Comment Letter A

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January 19, 2009

Linn Gum
Bureau of Land Management
300 S. Richmond Road
Ridgecrest, CA 93555

Re: **Coso Operating Company**
CACA-046289
CA-65002005-100

Dear Mr. Gum:

This letter presents the comments of Little Lake Ranch, Inc. ("LLR"), to the Environmental Assessment prepared by the Bureau of Land Management ("BLM") on the Coso Operating Company Hay Ranch Water Extraction and Delivery System, CACA-046289, CA-650-2005-100 project ("Project"). I am also enclosing a CD on which all of the reference materials cited in the body of this letter, and indexed at the end of this letter, can be found. Please address all of the comments and questions presented below in connection with the Sections noted. **A-1**

Coso Operating Company, LLC ("Coso") seeks to pump 4,839 acre-feet per year (AFY) of water from the Rose Valley Basin for 30 years ("Project"). The draft Environmental Assessment, dated December 2008, ("DEA") prepared by BLM states that the exported water will be used for injection to replenish the subsurface geothermal fluids ("Geofluids") due to water lost caused by evaporation. For the purposes of this letter, I will refer to the fluids produced by Coso from the underground geothermal reservoir as Geofluids. "Fluids" are all substances that flow, and can include water, steam, vapor, gas and liquids. In general, the Geofluids consist of both liquids and steam. (See DiPippo Report.) **A-2**

The DEA presents a new numerical groundwater flow model for the Rose Valley Basin ("Hydrology Model") which predicts what will happen upon the commencement of pumping by Coso. For the reasons noted below, the Hydrology Model is fundamentally flawed and unreliable. Nonetheless, even the Hydrology Model predicts that (a) if Coso pumps and **A-3** **A-4**

*Certified Specialist, Estate Planning, Trust and Probate Law State Bar of California Board of Legal Specialization transports water at a rate of 4,839 AFY, Coso would have to completely stop pumping after 1.2 years to avoid causing Little Lake to lose more than 10% of its water, or (b) under the most optimistic assumptions, Coso can only pump 480 AFY of water for 30 years to avoid reducing Little Lake's water supplies by more than 10%. A-4 (Cont.) A-5

The Little Lake Ranch certified hydrogeologist, Mr. Andrew Zdon, has reviewed the Hydrology Model. His report is being submitted concurrently with this letter. For the reasons stated, the Hydrology Model is not reliable and must be completely revised. It substantially over-states the ability of the Rose Valley Basin to support the pumping Project, and it hugely understates the impacts. In summary, the Hydrology Model must be redone because: A-6

- The thickness of the aquifer was arbitrarily increased beyond reasonable estimates. A-7
- The recharge of the aquifer was arbitrarily increased beyond reasonable estimates. A-8
- The specific yield of the aquifer was arbitrarily increased beyond reasonable estimates. A-9
- There are errors in the model or inputs regarding differences using measures of storativity compared to specific storage. A-10
- The impacts to Rose Valley and Little Lake were not based on a calibrated model. A-11
- The unreasonable and arbitrary inputs and assumptions used in the Hydrology Model, which are at variance to prior reports, were not discussed or justified. A-12
- The reasons for excluding the Portuguese Bench springs are not supported by the model. A-13
- There is an unexplained and questionable use of data only from the recent 14-day pumping test, rather than use of all available data to provide inputs. A-14
- Even using the flawed Hydrology Model, the triggers are not adequate to protect the Rose Valley and Little Lake from increasing harm after pumping stops. A-15

We are submitting concurrently with this letter, a report from Ronald DiPippo, Ph.D, a recognized geothermal expert, which illustrates the operations of Coso, explains why Coso's geothermal reservoir is drying out and identifies methods to preserve Coso without the importation of water from Rose Valley. (See DiPippo Report.) The report includes a number of <u>feasible</u> methods for Coso to minimize the decline and allow for the sustainable production of energy. A-16

Current Condition of Coso

What is the annual production of Geofluids? What is the relative portion of liquids compared to steam? Over the past 10 years, what is the total amount of fluids produced and the relative proportion between liquids and steam? How has the energy production varied depending upon production of fluids? What has been the annual production of electricity by megawatt (MW) compared to fluid production? What has been the relationship of the number of production wells compared to fluids produced and in MW hours? What is the available production of fluids compared to natural recharge of the geothermal reservoir? Has Coso exceeded the natural recharge of the reservoir by excessive production wells? **A-17**

According to the MIT Study, most geothermal reservoirs completely recharge on average in approximately 100 years. (See MIT Report.) If the geothermal reservoir is drying out, 100% of all Geofluids produced should be re-injected to maintain the geothermal reservoir. Is not the use of Coso's water-cooling towers fundamentally causing the destruction of the geothermal reservoir? **A-18**

Recharge to the Coso geothermal reservoir has been considered previously. According to the Fournier Recharge Study, recharge to the geothermal reservoir seems to come from "rain and snow that falls on the Sierra Nevada about 25 to 45 km west of Coso. This recharge water probably descends along east-dipping faults in the Sierra Nevada granites (the field and others and press) and migrates deep underground toward the Coso geothermal area." (Fournier Recharge Study, page 16.) In the conclusions from the Fournier Recharge Study, the conclusion was that "recharge into the deep part of the geothermal system probably comes predominantly from the Sierra Nevada. The main upflow in the hydrothermal system appears to be along a north-northeast-trending fault beneath Coso Hot Springs." (Fournier Recharge Study, page 23.) **A-19** What is the natural recharge rate of the Coso geothermal reservoir, if any? **A-20** At what rates could Geofluids be produced without exceeding natural recharge? Has the rate at which Coso produced Geofluids exceeded natural recharge rates? **A-21** Will the geothermal reservoir suffer less of a decline by reducing production rates? What would be the impact upon energy production by a reduction of production rates? **A-22**

It is assumed that a 50 MW power plant will use approximately 2,300 AFY of which 600 AFY would be replaced by natural recharge resulting in a deficit of 1,700 AFY. The importation of water is assumed but not planned, because the injection of imported water to preserve the Geofluids is considered unrealistic in an area as arid in water resources as in the CGSA. (1980 EIS, at page. 1-28.) The 1980 EIS got it pretty close, but it assumed water losses from WCTs. If an air-cooled system had been used, the water losses would have been much less. **A-23**

The DEA suggests that the use of groundwater from Rose Valley was considered in these earlier environmental documents. Didn't all of such reports <u>reject</u> the possibility of the use of the water from the Rose Valley as being unlikely? (See 1980 EIS, page 1-28.) What has changed to reverse this view? **A-24**

The 1980 EIS recognized the significant impacts to the Rose Valley should a water transfer project such as the Project be implemented. For instance, the 1980 EIS states that utilizing the water in Rose Valley to provide cooling water for geothermal production may cause a lowering of the water table from 60 to 100 feet resulting in the loss of groundwater storage, reduction of underflows, lowering the water level at Little Lake, effects on surface vegetation, and degradation of natural water. (1980 EIS 2-72) Section 6.0 discusses any irreversible or irretrievable impacts to resources. Groundwater could be irreversibly degraded depending upon any use in excess of recharge. (1980 EIS 6-1)

The amount of acceptable water table may be lowered in the Rose Valley must be determined and accepted by BLM, USGS, Lahontan Water Quality Board, Inyo County and DWP (1980 EIS 3-5). Lessees, such as Coso, would have to submit a Plan for Production ("PFP") to include any importation of water from sources other then Rose Valley, monitoring and artificial recharge of Little Lake, and injection of Geofluids in Rose Valley (1980 EIS 3-6). The third requirement applies if the lowering of the water table in Rose Valley is unacceptable. If springs used by wildlife appear to be drying as a result of the Project, the springs will be replenished by artificial means, at the cost of lessees. (1980 EIS 3-6) A "Hydrology Monitoring Plan" ("HMP") will be implemented to deal with the lowering of the lake water levels and actual groundwater recharge in Rose Valley. Little Lake will be maintained at levels within the current (1975-1980) annual and seasonal variations as per discussions among BLM, USGS, USFWS, CDFG, Inyo County, Lahontan Water Quality Control Board, and DWP. It was presumed that the possible injection of geothermal fluid at the bottom of Rose Valley, because it is somewhat heavier then fresh water, would help to keep or raise the water table. Nonetheless, there would still be a reduction in usable groundwater in storage. (3-6 and 3-7)

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Has the consultation occurred as required by the 1980 EIS? What are the results? Has an agreement been reached as a result of the environmental studies? Is such a consultation proposed? When will it happen? Is this a prior requirement of the CUP?

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California Energy Company, Inc. ("Cal Energy") submitted a Plan of Operations on July 29, 1985 as the operator of Coso Land Company which is a joint venture between Cal Energy and Caithness Geothermal 1980, Ltd. The purpose of the Plan of Operations was to drill a sufficient number of geothermal wells to define the geothermal reservoir and predict commercial production capability. Eight exploratory well pads were approved and 17 additional well pads and related structures are now proposed. (1988 EA) According to the 1988 EA, if water demands during the operations of Coso exceeded capacity, water may also be obtained from a water well at the power plant office site on BLM land in Rose Valley, from private wells at Coso Junction, or another observation well in the Upper Coso Basin (1988 EA, at page 1-34). The Rose Valley wells were permitted by BLM in October 1983 as part of a transmission line right-of-way. Applicant obtained a permit from the Inyo County Health Department in August 1985. Water withdrawals may be as much as 10,000 gallons per day in Rose Valley (1988 EA, at page 1-34). Note that Coso, or its predecessor, did not own the Hay Ranch at the time. Moreover, the water

A-27

extractions were limited to 10,000 gallons per day, while Coso now wants to pump at a rate of 3,000 gallons per minute. A-27 (Cont.)

How much of the original steam produced by Coso ends up as steam condensate? What are the ongoing water losses from the WCTs? What percentage of the produced steam in the Geofluids is actually re-injected as steam condensate? If the geothermal reservoir is now compartmentalized into three weakly connected volumes, what effect will the new injection have on each of the separate zones of the reservoir? Will this actually be effective in maintaining power levels at all power units? A-28 A-29

The only known public reports dealing with the production of Geofluids and the related re-injection thereof are those annual reports published by the California Department of Conservation Division of Oil, Gas, & Geothermal Resources ("DOGGR"). Refer to the annual reports of DOGGR published in 2006 and 2008 (DOGGR 2006 Report and DOGGR 2008 Report). These reports do reflect a steady decline in both production and injection rates, however, the injection rate as a percentage of the produced Geofluids continues to widen. The cause, of course, is evaporation at the WCTs, and it is this aspect of the Coso facility that must change. A-30

When compared to other liquid-dominated geothermal plants, Coso re-injects much less than almost every other plant. What is the reason for Coso's lack of reinjection when compared to other facilities? Can the level of reinjection be increased? A-31

Will the injected water partially be used to seek an enhanced geothermal system (EGS) solution to the decline? Is the Project really to allow Coso to conduct theoretical experiments regarding unproven EGS technology? Coso has been involved in multiple studies to prove EGS technology and increase output by using EGS. (See Geothermal Today 2003, pages 24-25.) What are the results of these studies? What water was used to conduct the studies? Does Coso have any ongoing EGS projects? Explain the status of all EGS projects and the contemplated source and use of water. A-32 A-33

It is typical for a private power generation company to exploit the resource for the maximum amount of short-term profit at the expense of the natural resource. (See DiPippo 2008, at Section 12.7, pages 294-295.) It is only after the geothermal reservoir has been largely exhausted or depleted to the point of decline, that the operator commences a phased shutdown of its operations only to ultimately achieve an appropriate balance of power production compared to the sustainable scope of the geothermal reservoir. The dilemma of Coso was preordained, because it sought approval and obtained permits to expand its operations and power production to the detriment of the resource itself. A-34

Thresholds of Significance

The DEA presumes that a 10% loss of the water inflows to Little Lake is not significant. A-35
How was this determination made? Neither Little Lake nor any resident of Rose Valley should be forced to suffer a water loss by virtue of the Project. Even a 10% decline, particularly during a normal drought, could destroy most, if not all, of the lakes, ponds and wetlands at Little Lake and Rose Valley, as well as the wildlife on which they depend. We disagree with the threshold assumption that a 10% loss of water is not significant.

Little Lake Ranch rejects the notion that a 10% reduction or less is not significant. Even A-36
assuming the Lake and the ponds could suffer a 10% decline but survive, what about the attendant impacts upon the surrounding habitat? The final amount of surplus waters from the water flowing through Little Lake are exactly the waters which allow Little Lake Ranch to enhance the wetlands and riparian habitat, extend water for irrigation to surrounding food plots and habitat communities, and generally enhance and preserve the water depending on the plant community. Additional mitigation is necessary, such as Coso funding a water project to provide supplemental water to Little Lake. The source of the water should be outside the Rose Valley. A-37

There is no question but the amount of precipitation and water flow through Little Lake vary seasonally and over a normal cycle of wet and dry years. While a 10% reduction on a temporary basis may fall within a normal fluctuation, a permanent reduction of surface flows by 10% would never be compensated by later wet year increases. The DEA and the pumping A-38
Project would permanently deprive Rose Valley and Little Lake of valuable water resources. How is the permanent and irretrievable reduction in underground water levels and surface flow not significant? Before condemning Little Lake and the Rose Valley to a permanent water loss, BLM must explore other alternatives.

It is presumed that the reduction in underflows to Indian Wells Valley is not significant because it represents only a small portion of the water budget for Indian Wells Valley. What is A-39
the water budget? Is the Indian Wells Valley Basin in a state of overdraft? Are there additional waters available in the Indian Wells Valley to supply to Coso? Could the underflow be tapped A-40
from a well in the Indian Wells Valley to supply all or a portion of the water wanted by Coso?

The statement that groundwater pumping would not result in significant reductions in "surface water levels" in Rose Valley is inconsistent with the impact analysis at Little Lake. There is actually an express direct impact in the lowering the surface area of Little Lake and its related ponds and streams. Losses to the springs could also reduce surface waters. Such A-41
reductions could affect soil erosion as well as fugitive dust emissions. The lowering of the groundwater table could also reduce moisture to the surface and therefore reduce the quantity of vegetation at the service. This again could affect erosion and air pollution. Even a 10% reduction in surface water levels could in fact increase windblown soil erosion.

How was the "significant" impact of a 10% decrease in groundwater and surface inflows to Little Lake determined? Is this an arbitrary number or a number based upon actual A-42
consideration of the impacts to the lake, ponds, wetlands and riparian habitat? Would a 5%

A-42 (Cont.)

decrease or lower be more appropriate? Why should Coso be allowed to overdraft the Rose Valley Basin at all? If the pumping Project harms existing users and owners of land overlying the Rose Valley Basin, why should they suffer any adverse impact? Monetary compensation to deepen wells and retrofit equipment does not mitigate the permanent loss of water. While there can be differences of opinion with respect to "significant", this is not a situation where Coso has a current legal right to deplete the Rose Valley Basin to the detriment of other proper and lawful owners of land overlying the Rose Valley Basin. The standard to permit the appropriation of water off basin should be the complete elimination of any impacts. (See *City of Barstow v. Mojave*, which establishes the priority of rights of overlying the aquifer and the complete subordination of rights by an appropriator). By suggesting the approval of the Project and accepting a 10% decrease in the water to lawful owners and users, would not BLM be approving the same type of water transportation as LADWP? Since Coso has no current vested rights to deplete the Rose Valley Basin in the manner suggested, should not BLM absolutely forbid any water pumping and transfer project which depletes the Rose Valley Basin? What is the justification for BLM to permit an overdraft? A-43 A-44

Where is the biological report that a permanent 10% loss of water flow would not adversely affect vegetation or wildlife? Since mitigation measures would only reduce or curtail pumping after the trigger point is reached, but the impacts of pumping may not fully be realized for years or decades after the cessation of pumping, how does mitigation protect the habitat? Is not the only way to protect the habitat by not pumping in the first place? A-45 A-46 A-47

The State of California identifies and evaluates all of the groundwater basins within the state. A compilation of the data and findings are set forth in California's Groundwater Bulletin 118. While acknowledging the available data for Rose Valley is scarce, California estimates that the total storage capacity is 820,000 acre-feet of water. (See Rose Basin 6-56.) This refers to storage capacity, not how much water is actually stored in the basin, which is likely less. If Coso is permitted to pump 4,800 AFY, it would deplete the Rose Valley Basin by a total of 144,000 AFY over the 30-year period of the Project, representing over 17% of the entire basin. How can BLM allow such water consumption to the detriment of all current and future water users within the Rose Valley? A-48

Section 3.3.3

The DEA reports that 3,000 AFY of water was used to irrigate approximately 511 acres. The Hay Ranch owned by Coso only contains 300 acres. It is misleading at best to reflect the alleged total acreage within the Rose Valley which may have been used for agricultural purposes. As reported by Mr. Glenn Harris of the BLM to the County, the BLM has no actual pumping records. Rather, Mr. Harris only estimated irrigation pumping using aerial photographs, and then further estimated a use of 6 AFY for the amount of water pumped per acre. These estimates provide no actual evidence of a safe pumping rate, nor do they in any way address what the adverse environmental impacts may have been from whatever pumping actually occurred. A-49 A-50

Even assuming the 6 AFY to irrigate 1 acre of alfalfa land is reasonable, such an estimate cannot provide evidence of a safe pumping rate by Coso for a number of reasons. First, there are no studies or reports of what the impacts from the pumping were. Recall that Mr. Zdon believes that the pumping may have caused Rose Spring to go dry, and that the Rose Valley Aquifer may not yet have recovered from the pumping. A-50 (Cont.)

Second, the water pumped for alfalfa irrigation was only seasonal, allowing some recharge of the aquifer during the wetter winter months. A-51

Third, any water pumped for alfalfa was used <u>on</u> the Rose Valley Basin (not transported off basin as proposed by Coso) and a portion of the water would have recharged the basin itself, resulting in a smaller loss of water per year. A-52

Fourth, there was public testimony that the reason agricultural activities stopped was because of the continual lowering of the water table and a corresponding increase in the costs to pump the water, resulting in an uneconomic farming activity. This fact also argues against allowing Coso to pump at the rate requested. A-53

Environmental Impacts

The balance of this letter will focus on all of the environmental impacts which the Project would cause. Please respond to all of the following comments and questions. A-54

Section 4.1 Air Quality

Because the Hay Ranch is now fallow, it is contributing to air pollution by increasing the amount of fugitive dust arising from the property. Steps should be taken to restore either agricultural use on the property or prevent dust emissions. A-55

The air quality section of the DEA only deals with construction activities. This section utterly fails to address the conversion of the Hay Ranch from agricultural to a fallow condition, the failure to conduct habitat enhancement activities on the Hay Ranch allowing additional dust and contamination, the impacts from the loss of natural habitat and vegetation necessary to reduce fugitive dust during the duration of the Project, and the removal of valuable water resources, both from the surface and the underground, which provide necessary moisture for the healthy propagation and maintenance of habitat, all of which serve to reduce PM10 emissions. All of these factors need to be addressed and evaluated. A-56

There is no discussion of the State Implementation Plan for the Coso junction PM10 planning area. The elimination of water from the underground and potentially at Little Lake will naturally cause a substantial drying out of all of the surface features throughout Rose Valley. The loss of water from the Rose Valley, and Little Lake in particular, may cause a significant increase of dust, small particulate emissions, loss of air quality and related contamination. The A-57

DEA does not truly address the loss of even 10% of water. There is a predicted drawdown in the water table and a consequent impact on the surface. These impacts should be evaluated. A-57 (Cont.)

Section 4.2 Soils

The Project will deplete the Rose Valley aquifer of water is storage. The amount of the water loss and the lowering of underground water levels are predicted in the Hydrology Model. Even with mitigation, the foregoing will occur. The conclusion that soil erosion is not significant is not supported by any evidence of report. This impact must be studied further. A-58

Section 4.3 Vegetation

Refer to my comments at Section 3.3.3 above. In addition, the pumping of water from the Hay Ranch at the proposed rate will deplete the Rose Valley Aquifer of needed water, and probably prevent any future use of the Rose Valley for agricultural purposes because of the lowering of the water table. A-59

The DEA further acknowledges that the disruption of soil and use of equipment may allow for the introduction of invasive and noxious weeds. The DEA then says that this impact is considered potentially significant <u>without mitigation</u>. This fact alone should necessitate the preparation of a full EIS and the re-submittal of the EIS for public comment. A-60

In an arid environment, a 10% loss of available water or moisture significantly impact surface vegetation and wildlife is unacceptable. In a desert environment seasonal fluctuations in moisture occur cyclically, such that an additional 10% loss of water would magnify or exacerbate the loss of water during drought conditions. The withdrawal of water from the underground will deplete the natural moisture available to all surface vegetation. (See Desertification Article) In addition, such reduction in the basic moisture in and around the surface of the Rose Valley will contribute to dust creation, particle emission, air visibility and the like.

Does a permanent reduction in underground water levels, even limited to 10%, decrease the moisture otherwise available to surface vegetation? What is the likely result of this reduction in moisture needed by plant life, and the wildlife which relies on it? If the water losses of 10% at Little Lake continue for over 100 years after pumping stops, isn't it obvious that vegetation and wildlife will also suffer during the Project and for 100 years later? Why weren't impacts to Biological Resources over the entire 30-year Project, at full pumping rates, studied? A-61

The DEA fails to address the impacts to the vegetation of Little Lake resulting from pumping at the rate of 4,839 AFY for 30 years. These impacts must be shown, assuming drawdowns of 4 to 12 feet at the north end of Little Lake.

The Hydrology Model shows that adverse impacts will continue for maybe centuries, even at much reduced pumping rates. How is this not significant? If the water is not available, how will vegetation and plant life survive? If there is no habitat, or a drastically reduced habitat, what will be the impacts upon wildlife? If Little Lake dries up, where will the migratory fowl go for stopovers, resting and nesting activities? Even a 10% loss of water to Little Lake and the Rose Valley would constitute a taking under the Federal and California Endangered Species Act, the Migratory Bird Treaty Act, and the Bald Eagle Protection Act. Why has there been no attempt to address these impacts? A-62

Section 4.5 Ground Water

See all comments to Section 3.2 attached as an appendix to the DEA. A-63

Section 4.6 Wildlife

The Project will directly impact at least two endangered species, the Desert Tortoise and the Mojave Ground Squirrel. While these species have been noted in the DEA, no sufficient safeguards have been imposed to protect them. It seems questionable that adequate attention to these impacts has been considered by the appropriate agencies, particularly when recalled that the water losses at Little Lake will decimate possible habitat areas on which they rely. A-64

There is no requirement for a survey of Rose Valley or Little Lake. The Hydrology Model predicts over a huge decline in Little Lake's surface water if the Project is approved for 30 years, leading inevitably to losses to natural communities and special-status species. The impacts continue for over 100 years, even after pumping stops. A-65

The CEQA analysis for the Coso geothermal project in 1988 allegedly addressed mitigations for habitat loss of the Mohave Ground Squirrel (MGS). Provide a map which delineates the exact footprint of the land and project considered by the 1988 CEQA document. A-66
Are all of the mitigation measures for the MGS included and incorporated herein? On the map of the 1988 project area, also delineate the precise limits of the 59.5-acre portion of the Project described herein. Verify that all of the lands within the Project area were previously considered and incorporated as part of the Coso Project. How much of the 2,193 acres of habitat used for geothermal projects has been used? How much remains? Is the 1988 plan still effective for the current Project? Was the MGS a threatened species in 1988 when protection, conservation and mitigation were being addressed? Should a new and updated assessment be performed for the MGS after a 20-year lapse from the previous study? A-67

The overview of impacts and most of the following stated possible impacts deal with the physical confines of the Hay Ranch and the area directly within the construction and operation of the pipeline consisting of approximately 59.5 acres. To the extent that impacts on biological resources are limited to analysis of the habitat and wildlife within the confines of this geographical area of the Project, the DEA should more clearly express this point. The indirect A-68 impacts from water drawdowns and impacts to surface water should be clearly and separately identified. Indeed, as to each separate potential impact, a separate discussion should follow with respect to ancillary or indirect impact at Portuguese Bench and Little Lake. A-68 (Cont.)

Has the importance of Little Lake as part of the Eastern Sierra Flyway and as a stopping ground for migratory fowl been considered? What percentage of migratory fowl rely upon Little Lake and its surrounding areas as a stopping point, resting area, feeding grounds, and nesting source to maintain migratory fowl? If the drawdown caused by the Project, when considered with the LADWP and Deep Rose Projects, increases impacts, where will the migratory fowl go? (See DU Letter 8-29-08) A-69

Section 4.7 Cultural Resources

The Programmatic Agreement ("PA") among BLM, the California State Historic Preservation Officer, and the Advisory Council on Historic Preservation recently executed in or about May, 2008, and attached as Appendix D, only addresses the discovery of new archaeological artifacts or cultural resources. It does not address the impacts of the geothermal plant to Coso Hot Springs discussed under Section 4.8 below. A-70

Section 4.8 Native American Values

In all previously published reports, there has been a rejection of the observations that the geothermal operations at Coso have any impact upon the Coso Hot Springs. Please provide the data which would suggest the water injection system could somehow now benefit the Coso Hot Springs. Describe how the injection of cold water into a hot geothermal reservoir could cause the reversal of effects. A-71

Temperatures of the Coso Hot Springs rapidly rose immediately following the commencement of geothermal operations. The rise continued until 1993 and stabilized until 2002, at which time they fell. How do the temperature fluctuations correlate with available data from Coso operations? Did the amount of Geofluids produced at Coso correspond with temperature variations? Has there been any evidence that the temperature and water levels changed over the last 10 years as the geothermal reservoir has been drying out? If not, what is the basis for asserting that the injection of water from the Rose Valley Basin may benefit Coso Hot Springs? A-72

The Paiute and Shoshone Indian Tribes engaged the services of Robert R. Curry, Ph.D. to investigate the causes of perceived changes at the Coso Hot Springs. Dr. Curry reviewed all of the monitoring information at Coso Hot Springs and compared it to the geothermal operations at Coso and the relevant changes or influence through natural causes, such as rainfall and potential recharge (Curry Report 2004). A-73

The essential findings of Dr. Curry can briefly be summarized as follows:

- Temperatures increased from 100° F to over 200° F by 1994 and have remained at the elevated levels ever since.

- Seasonal variations in the South Pool elevations fluctuated between 45' from 1979 through 1989. Beginning in 1989, the South Pool elevations rose as much as 10' to 11' and seasonal variation increased by as much as 8', which has continued to date.

- Changes in rainfall and potential recharge do not coincide with changes in temperature and pool volume nor do they correlate with observed changes in regional precipitation.

- It is possible to find the increased temperatures at Coso Hot Springs as a result of decreases in shallow groundwater upgradient as deeper geothermal fluids are extracted and diminished at the Coso geothermal unit called Navy 1.

- Observed changes in the seismicity associated with exploration drilling and production of geothermal resources could be contributing to the observed changes recorded at Coso Hot Springs.

- An equally likely cause is the consumption of all net groundwater recharge and meteoric water resources by the Coso Navy 1 Geothermal Development such as the cool water resources now absent, the Coso Hot Springs temperatures would reflect only the recycling of geothermal fluids.

- Changes in ground elevation and in particular subsidence is patently obvious as well as the presence of dying vegetation.

- Navy 1 would have intercepted potential groundwater flow and increased the rate of water loss as steam such that these activities prevented the dilution of Coso fumarole fluids. This can explain the observed temperature changes simply on intercepted groundwater flow and the time correlates with the activities at Coso's geothermal operations at Navy 1.

- Fracture porosity increased between 1990 and 1995 as small earthquakes increased in numbers in response to geothermal protection. These seismic signals indicate changes in fracture patterns that allow the much hotter water to flow into the Coso Hot Springs with increased volume and temperatures.

- The loss of hot spring and fumarole activity is to be expected when a site is developed for geothermal production.

A-73 (Cont.)

- The changes at Coso Hot Springs are believed to be the result of increased circulation of hot geothermal waters coupled with a possible decrease inflow from non-hydrothermal groundwater.

The increases in circulation and recirculation of hot geothermal water is believed to be the result of increased reservoir rock fracturing induced by the geothermal development. A-73 (Cont.)

Most importantly, the MOA required the cessation of geothermal operations if a perceptible change to the surface activity of the Hot Springs occurred. Why didn't this happen 20 years ago when impacts to Coso Hot Springs first became evident? A-74

The US Navy has conducted regular monitoring of the Coso Hot Springs. The DEA contains references to at least two of the more recent monitoring reports, namely Coso Hot Springs Monitoring Report 2004-2005 and 2005-2006, both prepared by Geologica, Inc., the hydrology consultant for the DEA. (Geologica 2005 and Geologica 2006.) At page 13 of the Geologica 2005 report and page 14 of the Geologica 2006 report, the same conclusions were reached. In summarized form, both reports indicate that Coso Hot Springs has shown "temperature increases" and "expanded thermal activity". Two decades of surveys have recorded "the steady increase in temperatures in shallow aquifers beyond well established seasonal variations". "Increased temperatures, expanded thermal activity and geochemical evidence of increasing steam influx have been relatively consistent since 1993." "Previous monitoring reports noted the correlation between increased thermal activity along the Coso Hot Springs fault, declining water levels, boiling and temperature increases in Coso #1." Moreover, the reports continue to state that "declines in cold water recharge alone cannot account for the changes in wells and surface manifestations in the Coso Hot Springs area". Finally the reports indicate that "changes in fluid chemistry appear to be the result of slightly increased steam or steam condensate input and/or decreased brine discharge in the shallow outflow of the Coso geothermal system". A-75

Do the Geologica monitoring reports confirm that the fluctuations of temperature and water levels in the Coso Hot Springs area cannot be explained by normal fluctuations? Are the changes in the Coso Hot Springs related to the geothermal operations of Coso? If the temperature increases and thermal activity cannot be attributed to natural causes or consistent with normal seasonal variations, what is left except Coso's geothermal operations? Why was Coso and its operations not even mentioned? What steps have been taken to reverse the impacts on the Coso Hot Springs from Coso's geothermal operations? A-76 Have all interested members of the community, and in particular the Paiute Indian Tribes, been advised of this causal connection? Does the 1979 MOA require remedial action? A-77

What was the condition of Coso Hot Springs ("CHS") before production began? What has occurred to the Hot Springs since production commenced? What is the interconnection A-78

A-78 (Cont.)

between Coso Hot Springs and the geothermal operations? (See my comments above regarding the impacts to CHS.)

A-79

Production of Geofluids from a hydrothermal reservoir for use in power or thermal energy generation can lower the water table, adversely affect nearby geothermal natural features (e.g., geysers, springs, and spas), create hydrothermal (phreatic) eruptions, increase the steam zone, allow saline intrusions, or cause subsidence (MIT Report, Section 8.2.9).

A-80

The Coso geothermal system is changing from a liquid only to a liquid and steam system. As fluid was withdrawn, pressures decreased and led to the creation of steam. Steam forms in a geothermal field when liquid water under high pressure is removed during production. The increase in steam flow could account for the rise in water levels and temperatures in the south pools of the Coso Hot Springs (ITS Hydrologic Analysis). Isn't this additional proof of a connection between the geothermal operation and Coso Hot Springs? The timing of the south pools water level temperature changes correlates with the onset of geothermal production. Thus, it cannot be ruled out that changes in Coso Hot Springs activity are due to natural causes.

The 1980 EIS further addressed the impacts the Electrical Plant may have on the Coso Hot Springs. Indeed, the Bureau of Land Management ("BLM") has added the Coso Hot Springs as an area of potential effect ("APE") as part of its consideration whether to grant a right-of-way to Coso for its Project. The 1980 EIS mentions that water flows to Coso Hot Springs could be altered. It goes on to state: "The integrity of Coso Hot Springs, highly valued by the Native Americans, may be lessened." The flows at the Hot Springs may increase or decrease due to geothermal production and connectivity. The effect cannot be quantified. (1980 EIS, page 2-76.)

A-81

Numerous cases can be cited of the compromising or total destruction of natural hydrothermal manifestations such as geysers, hot springs, mud pots, etc. by geothermal developments. (MIT Report, Section 8.2.10)

Carl F. Austin states that when compared to Deep Rose, the potentially greater effect on surface thermal manifestations (i.e. CHS) may be caused by the planned injection of cold water into the Coso reservoir. Depending upon the nature of the system, such an injection could quench the surface manifestations.

A-82

What is the temperature of the Geofluids currently being injected by Coso? What is the average temperature of the water from the Coso Valley Basin? Will the cooler water react differently in the Coso reservoir? By injecting cooler water, could this have an adverse impact upon Coso Hot Springs? Would the cessation of geothermal operations at Coso reduce adverse impacts of Coso Hot Springs? Would the reduction of Geofluids production at Coso, reduce or lessen the impacts on Coso Hot Springs?

The Programmatic Memorandum of Agreement (MOA) among the US Navy, the California State Historic Preservation Office (SHPO) and the Advisory Counsel on Historic Preservation (Advisory Counsel) was executed in December 1979, and is attached as Appendix A. The proposed scope of the leasing program to develop geothermal reservoirs is recited and it was assumed that approximately a 3-1/2 square mile area within the Coso known geothermal reservoir area (Coso KGRA) would be involved. It should be noted, however, that the MOA is expressly limited to lands controlled by the US Navy and not any portion of the Coso KGRA managed by BLM. Thus, the MOA is irrelevant and not binding on the Paiute Indian Tribes, at least insofar as the Project will also affect and benefit the BLM portion of Coso. The relationship of the Project between the US Navy portion and BLM has not been addressed at all. Indeed, virtually no reference to the BLM power generation activities are made a part of or considered in the DEA. Why has BLM been excluded? Will any of the water injection activities benefit or affect the BLM power generation facilities? What is the relationship between the Project and BLM? A-83

App. A, page A.4-8: At page A.4-8, it is noted that the geothermal production operations would generate waste products consisting of non-condensable gases, fluid remaining after flashing to provide steam, and the condensate. How these waste products would be managed at the time was not capable of evaluation. A-84

App. A, Page A.4-9: The productive life of the geothermal field was not specified. There is a note however that the geothermal reservoir, if "properly managed, can continue to produce energy indefinitely". It is this observation which is most critical concerning the current Project and Coso's plans. Has indeed the geothermal reservoir been properly managed? Should Coso's proposal to import water to rectify decades of mismanagement be allowed? Should not Coso, having made its decisions, knowing that it existed in a high desert environment where water is not readily available, be left to accept the consequences of its decision? A-85

App. A, Page A4-11: Section 6.a. the commander in charge of the Naval Weapons Center, specifically agreed to locate, identify and evaluate all historic and cultural properties that may be impacted from any Project-related undertaking. There is no indication in the DEA that this has occurred. The US Navy is not a co-sponsor of BLM of the DEA and no independent environmental analysis has been yet performed of the Project under NEPA.

Coso Hot Springs is already listed in the National Register of Historic Places. The impacts to Coso Hot Springs by the geothermal activities have been documented. How can there be any assurance that the further continuation of geothermal activities at Coso will not exacerbate the problem? Why has not the commander fulfilled his obligation to date under the MOA? A-86

App. A, Page A4-12: The Coso Hot Springs was identified and monitoring of its condition was required. More importantly, the MOA goes on to state: "In the event a perceptible change to the surface activity of the hot springs were to occur over a period of time as a result of the Geothermal Development Program the Navy will cease those actions on the part of the Navy A-87 and/or its agents which can reasonably be presumed to be causing this effect and will make every reasonable effort to determine what actions could be taken to mitigate this change." Has this Happened since 1987? Has any portion of Coso been limited in light of the obvious evidence? The MOA requires a reduction in production activities until the Coso Hot Springs is stabilized. What agreements have been reached with the Paiute Indian Tribes, SHPO or the Advisory Counsel to reverse the effects to the Coso Hot Springs? Have the Paiute Indian Tribes imposed various objections to the continued operation of Coso? Absent an agreement, the commander is not supposed to proceed. **A-87 (Cont.)**

App. A, Page A4-14: The MOA required annual review of the MOA including assessment of program operations. Has this occurred? Where are the annual reports, other than the 2 most recent monitoring reports? **A-88**

The current MOA does not address the past failures of Coso, Navy and BLM to comply with the earlier MOA. It only deals with archeology sites, and the not impact of Geofluid production by Coso on the Coso Hot Springs. Why not? **A-89**

Section 4.9 Visual Resources

US 395 bisects part of the Little Lake property in the south end of Rose Valley and is immediately adjacent to the Project in the Hay Ranch. US 395 is eligible for designation as a scenic highway. (California Streets and Highway Code Section 260, et seq.) A water loss, coupled with the degradation of vegetation and wildlife, may dramatically impact the available visual resources. If BLM allows a decrease of up to 10% of the water resources at Little Lake and a reduction in the underground water table, how will it maintain surface vegetation and wildlife? What is the mitigation? **A-90**

The Project still impacts scenic views in two ways. First, it will construct visible above-ground improvements including the substation, two storage tanks and a small portion of the pipeline. Second, the drawdown of the water table and the predicted decrease of surface water at Little Lake, will likely impact the visual beauty of the vegetation, habitat and wildlife visible to all residents of Rose Valley and motorists. The viewsheds should be protected. It is suggested that the BLM and the DEA adopt the visual resource standards as set forth in the Geothermal PEIS, which are set forth in the Geothermal PEIS for the appropriate Visual Resource Management (VRM) policies and procedures from page D-46 through D-51

A-91

Two water storage tanks will be constructed. The first, constructed on the Hay Ranch, will hold 250,000 gallons and be less than 20' tall. Nonetheless, it will be highly visible from Highway 395. All efforts should be made to comply with all appropriate visual screening techniques such as those discussed above.

The second tank will be much larger, but the size is not mentioned under the aesthetics. It will be a 1,500,000 gallon tank (six times the size of the tank at the Hay Ranch) and it will be

100' in diameter and 28' tall. It is not clear from the DEA whether the second tank will be visible from Highway 395. Will the second tank be visible from Highway 395? What efforts are being made to minimize its impact to the viewshed?

Impacts to the scenic quality region by indirect effects to regional water-dependent vegetation is noted. The assumption is that the Project, with mitigation, will minimize visual impacts. What happens without mitigation? What are the full impacts of the proposed Project?

With respect to the impacts of the Project on the aesthetics of Little Lake, the impacts are obvious. Even a 10% reduction in surface flows would lower the average water level available of Little Lake, decrease the amount of water available to replenish all of the ponds, wetlands and riparian habitat south of Little Lake, retard or harm natural vegetation, and reduce water available for wildlife. These impacts on biology will continue for over 100 years after pumping stops. This fact, in and of itself, is a significant impact which is not proposed to be mitigated in any fashion. **A-91 (Cont.)**

Additional Environmental Impacts

Neither Article 3 nor Article 4, discusses a number of environmental resources that are affected by the Project. The impacts were partially, but inadequately, addressed in the draft Environmental Impact Report (DEIR) and final Environmental Impact Report (FEIR) prepared by the County. The following represent our comments on the certain identified resources impacted by the Project that should be discussed and evaluated. **A-92**

Agricultural Land

The DEA needs to more completely assess the loss of potential agricultural use of the Hay Ranches. The Hay Ranches were indeed previously used for alfalfa hay production. By buying and converting the Hay Ranch to a site solely to be used for water pumping and transportation activities, Coso has precluded any other person from seeking the utilization of this land for agricultural purposes. Moreover, the lowering of the underground water table makes the economic utilization of the surface more difficult and the cost to pump and use water from the lowered underground more costly. Has the Hay Ranch ever been used or designated as prime agricultural land? Based on its former use, would the Hay Ranch be considered as prime agricultural land? Steps should be taken to restore either agricultural use on the property or prevent dust emissions. The elimination of the Hay Ranch from possible agricultural use should be evaluated. **A-93**

Does the removal of water from the Rose Valley Basin substantially prevent future agricultural use of property throughout Rose Valley? Does Coso's decision to use the Hay Ranch solely for water-pumping activities and not agriculture, remove agricultural land from production? **A-94**

The utilization of the Hay Ranch by Coso has, either directly or indirectly, eliminated 300 acres from useful agricultural production. As the owner of the property, Coso has chosen not to conduct agricultural activities and its Project will make the future utilization of the Hay Ranch, or any other land within Rose Valley, far less likely. As the depth to groundwater increases directly due to the pumping, the economic cost to pump water to the surface for any sort of agricultural use will increase. Will the continued operation of the Project effectively preclude future uses of the water? Limiting the impacts from the Project to only the 5 acres of the substation, a well site and pipelines ignores the real loss of the entire 300 acres of land for agriculture. A-95

Wildlife Habitat

While Little Lake is just outside the CGSA, it is a fresh water habitat nearly unique within the region. The riparian vegetation and fauna depending on the vegetation are vulnerable to any reduction of water levels. (1980 EIS, at page 2-101) The relative importance of Little Lake and Haiwee Springs should be protected as oases not readily present within the surrounding habitat. (1980 EIS, at page 2-103) The habitat at Little Lake will be affected if groundwater levels are lowered. Projected water use in the Rose Valley exceeds recharge. Because Little Lake is a very shallow body of water, lowered groundwater levels from water use in excess of recharge could reduce spring flows and return the Lake to a marsh. (1980 EIS 2-106) The riparian vegetation on the borders of Little Lake is particularly sensitive. There is a high probability that the water level of Little Lake will be lowered if water utilization for the proposed program reaches projected levels. If groundwater is used in the quantities projected, Little Lake has a high probability of decreasing in volume, and hence a valuable habitat for water fowl and other wildlife species may be endangered. (1980 EIS 4-5) A-96

The California Native Plant Society lists at least one very rare and endangered plant species known as Spartina Gracilis, also known as desert or alkali cord grass, existing on the western shore of Little Lake. (1980 EIS 2-120) The lowering of Little Lake could cause the loss of the rare cord grass, as well as other species that can only exist in oases. (1980 EIS 2-124.) Would a reduction in water levels further threaten this endangered species? A-97

Please explain the reasons for the DEA apparent disagreement with the comments made in the Groeneveld Article, including the following: A-98

> "Within arid or semi-arid climates, diversion of surface water and uncontrolled groundwater pumping has the potential to degrade native vegetation cover by reducing direct supply and recharge with subsequent sub-irrigation from groundwater. The degree of this impact is in direct proportion to the amount of water required by the vegetation cover."

> "The lowering of regional water tables due to ground-water pumping has probably played the most important role in driving large-scale changes from grass-dominated cover to shrub cover."
>
> "For all practical purposes, the changes in vegetation cover and composition due to water export must be regarded as permanent."
>
> "Unfortunately, annual runoff is predictable only across scales of months while groundwater pumping affects water tables for periods of years."

A-98 (Cont.)

Water Quality

Samples of the Little Lake group of water reflects a slightly higher amount of total dissolved solids (TDS) of 1200 mg/L compared to those of the Indian Wells Rose Valley and Coso-Argus Group waters. What accounts for the higher level of TDS at Little Lake? Is the much higher TDS level associated with the geothermal brine at Coso, estimated at 10,000 mg/L, a possible cause of the declining water quality? Is the geothermal brine being injected at lower levels in the geothermal reservoir? Is the brine being discharged at the surface, allowing for more percolation and recharge into the Rose Valley Basin? What is the depth at which Coso injects a portion of the produced Geofluids? How do the Geofluids impact the water quality of the Rose Valley Basin and the Little Lake group of waters? Will the reduction of water by the Project reduce water quality within the Rose Valley Basin? Will the reduction of cleaner and fresher water of the northerly Rose Valley waters reduce water quality at Little Lake? A-99

The Project would overdraft the Rose Valley Basin. It will decrease the available supply of water. All of the overlying owners of the Rose Valley Basin rely exclusively upon the underground for water for a variety of purposes, including irrigation, drinking water, domestic use, dust control, supplemental sources for wildlife and vegetation. While the percentage of the water removed from the Rose Valley Basin may be relatively low compared to the total water in storage, the depletion of water may affect water quality. Moreover, the removed water from the Rose Valley Basin will be injected into the geothermal reservoir and subjected to numerous toxic and hazardous substances. Thus, the otherwise fresh water from the Rose Valley will itself become contaminated. What is the mitigation for these impacts? What is the mitigation for the loss of potable water, due to its intentional contamination? A-100

Will not the reduction in underground water cause a greater interaction between the remaining waters and the surrounding rocks, sand and other below ground surfaces? Will not increased interaction directly affect the amount of TDS of the underground water? Will the reduced water flow into Little Lake prevent the natural replenishment of cleaner and fresher water sources? Will the concentration and the reduction of overall water, also affect water quality? A-101

Little Lake is shallow. Due to its shallow depth and the relatively flat angle of incline of A-102 its banks, even a small decrease in water level has the potential to (a) significantly decrease its surface area, (b) harm the quality of water, and (c) damage the ability of Little Lake to sustain plants, biological resources and fish in the Lake and ponds. As with most bodies of water, Little Lake's water quality depends on the movement and exchange of water. A reduction of inflow and/or outflow is likely to result in the stagnation of Little Lake's water and seriously diminish its quality. This, in turn, could have serious ramifications for dependent vegetation and wildlife. No study or evaluation of this issue has been performed or addressed as part of the Project. A-102 (Cont.)

The Geothermal PEIS suggests that the large volume and long duration of geothermal fluid production could have the greatest potential for impacts for hydrologic resources and water qualities. The result could include reduction and spring discharge rates, lowering of water levels in wells, the introduction of low-quality fluids to groundwater pathways, and the quality of available water. (Geothermal PEIS, at page 5-26) A-103

Hazardous Materials

The DEA fails to address several significant impacts all related to the Project, the injection of water in the geothermal reservoir, and the operation of the geothermal facility itself (both in its existing configuration and to the extent that the production of energy is increased and/or extended by virtue of the injection of water). A-104

The second largest quantity by category of hazardous wastes produced in California is identified as California Waste Codes ("CWC") 181, which includes waste generically identified as: "Other inorganic solid waste" which includes such substances as "environmentally hazardous waste substance solid NOS (nickel, cadmium), hazardous waste solid, NOS, (mercury) (fluorescent light tubes) (steel and garnet blast)." (Pollution Workplan 2008) CWC 181 materials accounted for a full 52% of the total Recurrent Waste going to landfill disposal sites (page 64-65) and 6% of total hazardous wastes sent to incineration for disposal (page 67). The Pollution Workplan goes on to identify the top 25 generators of CWC 181 wastes. Coso is the sixteenth largest generator of <u>all</u> CWC 181 wastes in the State of California; discharging a full 3,168.928 <u>tons</u> of CWC 181 wastes (see Table 25, page 74). Putting this in further comparison, the Pollution Workplan identifies a total of 55,026 total generators of wastes, so Coso must be regarded as a significant producer of hazardous wastes. A-105

No mention is made of how Coso currently handles the discharge of the waste created during its operations. The only stated reason for injecting of the water is for the creation and generation of additional Geofluids which may then be brought to the surface from Coso's production wells. The proposed Project will allow Coso to generate more Geofluids than it currently produces. What types of additional wastes will be generated and how much per year? How will they be handled? BLM should examine all of the better ways to capture all of the Geofluids for re-injection so that these very CWC 181 wastes are not discharged into the environment. What is the composition of the Geofluids? What portion of the Geofluids consists of non-condensable gases (NCG)? What is the process for handling NCG? How much of these A-106 A-107 materials are considered hazardous? How will Coso dispose of the hazardous substances? Will this add to the already overtaxed hazardous substances, landfills or waste depositories? What different types of technologies or equipment could Coso use to eliminate the additional hazardous waste? By seeking the injection of water to prolong the presumed life of Coso, it will by necessity increase or extend the generation of waste products, such as the NCGs and the H2S compounds. How can the DEA conclude that such waste generation is less than significant? What is the magnitude of the waste? What are its components? How is it being handled? How much more waste will be created as a result of the Project? Where is the waste being stored? Is there adequate storage? What are the health risks from the additional hazardous substances? A-107 (Cont.)

For the reasons noted above concerning the hazardous waste generated by Coso, and any increase in such waste as a direct result of the Project, no information has been provided about the capacity or local or regional waste facilities to handle the additional waste generation by Coso. As such, the DEA is deficient in this regard and must be updated. A-108

There is no mention of heat pollution from the Coso facility. All electrical generation plants emit vast quantities of heat. Indeed, per unit of power generated, geothermal plants produce and emit heat in far greater proportion than hydrocarbon and other types of generation plants. (See DiPippo 2008, Section 19.5.8, page 406; MIT Geothermal Report, Section 8.2.9.) The Project proposes to allow Coso to generate additional quantities of energy and extend its likely economic life for an unstated number of years. Will both of these factors increase the amount of heat emissions from Coso? How much residual heat is emitted to the atmosphere in appropriate measurement standards (per month or per year, and based upon the volume or quantity of Geofluids produced)? What portions of the environment are affected by such heat emissions? What is the likely effect on the habitat, including vegetation and wildlife? What are the impacts upon the workers at Coso? What method should be employed to minimize any impacts? How can the heat loss be reduced? A-109

Although thermal pollution is currently not a specifically regulated quantity, it does represent an environmental impact for all power plants that rely on a heat source for their motive force. Heat rejection from geothermal plants is higher per unit of electricity production than for fossil fuel plants or nuclear power plants, because the temperature of the geothermal stream that supplies the input thermal energy is much lower for geothermal power plants. Considering only thermal discharges at the plant site, a geothermal plant is two to three times worse than a nuclear power plant with respect to thermal pollution, and the size of the waste heat rejection system for a 100 MW geothermal plant will be about the same as for a 500 MW gas turbine combined cycle (MIT Report, Section 8.2.13).

Gaseous emissions result from the discharge of non-condensable gases (NCGs) that are carried in the source stream to the power plant. For hydrothermal installations, the most common NCGs are carbon dioxide (CO2) and hydrogen sulfide (H2S), although species such as methane, hydrogen, sulfur dioxide, and ammonia are often encountered in low concentrations (MIT Report, Section 8.2.1). Although steam is condensed when passing through a turbine, non- A-110 condensable gases such as carbon dioxide, hydrogen sulfide, sulfur dioxide, mercury, and several others pass through the turbine without condensing and are released into the atmosphere (Geothermal PEIS, Section 3.8.6, page 3-103). Of the 5% of non-condensable gases present in the steam, 75% or more is carbon dioxide. While the existing operations of Coso help to manage **A-110 (Cont.)** the NCG by converting H2S into a sulfur compound, nonetheless, Coso generates a tremendous amount of contaminated materials which must be disposed of. The Project will compound this problem, whereas a different technology and design, such as a binary design or a steam-binary hybrid, would eliminate the problem. An evaluation of alternative designs, the costs of implementing alternative designs, and the impacts upon power production should be assessed. **A-111**

The primary human health issue is the possible inhalation of NCGs that form when Geofluids turn to steam, including primarily hydrogen sulfides (H2S), but also such things as mercury, radon and benzene. The abatement systems for hydrogen sulfide were mentioned through the use of chemicals, including hydrogen peroxide, caustic soda, and catalytic compounds containing iron and nickel resulting in primarily a waste sludge of non-commercial sulfur (Geothermal PEIS, page 3-216). **A-112**

Subsidence

The 1980 EIS mentions the possibility of soil subsidence in Rose Valley as a result of the withdrawal of groundwater at page 2-49. Subsidence could occur with extensive long-term overdraft of the groundwater reservoir. This impact must be studied and evaluated. The Geothermal PEIS notes that subsidence can also occur when groundwater is pumped from underground aquifers at a rate exceeding the rate at which it is replenished. (Section 4.3.2, page 4-19) More evaluations of the subsidence potentials are required. Also, subsidence at Coso must be considered based on its decisions to use WCTs depleting the geothermal reservoir. Would the use of ACCs minimize subsidence risk? **A-113**

The Project will deplete the groundwater levels of the Rose Valley Basin leading to the potential subsidence. (See DiPippo 2008, Section 19.5.1, page 396.) Does the DEA accurately assess subsidence potential? Will the withdrawal of significant water resources from the Rose Valley Basin contribute to subsidence concerns? The likelihood of subsidence in prior geothermal studies is explored. (See DiPippo 2008, Section 19.5.1, page 396.) Additional studies and analyses are required. **A-114**

Coso is removing far more Geofluids than it is injecting, even with the addition of the proposed water from Rose Valley Basin. This may also cause subsidence. If geothermal fluid production rates are much greater than recharge rates, the formation may experience consolidation, which will manifest itself as a lowering of the surface elevation, i.e. this may lead to surface subsidence (MIT Report, Section 8.2.6). Moreover, because Coso is producing much more Geofluids than it injects (even with the Project), there is not only a risk of subsidence, but it is occurring. (See Wicks – Deformation.) Accordingly, all of the Geofluids should be captured and re-injected, not just a portion. **A-115**

Seismic Activity

There has been no consideration given to the effects on the geothermal reservoir when cool water is injected. The very purpose of the various enhanced or engineered geothermal systems ("EGS") is to inject water into geothermal reservoirs specifically for the purposes of creating fractures or fissures to create new areas from which Geofluids can be produced. (See Rose Progress Report and MIT Report.) Coso itself has been a test site for EGS. (See Geothermal Today 2003.) One of the concerns of EGS projects is the creation of seismic activity and the resulting possibility of landslides and other surface impacts. Might the injection of water from the Rose Valley contribute to seismic activity at Coso? What is the possibility of environmental harm from this activity? Will it cause or possibly lead to new fractures in the geothermal reservoir? Since the commencement of operations of Coso, what has the general level of seismic activity been associated with the Coso operation? Does Coso plan on using any of the water to create or operate and enhanced/engineered geothermal system (EGS)? Does Coso continue to perform under any EGS contracts or test programs? What is Coso's water needs to conduct EGS tests? Will the limitations and mitigation of the Project preclude the use of water for EGS tests? If not, what is the resulting probability of seismic activity? (See studies of enhanced seismic activity related to injection and EGS in Rose Progress Report.)

A-116

A-117

The high pressure injection of fluids directly into fault zones has been related to increases in seismic activities. (Geothermal PEIS, Section 4.3.2, Page 4-18) The Geothermal PEIS then notes that the high pressure injection of fluids from outside the geologic system is not the same as where Geofluids are withdrawn and then re-injected for a near zero net change, and would represent a much lower risk of increasing seismic activity (Geothermal PEIS, Page 4-19). This conclusion ignores the dramatic loss of heated liquids from evaporation when WCTs are employed at the facility for cooling purposes. Indeed, if there is no source of make-up water from nearby surface waters or underground water basins, and a WCT system is used, then the geothermal reservoir can be substantially depleted of water over time, actually increasing the possibility of seismic activity.

One of the other aspects of project economics and of project feasibility is the potential of the site for induced acoustic emissions, so there is always the potential for induced seismicity that may be sufficiently intense to be felt on the surface. There is some risk that, particularly in seismically quiet areas, operation of an EGS reservoir under pressure for sustained periods may trigger a felt earthquake (MIT Report, Section 5.7, page 5-8).

A-118

Volcanic Activity

Geothermal production and activity by its very nature involves connections between the surface and the extremely hot, and potentially volatile, resources at depth. Geothermal reservoirs routinely manifest themselves by surface activity, such as the Coso Hot Springs. Could the injection of cool water into the hot underground geothermal reservoir cause an increase in volcanic activity? Could the injection of cool water into the hot underground geothermal

A-119

reservoir cause a decrease of surface manifestations, such as Coso Hot Springs? What evidence is there to support a negative conclusion to these questions? A-119 (Cont.)

Global Warning

The analysis of an individual project on the worldwide issue of global warming is indeed difficult, if not speculative. Little Lake Ranch recognizes that electricity generated from geothermal reservoirs likely contributes far less to global warming as a result of a relatively minor release of CO_2, compared to hydrocarbon generating facilities. A-120

If global warming is fact, then the public needs and should demand the perpetual operation of clean and renewable resources. The design of Coso's Plant and the overexploitation of the resource have turned a sustainable resource into a limited resource. Perhaps consideration should be made of what the present value of a perpetual energy resource is, compared to a limited and depleting resource when that resource is improperly managed. A-121

The DEA states that the operation of the proposed Project would not result in additional emissions of CO_2 other than minor vehicle emissions. According to published reports, this is an inaccurate statement. Geothermal plants do emit CO_2, even though the so-called Project (the water transportation from Rose Valley to Coso for injection) would not in and of itself create CO_2. However, the injected water, to the extent that it results in higher levels of Geofluids production, will cause an increased level of CO_2 emissions from baseline standards. While perhaps not significant compared to hydrocarbon energy facilities, CO_2 emissions do exist. The DEA should at least actually report the facts. The Project will cause increased Geofluids production and the extension of the life of the Plant which would not otherwise exist without the Project. These environmental impacts must be addressed. A-122

Cumulative Impacts

There are no discussions of any cumulative, growth-inducing, and significant unavoidable impacts. A-123 The Deep Rose, LLC Project is not discussed. Deep Rose No. 16 LLC received an extension to continue geothermal explorations until 2010. (See CSLC Permit Extension 5-1-08) Deep Rose, Max Management and perhaps others have applied for geothermal exploration permits for a total of 4,500 acres of land managed by BLM. In an e-mail from Sean Haggerty of BLM to Kermit Witherbee, dated 2/27/08, there were a total of 25 pending geothermal lease applications in California. (Haggerty E-Mail 2-27-08) There were three pending projects in the West Coso region identified as CACA-43993, 43998 and 44082, containing the aggregate of 4,460 acres. The applications were filed by Terry Metcalf (Deep Rose) and Maxx Management Corp. A table with the summary of applications was provided. (See Haggerty E-Mail 2-27-08) Deep Rose further owns a relatively small piece of property very close to the Hay Ranch, from which it intends to extract water. While the initial provision of water was only for exploration purposes, it nonetheless can provide an additional source of water to explore, construct and operate any future geothermal facilities on its described A-124 resources. Has the full extent of the Deep Rose plans been considered? Shouldn't the full extent of the potential Deep Rose exploration be considered as part of the current Project?

The Deep Rose project is moving forward. The BLM has already budgeted and funded an environmental impact statement for Deep Rose. (See Harris E-Mail 9-2-08) Thus, the full extent of the Deep Rose project must be considered and evaluated for its cumulative impacts.

The DEA concludes, without analysis or consideration, several impacts which it states will have less than significant impacts, including geology and soils, hazards and hazardous waste, and public services and utilities. Given the very foreseeable Deep Rose and Maax Management explorations and developments, these conclusions are at least suspect and should be reexamined once the full extent of these other projects is considered. A-124 (Cont.)

The LADWP Leakage Recovery Project would deplete an additional 900 acre-feet of water per year. Not only is vegetation at Little Lake impacted, but throughout Rose Valley with respect to the lowering of the water table. No mention is also made of the structures that would have to be constructed in order to facilitate the LADWP Project. There would be wells, power stations, pipelines, access roads, and any number of other visual aspects to the Project which may detract natural viewshed along Highway 395. Yet, none of these additional aesthetics is mentioned. Why not? A-125

How much water may be extracted before subsidence may occur in the Rose Valley? LADWP proposes an additional 900 AFY of extractions per year. Will this be added to the Coso Project? If Deep Rose operates a geothermal facility, will Deep Rose also seek water extractions and in what amount? How much will this contribute to subsidence potential? A-126

With respect to hazardous materials, see all of the questions above regarding the creation and disposal of hazardous materials from Coso. If Deep Rose pursues a geothermal plant in the immediate vicinity, would not the same or closely identical creation of hazardous materials occur at Deep Rose? Given the much larger size and footprint of Deep Rose, what would be the overall impacts from heat emissions, air pollution, fugitive dust emissions, and air quality? A-127

Air quality and, in particular, the increase of dust emissions and air pollution, must be further examined. It is odd that the Little Lake habitat restoration would be considered a positive impact, which it would be with sufficient water resources, but will turn to a severe negative impact if water supplies are reduced as projected by the Project and the studies presented in the DEA. Only the LADWP Project addresses increased dust emissions from water removals, but the Deep Rose Project is hardly mentioned at all. If Deep Rose pursues the same design and environmental footprint of Coso, the emissions from the power plant, as well as fugitive dust, will be exacerbated. In a non-attainment area, this analysis seems suspect at best. A-128

In discussing the possibility of air pollution, it is noted that flash and dry-steam power plants emit geothermal vapors to the atmosphere, potentially releasing a range of pollutants A-129

(Geothermal PEIS Section 4.8, page 4-54). The increase of air pollution due to the higher rate of the production of Geofluids at Coso is not mentioned. Why not? What happens if Deep Rose is built and operated? A-129 (Cont.)

The LADWP Project is a nearly 20% increase of water consumption in Rose Valley, compared to the Project. The Deep Rose Project's needs for water have not even been addressed, whether for the related 640-acre project or the much more extensive 4,500-acre Project currently in process. Each of these Projects could substantially reduce the underground water level, impact and reduce biological resources during construction, operation and water drawdown, and otherwise harm the environment. Yet, virtually no analysis is provided. Why not? A-130

Appendix E (Alternatives Analysis)

A prudent re-design of its facility and a more reasonable management of the geothermal reservoir can sustain production at its current level, or close to it (which, of course, is the baseline by which the Project and all alternatives must be compared) would preserve a valuable environmental resource, the geothermal reservoir itself. With these factors in mind, an analysis of the stated alternatives can be addressed. A-131

Contained in the Inyo County Planning Department files concerning the Coso Project, there was a draft memo apparently received by the ICPD on December 20, 2007 (ICPD Cost Memo). This five-page memorandum contains a number of cost estimates with respect to the Project itself, but also to convert the Coso facility in a number of different ways. Some of the types of improvements include changing the turbine blade configurations, redesign of the units, replacement of steam turbines, a switch to binary systems, conversion of the water-cooling towers to dry-cooled systems, change in injection systems, and resorting to alternate water sources. The memo also talks about improvements related to gas removal systems of the non-condensable gases (NCG).

In virtually each case, Coso rejected the upgrades or improvements due to the presumed cost. However, there was no evaluation of the actual costs, what impacts they would have on energy production, how much water could be saved and/or re-injected, and what the timeframe for cost recovery would be. The ICPD must have realized that some analysis of relative costs was required. Yet, not even these preliminary studies were included as part of the DEA. Why not? How is the public or BLM supposed to understand the feasibility of the alternatives without basic cost information and what the revenues from increased injection will be? Obviously, Coso itself has evaluated these alternatives and undoubtedly has detailed cost and benefit analyses. Before environmental harm is done, let Coso produce the studies. The DEA should present the alternatives and their costs for public consideration. The self-serving objections of Coso cannot replace proper environmental analysis under CEQA. A-132

Perhaps BLM should consider the economic benefits which Coso may derive from the Project under the Energy Policy Act of 2005. A portion of this enactment is called the John A-133

Rishel Geothermal Steam Act Amendments of 2005 and it modifies provisions of the Geothermal Steam Act of 1970 (30 U.S.C. 1001 et seq.). Under Section 224 of the Energy Policy Act of 2005, Coso would be eligible to receive tax incentives and/or royalty reductions by increasing its production by 10% or more. What is the full extent of the incentives? To what extent would they lower Coso's cost of operation? Have the tax and royalty benefits been considered in connection with the proposed project? What is the economic implication of the Energy Policy Act of 2005 to Coso? A-133 (Cont.)

Changes to Coso's Plant are discounted with the conclusionary statements, unsupported by even the identification of the alternatives, as being "uneconomical" and result in "stranded investment costs." Whose fault is it that there now may be "stranded investment costs"? Who decided to construct the capacity? Who over-built the Coso facility to an extent that it could not be utilized based on the available geothermal reservoir? Are not all oil wells abandoned or stranded when the supply of oil runs out? Would an enormously polluting manufacturing plant be allowed to continue, merely to avoid stranded investment costs? Why is the amount spent by Coso on its capital costs even part of the DEA discussion? It was Coso which knowingly caused its own problems over 20 years ago. It has already recouped all of its costs, and has generated massive profits on top of the cost recovery. A-134

The DEA asserts that the changing of geothermal technologies for the intentional reduction of electrical generation does not have to be considered, as they may "conflict with the applicant's obligations under existing Power Purchase Agreements." When were these agreements negotiated? Were they signed by Coso at a time that Coso knew its annual production was declining? Why should Coso's obligations under a contract it freely negotiates and signs have any bearing on the environmental assessment from the Project? Did Coso contract to supply more energy than its current facility could produce? Is this a proper subject for analysis under NEPA?

Let's examine the economics of Coso. While admittedly a few years old, the data is the only public information available. For the fiscal year ending December 31, 2004, Coso earned $50,000,000 during the year 2004, after the payment of all operating expenses, royalties and taxes. The expenses obviously include the royalties and taxes paid to BLM of Inyo, US Navy and BLM. There is no question that these agencies rely upon the revenue generated by Coso. However, there is also no question but that Coso can easily afford significant changes to its operations and still generate enormous profits. See also the bond ratings reports from Moody's and Fitch in which the estimated net income generated by Coso is given. A-135

There is no question but that Coso has fully repaid all of the capital improvements it made to the facility. Indeed, it is likely that Coso has paid for the improvements many times over. For instance, refer to the report prepared by the US General Accounting Office in 2004 called "Information on the Navy's Geothermal Program," wherein it was reported that the US Navy had received about $249 million in royalties from 1987 through 2003, based on total electricity revenues of $2.3 billion received by Coso during the same period (GAO Report 2004, page 2). Nonetheless, Coso, in a further disregard of its responsibilities to the community and the environment, may contend that its debt service to pay for outstanding bonds prevents it from retrofitting the facility. Coso has decided to borrow the money. Should Coso's business judgments override impacts to the environment?

Coso knows that the Project only provides a temporary fix to bolster production. Sooner rather than later, Coso will have to stop importing water. With this in mind, Coso is already planning major capital improvements to maintain its production. Refer to the Fitch reports, dated December 3, 2007 and October 22, 2008, and Moody's, dated December 4, 2008, copies of which are provided. Some of the quotes from these rating reports include: "Projected capital improvements have been planned at the discretion of the sponsors; Fitch believes additional capital improvements could slow the rate of decline in steam production", "Recent declines in the Coso geothermal project's energy output will be remedied with a sponsor-funded capital improvement plan and should not persist beyond the near term", "CGP [Coso] has engaged in an accelerated capital improvement program designed to enhance Coso's steam production and energy output, which had been gradually declining", "Through Terra-Gen, ArcLight intends to fully fund the accelerated program with a $70 million equity contribution, demonstrating its support for the project in the near term", "Meaningful execution of the accelerated capital program should help boost generation output over both the near and long term," "the Project [Coso's capital project] estimates that the accelerated capital program should increase total capital expenditures by at least $100,000,000 compared to the base case and the Project expects the accelerated capital program will be implemented over the next several years starting in 2008," and "Meaningful execution of the accelerated capital program should help boost generation output over both the near and long term." A-135 (Cont.)

Refer to the GAO Report 2004 wherein it is stated "With proper management—not withdrawing too much fluid too fast and re-injecting fluids as needed—a geothermal field can potentially be productive indefinitely. In the absence of proper management, the productive life of the resource may be greatly reduced." (GAO Report 2004, page 25.) Coso's decision to install water-cooling towers, which of course allowed Coso to increase power generation but at the cost of enormous losses of waters through evaporation at its water-cooling towers, has precipitated its very dilemma. Why should Coso be permitted to now cause severe environmental damage based upon faulty economic decisions? A-136

The DEA asserts that inefficient energy conversion systems, including air-cooling or binary, is a waste of resources and are inappropriate reservoir management plans. The primary tool used by the geothermal industry is injection. This assertion is not consistent with current geothermal development plans as reported in the recently completed Geothermal PEIS, of which the BLM has a copy. An overwhelming majority of the new facilities will use the binary design, which allows for 100% re-injection of the Geofluids. It is also illogical in a desert environment, with scant water resources. A-137

While the DEA asserts that injection is the primary tool to reduce geothermal reservoir decline, it does not provide a single example of another geothermal power plant which is allowed to import water from an overdrafted aquifer. The BLM should provide a list of all geothermal facilities in the western United States that are allowed to overdraft an underground water basin to obtain injection water. The likely result is that no facilities would be identified, and injection water only comes from water sources that are capable of sustaining the transport of water. A-138

The DEA does not explain why Coso injects so little of the Geofluids it produces when compared to all other geothermal facilities in California. Little Lake has provided the BLM with the reports showing Coso injects a far less percentage of its Geofluids than similarly situated plants. The question of "Why" has gone unanswered. A-139

The basic Project's objectives are described at Section 5.1.2. Section 5.1.2 only speaks to minimizing the annual decline and to sustain production. At Section 5.2.2, the DEA states a different objective of "increased power generation." Why is this not stated as an objective of the Project? What is the current power generation and how much should it be increased? Is this really a Project objective? What evidence exits that such a result would occur, even if the Project is approved? A-140

The alleged alternatives of Section 5.2.2 are all apparently based upon information provided by Coso, none of which is being shared with the public. The second paragraph refers to incremental additional power generation output as predicted by Coso. The projections are based on a reservoir simulation performed by Coso. The projections of total mass flow produced, total mass injected, and the enthalpy of the fluid produced are again all supplied by Coso. Why aren't these projections and models provided to the public? Either produce the reports and studies for pubic review, or delete all reference to them. A-141

The third paragraph continues with the forecasts spanning through the year 2035. However, Coso's permits are allegedly only through 2031, but the Project is stated to have a 30-year term which would presumably end sometime in 2039. If these projections and forecasts are being used to assess the feasibility of the alternatives, then it is fundamental that the public be provided with the raw data so that it can determine for itself whether the forecasts are legitimate. A reference is made to some apparent report called "Global Power Solutions 2008," but the list of references on which the DEA is based does not contain such a described document. Rather, the only apparent support for these conclusions is based upon the verbal reports and personal communications from Coso's personnel itself. (See references Coso Operating Company.2007 and Coso Operating Company.2008.) How can anyone rely upon the self-serving projections from the applicant itself? Did the Global Power Solutions 2008 contain an independent analysis of Coso, or did it only accept and report Coso's own predictions? A-142

The DEA continues to then suggest that the proposed Project would have a cost of $13,400,000 to produce, on average, nearly 18 megawatts (MW) of power, presumably from the inception of injection through 2035. This gross Project cost and the estimated power generation A-143 is then translated in a cost-per-kilowatt of $750. Where are the studies to support this conclusion? How much will Coso generate in additional revenues by the increase in power? If the increase in power is going to be used to justify the Project, where is the economic analysis? Should Coso provide full copies of its contracts to ascertain the revenue potential? Without knowing how much additional revenues Coso receives, how can the public determine what alternatives may be feasible, at least from a cost perspective? (See DiPippo Report.) A-143 (Cont.)

The files of the ICPD also contain a document called Reservoir Model Forecast, received by ICPD December 20, 2007 (Coso Reservoir Model 12-20-07). A series of graphs were presented which were used to compare Coso's production rates without injection compared to production rates with injection. These graphs were not presented in the DEA nor updated and confirmed by independent analysis. Moreover, if the results are contained in the DEA, should the public be given access to the Coso Reservoir Model 12-20-07? Why isn't the public allowed to know what the complete effects of the Project will be? A-144

Figure 5.2-1 presumably is a chart produced by Coso. Where are the facts and evidence on which this chart is based? Where is the geothermal reservoir model? Where is the comparison of the proposed output in contrast to the likely continued output from Coso without the Project? Depending upon the revenues generated by Coso from additional output, how long will it take before the alleged cost of $13,400,000 is recaptured through the sale of energy? What is Coso's rate of return on the cost? A-145

Figure 5.2-1 further raises some rather striking questions. Assuming injection begins at 2009, there appears to be a fairly gradual to even nominal increase of output for the first 3 years, and then an explosive growth of output in the following 3 or 4 years. Output remains somewhat constant from years 6 through 11. Then, there is a precipitous decline from the year 2020 to 2023, after which output steadily increases for a few years. What accounts for these unexplained spikes and declines in output? If the injection rates constant, why are there such marked differences in production of energy? A-146

The DEA asserts that Coso generated approximately 250 megawatts in the early years. Nowhere in the material provided in the DEA is this established. There are a number of published reports dealing with the "capacity" of Coso's generators, but there are no published reports to the knowledge of the reader that verify Coso's actual energy output. The DEA then states that current output is under 200 megawatts. Where is the proof? Where are the public reports? If the feasibility of alternative 5.2.2 or any other alternative is going to be based upon the output of Coso, shouldn't the public have access to detailed output information? How is the public to confirm the statements? Are we to rely solely upon the verbal statements of the applicant's own personnel? What would Coso's current output have been if it had (a) installed and utilized less than 270 megawatts of capacity, or (b) used air-cooled condensers, thereby injecting 100% of the Geofluids, rather than its wasteful water-cooling towers? A-147

The Geothermal PEIS, at Table 2-7, indicates that the projected MW production at the Coso area in the year 2015 will be 75, and it is projected to be 150 MW at the year 2025. (Geothermal PEIS, page 2-35). What accounts for this substantial reduction in current production? Is the Geothermal PEIS correct in its estimate? What accounts for the increase in capacity and not a decrease? A-148

The DEA then claims that the "mass fluid produced" has declined from 15,000 kilograms per hour (KPH) to approximately 9,000 KPH. Refer to DOGGR 2008 Report, and show how these figures were calculated and describe the times during which the decline occurred. A-149

Finally, the consideration of using an air-cooled system in lieu of Coso's water-cooling towers is at least mentioned. Again, only Coso evaluated this proposal. To avoid public debate or information, Coso declared that "these modifications are very capital-intensive and result in a loss of net generated power for their water savings." Has Coso shared the estimated cost? If not, why not? Would an air-cooled system allow for 100% of Geofluids injection? Would such a system completely avoid the necessity of water importation and injection? How is the public, or the ultimate decision-makers, supposed to examine or know whether this is a feasible alternative, when it has nothing more than Coso's self-serving objections as a basis for decision?

A-150

By converting Coso to an air-cooled system, Coso would immediately have an additional 85% of the steam component of the Geofluids available for re-injection. No analysis of the costs versus benefits has been provided, nor the actual amount of additional water that could be injected. The air-cooled system may prolong the economic life of Coso, while minimizing environmental impacts related to water usage. The DiPippo Report indicates that somewhere around 1,000 acre-feet would be available for injection Coso has already indicated that a flow rate of 500 GPM is economical when looking at alternative sources of water. If true, why is the air-cooled system not considered, as it would supply far greater than 500 GPM? (See Page 5-5 of DEA.)

Geothermal reservoir utilization could affect groundwater resources because of consumption of water by evaporation and the need to re-inject water to replenish the geothermal reservoir (Geothermal PEIS Section 4.7.3, page 4-44). The magnitude of the effects varies depending upon groundwater conditions and the type of geothermal plants. Availability of water resources could be a limiting factor, affecting the expansion of geothermal reservoir development in a given area (Geothermal PEIS Section 4.7.3, page 4-44). A-151

Cooling water is generally used for condensation of the plant working fluid. The waste heat can be dissipated to the atmosphere through cooling towers <u>if make-up water is available</u>. Water from a nearby river or other water supply can also serve as a heat sink. There are opportunities for recovering heat from these waste fluids (and possibly from the brine stream) in associated activities such as fish farms or greenhouses. An alternative to water-cooling is the technique of air-cooling using electric motor-driven fans and heat exchangers. This approach is A-152 particularly useful where the supply of fresh water is limited, and is currently used mainly for binary power plants. (MIT Report, Section 8.2.9.)

Air-cooled systems use less cooling water and are more common in arid regions. Air-cooled systems would have fewer impacts associated with cooling water (Geothermal PEIS, page 4-45).

A-152 (Cont.)

The DEA states "the water savings, if re-injected, would not offset the power loss." If the use of air-cooled systems would increase the Geofluids available for injection, why would it not offset the power loss? How can Coso say that the re-injection of its own Geofluids would not perform the same beneficial purpose as injection of water from Rose Valley? Isn't this statement a complete conflict with the supposed objectives of the Project? (In support of the air-cooled alternative, see the DiPippo Report.)

A-153

Table 5.2-1 is a rather meaningless chart of alleged Electric Plant modification possibilities considered by Coso and rejected because of the cost. Who did the analysis? What is the documentary evidence to establish that any of these improvements were actually considered by someone other than Coso? How is the public to decide for itself the efficacy of these stated improvements?

The DEA concludes its evaluation of the plant modifications alternative by concluding "none of the system efficiency alternatives are competitive with the proposed water augmentation project." Since when do project alternatives need to be assessed based upon being competitive? Isn't this just a subtle way of saying that Coso doesn't want to spend the dollars to protect the environment? Does this mean that the environment will be sacrificed for Coso's profit motives? Does this mean that the alternatives need to generate the most economic benefit to Coso, without assessing environmental harm?

A-154

Section 5.2.3 addresses the alleged alternative sources of water. What is suspicious is that only Coso identified alternative sources of water, and the selection of the stated alternatives arose from personal conversations with a Coso representative. It was only Coso that estimated what an alternate water source would have to produce in order to be "economically feasible." Since when is the applicant in charge of presenting the only alternatives it wants considered? Does this meet CEQA standards? Where did the information for Table 5.2-2 come from? Who performed pumping tests? Who provided the estimate of potential productivity? Where are the test results and analysis? How can the public assume the accuracy of the information provided?

A-155

Why is there no analysis of the Coso Basin as a source of alternative water? How much water is in storage at Coso Basin? California Bulletin 118 indicates there may be as much as 390,000 acre-feet of storage capacity (Coso Basin 6-56). According to the 1985 EA, there is an annual natural recharge of the Coso Basin of 300 to 1,000 AFY (1985 EA, page 44-45). Have any new studies been performed to support, modify or reject this estimate? Given the short distance to the injection wells, why is this source of water rejected? If the Coso Basin receives

A-156

natural recharges of at least 300 AFY, and maybe considerably more, why wouldn't this provide an adequate water source? Please provide all test results to show flow rates. Was a hydrology model prepared for the Coso Basin? Why not? Does anyone rely on the Coso Basin for water supplies? Would mining for water in the Coso Basin have less of an environmental impact? A-156 (Cont.)

The alternative water sources conveniently omitted by Coso should be considered. Indeed, there has been no identification of a number of other options. Most of these have been previously described in the comments to the scoping of the DEA from the outset. Yet, there has been no consideration of why the alternative sources are not viable. First, the north and south Haiwee Reservoirs are filled with untold thousands of acre-feet of water. These are controlled by LADWP and provide water service to the City of Los Angeles. LADWP owns and operates an aqueduct that provides delivery of the water to the City which parallels Highway 395. This is an existing water source. There has apparently been no effort whatsoever to consider this alternative water source. Why not? A-157

Attached as Exhibit B is a list of at least 15 wastewater facilities within 60 miles of the Coso Plant. Why hasn't any consideration been given to the importation of wastewater for injection? What are the capacities of the identified plants? May some of them be located along the same general route of a proposed pipeline to provide ample economic justification to use wastewater? The Geysers geothermal facility in Napa encountered virtually the identical situation. The Geysers built 2 pipelines, one for 50 miles in length and the other over 25 miles in length, to import reclaimed wastewater. Why couldn't the same strategy work for Coso? (See also the DiPippo Report.) A-158

Another alternative which was never considered or mentioned is the ability of Coso to extend the depth of its existing production wells seeking additional sources from which Geofluids could be extracted. If Coso really intends to increase it power output, contrary to its stated objectives as was discussed earlier, drilling deeper may solve that problem. Was Coso asked whether deeper geothermal reservoirs may exist? Have there been any efforts made to explore for new or supplemental geothermal reservoirs within Coso's leased areas? Where are the studies or reports which define the extent of the geothermal reservoirs available to Coso? What would the cost be to seek additional resources through deeper production wells? (See DiPippo Report.) A-159

No Project

The environmental analysis of the "No Project" alternative is flawed. The statement that the No Project alternative would shorten the lifespan of Coso is not supported by any evidence. The statements regarding the life of geothermal projects and the loss of revenue to the federal government and BLM should be deleted from the DEA. The reduction in energy production coupled with the conversion of Coso's water-cooling towers (WCTs) to an air-cooled condenser (ACC) system could actually prolong the operation of Coso indefinitely, admittedly at the cost of new equipment costs and reduced energy production. This option should be evaluated for the A-160 preservation of the Coso geothermal reservoir itself and to totally eliminate the other environmental impacts set forth in the DEA. Moreover, the possible conversion of the Coso generating plant to other more environmentally friendly designs, such as a binary facility, must be evaluated to reduce or eliminate many of the environmental impacts already being caused by Coso, and would be made worse by the injection of water, leading to higher production rates.

The No Project alternative discussed in the DEA further suggests that the Coso Hot Springs would return to a natural state sooner if geothermal operations ceased. Previously, there has been a vigorous assertion that there has been no demonstrated connection between the geothermal plant and Coso Hot Springs. Is such a connection now conceded? If so, has not the operation of Coso impacted a valuable cultural and historical resource well beyond any expectation? Should not appropriate steps be taken to correct, limit or minimize this impact? **A-160 (Cont.)**

What other changes to Coso's Electrical Plant and method of operations could be found if pumping were not allowed? It is fairly obvious that Coso would simply not go away without the water- pumping project. It would simply mean that Coso would be forced to spend some of it profits to find other solutions. Why haven't all of these solutions been identified and discussed?

Considered Action Alternatives

The presentation of the information in addressing Section 5.4.1, Alternative 1, is on its face misleading and distorts the conclusions from the Hydrology Model. The DEA doesn't even bother to copy Figure C4-2 when discussing this alternative. Figure C4-2 clearly shows that Coso must entirely stop pumping within 1.2 years, not the 30 years being proposed for pumping, if the aquifer has a specific yield of 10%. Pumping must stop after 3 years if the aquifer has a specific yield of 30%. As more fully discussed herein, even the specific yield assumption of 10% is suspect, as the Hydrology Model was actually calibrated using just a 3% specific yield, causing all of the impacts to be skewed and probably vastly wrong and overstated. **A-161**

Alternative 1 confuses the data between pumping at 4,839 AFY <u>for 30 years</u> and alternate rates which may allow Coso to pump either 180 AFY, 320 AFY or 480 AFY, for 30 years. The DEA must compare the actual Project to Alternative 1, and not the Project assuming pumping will end in 1.2 years.

The second 5.4.2 alternative, known as Alternative 2, would apparently allow for higher pumping rates than stated at Alternative 1, but for a much shorter duration. Under Alternative 2, impacts from extraction rates of 750, 1,500 and 3,000 AFY were presented. Figure 5.4-2 shows that the 10% maximum allowable drawdown would be reached even if pumping stops as early as 1.75 years after pumping commencement at 3,000 AFY, but as long 6 years using the 750 AFY pumping rate. However, no information is presented to confirm that the Hydrology Model was calibrated to show these pumping rates. (See Zdon Memorandum 9-2-08.) In all three cases, once pumping ceased at the time the maximum environmental impacts were achieved, Little Lake would continue to feel the adverse impacts from water losses for more than 100 years after **A-162** pumping cessation. As with Alternative 1, the DEA fails to properly compare these alternate pumping rates to the entire Project (4,839 AFY for 30 years). It is beyond argument that either Alternative 1 or 2 is environmentally superior to the Project. A-162 (Cont.)

It is obvious that Coso cannot conceivably pump 4,839 AFY for 30 years without doing enormous environmental harm. The Hydrology Model, even in its flawed condition, would not allow such proposed pumping. Moreover, even if the 10% maximum reduction at Little Lake were guaranteed, the continuing damage to water supplies for over 100 years after the cessation of pumping constitutes yet another compelling reason to both (a) reject the entire Project without any further discussion, or (b) consider the more appropriate alternatives of either (i) reducing the initial allowed pumping to only 120 AFY, or (ii) mandating the termination of pumping after 1.2 years, by limiting the duration of the CUP to 1.2 years. A-163

Mr. DiPippo concludes that each of the suggested alternatives related to (a) the reduction of Geofluids production to prolong the life of the geothermal reservoir, (b) changing the water-cooling towers to an air-cooled system, (c) drilling deeper to reach and exploit a new geothermal reservoir below the current reservoir, (d) rotating the use of the production wells and generators, and (e) the importation of wastewater are all technically feasible and merit further investigation and research. (See DiPippo Report.) A-164

Little Lake Ranch identified a number of possible alternatives. None of these alternatives are discussed in the DEA, nor was any valid reason under CEQA given for the rejection of the alternatives. Based upon further review and reflection of the DEA, and our analysis of which alternatives may be feasible, Little Lake Ranch continues to believe that the DEA should address additional alternatives, including (a) the use of treated wastewater from sources throughout the immediate vicinity of Coso, (b) the retrofit of Coso's Plant to use air-cooled condensers to completely eliminate the loss of water at Coso through evaporation, (c) the better management of the geothermal reservoir by reducing production and output, (d) the purchase of water from the Los Angeles Department of Water and Power (LADWP), (e) the ability of Coso to deepen its own production wells to tap new sources of Geofluids, (f) the availability of water from nearby aquifers, such as Owens Valley, Coso or Indian Wells water basins, or (g) a combination of the alternatives. A-165

When addressing the alternatives based upon lower pumping rates, it is difficult if not impossible to analyze the feasibility of the alternatives, when Coso, without supplying any evidence whatsoever, has merely "indicated that their minimum economic pumping rate may be 3,000 acre-feet per year." What is the basis for this assertion? Has anyone independently verified the cost to build the Project, or has the DEA simply relied on Coso's statements? What is Coso's expected rate of return on investment? How much energy does Coso expect to generate with respect to the injected water? How much does Coso earn on each kilowatt/megawatt of electricity produced? Is Coso including its debt service (particularly considering that Coso has already captured many times over its initial investment cost)? How does Coso's assessment of its minimum economic pumping rate of 3,000 AFY compare to its A-166 statement that a pumping rate of 500 gallons per minute (GPM) is economic? (See page 5-5, Section 5.2.3.) A-166 (Cont.)

Appendix H

Page 3.2-1: The thesis prepared by Charles Bauer in 2002 called the Hydrology of the Rose Valley and Little Lake Ranch, Inyo County, California is a source of considerable factual data. (Bauer Thesis) This document was compiled as a master's thesis by a student. How reliable is the data? Should new or similar studies be performed by an experienced hydrologist over a longer period of time? What were the prevailing weather conditions during the time of Bauer's measurements? A-167

Page 3.2-2: There are repeated references to the "long-term pumping test" conducted in November and December, 2007. The characterization of the 2007 pumping test as "long term" is misleading and should be deleted. The test only lasted for 14 days. A 14 day pumping test should not be described as "long-term". Indeed, only multi-year or even decades long monitoring of surface wells, spring flows, underground water table levels and the like can effectively provide meaningful data as to water availability, recharge, discharge, water balances, etc. Rather than being argumentative about the length of the test, wouldn't it be better to just call it the 2007 Pumping Test or replace it with the 14 day pumping test or use some other neutral description? Similarly, referring to the test as lasting 20 days is also misleading. The actual pumping lasted for 14 days, while monitoring occurred for an additional 6 days. A-168

Page 3.2-4, Figure 3.2-1: This figure omits the Deep Rose property situated very close to the Hay Ranch. It purportedly has a water well. The Little Lake property west of Highway 395 also contains a significant seep. What other significant wells, springs, seeps and other water features have been omitted, deleted or overlooked? Some, but certainly not all, of the springs evident in the Rose Valley are briefly described and reflected on Figure 3.2-1. A number of springs which provide water to Little Lake are not shown. All springs should be identified. A-169

Page 3.2-5: The DEA uses different reference points for describing where the springs are and their relationship and elevations in comparison to the Hay Ranch wells, and the groundwater table at the Hay Ranch. All springs and other water features should be measured from the Hay Ranch wells and their relative elevations should be also stated to avoid confusion. For instance, the Davis Spring discharge is stated to be 600 feet higher than the groundwater table at Coso Junction, but no distance from the Hay Ranch is given. Coso Junction is far south of the Hay Ranch. The Hay Ranch has a much higher elevation than Coso Junction but the comparison to Davis Spring is not noted. Thus, it is difficult, if not impossible, to confirm the observation that the Davis Spring is unlikely to be affected by the pumping. What is the test data or other evaluation used to reach this conclusion? What tests or monitoring has been done to confirm the source of the waters in the Davis Spring? A-170

Page 3.2-16: See comments above about how to describe the 2007 Pumping Test. A-171

Page 3.2-18: The DEA indicates that only 300 acres of the 1,200-acre Little Lake Ranch property hosts plants. How was this conclusion reached? What is the basis of asserting that only 300 acres of land are used by habitat? Indeed, the figure should be much higher. Although Little Lake is located within a high desert area, it has a plethora of plant life, all of which depends upon water resources. Should the DEA differentiate between the riparian wetlands habitat versus the natural habitat throughout the area? **A-172**

The cinder mine operations on Cinder Road actually receive water from Little Lake's wells. The general manager indicates that the cinder mine does not have its own well or access to any other water sources. Little Lake supplies approximately 45 truckloads of water per month, averaging 3,800 gallons per truckload, or 171,000 gallons per month. There are 325,851 gallons in 1 acre-foot, so Little Lake provides the Cinder Block facility about 6.3 AFY of water. Should this consumption be factored into the Hydrology Model? If Little Lake suffers a 10% loss of water supplies, it may be unable to continue water deliveries. How would this water loss be mitigated? **A-173**

Use of the word "conservative" to describe how the groundwater budget was determined is questionable, in light of the information contained in the Zdon Memorandum 9-2-08. It appears that the consultant did not use real data nor made good-faith assumptions in preparing both the groundwater budget and the Hydrology Model. The Hydrology Model should be conservative to avoid impacts. This should be made clear and the DEA be presented in objective fashion. **A-174**

Page 3.2-19: There is a sentence regarding the outflow of saline geothermal brines from Coso. Is this surface discharge or subsurface underflow? Does Coso actually discharge brine water, or is it only re-injected Geofluids? What is the chemical composition of the brines? Are they hazardous? Where do the brines travel from the geothermal reservoir? Does the re-injection of brines increase the level of contaminants in the geothermal reservoir? **A-175**

Page 3.2-21: Samples of the Little Lake Group of water reflects a slightly higher amount of total dissolved solids (TDS) of 1200 mg/L compared to those of the Indian Wells Rose Valley and Coso-Argus Group waters. What accounts for the higher level of TDS at Little Lake? Is the much higher TDS level associated with the geothermal brine at Coso, estimated at 10,000 mg/L, a possible cause of the declining water quality? How do the Geofluids impact the water quality of the Rose Valley Basin and the Little Lake group of waters? Will the reduction of water by the Project reduce water quality within the Rose Valley Basin? Will the reduction of cleaner and fresher water of the northerly Rose Valley waters reduce water quality at Little Lake? **A-176**

Page 3.2-23: This suggests that the waters at Little Lake are generated primarily by the more southerly portion of the Sierra Nevada's within the Rose Valley, and perhaps geothermal waters from the east and not as significantly from the underground waters around the Hay Ranch area. The DEA notes that "significant evaporation" would have to occur at Little Lake to change its water chemistry to contradict this presumption. Is not evaporation and transpiration of the **A-177**

Little Lake group waters already occurring? Is not the evaporation at Little Lake far higher at Little Lake than anywhere else in Rose Valley? How much more evaporation would have to occur before it is considered "significant"? A-177 (Cont.)

Page 3.2-24: The stated injection rate at Coso is approximately 50% in the 20 years of production has resulted in a decline in pressure. Provide a chart accurately reflecting the amount of Geofluids produced per year compared to injections. Has there been a continuous decline in injection rates? What accounts for the decline in injection rates? What are the means by which the injection of Geofluids at Coso could be increased? A-178

Page 3.2-24: The DEA states that there is no natural recharge of the geothermal reservoir. What is the evidence that there are no natural recharges to the geothermal reservoir? Have any studies been performed on this assertion? When was the lack of recharge first discovered? Did Coso know about this assertion when it designed its plant? If not, why not? What design decisions did Coso make in recognition of the lack of recharge? If there is no recharge, why was WCT used in lieu of an air-cooled system? A-179

Page 3.2-24: According to the DEA, Coso has operational permits through 2031. Do all of the separate power plants (Navy 1, Navy 2 and BLM) all have the same Project permit duration? Should not the current Project be limited in duration to Coso's existing permits to operate at most? At the most, should not the Project CUP be limited to run concurrently with Coso's other permits? A-180

Page 3.2-26: The Coso process results in the separation of steam and waste brine and the DEA suggests that Coso re-injects the spent brine and steam condensate. This is a misleading observation suggesting that all of the steam, through the steam condensate, is injected. How much of the original steam produced by Coso end up as steam condensate? What are the ongoing water losses from the water-cooling towers? What percentage of the produced steam in the Geofluids is actually re-injected as steam condensate? If the geothermal reservoir is now compartmentalized into three weakly connected volumes, what effect will the new injection have on each of the separate zones of the reservoir? Will this actually be effective in maintaining power levels at all power units? A-181

What was the condition of Coso Hot Springs ("CHS") before production began? What has occurred to the Hot Springs since production commenced? What is the interconnection between Coso Hot Springs and the geothermal operations? (See my comments above regarding the impacts to CHS.) A-182

The Coso geothermal system is changing from a liquid only to a liquid and steam system. As fluid was withdrawn, pressures decreased and led to the creation of steam. Steam forms in a geothermal field when liquid water under high pressure is removed during production. The increase in steam flow could account for the rise in water levels and temperatures in the south pools of the Coso Hot Springs. (ITS Hydrologic Analysis) Isn't this additional proof of a A-183 connection between the geothermal operation and Coso Hot Springs? The timing of the south pools water level temperature changes correlates with the onset of geothermal production. Thus, it cannot be ruled out that changes in Coso Hot Springs activity are due to natural causes. A-183 (Cont.)

Carl F. Austin states that when compared to Deep Rose, the potentially greater effect on surface thermal manifestations (i.e. CHS) may be caused by the planned injection of cold water into the Coso reservoir. Depending upon the nature of the system, such an injection could quench the surface manifestations. A-184

Page 3.2-33: It is presumed that the reduction in underflows to Indian Wells Valley is not significant because it represents only a small portion of the water budget for Indian Wells Valley. What is the water budget? Is the Indian Wells Valley Basin in a state of overdraft? Are there additional waters available in the Indian Wells Valley to supply to Coso? Could the underflow be tapped from a well in the Indian Wells Valley to supply all or a portion of the water wanted by Coso? A-185

Page 3.2-34: The Hydrology Model on which the entire DEA is fundamentally flawed as described in the memorandum from Mr. Zdon. The actual results and predictions from the Hydrology Model as run were not even presented. CEQA requires that all environmental impacts of the proposed Project be identified, studied and reported in the DEA, without the effects from mitigation. Yet, the only impacts noted are assuming that mitigation occurs. This is contrary to CEQA. A-186

Page 3.2-36 Table 3.2-5: This reflects a drawdown at Little Lake in the water table from 4 feet to 11 feet. Since Little Lake is a shallow lake averaging 3 feet to 5 feet in depth, will this maximum drawdown completely destroy Little Lake? What would happen to the habitat, wildlife, viewshed, air quality, water quality and other environmental issues? A-187

Page 3.2-36: The projected drawdowns are simply listed by reference to Table 3.2-5 and Figure 3.2-14. The Hydrology Model only permits between 120 to 480 AFY of pumping for 30 years to avoid substantial impacts. Doesn't the Hydrology Model state that Coso could only pump at the rate of 4,839 AFY for less than 15 months to avoid the substantial impacts?

Wasn't the Hydrology Model calibrated and run on an assumption of a 3% specific yield? On what basis can the DEA arbitrarily assume different specific yields to predict the impacts than were set forth in the Hydrology Model itself? What is the evidence to vary specific yields? If the Hydrology Model wants to assume higher specific yield assumptions, doesn't the entire Hydrology Model have to be rerun and recalibrated to determine whether these assumptions can be sustained in actual practice? A-188

Page 3.2-38: The information contained in Figure 3.2-15 is illuminating. In particular, examine the last graph which involves Little Lake. Not only are the impacts of the complete pumping for 30 years not realized for many years after pumping stops, but in none of the A-189 scenarios, regardless of specific yield, does Little Lake return to its pre-pumping condition, even after 100 years has elapsed after the cessation of pumping. Since we have learned that the BLM and the DEA assume that only a 10% loss of water is acceptable, how can the Project possibly be approved? A-189 (Cont.)

Page 3.2-39: The mitigation measures require Coso to fund adjustment to existing wells to maintain functionality. Who determines when and if adjustments are needed? Who will be responsible for additional energy costs to operate the wells? What cumulative impacts to the environment will occur by additional energy usage to drill the deep wells, or lift the underground water higher by the pumps? A-190

Page 3.2-39, Hydrology-2: All of the mitigation measures rely upon Coso to conduct the monitoring and notify both the BLM and other owners in Rose Valley. What happens if Coso refuses? Should an independent monitor or water master be appointed and funded by Coso? Any excessive drawdown, regardless of cause, should force the immediate imposition of the mitigation measures. Coso must not be given any opportunity to debate the "cause" of the drawdown. A-191

Page 3.2-39: Impacts to the Indian Wells Valley Basin is discussed. Can the Indian Wells water basin provide a source of imported water to Coso? If so, how much could be imported per year? Assuming the higher estimated underflow of water to the Indian Wells Valley Basin of 1,300 acre feet per year, would the pumping and transfer of water from the Indian Wells Valley Basin be less damaging to the environment? A-192

Page 3.2-39: Impacts to Little Lake could continue for well over 100 years following even a cessation of pumping. Why does the text of the DEA suggest that it may take more than 30 years to recover, when Figure 3.2-15 shows that the Rose Valley Basin will not fully recover even after 100 years or longer? This error should be corrected. Once water flow to a spring is interrupted, what are the chances of a permanent loss of the spring regardless of later water recharges? Is there not evidence to suggest that removal of current water availability may permanently destroy a spring? Did the former agricultural pumping at the Hay Ranch cause Rose Spring to go dry? (See Zdon Memorandum 9-2-08) A-193

Page 3.2-40: At the very end of the discussion on Section 3.2.4, it is noted, without explanation, that groundwater recovery would occur more rapidly if pumping rates are reduced or pumping ceased sooner. Why not explain at this point the differences? Why not add a few sentences which would show the vastly reduced rate of pumping which the DEA considers safe, and that Coso can only pump at the full project rate for 1.2 years? A-194

Page 3.2-40: What is the support for the supposition that the Project will unlikely affect the Portuguese Canyon, Davis and Rose Springs? What studies or evaluations have been made to confirm the foregoing? Is it possible that the former agricultural pumping on the Hay Ranch caused Rose Spring to go dry? (See Zdon Memorandum 9-2-08) Please explain your answers. A-195

Page 3.2-41: Does the moisture and pressure content of the underground basin, even at Portuguese Bench and the other springs, facilitate or assist in the expression of waters through the springs? How can the results from the limited and short term pumping test provide any significant evidence of the lack of impact on the Davis Springs? A-196

Page 3.2-42: According to Bauer, the groundwater elevation of the Little Lake North Dock Well appears to be 3 feet higher than the lake level. (Bauer Thesis) This estimate seems questionable as the elevation of the lake can vary over the course of an average year based upon the availability of water, and how Little Lake manages the lake level for the utilizations of the waters downstream and south of the Lake. What is the relationship between water levels throughout Little Lake and its springs? In order for the springs to function, must there be a minimum available water level and/or pressure or water head? Could even a minor reduction in elevation level interfere with the operation of the springs? A-197

Page 3.2-43: The last paragraph contains a number of assumptions and conclusions regarding water availability, discharge rates and the potential changes to the spring outflow. On what basis are these conclusions drawn? What is the evidence that a decrease in water level of the lake will allow a proportionally larger discharge of the water at the Coso Spring? If the Hydrology Model is used to support the conclusion, why was Coso Spring not included within its boundaries? While a larger portion of the available water downstream of the lake from Coso Spring may occur, isn't there overall loss of water at the Little Lake property? What is the predicted magnitude of the total water losses? A-198

Page 3.2-44, Figure 3.2-16: This graph is incomplete. There are no references of drawdown or length of time. This appears similar to, but somewhat different than, the last graph of Figure 3.2-15. Please add the pertinent numbers and explain the significance of this figure. A-199

Page 3.2-44, Figure 3.2-17: This figure predicts drawdowns at Little Lake even after a very relatively short-term pumping from the Project (1.2 years). This predicts nearly a 4-inch drop in the water table which will continue for decades and decades even after pumping termination. The figure does not even reflect a return to pre-pumping levels for longer than 100 years. How is this virtually permanent loss of the water table mitigated? Doesn't this conclusively prove that even a very short duration of pumping by Coso will almost indefinitely impact Rose Valley and Little Lake? If such a relatively small drawdown is experienced at Little Lake, won't the rest of Rose Valley be similarly impacted, and perhaps at even greater drawdown levels? A-200

The differences between the B&C Model and the Hydrology Model must be explained. Why are the impacts from the B&C Model different than the Hydrology Model? What inputs or assumptions were made in the B&C Model that were changed in the Hydrology Model? Please describe each and every assumption difference and explain why the Hydrology Model made the changes. The B&C Model said that Little Lake would lose over 60% of its water supply if Coso A-201

A-201 (Cont.)

pursued its pumping project. How much water losses are predicted by the Hydrology Model? What are the assumption changes?

Precise and complete explanations of the suggested triggers and graphs shown in the ICPD Agenda 4-30-08 compared to the B&C Model and graphs in the DEA must be provided. It is at best unusual that we would see such a discrepancy in data from the hydrology consultant as late as April 30, 2008 when the DEA was released a short time later. The pumping test was conducted in November 2007. Surely, the hydrologist would have completed and calibrated the Hydrology Model well before April 30, 2008. What changed? What assumptions were modified? What new variables were inserted into the Hydrology Model after April 30, 2008 compared to the variables and assumptions used prior thereto? A-202

Page 3.2-45: The DEA rejects an analysis of the impacts from the Project on the biology of Little Lake, arguably because Little Lake can transfer its water resources to improve and enhance vegetation, which also serves as a habitat for wildlife. Obviously, the ability of Little Lake to manage its water supplies depends upon the existence of water supplies. This is not the same as "manipulation," which implies wrongful conduct. The suggestion that water resources at Little Lake are "highly manipulated" is argumentative at the least. The conclusion is also absurd. Little Lake can only manage and transfer water it has. If water is reduced by any amount, let alone 10%, how is Little Lake supposed to manage something that doesn't exist? Anybody in the world residing in a relatively arid environment would attest to the fact that a 10% loss of water is significant. The habitat and wildlife will not survive as well with 10% less water. A-203

The DEA also fails to address the impacts to the biology of Little Lake resulting from pumping at the rate of 4,839 AFY for 30 years. These impacts must be shown, assuming drawdowns of 4 to 12 feet at the north end of Little Lake. CEQA demands and requires such an analysis of impacts. A-204

Page 3.2-46: The Hydrology Model suggests that even if the pumping completely stopped after 1.2 years, Little Lake would not even feel the full impacts for 30 years or longer after cessation and that these impacts may increase with time. Given that the Hydrology Model only provides predictions, does not this represent a severe risk to Little Lake and Rose Valley? Since the Project clearly contemplates an over-pumping of the Rose Valley Basin in excess of natural recharge, what is the conceivable justification for permitting the pumping and transfer? A-205

Page 3.2-47: The nature of monitoring and frequency thereof is briefly summarized. Given the predicted water reductions at Little Lake, even under the best of circumstances, full monitoring and evaluation costs should be borne by Coso. As Little Lake will likely suffer more dramatic impacts than any other user, Little Lake by necessity will need to engage the services of its own independent hydrologist to monitor and evaluate the reports. Should not Coso also fund the reasonable costs associated with the evaluation of the data? The environmental impacts would not arise but for the Project. Why should Little Lake Ranch be forced to incur any costs A-206 to verify Coso's compliance with mitigation measures? Why is a representative of Little Lake excluded from the assessment of the damages and to recalibrate the Hydrology Model? Doesn't Little Lake have more to lose than the BLM or Coso, at least with respect to environmental impacts? A-206 (Cont.)

Page 3.2-49, Hydrology-4: This entire mitigation measure is far too subjective, uncertain and virtually incapable of objective assessment or realization. The last full paragraph on page 3.2-49 suggests that there may be some reduction of pumping to a lesser degree. What does this mean? Who determines when pumping should be reduced and to what extent? Why doesn't Little Lake have any input in this process, since it will be the likely recipient of the harm? To afford certainty, shouldn't pumping reductions and/or cessation be mandatory upon the attainment of specified triggers?

Page 3.2-50: Most of the discussion following Mitigation Measure Hydrology-4 is nothing more than guesswork. The purported remedy of challenging the CUP or trying to revoke the CUP is entirely illusory. Coso earns tens of millions of dollars a year. It is unrealistic to assume that anyone, including Little Lake Ranch or the BLM, would have the resources to pursue a legal challenge. Why should the BLM create a system wherein Coso wins by default? Should a small group of private citizens be forced to raise the resources necessary to fight a utility company? A-207

Page 3.2-53: The DEA contains certain summary predictions on the geothermal reservoir behavior based on conversations with Coso personnel. Has Coso presented its reservoir model? On what basis does the DEA make the conclusions set forth? Is there any data other than observations based solely upon verbal and anecdotal information from Coso? Is the reservoir model available for public review and input? If not, how is the public to verify the predictions and assumptions provided by Coso itself? Should not the public be entitled to evaluate all relevant evidence to determine the efficacy of the Project to produce the expected results? If there are no public studies available to confirm the assertions, shouldn't the unsupported statements be deleted from the DEA? A-208

Page 3.2-54: See all of our comments regarding the MOA appearing at Appendix E below. Please incorporate all of the questions and observations herein. Most importantly, the MOA required the cessation of geothermal operations if a perceptible change to the surface activity of the Hot Springs occurred. Why didn't this happen 20 years ago when impacts to Coso Hot Springs first became evident? A-209

Appendix C

The Hydrology Model as presented in the DEA is flawed and unsupportable. It must be re-run and this DEA must be revised and re-circulated for public comment. (See Zdon Memorandum 9-2-08.) A-210

Appendix C contains the pump test results and hydrologic data concerning the Project. It must be first noted that the actual test was conducted by Coso itself, the applicant. Coso collected and distributed test data. It is peculiar that the applicant would be responsible for the single most important test of the entire Project. Would not independence, neutrality, and fairness have dictated that the test would be conducted entirely by independent personnel to avoid any possibility of bias, tampering or manipulation? A-210 (Cont.)

The following will provide specific comments to the information contained in Appendix C and all of its subparts. Many of the comments will also pertain to the same or similar results noted in Section 3.2 of the DEA. A-211

Appendix C-1:

Appendix C-1 merely describes the testing protocols, and references the raw test data of the 14-day pumping test. No evaluations or conclusions were reached in this section of Appendix C. Which individuals performed the work? What are their qualifications and professional degrees? Why wasn't the Hydrology Model signed by any individual or company? (See Zdon Memorandum 9-2-08.) A-212

Page C1-3: During the course of the pumping test, an independent consultant only visited the site at the beginning of the test on November 19th, 9 days later on November 28th, and at the end of the 14-day test on December 3, 2007. Does this provide the public with any comfort that the test was independently performed and evaluated? Who was this person and what professional degrees did he or she hold? Did a certified hydrogeologist prepare or review the Hydrology Model? If so, who was it, and what are her or his qualifications? A-213

Page C1-3: At Section C1-2 identify the persons at Geologica who supervised the pumping test and provide their qualifications. Are they certified hydrogeologists?

Page C1-3: At Section C1-3, why was the flow rate at the Davis Spring measured? The DEA says that the pumping project is not expected to affect this spring. Was the Davis Spring included in the Hydrology Model? Was the spring flow rate used to help calibrate the Hydrology Model?

Since the Davis Spring was measured during the 2007 pumping test, doesn't this indicate the view of Geologica that the spring could be impacted? At a minimum, the Davis Spring and all other known springs should be included in the Hydrology Model. The Hydrology Model should also reflect any probable impacts to these springs from pumping. (See Zdon Memorandum 9-2-08) See all of my earlier comments on this issue.) A-214

Page C1-10: The aquifer specific yield could not be estimated using graphical methods. The uncertainty was to be addressed during the sensitivity analysis, but the DEA does not provide any analysis. Why not? Wasn't the Hydrology Model calibrated at 3%? Why then was A-215 the specific yield component of the Hydrology Model changed to estimate impacts from the pumping throughout Rose Valley and Little Lake? (See Zdon Memorandum 9-2-08.) If the Hydrology Model depends upon the specific yield factor, should additional tests be performed before drawing any conclusions? How long of a pumping test would have to be conducted to obtain more specific yield estimates? Were any of the specific yield estimates of 10%, 20% or 30% used to calibrate the Hydrology Model? While the conclusion is that pumping did not cause the disturbance because of the relative elevation of the Davis Spring, there were nonetheless variations. Can this test conclusively determine that the pumping will not impact the Davis Spring? **A-215 (Cont.)**

It is rather interesting that the 14-day pumping test is compared with the 24-hour pumping test in 2004. The groundwater flow model developed by Brown and Caldwell in 2006 (B&C Model) was compared. One significant conclusion drawn from the Pumping Test is that the B&C Model "may underestimate groundwater table drawdown developed at a distance from the Hay Ranch pumping wells." The significance is that the 14-day pumping test seems to have demonstrated a higher likelihood of underground water table drawdown than was earlier estimated by the B&C Model. The pumping test involved a water well pumping water for a relatively short 14-day period. What happens when both Hay Ranch wells are pumped? Would not even a much longer term pumping test, perhaps using both of the Hay Ranch wells, be more significant and provide even a greater support for the ultimate model and conclusions? Given the rather significant differences between the pumping test results and the B&C Model, why is there such a rush to approve the Project before a truly representative test can be performed and modeling prepared? **A-216**

Appendix C-2:

Page C2-1: We understand that the Hydrology Model uses a common, publicly available computer application from the United States Geologic Service (USGS) known as "MODFLOW". The DEA provides conclusions from the Hydrology Model based upon variables selected and inputted into the model software. The variables and inputs used by the consultant are wrong. (See Zdon Memorandum 9-2-08.) This leads to the well-known adage "Garbage In-Garbage Out." The Hydrology Model, as presented, cannot be used to support the conclusions in the DEA. **A-217**

Page C2-3: The DEA indicates that the groundwater table surfaces at, and discharges from, springs beneath Little Lake. It is these springs that sustain the Lake. Where are each of these springs located? What are the physical properties which allow the springs to operate? **A-218**

Page C2-3: The DEA indicates that water discharges across something called the "Little Lake Weir." The DEA should describe the physical structure and its function. **A-219**

Page C2-5: For unknown reasons, the springs at Rose, Tunawee Canyon, Little Lake Fault, and the Little Lake Canyon Springs were not measured for discharge rates, and they are **A-220**

not proposed to be monitored. Moreover, Little Lake Canyon Spring and Little Lake Canyon Spring have not been identified in figure C2-1. Please add the locations and the pertinent details of the Little Lake Canyon Spring. Aren't all of the springs in the Rose Valley susceptible to harm by reduction of the underground water table? How much of a factor does the pressure of the underground water have in allowing the natural springs to function? If underground water tables fall, aren't the springs jeopardized? Does the mere height of springs above other portions of the groundwater table automatically cause them to be not hydrologically connected? (See Zdon Memorandum 9-2-08.) **A-220 (Cont.)**

Page C2-5: The DEA states as a certainty that the Davis Siphon well and the Portuguese Bench springs "are not directly hydrologically connected to the alluvial aquifer." Doesn't the Hydrology Model actually show a connection? Shouldn't the springs be separately discussed and analyzed with respect to the connection to the main aquifer? (See Zdon Memorandum 9-2-08.) See my earlier comments. **A-221**

Page C2-5: The DEA states that the Coso Spring, entering into the Upper Pond at Little Lake, will likely be influenced by changes in the groundwater conditions in Rose Valley. If so, why wasn't the Coso Spring included within the Hydrology Model? What will the impacts be? On what evidence are the conclusions based? **A-222**

Page C2-5: Could earlier pumping of the Hay Ranch wells for agricultural purposes have impacted the Rose Spring? (See Zdon Memorandum 9-2-08) **A-223**

Page C2-6: The Siphon well located between Little Lake and the Upper Pond has an elevation below Little Lake, but higher than Coso Spring. The language in the parentheses at the seventh line should be corrected. It is located approximately 100-150 yards north of the Upper Pond. **A-224**

Page C2-6: Little Lake Ranch has the ability to raise or lower the water level in Little Lake, depending upon the adequacy of water flow from the natural springs. The use of the word "manipulate" to describe the ability of Little Lake Ranch to adjust the Lake levels is argumentative, and intends to imply or suggest a deceptive or deceitful purpose for the regular maintenance activities of Little Lake Ranch. Please use a more neutral word such as "manage." I doubt Geologica would approve of the word "manipulate" to describe the selection of assumptions and the predictions of the Hydrology Model, although such word might better reflect how the Hydrology Model was prepared rather than the management of water resources at Little Lake. **A-225**

Page C2-8: The Hydrology Model apparently uses a factor of 10% of the total precipitation falling on the Sierra Nevadas at elevations in excess of 4,500 feet which were used to establish predicted recharge rates. However, at least two other reports mentioned used recharge rates of only 6% to 8%. Please explain the basis on which the 10% figure was used in **A-226**

the Hydrology Model. Would the calibration for the Hydrology Model still correlate to a 6% or 8% recharge rate, rather than 10%? (See Zdon Memorandum 9-2-08.) A-226 (Cont.)

Page C2-9: Not all of the groundwater discharge points on the Little Lake property have been noted and should be. There are additional discharges from the Upper Pond to the Lower Pond, and from Upper Pond bypassing Lower Pond. There is a discharge from the Lower Pond south that goes to the next pond in succession, which we call Teal Pond. The discharge point somewhere between the Lower Pond and Teal Pond likely constitutes the southernmost boundary of the Rose Valley Basin and has been described in the DEA as the Little Lake Gap. The approximate location of the Little Lake Gap should be noted. What are the discharge rates from the Upper Pond and Lower Pond? Depending upon where the Little Lake Gap is located, there may be additional discharges from Teal Pond, as well as a succession of habitat ponds south of Teal Pond, leading to food plots, lava ponds located approximately ¼ mile east of Highway 395, and at the far south end of the Little Lake Ranch property a pond we call the Chukar Pond. Were any of these additional discharge points used to describe and create the Hydrology Model? If not, please explain why not and whether they should be included. A-227

Page C2-9: Please explain the reason that the Model grid ends at the south end of Little Lake. What is the reason for not including both the ponds and Coso Spring? All of these areas are north of the Little Lake Gap and are part of the Rose Valley Basin. Shouldn't the Hydrology Model incorporate these features? A-228

Page C2-10: The DEA suggests that around 3,000 AFY infiltrates into the ground and continues as groundwater underflow to the Indian Wells Valley. This underflow rate seems in contradiction to other statements of the amount of underflow to Indian Wells Valley. What number was used for the Hydrology Model? Should there be a clarification between the observed or calculated underflow and the amount used in the Hydrology Model? A-229

Page C2-10: There are new references to the amount of water used in Rose Valley measured in terms of cubic feet per day (CFD) or gallons per minute (GPM). Most of the discussion relating to the Hydrology Model speaks in terms of acre-feet per year (AFY). The changing measures of flow or amounts of water are confusing. The DEA should adopt and use a consistent measure or add the equations used to determine how many gallons per minute are equivalent to cubic feet per day, and then how many of either are equivalent to an acre-foot of water per year. As presented, it is extremely difficult to determine the relative amount of water being discussed at the various locations throughout Rose Valley. A-230

Page C2-10: Estimates of the water extraction from existing wells are stated. Little Lake Ranch consumes some of its water produced by its wells for residential, irrigation, habitat preservation and domestic uses. In addition, Little Lake provides water to the Cinder Block facility. (See comments above.) Should this consumption be factored into the model? This consumptive use should at least be mentioned. A-231

Page C2-12: The approximate boundaries of those portions of the Rose Valley which were included in the Hydrology Model are described and further depicted on Figure C2-2. Both Tunawee Canyon Spring and the Davis Spring are excluded. Yet, the Hydrology Model ends apparently mere feet away from the Davis Spring and predicts significant drawdowns at this boundary. Shouldn't the Hydrology Model include at least Davis Spring and perhaps Tunawee Canyon Spring? (See Zdon Memorandum 9-2-08.) The elevation lines on Figure C2-1 are not extended to either immediately north of, or at Little Lake north of the southern end of, Little Lake. Why not? Also excluded from the Hydrology Model is the Little Lake Hotel well, the Coso Spring, Little Lake Ranch Siphon well, and all of the water features in and around the Upper Pond and Lower Pond. Are these southerly water features part of the Rose Valley Basin? Where is the presumed location of the Little Lake Gap? Why doesn't the Hydrology Model include all relevant areas? Is it possible to show on Figure C2-1 the approximate location of the Coso Plant? Confirm that it is outside the boundaries of the Rose Valley Basin aquifer. A-232

Figure C2-12: There are some stated anomalies about the actual level of the underground water at areas in the more southerly portion of the Rose Valley. We have been verbally advised that the Cinder Mine operating in and around the Red Hill Cinder Cone has no water to access and that previous attempts to drill water wells have been unsuccessful, regardless of depth. Is it possible that there is a geologic reason for this area to contain underground rock features that are not porous? Does the presence of the cinder cone suggest reasons why relative water elevations in the immediate are may be skewed? Should this issue be further studied and included in the DEA? A-233

Page C2-13: The thickness of the aquifer, including the various Model layers, is apparently depicted only in the figures referenced in the B&C Report as Figures 8, 9 and 10. These graphical depictions have not been incorporated into the DEA. Each of these 3 figures should be included if the data contained therein was used to form the basis of the Hydrology Model. Apparently, the Hydrology Model used a total aquifer thickness extending as much as 3,500 feet below the ground surface water. According to our hydrologist, this vastly overstates the usable area of the aquifer from which water can be drawn and would accordingly tend to overstate the amount of water available in storage. Please explain the rationale for using this aquifer thickness. (See Zdon Memorandum 9-2-08.) Explain why the estimates used in the Hydrology Model conflict with the estimates from the Danskin Report. A-234

Page C2-14: The amount of evaporation and evapotranspiration were only assumed within the graphical boundaries of the Hydrology Model and, therefore, exclude a substantial area of wetlands and ponds south of Little Lake. It would also exclude the habitat surrounding Portuguese Bench and Tunawee Canyon Springs. As such, the evapotranspiration calculations used in the Hydrology Model are understated. This should be corrected. A-235

Page C2-14: Groundwater outflow to the Indian Wells Valley at Little Lake is discussed. However, the Hydrology Model stops at the south end of the Lake and excludes all A-236 land south of the Lake to the Little Lake Gap. Shouldn't the Hydrology Model be adjusted to take into account the water flows and discharges south of Little Lake? A-236 (Cont.)

Page C2-15: At Section C2-3.4, there is an indication that the layer 1 specific yield was initially specified as 10%. Did this change? Was the Hydrology Model able to be calibrated at a 10% specific yield? If not, what was the ultimate specific yield used as determined from the calibration process? Why were the impacts then later measured by bearing the specific yield factors and not using the impacts from the calibrated Hydrology Model? (See Zdon Memorandum 9-2-08.) A-237

Page C2-15: The predicted drawdown at Coso Ranch north well is compared to the actual results from the pumping test. Figure C2-14 shows a much greater drawdown than predicted. According to the DEA, some of this variation could have been caused by some unmetered water well pumping in the area of the Coso Ranch north well. Nonetheless, the actual drawdown seems to be considerably greater than the predicted drawdown. Would the unmetered well pumping account for the differential? Does it appear that that Hydrology Model understates the amount of actual drawdown? A-238

Page C2-16: According to Section C2-3.5.3, the Hydrology Model was calibrated to reflect a 3% specific yield. If the Hydrology Model was calibrated at this specific yield factor of 3%, how and why were the ultimate impacts from the Hydrology Model adjusted in the DEA, assuming specific yields of 10% (3 times the calibrated specific yield), 20% (nearly 6.5 times the calibrated specific yield), and 30% (10 times the calibrated specific yield)? See comments above and in Zdon Memorandum 9-2-08. A-239

Page C2-17: Several data gaps and limitations on the resulting model were noted. Of particular concern is the lack of recent seasonal groundwater elevation data north of Rose Valley and adjacent to southern Haiwee Reservoir. There are further fluctuation discrepancies which need further investigation. Data is further lacking with respect to transmissivity or storativity data outside the Hay Ranch (Page C2-18). There is also a lack of recent seasonal flow measurements or water level measurements on the Little Lake Ranch property (Page C2-18). Given the magnitude of the proposed Project and the likely impacts upon Little Lake, should not these data gaps be filled before any approval of the Project is allowed? If accurate data cannot be provided as part of the EIR, should not the testing period be extended until the data can be gathered? (See Zdon Memorandum 9-2-08.) A-240

Page C2-18: Section C2-4 indicates that that Hydrology Model was calibrated based upon the 2007 pumping test to produce an estimated specific yield of 3%. What is the scientific basis for suggesting that the actual specific yield of the Rose Valley Basin is higher, by multiples of 3 times, 6.5 times, or 10 times? Was the Hydrology Model ever recalibrated to assume higher specific yields? If not, why not? Using the calibrated specific yield of 3%, what would be the conclusions drawn from the Hydrology Model for pumping 4,839 AFY for 30 years, for pumping 3,000 AFY for 30 years, for pumping 750 AFY for 30 years, for pumping 480 AFY for A-241

30 years, and for pumping 120 AFY for 30 years? Why wasn't this data presented in the DEA? (See Zdon Memorandum 9-2-08.) Using a specific yield of 3% in accordance with the calibrated Hydrology Model, what is the maximum amount of water that could be safely pumped for 30 years without exceeding a 10% loss at Little Lake? Using a specific yield of 3%, how much water could be pumped by Coso without causing any depletion of water in the Rose Valley Basin? A-241 (Cont.)

Page C2-19: Was any attempt made to more precisely determine the types and composition of the soils in Rose Valley to determine an estimate of the specific yield in accordance with the Johnson, 1967 Report as set forth in Table C2-5? If so, describe such efforts and the results. A-242

Page C2-20: Were the mitigation measures adopted using a specific yield of 3% in accordance with the calibrated Hydrology Model, or were they based upon the higher specific yields of 10%, 20% or 30%? Please explain and justify the approach. A-243

Page C2-20: Are all of the facts and conclusions set forth in the DEA based solely upon the projected Project pumping rate, excluding the cumulative pumping from the proposed LADWP Project to pump an additional 900 AFY? Are the only conclusions from the combined Coso Project and the proposed LADWP Project listed in the cumulative impact section of the DEA? Please provide additional graphs and conclusions assuming a combined pumping rate of both the Coso Project and the LADWP Project. A-244

Page C2-21: In connection with the proposed augmentation proposal, the DEA indicates that a simulation was run for the proposal. Where are the results of the simulation? Was a chart or graph prepared to show what the impact from this proposal would be? How long would the augmentation proposal have to be continued to avoid a loss of water at Little Lake? Following full cessation of all pumping by Coso, how long would it take before the augmentation pumping could terminate? Why has none of this information been provided by the DEA? A-245

Figure C2-15: The presented map, including the predicted drawdown of the groundwater table at Little Lake, is measured at the Little Lake Ranch well. At this level, a 5-foot drawdown is set forth. After this well which proceeds south, the land drops sharply towards Little Lake. Farther south is the Little Lake Ranch House well, and even farther south is the Little Lake North Dock well at the north end of Little Lake. Why has no contour line been reflected for the North Dock well, which of course is the well closest to Little Lake itself? Shouldn't the predicted drawdown be reflected at the North Dock well to more accurately show the predicted drawdown which would have the most effect on Little Lake? Similarly, why does Table C2-1 exclude the well closest to Little Lake? A-246

Appendix C-3

Please include a page separator and title page for Appendix C-3. The chemical compositions of the waters in and around Rose Valley are difficult to read, simply due to the small size. It also appears that all of the chemical compositions of the waters in Rose Valley are very old. Some of the dates are also not correct, such as those involving the Rose Valley Ranch. If changes to the quality of water are to be monitored and measured, there should be a new baseline sampling of the water throughout Rose Valley. This data needs to be presented for further comment by the public. Why is there missing data? Given the questions raised on the impacts of the Project on water quality, shouldn't new tests be performed to measure changes in water qualify from a current baseline of water quality? **A-247**

Appendix C-4

Page C4-1: The statement at the end of Section C4.1 that the monitoring and mitigation plan is not designed to mitigate naturally occurring changes in the hydrological system is troubling and contrary to common sense. The Rose Valley Basin is stated to be in a steady-state. Any pumping will cause an overdraft. Indeed, the proposed pumping at 4,839 AFY will completely eliminate on an average annual basis all recharge. The pumping will be cumulative to any natural variations. Thus, the amount of drawdown caused by the pumping will further reduce underground water levels reduced by natural events, such as a relative lack of precipitation, snowmelt and recharge. Mitigation must take into account these natural variations so that pumping will cease or be severely curtailed when there is a normal cycle of drier years or drought. Just as LADWP is not allowed to pump as much water in drier years, so must the rate of pumping by Coso be automatically reduced in times of drought. What are the baseline levels of the Rose Valley Basin on which the Hydrology Model was based? Is it all averages? Did the Hydrology Model predict what would happen in drier years as compared to wetter years? This data and simulation should be presented. Moreover, there should be no room for debate or an analysis of causation in the implementation of mitigation. (See Zdon Memorandum 9-2-08) **A-248**

Page C4-2: The summary of hydrologic issues beginning at Section C4.2.1 merely states that the evaluation of the hydrological system within Rose Valley suggests that the project "may lower the water table elevation and groundwater flow rates in the Valley". (Page C4-2) The clever use of words completely ignores the actual prediction from the Hydrology Model. The summary should state that the Hydrology Model predicts anywhere from 5 to 12 feet of drawdown at Little Lake, when only a total of approximately 5 inches of drawdown is considered below significant. **A-249**

Page C4-2: The DEA should not characterize the November pumping test as "long term". In comparison, note that the DEA states that the pumping test had no discernable effect on wells 5 to 7 miles south, which was not surprising "given the limited duration of the pumping." **A-250**

Page C4-4: The second paragraph more correctly states that the principal impacts of the Project will be the drawdown of the groundwater table. Since it is a rather established fact that the Project will draw down underground water levels, the DEA should not use the word "may" to describe the impacts. A-251

Page C4-4: The discussion about specific yields is misleading. This paragraph should be clarified to report the actual findings from the calibrated Hydrology Model. (See my earlier comments and Zdon Memorandum 9-2-08.) A-252

Page C4-5: See my earlier comments regarding Davis spring, Tunawee Canyon spring, and Rose spring. Were any water composition tests performed to verify that the springs are not also fed and helped to operate by the larger Rose Valley aquifer? If these springs serve to also recharge the aquifer, why haven't they been included in the Hydrology Model? A-253

Page C4-5: How much drawdown in the underground water levels will be deemed significant for impacts at all of the other water wells and owners throughout Rose Valley? The depletion of water in Rose Valley must be considered significant. It is not mitigation to simply force Coso to pay for deepened wells as the drawdown continues unabated. We are talking not only about economic impacts by such owners having to deepen their wells, install greater capacity pumps, and use more energy to pump the water. Rather, the environmental impact is the reduction of water supplies in Rose Valley. Yet, there is no mitigation for the loss of water in Rose Valley. A-254

Page C4-5: Why does Appendix C of the DEA launch into a discussion of the impacts to vegetation and wildlife at Section C4.2.3? The assertion, without any information or evidence that the Project would have no impacts on vegetation, is entirely argumentative and misplaced. What is the scientific or logical basis for concluding that a reduction of available water will not reduce the ability of the land naturally, or a landowner, to care for its environment? Regardless of the ability of Little Lake Ranch to manage its water resources, it cannot manage what it doesn't have. A-255

Little Lake Ranch does not trust the mitigation measures. What happens if it takes longer than predicted for the monitoring wells to be impacted? Will Coso be allowed to continue pumping, even though a huge cone of depression is being created at the Hay Ranch? Because this cone of depression will slowly work its way southward, and the impacts may not even be felt for decades after the cessation of pumping, don't the mitigation measures offer Coso an opportunity to keep pumping because of delayed impacts at the monitoring wells? Once the cone of depression reaches the monitoring wells and Little Lake, it may be far too late. The impacts by way of the reduction in water supplies will continue to grow for another 30 years. (See Zdon Memorandum 9-2-08.) Rose Valley will not recover for more than 100 years after pumping stops. What is to prevent this from occurring? A-256

Page C4-5: The DEA indicates that the maximum drawdown at the Little Lake North Dock well should be limited to 0.3 feet. However, Table C4-1 refers to the Little Lake Ranch North well which is approximately 1 to 1-1/2 miles distant and north of the North Dock well. Which well is being monitored and what is the allowable drawdown? Does a 0.4-foot drawdown at the north well correspond to a 0.3-foot drawdown at the dock well? How do these drawdown triggers operate to prevent a more than 10% reduction? If the maximum allowable drawdown reduction at the North Dock well is 0.3 feet, why would the trigger be set at the maximum allowable drawdown realizing that the cone of depression will increase with time after pumping stops? Should the triggers at Little Lake allow for no drawdown to avoid the larger impacts as pumping continues? A-257

Page C4-7: The drawdown triggers are confusing and suspect, as reflected in Table C4-1. The Hydrology Model in general clearly says that maximum predicted drawdowns may not occur for as long as 30 years after pumping stops entirely. The problem is by the time a drawdown trigger is reached, the Hydrology Model predicts a continuing and massive increase of the drawdown over the next 30 years. Even after 30 years have elapsed, which would only worsen the drawdown, the Hydrology Model then predicts that Little Lake will not recover its previous water flow for as long as 100 years or longer. A-258

Page C4-7: Table C4-1 presents the data assuming that pumping entirely stops after just 1.2 years, and assumes a specific yield of 10%. What value is Table C4-1? This does not present an analysis of triggers, but only a prediction from the Hydrology Model of what will occur. Table C4-1 becomes relevant only if the CUP issued to Coso were expressly limited to a duration of 1.2 years. A-259

Page C4-7: Why aren't all of the wells at Little Lake listed at Table C4-1? What should the maximum allowable drawdowns be for each of the 3 Little Lake wells? Shouldn't the maximum allowable drawdown be changed to prevent the continuing reduction after pumping is stopped? Doesn't the Hydrology Model state that underground water levels will continue and accelerate even after pumping stops? Shouldn't the trigger be set much tougher so that the cumulative impacts from pumping will never exceed the 10% maximum drawdown? A-260

Page C4-7, Table C4-1: As written, the trigger levels are based upon the stated maximum drawdown levels. However, the table does not establish the current levels from which the drawdowns are set. What are the separate elevations being considered as a baseline start-up level? If the triggers are set at too low an elevation below the ground level, they will never be reached, regardless of how much Coso pumps. What is the process to determine the levels from which drawdowns will be measured? Identify the data on which these baseline levels are set. Is it based upon the levels during the summer or in the winter? What is the natural variation of levels? Shouldn't the initial level be based upon the relative highest level, rather than the lowest level, so that the allowable triggers will be effective? The average levels must not be used, as that would still ignore the cumulative impacts from pumping. A-261

Page C4-8: The Hydrology Model shows that there will be underground water level drawdown. How does merely deepening wells mitigate the loss of water in the aquifer? The DEA should state the amount of water that is deemed to be not significant. Isn't any water lost to the aquifer significant? The DEA should state that the Project will deplete the Rose Valley Basin. This by itself is significant and cannot be mitigated simply by the lowering of wells and installation of larger pumps. A-262

Page C4-8, Hydrology-2: Not just some, but all wells and springs may be affected by groundwater drawdown. The HMMP should expressly require the monitoring of all wells and springs. The report of well depths and drawdowns should be made monthly, and not just semi-annually. The well owners should be contacted immediately, and not have to wait for 6 months. Reduction or cessation of pumping must be automatic, if an applicable trigger point is reached. There should be no room for argument in mitigation. If any well or spring loses depth or flow beyond a stated trigger, then the pumping must be reduced or stopped. The HMMP cannot allow BLM or Coso to question whether the impact was caused or not caused by the Project. A-263

Page C4-8: Mitigation measure Hydrology-3 indicates that the monitoring locations, parameters, and schedules are presented in Tables C4-1 and C4-2. Table C4-1 only refers to the Little Lake Ranch North well. However, Table C4-2 states that the Little Lake North Dock well will simply be monitored, but no triggers are provided. Likewise, there is apparently no monitoring at the Little Lake Ranch well or the Little Lake House well. At the public meeting on August 20, 2008, it was suggested by representatives of Geologica, that all wells would be monitored and that triggers would be set as to each well. A-264

Page C4-8, Hydrology-3: How is the monitoring of wells handled? Who will do it? Will data be available daily, or will monitoring only occur manually once a month? Why is there a 20-day delay between the date data is collected before it is delivered? All data should be delivered to not only BLM, but Little Lake and all of the landowners having wells in Rose Valley. Why is there an automatic reduction of monitoring to quarterly after 2 years? Won't the effects of pumping continue for decades? Won't even greater impacts be observed later in time, rather than upon the commencement of pumping? Should an independent water master be hired and funded by Coso? Should the water master be approved by BLM, Coso and all affected Rose Valley owners? When is the Water Department given discretion to apparently change trigger levels? Once approved, the trigger levels should not be subject to modification. A-265

Page C4-9: Hydrology-4 adds an undefined concept that a trigger of a 0.3-foot drawdown may be exceeded if new data indicates a larger decrease of head would not result in a greater than 10% decrease in groundwater flow, or "substantially deplete the water availability to the springs and wetlands." Please define what a substantial depletion of water to the springs and wetlands means. How is this to be measured? What is the objective evidence on which this standard will be based? Once a trigger is reached, how long will it take to recalibrate the Model? Who will perform the analysis? What happens to pumping during the course of the recalibration of the Hydrology Model? Pumping should stop immediately. Will Little Lake Ranch have the A-266 right to participate in this process? Coso should not be allowed to continue pumping once a trigger is reached. Why is Coso given any right to continue pumping once a trigger level is reached? A-266 (Cont.)

Page C4-9, Hydrology-4: Explain the logic for allowing Coso to pump at the full pumping rate of 4,839 AFY for 30 years, when the Hydrology Model states that such pumping has to stop in only 1.2 years to avoid significant impacts? Why are changes to the pumping rate or duration only subject to approval by the Inyo County Water Department (ICWD)? Won't any such change fundamentally affect the basis on which the DEA has been prepared? How can ICWD ensure that Coso will not challenge the decision and voluntarily comply with the HMMP? A-267

Page C4-9: Mitigation measure Hydrology – 4 indicates that Coso will be allowed to pump at the full proposed pumping rate unless certain triggers are reached or exceeded. This mitigation measure does not, however, state what happens to the pumping when this point is reached other than to require a recalibration of the Hydrology Model and the establishment of new pumping rates. There must be a firm and unambiguous cessation of all pumping in the event the triggers are reached. The mitigation measure should expressly state that all pumping must immediately cease, without reason or excuse, if any trigger level is reached or exceeded. Otherwise, there will be endless litigation and claims while the experts do battle over the model and causation. A-268

Page C4-10: Section C4.2.5 provides erroneous goals of the HMMP. The HMMP is not designed to actually provide a system for "mitigating for groundwater drawdown in existing wells." The loss of water cannot be mitigated. The loss of water is a loss of water. There is no sufficient natural recharge to support any pumping. Coso will deplete the Rose Valley Basin. Merely providing a mechanism to allow landowners to deepen their wells and pump water from deeper portions of the aquifer is not truly mitigation. It simply provides some economic help to minimize the economic harm from the Project. It does not reduce the environmental impacts caused by the pumping. This should be restated. A-269

Page C4-10: Why is there reference that the HMMP is further designed to indicate "potential impacts to wetlands?" The DEA refused to study the biology of the Rose Valley and Little Lake. This appears to be an implicit admission that the Project will affect the wetlands and riparian habitat. This should be explained and clarified. A-270

Page C4-10: There are old sayings about letting the fox guard the chicken coop. The Hydraulic Monitoring and Mitigation Program (HMMP) at Section C4.3.1 states that the monitoring and mitigation will be performed by Coso and that Coso will report the results. Why is Coso performing the monitoring and mitigation of the HMMP? Does Coso get to set the standards and then determine whether it complies? Why shouldn't Coso fund an independent monitor? What if Coso does not? What if Coso delays or makes "honest" mistakes in data collection or interpretation? What if Coso does not really understand what its obligations are and chooses to file declaratory relief action for guidance, all the while continuing its pumping? What A-271 if Coso manipulates its data (much in the same way as the DEA suggests that Little Lake can manipulate its water resources, for good or bad)? A-271 (Cont.)

Why is BLM evaluating the changes "relative to natural conditions such as rainfall and snowfall"? Any and all water table reductions or water supply availability to Little Lake must be conclusively presumed to be caused by the pumping. As soon as "natural factors" are introduced, BLM will never be able to curtail pumping once the CUP is granted. This is not to say that there are not natural variations in water table levels or surface flow. Little Lake Ranch obviously concedes there are. The problem is that Coso's pumping will add to and make worse periods of drought. Even if the water table or water supplies are naturally reduced, then there is even more reason to stop all pumping. Coso is exporting water, not using it reasonably within the Rose Valley Basin. Coso's pumping should be expressly and without question subordinate to the legal rights and needs of all of the overlying owners. A-272

Page C4-10: Section C4.3.1 further provides that the data will be provided to Little Lake Ranch. Because Coso clearly is impacting Little Lake, Little Lake Ranch should not be forced to bear any expense in this process. Only a qualified hydrologist will be able to interpret and understand the dynamics of the system. Coso should bear, as part of the mitigation measures, the reasonable costs of a hydrologist selected by Little Lake, the maximum annual cost of which could be agreed plus an automatic CPI adjustment for the length of the CUP. A-273

Page C4-11: Phase 1 of the monitoring system set-up will allegedly help to "establish prevailing conditions prior to generating impacts and to establish the monthly baseline levels from which to compare the trigger level drawdown values." How long will monitoring last before pumping begins? At the public meeting on August 20, 2008, it was suggested that as short as 6 months of pre-pumping monitoring would occur. Explain how this limited amount of monitoring will establish proper baseline levels. What other data will be used to set baseline levels? Where will the baseline levels be set? How will they be determined? This is an enormously complex and controversial process, as the setting of the baseline levels could allow Coso to pump forever, regardless of the amount of drawdown in the Rose Valley Basin. They could also be set so high, to forbid any pumping from the inception. Without knowing the manner in which the baseline levels will be set, the DEA cannot possibly comply with CEQA. The comments made at the August 20th public meeting are also not repeated or confirmed in the DEA. This by itself is misleading. A-274

Page C4-11: Section C4.3.3 identifies the various monitoring phases of the proposed mitigation measures. The monitoring system does not even commence until construction of the Project commences. Question: What is the purpose of the delay? Why should not Coso begin monitoring as soon as the CUP is issued and approved by Coso? Indeed, shouldn't the commencement of actual pumping be delayed for at least one year after monitoring commences? Could not Coso commence construction upon issuance of the CUP, but only defer pumping commencement for one year after monitoring begins? A-275

Page C4-12: Better explain how the water flow measurements over the so-called Little Lake Weir will be constructed and operated. How will the measurement device be constructed to accurately measure water flow during these management activities? Please better define the location of the so-called "North Culvert." Will surface water monitoring occur at the North Culvert? Will the construction, placement and operation of the monitoring equipment require permits from CDFG and the California Regional Water Quality Control Board? (See Zdon Memorandum 9-2-08.) **A-276**

Page C4-12: Subsection "d" indicates that the water levels at Little Lake North Dock well will be monitored. However, such well is not identified on Figure C4-3. This should be added. Moreover, there is no trigger set for Little Lake Ranch North Dock well. Indeed, the triggers described in Table C4-1 set a .4 feet trigger for the Little Lake Ranch North well. **A-277**

Page C4-12: Subsection "f" indicates that the monitoring network will include the wells at Fossil Falls, Little Lake Hotel, and the Little Lake North Dock wells. No triggers or drawdown information is provided for these wells. Are they to be monitored? What equipment will be used? How frequently will monitoring occur? Will any triggers be stated? When will this information be provided to the public for comment? **A-278**

Page C4-14: As stated above, monitoring the Rose Valley Basin for only 6 months before pumping begins is woefully inadequate. Not only should a full 12 months be required, but even longer monitoring would be more appropriate. The mechanism to determine the background water levels is critical if the HMMP is to have any meaningful chance of success. Under no event should this step be left to Coso. Its self-interest in manipulating the data and setting the water levels is evident. Setting the water levels cannot be relegated to future environmental studies. **A-279**

Page C4-15: The threshold for the 2 existing Hay Ranch wells should include maximum daily pumping rates. The action if threshold is exceeded should eliminate discontinued pumping, as the amount of daily or yearly output by itself would not cause cessation of pumping. **A-280**

Regarding the 6 new observation wells, the original starting elevations are not noted. What will they be? How does the absence of starting elevations affect the triggers? To be meaningful, isn't the original elevation point crucial? The actions to reduce and stop pumping must be automatic. If the drawdown deviations or the maximum triggers are reached, all pumping should stop. Pumping should only be allowed to resume following the recalibration of the Hydrology Model, subject to the approval of an independent water master, the costs of which are borne by Coso. Why are there no triggers associated with the 2 Hay Ranch wells themselves? **A-281**

Page C4-15, Table C4-2: The methods to select the baseline elevations must be described. Without the beginning elevations and a description of how they were determined, there is no was to ascertain whether the drawdown levels and triggers are meaningful, or will do anything to protect Rose Valley and Little Lake. In all cases, the actions in response to the **A-282**

A-282 (Cont.)

exceedance of a trigger point must be absolute and non-discretionary. Moreover, there should be no discretion or leniency for Coso to argue that the trigger point was exceeded due to some cause other than pumping.

The adequacy of the mitigation measures are further flawed, because the Hydrology Model is based upon average annual conditions. The Hydrology Model should be run to reflect impacts from pumping during a cycle of wetter years as well as a cycle of drier years. In drier years, the pumping from the Project will accelerate or worsen the impacts from the drought cycle. To avoid even a 10% loss at Little Lake, the mitigation measures must assume a worst case scenario of a prolonged drought while pumping occurs. (See Zdon Memorandum 9-2-08.) A-283

Page C4-16: At least 10 wells are indicated to be monitored. Monthly monitoring alone is not adequate. Why are groundwater elevations not measured at least weekly, if not daily? Of the 10 wells listed, not all have trigger points as set forth in Table C4-1 and, in particular, the Fossil Falls well and the new well between Coso Junction and the Cinder Road, Red Hill well. There is also a discrepancy between the names used for the Cinder Road, Red Hill well. Table C4-2 refers to it as Cinder Road, Red Hill well, while apparently Table C4-1 refers to it as the Red Hill Cinder Road well. Is this the same well? Does it exist? The DEA should consistently refer to the same well using the same terminology. What are the triggers for the missing wells? What are the beginning elevations from which the drawdown will be measured? A-284

Page C4-16: The reduction of monitoring to only quarterly after 2 years is too short. Impacts for pumping will continue for over a 100 years, even after pumping stops. Continuous monitoring should be required. The reference to the "wetlands" at Little Lake should probably be deleted under the section called "Action if Threshold Exceeded." The DEA does not address any of the wetlands or habitat at Little Lake. Unless the DEA establishes baselines for the wetlands, habitat and wildlife, it is improper to talk about a trigger to protect these resources. Again, Little Lake Ranch believes that the DEA is in error and that the habitat and wetlands must be addressed, analyzed and protected. A-285

Page C4-17: The Little Lake Hotel well and North Dock well are mentioned, but no trigger points are provided. Why not? Longer-term baseline monitoring, daily or weekly monitoring during pumping, and the continuation of monitoring for the duration of pumping, should be required. A-286

Page C4-18: Table C4-2 indicates that there will be monitoring of Little Lake itself. For the first time, and nowhere else found in the DEA, is it suggested that a 1-foot or more change in the lake level will be a threshold requiring action. A 1-foot loss of water in Little Lake is much more than a 10% loss. There are no statements about what happens in the event of this water loss. Is this table accurate or in error? A-287

Page C4-18: Please identify exactly where the Little Lake North Culvert weir is located. Is it beyond the boundaries of the Hydrology Model? If so, why is it being monitored? Describe the type of equipment used to monitor the discharge rate. The DEA does not consistently refer to A-288 this discharge point and the discrepancies should be corrected. Why are there no triggers required? What is the frequency of monitoring? What is the purpose of the monitoring at this point? A-288 (Cont.)

Table C4-2 indicates that Little Lake Ranch Pond P1 (Upper Pond) will be monitored, but the parameters monitored and the frequency of monitoring are confusing. Under the parameters, it talks about the Siphon well discharge and the monitoring is only done by visual inspection. What is being monitored? Is it the Upper Pond known as Pond P1, or the Siphon well? What possible information can be gleaned from visual inspection? What measurements will be made? What monitoring equipment will be used? Where will it be located? Are there any triggers, and if not, why not? A-289

Page C4-18: Groundwater quality is proposed to be monitored. Yet, there is virtually no discussion of the impacts on water quality from the pumping in the DEA. This has been mentioned earlier. New water samples should be taken of all wells throughout Rose Valley to determine current water quality. Why is the trigger set at 2,000 MG/L for TDS? The TDS information for Little Lake is specified in a series of separate samples. It is not clear where these samples were taken. TDS levels vary considerably. What is the impact of increasing TDS levels? What is the baseline data for current water quality? A-290

Page C4-19: The threshold requiring action in connection with well yield seems too high. A loss of 25% or more in yield from the described wells would be severe. Shouldn't this trigger be set much lower, such as the 10% significant impact standard used throughout the DEA? A-291

Page C4-19: There is far too much leniency given to Coso. Cessation of pumping should be automatic. Pumping should not be allowed to resume until the Hydrology Model has been recalibrated. Pumping should not be resumed until an independent water master approves any changes in the Hydrology Model. All information should also be provided to Little Lake Ranch and any other person who requests notice of the study. All residents of Rose Valley and landowners should be allowed to provide input into this process. A-292

Page C4-19: The required termination of pumping by Coso after 1.2 years seems to only require this if the drawdown values in "<u>all</u> monitoring levels occur." This is too high of a standard. If the results of pumping seem to be consistent with the Hydrology Model in a majority of the monitoring wells, then pumping should cease. Coso cannot be allowed to argue some standard of reasonableness or causation. Why is Coso in charge of recalibrating the Model? Shouldn't an independent hydrologist perform the work? A-293

Page C4-20: See all comments above about the problems with the monitoring by Coso. Consider what has happened to Coso Hot Springs. The US Navy is in charge of the monitoring, but it receives enormous financial benefits from Coso's operations. Despite overwhelming evidence to the contrary, the US Navy has continued to deny that the geothermal operations have caused any impacts to Coso Hot Springs. The monitoring reports clearly provide a direct causal A-294 connection between geothermal operations and Coso Hot Springs. Nonetheless, the US Navy and Coso have taken no actions to reverse the problem or to limit production in direct violation of the 1979 MOA. The same thing should not happen to Little Lake. A-294 (Cont.)

Page C4-20: Delete all references that the background levels for each well shall account for natural variation, or to separate effects of pumping from natural effects. This again leaves open the door for dispute. If Coso is going to pump, its pumping should be expressly subordinate to natural variation. Indeed, its pumping will worsen any drawdown and water table reductions. A-295

Page C4-21: The timing to recalibrate the Hydrology Model is mentioned throughout Appendix C and the DEA. In some cases, the dates on which the Hydrology Model is to be recalibrated are contradictory. It seems that the more appropriate time to recalibrate the Hydrology Model should occur approximately 1 year after pumping commences. The only reason to advance the date on which this may occur is because the pumping has caused 2 or more of the triggers to be reached throughout the Rose Valley. To protect Rose Valley and Little Lake, the DEA should specify that the recalibrated Hydrology Model be completed no later than 15 months (a little over 1.2 years) after pumping commences. If the Hydrology Model has not been recalibrated by this time, then all pumping should automatically cease until the Hydrology Model is recalibrated and its results are known and made available for public input. Similarly, the Hydrology Model has to be recalibrated because of the exceedance of triggers, pumping again should immediately cease until the Hydrology Model is recalibrated and the public has the opportunity to provide input as to its results. A-296

Page C4-21: The only stated trigger at Little Lake is described in Table C4-1 as a 0.4-foot drawdown at the Little Lake Ranch North well. This seems to be in error. As noted previously, once a drawdown of 0.4 feet is hit at the Little Lake Ranch North well, while Coso is still pumping, a much larger cone of depression will continue to increase the drawdown, even after pumping stops. Thus, the maximum allowable drawdown must be much less than 0.4 feet at the Little Lake Ranch North well. (See Zdon Memorandum 9-2-08.) Moreover, this is a meaningless trigger unless we know what the beginning elevation is. A-297

Page C4-21: The section on the "redefinition of pumping rates and duration" is unclear. There is at least a suggestion that pumping should stop after 1 to 1.2 years, but this is never stated as an absolute requirement in the DEA. Why not? Will pumping absolutely stop after 1.2 years? If so, shouldn't the Project be redefined as a pumping project allowing pumping at 4,839 AFY for only 1.2 years? If that is accurate, shouldn't Coso then have to reapply for a new CUP, subject to another Environmental Impact Report based upon the environmental studies and recalibrated Hydrology Model conducted during the first year of pumping? Isn't this the only way to ensure the safety and protection of the Rose Valley Basin? A-298

Page C4-22: The DEA does state that drawdown could continue to decline for as long as 30 years after pumping ceases. However, neither the DEA nor Appendix C contains a sufficient A-299 description of the residual impacts, including the inability of the Rose Valley Basin to fully recover the water lost through the pumping Project for more than 100 years after pumping ceases. While a few of the graphs depict this extraordinarily long time for the Rose Valley Basin to recover, why is this impact not stated clearly in the DEA? More analysis is required. A-299 (Cont.)

Page C4-22: Water quality, as opposed to quantity, is mentioned here and at a few other places in Appendix C. The underground aquifer supplies 100% of all water used and consumed within Rose Valley for all purposes. Any degradation of the water quality could dramatically affect the residents of Rose Valley. See my comments above about water quality issues. A-300

Page C4-23: While there is no objection to the accumulation of data with respect to trends in precipitation data, recharge, seismic events, and major storms, none of these events should be permissible when addressing the rate or duration of pumping. Natural variations in recharge, surface flow, and underground water table levels will occur. Nonetheless, if trigger points are reached, pumping must stop regardless of the cause. A-301

Mitigation Measures

The nature of monitoring and frequency thereof is briefly summarized. Given the predicted water reductions at Little Lake, even under the best of circumstances, full monitoring and evaluation costs should be borne by Coso. As Little Lake will likely suffer more dramatic impacts than any other user, Little Lake by necessity will need to engage the services of its own independent hydrologist to monitor and evaluate the reports. Should not Coso also fund the reasonable costs associated with the evaluation of the data? The environmental impacts would not arise but for the Project. Why should Little Lake Ranch be forced to incur any costs to verify Coso's compliance with mitigation measures? Why is a representative of Little Lake excluded from the assessment of the damages and to recalibrate the Hydrology Model? Doesn't Little Lake have more to lose than BLM or Coso, at least with respect to environmental impacts? A-302

This entire mitigation measure is far too subjective, uncertain and virtually incapable of objective assessment or realization. The last full paragraph on page 3.2-49 suggests that there may be some reduction of pumping to a lesser degree. What does this mean? Who determines when pumping should be reduced and to what extent? Why doesn't Little Lake have any input in this process, since it will be the likely recipient of the harm? To afford certainty, shouldn't pumping reductions and/or cessation be mandatory upon the attainment of specified triggers? A-303

FEIR

The DEA is based predominantly on the DEIR prepared by the County and released for public comment in late July, 2008. Numerous comment letters were sent to the County on the DEIR, but none of these comments were considered when the DEA was being drafted. Based on these comment letters, the County made many changes to the DEIR when it ultimately released the FEIR on December 31, 2008. The DEA repeats the errors of the DEIR, and does not make A-304 the corrections and clarifications contained in the FEIR. The DEA should make all the changes, and it should be re-published for further comments from the public. A-304 (Cont.)

CONCLUSION

The DEA is incomplete and inadequate. It is based upon a fundamentally flawed Hydrology Model that cannot be fixed merely by answers to the questions posed. The DEA is incapable of being cured by a simple amendment. BLM must re-run the Hydrology Model to address all of the foregoing comments and questions. At a minimum, the DEA must be revised and completely rewritten consistent with the new Hydrology Model. Then, the DEA should again be subject to public examination and comment. However, the more appropriate action is for BLM to prepare an environmental impact study under NEPA and release it for further public comment. A-305

Very truly yours,

ARNOLD, BLEUEL, LAROCHELLE,
MATHEWS & ZIRBEL, LLP

Gary D. Arnold

Gary D. Arnold

GDA:jw
cc: Little Lake Ranch, Inc.

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EXHIBIT B

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January 20, 2009

Linn Gum
Bureau of Land Management
300 S. Richmond Road
Ridgecrest, CA 93555

Re: Coso Operating Company
CACA-046289, CA-650-2005-100
Finding of No Significant Impact

Dear Mr. Gum:

This letter presents the comments of Little Lake Ranch, Inc. ("LLR") in opposition to the proposed Finding of No Significant Impact prepared by the Bureau of Land Management ("BLM") in connection with the Coso Operating Company Hay Ranch Water Extraction and Delivery System, CACA-046289, CA-650-2005-100 project ("Project"). The FONSI should not be issued without the preparation of a full Environmental Impact Study ("EIS") under the provisions of NEPA, or should be modified as suggested below, if it is issued at all. B-1

LLR does not in any way oppose or object to the geothermal generation of electricity by Coso. There is no question that the geothermal plant provides a relatively clean and reliable energy source. Coso is a significant employer and provides substantial tax and royalty revenues to the County of Inyo ("County"), BLM and the United States Navy ("Navy"). LLR recognizes all of the benefits flowing from Coso's operations, and is certain that Coso will continue to prosper, even without the Project. B-2

Coso Operating Company, LLC ("Coso") seeks to pump 4,839 acre-feet per year (AFY) of water from the Rose Valley Basin for 30 years. The draft Environmental Assessment ("DEA") prepared by BLM, which is primarily based upon the hydrology and alternative studies found in the draft environmental impact report (DEIR) prepared by the County of Inyo ("County") and released for public comment in July 2008, states that the exported water will be used for B-3

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injection to replenish the subsurface geothermal fluids ("Geofluids") due to water loss caused by evaporation. B-3 (Cont.)

Coso wants the imported water for two basic reasons. First, Coso decided to install water-cooling towers (WCTs), at the cost of enormous losses of water through evaporation, merely for its profit, rather than air-cooled condensers ("ACCs"). Second, Coso installed more geothermal production wells than could be naturally recharged. Coso chose to exploit the geothermal reservoir beyond reasonable limits of sustainability. During the approval process for the additional production wells drilled by Coso, BLM failed to address the over-exploitation of the geothermal reservoir which has now been seriously depleted and failed to consider the impacts which may arise as the reservoir dried out, resulting in the current request by Coso to import water from Rose Valley. Coso wants the water as a temporary band-aid to maintain production, as the most inexpensive alternative available. In doing so, Coso will cause severe and unnecessary environmental damage. B-4

Sooner rather than later, Coso will have to stop pumping. With this in mind, Coso is already planning major capital improvements to maintain its production. Refer to the Fitch and Moody's ratings reports that Coso's parent intends to spend anywhere from $60,000,000 to $100,000,000 in improvements, copies of which are attached to my letter on the DEA. B-5

The DEA relies upon the same new numerical groundwater flow model for the Rose Valley Basin ("Hydrology Model") prepared by the County. The Hydrology Model predicts what will happen upon the commencement of pumping by Coso. For the reasons noted below, the Hydrology Model is fundamentally flawed and unreliable. B-6 Nonetheless, even the Hydrology Model predicts that (a) if Coso pumps and transports water at a rate of 4,839 AFY, Coso would have to completely stop pumping after 1.2 years to avoid causing Little Lake to lose more than 10% of its water, or (b) under the most optimistic assumptions, Coso can only pump 480 AFY of water for 30 years to avoid reducing Little Lake's water supplies by more than 10%. B-7

The Little Lake Ranch certified hydrogeologist, Mr. Andrew Zdon, has reviewed the Hydrology Model. His report is being submitted concurrently with this letter, together with two further memorandums recently sent to the County. The Hydrology Model overstates the ability of the Rose Valley Basin to support the pumping Project, and it understates the impacts. In summary, the Hydrology Model must be redone because:

- The thickness of the aquifer was arbitrarily increased beyond reasonable estimates.
- The recharge of the aquifer was arbitrarily increased beyond reasonable estimates.
- The specific yield of the aquifer was arbitrarily increased beyond reasonable estimates.
- There are errors in the model or inputs regarding differences using measures of storativity compared to specific storage.
- The impacts to Rose Valley and Little Lake were not based on a calibrated model.

B-8

- The unreasonable and arbitrary inputs and assumptions used in the Hydrology Model, which are at variance to prior reports, were not discussed or justified.
- The reasons for excluding the Portuguese Bench springs are not supported by the Hydrology Model.
- There is an unexplained and questionable use of data only from the recent 14-day pumping test, rather than use of all available data to provide inputs.
- Even using the flawed Hydrology Model, the triggers are not adequate to protect the Rose Valley and Little Lake from increasing harm after pumping stops.

B-8 (Cont.)

Even using the flawed Hydrology Model, the Project and proposed hydrology monitoring and mitigation plan ("HMMP") is likewise inadequate to protect the Rose Valley and prevent environmental harm for the following reasons:

- The Hydrology Model uses annual average conditions without considering the cumulative effects from pumping over a course of several drier than normal years.
- Even with mitigation, Little Lake will lose 10% of its water inflows, and the other Rose Valley residents and businesses will also suffer water losses.
- Even after all pumping stops, the impacts to Little Lake and Rose Valley will continue to get worse, and the aquifer will not recover the 10% water loss for more than 100 years, if ever.
- The triggers at which pumping is reduced or curtailed are not set at levels which address both the problems of pumping during droughts and the continuing decline in water levels and flows even after pumping stops.

B-9

A 10% loss of water inflows at Little Lake is a significant environmental impact, and requires the preparation of an EIS. According to Table 3.2-6 at page 3.2-42 of the DEA, the proposed pumping will ultimately draw down the underground water levels, kill vegetation reducing evapotranspiration, and reduce groundwater discharges at Little Lake. The Rose Valley Aquifer should not be forced to suffer any water loss by virtue of the Project, nor should Little Lake be denied 10% of its normal water inflows.

B-10

The DEA is deficient as presented. It does include the numerous changes made by the County when it released the final Environmental Impact Report (FEIR). BLM should also respond to all comments presented to the County. Moreover, because of the significant environmental harm that will be caused by the Project, an EIS is required and issuance of the FONSI is not permitted.

B-11

If Coso pumped water at the full pumping rate for 30 years, the water level at Little Lake would drop by anywhere from 3' to 8', and not fully recover for 150 years, even after all pumping stops. The only Project alternatives given any credence in the DEA are reducing initial pumping levels at varying rates, or possibly the duration of pumping. Alternative 1 would reduce the pumping rate from 180 AFY to 480 AFY for 30 years, which would still result in the 10% loss of water at Little Lake. Alternative 2 would reduce the pumping rate and duration of the

B-12

Project to 1 of 3 options: 750 AFY for 6 years, 1,500 AFY for 3 years, or 3,000 AFY for 1.75 years. These alternatives are compared to the Project, with mitigation requiring the cessation of pumping after only 1.2 years. In all cases, the pumping would still result in the 10% loss of water at Little Lake and the Rose Valley Aquifer would not recover for more than 100 years after pumping finally stops. B-12 (Cont.)

LLR has identified feasible alternatives to the Project. Among them are: (a) the retrofit of Coso's Plant to use ACCs to completely eliminate the loss of water at Coso through evaporation, (b) the reduction of Geofluids production, (c) the drilling of new or deeper production wells to tap new sources of geothermal fluids, (d) investment in capital upgrades to the Coso facility or method of operations, (e) the purchase of water from LADWP, (f) the transport of water from nearby aquifers, such as Owens Valley or Indian Wells water basins, or (g) a combination of the alternatives. These alternatives are summarily rejected in the DEA as not being feasible, based primarily on Coso's sole judgment of economic feasibility. Without the Project, one or more of these alternatives will quickly become "feasible" to Coso, and they provide the roadmap by which Coso will remain productive. B-13

The conversion to ACCs would be relatively expensive, but Coso has already committed to make capital improvements. The conversion to ACCs may reduce electricity production, but Coso would (a) be able re-inject virtually all of the produced Geofluids, (b) indefinitely extend the life of the geothermal plant, possibly in perpetuity, and (c) forever eliminate any need for imported water. While the footprint of an air-cooled system would be larger than the existing WCTs, it would be far less than the 60 acres needed to build the Project (FEIR, page 3-3), and it would eliminate all impacts related to the construction of the 9-mile-long pipeline. Likewise, the air-cooled system would use some electricity for cooling, but such electricity would be offset by the energy saved in not pumping and transporting water from the Rose Valley. The DEA should consider how much energy Coso could produce over time by using an air-cooled system, compared to the short-term increase of productions due to water injection. B-14

Alternatives are not infeasible simply because they may cost more to implement than the proposed Project. If the profitability of Coso were the only measure, no mitigation of environmental impacts would ever occur. Hundreds of billions of dollars if not trillions of dollars have been spent directly by private industry to reduce environmental damage over the preceding 20 to 30 years since the adoption of NEPA. Society recognizes that sometimes short-term profits or greater costs to operate are proper and prudent in order to save valuable environmental resources. All power-generation facilities impact the environment, and virtually all have had to change their methodology of operations or equipment to reduce these environmental impacts. That is all that LLR is suggesting to the County. The County should make Coso install less intrusive equipment and facilities so as to not jeopardize the water in Rose Valley for the use by future generations. B-15 B-16

Ronald DiPippo, a geothermal engineering expert, submitted a report which concludes that each of the alternatives concerning the design, upgrade and operation of the Coso plant are B-17 potentially feasible to eliminate the need of imported water. His report should be carefully read and considered before subjecting the Rose Valley to the proposed water losses. B-17 (Cont.)

Coso is a hugely profitable company. According to the U.S. General Accounting Office in 2004, the Navy had received about $249 million in royalties from 1987 through 2003, based on total electricity revenues of $2.3 billion received by Coso during the same period. In the calendar year 2004, Coso earned approximately $50,000,000 in net income, according to publicly available financial reports. The Fitch ratings reports provide an insight into the earnings of Coso. B-18

Coso's Project will deprive other commercial enterprises and the future residents of Rose Valley of vital water resources, solely because the Project will cause a decline of underground water levels. LADWP proposes to pump an additional 900 AFY to recover water seepage from Haiwee Reservoir. At least two companies have proposed additional geothermal explorations in the vicinity of Coso, including Deep Rose and Max Management, both of which will need some water. The DEA does not address these cumulative impacts because it asserts that the future projects are speculative. No accommodation has been made to force a reduction in, or curtailment of, the water pumping proposed by Coso to allow for projected growth within Rose Valley. B-19

The efficacy of the HMMP relies upon Coso to conduct the monitoring, notify the County and other landowners in Rose Valley of problems, and then to curtail pumping when requested by the County. Such reliance on the good faith of Coso is misplaced. The HMMP should be performed by the County or an independent water master, but funded by Coso. Once Coso has the CUP in hand for a 30-year pumping project, Coso will likely take all steps, including litigation, to prevent a reduction or curtailment of pumping, regardless of the conditions of the CUP to the contrary. B-20

The DEA suggests a "base line" monitoring of current water table conditions in the Rose Valley for only 6 months before pumping begins. Without an adequate base line, the Hydrology Model cannot effectively set the initial water table levels from which the triggers are measured. No pumping should commence until this pre-project monitoring has occurred for at least 12 months before pumping begins. Since the construction of the Edison substation to supply power will take 12 months to complete according to the DEA, pre-project water monitoring for 12 months should not pose any additional delays on the Project. B-21

Any and all water table reductions must be presumed to be caused by the pumping. Coso's pumping should be expressly and without question subordinate to the legal rights and needs of all of the overlying owners. Coso must not be given any opportunity to delay the reduction of pumping when triggers are reached to debate the "cause" of the drawdown. If triggers are reached, pumping should stop and Coso should bear the burden of proving that its pumping did not cause the trigger to be exceeded. B-22

The adequacy of the mitigation measures is further flawed, because the Hydrology Model is based upon average annual conditions. In drier years, the pumping from the Project will accelerate or worsen the impacts from the drought cycle. To avoid even a 10% loss at Little Lake, the mitigation measures must assume a worst case scenario of a prolonged drought while pumping occurs. Such a loss of water inflows will materially impact Little Lake, and its surrounding ponds, wetlands, riparian habitat and wildlife. Just as LADWP is not allowed to pump as much water in drier years, so must the rate of pumping by Coso be automatically reduced in times of drought. **B-23**

The triggers, set forth in the attached Table C4-1, are also misplaced and inadequate. The cessation of pumping at triggers which are set at the maximum allowable water level drop is not adequate. The Hydrology Model predicts that water table levels will continue to decline even after pumping stops. Thus, the triggers have to be set at more stringent levels to take into account the continuation and worsening of water losses following the cessation of pumping. **B-24**

LEGAL ANALYSIS OF FONSI

The BLM may adopt a FONSI for a proposed action only in the event that the action will clearly cause no significant effect on the human environment. (40 C.F.R. § 1508.13.) However, "an EIS *must* be prepared if substantial questions are raised as to whether a project *may* cause significant degradation of some human environmental factor." (*Alaska Wilderness League v. Kempthorne* (9th Cir. 2008) 548 F.3d 815, 824.) This standard does not require a showing that significant effects will *in fact* occur, but rather only that there are "substantial questions whether a project may have a significant effect." (*Center for Biological Diversity v. National Highway Traffic Safety Admin.* (9th Cir. 2008) 538 F.3d 1172, 1219-20.) If an agency finds that an EIS is not required and instead issues a FONSI, it must provide a "convincing statement of reasons" to explain its decision. The agency cannot rely on mere "conclusory assertions that an activity will have only an insignificant impact on the environment." (*Alaska Wilderness League*, 548 F.3d at 824.) Rather, the agency must demonstrate that it took the requisite "hard look" at the potential environmental impacts of the project in order to justify its conclusion that the project will have no significant effects. (*Blue Mountains Biodiversity Project v. Blackwood* (9th Cir. 1998) 161 F.3d. 1208, 1212.) General statements about "possible" effects and "some risk" do not constitute a "hard look" absent a justification regarding why more definitive information could not be provided. (*Id.* at 1213.) Before an agency brings about or authorizes a potentially significant and irreversible change to the environment, an EIS must be prepared that sufficiently explores the intensity of the environmental effects of a proposed project. (*National Parks & Conservation Ass'n v. Babbit* (9th Cir. 2001) 241 F.3d 722, 733.) **B-25**

To determine whether a proposed project will have significant impacts on the environment, an agency must evaluate, among other factors, the unique characteristics of the affected geographic area, the degree to which the effects on the quality of the human environment are controversial, and the degree to which the possible effects of the proposed action are highly uncertain or involve unique or unknown risks. (40 C.F.R. § 1508.27(b); *see* **B-26** *also Blue Mountains*, 161 F.3d at 1212.) Either controversy over the nature of a project's anticipated impacts or uncertainty regarding the nature or intensity of such impacts, alone, may be sufficient to require the preparation of an EIS. (*National Parks & Conservation Ass'n*, 241 F.3d at 731, 736; *see also Blue Mountains*, 161 F.3d at 1213-14 (holding that uncertainty regarding the effects of proposed timber sales contracts triggered requirement that EIS be prepared).) A substantial dispute exists when evidence presented to the lead agency casts doubt upon the reasonableness of the agency's conclusions. (*National Parks & Conservation Ass'n*, 241 F.3d at 736.) **B-26 (Cont.)**

Moreover, though an agency's decision to forego issuing an EIS may be justified in some circumstances by the adoption of mitigation measures intended to offset the anticipated impacts of a proposed project, the proposed mitigation measures "must be discussed in sufficient detail to ensure that environmental consequences have been fairly evaluated." (*Neighbors of Cuddy Mountain v. U.S. Forest Serv.* (9th Cir. 1998) 137 F.3d 1372, 1380.) A perfunctory description or mere listing of mitigation measures, without supporting analytical data, is insufficient to support a finding of no significant impact. (*National Parks & Conservation Ass'n*, 241 F.3d at 734.) **B-27**

LLR has submitted three separate reports from Andrew Zdon, certified hydrogeologist, which raise significant questions as to the accuracy and reliability of the Hydrology Model. Moreover, LLR has identified numerous likely adverse impacts that the Project will have on Rose Valley and Little Lake. A loss of the water inflows of 10% is much greater than the threshold of significance, particularly when Little Lake and the Rose Valley will not recover the effects of pumping for more than 100 years after pumping stops. Under these circumstances, a FONSI is not permitted and an EIS must be prepared. **B-28**

CONCLUSION

The entire Hydrology Model should be recalibrated and rerun. Once the true results are known, the HMMP has to be redrafted and new trigger points set. BLM should deny the right-of-way until an EIS is prepared and circulated for public comment. In the alternative, a very limited FONSI could be issued to allow a pumping rate of 750 AFY for 2 years that would be more than adequate to stress the aquifer and recalibrate the Hydrology Model. At that time, based upon real data and not just the predictions of a model, Coso can apply for an extension of pumping if the recalibrated Hydrology Model proves water is available and it is safe. **B-29**

Coso should bear the risk of loss (i.e. expenses to build the pipeline) if the new calibrated Hydrology Model shows that higher pumping is not possible. It is Coso that wants to transport the water off the Rose Valley Basin.

The Project should not be approved to provide Coso a limited and temporary source of injection water, when there are other feasible alternatives to allow for sustained and profitable geothermal energy production. Alternatives to the Project are not infeasible, merely because they may cost more than the Project. **B-30**

LLR urges BLM to (a) reject the Project, and allow Coso to pursue the alternatives mentioned above, or (b) reject the DEA entirely, unless a full EIS is published for further comment. Despite our objections, if the FONSI is signed and a right-of-way is granted, then the Project should further be conditioned on the following:

- Adopt as the Mitigation Standard, as previously suggested by one of the County's lawyers: "The County will ensure that the natural environment of the Little Lake area will not be adversely impacted by water extraction and export from the Hay Ranch water wells. This standard will be enforced by ensuring that groundwater levels, flows, and discharge in the vicinity of Little Lake are <u>unaffected</u> by water extraction from the Hay Ranch Wells."
- Prohibit any overdrafting of the Rose Valley Basin.
- Allow water pumping and transportation for the maximum of one (1) of the following:
  - 4,800 AFY for 1.2 years, or
  - Any one of:
    - 180 AFY for 30 years,
    - 750 AFY for 6 years,
    - 1,500 AFY for 3 years, or
    - 3,000 AFY for 1.75 years
- Monitoring of all wells and springs in Rose Valley should occur.
- Triggers should be set for all wells and springs in Rose Valley to reduce or curtail pumping according to the HMMP.
- Triggers must account for continuing water level declines after pumping stops.
- Pumping must stop if springs are impacted.
- The County should initiate mitigation in the event water levels or flows at any of the wells or springs are reduced, not the well or spring owner.
- Coso should be responsible for mitigation of impacts for so long as adverse impacts exist.
- Appoint a technical advisory committee or independent water master to recalibrate the Hydrology Model, with input from all stakeholders.
- A minimum of 12 months should be required before pumping begins to establish base line water levels.
- The base line levels should be set to avoid impacts during drought.
- Reduction of pumping should be mandatory if a trigger is reached in any one (1) monitoring well, without any requirement to prove the pumping caused the drawdown.
- If a trigger or maximum drawdown thresholds are reached in any well or spring, (a) pumping should stop, (b) the Hydrology Model must be recalibrated with the new pumping data, (c) Coso should bear the burden of proving, by clear and convincing evidence, that its pumping did not cause the exceedance, and (d) before any pumping can resume, a public hearing on the resumption must be conducted.
- All monitoring data should be available and sent to all property owners of Rose Valley and persons requesting notice.

B-31

- If a maximum drawdown is reached in any well or spring, all pumping must automatically stop, without any requirement to prove the pumping caused the drawdown.
- Regardless of reaching triggers, the recalibrated Hydrology Model must be completed no later than one (1) year after pumping commences. If the Hydrology Model has not been recalibrated by this time, then all pumping should automatically cease until the Hydrology Model is recalibrated, its results are known, and a public hearing is completed
- Require the consultation and agreement to determine an acceptable water table drawdown in the Rose Valley among BLM, USGS, Lahontan Water Quality Board, Inyo County and LADWP, in accordance with the 1980 EIS, at page 3-5.
- Automatically reduce the allowable pumping by Coso by the amount of any increased pumping or consumption of water by owners within Rose Valley, including LADWP for its seepage recovery project.

B-31 (Cont.)

Very truly yours,

ARNOLD, BLEUEL, LAROCHELLE,
MATHEWS & ZIRBEL, LLP

Gary D. Arnold

Gary D. Arnold

GDA:jw
Attachments
cc: Little Lake Ranch, Inc. (via e-mail)

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MEMORANDUM

To: **Gary Arnold, Arnold, Bleuel, LaRochelle, Mathews & Zirbel, LLP**
Walt Pachucki, TEAM Engineering & Management, Inc.

From: **Andrew Zdon, P.G., C.E.G., C.Hg., Golden State Environmental, Inc.**

Date: **January 14, 2009**

Re: Comments Concerning Coso Operating Company Hay Ranch Water Extraction and Delivery System, Meeting Comments

In response to the discussions at the Inyo County Water Commission meeting on January 12, 2009, Golden State Environmental, Inc. (GSE) wanted to provide some clarifications regarding our views of the Rose Valley model. As discussed there is great uncertainty associated with the predictive capabilities of the Rose Valley model. Some of the uncertainty is inherent in groundwater models due to uncertainty, and perhaps reasonable disagreements, in setting parameter estimates, such as recharge, hydraulic conductivity, transmissivity, specific yield, aquifer depth and storativity.

B-32

These uncertainties are then compounded by the additional uncertainties due to the flawed nature of the model which have been described in my previous letters. The critical flaws in the model include:

- Non-use of long-term groundwater level data for calibration;
- Lack of consideration of changing precipitation conditions over time for transient calibration and predictive simulations.
- Sensitivity analyses for recharge were only run for the non-pumping scenarios therefore the effect of full project pumping during dry year recharge conditions is not evaluated.
- Post-calibration alteration of specific yield prior to conducting predictive simulations.
- Unrealistic recharge distribution (recharge to Layer 1 from runoff is absent; all recharge is in deeper layers from mountain-block).
- The predictive model simulations were run with vastly different conditions than the calibration simulations which according to Cal-EPA guidance may make the simulations invalid.

Other uncertainty is tied with the amount of groundwater recharge from the north. Should the Los Angeles Department of Water & Power recover seepage losses (estimated at 900 afy) from Haiwee Reservoir, a 15 to 20% reduction to the inflow portion of the groundwater budget would be realized. Full project pumping by Coso (4,840 afy) as proposed would then exceed the remaining basin inflow (appx. 3,940 afy) creating an overdraft condition.

With respect to the proposed Hay Ranch project, the importance of the uncertainty is directly tied to the scale of the project. Since the proposed pumping would be nearly equal to estimated recharge from precipitation, major impacts would be expected and the uncertainty of the model becomes a particularly severe issue. As the proposed pumping rate is lowered towards zero, the importance of the uncertainty also is lowered. If the no project alternative (zero pumping) is approved, the uncertainty in the model becomes is academic. All of these issues point to the need to limit pumping to a small fraction of the estimated recharge for a much shorter pre-determined period of time, if the project is approved at all.

With respect to the limited pumping rate, it is important to remember that all of the model runs assume normal precipitation. This is a valid assumption for a model/basin in steady state. However, once project pumping initiates, the basin conditions will change and become transient (changing with time). In that case, transient conditions such as seasonal changes in precipitation/recharge will be very important. The model was not tested for how it responds to dry and wet years when there is project pumping (recharge sensitivity was only tested for non-pumping conditions). Recharge would certainly not be expected to be sensitive for the steady state runs but that would be very unlikely when project pumping is taking place. Witness the need for a drought recovery policy in the Owens Valley.

Any limited pumping should be based on an assumed dry-year condition (for example an estimated 65% year). Taking 65% of the assumed 3,940 afy that would be left if Haiwee seepage is recovered would leave approximately 2,360 afy. Any initial project pumping should be limited to less than half that amount to account for uncertainty in the recharge estimate. 750 afy for two years would allow 465 gallons per minute to be pumped 24 hours per day, 365 days per year for the period and would provide ample stress to the aquifer system to evaluate model predictive capability and potential impacts.

B-32 (Cont.)

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MEMORANDUM

To: **Gary Arnold, Arnold, Bleuel, LaRochelle, Mathews & Zirbel, LLP**
Walt Pachucki, TEAM Engineering & Management, Inc.

From: **Andrew Zdon, P.G., C.E.G., C.Hg., Golden State Environmental, Inc.**

Date: **January 9, 2009**

Re: Comments Concerning Coso Operating Company Hay Ranch Water Extraction and Delivery System, Final Environmental Impact Report

Golden State Environmental, Inc. (GSE) is providing the following comments concerning the final environmental impact report (EIR) described above. GSE's review has been focused on the responses to comments previously submitted by GSE concerning the proposed project including conceptualization of the groundwater regime, aquifer testing, numerical groundwater flow modeling, recommendations for monitoring and mitigation, and overall reporting. Those comments provided a considerable number of issues to be considered. Although there other issues that could be addressed, the following comments will focus on the following key issues: **B-32 (Cont.)**

- The non-use of long-term groundwater-level data during model calibration
- The impact analysis is based on an uncalibrated model;
- The monitoring and mitigation plan may not guard against significant environmental impacts.

NON-USE OF LONG-TERM GROUNDWATER LEVEL DATA FOR MODEL CALIBRATION

Detailed hydrographs and groundwater elevation data from ten wells in the model area date back as far as 1998 (most wells have at least 5 years of data). It is normal practice to calibrate a groundwater model with available groundwater elevation data such as those presented in Tables C2-2 and Figure C2-3. To "calibrate" the model using a 14-day aquifer test and ignore the opportunity to calibrate the model with the existing long-term groundwater elevation history cannot be considered acceptable practice. This goes to the concept of using "time-consistent observations" for transient model calibration, and basing a calibration strategy on how the model is to be used. If the model is to be used to make long-term predictions over many years, groundwater levels used in calibration should span a number of years. Use of short-term data such as those collected from aquifer testing in Rose Valley would be more appropriate if the model was intended to be used for a more short-term prediction (e.g., dewatering an excavation, planning for a groundwater treatment system, etc.).

The EIR describes a number of data limitations such as unknown pumping levels during the period that long-term groundwater level data exist. These are common issues that arise in basin-wide modeling efforts, particularly in the little-populated desert basins of the southwest and can be addressed in a number of ways including, but not limited to, using county records or contacting agricultural commissioners regarding operational histories of farming and using standard water-use estimates for given crops.

Additionally, what is lacking with the approach used is that the model is not tested for seasonal changes in precipitation/recharge conditions. Does the model accurately predict, under-predict or over-predict the groundwater response to dry and/or wet years? Further, the model, calibrated for a basin considered in steady state with only modest pumping, is used to evaluate impacts caused by pumping at very high rates, a vastly different condition. According to Cal-EPA Guidance for groundwater modeling, "*Conditions that are vastly different from the calibration and validation conditions, such as high pumping rates or drawdowns, may invalidate the model as a representation of the physical system.*" This combined with conducting a transient calibration covering less than a month, to make predictions extending over one hundred years only adds to the issue. Based on these concerns, even if we were to accept the model as is, the analysis would still have a wide margin for error. This further points to the need to use the long-term data for calibration purposes.

"UNCALIBRATED" MODEL

Model calibration is a complex process of adjusting model parameters to most accurately simulate measured groundwater levels while maintaining hydrogeologically realistic model parameters. This leads to one of the strengths of numerical models that being a means to evaluate the internal consistency of assumptions that are the conceptual model (our understanding of how the groundwater system works). According to Anderson & Woessner (1992), a standard groundwater modeling reference, "In a predictive simulation, the parameters **determined during calibration and verification are used to predict the response of the system to future events."**

According to the EIR, the specific yield of Layer 1 is "very sensitive." That means that a change in the value of specific yield will have a substantial change in the model's predictions. By changing the specific yield (as was done in the Rose Valley model) after model calibration is completed, the assumptions (or model parameters) are no longer internally consistent, and the impact scenarios are no longer based on the calibrated model. While a specific yield of 10% is a reasonable estimate (as was 3% as calibrated), that change would require additional model calibration and changes in one or more other parameters to maintain model calibration. Certainly trying to calibrate a model with one specific yield estimate to aquifer test data that yielded a significantly different value of specific yield is problematic. This points further to the need to calibrate the model to the long-term groundwater level data which are available using the value of specific yield (10%) used for the predictive scenarios. It is the continued opinion of GSE, that the results of the predictive scenarios as reported in the EIR are critically flawed. **B-32 (Cont.)**

MONITORING AND MITIGATION PLAN

It is clear that much time and effort and has been expended in putting together a thorough monitoring and mitigation plan. However, an over-arching concern of the adequacy of the plan can be summed up in Figure 3.2-17 of the Monitoring and Mitigation Plan (Early Pumping Termination (1.2 years) Scenario Results). As can be seen in the figure, assuming that pumping at the proposed rate is conducted, and assuming the drawdown trigger is reached and the well(s) are shut off after 1.2 years, groundwater levels predicted by the model in its current state would continue to decline for more than 10 years afterward. The model predicts that full recovery of the groundwater system would not occur in less than 100 years. This after only 1.2 years of pumping at project proposed pumping rates and with the 10% specific yield estimate. All of this also assumes that the area experiences 100% of normal precipitation for the entire period (more than 100 years). Given the predicted lag in timing of the full extent of impacts due to pumping, using a standard trigger and response type of management style would be very difficult as by the time a trigger is reached, the groundwater system and Little Lake could already be seriously impacted long-term. The lack of recovery of Rose Spring (likely permanent) is indicative of the slowness in the basin's ability to recover from stresses to the groundwater system.

DISCUSSION

This proposed project raises large water resource management concerns as proposed. Given some of the issues with the quantity of data and current state of modeling, moving forward with the project as proposed is a decidedly risky undertaking from an environmental and basin-management perspective. Given the issues described above either:

- Additional investigation, monitoring, and revision of the modeling should be conducted prior to considering the proposed project where pumping rates approaching in quantity the natural groundwater recharge to basin; or,
- Pumping should be conducted at reduced rates for a to-be-determined interim period to evaluate accuracy of existing analyses, and updating analyses and the proposed project as needed.

Clearly the first option would be a more environmentally conservative approach and would serve to protect Little Lake Ranch to a greater extent. However, the second option, if conducted carefully, could also be protective of the Rose Valley environment including Little Lake Ranch, while helping Coso Geothermal by providing a more sustainable resource.

B-32 (Cont.)

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MEMORANDUM

To: **Gary Arnold, Arnold, Bleuel, LaRochelle, Mathews & Zirbel, LLP**
Walt Pachucki, TEAM Engineering & Management, Inc.

From: Andrew Zdon, P.G., C.E.G., C.Hg., Golden State Environmental, Inc.

Date: September 2, 2008

Re: Comments Concerning Coso Operating Company Hay Ranch Water Extraction and Delivery System, Draft Environmental Impact Report

Golden State Environmental, Inc. (GSE) is providing the following comments concerning the draft environmental impact report (Draft EIR) described above. GSE's review has been focused on evaluating the hydrogeologic evaluation of the proposed project including conceptualization of the groundwater regime, aquifer testing, numerical groundwater flow modeling, recommendations for monitoring and mitigation, and overall reporting. As part of this analysis, model files provided by Geologica were used to evaluate the modeling effort. Our comments are described below based on these files and the associated reporting. Although numerous, the following is a partial list of some of the major issues resulting from our review:

- It is unclear why major deviations from the work by the U.S. Geological Survey are made, especially when data needed to support those deviations are lacking or absent, and can serve to lessen predicted project impacts.
- As modeled, extending the aquifer to an artificial and unrealistic great depth serves to significantly increase the estimated volume of groundwater in storage available for extraction to the project; thereby artificially and unrealistically lessening predicted impacts.
- Geologica provides no specifics as to why they chose 10% for the recharge value, this value being significantly higher than the estimates to the north or south, and may be a remnant of the calibrated estimate of the Brown and Caldwell model which was calibrated with differing boundary conditions and aquifer parameter estimates.
- Geologica has arbitrarily increased the specific yield; thereby decreasing the predicted future drawdown due to pumping. With this arbitrary change, Geologica has artificially and unrealistically caused the model to under-predict drawdown during the simulation period.
- The impact analysis is based on an uncalibrated model and faulty assumptions and analysis; therefore, the reliability of all groundwater impacts predicted and the mitigation measures set forth in the Draft EIR is critically undermined.

B-32 (Cont.)

Overall, the documentation of the modeling is incomplete in that specific input data are not detailed in the report, explanations of the use of certain data are unclear, and key results (such as groundwater budgets) are omitted. The model files provided by Geologica appeared to be a mix of MODFLOW-88/96 and MODFLOW-2000 files. As reiterated and further developed in this letter, fundamental flaws in modeling approach, omission of key results (e.g., groundwater budget), and the arbitrary change in aquifer parameters are far more significant than would non-working and/or inconsistent files.

CONCEPTUALIZATION OF THE GROUNDWATER REGIME

As reported, the conceptualization of the Rose Valley aquifer system was largely based on the work conducted by the U.S. Geological Survey for the Owens Valley (Danskin, 1998). The work conducted by Danskin represents the most in-depth hydrogeologic investigation of the Owens Valley region, and the numerical modeling presented in the Danskin report should form the basis of any more detailed modeling analyses in the region. The similarities between the area of the Owens Valley modeled by the U.S. Geological Survey and Rose Valley are readily apparent. It is unclear why then, in some key areas, major deviations from the work by the U.S. Geological Survey are made, especially when data needed to support those deviations are lacking or absent.

One example is the groundwater flow system with respect to aquifer thickness (assumed thickness of up to 3,000 feet). Danskin (1998) reports,

> *"Despite its large volume, the quantity of ground water flowing through or extractable from hydrogeologic unit 4 probably is minimal. Deep test drilling during 1988 by the Los Angeles Department of Water and Power (E.L. Coufal, oral commun., 1988) showed that most materials at depths greater than about 700 ft do not yield significant quantities of water to wells, generally less than 0.2 cubic feet per second."*

In support of Danskin, this has generally been our experience in other alluvial basins in the desert southwest. Given the depths of existing wells reported in the Draft EIR, this also appears to have been the case in Rose Valley. It is unclear then, on what basis the presented groundwater flow model extends the depth of the aquifer system to 3,000 feet below ground surface. This deviation from Danskin (a carry-over from the Brown and Caldwell modeling effort), and used in the draft EIR, requires additional data to justify this assumption. As modeled, extending the aquifer to an artificial and unrealistic great depth serves to significantly increase the estimated volume of groundwater in storage available for extraction to the project; thereby lessening predicted impacts. B-32 (Cont.)

On page C2-8, it is noted that the total volume of precipitation in the area is 42,000 acre feet per year (AF/yr), and assumes that 10% of this rainfall would recharge the groundwater basin. It further notes that Danskin used a value of 6% of rainfall for recharge in the Owens Valley to the north, and Williams used a value of 8% of rainfall for recharge in the Indian Wells Valley to the south. Geologica provides no specifics as to why they chose a value of 10%, which is higher than the estimates to the north or south, other than Geologica used the calibrated estimate of the Brown and Caldwell model (the Brown and Caldwell model was calibrated with differing boundary conditions and aquifer parameter estimates). The 10% estimate used by Geologica would result in greater volumes of recharge to the basin than would the assumptions used by previous investigators, and would likely lessen the impacts of the proposed pumping.

Another issue concerning the conceptualization of the groundwater system involves the description of Rose Spring. The Draft EIR refers to Rose Spring as dry. The Draft EIR also notes that a concrete structure and water pipes that once fed water from Rose Spring to the concrete structure are present, but are in a current state of disrepair. The disparity of ground surface elevation and the existing groundwater surface elevation (described as approximately 300 feet in Appendix C2) is noted. Additionally, it is stated that Rose Spring is not connected to the saturated aquifer (a more detailed discussion of the source of groundwater for this condition should be included). Thus, the Draft EIR concludes that impacts to the spring are not predicted. That certainly would be the case today. Based on the extended periods of time that would be required for water level recovery after the proposed project is complete, it can be extrapolated that the current dry state of Rose Spring could also be correlated with the overdraft of the Rose Valley system resulting from earlier agricultural pumping at Hay Ranch. In other words, the former agricultural pumping may well have caused Rose Spring to go dry, and the aquifer has not recovered sufficiently to restore the flow to Rose Spring. This concept is completely overlooked in the Draft EIR despite its consistency with modeled results. Additional discussion concerning this scenario should be included in the DEIR.

NUMERICAL GROUNDWATER FLOW MODELING

As reported, the numerical modeling conducted by Geologica does not follow protocols of standard professional practice, is based on faulty conceptualization as described above, and provides conclusions based on uncalibrated model results. Additionally, the lack of proper model documentation may lead to insufficient or inappropriate monitoring and mitigation.

Geologica's modeling approach started with the use of a previous model developed by Brown and Caldwell. Geologica completed a transient (changing conditions over time) recalibration of the Brown and Caldwell model based on a 14-day aquifer test at the Hay Ranch. Using the aquifer parameters from the transient calibration (based on the 14-day test), the steady-state (constant or equilibrium conditions) version of the model was then recalibrated by adjusting mountain front recharge rates and constant head boundary values. However, Geologica (pg. C2-16) also stated that they adjusted hydraulic conductivity and general head boundary conductance values during the steady-state recalibration. It is unclear what the transient calibration accomplished.

More puzzling is the presentation of detailed hydrographs and groundwater elevation data from ten wells in the model area that date back as far as 1998 (most wells have at least 5 years of data). It is normal practice to calibrate a groundwater model with available groundwater elevation data such as those presented in Tables C2-2 and Figure C2-3. To "calibrate" the model using a 14-day aquifer test and ignore the opportunity to calibrate the model with over 5 years of groundwater elevation history cannot be considered acceptable practice.

B-32 (Cont.)

The issue of modeling approach is significant in that the "use" of the model is to predict impacts associated with pumping over several years. Geologica "calibrated" the model using a combination of a single month of data (and assumed it represented steady-state conditions) and the drawdown data from a 14-day test. A far more robust calibration would have been to use the full dataset presented in their report.

On page C2-18, Geologica stated:

> *The model calibration to the 2007 pumping test data yielded an estimated specific yield for the alluvial aquifer of 3 %. This value is quite low for typical sand and gravel aquifers such as occur in Rose Valley and is believed to underestimate the specific yield value applicable to multi-year pumping.*

The paragraph continues by citing references that correctly point out that specific yield results from short-term aquifer tests are often not representative of long-term specific yields. This affirms the previous comments regarding the need to calibrate a model with data that are consistent with the ultimate use of the model. In this case it would be far more appropriate to have calibrated the model with the more than five years of data from Table C2-2 and Figure C2-3 than to "calibrate" it to a 14-day test and a one-time measurement of groundwater elevations and assume that it is representative of "steady-state" conditions.

Geologica continues with references to "text-book" estimates of specific yield based on aquifer material, and concludes:

> *Because specific yield could not be determined from the pumping test data, a range of values corresponding to high, medium, and low values of 30, 20 and 10 % were used in the project development impact analyses discussed below.*

In the next section (also on page C2-18), Geologica reiterates:

> *All aquifer parameters were maintained as described for the calibrated model with the exception that specific yield in the uppermost model layer was set to values of 10%, 20% or 30% for individual model runs to assess sensitivity to this parameter.*

The arbitrary increase in specific yield has the effect of decreasing the predicted future drawdown due to pumping. By making this arbitrary change, Geologica has artificially and unrealistically caused the model to under-predict drawdown during the simulation period.

Freeze and Cherry (1979, pg. 61) stated that the usual range of specific yield is between 0.01 and 0.30. While the "text-book" values that Geologica cites are likely accurate based on laboratory analysis of homogenous sediments as inferred in their Table C2-5, the Freeze and Cherry estimates are based on heterogeneous conditions normally encountered in field applications (see the discussion at the top of pg. 48 of Freeze and Cherry).

The "calibration" of the model to the data from the 14-day aquifer test yielded a specific yield result (0.03) that is well within the range cited by Freeze and Cherry. However, it is likely that this value may not be representative of a specific yield over several years. A more appropriate solution to this limitation is to calibrate the model to the multi-year dataset contained in the report. It is unacceptable to simply choose a new parameter estimate, especially one that will result in less drawdown under the proposed pumping condition.

B-32 (Cont.)

Further, changing the specific yield would undoubtedly require adjustment of other aquifer parameters in order to maintain model calibration. Reporting of additional recalibration after parameter adjustments was not disclosed in the Draft EIR. The Draft EIR does not contain a description concerning the evaluation of any changes in model calibration that should have occurred as a result of making each change in specific yield or other parameter adjustments. Therefore, the impact analyses were essentially based on an uncalibrated model. This error in basic modeling principles undermines the reliability of all groundwater impacts predicted and the mitigation measures set forth in the Draft EIR.

A significant problem is in the specification of storativity. Inspection of the provided MODFLOW files and statements in the report yields the conclusion that they likely contain estimates of specific storage rather than storativity as reported. Of note is that the storativity presented in Appendix C2 (Page C2-16) is provided with dimensional units while storativity is essentially a ratio, i.e., is a dimensionless number. If it is assumed that specific storage is being referred to, the resulting storativities vary from cell to cell based on aquifer thickness and range three orders of magnitude for Layer 2 (10^{-3} to 10^{-6}, dependent on aquifer thickness); and for Layers 3 and 4 are more typical of semi-confined conditions (10^{-3} to 10^{-4}), an unrealistic condition for these very deep sediments. For Layers 3 and 4, these storativities appear high. Further, having lower storativities in Layer 2 than in Layers 3 and 4 seems highly unlikely from a geologic perspective. Given the lack of the presentation of a sensitivity analysis, it is unclear as to the effects of this issue. If storativity was supposed to be set at 7 x 10^{-7}, an error in model data input occurred, and the input need to be corrected and the model recalibrated.

The following provide some additional specific comments concerning the numerical modeling:

Page C2-13 - Geologica states that mountain- front recharge is distributed amongst all 4 model layers. However, the model files (both the MODFLOW files and the Groundwater Vistas files) contain recharge in layers 2, 3 and 4, but not in layer 1. Either the text, or the Rose Valley model, needs correcting to resolve this issue. The absence of recharge in Layer 1 would be a major deviation from the conceptualization by the U.S. Geological Survey (Danskin, 1998) for the Owens Valley. This deviation would require additional discussion and justification.

Page C2-14 - The evapotranspiration rate is not specified in the report. All model files specify a rate of 2.52E-02 ft/day, which equals 9.2 ft/yr. This value appears to be significantly higher than similar estimates used in groundwater models of the Owens Valley without any explanation. Page C2-4 indicates that "*the area's annual evapotranspiration rate is reported to be 65 inches (CRWCB, 1993).*" This is apparently a data input error. Again, the lack of a reported sensitivity analyses results in not knowing the importance of this issue to the overall analysis.

Page C2-14 and C2-15 – Geologica stated that they chose to use General Head Boundaries (GHB) in the Little Lake area to simulate basin outflow rather than Drain (DRN) boundaries as Brown and Caldwell had done. Geologica's reasoning was as follows:

> *The MODFLOW drain package stops calculating flow to the drain when the local groundwater elevation drops below the base of the drain. It is anticipated that groundwater will continue to discharge to Indian Wells Valley at a reduced rate, even if pumping draws groundwater levels down below the level of Little Lake at some point in the future; thus the MODFLOW drain package does not adequately represent possible worst case conditions in the area. Use of MODFLOW GHB cells in this area better represents hydrogeologic conditions and allows both groundwater elevation and discharge rate to be easily monitored during simulations.*

Geologica is correct in stating that the basin outflow would be reduced to zero if the groundwater elevation dropped below the specified head of the DRN boundary. DRN boundary flow will decrease linearly with decreasing groundwater elevation until the groundwater elevation drop below the specified DRN boundary head, at which point flow is zero. It is therefore unclear what Geologica means when they state that DRN boundaries are not adequate to simulate the outflow. If the conceptualization is to permit outflow only at a rate that decreases with decreasing groundwater elevation, the use of the DRN package is appropriate.

The use of the GHB boundary results in a different situation where groundwater elevations drop below the boundary head estimate. With the DRN package, outflow would cease; with the GHB package, flow would reverse. Geologica has added the potential of groundwater flowing into Little Lake from the south by using the GHB package. This conceptualization is different than that used by Brown and Caldwell, and needs further discussion in the report. Essentially, this conceptualization would allow water to flow northward from Indian Wells Valley toward Rose Valley if groundwater levels dropped below those set in the GHB package. This would be an unrealistic condition.

Page C2-15 to C2-16 and Figures C2-8 to C2-11 – The horizontal hydraulic conductivity of all layers is apparently isotropic (equal in all directions) without any explanation.

B-32 (Cont.)

Estimates of vertical hydraulic conductivity were initially set equal to horizontal hydraulic conductivity which is physically unrealistic (given the typically layering of sediments present), and then "lowered to 1 ft/day to be more consistent" with the results of the aquifer test. During "recalibration" (discussed on page C2-16) it is stated that the vertical hydraulic conductivity was lowered further. Figure C2-8 to C2-11 show that "calibrated" vertical hydraulic conductivity estimates in the area of Hay Ranch (the location of the aquifer test) are 0.019 ft/day in layers 1 and 2, 0.003 ft/day in layer 3, and 0.28 ft/day in layer 4. If the aquifer test suggested a value of 1 ft/day, and the value had to be lowered this much to obtain a reasonable calibration, it suggests that 1) the test data were not reliable, 2) a calibration of the model using data presented in Table C2-2 and Figure C2-3 would be beneficial, or 3) the calibration is critically flawed. In either of the three cases, additional model calibration or reconceptualization appears to be needed prior to conducting the impact analysis.

Finally, the concept that alluvial fan deposits, basin fill deposits (including those to 3,000 feet below ground surface) and the volcanic rocks between Hay Ranch and Little Lake would have identical aquifer characteristics throughout the region for each layer is not supportable from a geologic perspective. Clearly, volcanic rocks will have differing hydraulic characteristics than alluvial fan deposits. Discussion should be provided as to why the model parameter zonation didn't approximate the parameter zonation as presented in the Owens Valley numerical groundwater flow model prepared by the U.S. Geological Survey.

RECOMMENDATIONS FOR MONITORING AND MITIGATION

Given the flawed modeling analysis as it currently exists, and which forms the basis of the monitoring and mitigation plan, it follows then that the monitoring and mitigation plan is based on faulty assumptions and analyses. Detailed review of the thresholds and triggers becomes a moot point because under the current analysis, there is no reliable basis from which to generate those threshold and triggers.

B-32 (Cont.)

A major concern is that the model currently predicts that impacts to the groundwater system (including at Little Lake) would continue to increase for an extended period of time after pumping has ceased (assuming pumping could continue for 30 years). Based on these results, once a trigger/threshold is reached and pumping is halted, impacts to Little Lake could continue to increase causing serious impacts to the Little Lake area. To avoid the 10% decline at Little Lake, the triggers for pumping reduction or curtailment would have to be set at a level assuming that the impacts will continue and become even more pronounced after pumping stops. Further, there is no discussion as to what baseline conditions for the trigger/thresholds presented will be. Establishing triggers and thresholds from an essentially moving target such as the groundwater surface over time as shown in the figures provided in Appendix C2 is problematic. How will drawdown attributability be established?

The monitoring and mitigation plan will also need to address potential impacts at the Portuguese Bench area. Although the DEIR states that impacts are unlikely to spring flow at that location, the numerical model predicts that groundwater elevation declines on the order of 20 to 30 feet immediately adjacent to the springs at Portuguese Bench will occur. In fact, the only reason that impacts are not predicted by the model at Portuguese Bench is because the model domain was terminated immediately down-gradient from the springs at Portuguese Bench eliminating the ability of the model to evaluate those conditions. This model construction issue, is also a major deviation from the previous work in the region by the U.S. Geological Survey who extended their model boundaries up to the mountain-front as opposed to only half-way up the alluvial fans of the Sierra Nevada. Of note is that on the eastern side of Rose Valley, the model domain extends right up to the mountain-front of the Coso Range.

It is not surprising, given the distance from the Hay Ranch to Portuguese Bench that the effects of pumping during the aquifer test were not seen at that location. That condition would likely take much longer than 2 weeks to develop. However, it is clear that significant drawdown in the Rose Valley would result in a steeper gradient across the faulted terrain that makes up Portuguese Bench, and would likely result in a reduction in spring flow. This is a simple groundwater-budget issue as described further in the Reporting section of this letter.

Reviewing the precipitation records of the region will indicate that average annual conditions are rarely achieved. A dryer-than-average period of several years may be followed by one or two very wet years, and then followed by another dry cycle. Based on the model results, the effects of pumping for a given year, may last for a much greater period than that for which pumping was conducted. Indeed, if the pumping rate were allowed during a succession of several dry years, the impacts would be significantly greater from the cumulative effects of the dry years and the pumping. It is unclear then how project pumping at the proposed rate (greater than 4,800 AF/yr) would affect the groundwater system (including at Little Lake) if three or four consecutive dry years occurred and groundwater pumping could exceed recharge by as much as a factor of two. A convenient way to test this would be to recreate the precipitation or runoff conditions for the past 20 years or more assuming project pumping as planned, and as planned with proposed monitoring and mitigation plan. It appears that the mitigation plan is based upon average annual conditions. To avoid the maximum impact of a 10% loss at Little Lake, the mitigation measures would apply to a worst-case scenario, assuming several dry years in addition to the proposed pumping. This analysis has not been performed, nor have the mitigation measures been adopted to prevent unreasonable impacts in a worst case scenario. This is a particularly key issue due to the lag in time between pumping occurring and impacts being seen at Little Lake.

With respect to the recommendations for additional monitoring at Little Lake Ranch, a discussion of the potential impacts caused by the construction of the new monitoring infrastructure and associated required permitting (California Department of Fish & Game; California Regional Water Quality Control Board – Lahontan Region, etc.) should be discussed in more detail. This would also include the potential impacts to wetlands near the Syphon Well and Coso Spring that would be caused if infrastructure was required to install a pump and associated infrastructure at Syphon Well. Additionally, if pumping from that well continues to be a proposed mitigation, analyses as to the impact on Coso Spring (in the immediate vicinity of Syphon Well) from pumping Syphon Well should be included. The concept of mitigating the loss of spring flow and wetlands at Little Lake Ranch due to project pumping by conducting additional pumping and adding to the imbalance in the groundwater system that would exist is not a suitable mitigation, in that it would simply exacerbate the impacts to the basin. Any monitoring program should be designed to eliminate this potential situation.

B-32 (Cont.)

Finally, the predictions based on the model are described in Table C4-1, which states: "*Based on current groundwater flow model results, these maximum drawdown values listed above result from pumping the Hay Ranch production wells at design rates for 1.2 years, with specific yield values of 10%. These maximum acceptable drawdowns can occur several years after pumping at Hay Ranch ceases.*" Based on this, and similar statements elsewhere, the monitoring and mitigation program makes the feasibility of maintaining the project pumping rate of 4,800 acre-feet per year for the lifespan of the 30-year project seem highly unlikely, if not virtually impossible, to achieve.

REPORTING

The Draft EIR states the overall proposal is for pumping of 4,839 AF/yr of groundwater, and the objective of the analysis is to evaluate the potential impacts of that pumping. When groundwater pumping begins in an area that has not been historically pumped (or has not been pumped significantly in several years as in the present case), three impacts will result: 1) increased groundwater inflow, 2) a decrease in natural outflows, and 3) a decrease in groundwater storage, manifested by decreased groundwater elevations. The primary purpose in developing a groundwater model for this type of analysis is to quantify each of these three impacts.

On page C2-11 of the report, a "conceptual groundwater budget" is presented. It appears to be from a steady-state simulation using the model since there are no storage terms. In this groundwater budget, total inflow and total outflow are about 5,000 AF/yr.

Because the pumping proposed in the Draft EIR is nearly equal to the total groundwater inflow in the basin, it would be expected that impacts would be significant. In this case, the effects of the proposed pumping would likely result in increased inflow from the northern boundary of the model since that boundary is conceptualized as constant heads. This means that the model simulates an unlimited ability to send groundwater into the model area based on the hydraulic gradient and aquifer properties. Natural outflow from the system is through subsurface flow to the south and southeast and evapotranspiration. Because these sinks are located at a distance further than the inflow boundary, it is reasonable to expect that decreases in natural outflow would lag behind increases in inflow. Finally, because the proposed pumping is high in relation to the total flow through the system, groundwater elevation declines and, thus, groundwater storage declines, would be expected to be the dominant impact, especially in the initial years of pumping.

The Geologica report does not discuss these simple concepts, and, in fact, does not present any summary of a transient groundwater budget (which is readily available output from MODFLOW). In an analysis such as this, the common and accepted practice is to present a transient groundwater budget that allows for the quantification of the timing and magnitude of groundwater budget impacts due to pumping. The absence of this reporting results in an incomplete analysis from which to base conclusions regarding how the groundwater system changes over time in response to the project pumping.

B-32 (Cont.)

The Draft EIR fails to provide sufficient reporting of any sensitivity analysis which is a key step in the modeling process. As stated in Danskin (1998),

> *"As is always the case with numerical models, not all parameters of the model were known completely. Because some uncertainty is present in each (model) parameter, there is some uncertainty in the model solution. This uncertainty is reflected in heads and inflow and outflow rates that are somewhat in error. A sensitivity analysis identifies which parameters exert the most control over the model solution and, therefore, have the potential to generate the largest errors. An improved understanding of those parts of the aquifer system represented by the most sensitive parameters yields the greatest improvement in the ground-water flow model."*

Although Appendix C-2 states that a sensitivity analysis was conducted, no quantitative results are provided. This despite that in the ASTM standards for groundwater flow model reporting, basic groundwater flow modeling text books, and standard professional practice, the inclusion of the results of a sensitivity analysis are considered a standard portion of any modeling report. Additionally, the results of sensitivity analyses can point to areas in which further data are needed to reduce the uncertainty that can result in modeling efforts such as this. In the context of the scope of the development of a numerical groundwater flow model, running a sensitivity analysis (particularly in MODFLOW2000) is a relatively minor effort. Quantitative results of the sensitivity analyses, in keeping with standard professional protocols, should be included in the report. Additionally, discussion should be included as to how, or if, the results of the sensitivity analysis were used to evaluate future data collection as part of the monitoring and mitigation plan.

Another example of incomplete documentation includes a discussion of the modeling software used in the creation of the Rose Valley model. A review of the model files provided to GSE by Geologica suggests that the numerical model was originally produced using the U.S. Geological Survey program MODFLOW2000 and then was saved using MODFLOW 88/96. The model files provided to GSE by Geologica included a MODFLOW2000 discretization package file for the Rose Valley model. This is not used in the version of MODFLOW for which the Rose Valley model was created and is presented. What is peculiar is that the discretization file appears to have been generated recently, despite the Groundwater Vistas file being set up for MODFLOW 88/96. A review of the model and how it is set up in Groundwater Vistas should be conducted to evaluate how this could occur, and whether this issue is affecting the creation of model files.

Further, it is unclear why the use of MODFLOW2000 was abandoned. This should be discussed. As a side note, the existing model creates drain (DRN) package files which are typically used to represent spring flow. However, in this model, there are no drains included. This is likely an artifact of the original Brown and Caldwell model.

Finally, the conceptualization of groundwater flow regimes, numerical groundwater flow modeling and impact analyses, and associated reporting involve extensive geologic interpretation, and that realm of professional practice requires that the work be conducted by, or under the direct supervision of, a California Professional Geologist. According to the California Business and Professions Code, Chapter 12.5, Section 7800 et seq,, geology is *"the science which treats of the earth in general; investigation of the earth's crust and rocks and other materials which compose it; and the applied science of utilizing knowledge of the earth and its constituent rocks, minerals, liquids, gases and other materials for the benefit of mankind."* Thus the study of groundwater (hydrogeology) falls under the purview of geology. Section 7835 goes on to state that, *"All geologic plans, specifications, reports, or documents shall be prepared by a professional geologist or a certified specialty geologist, or by a subordinate employee under his or her direction. In addition, they will be signed by the professional geologist, or registered specialty geologist, or signed and stamped with his or her seal, either of which will indicate his or her responsibility for them."* As presented, the interpretative reports presented in Appendix C of the Draft EIR show no indication of who wrote, or otherwise was the responsible professional for those reports, or even the company that prepared them. It is assumed that they were prepared by Geologica. In order to assure compliance with the Business and Professions code, the reports should be signed and/or stamped by an appropriate licensed professional.

The comments provided above have been provided by Andrew Zdon, a California Professional Geologist, Certified Hydrogeologist, and Certified Engineering Geologist, with more than 20 years of experience in hydrogeology including groundwater flow, numerical groundwater flow modeling, aquifer testing and associated reporting.

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CURRICULUM VITAE FOR
ANDREW ZDON
PRINCIPAL HYDROGEOLOGIST,
DIRECTOR – WATER RESOURCES

REGISTRATIONS and CERTIFICATIONS

Professional Geologist, California, 1994, No. 6006
Certified Engineering Geologist, California, 1995, No. 1974
Certified Hydrogeologist, California, 1995, No. 348
Registered Environmental Assessor I, California, 2003, No. 07774
Registered Geologist, Arizona, 1999, No. 33686
Certified Professional Geologist, American Institute of Professional Geologists, 1993, No. 8773

PROFESSIONAL HISTORY

Golden State Environmental, Inc., Principal Hydrogeologist, Director-Water Resources, 2008 to Present
TEAM Engineering and Management, Inc, Principal Hydrogeologist, 1996 - 2008
Woodward-Clyde Consultants, Hydrogeologist, 1992-1996
California State University, Los Angeles, Instructor, Groundwater Models and Management, 1993
County of Inyo, California, Assistant Hydrologist, 1991-1992
The MARK Group, Engineers and Geologists, Senior Staff Geologist, 1990-1991
Round Mountain Gold Corporation, Geologist, 1988-1990
Geothermal Surveys, Inc., Geologist, 1987-1988

EDUCATION

Bachelor of Science in Geology, Northern Arizona University, 1984

TRAINING

Professional training related to: groundwater resource management; numerical groundwater modeling including model calibration techniques, uncertainty analysis, and use of geographic information systems in conjunction with groundwater modeling efforts; and development of conceptual models and risk assessment associated with the cleanup of sites with soil and groundwater impacted by regulated compounds.

AFFILIATIONS

- American Institute of Professional Geologists, C.P.G. 8773: Southern Nevada Section Vice President (1998-1999)
- National Ground Water Association: Member of NGWA Monitoring Well Task Force (2001-2002)
- Groundwater Resources Association of California

- Nevada Water Resources Association

AWARDS

- California State Board of Registration for Geologists and Geophysicists, 2005 and 2006. Received Certificate of Appreciation for services as subject matter expert provided to the Board.
- California State Board of Registration for Geologists and Geophysicists, 2001. Received Certificate of Commendation for services as subject matter expert provided to the Board
- California State Board of Registration for Geologists and Geophysicists, 2000. Received two Certificates of Commendation for services as subject matter expert provided to the Board.

REPRESENTATIVE EXPERIENCE

Andrew Zdon has more than 20 years of experience in the fields of hydrogeology and geology. He has participated in a variety of regional and site-specific hydrogeology, engineering geology, and mining-related projects throughout the southwestern United States, New Zealand and Peru. Mr. Zdon is recognized as an expert in the area of numerical groundwater modeling and has been an instructor at California State University, Los Angeles in Groundwater Models and Management. Among his specialties in numerical groundwater modeling are: finite element and finite difference modeling of groundwater flow and groundwater / surface water interactions, contaminant transport, and dual-phase flow. Mr. Zdon has worked on water well, environmental, and minerals exploration drilling projects, and has supervised staff geologists, engineers, and technicians in carrying out soil and groundwater sampling and aquifer testing. Representative hydrogeology-related experience includes:

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- Consultant to Mammoth Mountain Ski Area in a joint project with the Mammoth Community Water District regarding water resources issues associated with a proposed land transfer with the Inyo National Forest. Work involved developing conceptual model and associated preliminary numerical groundwater flow model of an eastern Sierra watershed, conducting field investigations to evaluate hydrogeologic parameters identified to be sensitive in the numerical model, and finalizing the numerical groundwater flow model through updating parameters and boundary conditions based on data obtained from the field investigations and performing a transient calibration. The final numerical model was used to evaluate potential groundwater impacts of the proposed project.
- Served as consultant to Mono County conducting groundwater availability assessments for several Mono County communities. Work included conducting field reconnaissance activities, developing groundwater recharge estimates, evaluating local groundwater budgets, identifying potential future impacts due to regional growth, water quality issues, etc. Have also provided hydrogeologic support to the County of Mono with respect to reviewing and evaluating groundwater modeling conducted to evaluate potential impacts caused by expansion of a geothermal plant in Mono County.
- Hydrogeologic consultant for the Owens Valley Indian Water Commission through the development of hydrogeologic data gathering, development of conceptual models for the Lone Pine Reservation, Big Pine Reservation and Bishop Reservation areas of the Owens Valley, and development of numerical groundwater models for each of these areas. The models developed provide these Paiute/Shoshone tribes with tools to evaluate the impacts on local reservations of water resource activities conducted by outside agencies.

- Management of environmental activities associated with a 7,000-gallon gasoline release that occurred during 1999 in faulted, volcanic terrain in the Eastern Sierra Nevada. Work conducted at the site has included characterization of bedrock units including the use of rotary drilling and oriented-core drilling, surface and down-hole geophysical surveys, and extensive vapor and groundwater sampling. Ongoing remediation has included vapor extraction within the vadose zone, and a multistage groundwater treatment process. Mr. Zdon had previously conducted environmental activities including site characterization and remediation (excavation of petroleum hydrocarbon-impacted soils) leading to site closure prior to the 1999 release. Also served as designated expert and providing testimony (deposition) concerning pre-existing site conditions and fate and transport modeling.

- Provided expert witness testimony (deposition and court testimony) concerning hydrogeologic conditions associated with petroleum hydrocarbon releases from underground pipeline, San Luis Obispo County, California.

- Hydrogeologic consultant to the Tri-Valley Groundwater Management District (Chalfant, Hammil, and Benton Valleys), Mono County, California with respect to analyzing the potential impacts of a proposed groundwater export project by the USFilter Corporation. Work included field surveys/reconnaissance of existing groundwater conditions in the Tri-Valley area.

- Technical consultant to the Inyo County Water Department regarding a proposed groundwater export project by the Western Water Company in the Olancha area of Inyo County. Services primarily included providing technical oversight of aquifer testing activities conducted by Western Water's consultants.

- Groundwater modeling (MODFLOW) for the Harper Dry Lake Valley, San Bernardino County, California. Modeling was conducted for this Mojave Desert basin to evaluate the feasibility of developing a well field to support the construction of a proposed solar power facility.

- Served as an expert witness with regard to a water rights dispute concerning a spring used as a domestic water supply in the Mono Basin, Mono County, California.

- Groundwater flow modeling (MODFLOW), water-budget analysis, and water right vs. use analysis for the Lower Virgin River Valley, Spring Valley, and Cave Valley, Nevada. Investigations included development of recharge estimates for these valleys. Groundwater modeling associated with the Lower Virgin River Valley highlighted interactions between lowered groundwater levels along the Virgin River and associated decreases in river flow.

- Groundwater flow and solute transport modeling (MODFLOW and MT3D) to evaluate potential effects of solvent, petroleum hydrocarbons, insecticide and/or herbicide spillage in planned artificial recharge facility along the Santa Clara River in Ventura County, California.

- Served as expert witness for plaintiff (property-owner) concerning hydrogeologic conditions associated with leaking oil pipeline impacting private property, San Luis Obispo, California. Work involved reviewing existing data concerning site soils, fate and transport modeling, aquifer testing, etc., conducting limited field investigation to confirm conditions, and testimony (both deposition and in court).

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- Hydrogeologic characterization of Arco Pipeline Company Terminals 2 and 3, Port of Long Beach, California. Program included soil sampling, well construction, destruction of previously existing wells, groundwater sampling, hydrocarbon bail-down testing, and aquifer testing. Also developed dual-phase flow model (for groundwater and petroleum hydrocarbons using MARS) to evaluate remedial alternatives at both terminals. This complex modeling effort accounted for tidal fluctuations, and their effects on groundwater levels and transport of light non-aqueous phase liquids.

- Developed the methodology for the "Bishop Cone Audit," a surface water flow and usage auditing procedure being used by the County of Inyo and the Los Angeles Department of Water and Power as part of their long-term water management agreement. The audit determines surface water usage on lands owned by the City of Los Angeles, and derived from an extensive series of natural streams, canals and ditches within the Bishop, California area.

- Developing finite difference groundwater flow model (MODFLOW) to evaluate potential groundwater management activities including artificial groundwater recharge projects, future groundwater production well placement, and development of source water protection capture zones for the Murrieta County Water District, Murrieta, California.

- Developed finite-difference groundwater flow model (MODFLOW) to evaluate impacts of proposed groundwater pumping by the Owens Lake Soda Ash Company on nearby springs along Owens Lake, Inyo County, California.

- Finite element modeling (SEEP-2D) of groundwater seepage with respect to evaporation ponds for a proposed winery, San Luis Obispo County, California. Results were used to evaluate pond-sizing, potential effects of seepage with respect to the stability of nearby slopes, and to evaluate the volume of effluent that would reach the water table at that location.

- Provided technical oversight for finite element groundwater seepage modeling (SEEP/W) and hydrogeologic evaluation of tailings mitigation, Coeur Gold Golden Cross Mine Tailings Impoundment, New Zealand. Modeling was conducted to evaluate practicability of tailings dam dewatering schemes.

- Finite element modeling (SEEP/W) of groundwater seepage with respect to mitigation and sludge reclamation for closure of the Manukau Wastewater Treatment Plant, New Zealand. Groundwater modeling was used to evaluate groundwater and surface water interactions and the associated volume and locations of potential seepage into the plant's evaporation ponds before and after reclamation.

PUBLICATIONS - Available upon request.

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File AZ - CV

CURRICULUM VITAE

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Education Brown University, Providence, Rhode Island
Sc.B., Mechanical Engineering, 1962; *Cum Laude*
Sc.M., Engineering, 1964; J. Kestin, Adviser
Ph.D., Engineering, 1966; J. Kestin, Adviser

Honors and Awards

Corporation Scholarship, 1958-1962
ASTM Student Prize, 1961-1962
Tau Beta Pi Engineering Honor Society, 1962
Sigma Xi Research Society, 1962
Outstanding Educators of America, 1972, 1974
Top ASEE Campus Activity Coordinator for NE Region, 1975
University Service Award, 1976
AT&T Foundation Award for Excellence in Instruction of Engineering Students, 1989
Unsung Hero Award, Admissions Office, UMD, 2003
Ben Holt Power Plant Award, Geothermal Resources Council, 2007

Biographical Listings

American Men and Women of Science
International Scholars Directory
Dictionary of International Biography
Who's Who in Technology Today
International Who's Who in Engineering
Who's Who in the East
Who's Who in Frontiers of Science and Technology

Professional Societies

Geothermal Resources Council, ASME, ASEE, Sigma Xi Research Society.

Avocational Interests

Photography, travel, hiking, reading, sudoku and crossword puzzles.

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FULL-TIME AND PART-TIME APPOINTMENTS

1. **ITT-Grinnell Corporation, Providence, RI**
   Draftsman, 1958-59;
   Design Engineer, 1960-61.
2. **U.S. Naval Underwater Systems Center (now NUWC), Newport, RI**
   Mechanical Engineer, 1966-68.
3. **Brown University, Providence, RI**
   Post-Doctoral Fellowship, 1966;
   Research Associate, 1968-70;
   Visiting Professor of Engineering (Research), 1976-79;
   Adjunct Professor of Engineering (Research), 1979-86;
   Adjunct Professor of Engineering, 1988.
4. **University of Massachusetts Dartmouth, North Dartmouth, MA**
   Associate Professor of Mechanical Engineering, 1967-1974.
   Professor of Mechanical Engineering, 1974-1997.
   Chancellor Professor of Mechanical Engineering, 1997-2004.
   Granted Tenure, 1973.
   Chairman, Mechanical Engineering Department, 1973-79, 1987-1995.
   President, Faculty Senate, 1974-1976; 1997-1999.
   Director Industry Relations, College of Engineering, 1994-1995.
   Associate Dean, College of Engineering, 2001-2004.
   Courses taught: Engineering Thermodynamics I, II; Refrigeration and Air Conditioning; Aircraft and Rocket Propulsion Systems; Geothermal Energy; Statics; Dynamics; Fluid Mechanics; Introduction to Design; Computer Programming; Applied Thermodynamics Laboratories; Analysis of Energy Conserving Systems; Power Plant Design and Engineering; Heat Transfer; Classical Thermodynamics (graduate).
5. **Massachusetts Institute of Technology, Cambridge, MA**
   Visiting Lecturer & Researcher, 2005-present.

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ADMINISTRATIVE EXPERIENCE

1. **Chairman, Mechanical Engineering Department, 1973-79, 1987-1995.** Responsible for all activities of a 14-faculty person department; annual budgets of $750,000-950,000; 2 degree programs, BSME & BSMET; student body of 250; developed proposal for and won approval for MSME degree; prepared teaching assignments; carried out personnel annual evaluations; made contract renewal and tenure decisions; certified ME and MET for graduation; total of 14 years of service as chairman.
2. **President, Faculty Senate, 1974-1976; 1997-1999.** Leader of elected body of 51 faculty and librarians; responsible for all matters academic; worked closely with chancellor and deans, and with Senate presidents from other UMass campuses; worked to have the Faculty Senate recognized as the sole legitimate body for mandating all academic regulations and requirements; provided leadership in developing and implementing General Education program; collaboratively established guidelines for new academic centers and their evaluation.
3. **Director Industry Relations, College of Engineering, 1994-1995.** First person to hold this position; developed relations with regional companies to allow engineering students to gain internship experience while continuing their education; this led to the current Cooperative Education program.
4. **Associate Dean, College of Engineering, 2001-2004.** Responsible for Freshman-Year program called IMPULSE (Integrated Math, Physics, Undergraduate Laboratory Science and Engineering) involving 12-16 faculty from 4 departments and 2 colleges, 12-16

teaching assistants, and 100-120 freshmen; works with Admissions Office setting standards for acceptance; works with Financial Aid Office in administering engineering scholarships; responsible for maintaining academic and ethical standards among the students including probation, dismissal and readmission; organizes and conducts the annual 1-week residential Freshman Summer Institutes for 100 new freshmen involving 20 faculty and staff, and 12 resident and teaching assistants; responsible for all publications including the engineering sections in the General Catalogue; responsible for certifying all undergraduates for graduation.

SPONSORED RESEARCH PROJECTS

1. **Experiential Partnership for the Reorientation of Teaching (XPRT).**
   Principal Investigator, UMass Dartmouth, 1975-78.
2. **Ground-Source Heat Pump Facility.**
   Principal Investigator, UMass Dartmouth, 1997-2000.
3. **Raytheon Corporation Grant to Enhance Freshman Engineering.**
   Principal Investigator, UMass Dartmouth, 2001-2004.
4. **Raytheon Corporation Grant to Promote Engineering Among K-12.**
   Principal Investigator, UMass Dartmouth, 2003-2004.

RESEARCH REVIEW PANELS

1. **Meridian Corporation, Falls Church, VA**
   Member Research Advisory Panel, 1981-1983.
2. **U.S. Dept. of Energy, Washington, DC**
   Chairman, Energy Conversion Program Review Panel, 2005.
   Member, Co-Produced Geothermal Fluids Review Panel, 2007.
3. ***Geothermics***
   Member, Editorial Advisory Board, 2001-present.

INTERNATIONAL & REGIONAL ADVISORY BOARDS

1. **Instituto Costarricense de Electricidad, San Jose, Costa Rica**
   Member, Geothermal Advisory Panel, 1984-present; Chairman, 1999-2006.
2. **Los Alamos National Laboratory, Los Alamos, NM**
   Member, Central American Energy Resources Project Advisory Committee, 1985-1990.
3. **Instituto Nacional de Electrificacion, Guatemala City, Guatemala**
   Member, Geothermal Advisory Panel, 1986-1995; Chairman, 1986-1987.
4. **Interamerican Development Bank, Washington, DC**
   Consultant, 1991-1992.
5. **Comision Ejecutiva Hidroelectrica del Rio Lempa, San Salvador, El Salvador**
   Member, Geothermal Advisory Panel, 1992-1999; Chairman, 1997-1999.
6. **Kenya Power & Lighting Company, Ltd., Nairobi, Kenya**
   Member, Geothermal Board of Consultants, 1992-1995.
7. **Greater New Bedford Regional Vocational Technical High School, Massachusetts**
   Member, Advisory Committee for Engineering Technology program, 2001-present.
8. **Town of Dartmouth, Massachusetts**
   Member, Alternative Energy Committee, 2003-2005; Chairman, 2005-present.
   Member, Technical Research Group, 2007-present.
9. **University of Masasachusetts Dartmouth**, College of Engineering,
   Member, Industrial Advisory Committee, 2005-present.
10. **City of New Bedford, Massachusetts**
    Member, Mayor's Sustainability Task Force, 2007-present.

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PROFESSIONAL CONSULTING CLIENTS

1. Hammel-Dahl, Warwick, RI, 1969.
2. Francis Associates, Marion, MA, 1970-72.
3. Electric Power Research Institute, Palo Alto, CA, 1979-1990.
4. National Rural Electric Cooperative Association, Washington, DC, 1980.
5. Advanced Energy and Technology Association, Dover, NJ, 1980.
6. Stone & Webster Engineering Corporation, Boston, MA, 1981-1984.
7. Ryan, Beck & Company, West Orange, NJ, 1981.
8. Imperial Energy Corporation, Los Angeles, CA, 1982.
9. Occidental Research Corporation, Irvine, CA, 1982.
10. Cape Building Systems, Mattapoisett, MA, 1982.
11. EG&G Idaho, Idaho Falls, ID, 1982-1990.
12. Biphase Energy Systems, Placentia, CA, 1983-1986.
13. Visualizations, Providence, RI, 1984, 1986.
14. Mother Earth Industries, Scottsdale, AZ, 1984-1992.
15. William E. Nork, Inc., Reno, NV, 1985.
16. Utah Power & Light Company, Salt Lake City, UT, 1985.
17. Dow Chemical USA, Freeport, TX, 1986.
18. California Energy Company, San Francisco, CA, 1988.
19. First Reserve Corporation, Greenwich, CT, 1988.
20. City of Provo, Provo, UT, 1988.
21. Radian Corporation, Austin, TX, 1988-1990.
22. Calpine Corporation, San Jose, CA, 1993.
23. Ormat, Inc., Yavne, Israel, 1994.
24. Southern California Edison, Rosemead, CA, 1995-1999.
25. Kutak Rock LLP, Omaha, Nebraska, 2002-2003.
26. Tetra Tech Environmental Management Inc., Rancho Cordova, CA, 2002-2003.
27. Ormat International, Sparks, NV, 2002-2003.
28. Highland Capital Partners, Lexington, MA, 2004-2005.
29. GeothermEx, Richmond, CA, 2005-present.
30. GeoTek, Dripping Springs, TX, 2005-present.
31. Geodynamics, Brisbane, Australia, 2005-present.
32. Massachusetts Institute of Technology, Cambridge, MA, 2005-present
33. CH2M HILL, Inc., Redding, CA, 2007.
34. Viking Installations, Calgary, Canada, 2008.
35. Khosla Ventures II, LP, Menlo Park, CA, 2008.
36. Advanced Technology Ventures, Palo Alto, CA, 2008.
37. Little Lake Ranch, Inyo County, CA, 2008.
38. National Renewable Energy Laboratory, Golden, CO, 2008.

B-32 (Cont.)

Publications on Geothermal Energy & Power Plants

Books:

1. *Geothermal Energy as a Source of Electricity: A Worldwide Survey of the Design and Operation of Geothermal Power Plants*, R. DiPippo, U.S. Department of Energy, U.S. Government Printing Office, 1980, 370 pages.
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7. "Assessment of a Freshman Summer Institute: Impact on First-Semester Student Performance and Retention" R. DiPippo and E. Fowler, *Proc. Regional Meeting of New England Section of ASEE*, U. Maine, Orono, May 3, 2003. Best Paper in Conference Award.
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1. Cape Building Systems, Mattapoisett, MA: *1 report*
2. Visualizations, Providence, RI: *1 report*

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Ronald DiPippo, *Ph.D.*

RENEWABLE ENERGY CONSULTANT -- GEOTHERMAL & WIND SPECIALIST

August 14, 2008

Inyo County Planning Department
168 North Edwards Street
Post Office Drawer L
Independence, CA 93526

Dear Sir/Madam:

The attached letter is submitted in response to your invitation for the public to offer input to the Planning Department on the matter of the Draft Environmental Impact Report (DEIR): Conditional Use Permit #2007-03/Coso Operating Company LLC (Coso Hay Ranch Water Extraction, Export, & Delivery System).

I have also included my up-to-date *Curriculum Vitae* which shows my experience in geothermal power plants dating from the mid-1970s.

If you have any questions, I will be glad to answer them.

Sincerely,

Ronald DiPippo, Ph.D.

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I have been retained by Little Lake Ranch ("LLR") to assist in the evaluation of the environmental impacts arising from the pumping of groundwater to supply the Coso geothermal power plant ("Coso") with reinjection water, and to address reasonable alternatives to the Project.

My professional background is in geothermal power generating systems, and as such, my comments will focus on possible means to reduce water consumption at Coso, as well as to suggest alternative means to obtain additional water for reinjection if all else fails and this becomes absolutely necessary. I have attached a copy of my *Curriculum Vitae* to demonstrate my competency in commenting upon the matters set forth herein.

For the purposes of this letter, a "fluid" is any substance that flows; it can include steam, vapor, gas and liquid. "Geofluids" will refer to the fluids that are produced by Coso from their production wells. These geofluids are then processed in separators and flashers. The steam will be the vapor form of the geofluid which is used to drive the turbines. The liquid (sometimes called "brine") is that portion of the geofluids which is not flashed to steam and remains in liquid form.

Coso uses a double-flash steam system for eight of the nine power generating units. A simplified schematic of a generic double-flash system is depicted in Figure 1. To explain Figure 1 very briefly, Coso has drilled around 100 wells to produce and bring to the surface from the geothermal reservoir a mixture of hot water and steam, the "geofluids," through its production wells (PW). The geofluids are first separated in a cyclone separator (CS) into steam and liquid. The steam is transmitted to the turbines that drive the generators (T/G). The generators produce the electrical energy sold by Coso. After the steam flows through the turbine, it is condensed (C) and piped to the water cooling towers (WCT) (not shown in Fig. 1; see Fig. 4A). The functions of the WCT are discussed below. In the double-flash system, the liquid from the separator undergoes a flash process (F) by means of a throttle valve (TV) designed to produce low-pressure steam that is admitted to the turbine and yields more power. That portion of the geofluid which is not flashed into low-pressure steam remains a liquid (or brine), and is available for injection back into the geothermal reservoir through a series of injection wells (IW). Similarly, a certain small fraction of the condensed steam, now a liquid, after flowing through the WCTs is also available for reinjection. The flow of the geofluids, steam and liquid, through the Coso plant can be followed by reference to the small arrows on the darker lines in Fig. 1 representing the piping system throughout the facility. **B-32 (Cont.)**

The only Coso unit that differs in its energy conversion system is the last one constructed, BLM West. BLM West uses a single-flash process, even though the equipment that was ordered and is on site could be used in a double-flash plant. Figure 2 shows a *Google Earth* image of the BLM West plant. The nine power units were installed on a fast-track schedule between 1987 and 1989.

By the time that the last unit, BLM West, was built in 1989, it had already become clear that the reservoir in that part of the field was changing from a liquid-dominated reservoir to a liquid-vapor (two-phase) reservoir. This meant that there would be insufficient liquid at the wellhead to permit the second flash process (F). Thus, since the power equipment was already being manufactured, it was necessary during operation to abandon the double-flash concept and take a portion of the high-pressure steam from the cyclone separator and throttle it down to the proper pressure for use as low-pressure steam to keep the turbine balanced. Thus the effective operation is shown in Figure 3. Of course, this was an inefficient way to utilize the high-pressure steam, but was necessary because of the steam requirements of the dual-pressure turbine.

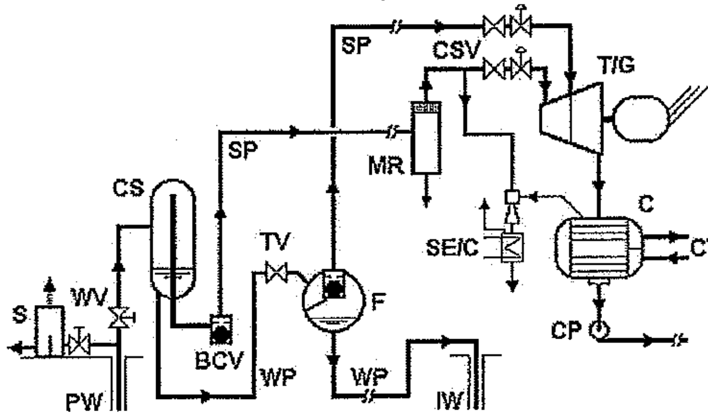


Fig. 1. Double-flash flow diagram. Nomenclature: PW, Production Well (typ); S, Silencer; WV, Wellhead Valve; CS, Cyclone Separator; BCV, Ball Check Valve; SP, Steam Piping; MR, Moisture Remover; CSV, Control & Stop Valves; WP, Water Piping; TV, Throttle Valve; F, Flasher; T/G, Turbine/Generator; C, Condenser; CP, Condensate Pump; SE/C, Steam-Jet Ejector/Condenser; CW, Cooling Water (to and from a cooling tower, not shown).

Fig. 2. Aerial view of Coso BLM West power plant courtesy of *Google Earth*.

B-32 (Cont.)

Coso, at a very early stage, must have realized that the liquid portion of the geofluid in the reservoir was being depleted while the steam component was increasing. This phenomenon is widespread through similar geothermal reservoirs and occurs as the underground waters in the geothermal reservoir are withdrawn and the reservoir pressure falls. One of the contributing factors for this effect is the lack of sufficient reinjection resulting from the operation of the water cooling towers.

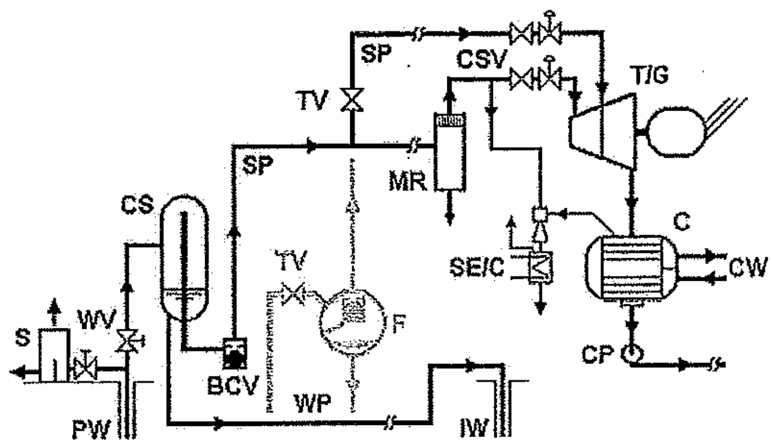


Fig. 3. Coso BLM West effective operation of the double-flash equipment as a single-flash plant. Nomenclature: Same as Fig. 1.

All of the power units are equipped with water cooling towers (WCT) that provide chilled water for the condensers. Since the geothermal steam condensate can be used as the cooling water (CW in Figures 1 and 3) after being cooled in the WCT, there is no need for the vast amounts of cooling water taken from external sources as is the case for fossil- or nuclear-fueled power plants. Nevertheless, the evaporative process that cools the water in the WCT consumes roughly 85% (by mass) of the steam that flows through the turbine. This water is released to the atmosphere through the cells of the WCT as water vapor. Even with this water loss, the WCT produces about 15% excess chilled water (more than is required to condense the steam from the turbine). This excess liquid is available to be reinjected and returned to the geothermal reservoir via injection wells. In addition to this amount, the liquid fraction of the geofluid remaining after the separation and flashing processes can also be reinjected.

The water balance and flow diagram is represented in Figure 4A for a typical early-life condition at Coso. Note that roughly 68% of the total geofluid produced from the reservoir is being reinjected. Note: Red pipelines carry steam and blue ones liquid.

B-32 (Cont.)

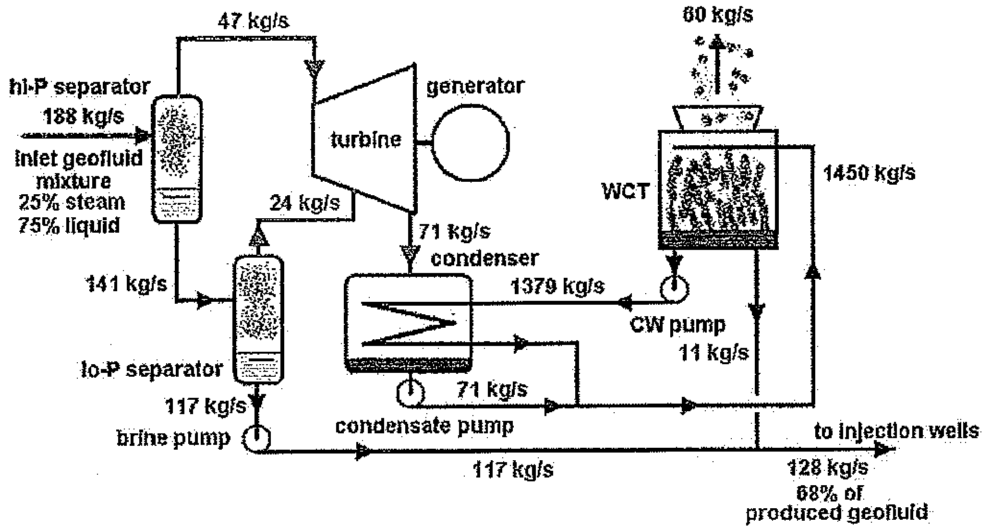


Fig. 4A. Water balance for typical conditions at a double-flash unit at Coso during early operating conditions.

In the case of a 240°C (464°F) liquid-dominated reservoir (similar to Coso) at the beginning of its operation, the maximum theoretical amount of liquid that would be available for reinjection is about 76% (by mass) of the geofluid received from the production wells. Thus, at best, there is a 24% deficiency in reservoir recharge even if all the available geofluid is reinjected. Over time, this can lead to reservoir drawdown (a lowering of the reservoir pressure) and can change the fluid characteristics in the reservoir from liquid-dominated to two-phase, liquid-vapor conditions.

B-32 (Cont.)

Coso started out with practically all liquid in the reservoir but now there is both liquid and steam within the reservoir. The geofluid coming out of the wells has less and less liquid and more and more steam, as time goes on. As the reservoir "dries out", the production wells yield a two-phase fluid with increasing percentages of steam and decreasing percentages of liquid. As a result there is less liquid left for reinjection now than was true when the plant started operating in 1987.

Figure 4B depicts what happens when the reservoir undergoes drying out. The steam flows to the turbine have to be maintained according to the specifications from the manufacturer for efficient operation. It can be seen that now only 23% of the produced geofluid mass is available for reinjection, a dramatic shortfall compared to the original operation. This will further accelerate the drying out process in the reservoir. We will return to this discussion later in this report.

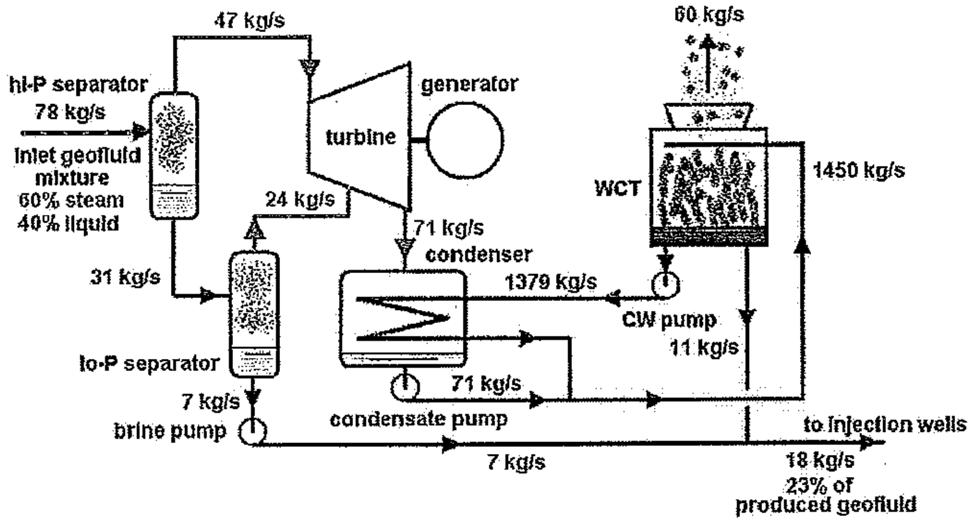


Fig. 4B. Water balance for typical conditions at a double-flash unit at Coso after change-over to vapor-dominated reservoir condition. Note: Steam flows to turbine have been kept the same as in Fig. 4A.

If this situation is allowed to continue, all the liquid may disappear from the production wells and only steam will come out. At that point, the reservoir becomes vapor-dominated (such as at The Geysers in northern California) and no liquid is produced at all. Then Coso will have only about 15% of the produced mass of steam left for reinjection as condensate.

This condition - having all steam coming from the wells - may sound like an advantage because it is the steam that drives the turbines and the generators for the production of electricity, but when it happens to a liquid-dominated system as a result of short-term exploitation, rather than over hundreds or thousands of years of natural activity, the condition is usually short-lived and the reservoir eventually becomes unproductive. The reason is that it is likely that the permeability of the producing reservoir will be severely reduced because of scaling in the fractures in the producing part of the reservoir as liquid flows toward the producing wells and flashes into steam within those fractures. The liquid keeps retreating, leaving precipitation in the fractures. In other words, the fractures slowly become encrusted with a variety of chemicals and minerals from the receding geofluids, thereby reducing the ability of the fractures to transmit geofluids. This problem is apparently present in the Coso reservoir, as it is reported in the Draft Environmental Impact Report ("DEIR") that the reservoir has become partitioned into three weakly connected sections (DEIR, page 3.2-26). The steam flow can be expected to decline and eventually to stop altogether. In that case, Coso might try re-drilling some of the now-nonproductive wells, but my suggestion would be to drill to deeper depths to get at a possible hotter "parent" liquid reservoir. The DEIR makes the point that there are so many wells now existing that there is no space for any more (DEIR, page 5-4), but there is no analysis or suggestion in the DEIR to consider the possibility of drilling to deeper depths to restore the greater production of geofluids. This alternative should be studied.

B-32 (Cont.)

Figure 5 shows the calculated <u>theoretical</u> trend in the percentage of the produced mass of geofluids that are available for reinjection as a function of the wellhead steam quality (percentage by mass of vapor in the two-phase mixture) for conditions like Coso.

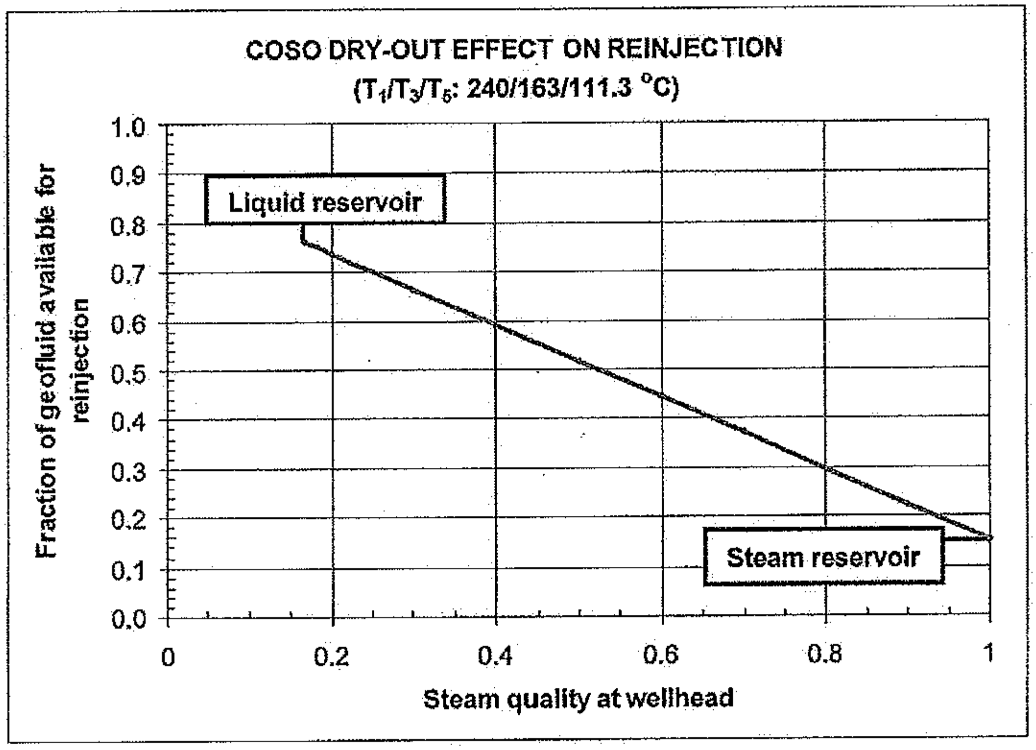


Fig. 5. Theoretical calculated change in fraction of the geofluid available for reinjection for conditions similar to those at Coso.

It is interesting to compare this theoretical curve to the actual record of reinjection at Coso since its commissioning; this is shown in Figure 6 where the data were taken from the most recent compilation from the California Division of Oil, Gas and Geothermal (CA DOGGR) web site (See: http://www.consrv.ca.gov/dog/geothermal/manual/Pages/production.aspx)

B-32 (Cont.)

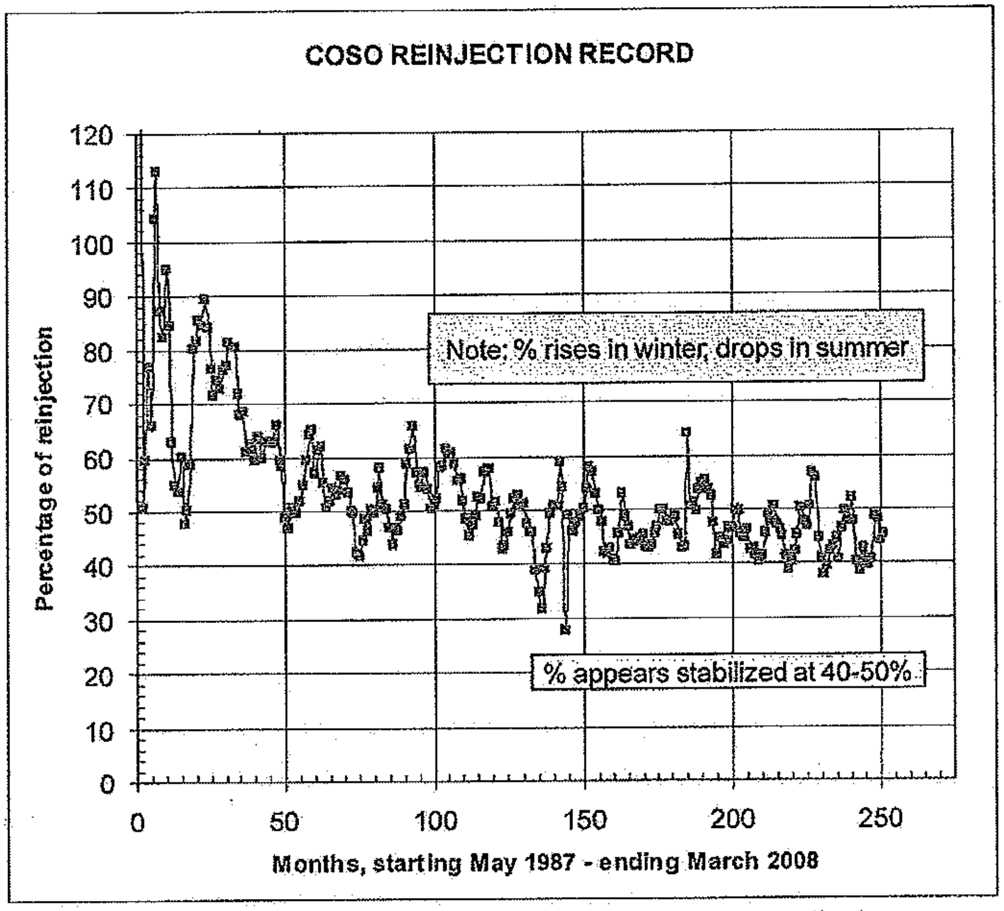


Fig. 6. Percentage of reinjection relative to production at Coso, all units.

Comparing Figures 5 and 6, it is possible to estimate that the average wellhead quality is now between 55-65%. What this means is that the relative portion of liquid compared to steam in the geofluids at Coso has steadily declined. Ultimately, this results in a smaller portion of the geofluids being available for injection as a direct result of the type of geothermal facility designed by Coso and its use of WCTs, through which a significant portion of the produced geofluid is lost through evaporation. Perhaps more revealing are the monthly records of the actual production and reinjection amounts (in 1000 kg) shown in Figures 7 and 8. The mass being produced from the reservoir is in steady decline, foretelling a time when the field will no longer be able to support power generation at any level.

B-32 (Cont.)

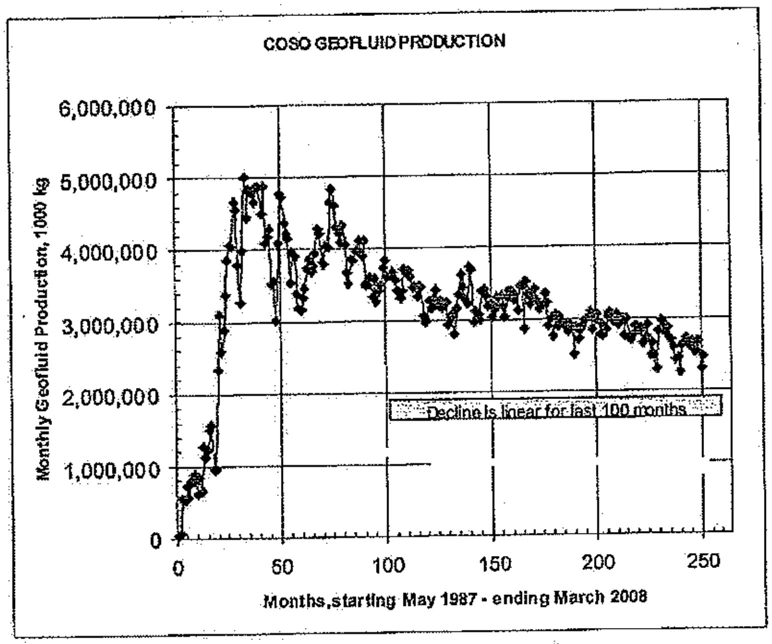


Fig. 7. Monthly production history at Coso.

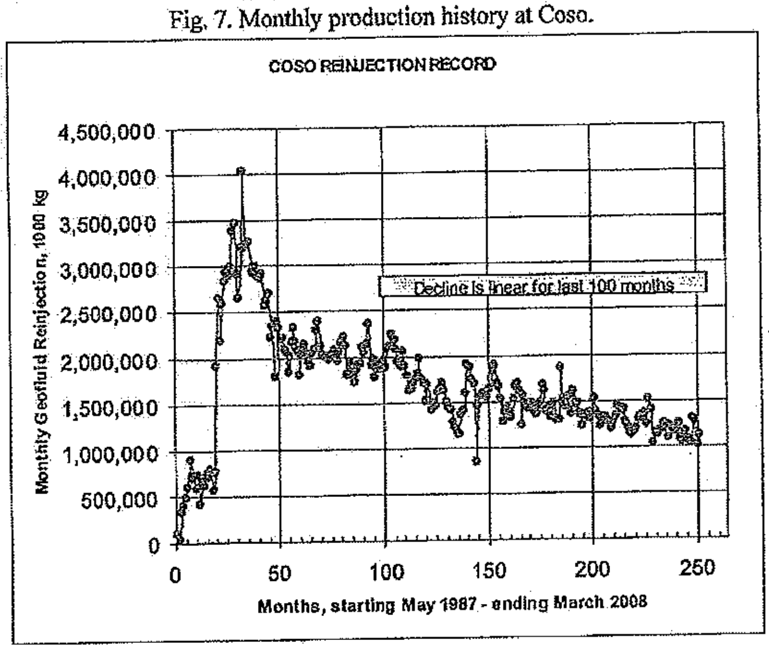


Fig. 8. Monthly reinjection history at Coso.

B-32 (Cont.)

Reservoir depletion is a common phenomenon at geothermal reservoirs. Given the availability of sophisticated reservoir simulation and modeling computer programs, reservoir engineers can predict with a reasonable degree of reliability the changes in reservoir characteristics, and recommend steps to alleviate the situation. For example, at The Geysers, which was a vapor-dominated reservoir from the inception of exploitation, the depletion became so severe that it was found advantageous (and economic) to construct water pipelines from two communities, Santa Rosa (SR) and Lake County (LC), to transport treated wastewater to The Geysers where it is being used to augment the reinjection. This has eased the reservoir decline, improved power production, and evidently extended the operating lifetime of the plants.

Given the monthly totals for geofluids produced and reinjected, it is possible to analyze Coso's geothermal plant to calculate the steam mass fraction at the wellhead, assuming that 15% of the steam flow through the turbines is available for reinjection. Figure 9 shows the results. There are seasonal variations but the trend is clearly upward, towards drier conditions. The black line is the best fit of a logarithmic equation to the data. The previous theoretical estimate of 55-65% steam is borne out by the actual data (most recent value = 60%).

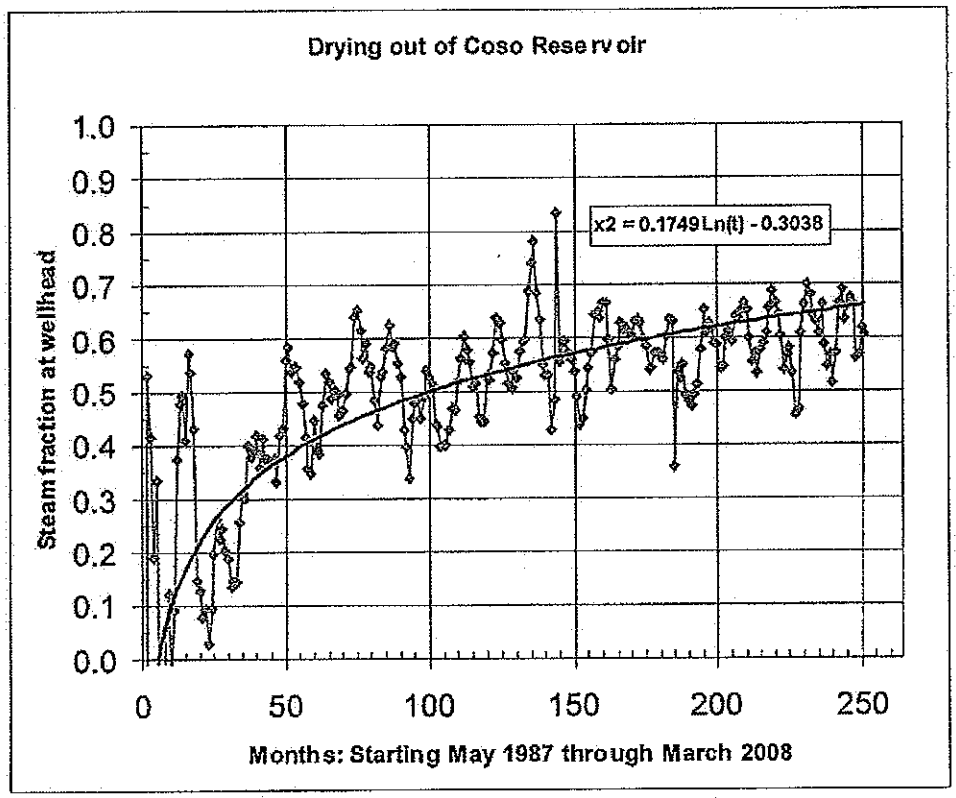


Fig. 9. Actual steam fraction by mass at the wellhead calculated from DOGGR data.

B-32 (Cont.)

With the results of Figure 9, one can now calculate the steam flow rate available at the wellheads. The results are shown in Figure 10. Although the total mass (steam and liquid) being produced from the reservoir is declining significantly, because the steam fraction at the wellhead is actually increasing (Fig. 9), this means that the monthly steam production (in tonnes or 1000 kg) is declining less significantly, about 20% over the last 14 years. This is a lot less than the 42% decline in total mass production of geofluids over the same period. Since the steam is what drives the turbines, the power level from the plant at the current time should be between 190-220 MW. If this trend continues unabated, the plant might be reduced to as low as 180 MW in 4-5 years. Again, the DEIR states that the power level is now under 200 MW (DEIR, page 5-3).

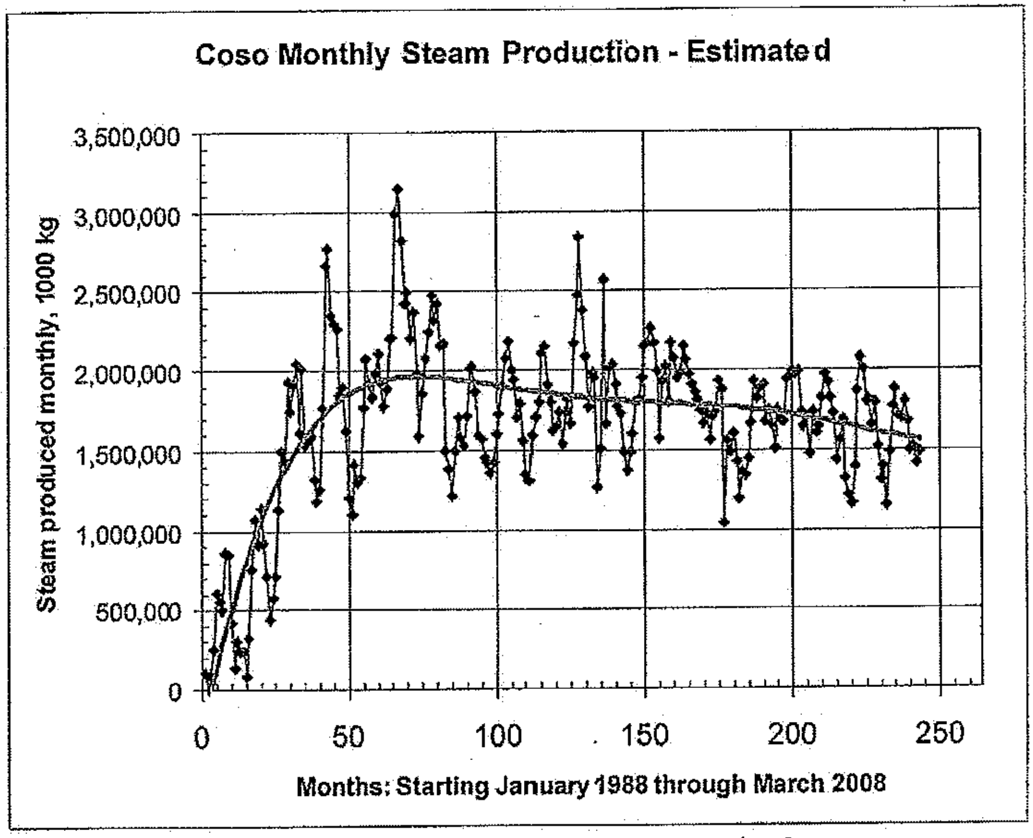


Fig. 10. Calculated monthly steam production trend at Coso.

When confronted with this problem, Coso has two fundamental alternatives. First, Coso may seek ways to reduce water consumption in the power plant to conserve as much of the geofluid as possible for reinjection. Or, second, Coso could decide to maintain its current geothermal facility intact, but to import water to replace the water being lost through evaporation of the WCTs as a consequence of the original design of its facility.

B-32 (Cont.)

Among the options is one that allows effectively 100% reinjection of the produced geofluids; namely, the use of an air-cooled system, i.e., an air-cooled condenser (ACC), in place of water-cooling towers and separate condensers. For example, at the Mammoth (Casa Diablo) binary plants north of Coso (see Figure 11), essentially all the produced geofluids are reinjected, and both power production and geofluid production have been steady, on average, and may be sustainable over a long time frame. Figures 12 and 13 illustrate this using data from the CA DOGGR. The sharp step increases seen in production (Fig. 12) correspond to new units being brought online. The percentage of reinjection has remained generally above 95%, averaging 97.5% over the entire life of plant operation, some 23 years.

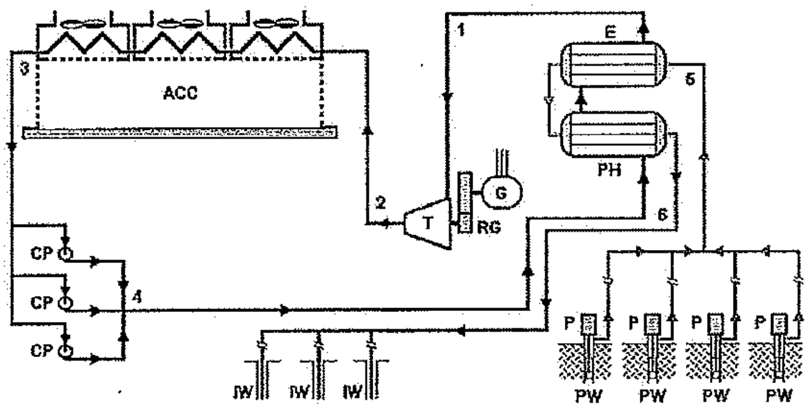


Fig. 11. Binary-type geothermal power plant with air cooling. Nomenclature: Same as Fig. 1 except: P, Well Pump; E, Evaporator; PH, Preheater; RG, Reduction Gear; ACC, Air-Cooled Condenser.

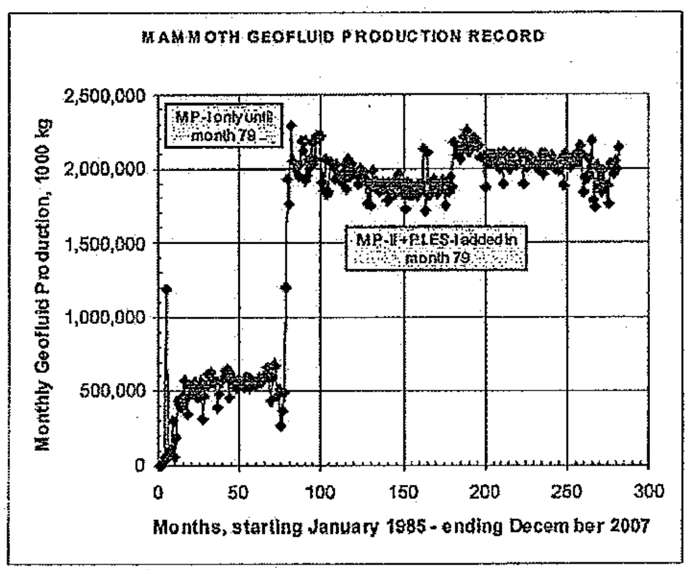


Fig. 12. Production history at Mammoth binary plant (Casa Diablo), California.

B-32 (Cont.)

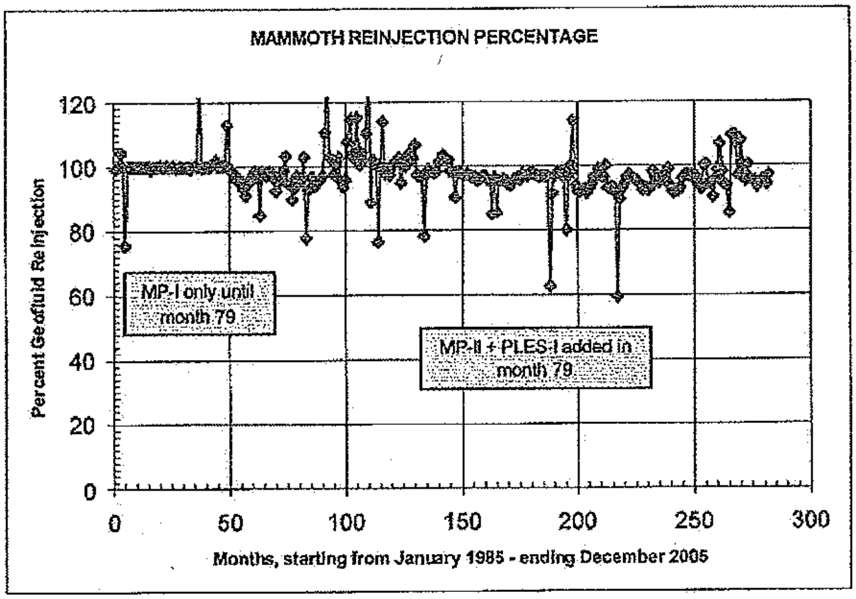


Fig. 13. Reinjection history at Mammoth binary plant (Casa Diablo), California.

While the use of air cooling is fairly common in binary-type geothermal plants (ones that use a secondary working fluid that is heated by the geofluid; see Fig. 11), it has not been employed in flash-steam plants to date for two basic reasons: (1) it leads to lower energy conversion efficiency, and (2) it is more costly from a capital cost standpoint.

However, it is technically feasible at flash-steam plants, as is illustrated in Figures 14A and 14B which depict a Coso-like plant equipped first with a WCT (Fig. 14A) and then with an ACC (Fig. 14B). Generally, ACC systems are more costly than plants with WCTs because they require more expensive components, and they occupy more land for the same power rating. Nonetheless, the advantages of using an air-cooled system in a facility such as Coso are evident. If alternative sources of water for importation are not reasonably available, then the use of an air-cooled system would reduce, or even arrest the rate at which Coso's geothermal reservoir is drying out, leading to prolonged production and an extended plant lifetime.

B-32 (Cont.)

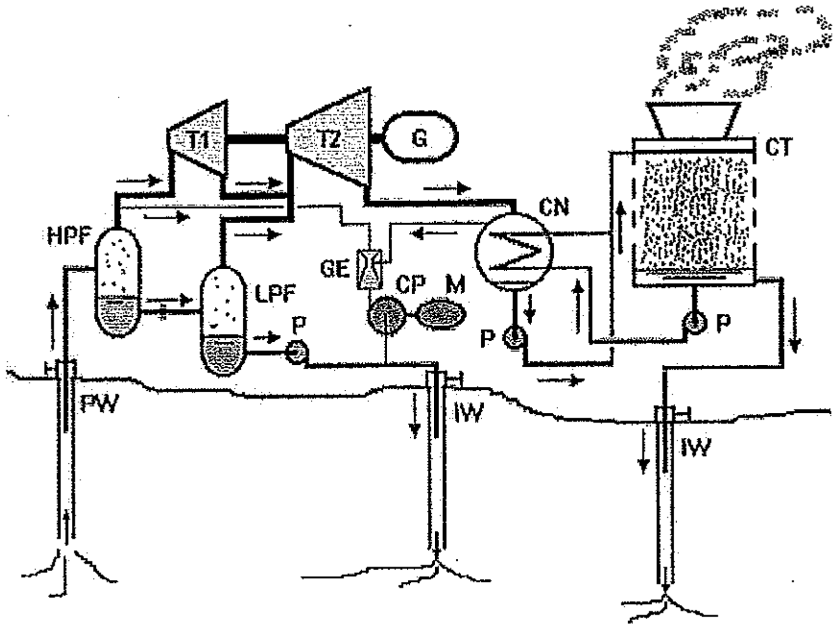


Fig. 14A. Coso-type plant equipped with a water cooling tower. Nomenclature: Same as Fig. 1 except: HPF, High-Pressure Flasher; LPF, Low-Pressure Flasher; GE, Gas Ejector; CP, Compressor; M,Motor; CN, Condenser; CT, Cooling Tower; P, Pump.

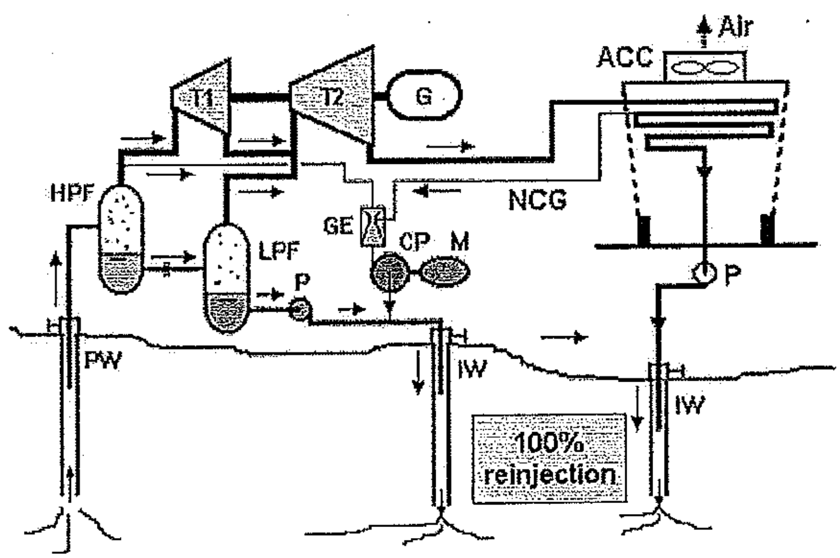


Fig. 14B. Coso-type plant equipped with an air-cooled condenser; possible design. Nomenclature: Same as Fig. 12A except: NCG, Noncondensable Gases; ACC, Air-Cooled Condenser.

B-32 (Cont.)

A recent design comparison from the Miravalles plant in Costa Rica showed that an ACC would cost more than three times as much as a WCT, would weigh more than two and a half times as much, would cover about three times as much surface area, and would consume about three times more fan power than a WCT. Generally speaking, WCT systems lead to higher net electrical production, a smaller footprint, less noise, lower capital cost, but at the expense of water consumption that could be used for reinjection. On the other hand, ACC systems do not need any water, but are much more expensive, have higher noise levels due to the numerous fans needed, occupy a larger footprint, have higher parasitic power requirements, and produce less net electricity. Even so, if there are compelling environmental reasons against using water-cooled systems, then air-cooled systems may be the system of choice. Given the desolate terrain at the Coso field (see Figs. 2 and 4), the larger footprint of ACC systems would seem to be easily accommodated, but the extra cost would need to be weighed against the projected revenues over the remaining extended life of the plant.

No information has been provided in the DEIR that addresses in any meaningful way the option of converting Coso's WCTs to an ACC system. I can provide, however, some conceptual estimates of the changes in power output from the current situation if ACCs were to replace the WCTs in use. As noted briefly above, the conversion of Coso from a WCT system to an ACC system would also reduce the amount of power generated by Coso. Assuming that Coso is now generating approximately 200 MW (net) power, which as we have seen is steadily declining under current operating procedures, I estimate that Coso's net power production utilizing an ACC system would be about 178 MW. This assumes that 8 power units (out of the 9 installed) are needed to produce 200 MW (net) and that the ACC fan power would increase the parasitic power load by 2.7 MW per power unit.

B-32 (Cont.)

The advantage of using the ACC system, of course, would be the reduction in the steady decline of geofluid production. It would also prolong the likely life of Coso for tens of years, thereby adding to the total amount of energy (electricity) that could be produced from Coso over its life, when compared to the inevitable shutdown of production as soon as Coso depletes its geothermal reservoir to a point where it is no longer economically viable. These added revenues must be weighed against the cost of installing the ACC system. Given the escalation in building costs that we are seeing nowadays, it is impossible for me to even estimate the cost of such a conversion, but it should be given a thorough examination before this option is discarded.

To better appreciate the differences between a WCT system and an ACC system, I refer the reader back to Figures 4A and 4B. In Fig. 4A which represents the early stages of plant operation (say 1990 or so), 188 kg/s of geofluid was produced from production wells per power unit, of which 75% (by mass) was liquid and 25% was steam. Approximately 71 kg/s of steam were condensed to liquid in the condensers and transferred to the WCT along with 1,379 kg/s of cooling water that has just been used to condense the steam. Thus 1,450 kg/s of still hot water is sent to the top of the cooling tower, where some 60 kg/s is lost through evaporation. Thus only 11 kg/s of the steam condensate is then available for injection. The total liquid available for injection is 128 kg/s because the 117 kg/s of brine from the flasher is added to the excess steam condensate. In other words, 68% of the 188 kg/s taken from the reservoir can be returned via injection wells. There is a further water requirement; in order to put the power plant into operation initially, a large volume of water must be loaded into the sump of the WCT since 1,379 kg/s of cooling water must be continuously recycled between the WCT and the condenser.

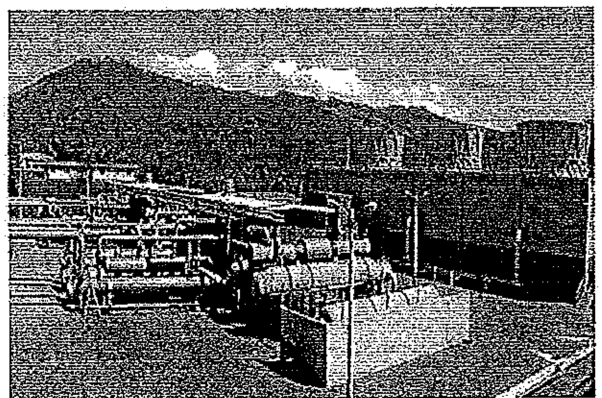
Figure 4B shows roughly the state of affairs currently at Coso after the geothermal reservoir has been constantly drying out over the years. The production wells now produce roughly 60% steam and only 40% liquid. For the specified turbine steam requirement, there is a much smaller amount of liquid available for injection. Indeed, whereas initially 117 kg/s of brine would be available to add to the 11 kg/s of steam condensate for injection, now we find only 7 kg/s of brine, and therefore only 18 kg/s or 23% of the produced geofluid mass is available for reinjection.

If an ACC system were used instead of this (see Fig. 14B), no water inventory is needed since the WCT is eliminated, and 100% of the produced geofluid can be returned to the reservoir. At current production conditions, that would amount to 78 kg/s of liquid compared to 18 kg/s. This additional 60 kg/s amounts to roughly 1,000 GPM, or about 1/3 of the proposed flow rate from the Hay Ranch wells. Since Coso has already indicated that a flow rate of 500 GPM is economical when looking at alternative sources of water (DEIR, page 5-5), it follows that the air-cooled option may turn out to be advantageous, particularly since it would supply far greater than 500 GPM.

The loss of water through the use of a WCT system can be easily explained. After the steam leaves the turbines, it enters a condenser and comes into contact with tubes carrying cold water from the WCT. This leads to the steam condensing. This condensed steam, which is still fairly hot, say, 46°C (115°F), is pumped to the top of the WCT. The water is then sprayed down into the tower through many nozzles which atomize the water into extremely small droplets. Fans operating at the top of the WCT cause air to be drawn into the WCT through the outside, passing up through and around the extremely small water droplets. This causes a fraction of the water to evaporate and results in heat being removed from the rest of the water, dropping its temperature. The water vapor generated by the evaporation is then driven up and out of the system by virtue of the fans which also create, in effect, a vacuum within the WCT to draw in the outside air.

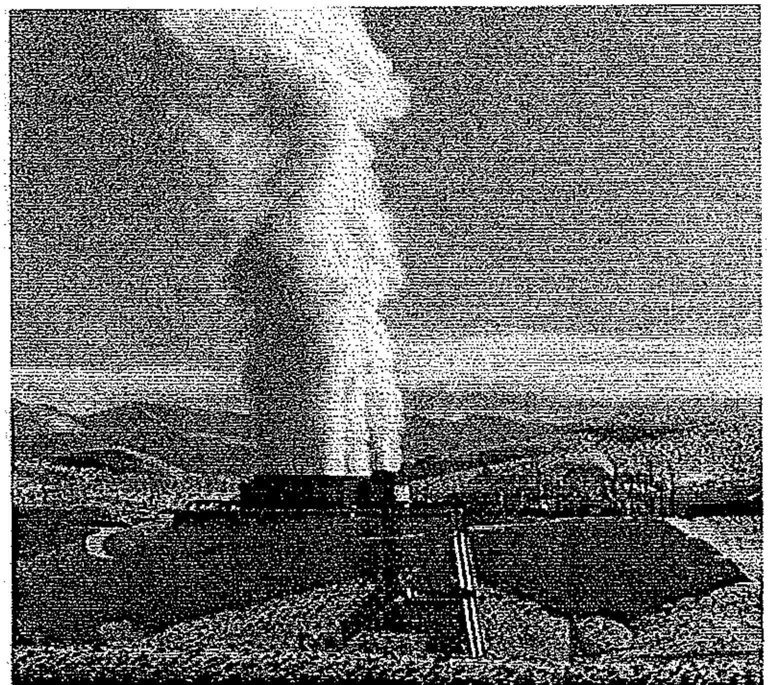
B-32 (Cont.)

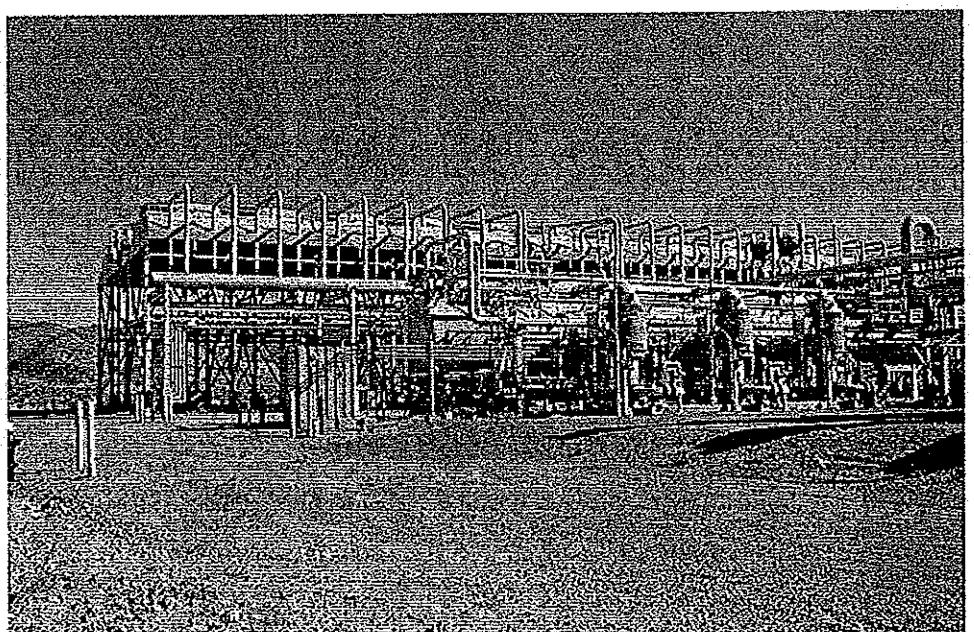
Photograph 1 shows a 3-cell WCT at the Miravalles Unit 5 binary power plant in Costa Rica, and Photograph 2 is a close up view of the same WCT showing the cascade of cooling water being deflected by the incoming air stream. Photograph 3 shows Coso Navy 1 plant (3 units) with an impressive vapor plume from its WCTs. And lastly, Photograph 4 shows a section of the ACCs at the Steamboat 2 binary plant near Reno in Nevada.


Photograph 1. Miravalles Unit 5, Costa Rica. WCT is on the right.


Photograph 2. WCT at Miravalles Unit 5, Costa Rica.

B-32 (Cont.)


Photograph 3. Navy 1 (3 units) showing vapor plume from the WCTs.


Photograph 4. A section of the ACCs at the Steamboat 2 binary power plant in Nevada.

B-32 (Cont.)

The conversion of Coso to an air-cooled system would require the utilization of more land. Given Coso's locale, additional land should not present an acquisitional or environmental problem. I estimate that each air-cooled unit serving one 25-MW power unit would require roughly 10,900 m^2 (117,500 ft^2 or 2.7 acres). From aerial views of the Coso units (*Google Earth*), it is clear that ample, reasonably flat, open area is available to the northeast of Navy 1, to the southwest of Navy 2, and to the west of both BLM plants to accommodate ACCs. A portion, but not all, of the air-cooled equipment and piping, could probably be installed within the current physical footprint of the separate geothermal facilities, thereby reducing the actual need for more land.

Another method to arrest the drawdown and continual drying out of the reservoir is to reduce geofluid production levels (and consequently, the power output) to seek the sustainable, long-term equilibrium balance between the rate of geofluid production and the sum of the rates of the natural recharge and reinjection. For example, the Wairakei geothermal field in New Zealand, the first liquid-dominated reservoir to be commercially developed, was initially over-exploited, having 193 MW installed in several small units. Very soon, it became clear that the field could not sustain this level of production, and three units were removed, leaving 157 MW online, which continues to operate to this day. At that time (c. 1960), the value of reinjection was not fully appreciated and the separated liquids were simply dumped into a nearby river; this practice has changed and most of the liquid is now reinjected.

Coso might consider a variation of this strategy to attain a sustainable operation. Since they have nine modestly sized power units (25-30 MW ratings), they might take a few of them off-line, reduce production, and monitor the reservoir response. Furthermore, by rotating which units are on-line and off-line on some appropriate cycle, reservoir production could be balanced across the field with no one area subjected to excess exploitation. In this way, they may be able to achieve a long-term sustainable operation without the need for an external supply of reservoir make-up water. B-32 (Cont.)

Yet another approach that Coso might consider is drilling new, deeper wells in an effort to reach a deeper, hotter, and most likely liquid-dominated reservoir. Should this prove successful, production from the new production zone would restore the percentage of liquid available for reinjection. If the new reservoir has a temperature of 280°C (535°F), the percentage of produced geofluid that would be available for reinjection would be about 70%. In fact, an exploratory well on the east side of the field encountered very high temperature, of the order of 370°C, but unfortunately the permeability was insufficient. There are examples of fields around the world where deeper reservoirs have been discovered after years of production and depletion using shallower zones, and perhaps Coso might be another one.

After exploring these (and perhaps other alternatives) and if they are found to lack technical or economic merit, Coso should also consider the use of treated wastewater from nearby communities, as is being done at The Geysers. The city of Ridgecrest and the China Lake Naval Air Weapons Station together generate wastewater in a volume rate that I estimate is roughly one-half the rate they are seeking from the new water wells at the Hay Ranch. The scope of such a project would be comparable to The Geysers pipelines in terms of length (SR, 41 miles; LC, 53 miles; Coso, 40-45 miles, est.) and elevation rise (SR, 3000 ft; LC, 2000 ft; Coso, 2000 ft, est.). The projected economics of such an endeavor may or may not look favorable, but the concept is worth a careful study. For instance, the cost incurred by The Geysers to install the SR pipeline and the related facilities to transport the wastewater from 41 miles away was approximately $200 million. The estimated added revenues per year were $67 million. Obviously, The Geysers felt that such capital expenditure was economically justified and the County should conduct a similar study.

The first of the suggested modifications (DEIR, page 5-4) relating to increasing the output without (a) utilizing more resources or (b) increasing system efficiency is not a true alternative since there is no way to accomplish such a goal without doing at least one of these two things. This alleged alternative should be deleted.

In my professional opinion, it appears that Coso designed and operated its geothermal plant to maximize the short-term production of energy and the sale of electricity for the generation of immediate profits, rather than designing and operating a facility which would provide longer-term energy production on a sustainable basis. It also appears that Coso installed and operated roughly one more turbine-generator unit than could be sustained by the geothermal reservoir. Coso may not have realized this at the time they ordered the last of their nine units, BLM West, but they must have become aware of it very soon thereafter. The installation of the last unit together with its immediate conversion to a single-flash system, seems to prove the overexploitation of the geothermal reservoir. While this often happens for economic reasons in order to produce the greatest amount of energy, albeit over a relatively shorter period of time, it nevertheless exacerbates the decline of the productive capacity of the geothermal reservoir itself. **B-32 (Cont.)**

By using one or more of the alternative designs and strategies mentioned herein, it is not too late for Coso to minimize its reservoir decline and achieve a greater measure of sustainability for a longer production of electricity, albeit at a somewhat higher capital cost for equipment, and a somewhat lower annual production of energy and profits. Nonetheless, these alternatives must be fully studied when balanced against the environmental harm that appears to be a definite possibility, since the importation of water from the Hay Ranch wells, even at the lowest production rates and for the shortest duration, is still predicted to cause Little Lake to lose at least 10% of its water supplies. Rather than accept this inevitable consequence, the geothermal alternatives should be carefully studied.

The DEIR states that the life of a geothermal power plant is indefinite (DEIR, page 2-1). While it is more or less true that the heat available in the reservoir rocks may continue to be available indefinitely, it is not valid to conclude that a typical geothermal power plant's life is indefinite. A geothermal plant relies upon the water sources interacting with the hot rocks to create the hot geofluids by which the power plant can operate. Obviously, a decline in the available geofluids would cause a power plant that is dependent on the geothermal reservoir to have a limited life. The faster the geofluids are produced and the greater the fraction of the geofluids that are lost through evaporation in WCTs, the faster that the available geothermal reservoir will dry out and not be available for commercial production.

Thus, the geothermal reservoir, and the power plant itself, can only be said to have an indefinite life if the geofluids are properly managed so that there is no net withdrawal of geofluids. That is, the rate of production is balanced against the rate of reinjection and the natural recharge rate. Since the DEIR states that currently there is no natural recharge (DEIR, page 3.2-24), it is obviously essential to reinject every drop of geofluid that is produced to have any hope of achieving long-term sustainability.

Respectfully submitted,

Ronald DiPippo, Ph.D.
August 14, 2008

B-32 (Cont.)

23 January 2009

Mr. Hector Villalobos, Field Office
Bureau of Land Management
Ridgecrest Field Office
300 S. Richmond Rd.
Ridgecrest, CA. 93555

Re: Hay Ranch Water Extraction and Delivery System Project, NEPA number CA-650-2005-100

Dear Mr. Villalobos,

On behalf of the Timbisha Shoshone Tribe of Death Valley, California, I am submitting comments on the BLM's Coso Operating Company: Hay Ranch Water Extraction and Delivery System Project Environmental Assessment. C-1

Tribal members and traditional users of Coso Hot Springs are in direct opposition to the verbiage "no adverse impact to Coso Hot Springs is expected or that extensive monitoring during the 20+ years has not demonstrated a direct connection between the springs and the geother-mal reservoir." Recording oral history of the area from those who used the springs long ago is our proof of the degradation and damage that BLM and China Lakes NAWS has allowed to take place. Coso Hot Springs is a very spiritual and cultural site, not only to the Timbisha Shoshone Tribe but to the Lone Pine Tribe, Fort Independence Tribe, Big Pine Tribe, Bishop Tribe and Benton Tribe. Our tribal elders stopped using the springs because they became too hot and the muds were no longer safe to use. We talk about the way it use to be, and we tell our children how it has been destroyed and when the children ask what happened? We tell the truth - that BLM and China Lakes NAWS allowed this destruction to take place when the geothermal plants were constructed and allowed to take the water from the springs. What has to occur before your scientists say there has been adverse impacts? C-2

Granting the Hay Ranch-Coso pipeline will only extend the life of the geothermal operation and cause impacts to the groundwater in the Rose Valley and the riparian habitat at Little Lake. C-3

In closing, it is our preference for the 2.2.1 No Action Alternative, where the BLM would not issue a right-of-way for construction of a pipeline from Hay Ranch (Rose Valley) to the Coso geothermal field. C-4

Sincerely,

Joe Kennedy,
Tribal Chairperson
Timbisha Shoshone Tribe

Comment Letter D

"Barbara Durham"
<dvdurbarbara@netscape.com>

01/24/2009 01:50 PM

Please respond to
<dvdurbarbara@netscape.com>

To "Donald Storm" <Donald_Storm@ca.blm.gov>

cc

bcc

Subject Hay Ranch Comments

Donald,

Just wanted to make sure you received a copy of our comments.

Barbara Durham
Timbisha Shoshone Tribe

D-1

Netscape. Just the Net You Need. BLM Hay Ranch Jan. 23,2009.pdf

BISHOP TRIBAL COUNCIL

January 23,2009

Hector Villalobos, Field Office Manager
Bureau of Land Management
Ridgecrest Field Office
300 S. Richmond Rd.
Ridgecrest, CA 93555

RE: Coso Operating Company: Hay Ranch Water Extraction and Delivery System Environmental Assessment

Please accept the following comments for BLM's *Coso Operating Company: Hay Ranch Water Extraction and Delivery System Environmental Assessment (December 2008).* E-1

(1) The EA concurs with the analysis in Inyo County's draft EIR which concludes that with mitigation, the Hay Ranch project will have no significant impacts. Since there was such a heavy reliance on Inyo County's document, the Final EIR should have been referenced instead of the incomplete and dated DEIR. BLM should have addressed the comments of Gary Arnold of Little Lake Ranch, Inc., and their hydrologists Andrew Zdon and Ronald DiPippo. E-2

(2) BLM is not a signatory to the Programmatic MOA in Appendix A, yet Appendix A is titled: "BLM/NAWS Memorandum of Understanding." E-3

(3) *4.5.1 Impacts to Coso Hot Springs*
On page 52, it is stated: *"No adverse impact to Coso Hot Springs is expected. The extensive monitoring of these springs during the 20+ years of geothermal resource development and utilization in the Coso KGRA has not demonstrated a direct connection between the springs and the geothermal reservoir. BLM has entered into a Programmatic Agreement with the SHPO and the ACHP (Appendix D) to provide a continuing framework for monitoring and addressing potential impacts to Coso Hot Springs from the Proposed Action."* E-4

The principal purpose for monitoring the hotsprings was to 1) to develop a criteria to detect "perceptible change to the surface activity of Coso Hot Springs" and 2) to be able to detect a perceptible change to the surface activity. (1979 Memorandum of Agreement between US Navy, ACHP and Cal SHPO). Not only was no criteria developed but a, after perceptible changes occurred the Navy failed to "cease actions" to "determine what actions could be taken to mitigate this change" and hence damage, perhaps *permanent, was done to this culturally important site. (language in quotations taken from text of MOA).* E-4 (Cont.)

Many Native American Elders stopped using Coso Hot Springs after the geothermal plants were constructed because the springs became too hot and the muds were no longer useable in the traditional way. The Tribe contends that adverse impacts have occurred at Coso Hot Springs since the inception of geothermal plants in the Coso KGRA and will continue to occur with the proposed Hay Ranch Water Extraction project. The Tribe further believes that any future monitoring conducted to address potential impacts at Coso Hot Springs through a framework based on the current conditions of Coso Hot Springs will be flawed due to the impacts already existing at the site. E-5

The Hay Ranch-Coso Pipeline cannot be viewed as a stand-alone project. BLM's granting of a right of way for the pipeline will extend the life of the geothermal operation by significantly drawing down the water in the groundwater in the Rose Valley. The geothermal operation has had significant adverse impacts on Coso Hot Springs for the past twenty years. Although there is no absolute way of determining the effects of future injections of water on Coso Hot Springs, past water injections as part of geothermal production have had adverse effects on the Springs. To date, these adverse effects have not been mitigated, and there is no current plan to use injected water into the geothermal reservoir as a form of mitigation according to the 1979 MOA signed by NAWS, ACHP, and SHPO. E-6

(4) 4.8.3 Mitigation

On page 56 it is stated: *"If changes in use patterns by the Traditional Practitioners resulting from the implementation of the undertaking are identified, BLM and CLNA WS will initiate consultation among the signatory and concurring parties regarding the observed changes."* E-7

BLM and NAWS must consult with other local tribes on this and other issues relating to Coso Hot Springs even though some of the tribe were not a signatories or a concurring parties to this Programmatic Agreement. E-8

In conclusion, it can reasonably be presumed that a pipeline project which withdraws 4,800 acres a year for up to thirty years will have significant impacts on Rose Valley, specifically the rare riparian habitat of Little Lake. Monitoring may not be able to stop the impacts to the springs in time. Thirty years of monitoring Coso Hot Springs has not prevented the degradation of this sacred site. These impacts combined with the controversy over the project require that an Environmental Impact Statement (EIS) be prepared for the project. In lieu of an EIS, the No Action Alternative is recommended for this project. E-9

Sincerely,

Michael Lumsden,
Chief Operations Officer
Bishop Paiute Tribe

"Brian Adkins" <badkins@bishoptribeemo.com>

01/23/2009 05:49 PM

To <Donald_Storm@ca.blm.gov>

cc

bcc

Subject RE: Coso Hay Ranch pipeline EA available

Donald,

Thank you for the opportunity to comment on this proposed project. Please find attached comments from the Bishop Paiute Tribe regarding the above referenced EA. A hardcopy of this attachment follows in the mail today. If you have any questions please do not hesitate to contact me by email or phone.

Thank you,

Brian Adkins
Environmental Director
Environmental Management Office
Bishop Paiute Tribe
50 Tu Su Lane
Bishop, Ca 93514
760-873-3584 ext 237(phone)
760-873-4614 (fax)

F-1

From: Donald_Storm@ca.blm.gov [mailto:Donald_Storm@ca.blm.gov]
Sent: Wednesday, December 10, 2008 11:26 AM
To: monty.bengochia@bishoppaiute.org; Valerie.spoonhunter@bishoppaiute.org; badkins@bishoptribeemo.com; theresa.yanez@bishoppaiute.org
Subject: Coso Hay Ranch pipeline EA available

Today BLM Ridgecrest mailed, certified-return receipt requested, to the Tribal Chair, c/o of the Tribe at the 50 Tu Su Lane address in Bishop, a copy of the Environmental Assessment for the Coso Hay Ranch pipeline project. **There is a comment deadline of Friday Jan. 23, 2009.** Thus, this "heads up" email alert about this document's pending arrival. A copy of the letter draft, signed by Linn Gun, Lands & Minerals Branch Chief, as Acting for Hector Villalobos, Office Manager, is enclosed for your convenience.

Donald J. Storm
Archeologist
BLM, Ridgecrest Field Office
(760) 384-5422

F-2

internet: Donald_Storm@ca.blm.gov Comments-BLM-EA Hayranch Project.PDF

Comment Letter G

BIG PINE PAIUTE TRIBE OF THE OWENS VALLEY
Big Pine Indian Reservation

January 23, 2009

Hector Villalobos, Field Office Manager
Bureau of Land Management
Ridgecrest Field Office
300 S. Richmond Rd.
Ridgecrest, CA 93555

RE: Coso Operating Company. Hay Ranch Water Extraction and Delivery System Environmental Assessment

Please accept the following comments for BLM's *Coso Operating Company Hay Ranch Water Extraction and Delivery System Environmental Assessment (December 2008).* G-1

(1) The EA concurs with the analysis in Inyo County's draft EIR which concludes that with mitigation, the Hay Ranch project will have no significant impacts. Since there was such a heavy reliance on Inyo County's document, the Final EIR should have been referenced instead of the incomplete and dated DEIR. BLM should have addressed the comments of Gary Arnold of Little Lake Ranch, Inc., and their hydrologists Andrew Zdon and Ronald DiPippo. G-2

(2) BLM is not a signatory to the Programmatic MOA in Appendix A, yet Appendix A is titled: "BLM/NAWS Memorandum of Understanding." G-3

(3) ***4.5.1 Impacts***
Impacts to Coso Hot Springs

On page 52, it is stated: *"No adverse impact to Coso Hot Springs is expected. The extensive monitoring of these springs during the 20+ years of geothermal resource development and utilization in the Coso KGRA has not demonstrated a direct connection between the springs and the geothermal reservoir BLM has entered into a Programmatic Agreement with the SHPO and the ACHP (Appendix D) to provide a continuing framework for monitoring and addressing potential impacts to Coso Hot Springs from the Proposed Action."*

As we stated in a letter to BLM for the first Hay Ranch EA.
The *Coso Hot Springs Analysis* (Technical Summary) submitted by Innovative Technical Solutions in April, 2007 upon the request of the Navy stated the following conclusion:

> *It is impossible to completely rule out time dependent changes observed at the Coso Hot Springs being due to natural variability associated with high Rayleigh number convection However, the timing of the onset of geothermal fluid withdrawal and changes in hot spring activity at Coso suggest a correlation (p. 60).*

G-4

P.O. Box 700 • 825 South Main Street • Big Pine, CA 93513 • Office: (760) 938-2003 • Fax: (760) 938-2942

Many Native American Elders stopped using Coso Hot Springs after the geothermal plants were constructed because the springs became too hot and the muds were no longer useable in the traditional way. The Tribe contends that adverse impacts have occurred at Coso Hot Springs since the inception of geothermal plants in the Coso KGRA and will continue to occur with the proposed Hay Ranch Water Extraction project. The Tribe further believes that any future monitoring conducted to address potential impacts at Coso Hot Springs through a framework based on the current conditions of Coso Hot Springs will be flawed due to the impacts already existing at the site. G-5

The Hay Ranch-Coso Pipeline cannot be viewed as a stand-alone project. BLM's granting of a right of way for the pipeline will extend the life of the geothermal operation by significantly drawing down the water in the groundwater in the Rose Valley. The geothermal operation has had significant adverse impacts on Coso Hot Springs for the past twenty years. Although there is no absolute way of determining the effects of future injections of water on Coso Hot Springs, past water injections as part of geothermal production have had adverse effects on the Springs. To date, these adverse effects have not been mitigated, and there is no current plan to use injected water into the geothermal reservoir as a form of mitigation according to the 1979 MOA signed by NAWS, ACHP, and SHPO. G-6

(4) 4.8.3 Mitigation

On page 56 it is stated: *"If changes in use patterns by the Traditional Practitioners resulting from the implementation of the undertaking are identified, BLM and CLNAWS will initiate consultation among the signatory and concurring parties regarding the observed changes."* G-7

BLM and NAWS must consult with the Big Pine Paiute Tribe on this and other issues relating to Coso Hot Springs even though the Tribe was not a signatory or a concurring party to this Programmatic Agreement. G-8

In conclusion, it can reasonably be presumed that a pipeline project which withdraws 4,800 acres a year for up to thirty years will have significant impacts on Rose Valley, specifically the rare riparian habitat of Little Lake. Monitoring may not be able to stop the impacts to the springs in time. Thirty years of monitoring Coso Hot Springs has not prevented the degradation of this sacred site. These impacts combined with the controversy over the project require that an Environmental Impact Statement (EIS) be prepared for the project. In lieu of an EIS, the No Action Alternative is recommended for this project. G-9

Sincerely,

Virgil O Moose

Virgil Moose
Tribal Chairperson

Comment Letter H

CALIFORNIA WATERFOWL

January 6, 2009

Linn Gum
The Bureau of Land Management
300 South Richmond Road
Ridgecrest, CA 93555

RE: Coso Operating Company Hay Ranch Water Extraction and Delivery System Environmental Assessment - CACA-046289 CA-650-2005-100.

Dear Ms. Gum:

The purpose of this letter is to express the California Waterfowl Association's (CWA) concerns with the Environmental Assessment (EA) for the proposed Coso Operating Company Hay Ranch Water Extraction and Delivery System Project (hereafter, Project). We believe the water extraction proposed for this Project will negatively impact the valuable Little Lake wetland habitat and the wildlife species that depend on it. The EA for the Project relies heavily on the Draft EIR completed by Inyo County. Therefore, in addition to the following comments, I have also attached CWA's more specific comments concerning the Draft EIR. **H-1**

California has lost more than 95% of its historic wetlands, largely due to urbanization, flood control and agriculture. As a result, many species have declined from historic levels, and are increasingly dependent on fewer wetlands. Despite these tremendous habitat losses, California arguably remains the most important wintering area for waterfowl and other waterbirds in the Pacific Flyway. Avian species from the north, some as far as Alaska and the Canadian Arctic, rely on our wetlands for nutritional and other needs while visiting during the winter. In addition, many resident bird species nest within or near local wetland habitats. Thus, because of the severe wetlands losses in our state, maintaining every acre of habitat is critical. **H-2**

The importance of wetland habitat in California is now recognized and state and federal policies have been established to insure conservation of existing wetlands and restoration of additional wetland acres. On November 14, 2000, the Inyo County Board of Supervisors also recognized the importance of restoring and maintaining wetlands in the state of California, and locally. They submitted a letter to the U.S. Fish and Wildlife Service in support of the "Upper Little Lake Habitat Restoration Improvement Plan". (Appendix F, Coso DEIR). They were not the only group who thought this was an important opportunity; 11 other private and government entities also pledged their support and funds for the project. Ultimately, about $500,000 of public and private funds was spent on this habitat restoration project as it overwhelmingly proceeded forward. **H-3**

4630 Northgate Blvd., Suite 150, Sacramento, CA 95834
916.648.1406 • www.calwaterfowl.org

The restoration was successful (and ongoing) and still functions as intended, providing wetland and upland habitat for a myriad of wildlife species. H-3 (Cont.)

We have reviewed BLM's Environmental Assessment of the proposed Project, and conclude that it inadequately evaluates the potential impact of reducing groundwater levels on local wetlands and associated wildlife. The Project also jeopardizes the cooperative effort to restore Little Lake wetlands that began almost 10 years ago. The proposed Project is not consistent with state or federal wetland policies, or the intention of the Inyo County Supervisors when they voiced their support for the Little Lake Project in 2000. As stated in the Assessment, the impact of the Project on Rose Valley water users and the wetlands of Little Lake "are significant" (pages 51-52), and groundwater modeling has indicated there will be a reduction in both aquifer levels and spring flows. Because Little Lake and the associated wetlands are dependent on spring flows, any drop in aquifer levels (even if only 10 percent as suggested in the DEIR) can negatively impact habitat quality and subsequently reduce the value to wildlife. H-4

In conclusion, CWA firmly believes that extracting water from the Rose Valley aquifer will ultimately deteriorate the quality of wetlands and their value to wildlife at Little Lake. For this reason we urge the BLM to reconsider the finding of no significant impact, and reject the Hay Ranch Water Extraction and Delivery System Project as currently proposed. H-5

Sincerely,

Gregory S. Yarris
Director of Conservation Policy

Attachment

CALIFORNIA
OUTDOOR
HERITAGE
ALLIANCE

December 29, 2008

Linn Gum
Bureau of Land Management
300 South Richmond Road
Ridgecrest, CA 93555

RE: Hay Ranch Water Extraction and Delivery System Project on Little Lake Ranch

Dear Ms. Gum:

The California Outdoor Heritage Alliance (COHA), a nonprofit organization dedicated to promoting wildlife conservation and protecting our hunting heritage is opposed to extracting water from the Rose Valley aquifer as proposed by the Hay Ranch Water Extraction and Delivery System Project. We believe that this water extraction will negatively impact the extremely valuable and sensitive wetlands, and wetland dependent species currently found on Little Lake Ranch. I-1

Little Lake Ranch consists of more than 1,200 acres of intensely managed wetlands and uplands that provide key wildlife habitat and wildlife dependent recreational opportunities. The property provides wintering habitat for many wetland dependent species and serves as an important stopover for the Pacific Flyway. With over 95% of California's wetlands destroyed, Little Lake Ranch is one of only a handful of wetlands that remain due in large part to water diversions and agricultural conversion. I-2

For nearly a decade, State and Federal agencies, along with non profit conservation organizations and private individuals have entered into public-private partnerships to protect and improve the wildlife habitat on Little Lake Ranch. Through these important partnerships hundreds of acres of habitat have been restored and protected. These wetlands now provide additional habitat for numerous wetland and upland dependent species, including providing habitat for species that are state and/or federally listed as threatened or endangered. Much of this work would not have been accomplished without generous private, as well as public funding. I-3

In conclusion, COHA strongly believes that the proposed Hay Ranch Water Extraction and Delivery System Project would ultimately reduce the water supply to Little Lake Ranch wetlands and significantly harm wetland dependant species. Fore these reasons, we request that the Bureau of Land Management reject the Hay Ranch Water Extraction and Delivery System Project as currently proposed due to the negative impacts that would occur under the proposed water extraction from the Rose Valley aquifer. I-4

Sincerely,

Bill Gaines
President

Coso Operating Company LLC

January 21, 2009

U.S. Department of the Interior
Bureau of Land Management
Ridgecrest Field Office
300 S. Richmond Road
Ridgecrest, CA 93555
Attn: Hector Villalobos

Re: Environmental Assessment No. CA-650-2005-100 – BLM Case File No. CACA-046289

Dear Mr. Villalobos,

Coso Operating Company LLC provides these comments to augment and clarify certain data and analysis contained or incorporated by reference in the subject Environmental Assessment ("EA") concerning the proposed Hay Ranch Water Extraction and Delivery System (the "Hay Ranch Project").

HAY RANCH PROJECT BACKGROUND

Coso Operating Company, LLC ("Coso" or "the Company") is a wholly-owned subsidiary of Terra-Gen Power, which is a renewable energy company focused on geothermal, wind, and solar generation projects. The Company operates the Coso Geothermal Projects, which are located partly on public land managed by the Bureau of Land Management ("BLM") and partly on federal land managed by the U.S. Navy as part of the U.S. Naval Weapons Center in Inyo County. Power production from the first elements of the Coso Geothermal Projects began in May of 1987.

The Coso Geothermal Projects consist of three separate but interlinked geothermal plants and are one of the top three producers of geothermal electric power in the country. The facilities are efficient, up to date, and well maintained, and have 20-year track record of providing safe, clean, and cost-effective renewable energy to Inyo County residents and others. The Coso Geothermal Projects currently produce approximately 200 megawatts ("MW"), approximately 8 percent of the U.S.'s geothermal power. This is enough electricity to meet the needs of approximately 200,000 homes, the equivalent of saving almost 3 million barrels of oil a year. The energy generated by the Coso Geothermal Projects is sold to Southern California Edison pursuant to long-term, fixed-price energy agreements.

California has committed itself to reducing its greenhouse gas emissions, and one of the ways in which it will do this is by converting 20 percent of the State's energy portfolio to renewable energy sources. For this reason, reliable and clean sources of energy are particularly important to this State at the present time and for the foreseeable future. The Coso Geothermal Projects, especially as proposed to be augmented by implementation of the Hay Ranch Project, can continue to help the State to meet its energy production goals and be part of the solution to global warming. The Coso Geothermal Projects reduce greenhouse gas emissions and dependence on foreign oil by satisfying electricity demand that would otherwise likely be supplied by fossil-fueled generation.

How the Coso Geothermal Power Plants Work

Instead of burning fossil fuel to create heat, geothermal power production takes advantage of naturally occurring hotspots and converts that heat to electricity. Under pressure from the natural geothermal resource, or reservoir, thousands of feet below the surface, hot geothermal fluid (brine), travels up wells, some as deep as 11,000 feet, and flashes into steam that drives turbines, which in turn drive electrical power generators. Brine that does not flash into steam, as well as condensed steam from the turbines, is collected and injected back into the geothermal reservoir through injection wells. This energy production is predictable and reliable and requires no dams, produces no radioactive byproducts, and can operate 24 hours a day, 365 days a year, unlike other sources of renewable energy. In addition, a geothermal power plant releases approximately 90% less carbon dioxide (a greenhouse gas) emissions than a comparable fossil fuel plant. (See Bloomfield & Moore, *Production of Greenhouse Gases from Geothermal Power Plants* (1999) at p. 4.) Like all geothermal resources, the Coso projects are a clean, renewable source of energy with a nearly perfect reliability factor. However, in some cases, as here, due to the loss of brine through cooling tower evaporation losses as time goes by, it becomes necessary to augment brine reinjection back into the geothermal resource to maintain reservoir pressure for optimizing the extraction of the hot geothermal fluid.

Ongoing Plant Improvements to Enhance Projection Efficiencies

Coso is dedicated to continually making improvements to the geothermal facilities in order to improve efficiency. To this end, the Company conducts evaluations on an ongoing basis to determine what modifications can benefit the performance of the facilities, and has invested more than $100 million in capital equipment improvements to the Coso Geothermal Projects to ensure they have the most up-to-date and efficient technology available. An example of this is Coso's continued review and evaluations of its piping system. In order to move fluids within the nearly 15,000-acre Coso facility, substantial piping systems are required. Within those systems, losses in energy occur due to many phenomena, including changes in elevation and friction in the lines. In order to minimize these losses, Coso designs its pipelines utilizing very conservative criteria. Standard Coso design calls for a maximum pressure drop of 5 pounds per square in ("p.s.i.") in any steam pipe line. This limitation on allowable pressure drop dictates line sizing, separator location, and pipe line routing for new and existing systems. Coso utilizes a piping pressure model to determine the performance of its steam gathering system. Existing systems are evaluated on an ongoing basis to determine if piping modifications could benefit the performance of the facility. Coso has invested over $8 million during the past seven years in the modification and replacement of approximately 6 miles of piping systems at the site. Over the next several years, and depending on the outcome of the permitting processes for the Hay Ranch Project, Coso plans to continue to invest a significant amount of capital to enhance the viability and efficiency of the geothermal facilities.

Benefits to the Local Community

In addition to providing clean and green power to the region, Coso and its affiliates have a long track record of being responsible stewards of the environment and the natural resources under their control. The Coso facilities have been a major economic benefit to Inyo County residents, generating more than $4.5 million in annual property taxes as well as providing additional sources of public revenue through royalty payments to the federal government, which are shared by the BLM with the County. Recent fixed-price power contract extensions will supply an enhanced tax base for the next 20 years. Besides being the largest private taxpayer in Inyo County, Coso employs 90 workers and is one of the largest private employers in the area and a major contributor to local schools, charities, and community organizations. The Company currently works with over 50 area businesses that supply goods and services that support the operation. Furthermore, during the state's energy crisis in 2001, Coso and its affiliates demonstrated the importance of geothermal power and its commitment to being a responsible corporate citizen by helping meet local area and California's energy needs by providing power for six months with no assurances that the Company would be repaid.

CONFORMANCE WITH FEDERAL AND STATE ENERGY POLICIES

The EA addresses the conformance of the proposed action with applicable land use plans (EA Section 1.2). Coso also wishes to emphasize that the proposed Hay Ranch Project is in conformance with relevant Federal and State energy policies.

As the EA points out, the loss of geothermal fluid at the Coso Geothermal Projects has resulted in the decline in the reservoir, creating a reduction of megawatt production from the geothermal power plants. The productivity of the plants in recent years has declined by approximately 25% from approximately 270 MWs to approximately 200 MWs. The current Project seeks to return productivity levels to normal through the provision of supplemental water from the Coso Hay Ranch wells.

Federal Law and Energy Policy Urge Reliance on Geothermal Generation

Federal law defines geothermal generation facilities as renewable energy resources. (42 U.S.C. § 15851(a).) Congress has also developed a limited funding incentives program for the development of qualified geothermal resources. (42 U.S.C. § 13317.) Moreover, federal law specifically encourages the development of technologies to better understand and extend the life-cycle of geothermal reservoirs. (See 42 U.S.C. § 16231(a)(2)(C).) Most recently, federal energy policy was changed through the enactment of the Energy Policy Act of 2005. The act, which was signed into law by President Bush, attempts to combat growing energy problems by providing a variety of incentives for renewable energy production. Additionally, this Project furthers the use of U.S. Navy lands for the generation of renewable energy.

California's Energy Regulation Agencies and State Law Urge Reliance on Geothermal Generation

Under California law, geothermal generation plants are categorized as renewable energy resources. (Pub. Res. Code, §§ 25741, 26003(i).) The California Legislature has recognized that the "[r]eduction of dependence on fossil fuels and stimulation of the state's economy through development of geothermal resources" is of vital importance. (Pub. Res. Code, § 3800.) Accordingly, the California Legislature has developed a funding program for the development of geothermal resources under certain conditions. (See Pub. Res. Code, § 3800 et seq.) Moreover, the regulatory agencies that set state policy for renewable energy resources have focused on geothermal generation plants as one means to achieve California's growing energy demands while reducing air pollution, global warming, and the other adverse effects associated with traditional fossil fuel generation plants.

In 2002, California's Governor signed the Renewable Portfolio Standard, SB 1078. This standard required an annual increase in renewable generation equivalent to at least 1% of sales, with an aggregate goal of 20% by 2017. Subsequently, in 2003, the California Energy Commission and the California Public Utilities Commission adopted California's Energy Action Plan, which accelerated the State's renewable energy goals. Specifically, the 2003 Energy Action Plan stated that energy conservation measures and the continued use of renewable energy facilities "would minimize the need for new generation, reduce emissions of toxic and criteria pollutants and greenhouse gases, avoid environmental concerns, improve energy reliability and contribute to price stability." Additionally, the 2003 Energy Action Plan moved up the proposed schedule for reaching a 20% renewable energy portfolio standard from 2017 to 2010.

In 2005, a new Energy Action Plan for the State of California provided still further incentives for increased reliance on renewable energy projects. First, the 2005 Plan confirmed the 2010 target date for reaching a 20% renewable energy portfolio standard. Second, the 2005

Plan called for the development of strategies to reach a 33% renewables standard by 2020 for all load serving entities. The 2005 Energy Action Plan specifically called out the need to encourage the use development of renewable energy resources including "facilities for wind, solar, geothermal and biomass."

In 2007, the California Energy Commission released its Integrated Energy Policy Report, which advanced policies to enable California to meet its energy needs in a carbon constrained world. The report also provides a comprehensive set of recommended actions to achieve these policies. Among them was the continued reliance on California's renewable generation portfolio including "renewable energy sources such as solar, wind, geothermal, and biomass."

At the beginning of 2008, an Energy Action Plan Update was released that continued to urge reliance on renewable energy resources, explaining that "[r]enewable energy policy is a cornerstone of our approach to reducing greenhouse gas emissions in the electricity sector."

Accordingly, both California law and the State-wide energy policies that guide future energy development in California encourage the continued reliance on renewable energy resources such as the Coso Geothermal Field. The Project proposed by Coso and under consideration by the County of Inyo would allow for that continued and efficient operation, thus contributing to the State's future energy supply.[1]

Multiple letters of support have been submitted to the County of Inyo by State Legislators and others supporting the Project and confirming that the continued and efficient operation of the Coso Geothermal Projects is in the best interest of the State. For example, letters from California Senator Bob Dutton of the Thirty-first District, California Senator Roy Ashburn of the Eighteenth District, and California Assembly-member Jean Fuller of the Thirty-second District have all expressed support for the Project and pointed out that the Project is important for meeting the State of California's Renewable Energy Portfolio Standard. Copies of those letters are provided with these comments.

THE EA AND NEPA

Because of the all-inclusive scope of analysis it affords, we agree that the EA for the Project fully complies with the requirements of the National Environmental Policy Act ("NEPA"), 42 U.S.C. §§ 4321 – 4347, the NEPA regulations adopted by the Council on Environmental Quality, 40 C.F.R. § 1500.1 *et seq.*, and BLM's NEPA Handbook H-1790-1

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[1] Although the sustained operation of the Coso Geothermal Projects would continue to make energy available to the State, the proposed Hay Ranch Project would not result in any significant growth inducing impacts. The proposed Hay Ranch Project will not extend the life of the Coso Geothermal Projects beyond that previously analyzed and approved. (EA Section 4.)

(January 2008). Coso believes that the analysis therein is thorough, reflects BLM's comprehensive review of the Hay Ranch Project, and supports the draft Finding of No Significant Impact ("FONSI"). The comments and additional substantial evidence herein are submitted to provide further explanation and amplification of the analysis and conclusions set forth in the EA and the findings set forth in the FONSI.

PROPOSED ACTION

Coso offers a minor clarification to the comprehensive description of the Hay Ranch Project set forth under the discussion of the Proposed Action. With respect to the tie-in of the proposed new substation with the existing Southern California Edison transmission line, Coso notes that the service line necessary to connect the Project to the new Southern California Edison power substation will be very minimal in length, because the existing Southern California Edison line actually clips the corner of the Hay Ranch property on which the new substation and pumping facilities will be located. For this reason, any impacts from new the poles and lines will be extremely minimal and less than significant.

ALTERNATIVES

The EA incorporates by reference the analysis of a reasonable range of alternatives to the proposed Hay Ranch Project set forth in the Draft Environmental Impact Report prepared by Inyo County (the "Draft EIR"). Coso provides the following supplemental information further demonstrating the infeasibility of the non-selected alternatives, taking into account economic and other considerations.

Piping

As noted previously, Coso is dedicated to perform ongoing evaluations to determine whether piping modifications could benefit the performance of the geothermal facility. Because all technologically feasible piping modifications have already been implemented, there are no additional modifications that have been identified to serve as an alternative to the Hay Ranch Project at this time. Accordingly, increased piping efficiency would not eliminate the need for the Hay Ranch Project.

Steam Turbines

Coso has already completed redesign and replacement on four of the units' steam turbine blading and sealing configurations at the facility. Steam path upgrades of this type allow for improved use of the steam that exists at the facility. It should be noted that work of this type has a cost of approximately $2,000,000 per unit. Coso indicates that it continues to evaluate the design of the units, and will make additional modifications when they become economically feasible. Because these elements are already being incorporated, they cannot serve as viable alternatives to the Hay Ranch Project.

As an alternative to the Hay Ranch Project, Coso also considered complete replacement of its steam turbines with newer equipment. However, advances in technology typically can only yield a 1 to 3% improvement in the design efficiency of the turbine at best. This minimal improvement in performance cannot support the capital expenditure of $10 to $15 million per turbine or $90 to $130 million for complete replacement, with almost no increase in capacity. In addition, such large scale turbine generator replacements are infeasible due to the down time associated with the retrofit of new equipment. Furthermore, this alternative would require the disturbance of new areas, approximately equal in size to the existing power plants, to place the new equipment. Once the new equipment was installed, it would have to be tied back into the existing auxiliary systems. This would require the permanent disturbance of an additional 30 acres and would cause concomitant air quality, noise, traffic, biological (including impacts to the habitats of listed wildlife species), and other environmental impacts. In addition to the land disturbance, significant construction equipment and extensive construction traffic would be required for a period of approximately 6 months per unit, and substantial grading and fill issues would be encountered during hillside construction activities, with resulting environmental impacts. Furthermore, because each of the nine units would, on a rotating basis, have to be completely shut down for approximately 6 months for construction and installation, the plant would not be fully operational for four and a half years. This loss of power would not only result in an additional economic burden to Coso, but because California's energy demands are increasing, the power would have to be generated elsewhere, most likely in a fossil-fuel burning power plant, which would entail the production of significantly greater environmental impacts (including air quality emissions, greenhouse gas emissions), with no net benefit.

Thus, as with the piping improvements alternative, even if all of the turbines were replaced, recharge would still be required in order to reverse the annual decline in reservoir productivity. Accordingly, the recharge Project is necessary to allow the plant to continue optimum energy generation.

For all of the above reasons, this alternative is infeasible at this time.

<u>**Binary Systems**</u>

In conjunction with the evaluation of replacement steam turbines, Coso considered the use of binary systems. In addition, Coso is continuing to evaluate binary and other heat recovery systems as a means for generation improvement.

As it relates to replacement of the steam turbines, the initial capital expenditure associated with procurement of completely new equipment as compared to equipment that is already in place can never be recovered. Complete replacement of the existing turbine sets with binary equipment, which is by its nature less efficient, would cost approximately $560,000,000.00, with no increase in generation.

As it relates to enhancement of generation, at this time there is insufficient brine in any one area to justify the capital costs for the equipment installation as compared to the potential generation improvement. The capital costs of additional auxiliary systems and equipment, coupled with the parasitic energy demands to run those auxiliaries, which can be as much as 30%, preclude the option of installing equipment of this type in an area where the brine available could be consolidated and effectively utilized. In addition, binary systems have additional impacts that are not present for the selected alternative. For example, the footprint of plants using binary systems is significantly bigger. The relative land area required for binary systems is approximately 60-acres, which is 3 times larger than that of the existing standard flash plant, when one considers the relative equipment required to transfer heat from the geothermal fluid to the motive fluid, the number of turbine generator sets required to generate a similar amount of electricity as compared to the current flash plants, and the surface area required to install the cooling units for the spent motive fluid. Developing this additional land would entail additional environmental impacts, including air quality, noise, and traffic impacts during construction and possible biological impacts due to the sensitive nature of some of the surrounding habitat.

Further, binary units create scaling concerns in the piping systems, a concern which is not presently at issue with present operations at the Coso Geothermal Projects. The use of binary units with the brines at the Coso Geothermal Projects will lead to scaling and plugging issues. At Coso, these scale deposits would not be hazardous, but would require significant plant down time, and additional maintenance staffing in order to keep the systems fully functional. To put this in perspective, currently the Coso plants are shut down approximately once per year, and operate in the 98.5 to 99.5 percent range. Using a binary system instead would require the machines to be taken offline a couple of days every month or two, or approximately 7 percent of the time, decreasing overall electric generation capacity by around 10 percent. As discussed elsewhere, this loss in renewable energy would likely be replaced by energy generated by traditional fossil-fuel burning plants, along with their attendant environmental impacts. Additionally, the scale deposit material would require disposal. Because of all of these significant drawbacks, this option was accordingly also eliminated as infeasible.

Gas Removal Systems

As another alternative for modifications to the power plant that could be made to provide additional output, Coso studies gas removal systems. Byproducts of the geothermal steam gathering process include non-condensable gases. These gases travel in the steam phase, and through the steam turbine. During the condensation process, these non-condensable gases are separated from the condensed steam. These gases occupy void space within the condenser and interfere with its operation. At that point, the gases can create a back pressure on the turbine, decreasing its efficiency and performance.

Coso has already implemented several equipment additions and modifications to ensure that gases are effectively removed from the process. These include installation of gas abatement units, addition of vacuum pumps and compressors, replacement of steam jet air ejectors, and expansion of the cooling capabilities of our condensers by addition of gas pre-coolers.

The installation of gas abatement units eliminated the need to reinject gases that are intrinsic to the geothermal steam. Gas concentrations in the steam had begun to increase as a result of gas reinjection, which was part of Coso's original design. Increases in gas concentration have a detrimental effect on condenser and turbine performance as described above. Coso has invested over $20 million dollars in the installation and operation of these gas abatement units, which represent the best available technology for control of hydrogen sulfide gas emissions.

The addition of vacuum pumps and compressors was undertaken in order to improve the efficiency of the gas removal systems. Vacuum pumps take the place of relatively inefficient steam driven jet ejectors, and allow the motive steam for that equipment to be routed through the steam turbines. The compressors boost the gas pressure from the vacuum pump discharge to move the gas flow through the abatement system. Coso has invested approximately $12 million dollars in the addition of this equipment.

Redesign and replacement of the primary steam ejectors has been implemented on five of the nine Coso units. This equipment replacement was undertaken to improve the performance of this equipment by better matching its design to the current operating conditions.

Gas pre-coolers have also been added to three of the Coso power plant units. They were added to remove excess water vapor that was being carried out of the main condenser in the gas stream and that was negatively affecting the performance of downstream equipment. This decline in performance led to increased system back pressure, which affected turbine performance. Installation of this equipment was achieved at a cost of $1,000,000 per unit. As with the other possibilities under this alternative, Coso reviews performance of the gas removal systems on a daily basis, and will make additional modifications when they are determined to be economically feasible. Similar to the piping alternative, this option cannot really serve as an alternative to the Project because all feasible modifications in this regard have already been incorporated, and future modifications will be undertaken as soon as they become feasible as well.

Coso has also conducted a detailed study to determine the benefit of replacement of the existing main condensers. No benefit could be realized on three of the units. On the remaining units, the replacement cost of $2.5 million per unit could not be economically justified.

For the above reasons, all of the alternatives regarding possibilities for modifications to the power plant that could be made to provide additional output above were either already being performed or were infeasible due to vast differentials between the cost of the improvement and resultant performance benefit.

Cooling Tower Redesign/Replacement

Evaporative cooling is the most efficient mode of cooling in dry climates like the area surrounding the Hay Ranch Project site because the ultimate heat sink is the wet bulb rather than the dry bulb temperature. The power plant's initial design included cooling towers at the nine units. Coso has investigated replacement of the cooling towers with dry cooling systems in order to reduce fluid losses due to evaporation. In addition, Coso has also considered augmenting the wet cooling systems with dry cooling. The overall objective was to save condensed steam currently evaporated in the cooling towers, and achieve 3,000 gallon-per-minute ("gpm") additional injection as a result. In both cases, the capital cost of the added equipment negated further investigation.

- **100% dry cooling.**

On an individual unit basis - 560 kph of steam flow, with 13% moisture, at 1.75 psia (3.5 inches of Hg) would require a GEA 18 cell unit for air cooled only. The capital cost quoted by the supplier would be $27.3 million, with a parasitic load of 2,670 kW. This number was confirmed as a very similar cost was calculated by scaling up from a smaller 1999 installation. The footprint for each unit would be 35,000 sq ft or 104 x 385 ft.

Four of these units would be required to achieve 3000 gpm of the current water augmentation project. (Total cost $110 million). This design attempts to maintain current generation, though the typical dry cooling unit has a very large negative impact to summer peak generation in dry climates. In addition, the loss in net generation due to the additional parasitic load required to operate these fans could not be recovered. Accordingly, and as relates to what is industry practice, dry cooling is typically not used with flash-type generation facilities like Coso's because of this reduced efficiency. Due to the high capital cost, detailed reductions during summer peak were not modeled.

- **Augmented dry cooling.**

An alternate design was also reviewed, estimated to save 60% of current evaporation on a unit basis. This approach would use air-cooling to augment the wet cooling during the winter months, and the cooler periods in the spring and fall. Based on current losses of 389 kph (778 gpm) due to evaporation, this design would reduce that to 156 kph (311 gpm) most of the year. This results in a savings of 468 gpm of water per unit. This approach would involve similar equipment to the above dry cooling scenario, but would not have to be designed to address the highest temperature conditions in the summer. Summer cooling would use the current evaporative cooling tower. A cost estimate of $14.06 million per unit yields a total cost of 80 million (6.4 fractional units were used in the calculation assuming size could be adjusted without appreciably affecting incremental cost.) Each of the 6+ units would have a footprint of 110 ft x 250 ft (0.6 acres excluding any maintenance clearance). This design would maintain generation in summer as the current wet cooling towers would continue to be used.

Installation of the seven augmented dry cooling units that would be required under this scenario would require the disturbance of 4.2 acres of additional land, and by their nature would be required to be located in a sensitive biological habitat area near the existing plants. Additional construction would also be required, with the concomitant air, noise, traffic, and other environmental impacts. Moreover, the additional parasitic load that this option would create would result in the transfer of approximately 18 MW <u>less</u> renewable power to the general public. This would lead to additional GHGs and the other environmental impacts that would occur due to the fact that this energy would have to be produced elsewhere, presumably in a fossil-fuel powered plant. In addition, this option would still require additional water, and thus the Project, or something very similar, would still be required. This option was rejected as infeasible because it would result in <u>less</u> energy being produced while causing <u>more</u> environmental impacts and would not eliminate the need for the Hay Ranch Project.

<u>Injection Systems</u>

Coso's primary focus is on fluid injection. Coso continues to do extensive research and testing to ensure that all available injectate is captured and returned to the reservoir in the most optimal areas. Coso conducts tracer studies, which provide information as to the amount of time, relative locations, and rate at which fluids return to production areas. Further, Coso routinely conducts injecting surveys, which indicates the depth at which the injectate re-enters the resource. Injection guidelines for each of the injection sites are set based upon this information.

Injection rates are carefully monitored and controlled in accordance with this optimization strategy. Augmentation fluids will be injected into the resource in conjunction with this philosophy. Evaluation of the effectiveness of the injection program will remain under constant scrutiny. Adjustments will be made as additional information is gathered. Because all feasible changes to the injection systems are already being incorporated into the geothermal facility, there are no additional options to be studied as an alternative to the Project.

Alternative Sources of Injection Water

All of the alternative sources of water considered for the Hay Ranch Project had significant drawbacks and additional environmental impacts not present, or present to a much lesser extent, in the selected alternative.

One of the primary problems with almost all of the other identified potential sources was their distance from the Project site, including one that was as far away as Barstow. While use of water from Hay Ranch will require only nine miles of piping, the other sources are at much greater distances and thus would require significantly longer piping. Using water at these other sources would require much more land and would cause considerably more construction-related environmental impacts, including air emissions, impacts to biological resources, traffic, and other issues. In addition, longer pipelines require more pumping, which requires more electricity. A longer pipeline would thus significantly diminish, or entirely eliminate, the very purpose of the Hay Ranch Project, and the greater distances would also significantly increase the costs of the Project.

As an example of one of the suggested alternative sources, one of the scoping comments submitted in the EIR process advocated using Ridgecrest wastewater. However, Ridgecrest is approximately 25 linear miles away, much farther than the selected source, and thus all of the drawbacks discussed in the previous paragraph apply. In addition, practically speaking, any pipeline would likely have to be much longer than the shortest route, and would have to be cut through a mountainous area, causing considerable difficulty and resultant significant environmental impacts, including the need for substantially more blasting and potentially tunneling. Furthermore, Coso's prior inquiries have evidenced that there is no water available for the Coso Geothermal Projects at this time. Because the alternative sources would cause greater environmental impacts, significantly increase the cost, reduce the Hay Ranch Project benefits, and supply insufficient water, thus failing the primary objective of the Hay Ranch Project, they were properly rejected as infeasible. For these reasons, the Hay Ranch source is thus clearly the preferred alternative.

AFFECTED RESOURCES

Hydrology – Surface Water

Coso notes for the administrative record that it received a letter from the Department of the Army dated August 11, 2008 which confirms that no United States jurisdictional waters will be impacted by the proposed Hay Ranch Project. A copy of this letter is being provided to County concurrently with these comments. The Army's letter states that:

> [W]e have determined that the proposed project would not discharge dredged or fill materials into a water of the United States or an adjacent wetland. Furthermore, we have determined that the project entails an activity (pumping groundwater and conveyance by pipeline) that is not subject to Corps regulation. Therefore, the project is not subject to our jurisdiction under Section 404 of the Clean Water Act and a Section 404 permit would not be required from our office. This letter contains an approved jurisdictional determination for the Coso Hay Ranch water extraction and reinjection project.

This additional substantial evidence confirms the BLM's conclusion that impacts to biological resources are not potentially significant.

ENVIRONMENTAL CONSEQUENCES

Hydrology and Water Quality

To ensure that all impacts to hydrology and water quality remain less than significant, the County has imposed a number of mitigation measures, including a comprehensive Hydrologic Monitoring and Mitigation Plan ("HMMP"), which establishes trigger points at which various types of mitigation would be implemented. (EA Appendix H.) Coso provides the following additional information to clarify and expand upon the information already incorporated by reference into the EA.

The Los Angeles Department of Water and Power ("LADWP") maintains some existing wells in the Rose Valley to recapture leakage that escapes from the Department's Haiwee Reservoir. Coso would like to further clarify that the Department's wells and potential pumping operations and the proposed Hay Ranch Project now before the County are two unrelated, independent activities. The mitigation measures and trigger points will be utilized and enforced for the Hay Ranch Project by the County and Coso irrespective of LADWP's project; the HMMP is specific to the Hay Ranch Project only. LADWP's project has its own design mechanisms that are completely separate and unrelated to the Hay Ranch Project. Accordingly, and because LADWP's wells have been in existence for some time, the Hay Ranch Project will not place any additional responsibilities on LADWP.

Additionally, and related to Table C4-1 in Appendix H of the EA, water level drawdown measured in observation wells north of the Hay Ranch (Dunmovin and Pumice Mine wells) might not be as useful a measurement for triggering mitigation as would be measurements in wells to the south of Hay Ranch. Water level drawdown in the northern wells will either reflect upgradient boundary effects resulting from Hay Ranch pumping or will be reflecting other hydrologic changes unrelated to drawdown impacts south of the Hay Ranch. These would include a reduction in mountain front recharge from the northern portion of the Rose Valley or groundwater entering the Rose Valley from the Owens Valley. If these impacts will ultimately affect Little Lake, their effect will likely first be measured in observation wells located close to but south of Hay Ranch, and this response would then be used to trigger mitigation. Because trigger levels at both the northern and southern wells will be used, the HMMP ensures that adequate mitigation for Project impacts is provided. This also ensures that non-Project wells in these areas (including LADWP's) will not be impacted.

The HMMP imposes mitigation and monitoring requirements to ensure that the water flows entering Little Lake are decreased by no more than 10% during Hay Ranch Project operations. This "maximum limit of 10% groundwater inflow reduction to Little Lake has been selected, to avoid a significant effect on Little Lake." (EA Appendix H at p. C4-6.) The HMMP makes clear that, in practical terms, this 10% maximum limit is a 0.3-foot reduction in the water level at the monitoring point, which is a more sensitive indicator to changes in groundwater flow into Little Lake than the surface elevation of Little Lake itself. (EA Appendix H at p. C4-5.) This trigger point is very conservative and is supported by substantial evidence because it is the minimal change in the inflow water levels that can be reliably measured. The estimates of predicted drawdowns to groundwater levels in the Rose Valley are a worst-case scenario analysis because the assumptions that were used to compute the impacts are each extremely conservative. Moreover, and in support of the use of the 10% threshold, this 10% reduction was solely used as a threshold in the model by which to set water level declines at wells miles upgradient from Little Lake. It is important to note that, <u>based on this, the 10% reduction in discharge to the lake will never occur</u> because the mitigation steps outlined when an upgradient threshold is exceeded will prevent this threshold from ever being reached.

To put the 10% into perspective, it should be noted that the use of 10% is equivalent to a 0.3-foot decline in the apparently relatively consistent 3-foot difference in hydraulic head readings between the lake and the aquifer adjacent to the lake. Quantifying 10% as being equivalent to a drawdown of 0.3 feet at the Little Lake North Dock well is based on the linear relationship in Darcy's Law, which is the equation used to describe the flux of groundwater moving through a porous media, and the 3-foot vertical hydraulic gradient between the well water level and the lake level. The flow model assumes 1,200 acre-feet per year of groundwater enter the Little Lake surface water and riparian area. This is based on the 700 acre-feet/year lost to transpiration occurring over an estimated 300 acres of vegetation, plus 500 acre-feet per year lost to evaporation directly off the 90-acre lake surface. This indicates that, of the groundwater moving into the Little Lake region at the southern end of the Rose Valley basin, approximately 1,200 acre-feet per year of groundwater exits the basin at Little Lake before it can exit the basin farther to the south at Little Lake Gap. If what goes into the lake and associated riparian vegetation equals what goes out via evapotranspiration, then a 10% decrease in inflow equals approximately 120 acre-feet/year of water (1,200 acre-feet x 0.10). It should be noted that 120 acre-feet per year is equal to only 2.4 percent of the total annual flux of groundwater (4,979 acre-feet) estimated to move through the basin as described in the flow model groundwater budget (Appendix C, Table C2-4). This further supports the conclusion that this impact will be less than significant with the required mitigation.

In Appendix C2 of the EIR (EA Appendix H at page C2-16) aquifer storage terms were calculated using the pumping test results. The values were a specific yield of 3% for model layer 1 and specific storage of 7 x 10^{-7}/feet for model layers 2 through 4. It is then explained on page C2-18 why a specific yield of 3% is never utilized in the groundwater flow model, but there is no discussion as to why a basin-scale flow model should generally not be calibrated to an aquifer test of 14 days. Both the specific yield and specific storage values are much lower and much more conservative than would traditionally be assumed for similar aquifer materials, and lower and more conservative than are typically assigned in groundwater flow models in the western US. The 3% specific yield and specific storage values are so overly conservative as to be unrealistic. This is why the 10% specific value was used instead of the 3%; 10% is within the range of what is traditionally and typically assumed for specific yield in the deposits defined by layer 1 of the model.

In addition, the rationale for the use of a groundwater flow model approximately 3,000 feet in thickness is helpful for understanding the modeling section in the HMPP. A brief statement from the Brown and Caldwell (2006) report might eliminate possible confusion on why the model bottom was extended significantly below any extraction well depths. The rationale behind this approach was two-fold: 1) it was recognized that pumping from the coarse-grained alluvium zone, as defined by model layer 1, would induce some upward flow from the underlying finer-grained alluvium, and 2) the model was developed with the potential to simulate the effect of deeper pumping in the future.

The flow model, although the best available tool for predicting future aquifer behavior, like any model contains some uncertainty. Only with the collection of water level changes over time in response to both Hay Ranch pumping and seasonal recharge events will our understanding of basin behavior improve. For this reason, Coso remains amenable to an alternative recalibration scheme that would fulfill all of the purposes and goals of the HMMP's current recalibration plan, while providing the most accurate data possible. For example, the model could be most useful if it is not recalibrated sooner than the eight to 12 month time period after Project start-up presently proposed in the HMMP.

Under the HMPP, two new monitoring well clusters, one 600 to 800 feet south of the Hay Ranch North well and one 600 to 800 feet south of the Hay Ranch South well, will be installed, each with three wells varying in depth from 290 to 550 feet below ground surface. (EA Appendix H at p. C4-12.)

There are three technical issues associated with this monitoring requirement that should be noted:

1. The key question associated with this project is the basin-scale response to the pumping of the Hay Ranch wells at an annual rate of 4,839 acre-feet per year. As such, the near-well water level response around the Hay Ranch wells is much less important than the water level response across the basin and in particular, between the Hay Ranch and Little Lake.

2. The installation of an observation well and the collection of water level data between the Hay Ranch North and South wells may provide data of scientific interest regarding well interference, but it will not be helpful in increasing our knowledge of potential basin-scale impacts.

3. Although fine-grained layers within the sand and gravel aquifer intersected by the Hay Ranch wells undoubtedly exist, and will affect the drawdown response in the immediate region of the pumping wells, standard aquifer test theory and data analysis shows that these effects diminish with increased lateral distance from the pumping well. Because the primary concern is how the cone of depression will grow towards Little Lake, within the approximately 9 miles between the Hay Ranch and Little Lake, the collection of detailed water level change data close to the Hay Ranch is less important than data approximately 1 mile, 3 miles, and 6 miles south of the Hay Ranch. At these distances, vertical differences in water level response to pumping will not be of importance.

Again, and similar to the recalibration comments submitted above, Coso would support an alternative observation well scheme that would meet all of the purposes and goals behind the HMMP while providing equally accurate data for monitoring purposes. For example, and based on the three observations above, it might be appropriate if the new observation wells installed include:

- One well located on the south-central boundary of the Hay Ranch property, installed with screen or perforated pipe from 10 feet above the water table to 100 feet below the water table, and

- A second well located approximately 3 miles south of Coso Junction near or along the Highway 395 right-of-way, installed with screen or perforated pipe from 10 feet above the water table to 50 feet below the water table.

Both wells should be equipped with a pressure transducer and data logger with water levels collected every 6 hours (6 am, 12 noon, 6 pm and 12 midnight). This data collection plan will ensure that both diurnal/tidal and barometric effects are captured at a suitable level of detail such that they can be filtered out of the water level response.

In Section C.4.3.3 of the HMPP, tasks a, b and c all involve the collection of groundwater levels beneath the lake, bathymetric and water quality data, respectively, from Little Lake. (EA Appendix H at p. C4-14.) Collection of this data is unnecessary as the manipulation of water flow by the Little Lake personnel makes the collection of this type of data inconsistent with the objectives of this HMMP. Because trends in this data are subject to effects from sources other than Hay Ranch pumping, however, some data of interest may be collected, but pre-project start-up data collection is simply unnecessary.

In Section C.4.3.3 of the HMPP, it is stated under the column titled "Monitoring Frequency" that water levels be measured hourly. (EA Appendix H, Table C4-2 at p. C4-15.) It is unnecessary to collect water level measurements from any well more than 4 times every 24 hours (every six hours). This level of monitoring provides fully adequate temporal frequency for evaluating water level changes due to diurnal/tidal forces and barometric changes. While the more frequent monitoring will collect more data, 4 times every 24 hours will be as statistically reliable and will be less likely to over-load the data logger memory or create overly cumbersome data files.

The preceding information provides additional substantial evidence supporting the conclusion that impacts to Little Lake will be less than significant with the implementation of mitigation.

<u>Cultural Resources</u>

The discussion of mitigation measures in connection with protection of cultural resources specifies that a "cultural monitor is required during any constructions activities within any avoidance area." Coso notes that is has committed to retaining a fully trained and certified

Native American resources monitor for monitoring purposes during all Project ground-disturbing activities.

Hazards and Hazardous Materials

The lack of any identified hazards in the EA is justified by consideration of the Hay Ranch Project design and location. The proposed nine-mile pipeline will not convey hazardous materials, and there will there are also no hazards related to a risk of the pipeline bursting. The pipeline is designed as an open system; there are open tanks at the end of the line, not a closed system in which pressure can build up. Both tanks will have pressure release valves that are maintained in the open position to allow constant release of pressure. Furthermore, no blasting is anticipated during the construction phase of the Hay Ranch Project, and, of course, none would be necessary during Hay Ranch Project operations. In the unlikely event some blasting is required during construction, it would be only on a short segment of pipeline located in a rocky area, but this section is not near any roadways or residential areas. Therefore, even to the extent blasting were necessary, it would cause no impacts due to hazards.

Cumulative Impacts

The EA takes into account a number of potential projects in the evaluation of the potential environmental consequences of the Proposed Action. In the EIR, the County also evaluated the proposed Hay Ranch Project in relation to greenhouse gas ("GHG") emissions (EIR at pp. 4-8 to 4-12.) In view of increasing government and public concerned about such emissions and their relationship to global warming, we are providing the following additional information regarding the scientific evidence for global warming and further description of the types of global warming gases. As this information demonstrates, implementation of the proposed Hay Ranch Project will be beneficial on balance in relation to global warming concerns.

The Earth's environment, including the climate, is in a state of continuous change. Despite this, the general scientific consensus has accepted that the global surface temperatures have risen almost a degree in the last hundred years, and that human activities, especially those involving the combustion of fossil fuels, are the primary cause of this change. (See, e.g., Bloomfield et al. , *Geothermal Energy Reduces Greenhouse Gases*, Climate Change Research (2003) at p. 77; U.S. Climate Change Initiative ["CCRI"], *Our Changing Planet* (2003) at p. 2.) GHGs are those gases that allow light and ultra-violet radiation from the sun to reach the Earth's surface unimpeded. As the sun's energy heats the surface of the earth, energy in the form of heat is re-radiated back to the atmosphere. However, GHGs absorb this reflected energy, allowing less of the heat to escape back to space, and instead trapping the heat in the lower atmosphere.

Scientific data show that emissions from human activities cause radiative forcing[2] and that this has elevated the levels of these GHGs in the atmosphere, which, in turn, has led to an increase in global temperatures. The single largest source of GHGs, accounting for approximately half of all global GHG emissions, is fossil fuel consumption in the transportation sector. (*See* EIR at p. 4-10.)

Global warming is expected to intensify the threats to the State's biological wealth by increasing the risk of wildfire and altering the distribution and character of natural vegetation. Continued global warming will increase extreme conditions, which will exacerbate air pollution, intensify heat waves, and expand the range of infectious diseases. (California Energy Commission ("CEC"), *Climate Change Impacts and Adaptation in California* (2005) at pp. 16-22; CEC, *Our Changing Climate Report* (2006) at p. 7.) Californians already experience the worst air quality in the nation, and higher temperatures are expected to increase the frequency, duration, and intensity of conditions conducive to air pollution creation.

The EIR contains a good discussion of the primary GHGs and how some of these are generated. (EIR at pp. 4-8 to 4-12.) Coso Operating Company, LLC would like to clarify the global warming potential ("GWP") of each GHG and their respective impacts varies. GWP is a simplified index used to estimate the potential effect of the different GHGs which is based on the heat-absorbing ability of each gas relative to that of carbon dioxide. For example, carbon dioxide has a GWP of 1, methane of 21, nitrous oxide of 310, hydrofluorocarbons have a range of 140 to 11,700 depending on the specific type, chlorofluorocarbons have a range of 6,500 to 9,200, and sulfur hexafluoride has a GWP of 23,900.[3] The implications of these numbers is that methane, for example, has 21 times the global warming potential of an equivalent amount of carbon dioxide, while nitrous oxide has a GWP 310 times that of the equivalent amount of carbon dioxide. (U.S. EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005, *available at*: http://www.epa.gov/climatechange/.)

Of the GHGs, carbon dioxide is by far the most prevalent GHG in the atmosphere. While it can be naturally occurring, it also enters the atmosphere via human-made sources. Indeed, in recent years, more than 96% of gross carbon dioxide emissions have come from fossil fuel combustion alone, demonstrating that presently the vast majority of emissions comes from

[2] "Radiative forcing" is a term used to describe any externally imposed change in the radiative energy budget of the earth's climate. An imbalance in the radiation budget has the potential to lead to changes in climate parameters and result in a new equilibrium state for the climate system. (Intergovernmental Panel on Climate Change ["IPCC"], Climate Change 2001 – The Scientific Basis (2001) at p. 353.)

[3] The GWP for ozone remains widely debated. Because ozone is often found in very low concentrations at ground levels and is actually beneficial when found in high concentrations at stratospheric elevations, where it blocks ultra-violet radiation from reaching the Earth's surface, the contribution of ozone to global climate change is unclear. (See Intergovernmental Panel on Climate Change, Climate Change 2001 – The Scientific Basis (2001); U.S. EPA Climate change website *available at*: http://www.epa.gov/climatechange/).

human-made sources. Even under these increased outdoor concentrations, carbon dioxide levels are generally not known to be associated with negative health effects, though much higher concentrations in enclosed spaces can be debilitating or even deadly. However, the main impacts from increased carbon dioxide in the atmosphere are related to its global warming potential. Ice-core analysis has shown that atmospheric carbon dioxide concentrations increased more than 31% over the last 200 years and are continuing to grow, likely tripling from the current level by the year 2100. (U.S. EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005, *available at*: http://www.epa.gov/climatechange/; IPCC Climate Change, *supra*, at p. 187; National Institute for Occupational Safety and Health ("NIOSH"), Pocket Guide to Chemical Hazards website.)

Methane is an odorless, colorless gas that is the principal component of natural gas. About sixty percent of global methane emissions come from human-related activities, including fossil fuel production, raising livestock, rice cultivation, biomass burning, and waste management. Methane is similarly not toxic to humans at atmospheric concentrations, but it has increased in atmospheric abundance by a factor of approximately 2.5 in the last 200 years. (U.S. EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005, *available at*: http://www.epa.gov/climatechange/; IPCC Climate Change, *supra*, at p. 248.)

Nitrous oxide, also referred to as "laughing gas," is commonly used in medical practice. It is produced by both human and natural sources, with human sources accounting for between 35 and 50 percent of total emissions levels. Agricultural activities produce the majority of human-generated nitrous oxide, with additional contributions from production of nylon and nitric acid and the burning of fossil fuel in internal combustion engines. While it is non-toxic, it is one of the five primary GHGs, and it also has a secondary role in increasing global warming by aiding in the destruction of ozone in the stratosphere. Nitrous oxide's global atmospheric concentrations have increased about 16% since 1750 and continue to increase. (U.S. EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005, *available at*: http://www.epa.gov/climatechange/; NIOSH website.)

Ozone, another odorless, colorless gas, has different functions and implications depending on its source and location in the earth's atmosphere. "Natural" ozone occurs at ground level and is a combination resulting from the down-mixing of the stratosphere and photochemical reactions of natural precursors from natural sources. Most of this type of ozone comes from reactions of ultraviolet radiation with the ozone precursors: volatile organic compounds and nitrogen oxides. Stratospheric or high-altitude ozone is formed when oxygen atoms are ionized by solar ultraviolet light and combine with other oxygen molecules. About 90% of the earth's ozone is contained in the high-altitude area referred to as the ozone layer, which absorbs radiation from the sun and is beneficial for the earth's ecosystem. Tropospheric or low-altitude ozone is created by chemical reactions from automobile and power plant emissions, as well as other industrial and commercial source emissions, in the presence of sunlight. This is the type of ozone that is considered a greenhouse gas, and it has increased by about 36% since the pre-industrial era. In addition to its direct radiative forcing, it creates an additional environmental impact by modifying the lifetimes of other greenhouse gases. Besides being a greenhouse gas, it can be a harmful air pollutant at ground level, and prolonged exposure can lead to respiratory distress or even irreparable lung damage. (CEC, *Public Health Related Impacts of Climate Change* (2005) at p. 22; IPCC Climate Change, *supra*, at p. 260; U.S. EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005, *available at*: http://www.epa.gov/climatechange/.)

Fluorinated gases, which have particularly high GWPs, include hydro-chlorofluorocarbon compounds ("H-CFCs"), hydrofluorocarbon compounds ("HFCs"), perfluorocarbon compounds ("PFCs"), and sulfur hexafluoride. H-CFCs were prohibited by international protocol in 1989. PFC emissions are byproducts of aluminum production. Sulfur hexafluoride is widely used by the magnesium industry. Other sources of these types of gases include semiconductor manufacturing and electric power transmission. While most of these have no ambient air health effects, prolonged exposure to concentrated amounts can result in deleterious health effects. In addition, these gases are particularly potent GHGs and may persist in the environment for thousands of years. (U.S. EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005, *available at*: http://www.epa.gov/climatechange/.)

Carbon dioxide is a byproduct of fossil fuel combustion, and the largest emitters of this GHG in California are the transportation sector, followed by electricity generation. (EIR at p. 4-10.) The Coso Geothermal field helps meet the State's energy needs in a clean, green way because geothermal energy facilities emit significantly lower amounts of carbon dioxide than coal, petroleum, or natural gas power plants, resulting in near-zero air emissions. (Bloomfield et al., *supra*, at p. 78, Figure 1; Kagel et al., *Clearing the Air: Air Emissions from Geothermal Electric Power Facilities Compared to Fossil-Fuel Power Plants in the United States*, GRC Bulletin (May/June 2005) at p. 113.) For this reason, increased geothermal utilization will help the State and the country reduce its GHG emissions while helping to meeting increasing power demands. (Bloomfield et al., *supra*, at p. 79; Bloomfield & Moore, *Production of Greenhouse Gases from Geothermal Power Plants* (1999) at p. 4.)

Because the Hay Ranch Project is designed to increase the productivity of a renewable energy source, it's implementation will off-set the need for a corresponding amount of fossil fuel production of electricity and consequently have an indirect, and net-positive impact on reducing carbon dioxide and other GHG emissions. Moreover, the construction and operation of the Hay

Ranch Project will not result in the emission of significant levels of any air pollutants. (EA Section 4.1.)

CONCLUSION

As is noted at the outset of this comment letter, the information provided merely clarifies and amplifies the discussion already included in the EA. We are providing the comments to further support a Finding of No Significant Impact by BLM with respect to Coso's request for BLM's issuance of a right-of-way grant for the Hay Ranch Project.

Thank you for your consideration of these comments. If you have any questions or concerns, we would be happy to meet with you at your convenience.

Sincerely,

Chris Ellis, Site Manager
COSO OPERATING COMPANY, LLC

Exhibits (Submitted Under Separate Cover):

1. Assembly Bill 1493 (2002)

2. Assembly Bill 32 (2006)

3. Bauer Report (2002)

4. Bloomfield & Moore, *Production of Greenhouse Gases from Geothermal Power Plants* (1999)

5. Bloomfield et al., *Geothermal Energy Reduces Greenhouse Gases*, Climate Change Research (2003)

6. Brown & Caldwell Report (2006)

7. California Energy Commission & California Public Utilities Commission, California Energy Action Plan (2003)

8. California Energy Commission & California Public Utilities Commission, California Energy Action Plan (2005)

9. California Energy Commission & California Public Utilities Commission, California Energy Action Plan Update (2008)

10. California Energy Commission, Climate Change Impacts and Adaptation in California (2005)

11. California Energy Commission, Integrated Energy Policy Report (2007)

12. California Energy Commission, Our Changing Climate Report (2006)

13. California Energy Commission, Public Health Related Impacts of Climate Change (2005)

14. Department of the Army Letter to Coso, dated August 11, 2008

15. Intergovernmental Panel on Climate Change, Climate Change 2001 – The Scientific Basis (2001).

16. Kagel et al., *Clearing the Air: Air Emissions from Geothermal Electric Power Facilities Compared to Fossil-Fuel Power Plants in the United States*, GRC Bulletin (May/June 2005)

17. National Institute for Occupational Safety and Health, Pocket Guide to Chemical Hazards, website, *available at*: http://www.cdc.gov/niosh/npg/

18. Office of Planning & Research, *Technical Advisory on CEQA and Climate Change* (June 19, 2008)

19. Senate Bill 1078 (2002) (Renewable Portfolio Standard)

20. Senate Bill 1389 (2002)

21. Senate Bill 1771 (200)

22. Senate Bill 812 (2002)

23. Senate Bill 97 (2007)

24. U.S. Climate Change Initiative, Our Changing Planet (2003)

25. U.S. EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005 Climate Change website, *available at*: http://www.epa.gov/climatechange/

Response to Comment Letter A
Arnold, Bleuel, LaRochelle, Mathews & Zirbel LLP
Dated January 19, 2009

A-1 The comment is noted. The comment is the introduction to the letter from Little Lake Ranch, Inc. No further response required.

A-2 The comment is noted. Comment summarizes the proposed project and clarifies commenter's use of the word "Geofluids" to mean fluids produced by Coso from the underground geothermal reservoir. No further response required.

A-3 Comment refers to the numerical groundwater flow model presented for the Rose Valley Basin which was utilized to predict what would happen as a result of pumping activities by Coso. No further response required.

A-4 The commenter's opinion is noted. The Hydrology Model is not "flawed and unreliable." The following discussion explains the assumptions and data used in the Hydrology Model.

Aquifer Thickness Represented in the Model

The thickness of the unconsolidated sedimentary deposits represented in the Hydrology Model is mainly based on the interpretation presented in the report prepared by GeoTrans (2004), entitled Revised Hydrogeologic Conceptual Model for Rose Valley. GeoTrans reviewed lithologic logging data from four deep uranium exploration wells advanced in 1979 (Schafer 1981), gravity data collected by the Navy, logs of water supply wells in Rose Valley, and previous reports on regional and local geology to develop a map of sediment thickness. Brown and Caldwell (2006) used the sediment thickness map developed by GeoTrans to specify the bottom elevation of deepest model layer in the numerical simulation model described in their 2006 report, Rose Valley Groundwater Model, Coso Operating Company, LLC, Rose Valley, California. Geologica (2008) adopted the same bottom elevation configuration specified in the 2006 groundwater model developed by Brown and Caldwell. The assigned sediment thickness in the model developed for the EIR varied from approximately 100 ft near Little Lake to approximately 3,500 ft near Hay Ranch, primarily based on the GeoTrans (2004) analysis. The inclusion of sediments deeper than the depth from which the pumping would occur was done for two reasons:

1. In case Coso desired to evaluate deeper pumping in the future; and

2. Some portions of the groundwater discharging into Little Lake is believed to come from deep groundwater.

The numerical model developed for the EIR uses four layers to represent the water saturated sediment deposits in Rose Valley. Model layers 1 and 2 are “active” (present and saturated) throughout the model domain and represent the generally permeable, shallow groundwater-bearing zone tapped by water supply wells in the valley. Model layers 3 and 4 are active from the north end of Rose Valley through the central part of the valley, and, consistent with the sediment thickness map developed by GeoTrans, pinch out (meaning, are not present) on the south side of the Red Hill cinder cone. As simulated in the model developed for the Draft EIR, model layers 3 and 4, representing geologic strata at depths ranging from approximately 700 to up to 3,500 ft below ground surface (bgs), were specified with hydraulic conductivity values that are 100 to 1,000 times lower than corresponding values of layers 1 and 2 in the model. This is based on soil descriptions from the available well log data. The fact that the model represents these lower layers as 100 to 1,000 times less permeable implies that they will yield far lower quantities of groundwater than the upper layers. This is consistent with the statements of Danskin (1998) that were cited by one commenter. Danskin originally had a deeper layer in his model, and later removed it to reduce the model run time (for efficiency), though there was possibly some loss of accuracy by not including it. The possible error would be minor compared to other inputs of the Owens Valley model. The conceptualization of the Hydrology Model is consistent with the Owens Valley model of Danskin, and is not flawed.

Aquifer Hydraulic Properties

The model was initially calibrated to time-drawdown data collected during the 14-day aquifer pumping/recovery test conducted in the Hay Ranch South well in November/December 2007. Results of that analysis indicated a short-term specific yield value of 3% for the water table aquifer near Hay Ranch. The consultant hired by Little Lake Ranch LLC (Little Lake Ranch) noted that that value is “well within the range cited by Freeze and Cherry. However, it is likely that this value may not be representative of a specific yield over several years” (Zdon, September 2, 2008 letter). Appendix C2 of the Draft EIR notes the pumping portion of the test represented only a 14-day period, and that the specific yield value over a longer time period of pumping (months to years) would likely be higher. It is a well known phenomenon that, during the early stages of pumping tests, an unconfined aquifer commonly acts like a confined aquifer, with corresponding low apparent values of specific yield. The soil pores start to drain later and then the aquifer starts to act like an unconfined aquifer. The apparent specific yield values become larger. The 3%

specific yield value is believed to be representative of the apparent specific yield for short duration pumping, as clearly stated in the Draft EIR.

Danskin (1998) summarized data from many pumping tests and notes that the specific yield "was difficult to calculate from the available tests" in the Owens Valley. None of these values reach the 10 to 15% range that is characteristic of a true specific yield of these aquifer materials (Hollett et al. 1991; Davis 1969)." Danskin states, "Aquifer tests, even those extending several days…..are affected very little by actual drainage of aquifer materials. This drainage, which accounts for nearly all of the specific yield value, is delayed and occurs over a period of weeks, months, or years. As a result, storage coefficients obtained from model calibration of long-term conditions are actually much more indicative of actual values than those calculated from aquifer tests." Danskin used a specific yield value of 10% in the Owens Valley groundwater model, based on calibration to an extensive database of long-term aquifer response. Values of 10, 20, and 30% were used in sensitivity analysis for the Draft EIR because of the uncertainty in specific yield. Simulation runs conducted to identify trigger levels for evaluation of pumping impacts and to evaluate potential cumulative impacts from other groundwater development projects in the valley used the 10% specific yield value identified by Danskin. As stated in the Draft EIR, the 14-day pumping duration accomplished in the November/December 2007 Hay Ranch aquifer test was not long enough to reliably estimate aquifer specific yield; consequently, Appendix C4: Rose Valley Hydrologic Monitoring and Mitigation Program describes procedures for monitoring groundwater table drawdown resulting from pumping the Hay Ranch wells, data evaluation procedures, and provides a time table for recalibrating the groundwater model to improve the estimate of specific yield.

The specific storage of a saturated aquifer is defined as the volume of groundwater that a unit volume of aquifer releases from storage under a unit decline in hydraulic head (water level). Specific storage has units of 1/length (ft^{-1}). Storativity of a saturated aquifer, also known as storage coefficient, is defined as the volume of groundwater that an aquifer releases from storage per unit surface area of the aquifer per unit decline in water level and is dimensionless. Below the groundwater table in layers 2, 3, and 4, where present in the Hydrology Model, groundwater is released from storage by a combination of decompression of water and decompression of the aquifer matrix under the reduced pressure resulting from a water level decline. The Hydrology Model was constructed to utilize specific yield values for the layer in which the groundwater table resided (layer 1), and specific storage values for all layers wholly below the groundwater table (layers 2, 3, and 4). Appendix C2 of the Draft EIR incorrectly termed this parameter "storativity", when in fact the parameter specified in the model was specific storage; this error has been corrected in the Final EIR and is also shown in Appendix B to the Decision Record.

A consistently low uniform specific storage value of 7 x 10^{-7}/ft was used for all layers. This implies an assumption that the water present in all layers was equally compressible, which is a reasonable assumption. A uniform specific storage also implies that the aquifer matrix was equally compressible in all layers. Sediments present in deeper layers 3 and 4 may be substantially less compressible than sediments encountered closer to the ground surface. None of the Rose Valley wells penetrate below the strata represented by layer 2; as such, no lithologic logging data or water level response data are available to evaluate specific storage values for sediments in layers 3 and 4 of the model. The Hydrology Model sensitivity analysis indicated that the model calibration was insensitive to the specific storage values in layers 3 and 4, and consequently there was no evidence from the model calibration to warrant raising or lowering the specific storage values from the default value identified.

The Hay Ranch production wells fully penetrate layers 1 and 2 of the Hydrology Model and do not penetrate layers 3 and 4 at all. Based on lithologic logging and pumping test response, the Rose Valley aquifer is vertically anisotropic (horizontal hydraulic conductivity is much greater than vertical hydraulic conductivity); consequently, the Hay Ranch production wells derive more than 95% of their water from the model layers 1 and 2. This is consistent with the conceptual model that recognizes the substantially higher permeability of the upper two layers, with a corresponding higher ability to yield water to pumping wells.

The groundwater table gradient throughout the central and southern part of Rose Valley averages approximately 20 ft per mile (mi). From the Pumice Mine well (approximately 1 mi north of Hay Ranch) to the LADWP wells and to Haiwee Reservoir, the groundwater table gradient increases to approximately 280 ft per mi, more than 10 times the gradient elsewhere in the valley. The groundwater levels measured in the LADWP V816 and V817 wells (3,435.2 and 3,433 ft above mean sea level [amsl] in November 2007) are nearly 170 ft higher than groundwater levels measured in the Cal-Pumice Mine well 0.6 mi to the south. From a hydrologic standpoint, the only possible explanation for the large difference in hydraulic head between the LADWP wells and the Cal-Pumice Mine well are perched water at the LADWP wells and a much lower transmissivity around the LADWP wells. The most plausible reason for the increase in groundwater gradient in this area is lower aquifer transmissivity. Sensitivity analysis during model calibration indicated that lowering the hydraulic conductivity of sediments in layers 1 and 2 gave the best fit to observed groundwater levels in this region. Although the fit to observed water levels in the area is not nearly as good as in the main portion of the valley, it is not uncommon for model head results to be less accurate in areas of lower permeability because the head gradients are very large. The key objective for the northern portion of the Hydrology Model was to match the overall hydraulic gradient from the model boundary to the Hay Ranch. This was completed successfully.

The hydrologic modeling analysis conducted for the Draft EIR indicated that the Hay Ranch project would increase seepage from southern Owens Valley/Haiwee Reservoir by, at most, 26 acre-feet/yr (ac-ft/yr), or fewer than 3% of the current estimated groundwater inflow from the north (see Table 3.2-6). Although the model accuracy, in matching specific hydraulic heads, is not as high in the northern end of Rose Valley, the model predicted heads are lower than observed values, suggesting that the hydraulic conductivity may be even lower than modeled. Decreasing the hydraulic conductivity would decrease the amount of additional inflow from the north during pumping to less than 26 ac-ft/yr. Because of the low projected increase in groundwater inflow from the north (26 ac-ft/yr or fewer) this issue does not constitute a significant impact or a new impact under CEQA. It has been identified as a data gap, and measures for further evaluating the groundwater inflow rate from Owens Valley and Haiwee Reservoir are laid out in the Hydrologic Monitoring and Mitigation Plan which would be implemented after approval of the CUP as part of the baseline monitoring program.

Lower values of hydraulic conductivity were assigned to volcanic deposits in the south end of Rose Valley compared to adjacent alluvial deposits. Deeper fine-grained basin fill deposits in the north and central parts of the valley were assigned lower hydraulic conductivity values than overlying sands and gravels.

The horizontal hydraulic conductivity of sediments in all layers was specified as isotropic (equal in all directions) in the model developed for the Draft EIR. This is a standard assumption for groundwater modeling and aquifer test analysis unless data are available that indicate otherwise. No data were identified to suggest that horizontal hydraulic conductivity in sediments of Rose valley is anisotropic (not equal in all directions).

Southern Extent of Hydrology Model Domain

The hydrologic model of Rose Valley developed for the Draft EIR is intended to provide a management tool for evaluating potentially significant impacts to beneficial uses of groundwater throughout Rose Valley using readily available information. The model grid was extended to the south side of Little Lake, which is a large, readily identifiable surface water feature at the south end of the valley. No attempt was made to simulate water level fluctuations or conduct detailed mass balance calculations for the lake. Insufficient information is available regarding the degree of connection between lake and aquifer, current and historic water level trends, discharge rates, and records of management practices to conduct a detailed calibration of the model to the lake/groundwater interaction in this area. Nor was it possible to explicitly simulate specific surface water features on the property such as Coso Spring, the various ponds south of Little Lake, the siphon well, and other features because little to no historical data were identified regarding flow rates and water levels needed to represent these features. The primary objective of the model as it relates to Little Lake is to simulate how pumping from the wells at Hay Ranch may impact groundwater flowing into Little Lake, not how surface water flows out of Little Lake. The intended objective has been met.

Section 3.2 and Appendix C2 of the Draft EIR (EA Appendix H) describe the conceptual basis for evaluating potential impacts to surface water features at Little Lake by assessing changes in the amount of groundwater flowing towards the property, water table drawdown, and, the amount of groundwater available to enter the lake. The model results provide detailed information on the expected change in groundwater levels; historical data (limited data available) on the relationship between groundwater level and flow/water level in major springs and Little Lake are then used to evaluate the likely effect of groundwater level changes on surface water bodies. Extending the model grid beyond Little Lake is not necessary for assessing potential impacts to surface water features on the property and is not justified by the available data.

Boundary Conditions Represented in the Hydrology Model

The groundwater inflow rate from the north is not well known, as stated in the Draft EIR and identified as a data gap needing further investigation during baseline monitoring studies for the proposed project. A review of the model water balance presented in Section 3.2 of the Draft EIR (EA Appendix H) indicates that the groundwater inflow rate from the northern boundary only increased 26 ac-ft/yr (fewer than 3%) if pumping at Hay Ranch at the full project development rate was implemented for a 30-year duration. A simulation has not been conducted with GHB cells on the northern boundary instead of CHB cells; however, this observation indicates that model predicted drawdown values are likely to be relatively insensitive to the choice of boundary condition because the amount of flow from the north is relatively low already.

The GHB package will allow groundwater inflow into Rose Valley from Indian Wells Valley to the south if the groundwater elevation north of the boundary cell were to drop below the boundary head estimate. The groundwater elevation in model grid cells north of the GHB boundary was monitored in all simulations, and never dropped below the boundary head estimate in any simulation attempted; consequently, use of the GHB package did not have a negative impact on simulation results.

The assertion that the evapotranspiration rate used in the Hydrology Model is 2.5 x 10^{-2} ft/day or 9.2 ft/year is not an error. The evapotranspiration package was configured with an "extinction depth" of 15 ft. This selection of extinction depth (15 ft) is a typical value and consistent with that used in the Danskin model for Owens Valley. MODFLOW adjusts the actual evapotranspiration rate during a simulation run based on the depth of groundwater below ground surface, using the maximum value when the water table is at ground surface and reducing the evaporation rate proportionately to a minimum (no evapotranspiration) when the water table is 15 or more ft bgs (i.e., below the extinction depth).

The evaporation rate from Little Lake has been estimated as ranging from 65 to 80 inches per year (CWRCB 1993, Bauer 2002). Plants in the area may transpire an additional 20 to 36 inches per year (Danskin 1998). Section 3.2 and Appendix C2 of the Draft EIR (EA Appendix H) state that evapotranspiration processes operating near Little Lake, including evaporation from the lake and transpiration from plants nearby, were estimated to total approximately 700 ac-ft/yr. The coarseness of the model grid (0.25 mi by 0.25 mi cells) does not allow for accurate representation of wetland and other plant types near the lake. All evapotranspiration was assumed to occur from two model cells that overlapped the location of Little Lake in order to be conservative. The evapotranspiration rate specified in the evapotranspiration package was adjusted incrementally during the steady-state model calibration until the evapotranspiration rate calculated by the model for the depth to groundwater calculated at Little Lake yielded a total evapotranspiration loss of 700 ac-ft/yr. The Hydrology Model will calculate lower evapotranspiration losses when groundwater levels near Little Lake decrease in response to pumping elsewhere in Rose Valley.

Hydrology Model Calibration Procedures

A steady-state groundwater flow model does not utilize aquifer storage parameters. There are no data to evaluate vertical groundwater gradients or infer aquifer vertical hydraulic conductivity because there are no clustered or adjacent monitoring wells or water supply wells screened at different depth intervals within the aquifer. The purpose of calibrating the Rose Valley groundwater model to the

November/December 2007 pumping test time-drawdown data ("the transient calibration") was to obtain preliminary estimates of aquifer storage properties that are used in long-term predictive transient simulations, including specific yield and specific storage and aquifer vertical anisotropy of hydraulic conductivity. The values of the "Initial Aquifer Parameters" on page C2-15, Section C2-3.4 of the Draft EIR (EA Appendix H) were initial values used during the early stages of model calibration, as described. These initial values were adjusted during the calibration process to be more consistent with pumping test data first, and then further adjusted to provide a better fit to both the pumping test and the steady-state calibration. This is standard practice in calibrating a hydrology model, with iterative changes that are made to improve the "fit" of the model results to the observed data. The process for estimating specific yield, specific storage, and vertical anisotropy and limitations of the available data are discussed at length in the Draft EIR and above.

Using long-term groundwater elevation data to calibrate the model was considered during preparation of the Draft EIR, and was rejected for reasons discussed below. There are currently no significant pumping stresses, that is, groundwater extraction, occurring in Rose Valley, and no records to document groundwater level changes over time in the past when there was substantial pumping for irrigation, as stated in the Draft EIR. The groundwater elevation hydrographs for wells in Rose Valley show little variation with time, and are not caused by a large well-documented stress such as pumping, These characteristic make the data not useful for long-term, transient calibration. The groundwater elevation fluctuations observed in the 5-year monitoring record, presented in the Draft EIR, are primarily the result of fluctuations in mountain front recharge related to seasonal and long-term variations in precipitation in the Sierras, barometric pressure fluctuations, measurement error, undocumented groundwater extraction or recovery, and other factors. The largest groundwater level fluctuations were observed in the LADWP wells at the north end of the valley, as discussed in the Draft EIR; the origin of these fluctuations is unknown, but they are not associated with groundwater pumping. Groundwater elevation and discharge rates from Little Lake, Little Lake spring, and various other surface water features on the Little Lake Ranch property were measured intermittently in 1998; however, groundwater elevations were not measured in the rest of the valley. There has been insufficient stress imposed on the Rose Valley basin, with the exception of Hay Ranch pumping for alfalfa farming in the 1970s (during which there were no widespread water level measurements), to be able to conduct long-term transient calibration. Future data collection modeling updates would resolve this. Considering that the current total annual groundwater extraction rate in Rose Valley is estimated to be approximately 40 ac-ft/yr, the 120 ac-ft of groundwater pumped during the

November/December 2007 pumping test represents a significant pumping stress that is appropriate to use for transient calibration. Limitations are discussed below.

A plan for obtaining additional data on background (pre-pumping) groundwater levels in the valley is described in the HMMP. The plan describes monitoring of new wells within Rose Valley and at the northern and southern ends of the valley, precipitation data evaluation, and surface water monitoring at Little Lake before pumping is started at Hay Ranch, and after commencement of the project.

Vertical hydraulic conductivity was set equal to horizontal hydraulic conductivity in all model layers in the 2006 model of groundwater flow in Rose Valley. Geologica deemed that assumption physically unrealistic for the upper portion (layers 1 and 2) of the model given the layering of low permeability (clay) and high permeability (sand/gravel) sediments present. Geologica staff did not change the one-to-one ratio of horizontal to vertical hydraulic conductivity initially specified for deeper fine-grained sediments in represented in layers 3 and 4 because the layers have such low permeability that vertical anisotropy has little impact on groundwater movement. Geologica staff initially set the vertical hydraulic conductivity of sediments in layers 1 and 2 around Hay Ranch to 1 ft/day based on the vertical anisotropy value estimated from graphical analysis of the November/December 2007 pumping test. This estimate was judged not to be entirely reliable because the only well with enough drawdown response to estimate this parameter (the Hay Ranch North well), fully penetrates the upper, approximately 700-ft portion of the water table aquifer, and thus gives little indication of possible anisotropy. The vertical anisotropy of the upper two model layers was increased (vertical hydraulic conductivity was reduced) during detailed calibration of the Hydrology Model to the time-drawdown data generated during the pumping test in order to better represent the low drawdown response observed at wells north (Pumice Mine) and south (Coso Junction #1) of the pumped well that only partially penetrate the aquifer (these wells are screened in Layer 1). The November/December 2007 pumping test data set had its limitations with regard to estimating specific yield and hydraulic conductivity, but it is the best data set available at present, as stated in the Draft EIR. The model calibration was not critically flawed; in fact, the decision to increase vertical anisotropy is conservative in that it reduces the amount of groundwater flow from deeper sediments within the basin consistent with the conceptual model of these units as yielding little water to pumping from (relatively) shallow wells.

The specific yield estimate of 3% developed from the 14-day pumping test likely underestimates long-term (multi-year) specific yield of the Rose Valley aquifer, as previously stated. The Draft EIR presents a conceptual basis for using more appropriate specific yield values based on sediment description. A value of 10% is routinely used in hydrological modeling as a conservative estimate of specific yield for unconsolidated, sandy alluvium. The specific yield value effective for pumping over a longer time period of months to years would likely be higher. It is a widely-accepted phenomenon that during the early stages of pumping tests an unconfined aquifer commonly acts like a confined aquifer, with corresponding small values of storage coefficient. Later, the soil pores start to drain, the aquifer starts to act like an unconfined aquifer, and the storage coefficient values become larger.

As previously explained, the storage coefficient derived from the short-term aquifer tests in Rose Valley was considered unrepresentative of true storage coefficients and was not used in the predictive model simulations of long-term aquifer response to pumping. Danskin (1998) used a storage coefficient value of 0.10 (10%) for the upper layer of his model, and it closely simulated the long-term transient response of the aquifer to pumping in Owens Valley. All of the predictive simulations for the Rose Valley model, aside from the sensitivity testing, used the 10% value, which is identical to what was used in the Owens Valley model.

The Draft EIR clearly states that long-term predicted drawdown is very sensitive to specific yield and presented the results of a sensitivity analysis using specific yield values of 10, 20, and 30%. Predictive scenarios used for decision making purposes, including identification of impacts from pumping, drawdown trigger levels, and cumulative impacts from other groundwater extraction projects in Rose Valley were conducted using a specific yield value of 10%. Long-term monitoring, and model calibration efforts for Owens Valley and numerous other modeling efforts in the Basin and Range alluvial basins indicated a specific yield value of 10% was appropriate for predicting impacts from pumping in similar alluvial sediment deposits, even though there is currently insufficient data to accurately estimate specific yield in Rose Valley.

The Hydrology Model was used to simulate time-drawdown data from the November/December 2007 pumping test, although it was understood that the pumping test would not yield values of specific yield that were representative of multi-year response to pumping, as stated in Appendix C2 (EA Appendix H) and described above. This simulation process yielded estimates of aquifer hydraulic conductivity (both vertical and horizontal), specific storage, and early-time specific yield. The effective specific yield will increase with pumping duration and slowly approach an asymptotic value as a result of delayed drainage that occurs over a period of months or even years (Danskin, 1998). The hydraulic conductivity and specific storage values of the aquifer are not influenced by delayed drainage and consequently do not change with time. As a result, revising aquifer parameters to simulate the November/December 2007 aquifer test time-drawdown data set using higher specific yields (10% or greater) that are appropriate for multi-year simulations would generate incorrect parameter estimates.

Hydrology Model Documentation

Extensive sensitivity analysis was performed during the development of the Hydrology Model for the Draft EIR but is succinctly documented in the report. The Final EIR includes detailed tables and figures in Appendix C2, as necessary, to depict the sensitivity of the model predictions to input parameters and provide a comprehensive summary of the sensitivity analysis results. The new tables and figures are set forth in Appendix B to the Decision Record. The Draft EIR does not present a groundwater budget breakdown table for the transient model prediction scenarios. The transient groundwater budget is not sufficiently different from the steady state budget to warrant a separate table. Predicted changes to the steady state groundwater budget are described on pages 3.2-42 through 3.2-46 and summarized in Table 3.2-6 (EA Appendix H).

The amount of additional groundwater drawn across the constant head cells at the north end of the model domain is limited by the relatively low hydraulic conductivity specified for sediments north of Hay Ranch, and by the hydraulic gradient developed between Hay Ranch and the northern boundary. An increase in groundwater inflow across the northern boundary of the model of only 26 ac-ft/yr (approximately 3% increase) was predicted for full project development (pumping at 4,839 ac-ft/yr for 30 years) with less change in inflow for lower pumping rates, shorter pumping durations, or larger values of specific yield (see Table 3.2-6 and page 3.2-42 of the Draft EIR in EA Appendix H). This small increase in inflow from the northern boundary demonstrates that the flow through the boundary is not unlimited, but is actually strongly limited.

The impacts of various schedules of pumping at Hay Ranch on the transient groundwater budget are discussed on page 3.2-41 through 3.2-46 of the Draft EIR (EA Appendix H). The predicted timing of delayed impacts of groundwater pumping at Hay Ranch on groundwater levels 9 mi to the south at Little Lake is discussed from page 3.2-46 through 3.2-47 as well as in the HMMP (EA Appendix H).

The Draft EIR Hydrology Model files were created using MODFLOW 88/96, consistent with the original Brown and Caldwell 2006 model. The modeling project was not started with MODFLOW2000 and then switched to MODFLOW 88/96. A file labeled as “MODFLOW2000 discretization package file” was included in the model files provided to GSE. E-mail discussion with technical support staff at Groundwater Vistas on September 15, 2008 indicated that Groundwater Vistas generates a discretization file with the phrase “MODFLOW2000” in the header whenever the model development interface is used to generate input files for MODFLOW, regardless of the version of MODFLOW selected by the user. This discretization file is provided for compatibility with Groundwater Vista’s 3-D visualization software, and has no impact whatsoever on the operation of MODFLOW. The modeling appendix is complete with respect to identification of the model version used to generate input files and does not need to be modified to address this non-issue. The MODFLOW version used for hydrologic simulations for the Draft EIR (MODFLOW 88/96) is appropriate for use in this application; MODFLOW2000 would not add features to the Hydrology Model that would significantly change the results and conclusions of the modeling effort for the Draft EIR.

A-5 The reference to the Hydrology Model run results is noted.

A-6 The comment regarding Mr. Zdon’s review of the Hydrology Model is noted.

A-7 The thickness of the unconsolidated sedimentary deposits represented in the Hydrology Model is mainly based on the interpretation presented in the report prepared by GeoTrans (2004), entitled “Revised Hydrogeologic Conceptual Model for Rose Valley.” Refer to response to comment A-4 for a discussion regarding thickness of the aquifer represented in the Hydrology Model.

A-8 The recharge of the aquifer was not arbitrarily increased. Refer to response to comment A-4 for a discussion regarding recharge rates represented in the Hydrology Model.

A-9 The specific yield of the aquifer was not arbitrarily increased. Refer to response to comment A-4 for a discussion regarding aquifer hydraulic properties represented in the Hydrology Model.

A-10 Refer to response to comment A-4 for a discussion regarding differences using storativity compared to specific storage. Essentially, Appendix C2 of the Draft EIR incorrectly referred to “storativity” when in fact the parameter specified in the model was “specific storage”; this error has been corrected in the Final EIR, as shown in Appendix B to the Decision Record.

A-11 The impacts to Rose Valley and Little Lake were based on a calibrated model. Refer to response to comment A-4 for a discussion regarding hydrology model calibration procedures.

A-12 Refer to response to comment A-4 for a discussion regarding inputs and assumptions used in the Hydrology Model.

A-13 The Davis Spring at Portuguese Bench outcrops at an elevation of 3,870 feet; groundwater elevation in the Rose Valley aquifer, located 2 miles east of the Davis Spring, average approximately 3,230 feet, which is more than 600 feet lower than the spring. Davis Springs is influenced by a nearby north-south trending fault that would tend to impede groundwater flow from the area of the spring toward the center of the valley, further isolating the spring from the effects of pumping. The hydraulic head gradient between Davis Spring and wells at Coso Junction is approximately 300 feet per mile; the gradient along the north-south axis of the valley is approximately 200 feet per mile, indicating much lower permeability sediments between Davis Springs and Coso Junction than at locations along the valley. It is not plausible that the Davis spring at Portuguese Bench would be influenced by pumping at the Hay Ranch because of the distance, the low-permeability sediments, and the fact that the spring is more than 600 feet higher than water levels in the valley. The Davis Spring, therefore, does not need to be represented in the Hydrology Model.

A-14 Refer to response to comment A-4 for a discussion regarding hydrology model calibration procedures.

A-15 Trigger levels are specified only for wells that are not routinely pumped and that are suitably located and constructed in order to provide early warning of impending groundwater drawdown impacts. A representative network of monitoring points have been identified that provide coverage over a broad area of the Rose Valley. One representative well, which would be located in the Dunmovin area and be identified at the start of the baseline monitoring program, would be monitored for trigger level compliance and for verification of the accuracy of the modeling effort. Six additional monitoring wells would be installed near the Hay Ranch pumping wells, and one new well would be installed between Coso Junction and the Cinder Road Red Hill well. Trigger levels would be identified for these wells after the exact locations and well screen depths are known.

Trigger levels were not set for the LADWP wells at the north end of the valley, even though groundwater levels would be monitored in these wells in order to supplement information for the Hydrology Model. This is because trigger levels established for a well in the Dunmovin area and for the Pumice Mine well would provide sufficient data to evaluate groundwater table drawdown at the north end of the valley.

The Little Lake Ranch House well is routinely pumped for water supply purposes. This makes the well less valuable as a hydrologic monitoring point because better data can be obtained from the Little Lake Ranch North well, which is not pumped. The amount of drawdown expected at the Little Lake Ranch House well (less than 1 ft) is unlikely to impede the routine functioning of the well. The Fossil Falls Campground well and Little Lake Hotel well would be monitored periodically during the project to improve the understanding of hydrologic conditions in the area; however, trigger levels were not specified for these wells because there are other nearby monitored wells identified (Cinder Road Red Hill well near Fossil Falls and Little Lake North well near Little Lake Hotel well).

The Little Lake North Dock well would be intensively monitored during the baseline study period and throughout project operation; however, a trigger level was not specified in Table C4-1 (EA Appendix H) for this well because of concerns that groundwater levels in the well may be affected by water level changes in Little Lake related to management practices. The trigger level for the Little Lake Ranch North well (which is different than the Little Lake North Dock well) located near the north end of the ranch property was conservatively specified as 0.3 ft with a maximum allowable drawdown of 0.4 ft.

A-16 The comment referring to submittal of Ronald DiPippo report is noted.

A-17 The questions presented are noted; they are not comments on the EA.

A-18 The comment regarding the MIT Report is noted.

Equipment already in place at the Coso geothermal field is considered part of the baseline physical condition of the environment. The purpose of the EA is to analyze change that would be caused by the proposed project; it is not meant to analyze the baseline physical conditions.

A-19 The comment regarding the Fournier Recharge Study is noted.

A-20 There is some natural recharge to the system from a combined effects of precipitation and surface saturation, and lateral movement of deep bedrock groundwater adjacent to an beneath the geothermal field.

A-21 As is indicated in Section 1.1 of the EA, a purpose of the proposed supplemental injection is to replace geothermal fluids that evaporate from the geothermal projects' cooling towers; so, yes, the rate at which Coso has produced geothermal fluids apparently has exceeded the rate of natural recharge.

A-22 Reducing the production rate of Coso geothermal plants would not meet the main objective of the proposed project. The purpose of the proposed project is to offset the substantial decline in the geothermal field's productivity, and the consequential reduction in power output.

A-23 The comment referring to the 1980 EIS is noted.

A-24 The comment refers to the 1980 Environmental Impact Statement approved by the BLM in connection with its evaluation of proposed leasing of the Coso Known Geothermal Resource Area ("Coso KGRA"). That evaluation included certain assumptions about potential development of the Coso KGRA, but did not evaluate any particular plan of development. In the context of potential utilization of groundwater from Rose Valley, the discussion set forth on the page cited in the comment concerned the assumed utilization of ground water from Rose Valley for "make-up" water for cooling requirements:

"Water Utilization - It is assumed that the liquid fraction of the geothermal fluid will be reinjected into the reservoir, and that the vapor fraction of the fluid will be used consumptively for cooling purposes. Although the majority of the water used by the cooling towers will be derived from condensed steam, it is estimated that each 50 MW station will require an additional 323 acre-feet per year "make-up" water to meet the cooling requirements. It is assumed that this water will be supplied from wells drilled in the Rose Valley and brought to the various generation stations using a pipeline. The most likely route of this pipeline is shown in Figure 1. 3-11. The pipeline will be 12 inches in diameter and pumps will be sized to permit transport of 4,000· acre feet per year. The pipeline will be constructed above ground. During the operation approximately 1 MW of electrical power will be consumed. A detailed description of the water requirements and water availability in the area is given in Appendix B of this EIS."

As the quoted language shows, the 1980 EIS does not reject the possibility of the use of water from Rose Valley as being unlikely; rather, such use was assumed for the purposes "make-up" water for the cooling requirements of power plants at Coso.

A-25 The analysis of potential ground water development in Rose Valley for the purposes of producing "make-up" cooling water for geothermal plants in the Coso KGRA, as set forth in the 1980 BLM EIS, was undertaken at a conceptual level without the benefit of the ground water modeling and later hydrologic data supporting the evaluation of the proposal under consideration. The potential adverse effects discussed in the 1980 EIS do not take into account the specific comprehensive monitoring and mitigation measures identified in the EA addressing potential impacts to ground water and Little Lake; those mitigation measures, in particular, are designed to avoid any irreversible adverse impacts to Little Lake that might otherwise occur from extractions of ground water in excess of the natural basin recharge.

A-26 The context addressed in the 1980 EIS for the process for establishing acceptable ground water impacts from developing a cooling water supply from Rose Valley was that the ground water production wells would be located on public lands in Rose Valley under the administrative authority of the BLM, and that the detailed evaluation of such proposed ground water development would be presented in a "Plan of Production." The Plan of Production eventually presented for BLM review, however, did not include any proposal for utilization of ground water from Rose Valley (BLM 1988). The current proposal calls for production of ground water in Rose Valley from wells located on private lands; accordingly, the primary regulatory jurisdiction for that ground water development lies with the County of Inyo rather than with the BLM. The EA recognizes the potential ground water impacts as being related to the proposed grant by BLM of a right of way over public lands for the proposed water pipeline. The BLM has incorporated by reference into the EA the analysis by the County of Inyo of potential ground water and related impacts in Rose Valley because the County has primary regulatory responsibility over that dimension of the proposed project. BLM has independently reviewed that analysis.

A-27 The utilization of ground water from Rose Valley addressed in BLM 1988 (referred to in Comment A-27 as the "1988 EA) clearly is not the same utilization as is being evaluated by the BLM in connection with the proposed grant of right-of-way for the Hay Ranch Project. In BLM 1988 the proposed use was as is described in the following discussion:

"Water for construction, dust control, and future drilling will be supplied by condensate. Approximately 30,000 gallons of water per day for three to four weeks will be needed to drill each well; 36,000 gallons of water per day may be needed for dust control. Between 6,000 and 16,500 gallons per hour of condensate will be produced at Coso Navy Unit 1 (NWC, 1986a), meeting construction and start-up water needs. The condensate can be augmented with produced geothermal fluids for dust control.

"If necessary, CECI may also use the Navy's the Coso No.2 observation water well to provide water for well drilling, construction, and power plant operations. CLJV may propose to drill a third observation well east of the existing wells. If CECI's water demand exceeds the capacity of the Coso No.2 observation water well and condensate from operating plants, water may be obtained from a water well at the remote power plant office site on BLM land in Rose Valley Figure 1.1-1), from private wells at Coso Junction, or another observation well in Upper Coso Basin. The well in Rose Valley was permitted by BLM under the transmission line right-of-way issued to CECI in October 1983. CLJV also obtained a permit from the Inyo County Health Department in August 1985. If this well supplies dust control and construction water, withdrawals may be as much as 10,000 gallons/day in Rose Valley." [BLM 1988, at p. 1-34]

The limit of 10,000 gallons/day from ground water withdrawals in Rose Valley was expressed in relation to the potential use of such water for "dust control and construction water."

A-28 The questions posed are answered by the information referenced in Comment A-30.

A-29 Because the reduction in steam production at the Coso geothermal field has been shown to be correlated with a reduction in geothermal fluid injection, the premise of the project is that increased fluid injection will result in increased steam production. Power production is directly proportional to steam production. The proposed pipeline would connect to the existing injection system and thus augment the ongoing injection of fluids (Draft EIR at p. 2-14).

A-30 The opinion of the commenter regarding evaporation at the WCTs is noted.

A-31 All of the produced steam passes through the power plant and is condensed. Approximately 70-80% of the steam is evaporated in the cooling tower, depending on the weather. 100% of the remaining 20-30% of produced steam in the Geofluids is reinjected as steam condensate.

A-32 EGS stimulation has been performed on wells at the Coso geothermal field. These tests were part of the Coso Enhanced Geothermal Systems Project. Further studies are deferred until 2010. The proposed project is unrelated to the Coso Enhanced Geothermal Systems (EGS) Project. The proposed project water would be injected into the existing injection system at well 88-1 as part of normal operations, and cannot be transported to the potential sites where EGS programs are located. The proposed Rose Valley water is mixed with other injection water within the injection system. The EGS operations are separate operations and not a part of the proposedproject. The appropriate environmental analysis and approvals would be obtained prior to work on EGS projects if additional EGS projects were to be conducted at Coso.

A-33 Refer to response to comment A-32 for discussion regarding EGS. The objective of the proposed project is to provide supplemental injection water to the Coso geothermal field to reverse the ongoing decline in reservoir productivity due to evaporation of geothermal fluids from the power plant cooling towers.

A-34 The comment referring to the conclusions of the DiPippo report is noted. The past actions and past intentions of Coso do not pertain to the environmental effects of the proposed project, and are outside the scope of the EA, except where it pertains to the analysis of cumulative impacts. The EA addresses the potential environmental impacts of the project as proposed and a discussion involving past studies and current projects of Coso is outside of the scope of the EA.

A-35 The 10% criterion is based on groundwater level monitoring data collected in 1997/1998 indicating an average 3 foot higher groundwater level in the Little Lake North Dock well on the north side of the lake when compared to the water level in Little Lake. Groundwater table drawdown in the North Dock well of 0.3 feet would reduce the groundwater gradient and associated groundwater recharge rate towards the lake by approximately 10% base on this observation. First, it is important to be clear that the 10% reduction refers only to groundwater that discharges into Little Lake and not the flow of groundwater through the entire thickness of the aquifer. The predicted reduction in flow towards Little Lake would never exceed the significance criterion of 10%, and would only approach that threshold for a period of 5 years in the middle of the monitoring period required for the CUP. A 10% reduction in groundwater discharge to Little Lake equates to less than a 3% decrease in the overall flow of groundwater through the entire width and thickness of Rose Valley near Little Lake, based on model results; therefore this is a conservative threshold.

It is also important to recognize that a 10% decrease in groundwater discharge to Little Lake equates to a drawdown of the groundwater level of approximately 0.3 feet at the northern end of Little Lake, and less at the southern end. The maximum allowable drawdown criterion of 3 feet is extremely small compared to the entire saturated thickness in permeable layers 1 and 2 of the model near Little Lake (approximately 100 feet). A 10% maximum decrease in groundwater discharge to

Little Lake would still allow for the vast majority of the groundwater to be available for creation of surface water features (e.g., ponds) prior to infiltration back into the aquifer. Flow from Coso Spring and other small springs near Little Lake that supply water to the wetlands is expected to continue without a substantial change, based on observations at Coso Spring that showed no decrease in spring flow when the water table declined by 1.0 feet in the Little Lake North Dock well (Bauer 2002). Groundwater flow through Rose Valley would continue, as described above, with a decrease of less than 3% in the overall groundwater flow near Little Lake.

It is helpful to understand how a 0.3 foot decrease in groundwater level compares to natural variability in groundwater levels. A drawdown of 0.3 feet in the groundwater level near Little Lake is substantially less than the historical range of groundwater fluctuation near Little Lake over the course of a year (Bauer 2002). Wetland plants near Little Lake have historically adapted to groundwater level changes of 1 foot or more, and it is therefore reasonably expected that wetland plants would adapt to the small change in groundwater level anticipated to result from the proposed project.

Little Lake normally experiences seasonal fluctuation in its surface area and volume, and can and has been manipulated to alter the lake surface and volume. Wetland and riparian species surrounding the lake are closely associated with the lake margin and fluctuate with the lake. Local plant root zones are likely inundated by lateral migration of water from the surface waters. The areas supporting riparian habitat would likely maintain the same width of wetland habitat, but would move with the open water margin, even with a small reduction in lake area volume. Maintaining flows into Little Lake to at least 90% of their current average flow rates would keep flows largely within the range of natural variation currently experienced. The 10% decrease in outflow to Little Lake was based on this value of natural vegetation and was determined to be the vegetation “tolerance” level at the lake in order to prevent significant impacts to water availability at the lake.

A-36 The comment is noted. Refer to response to comment A-35.

A-37 The augmentation alternative would involve extracting groundwater from a well on the Little Lake Ranch property and piping it to Little Lake to augment water levels. Little Lake Ranch’s legal counsel, Gary Arnold stated in a letter to the County dated September 3, 2008 that Little Lake Ranch members pumped groundwater from a well on the property to restore the water level in Little Lake following seismic activity in the area in 1971, thus demonstrating the conceptual feasibility of this alternative. (Final EIR at 2-39 – 2-40).

The total reduction in groundwater flow towards Little Lake peaks at approximately 70 ac-ft/yr for the proposed project with implementation of mitigation. The peak groundwater flow would occur approximately 11 years after project startup, and would decrease thereafter. The average reduction in groundwater flow over the duration of the 30-year CUP would be on the order of 50 ac-ft/yr. Little Lake generally has a surplus of water in the winter; Bauer (2002) reported surface water flow rates out of Little Lake of up to 5,000 ac-ft/yr in the winter months, whereas the average flow rate is approximately 3,000 ac-ft/yr. It is unlikely that augmentation would be needed in the winter. The highest evaporation rates and greatest need for water for irrigation purposes on the property occurs in late summer. Actual (annualized) groundwater extraction rates needed may range from 25 ac-ft/yr in the spring months and up to 150 ac-ft/yr in late summer.

The augmentation well would have to be fitted with a manual or automatic flow controller such that only as much water is pumped into Little Lake as is needed to maintain the water level at a height suitable for Little Lake Ranch purposes including management of flora and fauna in the vicinity. Groundwater extraction from a well located south of Little Lake would minimize drawdown beneath Little Lake and impacts to springs on the property because the water, after being discharged into the lake, would infiltrate back into the ground. The principal cost would be for well installation, pumping and conveyance equipment, trenching of a pipeline, and electrical power, which would be paid for by the applicant.

The amount of drawdown resulting from groundwater extraction on the property to augment Little Lake water levels would depend on the seasonal and long-term pumping schedule and rate of pumping, the location of the extraction well, and the depth of the well screen interval. The model grid for the Hydrology Model developed for the Draft EIR ends on the south end of Little Lake; consequently, the Hydrology Model would have to be modified to evaluate impacts of groundwater extraction south of the lake. A more practical evaluation of the feasibility of this alternative would be to test pump the former Little Lake Hotel well located on the west side of US 395 south of Little Lake and monitor groundwater and lake levels on the Little Lake Ranch property. Specifications for the Little Lake Hotel well and completion details of the hotel well are not available and have apparently been lost; however, the Little Lake Hotel well presumably pumped for more water than a typical domestic water supply well, with no reported impact on groundwater levels or surface water features at Little Lake.

A-38 Refer to response to comment A-35.

A-39 Sources of water to Indian Wells Valley are estimated at a total of 36,415 ac-ft/yr (Williams 2004). It appears to be (Williams 2004). It is not a feasible source of water as an alternative. The use of water from the Indian Wells Basin would be economically infeasible and could cause significant environmental impacts. Most of the cost of the project is related to the pipeline, as noted above. The northern end of the Indian Wells Basin is approximately 12 mi from the injection system location. The additional pipeline length required to pump water from the Indian Wells Basin would make this alternative infeasible because most of the project cost would be dependent on the pipeline length. The pipeline would also have to cross through rugged terrain, which could require more intrusive construction. Additional work could include blasting to pass through elevated land, and there would be more ground disturbance due to the greater length of the pipeline. The change in pipeline elevation could also require pump stations to lift the water over the pass, which would require construction of additional facilities. The added disturbance would cause more environmental impacts than the proposed project. The discussion of alternatives to a proposed project should focus on alternatives that are capable of feasibly attaining most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project The use of water from the Indian Wells Basin likely would not avoid significant impacts, and could potentially cause additional significant impacts.

A-40 Refer to response to comment A-39.

A-41 The reference language appears on page 3.3-14 of the Draft EIR, which was edited in the Final EIR to state the following:

"Groundwater pumping could result in significant reductions in surface water levels in Rose Valley, as described in Section 3.2 Hydrology and Water Quality. Concern has been expressed that reductions in surface waters would increase soil erosion in the valley. However, mitigation has been included in Section 3.2 Hydrology and Water Quality to monitor groundwater drawdown, with contingency plans to prevent surface water impacts (primarily at Little Lake) from groundwater drawdown. With implementation of the mitigation in Section 3.2 Hydrology and Water Quality, surface waters would not be significantly impacted and wind blown soil erosion would not increase."

Little Lake normally experiences seasonal fluctuation in its surface area and volume, and can and has been manipulated to alter the lake surface area and volume. Wetland and riparian species surrounding the lake are closely associated with the lake margin and fluctuate with the lake. Local plant root zones are likely inundated by lateral migration of water from the surface waters. The area supporting riparian habitat would likely maintain the same width of wetland habitat, but would move with the open water margin, even with a small reduction in lake area/volume. Maintaining flows into Little Lake to at least 90% of their current average flow rates would keep flows largely within the range of natural variation currently experienced. The 10% decrease in outflow to Little Lake was based on this value of natural variation and was determined to be the vegetation "tolerance" level at the lake in order to prevent significant impacts to water availability at the lake. The justification for the significance criteria is presented on page 3.2-45 and C4-5 of the Draft EIR.

Little Lake currently exports 6 ac-ft/yr of groundwater, which is provided to the nearby pumice mine. This withdrawal, while small, does have some effects on the lake and water available to the lake. Modeling demonstrated that this withdrawal could equal 0.1 ft of drawdown at the lake. The export and sale of water to the pumice mine suggests that there is some flexibility in the water management at Little Lake, and possibly some amount of excess water beyond what is needed to manage the habitat at the lake.

A-42 The comment is noted. Refer to response to comment A-41.

A-43 The comment is noted. Refer to response to comment A-41.

A-44 Water rights issues are beyond the scope of the requirements for analysis under CEQA. Water rights issues are very complex, and can only ultimately be determined by the State Water Resources Control Board or, ultimately, by the courts. Inyo County does not determine or enforce water rights, and they would not be addressed in the CUP. The EIR fully analyzes and addresses impacts to the environment associated with the groundwater pumping project as required under CEQA. Mitigation included in the EIR addresses and minimizes impacts associated with groundwater drawdown and off-site impacts. The proposed project would not have a significant impact on Little Lake or other groundwater users in the Rose Valley with the implementation of mitigation.

A-45 The EA utilized a biological survey conducted by UltraSystems in 2004: This survey of the project area included a 50 ft wide corridor around the proposed pipeline route and high point tank and a 20-ac area on the Hay Ranch property around the proposed facilities.

The results of three additional surveys referenced in the County's Draft EIR on page 3.4-1 are consistent with the results of the UltraSytems survey:

- A 2007 survey for the Coso Road Improvements project: This survey included a 99-ft corridor on either side of Coso Road from the intersection with Highway 395 up to the entrance to the CLNAWS, and also included desert tortoise surveys.

- 2007 reconnaissance surveys: Baseline data collection for the Draft EIR included reconnaissance surveys of areas beyond the areas of direct surface disturbance for the project. These areas included Portuguese Bench, Rose Spring, and Little Lake Ranch. These areas would experience no direct effects from surface disturbance, but were considered to have the potential to experience some indirect effects associated with potential groundwater drawdown.

- A 2008 botanical and general reconnaissance survey of the entire project area including a 99-ft buffer around the project pipeline route.

BLM consulted with USFWS in accordance with the provisions of Section 7 of the Federal Endangered Species Act, 16 U.S.C. § 1536 (EA Appendix B). The resulting Biological Opinion of the USFWS is attached as Appendix A to the Decision Record.

A-46 Impacts to biological resources are minimized through implementation of the HMMP. The potential for long-lasting groundwater drawdown is identified as potentially significant; however, the mitigation establishes a method for determining trigger points that incorporate the delayed response of groundwater drawdown further down the valley, and would avoid significant effects. The maximum allowable drawdown at Little Lake with the proposed mitigation plan is 0.3 ft. The level of groundwater drawdown is small enough to have less than significant impacts on the wetlands and biological resources at Little Lake, even though it may take over 100 years to regain that 0.3-ft loss in groundwater level. The HMMP includes monitoring requirements, both before and during pumping, to track any reductions in groundwater levels and imposes binding mitigation based on specific trigger points for any decreases.

A-47 The comment is noted. Refer to response to comment A-46 above.

A-48 Some loss of water from the aquifer is not necessarily a significant impact. Groundwater users would experience less than significant effects with implementation of mitigation. Impacts to habitat from a small loss of water from the aquifer would be less than significant with implementation of mitigation. Most plants are drought tolerant and do not rely on the groundwater table. Vegetation at Little Lake would experience less than significant impacts because of the mitigation that would prevent a decrease in inflows to Little Lake of greater than 10%.

A-49 The comment is noted. 511 acres refers to the previous land use utilized for agricultural operations.

A-50 All impact sections address potential impacts of the project as proposed at the full pumping rate. The entire EA addresses impacts of the proposed project (i.e., pumping at 4,839 ac-ft/yr for 30 years). Please refer to Chapter 4: Environmental Consequences of the Proposed Action for discussion of potential impacts associated with the proposed project. All impacts of the proposed project are analyzed by environmental parameter. Some impacts are identified as being potentially significant, but would be mitigated to less than significant levels by measures discussed in Chapter 4.

A-51 Recharge of an aquifer does not depend on cessation of ground water pumping.

A-52 Most of the water used for irrigation was lost from evaporation and evapotranspiration.

A-53 The source of the asserted “public testimony” is not identified. In any event the comment provides no foundation for comparing the economics of past farming activity with the economics of the proposed project.

A-54 The comment referring to the balance of the letter is noted.

A-55 The project could be used as agricultural land in the future since the project would only occupy approximately 5 out of the 300 acres of land comprising the Hay Ranch property. Steps to restore agricultural production on the Hay Ranch property are irrelevant to the analysis in the EA. Hay Ranch could be used for agricultural purposes in the future at the owner’s discretion. The existing state of the property is the baseline condition for the analysis of the proposed project. It is beyond the scope of the EA to address the effects of the baseline conditions.

A-56 Refer to response to comment A-55 for discussion regarding existing conditions at the Hay Ranch property. Effects of generation of fugitive dust due to loss of soil moisture from groundwater pumping are discussed in the EA beginning in Section 4.1.1. Much of the vegetation in the Rose Valley is comprised of drought tolerant species. Common species include shadscale; (*Atriplex confertifolia*), Nevada ephedra; (*Ephedra nevadensis*), and California buckwheat; (*Eriogonum fasciculatum*). At the northern end of the valley there are large stands of blackbrush; (*Coleogyne ramosissima*) as well as such Great Basin species sagebrush; (*Artemisia tridentata*), and bitterbrush; (*Purshia tridentata*), creosote bush; (*Larrea tridentata*), and burro bush; (*Ambrosia dumosa*).Water is often a limiting factor for plant growth in arid environments. Drought tolerant plants have developed strategies to maximize their efficiency in use of water. This allows them to thrive in areas where moisture is not adequate for most species to survive at all. Alluvial fans and slopes of desert mountains are characteristic landforms for drought tolerant species. Some local examples are shadscale and creosote bush.

Water-dependent vegetation is located in a few places in Rose Valley, including Portuguese Bench, Rose Spring, and Little Lake. Hydrologic studies have shown that artesian springs at Portuguese Bench are not hydrologically dependent on water in the Rose Valley; therefore, the project would have no impacts on riparian, wetland, or related biological vegetation along Portuguese Bench. Rose Spring is approximately 300 ft above the local groundwater table in the aquifer, and the water for the spring is derived from Sierra Nevada mountain front precipitation and groundwater underflow from Owens Valley, neither of which would be impacted by pumping at Hay Ranch. The Rose Spring is currently dry. Little Lake vegetation could be impacted by groundwater pumping, but impacts would be mitigated to less than significant levels by mitigation measures set forth in the HMPP. These measures would prevent drying of the lake and vegetation, and would avoid or minimize the generation of fugitive dust.

A-57 Refer to response to comment A-56 for discussion regarding potential air quality impacts.

A-58 Refer to responses to comment A-40 and A-41 for discussion regarding reductions in surface waters and increased potential for soil erosion.

A-59 The Hay Ranch property is not currently in use for agricultural purposes nor is it designated as agricultural lands or farmland. The proposed project would permanently affect only 5 ac (1.7%) of the 300-ac Hay Ranch. Approximately 295 acres would remain after construction that could be used for agricultural purposes in the future. Operation of the project facilities on the Hay Ranch property would not significantly impact the use of the property as farmland, as the proposed project would not directly convert the majority of the property to another land use. New wells could be established on the Hay Ranch property if agricultural operations were to resume. The new wells would have to undergo appropriate environmental permitting, but it is not infeasible that new wells could be established. The EA includes provisions to mitigate the potential impact of lowering of the ground water table on pumping for irrigation water (EA Appendix H, Hydrology-1).

A-60 As discussed in Section 4.3.3 of the EA, the following mitigation measures, which are an integral part of the project proposal, shall be implemented by the proposed project and would reduce the potentially significant impact to less than significant:

Construction equipment and vehicles shall be cleaned to remove dirt and any vegetative material prior to accessing the site. This will reduce the potential for introduction of invasive or noxious species.

Prior to construction, monitoring shall occur to determine the presence of noxious or invasive species on or adjacent to the pipeline corridor. Any removal program must be approved by the BLM in advance of its implementation.

The pipeline corridor shall be monitored for 5 years after completion of construction. Any noxious or invasive species found will be reported to the BLM and control measures will be developed and implemented only after review and approval by the BLM.

A-61 Refer to response to comment A-56 for discussion regarding drought tolerant plant species common in the project area.

Impacts to biological resources at Little Lake will be reduced to less than significant levels through implementation of the HMMP. The potential for long-lasting groundwater drawdown is identified as potentially significant; however, the mitigation establishes a method for determining trigger points that incorporate the delayed response of groundwater drawdown further down the valley, and would avoid significant effects. The maximum allowable drawdown of groundwater to the north of Little Lake with the proposed mitigation plan is 0.3 ft. The level of groundwater drawdown is small enough to avoid significant impacts on the wetlands and biological resources at Little Lake, even though it may take over 100 years to regain that 0.3-ft loss in groundwater level. The Draft EIR includes monitoring requirements, both before and during pumping, to track any reductions in groundwater levels and imposes binding mitigation based on specific trigger points for any decreases.

A-62 Refer to responses to comments A-45 and A-61. The comment provides no support for the asserted legal conclusion that “Even a 10% loss of water to Little Lake and the Rose Valley would constitute a taking under the Federal and California Endangered Species Act[s], the Migratory Bird Treaty Act, and the Bald Eagle Protection Act.”

A-63 The comment is noted.

A-64 Comprehensive mitigation measures to protect the Mojave ground squirrel and the desert tortoise are included in Section 4.6.3 of the EA. BLM consulted with USFWS in accordance with the provisions of Section 7 of the Federal Endangered Species Act, 16 U.S.C. § 1536 (EA Appendix B). The resulting Biological Opinion of the USFWS is attached as Appendix A to the Decision Record.

A-65 The comment is noted. Refer to response to comment A-41 for discussion regarding significance criteria and response to comment A-62 for discussion regarding impacts to wildlife. In addition, refer to response to comment A-64 for discussion regarding mitigation measures incorporated by the project to protect wildlife.

A-66 The 1988 stipulation effectively preserves more than 43,000 ac for Mohave ground squirrel habitat. The Coso development has used 474.69 ac of the allowed surface disturbance within the China Lake Naval Air Weapons Station (CLNAWS) boundary (2,193 ac were allotted), and has used zero acres outside of the boundary (35 ac were allotted) to date (2008 Annual Compliance Report submitted by Coso to the California Energy Commission). Maps of the lands included in the 1988 CEQA document are depicted in the BLM's Final Environmental Impact Statement for Proposed Leasing Within the Coso KGRA, dated September 1980 at, for example, Figure 2.11.1-4A. The Mohave Ground Squirrel Mitigation Plan was amended in 1997 in order to allow continuance of the Plan through the life of the Coso development. The plan allows for 2,193 ac of new surface disturbance inside the boundary of the CLNAWS and 35 ac outside the CLNAWS boundary and provides accompanying incidental take coverage related to those disturbances. It does not include disturbance on private lands. Coso has submitted an application for a 2081 Incidental Take Permit (which would allow the take of the Mohave ground squirrel and desert tortoise under certain terms and conditions) for activities to be conducted on private land. The California Department of Fish and Game (CDFG) has confirmed in its comment letter dated September 5, 2008 that the 3:1 ratio for the habitat mitigation requirement would apply (sufficing for both species because they occupy the same type of habitat), and that the requirement can be satisfied through a payment to the Desert Tortoise Preserve Committee, which also acquires and manages habitat for the Mohave ground squirrel.

A-67 Refer to response to comment A-66 for discussion regarding 1988 stipulation addressing the Mojave ground squirrel.

A-68 Table 2.3-2 (Project Facility Acreage) of the DEIR clearly states that the project area is approximately 60.5 acres. The EA is organized into separate discussions regarding all potential impact areas including potential impacts to surface water and groundwater.

A-69 Refer to responses to comments A-45 and A-61.

A-70 The referenced Programmatic Agreement (PA) states "the implementation and the operation of the proposed project may have an effect on the Coso Hot Springs but the effects cannot be fully determined at the time of project approval". The PA contains an effects assessment for the Coso Hot Springs and includes monitoring requirements of the Coso Hot Springs by the Traditional Practitioners (U.S. Navy).

A-71 The comment referring to all previously published reports is noted. Injection is typically a dynamic process in geothermal reservoirs as it is moved within the field in order to maximize the benefit (pressure support and injection derived steam) and minimize the cost (cooling) when injectate moves too quickly into the production area to be thoroughly heated by rock. Coso maximizes the benefit of injection and minimizes the risk of cool water breakthrough by 1) monitoring and evaluating the effects of injection, and 2) moving injection fluids to injection wells which would provide the most benefit and least breakthrough from injection. Injection monitoring by Coso includes tracer testing, production monitoring (enthalpy and flow rates), and geochemical monitoring of produced fluids for evidence of injection returns. Coso installed a water transfer system in order to move injection water around the field in 2000 (Coso pers. comm. 2008).

A-72 The Coso Hot Springs are actually a series of hot springs, fumaroles, and steam vents primarily located along the Coso Wash fault. The Coso Wash fault may provide a conduit from the deeper reservoir to the surface (ITSI 2007). The fluids discharged at Coso Hot Springs appear to have a similar source of water to the geothermal fluids produced from the reservoir.

The geothermal reservoir at Coso has changed as a result of production from a primarily liquid dominated system to one with significant vapor-dominated areas (Monastero 2002; Adams 2004; ITSI 2007). These changes are related to extraction of geothermal fluids. Other aspects of the hydrogeological setting have also changed including the presence of low-salinity groundwater, faulting, volcanism, and intrusions of magmatic gases and meteoric waters (Adams et al. 2001).

Some changes in the Coso Hot Springs appear to correlate with the onset of geothermal production. The water levels in South Pool decreased and the temperatures increased within six months of initiating production in mid-1987. These changes stabilized, however, and did not continue to increase as the total mass of fluid withdrawn has steadily increased. These observations exemplify the complex relationship and a modeling study designed to improve the understanding did not specifically prove that geothermal production of the Coso reservoir led to the changes observed in the South Pool (ITSI 2007).The contribution of steam to many features has increased (Geologica 2003; 2004; 2005; 2006; 2007; 2008). There appears to be a relationship between observed changes in the surface manifestations at Coso and changes in the Coso reservoir; however, the relationship is not a one-to-one correlation and is not fully understood (ITSI 2007). It is possible that changes in other aspects of the geologic setting or hydrothermal system may have caused or affected the Coso Hot Springs, given the changes in surface manifestations over the duration of the Coso geothermal system.

The expansion of the steam zone within the Coso Reservoir, as in other geothermal reservoirs, is related to the decline in reservoir pressure. Steam zones are developed in geothermal reservoirs as a result of natural venting (e.g., Yellowstone or The Geysers) (Truesdell and White 1973) or man-made production-related pressure drops. Pressure drops generate vapor-dominated or steam zones in geothermal systems with high heat flow (e.g., the Coso geothermal field) and limited real-time re-charge.

Data collected for the Coso Hot Spring Monitoring Program indicate that some of the surface manifestations of the geothermal system are also indicating an increasing influx of geothermal steam relative to hot water. Augmenting injection is anticipated to reduce or stabilize the growth of the pressure drop-related steam zone because it is designed to decrease the negative net withdrawal from the Coso reservoir, thereby reducing or possibly stabilizing reservoir pressure decline. Stabilizing the steam zone is likely to stabilize changes related to the increase in the steam zone.

Cold injection can recharge a geothermal reservoir just as cold groundwater recharges some geothermal systems naturally and prevents or reduces the development of steam zones. Water injection, especially into vapor-dominated portions of geothermal reservoirs, is currently known to increase (or stabilize the decrease of) reservoir pressures and flow rates and enhance energy recovery by increasing the long-term sustainability of production (Pruess 2008). When cold water contacts hot rock the water is heated until it reaches the saturation temperature at the reservoir at which point it may vaporize into steam. Water flows towards lower pressure zones; therefore, cold water injected into a reservoir flows towards the areas of the lowest pressure, which is the steam zone. The Coso geothermal field has sufficient heat to heat the reinjected water because it is one of the hottest geothermal resources currently utilized in the western United States.

No claim is made that enhanced injection would "restore" the Coso Hot Springs. The surface manifestations at Coso have been evolving for 300,000 years (Adams et al. 2000) and it is not clear to what state they could or would evolve if production ceased at Coso. However, some of the geochemical monitoring data reported as part of the Coso Hot Springs Monitoring Program suggests at least some changes are related to an increase in the flow of steam to the surface manifestations. The increase in steam flow may be related to the growth in steam zone in the reservoir if the Coso Hot Springs and the exploited portion of the geothermal reservoir are related. Stabilizing the growth of steam zones at Coso may stabilize or reduce further changes in Coso Hot Springs.

A-73 The comment referring to the essential findings of Dr. Curry (retained by the Paiute and Shoshone tribes) is noted. Previous activity and impacts from the geothermal power plan are part of the existing condition and beyond the scope of the EA.

A-74 The previous implementation of the existing MOA by the Navy is beyond the scope of this EA, although the EA did consider it for purposes of cumulative analysis and concluded that no potentially significant cumulative impacts would result from the project. The measures in the MOA as established were agreed upon by the signatory parties and remain valid. The Navy has consulted with the tribes regarding the changes at Coso Hot Springs and various types of mitigation measures have been suggested. There has been no agreement on mitigation to implement.

A-75 The comment regarding previous ongoing monitoring of the Coso Hot Springs by the U.S. Navy and monitoring reports of the Coso Hot Springs is noted.

A-76 Refer to response to comment A-72 for discussion of fluctuations and water temperatures at the Coso Hot Springs.

A-77 See response to comment A-74.

A-78 Refer to response to comment A-72 for discussion regarding the condition of Coso Hot Springs. The biggest change in the geothermal reservoir since production began is the decrease in reservoir pressure related to the negative net withdrawal. The increase in injection related to this project would reduce the negative net withdrawal.

A-79 The comment referring to the MIT Report is noted.

A-80 Refer to response to comment A-72 for discussion of fluctuations and water temperatures at the Coso Hot Springs. Comment referring to 1980 EIS is noted.

A-81 The comments referring to MIT Report and comments of Carl F. Austin are noted.

A-82 Refer to response to comment A-72 regarding Coso Hot Springs.

The injection of cooler water into the hot geothermal reservoir over 2 km southwest of the major surface manifestations and 1 to 3 km below the surface provides sufficient hot reservoir rock between the Coso Hot Springs and injection so the water would be heated by the hot reservoir rock as discussed above. The cooler temperature of the water relative to current waste brine injection would not be a factor.

The response of the Coso geothermal system to production has been pressure decline and the development of steam zones (ITSI 2007), suggesting that the system is operating with a negative net withdrawal of fluids. The response to pressure drop is not influx of cold or cooler water from the edges of the system (such as in parts of Cerro Prieto), but a drying of the system. It is apparently at an insufficient rate to maintain the reservoir pressures and liquid saturation during production of the reservoir, although it is possible that there is some natural leakage.

Refer to response to comment A-20 for discussion regarding reduced production of Coso geothermal fluids.

A-83 Refer to response to comment A-74 for discussion regarding MOA. Figure 4 of the EA identifies land ownership in regards to the proposed project.

Regarding the Paiute Indian Tribe, the BLM conducted Native American consultation pursuant to Section 106 of the National Historic Preservation Act. The resulting Programmatic Agreement is referenced in the response to comment A-70.

A-84 Refer to response to comment A-74 for discussion regarding MOA.

A-85 Refer to response to comment A-74 for discussion regarding MOA.

A-86 Refer to response to comment A-74 for discussion regarding MOA.

A-87 Refer to response to comment A-74 for discussion regarding MOA.

A-88 Refer to response to comment A-74 for discussion regarding MOA.

A-89 Refer to response to comment A-74 for discussion regarding MOA.

A-90 Refer to responses to comments A-35 and A-56 for discussion regarding 10% threshold and potential impacts to vegetation. The aesthetic qualities as seen by sensitive viewers on US 395 are described under the heading *Scenic Quality* beginning on page 4.9-1 of the EA. US 395 is eligible for designation as a scenic highway. The Coalition for Unified Recreation in the Eastern Sierra, a non-profit organization, has designated US 395 as a part of the Eastern Sierra Scenic Byway. Sensitive viewers in the project area are largely limited to the western portion of the project along US 395 in view of Hay Ranch. Sensitive viewers include motorists along US 395 in the project area vicinity.

Operational impacts are not likely to affect the aesthetic quality of the Rose Valley by affecting the vegetation at Little Lake. As discussed in Section 3.9.3 of the EA no impacts to visual resources are expected as a result of the Proposed Action and no mitigation measures are required.

A-91 According to Section 4.9.1 of the EA, because of the presence of the water wells and electrical transmission lines along the western end of the alignment, and an existing roadway along the remainder of the alignment (to the water line route), the sensitivity level for changes in the scenic quality is low. There are no impacts to visual resources due to the Proposed Action. The structures in the Proposed Action are only located within Hay Ranch, the facilities will be buried and construction will occur in or near existing disturbed areas such as roads. Secondly, as stated in response to comment A-35, Little Lake normally experiences seasonal fluctuation in its surface area and volume, and can and has been manipulated to alter the lake surface and volume. Wetland and riparian species surrounding the lake are closely associated with the lake margin and fluctuate with the lake. Local plant root zones are likely inundated by lateral migration of water from the surface waters. The areas supporting riparian habitat would likely maintain the same width of wetland habitat, but would move with the open water margin, even with a small reduction in lake area volume. Maintaining flows into Little Lake to at least 90% of their current average flow rates would keep flows largely within the range of natural variation currently experienced. The 10% decrease in outflow to Little Lake was based on this value of natural vegetation and was determined to be the vegetation “tolerance” level at the lake in order to prevent significant impacts to water availability at the lake.

A-92 Comment regarding inadequacy of DEIR and FEIR noted. The comment is the introductory sentence to additional environmental impacts the commenter feels were not adequately analyzed in the EA.

A-93 The Draft EIR states on page 3.8-1 (under *Agricultural Activities in the Vicinity of Hay Ranch*) that the Hay Ranch property has been fallow for over 15 years. The Hay Ranch parcel produced more than seven tons of alfalfa per acre when it was used for alfalfa production. It became economically infeasible to farm alfalfa on the property in the early 1990s due to the cost of electricity to pump water from 600 ft bgs, and the low price of alfalfa. The parcel is owned by Coso and has not been farmed since the early 1990s. Only five acres of the approximately 300 acres comprising the Hay Ranch property would be removed from potential resumed use for agricultural production.

It is not currently economical to grow alfalfa on the Hay Ranch property (based on the current price of alfalfa). The parcel meets the production criteria for designation as Prime Farmland, which is having the capability to produce greater than seven tons per acre of alfalfa; however, the Hay Ranch property does not meet the requirement of having an adequate moisture supply needed to produce sustained high yield.

There is minor potential for Hay Ranch property to be designated as Prime Farmland; however, this is unlikely to happen. No agricultural activities have taken place on the Hay Ranch property since the early 1990s. The Hay Ranch property is small compared to active farms in Inyo County (e.g., Lubkin Ranch at 760 ac) and would require deep groundwater pumping to reach water supplies, as explained on page 3.8-7 of Draft EIR. Further analysis of whether the Hay Ranch parcel would be designated as Prime Farmland in the future is too speculative for meaningful evaluation. There is currently no designated Prime Farmland or Williamson Act land in Inyo County. The project would not result in any potentially significant impacts to agricultural resources.

A-94 Refer to response to comment A-59 for discussion regarding conversion of farmland to non-agricultural use.

A-95 Refer to response to comment A-94 above. Refer to response to comment A-93 for discussion regarding agricultural potential of Hay Ranch property.

A-96 Impacts to vegetation and wildlife are discussed in Section 4.3 and 4.6 of the EA, respectively.

Without mitigation, groundwater withdrawal at Hay Ranch has the potential to reduce the groundwater flow to the Little Lake area, and to affect the sensitive riparian and wetland vegetation around Little Lake, located approximately 9 mi south of the project area. Without mitigation, groundwater inflowing into Little Lake is projected by the groundwater modeling results to be significantly reduced if the project were implemented as proposed (pumping at 4,839 ac-ft/yr for 30 years). Mitigation specifically designed to avoid these potentially significant impacts has been defined in order to avoid significant effects to groundwater and vegetation and would be part of any project approval.

The HMMP would establish trigger points for implementing mitigation that would prevent significant effects to water levels and impacts to wetland habitats at Little Lake. A reduction or cessation of pumping is required if trigger levels are reached. The reduction or cessation in pumping would avoid a greater than 10% reduction in ground water flows into the lake (less than 4-in decline), ponds, and wetlands.

Seasonal fluctuation in surface area and volume currently occurs at Little Lake. The lake is also managed to change its surface area and volume. Wetland and riparian species surrounding the lake are closely associated with the lake margin and fluctuate with the lake (Bagley pers. comm. 2008). Maintaining flows into Little Lake to at least 90% of their current average flow rates would keep flows largely within the range of variation currently experienced at the lake. The maximum drawdown at the north end of the lake would be approximately 0.3 ft (4 in), and would be even less at the south end of the property. Species at Little Lake are mostly either upland species that do not depend on groundwater, or marsh species that require inundation during the growing season (Bagley pers. comm. 2008). The inundation around the lake is closely tied to the wetted margin of the lake and the lateral migration of water at the margin. The wetted margin would contract and the same species would likely maintain the same width but move inward, even with a small decrease in lake size. These changes can be currently seen when the lake size is manipulated with boards in the weir at the south end of the lake. The time that water stops flowing over the weir could increase slightly but would not be outside the range currently experienced. There may be some impacts to marsh species but these are not expected to be significant because the vegetation would not significantly change from its current state. Marsh vegetation normally requires inundation during the growing season (summer). Summer is the time when water currently also does not flow over the weir. Effects to one CNPS listed species, alkali cordgrass (*Spartina gracilis*), were questioned. Alkali cordgrass is not federally or State listed. The species is on the CNPS List 4: Plants of Limited Distribution. This species occurs at Little Lake and currently experiences the seasonal and manipulated fluctuations in surface water levels. The changes in water levels would be within the envelope currently experienced with the implementation of mitigation. Populations of individuals would remain largely the same as they are currently. The project would not reduce or eliminate the occurrence of alkali cordgrass at Little Lake. Loss of a few individuals due to the contraction of the lake perimeter and wetted boundary would not be a significant effect.

The area downstream from the lake is inundated by outflow from the lake as well as water supply from springs. The lower springs would not stop flowing as a result of the project with mitigation. Wetland species would not be significantly impacted.

Phreatophytic species that may occur in the area between the south end of Little Lake and the lower ponds would likely be able to deepen their roots by a few inches if the groundwater table is lowered. Several studies by Inyo County, the LADWP, and the USGS have supported this concept (Bagley pers. Comm. 2008).

Some impacts may still occur to wetland vegetation and habitat at Little Lake Ranch even with implementation of mitigation; however, impacts would be less than significant because they would not result in a change in habitat type or a significant loss of habitat. No other aspects of the proposed project's operation other than groundwater pumping would impact water- dependent habitats in Rose Valley.

Species such as yellow warbler, common yellowthroat, yellow-billed cuckoo depend on wetland vegetation. None of these species were identified around Little Lake in a California Natural Diversity Database search (2007). If yellow warbler, common yellowthroat, and yellow-billed cuckoo were to occur at Little Lake, they would not be impacted by the project because the project would have minimal impacts to wetlands. Freemont cottonwood occurs on the Little Lake property. Cottonwoods have deeper roots systems than emergent wetland species as found around the lake margin. A study by S.J. Lite and J.C. Stromberg (Lite et al. 2005) that examined surface water and groundwater thresholds for maintaining cottonwood (*Populus-Salix*) forest in Arizona found that Freemont cottonwood (*Populus fremontii*) were dominant over other species when surface flow was present more than 75% of the time, when the inter-annual groundwater fluctuation was fewer than 1.65 ft, and when the average maximum depth to groundwater was fewer than 8.5 ft. Cottonwoods occur along sandy washes, near the surface water supply. The project would not result in significant groundwater drawdown that could impact cottonwoods. Groundwater drawdown of 0.3 ft or less would not significantly impact cottonwood roots. The project would not cause more severe inter-annual groundwater fluctuation than already occurs.

Passerine and raptor species at Little Lake would not be impacted because the project would not result in impacts to trees at Little Lake.

A-97 The commenter is incorrect in stating that alkali cordgrass is listed as "very rare and endangered" by the CNPS. The 1B CNPS list includes rare and threatened species. Spartina gracilis is on List 4: Plants of limited distribution. The CNPS website states that "The plants in this category (List 4) are of limited distribution or infrequent throughout a broader area in California, and their vulnerability or susceptibility to threat appears relatively low at this time. While we cannot call these plants "rare" from as statewide perspective, they are uncommon enough that their status should be monitored regularly. Should the degree of endangerment or rarity of a List 4 plant change, we will transfer it to a more appropriate list."

Refer to response to comment A-96 for a discussion of the potential wetland impacts associated with the proposed project.

A-98 Refer to response to comment A-96 regarding EA discussion concerning wetlands and potential impacts of the proposed project.

A-99 The stable isotopic composition of Little Lake water indicates that the primary cause of higher TDS in Little Lake is evaporation. The positive correlation of oxygen-18 and chloride values and the predominance of bicarbonate as the largest component in the dissolved solids are consistent with concentration of dissolved solids by evaporation, rather than influx of geothermal brine with higher dissolved solids. The chemical and isotopic character of Coso Spring immediately east of Little Lake, and some northeast correlation of isotopic and chloride data in groundwaters in the southern part of the valley compared with the chemistry of Coso geothermal fluids, indicate that there may be a component of geothermal water in the deep groundwater. It would be a minor component, if a factor, of the TDS in Little Lake. Any influence of the Coso geothermal groundwater system on the Rose Valley is a naturally occurring phenomenon and unrelated to geothermal development or the proposed project.

A-100 Rose Valley groundwater has contaminants that exceed both primary and secondary drinking water standards in some areas and is only used for drinking water in limited areas, primarily where the influence of Sierran recharge is higher. The proposed application is an industrial use of water and the water would be injected under the Coso injection well permits from the Lahontan Regional Water Quality Control Board. The proposed project does not include release of toxic substances into waters.

A-101 Refer to responses to comments A-99 and A-100 above.

A-102 Refer to responses to comments A-96 and A-99 above. Regarding stagnation, water quality may potentially be affected by stagnation if evaporation and degassing of the lake occur. Water quality could also be impacted if dissolved solid levels increased and dissolved oxygen levels decrease. This is not expected to be an issue at Little Lake because:

- Little Lake represents the surface expression of the groundwater aquifer which would maintain flow through springs in the lake throughout the project; the lake is not expected to stagnate.

- Little Lake already experiences varying degrees of evaporation as evidenced by the observed variations in water isotopes and chemistry discussed above and small increases or decreases are unlikely to be detectable.

- The lake volume would decrease if the water level in Little Lake drops, thereby reducing evaporation.

- Natural springs also provide water to the downstream areas and are thus unaffected by the lake water.

A-103 The comment referring to Geothermal PEIS is noted.

A-104 The proposed project would not increase power generation at the Coso geothermal field beyond baseline permitted levels. The impacts of changes in gas due to use of Rose Valley groundwater for injection may actually decrease the hazardous material and non-condensable gases produced. Reservoir pressure and/or sometimes temperature typically decline during the production of a geothermal resource. Production has led to pressure drops and an expansion of a vapor phase at the Coso geothermal field (ITSI 2007). Injection into the reservoir of spent brine, cooling tower blowdown, and other fluids can mitigate pressure decline to some extent and therefore injection has become a standard practice within the geothermal industry. The value of injection as pressure support varies with the reservoir and the amount and method of injection because every geothermal reservoir is unique. Production rates decline with a decline in reservoir pressure because production rates depend on reservoir pressure in addition to other reservoir characteristics, such as permeability.

Coso performed reservoir simulation of the Coso reservoir to evaluate the potential impacts of increasing injection using a standard geothermal reservoir modeling program and assuming that a) current rates of injection would continue, or b) injection was increased by 3,000 gpm. Based on reservoir simulation results provided by Coso, increased injection into the Coso geothermal reservoir is predicted to stabilize reservoir pressure decline in some areas.

The impacts of producing geothermal power from Coso geothermal fluids at the originally permitted power production rate has been addressed in the power plant environmental documents and the effects were found to be less than significant; it is not necessary to address further. The project would not generate more power output than was previously evaluated and produced at the power plants.

Injection fluids consisting of spent brine, steam condensate or imported groundwater would have significantly lower gas content than Coso geothermal fluids. Geothermal reservoir injection programs are typically designed to maximize boiling of injectate (injection derived steam). Injection fluids in geothermal systems rarely have the same chemistry (including hydrogen sulfide and non-condensable gas concentrations) as the original reservoir fluids. The gas concentrations of steam produced from boiling of injectate are typically low because the gas was removed in the power production process. Non-condensable gas concentrations may actually decrease to the extent that the amount of production that is derived from injection-derived steam increases. The project's implementation would not result in any significant impacts from hazardous materials.

A-105 Refer to response to comment A-104.

A-106 Analysis of the existing waste and discharge from the Coso power plants is outside the scope of this EA. Impacts of the power plants are not relevant to the proposed project because these impacts were addressed in previous documents. Previous documentation for the power plants addresses all impacts, and all impacts could be mitigated. The proposed project would not generate power or waste in excess of baseline permitted levels. The mitigation from previous documents is applicable to the ongoing generation of power from the plants (i.e., plant operation).

A-107 Refer to response to comment 104 for discussion regarding non-condensable gases. Coso has implemented several equipment additions and modifications to ensure that gases are effectively removed from the steam because non-condensable gases in the steam can create a back pressure on the turbine and decrease its efficiency and performance. Modifications include the installation of gas abatement units, the addition of vacuum pumps and compressors, the replacement of steam jet air ejectors, and the expansion of condenser cooling capabilities by installing gas pre-coolers.

A-108 Refer to response to comment A-106.

A-109 The proposed project would not result in power generation greater than the baseline permitted levels that have been addressed in prior environmental reviews and documentation.

A-110 Comment referring to MIT Report and Geothermal PEIS is noted.

A-111 Section 2 of the EA discussed the proposed action and project alternatives. Alternatives to the proposed project, including replacing the double-flash steam power plants currently in use with binary power plants, were discussed in the DEIR and that discussion is incorporated by reference into the EA. The proposed project would not result in power generation or waste streams greater than the baseline permitted levels that have been addressed in prior environmental reviews and documentation.

The initial capital expenditure associated with procurement of completely new equipment as compared to equipment that is already in place can never be recovered. Complete replacement of the existing turbine sets with binary equipment, which is less efficient than flash steam systems, would cost approximately $560 million and would not increase power generation. The alternative is economically infeasible.

Binary systems have additional impacts that are not present for the selected alternative. For example, the footprint of plants using binary systems is significantly larger. The relative land area required for binary systems is approximately 60 ac, which is three times larger than that of the existing standard flash plants. The acreage includes the equipment required to transfer heat from the geothermal fluid to the motive fluid, the turbine generator sets required to generate a similar amount of electricity as compared to the current flash plants, and the surface area required to install the cooling units for the spent motive fluid. Developing this additional land would entail additional environmental impacts, which could be significant.

Binary units create scaling concerns in piping systems. The use of binary units with the brines at the Coso geothermal field would lead to scaling and plugging issues. These scale deposits would not be hazardous, but would require significant plant down time. The Coso power plants are shut down approximately once per year presently and operate on-line in the 98.5 to 99.5% range. Using a binary system would require the power plants to be taken offline for a couple of days every month or two, or approximately 7% of the time. Taking the power plants offline for these periods would decrease overall electricity generation capacity by around 10%. A decrease in electricity generation capacity is not consistent with the project objectives.

A-112 The comment referring to the Geothermal PEIS is noted.

A-113 Subsidence is a downward movement of the ground surface. Subsidence can be caused by groundwater withdrawal in basins containing sediment composed of compressible clays. The area around the Hay Ranch property generally contains coarse sediments with few clay lenses. These sediments are well consolidated. (EA Appendix H, at pp. C2-2 to C2-3).

The difference in impacts of subsidence among the varying technologies (air cooled condensers and dry cooling units) does not pertain to environmental impacts of the proposed project, and are outside the scope of this EA. Subsidence impacts of the current project are not significant; less fluid loss would not increase subsidence. The potential lifetime of the project as a result of using air cooled condensers does not pertain to environmental impacts of the proposed project, and is outside the scope of this EA.

A-114 Refer to response to comment A-113 for discussion regarding potential subsidence associated with the proposed project.

A-115 Refer to response to comment A-113 for discussion regarding potential subsidence associated with the proposed project. Refer to response to comment A-31 for discussion regarding reinjection of Geofluids.

A-116 Induced seismicity is not considered to be a potential significant impact. Induced seismicity appears to be below the magnitude of earthquake required for significant structural damage in geothermal fields and potential geothermal fields in the United States. The seismicity is even below that level at which humans can readily detect events. This is for a few reasons:

1. There are no faults close enough to the injection area to perpetuate a large, high-damage event.

2. Large seismic events are initiated at depths of 3 to 6 mi bgs, while geothermal injection occurs at depths shallower than 3 mi bgs. This makes inducing a large seismic event very difficult.

3. Many geothermal fields are in remote locations far from developed urban or suburban areas, and most induced seismic events cannot be detected without scientific instruments. People cannot detect most induced seismic events associated with geothermal injection.

The Coso geothermal field is located in an extremely tectonically and seismically active area. Seismic activity at Coso is monitored and reported as part of the Coso Hot Springs monitoring program (Geologica 2004; 2005; 2006). The results of the monitoring suggest seismic activity is related to regional tectonics as well as local geothermal development.

Coso has been injecting cool (relative to the reservoir temperature) fluids for several years without any evidence of significant seismic activity. The remoteness of the project location (the closest residences are over 10 mi from the injection area) and the probable low-magnitude of the seismicity would result in less than significant impacts. There has also been no correlation between seismic activity and changes in

Coso Hot Springs for the parameters monitored. The introduction of cool water into hot rock produces fractures or microfractures, which in turn produce permeability; however, this process is currently occurring at Coso and does not cause significant seismicity.

A-117 Refer to response to comment A-32 for discussion regarding EGS.

A-118 The comments referring to the Geothermal EIS and the MIT Report are noted. Refer to response to comment A-116 concerning induced seismicity.

A-119 As is noted in the Draft EIR, on page 3.3-12, the last known eruption in the Coso volcanic field was about 40,000 years before present. The area is volcanically active, but the potential for an eruption occurring within the lifespan of the proposed project is low. The injection of water into the geothermal reservoir would not have impacts on volcanism, which is driven by magmatic activity at greater depths than the injection zone.

A-120 The comment regarding speculative nature of project-level global warming analysis is noted.

A-121 The Geothermal Steam Act of 1970, as amended, governs the leasing of geothermal resources on public lands. *Geothermal resources* include products of geothermal processes; steam and other gases; hot water and hot brines resulting from water, gas, or other fluids artificially introduced into geothermal formations; heat or other associated energy found in geothermal formations; and, any byproduct derived from them (U.S. Code Title 30 Chapter 23 §1001(c)). This Act authorizes the Secretary of the Interior to issue leases for development of geothermal resources and also prohibits leasing on a variety of public lands, such as those administered by the U.S. Fish and Wildlife Service (USFWS). The geothermal reservoir is not being used in a way that is inconsistent with these regulations. The environmental and other effects of the development and management of the geothermal resource were fully analyzed as part of the original permitting process.

Geothermal fluid extraction related to the development of geothermal power typically reduces reservoir pressure and/or sometimes temperature, depending on the nature of the reservoir and the type of development. The geothermal resource at Coso is a liquid limited rather than a heat limited resource (Monastero 2002). Pressures (rather than temperatures) decline as geothermal fluids are produced. Production at the Coso geothermal field has led to pressure drops and an expansion of a vapor phase (ITSI 2007).

Declines in reservoir pressure are a standard part of geothermal development and mitigation of these impacts are included in development plans. Geothermal resource managers maintain steam supply to the power plant for power generation, and mitigate pressure decline in one or more of the following ways:

1 Obtain additional geothermal fluid production by drilling of additional wells within and adjacent to the original well field,

2 `Reduce turbine inlet pressures or other plant efficiencies; and/or,

3 Implement injection strategies.

Increasing steam supply by drilling new wells requires that the resource is of sufficient size to allow for the additional drilling. Coso began operations with extensive acreage and has over 50 acres of leased land per MW dedicated to the existing Coso power plants. Coso has drilled numerous make up wells during the last twenty years of development. Coso has maximized available injection by using 30 to 40 injection wells and moving injection to different wells in order to maximize pressure support and steam from injected water (Monastero 2002) and to minimize breakthrough, or the cooling effect of injecting cold water on production temperatures.

The selection of a dual flash system with cooling towers is the optimal and most efficient use of a high temperature geothermal resource such as at the Coso geothermal field. Coso is optimizing the utilization of the resource by utilizing a high efficiency process to convert geothermal heat to power. Each geothermal power generation system is designed to match a specific geothermal resource and development plan. Coso has made numerous adjustments in order to optimize the power generation from the Coso geothermal field. These include:

1 Modifications to gas extraction systems

2 Piping modifications

3 Turbine modifications

The power plants were analyzed under CEQA and NEPA to identify environmental effects and to mitigate those effects. The potential loss of pressure was identified as a potential impact in previous environmental review, and the proposed project would not result in pressure-related impacts that exceed that prior analysis.

Refer to Section 4.1 of the EA for discussion regarding global warming.

A-122 The EA (Section 4.1) present a qualitative analysis of construction and operational impacts of greenhouse gas emissions from the proposed project. The proposed project would not result in power generation and associated carbon dioxide emissions greater than the baseline permitted levels that have been addressed in prior environmental reviews and documentation.

Of the greenhouse gasses (GHGs), carbon dioxide is by far the most prevalent GHG in the atmosphere. While it can be naturally occurring, it also enters the atmosphere via human-made sources. Indeed, in recent years, more than 96% of gross carbon dioxide emissions have come from fossil fuel combustion alone, demonstrating that presently the vast majority of emissions comes from human-made sources. Even under these increased outdoor concentrations, carbon dioxide levels are generally not known to be associated with negative health effects, though much higher concentrations in enclosed spaces can be debilitating or even deadly. However, the main impacts from increased carbon dioxide in the atmosphere are related to its global warming potential. Ice-core analysis has shown that atmospheric carbon dioxide concentrations increased more than 31% over the last 200 years and are continuing to grow, likely tripling from the current level by the year 2100. (U.S. EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005, *available at*: http://www.epa.gov/climatechange/; IPCC Climate Change, *supra*, at p. 187; National Institute for Occupational Safety and Health ("NIOSH"), Pocket Guide to Chemical Hazards website.)

Carbon dioxide is a byproduct of fossil fuel combustion, and the largest emitters of this GHG in California are the transportation sector, <u>followed by electricity generation</u>. (EIR at p. 4-10.) The Coso Geothermal field helps meet the State's energy needs in a clean, green way because geothermal energy facilities emit significantly lower amounts of carbon dioxide than coal, petroleum, or natural gas power plants, resulting in near-zero air emissions. (*See* Bloomfield et al., *Geothermal Energy Reduces Greenhouse Gases*, Climate Change Research (2003) at p. 78, Figure 1; Kagel et al., *Clearing the Air: Air Emissions from Geothermal Electric Power Facilities Compared to Fossil-Fuel Power Plants in the United States*, GRC Bulletin (May/June 2005) at p. 113.) For this reason, increased geothermal utilization will help the State and the country reduce its GHG emissions while helping to meet increasing power demands. (Bloomfield et al., *supra*, at p. 79; Bloomfield & Moore, *Production of Greenhouse Gases from Geothermal Power Plants* (1999) at p. 4.)

Because the Hay Ranch Project is designed to increase the productivity of a renewable energy source, it's implementation will off-set the need for a corresponding amount of fossil fuel production of electricity and consequently have an indirect, and net-positive impact on reducing carbon dioxide and other GHG emissions. Moreover, the construction and operation of the Hay Ranch Project will not result in the emission of significant levels of any air pollutants. (EA Section 4.1.)

A-123 A discussion of cumulative impacts is present for each impact area included in Section 4. As proposed, the project would not result in any significant and avoidable impacts.

Deep Rose has submitted an application to the County to conduct geothermal exploration activities on a limited amount of acreage. Deep Rose proposes to use a maximum of 55 ac-ft of water to conduct that exploration. Deep Rose has not proposed to develop the site as a geothermal plant, and would not do so until it has explored the area and determined there is potential for geothermal power generation. Deep Rose would have to undertake an extensive additional permitting process and the associated CEQA analysis based on the much more extensive impacts of a geothermal project, as opposed to an exploration project if Deep Rose determines there is potential for geothermal power generation. The geothermal project is entirely speculative at this time and is not subject to this cumulative impacts analysis.

Deep Rose and others have applied to BLM for leases of public land in the area of Rose Valley to pursue exploration for possible development of geothermal resources. Whether the results of the exploration will ultimately support geothermal resource development and, if so, at what location and scale, is too speculative to be taken into account meaningfully in the cumulative impact analysis for the proposed Hay Ranch project.

A-124 Refer to response to comment A-123.

A-125 As is acknowledged in the EA at page 52, the South Haiwee Reservoir Leakage Recovery project, if implemented, would likely have aggregate impacts to Rose Valley groundwater resources. Analysis using the numerical model indicated that the Reservoir Leakage Recovery project would cause additional drawdown in Rose Valley, additively increasing to that predicted for the Hay Ranch project, with the greatest largest increase in drawdown is estimated by the model to be of up to 10 feet in wells in the Dunmovin community at the north end of the valley and up to 0.5 feet at the south end of the valley near Little Lake, which would be a significant impact. However, to commence SHRSR groundwater pumping in Rose Valley, the City of Los Angeles is required to submit a detailed proposal to Inyo County as an application to pump groundwater. Prior to taking any action with the potential to affect the environment, Los Angeles, in cooperation with Inyo County, would be required to complete a CEQA analysis of the project and would not be allowed to take any action that would cause a significant detrimental effect to the environment. Although it has indicated some inclination to establish such a project, the City has taken no affirmative steps to do so and the likelihood of such a project is speculative. As such, it need not be mitigated as a cumulative impact by Coso. Since LADWP would be required to mitigate its pumping impacts, there is little likelihood that those impacts could be cumulatively considerable when added to the impacts from the Coso project. Any loss of groundwater flowing to the Hay Ranch as a result of improving the retention capability of the Haiwee Reservoirs, will be accommodated by the fact that Coso must comply with the established trigger levels.

A-126 Refer to response to comment A-113 for discussion regarding subsidence. Refer to response to comments A-123 and A-125 for discussion regarding Deep Rose and LADWP projects.

A-127 Refer to response to comment A-123 for discussion regarding Deep Rose project.

A-128 Refer to response to comment A-55 for discussion regarding air quality impacts of the proposed project. Comment regarding positive impact of Little Lake habitat restoration project is noted. Refer to response to comment A-123 for discussion regarding Deep Rose project.

A-129 The potential increase in power production at the power plants was not addressed because the project as proposed would not increase power production at the plants beyond the baseline permitted levels. The relevant baseline in this discussion is the amount of energy that is produced by the plants. The plants were evaluated under NEPA and CEQA, and have already been permitted.

Refer to response to comment A-123 for discussion regarding Deep Rose project.

A-130 Refer to response to comment A-123 for discussion regarding Deep Rose project. Refer to response to comment A-125 for discussion regarding LADWP Project.

A-131 Alternatives to the proposed project are discussed in Section 2 of the EA, which incorporates analysis from the Draft EIR.

A-132 Comment regarding draft memo received by the ICPD on December 20, 2007 is noted.

The range and detail of the discussion of alternatives set forth in the EA is reasonable in light of the minimal environmental effects that BLM has concluded will result from the project taking into account the mitigation measures required to be implemented. Coso has submitted additional information in its comments on the EA, contained in the letter from Coso Operating Company, LLC to BLM dated January 22, 2009, that reinforces BLM's conclusion in this respect. That information follows.

Piping

As noted previously, Coso is dedicated to perform ongoing evaluations to determine whether piping modifications could benefit the performance of the geothermal facility. Because all technologically feasible piping modifications have already been implemented, there are no additional modifications that have been identified to serve as an alternative to the Hay Ranch Project at this time. Accordingly, increased piping efficiency would not eliminate the need for the Hay Ranch Project.

Steam Turbines

Coso has already completed redesign and replacement on four of the units' steam turbine blading and sealing configurations at the facility. Steam path upgrades of this type allow for improved use of the steam that exists at the facility. It should be noted that work of this type has a cost of approximately $2,000,000 per unit. Coso indicates that it continues to evaluate the design of the units, and will make additional modifications when they become economically feasible. Because these elements are already being incorporated, they cannot serve as viable alternatives to the Hay Ranch Project.

As an alternative to the Hay Ranch Project, Coso also considered complete replacement of its steam turbines with newer equipment. However, advances in technology typically can only yield a 1 to 3% improvement in the design efficiency of the turbine at best. This minimal improvement in performance cannot support the capital expenditure of $10 to $15 million per turbine or $90 to $130 million for complete replacement, with almost no increase in capacity. In addition, such large scale turbine generator replacements are infeasible due to the down time associated with the retrofit of new equipment. Furthermore, this alternative would require the disturbance of new areas, approximately equal in size to the existing power plants, to place the new equipment. Once the new equipment was installed, it would have to be tied back into the existing auxiliary systems. This would require the permanent disturbance of an additional 30 acres and would cause concomitant air quality, noise, traffic, biological (including impacts to the habitats of listed wildlife species), and other environmental impacts. In addition to the land disturbance, significant construction equipment and extensive construction traffic would be required for a period of approximately 6 months per unit, and substantial grading and fill issues would be encountered during hillside construction activities, with resulting environmental impacts. Furthermore, because each of the nine units would, on a rotating basis, have to be completely shut down for approximately 6 months for construction and installation, the plant would not be fully operational for four and a half years. This loss of power would not only result in an additional economic burden to Coso, but because California's energy demands are increasing, the power would have to be generated elsewhere, most likely in a fossil-fuel burning power plant, which would entail the production of significantly greater environmental impacts (including air quality emissions, greenhouse gas emissions), with no net benefit.

Thus, as with the piping improvements alternative, even if all of the turbines were replaced, recharge would still be required in order to reverse the annual decline in reservoir productivity. Accordingly, the recharge Project is necessary to allow the plant to continue optimum energy generation.

For all of the above reasons, this alternative is infeasible at this time.

Binary Systems

In conjunction with the evaluation of replacement steam turbines, Coso considered the use of binary systems. In addition, Coso is continuing to evaluate binary and other heat recovery systems as a means for generation improvement.

As it relates to replacement of the steam turbines, the initial capital expenditure associated with procurement of completely new equipment as compared to equipment that is already in place can never be recovered. Complete replacement of the existing turbine sets with binary equipment, which is by its nature less efficient, would cost approximately $560,000,000.00, with no increase in generation.

As it relates to enhancement of generation, at this time there is insufficient brine in any one area to justify the capital costs for the equipment installation as compared to the potential generation improvement. The capital costs of additional auxiliary systems and equipment, coupled with the parasitic energy demands to run those auxiliaries, which can be as much as 30%, preclude the option of installing equipment of this type in an area where the brine available could be consolidated and effectively utilized. In addition, binary systems have additional impacts that are not present for the selected alternative. For example, the footprint of plants using binary systems is significantly bigger. The relative land area required for binary systems is approximately 60-acres, which is 3 times larger than that of the existing standard flash plant, when one considers the relative equipment required to transfer heat from the geothermal fluid to the motive fluid, the number of turbine generator sets required to generate a similar amount of electricity as compared to the current flash plants, and the surface area required to install the cooling units for the spent motive fluid. Developing this additional land would entail additional environmental impacts, including air quality, noise, and traffic impacts during construction and possible biological impacts due to the sensitive nature of some of the surrounding habitat.

Further, binary units create scaling concerns in the piping systems, a concern which is not presently at issue with present operations at the Coso Geothermal Projects. The use of binary units with the brines at the Coso Geothermal Projects will lead to scaling and plugging issues. At Coso, these scale deposits would not be hazardous, but would require significant plant down time, and additional maintenance staffing in order to keep the systems fully functional. To put this in perspective, currently the Coso plants are shut down approximately once per year, and operate in the 98.5 to 99.5 percent range. Using a binary system instead would require the machines to be taken offline a couple of days every month or two, or approximately 7 percent of the time, decreasing overall electric generation capacity by around 10 percent. As discussed elsewhere, this loss in renewable energy would likely be replaced by energy generated by traditional fossil-fuel burning plants, along with their attendant environmental impacts. Additionally, the scale deposit material would require disposal. Because of all of these significant drawbacks, this option was accordingly also eliminated as infeasible.

Gas Removal Systems

As another alternative for modifications to the power plant that could be made to provide additional output, Coso studies gas removal systems. Byproducts of the geothermal steam gathering process include non-condensable gases. These gases travel in the steam phase, and through the steam turbine. During the condensation process, these non-condensable gases are separated from the condensed steam. These gases occupy void space within the condenser and interfere with its operation. At that point, the gases can create a back pressure on the turbine, decreasing its efficiency and performance.

Coso has already implemented several equipment additions and modifications to ensure that gases are effectively removed from the process. These include installation of gas abatement units, addition of vacuum pumps and compressors, replacement of steam jet air ejectors, and expansion of the cooling capabilities of our condensers by addition of gas pre-coolers.

The installation of gas abatement units eliminated the need to reinject gases that are intrinsic to the geothermal steam. Gas concentrations in the steam had begun to increase as a result of gas reinjection, which was part of Coso's original design. Increases in gas concentration have a detrimental effect on condenser and turbine performance as described above. Coso has invested over $20 million dollars in the installation and operation of these gas abatement units, which represent the best available technology for control of hydrogen sulfide gas emissions.

The addition of vacuum pumps and compressors was undertaken in order to improve the efficiency of the gas removal systems. Vacuum pumps take the place of relatively inefficient steam driven jet ejectors, and allow the motive steam for that equipment to be routed through the steam turbines. The compressors boost the gas pressure from the vacuum pump discharge to move the gas flow through the abatement system. Coso has invested approximately $12 million dollars in the addition of this equipment.

Redesign and replacement of the primary steam ejectors has been implemented on five of the nine Coso units. This equipment replacement was undertaken to improve the performance of this equipment by better matching its design to the current operating conditions.

Gas pre-coolers have also been added to three of the Coso power plant units. They were added to remove excess water vapor that was being carried out of the main condenser in the gas stream and that was negatively affecting the performance of downstream equipment. This decline in performance led to increased system back pressure, which affected turbine performance. Installation of this equipment was achieved at a cost of $1,000,000 per unit. As with the other possibilities under this alternative, Coso reviews performance of the gas removal systems on a daily basis, and will make additional modifications when they are determined to be economically feasible. Similar to the piping alternative, this option cannot really serve as an alternative to the Project because all feasible modifications in this regard have already been incorporated, and future modifications will be undertaken as soon as they become feasible as well.

Coso has also conducted a detailed study to determine the benefit of replacement of the existing main condensers. No benefit could be realized on three of the units. On the remaining units, the replacement cost of $2.5 million per unit could not be economically justified.

For the above reasons, all of the alternatives regarding possibilities for modifications to the power plant that could be made to provide additional output above were either already being performed or were infeasible due to vast differentials between the cost of the improvement and resultant performance benefit.

Cooling Tower Redesign/Replacement

Evaporative cooling is the most efficient mode of cooling in dry climates like the area surrounding the Hay Ranch Project site because the ultimate heat sink is the wet bulb rather than the dry bulb temperature. The power plant's initial design included cooling towers at the nine units. Coso has investigated replacement of the cooling towers with dry cooling systems in order to reduce fluid losses due to evaporation. In addition, Coso has also considered augmenting the wet cooling systems with dry cooling. The overall objective was to save condensed steam currently evaporated in the cooling towers, and achieve 3,000 gallon-per-minute ("gpm") additional injection as a result. In both cases, the capital cost of the added equipment negated further investigation.

- **100% dry cooling**.

On an individual unit basis - 560 kph of steam flow, with 13% moisture, at 1.75 psia (3.5 inches of Hg) would require a GEA 18 cell unit for air cooled only. The capital cost quoted by the supplier would be $27.3 million, with a parasitic load of 2,670 kW. This number was confirmed as a very similar cost was calculated by scaling up from a smaller 1999 installation. The footprint for each unit would be 35,000 sq ft or 104 x 385 ft.

Four of these units would be required to achieve 3000 gpm of the current water augmentation project. (Total cost $110 million). This design attempts to maintain current generation, though the typical dry cooling unit has a very large negative impact to summer peak generation in dry climates. In addition, the loss in net generation due to the additional parasitic load required to operate these fans could not be recovered. Accordingly, and as relates to what is industry practice, dry cooling is typically not used with flash-type generation facilities like Coso's because of this reduced efficiency. Due to the high capital cost, detailed reductions during summer peak were not modeled.

- **Augmented dry cooling**.

An alternate design was also reviewed, estimated to save 60% of current evaporation on a unit basis. This approach would use air-cooling to augment the wet cooling during the winter months, and the cooler periods in the spring and fall. Based on current losses of 389 kph (778 gpm) due to evaporation, this design would reduce that to 156 kph (311 gpm) most of the year. This results in a savings of 468 gpm of water per unit. This approach would involve similar equipment to the above dry cooling scenario, but would not have to be designed to address the highest temperature conditions in the summer. Summer cooling would use the current evaporative cooling tower. A cost estimate of $14.06 million per unit yields a total cost of 80 million (6.4 fractional units were used in the calculation assuming size could be adjusted without appreciably affecting incremental cost.) Each of the 6+ units would have a footprint of 110 ft x 250 ft (0.6 acres excluding any maintenance clearance). This design would maintain generation in summer as the current wet cooling towers would continue to be used.

Installation of the seven augmented dry cooling units that would be required under this scenario would require the disturbance of 4.2 acres of additional land, and by their nature would be required to be located in a sensitive biological habitat area near the existing plants. Additional construction would also be required, with the concomitant air, noise, traffic, and other environmental impacts. Moreover, the additional parasitic load that this option would create would result in the transfer of approximately 18 MW less renewable power to the general public. This would lead to additional GHGs and the other environmental impacts that would occur due to the fact that this energy would have to be produced elsewhere, presumably in a fossil-fuel powered plant. In addition, this option would still require additional water, and thus the Project, or something very similar, would still be required. This option was rejected as infeasible because it would result in less energy being produced while causing more environmental impacts and would not eliminate the need for the Hay Ranch Project.

Injection Systems

Coso's primary focus is on fluid injection. Coso continues to do extensive research and testing to ensure that all available injectate is captured and returned to the reservoir in the most optimal areas. Coso conducts tracer studies, which provide information as to the amount of time, relative locations, and rate at which fluids return to production areas. Further, Coso routinely conducts injecting surveys, which indicates the depth at which the injectate re-enters the resource. Injection guidelines for each of the injection sites are set based upon this information. Injection rates are carefully monitored and controlled in accordance with this optimization strategy. Augmentation fluids will be injected into the resource in conjunction with this philosophy. Evaluation of the effectiveness of the injection program will remain under constant scrutiny. Adjustments will be made as additional information is gathered. Because all feasible changes to the injection systems are already being incorporated into the geothermal facility, there are no additional options to be studied as an alternative to the Project.

Alternative Sources of Injection Water

All of the alternative sources of water considered for the Hay Ranch Project had significant drawbacks and additional environmental impacts not present, or present to a much lesser extent, in the selected alternative.

One of the primary problems with almost all of the other identified potential sources was their distance from the Project site, including one that was as far away as Barstow. While use of water from Hay Ranch will require only nine miles of piping, the other sources are at much greater distances and thus would require significantly longer piping. Using water at these other sources would require much more land and would cause considerably more construction-related environmental impacts, including air emissions, impacts to biological resources, traffic, and other issues. In addition, longer pipelines require more pumping, which requires more electricity. A longer pipeline would thus significantly diminish, or entirely eliminate, the very purpose of the Hay Ranch Project, and the greater distances would also significantly increase the costs of the Project.

As an example of one of the suggested alternative sources, one of the scoping comments submitted in the EIR process advocated using Ridgecrest wastewater. However, Ridgecrest is approximately 25 linear miles away, much farther than the selected source, and thus all of the drawbacks discussed in the previous paragraph apply. In addition, practically speaking, any pipeline would likely have to be much longer than the shortest route, and would have to be cut through a mountainous area, causing considerable difficulty and resultant significant environmental impacts, including the need for substantially more blasting and potentially tunneling. Furthermore, Coso's prior inquiries have evidenced that there is no water available for the Coso Geothermal Projects at this time. Because the alternative sources would cause greater environmental impacts, significantly increase the cost, reduce the Hay Ranch Project benefits, and supply insufficient water, thus failing the primary objective of the Hay Ranch Project, they were properly rejected as infeasible. For these reasons, the Hay Ranch source is thus clearly the preferred alternative.

A-133 The consideration of tax benefits and royalty reductions that Coso could obtain under the Energy Policy Act of 2005 is outside the scope of the EA.

A-134 Refer to comment A-18 for discussion regarding the baseline conditions for the EA.

A-135 The discussion in the comment of the economics of the Coso geothermal operations is noted. Refer to response to comment A-133 for discussion regarding tax benefits and royalty reductions.

A-136 Comment regarding GAO Report 2004 is noted. Refer to comment A-18 for discussion of the baseline conditions for the EA. The EA analyzed the potential environmental impacts associated with the proposed project; with the identified mitigation, all potential impacts would be reduced to less than significant levels.

A-137 Refer to responses to comments A-131 and A-132 for discussion regarding alternatives to the proposed project.

A-138 The requested information is outside the scope of the EA and would not further inform the analysis of the potential environmental effects from approval of the Proposed Action.

A-139 Refer to responses to comments A-31 and A-132 for discussion regarding reinjection levels.

A-140 The purpose and need of the project is discussed in Section 1.1 of the EA, wherein it is stated that: "The loss of the geothermal fluid has resulted in the decline in the reservoir, creating a reduction of megawatt production from the geothermal power plants. The water transported by the proposed pipeline will replace the evaporated geothermal fluid, resulting in minimization of the decline of the reservoir." The objectives stated in sections 5.1. and 5.2 of the Draft EIR (discussion of Alternatives) are not inconsistent with the discussion in the EA. The baseline permitted levels of power production from the geothermal power plants are greater than current production. An improvement in electrical power production from the plants towards the baseline permitted levels is not inconsistent with the objective of minimizing the decline of the reservoir.

A-141 Refer to responses to comments A-131 and A-132 for discussion of project alternatives. The BLM independently considered the analysis of these alternatives presented in the Draft EIR and concluded that none of the alternatives was preferable to the Proposed Action when the comparative potential environmental effects of the proposal and its alternatives were taken into consideration.

A-142 The lifetimes of the power plants are analyzed in the previous environmental documentation, as listed in Table 1.4-1 on pages 10 and 11 of the EA. The lifetime was originally calculated based on the amortization of the power plant equipment (30 years). Federal permits for the power plants were issued based on this timeframe. Many permits are associated with the power plants and can be obtained from the resource agencies that issued the permits. The list of permitting agencies includes:

_ US Department of the Navy - China Lake Naval Air Weapons Station, California
_ US Bureau of Land Management - Ridgecrest, California
_ Great Basin Unified Air Pollution Control District, Bishop, California
_ California Division of Occupational Safety and Health - Fresno, California
_ California State Water Resources Control Board - Sacramento, California
_ Inyo County Health Department - Bishop California
_ Department of Toxic Substance Control - Sacramento, California
_ Lahontan Regional Water Quality Control Board - Victorville, California
_ California Energy Commission - Sacramento, California

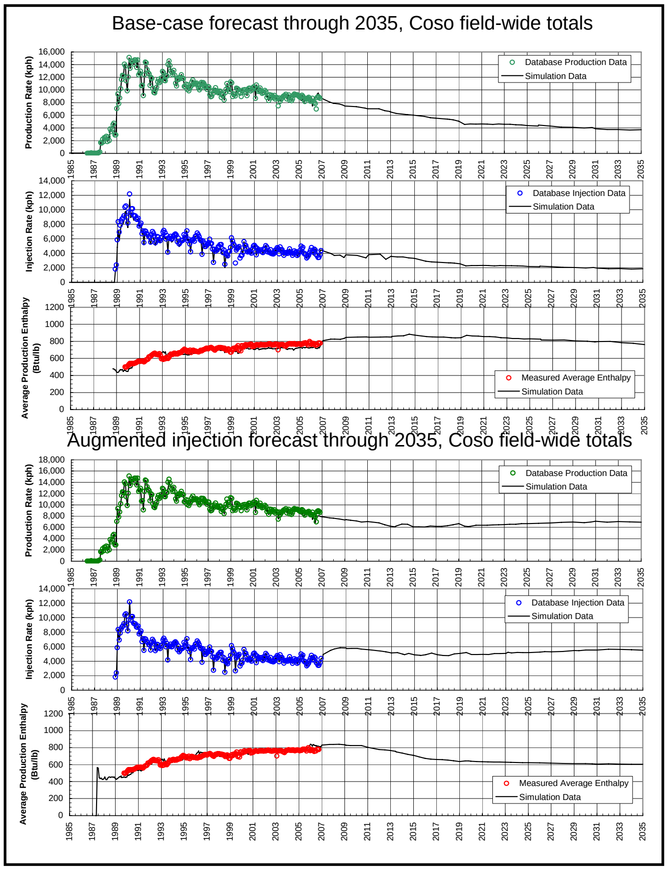
Permits can be renewed at the expiration date. The permit timeframe does not reflect the amount of time that the reservoir could be utilized before the geothermal resource is exhausted. The injection proposed in the Draft EIR would not increase production of geothermal fluids above existing levels. Injection would only stop the decline in production, but would not increase production. The existing power plants are currently permitted. Power plants have been operating for more than 30 years at other geothermal fields. The lifetime of the geothermal resource is indefinite.

As the County explained in response to essentially the same comment on the Draft EIR, Global Power Solutions is the firm for which Gary McKay works. Gary McKay is one of the Draft EIR preparers. The County removed the reference to Global Power Solution in the Final EIR.

A-143 As the County explained in its response to the same comment, the referenced analysis was performed as part of the preparation of the Draft EIR and was based in part on information provided by Coso and on industry standard steam rates.

Information provided to BLM by Applicant in connection with the EA is available for public review through a Freedom of Information Act request, to the extent that the information is not protected as proprietary. The EA discusses the potential environmental impacts of the proposed project without regard to the applicant's financial situation. Additional analysis of Coso's financials is not pertinent to the EA.

A-144 The requested graphs are included below. The geothermal reservoir model is proprietary.



A-145 Refer to response to comment A-144 for discussion regarding graphs. The graphs identify the baseline production rates and also show the augmented (with project) production rates. Refer to response to comment A-143 for discussion regarding economic analysis of project.

A-146 Refer to response to comment A-144. The total production is projected to be less than 3700 kph (at 760 btu/lb or 52% steam) after almost 30 years without augmented injection. The total production is projected to be 6900 kph (at 600 but/lb or 34% steam) with augmentation, which translates to about 25MW or 22% more power generation at 30 years.

A-147 Coso Operating Company, LLC has stated that the current power generation of the Coso Geothermal Projects is approximately 200 megawatts. Refer to comment A-142 for discussion regarding information supplied by Coso.

The comment questioning the past actions of Coso is noted. Refer to comment A-18 for discussion regarding past actions of Coso.

A-148 Table 2-7 of the Geothermal PEIS addresses potential new generation in the "Coso area"; it does not refer to the output of the existing geothermal plants.

A-149 Refer to comment A-146 for discussion regarding production.

A-150 Alternatives to the proposed project were discussed in Section 2 of the EA. An air-cooled system was considered previously in the DEIR. As discussed in the FEIR, the use of "dry cooling" to avoid the evaporative losses of the current wet cooling system used by Coso was analyzed as an alternative on page 5-4 of the Draft EIR. This alternative was rejected because it is economically infeasible, would have significant environmental impacts, and would not meet the project objective.

Evaporative cooling is the most efficient mode of cooling in the dry climate of the project area. The power plants' initial design included cooling towers at the nine units. Coso has investigated replacement of the cooling towers with dry cooling systems in order to reduce fluid losses due to evaporation. Coso has also considered augmenting the wet cooling systems with dry cooling systems. The overall objective was to save condensed steam currently evaporated in the cooling towers and achieve 3,000 gpm additional injection to match that of the proposed project.

To transition to dry cooling would require machinery costing $27.3 million, and would have a parasitic load of 2.67 MWe. The parasitic load for wet cooling is approximately 50% of the parasitic load for dry cooling. The additional cooling towers would require about 0.9 ac of surface disturbance. Four of these units would be required to achieve the 3,000 gpm of the proposed project. The total cost of replacing all the wet cooling with dry cooling depends on the efficiency required of the dry cooling system, but could cost as much as $110 million if the design attempts to maintain current generation, though the typical dry cooling unit has a very large reduction in summer peak generation in dry climates. The loss in net generation due to the additional parasitic load required to operate these fans could not be recovered. Dry cooling is typically not used with flash-type generation facilities because of this reduced efficiency. This alternative was rejected because the reduced efficiency would not meet the proposed project objective of the Draft EIR, and it would be economically infeasible.

An alternate design was analyzed that would save 60% of current evaporation on a unit basis. This approach would use air cooling to augment wet cooling during the winter months and during cooler periods in the spring and fall. Based on current losses of 1,255 ac-ft/yr (778 gpm) due to evaporation, this design would reduce evaporative losses to 502 ac-ft/yr (311 gpm) for most of the year. This would result in a savings of 755 ac-ft/yr (468 gpm) of water per unit. This approach would involve similar equipment to the dry cooling scenario, but would not have to be designed to address the highest temperature conditions in the summer. The current evaporative cooling tower would be used for cooling during the summer. A cost estimate of about $14 million per unit yields a total cost of $80 million (6.4 fractional units were used in the calculation assuming size could be adjusted without appreciably affecting incremental cost). Each of the units would have a footprint of about 0.6 ac.

Installation of the seven augmented dry cooling units that would be required under the augmented dry cooling scenario would require the disturbance of 4.2 ac of additional land. These units would need to be sited in MGS and desert tortoise habitat near the existing plants because of the power plant orientation. Additional construction would also be required, with the associated air, noise, traffic, and other environmental impacts. The additional parasitic load of the alternative would reduce power generation by approximately 18 MWe. This option was rejected as infeasible because less energy would be produced, and it would cause more environmental impacts than the proposed project.

Comment promoting conversion of Coso to an air-cooled system is noted.

A-151 Comment regarding geothermal reservoir utilization as discussed in the Geothermal PEIS is noted.

A-152 Comment regarding air-cooling as discussed in the MIT Report and Geothermal PEIS is noted. Refer to response to comment A-150 for discussion regarding air-cooling systems.

A-153 Refer to comment A-150 for discussion regarding air-cooling systems in the specific context of the Coso geothermal field.

A-154 Alternatives to the proposed project are discussed in Section 2 of the EA. See also discussion in response to comment A-132.

The EA identified and analyzed potential impacts of the proposed project. With the identified mitigation, all potential impacts would be reduced to less than significant levels.

A-155 The EA examines a reasonable range of alternative sources of injection water through its incorporation of the relevant discussion in the Draft EIR.

The injection of wastewater as an alternative to the proposed project was rejected because it is infeasible, does not reduce environmental impacts, and does not meet most objectives of the project. Alternative sources of injection water are analyzed beginning on page 5-5 of the Draft EIR under *Alternative Sources of Injection Water*. Coso has estimated that a water source would have to produce at least 500 gpm to be economically feasible as an injection water source. The rate is reasonable considering the fixed costs for a water extraction project are probably on the order of $7 million. A potential source of wastewater is in Ridgecrest, California which is approximately 25 mi southwest of the Hay Ranch parcel. The Hay Ranch water source would require about 9 mi of piping, the other identified sources are at much greater distances and thus would require a significantly longer pipeline with proportionate surface disturbance and environmental effects. The pipeline would likely need to be much longer than the 25-mi linear distance to compensate for terrain and other obstacles, and would have to be cut through a mountainous area. These factors would make the cost of the project much higher. Using wastewater would require much more land disturbance and would cause considerably more construction-related impacts. Cutting through mountainous areas could require blasting and tunneling. The environmental impacts would likely be greater than those of the proposed project. Longer pipelines require more pumping, which requires more electricity to operate. A longer pipeline would thus greatly diminish or eliminate the benefits of increased output. Coso has also learned that there is no water available for use at Coso geothermal field at this time. This alternative would not meet the stated objectives of the proposed project.

Recycling water currently used by the power plants would not meet the objective of the project. The objective of the project is to increase production. Additional injection water, in conjunction with the water that the commenter suggests should be recycled, is needed to increase production. This is because Coso already captures brine and evaporate from its processes and re-injects it into the ground. Despite this effort; however, the productivity of the geothermal resource has declined. Solely relying on the using the water that was utilized to produce electricity would not provide an additional source of water or eliminate the need for the proposed project.

Alternative sources of injection water are analyzed beginning on page 5-5 of the Draft EIR under *Alternative Sources of Injection Water*. Coso has estimated that a water source would have to produce at least 500 gpm to be economically feasible as an injection water source. The rate is reasonable considering the fixed costs for a water extraction project are probably on the order of $7 million; about $6 million is related to the pipeline and pumps for the Hay Ranch wells. The use of water from Coso Basin is discussed beginning in the last paragraph on page 5-5 of the Draft EIR. The review of potential production wells does not identify any other water sources that that have the potential to supply an adequate source of injection water as the Hay Ranch project at 3,000 gpm or the threshold rate of 500 gpm for economic feasibility, except possibly the Coso Ranch wells. Average well flow rates in the Coso Basin are low (<50 gpm as shown in Table 5.2-2 on page 5-6 of the Draft EIR); it is unlikely that new wells drilled in that area would produce water at economically feasible rates.

The use of water from the Owens Valley Basin would be economically infeasible and could cause significant environmental impacts. Most of the cost of the proposed project is related to the pipeline, as noted above. The southern end of the Owens Valley Basin is approximately 20 mi from the injection system location. The additional pipeline length required to pump water from the Owens Valley Basin would make this alternative infeasible because most of the cost of the project would be dependent on the pipeline length. The pipeline would also have to cross through rugged terrain, which could require more intrusive construction. The additional ground disturbance would cause more environmental impacts than the proposed project. The ability to secure a source of water is speculative and therefore has not been included. The Owens Valley has been subject to considerable groundwater withdrawal by the LADWP.

The use of water from the Indian Wells Basin would be economically infeasible and could cause significant environmental impacts. Most of the cost of the project is related to the pipeline, as noted above. The northern end of the Indian Wells Basin is approximately 12 mi from the injection system location. The additional pipeline length required to pump water from the Indian Wells Basin would make this alternative infeasible because most of the project cost would be dependent on the pipeline length. The pipeline would also have to cross through rugged terrain, which could require more intrusive construction. Additional work could include blasting to pass through elevated land, and there would be more ground disturbance due to the greater length of the pipeline. The change in pipeline elevation could also require pump stations to lift the water over the pass, which would require construction of additional facilities. The added disturbance would cause more environmental impacts than the proposed project. The discussion of alternatives to a proposed project should focus on alternatives that are capable of feasibly attaining most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project. The use of water from the Indian Wells Basin likely would not avoid any potential significant impacts, and could potentially cause significant impacts.

Purchasing water from the LADWP is an unrealistic option. The LADWP is authorized to export water from Inyo County for use in Los Angeles. Water supplies to Southern California are currently less than adequate, and there is little economic likelihood that the supply will increase. It is extremely unlikely that the LADWP would be allowed to divert water from use in its jurisdiction to a commercial sale for export. Furthermore, the use of water from the LADWP from either the Los Angeles aqueduct or the Haiwee Reservoirs would be economically infeasible. Costs would include purchase of water in addition to the construction of the infrastructure. A pipeline would have to be built through the LADWP and private property, and securing this right-of-way is speculative. The pipeline would also have to cross through rugged terrain, which could require more intrusive construction such as blasting. The additional ground disturbance could cause more environmental impacts than the proposed project. The increased demand could cause the utility to expand its infrastructure and could cause significant effects. The LADWP obtains its water from groundwater. It is therefore logical to assume that the water would be pumped from Owens Valley instead of Rose Valley.

The Los Angeles Aqueduct is approximately 8 linear mi from the injection system location and Haiwee Reservoir is 11 mi from the injection system. This alternative would require additional engineering, may need to cross US 395, and would involve legal issues related to the purchase of water from the LADWP. This alternative is economically infeasible, and may have additional significant environmental impacts when compared to the proposed project.

A-156 Analysis of alternative sources of water is presented in the Draft EIR Section 5.2.3, Table 5.2.2, and is addressed in Master Response L2. The first two wells in this table represent wells in the Coso Basin. These wells have insufficient flow rates to be considered as an alternative water source.

There is some evidence that there are is deep basin groundwater flow through the Coso Basin (Guler 2002; Williams 2004) to Indian Wells Valley; however, groundwater wells are scarce and are of low productivity (OB-1 and OB-2, see Draft EIR Table 5.2.2), suggesting that it is unlikely that there are sufficiently productive aquifers to meet the project objectives.

Williams (2004) and Gruler (2002) have used hydrochemical means for evaluating deep interbasin groundwater flow in the region and suggest that there could be over 3000 ac-ft of recharge to Indian Wells valley through the Coso Basin (Williams 2004)

Regardless of the potential flow at some depth within the basin, the water must be accessible through a water well with a reasonable flow rate. The available information shows that the Hay Ranch wells are most appropriate to provide a reasonable flow rate. The pumping test data for OB1 and OB-2 are proprietary information owned by Coso.

We are not aware of a hydrogeologic or numerical simulation of the Coso basin. The Coso Wash sub-basin was partially included in the ITSI hydrogeological analysis of the Coso geothermal system. Modeling of the Coso basin was outside the scope of the EA.

A-157 Refer to responses to comments A-155 and A-156 regarding the alternative sources of water considered.

A-158 Refer to response to comment A-155. The comment mischaracterizes circumstances at the Geysers geothermal field as being a "virtually identical situation" to the circumstances at the Coso geothermal. The comment overlooks the facts that the electrical energy production at the Geysers geothermal field is currently approximately four times the production at Coso. The comment also overlooks the facts that the respective wastewater supplies of the two referenced pipelines are 11 million gallon per day and 8 million gallons per day respectively. Thus the scale and economics of the injection water program are very different from the circumstances at Coso.

A-159 Deepening production wells is remote and speculative because it is unknown whether there would be a resource that would increase production. Coso has already drilled several deep wells near the limit of economic feasibility. A substantial new source of geothermal fluid was not identified.

A-160 It is not inaccurate or misleading to say that the life of the Coso power plants would be shortened without the proposed project. The original environmental review for the plants contemplated a potential future need for reservoir augmentation. The life of the power plant could be considered in terms of the energy source. The heat source of the Coso KGRA is not impacted by development and does not have a defined life. The life of the plant can also be determined in terms of the life of the equipment at the plant. The plants would shut down before the end of the life of the equipment without the proposed project.

Refer to response to comment A-132 for discussion regarding air-cooled condensers and binary facilities.

Contrary to the assertion in the comment, the discussion of the "No Project alternative in the EA does not suggest that the "Coso Hot Springs would return to a natural state sooner if geothermal operations ceased." That statement appears in the Draft EIR at page 5-7, and was not incorporated by reference into EA (*see* EA as Section 2.2.1 for the discussion in the EA of the "No Action Alternative." The County addressed this comment in the Final EIR at page 2-42:

"Some changes in the Coso Hot Springs appear to correlate with the onset of geothermal production. The water levels in South Pool decreased and the temperatures increased within six months of initiating production in mid-1987. These changes stabilized, however, and did not continue to increase as the total mass of fluid withdrawn has steadily increased. These observations exemplify the complex relationship and a modeling study designed to improve the understanding did not specifically prove that geothermal production of the Coso reservoir led to the changes observed in the South Pool (ITSI 2007).The contribution of steam to many features has increased (Geologica 2003; 2004; 2005; 2006; 2007; 2008). There appears to be a relationship between observed changes in the surface manifestations at Coso and changes in the Coso reservoir; however, the relationship is not a one-to-one correlation and is not fully understood (ITSI 2007). It is possible that changes in other aspects of the geologic setting or hydrothermal system may have caused or affected the Coso Hot Springs, given the changes in surface manifestations over the duration of the Coso geothermal system."

The EA discusses a reasonable range of alternatives in light of the assessment of the potential environmental impacts from approval of the Proposed Action. BLM is not required to identify and discuss all "other changes to Coso's Electrical Plant and method of operations" that might be found if the proposed water extraction project does not proceed.

A-161 Alternatives to the proposed project are discussed in Section 2 of the EA. Figure C4-2 is presented in Appendix H to the EA.

Two alternatives were brought forth for detailed comparison to the proposed project. The alternatives brought forth for comparison to the proposed project include Alternative 1, pumping Hay Ranch wells at the maximum rate sustainable for the 30-year project life without reaching trigger levels established in the analysis of the proposed project, and Alternative 2, pumping Hay Ranch Wells at lower rates.

The impacts of Alternatives 1 and 2 are compared directly to the impacts of the project as proposed. It is stated on page 5-7 of the Draft EIR that, "The environmental effects of Alternative 1 would be largely the same in nature as the proposed action, but would take longer to occur. The alternative would reduce but not eliminate hydrological and biological effects from groundwater pumping." Many impacts are related to the construction and placement of infrastructure. Those impacts would be the same for the alternatives as the proposed project.

The impacts of the alternatives would be less than the proposed project in terms of hydrologic and biological impacts. Alternative 1 effectively incorporates the mitigation determined for the proposed project using the same criteria for a significant impact at Little Lake. This alternative essentially minimizes pumping over a longer period of time, which may reduce some effects and the likelihood of impacts in terms of effects per year, but in the end result would still be the same as for the proposed project. It is valid under NEPA to generate an alternative based on mitigation determined in the EA. This alternative is compared with the project as proposed as well as the project with mitigation.

A-162 Alternative 2 includes reduced pumping rates. This impact would also have fewer hydrological impacts than the proposed project without mitigation; however, the effects could still be significant. The same mitigation would apply to this alternative as the proposed project. The difference again would be a slower accumulation of impacts; however, the end result in impacts would be the same as for the proposed project with mitigation. The comparison of alternatives compares the alternatives to the proposed project and the analysis on page 5-12 of the Draft EIR indicates that the "proposed project, without mitigation, would result in several potentially significant impacts." The alternatives, because they would also incorporate the mitigation of the proposed project, would have fewer impacts than the project as proposed but still may reach trigger points. In evaluating and choosing an alternative, it is important to understand the mitigation associated with each option. Alternative 2 without mitigation would have greater impacts than the proposed project with mitigation. The alternatives analysis presents a complete analysis of each alternative with mitigation. The total amount of impact would be the same; however, the amount of time over which effects accumulate would differ.

A-163 The analysis sufficiently identifies the impacts to surface waters, streams, and wetlands from the extraction of 4,839 ac-ft/yr for 30 years. The analysis begins on page 3.2-40 of the Draft EIR and continues through page 3.2-51. The project as proposed would have a potentially significant impact on groundwater and surface waters in the Rose Valley, particularly surface waters at Little Lake, without the implementation of the mitigation measures identified to avoid those potential impacts. Please refer to pages 3.2-39, 3.2-47, 3.2-48, 3.2-49, and Appendix C4: Rose Valley HMMP. With implementation of the mitigation measures in the EIR, no potentially significant impact would result from the project.

A-164 Comment regarding Mr. DiPippo's report conclusions is noted.

A-165 A reasonable range of alternatives were identified and discussed in the EA. Refer to response to comments A-132 (alternatives generally), A-150 (air-cooled systems), A-155 and A-156 and (alternative sources of water), and A-159 (deepening of production wells).

A-166 Economic constraints are one factor that may be considered when rejecting an alternative as infeasible. The minimum pumping economic rate does not matter as long as impacts of the proposed project can be reduced to less than significant levels.

Coso's rate of return on the project is not relevant to the environmental analysis and is therefore not considered nor does it need to be considered underNEPA. The amount that Coso earns in each kilowatt/megawatt of electricity and its debt service is not relevant to the environmental analysis of the EA.

The statement that 500 gpm is economic applies to a water source in the immediate proximity of the power plants, which would not require the expensive infrastructure and piping associated with the proposed project.

A-167 The thesis research was conducted under the supervision of graduate student advisor, and is subject to review of a graduate committee, typically composed of Professors, Associate Professors, and Assistant Professors with a PhD in a related field. Graduate-level research is typically viewed as high quality work, held to a high standard. The results of the research will be checked by re-measurement of appropriate hydrologic parameters such as water levels, during the monitoring period associated with this project.

A-168 Comment regarding “long-term pumping test” in the DEIR noted. The text changes were made (in the FEIR) as requested for the purpose of clarification.

It is inaccurate to state that only multi-year monitoring can provide meaningful hydrologic data. The 1-year period of study conducted by Bauer provided valuable data that showed seasonal variations and trends. These data would be supplemented by a multi-year data collection program, as part of the monitoring program that is defined in the Draft EIR.

A-169 Figure 3.2-1 on page 3.2-4 of the Draft EIR (EA Appendix H) is titled “Study Area Physiographic Features”. The Deep Rose property is not a physiographic feature. The Hay Ranch property is marked on the map because it would be the location of the proposed project. No changes to Figure 3.2-4 of the Draft EIR were made to include the Deep Rose property. The location of the Deep Rose project is included on Figure 4.2-1.

Figure 3.2-1 on page 3.2-4 of the Draft EIR contains the Little Lake Hotel Well and Little Lake Fault Spring locations. No changes to Figure 3.2-1 of the Draft EIR were made.

A-170 The springs are described in the Draft EIR relative to prominent geographic features for ease of locating them. Comparisons of water levels in the springs are referenced to the nearest water table elevations in the valley – this is an appropriate comparison, to demonstrate how the springs are connected (or their lack of connection) to the water table in the valley. Springs are shown on figures in Section 3.2: Hydrology and Water Quality (DEIR). These figures include scales such that the reader can measure distances (e.g., Figure 3.2-6).

Refer to response to comment A-13 for discussion regarding Davis Spring at Portuguese Bench.

A-171 Refer to response to comment A-168.

A-172 See the first full paragraph on page 3.2-18 of the Draft EIR (EA Appendix H) for a description of how the acreage of vegetation was estimated. Additionally the DEIR contains a discussion regarding wetland and riparian habitat on the fifth full paragraph on page 3.4-41.

A-173 The cinder mine operation's use of water from Little Lake is considered part of the baseline physical condition of the area, which is considered in the Hydrology Model. The total groundwater flow rate toward the Little Lake Ranch property would exceed 3,700 ac-ft/yr under all development alternatives, far greater than the 6.3 ac-ft/yr used for the Cinder Block facility. The yield from the well used to supply the Cinder Block facility is unlikely to be impacted unless the pump is set less than 0.3 ft below the static water table. Coso would be required to fund necessary mitigation to the well in the event that the well yield is impacted, such as setting the pump deeper as described on page C4-8 in the HMMP in the Draft EIR.

A-174 Refer to response to comment A-4 for discussion regarding Hydrology Model. The model does have several conservative assumptions in it that make it appropriate to use the term conservative.

A-175 The outflow of saline geothermal brines from Coso is subsurface flow. Coso injects waste brine, cooling tower blowdown and condensate into the reservoir. Injected Coso brine is similar to the reservoir brine except that it has lost some steam and gas during boiling. The approximate chemistry is as follows:

Injection water Coso Well 68-20 (Park et al., 2006)

Temp (°C)	**105**
pH	**7**
B(OH)3	**10 mM**
Ca2+	**1 mM**
Cl-	**200 mM**
HCO3	**2.8 mM**
Na+	**200 mM**
SiO2	**11 mM**

Injected fluids (brines) contain concentrations of metals and salts that occur naturally in geothermal systems including Coso and that are concentrated by steam during boiling. They are not hazardous. Regarding travel of brines, theoretical studies (e.g. Pruess 2008) of injection behavior and field studies of reservoir response to injection (e.g. Rose et al. 2002, Adams et al. 1999) suggest that injected fluids heat on contact with hot reservoir rocks and move rapidly towards areas of lower pressure depending on local permeability structures. Microseismicity studies of the Coso field suggest that injection fluid travel outward and downward from injection wells (Fung and Lees 1997).

Comment asking whether reinjection of brines increase the level of contaminants in the geothermal reservoir is noted. The chemistry of Coso injectate is similar to the chemistry of geothermal fluids in the reservoir albeit concentrated by steam and gas loss during boiling. The process of power generation does not add contaminants to the brine. These comments are irrelevant to the analysis of the impacts of the proposed project.

A-176 The higher levels of total dissolved solids (TDS) in Little Lake waters are related to evaporation in the lake (page 3.2-23 of the Draft EIR). There is no evidence of degradation of water quality based on a review of the available data on the chemistry of Little Lake waters. Significant changes are most likely related to differences in evaporation rates resulting from changes in the size of the lake. The effect of the pumping of Hay Ranch wells on the water quality in Little Lake are likely to be minimal relative to the effects of evaporation (> 50% based on some isotopic results, Draft EIR Figure 3.2-7). The water quality at Hay Ranch is not "cleaner and fresher" than the groundwater in the vicinity of Little Lake. Water quality effects of the project in Rose Valley and Hay Ranch are dependent on the amount of water extracted and the effect on the water levels in the vicinity. The water quality to the south may improve if the pumping reduces southward flow from Hay Ranch, which has relatively low water quality. More saline water as observed in the LEGO well may alternately be drawn towards the area of drawdown close to the center of the Valley. The evaporation rate would additionally decrease at Little Lake if the surface area of the lake is reduced, possibly improving water quality at Little Lake.

A-177 Comment requests clarification regarding page 3.2-23 of the DEIR (EA Appendix H). The discussion states the evidence supporting the source of waters at Little Lake. Evaporation occurs at Little Lake; however, the chemistry of the water suggests that the source of the constituents can not be from concentration through evaporation.

Little Lake can only evaporate at the lake. It is not physically possible for the lake to evaporate in other areas of Rose Valley. Analysis of the baseline condition (i.e., current evaporation of Little Lake) is beyond the scope of analysis required under CEQA.

A-178 The amount of injection at Coso has decreased primarily as a result of increasing enthalpy of produced fluids and decreasing total production. The amount of waste brine produced from flashing decreases as enthalpy increase. Decline in waste brine has produced decline in injection because waste brine makes up the bulk of injectate.

Coso already injects 100% of waste brine. The only way to increase the injection is to augment injection from outside the geothermal system.

A-179 Comment requests clarification regarding page 3.2-24 of the DEIR (EA Appendix H). Refer to response to comment A-20 for discussion regarding natural recharge. Based on ^{18}O and deuterium analysis, the source of the water in the Coso geothermal system is the Sierra and/or the Coso Range. Stable isotopic data has been available for the Coso geothermal system since 1980 (Fournier and Thompson 1980).

Equipment already in place at the Coso geothermal field is considered part of the baseline physical condition of the environment. The purpose of the EA id to analyze change that would be caused by the proposed project; it is not meant to re-analyze the baseline physical conditions.

A-180 Refer to response to comment A-142 for discussion regarding the considerations underlying the terms of the federal permits for the power plants.

A-181 Refer to comment A-31 for discussion regarding reinjection levels.

A-182 Refer to response to comment A-72 for discussion regarding the Coso Hot Springs.

A-183 Refer to response to comment A-72 for discussion regarding the Coso Hot Springs.

A-184 The comment referring to the opinion of Carl F. Austin is noted. Refer to response to comment A-72 for discussion regarding surface manifestations.

A-185 Refer to response to comment A-39 for discussion of Indian Wells Valley.

A-186 Comment expressing the opinion of Zdon concerning the Hydrology Model is noted. The discussion as to the requirements of CEQA are noted. The EA was prepared in accordance with the requirements of the National Environmental Policy Act.

A-187 Comment requests clarification regarding Table 3.2-5 of the DEIR (EA Appendix H). The maximum drawdown in wells in the Rose Valley that the hydrologic model predicts would result from pumping 4,839 ac-ft/yr for 30 years is considered a significant impact; therefore, mitigation has been outlined to reduce impacts to less than significant levels. See mitigation measures Hydrology-1 and -2 on page 3.2-39 of the Draft EIR, mitigation measure Hydrology-3 beginning on page 3.2-47 of the

Draft EIR, mitigation measure Hydrology-4 beginning on page 3.2-49 of the Draft EIR for mitigation that would prevent significant drawdown.

A-188 Comment requests clarification regarding page 3.2-36 of the DEIR (EA Appendix H). Refer to response to comment A-4 for discussion regarding the Hydrology Model.

A-189 Comment requests clarification regarding page 3.2-38 of the DEIR (EA Appendix H). Mitigation ensures no greater than a 10% reduction in groundwater flow at Little Lake and less than 2 to 3% in the aquifer in Rose Valley. All environmental impacts of the proposed project would be less than significant with mitigation; therefore, impacts to groundwater users in the Rose Valley would be less than significant. Refer to response to comment A-35 for discussion regarding significance threshold.

A-190 Comment requests clarification regarding page 3.2-39 of the DEIR (EA Appendix H). Mitigation Measure Hydrology-2 was revised in the FEIR to state that Coso would be responsible for any increase in electrical cost for pumping wells impacted by the project. Cumulative impacts to the environment resulting from increased energy needed to drill additional wells are not expected. Disputes regarding the adjustment of wells would be addressed primarily by the County. Because BLM's conclusion that, with mitigation, approval of the Proposed Action will not result in any significant adverse environmental impacts, BLM will require Coso's compliance with County requirements as a condition of the continuing effectiveness of the right-of-way grant for the proposed water pipeline.

A-191 The HMMP includes enforceable monitoring and reporting requirements. Coso would be required to implement these measures under the primary supervision of the County. BLM reasonably can rely on the County to enforce the conditions of its issuance of the conditional use permit.

Inyo County may revoke or limit the CUP or pumping if Coso does not comply with the HMMP. Coso's implementation of the HMMP and compliance with the conditional use permit will be conditions of the continuing effectiveness of the right-of-way grant.

Water supply wells can stop providing water in desired quantities for a variety of reasons unrelated to potential pumping impacts. Standard practice would include evaluating the nature and causes of the perceived impact. Denying Coso the right of appeal or the right to dispute a claim of damages would be contrary to good practice and fairness.

A-192 Refer to response to comment A-39 for a discussion of the Indian Wells Valley.

A-193 Comment requests clarification regarding page 3.2-39 of the DEIR (EA Appendix H). The text of the Executive Summary was clarified to note that "Even with mitigation, the project may result in a minimal lowering of the groundwater table beneath Little Lake. Groundwater table drawdown of up to 0.3 feet could develop within 10 years after start of pumping and persist for as much as 10 to 20 years; thereafter groundwater levels would slowly recover to pre-pumping levels over a period of 100 years or more. At no time would the groundwater flow available to Little Lake be reduced by more than 10%." The revisions to the Draft EIR were incorporated into the Final EIR are not significant new information that would require recirculation of the EA.

Rose Spring is mentioned in the publication "Springs of California", USGS Water Supply Paper 338 (1915) which indicates that Rose Spring is "essentially a surface spring" suggesting that it results from perched groundwater related to seepage from the Haiwee Reservoir or shallow groundwater inflow from Owens Valley, or both. It should be noted that the LADWP has had to lower the water level in Haiwee Reservoir approximately 18 ft over the last 2 decades due to seismic safety concerns (LADWP 2008), possibly reducing seepage towards the spring. The only water chemistry data identified for Rose Spring was Total Dissolved Solids (TDS) concentration data (see Figure 3.2-6) that indicated that Rose Spring had lower TDS concentrations than nearby wells completed in the Rose Valley aquifer but higher TDS concentrations than Haiwee Reservoir, which supports the seepage hypothesis. Rose Spring is located at an elevation of approximately 3,600 ft amsl. The groundwater elevation in the LADWP wells, approximately one mile south of Rose Spring, was 3,433 ft amsl in November 2007. It is unlikely that the water table in the Rose Valley would have been lowered sufficiently enough (more than 150 ft) by historic pumping to cause Rose Spring to dry. There is no way to monitor impacts to the spring and the proposed project is unlikely to affect it, regardless of historic impacts, given that the spring is presently dry.

A-194 Comment requests clarification regarding section 3.2.4 of the DEIR (EA Appendix H). Please see the discussion beginning in the last full paragraph on page 3.2-39 of the Draft EIR. This paragraph explains that impacts of the project would be less if it was terminated early or pumping rates were reduced. The Draft EIR does not designate a "safe" pumping rate.

The model-based projections presented in the Draft EIR indicate that groundwater extraction at Hay Ranch would likely need to be curtailed or terminated in substantially less time than 30 years. The recommended project alternative would entail pumping the Hay Ranch wells at the full project rate of 4,839 ac-ft/yr, to be evaluated and possibly reduced or ceased upon reaching trigger levels specified in the Draft EIR. Project pumping may be curtailed in fewer than 30 years because the Hydrology Model estimates that trigger levels would be reached in fewer than 30 years, depending on the rate of pumping. Monitoring and mitigation requirements would continue for the full 30-year duration of the County's conditional use permit, regardless of the duration of pumping. Hydrologic data collected during a planned baseline monitoring period and during the initial operating period of the project would be used to recalibrate the hydrologic model to confirm and/or modify the hydrologic impact predictions described in the Draft EIR because of current uncertainty in several key aquifer parameters in the Hydrology Model. The model recalibration would occur no more than 1 year after start of pumping at Hay Ranch. The model recalibration effort and/or termination or reduction of pumping may be required by the County earlier if hydrologic monitoring indicates that specified hydrologic trigger levels have been reached.

A-195 Refer to response to comment A-13 for discussion regarding Davis Spring at Portuguese Canyon. Refer to response comment A-193 for discussion regarding Rose Springs.

A-196 The moisture and pressure content do not facilitate or assist in the expression of water through the springs at the underground basins. Refer to response to comment A-13 for discussion regarding Davis Springs.

A-197 Bauer (2002) showed that the groundwater level at the north end of Little Lake was consistently three feet higher than Little Lake throughout the year of measurement. This relationship was maintained even when the level of Little Lake declined by a foot. There are no additional groundwater data points adjacent to Little Lake to compare results. Refer to response to comment A-195 for discussion regarding Portuguese Canyon, Davis and Rose Springs.

No claims are made that the groundwater level at the North Dock Well has always been 3 feet higher than the average elevation of the lake. It was consistently 3 feet higher than the lake during the year of measurement, however. This relationship would be monitored during the pre-startup monitoring that is specified in the HMMP, and would be continued during the operation of the project, in order to provide substantial additional data to document the relationship between groundwater and lake levels.

A-198 Refer to response to comment A-195 for discussion regarding springs. Water loss at the surface of Little Lake would not be greater than 10%.

A-199 Comment suggests Figure 3.2-16 of the DEIR is incomplete (EA Appendix H). Figure 3.2-16 has been corrected in the FEIR to show axis labels.

A-200 Comment requests clarification regarding Figure 3.2-17 of the DEIR (EA Appendix H). The comment mischaracterizes the results of the Hydrology Model runs. The figure shows a peak drawdown of 0.3 ft (fewer than 4 in) lasting for approximately 10 years with lower drawdown levels before and after that peak period. Drawdown levels at Little Lake would result in a less than significant impact throughout the modeled time period for the mitigated project. A substantial amount of groundwater was apparently pumped for years at Hay Ranch in the past for irrigation without destroying Little Lake. The Draft EIR states that greater drawdown levels would develop in Rose Valley north of Little Lake. These are described in detail in the Maximum Acceptable Drawdown values that are presented in Table 3.2-7 of the Draft EIR. No groundwater users would be significantly impacted with implementation of mitigation.

A-201 The Brown and Caldwell model used different input parameters than those used in the Hydrology Model. Those differences are explained in Appendix C2 to the Draft EIR (EA Appendix H). Section 3.2 and Appendix C2 of the Draft EIR provide a detailed explanation of the assumptions and differences in boundary conditions between the current model and the Brown and Caldwell model. Refer to response to comment A-4 for discussion of the Hydrology Model.

A-202 Comment refers to graphs shown in IPCD Agenda 4-30-08 and graphs and models included in the DEIR. The Draft EIR is the environmental document prepared for consideration by County decision-makers in determining whether to approve the proposed project; it is that analysis which BLM has incorporated by reference into the EA. BLM is not required to respond to explain analyses upon which it is not relying in the EA.

A-203 Refer to response to comment A-35 for discussion regarding significance thresholds and response to comment A-96 for discussion of potential impacts to wetlands.

A-204 With the required mitigation, pumping resulting in drawdowns of 4 to 12 feet at the north end of Little Lake will not be allowed to occur. Refer to response to comment A-35 for discussion regarding the significance threshold.

A-205 Refer to response to A-4 for discussion of the Hydrology Model.

A-206 Under the HMMP (EA Appendix H), monitoring of water levels would occur monthly for at least 2 years, and results must be reported to the County within 2 weeks of data collection, as stated on page C4-6 of the Draft EIR (EA Appendix H). If water levels decrease more slowly than predicted by the Hydrology Model after 2 years, Coso would be allowed to petition the County to reduce the monitoring frequency to quarterly. The Hydrology Model would also be recalibrated within 1 year of the beginning of pumping, or in less than 1 year if trigger levels are reached sooner. The Draft EIR states in mitigation measure Hydrology-1 on page 3.2-39 that the project applicant shall implement the HMMP. The Draft EIR states on page C4-10 that the monitoring and mitigation described in the HMMP would be performed by Coso; therefore, Coso would be responsible for the costs associated with mitigation monitoring. Coso would also work with the Inyo County Water Department to implement the HMMP. The County would review reports and provide oversight to ensure that requirements are being met.

Methods to prevent excessive pumping are outlined in the HMMP on page C4-19 of the Draft EIR (EA Appendix H). If the project is approved, remedial actions that would be taken based on conditions observed during the first year of pumping include:

- If drawdown trigger levels predicted for any point in time are exceeded in any of the selected monitoring wells, Coso shall verbally report the exceedence to the Inyo County Water Department within 48 hours, followed by a written report submitted to the Inyo County Water Department within 7 days.

- If drawdown trigger levels predicted for any point in time are exceeded in two or more of the selected monitoring points by at least 0.25 ft, Coso shall verbally report to the Inyo County Water Department within 48 hours, followed by a written report submitted to Inyo County Water Department within 7 days, followed by a recalibration of the Hydrology Model and recommendation of cessation of pumping or predictions of the duration of pumping that can be sustained without causing a significant reduction in water available to Little Lake (defined as no greater than 10% reduction in groundwater inflow); if appropriate, Coso may petition the County for permission to continue pumping for a specified duration. The County will evaluate the report and data, and will make a determination as to whether continued operation is appropriate.

- If predicted maximum acceptable drawdown trigger levels are exceeded in any of the selected monitoring points located at least 9,000 ft from both Hay Ranch production wells, Coso shall: verbally report to the Inyo County Water Department within 48 hours, followed by a written report submitted to the Inyo County Water Department within 4 days, followed by suspension of pumping within 7 days pending recalibration of the model, and recommend either cessation of pumping or make predictions of the duration of pumping that can be sustained without causing a significant reduction in water available to Little Lake (defined as no greater than 10% reduction in groundwater inflow), to be conducted within 4 weeks of the observation of the exceedence.

- If measured drawdown values in all monitoring locations at all times within first year of project pumping match predicted drawdown plots to within 25% or less but are generally below the predicted values, then Coso must stop pumping at 1.2 years. However, they may recalibrate the model before cessation of pumping and use available data collected to date to petition for a presumably small extension to pumping. The County will evaluate the report and data, and will make a determination as to whether continued operation is appropriate.

- If monitoring data collected during the first year show that a majority of monitoring points record drawdowns consistently lower than predicted, then Coso can recalibrate the Hydrology Model and make new predictions of the acceptable duration of pumping. Evaluation and correction of background levels for each well shall be conducted to account for natural variation and to separate effects of pumping from natural effects.

Table C4-2, beginning on page C4-15, of the Draft EIR (EA Appendix H) also outlines actions to be taken if certain thresholds are exceeded during the startup monitoring and reporting phase of the HMMP.

Monitoring required by the HMMP would remain impartial because Inyo County Water Department would be involved with the review of monitoring data, recalibration of the Hydrology Model, and the approval of continued operation of the proposed project.

See mitigation measure Hydrology-3 beginning on page 3.2-47 of the Draft EIR, which states that the applicant shall provide a qualified person, approved by Inyo County Water Department, to collect and analyze monitoring data. Coso would not be required to pay for an independent hydrologist for Little Lake unless the optional Task 1.1(h.) on page C4-13 of the Draft EIR is completed. This task involves the preparation of a groundwater diversion plan for Little Lake capable of providing water to augment water levels in Little Lake. If the stated conditions are met, Coso would provide funding for the diversion.

Table C4-2, below, identifies the monitoring locations and the monitoring parameters of the HMMP. Thresholds are also included in the table.

Table C4-2

Hydrologic Monitoring Parameter Summary Rose Valley Hydrologic Monitoring and Mitigation Program

Monitored Location (1)	Parameters Monitored	Monitoring Frequency	Threshold Requiring Action	Action if Threshold Exceeded
Groundwater Level, Extraction				
Hay Ranch North and Hay Ranch South wells	Total Groundwater Extracted	Daily	Pumpage not to exceed 4,839 acre-ft per year (13.25 acre-ft per day)	Reduce or discontinue pumping.
Six New Hay Ranch Observation wells (2 nests of 3 wells)	Groundwater Elevation	Measured hourly at a minimum using dedicated pressure transducer with data downloaded and plotted weekly for the first 3 months, then monthly. Supplement with manual measurements weekly for the first three months, then monthly. Hourly collection of data may be reduced to once every 4 hours, if appropriate and approved by Inyo County, as demonstrated by the analysis.	Deviation of observed drawdown in two or more wells is at least 0.25 feet more than predicted trigger level value at any time beyond 4 months.	Alert County. County evaluates whether reduced pumping is appropriate prior to model recalibration. If appropriate, recalibrate model within one month and reassess impact to Little Lake.
			Groundwater level decline in two or more wells exceeding updated model predicted drawdown trigger levels by more than 0.25 feet in any quarterly data collection and monitoring period Maximum acceptable drawdown level from Table C4-1 exceeded	Alert County. County to determine if decreased pumping is necessary immediately. Increase monitoring frequency to weekly for one month to confirm observation. Include results as part of quarterly data submittal. Recalibrate model within one month. Pumping ceases until the model is recalibrated and will re-start only if it can be shown that pumping can continue at a rate that will maintain wetlands and water levels at Little Lake Ranch.

Table C4-2

Hydrologic Monitoring Parameter Summary Rose Valley Hydrologic Monitoring and Mitigation Program

<table>
<tr><th>Monitored Location (1)</th><th>Parameters Monitored</th><th>Monitoring Frequency</th><th>Threshold Requiring Action</th><th>Action if Threshold Exceeded</th></tr>
<tr><td>Pumice Mine well</td><td rowspan="9">Groundwater Elevation</td><td rowspan="9">Monthly for first two years, then quarterly</td><td>Deviation of observed drawdown at least 0.25 feet from predicted trigger level value at any time beyond the first quarter in two or more wells</td><td>Alert County. Recalibrate model within one month. Reassess potential impact to Little Lake. County to evaluate whether reduction in pumping is warranted.</td></tr>
<tr><td>LADWP V816</td><td rowspan="7">Groundwater level decline exceeding updated model predicted drawdown trigger levels by more than 0.25 feet in any well in any quarterly data collection and monitoring period</td><td rowspan="7">Alert County. Increase monitoring frequency to weekly for one month to confirm observations. Include results as part of quarterly data submittal. Recalibrate model within one month. County to evaluate whether and when a reduction in pumping is warranted.</td></tr>
<tr><td>Dunmovin well</td></tr>
<tr><td>Coso Junction #1, Coso Ranch North Well</td></tr>
<tr><td>Lego well</td></tr>
<tr><td>Well G-36</td></tr>
<tr><td>Well 18-28</td></tr>
<tr><td>Fossil Falls Campground well. New well to be located between Coso Jnc and Cinder Road Red Hill well</td></tr>
<tr><td>Cinder Road, Red Hill well</td><td>Maximum acceptable drawdown level from Table C4-1 exceeded</td><td>Pumping ceases until the model is recalibrated and will re-start only if it can be shown that pumping can continue at a rate that will maintain wetlands and water levels at Little Lake Ranch.</td></tr>
<tr><td>Little Lake Ranch North well</td><td>Groundwater Elevation</td><td>Monthly for first two years, then quarterly</td><td>Deviation of observed drawdown at least 0.25 feet more than predicted value at any time beyond the first quarter</td><td>Revise trigger level based on Little Lake hydrology study Reduce or cease pumping at Hay Ranch at the direction of the County. Augment flow to Little Lake in accordance with EIR Section 3.2.3 (Hydrology-3) and</td></tr>
</table>

Table C4-2

Hydrologic Monitoring Parameter Summary Rose Valley Hydrologic Monitoring and Mitigation Program

Monitored Location (1)	Parameters Monitored	Monitoring Frequency	Threshold Requiring Action	Action if Threshold Exceeded
				implement the Augmentation Plan to maintain groundwater level above trigger level
			Groundwater level decline exceeding updated model predicted drawdown by more than 50% in the well in any quarterly data collection and monitoring period	Alert County. Increase monitoring frequency to weekly for one month to confirm observations. Include results as part of quarterly data submittal. Recalibrate model within one month. County to evaluate whether and when a reduction in pumping is warranted. .
			Maximum acceptable drawdown level from Table C4-1 exceeded	Pumping ceases until the model is recalibrated and will re-start only if it can be shown that pumping can continue at a rate that will maintain wetlands and water levels at Little Lake Ranch.
At least two of McNalley, Toone, Dews, or Buckland wells located west of Haiwee Reservoir	Groundwater Elevation	Monthly for first two years, then quarterly	N/A. Information used to update model	N/A
Haiwee Reservoir	Stage level	Request average weekly values from LADWP	N/A. Information used to update model	N/A
LADWP Aqueduct	Flow rate			
Little Lake Hydrology				
Little Lake Hotel Well and Little Lake North Dock well	Groundwater Elevation (or closed well pressure)	Measured hourly using dedicated pressure transducer with data downloaded and plotted weekly for the	No threshold applied, Information used to update model and trigger levels.	N/A
Little Lake	Lake Water Level Elevation			

Table C4-2

Hydrologic Monitoring Parameter Summary Rose Valley Hydrologic Monitoring and Mitigation Program

Monitored Location (1)	Parameters Monitored	Monitoring Frequency	Threshold Requiring Action	Action if Threshold Exceeded
Little Lake Weir	Little Lake Weir Discharge and Weir Height(1)	first 2 months, then monthly. Hourly collection of data may be reduced to once every 4 hours, if appropriate and approved by Inyo County, as demonstrated by the analysis.		
Little Lake North Culvert Weir	Little Lake System Discharge Rate			
Groundwater beneath Little Lake (minimum of four locations)	Groundwater elevation relative to lake	Monthly for 6 months after startup; then Quarterly		
Little Lake Ranch Pond P1	Occurrence of Siphon Well Discharge	Weekly by visual inspection; discontinue at end of baseline monitoring period		
Little Lake	Major operational changes	Request quarterly reporting of any major operational changes to lake level or groundwater pumping on property.	1 ft or more change in lake level or groundwater pumping on property in excess of 100 gpm daily average	None applicable. Data to be used for model updates, if needed, and for evaluating basin wide groundwater level responses in quarterly data submittal
Groundwater Quality				
Hay Ranch North and Hay Ranch South wells	Specific Conductivity/TDS	Quarterly	TDS increase to 2,000 mg/L or greater	Increase monitoring frequency to monthly for 3 months and monitor 18-28, G-36; evaluate basin wide response and determine whether reduction in pumping or supply of alternative water source is warranted

Table C4-2

Hydrologic Monitoring Parameter Summary Rose Valley Hydrologic Monitoring and Mitigation Program

Monitored Location (1)	Parameters Monitored	Monitoring Frequency	Threshold Requiring Action	Action if Threshold Exceeded
Coso Junction #2, Little Lake Ranch North well	Specific Conductivity/TDS	Quarterly	TDS increase to 1,500 mg/L or greater	Increase monitoring frequency to monthly for 3 months and monitor 18-28, G-36; evaluate basin wide response and determine whether reduction in pumping or supply of alternative water source is warranted
Well Yield				
Dunmovin wells, Coso Junction wells, Red Hill well, Fossil Falls Campground well	Well Yield	Quarterly	Decrease in yield of 25% or more from pre-startup levels	Mitigate well impacts per EIR Section 3.2.3 (Hydrology-2) and the Private Well Mitigation Plan
Precipitation Recharge				
Little Lake Canyon Precipitation Gauge	Precipitation totals	Daily using continuous recorder	No threshold applicable. Use data to identify basin groundwater level response (west side vs. east side) and mountain vs. valley precipitation for future numerical model updates	Recalibrate model and reassess impact to Little Lake
Haiwee Reservoir Precipitation Gauge				

(1) With the exception of Hay Ranch, every monitoring point is subject to access approval from the appropriate owner.

If approval is not forthcoming, alternative appropriate monitoring points will be established by Inyo County, if necessary.

A-207 The HMMP includes objective performance standards and outlines methods of monitoring and mitigating for impacts. Please refer to response to comment 206 for a discussion of the HMPP and how adaptive management has been incorporated into the plan. Inyo County is extremely experienced in protecting its groundwater resources, and is organized to evaluate pumping impacts and appropriate mitigation. The City of Los Angeles does extensive pumping in the Owens Valley in Inyo County, and the Inyo County Water Department is tasked with overseeing that pumping to avoid environmental affects. Inyo County has extensive experience regulating groundwater pumping, is organized to do so, and has a history of aggressively protecting the environment of the County.

Little Lake Ranch can offer input to Inyo County Water Department at any time in the process.

Inyo County Water Department would review and determine if and when pumping reductions and/or cessation of pumping is required if hydrologic triggers have been exceeded. Pumping cessation or reduction would be mandatory if the County determined that the proposed project caused trigger levels to be reached and that groundwater (and surface water) resources in the valley could be significantly impacted, as defined by the model and model recalibration. BLM can reasonably rely primarily on the County, as a public agency, to enforce the monitoring and mitigation requirements of the HMMP.

A-208 Coso has presented the results of the Coso reservoir model (see graph response to comment A-144) and indicated that the software used is the standard program for geothermal reservoir simulation is known as TETRAD. The Coso geothermal reservoir model is proprietary.

A-209 Refer to responses to comments A-72, A-74 and A-75 concerning the Coso Hot Springs.

A-210 The comment is noted. Refer to response to comment A-4 for discussion of the Hydrology Model.

A-211 The comment is noted. The comment is the introductory sentence to comments regarding Appendix C1 to the Draft EIR (EA Appendix H).

A-212 The comment is noted. The supervision of the pump test is described in Draft EIR Appendix C-1 (EA Appendix H). The Hydrology Model was originally developed by Brown and Caldwell, an environmental engineering and consulting firm, and was adapted and modified by Dan Matthews. He also prepared the groundwater analysis in the EIR in consultation with Dr. Galen Kenoyer and Inyo County Water Department staff. Senior review was conducted by Dr. Kenoyer, although his name was inadvertently left off of the List of Preparers in Chapter 6 of the Draft EIR. Dr. Kenoyer and Mr. Matthews professionally peer reviewed each others' work for this project. Mr. Matthews and Dr. Kenoyer are qualified hydrologists through training and experience. The State of California, Department of Consumer Affairs Geologists and Geophysicist Act, Code of Professional Geologist and Geophysicists Professional Standards (as amended, 2008), Section 7835 states:

> "All geologic plans, specifications, reports or documents shall be prepared by a professional geologist, or registered certified specialty geologist, or by a subordinate employee under his or her direction. In addition, they shall be signed by the professional geologist, or registered certified specialty geologist or stamped with his or her seal, either of which shall indicate his or her responsibility for them."

A "certified specialty geologist" means either a registered Certified Engineering Geologist or a registered Certified Hydrogeologist; however, the requirements read a "professional geologist" or "registered certified specialty geologist". The understanding is that registered geologists have the proper training in hydrogeology.

Mr. Matthews is a Washington State Registered Geologist, a Washington State Registered Hydrogeologist, and a California Registered Geologist. Mr. Matthews has nearly 25 years of experience providing hydrogeologic services on a wide range of projects. He has directed hydrogeologic characterization studies of a number of sites in Washington and California. He has used groundwater flow models to evaluate ground water development potential, to delineate well head protection areas, to design construction dewatering systems, and to optimally locate extraction wells for contaminant plume capture and treatment. Mr. Matthews has a Master's Degree in Hydrology and Water Resources from the University of Arizona and completed groundwater modeling coursework with Dr. Shlomo Neuman. A registration as a hydrogeologist in California is not required to perform the modeling or the CEQA analysis presented in the Draft EIR.

Additional review was provided by Dr. Kenoyer, who is a Senior Hydrogeologist with MHA|RMT. Dr. Kenoyer is a California Registered Professional Geologist. Dr. Kenoyer received his PhD in Hydrogeology from University of Wisconsin under the renowned groundwater modeling expert Dr. Mary Anderson. Dr. Kenoyer has also taught graduate level courses on groundwater modeling for 5 years as an Assistant Professor at Wright State University. He served on the American Society for Testing and Materials (ASTM) committee for writing standards for groundwater modeling, and has led the groundwater modeling group at RMT for 17 years, conducting many modeling projects over that time period.

Jill Haizlip is a geochemist and prepared the water quality analysis and analysis of impacts to the Coso Hot Springs. She has been working in the geothermal industry for 27 years. Ms. Haizlip has consulted with the previous Coso geothermal field operators to address issues related to the Coso geothermal reservoir fluid chemistry. She worked with non-condensable gas data and evaluated management plans to mitigate the effects of reservoir gasses. She also evaluated production processes to avoid scaling and precipitation effects on production facilities. More recently she has helped the Navy to compile the Coso Hot Springs Monitoring Program annual reports. Chapter 6: Report Preparers (DEIR) was updated to clarify which individuals prepared the work included in Appendix C1.

A-213 Refer to comment A-212 for discussion regarding the individuals that prepared the work included in Appendix C1. Also, response to comment A-212 provides a discussion regarding the qualifications of the preparers of the Hydrology Model.

A-214 The flow rate at Davis Spring was measured to evaluate whether the spring was influenced by the 14-day pumping test at Hay Ranch. Davis Spring was not included in the Hydrology Model in part because of the results of the monitoring conducted in November 2007, and because of its remote distance from and elevation above the Hay Ranch pumping location. The 14-day pumping test confirmed that there was no impact to the Davis Spring. No impacts to the Davis Spring are expected due to pumping at Hay Ranch.

A-215 Refer to response to comment A-4 for discussion of the Hydrology Model.

A-216 The comment is noted. See Appendix C2 of the Draft EIR (EA Appendix H) for a full discussion of the Hydrology Model. Refer to response to comment A-4 for a discussion of the pumping test.

A-217 Refer to response to comment A-4 for discussion of the general reliability of the Hydrology Model.

A-218 The comment is noted. The discharge of groundwater to Little Lake may occur as diffuse groundwater seepage through the pores between soil particles, over a broad area beneath Little Lake, rather than through springs. The location of any springs beneath Little Lake, if present, were not mapped for the EA.

The springs will flow (operate) when the elevation of the spring discharge point is lower than prevailing groundwater hydraulic head elevations, and, a flow path exists that connects the aquifer to the spring discharge points.

A-219 A weir is a small dam that is used to raise the water level of a river or stream. Water can flow over the top of the weir at high water levels.

A-220 The Little Lake Canyon springs were added to Figure C2-1. The addition is not significant new information that would require recirculation of the EA.

The Little Lake Canyon springs lie in an area mapped by the USGS as bedrock, and are therefore not part of the unconsolidated sediments that make up the Rose Valley aquifer. As such, drawdown in the Rose Valley aquifer is unlikely to have any impact on the Little Lake Canyon springs.

The underground water near the springs must be at a higher hydraulic head pressure than the elevation of the spring discharge point for the springs to function. Spring flow would not be affected by changes in groundwater elevation unless the springs are hydraulically connected to the aquifer from which Hay Ranch extracts groundwater.

Tunawee Canyon spring is located at an elevation of approximately 5,200 ft. The Tunawee Canyon spring is located approximately 1.5 mi west of the western limit of the alluvial aquifer in Rose Valley; it is not in the same aquifer. Changes in discharge from Tunawee Canyon spring could affect groundwater levels in Rose Valley because seepage from the spring flows down and ultimately recharges the Rose Valley aquifer. The amount of recharge is believed to be low, however, and is accounted for in the mountain front recharge term incorporated into the Hydrology Model. It is not plausible that pumping at Hay Ranch can have any influence on spring discharge because the spring surfaces nearly 2,000 ft higher than the groundwater table in Rose Valley, directly east of the spring; consequently the spring does not need to be represented in the Hydrology Model.

Two springs are identified in Little Lake Canyon on USGS topographic maps for the area. Both springs are located in areas which the USGS (Whitmarsh 1997) has classified as Mesozoic metasedimentary rocks. This confirms that the Little Lake Canyon springs are not in the Rose Valley aquifer, and it is not plausible that they would be influenced by groundwater pumping at Hay Ranch. They do not need to be represented in the Hydrology Model. Refer to response to comment A-13 for discussion regarding Davis Springs.

A-221 See Section 3.2.1 on page 3.2-5 of the Draft EIR (EA Appendix H) for a discussion of the springs in Rose Valley and their relationship to the groundwater system. The 14-day pumping test confirmed that there was no impact to the Davis Spring. Refer to response to comment A-220 for further discussion of other springs.

A-222 Springs closer to Little Lake in the southern end of Rose Valley, such as Coso Spring, are much closer to the water table in the centerline of the valley, rather than perched high on valley walls. This makes them potentially susceptible to impacts from groundwater pumping at Hay Ranch. Corresponding drawdowns in the vicinity of springs near Little Lake would also be managed to prevent drawdowns of 10% or more because the groundwater level at Little Lake would be monitored and the pumping managed to prevent more than a 10% reduction in flow to the lake. This is expected to have no significant impact on the flow in Coso Spring or other springs in the vicinity of Little Lake. Bauer (2002) found that even when the water table at Little Lake lowered by a foot, there was no corresponding decrease in flow at Coso Spring, during the year of monitoring. This suggests that water flowing to Coso Spring is derived from higher elevations. This is reasonable hydrologically for Coso Spring as well as other nearby springs, as this would give the spring water the hydraulic head needed to rise to the surface as a spring. Even if the water flowing to the springs near Little Lake were closely connected hydraulically to the water table in the centerline of the valley, the impacts to the springs are expected to be insignificant, because the drawdown in the water table would be less than 0.3 ft.

A-223 Refer to response to comment A-193 for discussion of earlier pumping of the Hay Ranch Wells.

A-224 During preparation of the FEIR edits were made to the text on page C2-6 of Appendix C for clarification. The addition is not significant new information that would require recirculation of the EA.

A-225 Comment noted. The word "manipulate" was not changed in the text.

A-226 Refer to response to comment A-35 for discussion on significance criteria. Refer to response to comment A-4 for discussion regarding the calibrations of the Hydrology Model.

A-227 These features are outside the southern extent of the model grid. No attempt was made to represent these features in the model, nor do they need to be. The amount of discharges from the upper pond and lower pond are not known, and these features are outside the model boundaries. Comment regarding additional discharges from Teal Pond is noted. None of the additional discharge points suggested by the commenter were used to describe and create the Hydrology Model.

Surface water flows on the Little Lake Ranch property that are not lost to evaporation or plant transpiration reinfiltrate into the ground and then flow towards Indian Wells Valley, as described in Section 3.2 (EA Appendix H). Evaporation losses and reinfiltration rates from surface water features south of Little Lake have no impact on water levels in the lake because of the southerly groundwater flow direction. Consequently, it is unnecessary to describe the various surface water features on the southern portion of the property or the amount or variation in water transfers between these features to evaluate the amount of groundwater flow available to the Little Lake Ranch property after implementation of the proposed project.

A-228 The hydrologic model of Rose Valley developed for the Draft EIR is intended to provide a management tool for evaluating potentially significant impacts to beneficial uses of groundwater throughout Rose Valley using readily available information. The model grid was extended to the south side of Little Lake, which is a large, readily identifiable surface water feature at the south end of the valley. No attempt was made to simulate water level fluctuations or conduct detailed mass balance calculations for the lake. Insufficient information is available regarding the degree of connection between lake and aquifer, current and historic water level trends, discharge rates, or records of management practices to conduct a detailed calibration of the model to the lake/groundwater interaction in this area. Nor was it possible to explicitly simulate specific surface water features on the property such as Coso Spring, the various ponds south of Little Lake, the siphon well, and other features because little to no historical data were identified regarding flow rates and water levels needed to represent these features. The primary objective of the model as it relates to Little Lake is to simulate how pumping from the wells at Hay Ranch may impact groundwater flowing into Little Lake, not how surface water flows out of Little Lake. The intended objective has been met.

Section 3.2 and Appendix C2 (EA Appendix H) describe the conceptual basis for evaluating potential impacts to surface water features at Little Lake by assessing changes in the amount of groundwater flowing towards the property, water table drawdown, and, the amount of groundwater available to enter the lake. The model results provide detailed information on the expected change in groundwater levels; historical data (limited data available) on the relationship between groundwater level and flow/water level in major springs and Little Lake are then used to evaluate the likely effect of groundwater level changes on surface water bodies. Extending the model grid beyond Little Lake is not necessary for assessing potential impacts to surface water features on the property and is not justified by the available data.

A-229 As stated in Table C2-4 on page C-11 of the Draft EIR (EA Appendix H), a value of 3,000 ac-ft/yr was used in the Hydrology Model for underflow to Indian Wells Valley through the Little Lake gap from Rose Valley. Refer to response to comment A-206 for discussion of Table C2-4.

A-230 During preparation of the Final EIR, edits were made to Appendix C2, page C2-10 to reflect consistent units.

A-231 The fact that Little Lake Ranch provides water to the Cinder Block facility was not known at the time the model was developed. The consumptive use of 6.3 ac-ft per year of groundwater on the Little Lake Ranch property for drinking water supply and irrigation and/or sale to off-site users is unlikely to significantly impact water levels on the property. Any exportation of water would be factored into the model recalibration in the future. The existing groundwater exportation is part of the baseline condition. The baseline is the habitat and lake level with the exportation project. The fact that Little Lake Ranch is able to export groundwater suggests flexibility in the water use to maintain habitat at Little Lake Ranch. The significance threshold of 10 percent decrease in groundwater flow into Little Lake would be from the baseline condition, which includes the exportation project. The proposed project would not require that Little Lake stop providing water to the pumice mine.

A-232 Refer to response to comment A-228 for discussion on southern extent of model domain and boundary conditions represented in the model. Refer to response to comment A-220 for discussion regarding Tunawee Canyon Springs. Refer to response to comment A-13 for discussion regarding Davis Springs. The location of Little Lake Gap is shown Figure 3.2-2 of the Draft EIR (EA Appendix H). Features that are significant in the hydrology of Rose Valley are included in the figures in Appendix C of the Draft EIR (EA Appendix H). The location of the power plant is shown on several other figures in the Draft EIR. It is not necessary to show and affects the scale of the map on Figure C2-1. The Coso power plants are categorically outside the boundaries of the Rose Valley aquifer.

A-233 The County is aware of the water level anomalies in the south end of the valley associated with the low permeability bedrock. This area is outside of the unconsolidated aquifer, and is not part of the model. It is not necessary to study this issue for the Draft EA. It will be addressed with the monitoring program described in the HMMP.

A-234 Appendix C2 (EA Appendix H) has been revised to include figures depicting alluvial aquifer thickness and model layer bottom elevation. Please refer to response to comment A-4 for discussion regarding aquifer thickness represented in the Hydrology Model.

A-235 Refer to response to comment A-228 for discussion on southern extent of model domain and boundary conditions represented in the model. Evapotranspiration that occurs outside the model boundaries is considered in the water balance of the model, in that it affects the flow of water into or out of the model boundaries, as a boundary condition. See page C2-9 in the Draft EIR (EA Appendix H) for a discussion on evaporation and evapotranspiration. Table C2-4 on page C2-11 in the Draft EIR shows a conceptual groundwater budget component matrix. Refer to response to comment A-206 for discussion of Table C2-4.

A-236 Refer to response to comment A-228 for discussion on southern extent of model domain and boundary conditions represented in the model.

A-237 Refer to response to comment A-4 for discussion regarding Hydrology Model.

A-238 Water levels in the Coso Ranch North well rose and fell nearly 0.8 ft in response to barometric pressure fluctuations during the November/December 2007 pumping test. These fluctuations dwarfed the drawdown caused by pumping the Hay Ranch well which was estimated to range from 0.1 ft to at most 0.3 ft. No clear drawdown response was observed in the Coso Junction Store #1 well which is located 10,900 ft south of the Hay Ranch wells, just 1,200 ft further south than Coso Ranch North well. The lack of apparent response in the Coso Junction Store #1 well supports the interpretation that the drawdown response in the Coso Ranch North well was low, and closer to 0.1 ft. For that reason, the Hydrologic Model appears to reasonably match the pumping test drawdown response in the two wells.

A-239 Refer to response to comment A-4 for discussion regarding the specific yield.

A-240 The data gaps identified in Section C2-3.5.5 on page C2-17 of the Draft EIR (EA Appendix H) do not need to be filled prior to approving the proposed project. The existing data are sufficient to evaluate whether or not the proposed project can proceed, with implementation of mitigation measures as needed to address project related impacts.

A-241 Refer to response to comment A-4 for discussion regarding the specific yield.

A-242 A discussion of the estimation of specific yield based on soils described in lithologic logs available for Rose Valley is described in Section C2-4 on page C2-18 of the Draft EIR (EA Appendix H). Also, refer to response to comment A-4 for discussion regarding the specific yield.

A-243 Mitigation measures were developed based on a specific yield of 10%. The rationale for estimating specific yield values for long-term pumping is presented in Section C2-4 on page C2-18 of the Draft EIR (EA Appendix H). The 10% specific yield value is consistent with the value identified by Danskin (1998) based on calibration of the Owens Valley model to the actual response of the aquifer and the existing long-term pumping data.

A-244 The potential LADWP project is described on page 41 of the EA. The discussion in Section 4.5.2 recognizes that impacts to groundwater resources in Rose Valley from the Proposed Action could be increase if LADWP Haiwee Reservoir seepage recovery project proceeds, but concludes that the HMMP addresses this possibility. This is because any loss of groundwater flowing to the Hay Ranch as a result of improving the retention capability of the Haiwee Reservoirs, would be accommodated by the fact that Coso must nonetheless comply with the established trigger levels.

A-245 Discussion of the results of the simulation run for the proposal are discussed in Appendix C2, Section C2-5.1 on page C2-20 of the Draft EIR (EA Appendix H) and in response to comment A-4.

The simulation results depend on the scenario evaluated. Augmentation for pumping the Hay Ranch wells at the full project rate for 30 years requires groundwater diversion longer than pumping at lesser rates or for shorter durations. However, because the mitigated pumping alternative (pumping at 4,839 ac-ft/yr until trigger levels are reached) is not predicted to significantly impact Little Lake, augmentation should be unnecessary. Augmentation of pumping would not be necessary with the mitigated alternative. Information regarding the simulation is conceptually presented in Section 3.2 beginning on page 3.2-1 of the Draft EIR (EA Appendix H), with more details presented in Section C2-5.1 of Appendix C2 on page C2-20 of the Draft EIR (EA Appendix H).

A-246 The map was drawn with a 5- foot contour interval; there isn't a 5-foot contour running through the North Dock Well.

Table C2-1 in the Draft EIR (EA Appendix H) does not list the North Dock Well because it was not made available to Geologica/Inyo County during the pumping test, it has not been surveyed and, consequently, a groundwater elevation cannot be calculated.

A-247 Appendix C3 to the Draft EIR (EA Appendix H) is a compilation of existing data. Not all analyses available were complete. There is a wide range of data available on water quality in Rose Valley. Given the evidence that the impacts to water quality are unlikely to be significant, the available data is sufficient.

A-248 The comment regarding the mitigation and monitoring plan is noted. Groundwater elevations are based on observations made in November 2007. Mountain front recharge, groundwater inflow from the north, and groundwater discharge to the south are all based on averages.

The Hydrology Model does not predict what would happen in drier years as compared to wetter years. These data were not analyzed or simulated.

Hay Ranch is located 9 miles north of Little Lake and a number of wells would be monitored between Hay Ranch and Little Lake, the Rose Valley Hydrologic Monitoring Team, however it is constituted, would have ample time to review groundwater drawdown trends throughout Rose Valley and conclusively decide whether a wave of drawdown is developing that would adversely impact Little Lake and thus require reducing or ceasing pumping at Hay Ranch.

Refer to response to comment A-206 regarding the remedial action requirements under the HMMP.

A-249 See the first full paragraph on page 3.2-43 of the Draft EIR (EA Appendix H) for discussion of potential drawdown at Little Lake North Dock well and impacts to Little Lake under full project pumping at a rate of 4,839 ac-ft/yr for 30 years.

A-250 The Draft EIR was revised to refer to the November/December pumping test as a "14-day pumping test" rather than a "long-term" test. It should be noted, however, that pumping tests are commonly run for shorter time periods, and the 14-day pumping test that was conducted here is relatively long compared to typical tests. It is when this time is compared to the length of time that pumping would be conducted for the Hay Ranch proposed project, that the length of time for the pumping test is relatively short, in comparison.

A-251 The comment is noted.

A-252 Refer to response to comment A-4 for discussion regarding the specific yield.

A-253 Refer to responses to comments A-13, A-214, A-220, A-221 and A-222for discussion regarding springs that were not included in the Hydrology Model.

A-254 Refer to response to comment A-206 for discussion regarding mitigation and monitoring and trigger levels. Refer to response to comment A-15 for discussion of drawdown trigger levels for other wells. Refer to response to comment A-35 for discussion regarding significance criteria for impacts to hydrology.

A-255 Section C4.2.3 in the Draft EIR discusses impacts to vegetation because the baseline physical conditions of Little Lake, including vegetation, are relevant to determining significance criteria. Refer to response to comment A-41 discussion of significance criteria for more discussion of the determination of significance criteria.

Refer to response to comment A-96 for discussion of vegetation and wildlife. Refer to response to comment A-97 for discussion of alkali cord grass. Comment regarding the ability of Little Lake Ranch to manage its water resources is noted.

A-256 The comment is noted. The Hydrology Model would be revised if it takes longer for the drawdowns to occur than predicted. Coso would not be allowed to continue pumping if a "huge cone of depression" is being created at Hay Ranch, because there are trigger levels and maximum allowable drawdown values at Hay Ranch, and a number of other intermediate points between Hay Ranch and Little Lake that would be monitored to detect unacceptable amounts of drawdown and to take appropriate action to stop it from propagating. The pumping would not continue unless the Inyo County Water Department determines that continued pumping would not impact Little Lake. The trigger levels are set to prevent exceedance of the maximum allowable groundwater drawdown, at any point in the future.

A-257 Refer to response to comment A-206 for discussion regarding mitigation and monitoring. The trigger levels in wells located upgradient of Little Lake serve as an early warning system to prevent the drawdown of more than 0.3 feet at Little Lake.

A-258 Refer to response to comment A-206 for discussion regarding mitigation and monitoring. Trigger levels have been set that are lower than the maximum acceptable drawdown values that would have to be exceeded at earlier points in time to avoid significant adverse impacts. Remedial actions are specified to avoid the specified maximum acceptable drawdown values from being exceeded.

A-260 Refer to response to comment A-206 for discussion regarding mitigation and monitoring and trigger levels.

A-261 Refer to response to comment A-206 for discussion regarding mitigation and monitoring, including baseline monitoring.

A-262 Refer to response to comment A-206 for discussion regarding mitigation and monitoring.

A-263 Refer to response to comment A-206 for discussion regarding mitigation and monitoring.

The evaluation of Rose Valley water wells (not monitoring wells) depths and water level reporting frequency is to be semi-annual, as stated on page C4-8 (EA Appendix A); this is reasonable given the relatively small amounts of drawdowns expected and the length of time it takes for water levels to respond to pumping. The County would evaluate water levels in identified monitoring points, as specified in Table C4-2 (EA Appendix H), and take appropriate action if trigger levels are exceeded, including model re-calibration and reduction or cessation of pumping if warranted. The County must be allowed some degree of flexibility in evaluating exceedance of trigger levels; for example, if a trigger level were exceeded in a monitoring point because there was substantial increase in pumping of a nearby well not associated with the Hay Ranch project, the County must have the flexibility to evaluate the significance of that single monitoring point.

A-264 Refer to response to comment A-206 for discussion of mitigation and monitoring.

A-265 The HMMP states that the HMMP would be implemented by qualified technical staff hired by the applicant solely at the expense of the applicant. This is a standard requirement under CEQA. A representative network of monitoring points has been identified that provide coverage over a broad area of the Rose Valley. The wells on the Hay Ranch property would be monitored daily. Other hydrologic features are more distant and respond to pumping more slowly, and would be monitored on a frequency suitable to identify significant trends. The Inyo County Water Department is functioning in the role of water master for the project. Refer to responses to comments A-206, A-263 and A-264 for further discussion regarding mitigation and monitoring.

A-266 The phrase "or substantially deplete the water availability to the springs and wetlands" has been deleted from pages C4-9, 3.2-49 (EA Appendix H) because it is redundant with the specified groundwater drawdown trigger levels established to protect Little Lake. This change is not significant new information that would require recirculation of the EIR. As stated on page C4-17 (EA Appendix H), the model would be recalibrated within 1 month of a trigger level exceedance. The work would be performed by a qualified expert approved by the County. As stated on page C4-17 (EA Appendix H), pumping would cease until the model is recalibrated and would only restart if it can be demonstrated to the County that pumping can continue without impacting Little Lake.

A-267 The County would issue the CUP for a 30-year term. Implementation of mitigation would be required, which may shorten the allowed period of pumping. The County can no more assure that Coso will not challenge the conditions of the authorization than it can ensure that Little Lake Ranch, LLC will challenge those terms. BLM will require compliance with the County’s approved conditional use permit and implementation of the County’s approved HMMP as a condition of BLM’s issuance of the right-of way grant for the water pipeline.

A-268 The comment is noted. Refer to response to comment A-206 for discussion regarding mitigation and monitoring.

A-269 The comment is noted. The specified mitigation measures have been reasonably calculated to avoid any significant adverse impacts to the Rose Valley ground water resources and any dependent uses of those resources. No revisions to the Draft EIR were made to change the wording on page C4-10.

A-270 Refer to response to comment A-96 for discussion of impacts to wetlands.

A-271 The aphorism in the comment is noted. Refer to response to comment A-206 for discussion regarding mitigation and monitoring.

A-272 Refer to response to comment A-206 for discussion regarding mitigation and monitoring. The trigger levels in the Hydrologic Model are conservatively set to protect the Little Lake resources; however, additional information may revise our understanding of the hydrology of the groundwater basin and warrant a re-evaluation of the HMPP.

A-273 On page 3.2-39 of the Draft EIR (EA Appendix H), mitigation measure Hydrology-1 states that "The project applicant shall finalize and implement the Draft Hydrological Monitoring and Mitigation Program (HMMP) included in Appendix C4 of this EIR." The County will be primarily responsible for enforcing the HMPP. BLM reasonably assumes that the County will dutifully fulfill its responsibility in this respect.

A-274 Refer to response to comment A-206 for discussion regarding mitigation and monitoring. Again, the EA has been prepared in accordance with the requirements of the National Environmental Policy Act and is not governed by "CEQA."

A-275 Refer to response to comment A-206 for discussion regarding mitigation and monitoring.

A-276 A variety of off-the-shelf hydrologic equipment devices can be used to measure flow over a weir. Exact equipment requirements would be developed at the start of the baseline monitoring period. The location of the North Culvert is shown on Figure 3.2-2 on page 3.2-7 of the Draft EIR (EA Appendix H). Permits from the water district would not be required as the mitigation and monitoring do not produce any wastewater discharge.

A-277 The Little Lake North Dock well has been added to Figure C4-3 (EA Appendix H). There is no trigger set for the North Dock well. Please refer to response to comment A-206 for a discussion of mitigation and monitoring.

Little Lake North Dock well and Little Lake Ranch North Well would both be monitored, as stated in Table C4-2 (EA Appendix H). However, the Little Lake Ranch North Well would be monitored for trigger levels as discussed in Table C4-1 and Table C4-2 (EA Appendix H).

The groundwater model does not require either well to be “run”. Model-predicted groundwater levels at the locations of these wells are used to interpret the results meaningfully.

Page C4-12, Section (d) (EA Appendix H), is clear that the Little Lake North Dock Well would be monitored. However, the Little Lake North Dock Well would not be used as a monitoring well for trigger levels, because it is likely to be influenced by lake level changes caused by management. It is not included in the trigger level wells presented in Table C4-1. Table C4-2 is clear in specifying that Little Lake Ranch North well, and not Little Lake North Dock well, would be monitored for threshold exceedances and potential actions if the threshold is exceeded.

A-278 Refer to response to comment A-206 for discussion of mitigation and monitoring and trigger levels. Little Lake Hotel well and Little Lake North Dock well would be monitored using dedicated pressure transducers collecting hourly water level readings initially. As stated in Table C4-2 (EA Appendix H), no trigger levels would be established for these wells. The monitoring data would be used to complete the hydrogeologic characterization of the Little Lake Ranch property and for Hydrology Model recalibration. The Fossil Falls Campground well would initially be monitored using an electronic water level sounder on a monthly basis. Trigger levels would not be established for the Fossil Falls Campground well; the data collected would be used for Hydrology Model recalibrations.

A-279 These are well-established standard statistical methods that are used in a variety of disciplines for evaluating background conditions, the significance of trends, and evaluating whether time-varying data of any kind exceed specified criteria. The use of these methods are commonly used and widely accepted in, for example, evaluating groundwater chemical trends in the Resource Conservation and Recovery Act and the Comprehensive Environmental Response, Compensation, and Liability Act. The six-month baseline horizon chosen by the County is reasonable in relation to these methods.

A-280 The text in Table C4-2 (EA Appendix H) was revised during preparation of the FEIR to note that the maximum combined daily pumping rate from the two wells would be limited to an annualized rate of 4,839 ac-ft/yr (equal to 13.25 ac-ft per day). Extraction would be discontinued for remainder of a calendar year when the reading on the flow totalizing recorder indicates that 4,839 ac-ft of groundwater has been extracted.

A-281 It is impossible to know or measure the starting elevation (background water levels) for the new monitoring wells before they are installed. See page C4-14 of the Draft EIR (EA Appendix H) regarding reference elevation for drawdown calculation. The background water levels would be defined during the pre-startup period.

Refer to response to comment A-206 for discussion regarding mitigation and monitoring.

A-282 The comment is noted. Table C4-2 (EA Appendix H) would be updated after recalibration of the model and at later times during the CUP to reflect changes to the monitoring frequency and locations needed to monitor project impacts. Rather than generating multiple tables now, the applicant would generate a new monitoring table for review, approval, or modification by Inyo County Water Department when the applicant has sufficient monitoring data to make an argument for reducing the monitoring frequency.

Starting levels have been defined based on historical water level measurements at the monitoring points. The background levels would be refined based on six months of data collection, prior to startup.

Refer to response to comment A-206 for discussion regarding mitigation and monitoring.

A-283 Refer to response to comment A-206 regarding mitigation and monitoring.

A-284 Refer to response to comment A-206 regarding mitigation and monitoring.

A-285 Groundwater level changes tend to change slowly once an initial period of adjustment has occurred. The text in Section C4.3.1 (EA Appendix H) has been revised to note that the applicant may request that Inyo County Water Department allow changes in monitoring frequency by presenting data to support reduction in monitoring frequency in regular periodic monitoring reports.

Refer to response to comment A-96 for discussion of impacts to wetlands. Refer to response to comments A-99 and A-100 for discussion of water quality.

A-286 The Little Lake Hotel well is located south of Little Lake, outside the Hydrologic Model grid; consequently, there is no basis for setting a trigger level for the Hotel well. Trigger levels were not specified for the North Dock well because the well may respond to changes in managed lake levels; as a result, a trigger level was specified for the Little Lake Ranch North well which is farther from the lake.

A-287 The level of Little Lake would be monitored, but as is clear in Table C4-2 (EA Appendix H), there is no action required other than reporting, and potentially revising the model. Little Lake levels are managed by Little Lake Ranch by periodically adjusting the level of the weir at the outlet to the lake. The lake level would be monitored as described in Table C4-2, and the data may be used to update the model, if needed, as described in Table C4-2. The trigger level for action in Little Lake area would be based on a change in groundwater elevation, in order to minimize changes in lake level.

A-288 The location of Little Lake North Culvert is shown on Figure 3.2-2 on page 3.2-7 of the Draft EIR (EA Appendix H). The North Culvert is located outside the current model boundaries. It is being monitored because it has relevance to evaluating the hydrologic budget of the lake.

This location is consistently referred to as the “North Culvert”. It is anticipated that a flow-measuring weir would be established at this location at the start of the baseline monitoring period; consequently, the text on page C4-12 and Table C4-2 of the Draft EIR (EA Appencix H) reference monitoring the North Culvert weir.

Trigger levels have been defined for groundwater levels near Little Lake. Flow through the North Culvert would be monitored for information purposes only.

The monitoring frequency as stated in Table C4-2 beginning on page C4-15 of the Draft EIR (EA Appendix H), is weekly for the first 2 months, and then monthly.

A-289 As stated in Table C4-2 on page C4-18 of the Draft EIR (EA Appendix H) for Monitor Location: Little Lake Ranch Pond P1: “Occurrence of siphon well discharge” is being monitored, “weekly, by visual inspection.” When the siphon well discharges into the pond, it makes a small but visible water spout. Little Lake Ranch staff has indicated that the siphon well has discharged uninterrupted for the “last few years”. The Little Lake Ranch staff has indicated that under no circumstances could the flow from the siphon be allowed to be interrupted or disturbed by adding flow meters, pressure gauges, or other monitoring equipment. Hence, the only feasible monitoring is to look at the discharge point, to visually determine whether the siphon well is still flowing; if the discharge stops, then some change to the hydrologic system has occurred.

A-290 No significant impacts to groundwater quality are anticipated; accordingly, the available data are sufficient.

A-291 The groundwater thresholds are appropriate in light of the the natural variation in the levels.

A-292 The model will be re-calibrated and the results reviewed within a period of approximately 1 month. That amount of time would not have the potential to cause a significant impact such that an arbitrary cessation of pumping is required before the model calibration is completed.

The comment regarding noticing is noted. Residents of Rose Valley are always welcome to provide input to the process at any time.

A-293 Trigger levels that would determine whether pumping must be reevaluated are based on groundwater levels, not time. The model indicates that it would take 1.2 years to reach the trigger levels pumping at the maximum amount allowed. It would not be appropriate to limit the permit to a 1.2 year period for several reasons. Most importantly, the model is conservative. It may be that Coso would be able to pump for a number of years without reaching a trigger level or threatening to exceed the significance criteria at Little Lake. The model assumes a direct connection between the northern portion of the Rose Valley aquifer and the southern. It could develop that the connection is not direct and that more water could be removed from the north without affecting the south, which would require a major revision of the trigger levels. Finally, assuming Coso must cease pumping at 1.2 years, it may develop that the aquifer regenerates more quickly than assumed and that Coso could resume pumping after some period of time. This could entail periodic pumping for the full 30-year period. Therefore, it is appropriate and protective to approve a 30-year CUP, even if it currently appears that pumping would not be allowed for that length of time.

Pumping would be evaluated and may require a reduction in pumping rate or stopping pumping according to mitigation measure Hydrology-4 or at the expiration of the CUP, whichever comes first.

A-294 The comment is noted. Refer to response to comment A-206 for discussion regarding mitigation and monitoring.

The HMMP is intended to serve as an enforceable guidance document for monitoring hydrologic impacts related to the Project. Inyo County may revoke or limit the CUP or pumping if Coso does not comply with the HMMP. Coso’s compliance with the

CUP, including implementation of the HMMP, will in turn be a condition of the right-of-way grant issued by BLM.

Water supply wells can stop providing water in desired quantities for a variety of reasons unrelated to potential pumping impacts. Standard practice would include evaluating the nature and causes of the perceived impact. Denying Coso the right of appeal or the right to dispute a claim of damages would be contrary to good practice and fairness.

A-295 Consideration of natural variation of water levels is essential, to distinguish that from impacts due to pumping.

A-296 It is agreed that some defined times for model re-calibration should be incorporated, as it is specified in the text, and that this re-calibration should occur before 15 months of operation have been completed. Exceedance of two or more triggers at any point in time by at least 0.25 ft requires the model to be re-calibrated within 1 month, and evaluation of the potential impact to Little Lake. The County would then determine if cessation or reduction in pumping is needed. This process is specified in Table C4-2, on page C4-16 of the Draft EIR.

A-297 Refer to responses to comments A-206 and A-293 for discussion regarding trigger levels.

A-298 Trigger levels that would determine whether pumping must be reevaluated are based on groundwater levels, not time. The model indicates that it would take 1.2 years to reach the trigger levels pumping at the maximum amount allowed. It would not be appropriate to limit the permit to a 1.2 year period for several reasons. Most importantly, the model is conservative. It may be that Coso would be able to pump for a number of years without reaching a trigger level or threatening to exceed the significance criteria at Little Lake. The model assumes a direct connection between the northern portion of the Rose Valley aquifer and the southern. It could develop that the connection is not direct and that more water could be removed from the north without affecting the south, which would require a major revision of the trigger levels. Finally, assuming Coso must cease pumping at 1.2 years, it may develop that the aquifer regenerates more quickly than assumed and that Coso could resume pumping after some period of time. This could entail periodic pumping for the full 30-year period. Therefore, it is appropriate and protective to approve a 30-year CUP, even if it currently appears that pumping would not be allowed for that length of time. Refer to comment A-206 and A-293 for discussion regarding trigger levels.

A-299 The drawdown levels at Little Lake would be managed to less than significant values in accordance with the HMPP, and would always be less than the natural variability in the groundwater levels that currently exist. While some residual drawdown may occur for several decades, this value would be small compared to the natural variability.

A-300 The comment is noted. Please refer to all responses to water quality comments including response to comment A-99 and A-100.

A-301 The comment is noted.

A-302 Refer to response to comment A-206 for discussion regarding mitigation and monitoring.

Additionally, the HMMP uses an adaptive management approach. Adaptive management is a process that allows the refinement and implementation of a mitigation plan to address the uncertainty in baseline conditions. The HMMP is based on four basic tenets:

1. A commitment to a continual learning process;
2. A reiterative evaluation of goals and approaches;
3. Redirection based on an increased information; and,
4. Explicit hypotheses about natural system structure and function, and about anticipated resource response.

The adaptive management approach is designed to allow information gathering and change in the management approach to reflect changing conditions. Adaptive management gives information gathering a high priority in the stewardship of natural resources. The HMMP outlines management principles for determining impacts to the hydrologic system in Rose Valley. Selected standards are used in adaptive management to determine whether those management principles are adequate.

The three key elements of adaptive management include:

1. Selection of indicators and criteria that reflect the desired conditions;
2. Monitoring of the indicators and criteria; and,

3. Implementation of management action when the desired conditions are violated or when conditions are deteriorating and preventive measures are available.

Table C2-4 (included in response to comment A-206) in the Draft EIR (EA Appendix H) identifies these three elements. The County and other resource agencies would use the plan and studies generated from the plan to make decisions in determining desired conditions, assessing the relationship between information gathered and management actions, and choosing appropriate action. Adaptive management is an accepted form of impact monitoring and mitigation; for example, under the federal ESA, adaptive management plans can be utilized as long as mitigation is "reasonably specific, certain to occur, and capable of implementation; they must be subject enforceable obligations; and most important, they must address the threats to the species in a way that satisfies the jeopardy and adverse modification standards" (Bloom and Boer 2008). BLM's inclusions as conditions of its issuance of the right-of-way to Coso of the requirements for Coso's compliance with the County-issued conditional use permit and implementation of the HMMP will serve to reinforce those.

A-303 Refer to response to comment A-302. Little Lake Ranch can offer input to Inyo County Water Department at any time in the process. Inyo County Water Department would review and determine if and when pumping reductions and/or cessation of pumping is required if hydrologic triggers have been exceeded. Pumping cessation or reduction would be mandatory if the County determined that the proposed project caused trigger levels to be reached and that groundwater (and surface water) resources in the valley could be significantly impacted, as defined by the model and model recalibration.

Refer to response to comment A-15 for discussion of trigger levels.

A-304 Comment noted. Appendix B of the Decision Record includes the corrections to the elements of the Draft EIR incorporated by reference into the EA that the County made in response to comments on the Draft EIR.

A-305 The comment regarding the inadequacy of the EA is noted. Refer to previous response to comments regarding Hydrology Model.

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Response to Comment Letter B
Arnold, Bleuel, LaRochelle, Mathews & Zirbel LLP
Dated January 20, 2009

B-1 The comment regarding the opinions of Little Lake Ranch that BLM should prepare a "full Environmental Impact Study (sic) is noted

B-2 The comment clarifying the position of Little Lake Ranch, Inc. regarding the geothermal generation of electricity by Coso is noted.

B-3 The comment summarizing the Proposed Action and the previous Draft EIR is noted.

B-4 The comment regarding the installation of water cooling towers and other past actions of Coso is noted. The past actions and past intentions of Coso do not pertain to environmental effects of the proposed project, and are outside the scope of the EA, except to establish the baseline conditions for the analysis of cumulative impacts. Equipment already in place at the Coso geothermal field is considered part of the baseline physical condition of the environment. The purpose of this EA is to analyze change that would be caused by the Proposed Action; it is not meant to analyze the baseline physical conditions.

The EA supports the BLM conclusion that with mitigation, the potential impacts resulting from the Proposed Actiond to less than significant. Refer to Section 4, Environmental Consequences of the Proposed Action, for a discussion of the potential impacts of the project.

B-5 Refer to Comment Letter H (prepared by Coso Operating Company, LLC) for discussion regarding ongoing plant improvements. Coso Operating Companydoes not deny that it is continually making improvements to its geothermal facility in order to improve efficiency. The comment referring to the Fitch and Moody's rating report is noted.

B-6 Refer to response to comment A-4 for discussion regarding the Hydrology Model.

As stated in the HMMP,(EA Appendix H) once the project is implemented if measured drawdown values in all monitoring locations at all times within first year of project pumping match predicted drawdown plots to within 25% or less but are generally below the predicted values, then Coso Operating Company must stop pumping at 1.2 years. However, they may recalibrate the model before cessation of pumping and use available data collected to date to petition for a presumably small extension to pumping. The County will evaluate the report and data, and will make a determination as to whether continued operation is appropriate. .BLM is conditioning its approval of the Proposed Action on implementation by Coso Operating Company of the HMMP and compliance with the Conditional Use Permit obtained from the county.

The hydrologic analysis was based on the proposed amount of pumping (4,839 ac-ft/yr) for the proposed number of years (30). The primary mitigation measure identified for the project was to reduce the pumping duration based on hydrologic monitoring that would rely on trigger levels for specified actions in order to mitigate current or future impacts of the proposed project. The analysis in the Draft EIR (EA Appendix H)supports BLM's conclusion that with implementation of the specified mitigation measures the implementation of the Proposed Action will not result in significant adverse impacts to hydrologic features in Rose Valley.

Analysis presented in the Draft EIR (EA Appendix H) indicates that groundwater extraction at Hay Ranch would likely need to be curtailed or terminated in substantially less time than 30 years. The recommended project alternative would entail pumping the Hay Ranch wells at the full project rate of 4,839 ac-ft/yr, to be evaluated and possibly reduced or ceased upon reaching trigger levels specified in the HMMP.. Project pumping may be curtailed in fewer than 30 years because the Hydrology Model estimates that trigger levels would be reached in fewer than 30 years, depending on the rate of pumping. Monitoring and mitigation requirements for the Project would continue for the full 30-year duration of the CUP, regardless of the duration of pumping. Hydrologic data collected during a planned baseline monitoring period and during the initial operating period of the project would be used to recalibrate the hydrologic model to confirm and/or modify the hydrologic impact predictions described in the Draft EIR because of current uncertainty in several key aquifer parameters in the Hydrology Model. The model recalibration would occur no more than 1 year after start of pumping at Hay Ranch. The model recalibration effort and/or termination or reduction of pumping may be requested by the County earlier if hydrologic monitoring indicates that specified hydrologic trigger levels would be, or likely would be, exceeded earlier than the expected 1.2-year mitigated pumping alternative.

B-7 Refer to response to comment B-6.

B-8 The comments of the, Mr. Andrew Zdon, on behalf of Little Lake Ranch are noted. Mr. Zdon's comments are addressed in Response to Comment Letter A (A-6 through A-15).

B-9 The comment regarding the "flawed" Hydrology Model is addressed in Response to Comment Letter A (A-4). Also, the comment regarding the HMMP was previously addressed in Response Comment Letter A (A-206).

B-10 The comment regarding the 10% loss of water inflows is addressed in Response to Comment Letter A (A-35).

Habitat at Little Lake is not anticipated to be adversely affected even with a 10% decrease in flows. There appears to be some flexibility in the management of the wetland at Little Lake, though it is noted that any loss of water can impact the water table and wetland levels. Little Lake currently exports some of their water (approximately 6 ac-ft/yr) to a nearby pumice mine for non-wetland and consumptive uses. This exportation constitutes a loss of its water, while they are still able to maintain the wetlands.

B-11 The comment regarding the deficiency of the EA is noted. BLM is responding to all comments received with respect to the EA, including comments on the elements of the Draft EIR that BLM incorporated by reference into the EA.

B-12 Alternatives to the proposed project are discussed in Section 2 of the EA. Alternative 1 and Alternative 2 are discussed in the Response to Comment Letter A (A-161 and A-162).

B-13 Alternatives to the proposed project are discussed in Section 2 of the EA. The alternatives suggested by the commenter are addressed in the Response to Comment Letter A. A discussion for each of the alternatives suggested can be found in the following responses: A-150 (ACC), A-22 (reduced production of Geofluids), A-165 (deepening wells), Comment Letter J (capital improvements), A-157 (purchase of water from LADWP and use of water from Owens Valley), and A-39 (use of water from Indian Wells Valley).

B-14 Alternatives to the proposed project are discussed in Section 2 of the EA. ACC systems are discussed in the Response to Comment Letter A (A-150).

B-15 Refer to response to comment B-13 for discussion of alternatives considered in the EA.

B-16 Refer to response to comment B-13 for discussion of alternatives considered in the EA.

B-17 The comments of Mr. Ronald DiPippo are noted and are addressed in the responses identified in response to comment B-13.

B-18 The comment on the profitability of Coso Operating Company is noted.

B-19 The potential impacts to underground water levels resulting from the Proposed Action are discussed in Section 4.5.1 and Appendix H of the EA. As discussed in Section 4.5.2 the potential impacts to groundwater resources in Rose Valley from the Proposed Action may be increased by the LADWP Haiwee Reservoir seepage recovery project, if either or both of those projects proceed. The HMMP, as is discussed in the Response to Comment Letter A (A-206) addresses this possibility.

Development of the Deep Rose project is speculative at this time. Exploration does not always result in development of a geothermal resource. The size of a power plant, type of power plant, timing of operation, and the water needs of the Deep Rose project are all largely unknown and too speculative at this time to evaluate.

B-20 Mitigation is discussed in the Response to Comment Letter A (A-206).

Inyo County Code §18.77.045 outlines the process for revocation of a CUP; this regulation is discussed on page 3.2-31 of the Draft EIR. The Inyo County Planning Commission would conduct a noticed public hearing on the issue if evidence shows that the water transfer subject to the CUP has unreasonably affected, or has the potential to unreasonably affect, the overall economy or the environment of Inyo County, or that there has been a failure to comply with the provisions of the permit. The Planning Commission would modify the terms of the CUP in order to avoid impacts if the Commission finds that an existing water transfer, if continued, would cause an unreasonable effect on the overall economy or the environment of the County. The Commission would order the implementation of mitigation measures as it finds to be necessary to reduce impacts to less than significant if the commission finds that the water transfer has unreasonably affected the overall economy or the environment of the County. The Commission can also modify the CUP to the extent that it finds necessary to avoid impacts in the future.

The Commission may revoke the CUP at the conclusion of the public hearing described above if it finds that the water transfer cannot be continued without causing an unreasonable effect on the overall economy or environment of Inyo County. The CUP may also be revoked if the Commission finds that there has been a failure to comply with the terms of the CUP.

Inyo County Code §18.77.055 allows any interested party to challenge, during the term of the permit, the ongoing transfer of water subject to the CUP. This regulation is discussed on page 3.2-31 of the Draft EIR (EA Appendix H). A challenge can be made if one or more of the following circumstances exist:

- There has been or is an ongoing violation of one or more conditions of the CUP
- The transfer or transport of water under the CUP has unreasonably affected the overall economy or the environment of the County

The process for challenging the ongoing transfer or transport of water is to first file a signed written statement with the planning commission that sets forth the challenge. The Planning Commission would complete a review and make a determination within 45 days of receipt of the challenge whether or not to have a hearing on the challenge. The Commission would then follow the provisions set forth in Inyo County Code §18.77.045, as described above, to determine if Coso is in violation of the CUP.

Penalties for excessive pumping do not pertain to environmental effects of the proposed project. The EA analyzes potential impacts of the proposed project. BLM is requiring as a condition of approval of the Proposed Action, that Coso Operating Company obtain a CUP from the County and implement the HMMP approved by the County.

B-21 The requirement for baseline studies remains at 6 months. The Hydrology Model is discussed in the Response to Comment Letter A (A-4).

B-22 Refer to the Response to Comment Letter A (A-206) for discussion of trigger levels.

B-23 Refer to the Response to Comment Letter A (A-206) for discussion of Hydrology Model. The effects of pumping would be averaged over many years because of the physical configuration of the Rose Valley groundwater basin and the way drawdown effects propagate out from a pumping center. The effects of drought years and years of above average rainfall are likewise averaged out by the length of time required for infiltration or natural discharge from the basin. The Draft EIR's use of averages, which has been incorporated into the EA, is the appropriate way to address long-term response in the reservoir. The Hydrology Model is accurate for the analysis proposed. The HMMP requires continued calibration of the model as more data is obtained once the aquifer is stressed. The HMMP identifies trigger points to detect significant impacts, which accounts for delayed response down-valley.

B-24 Refer to the Response to Comment Letter A (A-206) for discussion of trigger levels.

B-25 The legal arguments of Little Lake Ranch, Inc. with respect to the FONSI are noted.

B-26 The legal arguments of Little Lake Ranch, Inc. with respect to the FONSI are noted.

B-27 The legal arguments of Little Lake Ranch, Inc. with respect to the FONSI are noted.

B-28 The legal arguments of Little Lake Ranch, Inc. with respect to the FONSI are noted.

B-29 The recommendations of Little Lake Ranch are noted. Under the mitigation requirements being imposed as a condition of BLM's approval of the Proposed Action, Coso Operating Company will bear the risk that is will not be able to pump the full amount of water that for which the project is being designed.

B-30 The comment is noted. Refer to response to comment B-13 for discussion of alternatives considered in the EA.

B-31 The recommendations for further conditions are noted. The EA supports BLM's conclusion that, with the identified mitigation, the potential environmental impacts resulting from the Proposed Action would be reduced to less than significant. Refer to Section 4, Environmental Consequences of the Proposed Action, for a discussion of the potential impacts of the project.

Response to Comment Letter C
Joe Kennedy, Tribal Chairperson, Timbisha Shoshone Tribe
Dated January 23, 2009

C-1 The comment is noted. Comment is the introductory sentence to the Tribe comment letter regarding the DEA.

C-2 The comment regarding the objection of the tribal members to the quoted verbage is noted. Comment regarding oral history of the area is noted. Previous activity and impacts from the geothermal power plant are par of the existing conditions and beyond the scope of the EA. Comment regarding the spirituality of the Coso Hot Springs is noted.

The EA supports BLM's conclusion that all impacts will be less than significant with mitigation incorporated.

C-3 The comment is noted. Refer to response to comment C-2 for discussion regarding conclusions of the DEIR and DEA.

C-4 The comment regarding the Tribe's preference for the approval of the No Action Alternative is noted.

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Response to Comment Letter D
Barbara Durham, Timbisha Shoshone Tribe
Dated January 24, 2009

D-1 The comment is noted. Comment asks whether the BLM has received the comment letter from Joe Kennedy, Tribal Chairperson of the Timbisha Shoshone Tribe (dated January 23, 2009). The letter in question was received.

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Response to Comment Letter E
Michael Lumsden, Chief Operations Officer, Bishop Paiute Tribe
Dated January 23, 2009

E -1 The comment is noted. The comment is the introductory sentence to the Tribe's comment letter regarding the EA.

E-2 At the time of the preparation and distribution of the EA, the FEIR was not available. Responses to the comments on the EA and unsigned FONSI submitted on behalf of Little Lake Ranch, Inc. are addressed in this Decision Record.

E-3 Mr. Lumsden is correct, the BLM was not a signatory to the original 1979 MOA; rather, BLM is a signatory on the MOA completed in 2008. The title of Appendix A to the EA has been corrected.

E-4 The comment regarding Section 4.5.1 of the EA is noted. The comment regarding language of the MOA is noted. The EA supports BLM's conclusion that that no potentially significant adverse cumulative impacts will result to the Coso Hot Springs from approval of the Proposed Action. The measures in the MOA as established were agreed upon by the signatory parties and remain valid. The Navy has consulted with the tribes regarding the changes at Coso Hot Springs and various types of mitigation measures have been suggested. There has been no agreement on mitigation to implement.

E-5 The comment regarding the usage of Coso Hot Springs is noted. Refer to response to comment A-72 for discussion regarding the condition of Coso Hot Springs. Refer to response to comment A-28 for history of Coso Hot Springs. Refer to response to comment A-206 for a discussion regarding mitigation and monitoring.

E-6 Refer to response A-72 regarding the effect of the geothermal operations on the Coso Hot Springs.

E-7 The comment regarding 4.8.3 Mitigation is noted.

E-8 The EA was distributed for a 30-day public review with an unsigned Finding of No Significant Impact (FONSI) and Record of Decision during which all relevant information was available to all interested members of the community.

E-9 The comments are noted. Refer to responses A-96 and A-206 regarding discussion of project impacts and implementation of the mitigation monitoring program for the project.

Response to Comment Letter F
Brain Adkins, Environmental Director, Bishop Paiute Tribe
Dated January 23, 2009

F-1 The comment is noted. Comment is an introductory sentence which presents to the comment letter of the Bishop Paiute Tribe (Comment Letter E) as an attachment.

F-2 The comment is correspondence between the BLM and Bishop Paiute Tribe regarding the availability of the Environmental Assessment for public review. The comment is noted.

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Response to Comment Letter G
Virgil Moose, Tribal Chairperson,
Big Pine Paiute Tribe of the Owens Valley
Dated January 23, 2009

G-1 The comment is the introductory sentence to the letter presenting the objections of the Big Pine Paiute Tribe of the Owens Valley.

G-2 At the time of the preparation and distribution of the EA, the FEIR was not available. Responses to comments by Mr. Arnold and his consultants are addressed in this Decision Record.

G-3 Mr. Moose is correct, the BLM was not signatory to the 1979 MOA; rather, BLM is a signatory on the MOA executed in 2008. They are a signatory on the MOA completed in 2008. The title of Appendix A to the EA has been corrected.

G-4 The comment is noted.

G-5 The comment regarding the usage of Coso Hot Springs is noted. Previous activity and impacts from the geothermal power plant are part of the existing conditions and beyond the scope of the EA. Refer to response to comment A-206 for a discussion regarding mitigation and monitoring.

G-6 BLM has not considered the Proposed Action in isolation from the existing geothermal development in the Coso KGRA. As is set forth in EA Section 1.4, the environmental aspects of geothermal exploration and development at the Coso geothermal project sites have been addressed in numerous documents. The evaluations in the EA are tiered from the earlier environmental documents and the associated approvals.

The possibility of the use of groundwater from Rose Valley for power plant cooling was considered in prior environmental documentation (NWC 1979; BLM 1980a). The analyses in these earlier reviews, however, did not set forth a specific development and pipeline transportation proposal. (EA at p. 10)

G-7 The comment referring to mitigation presented in the EA is noted.

G-8 As discussed in Section 4.8.3 of the EA, the major provisions of the Programmatic Agreement (“PA”) (which resulted from consultation with the five tribes of the Owens Valley region) require that the BLM will assume all archaeological sites within the Area of Potential Effects (“APE”) as eligible for the National Register of Historic Places (“NRHP”). For a further discussion of impacts to Native American values, please refer to Section 4.8.3 of the EA.

G-9 The comment is noted.

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Response to Comment Letter H
Gregory S. Yarris, Director of Conservation Policy, California Waterfowl Association
Dated January 6, 2009

H-1 The comment is the introductory sentence to the comment letter expressing the concerns of the California Waterfowl Association.

H-2 The comment regarding the history and importance of wetland habitat in California is noted.

H-3 The comment regarding the history and importance of wetland habitat in California is noted.

H-4 The 10% significance criterion used to assess potential impacts is based on groundwater level monitoring data collected in 1997/1998 (Bauer 2002) indicating an average 3 ft higher groundwater level in the Little Lake North Dock well on the north side of the lake when compared to the water level in Little Lake. Groundwater table drawdown in the North Dock well of 0.3 ft would reduce the groundwater gradient and associated groundwater recharge rate towards the lake by approximately 10% based on this observation. First, it is important to be clear that the 10% reduction refers only to the groundwater that discharges into Little Lake, and not to the flow of groundwater through the entire thickness of the aquifer. Drawdown predicted to occur at the north end of Little Lake increases slowly following project startup, reaches a maximum of 0.3 ft approximately 11 years after startup, and decreases slowly thereafter for the proposed project (groundwater pumping at 4,839 ac-ft/yr) with mitigation measures, until trigger levels are reached (presumed by the model to be 1.2 years, but in reality may be longer). The predicted reduction in flow towards Little Lake would never exceed the significance criterion of 10%, and would only approach that threshold for a period of 5 years in the middle of the monitoring period required for the CUP. A 10% reduction in groundwater discharge to Little Lake equates to less than a 3% decrease in the overall flow of groundwater through the entire width and thickness of Rose Valley near Little Lake, based on model results; therefore, this is a conservative threshold.

It is important to recognize that a 10% decrease in groundwater discharge to Little Lake equates to a drawdown of the groundwater level of approximately 0.3 ft at the northern end of Little Lake, and less at the southern end. The maximum allowable drawdown criterion of 0.3 ft is extremely small compared to the entire saturated thickness in permeable layers 1 and 2 of the model near Little Lake (approximately 100 ft). The last paragraph on page 3.2-45 of the Draft EIR states, “A 10% maximum decrease in groundwater discharge to Little Lake would still allow for the vast majority of the groundwater to be available for creation of surface water features (e.g., ponds) prior to infiltration back into the aquifer." Flow from Coso Spring and other small springs near Little Lake that supply water to the wetlands is expected to continue without a substantial change, based on observations at Coso Spring that showed no decrease in spring flow when the water table declined by 1.0 feet in the Little Lake North Dock well (Bauer 2002). Groundwater flow through Rose Valley would continue, as described above, with a decrease of fewer than 3% in the overall groundwater flow near Little Lake.

It is helpful to understand how a 0.3-ft decrease in groundwater level compares to natural variability in groundwater levels. Figure 3.2-3 on page 3.2-10 of the Draft EIR presents Bauer's (2002) data that show that groundwater elevation near Little Lake varied by approximately 1 ft during the year of measurement. A drawdown of 0.3 ft in the groundwater level near Little Lake is substantially less than the historical range of groundwater level fluctuation near Little Lake over the course of a year (Bauer 2002). Wetland plants near Little Lake have historically adapted to groundwater level changes of 1 ft or more, and it is expected that wetland plants would adapt to the small change in groundwater level anticipated to result from the proposed project.

Potential impacts to surface water and groundwater as discussed in Section 4.4 and Section 4.5 of the DEA. Potential impacts to wetland and riparian vegetation at Little Lake are discussed beginning on page 3.4-42 of the Draft EIR. Without mitigation, groundwater withdrawal at Hay Ranch has the potential to reduce the groundwater flow to the Little Lake area, and to affect the sensitive riparian and wetland vegetation around Little Lake, located approximately 9 mi south of the project area. Without mitigation, groundwater inflowing into Little Lake is projected by the groundwater modeling results to be significantly reduced if the project were implemented as proposed (pumping at 4,839 ac-ft/yr for 30 years). Mitigation specifically designed to avoid these potentially significant impacts has been defined in order to avoid significant effects to groundwater and vegetation and would be part of any project approval.

Wetlands and riparian vegetation at Little Lake Ranch could be impacted by drawdown of groundwater that supplies the surface water flows at the lake. Impacts would not occur immediately, but would occur over time; adverse effects would be potentially significant without mitigation. The Draft EIR includes an HMMP. The HMMP would be implemented if the CUP is approved. The HMMP would establish trigger points for implementing mitigation that would prevent significant effects to water levels and impacts to wetland habitats at Little Lake. A reduction or cessation of pumping is required if trigger levels are reached. The reduction or cessation in pumping would avoid a greater than 10% reduction in flows into the lake (4-in decline), ponds, and wetlands.

Seasonal fluctuation in surface area and volume currently occurs at Little Lake. The lake is also manipulated or managed to change its surface area and volume. Wetland and riparian species surrounding the lake are closely associated with the lake margin and fluctuate with the lake (Bagley pers. comm. 2008). Maintaining flows into Little Lake to at least 90% of their current average flow rates would keep flows largely within the range of variation currently experienced at the lake. The maximum drawdown at the north end of the lake would be approximately 0.3 ft (4 in), and would be even less at the south end of the property. Species at Little Lake are mostly either upland species that do not depend on groundwater, or marsh species that require inundation during the growing season (Bagley pers. comm. 2008). The inundation around the lake is closely tied to the wetted margin of the lake and the lateral migration of water at the margin. The wetted margin would contract and the same species would likely maintain the same width but move inward, even with a small decrease in lake size. These changes can be currently seen when the lake size is manipulated with boards in the weir at the south end of the lake. The time that water stops flowing over the weir could increase slightly but would not be outside the range currently experienced. There may be some impacts to marsh species but these are not expected to be significant because the vegetation would not significantly change from its current state. Marsh vegetation normally requires inundation during the growing season (summer). Summer is the time when water currently also does not flow over the weir. Effects to one CNPS listed species, alkali cordgrass (*Spartina gracilis*), were questioned. Alkali cordgrass is not federally or State listed, as stated on page 3.4-16 of the Draft EIR. The species is on the CNPS List 4: Plants of Limited Distribution. This species occurs at Little Lake and currently experiences the seasonal and manipulated fluctuations in surface water levels. The changes in water levels would be within the envelope currently experienced with the implementation of mitigation. Populations of individuals would remain largely the same as they are currently. The project would not reduce or eliminate the occurrence of alkali cordgrass at Little Lake. Loss of a few individuals due to the contraction of the lake perimeter and wetted boundary would not be a significant effect.

The area downstream from the lake is inundated by outflow from the lake as well as water supply from springs. The lower springs would not stop flowing as a result of the project with mitigation. Wetland species would not be significantly impacted.

Phreatophytic species that may occur in the area between the south end of Little Lake and the lower ponds would likely be able to deepen their roots by a few inches if the groundwater table is lowered. Several studies by Inyo County, the LADWP, and the USGS have supported this concept (Bagley pers. Comm. 2008).

Some impacts may still occur to wetland vegetation and habitat at Little Lake Ranch even with implementation of mitigation; however, impacts would be less than significant because they would not result in a change in habitat type or a significant loss of habitat. No other aspects of the proposed project's operation other than groundwater pumping would impact water- dependent habitats in Rose Valley.

Species such as yellow warbler, common yellowthroat, yellow-billed cuckoo depend on wetland vegetation. None of these species were identified around Little Lake in a California Natural Diversity Database search (2007). Refer to page 3.4-19 of the Draft EIR for the list of special status species potentially occurring at Little Lake. If yellow warbler, common yellowthroat, and yellow-billed cuckoo were to occur at Little Lake, they would not be impacted by the project because the project would have minimal impacts to wetlands. Freemont cottonwood occurs on the Little Lake property. Cottonwoods have deeper roots systems than emergent wetland species as found around the lake margin. A study by S.J. Lite and J.C. Stromberg (Lite et al. 2005) that examined surface water and groundwater thresholds for maintaining cottonwood (*Populus-Salix*) forest in Arizona found that Freemont cottonwood (*Populus fremontii*) were dominant over other species when surface flow was present more than 75% of the time, when the inter-annual groundwater fluctuation was fewer than 1.65 ft, and when the average maximum depth to groundwater was fewer than 8.5 ft. Cottonwoods occur along sandy washes, near the surface water supply. The project would not result in significant groundwater drawdown that could impact cottonwoods. Groundwater drawdown of 0.3 ft or less would not significantly impact cottonwood roots. The project would not cause more severe inter-annual groundwater fluctuation than already occurs.

Passerine and raptor species at Little Lake would not be impacted because the project would not result in impacts to trees at Little Lake.

H-5 The opinion of the CWA is noted. The EA concluded that with mitigation, all potentially significant impacts would be reduced to less than significant.

Response to Comment Letter I
Bill Gaines, President, California Outdoor Heritage Alliance
Dated December 29, 2008

I-1 The comment regarding the COHA's concern that this water extraction project will negatively impact the extremely valuable and sensitive wetland, and wetland dependent species currently found on the Little Lake Ranch is noted.

The DEIR concluded that with mitigation, the project would not result in any significant impacts to the environment. Similarly, the DEA concluded that all impacts will be less than significant with mitigation incorporated.

I-2 The comment regarding Little Lake Ranch's wetland habitat is noted. Impacts to Little Lake are described beginning on page 3.2-40 of the Draft EIR. Impacts to biological resources are minimized through implementation of the HMMP. The potential for long-lasting groundwater drawdown is identified as potentially significant; however, the mitigation establishes a method for determining trigger points that incorporate the delayed response of groundwater drawdown further down the valley, and would avoid significant effects. The maximum allowable drawdown at Little Lake with the proposed mitigation plan is 0.3 ft. The level of groundwater drawdown is small enough to have less than significant impacts on the wetlands and biological resources at Little Lake, even though it may take over 100 years to regain that 0.3-ft loss in groundwater level. The Draft EIR includes monitoring requirements, both before and during pumping, to track any reductions in groundwater levels and imposes binding mitigation based on specific trigger points for any decreases. Impacts to wildlife are discussed in Section 4.6 of the EA. Also see Response A-96.

I-3 Special status species are protected under federal and State regulatory acts including: federal Endangered Species Act (ESA), Migratory Bird Treaty Act, Bald Eagle Protection Act, CESA, and CDFG Code. Impacts to wildlife are discussed in Section 4.6 of the EA. Additionally, these regulations were previously discussed in Section 3.4.2: Regulatory Setting, beginning on page 3.4-23 of the Draft EIR.

I-4 The comment regarding reduction in water supply to Little Lake Ranch wetlands is noted. See comment I-2 above regarding the maximum allowable drawdown at Little Lake.

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Response to Comment Letter J
Chris Ellis, Site Manager
Coso Operating Company LLC
January 21, 2009

The letter clarifying and augmenting the data and analysis presented in the Environmental Assessment is noted.