

September 11, 1998

Bruce Kaneshiro
CPUC EIR Project Manager
c/o Environmental Science Associates
225 Bush Street, Suite 1700
San Francisco, CA 94184-4207

Re: Proposed Divestiture of Electric Generation Assets by Pacific Gas and Electric Company
Application No. 98-01-008

Dear Mr. Kaneshiro:

On behalf of the seven thousand Sierra Club members of the Redwood Chapter, we are commenting on the Draft Environmental Impact Report for the Divestiture of PG&E's 14 Power Plants at The Geysers.

[Begin T0]

Attached is a list of comments on deficiencies or errors in the DEIR environmental assessment. Some comments could not be addressed to specific areas in the DEIR because they were never raised. We find the DEIR is deficient and a re-issuance of the DEIR is necessary to address the issues as follows.

[End T0]

We recognize and appreciate the step taken by the CPUC of conducting an environmental review under CEQA.

Sincerely,

/s/

Krista Rector
Redwood Chapter Executive Committee

Cc: Mile Reilly, Supervisor, Sonoma County
Rue Firch, Planning Commissioner, Sonoma County
Senator Mike Thompson
Representative Virginia Strom-Martin,
Tara Mueller, Esq.
Rich Ferguson, CEERT Representative

[Begin T1]

- 1) The listing of the steelhead and coho salmon under the Federal Endangered Species Act is a significant change in circumstances since the project was first authorized. Therefore, the project's impacts on steelhead and coho salmon must be considered in the DEIR. (See CEQA Guidelines, 14 Cal. Code Regs. Section 15065.)

[End T1]

[Begin T2]

- 2) The DEIR's "environmentally baseline" against which the project's impacts must be measured is non-existent for the project. This is different from the "no project" alternative, which is continued operation of the project under its' current ownership. (14 Cal. Code Regs Section 15125, 15126(d).)

[End T2]

[Begin T3]

- 3) The DEIR's alternatives analysis must consider decommissioning of the project plant(s) as one of the reasonable and feasible alternatives. (Id., 15126(d).) One reason alone would be the effect of Proposition 9. According to the Analysis of the California Energy Commission's "Preliminary Analysis of the Utility Rate Reduction and Reform Act", rate levels for residential customers of PG&E would plunge 26 percent starting in January, 1999. PG&E would be impacted due to a \$2.9 billion debt for the Diablo Canyon plant in addition to The Geysers plants, including debts for Units 21, 22, 23 and 24 which were never built. Another reason you give on pg 3-7 is that "PG&E would not be required to sell its plants, and it is not certain that the plants would be sold" thus leaving it open ended to financial decisions to decommission.

[End T3]

[Begin T4]

- 4) The DEIR must consider the full range of environmental impacts, direct and indirect, short term and long term. Year 2005 is not sufficiently long term. (14 Cal. Code Regs. Section 15126.)

[End T4]

[Begin T5A]

- 5) See CEQA Guidelines Appendix G for effects that are normally treated as significant. We argue that certain impacts must be treated as significant and mitigation measures adopted for these impacts, see Item C – "Substantially affect a rare or endangered species of animal or plant or the habitat of the species." (14 Cal. Code Regs. Section 15000 et seq, App. G.) Since the permits for the plants were issued, the threatened listing of Russian River Central Coast ESU for steelhead (*Oncorhynchus mykiss*) took place on 8/11/97 and Russian River Central Coast ESU for Coho salmon (*Oncorhynchus kisutch*) took place on 10/31/96. (Refer to Federal Registers Vol. 63, No. 18 and Vol. 62 No. 159.) Big Sulphur Creek, a main tributary of the Russian River, drains The Geysers 85 mile watershed and is a steelhead habitat nursery. [End T5A] [Begin T5B] In addition, you state that hydrogen sulfide in Sonoma County would increase and The Geysers is probably the largest source of atmospheric sulfur in California (Suter, 1978) and sulfur dioxide has been shown to be a phytotoxicant or a poison to plants.

[End T5B]

[Begin T5C]

Please refer to the "Geysers-Calistoga KGRA Fish Populations and Element Loads" published in June, 1990 by the University of San Francisco with oversight by Steven Sharpe of the Sonoma County Department of Planning and the California Energy Commission.

This report published the results of studies on fish muscle and organ tissue showing the impacts of chemical element levels impacts from Geothermal activity. A copy of the report is available from Steve Sharpe, who is located in the LAFCO Agency in Santa Rosa or you may contact the author of this letter. Also please refer to “The Potential Impacts on Aquatic Ecosystems From the Release of Trace Elements in Geothermal Fluids” by Cushman, Heldebrand and Brocksen (Environmental Sciences Division Publication NO. 1097, October, 1997.) This addresses the bioaccumulation hazard in the Big Sulphur Creek region. Please refer to the files at the Northern California Regional Water Quality Control Board on the condensate spills to local water ways and fish kills (files: 6/85, PG&E, 20,000 gallon spill; 4/86, Unocal, 540 gallons, Big Sulphur Creek; 8/86, Unocal, 11,440 gallons, Big Sulphur Creek; 2/87, NCPA, 15,000 gallons, Big Sulphur Creek; and 4/88, PG&E, 30,700 gallons, Big Sulphur Creek as examples.)

[End T5C]

[Begin T5D]

It is particularly notable that in Table 2.3 pg 2-45 “Partial List of Federal, State, Regional And Local Permits and Requirements Applicable to PG&E’s Proposed Divestiture” that you have not indicated any requirements for The Geysers from the National Marine Fisheries Service despite ESA listings and the history of spills.

[End 5D]

[Begin T5E]

On pg 4.7-33 and 34 your assessment of adequate mitigation is to have PG&E hand over materials (unidentified) and a subsequent signing of a disclosure form noting the new owner received the forms. This constitutes all action necessary to “mitigate” impacts to endangered species. If touching the Bible were equivalent to clean living then all us Bible holders would be free from all sin.

[End T5E]

[Begin T6]

- 6) See CEQA Guidelines Appendix G for effects that are normally treated as significant. We argue that certain impacts must be treated as significant and mitigation measures must be adopted for these impacts, see Item F. “Substantially degrade public water supply” (14 Cal. Code Regs. Section 15000 et seq, App. G.) The City of Cloverdale’s historic water extraction rights, since the later 1800s, is from Pluton Creek, a tributary of Big Sulphur Creek, and from the confluence of Big Sulphur Creek with the Russian River. Today, the intake water wells are pulling from the gravels beneath the Russian River at the confluence. The City wells supply the drinking water for 6,000 people.

[End T6]

[Begin T7]

- 7) See CEQA Guidelines Appendix G for effects that are normally treated as significant. We argue that certain impacts must be treated as significant and mitigation measures adopted for these impacts, see Item X. “Violate any ambient air quality standard, contribute substantially to an existing or projected air quality violation, or expose sensitive receptors to substantial pollutant concentrations.” (14 Cal. Code Regs. Section 15000 et seq, App. G.) You have not addressed in adequate manner the impacts of radon other than a “nod” on pg 4.5-47. Even though you point out on pg E-9 the California Energy Commissions concern and requirement for a significant number of Plant Units to contact them immediately if Radon exceeds standards.

[End T7]

[Begin T8]

- 8) Financial impacts on the environment are significant because of the potential that bankruptcy and insufficient bonds will result in an inability to clean up the environment. If a single owner, such as a steam field leaseholder, purchases a plant, then their capital is sunk deeper into the same potentially insolvent generation unit. Please see the results of the Geo Operator Corporation bankruptcy that resulted in 24 leaking wells in 1997 in Sonoma and Mendocino Counties. Geo's bonds were inadequate and could only address one well head in Mendocino, leaving the remaining 23 wells to be repaired with County and State funds of over \$2 million. The wells had to be replugged because of leaking hydrogen sulfide killing any living thing within hundreds of yards. (4/11/97 Final Report on GEO Abandonment filed with Sonoma County Planning Dept. and available in local libraries.)

A mitigation step should be included that would require a bonding requirement of the new owners to a level that would ensure that decommission and habitat restoration is done correctly and completely. This should be extended to address all directly related environmental damage. In addition, sufficient funds should be collected from plant operators to provide for inspections and monitoring by an independent party responsible to the public.

[End T8]

[Begin T9]

- 9) The DEIR mentions the current and future projects for LACOSAN and Santa Rosa for injection of wastewater into 14-28 injection wells to "kickstart" the production of steam. However, there is the potential that the LACOSAN project may not be successful, and that the Santa Rosa project may not take place. You neglect in pg 2-36 to mention any of the other impacts of the steam constituents beyond sulfur. What has been unaddressed in this DEIR is the increase of corrosive solutes in the geothermal steam that have produced high levels of chloride at the wellhead with observed levels greater than 100 ppm. The chloride-bearing steam is acidic and highly corrosive and, as The Geysers reservoir dries out over time, the production of higher levels will increase with resultant long-term significance. You noted on pg C-8 that "Note that a change to cycling operations increases maintenance costs, due to the higher variability of operations and/or increased corrosion in the steam wells." You will need to reassess the impacts on both financial and environmental conditions from a continued increase of corrosive acids over the long term.

Also, item 7. on pg. S-12 stating that "the two proposed waster injection projects....are being implemented and have helped to stabilize generation capacity at the Geysers plant" is highly speculative and false, since not one inch of pipe has been laid for the more massive project. It is hard to believe that a proposed project has such far-reaching capabilities as to effect production when nothing, in fact, has occurred.

[End T9]

[Begin T10]

- 10) On Pg. S-5 and 2-7, please elaborate on the statement that "PG&E will retain certain liabilities for existing contamination of soil and groundwater and will be responsible for conducting remediation activities of such contamination after the sales." What liabilities? What sites? What contamination? What groundwater and water hydrology courses? What mitigates the contamination? What are the standards that must be reached? On pg. 4.9-13 you note that PG&E hasn't completed a Risk assessment to determine the nature and extent of the contamination.

[End T10]

[Begin T11]

- 11) Pg. S-5 The statement that “The Purchase and Sale agreement for each plant requires a deed restriction that prevents the new owner from using the site for residential or other sensitive uses” should also contain the following: “deed restrictions also commits the new owner to uphold all plant EIR mitigations that stipulated a return to native habitat after the decommissioning of the plant.”

[End T11]

[Begin T12]

- 12) On pg S-17 and 1-7 you mention that one of the areas of controversy is “the potential for the sales to increase diversions from creeks in the Geysers area” however, you never address this issue in any way in the DEIR, nor is there any attempt to show whether there is a significant impact nor an offsetting mitigation to the effect. There are almost 100 applications for increased water diversion from the Russian River and it’s tributaries pending before the California Division of Water Rights. One of the two largest is an application by UNOCAL to extract additional water from the Big Sulphur Creek tributaries. Please contact the DWR for information or let the writer of the letter know that you need help and information will be supplied. What creeks are you referring to? Please note that on pg 4.4-16 you state “Changes in production at the Geysers would not be expected to affect water quality or quantity.” Which is it? Affect or no affect?

[End T12]

[Begin T13]

- 13) On pg. 2-6 you state that the sale of the power plants is to occur under the following terms and conditions, “The Geysers Power Plant will be offered for sale through a competitive bidding process to buyers who are qualified to ensure that the plant operates when needed for system reliability, and, when no longer needed, to conduct any required decommissioning in a responsible manner.” Please give specific qualifications by which actions are to be ensured. What are the specific tasks that they will conduct in order to decommission in a responsible manner?

[End T13]

[Begin T14]

- 14) On pg 2-38, we take exception to the statement that “geothermal steam is expanded through a steam turbine and cooled and condensed into water...” When, in fact, the condensate contains a vast number of toxic substances. These toxic substances are the reason condensate is reinjected instead of shipped out of the area. The original permit granters were afraid to ship that much waste over the Highways of California since the only site that could take something of this high of level of toxicity was Kettleman Hills in Southern California. You need to adequately address the environmental impacts from the handling of potentially increased amounts of condensate.

[End T14]

[Begin T15]

- 15) You outline in Table 2.2 the fact that 14 Units are using outdated technology for “scrubbing” Hydrogen Sulfide. There are a significant number of the plants that don’t use Stretford systems. You are responsible to address the environmental impacts and the potential for mitigation from decommissioning plants with non-Stretford systems and addressing the uncoupling of some plants from a single sale and bid proposal.

[End T15]

[Begin T16]

- 16) It is noted on Pg 4.5-45 that you have included “Annual Wind Rose” patterns for air particulate impacts for all the plant sites except for The Geysers. This is notable when on pg 4.5-75 you note that hydrogen sulfide emissions will increase by 40% in the Sonoma County plants. We can only assume that you did not have them available. Please contact the Regional Air Quality Control Board or the author of this letter and air patterns will be made available to you. The fallout in The Geysers is notable and there are Deer Lung studies available. Please contact or visit the Regional Library in the town of Lakeport.

[End T16]

[Begin T17]

- 17) On pg 4.8-2 you make an interesting statement that the problem with The Geysers is that it is “not a ‘unitary’ steam field; i.e., each operator is not ‘assigned’ a percentage of the field to utilize. Instead, the more wells an operator builds, the more the operator is free and able to tap the resource. As a result, too many wells have been used to tap the KGRA. The steam resource is being unsustainably drawn upon, and the steam pressure from the field has been dropping for many years, currently to as low as 200 pounds per square inch (psi) from a peak of 500 psi.” What you haven’t addressed is what this impact has on the productivity and potential shutdown of certain plants. Nor have you addressed the issue that the root problem could exacerbate an accelerated shutdown of the resource extraction and the resultant impacts and mitigations.

[End T17]

[Begin T18]

- 18) On pg 4.9-20 and E-5 you list hazardous materials at the power plants as less than significant. You mention asbestos as insulation material, but you may be unaware that The Geysers contains two unique materials, serpentine or asbestos and cinnabar or mercury. There are many abandoned mines and tailing sites going back approximately 100 years. The sites should be identified and OSHA requirements should be explained to new owners, including the run off pattern into area water ways. This would be significant for Plant #14 and “has four pumps in the turbine room from constant standing water” and from the floorplan layouts of the plants showing significant number of “sump/pump”, “standing water”, and “drainage pipe” sites. Also worthy of note is Plant #15 which was built directly upon a mercury mine (Bedrossian, 1980). A mercury retort and mine tailings are adjacent to the Filley 1 well pad. As stated by Mark Walters in “Geochemical Aspects of the Unit 15 Steam Field”, that “therefore it is no surprise that steam from the Unit 15 steam field contains mercury and associated elements.” This is one example of many found easily in literature going back to the 1960s and can be found through a simple online search at the downtown Santa Rosa library.

[End T18]

T. SIERRA CLUB REDWOOD CHAPTER

- T0 Comments on specific alleged deficiencies or errors are addressed individually as they are raised in the commenter's subsequent comments. The CPUC disagrees with the commenter's assessment of the DEIR as deficient. Therefore, there is no need to re-issue the document.
- T1 Potential impacts to steelhead trout and coho salmon at the Pittsburg and Contra Costa Power Plants are discussed under Impact 4.7-2, and mitigation is provided under Mitigation Measure 4.7-2. These two species are not expected to be impacted by operations at the Potrero Power Plant, where occurrences of salmonids are rare. Big Sulphur Creek in the vicinity of the Geysers is an important steelhead spawning and rearing stream. However, there is nothing inherent in the normal operating processes of the Geysers Power Plant that would constitute a "take" of a listed species, and thus the change in listing status is not relevant to the CEQA analysis. Should a "take" occur as a result of equipment failure (e.g. geothermal condensate spill) or personnel negligence, the enforcement of the provisions of the Endangered Species Act would be no different whether PG&E or another entity owned the power plant.
- T2 It is not clear why the commenter believes that the environmental baseline is nonexistent. The Baseline scenario for 1999 is defined on pages 3-2 and 3-9 through 3-12 of the DEIR and is used as a basis of comparison in evaluating all environmental impacts discussed in the DEIR. As noted in the DEIR, the baseline reflects the ongoing restructuring of the electric utility industry that will continue to occur with or without implementation of the proposed project.
- T3 Proposition 9 was on the ballot in California on November 3, 1998 and was defeated. Regarding decommissioning, please see the response to Comment B5.
- T4 As noted in the comment, the intention of the CEQA requirement to address both short-term and long-term significant effects of the project is to ensure consideration of the full range of environmental impacts associated with the project. The year 2005 was selected for analysis of long-term effects for the following reasons: (1) the restructuring of the electric industry will be complete by then; (2) for purposes of a cumulative analysis, it is difficult to anticipate future projects beyond that date; (3) a variety of anticipated changes in the regional electricity generation and transmission system will have been implemented by 2005; and (4) beyond that date, physical and operational differences between restructuring with divestiture as currently proposed and without divestiture could be effectively eliminated. In this context, evaluating potential effects through the year 2005 does encompass the potential long-term effects of the project. Please also note that the air quality analysis also considers longer-term cumulative air quality effects in 2015, based on populations projections supplied by the Association of Bay Area Governments and extrapolations of air quality projections developed by the BAAQMD.
- T5a Please see response to Comment T1.

T5b The commenter implies that hydrogen sulfide will convert to sulfur dioxide, which is a phytotoxicant to plants, and will result in ambient air levels that are great enough to damage plants. Studies indicate that the conversion of hydrogen sulfide to sulfur dioxide in the atmosphere is a slow process (Seinfeld, 1986 and Baulch, et al., 1982), with typical conversion times being over 53 hours. Within that time period, pollutant emissions from the Geysers plants would be transported many miles downwind, and concentrations of these pollutants would be extremely small because of dilution by the air. Therefore, hydrogen sulfide conversion to sulfur dioxide at these larger distances from the plants would result in levels well below those that could affect plants.

In addition to the response, the following references are hereby added to the reference list for Section 4.5, Air Quality, on page 4.5-84 of the DEIR:

Seinfeld, J.H., *Atmospheric Chemistry and Physics of Air Pollution*, John Wiley & Sons, pages 164-169, 1986.

Baulch, D.L., R.A. Cox, P.J. Crutzen, R.F. Hamilton, F.A. Kerr, J. Troe, and R.P. Watson, *Evaluated Kinetic and Photochemical Data for Atmospheric Chemistry*, J. Phys. Chem. Ref. Data, Vol. 11, 1982.

T5c It cannot be assumed that the proposed divestiture of the Geysers Power Plant will result in an increase in geothermal condensate spills because it is not projected that divestiture would lead to additional accidents. Therefore, the concern, while valid, does not constitute an impact of divestiture.

T5d PG&E has not received any National Marine Fisheries Service (NMFS) requirements for the Geysers. The Secretary of Commerce, through NMFS, has not yet issued a Protective Regulations ruling for steelhead trout under Section 4(d) of the Endangered Species Act of 1973. Until such a ruling is made, NMFS is acting in the role of advisory agency rather than regulatory agency with respect to threatened steelhead.

T5e The proposed divestiture project, i.e. the transfer of ownership of PG&E's power plants, is not expected to have any impacts on special status species other than those discussed in Impacts 4.7-1 and 4.7-2. Mitigation Measure 4.7-1 addresses the need for future owners to be aware of all biological resources within the project area so as to not impact these resources through unforeseen, non-power-production activities such as equipment storage, maintenance practice changes, road access, facility repair, etc. To clarify that the materials provided by PG&E to the new owners must be readily accessible, Mitigation Measure 4.7-1 on page 4.7-34 of the DEIR is hereby amended as follows:

Mitigation Measure 4.7-1 PG&E shall provide ~~Provide~~ future plant owners with informational materials and training documents in PG&E's possession concerning jurisdictional wetlands and special status species and habitats in the vicinity of the power plants to be divested. This material shall be indexed and organized in a manner that is readily accessible to the new owners.

T6 Section 4.4.3, Significance Criteria, includes both CEQA Appendix G, Item (f): Substantially degrade water supply; and Item (g): Contaminate a water supply. As described in Impact 4.4-1, the project would have minimal, if any, effects on water quality.

T7 The measured concentrations of radon are typical of safe background levels and well below levels causing health problems. As a precaution to prevent exposure levels from exceeding health levels, the Air District requires that radon levels be monitored near the Geysers project. There are typographical errors on page 4.5-47 that lead to the wrong conclusions. Thus the text regarding radon in the third sentence of the third full paragraph on page 4.5-47 of the DEIR has been changed to read:

The measurements ~~indicated~~ showed levels of radon ranging from ~~3-0.3~~ to ~~5-0.5~~ pico-curies per liter of air, which is ~~below~~ above typical background levels of 1 pico-curie per liter (1998, personal communication with Lake County APCD).

T8 The steam field operator referenced in the comment did go bankrupt and abandon 24 leaking wells in the Geysers Known Geothermal Resource Area in 1997. U.S. Environmental Protection Agency Superfund monies were used to cap seven of the wells, and a grant from the CEC provided the funds to cap all but one of the remaining wells. The one uncapped well is not currently considered an environmental threat. Please note that potential buyers of the project power plants will be carefully screened for financial solvency and will be subject to CPUC approval. Regarding decommissioning, please see responses to Comments B5 and K1.

T9 The increase in cycling operations discussed in Attachment C is going on currently, and has been going on since 1994. Increased cycling would not be a consequence of divestiture, although restructuring may encourage cycling by altering the economic incentives faced by any owner, whether it be PG&E or a new buyer. For this reason, analyzing the impacts of cycling is beyond the scope of this DEIR.

The Lake County effluent pipeline currently is able to deliver at least 8 million gallons per day (mgd) to the Southeast Geysers area (see the response to Comment P54). Although smaller, this is still comparable to the proposed 11 mgd capacity for the Santa Rosa pipeline. The Lake County line has been in operation less than a year, but has already increased generation capacity at the affected PG&E units by about 40 MW, which is an average of 10 MW apiece for Units 13, 16, 18 and 20, the four units affected. Also please see the response to Comment L15. It appears that, if anything, the DEIR had underestimated the potential improvements from these projects.

The comment faults information presented in the Project Description (on page 2-36 of the DEIR) for failing to address constituents of the geothermal steam. Such constituents are described elsewhere in the DEIR where relevant. For example, chemical constituents found in geothermal steam are mentioned on page 4.9-12. (Also, as noted on page 4.4-12 of the DEIR, the Geysers plant has a zero water discharge program and therefore needs no NPDES permit nor wastewater discharge requirements.)

The commenter alleges that there are “corrosive solutes in the geothermal steam that have produced high levels of chloride at the wellhead with observed levels greater than 100 ppm.” The commenter goes on to claim that “the chloride-bearing steam is acidic and highly corrosive...” However, the commenter provides no basis for these assertions. In fact, steam or water having chloride concentrations of “greater than 100 ppm” would be neither “acidic” nor “highly corrosive.” The chloride ion by itself is a neutral ion (a constituent of table salt) that imparts no acidic quality to steam or water, and low concentrations of 100 ppm chloride are not corrosive. Given the fact that the drinking water standard for chloride is 500 ppm, a concentration of 100 ppm of chloride would not be considered a “high level” by any authority. It follows that the claim that it could be “highly corrosive” or “acidic” appears unreasonable.

The commenter’s assertion that the statement on page S-12 of the DEIR [“7. The two proposed wastewater injection projects...are being implemented...”] is “highly speculative and false” is mistaken. The DEIR text is correct as written. The DEIR is merely stating the cumulative assumptions for the year 2005, not claiming that the projects are happening now or are guaranteed to happen as the commenter seems to imply. The commenter is correct that the proposed projects may in fact not ultimately be approved or implemented, but CEQA requires that the cumulative analysis assume that proposed projects actually will occur.

- T10 The comment focuses specifically on the Executive Summary of the DEIR and on Chapter 2, the Project Description. However, the concerns of the commenter regarding existing contamination and cleanup are discussed in the local setting and impact descriptions for the Geysers Power Plant in the Hazards section of the DEIR. The Hazards setting for the Geysers Power Plant begins on page 4.9-12. Impacts of remediation are discussed under Impact 4.9-1, which starts on page 4.9-14, and under Impact 4.9-2, which can be found on page 4.9-18.

The Phase II Environmental Site Assessment and the Risk Assessment have now been completed for the Geysers Power Plant. The findings and conclusions of the Phase II Environmental Site Assessment and the Risk Assessment do not modify the analysis nor conclusions of the DEIR. Page 4.9.13 of the DEIR (bottom of page) is hereby amended with the following new paragraphs:

A Phase II Environmental Site Assessment (ESA) was performed by Fluor Daniel GTI at Pacific Gas and Electric Company’s (PG&E) Geysers Power Plant (GPP). The purpose and objectives of the Phase II ESA were:

- to conduct subsurface testing to investigate issues identified in the Phase I ESA and establish a baseline definition of chemical distribution;
- to present, summarize, and evaluate data collected during the subsurface testing to determine the nature and extent of any impact on soil and groundwater;

- to conduct and present the results of a baseline health risk assessment (BHRA);
- to establish cleanup levels for chemicals which, based on the BHRA and regulatory requirements, are likely to require remediation; and
- to develop a reasonable approach for conducting any required remediation and estimate the costs that would be incurred if the approach were implemented. A reasonable approach is defined as a cost effective approach having a high likelihood of being accepted by regulatory agencies having jurisdiction over the remediation process.

Fluor Daniel prepared a soil and groundwater sampling plan for the site; a summary of the work that was completed during the Phase II subsurface testing is provided below.

Subsurface Testing Completed between January and July 1998:

- drilled 347 soil borings, including hand augured borings;
- collected and analyzed 927 soil samples;
- installed 36 temporary groundwater monitoring wells;
- collected and analyzed 76 groundwater samples from 36 newly installed temporary wells and 11 existing permanent monitoring wells; and
- measured liquid levels in all wells.

The data at the Geysers Power Plant during the Phase II subsurface testing were used to further describe the site characteristics and to describe the nature and extent of chemicals in soil and groundwater. A summary of results of the Phase II investigations follows.

Soil Results:

- Volatile Organic Compounds (VOCs). The only VOC detected in soil was methylene chloride, which is a suspected laboratory contaminant.
- Polynuclear Aromatic Hydrocarbons (PAHs). PAHs were present in 14 percent of the samples; PAHs were most often detected in the 0- to 1-foot soil zone; the maximum concentrations ranged from a low of 0.22 mg/kg for anthracene at the General Construction Warehouse, to a high of 1.3 mg/kg for acenaphthene and pyrene (each) at the Scrap and Turbine Yard. The average concentration at the 95% upper confidence limit (UCL) for acenaphthene and pyrene were 0.07 mg/kg and 0.073 mg/kg, respectively.
- Polychlorinated Biphenyls (PCBs). PCBs were detected in 4 percent of the samples collected; the maximum concentration was 8.4 mg/kg at Unit 5/6 and the average concentration at the 95% UCL was 0.15 mg/kg.

- Total Extractable Hydrocarbons (TEH). TEH was detected in 88 percent of the samples. The maximum TEH concentration was 19,000 mg/kg at 3.5 ft. at Former Unit 15; however, the majority of the samples are far below this maximum value. The average TEH concentration at the 95% UCL was 193 mg/kg.
- Metals. Various metals were detected throughout the Geysers Power Plant (as expected based on the bedrock geology and natural geothermal conditions); a comparison of metals results to background conditions indicates the metals are naturally occurring in soil and bedrock.
- Asbestos. No asbestos was detected or observed.

Groundwater results:

- Separate-phase hydrocarbon petroleum product. SPH products were observed at three locations: Units 7/8, 9/10, and 14.
- VOCs. VOCs were detected in 22 percent of the samples. The highest concentration was 190 µg/L of 1,1-DCA at Unit 7/8.
- TEH. Hydrocarbons were detected in 28 percent of the samples; the highest concentration was 560,000 µg/L at Unit 7/8.
- PAHs. PAHs were detected in 2 percent of the samples; the highest concentration was naphthalene at 15 µg/L at Unit 9/10.
- Metals. Various metals were detected in the groundwater. The concentrations of metals varied throughout the Geysers area as influenced by varying soil and bedrock geochemistry. The mechanism for their presence in groundwater was generally defined as dissolution of naturally occurring metals from soil and/or bedrock, although at five investigation areas (Unit 5/6, 7/8, 9/10, 11 and former Unit 15) the metals in groundwater may be due to potential contaminant sources.
- PCBs. No PCBs were detected in the 29 groundwater samples analyzed.

A baseline health risk assessment was completed to determine whether the chemicals detected in soil and groundwater present an unacceptable risk to human health and the environment given the assumptions made for the risk assessment. The acceptable level of risk established for this project was consistent with that typically allowed by state and federal environmental agencies, as follows:

- (a) For cancer-causing chemicals (carcinogens): a cumulative (i.e. the sum of risks posed by all chemicals) incidental increase in risk to human health not exceeding 1 in 100,000.
- (b) For chemicals having other toxic effects (noncarcinogens): a cumulative toxic effect not having a hazard index exceeding 1.0.

Health risks were calculated for potential receptor populations including the current and hypothetical future power plant worker, the current and hypothetical future construction worker, the current and hypothetical future visitor (includes vendors providing deliveries, trespassers and land owners using the area for recreation purposes), the hypothetical future office worker, and the hypothetical future resident.

The risk assessment showed there to be risks to the hypothetical future resident exceeding the project threshold at several investigation areas. The calculated cumulative risk (the sum of risk posed by all chemicals) exceeded the project thresholds for: (1) PCBs and PAHs in soil at Unit 5/6; (2) benzo(a)pyrene in groundwater at Unit 14; and (3) metals in groundwater at several investigation areas (Unit 5/6, 7/8, 9/10, 11, and Former Unit 150.

Risk-based cleanup goals were calculated for boron and vanadium in groundwater. Cleanup goals established in environmental laws and regulations and in previous restoration projects approved by environmental agencies having jurisdiction over the Geysers Power Plant were used for PCBs, PAHs, and other metals.

Cleanup goals for soils were established as follows:

- 100 mg/kg TEH where shallow groundwater was encountered. This value was selected on the basis of a review of cleanup levels approved by regulatory agencies for restoration of former Unit 1-2 and 3-4 at the Geysers Power Plant.
- 1,000 mg/kg TEH where groundwater is not encountered. This level is based on industry and regulatory standards.
- 1.0 mg/kg total PCBs (dry weight). This goal is based on federal regulation regarding PCB wastes.

Cleanup goals for groundwater were established as follows:

- 100 µg/L TEH. This value was selected on the basis of a taste and odor threshold established for diesel in water.
- MCLs for other VOCs, PAHs and metals. The maximum contaminant levels were taken from state and federal regulations regarding beneficial use designations and drinking water standards.
- 980 µg/L and 80 µg/L for boron and vanadium, respectively. These are calculated risk values based cleanup goals protective of human health for drinking water uses (MCLs do not exist for these two compounds).

The data collected during the Phase II investigation were compared against the hypothetical cleanup goals listed above. On that basis, Fluor Daniel GTI postulated that the following site conditions exist for which a regulatory agency would likely require remediation on the basis of the various cleanup goals listed above:

- PCBs in soil: remediation of PCBs in soil at Unit 5/6 where the total PCB concentrations exceed 1.0 mg/kg.
- TEH in soils at sites with shallow groundwater: remediation of petroleum hydrocarbons in soil at locations where concentrations exceed 100 mg/kg TEH.
- TEH in soil at sites with deep groundwater: remediation of petroleum hydrocarbons in soil at locations where concentrations exceed 1,000 mg/kg TEH.
- Separate phase hydrocarbon petroleum product: remediation of floating petroleum hydrocarbons in groundwater where present in measurable thickness.
- TEH in groundwater: remediation of dissolved TEH in groundwater where present in concentrations exceeding 100 µg/L TEH.
- VOC, PAHs, and metals in groundwater: remediation of dissolved organic compounds in groundwater where present in concentrations exceeding MCLs (or risk-based goals for boron and vanadium).

Fluor Daniel GTI suggested various remediation approaches for the contaminants. The alternatives were evaluated and ranked according to their effectiveness, their ease of implementation, and their cost. On the basis of the evaluation and ranking, the highest ranking remedial alternative for each remedial issue was called out as the preferred alternative. The actual remedial steps to be taken ultimately will be decided with the participation of the lead agency.

The findings and conclusions of the Phase II investigation and the Risk Assessment do not modify the analysis nor conclusions of the DEIR.

In addition, page 4.9-25 of the DEIR is hereby amended with the following additional reference:

Fluor Daniel GTI, *Phase II Environmental Site Assessment: Geysers Power Plant*, prepared for Pacific Gas and Electric Company, San Francisco, California, August 1998.

- T11 No EIR mitigation measures refer to decommissioning of the units. Regarding decommissioning generally, please see response to Comment B5.
- T12 Page 1-7, item No. 4 of the DEIR lists concerns raised by the public with respect to the project prior to publication of the DEIR; no analysis or conclusions of environmental effects are presented in this section. Although there currently are diversions of some creeks by steamfield owners (not owners of generating units) for reinjection, there is no evidence that new owners of the generating units would attempt additional creek diversions, and no diversions are proposed as part of the project. Also see response to Comment N19.

T13 Please see response to Comment B5.

T14 The statement on page 2-38 of the DEIR (third paragraph) that “geothermal steam is expanded through a steam turbine and cooled and condensed into water...” accurately describes the overall electricity-generating process at the Geysers Power Plant. Steam condensate is produced during normal turbine operation. There is no reason to believe that divestiture would result in increased amounts of steam condensate being generated at the plant. See the responses to Comments H4, H5, and H15 for discussions of market forces and related factors that might affect future utilization of the Geysers steam resources.

Trace chemical constituents of geothermal steam were discussed in the DEIR in Section 4.9, Hazards. Toxic properties of the trace constituents of steam reflect the natural properties of local geology. There is no information to support the commenter’s contention that steam contains a “vast number of toxic substances” that the “original permit granters were afraid to ship...over the highways of California.”

Hazardous waste streams at the Geysers Power Plant generally are process wastes associated with abatement systems; these wastes are handled in proper fashion, as is described in detail in the DEIR on page 4.9-23 under Impact 4.9-5, and on page E-5 of Attachment E.

The most significant toxic component found in the naturally occurring geothermal steam is hydrogen sulfide gas, as is discussed in the DEIR on page 4.9-12. All of the generating units at the Geysers Power Plant have hydrogen sulfide abatement systems, as is mentioned on page 4.9-12 and described in more detail in Attachment E in the DEIR. Also see response to Comment H22.

Other naturally occurring trace contaminants of geothermal steam include mercury and arsenic, as is mentioned on page 4.9-13 in the DEIR. Mercury is removed from the geothermal steam by means of activated-carbon scrubbers, as is described in the DEIR on page 4.9-13 (second paragraph). Precautions taken to minimize exposure to other metals including arsenic are described in the response to Comment H47.

T15 Please see response to Comment B5 regarding increased risk of environmental impact under a new owner in relation to plant decommissioning. The potential impacts of future decommissioning (not a part of divestiture) of the sulfur scrubbing units would not be affected by plant ownership, nor by the type of sulfur scrubbing technology employed at various Geysers units. The commenter offers no rationale for why decommissioning of the various scrubber systems might pose any unusual environmental problems.

Refer to the response to Comment H31 for a discussion of best available control technology for hydrogen sulfide at the Geysers units. Refer to the response to Comment H22 for an expanded description of sulfur scrubbing systems.

T16 The commenter notes that a representative wind rose was not presented for the Geysers Power Plant similar to those provided for the three Bay Area power plants, and assumes that such data were unavailable to the DEIR preparation team. In fact, tabular wind speed and direction data from several locations within the Geysers area were available to the DEIR authors during report preparation. These data were reviewed and considered as part of the environmental review for air quality impacts. They were not presented in the DEIR because the Geysers units, unlike each of the fossil-fueled plants, are located in a mountainous region with units widely separated by distance, elevation, and terrain. The several available meteorological data sets examined for the Geysers each tended to show influences from local topography specific to the location of the Geyser unit closest to that monitoring station. Because of these local influences, none of the available meteorological data sets could be considered representative for the all of the Geyser units and, thus, were not presented in the DEIR. The local wind flow situation present in the Geysers area is further discussed on the final paragraph of page 4.5-2 and the first full paragraph of page 4.5-3 of the DEIR.

T17 The decline in the Geysers steam field production has been known since at least 1987. Both steam field and power plant operators have studied various means of extending the steam supply, including closing power plants. Based on the analysis presented in the DEIR, divestiture of the Geysers is unlikely to exacerbate the steam field decline. For this reason, analysis of “productivity and potential shutdown of certain plants” is inappropriate given the lack of any discernible causation.

Alternative 3 (sale of Geysers units to the steam field owners) is designated the “environmentally superior alternative” because it would “unify” the steam fields to a large extent by vertically integrating the operations (see page 6-23 of the DEIR). This would improve the incentives to effectively coordinate steam and electricity production to maximize the economic benefits from Geysers generation.

T18 The runoff from the plants at the Geysers is contained through on-site drainage facilities and injected to supplement the natural deep groundwater and increase steam production.

The DEIR page 4.3-6 has been revised in response to Comment H27 to list serpentine as part of the geologic structure of the Franciscan Formation that underlies the Geysers. As noted in response to Comment H27, in order for asbestos particles that are contained in the serpentine rock to become a hazard, it would have to be entrained into the air and transported by the wind to offsite receptors. For this to occur, the exposed rock would have to be crushed through construction activities and clearing and grading operations. The project will not require construction operations at the Geysers plant. Therefore there would be no exposure to asbestos particles under divestiture.

With respect to the area’s mercury mines, page 4.3-6, paragraph 2 is hereby revised to add the following language at the end of the paragraph:

Several abandoned mercury mines are located within the Geysers area, including Big Chief Mine, Thorne Mine, and Big Injun Mine which are located within ¾ mile from Unit 16. Soil samples from the area near Unit 16 were collected and analyzed as part of the Phase II Environmental Site Assessment (Flour Daniel GTI, 1998). Mercury levels in the soil samples were found to be within background levels.