APPENDIX A
NOTICE OF PREPAPRATION AND PUBLIC SCOPING

NOTICE OF PREPARATION AND EIR SCOPING COMMENTS

This appendix contains a copy of the Notice of Preparation of the EIR for the Bottle Rock Steam Project and copies of the comments for scoping of the EIR received during the scoping period.

Consistent with Section 15082 CEQA Guidelines, a Notice of Preparation (NOP) was issued by the Lake County Community Development Department on October 8, 2009. The NOP identified the Lake County Community Development Department as the Lead Agency for CEQA compliance for the proposed project. The NOP was submitted to the State Clearinghouse (Governor's Office of Planning and Research) and distributed to each responsible and trustee agency. The NOP also was filed with the USDI Bureau of Land Management. The NOP was mailed to all adjacent land owners and parties expressing interest in the proposed project. Issuance of the NOP initiated a required 30-day period during which written comments could be received on the scope and content of the EIR. In addition, a public meeting for EIR scoping was held October 27, 2009 in Cobb. Oral comments on the content of the EIR that were made at the meeting were summarized.

The purpose of scoping is to identify the potentially significant environmental issues, reasonable alternatives and mitigation measures for the proposed project. CEQA requires responses in the EIR only for those scoping elements. All the written comments received by the Lead Agency during the NOP review period are copied in this appendix.

The comment letters address a range of environmental and non-environmental issues. As stated in Section 15082 (b) (3) of the CEQA Guidelines, a list of concerns not related to the specific project shall not meet the requirements of this section of CEQA for a response. For this reason, a number of written and oral comments that were not specific to the proposed project identified in the NOP or to its physical environmental impacts are not addressed in this EIR. These include the following:

- The past record of existing use permit and other permit violations by the project sponsor at the site of their existing, permitted operations do not constitute the basis for environmental impact evaluation, provided that the project does not result in physical changes to adjacent properties. Resolution of those permit compliance issues is beyond the scope of CEQA in the EIR.

- Comments regarding the financial viability and motives of the project sponsor are not germane to the assessment of environmental impacts.

- Comments about the effects of the project on property values are not about environmental issues and are specifically exempt from assessment in CEQA, provided that the project does not result in physical changes to adjacent properties.

- Legal issues related to easements, rights of access, ownership, property lines, and other disputes are not environmental impact issues.

- Comments about the adequacy of existing laws, rules and regulations and their environmental impacts are not project-related and do not require evaluation in the EIR.

- Comments of support or opposition to the project are noted but no further action is required for the EIR.

- Suggestions for environmental impacts and their level of significance, alternatives and mitigation measures should be considered by the Lead Agency but do not require assessment in the EIR. Environmental issues found not to be important may be scoped out of the EIR under Section 15083 (a) CEQA Guidelines. However, CEQA does require an explanation in the record of why the Lead Agency did not accept the evaluation of a specific environmental impact, alternative or mitigation measure.

While excluded from evaluation in the EIR, the above noted types of comments may be considered by the decision-makers at the time they consider whether to approve or disapprove the proposed project.

COUNTY OF LAKE
COMMUNITY DEVELOPMENT DEPARTMENT
Courthouse - 255 N. Forbes Street
Lakeport, California 95453
Telephone 707/263-2221 FAX 707/263-2225

Notice of Preparation of an Environmental Impact Report and Notice of Scoping Meeting

TO: Responsible Agencies, Agencies with Jurisdiction by Law, Trustee Agencies, Involved Federal & State Agencies, and Agencies/People Requesting Notice

FROM: County of Lake
Community Development Department
Richard Coel, Director
255 North Forbes Street, Lakeport, CA 95453

DATE: October 8, 2009

RE: **Notice of Preparation (NOP) of an Environmental Impact Report (EIR) and Notice of Scoping Meeting for the <u>Bottle Rock Power Steam Project</u> scheduled October 27, 2009**

The County of Lake (Lead Agency) is preparing an Environmental Impact Report (EIR) for the proposed Bottle Rock Power Steam Project (Project) to inform decision makers and the general public of the potential public safety and environmental impacts of the project. The project owner, Bottle Rock Power GeoResource, has filed an application with the County for a Conditional Use Permit, requiring the County to conduct an environmental review of the Steam Project, which would involve construction of two new well pads near the existing Bottle Rock Power generating facility, each with 11 production wells and one injection well, as well as associated access roads and pipelines (see below for a more complete project description.

The County is cooperating with the California Energy Commission and the U.S. Bureau of Land Management (BLM) in the preparation of the EIR. The Energy Commission has jurisdiction over the licensing of the Bottle Rock plant, but the production and injection wells and associated infrastructure, including pipelines and access roads, are exempt from the Energy Commission's process and instead fall under the jurisdiction of the County. BLM well permits are required because the new steam field is on private land with federal mineral rights. BRP GeoResource has already been issued a geothermal lease by BLM. Both the Energy Commission and BLM will issue separate noticing for this project to meet those agencies obligations under the Warren-Alquist Act and the National Environmental Policy Act (NEPA), respectively. The County, the Energy Commission and BLM will coordinate their processes and documents to the extent feasible. The County has contracted with a consultant company, EDAW, to prepare the EIR, with direction from the County and input and review by the Energy Commission and BLM.

This notice fulfills the County's obligations under the California Environmental Quality Act (CEQA) to provide public notice of its intent to prepare in EIR for the Steam Project, and to hold a public scoping meeting to take public comment on the content of the EIR.

LOCATION

The project is located within a leasehold of approximately 350 acres known as the Francisco Leasehold on High Valley Road, Glenbrook Area, Lake County, California, within the Geysers Known Geothermal Resource Area (KGRA). It is located near the town of Cobb, California. The project site is located in the southeast and southwest quarters of the Section 31, Township 12 North, Range 8 West and the northeast quarter of Section 6, Township 11 North, Range 8 West and the southwest quarter of the southwest quarter of Section 32, Township 12 North, Range 8 West. The project area includes the following Assessor's Parcel Numbers:

013-002-01
013-002-03
013-002-04
013-002-05
011-012-97

PROJECT DESCRIPTION

LEASEHOLD AREAS AND WELL FIELDS

The existing steam field providing resource to Bottle Rock Power (BRP) is located on the Francisco Leasehold, held by Bottle Rock Power, and consists of 9 active production wells, 2 active injection wells, and 4 suspended production/injection wells. The proposed well pads would be located on the BRP GeoResource Leasehold located just north of the Francisco Leasehold. Figure 1.3-1 shows the project location and vicinity. Figure 1.3-2 shows the location of existing and proposed components. Two well pads would be constructed on the BRP GeoResource Leasehold (well pads 1-31 and 2-31). Well pad 1-31 (West pad) would be located approximately 0.5 miles west of High Valley Road. Well pad 2-31 (East pad) would be located immediately west of and adjacent to High Valley Road.

DESCRIPTION OF SITE CONDITIONS

The general locations for the two well pads were originally identified during the mid1980s when the Department of Water Resources (DWR) held the geothermal rights (then known as the Binkley Leasehold) and planned to develop the geothermal resources. The well pads were never constructed although the East pad was permitted. DWR maintained ownership until the mid 1990's until a decision was made to relinquish the rights to the geothermal resource. At that time mineral ownership reverted to the Bureau of Land Management (BLM).

BRP completed an analysis of potential sites for well pads throughout the leasehold, when it became apparent that the BLM intended to offer the lease for competitive bidding under the newly promulgated 2005 Energy Policy Act regulations. The analysis concluded that the two original locations still represented the most appropriate locations for drilling. The primary criteria for selecting well pad locations in The Geysers have been:

- Absence of any landslide potential – any small mass movement could impact the integrity of shallow well casings
- Minimizing total area of disturbance
- Anticipation of major environmental constraints prior to detailed environmental analysis

- Ability to access all major geothermal resource targets within the lease using currently available directional drilling technologies

The well pads do not appear to be located in areas with the potential for landslides, although all geotechnical evaluations for the West pad are not yet complete. Surface disturbance for both well pads was minimized by the placement of the pads in topographic areas that would require grading without extensive use of spoils areas.

Analysis completed by BRP GeoResource indicated only one previously known, specific, environmental constraint. The original location for the DWR West pad was close to an identified archaeological site, CA-LAK-1180. The West pad for the BRP Steam Project was re-positioned to the west-southwest of the original DWR location in order to avoid impacts to this archaeological site.

The two selected well pads will allow drilling access to most of the lease with ease. Directional drilling techniques allow well targets to be tested, not only at the correct location and depth, but also from wells drilled in the most appropriate direction with respect to regional stress fields.

WELL PADS

The sites for the proposed well pads were originally determined during the mid-1980's when DWR held the geothermal rights and planned to develop the geothermal resource. The well pads were never constructed but later analysis by BRP confirmed these sites were still the most appropriate for drilling. The well pad locations appear to be located away from areas with landslide potential and surface disturbance would be minimized by their placement in topographic areas that would require grading without extensive use of spoils. Well pad placement was also determined by the anticipation of other environmental constraints (e.g., noise, geology, and water resources) and ability to access all major geothermal resource targets within the leasehold using directional drilling technologies.

The operational area of each well pad would be approximately 3.2 acres in size but construction of the pads would disturb an area of approximately 8.4 acres for the West pad and 8 acres for the East pad. The access road between the East and West pads would disturb approximately 5.2 acres. Actual dimensions of each well pad would be modified to best match the specific physical and environmental characteristics of the project area to minimize cut and fill and ground disturbance. A geotechnical study would be completed prior to construction for slope stability analysis to minimize the chances of landslides and other geologic hazards.

Well pad preparation activities would include clearing, earthwork, drainage, and other improvements necessary for efficient and safe operation as well as for fire prevention. The Lake County Grading Ordinance provides restrictions on grading activities between October 15 and April 15; grading during these restricted months requires a mitigation plan approved by Lake County prior to grading activities. All vegetation would be removed from the area of construction. Clearing would include removal of organic material, stumps, brush, and slash. One of the goals of site selection has been to balance the amount of cut and fill required for each well pad. Current estimates of cut and fill for the West pad is 55,000 cubic yards of cut and 95,000 cubic yards of fill. For the East pad a balanced cut and fill of 175,000 cubic yards is proposed. An additional 40,000 cubic yards of cut is proposed for the access road between the two pads.

Topsoil and other cut materials created during the construction of the well pads and access road would be used for fill purposes elsewhere on the two well pad sites. The marketable timber would be cut and stacked. The brush and stumps would be removed, stockpiled and burned or buried in spoil areas. Topsoil would be stockpiled for use in final soiling of fill areas. The stockpile areas would be in areas that are disturbed during the cut and fill process. Brush would be mulched and used in revegetation.

Both well pad sites would be prepared to create a level pad for the drill rig and a graded surface for the support equipment. The fill area would be keyed into undisturbed ground. The fill would be placed in 6 to 8 inch lifts and compacted using generally approved compaction equipment to 90 percent of the American Society for Testing and Materials (ASTM) D 1557 - 70 and the top two feet compacted to 95 percent. Cut slopes higher than thirty feet would be benched unless authorized by a registered civil engineer. The cut slope would be cut with a slope bar. A drainage system would be provided to carry away the water collected on the upper slopes and natural drainage systems. The drainage system would consist of ditches on the upslope perimeter of the well pads. These ditches would be sloped to drain at a gradient of 2 percent. Energy dissipaters would be installed where required. All machinery, drilling platforms, and oil and fuel storage would be in contained areas to prevent direct runoff. Fluids from these areas would be fully contained.

Well pad cut and fill slopes exposed by grading would be re-vegetated with approved grasses and/or woody plants and trees. The revegetation would be done the first fall after completion of construction prior to the start of the growing seasons in late summer or early fall in order to utilize the first light rains to germinate grass seeds. All seeds and propagules (such as tubers, offsets, or runners) used in revegetation of disturbed lands would be native species. A Seed Mix and Specifications Plan is proposed. Well pad facilities would include the drill rig, water storage truck or tank, mud and water mixing tanks, an above ground diesel fuel storage tank, pipe rack, and drillers/geologist trailers.

WELL DRILLING

The wells would be drilled with a rotary drilling rig similar to those used throughout The Geysers. The drill rig would extend as much as 178 feet above the ground surface (depending on the type of rig used). Rig masts are made of a metal lattice and are painted red and white at the top and include flashing lights to meet Federal Aviation Administration (FAA) requirements.

Directional drilling may be conducted based on the location and extent of geothermal resources in proximity to the well site. Geothermal drilling permit applications would be submitted to the BLM for the drilling of these wells. A Drilling Plan would be prepared prior to drilling each well. The Drilling Plan would detail the drilling sequence of operations, the rig well pad layout, a well completion schematic, and a description and specification of the temporary noise barriers that are used for drilling.

The drilling program involves drilling a borehole to the reservoir formation at a measured depth of about 10,000 to 12,000 feet. The wells would be completed with a slotted liner through the production zone with a continuous string of production casing from the top of the production zone to the surface.

Wells would be drilled using a combination of bentonite-based mud and air drilling methods. The upper portion of the wells would be drilled using conventional mud drilling with surface casing set and cemented to approximately 3,000 feet and production casing set and cemented to between 6,000 to 7,000 feet, based on depth to the geothermal reservoir in the BRP GeoResource wells. Below the production casing, and through the steam reservoir, it is standard practice in The Geysers KGRA to drill with air in order to prevent damage to the reservoir by drilling muds migrating into the formation and reducing reservoir permeability.

A sumpless drilling process would be used to drill the borehole. A closed loop, mud circulating system, is being proposed for the project to eliminate the dumping of solids or liquids into the sump. The system would minimize the liquid and solid waste streams during the drilling operation by separation and drying of the solids and reclaiming water. During drilling operations a standard compartmentalized series of tanks, or mud pit system, would be used for solids processing as the drill cutting are brought to surface by

the circulation of the drilling fluid. Using the surface tanks, mechanical solids removal equipment, chemical treatment and transfer pumps, the drilling fluid would be continuously circulated and processed in a closed loop system.

Drilling operations would be carried out 24 hours a day, seven days a week, until total depth is reached. An estimated 60 to 90 days would be required to drill and test each well, and approximately 12 to 15 field personnel would be working on each drilling operation at any one time. No camp sites or air strips would be required on the lease site. Drilling supervision would also be on site in trailers 24 hours a day.

STEAM AND INJECTION PIPELINES

The proposed steam pipeline would extend from the existing Francisco well pad (the closest location to interconnect to the existing steam pipeline to the power plant) and parallel High Valley Road to the west, and then parallel Saw Mill Road to the northwest. The steam pipeline would then bifurcate, with one segment paralleling a new access road to the west across High Valley Creek and up to the West pad, and the second segment extending north and then northeast to the East pad. A second steam pipeline eventually would be required to parallel the existing pipeline from the Francisco well pad to the main tie-in to the plant, and would be constructed parallel and adjacent to the existing steam pipeline from the Francisco pad to the tie-in for BRPP as steam volumes require. Pipelines, including insulation, are anticipated to be 30 inches in diameter, depending upon well productivity, and would be located above ground. Horizontal expansion loops (typically a square bend in the pipeline approximately 30 feet by 30 feet, would be constructed every 300 to 450 feet along the pipeline route to allow for thermal expansion. Depending on final steam pipeline alignment, some of the horizontal expansion loops may be eliminated as vertical road crossing loops may provide sufficient flexibility.

The project includes construction of an approximately 1.2-mile long, 4 to 6-inch diameter injection pipeline, to be located on stanchions with the steam pipeline, extending from the Francisco pad to the new well pads. An additional injection pipeline would be built on stanchions with the new steam pipeline from the main injection-tie in to the Francisco pad.

PROPOSED EQUIPMENT AND FACILITY IMPROVEMENTS

The project would contain the following features:

- Addition of the West pad with up to 11 production wells and 1 injection well
- Addition of the East pad with up to 11 production wells and 1 injection well
- Construction of a new access road between well pads
- Addition of approximately 1.2 miles of insulated steam pipeline from the new well pads to the Francisco well pad header
- Addition of approximately 0.7 mile of new insulated steam pipeline from the Francisco pad parallel to the existing steam pipeline, to the tie-in point to the main steam pipeline line once sufficient steam is developed on the BRP GeoResource Leasehold
- Addition of an approximately 2-mile long, 4 to 6-inch diameter injection pipeline, to be located within the same corridor as the steam pipeline, extending from the main injection tie in at the plant to the new wells

- Addition of a remote telemetry and control building on each pad as well as distributed control systems at each site
- Addition of groundwater wells in up to three areas and associated temporary infrastructure (pumps, generators, pipelines, storage tanks) to meet the water demand for project construction
- Backup standby power generation equipment to allow for well field control in the event of utility power failure
- Corrosion mitigation equipment and chemical storage facilities
- Minor power plant modifications to accommodate control and monitoring of the new steam field.

ACCESS ROADS

The West pad would be accessed via a new road to be constructed between the pads. The location of the access roads are shown in Figure 1.3.2. Access to both well pads for construction and post construction operation would be primarily along paved High Valley Road. High Valley Road will be maintained, as it already is, by Bottle Rock Power. Glenbrook Road, to the north of High Valley Road, is also being considered as an alternative access road option.

Access to the West pad would be along a new road that would run along the south side of the East pad and west to the West pad. The road would be approximately 20 feet wide and would require grading and removal of about 40,000 cubic yards of material in order to make the road safe and usable for transport of heavy equipment. Topsoil would be salvaged and stored at a designated staging area on the pads. Removed fill material would be properly disposed of or reused. This new road would have a maximum slope of about 15 percent. The access road would cross High Valley Creek at one location with either a proposed culvert crossing, or a clear-span bridge. Installation of the culvert would include some excavation, if necessary, into the creek to clear vegetation and grading as necessary to install the new culvert. Bedding material would then be placed in the bottom of the excavation. The new culvert would be lowered in place over the bedding material with a backhoe that is staged along the existing roadway. The culvert would then be backfilled with soil and compacted as required by the project specifications. Alternately, culverts may be backfilled with concrete slurry. After culverts are backfilled, either sacked concrete or concrete headwalls would be installed at the inlet and outlet of the culvert. Concrete headwalls would be poured in place. The clear-span bridge option would entail placing the bridge over High Valley Creek at the same location, but without any creek-bed disturbance.

POTENTIAL ENVIRONMENTAL IMPACTS OF THE PROPOSED PROJECT

Based on the project description and the Lead Agency's understanding of the environmental issues associated with the project, the following topics will be analyzed in detail in the EIR:

- Aesthetics
- Air Quality
- Biological Resources
- Cultural Resources
- Geology / Soils & Seismicity
- Hazards and Hazardous Materials
- Hydrology / Water Quality
- Land Use/Planning
- Noise
- Population/Housing
- Public Services/Recreation
- Transportation / Traffic
- Utilities / Service Systems

The Lead Agency solicits comments regarding the scope and content of the EIR from all interested parties requesting notice, responsible agencies, agencies with jurisdiction by law, trustee agencies, and involved agencies. Please send your written/typed comments (including a contact name) to the following:

Lake County Community Development Department
Richard Coel, Director
255 North Forbes Street, Lakeport, CA 95453
Phone: (707) 263-2221 Fax: (707) 263-2225 E-mail: richardc@co.lake.ca.us

Due to the time limits mandated by California law, written comments concerning the scope of the environmental review must be sent at the earliest possible date, but no later than 30 days from receipt of this notice.

Notice of Scoping Meeting:
Pursuant to California Public Resources Code §21081.7, 21083.9, and 21092.2, the Lead Agency will conduct a public scoping meeting for the same purpose of soliciting oral and written comments from interested parties requesting notice, responsible agencies, agencies with jurisdiction by law, trustee agencies, and involved federal agencies, as to the appropriate scope and content of the EIR. The scoping meeting will be held on **Tuesday, October 27, 2009 from 5:30 PM to 7:30 PM** at the following location:

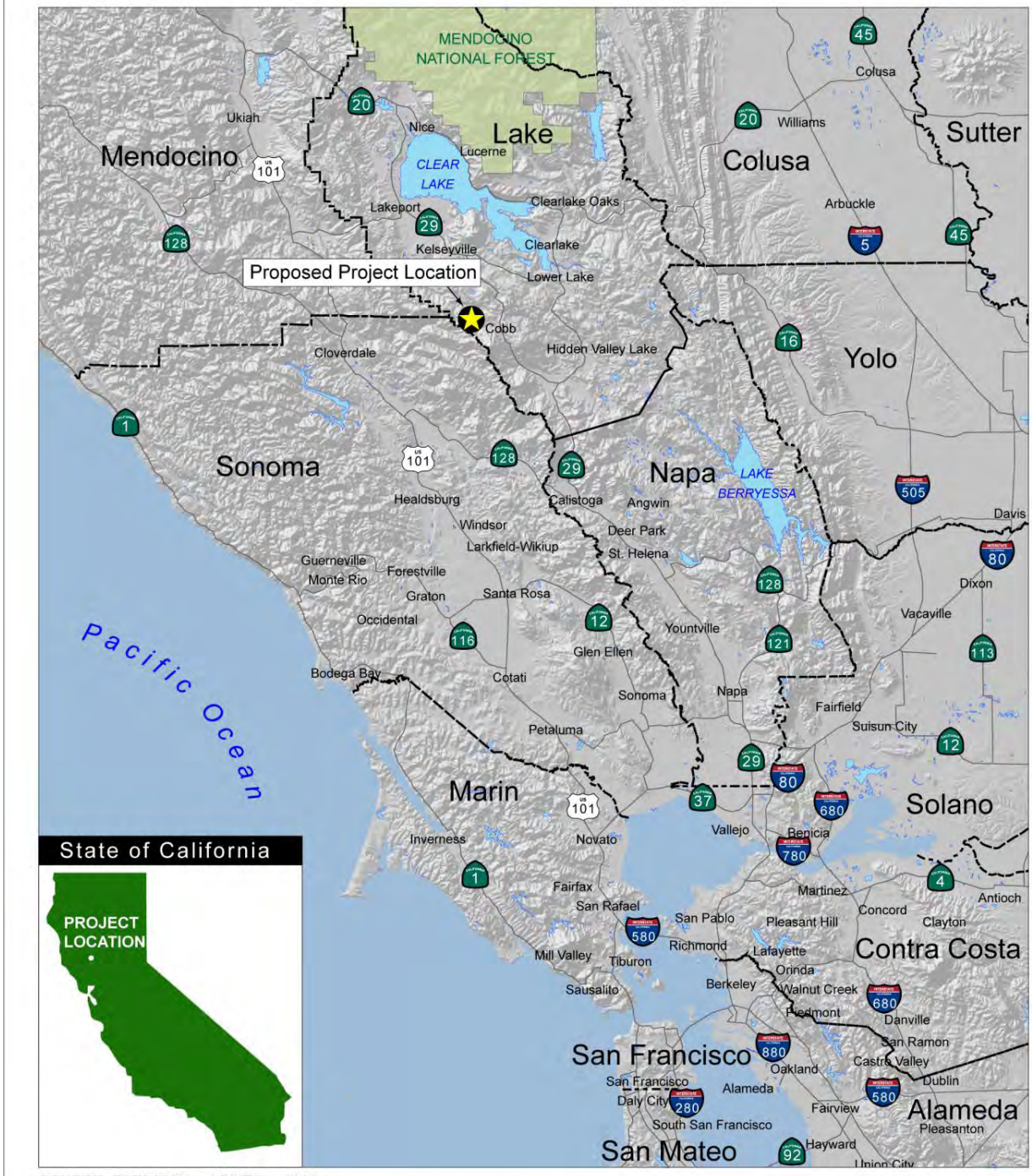
15780 Bottle Rock Road
(Red Schoolhouse)
Cobb, CA

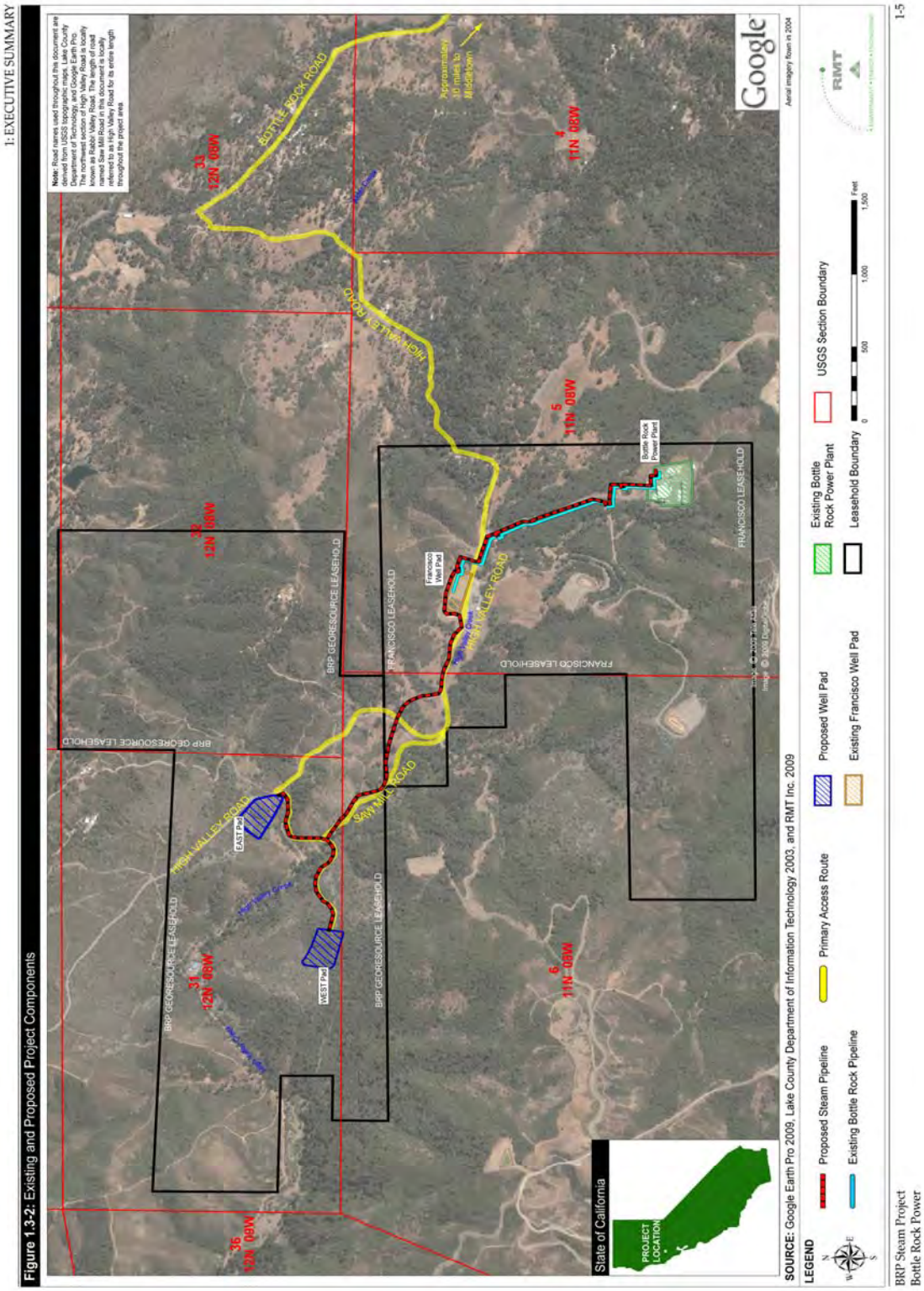
Staff from the California Energy Commission will also be present at the scoping meeting, to answer questions concerning the Petition to Amend the Energy Commission Decision for the Bottle Rock Power Geothermal Power Plant that has been filed by the applicant. For additional information, please contact Richard Coel at (707) 263-2221

Sign:_____ Date: October 8, 2009

Richard Coel, Community Development Director

Figure 1.3-1: Proposed Project Location




1: EXECUTIVE SUMMARY
Figure 1.3-2: Existing and Proposed Project Components
Note: Road names used throughout this document are derived from USGS topographic maps. Lake County Department of Technology, and Google Earth Pro. The northwest section of High Valley Road is locally known as Bottle Rock Road. The segment of road named Saw Mill Road in this document is locally referred to as High Valley Road for its entire length throughout the project area.
BOTTLE ROCK ROAD
HIGH VALLEY ROAD
SAW MILL ROAD
EAST Pad
WEST Pad
Francisco Well Pad
Bottle Rock Power Plant
BRP GEORESOURCE LEASEHOLD
FRANCISCO LEASEHOLD
Approximately 1.5 miles to Middletown
36 12N 08W
31 12N 08W
32 12N 08W
33 12N 08W
6 11N 08W
5 11N 08W
4 11N 08W
State of California
PROJECT LOCATION
Google
Aerial imagery flown in 2004
SOURCE: Google Earth Pro 2009, Lake County Department of Information Technology 2003, and RMT Inc. 2009
LEGEND
Proposed Steam Pipeline
Existing Bottle Rock Pipeline
Primary Access Route
Proposed Well Pad
Existing Francisco Well Pad
Existing Bottle Rock Power Plant
Leasehold Boundary
USGS Section Boundary
0 500 1,000 1,500 Feet
RMT
BRP Steam Project
Bottle Rock Power
1-5

Lake County Community Development Department
Richard Coel, Director
255 North Forbes Street
Lakeport, CA 95453

RECEIVED

OCT 30 2009

LAKE COUNTY COMMUNITY
DEVELOPMENT DEPT.

October 27, 2009

RE: NOP of an EIR for the Bottle Rock Power Steam Project

Dear Mr. Coel:

We are writing about the recent application from the Bottle Rock Power Company to drill 24 new wells on the proposed East and West Pads near High Valley Road in the town of Cobb. The recent actions of Bottle Rock Power are very concerning to me and my husband. We bought our home off Bottle Rock Road in Cobb in July 2002. When we purchased the home, the surroundings and environment were very quiet, which was one of the reasons we decided to move here. About 1 to 1 ½ years after we moved here, we noticed a sudden and abrupt change to the quiet atmosphere. We began hearing the drilling sounds from the Bottle Rock Power drilling rigs in 2003. Since that time, I've been in contact with the Company explaining the noise nuisance that was affecting our livelihood. When the drilling is occurring we hear it throughout the morning, day, and into all hours of the night. It is an all day and all night operation. It is a very loud industrial noise which I can only compare to a loud and highly used interstate or airport. It has completely disrupted our daily and nighttime lives. My husband, who works at home, gets no rest or reprieve from the constant noise while the drilling rigs are operating.

First, I will explain some of the history between us and Bottle Rock Power so that the County can understand that we and the other members of the community have already been subjected to the noise of the drilling for many years now. I have been speaking about my noise concerns with the Bottle Rock Power Company employees for many years (since 2003). At first I was speaking with Gary Snedaker as he was the person who took noise complaints. After he left the company, I was told to speak with Ron Seeze, who had been my point person for a year or two. Both helped very little. Ron Seeze had retired and I have not been advised as to who in the Company can address our noise concerns. As a result, beginning in the summer of 2008 I finally began calling the County (Board of Supervisors Rob Brown as well as the Community Development Planning Director, Richard Coel).

I was told since 2003 by Bottle Rock Power that they would put sound barriers up around the drilling rigs to help alleviate noise problems. Since the summer of 2008, these critical sound barriers were never installed. In fact, as a result of a community meeting in November 2008, sound barriers were attempted to be installed but dismantled because they were not up to engineering specifications. What a huge disappoint to the neighbors who have suffered with the noise problems for five years now. Not to mention the wildlife impacts.

The dated Use Permit (85-27), states that

> "Approval is subject to the following terms and conditions…
>
> 3. The Planning Commission may, during public hearing, modify or revoke this Use Permit any time during its term if it is determined that the use herein permitted is creating a **nuisance** or a condition hazardous or detrimental to the general public or to property in the vicinity of the use.
> 4. …Project phasing shall incorporate the following general principles:
> b. Environmental impact such as surface disturbance erosion, sedimentation, **drilling noise** and dust emissions **shall be minimized**." (Emphasis added)

With no sound barriers around the drilling rigs the drilling noise is *not* being minimized especially when it is an all day and all night long operation. The Use Permit continues to state that in granting the permit, the County Planning Commission made the determination that "The revised noise standard of Ldn 50 dBA will reduce the likelihood of disturbance to residents in the project area." The Permit also states that the Planning Commission further declared that:

> "This use **permit may be modified or revoked** if the Lake County Planning Commission finds that the use to which this permit is put **is detrimental to the health**, safety, morals, **comfort, and general welfare** of the persons residing or working in the neighborhood of such use, or if it is injurious or detrimental to property and improvements in the neighborhood or to the general welfare of the county, **or is a nuisance**." (Emphasis added)

We live in a rural area. We do not live in a subdivision. We have two neighbors. Typical community noise levels (Ldn) in a rural area is between 40 and 50 dBA. 50dBA is typical for a quiet suburban residential neighborhood, not close to major roads, with little nighttime activity. When the drilling is operating (especially on or near the Francisco Pad) the noise levels at our home are well above 50 dBA. It is common to have it so loud that the television at high volumes cannot even closely mask the noise from the drilling. Imagine trying to sleep to such a high level of noise. It cannot be done. There are times where we cannot sleep in our own home because of the loudness from the drilling.

It is due time for seriously well engineered sound barriers to be constructed at the drilling sites. The fact we've lived without them for five years still astounds me. Noise levels between 70-80 dBA are generally considered unacceptable for residential use where an area is strongly affected by a major transportation source. There are many times that this is the case at our home as a result of the nearby drilling locations. It sounds like we live next to a constant freight train that never stops. It appears that again the Bottle Rock Power Company is not abiding by their Use Permit, especially regarding the extreme noise disturbance. I must state the word "again" in the previous sentence because the Company has been violating their Use Permit for years now. In fact, the County in 2008

cited the Company with over ten violations of their Use Permit. Several of these violations were detrimental to the environment.

I was told by Ron Seeze (Bottle Rock Power) that sound specialists employed by the Company would run sound tests. These tests were done on Company land and they were conducted when there was one week of *no* drilling. Such tests are inadequate and make a mockery out of a very serious situation.

Research conducted by the U.S. Environmental Protection Agency has determined that a threshold level for significant adverse impact occurs when noise level is above 55 decibels (dB) over a 24 hour period (Environmental Protection Agency, 1974). Normal background noise levels for residences range from 34 to 47 dB (Environmental Protection Agency, 1973). Studies have indicated that the disturbance of sleep becomes increasingly apparent as ambient noise levels exceed about 35 db(A). It has been found that the probability of subjects being awakened by a peak sound level of 40 dB (A) is 5%, increasing to 30% at 70 (A). Studies have also shown that constant noise problems can lead to stress, illness, and aggression. We've noticed ourselves in being victims of the drilling noise that we are more stressed and aggravated as a result of the constant drilling noise. It has been found that the actual loudness of a sound is only one component of the effect it has on human beings. Other factors to consider are the time and place, the duration, the source of the sound, and whether the listener has any control over it. When the drilling is being conducted, there is no rest because it is a constant operation and we notice that drilling can occur for entire seasons (months and months at a time) and sometimes longer. In reading the recent NOP, it states that drilling operations will be carried out 24 hours a day, seven days a week and it will take an estimated 60-90 days to drill each well. In my dealings with Bottle Rock Power since 2003, whenever I asked how long drilling would last for a particular well the drilling always lasted much much longer than what the Company had stated or proposed to me. So I estimate that it will take 90 days to drill each of the 24 new wells. That equates to 2,160 days, which is over **5 years** of drilling associated noise! This is already on top of the 5 years we've already been subjected to the noise from the drilling and the power plant. So, in essence, we're looking at being victims of the noise for 10 years! That is simply unacceptable.

As well as constructing sound barriers, we would recommend that the drilling rigs not operate during nighttime hours (from 9pm to 7am). It seems criminal that the Company is affecting our sleep during the night with the constant drilling noise. It affects our jobs and our livelihood. We are well beyond the point that the noise should be considered a nuisance. It is a health and safety issue now and it is due time that the noise issue be resolved.

We recognize that the East and West pads appear to be located about ¾ to one mile away from our home. We realize that there are some small hills that may affect the noise. From past experience, the well pad that screams the most noise that we hear is from the Francisco Pad. Although it is difficult to estimate just how much noise we will hear from the proposed operations, the EIR must thoroughly address and analyze the noise impacts. The past CEQA document for drilling on this land is now decades old and never

adequately analyzed noise impacts in the first place. Noise tests must be done and adhered to. And violations must be cited by the County to the Company when the Company does not abide by the Use Permit. Heavily constructed and well engineered sound barriers must finally be installed.

It is difficult for us to believe that Bottle Rock Power will help to alleviate the noise problems. They have a horrible track record of simply not caring what the neighbors are hearing or what their Use Permits prohibit or allow. I've told Bottle Rock Power for years that their drilling is extremely loud inside my home and they simply have not cared at all; my concerns have fallen on deaf ears with the Company. We'd like to see heavy County involvement. The Company simply needs to be babysat. I believe that they think they can get away with whatever they want in Lake County. I'm hoping the County will make them think twice about that.

In the last several months (late summer of 2009), we noticed an increased use in truck traffic working for Bottle Rock Power. I mentioned this concern to Mr. Coel of the County and he stated that they used the trucks to address the violations they were subjected to recently. The trucks continuously used their "jake" brakes (compression braking) in front of our home. We are on a straight portion of Bottle Rock Road and it is flat. The use of compression braking is not required in this section where we live, the truckers simply do not want to over use their regular brakes. The noise is horrendous and the use of compression braking here is ridiculous and should not be used by the trucks working for Bottle Rock Power.

We also would like to stop seeing the Company truckers use the turnouts on Bottle Rock Road (when heading east on Bottle Rock Road from High Valley Road) for dumping/storing their equipment. Over the years, we've seen pieces of drilling equipment, etc dumped at these turnouts on the side of the road. This road is within Lake County's Scenic Combining District and should not be used as a storage place for dumped drilling equipment from Bottle Rock Power.

We recently gave birth to a new baby girl. The recent NOP from Bottle Rock Power greatly concerns us for several reasons. The noise problems as I mentioned above can have a detrimental impact to her growing up for all the reasons I stated previously. We are also concerned regarding the sulfuric smell emanating from the well pads. Sometimes the odor is so bad that being outside seems really unhealthy. I feel I must bring our daughter indoors. That is a terrible way to live life, i.e. being subjected to the noise levels and odors that we must be inside with the doors closed. It is unbelievable that Bottle Rock Power can do this. I'm hoping the County, through reading this letter and hearing other concerns from the Community, will see that this Company is actually environmentally damaging and not friendly to its neighbors.

We are also subjected to the frequent earthquakes that are associated with the well drilling. These quakes are constant and impact our livelihood and property values. There has to be a correlation between earthquakes and the drilling of boreholes into the reservoir formation at a depth around 12,000 feet. I hope to see an earthquake analysis in

the EIR. The quakes and constant noise severely impacts our lives at home and our property values.

The CEQA analysis done decades ago to drill on Bottle Rock Power property included a severely inadequate analysis on wildlife impacts associated with drilling as well as the other projects. As a Registered Professional Forester working nearby, I know first hand that there has been a pair of Northern Spotted Owls (NSOs) on Boggs State Forest, which is located only about two air miles from the East and West pads. The new EIR must address associated impacts to this threatened and endangered species. In order to harvest timber in CA, foresters must call for NSOs six separate times in one year to determine their location or if they are even present near the harvest plan. If there are NSOs near the project, strict regulations must be adhered to because of their sensitivity to noise from trucks and logging equipment. The noise associated with the drilling operations which are proposed to occur for over 5 years all day and all night long will be a detrimental impact to any NSOs associated with the project or located near the project. I hope to see not only an analysis for the NSO, but also a thorough wildlife analysis in the EIR addressing noise impacts to threatened, rare, and endangered bird species that are especially sensitive to noise from the drilling operations.

If the recent past is any indication of how Bottle Rock Power will conduct themselves in the future, we are extremely concerned that the Company will even abide by any future Use Permits or approved EIR. Their recent actions of severe violations are abysmal and my concerns voiced to them have only fallen on deaf ears. This is not a company anyone would want as a neighbor. I know Lake County has been known to be a bit of an "outlaw" county where people can do whatever they want. I hope the County sees past the money that this Company might bring in, but instead look at the Company's past conduct with all the violations, the community unrest, the unpaid property taxes the Company still owes on and realizes that this proposed project is not in Lake County's best interest for the environment or for its citizens.

Sincerely,

Mr. and Mrs. Sone
PO Box 1511
Cobb, CA 95426

CONCERNS TO BE ADDRESSED FOR EXPANSION OF STEAM PRODUCTION AT BOTTLE ROCK POWER - GEOTHERMAL

Due to the significant impact to the residents of High Valley Road, alternatives to the use of High Valley Road for project expansion needs to be evaluated.

Specific and meaningful road maintenance requirements need to be developed. The EIR must evaluate the current road maintenance needs and clearly state the maintenance requirements, including winter storm weather maintenance, for the BRP to conduct. Timelines for the maintenance must be included. Winter storm maintenance for the fall of 2009 has still not been accomplished by BRP, even though there was a predicted and significant storm event that has given the area nearly ten inches of rainfall to date.

The EIR needs to include alternatives to "multiple concurrent drillings". The negative impact will be compounded from that type of drilling activity particularly on the Jadikers' but also on all the residents.

The residential zoning of the neighborhood is not consistent with the industrial activities that are currently taking place at BRP. Since BRP's start up, the residential setting has been transformed to an industrial backyard. My family and my neighbors have been exposed to well pad mud that and dust (likely to contain drilling cuttings) that has migrated offsite into the neighborhood. Hydrogen sulfide gas has permeated my property, including my house, to the point where it has become intolerable and a health issue, such as, nose bleeds and intense headaches. Vehicles have had "near misses" at my property with my vehicle, my pets, and my child. Noise from the power plant, drill rigs, and traffic has impacted an entire neighborhood, including Bottle Rock Road residents; to the point where it was a long term nuisance. The number of residents in the area has grown significantly since the DWR project. Industrial encroachment into the neighborhood is significantly more harmful than it was during the DWR management. Expansion will exacerbate the current, intolerable, significant impacts this company is having on its neighbors

In the CEC PTA, it states that High Valley Road and Sawmill Road have no L.O.S. data available, and it states *that traffic operations – related activities are expected to have a less than significant impact.* This statement is speculative and does not address the current outstanding issues that have been disclosed by High Valley Road residents to the county and the BRP. It is very premature for the plan proponent to make such a statement. Compliance with the current use permit is not occurring by BRP and its subcontractors and the use permit is not being regularly enforced. The county has received continual complaints from the residents regarding traffic, including speeding vehicles (in areas beyond the one monitoring camera), ID stickers are required for full time BRP employees, and all others are required to be let in by a guard at the gate, the road is too narrow for two average sized vehicles and vehicles are routinely pulling off of the road in order to pass,

breaking down the road edge and creating erosion at the shoulder. The requirement of carpooling has not occurred during BRP'S management of the power plant and steam fields. Complaints to BRP and Lake Co. have been made by residents regarding safety, including "near misses" from reckless driving by employees or subcontractors. The neighborhood is currently being significantly impacted, yet the CEC PTA states that there will be less than a significant impact even though it discloses that there will be a huge increase in traffic.

The EIR should address the continuing concern that compliance with the current Use Permit and environmental law is not occurring and new acts of non compliance continue to happen under the current power/steam field management. The EIR should clearly state how compliance to county, state and federal laws and permits will be achieved, in clear and enforceable language.

The county should not be going forward with a new EIR until the old (and new) non compliance, issues are resolved and corrected. This is a normal business and public service practice used to bring violators, like BRP, into compliance. The county's decision to expedite the project raises the concern that the project's environmental review will be inadequate for the protection of the neighborhood and the environment. There appears to be a disregard for the law not only by the project proponent but also by the enforcer of the permit, if the non compliance issues are not addressed prior to moving forward on a new project.

The role of the CEC PTA is confusing and I am not sure what role it plays in the CEQA review and EIR development for the project. I was not notified of the PTA and did not have a chance to comment on that particular document. Is the PTA a CEQA document that allows for public comment, during development and prior to approval? The PTA states that information in it will be used for the development of the county's EIR. Why was this document not disclosed to the public, for review and comment, as required by CEQA? The daylighting of the PTA just prior to the Public Scoping does not seem to fit the guidelines of CEQA; the information within the huge document is much more indepth than the eight page Notice of Preparation and Notice of Scoping Meeting Lake County has circulated. A restarting of public comment for the scoping should be considered so that the public can be more fully informed about the project and can have more time to submit meaningful comment for EIR development.

I am requesting a project site visit for interested neighbors, to see the actual areas proposed for development. The aerial map that is part of the Notice of Preparation is too small to clearly see how my neighbors and I will be affected by the project.

Gerri Fletcher
High Valley Road resident

BOTTLE ROCK POWER EXPANSION PROJECT

SERPENTINE ROCK – LCAQ SHOWS THAT THE PROJECT AREA, ON BOTH SIDES OF HIGH VALLEY CREEK, WILL BE IN AN AREA OF ASBESTOS. DUST FROM THE PROJECT WILL LIKELY HAVE ASBESTOS IN IT. HOW WILL THE RESIDENTS BE PROTECTED FROM ASBESTOS DUST?

ALL AREAS THAT ARE USED FOR VEHICLE TRAFFIC MUST BE CHIPPED SEALED/ PAVED TO PREVENT AIRBORNE DUST.

MUD ON VEHICLES WILL BE BROUGHT TO THE RESIDENTIAL AREAS WHERE NEIGHBORS AND CHILDREN WILL BE EXPOSED TO THE POTENTIALLY HAZARDOUS DUST.

AIR QUALITY STATES THERE IS NO ASBESTOS IN THE DUST ON THE ROAD BECAUSE BRP DID NOT REPORT ANY. WE WOULD LIKE THIRD PARTY TESTING, VALIDATION.

DUST FROM TRUCKS - THROWING MUD IS A VERY BIG DEAL. JUST WATERING THE DUST DOES NOT GET RID OF IT. IT DRIES RIGHT AWAY AND IS DUST AGAIN. THE BLACKTOP SHOULD NOT BE DUSTY. ONSITE MUD AND DUST SHOULD NOT BE ALLOWED TO LEAVE THE SITE AND SHOULD NOT BE BROUGHT INTO THE RESIDENTIAL AREA.

WHEN STEAM LEAKS HAPPEN, THEY SHOULD BE SHUT DOWN AND FIXED BEFORE THE NEIGHBORSHOOD GETS EXPOSED TO H2S AND THE ROTTEN EGG SMELL. A SNIFFER BEHIND CLAY'S HOUSE IS A MUST! ALSO, AIR QUALITY SHOULD NOT NOTIFY BRP BEFORE COMING OUT TO TEST.

THE NEIGHBORHOOD 911 ALERTS SYSTEMS, HAS NOT BEEN TESTED. THE 911 ALERT SYSTEM MUST BE READY FOR AN EMERGENCY. GUIDELINES NEED TO BE DEVELOPED AND ACCEPTED BY THE NEIGHBORHOOD FOR 911 AND EMERGENCY NOTIFICATION.

LOUD DIESEL PICK UP TRUCKS AND VEHICLES WITH LOUD MUFFLERS START UP THE HILL IN FRONT OF MY HOUSE AT 4:30 – 5:30 AM. HOW ABOUT "NO LOUD MUFFLERS" OR SQUEAKY BRAKES AND NO ENGINE BRAKES. HOW CAN THIS BE ENFORCED, SINCE THIS HAS NOT YET BEEN ENFORCED BY THE COUNTY IN THE THREE YEARS OF COMPLAINING ABOUT IT?

A GUARD AT THE HIGH VALLEY/ BOTTLE ROCK ROAD GATE WHENEVER CONTRACTORS ARE COMING IN. NO MATTER WHAT THESE

CONTRACTORS ARE DOING.

HOW WIDE DO TURNOUTS HAVE TO BE AND HOW FAR BETWEEN FOR HEAVY TRUCK TRAFFIC. CALFIRE INSPECTS ALL DRIVEWAYS AND NEW ROADS TO INSURE SAFE FIRE PROTECTION. THIS IS ESPECIALY IMPORTANT WHEN THERE WILL BE WELL OVER 200 VEHICLES PER DAY ON HIGH VALLEY ROAD, A NARROW SINGLE LANE ROAD.

Kelly Fletcher
High Valley Road Resident

Sierra Club Lake Group

15995 Lucy Circle Lower Lake, CA 95457

November 2, 2009

Mr. Richard Coel
Community Development Department
Planning Division
255 N. Forbes Street
Lakeport, CA 95453

RE: Bottle Rock Steam Power NOP

Dear Mr. Coel:

The Lake Group appreciates this opportunity to comment on Bottle Rock Power's application to expand their facilities. It is apparent that this project could have significant environmental impacts, which will require detailed and comprehensive analysis and stringent mitigation proposals. Our specific concerns are listed below.

Land use. This project is located in a geographical setting of great natural beauty, which has attracted a substantial residential population. The potential for conflict with heavy industry (also well established in the neighborhood) is obvious. We suggest that this conflict be evaluated from a planning perspective, and attention be given to the possibility of establishing physically separate zoning districts for geothermal extraction facilities and for homes. It might also be advisable to require disclaimers to be attached to any future transfers of residential properties in this vicinity to make sure that future homeowners are aware of the nuisances and potential hazards attached to properties in a geothermal production zone.

Neighborhood impacts. At a minimum, these could include traffic, noise, light pollution, seismicity, odors, and release of toxic gases. It is important to distinguish between temporary impacts during construction, and those which can be expected to continue throughout the life of the facility, with the latter requiring the most exhaustive mitigation. With regard to both light and noise, attention should also be paid to the rugged nature of the terrain, which will effectively block these impacts in some instances, and in other cases may accentuate them.

Water quality. Erosion on this site has the potential to impact Kelsey Creek, and could even increase the sediment burden on Clear Lake; the possibility of discharge of heavy metals and other toxic substances during steam field operations makes this potential impact particularly alarming. A detailed drainage plan is needed, as is implementation of strict erosion-control BMPs not only during grading activities but also continuously during operations. Apparently on-site cuts will not be

sufficient to produce all the fill needed to complete the project: the source of this fill must be identified.

Biological resources. Especially since the site is characterized by serpentine soils, which frequently support botanical rarities, a thorough site survey by competent professionals should be conducted, with field studies taking place *during the spring season* when annual plants grow and bloom.

Traffic. The increased traffic load in the immediate neighborhood is obvious; as has been suggested, evaluation of alternative access routes to High Valley Road should be considered. We also recommend examination of traffic impacts to Bottle Rock Rd, the Cobb community center, and Highway 175.

Extensive mitigations will undoubtedly be proposed to prevent or to alleviate project impacts. To be effective, a comprehensive mitigation monitoring plan must be a precondition of project approvals, with a clear demarcation of authority, appropriate inspection schedule, and prohibitive consequences for non-compliance. Since this application is not for a new project, but will instead extend the scope of an existing operation, plans for mitigations and enforcement should take compliance history into consideration.

If, as seems quite probable, it proves impossible to fully mitigate the project's environmental effects, the production of substantial quantities of "green power" will undoubtedly be presented as an overriding consideration. The Sierra Club strongly favors the replacement of greenhouse gas emitting fossil fuels with alternative sources of energy, and would support this argument in principle, but only if the power source – in this case, steam – actually exists in quantities that warrant its development. Otherwise the landscape will be scarred and the neighborhood adversely affected with no compensatory benefit, as has occurred in a number of places throughout the Geysers area, which is dotted with well pads that are not now in production. We are especially concerned about this possibility since previous attempts to tap this particular steam field were so disappointing that the power plant was withdrawn from production. To prevent this scenario from being repeated, we request very strongly that a rigorous evaluation of the steam field itself be conducted during the course of the EIR on the project.

Yours sincerely,

Victoria Brandon

Chair, Sierra Club Lake Group

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NOV 03 2009

LAKE COUNTY COMMUNITY
DEVELOPMENT DEPT

Nov. 2, 2009

Dear Mr. Coel,

I am writing to you in response to the notice of preparation letter mailed out & public scoping meeting which I attended on 10/27/09 in Cobb regarding the Bottle Rock Power Company application to drill new wells near the High Valley Road in Cobb. Without repeating the numerous details voiced by community Residents (who are also understandably upset with CalPine Power Co.) of ongoing Geysor development & activity, I would like to include my concerns as a Cobb homeowner of 17 years. My home is located off Bottle Rock Road near High Valley Road & I have experienced the impact of increased well drilling over the years. The continued development of the Geysor projects negatively impacts local residents which includes increased traffic & noise of 'jake brakes' of trucks on Bottle Rock Rd. & the ongoing noise heard from drillings rigs & frequent obnoxious sulfuric stench in the air. This is especially noticeable in the hot summer when I come home from work & attempt to cool my home by opening windows in the evening. It is no longer the quiet countryside I remember & not cost efficient to use air conditioning for hours on end. The carcinogenic & hazardous materials released into the environment & improperly contained per report by direct observation & investigation by local residents is criminal at best & a sad example of 'business as usual.' Considering the past history & lack of enforcement of the terms & conditions for use permits, this clearly stands as testimony of how the County apparently regards the repeated concerns voiced by the residents of this area. Is it any wonder why 'going through the motions' of public meetings results in such angry responses ?.... & I have heard them time & again!

The frequency & degree of jolting earthquake tremors impacts personal property including the structural integrity of homes & also depreciates property values. I would like to ask you Mr. Coel & those responsible for overseeing the questionable activities of the Bottle Rock Power Co.... how much is 'your' property being compromised & the quality of 'your' life being affected by the overt & unscrupulous business practices of these companies? I also want to voice my concerns of personal health as a result of air quality & the detrimental environmental impact on wildlife & the biological resources at stake & quality of all ecosystems involved. The undermining & deterioration of the environment for 'progress sake' without forethought or care seems at best an arrogant expression of ignorance, apathy or greed... in some capacity of all parties involved, who have the power & influence to make decisions. What part will you play? I would hope & wholeheartedly encourage 'Responsible Agencies' to ask what their investment or interest is in the future of this beautiful area & home to many in Cobb Mtn.

Sincerely,

Sheila Schneider
P.O. Box 582
Cobb, CA. 95426

California Native Plant Society
Milo Baker Chapter

Richard Coel, Director
Department of Community Development
County of Lake
255 North Forbes Street
Lakeport, CA 95453
707-263-2221 richardc@co.lake.ca.us

Subject: BRP Steam Project, Bottle Rock Power

Via: Email and U.S. mail

Dear Mr. Coel:

On behalf of the Milo Baker Chapter of the California Native Plant Society (CNPS), thank you for the opportunity to comment on the subject project

The Milo Baker Chapter of the California Native Plant Society (CNPS) herewith submits comments on the subject proposal. These comments are based upon our review of certain available environmental documents and archival data on the subject area.

1. Based upon evidence submitted in the published preliminary environmental report and analysis by CNPS, we find that the project as presently constituted would have significant adverse impacts to the natural environment. Furthermore, some of these significant impacts appear to be unmitigable. Therefore, environmental law of the State of California pursuant to the California Environmental Quality Act (CEQA) requires that a full Environmental Impact Report (EIR) be prepared as defined by CEQA..

2. A new and detailed biological study is required in order to fully analyze the biota present on site and the ecological and hydrological impacts of this project. These studies must span more species detail and extend the time span of field study considered to date. The study should address the habitat value of the existing habitats on site, including wetland and oak woodland components, with emphasis on rare and endangered species, and upon habitat fragmentation and biodiversity.

3. The EIR to be prepared should be prepared by qualified environmental scientists, who are in a third party contract arrangement. Contract arrangements with a party in interest (e.g. a project applicant) are not appropriate for a project with the potential to have a significant adverse impact upon the environment.

4. The EIR must conduct new data collection using methods that are scientifically well founded. The prior EA, for example, alludes to the diminished value of oak woodland with insufficient mensuration of stand extent and insufficient analysis of habitat fragmentation and edge effect impact analysis; furthermore, insufficient characterization is given of the difficulty of oak woodland regeneration and efficacy of mitigation to establish proposed plant regrowth from seed bank rejuvenation or seedling transplant. The prior EA has fundamentally flawed and unscientific evaluation criteria, by not adequately having addressed these broader ecological impacts related to habitat fragmentation and regeneration capability.

5. California oak woodlands in the Mayacamas Mountains and elsewhere are not regenerating as robustly as might be expected. This phenomenon calls into question simplistic mitigation of replanting trees or understory species whether on or off site. In particular, this phenomenon underscores the inappropriateness and inapplicability of simplistic mitigation included in the prior EA. When destruction of an oak woodland occurs, the entire fabric of understory is lost, making replacement of the entire habitat problematic if not impossible. The EIR must fully address this inability to mitigate certain biological impacts and examine fully all feasible alternatives to the project including: development elsewhere in the County, development at a reduced scale and the No Project alternative.

6. The EIR must utilize all credible resources in classifying rare and endangered species. The EA, for example, acknowledges the presence of listed species, but fails to adequately quantify impacts to each species. The insufficient analysis of listed flora and fauna is a major flaw in the prior analysis that must be addressed in the EIR.

7. Impacts to wetlands areas within the project are of great importance in the long term survival of the species that populate these habitats. The prior EA is, in fact, inconsistent and inaccurate in its characterization of mesic areas. The wetlands must be clearly defined and the associated flora and fauna more carefully classified. An EIR is required to present a detailed database of the wetland characteristics and clearly assess impacts to these sensitive areas. The analysis of the Clear Lake hitch in High Valley Creek is but one example of a species that requires considerable further analysis; moreover, data on the Western Pond Turtle and Foothill Yellow-legged Frog must be greatly expanded in order to understand fully the likely impacts to those species. The EA states that it has identified 51 special status species that may be present on site, without a corresponding level of detail that would be warranted for each. The EA has identified some of the species that will be adversely impacted, but fails to adequately address the ecosystems as a whole, particularly with regard to habitat fragmentation and edge effects. Fragmentation analysis is critical, since the loss of habitat value cannot simply be measured by numbers of trees or plants lost, but in the loss of linkage to adjacent habitat. In fact, the habitat loss is certainly much greater than suggested by the EA, since ecological edge effects and habitat continuity have been largely undescribed in the prior EA.

8. Mitigation suggested falls well short of the detail needed to insure meaningful

mitigation, and, in fact, calls in to question whether many of the significant impacts can be mitigated to a less than significant level. For example, phrases such as "Best Management Practice" are over-utilized in the prior EA, in places where the decision maker needs very clear guidance on techniques used. For example, in plant propagation, one needs to understand the exact season, technique and likelihood of survival for flora transplantation for each species addressed.

9. In summary, a full EIR with original data collection and analysis is needed to allow full public review and disclosure of the subject project. Simple peer review of the existing database would fall far short of CEQA requirements for this project.

The California Native Plant Society is a science based organization with specialized knowledge of the flora of California. Our staff and members have extensive knowledge of the vegetation of the Mayacamas Mountains including the subjects of plant taxonomy and ecology. In the normal course of a given year CNPS reviews hundreds of land development proposals in an impartial and scientific manner. We have no economic interest whatsoever in the affairs of the applicant or any other party who may benefit from the proposed project's approval or disapproval.

Please consider the herein comments as part of the administrative record of the subject project and please transmit to us any further biological reports, notices or findings relative to the subject project. Our staff will be available to review subsequent submittals regarding this project and interact with Lake County representatives and their consultants if the project proceeds. If you have any questions regarding these comments please contact the undersigned.

C.Michael Hogan PhD, Conservation Chairman, Milo Baker Chapter, 415 4201029

California Native Plant Society, Milo Baker Chapter P.O. Box 892 Santa Rosa, CA 95402

GERRI FLECTHER
P.O.BOX 1272
COBB, CA 95426

November 9, 2009

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NOV 12 2009
LAKE COUNTY COMMUNITY
DEVELOPMENT DEPT.

Mr. Richard Coel
Director – Community Development Department
County of Lake
255 North Forbes Street
Lakeport, CA 95453

Dear Mr. Coel,

Please consider these comments and concerns in the EIR for the Bottle Rock Power Geothermal Expansion project.

Loud vehicles are a nuisance. Diesel trucks, jake/engine brakes and engine fans, as well as vehicles with loud mufflers are a disturbance to the peace and quiet of this residential area. The hours of operation and the noise from these types of vehicles should be evaluated, and addressed with mitigation that eliminates or minimizes this type of industrial traffic nuisance in a quiet residential neighborhood.

The BPR et al traffic should not be allowed to obstruct local traffic. Safe ingress and egress on the narrow road is an important issue for the neighborhood.

To address new and unforeseen issues, the EIR mitigations and subsequent Use Permits should be "revisited" biannually with input from those adversely affected by the project.

If the steam is considered a possible or potential health hazard to nearby residences and wildlife, how will those affected be protected?

Should the neighbors to the project be subjected to the nuisance of the steam emissions, the foul smell and the health risk that this type of development in a residential area will impose on them?

How will the county ensure that the project will be in compliance with county, state and federal laws? Is the current system of a "on again, off again" part time geothermal coordinator that oversees all geothermal projects in the county adequate?

Can the EIR evaluate the need to have a power plant and steam field management that will work constructively with neighborhood/community groups?

Is an advisor group an option that will reassure local residents that their concerns and safety issues are being relayed to ~~the~~ and addressed by the BRP et al?

Would monetary fines for violations of the Use Permit, fines that area progressive if the BRP et al are constantly non compliant and are not timely in corrective action, be a deterrent to violations occurring? Can fines be described in the Use Permit or the EIR? Can timelines for corrective action be described in the permit and the EIR?

Onsite camping/ living is not a use that is consistent for a residential area. Is this type of use going to be allowed and addressed in the EIR?

New emission monitors need to be considered that can comprehensively detect all possible hazardous and nuisance conditions that affect the neighborhood. To ensure that all residents potentially affected by these emissions are protected, the monitors should be placed at the closest residential site to the project area(s). These locations are: #1 Bill Jadiker's – to monitor new well/drilling emissions. #2 David Coleman's – to monitor power plant and Francisco pad emissions. #3 Clay Stewart's – to monitor Francisco pad and new well/drilling emissions.

Is an alert system to notify residents when emissions are above Lake County Standards needed to maintain safety considerations of the neighbors? Will the plant and the new operation be allowed to go above the Lake Co standards? If so, why? How will it affect the neighbors and community?

Is a requirement to have county/state staffing assigned for quick response to community emission complaints for both the power plant and the well pads being considered?

Utilizing wash racks for all vehicles leaving the BRP et al industrial site should be considered to mitigate the potentially hazardous dirt/dust that is transported to the neighborhood on vehicles.

Because potentially hazardous dirt/dust will b be transported to High Valley Road from the project site(s), daily cleaning of High Valley Road with a street sweeper type vehicle, should be considered.

The EIR should consider carpooling of all BRP et al workers to alleviate traffic congestion on High Valley Road.

To reduce the impact of the traffic nuisance that will be created by this project, limiting the hours of all BRP et al traffic to the hours of 8 a.m. to 6 p.m. should be considered.

Is the damage to the roadway created by the traffic from the project and the cumulative effect of the current operation being evaluated?

Weekend and holiday traffic should not be allowed to occur. Who is going to monitor the 15mph speed limit? Is it effective to have the BRP et al monitoring themselves?

Is the damage to the roadway and drainage structures and facilities from vehicles driving off of the paved surface being evaluated? High Valley Road is a single lane road and there is not enough room for two vehicles to pass each other without driving of off the roadway. Vehicles should not be allowed to drive of off the pavement. Are there enough paved turnouts to allow for passing? Is the EIR going to evaluate this important issue?

Is the road passable to emergency traffic at all times? How are emergency vehicles going to access High Valley Road? Is the gate system adequate for allowing prompt response of emergency traffic? How are they going to pass each other as well as other vehicles on a single lane road? Safety concerns are very important and need thorough evaluation and planning.

The traffic signs along High Valley Road are an aesthetic issue. Is it being addressed in the EIR? The High Valley Road residents should be involved in the development and approval of all signs installed by BRP et al.

Thank you for your consideration of these issues.

Sincerely,

Gerri Fletcher

Gerri Fletcher.

To: Rick Coel
Community Development
Lake County, CA
Regarding input for the EIR, Bottle Rock Power Plant Steam Field Expansion

ENVIRONMENTAL CONCERNS REGARDING BOTTLE ROCK POWER PLANT EXPANSION

By Joan Moss November 13, 2009

I am writing input for the EIR to address environmental concerns that include compliance issues, Lead Agency privileges and responsibilities, human health concerns, water usage, air quality, noise, and zoning, and the designation "clean renewable green energy."

I question whether expansion of the Bottle Rock Power Steam field is appropriate when notices of violation written by Lead Agency Lake County against the plant for actions detrimental to the environment have not been resolved, namely, the dumping of drilling mud into a meadow, the illegal dumping of hazardous waste at local Lake County landfill sites.

The Pestoni Brothers tested the dirt dumped illegally at the Quackenbush site, and the public has not learned how those tests compared to what the test results presented by Bottle Rock Power when the dirt was brought to the site.

I want to be sure that Lead Agency representatives have the right to enter the Power Plant when needed and to review activities there when ordered to on a spontaneous basis, rather than on 24 hour notice.

A credibility gap exists at the present time between the Power Plant administration officials and the neighbors who proved that the use permit was being violated. Only through honesty and integrity will these credibility gaps be resolved.

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LAKE COUNTY COMMUNITY DEVELOPMENT DEPT.

The Lead Agency must require transparency and openness on the part of the administration, the administration which was proved to be in violation of its own use permit ladst year.

The Geothermal Coordinator will be required to write and promote geothermal development. This will be possible only when and if existing violations of the use permit have been resolved to the satisfaction of all parties, including the neighbors. Otherwise, such publicity would be inaccurate and give out false impressions that all is well at the Bottle Rock Power Plant.

I would suggest that the 500 page document concerning the propose expansion be available for the public to read at a central location, possibly the mountain High Coffee Shop on Cobb Mountain.

I attended a scoping meeting, a Notice of Preparation of this EIR for the steam field expansion, at which people complained of bloody noses caused by the emissions, pink steam being one of the emissions. I would like to know what kind of monitoring is planned so that human beings inside and outside the plant know what is in the pink steam and what is in other emissions from the plant. I understand the pink steam may contain iron, sulfur, arsenic, mercury, and other toxins. I want to know what is being done to prevent this pink steam from entering the watersheds of Big Valley, which has already qualified for Clean Up and Abate Grants through the Central Valley Regional Water Quality Control Board.

Two residents of Cobb Mountain assert they have been tested and have mercury in their bodies. I wish to know and learn how others can be tested, and whether the mercury in their bodies comes from geothermal development.

The State of California is under a Conserve Water Order from Governor Arnold Schwarzenegger, and I believe using 200,000 of gallons water per day for the construction and

drilling of the two new pads and the 22 geothermal wells is excessive use of water for a steam source that is not certain.

How can residents be subjected to drilling taking place 24 hours a day, 7 days a week?

I want to know why hills should have to be decapitated when it is not even known for sure if there is enough steam to make the proposed development worthwhile?

I heard a neighbor allege that liquid from inside the berms surrounding the existing sump ponds is escaping into the streams that flow down into Big Valley. I propose monitoring by an independent agency.

How can geothermal expansion be justified in a residential area only three tenths of a mile from people's houses? The present development is causing problems already that have not been resolved.

The dust and danger of huge trucks driving up and down the same narrow road used by residents to travel to and from their homes presents further denigrations to the quality of life on Cobb Mountain.

How can this proposed development be considered clean renewable energy when geothermal steam dried up to the point that treated waste water is now being piped up from both Santa Rosa and Lake County to keep the plants going?

Thank-you for reading my concerns. I trust they will be addressed in the development of a responsible Environmental Impact Report.

Joan Moss 279-1650

9291 Wildcat Road
Kelseyville, CA 95451

CC Jerry Brunns Central California Regional Water Quality Control Board
CC California Governor Arnold Schwarzenegger
CC President of the USA Barack Obama

November 9,2009

To :

Richard Coel

Lake County Planning Department,

255 Forbes St.

Lakeport, California

From:

Bill Jadiker

6700 High Valley Rd.

Cobb, CA 95426

RECEIVED

NOV 13 2009

LAKE COUNTY COMMUNITY
DEVELOPMENT DEPT.

Re:

Scoping meeting, environmental questions for the EIR

to be submitted to EDWA for consideration.

To whom it may concern,

When Mary and I came back from Mexico, we decided to look into building a house on the Binkley Ranch. That was around 1973. So we camped down by the creek at the campground while we chose a spot.

Mary liked this spot because it was up on a knoll, had a good spring and it was where the indians had originally camped. It had the nicest view. We had to cut a couple of trees just for the view. It was way far away from everyone and everything.

Mary said that she wanted the house here and we hired a well known architect to design the house. Mary had the house built in post and beam construction so that she could have as many windows as possible to enjoy the view. The connection between the house, the view, and the natural surroundings plus the really good spring was the most important consideration.

No one else had built in the valley, but Mary, thinking ahead, had the property rezoned to Developmental Residential so that others in the family could come and build their future homes in their chosen places.

We have lived here for over forty years and there are countless memories tied to this house and location. I would love to live here the rest of my days, and I hope to pass this house in its quiet natural setting to my kids. The air here is nice an clean, it is quiet and i had hoped that it would stay this way.

I am afraid that all the noise, and the stuff associated with this project will drive me right out of my house. Has anyone ever lived 800 feet from a drilling well?
If it gets too much from the noise, and smells and all, what am I to do?
I've lived most of my life here. It's a sad situation we find ourselves in.
I don't know what to do, or whom to speak with to stop this project from affecting the quality of my life. Please take my situation into careful consideration as I am the one most affected by all this. Maybe you will find that there are too many things that could go wrong with this proposed

project.
Here are some questions and concerns of mine:

Bills Questions

Aesthetics

1. It certainly will affect my visual and I wont' be able to enjoy the night sky with all those lights and blinking beacon.

2. Its going to affect my reason for being here in the first place, the beauty of the scenery.

3. Mary designed the Post and Beam house for the Eastern, Western and Southern views. How will the project impact the quality of these views from inside my house.

4. I will be able to see the drill rigs from inside my house. What measures should be take to mitigate this? NO DRILLING RIGS AT ALL!

5. How will the construction, the bridge, the new roads affect my travel back and forth to my residence and the aesthetics of the natural beauty that I have enjoyed for over forty years. It would be dramatic in both my visual and both the impact of obstruction to my travels.
the guy said that I could take the Glenbrook road, but that is way out of my way. What if I have an emergency.

6. Will EDAW come to my house and see the view from inside my house and see the dramatic impact that the new proposed West pad will create from inside my living room?

7. The whole house was designed with the soother view in mind, and both proposed pads will severely impact this.

---

1. In the event of any easterly breeze my location will be highly impacted by the dust the smells, steam, by construction, and sulfur.

2. In the case of toxic steam how would I be evacuated from my residence for emergency purposes.

3. As far air quality is concerned, the system should be monitored in the case of Pink steam.

4. I am afraid of how all that dust from construction is going to affect my breathing and health passing through the construction work.

5. Should they place an air quality monitor right at my house location. This would be necessary since I am the closest to a rig.

6. What kind of emergency alarm system is the proposed plan going to recommend to protect my health, life and property? Will there be some sort of system to automatically notify me so that proper evacuation measure can be taken. Will emergency escape measures be provided in case of some potential disaster.

7. The proximity is so dramatic.
It has never been this close to my house, so what will be the compensation if I am forced to move from my house if the quality of my life is dramatically affected by the smell, lights, noise, traffic, or vibrations? And who will be responsible for this compensation. And who will predetermine the amount of compensation necessary if I have to move?

8. In case of some closure of the road because of slide or road damage, my house is situated such that I have no normal ways of escape. Although there is dirt road that gives me access to the above chip seal road, there is no guarantee that I can use this in case of abnormal conditions such as heavy rain or snow.
So how would I provided emergency escape in this possible scenario. Should the applicant provide a paved escape route for me?

9. We built our house because of the nice spring. I hope that it will stay that way. I am concern about the amount of water they plan to use, and would like EDAW to come out and do a test of my well to see the amount of flow, so that a baseline can be established in case the projects use of water starts to diminish my well. What do I do if my water goes bad or diminishes?

10. I am concerned that the project will take away the privacy that I have been accustomed to.

11. When Calpine drilled here close to the house, years ago, they installed a noise monitor close by the house. The housing is still there. I hope that they will put another one up to insure that the project will not get too loud.

12. I would like to find out the direct line of sight distance from the well pad to my house. Can EDAW come out and survey that?

13. I just heard today that my house is going to have to be rezoned, and I have a problem about that. Mary worked hard to have it rezoned to Developement Residential. I wasn't involved with it, and I don't know why Mary did it, but I don't want her work undone. She must have done it for some reason. Please do not rezone my house. Can EDAW look into if the rezoning will conflict with my wife's original intentions?

I hope that you will really take into consideration my close proximity to the project, and that I am afraid that this new project will so impact the quality of my life, that I will be forced to move.

Sincerely,
Bill Jadiker.

Bill Jadiker

NOVEMBER 10, 2009

To: Richard Coel, Director
Community Development Department
County of Lake
225 North Forbes St, Lakeport, CA 95426

RECEIVED
NOV 13 2009
LAKE COUNTY COMMUNITY DEVELOPMENT DEPT

To: Mark Winsor
Project Manager
EDAW/AECOM
150 Chestnut St, San Francisco, CA 94111

Re: Comments and Questions Concerning the Preparation of an Environmental Impact Report Bottle Rock Power Steam Project.

The Coleman Families has owned our property on High Valley rd since 1875. They are part of three homesteads. Two of the homesteads are the Francisco leasehold Operated by Bottle Rock Power (BRP LLC). BRP LLC does not own the property or the mineral rights to this leasehold. BRP LLC does not have any contracts with any part of the Coleman family. The part of the family that owns the Francisco leasehold does have a contact with Dept of Water Resources (DWR). This is important information. This ties DWR to BRP LLC. Since BRP LLC and Bottle Rock Power GeoResource (BRPGR) are part of the same group of companies. Where does DWR fit in. The proposed steam from BRPGR lease is intended to power BRP LLCs power plant. The Coleman/Francisco family should have some say.

After reading the 700 plus page Bottle Rock Power Steam project report. We have found the proposal bias and flawed. A large amount of the material was dated. The idea of a peer review for this document as proposed by BRPGR and BRP LLCs management could compromise EDAW/AECOMs credibility. Because of the expected environmental impact to the leasehold and area surrounding it, EDAW/AECOM should do the best job possible. To reinforce this Bob Giguiere the Project Manager for BRPGR. And Brian Harms the General Manager BRP LLC. Stated in a taped interview. That no design is 100%, it is more like 10 to 30%. Is there project design only 10 to 30% correct?

We feel due size and complexity of the proposed project. Also there are a large number of unaddressed questions. We are asking that Petition to Amend by the Calif Energy Commission. Any and all permitting by the County of Lake. Any and all permits that are required by the BLM. Any permits required by Army Corps of Engineers. Any zoning or changes in the County of Lake general plan concerning this project. Any and all permits required by Calif Fish and Game. That all this needsto put on hold until the Environmental Impact Report is complete and finalized. BRPGR and BRP LLC have already attempted to start this project. There are numerous laws,rules, regulation, codes, and statutes that have to adhered to. We would not like to see any bias or favoritism happen inthis process. We do not know why they know want to move so quickly. They have had the BRPGR lease hold for several years ow. Please let the process proceed as it was designed to. We hope the questions we have submitted will be addressed correctly and completely. We would like a Community Advisory Panel created to help the County of Lake monitor this project.

1. How does CEQA apply to BRPGR project. How will it be implemented. Will the Calif Public Resource Codes be taken into account. Which of these codes apply to the proposed project. How will you identify them.

2. In Location they refer to township and range figures. Are they correct. When was the last time the leasehold was surveyed. Was it a legal survey. Are all the parcel numbers correct. Do they include all the parcels of the access roads. How many roads access the leasehold and do they have easement rights to use them for this project.

3. What is the history of the leasehold environmentally. Has the property ever been mined. If so what for. Has any material from mining been dumped or stored on the leasehold. Have any noncompliant, hazardous or toxic materials been dumped or stored leasehold. How will EDAW/AECOM determine a baseline for what has happened environmentally to the leasehold before this project begins. If there are noncompliant, hazardous or toxic materials on the leasehold who is responsible for cleanup, abatement or mitigation. This should be done before the new project starts

4. Is this proposed project exploration. Is it a continuation of an existing project. If so who responsible for Insurance and Bonding. Which company will carry the Insurance and Bonds. How many companies are currently involved with the leasehold. Is Bottle Rock Power LLC and BRPGR the same company. Do some other corporations own all the different Bottle Rock Power LLCs. Will they be responsible if something go's wrong. How is the Dept of Water Resources involved. They use to have the lease hold in there pocesstion. They required a $10,000,000 Bond for Bottle Rock Power. What is for. Did DWR create any environmental problems when they had the leasehold. Were there any legal problems. The BLM in Sacramento told me there is a large file on this subject. Were these possible problems from them being on the

leasehold or from the existing Francisco steam field and power plant. Were there any spills. over topping of the sumps or other environmental problems. It seems that any thing that is not part of the native environment that has flowed or was deposited on leasehold should be investigated. Will EDAW/AECOM look into this.

5. Does this new company have the finances to see the project thought to completion. How is it being funded. At the scopeing meeting The Energy Commission said that if they what to throw there money away it was there problem. If the project turns out not to worth while every one living in the area will be seriously impacted. Do they have a plan B. What happens if there is not enough steam. This is the problem on the Francisco leasehold. Is there any supporting data to show that there is enough steam reserves to compensate for the effort to retrieve it.

6. Will EDAW/AECOM or a third party do a complete survey of the geology and hydrology of the lease hold. Will USGS be involved. There have been so many failures in this area because of poor, incomplete or fabricated data. The time is right to determine is there enough steam. How much information is available on the geology and hydrology for the lease hold. It seems like every one is still guessing.

7. This information on the geology and hydrology will help determine where the ground water is. Know one has done this for BRP LLC. We will at least have some idea what water is there and how it might impacted. The other question is how has BRP LLC affected the ground water. Has it been contaminated what tests will be done to check this out. How will drilling affect the ground water, springs, wells and all the under ground water sources.

8. Where will BRPGR obtain the water needed to complete this project. Will they use the well on the Francisco leasehold. Will they drill new wells. If so where will they

drill them. Who has the rights to the water. Does it belong to the land owners or the leaseholder. Who has jurisdiction over the amount of water removed from the ground. There should be limits on usage by a large industrial facility in a rural setting. What recourse will the local residents have if there wells,springs and surface water dries up from over use by BRPGR. How will this effect the watershed and wildlife. Will you list all the County, State and Federal regulations involving water use and water rights for the new leasehold.

9. How many Calif Fish and Game Regulations or codes will apply to the project. Will they be listed. How many US Fish and Wildlife regulation and codes will also apply. Who will over see this. Will they be listed. How in depth will you address them. Will EDAW/AECOM use in house biologists or subcontract them. Will there qualifications be listed. Will you work with Calif and Federal Government biologists.

10. Are there any Timber or Oak woodland stands on the leasehold. Are they protected. To what level will you look into the plant life on the leasehold. How many seasons do look into. How in-depth will your studies be. Will EDAW/AECOM use in house botanists or will they be subcontracted. Will there qualifications be listed. Will you work with Calif and Federal botanist.

11. How will they prevent, mitigate or control invasive plants and animals on the leasehold. We have been fighting star thistle for years. Will there be a plan to control this and any other non native species from moving on to the leasehold. Will there be a plan to mitigate existing invasive species from moving on to the leasehold. Will these invasive species be identified before the are able to move on to the leasehold. How can they or will they effect the environment. Should this problem be addressed before this project starts. Are there any County, State or Federal regulations, codes or statues that apply to this.

12. According to the Lake Co geology maps. There seems to be large amounts of Serpentine at the location of the two drill pads. How much naturally occurring Asbestos (NOA) would be found in the Serpentine rock formations at these locations. What percent of asbestos is safe. Are there any other rock formations that contain (NOA) on the leasehold. How deep do these formations go. How much (NOA) will be exposed when they start moving the 319,000 cubic yards or material. Are there other locations on the leasehold better suited for the well pads that do not have (NOA). How dangerous is (NOA). Will the rock formations be tested for asbestos concentrations. How will this be done. What other minerals will they encounter in these rock formations. Are they potentially hazardous as well. Will there be Mercury in the rock formations. How do you test for it. What are all of the County, State and Federal regulations, codes and statutes that apply to these and any other potentially hazardous minerals that might be found. Will they be listed. Will USGS be involved. If not why.

13. What constitutes the impact area. What does cumulative impact mean. How do you determine what and whom will be effected. In there proposal they refer to a impact zone to be a 10-mile radius. Is this true. What is the population of the area. Will all cumulative impacts be taken into consideration. How do determine what are the key receptor sites are. Do they only have to fit in the impact zone.

14. What is a watershed. Is the leasehold in the High Valley watershed. Is the High Valley watershed part of a larger watershed. How does the High Valley watershed effect Clear Lake. What is impacted by what occurs in the watershed. Have DWR and BRP impacted the watershed. Have any other geothermal activities affected the watershed (UNOCAL, Union Oil, Calpine)ect. Has any activities polluted, contaminated,

disrupted, modified, altered, changed or impacted the High Valley watershed in or around the leasehold. How will you ascertain whether this has or has not occurred. Whom will you contact. Which County, State and Federal agencies will you contact. Will they be listed. If some of these actions occurred will the environmental impact be reserved to just the leasehold. If some or all these impacts have occurred will they have to be mitigated before the the new project is started. Will it be that the whole watershed is looked at. What are the potential problems that will occur to the whole watershed from this new project. If the leasehold has been contaminated who is responsible for its clean up.

15. How many species of fish are found in the High Valley and surrounding watersheds. How many of these fish are native. How many types fish spawn in the High Valley watershed and its tributaries. Are any of them endangered or threatened.

16. How was the engineering developed for this project. Were all possible contingencies taken into account. Does this project require Calif licensed engineers. It seems like the environment is affected by how well the project is thought out before it is started.I am concerned by this project. The company and the project managers seem well over there heads. Will the ERI address there ability to do the best job possible. So far all I have read and seen show lack thought and insight as far as this project is concerned. There main concern seems to going as fast a possible. This rarely produces the best results. Will any unions be involved

17. I have a thousand other questions. If I did this for a living I might be able put them all down. I am counting on the EIR and other more qualified parties to answer these questions for me. I am hoping that EDAW/AECOM will do the best possible job. I hope the few questions I have submitted fit into the perimeters set forth.

We will see what the draft EIR brings.

Thank you the Coleman Family

7645 High Valley Rd, Cobb. CA 95426

Contacts

David and Cordelynn Coleman

3733 Canon Ave, Oakland, CA 94602

510-336-0974 redandcurly@yahoo.com

Larry and Willa Coleman

226 Sherman way, Red Bluff, CA 96080

530-527-6157

cc. Dale Rundquist Calif Energey Commission

cc. Sean Hagerty BLM Sacramento

cc. Guy Chids CVWQCB

cc. Steve Rosenbaum CVWQCB

cc. Eileen Boken EPA Dist 9

cc. Peck Ha Army Corps of Engineers

SCOPING ISSUES FOR TREATMENT IN THE DRAFT EIR FOR THE BOTTLE ROCK POWER GEORESOURCE BINKLEY LEASEHOLD GEOTHERMAL STEAM DEVELOPMENT PROJECT

Submitted by: Hamilton Hess, Chair, Friends of Cobb Mountain.

To:: Mr. Richard Coel, Director, Lake County Department of Community Development

255 North Forbes Street
Lakeport, CA 95453

RECEIVED

NOV 13 2009

LAKE COUNTY COMMUNITY DEVELOPMENT DEPT.

SOURCES OF NOISE AND MITIGATIONS TO BE REQUIRED

The noise regulations and standards mandated in the Noise Element of theLake County General Plan need to be clearly referenced as mandatory in this EIR and in any subsequent use permit for the project..

WELL DRILLING

Rigs to be shielded with County authorized BACT sound walls.

All diesel engines to be required to be equipped with BACT catalytic mufflers.

Drill pipe stacking, well blowing, bleeding and steam stacking to be prohibited 10:00 pm to 7: am

ROAD AND DRILLING PAD CONSTRUCTION AND MAINTENANCE

Tractors and other diesel or gasoline driven machinery to be equipped with BACT catalytic mufflers.

TRUCK TRAFFIC INTERIOR OR EXTERIOR TO THE PROJECT

To be confined to the hours of 7:00 am to 7:00 pm except in verifiable emergency.

Jake brakes to be prohibited from use.

NOISE -- GENERAL

A provision needs to be made for noise measurements on-call at residences 24/7, and a plan needs to be developed to shield residences filing noise complaints, and we ask that continuous noise (for over one hour) higher than 40 dBA at residences be prohibited between 10:0 pm and 7:00 am.

The sensitivity of wildlife to noise, particularly to those who hunt heir prey or avoid their own predators by sound needs to be taken into account in the design of this project.

GRADING AND SOIL MANAGEMENT

County and California UBC standards and requirements for grading, soil retention, and prevention of erosion must be written into the EIR as mitigations to be spelled out in the Use Permit if the project is approved. Topsoil must be stockpiled for restoring cover for revegetation. Graded areas must be kept as small as possible, and the movement of trucks and heavy equipment over non-graded areas must be prohibited.

VEHICULAR TRAFFIC

Vehicular traffic on the High Valley Road from its junction with Bottle Rock Road to the Bottle Rock Power operational site is one of the major concerns of residents in the local community living in scattered homes along this route. Bottle Rock Power's past and present use of this narrow, hilly and largely one way road has been and is fraught with difficulties in matters of road safety, regional security, speeding, and traffic volume. The applicant's own figures reveal that the present road use is about 136 trips per day to the Bottle Rock Power plant area, and that an additional traffic load for the new project which this EIR will cover will be about 232 trips per day, bringing the total Bottle Rock load (not counting local residential use) to about 368 trips per day. Assuming that these are one way trips, the figure should be approximately doubled in accounting for return trips as well. Upward to 740 trips must therefore be considered as realistic. Assuming that daytime traffic would be at least double than that at night, this means about forty trips of industrial traffic per daytime hour or a trip every minute and a half. This would clearly be an impossible situation. Another route apart from the High Valley Road must be used by Bottle Rock Geo. This issue must be resolved in the EIR. Also, we are aware that the legality of an easement for Bottle Rock Geo traffic to use High Valley Road is in question. This legal issue must be resolved by the County prior to the completion of the Draft EIR.

VISUAL IMPACTS

The visual impact of drilling rigs and appurtenant structures rising above the horizon for many viewers, inclusive of residents in at least fifty homes in the subdivisions west of Hwy 175 on Boggs Mountain, will create a significant industrial intrusion into what is now an essentially natural viewscape. For this there is no possible mitigation, nor is there possible mitigation for the considerable land form transformation with the lowering of the hill for the east pad. The persons who purchased their residences on Boggs Mountain will suffer permanent loss of part of the pristine beauty of the picture window viewscape that they purchased, and it is likely that their residential property values will decline. We ask that this question be treated in the EIR in consultation with at least two local, licensed real estate agents. Added to that, the lighting on the drilling rigs at night will also be intrusive. This must be mitigated as far as possible by a requirement that all lights must shine downward except for the aircraft warning light at the top. We ask that a study of state of the art light shielding methods and equipment be conducted in relation to this problem.

BIOLOGICAL IMPACTS

All plant and animal species resident or habitually transient on the leasehold must be identified with mitigations designed and implemented for the survival of rare and endangered and endemic species. We ask that a general plan and set of requirements for wildlife management during the life of the project be established and conducted. This will include documenting plant and animal habitat modification and loss, the interface between specific plant populations and animal populations, and identification of critical habitat areas for specific plant and animal species in which development must be prohibited. Serpentine soils, which widely occur on the leasehold, are home to certain rare plants whose populations must be identified and preserved. Surveys for flowering plant species can be done comprehensively only during the April to June blooming season. We request that this be done by qualified botanists in cooperation with EDWA. Amphibian populations in High Valley Creek, together with red and yellow legged frogs, should be surveyed with special care because of their declining numbers. Fish populations in High Valley Creek need to be identified, quantified and protected from silt invasion, chemical spills, and loss of shade cover over the stream itself. Current work to rebuild the diminishing hitch population appertains directly to habitat availability and quality in Kelsey and High Valley Creeks.

ARCHAEOLOGY

Existing known archaeological sites must be protected without revealing their exact locations and other possible sites also need to be sought and protected.

WATER QUANTITY AND QUALITY

A project need for 200,000 gallons of water for site construction and well drilling has been stated in the project proposal. The source or sources for this must be identified, and it must be demonstrated that neighboring springs and wells will not be affected in their productivity. The project operator must guarantee in writing to supply water on a permanent basis to any property owner whose own natural supply has been diminished, or with the burden of proof on the operator that his own water taking has not been responsible for the diminished supply. The same responsibility of proof must be undertaken with regard to possible degradation of water quality in local sources by practices or actions of the operator. High Valley Creek is a tributary of Kelsey Creek which flows into Clear Lake and also feeds the Big Valley water table. Its protection from contamination is of prime importance, and adequate measures for such protection from spills, overflows or other liquid or solid releases must be written into the EIR. Also, an immediate alarm system for downstream water users as far down as Clear Lake must be installed.

AIR QUALITY

In addition to the common Geysers problem of hydrogen sulfide emissions which routinely require monitoring and the achievement of stated emission levels, this proposed project is to be conducted in an area which is known to have higher levels than normal in The Geysers steam field of iron oxide, mercury, arsenic, and radon, producing what has been referred to as "pink steam". As there are residents in immediately adjoining areas to the proposed development wells, and as these constituents are known to be hazardous to human health, and as there is no means available of testing or monitoring for them on a routine and continuous basis either during well

drilling or steam production, and as there are no means of separating them from the steam short of chemical treatment at the power plant, and as some emissions to the atmosphere at the wellhead during drilling and testing, or from the steam lines are inevitable, it is possible that the production of such steam cannot be legally allowed. We ask for a thorough analysis of this problematic situation, inclusive of the toxicity and likely concentrations of these elements in the steam.

Serpentine rock and soils are widely present in the project region and are commonly bearers of asbestos, a known carcinogen. While it is unlikely (but not impossible) to be found in the steam zone, particulate asbestos as dust will be present at the surface level and must be subjected to the rigid controls required by the Lake County Air Pollution Control District. Blowing winds and vehicular tires, and also shoes, can carry the dust far and wide, and all possible means of containment must be employed, all subject to Air District direction.

SOCIAL IMPACTS AND ECONOMIC IMPACTS ON REGIONAL PROPERTY OWNERS

We readily acknowledge that geothermal development projects benefit the economy of the County, will bring welcome income to the lessors of the steam rights, and to the far away investors, and will provide employment for some local residents, although many of the rig crew members are imported from outside. These project benefits are invariably cited in EIRs for geothermal and other industrial and commercial projects as reasons for supporting the project. The political slant is all too obvious. We request that the EIR, for this proposed project, seeks a balance in fairness. The neighbors of such projects are always the losers, routinely dismissed as NIMBYs; as if acquiring monetary value is always good, and losing value is just the way the ball bounces. Those who are on the receiving end of the detrimental impacts of a project have few rights and receive little sympathy, nor indeed, recompense for their losses. In this case, the losses are the peace and quiet and natural mountain beauty that brought many home owners to the area to begin with. Their out of door (or out of window) lives will now be partially dominated by an industrialized viewscape and audioscape and occasional whiffs of hydrogen sulfide. The Bottle Rock Power plant brought us some of this in the past, and now it inevitably brings us more. The impact on the residents will be loss in property value as well as loss in pleasure in living here. The EIR must provide a fair analysis of this situation. Recompense? Not just sympathy. What about free electricity? This would bring at least a small degree of justice to the case.

A PROJECT ALTERNATIVE

Friends of Cobb Mountain have been close geothermal watchers since 1970 when the industry first became active in the Cobb area, and it has been our firm impression from a variety of knowledgeable sources that the area proposed by Bottle Rock Power for exploration and development is lacking in sufficient good quality steam to be worth the cost of drilling. This assessment may, of course be wrong, but it should be weighty enough to inspire the developer towards caution. What we propose here we would hope would be attractive to all parties concerned. This is to propose that Bottle Rock should apply for one pad -- preferably for visual and noise reasons the west pad -- to determine the availability of steam in several wells, and then proceed to the rest of the project if the results are favorable. This would save a great deal of adverse impact and altered or damaged countryside from the project if the exploration is

unsuccessful. The total project is staggering in the extent of topographical impact that it will entail with the removal and movement of 319,000 cubic yards of soil and rock. It would be a topographical and environmental tragedy if all of this were to take place uselessly with failure of steam development.

SEISMIC IMPACTS

Seismic events caused by steam production and fluid injection into the reservoir are well known in The Geysers geothermal field, and earthquakes seemingly caused by geothermal operations have already been recorded in proximity to the Bottle Rock Power Plant area. Production from the wells drilled for the proposed project will presumably contribute to the seismic phenomenon.

Hamilton Hess

November 12, 2009

November 78,2009

To :
Richard Coel
Lake County Planning Department,
255 Forbes St.
Lakeport, California

From:
Linda Fung
P.O. Box 332
8195 High Valley Road,
Cobb, CA 95426

RECEIVED
NOV 13 2009
LAKE COUNTY COMMUNITY
DEVELOPMENT DEPT.

Re:
Scoping meeting, environmental questions for the EIR
to be submitted to EDWA for consideration.

BOTANICAL AND NATURAL

1.How will the excessive water spraying for serpentine dust affect the delicate grasses and forest floor around the well pads.

2. Will the serpentine dust and water and sump mud drain into High Valley Creek?

3. Are there bird and squirrel nests in the trees around the drilling sites, and how will the noise, light and serpentine dust affect them? A large nest was sighted next to the creek two thirds up the tree.

4. If oils, gas and toxins seep into High Valley Creek, will it affect the tiny fish called "the Hitch" treasured by the Pomo, in High Valley Creek and further down in Kelsey Creek where the Hitch are thriving (according to reports).

5. Are there rare and endangered plants and animals growing at the hillside sites that will be demolished?

6. Are your botanists aware of the wild rose (rosa nutkana) or Nootka Rose? It is growning on the left side of the road by the chain link fence right before the bridge on lower High Valley Road. Can these be found on proposed project site?

7. There is also a mild weed variety that grows around serpentine outcroppings. I have seen it the area.

8. Here is a list of other plants that may be threatend:
   a. Witch Hazel
   b. Kermes Oak
   c. Purple Trillium
   d. Calypso Orchid

9. Is the forest on either side of the proposed project road that goes up to the West Pad a pgymy forest?

10 If so, would this be treated as a rare or endangered area?

11. Does the serpentine, which is scattered around this pygmy forest-looking area, indicate a large vein?

12. Would any wild bear habitat be disturbed by this project?

CULTURAL

1. Are there any archeological sites near the proposed well pad construction?
I have read that one of the Mayacamas tribes lived in the valley near Alder Creek and Kelsey Creek for about two years in the Mid eighteen hundreds. They were called the Wappo.

2. If relic were found during construction would there be a knowledgable scientist on site to halt production?

I have seen many relics all around lower and upper High Valley.
Arrowheads and tools are sometimes apparent.
Would there be any Lake County diamonds up there?

The fact that the Binkley Ranch is one of the oldest homesteads in the area, and so should that ranch be considered a historical site? How will the project affect the historical significance of this ranch?

3. At the Lake County Historical museum in Lakeport, there is a display of a prehistoric mammoth molar found by George Knauss as he was installing a telephone pole at the intersection of High Valley Road and Alder Creek in 1962.
It was indentified and authenticated in San Francisco by a geologist at the Division of Mines and Minerals. Would there still be the body of a woolly mammoth buried at that site?
This is very close to the Alder Creek Bridge on lower High Valley Road where BRP GeoResource wants to install a bigger bridge for their new proposed project. Would that construction threaten that site?

Linda M. Fung
November 12, 2009

November 11,2009

To : EDAW c/o
Richard Coel
Lake County
Community Development Department
255 North Forbes St.
Lakeport, California 95453

From:
Randall Fung
P.O. Box 332
8195 High Valley Road,
Cobb, CA 95426

RECEIVED
NOV 13 2009
LAKE COUNTY COMMUNITY
DEVELOPMENT DEPT.

Re:
Scoping meeting, environmental questions for the EIR
to be submitted to EDAW for consideration.

If I might, before submitting my questions for my environmental concerns, I would like to make a few comments for the EIR contractor to consider.

I have read through a good many sections of the proposed plan, using the documentation received from the County in a disk containing the proposal and CEC PTA. Although this is not an initial draft, it is the only valid and complete statement of the proposed geothermal expansion plan that we have to work with. One would assume that it would be accurate.

Brent Schroeder, representing EDAW and Rick Coel, representing the LCDD,stated at the scoping meeting that EDAW would do a peer review of the document and then analyze what additional studies would need to be performed. I would have to assume by these statements that they mean to review the initial proposed plan documents known as the CEC PTA submitted to Lake County. LCDD has not informed the public of any other documentation.

Further more, Brent Schoeder stated that they hoped to get the initial draft done by the first of the year.

This was also stated by the lead agency through Rick Coel with LCDD. I find this very hard to fathom, since that is less that two full months. Many of the field studies would have to be conducted in the spring. And if

geotechnical or hydrology field studies with boring equipment were to be required, these would have to wait until the spring as well, due to the necessity of crossing the already flowing High Valley Creek and end of the permitted grading period with the beginning of the rainy season.

I am unsure if EDAW means to wait until the CEC PTA is submitted as a legal initial draft or even a final draft before reviewing it. Currently it is unknown if it is even a legal document to be reviewed.In a recent conversation, when questioned about some errors in the document and figures quoted, Bob Guiguerre, the Bottle Rock GeoResource project manager, stated that the document was not official, since it had not been approved as the initial EIR, and that it might only be 30 percent correct due to their inability to determine all the factors. He stated that they had submitted the incomplete report, because it is only a "design plan" and that they had needed to get the application process started, and that they could only guess as to the details necessary for the project. If need be, I can supply evidence to these statements. These statements by themselves should raise a red flag to EDAW to view the proposal document with some skepticism. There are many errors, erroneous facts, statements and conflicting evidence already associated with this document. I find it hard to understand how EDAW or any EIR contractor could rely on any part of this document as the basis for their own study if there are already so many mistakes found within it.

I urge EDAW or any other contractors associated with the EIR study to conduct full impartial studies from the ground up without any reliance on the materials already presented.

Examples of questionable material

Although one understands that there are typo's in some documents, the figures stated, form the very content upon which the questions will be formulated. Therefore, it would be assumed that all the figures have been carefully checked by the applicant and the impressive list of preparers. I am only a lay person, and I am surprised that I should be be able find any erroneous, incorrect or missing information in the document.

1. Of course the first noticeable error is Dale Runquists misspelled name. Lunquist instead of Runquist. This easily should have been apparent. Not a major factor, but a red flag as to the haste of preparation.

2. The second error to be fairly noticeable was the figure associated with the Greenhouse Gases document, 4.3-2. The statement says that:
The direct GHG emissions from this project during operations would be approximately 28,000 million tons of C02 (MTCO2) equivalent per year. Of course I am just a lay person, but this figure stuck way out and after speaking with Dale Runquist of the CEC, it was confirmed that it should have stated 28000 "short" tons of C02. A simple typo or error in statement, but another red flag.
The question is that if after reading for only an hour, two statements come up incorrect, what is the balance of correctness needed to be relied upon as document for subsequent "peer review". How many other errors undetected lie within the document received as fact?

3.Project Description and Alternatives document, 3-13 states that they will be using a culvert to cross High Valley Creek. It was discovered a few days ago that BRP (generic, not specific-Binkley Geo HoldCo) had applied for a permit for a prefab span bridge across High Valley Creek. Permit was not permitted by Fish and Game. Permit application stated that they had gotten permits from County for project, but County denies this. Red Flag.

4. The proposed document states that the two site were chosen for the least potential of slide. Yet, at the scoping meeting, on video tape, Bob guiguerre makes this statement:
(video documentation of meeting, video recording: MOV03416 22:48)
"....we have done geotechnical research on both of these pad locations...this ground that is surrounding these pads is **slide area** and because of that, we can't just go out there and cut or put in a 3 acre pad and walk away, because we have to protect the wells once they are in.....
(me) These are two contradictory statements saying that the pad areas are least potential for slide, yet they have to be big because of slide.
As well, add to the evidence that RMT hired Eviron Stategies to do the bore testing for the engineered study of the pads. In another conversation, both the president and project manager of the BottleRock GeoResourse state that the bore testing had only been done on the West pad and that the East pad has not had actual bore testing. The geotechnical information had been done from old research.

5. On the document, Project overviews and design, 2-5, the document clearly states:
2.2.1 GEOTHERMAL RESOURCE CHARACTERISTICS

...No publicly available chemical data is available from 39A-30."
There are known reports for these wells. They were closed due to the toxic content.

These are only a few of the mistakes that I have found with the proposal. There are many, many more.

Quote:
...No wells have been drilled within the project area; therefore, actual data on the physical and chemical characteristics of the geothermal steam is not available. Geothermal resource data can be projected from wells drilled immediately to the southeast and northeast of the BRP GeoResource leasehold boundary."

All one has to do is to look at the many failed wells of the past to imagine the effect of the failed proposed project on the landscape, versus the actual gain in steam. If this becomes a failed project, it will be a mark on EDWA's rooster of gleaming accomplishments. So is with this that I urge EDWA to seriously consider all the various aspects of this project, from the past history of non compliance, to the failed efforts on their current leasehold, and the unknown risk of the proposed project going forward.

I would further urge EDAW to look into Bottle Rock Power's poor history of compliance and Notice of Violations in the recent past. There is evidence of possible lack of paper filing with the proper regulatory agencies, and current non compliance with use permit 85-27. As the application and easements are being granted under the "umbrella" of one company know as Bottle Rock Power, and that the management teams, construction crews and subcontractors might be the same, then the past history must be taken into consideration in determining the necessary mitigation, regulatory and compliance requirement for the EIR.

As the firm hired to conduct the final EIR, the consideration of mitigation must include the **possibility of an honest no project alternative** for the zero mitigation if the project is not viable in any of the conditions set forth in CEQA, county plan, or other unmitigable environmental considerations.

EDAW's own website presents a very reputable firm with very impressive list of impeccable clients and past projects. I place all my trust into EDAW to

perform the necessary actions and consideration to come out with the most complete EIR and mitigation suggestions for the project. I am happy that EDAW has take the time to take my comments into consideration.

QUESTIONS:

1. Is this a expansion of the exiting power plant or is it a new project for a new applicant?

2. Is Bottle Rock Power GeoResource an entirely separate entity selling power to BRP, or is it BRP expanding it's current steam fields.

3. What are the exact heirachy or relationships of the corporate structure so that easements, financial and insurance obligations can be determined for the use permit?

4. As the two companies will be sharing the same management, ownership, contractors, how will the separate obligations of each LLC be detemined?

5. How will the two CUP's be juxtaposed with each other.
As an example, the current use permit for BRP traffic plan allows 70 daily trips. The new proposed plan proposed an additional 300 vehicles a day. So doesn't the additional amount of vehicles violate the old use permit.
How will the overlays of the two coinciding permits be juxtaposed?

6. Will EDAW consider the old use permit for the Binkley lease and examine the old EIR done for the previous use permit 85-92?

7. Will the addition of a new use permit for the Binkley steam field "expansion" lead to an over cumulative effect voiding the old user permit?

8. How can two use permits be juxtaposed at all?

9. How will the additional use permit adversely affect the quality of life of the residents? Obviously quadrupling the amount of traffic through a residential zone would be a serious unmitigable impact on the residents.

10. How will rezoning the parcel to RL affect the two existing residences on the parcel?

11. Will the rezoning of the parcel lead to a property value loss in the residential zones? Will this affect any proposed builing plans in the future?

12. Will the new expansion affect the property values of the nearby residents? Should there be parcel accessments to determine baseline to compare loss of value?

13. Will Bottle Rock GeoResource be require to hold it's own bond for closure, cleanup and emergency contigincies as per the old use permit?

14. If one of the coinciding permits is more strict that the other, who will determine if the stricter one is mandated, so that the new expansion will not be weakened by the existence of the old use permit?

15. Should ONE new stricter permit be written for both the exiting BRP lease and the new Binkley lease for simplicity and clarity?

16. How can the new proposal violate the County General Plan?
Policy N-1.2
to **prohibit** the development of new commercial, industrial, or other noise-generating land uses ADJACENT to existing residential uses and other sensitive noise receptors.
and:
Noise Policy GR-2.1 "Avoid siting near sensitive receptors. The County should avoid approving new geothermal operations near residences, commercial resorts or other sensitive receptors where it can be reasonably **expected to adversely affect their quality of life.**"
(will these two important items of the County General plan just be totally ignored?)

17. Would the County have to have a hearing to alter the old use permit, and/or the general plan to approve the project?

18. Should EDAW recommend that the zone change hearing be held before the EIR initial draft, because if the zone change is not allowed, it would negate going forward with the proposal, seeing that the conflict cannot be remedied?

20. At what point can the County override the popular opinion of the affected neighbors in determining the rezoning, violation of general plan and use

permit?

21. Since the legality of the easement of High Valley Road is currently in question with County Legal counsel, shouldn't the alternate roads be studied as well until a final determination can be made?

22. County General Plan Policy T-1.9
"To reduce heavy truck traffic in residential areas. (60 large trucks going through my property will affect my quality of life) and near noise sentive land uses, the County should ensure truck routes are desininate in a manner that traffic noise impacts are minimized"
this could not be more clear. Can the proposed plan authorize traffic without checking into the legality of the easement, and break the general plan by using High Valley Road, when no residents live on Cold Water Creek Road, and no one will be affected by traffic on that road?

23. An EIR is good for recommendations as to the structure and requirements of a CUP, but the CUP is only as good as the monitoring and enforcing of it. In the past, the compliance, monitoring, and enforcing of the current use permit for the BRP lease has been very lacking, to say the least. So will the new use permit have stricter enforcement methods?

a. Will there be a citizens advisory committee to be able to have citizens input to enforce policy?

b. What will be the consequences of noncompliance and what will be the means of accomplishing the enforcement of the use permit.

c. Will EDAW study to determine the amount of manpower needed to monitor and realistically enforce the projected CUP?

d. Should fines be collected for the citizens as well as the county as motivation for the applicant to conform to the CUP?

e. Should all necessary records be available to public access to ensure that neighbors have a right to have their CUP in compliance. To date, there has been much hiding of the records and logs, so that the neighbors cannot really see a transparent picture of compliance. BRP has gone as far as threatening to arrest neighbors for taking pictures of noncompliance to protect their own interests. Gate logs of entry and logs of hazardous materials have been claimed as confidential and the public or neighbors have been denied access to these logs. Attempts to gain access to the logs through the County LCDD has also been fruitless, so that those very citizens proposed to be protected by the CUP are denied the information upon which to base their claims.

This is very unfair and EDWA should look seriously into the past noncompliance and record of complaints not addressed to view this whole picture of the same management team that will be going forward into the new project.
What will be the mitigation for these existing and future dilemmas?

f. What type of fines would have to be established to GUARANTEE COMPLIANCE?

Aesthetics per CEQA significant effects

1.Will the tremendous amount of lights needed for 24 hour operations affect my view to the west in the night skies? How will that adversely affect my quality of life, since I live on a knoll and the proposed pads are in my direct line of sight looking west.

2. Will the project damage the scenic view that I enjoy traveling to Bill Jadiker's house which is only 700 feet from the proposed west pad? How can the lost of 8 acres of my scenic view be mitigated?

3. Will EDAW do a study on the effects of ambient light with various weather conditions from my residence at 8195 High Valley Road in order in order to determine if the lighting needed for the 24 hour drilling will affect my quality of life and change the appearance of the western sky?

4. Will the necessary road signs for traffic control affect the beauty of High Valley Road?

5. Should EDAW recommend a citizens advisory board to help determine the changes needed for the project to be able to give equal input from the nearby residents that will be impacted forever?

6. Should EDAW consider the total impact of the project's aesthetic effects upon the communities to the east as far as the lighting of the night sky and the drilling tower beacon lights? Like the residents on Fox drive?

7. Will the necessary removal of the natural habitat of the proposed 26 acres affect the wildlife such as deer, foxes, coyotes which are part of our natural aesthetics roaming around our valley and properties?

8 Will EDAW view at all the scarred cuts from old abandoned wells in the Mayacamas range and balance the risk of the proposed project with the lack of any existing well data on the proposed project lease against the damage of lost native habitat and changed natural beauty that this project will necessitate? You only have to view the large cut pad on the Robinson property from the the top of Sulfur Creek Road to see the effects of an abandoned well to see the unmitigatable effects.

9. If the project is a failure, how would the removal and relandscaping of 26 acres be returned to its natural state in closure? Would that even be possible?

10. Who would be responsible for the failed project to be returned back to its natural setting and should there be a bond imposed to be sure that the cost of renaturalization be enabled?

We are very worried about the visual impact that this project would have on the quality of our lives. We have lived in this valley for over 20 years and have come to enjoy its natural beauty. We are afraid that the project will forever change the valley as we know it, as far as the proposed alterations to the native landscape and mountains. The Mayacamas mountain range is scarred with old abandoned projects. These were never returned to a natural state after the abandoned projects. So we are very fearful that this, too, because of the lack of steam will end up as such. Once done, it can never return to its natural state. We implore EDAW to seriously consider the risks of this proposed project against the unmitigable damage to the landscape and the forever scarring of our aesthetics.

Farmland

1. Although our ranch is zoned RR, we do have livestock and I am concerned about the effect of the proposed 368 daily vehicle trips affecting the disposition of my gentle donkeys. They graze on the field, and the road is within 15 feet. I am afraid that the traffic will scare them so that they will no longer use the field for grazing and stay up on the knoll where their barn is. How will the traffic affect my donkeys? Should there be some trees or shrubs planted by the applicant along my fence line to mitigate the traffic effects?

2. I like to ride my horse and mammoth jack along the road. Will the newly proposed traffic plan of 368 vehicle affect the quality of my daily life by

not allowing me to continue to do that because of the 400 percent increase in traffic? Should there be a imposed rule that traffic must stop 50 feet away from my horse so that it will not spooked and possibly cause me to have injuries. Should the applicant be required to make a pedestrian trail or horse path so that I will be out of the way of the oncoming traffic?

3. Will EDAW consider the needs of a horse or mule crossing signs and speed bumps by 8195 High Valley Road to slow down the traffic for the animals?

4. Will the amount of exhaust emissions affect the quality of my organic produce and orchard down by the road?

Air Quality

One can cope with the noise problem by purchasing good quality noise canceling earphones and having them on for 18 hours a day, but it is impossible to cancel out bad smell.
And even a slight noxious odor all day can become horribly untolerable over a long period.
There have been so many reports of headaches and nausea associated with the geothermal projects. Although there are danger levels and over allowable rates for the Hydorgen Sulfide, there are no mitigation methods to address the change in the quality of life that one experiences from the constant smell of sulfur or steam chemical. And certainly there are no monitoring systems or even use permit guidelines for the exhaust emmissions that collect in the valley.

The valley is like a bowl, and depending upon the weather conditions, collect the smells in different areas at different tempurature and climate changes. With noise, I can capture the offending violation with a video or voice recording, but the problem with smell is that is is virtually impossible to capture with a bottle. And even if captured, that much harder to test without the smell escaping. So how does one monitor the problem of noxious odor and how does one monitor the effect upon the quality of life.

There certainly is a difference on the tolerance level between those who make money at the Geysers and can live with it for a day and go home to a place where they know they will not be bothered by it, and the very people living here who have no control over that offensive odor penetrating their very existence day in and day out.

And what is the long term effect of breathing in the slight odors and chemical that occur with geothermal steam. Has a study ever been conducted to determine this. We know that the workers wear monitors to alert them if the H2S gets over the danger level, but I am talking about the long term effect of low dosage day in and day out. Has any study ever been done.

EDAW must do a survey of the rate of cancer occuring on High Valley Road. Compared to the national average, it is incredibly high. Gary Julliani died of cancer. Gary Ostrander died of Cancer. Raymond Warren died of cancer. Bill Barrett died of cancer. That is four people in a half mile radius dying of similar cancers. This high rate of cancer must be studied to see if there is any correlation to the geothemal projects. Please show me another stretch of road that has this high an occurance. Might it be due to the air quality. I don't know, but this certainly must raise some red flags. If no one else has raised this issue, I do so now. I am not an alarmist, but these are the facts. Perhaps there is no correlation, but it must be taken into consideration.

1. Although there is an air monitoring station down by the Wilcox property, I am up on a hill and can smell odors not recorded down in the valley, so I would like a monitor on various locations around the valley and up on the knoll residences.

2. The monitor only captures H2S and that is only one of the elements in the steam. We want monitors that give a complete readout of ALL potential metals, chemicals and hazards associated with geothermal. Will there be any monitors for levels of Mercury or Boron. These are chemicals associated with some of the wells close to the proposed project sites. Aren't we entitled to have equipment that can monitor for these as well. Speaking to Doug Gerhart of Air Quality, he stated that the contrator of the project must do periodic tests on the steam found. But again we find that the fox is guarding the chicken coop, and voluntary tests are not sufficient. Of course the tests are done by independent labs, but the sampling is done in house and therein lies the problem. We have already been working for now over a year and half trying to find the results of the material in the sumps, which is reported to be tested by independent labs, and have yet to see any results. In house sampling cannot be relied upon. We cannot wait a year to find out about the air we are breathing. There must be stringent compliance rules written into the use permit and serious fines associated with noncompliance. We feel that our

health has been put to risk by BRP's non compliance in many ways. Sumps leakng into our water supplys, hazardous dust from trucks, steam leaks, etc.
There has to be stricter guidelines for air quality.
The results of the testing must be immediately accessible by the public.

3. Will there be any warning system to inform us of steam leaks and sulfur fumes? These days we have to smell it, then check online to see the readout of the monitoring sytem, call air quality and wait for them to come out to close down steam leaks. We hope there will be a better system than this archaic method. What does EDAW suggest for the monitoring/compliance of monitoring all possible hazardous chemicals.

4. I spoke with Doug Gerhart of LCAQMB and he told me that the monitoring of vehicle emmsissons was a state compliance issue, not his. So we are worried about the exhaust fumes from the vast amount of diesel equipment needed for the construction phase of moving 350,000 tons of earth.

5. How does EDAW propose to monitor the vehicle emmssions of the construction vehicles and what should the allowable limit be.

6. Can EDAW do a study to see if exhaust emmissions can be lowered significantly by:

a. newer equipement with lower exhaust ratio?

b. a monitoring check of the output of equipment used so that an actual amount of emmission for the actual project can be predicted rather than a statiscal estimate from charts of estimated emmssions from theoretical equipment charts.

c. using car pooling instead of invidual vehicle trips

d. Using less construction vehicles per hour so that the exhaust can dissapate without collecting in the valley. This is an important point, since the proposed project is planning to construct both pads simultaneously. The effect of 15 grading vehicles in one hour will allow the fumes to culmatively gather under certain weather conditions, whereas half the vehicles used might allow the exhaust fumes to dissapate so that there will less loss of quality of life for surrounding homes. This must be taken into account and the amount of construction vehicles used at any given time be limited. Otherwise it will be an exhaust gas bowl that we will have to live in. Also, the culmulative effect of the current power plant and the new propsed expansion project must be taken into account.

5. There will have to be a study done on how the exhaust fumes will affect Bill Jadiker, the neighbor living 800 feet from the West pad. All the fumes will collect in the valley and be funneled down to his residence. There will have to be some sort of air monitoring system to detect H2S, exhaust fumes, and all associated project emmssions. A H2S monitoring station is not enough for someone living that close to the project.

6. Special consideration MUST be given to the fact that he is a elderly citizen who has no breathing problems. If he starts to get any breathing problems, there should be provisions that the project must be stopped immediately for danger to his health. This must have a strict compliance measure or an immediate injunction clause. His health is more important than any project, and all the relatable emmissions from this project must be mitigated.

7. There should be a special alarm system for both Bill Jadiker and Ron Fidge's residences as they are the closest to the proposed pads. If any project related emmissions get too high, the project must be stopped. this would include, but not be limited to:

a. Related vehicle or construction fumes

b. Related geothermal emmissions of any sort

c. any detectable trace of serpentine dust or asbestos related particles.

All the following questions and suggestions about
Serpentine and asbestos dust control
must be taken seriusly into consideration!

8. Will there be a special monitoring device for serpentine dust or asbestos?

9. How will the dust from the serpentine be monitored? Will there be an independent monitoring agent on site 24/7 to monitor the dust control. Due to BRP managements poor compliance history, this is a really serious concern and we insist that EDAW act responsibly by taking in the poor compliance record of BRP and suggest the strongest control possible over the monitoring of this potentially life threatening dust.

10. Although we always hears about he onsite management of dust control and asbestos control, this is a rare case of someone living that close to the project 24 hours a day. We cannot trust a construction crew with little to no training and working on a deadline to monitor themselves as far as proper control of hazardous dust.

11. Although water is being proposed to be used to keep the serpentine dust down, this is an archaic approach at best. The dust will mix with the native soil and still get air born with the construction project, or carried away in vehicles by tires or dust on surfaces.

12. In normal asbestos control, houses with the most minute amount of abestos control are tented. As this is impossible, it is hard to see how the serpentine dust is really going to be controlled to the level required by law.

13. The serious nature of the serpentine dust must have the strictest mitigation, compliance and enforcement measures possible. This will the number one problem for the proposed project. It cannot be taken lightly in any manner. The only ways that compliance will be possible is by having an on site independent monitoring person recording and testing all dust, soil, vehicles for asbestos dust control. LCAQQMB has stated that the allowable distance for dust migration is 10 feet. It is hard to imagine how the project can go forward with this requirement. I am sure that it will be ignored by the construciton crews.

14. The project must require that all operators in the vicinity of the serpentine area wear hazardous dust masks at all times and even dust suits so that the dust can be contained within the allowable limit and range. Workers subjected to the hazardous dust must not be allowed to wear clothing outside of the work area, so protective, removeable suits are a must. Given the nature of the project and the amount of crews needed to complete, you can only imagine what would happen if all the workers wear normal clothes, and get serpentine dust on their clothes while working in the hot dry summer. Workers traveling back and forth to work (368 vehicles trips a day) will easily carry dust amounts into the residential area that exceeds the limits. Therefore there should be sampling testing around the residences to insure that this is not happening.

15. ALL VEHICLES MUST BE WASHED BEFORE THE EXIT TRIP, before entering into the residential areas, including, but not limited to vehicle under carriages, tires treads and walls, wheel wells, and vehicle bodies. Windows should be required to be rolled up so that any dust of of workers clothes may not be blown out into the residential neigborhood through which the vehicles will travel.

16. The best approach would be to find an alternate route not traveling through residential neighborhoods with families, animals and childern. If the route must be taken through our neighborhood then each vehicle must be dealt with as if they are exposed to hazardous asbestos dust.

17 Just because the dust is constrolled with water so it does not fly away, does not get rid of the hazardous dust. It just dries and waits to be carried away, so what is exactly the method for dealing with this hazard? Again, in most construction the area would be tented. How does EDAW propse to deal with this most serious issue?

18. what will be the monitoring system to detect traceable and excessive amounts of asbestos dust existing the project area?

We as neighbors living close to the project area day in and day out are extremely concerned about this particular issue. This project will not only diminish our quality of life, but its potential to cause injury to our health from this one issue of asbesos alone is enough for EDAW to consider a no project alternative on the EIR.

Biological Resources

I will leave that up to other Botanical specialists, and native conservatists, but the following are my personal concerns as fas as the effects upon native habitat.

We love seeing the deer, foxes, coyotes, turkeys and other living species that live in High Valley and the surrounding mountains. This is part of the reason that we live there. Since BRP started it's operations in 2005, we have noticed a dramatic reduction in the amount of wild life. We no longer hear the foxes crying at night, nor the sound of coyotes crying.

1. Will the proposed project drive the wildlife further into the mountains and affect our ability to be close to the natural wild life.

2. How will EDAW study this effect of loss wild life interaction with the residents?

3. As there is a tremendous amount of serpentine in the proposed pads, and the applicant has stated that the mitigation for the dust control would be water spraying, how will the run off from the spraying affect the natural creeks and

stream surrounding the pad areas.

4. What should the monitoring process be for ensuring that the creeks are not affected by the run off?
5. What should be the mitigation practices for ensuring that no water with serpentine or other contaminates will run into the streams?

6. How can the lost of 26.59 acres of natural habitat NOT be a serious nonmitagable factor?

7. If the project fails, can the loss of all this natural habitat ever be brought back to it's original state of balance?

GEOLOGY

1. Cobb is the center of the most earthquakes occurring anywhere in the World. Although the majority of the seismic activity is under 4, we do get an occassion 4.5. Although the geothermal industry has denied any relationship of their activities to seismic activity in the past, the most recent studies show a direct correlation to geothermal activities. Recently, the Federal government stopping funding on the AltaRock project down in Anderson Springs and this brought national attention to the problem of geothermal related seismic activity. Being right here in the heart of it, we experience earthquakes daily.
1. What will be done to minimize the amount of earth quakes or shaking that we experience?

2. Should there be a bond or fund established by the new project to pay for damages related to seismic activity?

3. What can we do if we find damages to our house, property or personal possessions due to seismic activity.

4. Who will be monitoring this correlation between the new proposed project drilling and the amount of earthquakes that start to occur. Will EDAW establish a normal baseline to compare against?

5. Will EDAW conduct their own field study of the geology, or rely upon a the CEC PTA proposal?

6. Should the geology report include multiple drilling at many various points within the parcel to determine the entire geology, rather than to test the engineering geology at the specific well pad site.

6. How does testing only at the West well pad site tell us about the geology on the East pad, or any other information about the total geology necessary for determining the proper mitigation requirements?

7. The new proposed project will require a new road and bridge or culvert across High Valley Creek. The new crossing of the creek will require that a new road be graded to access the top of the mountain to the new West Pad. Has the geology of that newly proposed road winding up the mountain been tested for slide potential?

8. Will retaining walls be required on the access roads going up the steep side to the West Pad?

9. It was stated that the East Pad was never bore tested to find out the true geology. Will this be required for the initial EIR?

10. Since the new East pad required an extensive amount of cut and fill, and removing the top of the hill to a lower level, has any bore testing or geotechnical field studies been conducted on the ground below the proposed East pad to make sure that a land slide will not occur.

11. It is not uncommon in these areas to get 150 inches of rain in a winter. Although the normal rainfall is around 50 to 80 inches, these super rain events happen every decade. Will there be any studies that include these potentials of mud slides in the geology tests, rather on relying on tests done while the ground is dry?

12. Will there be any slump testing of the soils to determine rate of slide?

13. Will there be bore testing on the area below the East pad to determine if there is enough strength to support retaining walls if needed if the slump tests show signs of slide potential?

14. Who will be responsible to carry out the field geology report?

15. The project manager was inconsistent is stating the lack of serpentine in

the West pad:
(Video Recording of meeting: MOV03416 23:17
"We drilled on top of this hill 172' **and there is no serpentine. The serpentine angle** is such that when we build our slope, which is the cut and fill terrace that comes down to that pad, we miss it, because as you come 30' down, cut 30' the slope of the serpentine is below that and we never touch it. and it just tickled me pink..."
So first he states there is NO SERPENTINE and then he states that there is serpentine at an angle which the proposed plan will not touch. But as in the case of the changes in the culvert to the bridge project, and the statement that all design plans are only 30 percent correct, isn't there a great need to more closely examine the exact geology of the site to determine the amount of serpentine exposure if the project were to run into any changes or difficulties in actual construction?

16. Will there be someone INDEPENDENT on site to monitor any of the serpentine contact. Due to BRP's poor record of self monitoring, it would be advisable to recommend some sort of independent citizens advisory committee or independent contractor to monitor the construction phase.

17. Will there be any comparison of the new Environ geology report and the old EIR done for the use permit 85-92, the original CUP of the proposed project?

HYDROLOGY

1.Has a new independent hydrology study been conducted on the Binkley Steamfield proposed plan parcel?

2. Will EDAW do it's own field, from the ground up, hydrology study on the proposed project parcel?

3. What are the water resources that will be used for the project.

4.. Does the applicant for the proposed project have a water contract with the Binkley Ranch?

5. Does the contract, if in existence, spell out the terms of water usage, or how compensation or mitigation will be death with if the proposed plan affects the surrounding wells?

6. The project project proposal states that it will be using existing domesticated water wells with pipes in ground. Have these wells been tested for output, flow? Has a chemical analysis been conducted on these wells? Have these wells been tested for output in various times of the year?

7. The numbers given in different parts of the EIR for amount of water to be used during construction are not consistent. But it is clear that the amount to be used every day during construction is much greater than the amount cited as currently drawn from the one existing well (500 gallons per day). The effects on existing local wells could be devastating.
If the output of the existing wells do not show enough output for the current proposed plan of 160,000 gallons a day for construction, where will the rest of the water come from?

8. If the water has to be trucked in, will it come from the current BRP plant on the coleman lease. Does the applicant have a current contract with the Coleman family for use of water for the proposed project on the Binkley leasehold?

9. If all water must be drawn from the proposed project parcel, what proof is there that enough water exists? Has any test well been drilled to support this data, or is the estimate based on old hydrology reports? Is this sufficient to insure the adequacy of sufficient water resources?

10.. If necessary, how much water will need to be trucked in from outside sources, and what amount of trucks per day will be needed to carry out this plan? How will that impact the proposed traffic plan. How will that affect the large trucks to passenger vehicle count?

11. If the proposed plan's consumption of water diminishes surrounding property owners well supplies, what will be the compensation or actions require to mitigate the damages? Who will be responsible for determining these losses and mitigation and compensation? Will that be left up to civil suits by neighbors against the corporation. Which corporation will be sued? Who is responsible for these losses. Will there be a bond to insure compensation?
Will this be written into the use permit?

12. Is the water consumption by the project a fair ratio to the overall

consumption of the surrounding properties? The use of 160,000 gallons a day for construction is equivalent to 1600 homes daily consumption of 100 gallons a day, based on a water experts estimates. Is that a fair ratio to the amount of other properties and residents in the close area that will be affected by this usage?

13. Will EDAW propose that a baseline study of flow be done on each of the surrounding properties to set up a baseline, so that if our wells diminish, this loss can be verified? This procedure had been neglected for the BRP project, and so now, when we claim loss, there is no baseline to compare to. The EIR acknowledges that the record of existing wells from DWR may not be complete or accurate, so they should survey all wells within one mile, by surveying homeowners. For each well, a record should be made of the existing static water level after a period of no pumping, and after a specific period (at least three hours) of pumping. Pump pressure and yield should be recorded. This is the only way to get a record of what exists today, so that change can be measured quantitatively.

14. Will any well water be allowed to be used for any injection purposes. We ask that this be expressly forbidden, due to limited drinking water in the area.

15. I could not find any water quality data in the EIR. If well water is going to be used for controlling dust, will there be any tests done to see if there are pollutants such as mercury, sulfide, boron, sodium, or chloride that would migrate into the watershed, and what the impacts would be.

16. What would be the mitigation for damage to plants from use of water that contained boron.

17. Would there be any ongoing testing of the chemical content of the water during the construction phase to prevent damage to native habitat?

The statement that springs are separated from proposed pads by hydraulic divides, therefore appear to be hydraulically isolate: Actually, groundwater gradients often do not follow lines as surface divides, so this statement is dubious.

18. If grading and paving is involved in the construction of roads and pads, will there be be a study done to see how that amount of lack of native habitat

will affect the surround wildlife and vegetation. Solid surfaces collect and distribute water differently than native mulched soil, so the effect of paved or hard packed surfaces must be taken into consideration as to the change in flow, collection, distribution and absorption.

HAZARDS AND HAZARDOUS MATERIALS

1.The new Binkley steamfielf project proposed to have to mitigate the dust control with water spray. How will the runoff be prevent from contaminating the creeks and waterways?

2. What type of measures will be used to inform the surround neighborhood of potentially hazardous materials.

3. Will there be any public access to the information pertaining to the materials moved through our neighborhoods? Doesn't the public have a right to know and access these records for their safety? Should the residents and public have a right to access the truck logs to determine the properties of the materials being transported through their properties?

4. What level of potentially hazardous material can be lawfully transported through a zoned residential area?

5. Will there be a requirement for a wash station to remove all hazardous materials from the Binkley Steamfield project before entering the BRP leasehold?

6. Will all vehicles, trucks or transport vehicles be require to have identifying placards as to the LEVEL of hazardous waste, even though some of the material might not qualify as highly dangerous?

7. Will all loads be required to be tarped before leaving the project area? In the past, we have observed many untarped truck loads with drilling mud, and a phone call to Highway patrol did not yield any beneficial results.

8. Will there be an inspection of the current steam pipe systems to determine

their longevity, potential for bursting or leaks due to their old age and dilapidated condition upon the reopening of BRP in 2005?

9. Will there be any pressure strength tests conducted on the old pipes?

10. How will the residents living close to such an extensive project be protected from wildfires due to negligence of the project such as, but not limited to:
sparks caused by grading, exhaust sparks by trucks vehicles, cigarette or flammable materials or litter thrown out of vehicles, vehicles with improper clearance or sparking mufflers, equipment fires spreading to native habitat, welding sparks causing fires, etc.

11. Should an emergency and recovery bond be established to cover the damages and quick evacuation due to the negligence of this project, or will the nearby residents be forced to sue the non compliant company in civil court?

12. How will neighbors be notified of a potentially hazardous situation?

13. Do steam leaks for any length of time and exposure to toxic fumes rise to the level of immediate notification for response?

14. Should there be an automatic phone emergency system to notify the surrounding neighbors of potential hazardous situation? Who will determine the level of hazard that the residents should be notified?

15. Will there be ANY INCREASED RISK to life, health, limb, property, due to this project being approved near residential zoning?

16. What will be the emergency response plan, and who will implement it and determine the criterial needed for the implementation of the plan?

17. What will be the emergency escape route for Bill Jadiker, the neighbor on the other side of the project in case of dire emergency?

18. What are the alternative escape routes if any emergency cuts off our access or escape.

19. If my friend Bill Jadiker (700 feet from the proposed West well pad) needs my assistance in time of medical, or any other emergency situation, will

the construction project hamper my attentiveness in any manner, no matter how small? If the answer is yes in any amount, how will this affect Bills risks? In the unfortunate case of the delay causing harm, injury, death or loss of property, will there be a bond to cover the costs, or will the resident or defendant be require to seek their own recovery costs in civil court.

20.Will the project provide IMMEDIATE alternative access if construction blocks the road for Bill Jadiker. Will the project be required to provide CONTINUOUS access for the blocked resident, Bill Jadiker?

21. We cannot see how the significant and out of proportion increase in traffic will not increase the hazards due to traffic. Enclosed in the disk, labeled 1. "hazardous road for truck traffic" is a photo showing two large trucks trying to pass on High Valley Road. The residents house is merely 70 feet from the road in this photo, and as you can see in the photo, the right rear tire of the truck traveling uphill is off the road only the soft bank. Luckily this was in the summer, so the tire did not sink into the dirt. Had this photo been taken in a fairly common rain event of 5 inches in one day, or subsequent days of rain, the potential for the truck to sink in the mud and roll over into the house would have been significant.

22. As there are not run outs on the steep High Valley Road grade, the potential for a runaway truck is greatly enhanced, and the houses below are in high risk of danger leading to potential property damage or even worse death or personal injury.

23. Alternative truck routes need to be examined to lower the potential of hazardous spills in a neighborhood as well as the additional elevated level of traffic accidents.

24. Again, the potential of all these hazards will be so significantly increase with the proposed project, that the necessity for some sort of bond is necessary for immediate compensation due to negligence. The decision of the release of this compensation should be decided by a citizens advisory committee, not the County nor Corporation which is causing these grievances.

As the County is seeking to approve this new industrial complex near and through residences, it is imperative that all these guidelines as to financial and legal responsibilities be spelled out specifically and clearly before proceeding. All parties must agree on the final plan, or a no approval should

be mandated. The approval of a new geothermal project this close to residents creates a very high potential for damage or death or loss of property. All this must be addressed in the EIR because of the impact upon the nearby communities.

Respectfully,

Randall Fung

11/11/09

Table of Contents

Statement and Questions

Attachments for Randall Fung

1. Photos of non compliance and what we are trying to prevent from happening again.

2. Notice of violation issued by County for past non compliance showing that we need stricter methods of enforcing the CUP

3. A Letter showing the intention of BRP to try to keep citizens and neighbors from being able to photograph their noncompliant activities. Shows the need for a citizens monitoring group and/or citizens advisory panel so that the public has more enforcement and input power.

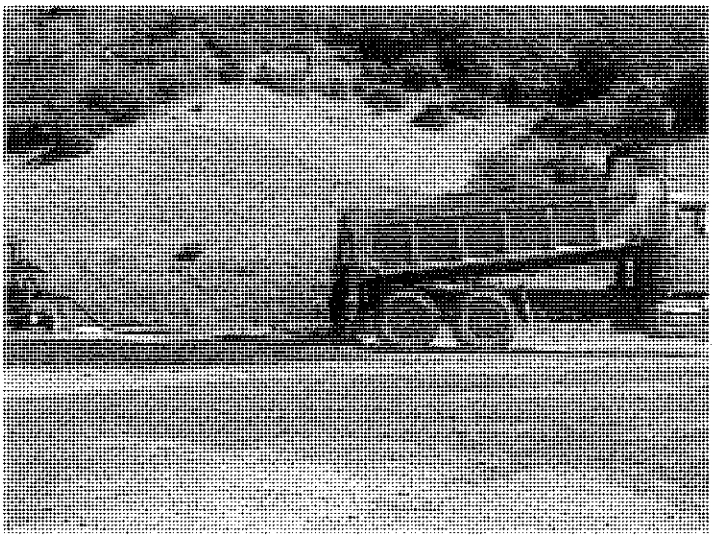
4.The current use permit traffic plan showing the amount of cars allowed per day at 50-60 vehicles. Shows that the new proposed project estimate of 368 vehicles will violate the old CUP. What good is a new EIR proposal if it violates the old CUP? Shows the need for determining the juxtapositioning of the two CUP's

5. Dangerous Hazardous Road Conditions-shows two trucks trying to pass on High Valley Road. Road is too narrow for this development.

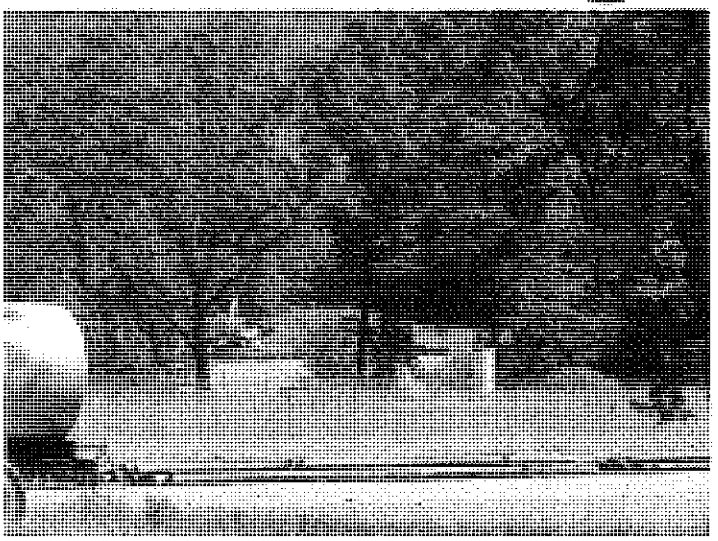
6. Photo showing the close proximity of Bill Jadikers house to the West pad-800 feet.

7. A Letter by High Valley residents sent to LCDD questioning the County's naming and assumption of High Valley Rd. as the access road for the project. We will take this to court if necessary.

8. Printed from the Lake County General Plan showing that the new proposed project will VIOLATE the County general plan of Policy N-1.2, Gr-2.1



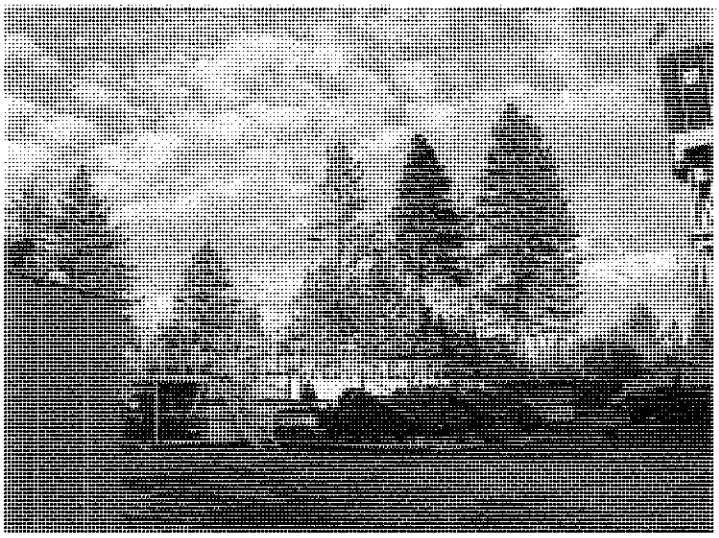
SUMP MUD DIRECTY DUMPED ON PAD SURFACE TO DRY



HUGE PILE OF SUMP MUD DUMPED ONTO VIRGIN MEADOW!

TRASH IN STORAGE YARD, JUNK & EQUIPMENT EVERYWHERE

THE VIRGIN MEADOW DESTROYED FOREVER



STEAM HAZARDOUS TO NEARBY TREES

CARELESS DESTRUCTIVE GRADING ACROSS CREEK BEDS

THESE ARE PICTURES OF WHAT WE DO NOT WANT!

PAST NON COMPIANCE & VIOLATIONS BY BRP - SAME MANAGEMENT

COUNTY OF LAKE
COMMUNITY DEVELOPMENT DEPARTMENT
Courthouse - 255 N. Forbes Street
Lakeport, California 95453
Telephone 707/263-2212 FAX 707/263-2225

2

NOTICE OF VIOLATION

LAKE COUNTY ZONING ORDINANCE
LAKE COUNTY ZONING ORDINANCE 21-61
USE PERMIT # 85-27

A CASE NUMBER: PL090112-02
OWNER(S) NAME: Bottle Rock Power Corporation
VIOLATION ADDRESS: 7385 High Valley Road, Cobb, CA 95426
MAILING ADDRESS: PO Box 326, Cobb, CA 95426
ASSESSORS PARCEL NUMBER: 013-002-03, 04, 05

B. VIOLATION(S) ZONING ORDINANCE CHAPTER 21 USE PERMIT # 85-27

- Condition I.7 – a use permit modification was not applied for nor approved to construct a pipe pad to the west of the Francisco pipeyard.
- Condition B.7 – functional impermeable retaining levees at least 18" in height and 3' thick to retain potentially hazardous materials on the drill site are not present in working order.
- Condition C.1 – the sumps at all three drilling sites are not constructed to standards for use in excess of one (1) year, which requires sumps to be double-lined with leachate collection systems consistent with Subchapter 15, Chapter 3, Title 23 of the CA Administrative Code.
- Condition C.2 – three feet of freeboard was not maintained in the Francisco sump, and drill cuttings were placed directly on the drill pad.
- Condition C.3 – contingency plan is not in place that includes a list of surface water users downstream of the Francisco Pad to Clear Lake.

letter dated April 13, 2009, a deadline for submittal of the additional soil sampling was not given, however, CDD requests that this plan be provided for review by May 13, 2009.

While not listed in the formal NOV issued on January 12, 2009, CDD has been working with BRP staff to address issues related to Condition M.7 which states "the permit holder shall surface all project roads with a double chip seal surface. . ." The chip seal surfacing that exists on the road in front of the Francisco pad is in a deteriorated state and no surfacing is present on secondary roadways leading to the Coleman or West Coleman pads. In February 2009, BRP submitted a Road Maintenance Plan for 2009-2010 for High Valley Road from the intersection of Bottle Rock Road to the edge of the Binkley Ranch. The CDD concurs with this plan and requests that the work scheduled to occur in 2009 be completed prior to October 15, 2009 to avoid issuance of a Notice of Violation.

While this plan addresses only High Valley Road, it should be noted that Condition M.7 requires surfacing of all project roads. Prior to October 15, 2009, a minimum of a double chip seal surfacing shall be installed on internal project roadways interconnecting the three steamfield pads with the power plant and High Valley Road.

The Department has noted several smaller issues related to storage of materials on idle pads (Condition D.4), approval of a scenic enhancement plan (Condition I.1), and pipeline painting (Condition I.2) that will not be discussed in detail in this letter, but are mentioned to direct your attention to a few issues that the CDD is anticipating will be addressed in the internal audit that you have indicated will be taking place shortly.

While the Department appreciates the steps Bottle Rock Power, LLC is taking to correct issues at the facility, there are still some significant measures that need to be taken to come into full Use Permit compliance. Please be advised that CDD authorization of future drilling activities may be contingent upon completion of outstanding compliance issues listed above.

The Community Development Department appreciates the approach you plan to take as the new General Manager for Bottle Rock Power, LLC, and looks forward to working with you to insure compliance at the facility. Please do not hesitate to contact me at (707) 245-9740 with any questions or concerns.

Respectfully,

Melissa Floyd
Geothermal Coordinator
mlbanks@yahoo.com

Cc: Central Valley Regional Water Quality Control Board
High Valley Road Preservation Committee
Friends of Cobb Mountain

(3)

Bottle Rock Power LLC
7385 High Valley Road
P.O. Box 326
Cobb, CA 95426
Phone: (707) 928-4578
Fax: (707) 928-4581

ISSUED BECAUSE WE TOOK PHOTOS OF NON COMPLIANCE

June 5, 2009

Re: Bottle Rock property access

Dear Neighbor:

It is necessary for Bottle Rock Power to maintain careful control of access to lease held property. No one may enter or cross Bottle Rock property without proper authorization. There have been numerous instances of individuals and groups entering the property and using the portion of High Valley Road which runs through leasehold as access to neighboring property without proper authorization. Bottle Rock Power has posted new signage describing the safety process that must be followed for visits on the property. A photograph of the new sign on High Valley Road is attached.

We are hopeful that everyone will adhere to the postings for their safety and the privacy of neighboring properties. Bottle Rock Power is not staffed to manage all possible security problems that may arise. We are however authorizing the Lake County Sheriff's Department to act on our behalf to manage trespassing as necessary.

Please feel free to contact me with any questions or concerns.

Respectfully,

Brian Harms
General Manager

SHOWS NEED FOR CITIZENS ADVISORY PANEL & A WAY FOR CITIZENS & NEIGHBORS TO MONITOR ACTIVITIES WITHOUT ARREST

85-27 USE PERMIT 1987 MCR PLAN
ATTACHMENT # 5
CURRENT APPROVED TRAFFIC PLAN
(4)

1.0 INTRODUCTION

MCR Geothermal Corporation (herein abbreviated as MGC) is the operator for the Francisco Steam Field which supplies steam to the California Department of Water Resources Bottle Rock Power Plant (herein abbreviated DWR). Both the steam field and the power plant are located in the Sections 5 & 6, Township 11 North, Range 8 West, Mount Diablo Base and Meridian.

The MGC control building and field offices are located on High Valley Road approximately one mile southwesterly of its intersection with Bottle Rock Road in Lake County, California.

Access to the leasehold and steamfield is from the intersection of High Valley Road and Bottle Rock Road.

Field operators for MGC and DWR are on duty 24 hours a day and are based in the control building and power plant. Normal business hours are Monday through Friday, 8:00 a.m. to 4:30 p.m.

24 hour telephone numbers are: MGC (707) 928-5277
DWR (707) 928-5225

2.0 BACKGROUND

DWR has completed all construction activities and the power plant and steam field are now operational. MCR drilling operations have currently ceased, but steam field expansion and additional drilling will occur in the future. Traffic to support the operations is limited to employees, suppliers and waste product removal. MGC estimates that employees and contractors will average 50-60 vehicle trips per day and of that 1-5 can be described as large vehicle traffic (1 ton or larger).

During construction of the steam field and power plant facilities, a guard service was utilized to restrict the traffic coming to and from the lease. As proposed this service would end with conclusion of construction at the power plant and that a key card gate system (existing) would remain to restrict unauthorized traffic. The following modified key card system will be installed.

3.0 USE OF HIGH VALLEY ROAD

Traffic Plan Description
Key Card/Phone System

MGC will upgrade the existing gate to include remote opening capabilities. This system will allow residents, MGC & DWR to open the gate from their home or office using a touch tone phone. Residents and property owners without touch tone phones will have to make other arrangements to allow visitors through the gate. All residents and property owners have been issued key cards which will provide 24 hour access both into and out of the road. Lost cards will be replaced at a cost of $5.00 each.

(4) TRIPS PER DAY

for well pad construction. A total of ten 10-wheeler trucks were assumed to travel to and from the area on one day. REQUIRE FINES IF TOTAL EXCEED 150%

Pipeline construction materials would be delivered via truck-trailer combinations, with a maximum of five delivery trucks arriving each day.

Construction staff is expected to work eight-hour days resulting in an estimated 50 percent of the daily construction staffing trips occurring during the p.m. peak period and 15 percent of truck traffic occurring during the p.m. peak hour.

The construction of the project would be expected to generate a maximum of 232 daily trips, including 55 trips during the p.m. peak period. Table 4.12.4 summarizes the expected traffic for project construction and includes baseline traffic conditions. Impacts to traffic are described below under LOS.

Cannot be above 55

Table 4.12-4 : Summary of Trip Generation During Construction

Use Type	Staffing		Mode				Weekday Daily Trips	PM Peak Hour Trips
	Employees	Contract Help	Passenger Vehicles	Delivery Trucks*	10-Wheelers	Trucks/ Trailers		
Existing								
Steam Field Operations	13	16	29	0	0	0	58	15
Power Plant Operations	11	0	11	0	0	0	22	5
Miscellaneous		14	14	3	3	8	56	14
Sub-total	24	30	54	3	3	8	136	34
Construction								
Drill Pad + Well + Access Road	0	30	30	10	10	36	172	38
Pipeline Construction	0	15	15	0	10	5	60	17
Sub-total	0	45	45	10	20	41	232	55
Total	24	75	99	13	23	49	368	89

* includes pilot cars to accompany drill rig component deliveries via extra-legal size loads

CURRENT PROPOSED PLAN 368 !!

TRIPS PER DAY

range for a given land use where the existing noise level is within the normally acceptable range, a 5 dBA or greater increse due to the project is considered significant;

Policy N-1.2
to prohibit the development of new commercial, industrial, or other noise-generating land uses adjacent to existing residential uses and other sensitive noise receptors.

FROM LAKE COUNTY
GENERAL PLAN

NOISE

Noise policy GR-2.1 Avoid siting near sensitive Receptors. The County should avoid approving new geothermal operations newar residences, commercial resorts or other sensitive receptors where it cn be reasonably expected to adversely affect their quality of life.

Policy T-1.9 Truck Routes.
To reduce heavy truck traffic in residential areas and near noise sensitive land uses, the County shall ensure truck routes are designated in a manner such that traffic noise impacts are minimized. {New Policy}

General Plan 8.2.3.1
If the noise level resulting from implemenation of the Poposed Project would exceed the "normally acceptable"

LAKE COUNTY GENERAL PLAN

5

DANGEROUS AND LIBELOUS ASPECTS OF HEAVY EQUIPMENT USE and OVER-BURDEN OF HIGH VALLEY ROAD:

1) Narrow, steep, tight curves on the final approach or exit from Bottlerock Power is an area where a SERIOUS accident WILL happen, either to residents, their vehicles, or to heavy equipment drivers. (attached photos)

A) There is no possible safe escape. Serious property damage or truck/driver injury will occur when brakes fail. There are no possible safe exits, so any children playing, adults working, cars attempting to pass, etc. are in extreme danger when ANY heavy equipment, including the many 18 wheel trucks, loaded or empty, exit Bottlerock Power. Toxic material spills will inevitably occur within these dangerous conditions.

B) Car AND heavy equipment use will ILEGALLY AND DRAMATICALLY increase if Bottlerock Power, through your Environmental Impact Report, is not IMMEDIATELY prevented from using High Valley Road for ANY of their work on a newly acquired Binkley 470 acre lease (B470), or any other newly acquired geothermal leasehold. The dangers cannot be over emphasized!

C) Any entity which acquires ANY of the many HUNDREDS of potential geothermal leaseholds (including Bottlerock Power) must not be allowed to use High Valley Road (HVR) WITHOUT PROPRER LEGAL AND SAFETY AUTHORITY. The owner of (B470) could have been any company, perhaps Exxon Mobile or Cal Pine. EVERY leasehold is subject to legal and safe access negotiations.

CAUTION: Bottlerock Power appears to protect itself financially and legally through sub (expendable) corporations and easy access to lawyers.

We NEED your public protection
We NEED safe living conditions
We NEED every entity to abide by the law

Sincerely:

Concerned Cobb Residents

HAZARDOUS DANGEROUS ROAD - HIGH VALLEY RD.

5

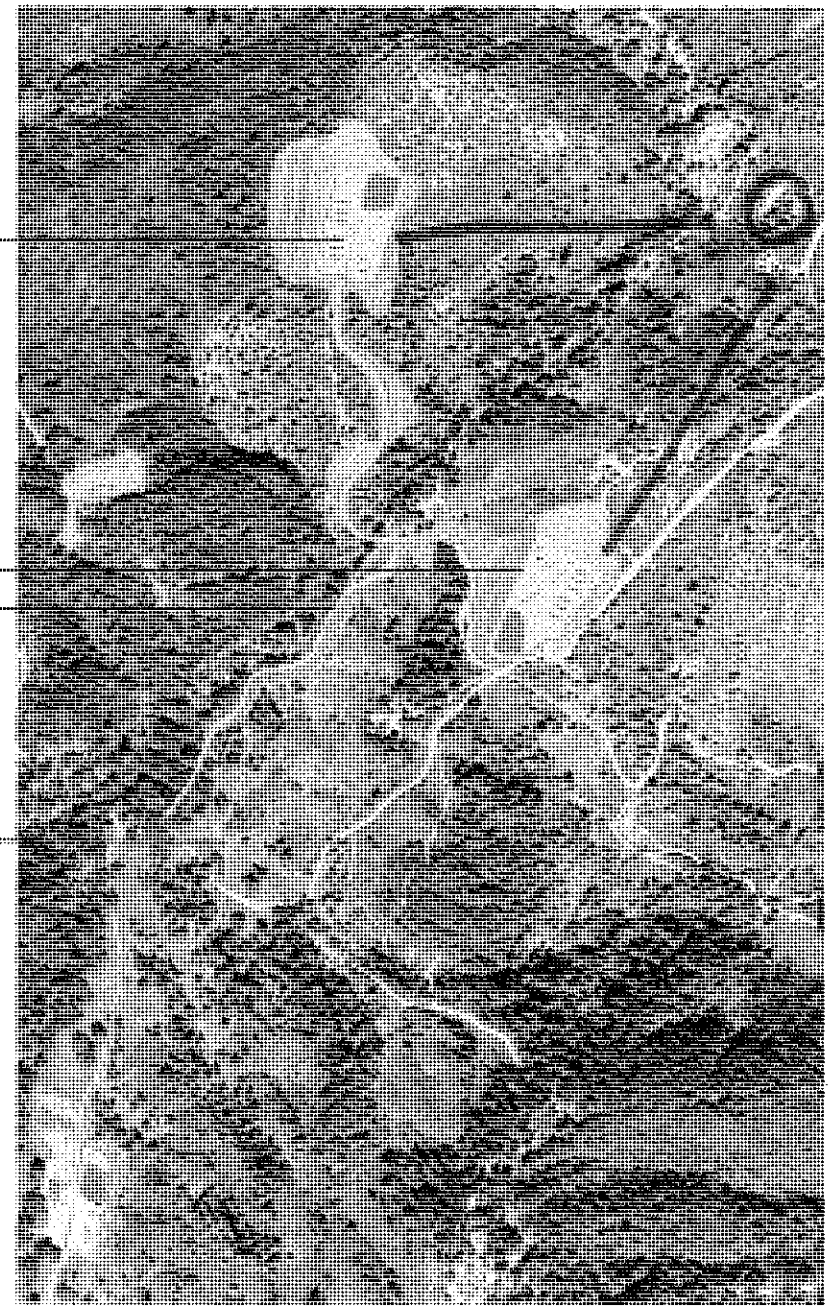
800 ~~1800~~' TO HOUSE WIDTH OF WALMART

6

VIEW FROM TOP OF PAD W

SONY T-9 38mm WIDE ANGLE

Figure 2.1-2: Simulation of Project Components After Construction



SOURCE: Google Earth, 2005

3/10's MILE

800' + 1000'

7

To:
Richard Coel, Director LCDD
255 North Forbes Street,
Lakeport, CA 95433
From:
High Valley Residents, nearby property owners, neighbors and concerned citizens

Re: Bottle Rock Power GeoResource's legality of easement through High Valley Road.

1. We, the undersigned, contest Lake County Development Department's assumption that the named applicant, Bottle Rock Power GeoResource LLC has a legal right of way through High Valley Road properties for the Construction of the proposed Binkley Steam Field project on Assessor's Parcel Numbers:
013-002-01, 013-002-03, 013-002-04, 013-002-05, 001-012-97

2. We, the undersigned, believe that LCDD has the obligation to verify the legality of any easements by Bottle Rock Power GeoResource LLC before the EIR process can begin.

We believe that Bottle Rock Power GeoResource is a separate legal entity than Bottle Rock Power Corp LLC, and has no granted right of way through High Valley Road.
Binkley Geo Resouce LLC purchased the new Binkley Lease at a public auction held by the Bureau of Land Management. According to BLM, no easements were granted with sale.
As Bottle Rock Power GeoResource is a LLC, it has separate legal and financial responsibilities than Bottle Rock Power Corp LLC.
Has Bottle Rock Power GeoResource provided any legal documents showing proof of granted easements through High Valley Road?
Based on this letter of contest, the LCDD is required to verify the legality of the easements that it proposes on the letter sent out on October 6, 2009 informing responsible agencies, agencies with jurisdiction by law, trustee agencies, federal and state agencies and citizens.

1 Is the application for the EIR a legal document?

2. Is it the responsibility of LCDD to ensure that all information on the EIR application is correct?

3. Is High Valley Road named as the access road on the EIR application?
Does the county know for a fact that Bottle Rock Power GeoResource LLC has a legal right of way on High Valley Road.

4. Has LCDD checked county records to confirm the easement before proceeding with the application and the hiring of a contractor to study an EIR for said road?

5. Has Bottle Rock GeoResource provided any documents proving their easements?

6 .We contest this easement and insist that the County is obligated to verify this fact before proceeding with the EIR process, since High Valley Road is named as the legal easement for Bottle Rock Geo Resource.

7. Can the county provide any explanation why it is not obligated to verify the legality of the

easement?

8. There will be a lot of time and money spent on doing the EIR with High Valley Road consideration as the easement. If this turns out not to be the case, it will be a waste of time and money for the County as well as all involved. This must be verified before anything can proceed

9. If the county cannot verify the legality of the easement per the above questions, we demand a postponment of the EIR process until such determination can be verified by the County in a court of law.

It is the duty of the County to be responsible for information recorded on the application and it is the duty and obligation of LCDD to confirm the legality of the easement stated on an application to the County of Lake for the propsed Bottle Rock Steam Project.

We cannot see how the county cannot agree with this request.
As the Director of LCDD, you cannot make this decision about legality of the easement on your own. You must consult with your legal counsel on this matter.
Recently you informed us that you had to consult with your legal counsel about whether you had the proper jurisdiction over the matter of some speed bumps and gate installed by BRP without proper permitting. You put off any pending actions until this was decided by legal counsel.
The consquences regarding the legality of Bottle Rock Power GeoResources' easements are of much greater consequences. Again, LCDD must be consistent in its handling of these matters.

Respectully,
High Valley Preservatioon Committee and the undersigned

Red Trudeck
Ann T.L
14957 Bottle Rock
Cynthia Trudeck

7877 High Valley Rd.

Guy Fu

Dennis Jensen 7925 High Valley Rd.

Randall Fung 8195 High Valley Rd

Linda Fung 8195 High Valley Rd.

D Coleman 7645 High Valley Rd.

[redacted]

Ronald F Felge 7777 High Valley Rd.

Hamilton Jesse

Scotty Turner 8185 HIGH VALLEY RD

Milt Rhine 14637 Bottle Rock Rd.

To
County of Lake
Community Development Department
255 North Forbes St.
Lakeport, CA 95453

From:
Ron and Nacy Trader
P.O. Box 475
14687 Bottle Rock Rd.
Cobb, CA 95426

RECEIVED
NOV 13 2009
LAKE COUNTY COMMUNITY
DEVELOPMENT DEPT

Questions for EIR Contractor

How do you justify changing what is obviously an appropiate zoning for the area just to satisfy a coroporate whim?

current sound levels, will the increase from 15 to 35 megs cause the aleady intrusive sound to become even louder? It already permiates my house walls nightly at nearly two miles away.

ground water contamination. Please explain "injection well" ie: isn't this the contaminated steam condensate (arsenic, boron, mercury and other asorted minerals and heavy metals)from the cooling tower being reinjected into the area's groundwater tables. Everybody living in this area is on private wells as there is no mutual water district service here. Will we have to do our own testing? will the county provide it? Does this actually enhance steam production? or is it just a way to dispose of highly toxic waste? (into the groundwater) how much "injection water" actually makes it to productive steam zone after substantial evaporation?

The existing steam line has encountered numerous problems. One fatality and numerous uncontrolled releases, Is the new steam line going to tie in to existing line? placing even more stress to these aged structures, or will it be sent directly to the plant? I heard two different answers at the last public meeting. Are there contingency plans in place in the event of a minor or major problem since the only thing between the steam well and the world

is a twenty five year old series of welds.

currently, as stated in the report (proposal) there are thirteen existing wells in both production and injection capacity. The plant reports to produce approximately fifteen megs of power, if the idea here is to "save the plant", how much useful dry steam must be produced from each of the proposed new wells in order to bring it up to speed? how much of a hurry will you be operating under to acheive this? How many environmental catastrophes will be overlooked in favor of expediency and or economic gain? Why does the company think there is any more steam at the new proposed pad than the others considering their dismall performance since the begininng of the project back in the eighties?

Will there be anybody from the county or other government agency, or even a local community representitve to monitor these events? Or, will everybody be kept off "their private property"?

Water usage.
As mentioned earlier, everybody in the area, lives from the water supplied by private wells, How much water will this project actually use? Keeping in mind the Snows Lake Vinyard fiasco. How much more they did than what they proposed, how much water they pulled from the local aquafirs, causing many local wells to go dry in late summer, all in flagrant violations of county use permits, please now address how much water will actually be used. They obviously will get the water faster and cheaper from local wells versus being trucked in, which will the choose? If we agree it's local groundwater, then we must have a realistic idea of what this will take.

Normal drilling operations,
What is the pit capacity of either of the proposed drilling rigs. What is the size of the fresh water storage tank,
or tanks. Lets assume a 10,000 gallon mud pit and a 3000 gallon fresh water or "day tank" This does not include water stored in much larger "baker tanks" So, working with one rig, 10,000 gallons to fill the initial pit. Water will be mixed with bentonite, for viscosity, caustic soda, as a element to keep yield point low and ph slightly alkalie. Lime will be added for quick thickening as the bentonite can often take a longer period of time to "yield". The reason I mention these is lost circulation, every time the rig loses circulation, all these chemicals wash out into the formation

potentially contaminating local ground water.
With normal drilling ops, water will have to be continuously added to the pit as the well goes deeper and more mud is required, now, with lost circulation, a whole new catagory arrises.
Lost Circulation. Will there be restrictions or protocol regarding how much drilling will be done prior to cementing the fractured zone? ie: how many "pits" of water based mud, will you be willing to "pump away" before calling the cementers? Will you be willing to save on the cementing expense of a lost circulation by using several pits of cottonseed hulls or other lost circulation materials while the hole leaks the contaminated mud into the ground water zones? Remember each pit represents several thousand gallons of water. Please explain to the community if you've explored the seriousness of the water useage you're proposoing. Explain how much water is used in the cementing process, for both lost circulation and casing jobs. Now, knowing the above calculations are for one rig, now double your figures to run two, full size, deisel powered rigs, at the same time. Will there be any restrictions on how much water can be used in general housekeeping
operations such as washing the rig?

Drilling noise.

Since a great deal of the drilling will be done with air, noise is now a significant issue. The sound the releasing of air pressure during connections, about 1 each hour will be difficult to mitigate. Depending on the amount of steam encountered, these conections will sound similar to a commercial airliner taking off. Will there be two rigs running at the same schedule, leaving more than one connection per hour, or will we have to endure them each taking turns? Fishing and stuck pipe on air must be addressed. A trip in and out of the hole on an "open ended" fishing job is beyond rediculous for a residential area. These can go on, potentially, for days, 24 hours per, especially if the pipe becomes stuck and takes several trips to remove the fish.
Slotted liners? Now this goes beyond rediculous for local noise levels, each of these operations could easily take a full day or more of what will sound like a rocket being launched.
Fuel spills and other threats to local creeks. It is almost impossible to not spill either small or large amounts of diesel, hydraulic and motor oils, plus a miriad of other non water based fluids. Each of these has potential for gross contamination of

plant life and creekwaters. Will there be any regulatory agencies on site to keep these events in check? Will there be announced periodic checks which the company could "prepare for" or will regular random checks be facilitated?

Is the idea of 60-90 days per well an agreement? ie: if it goes past 90 days do they have to stop and move on to the next one? or, will we be subjected to whatever torture they have to dish out untill they get the depth and results they want. Since this particular area is unexplored, there is now way of really knowing how long a 10-12,000 foot hole could take.

finally, grossly contaminated steam. All steam wells at the geysers have impurities, however, if grossly contaminated, or, otherwise known as "pink steam", is encountered, will the commpany be required to shut down? "wash" the steam? or will any measures be taken in this event whatsoever?

Questions for the legal county mandated EIR for the Bottle Rock Power GeoResource project.

Each question contains
A. STATEMENT for the question
B. QUESTION
C. CONCLUSION
Any information desired or evidence for a statement, question or conclusion, contact

Ronald Fidge
(Binkley Family)
P.O. Box 102
Cobb, CA 95426

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1. CONTROL OR DESTRUCTION

A. STATEMENT
The questions of greatest concern and importance cover the issues that cause the greatest destruction and duress to the environment and citizens which, should be protected by the EIR and its subsequent use permit.

B. QUESTION
· How do you plan to see your carefully researched EIR enforced?
· You do care about us and our environment, don't you?
· Does your research and written assessment include the proper legal enforcement of our concerns for our environment and its citizens.
· What are you going to demand or cause to be implemented that will expose and incarcerate officials that obey their public statements, such as "we don't violate after the fact"?
· What you putting in place to deal with officials who act as if they have been bought off and willfully allow the EIR and its CUP to be ignored and violated by its applicant.
· Is your researched EIR to include the applicant's "track record" and their unresolved NOV's
· Does your EIR document cover the protection of our earths natural surroundings and its citizens in the designated area?
· Will you then approve of an applicant who has given the County a 4 million dollar benefit of which not a dollar has been spent on protecting the property and its citizens that created the millions?
· Do you allow the applicant to cause great duress and cause loss of quality

of life to the citizens of Cobb and High Valley?

· Will you oversee and trust these County Officials to write a corresponding CUP that upholds your EIR? (I don't)

· Are you aware that the county officials work together to illegally dump toxic waste material from the three Coleman drilling sumps all over this county?

· Are you aware that they were stopped midway by the first State NOV's, then the County's NOV's?

· Are you aware that Kettleman and out of county dump sites were the only legal sites?

· Are you aware that your applicant's illegal dumping of the toxic waste in our County of Lake would have saved your applicant many millions of dollars?

· Will you endorse this County with its corrupt, incompetent officials to proceed with the permitting of a business that has ignored the existing EIR and the CUP?

· Do you know to legally allow this applicant's "pink steam project" onto the Binkley land will have you to recommend a zoning change?

· Are you aware that much time and resources were spent by the Binkley family to get our property rezoned so we the Binkley families could enjoy our property by living on it?

· Are you aware that the planned development that our ranch is now zoned as, creates our desired use of it as a large family for our pleasure?

· Are you aware that the planned development has been established for at least 5 more homes on this parcel?

· Are you aware that if you advocate the destruction of our dreams that the Binkley family has for this land by a rezoning, you will be forcing us into greater duress and loss of enjoyment of our property and forcing us to enter into a Federal lawsuit? "DEPRAVATION OF RIGHTS UNDER COLOR OF AUTHORITY. TITLE 18 US CODE, SECTION 241 and 242.

· Are you aware that 600 million of State tax payer money couldn't make the present BRP project a go? Why do you expect, or allow, any further investments to do anything more than to defraud or bilk a bunch of investors out of their finances and scoop up some of Obama's green money?

· What do you do with pink steam?

· Do you understand that if these question aren't all answered in a very constructive and affirmative way, your .5 million dollar EIR will be totally useless?

· Upon your investigation into the illegal activities of our County Officials, are you going to recommend an audit? A grand jury investigation? A complete comprehensive Federal investigation into these illegal activities?

C. CONCLUSION

Incompetent, useless County Official = incompetent, useless EIR and its CUP The EIR is to protect us and our environment. If you don't establish a sound oversight procedure, you will be guilty of advocating the RAPE of our environment and us its citizens. The illegal activities of our officials have force us to do their jobs for over a year and half.

2. HYDO FRACTURING AND ITS CAUSED EARTHQUAKES

A. STATEMENT

Hydro fracturing was allowed to be started by this County Officials in the Anderson Springs geo area this year. It was started with about a one month worth's of paper work and one secret public meeting, no EIR.

B. QUESTIONS

· What is controlling our County Officials to make these very dangerous and haphazard decisions?

· Will this EIR speak for or against hydro fracturing?

· What is this process that causes so many earth quakes?

· Will the EIR speak for or against future hydro fracturing?

· How do you plan to have your EIR's stated rules an laws, implemented and controlled?

C. CONCLUSION

The County Officials in control of this type of thing, allowed this dangerous procedure to slide through; it was again the State and Federal government that shut this hydro fracturing operation down. Where's our County government???

3. OUR SPRINGS AND THEIR DESTRUCTION

A. STATEMENT

Here in Cobb at this elevation, it's known that hundreds of springs feed our year round creeks and our water supplies for our homes. At this location most good wells can be considered spring fed. Here on the Binkley Ranch, all our homes use the water from springs.

B. QUESTIONS

· What are you going to do or write into the EIR in regards to the contamination and/or plugging of our springs by drilling activities?

· Are you going to mandate the monitoring of all the springs and their flows and contaminates that are within one mile of this drilling operation?
· What are you going to implement if they drill into our water supply.
· Are you going to require a bond that is easily accessible to implement the replenishing of that water supply that's affected?

C. CONCLUSION

The spring that feeds my home on top of Knob Cone Hill overlooking the Francisco drill pad was contaminated twice since BRP has started. The last time was in 2007 at which time the spring flow has permanently dropped from 1.5 gpm down to .5 gpm. Samples of the contamination were shown to current BRP staff who refused to do anything about it.

4. BLOWING STEAM PIPES

A. STATEMENT

As a resident, I was here before BRP; during construction, I saw a local young man get killed by a supposed new steam pipe blowing up. Now, it's been 25 years with 10 years or more with these steam pipes just sitting with moisture in them. Of course many blow outs have happened since the restart of the power plant. It's stated that the applicant is going to hook the new steam lines into the old.

B. QUESTONS

· Are you going to address the hazardous question of the existing well heads and steam lines?
· Are you going to address the old steam pipes ability to handle extra pressure, volume and vibration?
· Are you addressing the use of N.D.T. (non destructive testing) for the old steam pipe system?
· Are you aware of the many blow outs that have happened and are happening?

C. CONCLUSION

300 degree steam at 50 or more PSI is extemely dangerous. The BRP employees are daily subjected to close encounters with these dangerous steam pipes. We citizens of Cobb and High Valley pass by and under the pipes for the Francisco pad while using our right of way. Who is going to be cooked to death next???

5. ONE DRILLING PAD VS. TWO DRILLING PADS

A. STATEMENT

The contruction of two pads and a bridge over our pristine High Valley Creek with its road to the West pad destroys over 21 acres of Binkley Ranch surface for two 3 acre pads, which are both in serpentine rock.

B. QUESITONS

· Are you going to show or address the abusdity of these two pads due to the great destruction, asbestos and pink steam potential?

· Are you going to be environmentally guided in having BRP geo look at the mountain just to the south of their East pad?

· Do you know that there is no serpentine in this mountain?

· Do you know that they can reach both of their leases from this location?

· Are you willing to allow approximately 10 acres of destruction to produce a 7+ acre pad?

C. CONCLUSION

This single pad would stop the destruction of our pristine High Valley Creek with the implementaton of the proposed bridge and the steep access road to the ridiculous West pad.

6. VERY DANGEROUS HIGH VALLEY ROAD

A. STATEMENT

The citizens of High Valley Road have had a continuous problem with the large amount of big rig traffic on the narrow, steep and twisting upper one half of HVR. Two large rigs can't pass safely on this section of road. Yet the EIR states that High Valley Road is going to be used as the applicant's access.

B. QUESTIONS

· Are you going to look at the legality of the lack of safety in regards to the use of this road by big heavy rigs?

· Are you going to review the homes and lives that could be destroyed if brakes were to fail?

· Are you aware that the nearby creek can easily be polluted by a rig going off this narrow, steep one lane road?

· Are you going to look into the state regulations as far as the legality of this dangerous one lane road being used by a commercial entity that requires hazmat rigs to pass othe rigs and private citizens vehicles?

· Are you investigating the legality of this applicant's commercial activity and their changing the right of way speed limit, installation of yield signs,

installation of hazardous obsticles in my right of way through the Coleman property along with the installation of gates, all done without a permit and public input required by the current CUP?

C. CONCLUSION

I've lived here since 1972 when this road was dirt and gravel, and it was dangerous then for two big rigs to pass on this road, including the passing of rigs and civilian traffic; it's still very dangerous and it's only a matter of time before a major accident occurs causing possible destruction and death.

7. WHERE ARE THE BINKLEY PROPERTY LINES?

A. STATEMENT

Back in the days that the property lines were being surveyed in this area, many of those surveys were done from a local bar stool, thus the reason for all the unusual shaped "one square mile sections" in this area.

B. QUESTIONS

· Are you addressing the importance of knowing where the property lines are?
· Will you require a survey to establish this legal evidence?

C. CONCLUSION

Nothing like drilling and destroying someone else's property.

8. PINK STEAM

A. STATEMENT

While I have seen this phenomenon, I wasn't aware of how bad the pink steam is until I did research. The Federal High Valley 39A-30 well on top of the Big C mountain which produced pink steam. Across the valley from the two proposed project pads locations, are the L'Esperance #1 and #2 pink steam wells.

B. QUESTIONS

· Are you aware and concerned that the two proposed pads are obviously on top of the pink steam field.
· How bad is this pink steam?
· How much of this pick steam does it take to kill us or our animals?
· What effects does exposure cause to us and our environment?
· Can this stuff be abated for commercial use?
· Are you going to ask the question of the applicant and all officials, why drill on top of a toxic pink steam field?
· Are you going to requre an investigation into an emergency evacuation plan?

· Are you going to demand a phone connected monitoring system because of the radon 222 and all its daughters, along with the mercury vapor as mandated in the 87-92 Binkley use permit?
· What is radon 222 and what are all its daughters. How dangerous are they?
· How dangerous is the mercury vapor?
· How will you mandate our protection when these incomptetents shear off, blow, or destroy a well head while encountering pink steam.
· Do you know the prevailing wind from these pad sites is towards my house (Ron Fidge) which puts me in harms way of this pink steam hazard and serpentine dust.
· Are you aware that that Mr. Jadiker and family will also be endangered when the wind blows to the west by the project contiminates.
· Are you going to have a complete analysis done on the information already available on the pink steam?
· Do you know that your findings will show that it is extremely carcenagenic to the respiratory system?
· In your investigation into this pink steam and its dangers to human and all life, are you going to recommend a paid permanent moving out of the two most affected residents while drilling proceeds on top of this pink steam field?
· Are you aware that Mr. Harms, president of BRP (same management as applicant) said "yes" to the above question in a Binkley family meeting?

C. CONCLUSION

This nasty pink steam field is not worth drilling for or through.
The applicants project is right on top of the pink steam field. The Binkley 87-92 required an evacuation plan regarding the encountering of pink steam and also state of the art monitoring system for radon 222 and mercury vapor. If you permit this whole disfuctional operation, it will have great potential to cause harm to Mr. Jadiker and family, and my life. The only route of escape would be have be into the pink steam hazard. What are the studies concerning living within the exposure radius of this pink steam for a long duration. Would you like to know that you and your kids have to breath this stuff for an unknown duration???
We the most affected citizens won't tolerate any more disregard for us and our environment.

9. WHITE ELEPHANT #2

A. STATEMENT

Assuming that you are aware of the expensive State "white elephant #1" I want to address "White Elephant #2" and its current application for the EIR.
The necessity to rezone to allow this entity to proceed with their equity company's agenda of creating NOV type conditions in our pristine environment won't be tolerated. The County Officials refusal to care for our well being is greatly affecting the quality of our lives.

B. QUESTIONS

· Are you investigating the current impact on us, the High Valley and Cobb citizens by your applicants 6 megawatt white elephant?
· Are you aware that we have been ripped off as well as many investors?
· We of High Valley have suffered greatly, are you concerned?
· Do you expect us to be treated as badly in regards to the new Binkley Geo operation?
· Are you researching the effects of the rezoning in regards to the Binkley's losing potential homesites?

C. CONCLUSION

The love of money is the root of all evil. This current applicant has State and Count NOV's to proved how hazardous an operation it is. The rezoning will not be tolerated because the Binkley Ranch went through great trouble to get the Planned Develpmental Residential status.

10. POLLUTED GROUND WATER TABLE

A. STATEMENT

The double clay liners in all three Colemman sumps were designed with the purpose of keeping toxic drilling waste from entering the High Valley ground water table. All three liners were badly destroyed by a large excavator in 2007 an dearly 2008. This condition has not been repaired and still remains a non compliant serious problem.

B. QUESTIONS

· Do you know that the High Valley Creek and then the Kelseyville Creek which flows to Clearlake has its headwaters in the Coleman Meadow.
· Are you concerned about the toxic drilling fluids which have leaked through the 3 breached liners down into the Coleman meadows water table. It's presently working its way down towards or through the Binkley project water table.

· Are you going to investigate and mandate test sampling from wells drilled in the meadows close to the polluting sumps to see if it is affecting the new Binkley project water table.
· Are you going to investigate whether contamination from the Francisco sumps are contaminating the new Binkley Lease project water table?
· Do you know there are tests available from an investigation into this matter? Are they sufficient tests?

C. CONCLUSION
Your applicant has fatiqued us in their destruction of our pristine environment.

11. PRISINE HIGH VALLEY CREEK (WAS)
A. STATEMENT
We the families of the Binkley Ranch enjoy our High Valley Creek with its pools, falls and wild nature. This is enjoyed all the way to Kelsey Creek.

B. QUESTIONS
· Are you aware that you applicant has continued to damage the upper headwaters of our beloved creek as stated in the NOV's and State Fish and Game violation?
· Do you think that I am impressed with the possibility that you are going to allow this type of operator onto a new section of earth, to rape it?
· Do you know the applicant is still not in compliance
· So do you think that these operators give a damn for us and our environment? I know they don't!!!
· Are you aware that this BRP company has covered up their destruction of our polluted environment?
· Are you going to investigate the very recent Fish and Game Violation for doing to the stream beds what they got NOV's for in the last year?

C. CONCLUSION
Where ever the stinky, rotten carcss is, the turkey vultures can be found.

12. SECURITY OR LACK OF IT
A. STATEMENT
Your applicant is a state of complete disregard for what the Department of Water Resocurces guaranteed to the right of way owners of High Valley Rd. That BRP was to guarantee security for the High Valley Citizen.

B. QUESTIONS

· Do you know that your applicant has to present not bothered to provide security for all parties on High Valley Road?

· Will your investigation will show that trespassors drinking beer, toting guns went unapprehended and unreported as in the recent incident.

· Are you going to research the security for the residents of High Valley Road and the Binkley ranch due to the vast reported increase in strangers using this access?

· Will you investigate and review the use of camera monitoring systems and guards at the BRP entrance gate as addressed in use permit 85-27?

· Are you going to advise the applicant to get an appointment with a good psychiatrist?

· Do you believe that he is unaware of the absurdity of this bizarre proposed project?

C. CONCLUSION

Mr. Harms has time and again, treated us as his enemies. He couldn't be further from the truth, as our past interaction with DWR and the original new owner, Ron Suesse shows. It wasn't until the vast violations were discovered and only the State cared about these diastrous situations that we got very upset at both BRP and our corrupt County Officials who would not issue NOV's to BRP. Our supervisor, Mr. Rob Brown made the public statement,
"we don't violate after the fact" and his code enforcement, Mr. Ron Yoder made the public statement,
"as of yet, I have no violations", all the while, fully aware of the many violations.

I, Ron Fidge, am asking you on behalf of my fellow High Valley friends that you don't use what is known as "milk toast language" in the constructive control conditions you need to establish in order to make your EIR do it's job.

Thanks, again if you need information write to:

Ron Fidge
P.O. Box 102
Cobb, CA 95426

Ronald Fidge

PO Box 649,
Cobb, CA 95426

To: Rick Coel
Lake County Building Dept.,
255 N. Forbes
Lakeport, CA

Mr. Coel,

Further to the Environment Impact Report being done for Binkely Steam Field Project I have some questions that I would like to have answered:

1/ Have the County or Bottlerock Power considered using wind power instead of the invasive pursuit of steam?

2/ How can this project be considered a 'Renewable Resource' form of energy when the process includes:
a/ taking the top off of a mountain,
b/ removable so much soil from the well site
c/ exposing the population to potentially harmful gases
d/ endeavoring to use 'steam' which is not renewable in fact it is well known that within just a few years a steam source can stop producing?

3/ Has the County considered that the project may NOT be viable or is this not investigated before a use permit is issued? The EIR needs to include the viability of the project in consideration to the huge environmental sacrifice.

4/ Is the County/Board of Supervisors concerned about the damage to the environment and the constituents who elected them or are they more concerned about the potential tax revenue? Please explain.

5/ Is the County/Board of Supervisors concerned about the depth of the wells and the drilling? Considering the extremely high volume of earthquakes in the area already are they concerned that if a well goes too deep it could trigger a catastrophic earthquake? I request that the EIR include this very serious issue.

6/ The EIR needs to include the monitoring of the many different toxic substances already located in the High Valley Rd/ Bottlerock Rd & Glennbrook Rd geothermal areas managed by Bottlerock Power to thoroughly ascertain the existing impact on the land, water, air, and the

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lives of residents is this area? The monitoring should be done over a 12 to 24 month period due to the climatic changes and different activities of Bottlerock Power. This is VITAL information.

7/ In light of the fact that most people are well aware that EIR's have already been done in the local geothermal areas, a new report needs to be created from the ground up (no data from previous reports to be included) to ascertain the current and potential impact. People in the South Lake County areas, specifically ALL residents of High Valley Rd need to be interviewed for this report.

8/ Bottlerock Power is infringing upon residentially zoned areas with industrial activities, why has the County not controlled the infringement upon these areas in order to protect the environment & residents?

9/ Is the County aware of the harmful gases that can escape from the deep within the earth when drilling activity begins? How will this be managed and disposed of? In consideration to Bottlerock Power's history of violations will the County be overseeing this on site? This needs to be included in the EIR.

10/ Is the County benefiting financially from the Geothermal Industry if so please disclose how the County will benefit from this project financially?

11/ Assuming the County is benefiting financially I feel it would be in the best interests of our County to employ (with the financial proceeds) on behalf of the residents and environment a representative. We have a billion dollar industry in our back yard with no representation. This person should have a strong legal and environmental back ground.

12/ As the County has been unable to address the violations of Bottlerock Power's Use Permit what plans do they have in the future to better job monitoring them?

Sincerely,

Susie A. Cashmore
E. scashmore@mchsi.com
P. 707-928-4990

BINKLEY FAMILY TRUST
P. O. Box 592
Cobb, CA 95426

County of Lake
Community Development Department
Richard Coel, Director
255 No. Forbes Street
Lakeport, CA 95453

Re: Preparation of EIR
Bottle Rock Power Steam Project

Dear Mr. Coel:

The Binkley Ranch is the location for the two well pads and access road that BRP Geo is seeking permits for.

My Grandparents homesteaded the Binkley Ranch in 1918. Over the years the family has worked hard to keep it in the family. We formed a trust, the Binkley Family Trust, to protect it and make it as permanent as possible. Currently I personally have three generations of family living on the ranch and we are faced with two very large well pads and a new access road that will be truly disruptive to not only the use of our land, but also our day to day lives.

I understand that no matter how this project goes forward there will be an impact to our family. We are not seeking to stop the Bottle Rock Power Steam Project, just be allowed to have more input into the location and designs of the well pads on our property. We believe that by working more closely together we can come to a compromise that will not only minimize the impact to our family and the county as a whole, but also still allow full access to the steam underneath.

I would like to stress the need for a permanent County Geothermal Coordinator, one person contact for any geothermal information or complaint.

From our earliest dealings with DWR and now with Bottle Rock Power we have tried to have the well pads located where they disturb the least amount of land and have natural sound, visual, and noise barriers for our neighbors, Bottlerock Road, etc. Neither of the proposed well pads meet this standard.

The permitted East well pad that DWR designed had a working area of 2.1 acres with only a disturbed area of 2.9 acres. BRP Geo's proposed 50% enlargement of the East well pad to 3 acres requires increasing the disturbed area by 275% to approximately 8 acres. If the East well pad had not been permitted for DWR I doubt that that at this time it would be considered at all in its expanded form due to the huge amount of cut and fill

of serpentine soil. Also since most of the soil in the disturbed area is serpentine it will require a huge amount of water for mitigation purposes. This is a concern to us since all of our domestic water is provided by local springs.

The Binkley Family would like to know that before any well pad is approved, that every effort be made to locate it in the very best location to meet practical and environmental needs. One location I suggested for the East well Pad would require much less cut and fill and would be about the same distance for drilling from the furthest leasehold corner – shorter distance to Bottle Rock Power Plant for piping, better noise and visual barrier from Bottlerock Road and easy access from Rabbit Valley Road.

If it is necessary for a West well pad, the current location could be moved slightly southwest so a natural berm could be left on the North side, it would be a big improvement. We had been assured that the West well pad would be designed so that there would be a natural berm on the North end so that no fill would be visible from any residence or Bottlerock Road. Current proposal of the West well pad shows approximately twenty feet of fill on the North Slope.

Please consider all possibilities – such as moving the East pad further South or maybe one very large well pad rather the two large well pads. A single 6 acre pad located to the South of the current East pad location that combined both the East and West pads would have much less of an impact on our family, the neighbors, Bottlerock Rd. and the environment.

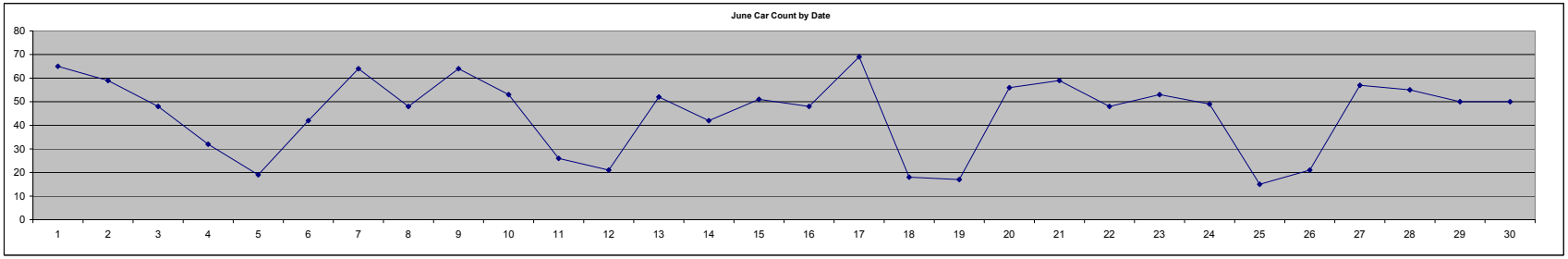
It would be much better to plan carefully now than to look back in hindsight and ask "Why were the well pads build in these locations" and not have a good answer.

Sincerely,

Chris Mahnke
Binkley Family Trust

APPENDIX B
TRAFFIC AND CIRCULATION

Time Start	Time End	7/1/2009	7/2/2009	7/3/2009	7/4/2009	7/5/2009	7/6/2009	7/7/2009	7/8/2009	7/9/2009	7/10/2009	7/11/2009	7/12/2009	7/13/2009	7/14/2009	7/15/2009	7/16/2009	7/17/2009	7/18/2009	7/19/2009	7/20/2009	7/21/2009	7/22/2009	7/23/2009	7/24/2009	7/25/2009	7/26/2009	7/27/2009	7/28/2009	7/29/2009	7/30/2009	7/31/2009
12:00 AM	12:59 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00 AM	1:59 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00 AM	2:59 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 AM	3:59 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 AM	4:59 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 AM	5:59 AM	2	2	4	2	4	0	1	2	1	3	3	2	2	1	2	1	2	1	1	3	1	1	1	3	3	3	2	3	1	1	1
6:00 AM	6:59 AM	1	2	0	1	0	2	2	1	1	0	0	0	1	3	1	1	5	0	1	1	1	1	2	1	0	0	3	2	1	2	4
7:00 AM	7:59 AM	2	1	2	0	0	2	2	1	4	3	0	2	0	2	2	2	4	0	0	3	4	2	1	1	0	0	1	2	2	2	3
8:00 AM	8:59 AM	3	2	3	0	0	1	1	1	4	3	1	2	3	1	0	2	2	0	0	6	3	2	3	1	0	0	6	1	1	4	3
9:00 AM	9:59 AM	1	2	2	3	2	2	3	3	1	7	0	0	5	1	3	1	3	1	3	1	2	2	4	4	0	0	4	2	5	4	1
10:00 AM	10:59 AM	6	0	1	0	0	1	4	4	10	4	2	3	4	2	1	2	7	0	0	1	1	1	1	5	0	2	7	4	4	4	2
11:00 AM	11:59 AM	6	3	5	0	1	5	4	4	3	4	2	0	6	5	3	5	6	4	2	5	5	7	3	1	1	0	2	4	4	4	1
12:00 PM	12:59 PM	3	3	2	5	0	4	9	3	5	5	3	2	4	2	6	6	3	1	1	2	5	5	6	5	0	5	6	3	4	1	6
1:00 PM	1:59 PM	7	6	5	1	3	3	5	1	4	2	1	0	6	9	5	7	6	0	3	3	6	5	1	4	0	2	3	7	4	4	6
2:00 PM	2:59 PM	3	5	3	3	2	2	7	3	5	4	1	2	4	1	5	3	6	2	2	6	1	1	1	4	2	2	6	3	3	2	1
3:00 PM	3:59 PM	11	7	9	4	2	4	4	8	9	9	4	0	7	7	8	4	6	0	0	6	11	8	9	7	0	0	8	9	8	5	7
4:00 PM	4:59 PM	10	11	3	2	2	7	5	4	7	2	2	5	3	4	5	2	7	0	1	7	6	4	8	4	1	1	4	5	4	3	5
5:00 PM	5:59 PM	6	8	1	5	2	3	7	6	3	1	5	2	2	1	4	8	7	4	1	3	6	6	7	3	4	4	2	6	4	9	5
6:00 PM	6:59 PM	0	5	4	2	1	4	7	3	2	1	0	1	4	2	3	2	1	1	1	4	2	1	4	1	0	2	1	3	1	4	1
7:00 PM	7:59 PM	0	0	1	2	0	0	1	2	2	0	0	0	0	0	2	0	2	3	1	0	1	1	0	3	0	0	0	0	2	0	1
8:00 PM	8:59 PM	1	2	2	0	0	0	2	0	3	0	1	0	1	1	1	1	2	0	0	3	3	1	2	2	3	0	2	1	1	1	0
9:00 PM	9:59 PM	3	0	1	1	0	2	0	1	0	4	1	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1	0	1
10:00 PM	10:59 PM	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
11:00 PM	11:59 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Total		65	59	48	32	19	42	64	48	64	53	26	21	52	42	51	48	69	18	17	56	59	48	53	49	15	21	57	55	50	50	48



Level Of Service Computation Report
2000 HCM Unsignalized Method (Base Volume Alternative)

Intersection #1

Average Delay (sec/veh): 2.3 Worst Case Level Of Service: A[9.2]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L - T - R			L - T - R			L - T - R			L - T - R		
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Lanes:	0 1 0 0 0			0 0 0 1 0			1 0 0 0 1			0 0 0 0 0		
Volume Module:												
Base Vol:	2	64	0	0	42	2	20	0	14	0	0	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	2	64	0	0	42	2	20	0	14	0	0	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PHF Volume:	2	71	0	0	47	2	22	0	16	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	2	71	0	0	47	2	22	0	16	0	0	0
Critical Gap Module:												
Critical Gp:	4.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	6.6	xxxx	6.4	xxxxx	xxxx	xxxxx
FollowUpTim:	2.3	xxxx	xxxxx	xxxxx	xxxx	xxxxx	3.7	xxxx	3.5	xxxxx	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	49	xxxx	xxxxx	xxxx	xxxx	xxxxx	123	xxxx	48	xxxx	xxxx	xxxxx
Potent Cap.:	1508	xxxx	xxxxx	xxxx	xxxx	xxxxx	830	xxxx	972	xxxx	xxxx	xxxxx
Move Cap.:	1508	xxxx	xxxxx	xxxx	xxxx	xxxxx	829	xxxx	972	xxxx	xxxx	xxxxx
Volume/Cap:	0.00	xxxx	xxxx	xxxx	xxxx	xxxx	0.03	xxxx	0.02	xxxx	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	0.0	xxxx	xxxxx	xxxx	xxxx	xxxxx	0.1	xxxx	0.0	xxxx	xxxx	xxxxx
Control Del:	7.4	xxxx	xxxxx	xxxxx	xxxx	xxxxx	9.5	xxxx	8.8	xxxxx	xxxx	xxxxx
LOS by Move:	A	*	*	*	*	*	A	*	A	*	*	*
Movement:	LT - LTR - RT			LT - LTR - RT			LT - LTR - RT			LT - LTR - RT		
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	0.0	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	7.4	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	A	*	*	*	*	*	*	*	*	*	*	*
ApproachDel:	xxxxxx			xxxxxx			9.2			xxxxxx		
ApproachLOS:	*			*			A			*		

Note: Queue reported is the number of cars per lane.

Level Of Service Computation Report
2000 HCM Unsignalized Method (Base Volume Alternative)

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Intersection #2 Bottle Rock/Glenbrook

****

Average Delay (sec/veh): 0.2 Worst Case Level Of Service: A[9.0]

****

Street Name:	Bottle Rock									Glenbrook								
Approach:	North Bound					South Bound				East Bound					West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Rights:	Include					Include					Include					Include				
Lanes:	0	1	0	0	0	0	0	0	1	0	0	0	1!	0	0	0	0	0	0	0
Volume Module:																				
Base Vol:	1		88		0	0		55		2	1		0		1	0		0		0
Growth Adj:	1.00		1.00		1.00	1.00		1.00		1.00	1.00		1.00		1.00	1.00		1.00		1.00
Initial Bse:	1		88		0	0		55		2	1		0		1	0		0		0
User Adj:	1.00		1.00		1.00	1.00		1.00		1.00	1.00		1.00		1.00	1.00		1.00		1.00
PHF Adj:	0.90		0.90		0.90	0.90		0.90		0.90	0.90		0.90		0.90	0.90		0.90		0.90
PHF Volume:	1		98		0	0		61		2	1		0		1	0		0		0
Reduct Vol:	0		0		0	0		0		0	0		0		0	0		0		0
FinalVolume:	1		98		0	0		61		2	1		0		1	0		0		0
Critical Gap Module:																				
Critical Gp:	4.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx					6.4		6.5		6.2	xxxxx	xxxx	xxxxx		
FollowUpTim:	2.3	xxxx	xxxxx	xxxxx	xxxx	xxxxx					3.5		4.0		3.3	xxxxx	xxxx	xxxxx		
Capacity Module:																				
Cnflict Vol:	63	xxxx	xxxxx	xxxx	xxxx	xxxxx					162		162		62	xxxx	xxxx	xxxxx		
Potent Cap.:	1490	xxxx	xxxxx	xxxx	xxxx	xxxxx					833		734		1008	xxxx	xxxx	xxxxx		
Move Cap.:	1490	xxxx	xxxxx	xxxx	xxxx	xxxxx					833		733		1008	xxxx	xxxx	xxxxx		
Volume/Cap:	0.00	xxxx	xxxx	xxxx	xxxx	xxxx					0.00		0.00		0.00	xxxx	xxxx	xxxx		
Level Of Service Module:																				
2Way95thQ:	0.0	xxxx	xxxxx	xxxx	xxxx	xxxxx					xxxx	xxxx	xxxxx			xxxx	xxxx	xxxxx		
Control Del:	7.4	xxxx	xxxxx	xxxxx	xxxx	xxxxx					xxxxx	xxxx	xxxxx			xxxxx	xxxx	xxxxx		
LOS by Move:	A		*		*	*		*		*	*		*		*	*		*		*
Movement:	LT	-	LTR	-	RT	LT	-	LTR	-	RT	LT	-	LTR	-	RT	LT	-	LTR	-	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx					xxxx		912	xxxxx		xxxx	xxxx	xxxxx		
SharedQueue:	0.0	xxxx	xxxxx	xxxxx	xxxx	xxxxx					xxxxx		0.0	xxxxx		xxxxx	xxxx	xxxxx		
Shrd ConDel:	7.4	xxxx	xxxxx	xxxxx	xxxx	xxxxx					xxxxx		9.0	xxxxx		xxxxx	xxxx	xxxxx		
Shared LOS:	A		*		*	*		*		*	*		A		*	*		*		*
ApproachDel:	xxxxxx					xxxxxx							9.0			xxxxxx				
ApproachLOS:			*					*					A					*		

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Note: Queue reported is the number of cars per lane.

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Level Of Service Computation Report
2000 HCM Unsignalized Method (Base Volume Alternative)

Intersection #1 Bottle Rock/High Valley

Average Delay (sec/veh): 4.5 Worst Case Level Of Service: A[9.8]

Street Name:	Bottle Rock									High Valley												
Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Rights:	Include					Include					Include					Include				
Lanes:	0	1	0	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0
Volume Module:																				
Base Vol:	2		64		0	0		42		3	53		0		36	0		0		0
Growth Adj:	1.00		1.00		1.00	1.00		1.00		1.00	1.00		1.00		1.00	1.00		1.00		1.00
Initial Bse:	2		64		0	0		42		3	53		0		36	0		0		0
User Adj:	1.00		1.00		1.00	1.00		1.00		1.00	1.00		1.00		1.00	1.00		1.00		1.00
PHF Adj:	0.90		0.90		0.90	0.90		0.90		0.90	0.90		0.90		0.90	0.90		0.90		0.90
PHF Volume:	2		71		0	0		47		3	59		0		40	0		0		0
Reduct Vol:	0		0		0	0		0		0	0		0		0	0		0		0
FinalVolume:	2		71		0	0		47		3	59		0		40	0		0		0
Critical Gap Module:																				
Critical Gp:	4.3	xxxx	xxxxx	xxxxx	xxxx	xxxxx					7.0	xxxx			6.8	xxxxx	xxxx	xxxxx		
FollowUpTim:	2.3	xxxx	xxxxx	xxxxx	xxxx	xxxxx					4.0	xxxx			3.8	xxxxx	xxxx	xxxxx		
Capacity Module:																				
Cnflict Vol:	50	xxxx	xxxxx	xxxx	xxxx	xxxxx					124	xxxx			48	xxxx	xxxx	xxxxx		
Potent Cap.:	1477	xxxx	xxxxx	xxxx	xxxx	xxxxx					750	xxxx			878	xxxx	xxxx	xxxxx		
Move Cap.:	1477	xxxx	xxxxx	xxxx	xxxx	xxxxx					749	xxxx			878	xxxx	xxxx	xxxxx		
Volume/Cap:	0.00	xxxx	xxxx	xxxx	xxxx	xxxx					0.08	xxxx			0.05	xxxx	xxxx	xxxx		
Level Of Service Module:																				
2Way95thQ:	0.0	xxxx	xxxxx	xxxx	xxxx	xxxxx					0.3	xxxx			0.1	xxxx	xxxx	xxxxx		
Control Del:	7.4	xxxx	xxxxx	xxxxx	xxxx	xxxxx					10.2	xxxx			9.3	xxxxx	xxxx	xxxxx		
LOS by Move:	A		*		*	*		*		*	B		*		A	*		*		*
Movement:	LT	-	LTR	-	RT	LT	-	LTR	-	RT	LT	-	LTR	-	RT	LT	-	LTR	-	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx					xxxx	xxxx	xxxxx			xxxx	xxxx	xxxxx		
SharedQueue:	0.0	xxxx	xxxxx	xxxxx	xxxx	xxxxx					xxxxx	xxxx	xxxxx			xxxxx	xxxx	xxxxx		
Shrd ConDel:	7.4	xxxx	xxxxx	xxxxx	xxxx	xxxxx					xxxxx	xxxx	xxxxx			xxxxx	xxxx	xxxxx		
Shared LOS:	A		*		*	*		*		*	*		*		*	*		*		*
ApproachDel:	xxxxxx					xxxxxx					9.8					xxxxxx				
ApproachLOS:			*					*					A					*		

Note: Queue reported is the number of cars per lane.

Level Of Service Computation Report
2000 HCM Unsignalized Method (Base Volume Alternative)

Intersection #2 Bottle Rock/Glenbrook

Average Delay (sec/veh): 2.9 Worst Case Level Of Service: B[10.1]

Street Name:	Bottle Rock									Glenbrook								
Approach:	North Bound					South Bound				East Bound					West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Rights:	Include					Include					Include					Include				
Lanes:	0	1	0	0	0	0	0	0	1	0	0	0	1!	0	0	0	0	0	0	0
Volume Module:																				
Base Vol:	1	88		0		0	53		2		34		0		23	0		0		0
Growth Adj:	1.00	1.00		1.00		1.00	1.00		1.00		1.00		1.00		1.00	1.00		1.00		1.00
Initial Bse:	1	88		0		0	53		2		34		0		23	0		0		0
User Adj:	1.00	1.00		1.00		1.00	1.00		1.00		1.00		1.00		1.00	1.00		1.00		1.00
PHF Adj:	0.90	0.90		0.90		0.90	0.90		0.90		0.90		0.90		0.90	0.90		0.90		0.90
PHF Volume:	1	98		0		0	59		2		38		0		26	0		0		0
Reduct Vol:	0	0		0		0	0		0		0		0		0	0		0		0
FinalVolume:	1	98		0		0	59		2		38		0		26	0		0		0
Critical Gap Module:																				
Critical Gp:	4.2	xxxx		xxxxx		xxxxx	xxxx		xxxxx		7.0		7.1		6.8	xxxxx		xxxx		xxxxx
FollowUpTim:	2.3	xxxx		xxxxx		xxxxx	xxxx		xxxxx		4.0		4.5		3.8	xxxxx		xxxx		xxxxx
Capacity Module:																				
Cnflict Vol:	61	xxxx		xxxxx		xxxx	xxxx		xxxxx		160		160		60	xxxx		xxxx		xxxxx
Potent Cap.:	1493	xxxx		xxxxx		xxxx	xxxx		xxxxx		713		639		864	xxxx		xxxx		xxxxx
Move Cap.:	1493	xxxx		xxxxx		xxxx	xxxx		xxxxx		713		638		864	xxxx		xxxx		xxxxx
Volume/Cap:	0.00	xxxx		xxxx		xxxx	xxxx		xxxx		0.05		0.00		0.03	xxxx		xxxx		xxxx
Level Of Service Module:																				
2Way95thQ:	0.0	xxxx		xxxxx		xxxx	xxxx		xxxxx		xxxx		xxxx		xxxxx	xxxx		xxxx		xxxxx
Control Del:	7.4	xxxx		xxxxx		xxxxx	xxxx		xxxxx		xxxxx		xxxx		xxxxx	xxxxx		xxxx		xxxxx
LOS by Move:	A	*		*		*	*		*		*		*		*	*		*		*
Movement:	LT	-	LTR	-	RT	LT	-	LTR	-	RT	LT	-	LTR	-	RT	LT	-	LTR	-	RT
Shared Cap.:	xxxx	xxxx		xxxxx		xxxx	xxxx		xxxxx		xxxx		767		xxxxx	xxxx		xxxx		xxxxx
SharedQueue:	0.0	xxxx		xxxxx		xxxxx	xxxx		xxxxx		xxxxx		0.3		xxxxx	xxxxx		xxxx		xxxxx
Shrd ConDel:	7.4	xxxx		xxxxx		xxxxx	xxxx		xxxxx		xxxxx		10.1		xxxxx	xxxxx		xxxx		xxxxx
Shared LOS:	A	*		*		*	*		*		*		B		*	*		*		*
ApproachDel:	xxxxxx						xxxxxx						10.1					xxxxxx		
ApproachLOS:		*					*						B					*		

Note: Queue reported is the number of cars per lane.

Level Of Service Computation Report
2000 HCM Unsignalized Method (Base Volume Alternative)

****

Intersection #1 Bottle Rock/High Valley

****

Average Delay (sec/veh): 2.4 Worst Case Level Of Service: A[9.2]

****

Street Name:	Bottle Rock						High Valley					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L - T - R			L - T - R			L - T - R			L - T - R		
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Lanes:	0 1 0 0 0			0 0 0 1 0			1 0 0 0 1			0 0 0 0 0		
Volume Module:												
Base Vol:	2	64	0	0	42	3	22	0	15	0	0	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	2	64	0	0	42	3	22	0	15	0	0	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PHF Volume:	2	71	0	0	47	3	24	0	17	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	2	71	0	0	47	3	24	0	17	0	0	0
Critical Gap Module:												
Critical Gp:	4.3	xxxx	xxxxx	xxxxx	xxxx	xxxxx	6.6	xxxx	6.4	xxxxx	xxxx	xxxxx
FollowUpTim:	2.3	xxxx	xxxxx	xxxxx	xxxx	xxxxx	3.7	xxxx	3.5	xxxxx	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	50	xxxx	xxxxx	xxxx	xxxx	xxxxx	124	xxxx	48	xxxx	xxxx	xxxxx
Potent Cap.:	1477	xxxx	xxxxx	xxxx	xxxx	xxxxx	830	xxxx	972	xxxx	xxxx	xxxxx
Move Cap.:	1477	xxxx	xxxxx	xxxx	xxxx	xxxxx	829	xxxx	972	xxxx	xxxx	xxxxx
Volume/Cap:	0.00	xxxx	xxxx	xxxx	xxxx	xxxx	0.03	xxxx	0.02	xxxx	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	0.0	xxxx	xxxxx	xxxx	xxxx	xxxxx	0.1	xxxx	0.1	xxxx	xxxx	xxxxx
Control Del:	7.4	xxxx	xxxxx	xxxxx	xxxx	xxxxx	9.5	xxxx	8.8	xxxxx	xxxx	xxxxx
LOS by Move:	A	*	*	*	*	*	A	*	A	*	*	*
Movement:	LT - LTR - RT			LT - LTR - RT			LT - LTR - RT			LT - LTR - RT		
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	0.0	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	7.4	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	A	*	*	*	*	*	*	*	*	*	*	*
ApproachDel:	xxxxxx			xxxxxx			9.2			xxxxxx		
ApproachLOS:	*			*			A			*		

****

Note: Queue reported is the number of cars per lane.

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Level Of Service Computation Report
2000 HCM Unsignalized Method (Base Volume Alternative)

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Intersection #2 Bottle Rock/Glenbrook

****

Average Delay (sec/veh): 0.4 Worst Case Level Of Service: A[9.0]

****

Street Name:	Bottle Rock									Glenbrook								
Approach:	North Bound					South Bound				East Bound					West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Rights:	Include					Include					Include					Include				
Lanes:	0	1	0	0	0	0	0	0	1	0	0	0	1!	0	0	0	0	0	0	0
Volume Module:																				
Base Vol:	1	88		0		0	53		2		3	0		2		0	0		0	
Growth Adj:	1.00	1.00		1.00		1.00	1.00		1.00		1.00	1.00		1.00		1.00	1.00		1.00	
Initial Bse:	1	88		0		0	53		2		3	0		2		0	0		0	
User Adj:	1.00	1.00		1.00		1.00	1.00		1.00		1.00	1.00		1.00		1.00	1.00		1.00	
PHF Adj:	0.90	0.90		0.90		0.90	0.90		0.90		0.90	0.90		0.90		0.90	0.90		0.90	
PHF Volume:	1	98		0		0	59		2		3	0		2		0	0		0	
Reduct Vol:	0	0		0		0	0		0		0	0		0		0	0		0	
FinalVolume:	1	98		0		0	59		2		3	0		2		0	0		0	
Critical Gap Module:																				
Critical Gp:	4.3	xxxx	xxxxx	xxxxx	xxxx	xxxxx					6.4	6.5		6.2	xxxxx	xxxx	xxxxx			
FollowUpTim:	2.3	xxxx	xxxxx	xxxxx	xxxx	xxxxx					3.5	4.0		3.3	xxxxx	xxxx	xxxxx			
Capacity Module:																				
Cnflict Vol:	61	xxxx	xxxxx	xxxx	xxxx	xxxxx					160	160		60	xxxx	xxxx	xxxxx			
Potent Cap.:	1463	xxxx	xxxxx	xxxx	xxxx	xxxxx					836	736		1011	xxxx	xxxx	xxxxx			
Move Cap.:	1463	xxxx	xxxxx	xxxx	xxxx	xxxxx					835	735		1011	xxxx	xxxx	xxxxx			
Volume/Cap:	0.00	xxxx	xxxx	xxxx	xxxx	xxxx					0.00	0.00		0.00	xxxx	xxxx	xxxx			
Level Of Service Module:																				
2Way95thQ:	0.0	xxxx	xxxxx	xxxx	xxxx	xxxxx					xxxx	xxxx		xxxxx	xxxx	xxxx	xxxxx			
Control Del:	7.5	xxxx	xxxxx	xxxxx	xxxx	xxxxx					xxxxx	xxxx		xxxxx	xxxxx	xxxx	xxxxx			
LOS by Move:	A	*		*	*	*					*	*		*	*	*	*			
Movement:	LT	-	LTR	-	RT	LT	-	LTR	-	RT	LT	-	LTR	-	RT	LT	-	LTR	-	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx					xxxx	898		xxxxx	xxxx	xxxx	xxxxx			
SharedQueue:	0.0	xxxx	xxxxx	xxxxx	xxxx	xxxxx					xxxxx	0.0		xxxxx	xxxxx	xxxx	xxxxx			
Shrd ConDel:	7.5	xxxx	xxxxx	xxxxx	xxxx	xxxxx					xxxxx	9.0		xxxxx	xxxxx	xxxx	xxxxx			
Shared LOS:	A	*		*	*	*					*	A		*	*	*	*			
ApproachDel:	xxxxxx			xxxxxx							9.0				xxxxxx					
ApproachLOS:	*			*							A				*					

****

Note: Queue reported is the number of cars per lane.

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Table 4.2-8 Stopping Sight Distance - Intersections

Intersection	SSD	Stopping Sight Distance (ft)			
		northbound approach	southbound approach	eastbound approach	westbound approach
Bottle Rock / Cole Creek	Req'd	550	550	400	400
	Avail	850	1,250	1,225	775
Bottle Rock / Harrington Flat	Req'd	550	550	n/a	250
	Avail	**475**	**400**	n/a	400
Bottle Rock / Rainbow	Req'd	250	250	n/a	250
	Avail	375	350	n/a	400
Bottle Rock / Rt. 29	Req'd	550	550	725	725
	Avail	1,250	n/a	2,300	2,025
Bottle Rock / Sulphur Creek	Req'd	550	550	n/a	250
	Avail	725	750	n/a	550

Source: AECOM - February, 2010
Note: Sight distances rounded to the nearest 25 feet.
Bold indicates insufficient sight distance available

Table 4.2-9 Stopping Sight Distance - Horizontal/Vertical Curvature

Location	Posted Speed	Required SSD	Dist, CL to Obstruction	Available SSD
Bottle Rock Road - 1.0 miles north of Bottle Rock Road/High Valley Road	45	325	9	325
Bottle Rock Road - 1.5 miles south of Bottle Rock Road/High Valley Road	25	155	11	250
High Valley Road - 0.1 miles west of Bottle Rock Road/High Valley Road	15	80	10	175
High Valley Road - 0.30 miles west of Bottle Rock Road/High Valley Road	15	80	9	150
High Valley Road - 0.35 miles west of Bottle Rock Road/High Valley Road	15	80	9	150
High Valley Road - 0.5 miles west of Bottle Rock Road/High Valley Road	15	80	9	175
Glenbrook Road - 0.3 miles west of BR	15	80	9	250
Glenbrook Road - 0.5 miles west of Bottle Rock Road/High Valley Road	15	80	9	300
Glenbrook Road - 1.4 miles west of Bottle Rock Road/High Valley Road	15	80	11	175
Glenbrook Road - 1.5 miles west of Bottle Rock Road/High Valley Road	15	80	7	125
Lee Road - 0.1 miles east of Lee Road/Rabbit Road	15	80	11	125
Lee Road - 0.4 miles east of Lee Road/Rabbit Road	15	80	11	150

Source: AECOM - February, 2010
Bold indicates insufficient sight distance available
Photographs/exhibits provided in Appendix D.
Stopping sight distance measured for each approach, rounded to nearest 25 feet.

LKX 060 Bottle Rock Road

Collision Report Summary

8/10/2009

Date Range Reported: 10/1/03 - 9/30/08

Total Number of Collisions: 57

Report#	Date	Time	Location	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Dir. of Travel 1	Movement Prec. Coll. 1	Dir. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil.	Ver.
1133685	11/24/03	20:40	Bottle Rock Rd & Harrington Flat Rd	5808'	North	Hit Object	Fixed Object	North	Other Unsafe Turning			Other Hazardous Movement	0	0	
1161628	12/13/03	08:10	Bottle Rock Rd & Harrington Flat Rd	5808'	West	Hit Object	Fixed Object	West	Ran Off Road			Other Hazardous Movement	0	0	
1201678	12/23/03	10:40	Bottle Rock Rd & High Valley Rd	2112'	South	Hit Object	Fixed Object	North	Ran Off Road			Other Hazardous Movement	0	0	
1182931	12/27/03	18:25	Bottle Rock Rd & Cole Creek Rd	10032'	South	Hit Object	Fixed Object	North	Ran Off Road			Unsafe Speed	0	0	
1208740	1/3/04	17:45	Bottle Rock Rd & Rt 29	3'	West	Broadside	Other Motor Vehicle	South	Making Right Turn	East	Stopped in Road	Unsafe Speed	0	0	
1209510	1/5/04	08:40	Bottle Rock Rd & Harrington Flat Rd	2'	South	Hit Object	Fixed Object	North	Proceeding Straight			Unsafe Speed	0	0	
1301482	2/2/04	13:50	Bottle Rock Rd & Nancy Dr	50'	West	Hit Object	Fixed Object	West	Ran Off Road			Unsafe Speed	0	0	
1335138	3/23/04	17:05	Bottle Rock Rd & Sulphur Creek Rd	2640'	South	Overturned	Non-Collision	West	Making Left Turn	North	Proceeding Straight	Auto R/W Violation	1	0	
1357245	3/25/04	13:35	Bottle Rock Rd & Cole Creek Rd	117'	West	Broadside	Other Motor Vehicle	West	Crossed Into Opposing	East	Proceeding Straight	Unsafe Speed	4	0	
1470963	6/2/04	08:30	Bottle Rock Rd & Sulphur Creek Rd	7392'	South	Sideswipe	Other Motor Vehicle	South	Crossed Into Opposing	North	Proceeding Straight	Wrong Side of Road	0	0	
1652711	9/27/04	09:30	Bottle Rock Rd & Harrington Flat Rd	4752'	North	Hit Object	Fixed Object	North	Ran Off Road			Other Than Driver or Ped	2	0	
1814018	12/17/04	00:25	Bottle Rock Rd & Harrington Flat Rd	5280'	South	Hit Object	Fixed Object	South	Ran Off Road			Other Than Driver or Ped	0	0	
1915822	2/26/05	21:20	Bottle Rock Rd & Rt 29	8976'	South	Hit Object	Fixed Object	West	Proceeding Straight			Unsafe Speed	0	0	

Report#	Date	Time	Location	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Dir. of Travel 1	Movement Prec. Coll. 1	Dir. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil.	Ver.
1915830	3/5/05	14:20	Bottle Rock Rd & Harrington Flat Rd	3696'	South	Hit Object	Fixed Object	South	Ran Off Road			Wrong Side of Road	0	0	
1952843	4/1/05	07:50	Bottle Rock Rd & Harrington Flat Rd	6336'	South	Hit Object	Fixed Object	North	Ran Off Road			Improper Turning	0	0	
2047668	5/27/05	23:25	Rt 29 & Bottle Rock Rd	0'	In Int.	Broadside	Other Motor Vehicle	North	Making Left Turn	South	Proceeding Straight	Auto R/W Violation	1	0	
2152162	7/15/05	23:05	Bottle Rock Rd & High Valley Rd	2640'	South	Hit Object	Fixed Object	South	Ran Off Road			Improper Turning	0	0	
2186456	8/8/05	15:40	Rt 29 & Bottle Rock Rd	0'	In Int.	Broadside	Other Motor Vehicle	South	Making Left Turn	South	Proceeding Straight	Auto R/W Violation	1	0	
2181541	8/13/05	16:46	Bottle Rock Rd & Rt 175	10560'	North	Broadside	Other Motor Vehicle	South	Making Left Turn	North	Proceeding Straight	Auto R/W Violation	2	0	
2196868	8/29/05	07:15	Bottle Rock Rd & Harrington Flat Rd	3168'	South	Hit Object	Fixed Object	North	Ran Off Road			Other Hazardous Movement	1	0	
2244848	9/12/05	10:05	Bottle Rock Rd & Cole Creek Rd	700'	South	Other	Non-Collision	North	Proceeding Straight			Improper Turning	0	0	
2309532	11/4/05	17:05	Bottle Rock Rd & Sulphur Creek	7392'	West	Broadside	Other Motor Vehicle	West	Passing Other Vehicle	West	Making Left Turn	Wrong Side of Road	1	0	
2366923	12/3/05	20:05	Bottle Rock Rd & Penson Ct	215'	North	Hit Object	Fixed Object	South	Ran Off Road			Other Hazardous Movement	0	0	
2360868	12/5/05	08:45	Bottle Rock Rd & Cole Creek Rd	10032'	South	Overturned	Fixed Object	North	Ran Off Road			Unsafe Speed	2	0	
2366927	12/6/05	20:23	Bottle Rock Rd & Harrington Flat Rd	3168'	South	Hit Object	Fixed Object	South	Other Unsafe Turning			Improper Turning	1	0	
2384347	12/12/05	14:25	Bottle Rock Rd & Rainbow Dr	7920'	North	Hit Object	Fixed Object	North	Ran Off Road			Improper Turning	1	0	
2487693	2/14/06	12:05	Bottle Rock Rd & Rainbow Dr	5280'	North	Overturned	Non-Collision	North	Other Unsafe Turning			Other Hazardous Movement	1	0	
2496010	2/16/06	20:20	Bottle Rock Rd & Harrington Flat	4752'	South	Hit Object	Other Object	North	Proceeding Straight			Other Hazardous Movement	0	0	
2511384	3/2/06	05:40	Bottle Rock Rd & Harrington Flat Rd	2112'	North	Hit Object	Fixed Object	South	Ran Off Road			Unsafe Speed	0	0	

Report#	Date	Time	Location	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Dir. of Travel 1	Movement Prec. Coll. 1	Dir. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil.	Ver.
2679859	6/10/06	12:35	Bottle Rock Rd & Harrington Flat	7920'	West	Hit Object	Not Stated	East	Ran Off Road			Improper Turning	1	0	
2749362	7/21/06	14:40	Bottle Rock Rd & Kahms Ln	1056'	South	Rear-End	Other Motor Vehicle	North	Passing Other Vehicle	North	Proceeding Straight	Wrong Side of Road	0	0	
2747043	7/26/06	16:48	Rt 29 & Bottle Rock Rd	0'	In Int.	Rear-End	Other Motor Vehicle	North	Proceeding Straight	North	Stopped in Road	Unsafe Speed	2	0	
2769514	7/29/06	16:05	Bottle Rock Rd & Harrington Flat Rd	4752'	South	Head-On	Other Motor Vehicle	North	Proceeding Straight	South	Proceeding Straight	Wrong Side of Road	3	0	
2775680	8/20/06	08:12	Bottle Rock Rd & Rt 175	5016'	North	Head-On	Other Motor Vehicle	North	Crossed Into Opposing	South	Proceeding Straight	Unsafe Speed	0	0	
2787806	8/28/06	20:30	Bottle Rock Rd & Harrington Flat Rd	4752'	North	Hit Object	Fixed Object	North	Ran Off Road			Improper Turning	1	0	
2954663	12/19/06	16:46	Rt 29 & Bottle Rock Rd	0'	In Int.	Broadside	Other Motor Vehicle	East	Making Left Turn	South	Proceeding Straight	Auto R/W Violation	0	0	
2969681	12/27/06	20:30	Bottle Rock Rd & Cole Creek Rd	1320'	East	Overturned	Fixed Object	West	Other Unsafe Turning			Improper Turning	0	0	
3001700	1/8/07	06:45	Bottle Rock Rd & Bottle Rock Rd 15485	320'	South	Overturned	Non-Collision	North	Ran Off Road			Unsafe Speed	0	0	
3001716	1/16/07	18:30	Bottle Rock Rd & Rt 29	18480'	East	Hit Object	Fixed Object	West	Ran Off Road			Unsafe Speed	0	0	
3026183	1/29/07	06:10	Bottle Rock Rd & Rainbow Dr	3168'	West	Broadside	Other Motor Vehicle	West	Proceeding Straight	East	Proceeding Straight	Unsafe Speed	1	0	
3039483	2/8/07	21:28	Bottle Rock Rd & Sulphur Creek Rd	7392'	East	Hit Object	Fixed Object	West	Ran Off Road			Driving Under Influence	0	0	
3090362	3/16/07	17:15	Bottle Rock Rd & Sulphur Creek Rd	4224'	West	Hit Object	Animal	West	Proceeding Straight			Other Than Driver or Ped	1	0	
3200218	5/30/07	16:25	Bottle Rock Rd & Sulphur Creek	5808'	North	Hit Object	Fixed Object	North	Ran Off Road			Unsafe Speed	1	0	
3241107	6/22/07	13:55	Bottle Rock Rd & Harrington Flat Rd	1584'	East	Overturned	Non-Collision	East	Ran Off Road			Driving Under Influence	0	0	
3237254	6/23/07	17:20	Bottle Rock Rd & Harrington Flat Rd	4752'	South	Sideswipe	Other Motor Vehicle	North	Crossed Into Opposing	South	Proceeding Straight	Wrong Side of Road	0	0	

Report#	Date	Time	Location	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Dir. of Travel 1	Movement Prec. Coll. 1	Dir. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil.	Ver.
3251612	7/3/07	19:10	Bottle Rock Rd & Rainbow Dr	1584'	North	Hit Object	Fixed Object	North	Other Unsafe Turning			Improper Turning	0	0	
3256491	7/4/07	11:30	Bottle Rock Rd & Rt 175	2640'	North	Sideswipe	Other Motor Vehicle	South	Making U Turn	South	Proceeding Straight	Unsafe Starting or Backing	0	0	
3381657	9/9/07	00:01	Bottle Rock Rd & Kahms Rd	1584'	East	Head-On	Non-Collision	South	Ran Off Road			Unsafe Speed	1	0	
3375660	9/12/07	21:10	Bottle Rock Rd & Rt 29	0'	In Int.	Broadside	Motor Vehicle on Other	West	Making Right Turn	East	Making Right Turn	Improper Turning	0	0	
3401490	10/4/07	21:05	Bottle Rock Rd & High Valley Rd	4752'	South	Sideswipe	Other Motor Vehicle	South	Proceeding Straight	North	Proceeding Straight	Wrong Side of Road	0	0	
3411516	10/15/07	13:15	Bottle Rock Rd & Rt 29	18480'	South	Hit Object	Fixed Object	North	Proceeding Straight			Unsafe Speed	0	0	
3491707	11/28/07	09:40	Bottle Rock Rd & Cole Creek Rd	6864'	West	Hit Object	Fixed Object	East	Ran Off Road			Improper Turning	1	0	
3582777	1/11/08	07:00	Bottle Rock Rd & Harrington Flat Rd	455'	South	Hit Object	Fixed Object	South	Ran Off Road			Other Hazardous Movement	0	0	
3565272	1/13/08	07:50	Bottle Rock Rd & Rainbow Dr	5808'	East	Hit Object	Fixed Object	East	Ran Off Road			Other Hazardous Movement	1	0	
3582789	1/19/08	20:37	Rt 29 & Bottle Rock Rd	0'	In Int.	Broadside	Other Motor Vehicle	East	Stopped in Road	South	Proceeding Straight	Driving Under Influence	0	0	
3884059	9/6/08	16:10	Bottle Rock Rd & Rainbow Dr	2640'	North	Overturned	Non-Collision	North	Other Unsafe Turning			Driving Under Influence	1	0	
3951475	9/24/08	06:20	Bottle Rock Rd & Anderson Wy	528'	North	Hit Object	Animal	South	Proceeding Straight			Other Than Driver or Ped	0	0	

Settings Used For Query

Parameter	Setting
Street Name	BOTTLE*
Starting Date	10/1/2003
Ending Date	9/30/2008
Distance from Intersection	>= 0' for non rear-end collisions
	>= 0' for rear-end collisions

LKX 060 High Valley Road

Collision Report Summary

8/10/2009

Date Range Reported: 10/1/03 - 9/30/08

Total Number of Collisions: 8

Report#	Date	Time	Location	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Dir. of Travel 1	Movement Prec. Coll. 1	Dir. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil.	Ver.
1378587	4/17/04		High Valley Rd & 10915 High Valley Rd	150'	North	Hit Object	Fixed Object	North	Ran Off Road			Other Hazardous Movement	0	0	
1700055	10/7/04	20:30	High Valley Rd & Rt 20	10560'	North	Hit Object	Fixed Object	South	Ran Off Road			Driving Under Influence	0	0	
1714236	10/31/04	08:30	High Valley Rd & Rt 20	25872'	North	Overturned	Non-Collision	South	Ran Off Road			Driving Under Influence	4	0	
2027592	5/5/05	19:30	High Valley Rd & Cerritos Dr	5'	North	Overturned	Non-Collision	South	Other Unsafe Turning			Driving Under Influence	0	0	
2787810	8/13/06	21:50	High Valley Rd & Lakeview Dr	528'	North	Head-On	Fixed Object	North	Ran Off Road			Driving Under Influence	2	0	
3436579	10/21/07	18:40	High Valley Rd & Cerittos Dr	23760'	North	Overturned	Fixed Object	South	Ran Off Road			Improper Turning	3	0	
3577139	1/22/08	13:30	High Valley Rd & Valley Oak Dr	20592'	North	Hit Object	Fixed Object	South	Ran Off Road	North	Proceeding Straight	Unsafe Speed	0	0	
3868831	8/15/08	12:00	High Valley Rd & Cerrito Dr	44352'	North	Overturned	Fixed Object	North	Ran Off Road			Improper Turning	0	0	

Settings Used For Query

Parameter	Setting
Street Name	HIGH VALLEY*
Starting Date	10/1/2003
Ending Date	9/30/2008
Distance from Intersection	>= 0' for non rear-end collisions
	>= 0' for rear-end collisions

LKX060 Saw Mill Road

Collision Report Summary

8/10/2009

Date Range Reported: 10/1/03 - 9/30/08

Total Number of Collisions: 1

Report#	Date	Time	Location	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Dir. of Travel 1	Movement Prec. Coll. 1	Dir. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil.	Ver.
3268185	7/16/07	06:10	Alderpoint Rd & Sawmill Rd	1056'	West	Hit Object	Fixed Object	West	Proceeding Straight			Improper Turning	0	0	

Settings Used For Query

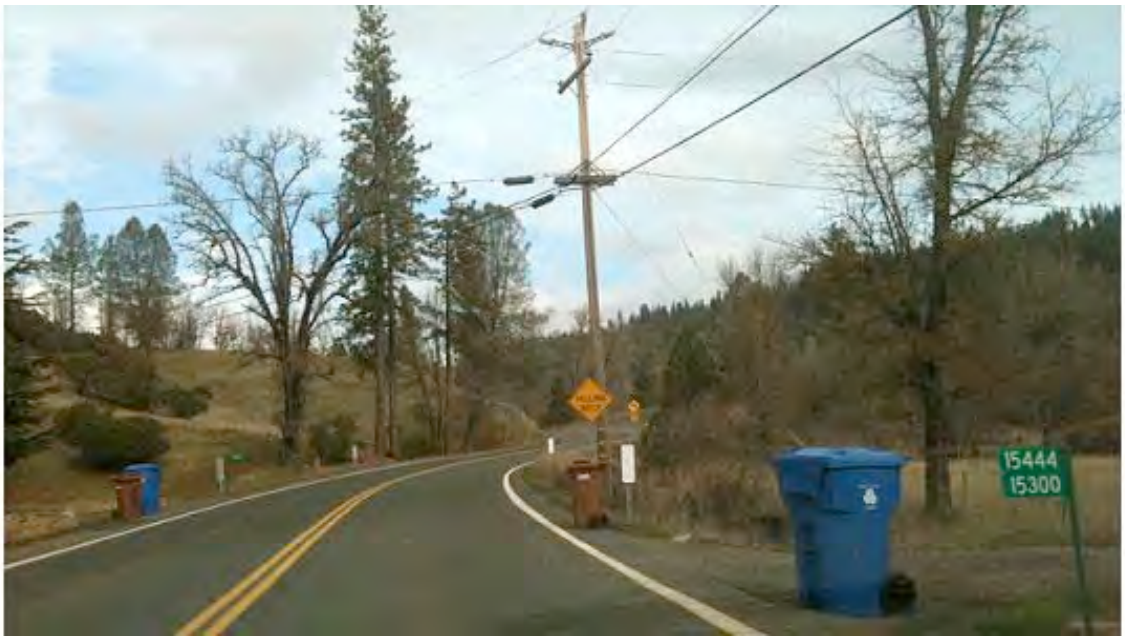
Parameter	Setting
Cross Street	SAW MILL ROAD
Starting Date	10/1/2003
Ending Date	9/30/2008
Distance from Intersection	>= 0' for non rear-end collisions
	>= 0' for rear-end collisions

Segment	Cross Street	Collisions					Injuries	Killed	Incident Rate
		Vehicle	Bicycle	Pedes-trian	Unkn./ Other	Total			
Bottle Rock	Anderson Wy				1	1	0	0	0.27
Bottle Rock	Bottle Rock Rd 15484				1	1	0	0	0.27
Bottle Rock	Cole Creek	2			3	5	5	0	1.34
Bottle Rock	Harrington Flat	2			16	18	4	0	4.83
Bottle Rock	High Valley Road	2			1	3	0	0	0.81
Bottle Rock	Kahms	1			1	2	1	0	0.54
Bottle Rock	Nancy				1	1	0	0	0.27
Bottle Rock	Penson	1				1	0	0	0.27
Bottle Rock	Rainbow	1			5	6	5	0	1.61
Bottle Rock	Rt 175	3				3	2	0	0.81
Bottle Rock	Rt 29	8			2	10	4	0	2.68
Bottle Rock	Sulphur Creek	2			4	6	4	0	1.61
Bottle Rock Average		**22**	**0**	**0**	**35**	**57**	**25**	**0**	**1.28**
High Valley	10915 High Valley				1	1	0	0	1.61
High Valley	Rt 20				2	2	4	0	3.22
High Valley	Cerritos				3	3	3	0	4.83
High Valley	Lakeview				1	1	2	0	1.61
High Valley	Valley Oak				1	1	0	0	1.61
High Valley Average		**0**	**0**	**0**	**8**	**8**	**9**	**0**	**2.58**
Saw Mill	Alderpoint				1	1	0	0	5.48

Segment	Cross Street	Collisions - Ungrouped											
		Auto R/W Violation	Wrong Side of Road	Ped R/W Violation	Traffic Signals and Signs	Following Too Closely	Unsafe Speed	Ped Violation	Other Hazardous Movement	Improper Turning	DUI	Unknown/ Other/ Not Stated	Total
Bottle Rock	Anderson Wy											1	1
Bottle Rock	Bottle Rock Rd 15484						1						1
Bottle Rock	Cole Creek						2			3			5
Bottle Rock	Harrington Flat		3				3		5	4	1	2	18
Bottle Rock	High Valley Road		1						1	1			3
Bottle Rock	Kahms		1				1						2
Bottle Rock	Nancy						1						1
Bottle Rock	Penson								1				1
Bottle Rock	Rainbow						1		2	2	1		6
Bottle Rock	Rt 175	1					1					1	3
Bottle Rock	Rt 29	3					5			1	1		10
Bottle Rock	Sulphur Creek	1	2				1				1	1	6
Bottle Rock Average		**5**	**7**	**0**	**0**	**0**	**16**	**0**	**9**	**11**	**4**	**5**	**57**
High Valley	10915 High Valley								1				1
High Valley	Rt 20										2		2
High Valley	Cerritos									2	1		3
High Valley	Lakeview										1		1
High Valley	Valley Oak						1						1
High Valley Average		**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**2**	**4**	**0**	**8**
Saw Mill	Alderpoint									1			1
Saw Mill Average		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**

Segment	Cross Street	PCF - Grouped					
		Auto R/W Violation	Traffic Signals and Signs	Unsafe Speed	Other Hazardous Movement	Improper Turning	Unknown / Other / Not Stated
Bottle Rock	Anderson Wy	0%	0%	0%	0%	0%	100%
Bottle Rock	Bottle Rock Rd 15484	0%	0%	100%	0%	0%	0%
Bottle Rock	Cole Creek	0%	0%	40%	0%	60%	0%
Bottle Rock	Harrington Flat	0%	0%	17%	28%	22%	33%
Bottle Rock	High Valley Road	0%	0%	0%	33%	33%	33%
Bottle Rock	Kahms	0%	0%	50%	0%	0%	50%
Bottle Rock	Nancy	0%	0%	100%	0%	0%	0%
Bottle Rock	Penson	0%	0%	0%	100%	0%	0%
Bottle Rock	Rainbow	0%	0%	17%	33%	33%	17%
Bottle Rock	Rt 175	33%	0%	33%	0%	0%	33%
Bottle Rock	Rt 29	30%	0%	50%	0%	10%	10%
Bottle Rock	Sulphur Creek	17%	0%	17%	0%	0%	67%
Bottle Rock Average		**6.7%**	**0.0%**	**35.3%**	**16.2%**	**13.2%**	**28.6%**
High Valley	10915 High Valley	0%	0%	0%	100%	0%	0%
High Valley	Rt 20	0%	0%	0%	0%	0%	100%
High Valley	Cerritos	0%	0%	0%	0%	67%	33%
High Valley	Lakeview	0%	0%	0%	0%	0%	100%
High Valley	Valley Oak	0%	0%	100%	0%	0%	0%
High Valley Average		**0.0%**	**0.0%**	**20.0%**	**20.0%**	**13.3%**	**46.7%**
Saw Mill	Alderpoint	0%	0%	0%	0%	100%	0%
Saw Mill Average		**0.0%**	**0.0%**	**0.0%**	**0.0%**	**100.0%**	**0.0%**

BOTTLE ROCK ROAD



Bottle Rock Road – northbound
Signage – "Narrow Road"

Bottle Rock Road – northbound
Signage – "Windy Road"

Bottle Rock Road – northbound

Bottle Rock Road – northbound

Bottle Rock Road – northbound
Signage – "25mph through Curves"

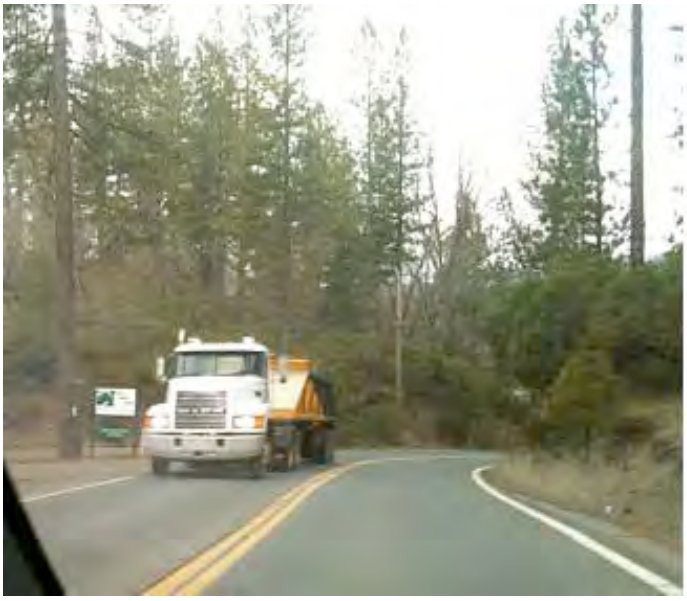
Bottle Rock Road – northbound
Signage – "School Bus Stop and Turn Around 500 ft."

Bottle Rock Road – northbound

Bottle Rock Road – northbound
Truck

Bottle Rock Road – northbound
Signage – "Narrow Bridge"

Bottle Rock Road – northbound
Signage – "25mph through Curve"



Bottle Rock Road – northbound
Truck at Bottle Rock Road/High Valley Road intersection

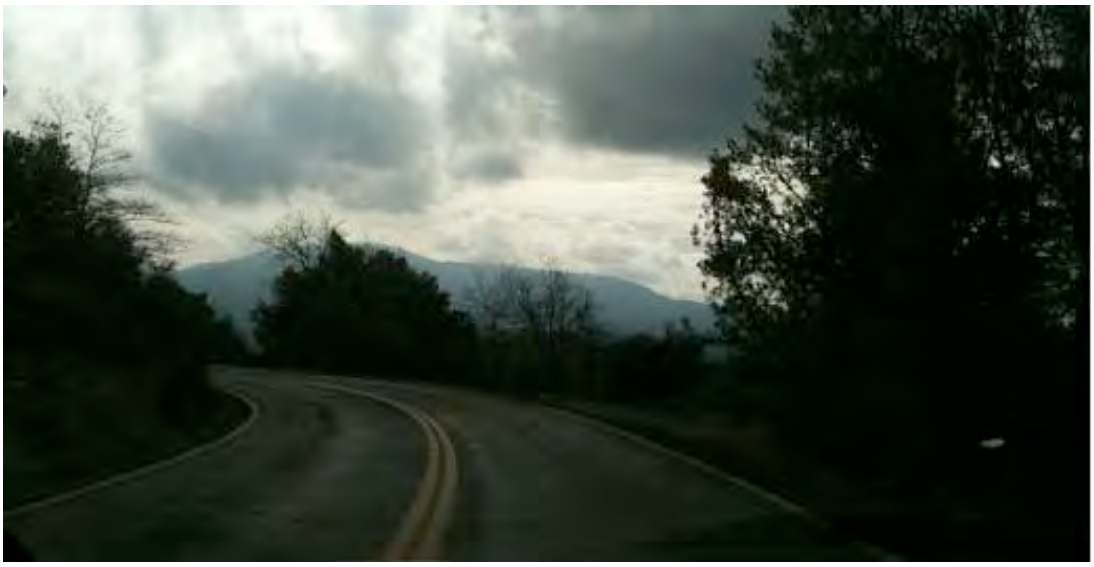
Bottle Rock Road – northbound
Signage – "Passing Lane ¼ Mile"

Bottle Rock Road – northbound
Trucks Passing

Bottle Rock Road – northbound
Passing Lane

Bottle Rock Road - southbound
Bottle Rock Road/Harrington Flat Road intersection

Bottle Rock Road - southbound
Signage – "45mph speed limit"



Bottle Rock Road - southbound

Bottle Rock Road - southbound
Signage – "Narrow Bridge"

HIGH VALLEY ROAD

High Valley Road
Bottle Rock Road/High Valley Road intersection – Facing Bottle Rock Road (SB)

High Valley Road
Bottle Rock Power Plant Security Gate

High Valley Road
Signage – "No Truck Traffic 7 a.m. – 7 p.m."

High Valley Road
0.1 miles west of Bottle Rock Road

High Valley Road
Bridge to BRPP site

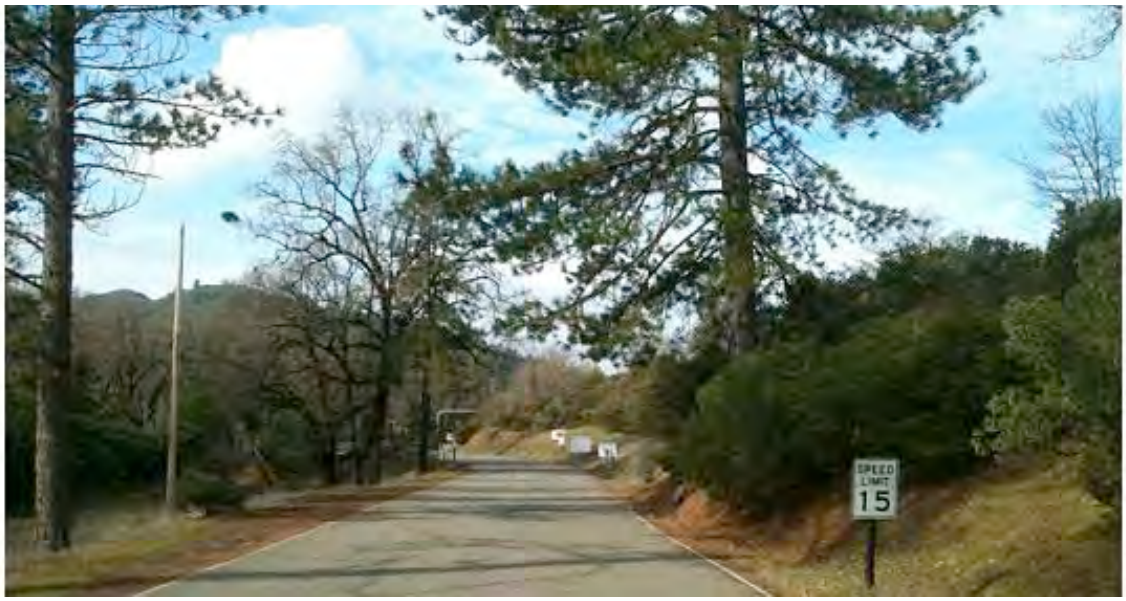
High Valley Road
Signage – "15mph speed limit"

High Valley Road
Signage – "14% Grade"

High Valley Road
0.5 miles west of Bottle Rock Road

High Valley Road
Mirrored Curves

High Valley Road
Signage – “15mph speed limit”, Mirrored Curve



High Valley Road
Signage – "15mph speed limit", BRPP entrance

High Valley Road
Coleman-Francisco lease

RABBIT VALLEY ROAD

Rabbit Valley Road
Rabbit Valley Road/Saw Mill Road intersection – facing Saw Mill Road to Calpine Plant

Lee Road
Gate to Rabbit Valley Road

Lee Road

Rabbit Valley Road/Lee Road intersection – Lee Road (to proposed west pad)

GLENBROOK ROAD

Glenbrook Road
Lee Road, facing Glenbrook Road/Lee Road intersection

Glenbrook Road
Glenbrook Road easement, facing Bridge to Glenbrook Road

Glenbrook Road
1.5 miles west of Bottle Rock Road

Glenbrook Road
Passing Lane/Truck Pullout – 0.9mi west of Bottle Rock Road

Glenbrook Road

Glenbrook Road

Glenbrook Road
Passing Lane/Truck Pullout – 0.3 mi from Bottle Rock

Glenbrook Road
Jellystone RV and Camp Resort

LEE ROAD

Lee Road
At Rabbit Valley Road/Lee Road – 19' wide roadway

Lee Road

Lee Road
Truck Pullout

Lee Road
0.4 miles east of Rabbit Valley Road

Lee Road

Lee Road
Residence on Lee Road - occupied 2 wks/yr

Lee Road
Gate to Binkley property/Glenbrook Road easement

APPENDIX B - SIGHT DISTANCE CALCULATIONS

Table 4.2-8 Stopping Sight Distance - Intersections

Intersection	SSD	Available SSD (ft)			
		northbound approach	southbound approach	eastbound approach	westbound approach
Bottle Rock / Cole Creek	Req'd	550	550	400	400
	Avail	850	1,250	1,225	775
Bottle Rock / Harrington Flat	Req'd	550	550	n/a	250
	Avail	**475**	**400**	n/a	400
Bottle Rock / Rainbow	Req'd	250	250	n/a	250
	Avail	375	350	n/a	400
Bottle Rock / Rt. 29	Req'd	550	550	725	725
	Avail	1,250	n/a	2,300	2,025
Bottle Rock / Sulphur Creek	Req'd	550	550	n/a	250
	Avail	725	750	n/a	550

Source: AECOM - February, 2010
Note: Sight distances rounded to the nearest 25 feet.
Bold indicates insufficient sight distance available

Table 4.2-9 Stopping Sight Distance - Horizontal/Vertical Curvature

Location	Posted Speed	Required SSD	Radius	HSO	Available SSD
Bottle Rock Road - 1.0 miles north of Bottle Rock Road/High Valley Road	45	325	1500	9	325
Bottle Rock Road - 1.5 miles south of Bottle Rock Road/High Valley Road	25	155	725	11	250
High Valley Road - 0.1 miles west of Bottle Rock Road/High Valley Road	15	80	400	10	175
High Valley Road - 0.30 miles west of Bottle Rock Road/High Valley Road	15	80	325	9	150
High Valley Road - 0.35 miles west of Bottle Rock Road/High Valley Road	15	80	325	9	150
High Valley Road - 0.5 miles west of Bottle Rock Road/High Valley Road	15	80	450	9	175
Glenbrook Road - 0.3 miles west of BR	15	80	850	9	250
Glenbrook Road - 0.5 miles west of Bottle Rock Road/High Valley Road	15	80	1250	9	300
Glenbrook Road - 1.4 miles west of Bottle Rock Road/High Valley Road	15	80	350	11	175
Glenbrook Road - 1.5 miles west of Bottle Rock Road/High Valley Road	15	80	275	7	125
Lee Road - 0.1 miles east of Lee Road/Rabbit Road	15	80	200	11	125
Lee Road - 0.4 miles east of Lee Road/Rabbit Road	15	80	275	11	150

Source: AECOM - February, 2010
Bold indicates insufficient sight distance available
Photographs/exhibits provided in Appendix D.
Stopping sight distance measured for each approach, rounded to nearest 25 feet.
HSO - Distance from Centerline to obstruction

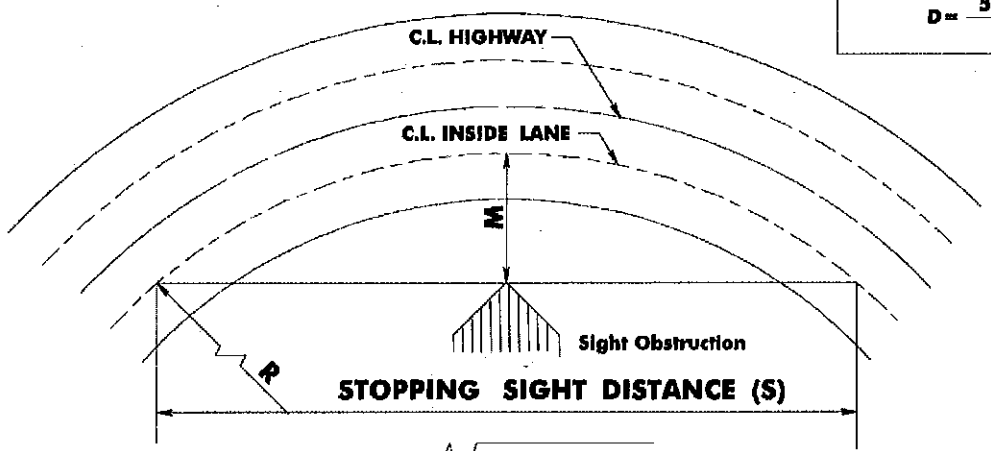
MINIMUM STOPPING SIGHT DISTANCE ON HORIZONTAL CURVES

FIGURE: 4–A

BDC02MR–3

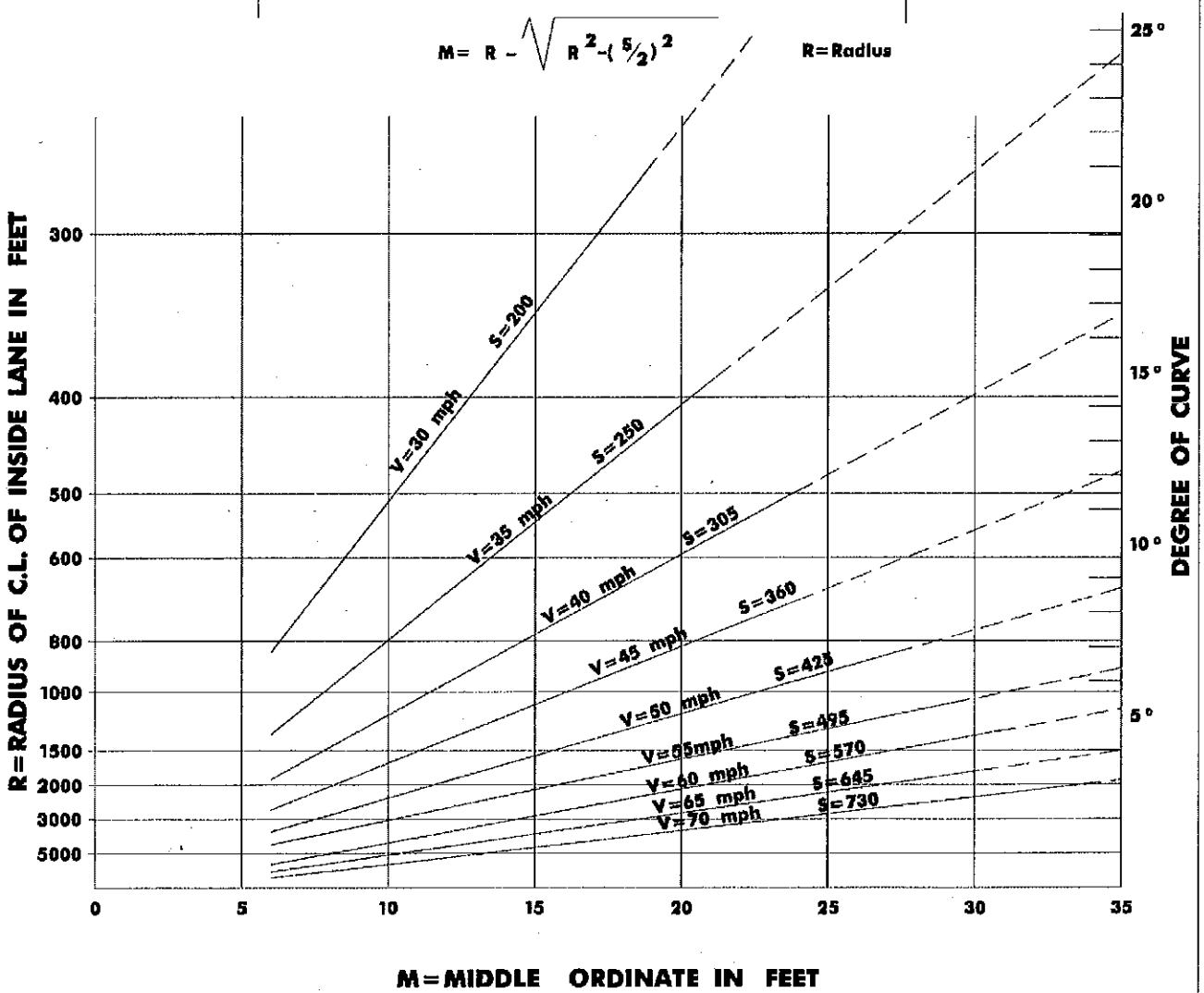
D = Degree of Curve

$$D = \frac{5730}{R}$$



$$M = R - \sqrt{R^2 - (S/2)^2}$$

R = Radius



Traffic Addendum for the Petition to Amend

The California Energy Commission Final Decision on Bottle Rock Power Plant (79-AFC-4C)

February 2010

Prepared for:
Bottle Rock Power, LLC
7385 High Valley Road
Cobb, CA 95426

Prepared by:
RMT Inc.
4 West Fourth Avenue, Suite 303
San Mateo, California 94402

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List of Acronyms and Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
BRP	Bottle Rock Power, LLC.
BRPP	Bottle Rock Power Plant
Caltrans	California Department of Transportation
CA-MUTCD	Manual on Uniform Traffic Control Devices – California Supplement
CEC	California Energy Commission
CFR	Code of Federal Regulations
COC	Condition of Certification
CVC	California Vehicular Code
CWPP	Community Wildfire Protection Plan
HCM	Highway Capacity Manual
LORS	Laws, Ordinances, Regulations, and Standards
LOS	Level of Service
MUTCD	Manual on Uniform Traffic Control Devices
NWPR	North Western Pacific Railroad
PTA	Petition to Amend
RVs	Recreational Vehicles
SWITRS	Statewide Integrated Traffic Records System
TRANS	Transportation
v/c	Volume-to-Capacity

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1: Introduction

1.1 Overview

This report is an addendum to the traffic analysis provided in Section 4.12 Traffic and Transportation in the "Petition to Amend the California Energy Commission Final Decision on Bottle Rock Power Plant (79-AFC-4C)" RMT 2009), herein referred to as the PTA, submitted to the California Energy Commission (CEC) on September 30, 2009. The PTA was submitted to request authorization to implement the Bottle Rock Power Steam Project (project) (described below).

The purpose of this report is to provide supplemental information and environmental impact analysis for the use of an alternative access route, comprised of two options, for the BRP Steam Project. The newly considered routes would be alternatives to using High Valley Road during the construction period only. The alternatives are designed to address concerns raised by residents on Bottle Rock Road and to avoid additional truck traffic on High Valley Road. The alternative routes would use either private roads (Glenbrook Road and Lee Road) and an existing campground road (Option A), or just private roads (Glenbrook Road and Lee Road) (Option B). The applicants have not yet been able to secure access to the private roads. The use of either of these two optional routes remains contingent upon the applicant's ability to obtain agreements with the private land owners. If these agreements are not obtained, then High Valley Road would be used for the construction and drilling related traffic.

1.2 Project Description

The proposed project would be constructed in Lake County, northwest of the community of Cobb and adjacent to the existing Bottle Rock Power Plant (BRPP) (Figure 1.2-1). Project components would be built on two leaseholds known respectively as the Francisco and BRP GeoResource Leaseholds. The development of a new steam field would consist of two well pads, up to 12 wells per pad, an access road that connects the two pads, new steam pipelines, and new injection pipelines. The proposed project components would allow Bottle Rock Power, LLC (BRP) to increase the power output of the plant to approximately 55 MW, with minimal physical changes to BRPP and no changes to the existing electrical transmission facilities.

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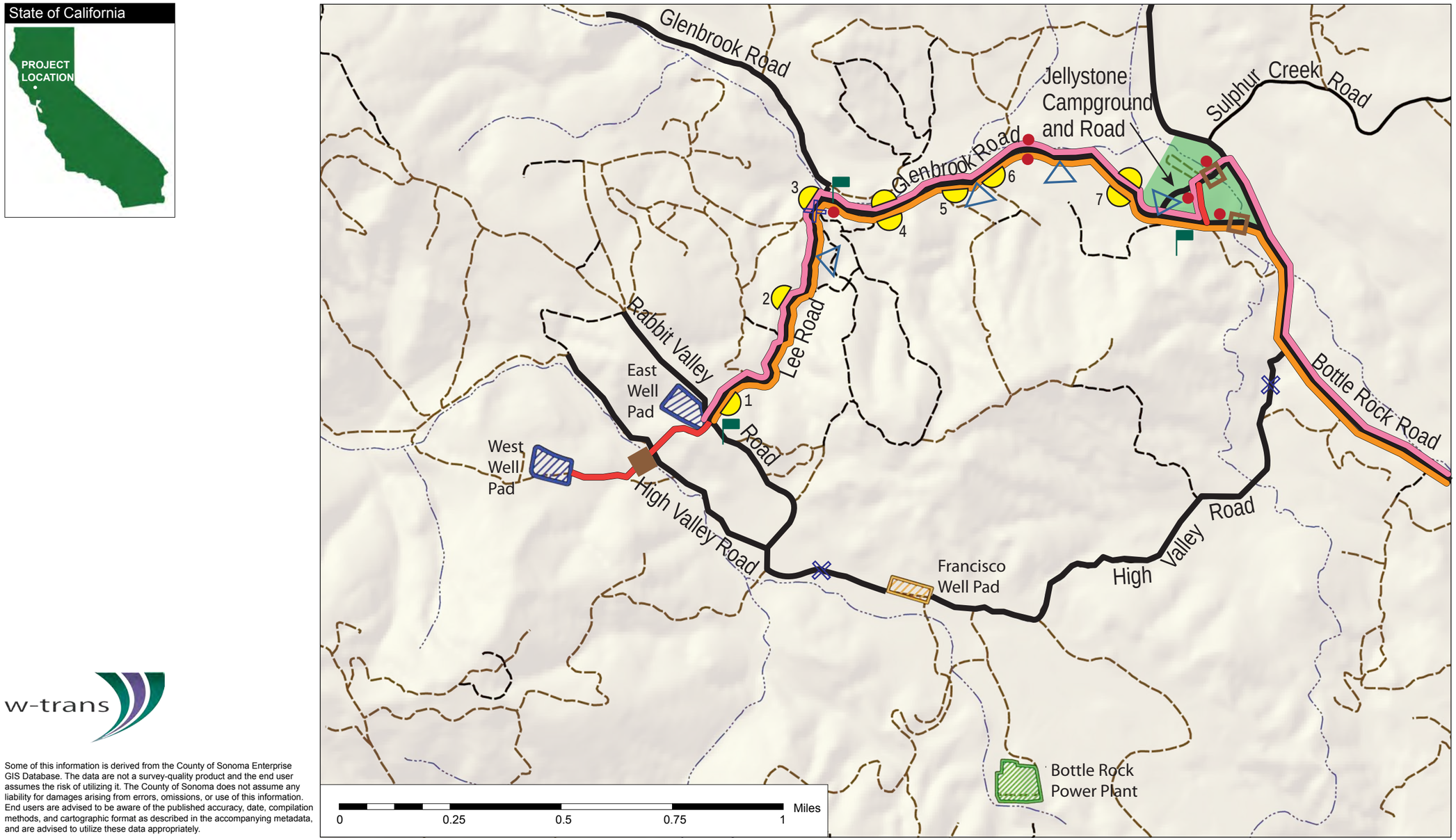
Figure 1.2-1: Project Area and Proposed Construction Phase Traffic Improvements



SOURCE: U.S. Geological Survey, EROS Data Center, Sioux Falls , SD 2009, Lake County Department of Information Technology 2009, Sonoma County GIS Department 2009, and W-Trans 2010

LEGEND

- Alternative Access Route Option A
- Alternative Access Route Option B
- Proposed Construction Sign
- Vehicle Turnout
- Existing Bridge
- Proposed Bridge
- Existing Driveway
- Existing Private Road
- Proposed Access Road
- Existing Gate
- Proposed Flagger Location
- Proposed Well Pad Area
- Existing Francisco Well Pad Area
- Existing Bottle Rock Power Plant
- Paved Road
- Unimproved Road
- Unpaved Road

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2: Traffic and Transportation Setting of the Project Area

2.1 Road Network Overview

2.1.1 PRIVATE ROAD NETWORKS

The project is located in a remote area where access to the regional transportation system, including county roads and state and federal highways, is via a network of private roads. The proposed project area is located in a mountainous region that is currently accessed via four private roads (see Figure 1.2-1):

- High Valley Road
- Glenbrook Road
- Rabbit Valley Road
- Lee Road

High Valley Road and Glenbrook Road connect to Bottle Rock Road, a Lake County road. Glenbrook Road intersects Bottle Rock Road approximately 800 feet north of High Valley Road. Glenbrook Road is used by area residents and others unrelated to the BRP Steam Project and BRPP. The road provides access to Jellystone Camp Resort (an existing campground) as well as to a network of private roads. Glenbrook Road provides an east-west connection in the area

Lee Road intersects Glenbrook Road approximately 1.5 miles from the intersection of Glenbrook Road/Bottle Rock Road and provides access to areas south of Glenbrook Road. Lee Road provides access to the proposed drill pads, as well as a connection to High Valley Road and Rabbit Valley Road.

Local county roads in the project area are generally paved two lane roads. Private roads in the area are predominantly unpaved, single lane roads with a limited and discontinuous shoulder. High Valley Road, Glenbrook Road, Rabbit Valley Road, and Lee Road are all unpaved.

Study Area

The new study area presented in this addendum addresses the use of three private roads and one intersection that would only be used during the construction phase of the proposed project.

Option A includes the use of:

- Jellystone Camp Resort Road between Bottle Rock Road and Glenbrook Road
- Glenbrook Road between Jellystone Camp Resort Road and Lee Road
- Lee Road between Glenbrook Road and the proposed connection with the new East Pad

Option B includes the use of:

- Glenbrook Road between Bottle Rock Road and Lee Road
- Lee Road between Glenbrook Road and the proposed connection with the new East Pad

The project study area and two potential primary access route options are shown in Figure 1.2-1.

Negotiations are currently underway to obtain easements or access agreements for either alternative access route option. This addendum will analyze the impacts of both routes; however, only one route would be used once all necessary permissions and agreements have been obtained.

2.2 Existing Road Network Description

2.2.1 ROAD NETWORKS

Glenbrook Road

Glenbrook Road is a private narrow, unpaved road that connects to the public street network at Bottle Rock Road. It is curvilinear and ranges between 10 and 24 feet wide. The roadway crossing of Kelsey Creek 400 feet west of Bottle Rock Road is 12 feet wide. The creek bed is less than 6 feet below roadway elevation and the bridge is not equipped with any safety railing.

Lee Road

Lee Road connects to Glenbrook Road approximately 1.5 miles west of its intersection with Bottle Rock Road, and is equipped with a gate. Keys to the gate are available to the BRPP personnel and area residents. Lee Road provides a direct connection to the proposed BRP East pad and connects to a network of private roads to the south, including High Valley Road (also known as Rabbit Valley Road) and Saw Mill Road (also known as High Valley Road). Segments of Lee Road are steep, possibly exceeding 15 percent grade, with the width ranging between 15 and 21 feet. Drainage system improvements along Lee Road appear to have been constructed recently, including installation of new cross culverts, with the roadbed re-graded, and re-surfaced with gravel. Two residences have direct access from Lee Road.

Jellystone Camp Resort Road

Jellystone Camp Resort is located on the north side of Glenbrook Road near Kelsey Creek and Bottle Rock Road. Primary access to the campground is provided via Bottle Rock Road; however, there is also access along Glenbrook Road. The Jellystone Camp Resort contains 107 individual campsites served by a network of drive aisles with two driveways connecting to the surrounding street network. Figure 1.2-1 depicts the current signage and access points to the campground. Traffic entering the campground from Bottle Rock Road would cross an existing bridge.

BRP has begun negotiations to obtain an access agreement through the campground for the purpose of routing construction traffic and equipment through the campground in lieu of using a comparable connection via Glenbrook Road near Bottle Rock Road. BRPP currently has an existing emergency access easement which delineates an emergency access route through the campground and does not utilize the primary drive aisle alignment. The use of this easement or additional

permissions obtained by the owner of the Jellystone Camp Resort may be subject to additional conditions.

2.2.2 ROAD CLASSIFICATIONS

Glenbrook Road and Lee Road most closely fit the Lake County's "Substandard Collector" classification, with a design capacity of 3,600 vehicles per day (Lake County 2008). The Highway Capacity Manual (HCM) (2000) is a widely used standard for determining roadway classifications based on traffic capacity; however, the HCM does not provide classifications for very low volume roadways such as Glenbrook Road and Lee Road because capacity is not expected to be an issue.

2.2.3 ROADWAY CHARACTERISTICS

Project roadways already analyzed for potential impacts from the proposed project include two private roads (Rabbit Valley Road and High Valley Road), one public road (Bottle Rock Road), and one intersection (Bottle Rock Road/Glenbrook Road). Descriptions of existing facilities in this traffic addendum will be limited to the description of the alternative access route; however, Table 2.2-1 below provides a summary of the characteristics of the existing roadways within the project area.

Table 2.2-1: Characteristics of Project Area Roadways

Road	Road Classification	Design Capacity (vehicles/day)	Daily Traffic Volumes (vehicles/day)	Width (ft)	Connects to
Glenbrook Road	Local Road	3,600	50	10-24	Bottle Rock Road
Lee Road	Local Road	3,600	10	15-21	Glenbrook Road
Jellystone Camp Resort Road	Local Road – Rural Recreational	3,600	214	11-14	Bottle Rock Road and Glenbrook Road
Bottle Rock Road	Minor Arterial	12,000	1,131	24	High Valley Road and Glenbrook Road
Rabbit Valley Road	Local Road	3,600	20	14-20	East pad
High Valley Road	Local Road	3,600	136	14-20	Proposed access road to the West pad

SOURCE: RMT 2009

2.3 Existing Traffic Conditions

2.3.1 EXISTING TRAFFIC TRIPS

Existing BRPP traffic trips are shown in Table 2.3-1. Employees typically work 40 hours per week on four 10-hour day shifts, usually beginning at 6 a.m. or 8 a.m. Several employees work shifts spanning 24 hours per day to maintain plant operations. Estimated power plant-generated traffic is 136 vehicle trips per day, with 25 percent of traffic assumed to occur during the p.m. peak period.

Area residents contribute an estimated average daily traffic volume of 20 trips. Combined with the 136 site-related trips, the average total weekday traffic volume on High Valley Road is 156 vehicle trips per day. BRPP personnel do not currently use Glenbrook Road or Lee Road for existing plant and/or steam field operations. Vehicular traffic is assumed to be 100 percent passenger vehicles composed of area residents and the occasional camper (due to the difficulty of access for larger vehicles). Traffic volumes for the project area were estimated using data collected from the study intersection and are estimated based on surrounding land uses and observations made in the field.

Table 2.3-1: Summary of Existing Site-Generated Traffic

Use Type	Staffing		Mode				Weekday Daily Trips	PM Peak Hour Trips*
	Employees	*Contract Employees*	*Passenger Vehicles*	*Delivery Trucks*	*10 Wheelers*	*Semi-trucks*		
Steam Field Operations	13	16	29	0	0	0	58	15
Power Plant Operations	11	0	11	0	0	0	22	5
Miscellaneous Site Activities	0	14	14	3	3	8	56	14
Total	**24**	**30**	**54**	**3**	**3**	**8**	**136**	**34**

* 25 percent of the daily traffic is assumed to occur during the p.m. peak hour.

SOURCE: RMT 2009

2.3.2 LEVEL OF SERVICE

Definition of Level of Service

Roadways and intersections are rated at varying levels of service (LOS). LOS is a measure of roadway operating conditions, ranging from LOS A, which represents the best range of operating conditions, to LOS F, which represents the worst. Basic definitions are presented in Table 2.3-2.

Table 2.3-2: LOS Criteria for Roadways

LOS	v/c	Traffic Flow Characteristics
A	0.00-0.60	Free flow; insignificant delays
B	0.61-0.70	Stable operation; minimal delays
C	0.71-0.80	Stable operation; acceptable delays
D	0.81-0.90	Approaching unstable flow; queues develop rapidly (no excessive delays)
E	0.91-1.00	Unstable operation; significant delays
F	>1.00	Forced flow; jammed conditions

SOURCE: Transportation Research Board 2000

LOS can be estimated based on volume-to-capacity (v/c) ratio, the intersection capacity utilization (the ratio of the number of vehicles actually traveling on a roadway to the number of vehicles it was designed to convey), or the average delay experienced by vehicles on the roadway.

The majority of roadways and highways in the project area operate at LOS A or better, meaning that motorists on most roadways do not experience substantial delays, even during peak travel hours. The California Department of Transportation (Caltrans) considers a LOS D or better on state highway segments to be acceptable for planning purposes.

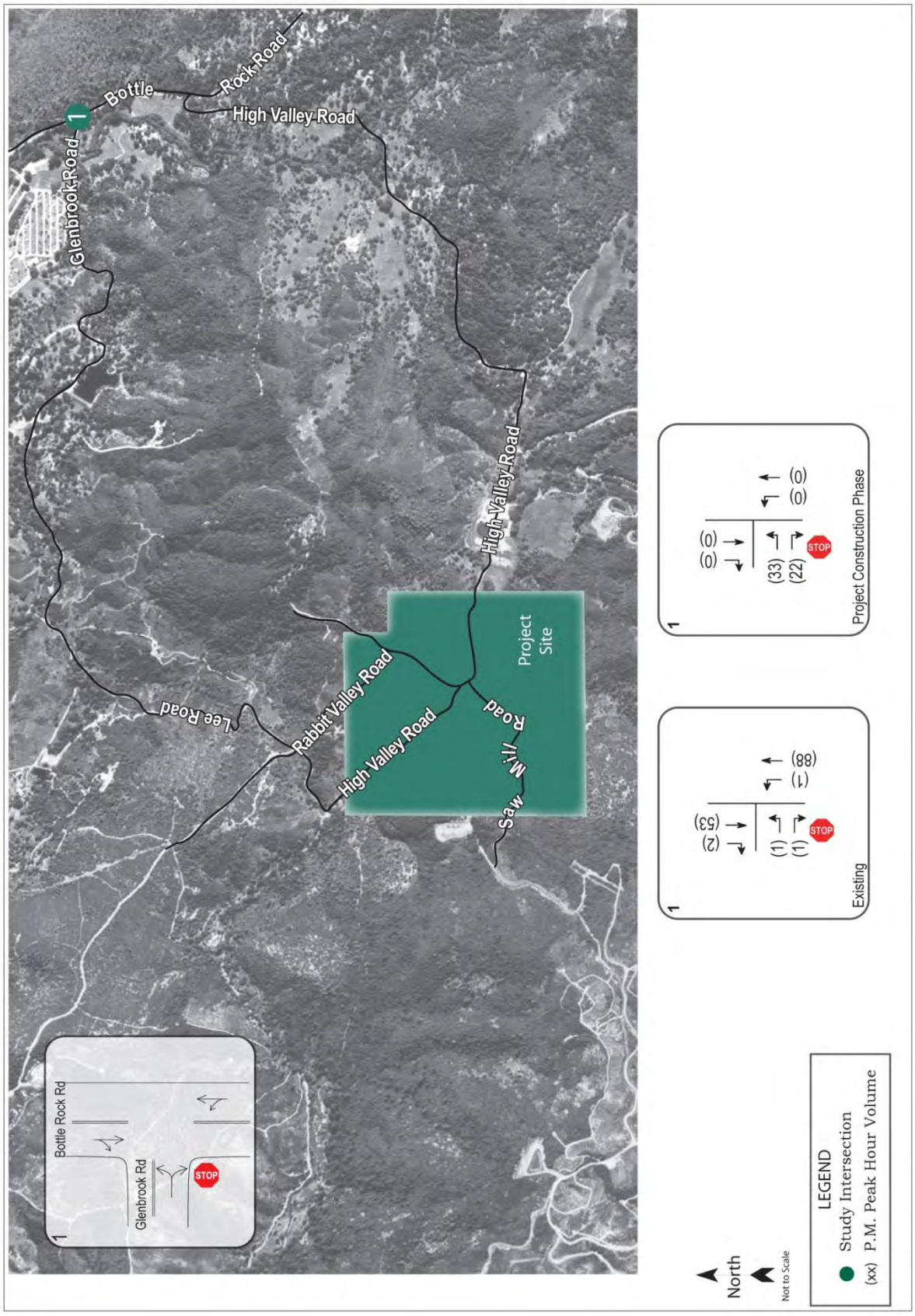
LOS for Bottle Rock Road and Glenbrook Road

The intersection of Bottle Rock Road and Glenbrook Road is a T-intersection with stop controls on the Glenbrook Road approach (Figure 2.3-1. The stop-controlled approach is striped as one lane, but is more than 40 feet wide at the edge of pavement, allowing outbound left- and right-turning vehicles to queue separately. Bottle Rock Road is the major street approach and consists of one travel lane in each direction.

Turning movement counts for p.m. peak weekday periods were collected to assess the existing operating conditions and associated LOS for this intersection. Five vehicles turned at the intersection during the p.m. peak hour. Intersection movements included:

- Two southbound right turns
- One northbound left turn
- Two eastbound turns (one left and one right)

Figure 2.3-1: Lane Configuration and Traffic Volumes



SOURCE: W-Trans 2009

The eastbound minor street approach would be expected to have the highest delay of any intersection approach. Average daily traffic volumes on Glenbrook Road were estimated using this turning movement count together with the percentage of daily trips occurring during the p.m. peak period on Bottle Rock Road (i.e., slightly less than 10 percent), resulting in an estimated 50 vehicles per day using Glenbrook Road. The resulting turning movement volumes are indicated in Figure 2.3-1.

The study intersection is currently operating acceptably at LOS A based on these estimates, with an average delay of 9.0 seconds per vehicle on the stop-controlled eastbound approach. Calculations used to determine the LOS can be found in Appendix A.

2.3.3 PERCENTAGE OF PASSENGER VEHICLES AND TRUCKS

Glenbrook and Lee Roads and the Jellystone Camp Resort are located in a very rugged mountainous setting. Access for trucks would be difficult given their current condition. Trucks associated with BRPP and drilling operations do not use Glenbrook Road or Lee Road. It is assumed that existing vehicular traffic is 100 percent passenger vehicles associated with area residences and occasional campers. The Jellystone Camp Resort Road is assumed to carry mostly passenger vehicle traffic; however, large recreation vehicles (RVs) do use this road and campground.

2.3.4 TRAFFIC SAFETY

The study intersection of Glenbrook Road and Bottle Rock Road had no collisions published in the California Highway Patrol Statewide Integrated Traffic Records System (SWITRS) reports for the period of 2004 to 2008. A similar search of SWITRS reports were reviewed for the project region (and included the intersection of High Valley Road/Bottle Rock Road) from a period of 2003 to 2008 (RMT 2009). No collisions occurred within the intersection of High Valley Road and Bottle Rock Road during this time. The lack of reported collisions indicates no apparent traffic safety hazards exist at either intersection (CHP 2009 and Yung pers. comm. 2010).

2.4 Alternative Transportation

A variety of modes of alternative transportation methods were reviewed to evaluate if such facilities may be affected by or serve the project, including airports, railroads, transit services, bicycle, and pedestrian facilities.

2.4.1 AIRPORT OPERATIONS

The closest airport is Paul Hoberg Airport, located approximately 6 miles east of the project area. Project traffic is not expected to impact operation of this airport. No heliports are located within 5,000 feet of the project area.

2.4.2 RAIL FACILITIES

No railroad lines run through or around Lake County, nor are there plans to install such facilities at this time. The closest railroad alignment is the North Western Pacific Railroad (NWPR), which is located more than 10 miles west of the plant in Sonoma County and is not currently operational.

2.4.3 TRANSIT SERVICES

Public bus services are not provided in the project area, nor are they planned to be added at this time. School buses serve residents on Bottle Rock Road near its southerly intersection with SR 175.

2.4.4 BICYCLE AND PEDESTRIAN FACILITIES

The Lake County Regional Bikeway Plan identifies existing bikeways in the nearby community of Middletown (Lake County/City Area Planning Council 2006). The closest designated bike path to the proposed project area is located in the community of Kelseyville, more than 8 miles southeast of the project area. The proposed project would not affect users.

The Jellystone Camp Resort generates pedestrian and bicycle traffic on Glenbrook Road, especially during the peak summer months. A warning sign, “Slow, Children at Play,” is posted approximately 0.25 miles from the Glenbrook Road intersection with Bottle Rock Road. It is assumed that pedestrians and cyclists walk and ride (respectively) along the edges of the roadway. No other visible pedestrian or bicycle trails or areas are located along this roadway.

3: Environmental Impact Analysis

The following section presents an impact analysis specific to the use of the two alternative access route options as an alternative access route for the construction phase of the BRP Steam Project. Additional information pertaining to High Valley Road and Rabbit Valley Road access route may be presented here for the purposes of comparison and context; however, the complete impact analysis of the High Valley Road route is available in the PTA (2009).

3.1 CEQA Significance Criteria

The proposed project would result in a significant impact if it would:

- Create safety hazards on any project area roadway by way of a project vehicle exceeding weight limitations on any transportation facility, or project roadway designs that do not conform to local road design standards, or degrade operation below acceptable county LOS standards
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)
- Result in inadequate emergency access
- Result in inadequate parking capacity
- Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts and bicycle racks)
- Conflict with applicable laws, regulations, ordinances, standards, adopted local, regional, state, and federal plans, leases, and permits related to traffic and transportation

3.2 Project Impacts

Potential Impact: Potential to create safety hazards on any project area roadway by way of a project vehicle exceeding weight limitations on any transportation facility, or project roadway designs that do not conform to local road design standards, or degrade operation below acceptable county LOS standards

Option A: (Jellystone Camp Resort Road, Glenbrook Road, and Lee Road)

Construction of the proposed project would generate a maximum of 232 daily trips, including 55 trips during the p.m. peak period. Table 3.2-1 summarizes the expected traffic for construction of the proposed project and includes baseline traffic conditions.

Level of Service

Construction would generate an additional 55 p.m. peak-hour trips at the intersection of Jellystone Campground Road and Bottle Rock Road, using the same trip distribution assumptions made for

Table 3.2-1: Summary of Maximum Trip Generation During Construction

Use Type	Staffing		Mode				Weekday Daily Trips	PM Peak Hour Trips
	Employees	*Contract Help*	*Passenger Vehicles*	*Delivery Trucks**	*10-Wheelers*	*Trucks/ Trailers*		
Existing								
Steam Field Operations	13	16	29	0	0	0	58	15
Power Plant Operations	11	0	11	0	0	0	22	5
Miscellaneous		14	14	3	3	8	56	14
Sub-total (Existing Traffic Only)	**24**	**30**	**54**	**3**	**3**	**8**	**136**	**34**
Construction								
Drill Pad + Well + Access Road	0	30	30	10	10	36	172	38
Pipeline Construction	0	15	15	0	10	5	60	17
Sub-total (Construction Traffic Only)	0	45	45	10	20	41	232	55
Total (Construction and Existing Traffic)	**24**	**75**	**99**	**13**	**23**	**49**	**368**	**89**

* Includes pilot cars to accompany drill rig component deliveries via extra-legal size loads

SOURCE: RMT 2009

existing traffic volumes. This is a maximum estimate which assumes simultaneous construction of all project components. The resulting turning movement volumes are indicated in Figure 2.2-1.

Turning movements at this intersection were found to be less than the volumes previously evaluated at the intersection of High Valley Road and Bottle Rock Road, which is estimated to

operate at the same LOS or better, LOS A. LOS impacts from the use of the Jellystone Camp Resort Road and Bottle Rock Road intersection during project construction would be less than significant.

Traffic Volume. The proposed project is expected to generate 232 weekday daily trips, including 142 truck trips and 90 passenger vehicle trips. Approximately 24 percent, or 34 truck trips, would be expected during the p.m. peak hour Truck traffic would increase from 0 to 40 percent on Glenbrook Road and Lee Road, which would be considered a potentially significant increase in truck traffic. It is assumed that the increase of truck traffic on Jellystone Camp Resort Road would be less than 40 percent due to the existing volume of large RVs that use the campground.

Safety impacts from the potentially significant increase in truck traffic on Jellystone Camp Resort Road, Glenbrook Road, and Lee Road are addressed below under Traffic Safety.

Existing Road Infrastructure Compatibility. Construction traffic would include extra-legal size (overweight or extra-long) vehicles. Lee Road has recently been resurfaced and the existing roadbed was found to be sufficiently intact to support heavy and large vehicles. Existing grades for Glenbrook and Lee Road do not exceed 15 percent and could accommodate construction vehicles without additional grading or flattening.

Two existing bridges, one located at the entrance to Jellystone Camp Resort, and the other on Glenbrook Road near Bottle Rock Road, may be structurally insufficient to withstand the vehicle weights associated with the transport of drill pad construction equipment, and should be evaluated by a professional structural engineer if the Option A access route is selected. The Glenbrook Road Bridge will be completely replaced under emergency provisions before the project is implemented. Impacts from heavy vehicles using the alternative access route Option A roadways would be less than significant with the implementation of mitigation measure Traffic-1, which requires further evaluation and upgrade, as necessary.

> **Mitigation Measure Traffic-1:** The existing bridge on Jellystone Camp Resort Road would be evaluated by a professional structural engineer prior to project construction. The engineer's findings and recommendations would be implemented prior to use by project traffic.

In the event that repair of the bridge is recommended as a result of this assessment, the in-stream footprint would be avoided as much as possible and any work would be conducted in the driest part of the year. A Streambed Alteration Agreement with the California Department of Fish and Game (and possible authorizations from other regulatory agencies) would be required for any activities that affected the bed bank or channel of the creek. Less than significant impacts to biological resources would occur if the implementation of the Biology-7 (proposed CUP mitigation measure), identified in the PTA for High Valley Creek, is also implemented for Kelsey Creek.

If replacement of the bridge is recommended, a clear-span bridge (one that would span the banks of the creek entirely) would be installed to avoid impacts to the stream bed itself and any riparian vegetation. Additional mitigation in the form of tree replacement, bank re-vegetation and stabilization and appropriate drainage controls may also be required. Less than significant impacts to biological resources would occur with the implementation of the Biology-1 through Biology-8 (proposed CUP mitigation measures) identified in the PTA.

In both cases, bridge repair or bridge replacement, there would also be the potential for impacts to air quality, noise, traffic itself, and public safety. Impacts would all be less than significant with the implementation of: AQ-SC3 Construction Fugitive Dust Control and AQ-SC5 Diesel-Fueled Engines Control Conditions of Certification (COCs) identified in the PTA for construction equipment air emissions; NOISE-1 COC identified in the PTA for traffic-related noise; and TRANS-2 COC Worker Traffic Safety Training identified in the PTA for traffic safety, along with Mitigation Measure Traffic-2 identified below.

Traffic Safety. Proposed use of Jellystone Camp Resort Road, Glenbrook Road, and Lee Road would have the potential to significantly impact the safety of construction workers and the public. Area residents and recreationalists at the nearby Jellystone Camp Resort are particularly at risk for safety hazards given their proximity to the roadway and expected mode of transportation (i.e., pedestrian and bicycle traffic) on Glenbrook Road.

Safety impacts from the potentially significant increase in truck traffic would be reduced to a less than significant level with the implementation of the new mitigation measure Traffic-2, which requires posting additional safety signage and the previously identified Condition of Certification (COC) TRANS-2. Mitigation measure COC TRANS-2[1] in the revised Conditions of Certification (Section 4.4) specifies that the BRPP operator would implement a worker safety program to reduce safety hazards to workers and the travelling public.

> **Mitigation Measure Traffic-2:** Temporary traffic control signing would be installed on Jellystone Campground Road, Glenbrook Road, and Lee Road in conformance with the principles of the Manual on Uniform Traffic Control Devices – California Supplement (CA-MUTCD), Chapter 6 Temporary Traffic Control. Construction traffic routes would be delineated with construction traffic signs, including a G20-1, "Road Work Ahead" sign. Signs would be posted as close as possible to roadway entrances, for eastbound traffic on Jellystone Camp Resort Road near the Bottle Rock Road intersection, on Glenbrook Road approaching the Jellystone Camp Resort, and at the halfway point between Bottle Rock Road and Lee Road. Signs would be installed similarly for westbound traffic.

Implementation of mitigation measure Traffic-2 and COC TRANS-2 would ensure that the traffic safety impacts would be less than significant with mitigation.

Option B (Glenbrook Road, Lee Road only)

The impacts of Option B would be identical to those of Option A, with the once exception that Mitigation Measure Traffic-2 would not be necessary because Option B would not use the Jellystone Camp Resort Road and campers of the resort would not be affected.

[1] Conditions of Certification are measures included in the CEC Staff Decision for the original BRPP authorization. COC TRANS-2 is one of the measures that was updated and presented in the PTA.

Potential Impact: Potential to substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)

Option A (Jellystone Camp Resort Road, Glenbrook Road, and Lee Road)

There would be a temporary increase in the percentage of heavy vehicles on these roadways during construction, which could present a safety hazard to the travelling public and recreationalists. Extra-legal size loads necessary to delivery construction equipment to the project area may create a potentially significant impact on the safety of the traveling public on Jellystone Camp Resort Road, Glenbrook Road, and Lee Road. The implementation of mitigation measures Traffic-1 and COC TRANS-2 would reduce the impacts from safety hazards to a less than significant level.

The use of the campground as a route for construction traffic would introduce various semi truck-trailers. Although these large vehicles do not usually access the campground, they are comparable in size to existing campground traffic (i.e., RVs and camper-trailer-truck combinations). The campground is currently equipped with traffic warning signs, such as the 5 mph posted speed limit sign and a Slow Children at Play sign. These signs increase driver awareness to the potential presence of pedestrians and bicyclists in the area. The construction traffic drivers would be expected to adhere to the posted speed and keep an eye out for children, and the campground users would be expected to be concurrently aware of these large vehicles.

Portions of the existing Jellystone Camp Resort Road would be utilized by construction traffic. These segments are at a minimum 11 feet wide, including where the road passes trees and individual campsites. Vertical clearances exceed 15 feet along this road and are adequate for semi tractor-trailer trucks to access. Construction traffic would exit the campground through an existing campsite and adjoining open space. The removal of the campsite may present a safety hazard to campground users since the traffic route would not be clearly defined and separated from pedestrian uses. Impacts related to safety hazards from the use of the campground as an access route for construction traffic would be reduced to a less than significant level with implementation of mitigation measure Traffic-3.

Mitigation Measure Traffic-3: A well defined access road would be constructed between the existing Jellystone Camp Resort Road and Glenbrook Road. The new access road would maintain a minimum width of 10 feet throughout its approximately 140 foot length. The road right-of-way would be clearly demarked with temporary warning fencing to keep campground users away from the access road during the construction period. Construction of this road would include tree trimming to maintain a 15 foot vertical clearance, creating a compacted roadbed, and removal or relocation of existing campsite amenities and associated landscaping. Vegetation management and minor grading would be implemented to ensure trucks can safely turn onto Glenbrook Road from the campground.

Minor tree trimming, vegetation management, compacting and minor grading in a previously disturbed area, would not affect adjacent habitat values and would constitute a less than significant impact to biological resources with the implementation of the Biology-1 through

Biology-8 (proposed CUP mitigation measures) identified in the PTA. With the potential exception of public safety, there would be no impacts to other resources since this new access road through the Jellystone campground would be constructed on already disturbed land. Potential public safety impacts would be reduced to a less than significant level with the implementation of TRANS-2 COC Worker Traffic Safety Training identified in the PTA for traffic safety, and the new mitigation measure (Mitigation Measure Traffic-2), identified above.

Option B (Glenbrook Road, Lee Road only)

The impacts of Option B would be identical to those of Option A, with the once exception that Mitigation Measure Traffic-3 would not be necessary because Option B would not use the Jellystone Camp Resort Road and campers of the resort would not be affected.

Potential Impact: Potential to result in inadequate emergency access

Option A (Jellystone Camp Resort Road, Glenbrook Road, and Lee Road)

Jellystone Camp Resort Road, Glenbrook Road and Lee Road are often less than 20 feet wide and unable to accommodate two-way travel. Construction traffic would include various size trucks including semi tractor-trailer trucks on all roadways within the project area. Emergency vehicles would be forced to wait until an oncoming vehicle passes or moves out of the way with the increase in traffic volumes and vehicle sizes. In addition, construction vehicles carrying significant loads (e.g., when transporting well drilling equipment) would be traveling below the posted speed of 5 mph. Slow moving construction traffic could potentially significantly impact emergency vehicle access and response times.

Seven existing turnouts have been identified along Glenbrook Road and Lee Road that range from 40 to 100 feet wide. Other turnouts exist along Glenbrook Road and Lee Road, however, only the locations of the seven largest ones are shown on Figure 1.1-1.

Turnouts would enable large vehicles to stop and allow oncoming vehicles to pass construction traffic. The presence of flaggers equipped with radio or telephone communication would ensure construction traffic would stop at turnout locations for emergency vehicles. Turnouts 1, 4, 5, and 7 (Figure 1.1-1) would require additional tree trimming and/or shrubbery removal to maintain a suitable travel path for passing vehicles. Impacts to emergency access would be reduced to a less than significant level with the implementation of mitigation measure Traffic-4.

> **Mitigation Measure Traffic-4:** A minimum of seven vehicle turnouts should be kept clear of obstructions and provide a minimum 20-foot wide by 40-foot long area for two-way traffic to pass construction traffic on Glenbrook Road and Lee Road. A minimum of three flaggers and related traffic control devices would be stationed along the route in accordance with CA-MUTCD, Chapter 6 Temporary Traffic Controls to ensure two-way traffic would be maintained along the access route.

Minor tree trimming and/or shrubbery removal would not affect adjacent habitat values and would constitute a less than significant impact to biological resources with the implementation of the Biology-1 through Biology-8 (proposed CUP mitigation measures) identified in the PTA.

Option B (Glenbrook Road, Lee Road only)

The impacts from Option B would be identical to those identified for Option A above.

Potential Impact: Potential to result in inadequate parking capacity

Option A (Jellystone Camp Resort Road, Glenbrook Road, and Lee Road)

The use of Jellystone Camp Resort Road, Glenbrook Road, and Lee Road, as an access route for construction traffic for the proposed project, would not change impacts to parking. Parking impacts have been analyzed in the PTA (RMT 2009).

Option B (Glenbrook Road, Lee Road only)

Impacts from Option B would be identical to those of Option A.

Potential Impact: Potential to conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts and bicycle racks)

Option A (Jellystone Camp Resort Road, Glenbrook Road, and Lee Road)

The proposed project is not expected to serve alternative modes of transportation including air, rail, transit, bicycle, and pedestrian modes. The use of Jellystone Camp Resort Road, Glenbrook Road, and Lee Road would not conflict with Lake County policies, plans, and programs that support these alternative modes; therefore, the project would have no impact on alternative mode facilities.

Option B (Glenbrook Road, Lee Road only)

Impacts from Option B would be identical to those of Option A.

Potential Impact: Potential to conflict with applicable laws, regulations, ordinances, standards, adopted local, regional, state, and federal plans, leases, and permits related to traffic and transportation

Option A (Jellystone Camp Resort Road, Glenbrook Road, and Lee Road)

Modifications and use of Jellystone Camp Resort Road, Glenbrook Road, and Lee Road, would conform to federal, state or local laws and requirements. Applicable federal, state, and local laws, ordinances, regulations, and standards (LORS) are listed in Section 4.0: Regulatory Setting and Conditions of Certification. No significant impacts would occur.

Option B (Glenbrook Road, Lee Road only)

Impacts from Option B would be identical to those of Option A.

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4: Regulatory Setting and Conditions of Certification

The project would comply with applicable Laws, Ordinances, Regulations, and Standards (LORS) pertaining to traffic and transportation. Applicable LORS are summarized below.

4.1 Applicable LORS

4.1.1 FEDERAL LORS

Code of Federal Regulations

Title 49, Code of Federal Regulations (CFR), Sections 171-173 and 177 include general information, regulations, and definitions pertaining to the transportation of hazardous materials, the types of materials defined as hazardous, shipping requirements, marking of transportation vehicles, training requirements, and carriage by public highways.

Title 49, CFR, Sections 350-399 and Appendices A through G address safety issues for transport of goods, materials, and substances over public highways.

Hazardous Materials Act of 1974

The Hazardous Materials Act of 1974, which is overseen by the Federal Department of Transportation, governs the transportation of hazardous materials in the nation. The main objective of this policy is to improve regulations and enforcement efforts that deal with the transportation of hazardous materials in commerce.

4.1.2 STATE LORS

California Vehicle Code

Section 353 defines hazardous materials.

Sections 31303-31309 include regulations for the transportation of hazardous materials, routes used, and any applicable restrictions.

Section 34500 et seq., regulates the safe operation of vehicles and includes those that are used for the transportation of hazardous materials.

Sections 2500-2505 authorize the issuances of licenses by the Commissioner of CHP for the transportation of hazardous materials, including explosives.

Division 15, Size, Weight, and Load, Chapter 5, Article 6 states transported load regulations. Approvals from the State Department of Transportation are required for transportation of oversized or excessive loads over state highways, including limitations based on axles and wheel base lengths.

California Streets and Highway Code

Sections 117 and 660-672 and California Vehicular Code (CVC) 35780 et. seq., requires permits for the transportation of oversized loads on county roads.

4.1.3 LOCAL LORS

Lake County General Plan

The Lake County General Plan, Transportation and Circulation Element include the following policies and goals applicable to the proposed project:

- Goal T-1, which provides an objective "to plan and provide a unified, coordinated and cost-efficient countywide road and highway system that ensures safety and maintains adequate LOS and efficient movement of people and merchandise."
- Policy T-1.2, which provides guidance for road standards, noting "roads should be improved and constructed to the design standards recommended by the County Department of Public Works…and shall be based on the AASHTO standards, and supplemented by Caltrans and County Standards." Lake County road standards are summarized in Table 4.1-1 below.
- Policy T-1.8 specifies acceptable traffic operation on county roads as LOS C or better where feasible and provides that LOS E is acceptable where "improving the segment to LOS C is deemed infeasible due to cost, negative community and/or environmental impacts, and constructability issues."
- Policy T-1.9 provides guidance on heavy vehicle traffic, including establishing truck routes and otherwise restricting truck traffic routes to limit the impact in residential areas and near noise sensitive land uses.

Table 4.1-1: Lake County Road Standards

Design Parameter	Road Classification			
	Minor Arterial	Major Collector	Minor Collector	Local Street
Design Speed	60 mph	50 mph	40 mph	30 mph
Number of Lanes	2-4	2-4	2	2
Lane Width	12 ft	12 ft	11 ft	11 ft
Right-of-Way Width	60 ft	50 ft (min)	50 ft	50 ft
Maximum Grade	12%	12%	12%	16%

SOURCE: Lake County 2008

The Lake County General Plan, Land Use and Geothermal Resources Elements include the following policies and goals applicable to the proposed project:

- **Policy LU-5.5 Access.** The County shall locate industrial development where there is access from collector or arterial roads, and where industrial/heavy commercial traffic is not routed through residential or other areas with uses not compatible with such traffic.

Lake County Road Design and Construction Standards

The Lake County Road Design and Construction Standards, Section 3, Road Design Standards, provide guidance for design of the structural section and appropriate TI for county roads (Lake County 2007).

Lake County Community Wildfires Protection Plan

The Draft Lake County Community Wildfire Protection Plan (CWPP) provides guidance for private roadways and states, "A clearance of 20 feet (width) and 15 feet (height) is needed along roads and driveways, as well as a turnaround of a minimum of 45-feet radius, or a Hammerhead Turnout measuring 60-feet long, 10-feet wide, and facing perpendicular to the driveway. Maintain good access to your house for fire apparatus (wide enough for two vehicles to pass, built to carry at least 40,000 lbs, less than 15 percent grade, room to turn etc.)"(Lake County 2009).

4.2 Agencies and Agency Contacts

No additional agencies were contacted for the preparation of this traffic addendum.

4.3 Permits Required and Permit Schedule

No permit approvals would be required for the use of Jellystone Camp Resort Road, Glenbrook Road, or Lee Road as an access route to the project area.

4.4 Conditions of Certification

The CEC Conditions of Certification currently applicable to the BRPP were originally adopted by the CEC in 1980, suspended in 1993 in part to modify environmental monitoring and reporting requirements in consideration of BRPP's suspended status (Order 93-0426-02). The COCs were modified again in 2006 in conjunction with the refurbishment and restart of the facility (Order 06-1213-12). Bottle Rock Power intends to comprehensively update the applicable COCs currently in effect for BRPP to reflect CEC's current standards, as well as to amend, add, or strike any COCs necessary to address the proposed project's activities. The following COCs have been updated to include the use of Glenbrook Road.

4.4.1 PROPOSED CONDITIONS OF CERTIFICATION

Currently, there are no existing conditions of certification relating to Traffic and Transportation. The project owner proposes the following conditions considered as standard by the CEC with the use of both alternative access route options.

COCTRANS-2: Worker Traffic Safety Training

The project owner shall brief and train all construction workers that commute to the site, and all truck drivers and delivery drivers that drive to and from the site during construction, on safety awareness and standards with regard to the nearby bus stop(s) and with regard to school children safety. The briefing and training shall be conducted for such workers and drivers before they begin working at the site and shall include, among other safety issues, the following elements:

- California highway and driving laws and regulations that relate to school busses and school children;
- The locations of bus stops and residences along the traffic routes in the vicinity of the site;
- The approximate times that school bus routes are driven to pick up and to drop off students;
- The type of risks to school children that can arrive on rural highways and roads during elevated construction traffic periods;
- The particular risks that can arise during low visibility conditions such as when foggy or at night;
- The need to be exceptionally careful and patient when following a slower moving vehicle to ensure heightened danger activities such as passing do not endanger others; and
- The need to be exceptionally alert and cautious during the morning and afternoon school bus periods and also the need to be alert for shortened days that result in school buses being present at unusual times.

  Verification: The project owner shall report the results of the worker traffic safety training in its monthly compliance reports submitted to the CPM, beginning with the first report after site mobilization and continuing until construction is completed.

5: References

California Department of Transportation (Caltrans). 2006. California Manual on Uniform Traffic Control Devices for Streets and Highways.

California Highway Patrol (CHP). 2009. Statewide Integrated Traffic Records System (SWITRS). Website: http://www.chp.ca.gov/switrs/. Accessed December 21, 2009.

Lake County. 2007. Road Design and Construction Standards.

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Lake County/City Area Planning Council. 2006. Lake County Regional Bikeway Plan. Website: http://www.lakeapc.org/docs/2006%20Lake%20Regional%20Bikeway-Final.pdf. Accessed December 21, 2009. August 2006.

RMT, Inc (RMT). 2009. Petition to Amend the California Energy Commission Final Decision on Bottle Rock Power Plan (79-AFC-4C). September 2009.

Transportation Research Board. 2000. High Capacity Manual.

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APPENDIX A:
Level of Service Calculations

HCS+: Unsignalized Intersections Release 5.4

TWO-WAY STOP CONTROL SUMMARY

Analyst: V Aguayo
Agency/Co.: W-Trans, Inc
Date Performed: 10/27/2009
Analysis Time Period: 10/27/09
Intersection: Glenbrook Rd/Bottle Rock Rd
Jurisdiction: County of Lake
Units: U. S. Customary
Analysis Year: 2009
Project ID: BRP Steam Project
East/West Street: Glenbrook Road
North/South Street: Bottle Rock Road
Intersection Orientation: NS Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	1	88		2	53	
Peak-Hour Factor, PHF	0.90	0.90		0.90	0.90	
Hourly Flow Rate, HFR	1	97		2	58	
Percent Heavy Vehicles	10	--	--	10	--	--
Median Type/Storage	Raised curb			/ 1		
RT Channelized?						
Lanes	0	1		0	1	
Configuration	LT			LT		
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				1	0	1
Peak Hour Factor, PHF				0.90	1.00	0.90
Hourly Flow Rate, HFR				1	0	1
Percent Heavy Vehicles				0	0	0
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/		No	/
Lanes				0	1	0
Configuration					LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LT	LT					LTR	
v (vph)	1	2					2	
C(m) (vph)	1496	1448					901	
v/c	0.00	0.00					0.00	
95% queue length	0.00	0.00					0.01	
Control Delay	7.4	7.5					9.0	
LOS	A	A					A	
Approach Delay							9.0	
Approach LOS							A	

HCS+: Unsignalized Intersections Release 5.4

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: V Aguayo
Agency/Co.: W-Trans, Inc
Date Performed: 10/27/2009
Analysis Time Period: 10/27/09
Intersection: Glenbrook Rd/Bottle Rock Rd
Jurisdiction: County of Lake
Units: U. S. Customary
Analysis Year: 2009
Project ID: BRP Steam Project
East/West Street: Glenbrook Road
North/South Street: Bottle Rock Road
Intersection Orientation: NS Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	1	88		2	53	
Peak-Hour Factor, PHF	0.90	0.90		0.90	0.90	
Peak-15 Minute Volume	0	24		1	15	
Hourly Flow Rate, HFR	1	97		2	58	
Percent Heavy Vehicles	10	--	--	10	--	--
Median Type/Storage	Raised curb			/ 1		
RT Channelized?						
Lanes	0	1		0	1	
Configuration	LT			LT		
Upstream Signal?		No			No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				1	0	1
Peak Hour Factor, PHF				0.90	1.00	0.90
Peak-15 Minute Volume				0	0	0
Hourly Flow Rate, HFR				1	0	1
Percent Heavy Vehicles				0	0	0
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
RT Channelized?						
Lanes				0	1	0
Configuration					LTR	

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0

Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
Percent Blockage	0	0	0	0

Upstream Signal Data

	Prog. Flow vph	Sat Flow vph	Arrival Type	Green Time sec	Cycle Length sec	Prog. Speed mph	Distance to Signal feet
S2 Left-Turn							
Through							
S5 Left-Turn							
Through							

Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

	Movement 2	Movement 5
Shared ln volume, major th vehicles:	97	58
Shared ln volume, major rt vehicles:	0	0
Sat flow rate, major th vehicles:	1700	1700
Sat flow rate, major rt vehicles:	1700	1700
Number of major street through lanes:	1	1

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation

Movement		1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(c,base)		4.1	4.1				7.1	6.5	6.2
t(c,hv)		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)		10	10				0	0	0
t(c,g)				0.20	0.20	0.10	0.20	0.20	0.10
Percent Grade				0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)		0.00	0.00				0.70	0.00	0.00
t(c,T):	1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c)	1-stage	4.2	4.2				6.4	6.5	6.2
	2-stage	4.2	4.2				5.4	5.5	6.2

Follow-Up Time Calculations

Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(f,base)	2.20	2.20				3.50	4.00	3.30
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	10	10				0	0	0
t(f)	2.3	2.3				3.5	4.0	3.3

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal

	Movement 2		Movement 5	
	V(t)	V(1,prot)	V(t)	V(1,prot)
V prog				

Total Saturation Flow Rate, s (vph)
Arrival Type
Effective Green, g (sec)
Cycle Length, C (sec)
Rp (from Exhibit 16-11)
Proportion vehicles arriving on green P
g(q1)
g(q2)
g(q)

Computation 2-Proportion of TWSC Intersection Time blocked	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
alpha				
beta				
Travel time, t(a) (sec)				
Smoothing Factor, F				
Proportion of conflicting flow, f				
Max platooned flow, V(c,max)				
Min platooned flow, V(c,min)				
Duration of blocked period, t(p)				
Proportion time blocked, p	0.000		0.000	

Computation 3-Platoon Event Periods	Result
p(2)	0.000
p(5)	0.000
p(dom)	
p(subo)	
Constrained or unconstrained?	

Proportion unblocked for minor movements, p(x)	(1) Single-stage Process	(2) Two-Stage Process Stage I	(3) Two-Stage Process Stage II
p(1)			
p(4)			
p(7)			
p(8)			
p(9)			
p(10)			
p(11)			
p(12)			

Computation 4 and 5
Single-Stage Process

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
V c,x	58	97				161	161	58
s								
Px								
V c,u,x								
C r,x								
C plat,x								

Two-Stage Process

	7	8	10	11

	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2
V(c,x)					62	99	62	99
s						1500		1500
P(x)								
V(c,u,x)								
C(r,x)								
C(plat,x)								

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.	9	12
Conflicting Flows		58
Potential Capacity		1014
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity		1014
Probability of Queue free St.	1.00	1.00

Step 2: LT from Major St.	4	1
Conflicting Flows	97	58
Potential Capacity	1448	1496
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1448	1496
Probability of Queue free St.	1.00	1.00
Maj L-Shared Prob Q free St.	1.00	1.00

Step 3: TH from Minor St.	8	11
Conflicting Flows		161
Potential Capacity		735
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity		733
Probability of Queue free St.	1.00	1.00

Step 4: LT from Minor St.	7	10
Conflicting Flows		161
Potential Capacity		835
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	1.00	
Maj. L, Min T Adj. Imp Factor.	1.00	
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity		833

Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St.	8	11
Part 1 - First Stage		
Conflicting Flows		62
Potential Capacity	817	847
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity	816	846
Probability of Queue free St.	1.00	1.00

Part 2 - Second Stage		
Conflicting Flows		99
Potential Capacity	847	817
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity	846	816
Part 3 - Single Stage		
Conflicting Flows		161
Potential Capacity		735
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity		733
Result for 2 stage process:		
a	0.91	0.91
y		1.40
C t		712
Probability of Queue free St.	1.00	1.00
Step 4: LT from Minor St.	7	10
Part 1 - First Stage		
Conflicting Flows		62
Potential Capacity	930	966
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity	929	965
Part 2 - Second Stage		
Conflicting Flows		99
Potential Capacity	966	930
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity	964	929
Part 3 - Single Stage		
Conflicting Flows		161
Potential Capacity		835
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	1.00	
Maj. L, Min T Adj. Imp Factor.	1.00	
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity		833
Results for Two-stage process:		
a	0.91	0.91
y		1.40
C t		810

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)				1	0	1
Movement Capacity (vph)				810	712	1014
Shared Lane Capacity (vph)					901	

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
C sep				810	712	1014
Volume				1	0	1
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh					901	
SUM C sep						
n						
C act						

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config	LT	LT					LTR	
v (vph)	1	2					2	
C(m) (vph)	1496	1448					901	
v/c	0.00	0.00					0.00	
95% queue length	0.00	0.00					0.01	
Control Delay	7.4	7.5					9.0	
LOS	A	A					A	
Approach Delay							9.0	
Approach LOS							A	

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	1.00
v(il), Volume for stream 2 or 5	97	58
v(i2), Volume for stream 3 or 6	0	0
s(il), Saturation flow rate for stream 2 or 5	1700	1700
s(i2), Saturation flow rate for stream 3 or 6	1700	1700
P*(oj)	1.00	1.00
d(M,LT), Delay for stream 1 or 4	7.4	7.5
N, Number of major street through lanes	1	1
d(rank,1) Delay for stream 2 or 5	0.0	0.0

APPENDIX C
AIR QUALITY AND CLIMATE CHANGE

AECOM Environment

Prepared by:
AECOM
Camarillo, CA
60148217-1
June 2010

Appendix C

Construction and Operations Air Emissions Calculations

Prepared By Allison Wakita

Reviewed By Snigdha Mehta

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1.0 Introduction

This Appendix contains a description of the emission calculation methodologies and includes the emissions calculations for the construction and operation of the BRP (Bottle Rock Power) Steam Project (Project). Emissions from the construction of the Project are addressed in Section 2. Emissions from operation of the BRP Steam Project are addressed in Section 3, and additional emissions from the operation of the Bottle Rock Power Plant are discussed in Section 4. References are provided in Section 5.

Emissions model runs are provided in Attachment C.1. Tables showing emissions calculations and emissions summaries during construction of the Project are provided in Attachment C.2. Operational emissions calculations are provided in Attachment C.3.

2.0 Construction Emissions

During the construction of the Project there will be emissions similar to those associated with any large industrial construction project. Onsite emissions will arise primarily from heavy duty vehicles and equipment. Onsite fugitive dust emissions will be generated during site preparation and during construction. Offsite emissions will occur from construction worker vehicles and material delivery trucks. Offsite fugitive dust emissions will be generated during soil handling. The construction-related emissions are transient in nature.

The BRP Steam Project will include four phases of construction:

1. Access road construction;
2. Pipeline construction;
3. Well pad construction; and
4. Well drilling.

Access road work would take approximately eight weeks and would be preformed prior to pad construction. Construction of each well pad will require 12 weeks, for a total of 24 weeks for both well pads. Construction of the steam and injection pipeline would take approximately 16 weeks. Construction also includes drilling of up to 11 production wells and one injection well on each well pad. Multiple drill rigs will be used in order to more efficiently develop the new steam field. The project proposes to use a maximum of two drill rigs at a time. Total drilling time is expected to be a maximum of 90 days per well. Construction phases of the different project elements are expected to overlap when possible.

In order to develop the worst case construction emission scenarios, construction emissions were calculated for each phase of construction. Subsections 2.1, 2.2, 2.3 and 2.4 of this section describe the methodology used to estimate emissions from each phase of construction. Section 2.5 discusses the summary of construction emissions. Emissions model runs are provided in Attachment C.1. Detailed emissions calculations are provided in Attachment C.2.

2.1 Access Road Construction

2.1.1 RoadMod Emissions

The project includes construction of a new road to provide access between the East and West Pads. The road would be approximately 20 feet wide and approximately 7,500 feet long. The road would be surfaced initially with gravel, and maintained. Once pads are constructed and wells drilled, the road would be surfaced and maintained with a double chip-seal surface in order to make the road safe and usable for transport of heavy equipment. Access Road construction also includes the construction of a clear span bridge. The crossing is anticipated to be 20-feet wide by 90-feet long clear span, steel “I” beam structure. The bridge would consist of a steel deck with an asphalt surface. The bridge would be supported by two concrete footing and support walls, one at each end, and would not be in the creek flow area.

As recommended by the Bay Area Air Quality Management District (BAAQMD) California Environmental Quality Act (CEQA) Guidelines, the construction-related criteria air pollutants emissions and greenhouse gas (GHG) emissions from the access road construction were estimated using the Sacramento Metropolitan Air Quality Management District's (SMAQMD) Roadway Construction Emissions Model (RoadMod) (BAAQMD, 2010). RoadMod also quantifies fugitive PM dust, exhaust, GHGs and off-gas emissions from the following activities: grubbing/land clearing, grading/excavation, drainage/utilities/sub-grade, and paving.

In addition to the default assumptions and emission factors used in RoadMod, the following assumptions were used in the emissions calculations:

- The project construction will start in the year 2013;
- The Project Type is New Road construction with the predominate soil type as Weathered Rock-Earth;
- Road construction will span eight weeks, with construction occurring seven days per week;
  - This is equivalent to 2.55 months in RoadMod, which assumes 22 work days per month;
- The road will span 2.0 miles;
- Construction will disturb a total of 5.79 acres;
- Maximum acreage graded/disturbed in one day - 25 percent of the total area graded/disturbed (based on URBEMIS default);
- 40,000 cubic yard (y^3) of cut and no fill will be required;
- A maximum of 714 y^3/day of soil will be exported per day by a 16.5 y^3 truck;
- Water trucks will be used to control fugitive emissions;
- The average one-way worker commute is 35 miles;
- No signal boards are required; and
- Additional rubber tired loaders, off-highway trucks, cranes, and other construction equipment will be required (see Attachment C.1 for details).

More detailed assumptions and emissions factors used in RoadMod are included in the Attachment C.1.

2.1.2 SO_2 Calculations

Since RoadMod does not calculate SOx emission, an external calculation was made to estimate the SOx emissions during road construction. To calculate the SOx emissions, it was assumed that all of the CO_2 emissions formed during construction is a result of diesel combustion. The daily and annual quantities of diesel fuel used during road construction was calculated with Equation 2-1 and the default CO_2 emission factor from Transportation California Low Sulfur Diesel from the California Air Resource Board's (CARB) Regulation for Mandatory Reporting of Greenhouse Gases (CARB, 2007).

$$\text{Fuel (gallons/day)} = CO_2 \text{ (kg/day)} \ / \ EF_{CO2} \text{ (kg } CO_2\text{/gallon)} \qquad \text{(Eqn. 2-1)}$$

Where:

Fuel = diesel fuel consumed per day during construction (gal/day)

CO_2 = RoadMod calculated CO_2 emissions (kg/day)
EF_{CO2} = CARB emission factor for transportation diesel combustion (9.96 kg CO_2/gallons)

The calculated fuel usage was used to calculate the SOx emissions. It was assumed that the sulfur content of the fuel is 15 parts per million by weight (ppmw) and that all of the sulfur in the fuel combines with oxygen to form SO_2. The daily and annual SOx calculations are shown in Equation 2-2 and 2-3.

Daily (lb/day) = fuel use (gal/day) x fuel density (lb/gal) x sulfur content (ppmw) ÷ 10^6 x weight ratio (SO_2 to sulfur) (Eq. 2-2)

Annual (lb/yr) = fuel use (gal/yr) x fuel density (lb/gal) x sulfur content (ppmw) ÷ 10^6 x weight ratio (SO_2 to sulfur) (Eq. 2-3)

SOx emissions calculations from RoadMod CO_2 estimates are provided in Table C.2-1 in Attachment C.2.

2.2 Pipeline Construction

2.2.1 RoadMod Emissions

Similar to the access road construction, RoadMod was used to calculate emissions from the construction of the steam and injection pipelines. As recommended in the BAAQMD CEQA Guidelines, a pipeline is a linear project and RoadMod is the preferred emissions model.

In addition to the default assumptions and emission factors used in RoadMod, the following assumptions were used in the emissions calculations for pipeline construction:

- The pipeline construction will start in the year 2013;
- The Project Type is Bridge/Overpass construction with the predominate soil type as Weathered Rock-Earth;
- Pipeline construction will span 16 weeks, with construction occurring seven days per week;
  - This is equivalent to 5.1 months in RoadMod, which assumes 22 work days per month;
- The pipeline will span 2.0 miles;
- Construction will disturb a total of 5.79 acres;
- Maximum acreage graded/disturbed in one day - 25 percent of the total area graded/disturbed (based on URBEMIS default);
- No cut or fill will be required;
- Clearing and grading will be accomplished during road construction and additional clearing/grading will not be required.
- No signal boards are required;
- The average worker commute is 35 miles; and
- Additional rubber tired loaders, off-highway trucks, cranes, and other construction equipment will be required (see Attachment C.1 for details).

More detailed assumptions and emissions factors used in RoadMod for pipeline construction are included in Attachment C.1.

2.2.2 SOx Calculations

Similar to the access road, SOx emissions from pipeline construction were calculated externally as described in Section 2.1.2. Detailed SOx calculations are provided in Table C.2-1 of Attachment C.2.

2.3 Well Pad Construction

While the operational area of each well pad would be approximately 3.2 acres in size, construction of the pads would disturb an area of approximately 9.12 acres for the West Pad and 7.60 acres for the East Pad. Well pad preparation activities would include clearing, earthwork, drainage, and other improvements necessary for efficient and safe operation as well as for fire prevention. All vegetation would be removed from the area prior to construction.

The Urban Emissions Model (URBEMIS) 2007 Version 9.2.4 air quality modeling software, which is the most current version available, was used to calculate construction emissions associated with well pad construction. URBEMIS is designed to model emissions associated with development of urban land uses and attempts to summarize criteria pollutant emission as well as CO_2 that would occur during construction and operation of a new development. This model is publicly available, widely used by CEQA practitioners and air districts, and recommended in the BAAQMD CEQA Guidelines (BAAQMD, 2010).

Table 2-1 summarizes the assumptions that were embedded into the URBEMIS model to calculate emission from each well pad:

Table 2-1 Assumptions used in the URBEMIS Model for Well Pad Construction

Parameter	East Well Pad	West Well Pad
Construction/Vehicle Fleet	California State-Wide	
Construction Year	2013	
Land Acreage	3.2	3.2
Total Disturber Acres	7.60	9.12
Construction Timeline	12 weeks, 7 days per week	
Required Construction Phases	Mass Grading (clearing/grubbing/grading) Building Construction	
Proposed Cut (cu.yd)	55,000	55,000
Proposed Fill (cu.yd)	175,000	95,000

The URBEMIS output files and additional assumptions embedded in the model for construction of the Project are provided in Attachment C.1.

2.4 Well Drilling

Emissions from well drilling are comprised of four parts:

1. Emissions from the diesel fired generator engines that power the drill rigs and forklifts;
2. Particulate emissions from air drilling;
3. Emissions from vehicle travel; and
4. Emissions from well venting/flow testing.

Emissions calculation methodology for each of these phases of well drilling is described in the subsections below. Constants used in well drilling calculations are provided in Table C.2-2.

2.4.1 Diesel-Fired Engine Emissions

2.4.1.1 Criteria Pollutants

Diesel-fired engines are used to drive the equipment on the drill rig and to power forklifts on the well pad. It was assumed that the generators used on the ThermaSource Rig 108 are representative of the equipment that will be used for the project. ThermaSource Rig 108 uses three Caterpillar 3512C land electric generators each powered by Tier 2 EPA certified engines. These generators are 1476 base horsepower (bhp) each and are each rated at 1100 kilowatts (kWs) (ThermaSource, 2010). Emissions for the generator engines are based on the Tier 2 emission standards and a load factor based on the anticipated fuel usage proposed by the Applicant. Since the maximum daily fuel usage was proposed by the applicant, and the generator engines emissions are calculated from the maximum fuel usage, it was assumed that forklift emissions are included in the generator emissions estimates. Separate emissions for forklift usage were not calculated.

The load factor is the ratio between the maximum calculated fuel usage and the proposed fuel usage by the applicant. This factor is calculated with Equation 2-4.

$$\text{Load} = \text{Gallons} / [\text{BSFC} \times \text{Engines} \times \text{Hours} \times \text{HP} / (\text{fuel density} \times \text{HHV})] \qquad \text{(Eq. 2-4)}$$

Where:

Load = Load Factor

BSFC = Brake Specific Fuel Consumption (Btu/Hp-hr)

Fuel Density = Density of Diesel Fuel (7.2 lb/gallon)

HHV = Heating value of diesel (137,000 Btu/lb)

Hp = Engine capacity (1,476 bhp/engine)

Gallons = gallons of diesel fuel proposed by the applicant (3,000 gallons/day/rig)

Engine = number of engines per drill rig (3 engines/drill rig)

Hours = Operating Hours Per day (24 hr/day)

Under the Tier 2 standards, the emission limit for NOx is combined with non-methane hydrocarbons (NMHC). For these emission estimates, the NOx fraction is assumed to be 95 percent of the combined emissions, and the balance NMHC (CARB, 2003). NMHC is assumed to be equivalent to VOC. The calculation procedure for NOx, CO, PM10, and VOC are similar to one another; only the

emission factors differ between the calculations. The assumptions, emission factors and emission calculations are presented in Attachment C.2.

Emission factors of NOx, CO, PM10, and ROC were calculated using the following equation:

EF (lbs/hr) = EL (g/bhp-hr) x Engine Capacity (bhp) ÷ 453.6 g/lbs (Eq. 2-5)

Where:

EF = Emission factor (lb/hr)

EL = Tier 2 ATCM emission limit

The procedure used to estimate SOx emissions differs from that used for the other criteria pollutants. Emission estimates for SOx were based on estimated fuel use and fuel sulfur content. Fuel consumption was estimated based on the EPA default fuel consumption rate of 7,000 Btu/hp-hr (EPA, 1996), and the fuel sulfur content was assumed to be 15 parts per million by weight (ppmw) based on the use of ultra-low sulfur diesel. The emission factor for SOx was calculated by assuming that 100 percent of the sulfur present in the fuel is oxidized to SO_2 according to the following equation.

EF (lbs/hr) = (Gallons x Fuel Density x S x MW_{SO2}) / (100 x MW_S x Engine) (Eq. 2-6)

Where:

EF = Emission factor (lb/hr)

Gallons = gallons of diesel fuel proposed by the applicant (3000 gallons/day/rig)

Fuel Density = Density of Diesel Fuel (7.2 lb/gallon)

S = Sulfur content of diesel fuel (percent)

MW_{SO2} = Molecular weight of SO_2 = 64.07 lb/mole

MW_S = Molecular weight of sulfur = 32 lb/mole

Engine = number of engines per drill rig (3 engines per drill rig)

The daily and annual emissions were calculated using the following equation:

Emissions (lbs/day) = EF (lb/hr) x DOH x N x DR x Load (Eq. 2-7)

Where:

DOH = Daily operating hours (24 hours/day)

N = number of engines per drill rig (3 engines/drill rig)

DR = max number of drill rigs used at one time (2 drill rigs)

Load = load factor calculated in Equation 2-x.

The annual emissions are based on the assumption that the maximum drilling scenario will involve use of two drill rigs with three generators per rig every day of the year. The annual emissions were calculated with Equation 2-8.

Annual (ton/yr) = Emissions (lb/day) x 365 (days/yr) ÷ 2000 (lb/ton) (Eq. 2-8)

Emissions from the diesel powered drill rigs are provided in Attachment C.2, Tables C.2-31 a through c.

2.4.1.2 GHGs

GHG emissions from diesel-fired generator engines are based on the Applicant-provided fuel usage for drilling, the expected hours of operation and the emission factors listed in Tables 4 and 6 of CARB Compendium of Emission Factors and Methods to Support Mandatory Reporting of Greenhouse Gas Emissions were calculated according to Equation 2-9 and 2-10 (CARB, 2007).

$Emissions_{GHG}$ (MT/yr) = fuel use (gal/yr) x EF_{GHG} (kg CO_2/gal) ÷ 1,000 (kg/metric ton) (Eq. 2-9)

GHG (MT/yr) = fuel use (gal/yr) x EF_{GHG} (kg/MMBtul) x HHV (MMBtu/gal)÷ (1,000 kg/metric ton)

(Eq. 2-10)

Where:

GHG = Greenhouse gas emissions (MT/yr)

Fuel use = proposed fuel usage (3000 gallons/day/drill rig x 365 days/yr)

EF_{GHG} = emission factor for each GHG

HHV = higher heating value of diesel fuel (CARB, 2007a)

CO_2 equivalent emissions (CO_2e) were calculated using the global warming potentials (GWP) (CARB, 2007a). Total GHG emissions from drill rig generator engines are shown in Table C.2-3d in Attachment C.2.

2.4.2 Particulate Emissions from Air Drilling

During the last 4,000 feet of drilling (each well), the drilling technique changes from the mud-based drilling technique to air drilling. Air drilling will create particulate emissions from the displaced rock. PM emissions are not expected during mud drilling, but are expected during air drilling. To calculate air drilling PM emissions, it was assumed that the entire volume of the well bore drilled with air drilling techniques could be emitted as a particulate. The particulate emissions get abated by 90 percent control efficiency of the cyclone separator before venting to the atmosphere.

The emissions from air drilling are calculated with Equations 2-11 and 2-12.

Well (lb/well) = ($Diameter^2$/4) x π x depth x density x (1-CE) (Eqn. 2-11)

Where:

Well = emissions from air drilling (lb/well)

Diameter = Well bore diameter

Depth = Length of well drilled during air drilling (4,000 feet)

Density = density of grawacke materials (156 lb/cu/ft)

CE = control efficiency of cyclone separator (90 percent)

To calculate the maximum daily emissions, it was assumed that air drilling occurs over a 33 day period and up to two wells can undergo air drilling on any given day. The daily emissions were calculated with Equation 2-12.

Daily (lb/day) = (Well (lb/well) x two wells) ÷ (33 days/well) (Eqn. 2-12)

Emissions from air drilling are provided in Table C.2-4 in Attachment C.2.

2.4.3 Emissions from Vehicle Travel

2.4.3.1 Criteria Pollutants from Vehicle Travel

The combustion of fuel in motor vehicle engines results in the generation of CO, VOC NOx, SOx, PM10 and PM2.5 emissions. Motor vehicle brake and tire wear results in the generation of PM10 and PM2.5 emissions. The following predictive emission equation was used to calculate emissions from both onsite and offsite motor vehicles:

$$\text{Exhaust Emissions}_{i,j}\,(\text{lb}) = EF_{V,i,j} \times \text{Trips}_j \times \text{Distance} \qquad \text{(Eq. 2-13)}$$

Where:

$EF_{V,i,j}$ = Emission factor for specific air contaminant i from motor vehicle type j (lb/mi)

Trips_j = Trips by motor vehicles of type j (trips/day)

Distance = Round trip distance travelled (miles/trip)

CO, ROC, NOx, SOx and PM10 emission factors were compiled by running the CARB's EMFAC2007 (version 2.3) Burden Model (CARB, 2007b) for the LCAQMD jurisdiction during calendar year 2013. Daily emissions by vehicle class (light-duty truck, heavy, heavy-heavy duty diesel vehicle, etc.) from the Burden model were divided by the daily mileage traveled by vehicles within the class from the Burden Model to calculate the emission factors. The emission factors account for the emissions from start, running and idling exhaust. In addition, the VOC emission factors take into account diurnal, hot soak, running and resting emissions, and the PM10 emission factors account for exhaust, brake wear and tire wear emissions separately.

PM2.5 emission factors were calculated by multiplying the PM10 emission factors by the mass fraction of PM2.5 emissions in motor vehicle exhaust, brake wear and tire wear PM10 emissions.

The motor vehicle emission factors from the Burden model and the calculated PM10 and PM2.5 emission factors are listed in Attachment C.2, Table C.2-5a and b. The hourly, daily, and annual emissions are provided in Attachment C.2, Tables C.2-6 a through c, respectively.

Table 2-2 lists the data required to estimate the motor vehicle exhaust, brake wear and tire wear emissions.

Table 2-2 Data Required for Vehicle Travel Emissions

Parameter	Value	Reference
EV– Vehicle exhaust, wear and tear emission factor	Varies (lb/mile)- depending upon control technology, type and fuel	EMFAC 2007 model run for LCAQMD 2010
Trips – vehicle trips per unit time	Varies (trips/day) – depending on vehicle capacity and quantity of material transported	AECOM estimation based on Project Description
Distance – distance travelled per round trip	Varies (miles/trip) – depending on the distance between trip origin and destination	AECOM assumption based on Project Description
FPM2.5 - fraction of PM2.5 emissions in PM10 emissions	**PM10 Category** / **Tech.** / **PM2.5 Fraction** Exhaust / CAT / 0.928 Exhaust / NCAT / 0.756 Exhaust / DSL / 0.920 Tire Wear / N/A / 0.250 Brake Wear / N/A / 0.429	South Coast Air Quality Management District (SCAQMD), 2006

2.4.3.2 Fugitive Emissions from Vehicle Travel

This section describes the methodology used to estimate fugitive dust emissions from vehicle travel on paved and unpaved roads.

<u>Motor Vehicle Entrained Paved Road Dust Emissions</u>

Vehicle travel on paved roads generates fugitive PM10 and PM2.5 emissions by entrainment of dust on the roads. The following predictive emission equation was used to calculate entrained paved road dust emissions:

$$\text{Entrained Dust PM10 Emissions}_j\ (\text{lb}) = EF_{D,j} \times \text{Trips}_j \times \text{Distance} \qquad \text{(Eq. 2-14)}$$

Where:

$EF_{D,j}$ = Emission factor for entrained road dust PM10 from motor vehicle type j (lb/mi)

Trips_j = Trips by vehicles of type j (trips/day)

Distance= Round trip distance traveled (miles/trip)

The emission factor ($EF_{D,j}$) was calculated from the following equation from CARB Emission Inventory Methodology 7.9, “Entrained Paved Road Dust” (CARB, 1997):

$$EF_{D,j}\ (lb/mi) = K \times (sL_j/2)^{0.65} \times (W_j/3)^{1.5} \quad \text{(Eq. 2-15)}$$

Where:

K = constant (lb/mile) (PM10, K = 0.016; PM2.5, K = 0.0073)

sL_j = Silt loading on roads traveled by motor vehicle of type j (g/m^2)

W_j = Average weight of vehicles on roads traveled by vehicles of type j (tons)

It was assumed that offsite motor vehicles travel on paved collector roads.

The calculated PM10 and PM2.5 entrained paved road dust emission factors are in Attachment C.2, Table C.2-5b, and the hourly, daily, and annual emissions are provided in Attachment C.2, Tables C.2-6a through C.2-6c, respectively.

Table 2-3 lists the data required to estimate the fugitive emissions from vehicle travel on paved roads.

Table 2-3 Data Required for Paved Road Dust Emissions

Parameter	Value	Reference
Trips – vehicle trips per unit time	Varies (trips/day) – depending on vehicle capacity and quantity of material transported	AECOM estimation based on Project Description
Distance – distance travelled per round trip	Varies (miles/trip) – depending on the distance between trip origin and destination	AECOM assumption based on Project Description
sL - Silt loading	0.035 g/m^2	Table 3 of CARB Emission Inventory Methodology 7.9
W = average weight of vehicles	2.4 tons	Table 3 of CARB Emission Inventory Methodology 7.9 for Lake County

Vehicle Travel on Unpaved Surfaces

Vehicles traveling on unpaved surfaces generate fugitive PM10 and PM2.5 emissions. The following equation was used to estimate these emissions:

$$\text{Emissions (lb)} = EF_U \times Trips_U \times \text{Distance} \quad \text{(Eq. 2-16)}$$

Where:

EF_U = Controlled PM10 emission factor for vehicle travel on unpaved surfaces (lb/mi)

$Trips_U$ = Trips by motor vehicles of type on unpaved surface (trips/day)

Distance = Round trip distance travelled (miles/trip)

The controlled emission factor was calculated from:

$$EF_U \text{ (lb/mi)} = k \times (s/12)^{0.9} \times (W/3)^{0.45} \times (1-CE/100) \quad \text{(Eq. 2-17)}$$

Where:

k = constant (lb/mile) (PM10, k = 1.5; PM2.5, k = 0.15)
s = Surface silt content (percent)
W = Average vehicle weight (tons)
CE = Control efficiency from watering four times per day (percent)

Source: (EPA, 2006a)

The emission factors are listed in Attachment C.2, Table C.2-5b, and the monthly and hourly emissions are provided in Attachment C.2, Tables C.2-6a through C.2-6c, respectively.

Table 2-4 lists the data required to estimate the fugitive emissions from vehicle travel on unpaved roads.

Table 2-4 Data Required for Unpaved Road Fugitive Dust Emissions

Parameter	Value	Reference
Trips – vehicle trips per unit time	Varies (trips/day) – depending on vehicle capacity and quantity of material transported	AECOM estimation based on Project Description
Distance – distance travelled per round trip	Varies (miles/trip) – depending on the distance between trip origin and destination	AECOM assumption based on Project Description
s - Surface silt content	8.5%	AP-42, Section 13.2.2, November 2006 for industrial unpaved roads, Table 13.2.2-1, Mean silt content for construction site
W = average vehicle weight	20 tons	AECOM assumed based on the average of a 10 ton empty and a 30 ton full dump truck
CE - Control efficiency from	75%	AECOM assumption

Table 2-4 Data Required for Unpaved Road Fugitive Dust Emissions

Parameter	Value	Reference
watering thrice per day		

2.4.4 Well Venting and Flow Testing

2.4.4.1 Uncontrolled Emissions

Emissions from well venting during drilling and flow testing activities are attributed to the air contaminants present in the non-condensable gases (NCG) that are released from well steam. During well venting, the wells will be vented to atmosphere and BRP will control and monitor the H_2S emissions. GeothermEx, Inc, provided detailed information from existing, near-by wells which demonstrates the ratio ox NCG to steam and the composition of the NCG. This information is used in conjunction with steam flow rates to estimate emissions. In order to prevent the underestimation of emissions, it was assumed that the well venting occurs with the maximum anticipated steam flow rate for a maximum of 40 hours per test followed by eight hours of flow testing at the maximum anticipated flow rate. It was assumed that venting can occur 24 hours per day.

The following equation was used to estimate the uncontrolled emissions of these NCG components from the steam:

$$E_i \text{ (lb/hr)} = M_i \times C_{NCG} \times Q_{steam} / 106 \qquad \text{(Eq. 2-18)}$$

Where:

E_i = Emission rate of pollutant i (lb/hr)

M_i = Mass fraction of pollutant i in NCG (lb of i / lb of NCG)

C_{NCG} = Weighted average mass concentration of NCG in steam (ppmw)

Q_{steam} = Steam flow rate (40,000 lb/hr)

Mass fraction of a pollutant in the NCG stream was estimated using the following equation

$$M_i \text{ (lb of i / lb of NCG)} = C_i / C_{NCG} \qquad \text{(Eq. 2-19)}$$

Where:

C_i = Mass concentration of pollutant i in steam (ppmw)

Emissions backflow and well testing events were estimated using the following equation:

$$E_i \text{ (lb/event)} = E_i \text{ (lb/hr)} \times \text{Duration (hr/well)} \times N \qquad \text{(Eq.2-20)}$$

Where:

E_i = Emission rate of pollutant i

N = Number of wells flowed or tested (1 well per event)

Annual emissions were estimated using the following equation:

$$E_i \text{ (tpy)} = E_i \text{ (lb/event)} \times N' \text{ (events/year)} / 2000 \quad \text{(Eq.2-21)}$$

Where:

E_i = Emission rate of pollutant i
N' = Number of events per year

Table 2-5 lists the data required to estimate the emissions from NCG through the portable treatment unit (PTU) during backflow and testing.

Table 2-5 Data Required for Well Venting Emissions

Parameter	Value	Reference
C_{NCG} – Weighted average mass concentration of NCG in steam	18,174 ppmw	Source test of existing nearby wells by GeothermEx. The average ppmw calculated by AECOM for each well with data provided by GeothermEx
C_i - Weighted average mass concentration of pollutant i in steam	Varies (lb of i / 10^6 lb steam) or (ppmw)- depending upon the pollutant	Source test of existing nearby wells by GeothermEx. The average ppmw calculated by AECOM for each well with data provided by GeothermEx
Maximum Steam Flow Rate	40,000 lb/hr	Provided by Applicant.
Maximum Venting Duration	48 hours/well	Provided by Applicant. (40 hours for well drilling + 8 hours for flow testing)
N – number of wells tested per event	1 – Only one well will be tested at a time.	Provided by Applicant.
N' – number of events per year	12 – Assumes all of the wells drilled in one year will also be flow tested.	Assumption.

Uncontrolled pollutant emission rates from the NCG stream during well testing are provided in Attachment C.2, Table C.2-7a through C.2-7e.

2.4.4.2 Controlled Emissions

BRP proposed to monitor and control the H_2S emissions from well testing through a wet chemistry process. Since the wet chemistry process will control H_2S emissions below the LCAQMD standard of five lb/hr, the H_2S emissions from well venting were set to five lb/hr. It was also assumed that water

injection and the use of a water spray would put the ammonia is the aqueous phase and control the ammonia emissions by 75 percent. These estimates are provided in Attachment C.2-7d, Table 2.5.

2.4.5 Summary of Drilling Emissions

The four parts to well drilling (generator engines, particulate emissions from air drilling, emissions from vehicle travel and forklift usage, and emissions from well venting/flow testing) were combined to estimate the total emissions from drilling. Summaries of drilling emissions are provided in Tables C.2-8a through C.2-8c in Attachment C.2

2.5 Summary of Construction Emissions

It was assumed that the well pads, pipeline and access road could be constructed in the first year of construction and that well drilling and flow testing would occur in the years that follow. The emission from construction of the well pads, pipeline and access road were summed and compared to the emissions from well drilling and flow testing to calculate the maximum daily and annual emissions. A summary of the emissions from construction of the Project are provided in Table C.2-9a and C.2-9b of Attachment C.2.

3.0 Project Operating Emissions

Criteria pollutant, toxic air contaminates (TAC), and GHG emissions from the proposed Project were estimated for the following operating conditions and equipment:

- Well venting at the well pads due to startup and shut down of the Bottle Rock Power Plant;
- Maintenance vehicle travel; and
- Maintenance and testing of the emergency propane generator.

The methodologies used to calculate emissions from these sources are described in the subsections 3.1, 3.2, and 3.3. Operational emissions calculations are provided in Attachment C.3.

3.1 Start-up and Shut-down Emissions

3.1.1 Emissions from Non-condensable Gases

During the worst-case scenario of startup and shut down activities at the Bottle Rock Power Plant, the steam from the new wells will abated with the wet chemistry process as defined in the *Hydrogen Sulfide Detection and Abatement Performance Plan* prior to venting to the atmosphere through the rock muffler. In order to characterize emissions, this worst-case scenario was used to develop emissions during the operation of the well pads.

Startups and shutdowns are anticipated to be a maximum of 45 minutes per event and it was assumed that a maximum of 10 startup/shut down events occur per year for calculation purposes. Similar to well testing, emissions during start up and shutdown activities are attributed to the air contaminants present in well steam. The well testing emissions were calculated with the NCG to steam ratio, the composition of the NCG in near-by existing wells provided by GeothermEx Inc, concentration of metals contained in the steam, and the anticipated maximum steam flow rate for the drilled wells. With an exception of H_2S and NH_3, it was assumed that all of the NCGs in the steam will be released to the atmosphere. The unabated emissions were calculated using the methods described in Section 2.4.4.1. It was assumed that the wet chemistry process will control the H_2S emissions below the LCAQMD standard of five lb/hr and water injection will control the NH_3 emissions by 75 percent. Emissions estimates for startup and shutdown events are provided in Tables C.3-2a through C.3-2c in Attachment C.3.

3.1.2 GHG Emissions from NCGs

GHG emitted from NCG stream mainly consist of CO_2 emissions, with lesser amounts of methane. CO_2 and CH_4 emissions were calculated along with other NCG components during startup and shutdown events. The methodology described in Section 3.1.1 was also used to estimate CO_2 and CH_4 emissions.

CO_2 equivalent emissions are calculated using the global warming potential (GWP) provided in "CARB Compendium of Emission Factors and Methods to Support Mandatory Reporting of Greenhouse Gas Emissions, Appendix A" (CARB, 2007c). Total GHG emissions are shown in Attachment C.3, Table C.3-2d.

3.2 Emergency Generator Emissions

3.2.1.1 Generator Engine Criteria Pollutants

The assumptions used for calculating emissions from emergency engine operation include:

- One 750-kW propane-fired engine (emergency generator engine);
- The emergency generator engine will be operated for one, one-hour test per week, not to exceed 50 hours per year;
- Emissions do not reflect emergency use; and
- 100 percent of the PM10 emissions are assumed to be PM2.5.

The emissions from the generator engine were calculated based on the SCAQMD default emission factors for propane-fired engines and the calculated fuel usage for the engine (SCAQMD, 2007).

The emission factors were converted from a fuel rate basis to an hourly rate using a heating value of 91.5 MMBtu/10^3 gal and a fuel consumption rate of (10,000 Btu/bhp-hr) (EPA, 2008), according to Equation 3-1.

$$\text{Hourly (lb/hr)} = \text{EF' (lb/}10^3\text{ gal)} \div 91.5\text{ MMBtu/}10^3\text{ gal} \times 10{,}000\text{ Btu/hp-hr} \div 10^6\text{ Btu/MMBtu} \times \text{hp} \qquad \text{(Eq. 3-1)}$$

Where:

Hourly = Hourly emissions from propane generator (lb/hr)

EF' = SCAQMD emission factor (lb/1000 gallon)

hp = engine horsepower

Tables C.3-3a through C.3-3d in Attachment C.3 present the emissions from the emergency propane-fired generator engine.

3.2.2 Generator Engine TAC Emissions

TAC emissions from the emergency generator were quantified for routine testing and maintenance operation only, which will be limited to no more than 50 hours per year. The TAC emissions were quantified by using the default SCAQMD TAC emission factors for propane-fired engines and the methods described in Section 3.2.1 (SCAQMD, 2007). TAC emission estimates are providedin Table C.3-3e in Attachment C.3.

3.2.3 Generator Engine GHG Emissions

Combustion of propane generates GHG emissions including CO_2, CH_4 and N_2O. GHG emissions were estimated using the following equation:

$$E_{GHG} = \text{fuel use (MMBtu/year)} \times EF_{GHG} \times \text{conversion factor} \qquad \text{(Eq. 3-2)}$$

Where:

E_{GHG} = Emissions of a GHG (metrics tons/yr)

EF_{GHG} = emission factor for each GHG (kg GHG/MMBtu)

conversion factor = conversion factor for kg to metric tons

Emissions factors were obtained from "CARB Compendium of Emission Factors and Methods to Support Mandatory Reporting of Greenhouse Gas Emissions, Appendix A" (CARB, 2007c) for propane use in stationary combustion device.

CO_2 equivalent emissions are calculated using the global warming potential (GWP) provided in "CARB Compendium of Emission Factors and Methods to Support Mandatory Reporting of Greenhouse Gas Emissions, Appendix A" (CARB, 2007c). For example, the GWP of methane is 21 times that of CO_2 and the GWP of nitrous oxide is 310 times that of CO_2. Total GHG emissions are shown in Attachment C.3 Table C.3-3f.

3.3 Operations & Maintenance Vehicle Emissions

The facility will require periodic vehicle travel and equipment use for routine maintenance, inspections, and repairs. Criteria pollutant emissions are expected from the combustion of fuel in these equipment and vehicles. Fugitive PM10 and PM2.5 emissions are also expected from vehicle traffic.

Criteria pollutant emissions from equipment use were calculated as described in Section 2.4.3 based on the proposed fuel usage by the applicant. The fuel usage was converted to a mileage based on a calculated fuel economy which was calculated from the GHG emissions. The mileage for an onsite pickup truck was calculated with the following equation:

$$\text{Mileage (miles/yr)} = \text{Fuel (gal/yr)} \times GHG_{CO2}\text{ (kg/gal)} \div EF_{CO2}\text{ (kg/mile)} \qquad \text{(Eq. 3-3)}$$

Where:

Mileage = number of miles traveled by maintenance truck per year (miles/yr)

Fuel = Proposed fuel usage by the applicant (9,865 gallons/yr)

GHG_{CO2} = CO_2 emission factor for California Reformulated Gasoline (kg/gallons)

EF_{CO2} = OFFROAD CO_2 Emissions Factor for On-Site Pickup Truck (kg/mi)

The annual mileage per year and the methods described in Section 2.4.3 were used to calculate the criteria pollutant and GHG emissions from maintenance vehicles. Maintenance vehicles emissions are shown in Attachment C.3, Table C.3-4a through C.3-4d.

3.4 Summary of Operational Emissions

The emissions from well venting during startup/shutdown, maintenance vehicles, and maintenance and testing of the emergency generator were summed together to calculate the total emissions for the operation of the BRP Steam Project. Emissions for operation of the Project can be found in Table C.3-5a and C.3-5b of Attachment C.3.

4.0 Cumulative Emissions

During normal operation of the Bottle Rock Power Plant, the steam is piped from the geothermal well to power a turbine generator. The condensate will be discharged as make-up water to the cooling tower and the NCG stream will be routed to the Stretford Unit before being released to the atmosphere. Thus, during normal operation there will be two point sources of emissions: controlled emissions from Stretford Unit stack and cooling tower. The emissions from NCG stream are described in Section 4.1. Emissions from cooling tower are discussed in Section 4.2. Detailed emissions calculations can be found in Attachment C.3.

4.1 Non-Condensable Gas Emissions

4.1.1 Uncontrolled Emissions

The BRP Steam project would increase the amount of steam produced for use at the power plant to bring the plant up to the design capacity of 55 megawatts (MW). Along with the composition of the NCG in the steam GeothermEx, Inc, provided information of turbine efficiency. The turbine efficiency is presented in Table C.3-6a in Attachment C.3. This information was used to calculate the maximum steam required to bring the plant up to 55 MW with Equation 4-1.

$$Q_{steam}(1000\ lb/hr) = (55\ MW - 18.5\ MW) \div Generation\ (MW/well) \times Production\ (1000\ lb/hr\text{-}well) \quad \text{(Eqn. 4-1)}$$

Where:

Q_{steam} = steam requires to bring the power plant up to 55 MW (1000 lb/hr)

Generation = Estimated generation from new wells (MW/well)

Production = Estimated steam flow rate per well (1000 lb/hr-well)

The calculated maximum steam flow rate, the components of NCGs in the steam and Equations 2-18, 2-19, 2-20 and 2-21 were used to calculate the uncontrolled emission from the NCGs in the steam at the Bottle Rock Power Plant. GHG emissions were calculated with the methodologies described in Section 3.2.3

4.1.2 Controlled Emissions

Controlled emissions were estimated based on the uncontrolled emission rate and a 98.9 percent control efficiency of the Stretford Unit. The Stretford process absorbs the H_2S gas from the NCG stream through a series of chemical reactions and converts it to an elemental sulfur and water. Normal operating emissions associated with NCG from the steam turbine are always controlled.

The controlled H_2S emissions were calculated according to Equation 4-2.

$$E_{con}\ (lb/hr) = E_{uncontol} \times (1 - CE) \quad \text{(Eq. 4-2)}$$

Where:

E_{con} = Controlled H_2S emission rate (lb/hr)

$E_{uncontrol}$ = Uncontrolled H_2S emission rate (lb/hr)
CE = Control efficiency of Stretford Unit (98.9 percent)

Annual emissions were calculated as a product of hourly emissions and 8,760 hours per year of operation. Daily emissions assume that the power plant operates 24 hours per day.

The normal operating emissions are provided in Attachment C.3, Table C.3-6a though C.3-6e.

4.2 Cooling Tower Emissions

The additional steam from the BRP Steam Project will require additional cooling from the existing cooling system at the Bottle Rock Power Plant. The existing cooling system was designed for nominal 55 MW and no additional equipment will be required to operate the cooling system with the proposed increase in steam. The existing cooling water system is comprised of a five-cell Hamon counter flow cooling tower with 150-hp electric driven fan in each cell.

Current operation uses one circulating water pump which pumps at a rate of 40,000 gallons per minute (gpm). The additional steam from the BRP Steam Project will require two circulating pumps circulating a total of 80,000 gpm.

Emissions from cooling tower include PM formed from solids and off-gases from gases dissolved in circulating water. Section 4.2.1 describes the methodology used to estimate PM10 and PM2.5 emissions from cooling tower. TAC in the form of PM or gases are discussed in Section 4.2.2.

4.2.1 Cooling Tower PM10 and PM2.5 Emissions

Because wet cooling towers provide direct contact between the cooling water and the air passing through the tower, some of the liquid water may be entrained in the air stream and be carried out of the tower as "drift" droplets. PM10 emissions are generated when the drift droplets evaporate and leave fine PM formed by crystallization of dissolved solids. Dissolved solids found in cooling tower drift can consist of mineral matter, chemicals for corrosion inhibition, etc. As described in EPA AP-42, Section 13.4, Wet Cooling Towers (EPA, 1995), PM emissions are calculated by multiplying the total liquid drift factor by the Total Dissolved Solids (TDS) fraction in the circulating water. PM10 emissions are estimated by assuming that once the water evaporates, all of the solid particles are within the PM10 size range. Hourly PM10 emissions were calculated according to the following equation:

$$\text{Emissions (lb/hr)} = \text{WCR} \times 60 \text{ min/hr} \times (\text{Drift \%} / 100) \times \text{Density}_W \times \text{TDS} \times \text{PM10 fraction} \quad \text{(Eq. 4-3)}$$

Where:

WCR = Water Circulation Rate (gallons per minute)

Density_W = Density of water (lb/gallon)

TDS = Total Dissolved Solids, ppm (lb/10^6 lb water)

Drift % = Drift eliminator efficiency (percent)

It was assumed that 100 percent of the PM emissions are PM10, and 100 percent of the PM10 emissions are PM2.5.

Daily emissions were calculated based on the maximum daily operating schedule of 24 hours per day. Annual emissions were calculated assuming continuous operation for 8,760 hours per year. Cooling tower PM10 and PM2.5 emissions are presented in Attachment C.3, Table C.3-7a through C.3-7c.

4.2.2 Cooling Tower TAC Emissions

The cooling tower will be a source of chloroform emissions from the application of sodium hypochlorite as a biocide for cooling tower maintenance. Biocide usage is estimated by the engineering contractor based on experience with similar applications. Chloroform emissions are estimated using Equation 4-4. TAC emission calculations from the cooling tower are provided in Tables C.3-7d thought C.3-7e in Attachment C.3.

Emissions = EF x biocide usage x density x hypochlorite concentration x ME (Eq. 4-4)

Where:

EF = emission factor of chloroform per pound of chlorine (lb/lb)

biocide usage = predicted biocide usage in cooling tower (gal/yr)

density = density of sodium hypochlorite solution (lb/gallon)

hypochlorite concentration= concentration of hypochlorite in solution (percent)

ME = molar equivalent (moles of chlorine per mole of sodium hypochlorite)

The emission factor is taken from study contracted by CARB for sources of chloroform in the South Coast Air Basin (Rogozen, 1998).

4.3 Summary of Additional Emissions at the Bottle Rock Power Plant

The emissions from NCGs in the steam and cooling tower operation were summed to calculate the total emission at the Bottle Rock Power Plant. These emissions are presented in Table C.3-8a and Table C.3-8b in Attachment C.3.

5.0 References

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Attachment C.1

URBEMIS and RoadMod Output Files

Welcome to the Road Construction Emissions Model, Version 6.3.2

User Instructions

This spreadsheet system contains the following individual worksheets:

1. This worksheet of User Instructions
2. Emission estimates
3. Data Entry
4. Emfac2007
5. OFFROAD2007 Convert
6. OFFROAD2007 HP & LF
7. OFFROAD EF

Changes from previous version of Road Construction Emissions Model (Version 6.3 to Version 6.3.1 and 6.3.2)

1) Corrections to calculations on Data Entry Sheet.
2) Total ROG Calculation - Water Truck for Grading/Excavation included.
3) Total CO Calculation - Worker Commute Emission and Soil Hauling corrected.
4) Total CO Calculation - Water Truck Emissions for Grading/Excavation corrected.
5) Total NOx Calculation - Worker Commute Emissions and Soil Hauling Emissions corrected.
6) Total NOx Calculation - Water Truck Emissions for Grading/Excavation corrected.
7) Total PM2.5 Calculation corrected to include exhaust and fugtive PM2.5.
8) Total Exhaust PM2.5 and Total Fugitive PM2.5 corrected.
9) Total CO2 Calculation - Soil Hauling CO2 emissions included.
10) Estimating Number of Scrapers for Grubbing/Land Clearing corrected.
11) Worker Commute Emissions for Grubbing/Land Clearing sum corrected.

Changes from previous version of Road Construction Emissions Model (Version 6.2 to Version 6.3)

1) PM2.5 and CO2 Emission Factors Added.

Changes from Road Construction Emissions Model (Version 5.2 to Version 6.2).

1) EMFAC2007 emission factors added (previous EMFAC versions dropped).
2) OFFROAD2007 emission factors added.
3) Project length changed to include 2005 through 2025.

The Emission Estimates worksheet calculates a project's emissions in pounds per day (and kilograms per day) by project phase and tons (and megagrams) over the entire construction period.
The worksheet can be used to estimate emissions for both vehicle exhaust and fugitive dust. The methodology used to estimate fugitive dust emissions is a simplified methodology involving estimates of the maximum area (acreage) of land disturbed daily. Detailed fugitive dust emission estimates associated with individual materials handling operations and/or activity/vehicle types cannot be conducted with this version of the model.
The Emission Estimates worksheet cannot be modified directly, it is a protected worksheet. It can only be modified indirectly by entering information for the project in selected areas of the Data Entry worksheet.
The last four of these worksheets - Emfac2007, OFFROAD2007 Convert, OFFROAD2007 HP & LP, and OFFROAD EF - cannot be modified by the user. They are protected worksheets. Even though all or portions of several worksheets are protected, the individual formulas used in the calculations can be seen by the user.
The Data Entry worksheet includes several areas that can be modified by the user.
User instructions in the Data Entry worksheet are highlighted in red.
On the Data Entry worksheet, the user has two options for entering project data: required data and optional data. Required data is entered in the data input section (yellow cells). That required data is then used by the worksheet to calculate default values for the project.
The user can override the default values (blue cells) calculated for a project and is encouraged to do so if project specific information is available. Due to the difficulty in developing reliable default values for road construction projects, the user is encouraged to enter as much site specific information as is available for the project being analyzed.
The Data Entry Worksheet also includes a button that allows the user to clear previously entered data. This button is found just at the top of and to the right of the data entry portion of the worksheet.
When projects are discontinuous, the user must make adjustments to the spreadsheet manually, since the program cannot be setup to anticpate unexpected project delays.

#VALUE! <- This error message may occur during use of the spreadsheets. This occurs whenever the user enters a non numeric value, including a space character, into a cell that is used to calculate a numeric value. Consequently, to erase values entered into the spreadsheets, use the delete key instead of the space bar!

Note: Information in this worksheet is based on conversations with knowledgeable individuals at the Sacramento Metropolitan Air Quality Management District, the California Department of Transportation, the California Air Resources Board, the U.S. EPA, and private industry involved in road construction.
Also, the 26th edition of Walker's Building Estimator's Reference Book (1999) was used in the development of this spreadsheet.
This spreadsheet was prepared by Jones & Stokes and Rimpo and Associates, Inc. with the financial support and direction of the Sacramento Metropolitan Air Quality Management District.

http://www.airquality.org
874-4800

http://www.jonesandst
Shannon Hatcher
shatcher@icfi.com
916/737-3000

http://www.rimpoandassociates.com
Tim Rimpo
trimpo@rimpoandassociates.com
916/337-8449

Road Construction Emissions Model
Data Entry Worksheet

Version 6.3.2

Note: Required data input sections have a yellow background.
Optional data input sections have a blue background. Only areas with a
yellow or blue background can be modified. Program defaults have a white background.
The user is required to enter information in cells C10 through C25.

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Input Type

Project Name	tleRock Access Road Construction	
Construction Start Year	2013	Enter a Year between 2005 and 2025 (inclusive)
Project Type	1	1 New Road Construction 2 Road Widening 3 Bridge/Overpass Construction
Project Construction Time	2.6	months
Predominant Soil/Site Type: Enter 1, 2, or 3	2	1. Sand Gravel 2. Weathered Rock-Earth 3. Blasted Rock
Project Length	1.420454545	miles
Total Project Area	5.8	acres
Maximum Area Disturbed/Day	1.4	acres
Water Trucks Used?	1	1. Yes 2. No
Soil Imported	0.0	yd^3/day
Soil Exported	714.3	yd^3/day
Average Truck Capacity	16.5	yd^3 (assume 20 if unknown)

To begin a new project, click this button to clear data previously entered. This button will only work if you opted not to disable macros when loading this spreadsheet.

The remaining sections of this sheet contain areas that can be modified by the user, although those modifications are optional.

Note: The program's estimates of construction period phase length can be overridden in cells C34 through C37.

Construction Periods	User Override of Construction Months	Program Calculated Months	2005	%	2006	%	2007	%
Grubbing/Land Clearing		0.26	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation		1.15	0.00	0.00	0.00	0.00	0.00	0.00
Drainage/Utilities/Sub-Grade		0.77	0.00	0.00	0.00	0.00	0.00	0.00
Paving		0.38	0.00	0.00	0.00	0.00	0.00	0.00
Totals	0.00	2.55						

Hauling emission default values can be overridden in cells C45 through C46.

Soil Hauling Emissions

User Input	User Override of Soil Hauling Defaults	Default Values
Miles/round trip		30
Round trips/day		43
Vehicle miles traveled/day (calculated)		1298.701299

Hauling Emissions	ROG	NOx	CO	PM10	PM2.5	CO2
Emission rate (grams/mile)	0.84	10.25	5.45	0.40	0.33	1874.76
Emission rate (grams/trip)	10.32	7.57	172.85	0.01	0.01	199.87
Pounds per day	4.4	30.8	48.5	1.1	0.9	5401.0
Tons per contruction period	0.06	0.39	0.61	0.01	0.01	68.17

Worker commute default values can be overridden in cells C60 through C65.

Worker Commute Emissions

	User Override of Worker Commute Default Values	Default Values
Miles/ one-way trip	35.00	20
One-way trips/day		2
No. of employees: Grubbing/Land Clearing		6
No. of employees: Grading/Excavation		9
No. of employees: Drainage/Utilities/Sub-Grade		9
No. of employees: Paving		7

	ROG	NOx	CO	PM10	PM2.5	CO2
Emission rate - Grubbing/Land Clearing (grams/mile)	0.118	0.211	2.201	0.033	0.018	426.660
Emission rate - Grading/Excavation (grams/mile)	0.118	0.211	2.201	0.033	0.018	426.660
Emission rate - Draining/Utilities/Sub-Grade (gr/mile)	0.118	0.211	2.201	0.033	0.018	426.660
Emission rate - Paving (grams/mile)	0.118	0.211	2.201	0.033	0.018	426.660
Emission rate - Grubbing/Land Clearing (grams/trip)	0.746	0.316	7.305	0.130	0.013	192.690
Emission rate - Grading/Excavation (grams/trip)	0.746	0.316	7.305	0.130	0.013	192.690
Emission rate - Draining/Utilities/Sub-Grade (gr/trip)	0.746	0.316	7.305	0.130	0.013	192.690
Emission rate - Paving (grams/trip)	0.746	0.316	7.305	0.130	0.013	192.690
Pounds per day - Grubbing/Land Clearing	0.150	0.214	2.443	0.038	0.017	408.345
Tons per const. Period - Grub/Land Clear	0.000	0.001	0.007	0.000	0.000	1.145
Pounds per day - Grading/Excavation	0.150	0.214	2.443	0.038	0.017	408.345
Tons per const. Period - Grading/Excavation	0.002	0.003	0.031	0.000	0.000	5.154
Pounds per day - Drainage/Utilities/Sub-Grade	0.150	0.214	2.443	0.038	0.017	408.345
Tons per const. Period - Drain/Util/Sub-Grade	0.001	0.002	0.021	0.000	0.000	3.436
Pounds per day - Paving	0.173	0.214	2.443	0.038	0.017	490.575
Tons per const. Period - Paving	0.001	0.001	0.010	0.000	0.000	2.064
tons per construction period	0.004	0.006	0.069	0.001	0.000	11.800

Water truck default values can be overriden in cells C91 through C93 and E91 through E93.

Water Truck Emissions	User Override of Default # Water Trucks	Program Estimate of Number of Water Trucks	User Override of Truck Miles Traveled/Day	Default Values Miles Traveled/Day		
Grubbing/Land Clearing - Exhaust		1		40		
Grading/Excavation - Exhaust		1		40		
Drainage/Utilities/Subgrade		1		40		
	ROG	**NOx**	**CO**	**PM10**	**PM2.5**	**CO2**
Emission rate - Grubbing/Land Clearing (grams/mile)	0.84	10.25	5.45	0.40	0.33	1874.76
Emission rate - Grading/Excavation (grams/mile)	0.84	10.25	5.45	0.40	0.33	1874.76
Emission rate - Draining/Utilities/Sub-Grade (gr/mile)	0.84	10.25	5.45	0.40	0.33	1874.76
Pounds per day - Grubbing/Land Clearing	0.07	0.90	0.48	0.04	0.03	165.18
Tons per const. Period - Grub/Land Clear	0.00	0.01	0.01	0.00	0.00	2.08
Pound per day - Grading/Excavation	0.07	0.90	0.48	0.04	0.03	165.18
Tons per const. Period - Grading/Excavation	0.00	0.01	0.01	0.00	0.00	2.08
Pound per day - Drainage/Utilities/Subgrade	0.07	0.90	0.48	0.04	0.03	165.18
Tons per const. Period - Drainage/Utilities/Subgrade	0.00	0.01	0.00	0.00	0.00	1.39

Fugitive dust default values can be overridden in cells C110 through C112.

Fugitive Dust	User Override of Max Acreage Disturbed/Day	Default Maximum Acreage/Day	PM10 pounds/day	PM10 tons/per period	PM2.5 pounds/day	PM2.5 tons/per period
Fugitive Dust - Grubbing/Land Clearing		1.4475	14.5	0.0	3.0	0.0
Fugitive Dust - Grading/Excavation		1.4475	14.5	0.2	3.0	0.0
Fugitive Dust - Drainage/Utilities/Subgrade		1.4475	14.5	0.1	3.0	0.0

Off-Road Equipment Emissions

Grubbing/Land Clearing Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	CO2 pounds/day
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
		Cranes	0.00	0.00	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Excavators	0.00	0.00	0.00	0.00	0.00	0.00
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
		Graders	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
1.00		Off-Highway Trucks	1.24	3.64	10.24	0.36	0.33	1559.66
		Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00

1.00		Other Material Handling Equipment	0.55	1.53	5.73	0.18	0.17	665.84
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00
		Rollers	0.00	0.00	0.00	0.00	0.00	0.00
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
	1	Rubber Tired Dozers	1.51	6.67	12.84	0.53	0.49	1245.79
1.00		Rubber Tired Loaders	0.54	2.71	4.11	0.23	0.21	458.86
	1	Scrapers	1.61	6.11	14.29	0.55	0.51	1623.76
0.00	3	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00
		Trenchers	0.00	0.00	0.00	0.00	0.00	0.00
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
	Grubbing/Land Clearing	pounds per day	5.5	20.7	47.2	1.9	1.7	5553.9
	Grubbing/Land Clearing	tons per phase	0.0	0.1	0.1	0.0	0.0	15.6

Grading/Excavation Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	CO2 pounds/day
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
1.00	0	Cranes	0.64	2.17	5.85	0.21	0.20	739.64
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
	1	Excavators	0.59	3.25	4.37	0.25	0.23	547.36
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
	1	Graders	0.77	3.84	5.86	0.33	0.30	647.87
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
1.00	0	Other Construction Equipment	0.36	1.88	2.50	0.20	0.19	287.78
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00
		Rollers	0.00	0.00	0.00	0.00	0.00	0.00
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00
	1	Rubber Tired Loaders	0.54	2.71	4.11	0.23	0.21	458.86
	1	Scrapers	1.61	6.11	14.29	0.55	0.51	1623.76
0.00	3	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00
		Trenchers	0.00	0.00	0.00	0.00	0.00	0.00
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
	Grading/Excavation	pounds per day	4.5	20.0	37.0	1.8	1.6	4305.3
	Grading	tons per phase	0.1	0.3	0.5	0.0	0.0	54.3

Drainage/Utilities/Subgrade Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*		ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	CO2 pounds/day
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
		Cranes	0.00	0.00	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Excavators	0.00	0.00	0.00	0.00	0.00	0.00
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
	1	Graders	0.77	3.84	5.86	0.33	0.30	647.87
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
		Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
	1	Plate Compactors	0.02	0.09	0.11	0.00	0.00	14.83
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00
		Rollers	0.00	0.00	0.00	0.00	0.00	0.00
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00
	1	Scrapers	1.61	6.11	14.29	0.55	0.51	1623.76
0.00	3	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00
	1	Trenchers	0.70	2.55	4.29	0.37	0.34	353.84
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
	Drainage	pounds per day	3.1	12.6	24.6	1.3	1.2	2640.3
	Drainage	tons per phase	0.0	0.1	0.2	0.0	0.0	22.2

Paving	Default Number of Vehicles		ROG	CO	NOx	PM10	PM2.5	CO2
Override of Default Number of Vehicles	*Program-estimate*	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
		Cranes	0.00	0.00	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Excavators	0.00	0.00	0.00	0.00	0.00	0.00
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
		Graders	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
		Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
	1	Pavers	0.78	2.82	4.67	0.41	0.38	386.18
	1	Paving Equipment	0.58	2.12	3.52	0.31	0.28	291.96
		Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00
	1	Rollers	0.50	2.07	3.18	0.27	0.25	299.86
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Scrapers	0.00	0.00	0.00	0.00	0.00	0.00
0.00	3	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00
		Trenchers	0.00	0.00	0.00	0.00	0.00	0.00
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
	Paving	pounds per day	1.9	7.0	11.4	1.0	0.9	978.0
	Paving	tons per phase	0.0	0.0	0.0	0.0	0.0	4.1
Total Emissions all Phases (tons per construction period) =>			0.1	0.4	0.9	0.0	0.0	96.3

Equipment default values for horsepower, load factor, and hours/day can be overridden in cells C285 through C317, E285 through E317, and G285 through G317.

Equipment		Default Values Horsepower		Default Values Load Factor		Default Values Hours/day
Aerial Lifts		60		0.46		8
Air Compressors		106		0.48		8
Bore/Drill Rigs		291		0.75		8
Cement and Mortar Mixers		10		0.56		8
Concrete/Industrial Saws		19		0.73		8
Cranes		399		0.43		8
Crushing/Proc. Equipment		142		0.78		8
Excavators		168		0.57		8
Forklifts		145		0.30		8
Generator Sets		549		0.74		8
Graders		174		0.61		8
Off-Highway Tractors		267		0.65		8
Off-Highway Trucks		479		0.57		8
Other Construction Equipment		75		0.62		8
Other General Industrial Equipment		238		0.51		8
Other Material Handling Equipment		191		0.59		8
Pavers		100		0.62		8
Paving Equipment		104		0.53		8
Plate Compactors		8		0.43		8
Pressure Washers		1		0.60		8
Pumps		53		0.74		8
Rollers		95		0.56		8
Rough Terrain Forklifts		93		0.60		8
Rubber Tired Dozers		357		0.59		8
Rubber Tired Loaders		157		0.54		8
Scrapers		313		0.72		8
Signal Boards		20		0.78		8
Skid Steer Loaders		44		0.55		8
Surfacing Equipment		362		0.45		8
Sweepers/Scrubbers		91		0.68		8
Tractors/Loaders/Backhoes		108		0.55		8
Trenchers		63		0.75		8
Welders		45		0.45		8

0

END OF DATA ENTRY SHEET

Road Construction Emissions Model, Version 6.3.2

Emission Estimates for ->	BottleRock Access Road Construction			Total	Exhaust	Fugitive Dust	Total	Exhaust	Fugitive Dust	
Project Phases (English Units)	**ROG (lbs/day)**	**CO (lbs/day)**	**NOx (lbs/day)**	**PM10 (lbs/day)**	**PM10 (lbs/day)**	**PM10 (lbs/day)**	**PM2.5 (lbs/day)**	**PM2.5 (lbs/day)**	**PM2.5 (lbs/day)**	**CO2 (lbs/day)**
Grubbing/Land Clearing	5.7	23.6	48.3	16.4	1.9	14.5	4.8	1.8	3.0	6,127.4
Grading/Excavation	9.1	71.4	68.9	17.5	3.0	14.5	5.6	2.6	3.0	10,279.8
Drainage/Utilities/Sub-Grade	3.3	15.5	25.7	15.8	1.3	14.5	4.2	1.2	3.0	3,213.8
Paving	2.0	9.5	11.6	1.0	1.0	-	0.9	0.9	-	1,468.6
Maximum (pounds/day)	9.1	71.4	68.9	17.5	3.0	14.5	5.6	2.6	3.0	10,279.8
Total (tons/construction project)	0.2	1.1	1.3	0.4	0.1	0.3	0.1	0.1	0.1	181.8

Notes:

Project Start Year ->	2013
Project Length (months) ->	3
Total Project Area (acres) ->	6
Maximum Area Disturbed/Day (acres) ->	1
Total Soil Imported/Exported (yd^3/day)->	714

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.

Emission Estimates for ->	BottleRock Access Road Construction			Total	Exhaust	Fugitive Dust	Total	Exhaust	Fugitive Dust	
Project Phases (Metric Units)	**ROG (kgs/day)**	**CO (kgs/day)**	**NOx (kgs/day)**	**PM10 (kgs/day)**	**PM10 (kgs/day)**	**PM10 (kgs/day)**	**PM2.5 (kgs/day)**	**PM2.5 (kgs/day)**	**PM2.5 (kgs/day)**	**CO2 (kgs/day)**
Grubbing/Land Clearing	2.6	10.7	22.0	7.5	0.9	6.6	2.2	0.8	1.4	2,785.2
Grading/Excavation	4.1	32.5	31.3	7.9	1.4	6.6	2.6	1.2	1.4	4,672.6
Drainage/Utilities/Sub-Grade	1.5	7.1	11.7	7.2	0.6	6.6	1.9	0.5	1.4	1,460.8
Paving	0.9	4.3	5.3	0.5	0.5	-	0.4	0.4	-	667.5
Maximum (kilograms/day)	4.1	32.5	31.3	7.9	1.4	6.6	2.6	1.2	1.4	4,672.6
Total (megagrams/construction project)	0.2	1.0	1.2	0.4	0.1	0.3	0.1	0.0	0.1	164.9

Notes:

Project Start Year ->	2013
Project Length (months) ->	3
Total Project Area (hectares) ->	2
Maximum Area Disturbed/Day (hectares) ->	1
Total Soil Imported/Exported (meters ^{3}/day)->	546

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sume of exhaust and fugitive dust emissions shown in columns K and L.

Welcome to the Road Construction Emissions Model, Version 6.3.2

User Instructions

This spreadsheet system contains the following individual worksheets:

1. This worksheet of User Instructions
2. Emission estimates
3. Data Entry
4. Emfac2007
5. OFFROAD2007 Convert
6. OFFROAD2007 HP & LF
7. OFFROAD EF

Changes from previous version of Road Construction Emissions Model (Version 6.3 to Version 6.3.1 and 6.3.2)

1) Corrections to calculations on Data Entry Sheet.
2) Total ROG Calculation - Water Truck for Grading/Excavation included.
3) Total CO Calculation - Worker Commute Emission and Soil Hauling corrected.
4) Total CO Calculation - Water Truck Emissions for Grading/Excavation corrected.
5) Total NOx Calculation - Worker Commute Emissions and Soil Hauling Emissions corrected.
6) Total NOx Calculation - Water Truck Emissions for Grading/Excavation corrected.
7) Total PM2.5 Calculation corrected to include exhaust and fugtive PM2.5.
8) Total Exhaust PM2.5 and Total Fugitive PM2.5 corrected.
9) Total CO2 Calculation - Soil Hauling CO2 emissions included.
10) Estimating Number of Scrapers for Grubbing/Land Clearing corrected.
11) Worker Commute Emissions for Grubbing/Land Clearing sum corrected.

Changes from previous version of Road Construction Emissions Model (Version 6.2 to Version 6.3)

1) PM2.5 and CO2 Emission Factors Added.

Changes from Road Construction Emissions Model (Version 5.2 to Version 6.2).

1) EMFAC2007 emission factors added (previous EMFAC versions dropped).
2) OFFROAD2007 emission factors added.
3) Project length changed to include 2005 through 2025.

The Emission Estimates worksheet calculates a project's emissions in pounds per day (and kilograms per day) by project phase and tons (and megagrams) over the entire construction period.
The worksheet can be used to estimate emissions for both vehicle exhaust and fugitive dust. The methodology used to estimate fugitive dust emissions is a simplified methodology involving estimates of the maximum area (acreage) of land disturbed daily. Detailed fugitive dust emission estimates associated with individual materials handling operations and/or activity/vehicle types cannot be conducted with this version of the model.
The Emission Estimates worksheet cannot be modified directly, it is a protected worksheet. It can only be modified indirectly by entering information for the project in selected areas of the Data Entry worksheet.
The last four of these worksheets - Emfac2007, OFFROAD2007 Convert, OFFROAD2007 HP & LP, and OFFROAD EF - cannot be modified by the user. They are protected worksheets. Even though all or portions of several worksheets are protected, the individual formulas used in the calculations can be seen by the user.
The Data Entry worksheet includes several areas that can be modified by the user.
User instructions in the Data Entry worksheet are highlighted in red.
On the Data Entry worksheet, the user has two options for entering project data: required data and optional data. Required data is entered in the data input section (yellow cells). That required data is then used by the worksheet to calculate default values for the project.
The user can override the default values (blue cells) calculated for a project and is encouraged to do so if project specific information is available. Due to the difficulty in developing reliable default values for road construction projects, the user is encouraged to enter as much site specific information as is available for the project being analyzed.
The Data Entry Worksheet also includes a button that allows the user to clear previously entered data. This button is found just at the top of and to the right of the data entry portion of the worksheet.
When projects are discontinuous, the user must make adjustments to the spreadsheet manually, since the program cannot be setup to anticpate unexpected project delays.

#VALUE! <- This error message may occur during use of the spreadsheets. This occurs whenever the user enters a non numeric value, including a space character, into a cell that is used to calculate a numeric value. Consequently, to erase values entered into the spreadsheets, use the delete key instead of the space bar!

Note: Information in this worksheet is based on conversations with knowledgeable individuals at the Sacramento Metropolitan Air Quality Management District, the California Department of Transportation, the California Air Resources Board, the U.S. EPA, and private industry involved in road construction.
Also, the 26th edition of Walker's Building Estimator's Reference Book (1999) was used in the development of this spreadsheet.
This spreadsheet was prepared by Jones & Stokes and Rimpo and Associates, Inc. with the financial support and direction of the Sacramento Metropolitan Air Quality Management District.

http://www.airquality.org
874-4800

http://www.jonesandst
Shannon Hatcher
shatcher@icfi.com
916/737-3000

http://www.rimpoandassociates.com
Tim Rimpo
trimpo@rimpoandassociates.com
916/337-8449

Road Construction Emissions Model

Version 6.3.2

Data Entry Worksheet

Note: Required data input sections have a yellow background.
Optional data input sections have a blue background. Only areas with a yellow or blue background can be modified. Program defaults have a white background.
The user is required to enter information in cells C10 through C25.

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

To begin a new project, click this button to clear data previously entered. This button will only work if you opted not to disable macros when loading this spreadsheet.

Input Type

Project Name	BottleRock Pipeline Construction	
Construction Start Year	2013	Enter a Year between 2005 and 2025 (inclusive)
Project Type	3	1 New Road Construction 2 Road Widening 3 Bridge/Overpass Construction
Project Construction Time	5.1	months
Predominant Soil/Site Type: Enter 1, 2, or 3	2	1. Sand Gravel 2. Weathered Rock-Earth 3. Blasted Rock
Project Length	2	miles
Total Project Area	5.8	acres
Maximum Area Disturbed/Day	1.4	acres
Water Trucks Used?	1	1. Yes 2. No
Soil Imported	0.0	yd^3/day
Soil Exported	0.0	yd^3/day
Average Truck Capacity	16.5	yd^3 (assume 20 if unknown)

The remaining sections of this sheet contain areas that can be modified by the user, although those modifications are optional.

Note: The program's estimates of construction period phase length can be overridden in cells C34 through C37.

Construction Periods	User Override of Construction Months	Program Calculated Months	2005	%	2006	%	2007	%
Grubbing/Land Clearing		0.51	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation		2.30	0.00	0.00	0.00	0.00	0.00	0.00
Drainage/Utilities/Sub-Grade		1.53	0.00	0.00	0.00	0.00	0.00	0.00
Paving	0.00	0.77	0.00	0.00	0.00	0.00	0.00	0.00
Totals	0.00	5.10						

Hauling emission default values can be overridden in cells C45 through C46.

Soil Hauling Emissions

User Input	User Override of Soil Hauling Defaults	Default Values
Miles/round trip	0.00	30
Round trips/day	0.00	0
Vehicle miles traveled/day (calculated)		0

Hauling Emissions	ROG	NOx	CO	PM10	PM2.5	CO2
Emission rate (grams/mile)	0.84	10.25	5.45	0.40	0.33	1874.76
Emission rate (grams/trip)	10.32	7.57	172.85	0.01	0.01	199.87
Pounds per day	0.0	0.0	0.0	0.0	0.0	0.0
Tons per contruction period	0.00	0.00	0.00	0.00	0.00	0.00

Worker commute default values can be overridden in cells C60 through C65.

Worker Commute Emissions

	User Override of Worker Commute Default Values	Default Values
Miles/ one-way trip	35.00	20
One-way trips/day		2
No. of employees: Grubbing/Land Clearing		8
No. of employees: Grading/Excavation		11
No. of employees: Drainage/Utilities/Sub-Grade		10
No. of employees: Paving	0.00	9

	ROG	NOx	CO	PM10	PM2.5	CO2
Emission rate - Grubbing/Land Clearing (grams/mile)	0.118	0.211	2.201	0.033	0.018	426.660
Emission rate - Grading/Excavation (grams/mile)	0.118	0.211	2.201	0.033	0.018	426.660
Emission rate - Draining/Utilities/Sub-Grade (gr/mile)	0.118	0.211	2.201	0.033	0.018	426.660
Emission rate - Paving (grams/mile)	0.118	0.211	2.201	0.033	0.018	426.660
Emission rate - Grubbing/Land Clearing (grams/trip)	0.746	0.316	7.305	0.130	0.013	192.690
Emission rate - Grading/Excavation (grams/trip)	0.746	0.316	7.305	0.130	0.013	192.690
Emission rate - Draining/Utilities/Sub-Grade (gr/trip)	0.746	0.316	7.305	0.130	0.013	192.690
Emission rate - Paving (grams/trip)	0.746	0.316	7.305	0.130	0.013	192.690
Pounds per day - Grubbing/Land Clearing	0.186	0.265	3.028	0.047	0.022	506.117
Tons per const. Period - Grub/Land Clear	0.001	0.001	0.017	0.000	0.000	2.839
Pounds per day - Grading/Excavation	0.186	0.265	3.028	0.047	0.022	506.117
Tons per const. Period - Grading/Excavation	0.005	0.007	0.076	0.001	0.001	12.777
Pounds per day - Drainage/Utilities/Sub-Grade	0.186	0.265	3.028	0.047	0.022	506.117
Tons per const. Period - Drain/Util/Sub-Grade	0.003	0.004	0.051	0.001	0.000	8.518
Pounds per day - Paving	0.049	0.265	3.028	0.047	0.022	12.733
Tons per const. Period - Paving	0.000	0.000	0.000	0.000	0.000	0.000
tons per construction period	0.009	0.013	0.144	0.002	0.001	24.134

Water truck default values can be overriden in cells C91 through C93 and E91 through E93.

Water Truck Emissions	User Override of Default # Water Trucks	Program Estimate of Number of Water Trucks	User Override of Truck Miles Traveled/Day	Default Values Miles Traveled/Day
Grubbing/Land Clearing - Exhaust		1		40
Grading/Excavation - Exhaust		1		40
Drainage/Utilities/Subgrade		1		40

	ROG	NOx	CO	PM10	PM2.5	CO2
Emission rate - Grubbing/Land Clearing (grams/mile)	0.84	10.25	5.45	0.40	0.33	1874.76
Emission rate - Grading/Excavation (grams/mile)	0.84	10.25	5.45	0.40	0.33	1874.76
Emission rate - Draining/Utilities/Sub-Grade (gr/mile)	0.84	10.25	5.45	0.40	0.33	1874.76
Pounds per day - Grubbing/Land Clearing	0.07	0.90	0.48	0.04	0.03	165.18
Tons per const. Period - Grub/Land Clear	0.00	0.02	0.01	0.00	0.00	4.17
Pound per day - Grading/Excavation	0.07	0.90	0.48	0.04	0.03	165.18
Tons per const. Period - Grading/Excavation	0.00	0.02	0.01	0.00	0.00	4.17
Pound per day - Drainage/Utilities/Subgrade	0.07	0.90	0.48	0.04	0.03	165.18
Tons per const. Period - Drainage/Utilities/Subgrade	0.00	0.02	0.01	0.00	0.00	2.78

Fugitive dust default values can be overridden in cells C110 through C112.

Fugitive Dust	User Override of Max Acreage Disturbed/Day	Default Maximum Acreage/Day	PM10 pounds/day	PM10 tons/per period	PM2.5 pounds/day	PM2.5 tons/per period
Fugitive Dust - Grubbing/Land Clearing		1.4475	14.5	0.1	3.0	0.0
Fugitive Dust - Grading/Excavation		1.4475	14.5	0.4	3.0	0.1
Fugitive Dust - Drainage/Utilities/Subgrade		1.4475	14.5	0.2	3.0	0.1

Off-Road Equipment Emissions

Grubbing/Land Clearing Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	CO2 pounds/day
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
		Cranes	0.00	0.00	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Excavators	0.00	0.00	0.00	0.00	0.00	0.00
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
		Graders	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
		Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
1.00		Plate Compactors	0.02	0.09	0.11	0.00	0.00	14.83
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00
		Rollers	0.00	0.00	0.00	0.00	0.00	0.00
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
	1	Rubber Tired Dozers	1.51	6.67	12.84	0.53	0.49	1245.79
		Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00
	1	Scrapers	1.61	6.11	14.29	0.55	0.51	1623.76
0.00	4	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00
		Trenchers	0.00	0.00	0.00	0.00	0.00	0.00
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
	Grubbing/Land Clearing	pounds per day	3.1	12.9	27.2	1.1	1.0	2884.4
	Grubbing/Land Clearing	tons per phase	0.0	0.1	0.2	0.0	0.0	16.2

Grading/Excavation	Default Number of Vehicles		ROG	CO	NOx	PM10	PM2.5	CO2
Override of Default Number of Vehicles	*Program-estimate*	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
1.00		Bore/Drill Rigs	0.68	2.91	6.17	0.19	0.17	1641.74
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
	1	Cranes	0.64	2.17	5.85	0.21	0.20	739.64
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1	Excavators	0.00	0.00	0.00	0.00	0.00	0.00
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
	1	Graders	0.77	3.84	5.86	0.33	0.30	647.87
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00
		Rollers	0.00	0.00	0.00	0.00	0.00	0.00
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00
	1	Rubber Tired Loaders	0.54	2.71	4.11	0.23	0.21	458.86
	1	Scrapers	1.61	6.11	14.29	0.55	0.51	1623.76
0.00	4	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00
		Trenchers	0.00	0.00	0.00	0.00	0.00	0.00
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
	Grading/Excavation	pounds per day	4.2	17.7	36.3	1.5	1.4	5111.9
	Grading	tons per phase	0.1	0.4	0.9	0.0	0.0	129.0

Drainage/Utilities/Subgrade Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*		ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	CO2 pounds/day
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
		Cranes	0.00	0.00	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Excavators	0.00	0.00	0.00	0.00	0.00	0.00
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1	Graders	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
		Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
	1	Plate Compactors	0.02	0.09	0.11	0.00	0.00	14.83
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00
		Rollers	0.00	0.00	0.00	0.00	0.00	0.00
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00
	1	Scrapers	1.61	6.11	14.29	0.55	0.51	1623.76
0.00	4	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00
	1	Trenchers	0.70	2.55	4.29	0.37	0.34	353.84
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
	Drainage	pounds per day	2.3	8.8	18.7	0.9	0.9	1992.4
	Drainage	tons per phase	0.0	0.1	0.3	0.0	0.0	33.5

Paving Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	CO2 pounds/day
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
		Cranes	0.00	0.00	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Excavators	0.00	0.00	0.00	0.00	0.00	0.00
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
		Graders	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
0.00		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
		Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1	Pavers	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1	Rollers	0.00	0.00	0.00	0.00	0.00	0.00
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Scrapers	0.00	0.00	0.00	0.00	0.00	0.00
0.00	4	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00
		Trenchers	0.00	0.00	0.00	0.00	0.00	0.00
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
	Paving	pounds per day	0.0	0.0	0.0	0.0	0.0	0.0
	Paving	tons per phase	0.0	0.0	0.0	0.0	0.0	0.0
Total Emissions all Phases (tons per construction period) =>			0.2	0.7	1.4	0.1	0.1	178.8

Equipment default values for horsepower, load factor, and hours/day can be overridden in cells C285 through C317, E285 through E317, and G285 through G317.

Equipment		Default Values Horsepower		Default Values Load Factor		Default Values Hours/day
Aerial Lifts		60		0.46		8
Air Compressors		106		0.48		8
Bore/Drill Rigs		291		0.75		8
Cement and Mortar Mixers		10		0.56		8
Concrete/Industrial Saws		19		0.73		8
Cranes		399		0.43		8
Crushing/Proc. Equipment		142		0.78		8
Excavators		168		0.57		8
Forklifts		145		0.30		8
Generator Sets		549		0.74		8
Graders		174		0.61		8
Off-Highway Tractors		267		0.65		8
Off-Highway Trucks		479		0.57		8
Other Construction Equipment		75		0.62		8
Other General Industrial Equipment		238		0.51		8
Other Material Handling Equipment		191		0.59		8
Pavers		100		0.62		8
Paving Equipment		104		0.53		8
Plate Compactors		8		0.43		8
Pressure Washers		1		0.60		8
Pumps		53		0.74		8
Rollers		95		0.56		8
Rough Terrain Forklifts		93		0.60		8
Rubber Tired Dozers		357		0.59		8
Rubber Tired Loaders		157		0.54		8
Scrapers		313		0.72		8
Signal Boards		20		0.78		8
Skid Steer Loaders		44		0.55		8
Surfacing Equipment		362		0.45		8
Sweepers/Scrubbers		91		0.68		8
Tractors/Loaders/Backhoes		108		0.55		8
Trenchers		63		0.75		8
Welders		45		0.45		8

0

END OF DATA ENTRY SHEET

Road Construction Emissions Model, Version 6.3.2

Emission Estimates for -> BottleRock Pipeline Construction Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	CO2 (lbs/day)
Grubbing/Land Clearing	3.4	16.4	28.4	15.6	1.2	14.5	4.1	1.1	3.0	3,555.7
Grading/Excavation	4.5	21.2	37.5	16.1	1.6	14.5	4.5	1.4	3.0	5,783.2
Drainage/Utilities/Sub-Grade	2.6	12.3	19.9	15.5	1.0	14.5	3.9	0.9	3.0	2,663.7
Paving	0.0	3.0	0.3	0.0	0.0	-	0.0	0.0	-	12.7
Maximum (pounds/day)	4.5	21.2	37.5	16.1	1.6	14.5	4.5	1.4	3.0	5,783.2
Total (tons/construction project)	0.2	0.8	1.5	0.8	0.1	0.7	0.2	0.1	0.1	214.0

Notes: Project Start Year -> 2013
Project Length (months) -> 5
Total Project Area (acres) -> 6
Maximum Area Disturbed/Day (acres) -> 1
Total Soil Imported/Exported (yd^3/day)-> 0

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.

Emission Estimates for -> BottleRock Pipeline Construction Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	Total PM10 (kgs/day)	Exhaust PM10 (kgs/day)	Fugitive Dust PM10 (kgs/day)	Total PM2.5 (kgs/day)	Exhaust PM2.5 (kgs/day)	Fugitive Dust PM2.5 (kgs/day)	CO2 (kgs/day)
Grubbing/Land Clearing	1.5	7.4	12.9	7.1	0.5	6.6	1.8	0.5	1.4	1,616.2
Grading/Excavation	2.0	9.7	17.0	7.3	0.7	6.6	2.0	0.7	1.4	2,628.7
Drainage/Utilities/Sub-Grade	1.2	5.6	9.0	7.0	0.5	6.6	1.8	0.4	1.4	1,210.8
Paving	0.0	1.4	0.1	0.0	0.0	-	0.0	0.0	-	5.8
Maximum (kilograms/day)	2.0	9.7	17.0	7.3	0.7	6.6	2.0	0.7	1.4	2,628.7
Total (megagrams/construction project)	0.2	0.8	1.3	0.7	0.1	0.6	0.2	0.1	0.1	194.1

Notes: Project Start Year -> 2013
Project Length (months) -> 5
Total Project Area (hectares) -> 2
Maximum Area Disturbed/Day (hectares) -> 1
Total Soil Imported/Exported (meters ^{3}/day)-> 0

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sume of exhaust and fugitive dust emissions shown in columns K and L.

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Urbemis 2007 Version 9.2.4

Summary Report for Winter Emissions (Pounds/Day)

File Name: J:\Client-Projects\BottleRock\60148217\Documents_Reports\Working_reports\Draft AQ Section\Calculations\EastPad.urb924

Project Name: East Pad Construction

Project Location: California State-wide

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2013 TOTALS (lbs/day unmitigated)	9.32	86.56	46.48	0.07	38.26	3.79	42.05	8.02	3.49	11.51	13,584.95
2013 TOTALS (lbs/day mitigated)	9.32	86.56	46.48	0.07	6.25	3.79	10.04	1.34	3.49	4.82	13,584.95

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Urbemis 2007 Version 9.2.4

Detail Report for Summer Construction Mitigated Emissions (Pounds/Day)

File Name: J:\Client-Projects\BottleRock\60148217\Documents_Reports\Working_reports\Draft AQ Section\Calculations\EastPad.urb924

Project Name: West Pad Construction

Project Location: California State-wide

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES (Summer Pounds Per Day, Mitigated)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Time Slice 1/6/2013-3/31/2013 Active Days: 85	**7.61**	**63.25**	**40.55**	**0.03**	7.32	**3.07**	10.39	1.55	**2.82**	4.37	**9,556.32**
Building 01/06/2013-03/31/2013	1.46	11.58	12.76	0.01	0.06	0.60	0.66	0.02	0.55	0.57	2,476.74
Building Off Road Diesel	0.99	7.52	4.67	0.00	0.00	0.44	0.44	0.00	0.40	0.40	924.82
Building Vendor Trips	0.31	3.78	2.98	0.01	0.03	0.15	0.18	0.01	0.13	0.15	953.25
Building Worker Trips	0.16	0.27	5.11	0.01	0.03	0.02	0.05	0.01	0.01	0.02	598.67
Mass Grading 01/06/2013-03/31/2013	6.15	51.67	27.79	0.02	7.26	2.47	9.73	1.52	2.27	3.80	7,079.58
Mass Grading Dust	0.00	0.00	0.00	0.00	7.19	0.00	7.19	1.50	0.00	1.50	0.00
Mass Grading Off Road Diesel	5.45	42.62	22.89	0.00	0.00	2.13	2.13	0.00	1.96	1.96	5,132.20
Mass Grading On Road Diesel	0.64	8.95	3.15	0.02	0.06	0.33	0.39	0.02	0.31	0.33	1,742.86
Mass Grading Worker Trips	0.05	0.09	1.75	0.00	0.01	0.01	0.02	0.00	0.00	0.01	204.52

Construction Related Mitigation Measures

The following mitigation measures apply to Phase: Mass Grading 1/6/2013 - 3/31/2013 - Remove Topsoil

For Soil Stablizing Measures, the Replace ground cover in disturbed areas quickly mitigation reduces emissions by:

PM10: 5% PM25: 5%

For Soil Stablizing Measures, the Water exposed surfaces 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Soil Stablizing Measures, the Equipment loading/unloading mitigation reduces emissions by:

PM10: 69% PM25: 69%

For Unpaved Roads Measures, the Reduce speed on unpaved roads to less than 15 mph mitigation reduces emissions by:

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PM10: 44% PM25: 44%

For Unpaved Roads Measures, the Manage haul road dust 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

Phase Assumptions

Phase: Mass Grading 1/6/2013 - 3/31/2013 - Remove Topsoil

Total Acres Disturbed: 9.12

Maximum Daily Acreage Disturbed: 2.28

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 432.9

Off-Road Equipment:

1 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day

1 Graders (174 hp) operating at a 0.61 load factor for 6 hours per day

1 Off Highway Trucks (479 hp) operating at a 0.57 load factor for 8 hours per day

1 Rollers (95 hp) operating at a 0.56 load factor for 8 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day

1 Rubber Tired Loaders (164 hp) operating at a 0.54 load factor for 8 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Building Construction 1/6/2013 - 3/31/2013 - Telemetry and Control Building construction

Off-Road Equipment:

1 Cement and Mortar Mixers (10 hp) operating at a 0.56 load factor for 8 hours per day

1 Cranes (399 hp) operating at a 0.43 load factor for 4 hours per day

2 Forklifts (145 hp) operating at a 0.3 load factor for 6 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

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Urbemis 2007 Version 9.2.4

Summary Report for Annual Emissions (Tons/Year)

File Name: J:\Client-Projects\BottleRock\60148217\Documents_Reports\Working_reports\Draft AQ Section\Calculations\EastPad.urb924

Project Name: West Pad Construction

Project Location: California State-wide

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2013 TOTALS (tons/year unmitigated)	0.32	2.69	1.72	0.00	1.94	0.13	2.07	0.41	0.12	0.53	406.14
2013 TOTALS (tons/year mitigated)	0.32	2.69	1.72	0.00	0.31	0.13	0.44	0.07	0.12	0.19	406.14
Percent Reduction	0.00	0.00	0.00	0.00	83.99	0.00	78.71	83.83	0.00	64.75	0.00

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Urbemis 2007 Version 9.2.4

Detail Report for Annual Construction Mitigated Emissions (Tons/Year)

File Name: J:\Client-Projects\BottleRock\60148217\Documents_Reports\Working_reports\Draft AQ Section\Calculations\EastPad.urb924

Project Name: East Pad Construction

Project Location: California State-wide

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES (Annual Tons Per Year, Mitigated)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
2013	0.40	3.68	1.98	0.00	0.27	0.16	0.43	0.06	0.15	0.21	577.36
Building 01/06/2013-03/31/2013	0.06	0.48	0.53	0.00	0.00	0.03	0.03	0.00	0.02	0.02	103.93
Building Off Road Diesel	0.04	0.31	0.19	0.00	0.00	0.02	0.02	0.00	0.02	0.02	37.97
Building Vendor Trips	0.01	0.16	0.13	0.00	0.00	0.01	0.01	0.00	0.01	0.01	40.51
Building Worker Trips	0.01	0.01	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.44
Mass Grading 01/06/2013-03/31/2013	0.34	3.20	1.44	0.00	0.26	0.14	0.40	0.06	0.13	0.18	473.43
Mass Grading Dust	0.00	0.00	0.00	0.00	0.25	0.00	0.25	0.05	0.00	0.05	0.00
Mass Grading Off Road Diesel	0.25	2.05	0.97	0.00	0.00	0.09	0.09	0.00	0.09	0.09	243.61
Mass Grading On Road Diesel	0.08	1.14	0.40	0.00	0.01	0.04	0.05	0.00	0.04	0.04	222.21
Mass Grading Worker Trips	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.61

Construction Related Mitigation Measures

The following mitigation measures apply to Phase: Mass Grading 1/6/2013 - 3/31/2013 - Majority of Site Work. Clearing, grubbing, grading, etc.
For Soil Stablizing Measures, the Replace ground cover in disturbed areas quickly mitigation reduces emissions by:

PM10: 5% PM25: 5%

For Soil Stablizing Measures, the Water exposed surfaces 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Soil Stablizing Measures, the Equipment loading/unloading mitigation reduces emissions by:

PM10: 69% PM25: 69%

For Unpaved Roads Measures, the Reduce speed on unpaved roads to less than 15 mph mitigation reduces emissions by:

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PM10: 44% PM25: 44%

For Unpaved Roads Measures, the Manage haul road dust 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

Phase Assumptions

Phase: Mass Grading 1/6/2013 - 3/31/2013 - Majority of Site Work. Clearing, grubbing, grading, etc.

Total Acres Disturbed: 7.6

Maximum Daily Acreage Disturbed: 1.9

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 1298.7

Off-Road Equipment:

1 Graders (174 hp) operating at a 0.61 load factor for 6 hours per day

1 Off Highway Trucks (479 hp) operating at a 0.57 load factor for 8 hours per day

1 Rollers (95 hp) operating at a 0.56 load factor for 8 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day

1 Scrapers (313 hp) operating at a 0.72 load factor for 8 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Building Construction 1/6/2013 - 3/31/2013 - Telemetry and Control Building construction. Assumed simultaneous construction

Off-Road Equipment:

1 Cranes (399 hp) operating at a 0.43 load factor for 4 hours per day

2 Forklifts (145 hp) operating at a 0.3 load factor for 6 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

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Urbemis 2007 Version 9.2.4

Summary Report for Summer Emissions (Pounds/Day)

File Name: J:\Client-Projects\BottleRock\60148217\Documents_Reports\Working_reports\Draft AQ Section\Calculations\Pad Construction.urb924

Project Name: West Pad Construction

Project Location: California State-wide

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2013 TOTALS (lbs/day unmitigated)	7.61	63.25	40.55	0.03	45.73	3.07	48.80	9.57	2.82	12.39	9,556.32
2013 TOTALS (lbs/day mitigated)	7.61	63.25	40.55	0.03	7.32	3.07	10.39	1.55	2.82	4.37	9,556.32

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Urbemis 2007 Version 9.2.4

Detail Report for Winter Construction Mitigated Emissions (Pounds/Day)

File Name: J:\Client-Projects\BottleRock\60148217\Documents_Reports\Working_reports\Draft AQ Section\Calculations\Pad Construction.urb924

Project Name: West Pad Construction

Project Location: California State-wide

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES (Winter Pounds Per Day, Mitigated)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Time Slice 1/6/2013-3/31/2013 Active Days: 85	**7.61**	**63.25**	**40.55**	**0.03**	7.32	**3.07**	10.39	1.55	**2.82**	4.37	**9,556.32**
Building 01/06/2013-03/31/2013	1.46	11.58	12.76	0.01	0.06	0.60	0.66	0.02	0.55	0.57	2,476.74
Building Off Road Diesel	0.99	7.52	4.67	0.00	0.00	0.44	0.44	0.00	0.40	0.40	924.82
Building Vendor Trips	0.31	3.78	2.98	0.01	0.03	0.15	0.18	0.01	0.13	0.15	953.25
Building Worker Trips	0.16	0.27	5.11	0.01	0.03	0.02	0.05	0.01	0.01	0.02	598.67
Mass Grading 01/06/2013-03/31/2013	6.15	51.67	27.79	0.02	7.26	2.47	9.73	1.52	2.27	3.80	7,079.58
Mass Grading Dust	0.00	0.00	0.00	0.00	7.19	0.00	7.19	1.50	0.00	1.50	0.00
Mass Grading Off Road Diesel	5.45	42.62	22.89	0.00	0.00	2.13	2.13	0.00	1.96	1.96	5,132.20
Mass Grading On Road Diesel	0.64	8.95	3.15	0.02	0.06	0.33	0.39	0.02	0.31	0.33	1,742.86
Mass Grading Worker Trips	0.05	0.09	1.75	0.00	0.01	0.01	0.02	0.00	0.00	0.01	204.52

Construction Related Mitigation Measures

The following mitigation measures apply to Phase: Mass Grading 1/6/2013 - 3/31/2013 - Remove Topsoil

For Soil Stablizing Measures, the Replace ground cover in disturbed areas quickly mitigation reduces emissions by:

PM10: 5% PM25: 5%

For Soil Stablizing Measures, the Water exposed surfaces 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Soil Stablizing Measures, the Equipment loading/unloading mitigation reduces emissions by:

PM10: 69% PM25: 69%

For Unpaved Roads Measures, the Reduce speed on unpaved roads to less than 15 mph mitigation reduces emissions by:

6/22/2010 4:49:01 PM

PM10: 44% PM25: 44%

For Unpaved Roads Measures, the Manage haul road dust 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

Phase Assumptions

Phase: Mass Grading 1/6/2013 - 3/31/2013 - Remove Topsoil

Total Acres Disturbed: 9.12

Maximum Daily Acreage Disturbed: 2.28

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 432.9

Off-Road Equipment:

1 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day

1 Graders (174 hp) operating at a 0.61 load factor for 6 hours per day

1 Off Highway Trucks (479 hp) operating at a 0.57 load factor for 8 hours per day

1 Rollers (95 hp) operating at a 0.56 load factor for 8 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day

1 Rubber Tired Loaders (164 hp) operating at a 0.54 load factor for 8 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Building Construction 1/6/2013 - 3/31/2013 - Telemetry and Control Building construction

Off-Road Equipment:

1 Cement and Mortar Mixers (10 hp) operating at a 0.56 load factor for 8 hours per day

1 Cranes (399 hp) operating at a 0.43 load factor for 4 hours per day

2 Forklifts (145 hp) operating at a 0.3 load factor for 6 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

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Urbemis 2007 Version 9.2.4

Summary Report for Annual Emissions (Tons/Year)

File Name: J:\Client-Projects\BottleRock\60148217\Documents_Reports\Working_reports\Draft AQ Section\Calculations\Pad Construction.urb924

Project Name: West Pad Construction

Project Location: California State-wide

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2013 TOTALS (tons/year unmitigated)	0.32	2.69	1.72	0.00	1.94	0.13	2.07	0.41	0.12	0.53	406.14
2013 TOTALS (tons/year mitigated)	0.32	2.69	1.72	0.00	0.31	0.13	0.44	0.07	0.12	0.19	406.14
Percent Reduction	0.00	0.00	0.00	0.00	83.99	0.00	78.71	83.83	0.00	64.75	0.00

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Urbemis 2007 Version 9.2.4

Detail Report for Annual Construction Mitigated Emissions (Tons/Year)

File Name: J:\Client-Projects\BottleRock\60148217\Documents_Reports\Working_reports\Draft AQ Section\Calculations\Pad Construction.urb924

Project Name: West Pad Construction

Project Location: California State-wide

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES (Annual Tons Per Year, Mitigated)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
2013	0.32	2.69	1.72	0.00	0.31	0.13	0.44	0.07	0.12	0.19	406.14
Building 01/06/2013-03/31/2013	0.06	0.49	0.54	0.00	0.00	0.03	0.03	0.00	0.02	0.02	105.26
Building Off Road Diesel	0.04	0.32	0.20	0.00	0.00	0.02	0.02	0.00	0.02	0.02	39.30
Building Vendor Trips	0.01	0.16	0.13	0.00	0.00	0.01	0.01	0.00	0.01	0.01	40.51
Building Worker Trips	0.01	0.01	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.44
Mass Grading 01/06/2013-03/31/2013	0.26	2.20	1.18	0.00	0.31	0.10	0.41	0.06	0.10	0.16	300.88
Mass Grading Dust	0.00	0.00	0.00	0.00	0.31	0.00	0.31	0.06	0.00	0.06	0.00
Mass Grading Off Road Diesel	0.23	1.81	0.97	0.00	0.00	0.09	0.09	0.00	0.08	0.08	218.12
Mass Grading On Road Diesel	0.03	0.38	0.13	0.00	0.00	0.01	0.02	0.00	0.01	0.01	74.07
Mass Grading Worker Trips	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.69

Construction Related Mitigation Measures

The following mitigation measures apply to Phase: Mass Grading 1/6/2013 - 3/31/2013 - Remove Topsoil

For Soil Stablizing Measures, the Replace ground cover in disturbed areas quickly mitigation reduces emissions by:

PM10: 5% PM25: 5%

For Soil Stablizing Measures, the Water exposed surfaces 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Soil Stablizing Measures, the Equipment loading/unloading mitigation reduces emissions by:

PM10: 69% PM25: 69%

For Unpaved Roads Measures, the Reduce speed on unpaved roads to less than 15 mph mitigation reduces emissions by:

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PM10: 44% PM25: 44%

For Unpaved Roads Measures, the Manage haul road dust 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

Phase Assumptions

Phase: Mass Grading 1/6/2013 - 3/31/2013 - Remove Topsoil

Total Acres Disturbed: 9.12

Maximum Daily Acreage Disturbed: 2.28

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 432.9

Off-Road Equipment:

1 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day

1 Graders (174 hp) operating at a 0.61 load factor for 6 hours per day

1 Off Highway Trucks (479 hp) operating at a 0.57 load factor for 8 hours per day

1 Rollers (95 hp) operating at a 0.56 load factor for 8 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day

1 Rubber Tired Loaders (164 hp) operating at a 0.54 load factor for 8 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Building Construction 1/6/2013 - 3/31/2013 - Telemetry and Control Building construction

Off-Road Equipment:

1 Cement and Mortar Mixers (10 hp) operating at a 0.56 load factor for 8 hours per day

1 Cranes (399 hp) operating at a 0.43 load factor for 4 hours per day

2 Forklifts (145 hp) operating at a 0.3 load factor for 6 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

Attachment C.2

Construction Emissions Calculations

Additional SOx Calculations from RoadMod

Table C.2-1 SOx Calculations from CO_2 Emissions				
	Pipeline Construction		Road Construction	
Max CO_2[1]	2,628.7	kg CO_2/day	4,672.6	kg CO_2/day
Total CO_2[1]	194.1	$MTCO_2$/yr	164.9	$MTCO_2$/yr
CO2 EF from Diesel Combustion	9.96	kg CO_2/gallon	9.96	kg CO_2/gallon
Calculated Max Daily Gallons	263.93	gallons/day	469.14	gallons/day
Calculated Annual Gallons	19,489.92	gallons/yr	16,555.03	gallons/yr
Sulfur in Diesel	15	ppmw	15	ppmw
Density of Diesel Fuel	7.2	lb/gallon	7.2	lb/gallon
Molcular Weight S	32	lb/lbmol	32	lb/lbmol
Molecular Weight SO_2	64	lb/lbmol	64	lb/lbmol
Max Sulfur Emission	0.06	lb/day	0.10	lb/day
Annual Sulfur Emissions	4.21	ton/yr	3.58	ton/yr

Notes:

[1]Assumes all CO_2 emissions come from diesel powered vehicles

Well Drilling Constants

Table C.2-2 Constants Used on Well Drilling Calculations		
Parameter	**Value**	**Unit**
Working hours per day	24	hours/day
Working days per week	7	days/week
Number of Well Pads	2	pads
Number of Wells per pad	12	wells/pad
Capacity of liquid carrying trucks	2000	gal/truck
Cement truck capacity	10	cu.yd/truck
Number of drill rigs operating simultaneously	2	rigs
Drilling time per well	90	days/well
Total personnel per drilling operation	15	people/pad
Total drilling personnel	30	pesonnel
Calculated Daily Fuel Consumption	5506	gal/day/drill rig
Proposed Daily Fuel Consumption	3000	gal/day/drill rig
Vehicle speed	15	miles/hr
Total Cement Required Per Well	311	cu.yd/well
Total Well Depth	11000	feet
Mud drilling Depth	7000	feet
Air Drilling Depth	4000	feet
Cement Casing depth	7000	feet
Time Required for Mud Drilling	57	days
Time Required for Air Drilling	33	days
Total Drilling Time	1080	days
Drilling Years	3	years
Wells drilled per year	8	wells/year

Emissions from Diesel-Fired Drill Rig Generator Engines

Table C-2-5a Drill Rig Engines Specification			
Rig Engine Specification	**ICE - CAT 3512 C**	**Unit**	**Data Source**
EPA/CARB Tier	2	---	Vendor data
Model Year	2006	---	Vendor data
Output Power	1100	kW @1200 RPM	Vendor data
Engine power	1476	bhp	Vendor data
Brake Specific Fuel Consumption	7000	Btu/hp-hr	AP-42
Number of engines	3	Engines/Rig	Vendor data
Fuel Specification	Diesel	---	---
Heating value	19,300	Btu/lb	AP-42
Fuel density	7.001	lb/gal	Vendor data
Sulfur content	0.0015	% by weight	BACT Standard
Fuel Consumption	5,506	gal/day/drill rig	Calculated
Proposed Fuel Consumption	3,000	gal/day/drill rig	Applicant Provided

Table C.2-3b Drill Rig Engine Emission Factors and Hourly Emissions					
Pollutant	**Diesel Engine Emission Factor**	**Units**	**Diesel Engine Hourly Emissions (lb/hr)**	**Maximum Hourly Emissions from 1 Drill Rig[4] (lb/hr)**	**Maximum Hourly Emissions from 2 Drill Rigs (lb/hr)**
NOx [1]	4.56	g/bhp-hr	14.8	44.5	89.0
ROG [1,2]	0.24	g/bhp-hr	0.78	2.34	4.69
CO [1]	2.6	g/bhp-hr	8.46	25.4	50.8
SO_2 [3]	0.005	g/bhp-hr	0.02	0.05	0.10
PM10 total [1]	0.15	g/bhp-hr	0.49	1.46	2.93
PM2.5	0.15	g/bhp-hr	0.49	1.46	2.93

Table C.2-3c Total Daily and Annual Drill Rig Emissions				
Pollutant	**Daily Emissions from 1 Drill Rig (lb/day)**	**Annual Emissions from 1 Drill Rig (tpy)**	**Total Daily Emissions from 2 Drill Rigs (lb/day)**	**Total Annual Emissions from 2 Drill Rigs (tpy)**
NOx	582	106	1,164	212
ROG	31	6	61	11
CO	332	61	664	121
SO_2	1	0	1.26	0.23
PM10	19	3	38	7
PM2.5	19	3	38	7

Table C.2-3d GHG Emissions from Drill Rig Engines			
Pollutant	**GHG Emission Factor**	**Emission Factor Unit**	**Annual GHG Emissions (MT/yr)**
CO_2	10.14	kg CO_2/gallon	4.08E+04
CH_4	3.00	g/MMBtu	1.63E+00
N_2O	0.60	g/MMBtu	3.26E-01
CO_2e	**---**	**---**	**4.09E+04**

NOTES:

1. ATCM Diesel Engine Emission Factors from California Code of Regulations, Title 13, Division 3, Chapter 9, Article 4, Section 2423
2. ROG = NHMC
3. The emission factor for SO_2 is derived from BSFC, heating value and fuel sulfur content and by assuming 100% of fuel sulfur is converted to SO_2
4. Each drill rig has three generator engines.

Particulate Emissions from Air Drilling

Table C.2-4 Particulate Emissions from Air Drilling of Wells		
Parameter	**Value**	**Units**
Well Bore Diameter	8.75	in
Well Bore Diameter	0.73	ft
Cross Sectional Area	0.42	sq. ft
Length of Well Drilled Using Air Drilling	4000	ft
Well Bore Volume	1,670.33	cu.ft
Blooie Line Cyclone Separator Efficiency	90%	
Emissions	167.03	cu.ft
Density of Graywacke	156	lb/cu.ft
PM emissions	26,057	lb/well
PM10 emissions rate	**1,592**	**lb/day**
PM10 emissions rate	**66**	**lb/hr**
PM10 emission rate	**106**	**tpy**

Motor Vehicle Emission Factors

Table C.2-5a Motor Vehicle Emission Factors

Vehicle Type	Vehicle Class	Emission Factors											
		CO (lb/mi)	ROG (lb/mi)	NOx (lb/mi)	SOx (lb/mi)	Exh. PM10 (lb/mi)	Fug. PM10 Unpaved (lb/mi)	Fug. PM10 Paved (lb/mi)	Diesel PM (lb/mi)	Exh. PM2.5 (lb/mi)	Fug. PM2.5 Unpaved (lb/mi)	Fug. PM2.5 Paved (lb/mi)	CO_2e (kg/mi)
On-Site Fuel Truck	MHD-DSL	5.53E-03	5.88E-04	2.31E-02	0.00E+00	7.06E-04	5.17E-01	8.37E-02	7.06E-04	6.49E-04	5.17E-02	3.82E-02	1.49E+00
On-Site Cement Trucks	HHD-DSL	9.26E-03	2.21E-03	3.18E-02	0.00E+00	1.05E-03	5.17E-01	8.39E-02	1.05E-03	9.68E-04	5.17E-02	3.83E-02	1.91E+00
On-Site Watering Trucks	HHD-DSL	9.26E-03	2.21E-03	3.18E-02	0.00E+00	1.05E-03	5.17E-01	8.39E-02	1.05E-03	9.68E-04	5.17E-02	3.83E-02	1.91E+00
Off-Site Construction Worker Commute	LDA-CAT	1.18E-02	1.26E-03	1.13E-03	7.33E-06	2.93E-05	1.99E-01	8.70E-04	0.00E+00	2.72E-05	1.99E-02	3.92E-04	3.71E-01
Off-Site Fuel Trucks	MHD-DSL	5.53E-03	5.88E-04	2.31E-02	0.00E+00	7.06E-04	1.99E-01	8.26E-04	7.06E-04	6.49E-04	1.99E-02	3.77E-04	1.49E+00
Off-Site Watering Trucks	HHD-DSL	9.26E-03	2.21E-03	3.18E-02	0.00E+00	1.05E-03	1.99E-01	1.04E-03	1.05E-03	9.68E-04	2.00E-02	4.48E-04	1.91E+00
Off-Site Cement Trucks	HHD-DSL	9.26E-03	2.21E-03	3.18E-02	0.00E+00	1.05E-03	1.99E-01	1.04E-03	1.05E-03	9.68E-04	2.00E-02	4.48E-04	1.91E+00

Note:

The emission factors, except fugitive emissions from entrained road dust, were compiled by running the California Air Resources Board's EMFAC2007(version 2.3) Burden Model and dividing calculated daily emissions by daily vehicle-miles-traveled.

All the emission factors account for the emissions from start, running and idling exhaust. In addition, the VOC emission factors take into account diurnal, hot soak, running and resting emissions, and fugitive PM10 and PM2.5 emission factors take into account tire and brake wear and entrained paved or unpaved road dust.

Emissions [pounds/day] = Emission factor [pounds/mile] x Vehicle miles traveled [miles/day]

Table C.2-5b Motor Vehicle Entrained Paved and UnPaved Road PM10 and PM2.5 Emission Factors

Vehicle Type	On-Road Average Vehicle Weight (tons)[1]	Road Type	Silt Loading Paved (%)[2]	PM10 Emission Factor Paved (lb/mi)[3]	PM2.5 Emission Factor Paved (lb/mi)[4]	Silt Content Unpaved Surafce (%)[5]	Controlled PM10 Emission Factor Unpaved (lb/mi)[6]	Controlled PM2.5 Emission Factor Unpaved (lb/mi)[7]
On-Site Fleet Average	20	Local	0.32	0.0837	0.0382	8.5	0.5165	0.0517
Off-Site Fleet Average	2.4	Collector	0.035	0.0008	0.0004	8.5	0.1989	0.0199

Notes:

[1] Average of 30 tons loaded and 10 tons empty weights for on-site trucks, From ARB Emission Inventory Methodology 7.9, Entrained Paved Road Dust (1997) Table 3 for Lake County for off-site tucks

[2] From ARB Emission Inventory Methodology 7.9, Entrained Paved Road Dust (1997)

[3] PM10 Emission factor [lb/mi] = 0.016 (Silt Loading/2)$^{0.65}$ (Weight/3)$^{1.5}$, Reference: ARB Emission Inventory Methodology 7.9, Entrained Paved Road Dust (1997)

[4] PM2.5 emission factor [lb/mi] = = 0.0073 x (Silt Loading/2)$^{0.65}$ (Weight/3)$^{1.5}$, Reference: ARB Emission Inventory Methodology 7.9, Entrained Paved Road Dust (1997)

[5] Reference: AP-42, Section 13.2.2, November 2006 for industrial unpaved roads, Table 13.2.2-1, Mean silt content for construction site

[6] PM10 Emission Factor [lb/mi] = 1.5 x (silt content [%] / 12)$^{0.9}$ x (vehicle weight [tons] / 3)$^{0.45}$ x (1-CE), Reference: AP-42, Section 13.2.2, November 2006 for industrial unpaved roads

Reduction from watering four times a day for unpaved road (CE) = 80% SCAQMD 1993 CEQA Air Quality Handbook, Table 11-4

[7] PM2.5 Emission Factor [lb/mi] = 0.15 x (silt content [%] / 12)$^{0.9}$ x (vehicle weight [tons] / 3)$^{0.45}$ x (1-CE), Reference: AP-42, Section 13.2.2, November 2006 for industrial unpaved roads

Emissions [pounds per day] = Controlled emission factor [pounds per mile] x Miles traveled [miles/day]

Vehicle Emissions from Well Drilling

Table C.2-6a Hourly Emissions from Vehicles Used During Well Drilling												
			Maximum Hourly Emissions									
Vehicle Type	Hourly Vehicle trips [1]	Miles Travelled/Vehicle Trip [2]	CO (lb/hr)	ROG (lb/hr)	NOx (lb/hr)	SOx (lb/hr)	PM10 Exhaust (lb/hr)	PM10 Fugitive (lb/hr)	Diesel PM (lb/hr)	PM2.5 Exhaust (lb/hr)	PM2.5 Fugitive (lb/hr)	CO_2e (kg/hr)
On-Site Fuel Truck	6	3	0.100	0.011	0.415	0.000	0.013	9.298	0.013	0.012	0.930	26.768
On-Site Cement Trucks	1	3	0.028	0.007	0.095	0.000	0.003	1.550	0.003	0.003	0.155	5.716
On-Site Watering Trucks	2	5	0.093	0.022	0.318	0.000	0.011	5.167	0.011	0.010	0.517	19.054
Off-Site Construction Worker Commute	30	35	12.348	1.327	1.186	0.008	0.031	0.913	0.000	0.029	0.412	389.091
Off-Site Fuel Trucks	6	30	0.995	0.106	4.151	0.000	0.127	0.149	0.127	0.117	0.068	267.680
Off-Site Watering Trucks	2	30	0.556	0.133	1.907	0.000	0.063	0.062	0.063	0.058	0.027	114.326
Off-Site Cement Trucks	1	30	0.278	0.066	0.954	0.000	0.032	0.031	0.032	0.029	0.013	57.163
Total Onsite			**0.220**	**0.039**	**0.828**	**0.000**	**0.026**	**16.015**	**0.026**	**0.024**	**1.602**	**51.538**
Total Offsite			**14.177**	**1.632**	**8.198**	**0.008**	**0.253**	**1.155**	**0.222**	**0.233**	**0.520**	**828.259**

Notes:

[1] Hourly number of water truck trips assumed, other vehicle trips calculated based on material requirement, drilling time and truck capacity

[2] Miles travelled per trip assumed

Table C.2-6b Daily Emissions from Vehicles Used During Well Drilling												
			Maximum Daily Emissions									
Vehicle Type	Daily Vehicle trips [1]	Miles Travelled/Vehicle Round Trip [2]	CO (lb/day)	ROG (lb/day)	NOx (lb/day)	SOx (lb/day)	PM10 Exhaust (lb/day)	PM10 Fugitive (lb/day)	Diesel PM (lb/day)	PM2.5 Exhaust (lb/day)	PM2.5 Fugitive (lb/day)	CO_2e (kg/day)
On-Site Fuel Truck	6	3	0.100	0.011	0.415	0.000	0.013	9.298	0.013	0.012	0.930	26.768
On-Site Cement Trucks	1	3	0.028	0.007	0.095	0.000	0.003	1.550	0.003	0.003	0.155	5.716
On-Site Watering Trucks	2	20	0.371	0.088	1.272	0.000	0.042	20.670	0.042	0.039	2.069	76.217
Off-Site Construction Worker Commute	30	70	24.697	2.655	2.372	0.015	0.062	1.826	0.000	0.057	0.824	778.182
Off-Site Fuel Trucks	6	60	1.991	0.212	8.301	0.000	0.254	0.297	0.254	0.234	0.136	535.359
Off-Site Watering Trucks	2	60	1.112	0.265	3.815	0.000	0.126	0.124	0.126	0.116	0.054	228.651
Off-Site Cement Trucks	1	60	0.556	0.133	1.907	0.000	0.063	0.062	0.063	0.058	0.027	114.326
Total Onsite			**0.498**	**0.106**	**1.782**	**0.000**	**0.058**	**31.517**	**0.058**	**0.053**	**3.154**	**108.701**
Total Offsite			**28.355**	**3.264**	**16.395**	**0.015**	**0.505**	**2.310**	**0.444**	**0.465**	**1.040**	**1656.518**

Notes:

[1] Daily number of water truck trips assumed, other vehicle trips calculated based on material requirement, drilling time and truck capacity

[2] Average miles per vehicle trip assumed for on-site fuel and cement trucks, daily mileage for water trucks based on 4 times per day watering frequency, For offiste vehicles daily VMT is the round trip distance = twice of hourly VMT

Vehicle Emissions from Well Drilling

Table C.2-6c Annual Emissions from Vehicles Used During Well Drilling												
			Annual Emissions									
Vehicle Type	**Annual Vehicles trips [1]**	**Miles Travelled/Vehicle Round Trip [2]**	**CO (tpy)**	**ROG (tpy)**	**NOx (tpy)**	**SOx (tpy)**	**PM10 Exhaust (tpy)**	**PM10 Fugitive (tpy)**	**Diesel PM (tpy)**	**PM2.5 Exhaust (tpy)**	**PM2.5 Fugitive (tpy)**	**CO_2e (MT/yr)**
On-Site Fuel Truck	2010	3	0.017	0.002	0.070	0.000	0.002	1.557	0.002	0.002	0.156	8.967
On-Site Cement Trucks	252	3	0.004	0.001	0.012	0.000	0.000	0.195	0.000	0.000	0.020	1.441
On-Site Watering Trucks	730	20	0.068	0.016	0.232	0.000	0.008	3.772	0.008	0.007	0.378	27.819
Off-Site Construction Worker Commute	10950	70	4.507	0.484	0.433	0.003	0.011	0.333	0.000	0.010	0.150	284.037
Off-Site Fuel Trucks	2010	60	0.333	0.035	1.390	0.000	0.043	0.050	0.043	0.039	0.023	179.345
Off-Site Watering Trucks	730	60	0.203	0.048	0.696	0.000	0.023	0.023	0.023	0.021	0.010	83.458
Off-Site Cement Trucks	252	60	0.070	0.017	0.240	0.000	0.008	0.008	0.008	0.007	0.003	28.810
Total Onsite			**0.088**	**0.019**	**0.314**	**0.000**	**0.010**	**5.525**	**0.010**	**0.009**	**0.553**	**38.227**
Total Offsite			**5.113**	**0.585**	**2.760**	**0.003**	**0.085**	**0.414**	**0.074**	**0.078**	**0.186**	**575.649**

Notes:

[1] Annual number of water truck trips = Daily trips x 365, other vehicle trips calculated based on material requirement, drilling time and truck capacity

[2] Average miles per vehicle trip assumed for on-site fuel and cement trucks, daily VMT for water trucks based on 4 times per day watering frequency, for offiste vehicles - round trip distance = twice of hourly VMT

Emissions From Well Venting and Flow Testing

Table C.2-7a Reference Parameters		
Max Steam Flow Rate During Testing	40,000	lb/hr/well
Maximum Daily Test Duration	24	hr/day
Average Test Duration	48	hrs/test/well
Number of Vented	1	wells/event
Number of Events	12	events/year
Average NCG/Steam Ratio	10,534.0	ppmw
Permitted H_2S Limit	5	lb/hr
Control Efficiency of Water Spray	75	% NH_3
Pounds per Metric Ton	2,204.62	lb/MT

Table C.2-7b Component Flow Rates Per Well			
NCG Component	**Average Component/Steam Ratio (ppmw)**	**Average Component/NCG Mass Fraction (lb/lb NCG)**	**Component Mass Flowrate (lb/hr)**
CO_2	8.84E+03	8.39E-01	3.54E+02
H_2S	4.00E+02	3.80E-02	1.60E+01
NH_3	2.35E+02	2.23E-02	9.41E+00
Ar	1.03E+00	9.73E-05	4.10E-02
N_2	1.14E+02	1.09E-02	4.57E+00
CH_4	2.69E+02	2.55E-02	1.07E+01
H_2	1.42E+02	1.35E-02	5.67E+00
He	5.30E+02	5.03E-02	2.12E+01
O_2	4.65E-01	4.41E-05	1.86E-02
B	2.18E+01	---	8.72E-01
As	5.50E-02	---	2.20E-03
Hg	1.58E-02	---	6.32E-04

Table C.2-7d Emissions Calculations				
Pollutant	**Maximum Hourly Emissions Per Well (lb/hr/well)**	**Maximum Hourly Emissions (lb/hr)**	**Maximum Daily Emissions (lb/day)**	**Maximum Annual Emissions (ton/yr)**
H_2S	5.00E+00	5.00E+00	1.20E+02	1.44E+00
NH_3	9.41E+00	2.35E+00	5.64E+01	6.77E-01
B	8.72E-01	8.72E-01	2.09E+01	2.51E-01
As	2.20E-03	2.20E-03	5.28E-02	6.34E-04
Hg	6.32E-04	6.32E-04	1.52E-02	1.82E-04

Table C.2-7e GHG Calculations from Well Venting		
Pollutant	**Component Mass Flowrate (lb/hr)**	**Annual GHG Emissions (MT/yr)**
CO2	3.54E+02	9.24E+01
CH4	1.07E+01	2.81E+00
CO2e	---	1.51E+02

Summary of Emissions from Well Drilling

Table C.2-8a Summary - Hourly Drilling Emissions							
		Sources					Max Hourly Emission
		Drill Rig	Vehicles		Air Drilling	Well Venting	
Pollutant	Unit		Onsite	Offsite			
NOx	lb/hr	89.03	0.83	8.20	---	---	98.05
ROG	lb/hr	4.69	0.04	1.63	---	---	6.36
CO	lb/hr	50.76	0.22	14.18	---	---	65.16
SO_2	lb/hr	0.10	0.00	0.01	---	---	0.10
PM10	lb/hr	2.93	0.03	0.25	66.35	---	69.56
PM2.5	lb/hr	2.93	0.02	0.23	66.35	---	69.53
Fugitive PM10	lb/hr	---	16.02	1.15	---	---	17.17
Fugitive PM2.5	lb/hr	---	0.00	0.52	---	---	0.52
H_2S	lb/hr	---	---	---	---	5.00	5.00

Table C.2-8b Summary - Daily Drilling Emissions							
		Sources					Max Daily Emission
		Drill Rig	Vehicles		Air Drilling	Well Venting	
Pollutant	Unit		Onsite	Offsite			
NOx	lb/day	1164.3	1.8	16.4	---	---	1182.5
ROG	lb/day	61.3	0.1	3.3	---	---	64.6
CO	lb/day	663.9	0.5	28.4	---	---	692.7
SO_2	lb/day	1.3	0.0	0.0	---	---	1.3
PM10	lb/day	38.3	0.1	0.5	1592.4	---	1631.2
PM2.5	lb/day	38.3	0.1	0.5	1592.4	---	1631.2
Fugitive PM10	lb/day	---	31.5	2.3	---	---	33.8
Fugitive PM2.5	lb/day	---	3.2	1.0	---	---	4.2
H_2S	lb/day	---	---	---	---	120.0	120.0

Table C.2-8c Summary - Annual Drilling Emissions							
		Sources					Total Annual Emission
		Drill Rig	Vehicles		Air Drilling	Well Venting	
Pollutant	Unit		Onsite	Offsite			
NOx	tons/yr	212	0.3	2.8	---	---	216
ROG	tons/yr	11	0.0	0.6	---	---	12
CO	tons/yr	121	0.1	5	---	---	126
SO_2	tons/yr	0.23	0.0000	0.003	---	---	0
PM10	tons/yr	7	0	0.1	106	---	113
PM2.5	tons/yr	7	0.0	0.1	106	---	113
Fugitive PM10	tons/yr	---	5.5	0.2	---	---	6
Fugitive PM2.5	tons/yr	---	0.6	0.4	---	---	1
H_2S	tons/yr	---	---	---	---	1	1
CO_2e	tons/yr	40,888	38	576		151	41,654

Summary of Construction Emissions

Table C.2-9a Summary of Maximum Daily Emissions (lb/day)										
Construction Phase	**VOC**	**NOx**	**CO**	**SO2**	**PM10 Exhaust**	**PM10 Dust**	**Total PM10**	**PM2.5 Exhaust**	**PM2.5 Dust**	**Total PM2.5**
Year 1										
East Pad	9.32	86.56	46.48	0.07	3.79	6.25	3.79	3.49	1.34	4.82
West Pad	7.61	63.25	40.55	0.03	3.07	7.32	3.07	3.82	1.55	4.37
Pipeline	4.49	37.46	21.24	0.06	1.60	14.48	1.60	1.45	3.01	4.46
Access Road	9.10	68.88	71.42	0.10	3.00	14.48	3.00	2.64	3.01	5.65
Construction	**30.52**	**256.14**	**179.69**	**0.26**	**11.47**	**42.52**	**11.47**	**11.40**	**8.91**	**19.30**
Year 2										
Drilling/Well Venting/Flow Testing	64.65	1,182.47	692.70	1.28	1,631.25	33.83	1,631.25	1,631.20	4.19	1,631.20
Max Daily	**64.65**	**1,182.47**	**692.70**	**1.28**	**1,631.25**	**42.52**	**1,631.25**	**1,631.20**	**8.91**	**1,631.20**

Table C.2-9b Annual Emissions (ton/yr)											
Construction Phase	**VOC**	**NOx**	**CO**	**SO2**	**PM10 Exhaust**	**PM10 Dust**	**Total PM10**	**PM2.5 Exhaust**	**PM2.5 Dust**	**Total PM2.5**	**CO_2 (MT/yr)**
Year 1											
East Pad	0.40	3.68	1.98	0.00	0.16	0.27	0.43	0.14	0.06	0.21	524
West Pad	0.32	2.69	1.72	0.00	0.13	0.31	0.44	0.12	0.07	0.19	368
Pipeline	0.18	1.46	0.84	4.21	0.06	0.69	0.75	0.06	0.14	0.20	194
Access Road	0.17	1.28	1.14	3.58	0.06	0.35	0.40	0.05	0.07	0.12	165
Year 1 Total	**1.07**	**9.11**	**5.69**	**7.79**	**0.41**	**1.62**	**2.03**	**0.37**	**0.35**	**0.73**	**1251**
Year 2											
Drilling/Well Venting/Flow Testing	11.79	215.56	126.35	0.23	112.76	5.71	118.47	112.75	0.97	113.72	41,654
Max Annual	**11.79**	**215.56**	**126.35**	**7.79**	**112.76**	**5.71**	**118.47**	**112.75**	**0.97**	**113.72**	**41,654**

Attachment C.3

Operational Emissions Calculations

Steam Characterization

Table C.3-1a Calculated Averages for Each Well											
Well Name	**CO2 ppmw**	**H2S ppmw**	**NH3 ppmw**	**Ar ppmw**	**N2 ppmw**	**CH4 ppmw**	**H2 ppmw**	**He ppmw**	**O2 ppmw**	**NCG ppmw**	**Total ppmw**
average ppmw[1]	8.84E+03	4.00E+02	2.35E+02	1.03E+00	1.14E+02	2.69E+02	1.42E+02	5.30E+02	4.65E-01	9.83E+03	1.05E+04
Average lb component/lb NCG	8.39E-01	3.80E-02	2.23E-02	9.73E-05	1.09E-02	2.55E-02	1.35E-02	5.03E-02	4.41E-05	----	1.00E+00

Table C.3-1b Metals in Steam					
	Well 1	**Well 2**	**Well 3**	**Well 4**	**Average Concentrations used in Calculations**
Boron (ppmw)	0.5, 14	31, 30	---	29	21.8
Arsenic (ppbw)	<10			<100	55
Mercury (ppbw)	19	4,8	25, 8.8	<30	15.8

Notes:

1. Calculated from values presented in E*valuation of the Geothermal Resources Steam Quality and Seismicity for the Bottle Rock Power Expansion Project at The Geysers Geothermal Field, California*

Startup/Shutdown Emissions

Table C.3-2a Reference Parameters		
BRP Current Generation	18.5	MW
BRP Full Capacity	55	MW
Maximum Number of New Wells	22	wells
Maximum Shutdown Time	0.75	hrs/event
Maximum Startup Time	0.75	hrs/event
Number of Startup/Shutdown Events	10	events/yr
Average NCG content	10534	ppmw
Permitted H2S Limit	5	lb/hr
Assumed Control Effiiencey of Water Spray for NH3	75	percent
Pounds per Metric Ton	2204.62	lb/MT

Table C.3-2b Startup/Shutdown Flowrates			
NCG Component	**Average Component Concentration (ppmw)**	**Average Component/ NCG Mass Fraction (lb/lb NCG)**	**Maximum Flow Rate (lb/hr)**
CO_2	8.84E+03	8.39E-01	5.65E+03
H_2S	4.00E+02	3.80E-02	2.56E+02
NH_3	2.35E+02	2.23E-02	1.50E+02
Ar	1.03E+00	9.73E-05	6.55E-01
N_2	1.14E+02	1.09E-02	7.30E+01
CH_4	2.69E+02	2.55E-02	1.72E+02
H_2	1.42E+02	1.35E-02	9.06E+01
He	5.30E+02	5.03E-02	3.38E+02
O_2	4.65E-01	4.41E-05	2.97E-01
B	21.8	---	1.39E+01
As	0.055	---	3.51E-02
Hg	0.0158	---	1.01E-02

Table C.3-2c Emissions from Start/Shutdown							
Pollutant	**Component Mass Flowrate (lb/hr)**	**Maximum H_2S to Abate (lb/hr)**	**Calculated Uncontrolled Emissions (lb/event)**	**Controlled Emissions (lb/event)**	**Maximum Hourly Emissions (lb/hr)**	**Maximum Daily Emissions (lb/day)**	**Annual Emissions (ton/yr)**
H_2S	2.56E+02	2.51E+02	3.83E+02	7.50E+00	3.75E+00	7.50E+00	3.75E-02
NH_3	1.50E+02	---	2.25E+02	5.63E+01	2.82E+01	5.63E+01	2.82E-01
B	1.39E+01	---	2.09E+01	2.09E+01	1.04E+01	2.09E+01	1.04E-01
As	3.51E-02	---	5.27E-02	5.27E-02	2.63E-02	5.27E-02	2.63E-04
Hg	1.01E-02	---	1.51E-02	1.51E-02	7.57E-03	1.51E-02	7.57E-05

Table C.3-2d GHG Emissions from Startup/Shutdown		
Pollutant	**Component Mass Flowrate (lb/hr)**	**Annual GHG Emissions (MT/yr)**
CO_2	5.65E+03	3.84E+01
CH_4	1.72E+02	1.17E+00
CO_2e	---	6.29E+01

b

Emergency Engine Criteria Pollutant Emission Calculations

Table C.3-3a Default Emission Factors for Propane Engines		
Pollutant	**Emission Factor**	**Unit**
NOx	139	lb/1000 gal
VOC	83	lb/1000 gal
CO	129	lb/1000 gal
SOx	0.35	lb/1000 gal
PM10	5	lb/1000 gal

Table C.3-3b Propane Generator Engine Data		
Horsepower	1006	hp
Daily Hours	1	hr/day
Annual Hours	50	hr/yr
Fuel Use[2]	109.9	gal/hr
	5,497	gal/yr

Table C.3-3c Reference Data		
Parameter	**Value**	**Units**
Fuel Consumption	10,000	Btu/hp-hr
Sulfur Content	15	ppmw
Heating Value Propane	91,500	Btu/gal
Density Diesel	4.2	lb/gal
Conversion kg to lbs	0.454	kg/lb
Conversion g to lbs	454	g/lb
Conversion lb to tons	2,000	lb/ton
Conversion lb to MT	2,205	lb/MT
Conversion g to MT	1,000,000	g/MT
Molecular Weight S	32	lb/mol
Molecular Weight SO_2	64	lb/mol

Table C.3-3d Emissions for Propane Powered Emergency Generator			
Pollutant	**Max Hourly (lb/hr)**	**Max Daily (lb/day)**	**Annual (ton/yr)**
NOx	15.28	15.28	0.382
VOC	9.13	9.13	0.228
CO	14.18	14.18	0.355
SOx	0.04	0.04	0.001
PM10	0.55	0.55	0.014
PM2.5	0.55	0.55	0.014

Table C.3-3e TAC Emissions from Emergency Generator			
TAC	**Emission Factors[1] (lb/1000 gallon)**	**Max Hourly (lb/hr)**	**Annual (lb/yr)**
Benzene	1.43E-01	1.57E-02	7.86E-01
1,3-Butadiene	6.00E-02	6.60E-03	3.30E-01
Carbon Tetrachloride	1.60E-03	1.76E-04	8.80E-03
Ethlyene Dibromide	1.93E-03	2.12E-04	1.06E-02
1,2-Dichloroethane	1.02E-03	1.12E-04	5.61E-03
Formaldehyde	1.86E+00	2.04E-01	1.02E+01
Methylene Chloride	3.73E-03	4.10E-04	2.05E-02
PAHs	8.79E-03	9.66E-04	4.83E-02
Vinyl Chlorine	6.50E-04	7.15E-05	3.57E-03
Ammonia	3.00E-01	3.30E-02	1.65E+00
Total TACs	**---**	**2.62E-01**	**1.31E+01**

Table C.3-3f Emissions for Propane Powered Emergency Generator				
Pollutant[3]	**Emission Factor**	**Emission Factor Unit**	**Global Warming Potential**	**Annual GHG Emissions (MT/yr)**
CO_2	5.74	kg/gallon	1	63.109
CH_4	1.00	g/MMBtu	21	0.001
N_2O	0.10	g/MMBtu	310	0.000
CO_2e	---	---	---	63.161

Notes:

[1]Emission Factors taken from SCAQMD General Instruction Book for the AQMD 2007-2008 Six-Month Transisiontal Emissions Reporting Program

[2] Calculated fuel usage.

[3]GHG emission factors taken from ARB Mandatory Reporting, Appendix A

Motor Vehicle Emission Factors

Table C.3-4a Motor Vehicle Emission Factors

Vehicle Type	Vehicle Class	EMFAC Emission Factors									
		CO (lb/mi)	ROG (lb/mi)	NO_x (lb/mi)	SO_x (lb/mi)	PM10 Exh (lb/mi)	PM10 Tire + Brake (lb/mi)	PM2.5 Exh (lb/mi)	PM2.5 Tire + Brake (lb/mi)	CO_2 (kg/mi)	CO_2e (kg/mi)
On-Site Pickup Truck	LDT1-CAT	2.49E-02	2.80E-03	2.26E-03	9.52E-06	4.29E-05	4.76E-05	3.98E-05	1.70E-05	4.55E-01	4.58E-01

Note:

The emission factors, except fugitive emissions from entrained road dust, were compiled by running the California Air Resources Board's EMFAC2007(version 2.3) Burden Model and dividing calculated daily emissions by daily vehicle-miles-traveled.

All the emission factors account for the emissions from start, running and idling exhaust. In addition, the VOC emission factors take into account diurnal, hot soak, running and resting emissions, and fugitive PM10 and PM2.5 emission factors take into account tire and brake wear and entrained paved or unpaved road dust.

Emissions [pounds/day] = Emission factor [pounds/mile] x Vehicle miles traveled [miles/day]

Table C.3-4b Motor Vehicle Entrained Paved and UnPaved Road PM10 and PM2.5 Emission Factors

Vehicle Type	On-Road Average Vehicle Weight (tons)[1]	Road Type	Silt Loading Paved (%)[2]	PM10 Emission Factor Paved (lb/mi)[3]	PM2.5 Emission Factor Paved (lb/mi)[4]	Silt Content Unpaved Surafce (%)[5]	Controlled PM10 Emission Factor Unpaved (lb/mi)[6]	Controlled PM2.5 Emission Factor Unpaved (lb/mi)[7]
Off-Site Fleet Average	2.4	Collector	0.035	0.0008	0.0004	8.5	0.1989	0.0199

Notes:

[1] Average of 30 tons loaded and 10 tons empty weights for on-site trucks, From ARB Emission Inventory Methodology 7.9, Entrained Paved Road Dust (1997) Table 3 for Lake County for off-site tucks

[2] From ARB Emission Inventory Methodology 7.9, Entrained Paved Road Dust (1997)

[3] PM10 Emission factor [lb/mi] = 0.016 (Silt Loading/2)$^{0.65}$ (Weight/3)$^{1.5}$, Reference: ARB Emission Inventory Methodology 7.9, Entrained Paved Road Dust (1997)

[4] PM2.5 emission factor [lb/mi] = = 0.0073 x (Silt Loading/2)$^{0.65}$ (Weight/3)$^{1.5}$, Reference: ARB Emission Inventory Methodology 7.9, Entrained Paved Road Dust (1997)

[5] Reference: AP-42, Section 13.2.2, November 2006 for industrial unpaved roads, Table 13.2.2-1, Mean silt content for construction site

[6] PM10 Emission Factor [lb/mi] = 1.5 x (silt content [%] / 12)$^{0.9}$ x (vehicle weight [tons] / 3)$^{0.45}$ x (1-CE), Reference: AP-42, Section 13.2.2, November 2006 for industrial unpaved roads

Reduction from watering four times a day for unpaved road (CE) = 80% SCAQMD 1993 CEQA Air Quality Handbook, Table 11-4

[7] PM2.5 Emission Factor [lb/mi] = 0.15 x (silt content [%] / 12)$^{0.9}$ x (vehicle weight [tons] / 3)$^{0.45}$ x (1-CE), Reference: AP-42, Section 13.2.2, November 2006 for industrial unpaved roads

Emissions [pounds per day] = Controlled emission factor [pounds per mile] x Miles traveled [miles/day]

Motor Vehicle Emission Factors

Table C.3-4c Reference Data		
Predicted Fuel Usage	9,865	gallons/year
CO_2 EF for CA Reformulated Gasoline	8.55	kg/gallon
Calculated Fuel Economy	5.32E-02	gallons/mi
Calculated Annual Mileage	1.85E+05	miles/year

Table C.3-4d Calculated Emissions from Vehicle Travel			
Mobile Source Emissions	**Hourly Emissions (lb/hr)**	**Daily Emissions (lb/day)**	**Annual Emissions (ton/yr)**
CO	12.66	12.66	2.31
ROC	1.43	1.43	0.26
NOx	1.15	1.15	0.21
SOx	0.005	0.005	0.001
PM10 Exh.	0.02	0.02	0.004
PM2.5 Exh.	0.02	0.02	0.004
Fugitive PM10	0.44	0.44	0.08
Fugitive PM2.5	0.20	0.20	0.04
CO_2e (MT/yr)	---	---	85.0

Summary of Project Emissions

Table C.3-5a Summary of Project Emissions							
	CO	VOC	NOx	SOx	PM10	PM2.5	H_2S
Hourly Emissions (lb/hr)							
Startup/Shutdown	---	---	---	---	---	---	3.75
Mobile Sources	12.66	1.43	1.15	0.00	0.02	0.02	---
Emergency Generators	14.18	9.13	15.28	0.04	0.55	0.55	---
Total	**26.84**	**10.55**	**16.43**	**0.04**	**0.57**	**0.57**	**3.75**
Daily Emissions (lb/day)							
Startup/Shutdown	---	---	---	---	---	---	7.50
Mobile Sources	12.66	1.43	1.15	0.00	0.02	0.02	---
Emergency Generators	14.18	9.13	15.28	0.04	0.55	0.55	---
Total	**26.84**	**10.55**	**16.43**	**0.04**	**0.57**	**0.57**	**7.50**
Annual (ton/yr)							
Startup/Shutdown	---	---	---	---	---	---	0.04
Mobile Sources	2.31	0.26	0.21	0.00	0.00	0.00	---
Emergency Generators	0.35	0.23	0.38	0.00	0.01	0.01	---
Total	**2.67**	**0.49**	**0.59**	**0.00**	**0.02**	**0.02**	**0.04**

Table C.3-5b Project TAC Emissions		
Project TAC Emissions	**Hourly Emissions (lb/hr)**	**Annual Emissions (ton/yr)**
H_2S	3.75E+00	3.75E-02
NH_3	2.82E+01	2.82E-01
B	1.04E+01	1.04E-01
As	2.63E-02	2.63E-04
Hg	7.57E-03	7.57E-05
Benzene	1.57E-02	3.93E-04
1,3-Butadiene	6.60E-03	1.65E-04
Carbon Tetrachloride	1.76E-04	4.40E-06
Ethlyene Dibromide	2.12E-04	5.30E-06
1,2-Dichloroethane	1.12E-04	2.80E-06
Formaldehyde	2.04E-01	5.11E-03
Methylene Chloride	4.10E-04	1.03E-05
PAHs	9.66E-04	2.42E-05
Vinyl Chlorine	7.15E-05	1.79E-06
Total TACs	**4.27E+01**	**4.30E-01**

Table C.3-5c Summary of Project GHG Emissions	
Operational Sources	**CO2e (MT/yr)**
Startup/Shutdown	62.9
Mobile Sources	85.0
Emergency Generators	63.2
Project Total	**211.1**

Emissions from Normal Operations

Table C.3-6a Power Production from New Production Wells in the BRP GeoResource Leasehold				
Well Productivity	**Steam Production Rate Per Well[1] (KPH)**	**Average Steam Consumption Rate[2] (KPH/MW)**	**Estimated Generation From New Wells (MW/well)**	**New Wells used for 55 MW Total Generation**
Low	10	21	0.48	22
Medium	30	17.5	1.71	21.29
High	50	14	3.57	10.22

Table C.3-6b Reference Parameters		
BRP Current Generation	18.5	MW
BRP Full Capacity	55	MW
Maximum Number of New Wells	22	wells
Daily Hours of Operation	24	hr/day
Annual Hours of Operation	8,760	hrs/yr
Average NCG/Steam Ratio	10,534	ppmw
Permitted H2S Limit	5	lb/hr
Molecular Weight of H_2S	34.081	lb/lbmol
Control Efficieny of Streford Process	98.9	%
Percent Ammonia Moved to Aqueous Phase	75	%
Pounds per Metric Ton	2,204.62	lb/MT

Table C.3-6c Operating Steam Flowrates						
NCG Component	**Average Component/Steam Ratio (ppmw)**	**Average Component/NCG Mass Fraction (lb/lb NCG)**	**Low Productivity Mass Flowrate (lb/hr)**	**Medium Productivity Mass Flowrate (lb/hr)**	**High Productivity Mass Flowrate (lb/hr)**	**Maximum Flow Rate (lb/hr)**
NCGs						
CO_2	8.84E+03	8.39E-01	1.95E+03	5.65E+03	4.52E+03	5.65E+03
H_2S	4.00E+02	3.80E-02	8.80E+01	2.56E+02	2.04E+02	2.56E+02
NH_3	2.35E+02	2.23E-02	5.17E+01	1.50E+02	1.20E+02	1.50E+02
Ar	1.03E+00	9.73E-05	2.26E-01	6.55E-01	5.24E-01	6.55E-01
N_2	1.14E+02	1.09E-02	2.52E+01	7.30E+01	5.84E+01	7.30E+01
CH_4	2.69E+02	2.55E-02	5.91E+01	1.72E+02	1.37E+02	1.72E+02
H_2	1.42E+02	1.35E-02	3.12E+01	9.06E+01	7.25E+01	9.06E+01
He	5.30E+02	5.03E-02	1.16E+02	3.38E+02	2.71E+02	3.38E+02
O_2	4.65E-01	4.41E-05	1.02E-01	2.97E-01	2.38E-01	2.97E-01
Metals						
B	2.18E+01	---	4.80E+00	1.39E+01	1.11E+01	1.39E+01
As	5.50E-02	---	1.21E-02	3.51E-02	2.81E-02	3.51E-02
Hg	1.58E-02	---	3.48E-03	1.01E-02	8.07E-03	1.01E-02

Table C.3-6d Calculated Emissions for Current Operations at 18.5 MW				
Emissions Calculations[3]	**Uncontrolled Maximum Hourly Emissions (lb/hr)**	**Controlled Hourly Emissions (lb/hr)**	**Daily Emissions (lb/day)**	**Annual Emissions (ton/yr)**
H_2S	155.46	1.71	41.04	7.5
NH_3	91.37	22.84	548.22	100.1
B	56.46	56.46	1355.09	247.3
As	0.14	0.14	3.42	0.6
Hg	0.04	0.04	0.98	0.2

Emissions from Normal Operations

Table C.3-6e Additional Emissions at Power Plant from BRP Steam Project Steam				
Emissions Calculations	Uncontrolled Maximum Hourly Emissions (lb/hr)	Controlled Hourly Emissions (lb/hr)	Daily Emissions (lb/day)	Annual Emissions (ton/yr)
H_2S	255.60	2.81	67.48	12.3
NH_3	150.23	37.56	901.36	164.5
B	13.92	13.92	334.19	61.0
As	0.04	0.04	0.84	0.2
Hg	0.01	0.01	0.24	0.0

Table C.3-6f Total Emissions at Bottle Rock Power Plant				
Emissions Calculations	Uncontrolled Maximum Hourly Emissions (lb/hr)	Controlled Hourly Emissions (lb/hr)	Daily Emissions (lb/day)	Annual Emissions (ton/yr)
H_2S	411.06	4.52	108.52	19.8
NH_3	241.60	60.40	1449.58	264.5
B	70.39	70.39	1689.28	308.3
As	0.18	0.18	4.26	0.8
Hg	0.05	0.05	1.22	0.2

Table C.3-6g GHG Emissions from Normal Operations						
	Calculated Current Operation		Additional Operation		Total Emissions	
GHG Emissions	Hourly Emissions (lb/hr)	Annual Emissions (MT/yr)	Hourly Emissions (lb/hr)	Annual Emissions (MT/yr)	Hourly Emissions (lb/hr)	Annual Emissions (MT/yr)
CO_2	3,435.4	13,650.7	5,648.4	22,443.6	9,083.8	36,094.3
CH_4	104.4	414.7	171.6	681.9	276.0	1,096.6
CO_2e	---	22,359.8	---	36,762.7	---	59,122.5

Notes

1. From *Evaluation of the Geothermal Resources Steam Quality and Seismicity for the Bottle Rock Power Expansion Project at The Geysers Geothermal Field, California*
2. Takes into account the production from existing wells on the Francisco Lease
3. Assumes current production uses wells with low productivity.

Cooling Tower Particulate Emission Calculations

Table C.3-7 Reference Data		
Parameter	**Value**	**Units**
Daily Operating Hours	24	hrs/day
Annual Operating Hours	8,760	hrs/yr
Density Water	8.35	lb/gal
Conversion min to hours	60	min/hr
PM10 Fraction of TSP	100	%
PM2.5 Fraction of PM10	100	%

Table C.3-7b Cooling Tower Data				
	Current Operation		**New Operation**	
Parameter	**Value**	**Units**	**Value**	**Units**
Number of Circulating Pumps	1	pump	2	pumps
Water Circulation Rate	40,000	gpm	80,000	gpm
Total Liquid Drift	0.00050	%	0.00050	%
Average TDS of Circulated Water	500	ppmw	500	ppmw

Table C.3-7c Current Emissions from Cooling Tower Operation			
Pollutant	**Max Hourly (lb/hr)**	**Max Daily (lb/day)**	**Annual (ton/yr)**
PM10	0.05	1.20	0.22
PM2.5	0.05	1.20	0.22

Table C.3-7d Additional Emissions from Cooling Tower Operation			
Pollutant	**Max Hourly (lb/hr)**	**Max Daily (lb/day)**	**Annual (ton/yr)**
PM10	0.05	1.20	0.22
PM2.5	0.05	1.20	0.22

Table C.3-7e Total Cooling Tower Emissions			
Pollutant	**Max Hourly (lb/hr)**	**Max Daily (lb/day)**	**Annual (ton/yr)**
PM10	0.10	2.40	0.44
PM2.5	0.10	2.40	0.44

Table C.3-7f Cooling Tower TAC Reference Data		
Item	**Value**	**Reference**
Emission Factor (lb chloroform/lb chlorine added)2	0.0034	1
Sodium Hypochlorite Solution Use (gal/month)	2,865	Assumed
Sodium Hypochlorite Density (lb/gal)	10	MSDS
Sodium Hypochlorite Solution Concentration (%)	12.5%	MSDS
lb Chlorine Equivalent/lb Sodium Hypochlorite	0.95	Calculated
Operating Hours (hrs/yr)	8,760	Design Basis

Table C.3-7g Additional TAC Emissions from BRP Cooling Tower						
	Current Operation		**Additional Operation**		**Total Operation**	
Pollutant	**Maximum Hourly (lb/hr)**	**Maximum Annual (ton/yr)**	**Maximum Hourly (lb/hr)**	**Maximum Annual (ton/yr)**	**Maximum Hourly (lb/hr)**	**Maximum Annual (ton/yr)**
Chloroform[1]	7.92E-06	6.94E-02	7.92E-06	6.94E-02	1.58E-05	1.39E-01

Notes:

TSP Emission Rate = based on USEPA AP-42, Section 13.4 Wet Cooling Towers, Table 13.4-1, modified to design

2 From: Michael B. Rogozen, Harvey E. Ritch, Michael A. Guttman, Daniel Grosjean and Edwin L. Williams II, Sources and Concentrations of Chloroform Emissions in the South Coast Air Basin, Final Report, prepared by Science Applications International Corporation, Manhattan Beach, CA, for the California Air Resources Board, Sacramento, CA, April 8, 1988. Downloaded from http://www.arb.ca.gov/research/apr/past/statnry.htm#Toxic%20Air%20Contaminants.

Summary of Additional Emissions at the Bottle Rock Power Plant

Table C.3-8a Additional Emissions at the BRP Power Plant				
	PM10	**PM2.5**	**H_2S**	**NH_3**
Hourly Emissions (lb/hr)				
Operational Steam	---	---	2.81	37.56
Cooling Tower	0.05	0.05	---	---
Total	**0.05**	**0.05**	**2.81**	**37.56**
Daily Emissions (lb/day)				
Operational Steam	---	---	67.48	901.36
Cooling Tower	1.20	1.20	---	---
Total	**1.20**	**1.20**	**67.48**	**901.36**
Annual Emissions (ton/yr)				
Operational Steam	---	---	12.31	164.50
Cooling Tower	0.22	0.22	---	---
Total	**0.22**	**0.22**	**12.31**	**164.50**

Table C.3-8b Summary of GHG Emissions	
Operational Sources	**CO2e (MT/yr)**
Startup/Shutdown	62.9
Mobile Sources	85.0
Emergency Generators	63.2
Project Total	**211.1**
Bottle Rock Power Plant	36,762.7
Cumulative Total	**36,973.8**

BOTTLE ROCK POWER

DHISERVICES
Formation Evaluation Specialists

HYDROGEN SULFIDE DETECTION AND ABATEMENT PERFORMANCE PLAN

Name of Company_____

Name of Well _____

Location of Well _____

_____ submits the following proposal for the detection, abatement and documentation of hydrogen sulfide (H_2S) emissions, during the drilling, initial clean out, and flow testing phases of the above geothermal well.

I. Operations Overview

This H_2S abatement system is designed to use sodium hydroxide and hydrogen peroxide in the control of H_2S emissions during air drilling or well testing operations. This system will incorporate specially designed electrically driven positive displacement chemical metering pumps manufactured by Pulsafeeder, Rochester, New York (see Pump Specification Attachment).

The system will also be equipped with a fire extinguisher, safety eyewash station, and chemical storage tanks or drums. Abatement equipment will be installed and chemical supplies will be on site and the Lake County Air Quality Management District (LCAQMD) notified (see Section X, Notification) prior to the commencement of air drilling. Chemical storage will be maintained at adequate levels to ensure proper abatement of H_2S emissions. At least, a 24-hour supply of abatement chemicals will be on site at the Bottlerock Power Facility. Commencement of abatement will begin when uncontrolled H_2S mass emissions exceed 3 pounds per hour or exceed 1000 ppm_v, or 1890 ppm_w. A copy of the permit and this H_2S abatement performance plan will be posted in the drilling supervisor's office and in the logging trailer. An abatement logbook will be maintained on site and made accessible to both company and district personnel (see Section VII, Documentation).

II. Abatement Process

The abatement process incorporates the use of sodium hydroxide and hydrogen peroxide as described in the Society of Petroleum Engineers publication 7882 (SPE 7882), Harry Castrantas, 1981.

A. The following equations describe this process:

$H_2S + NaOH \Leftrightarrow NaHS + H_2O$

$H_2S + 2NaOH \Leftrightarrow Na_2S + 2H_2O$

$NaHS + 4H_2O_2 \Rightarrow NaHSO_4 + 4H_2O$

$Na_2S + 4H_2O_2 \Rightarrow Na_2SO_4 + 4H_2O$

B. The following chemical concentrations used and injection rates expressed as mole ratios and weight ratios will be:

Sodium hydroxide solution 25% or 30% or 50% (wt)
Hydrogen peroxide solution 35% (wt)

<u>Mole Ratios</u> Sodium hydroxide: Hydrogen sulfide = 4:1
Hydrogen peroxide: Hydrogen sulfide = 6:1

<u>Weight Ratios</u> Sodium hydroxide: Hydrogen sulfide = 4.7:1
Hydrogen peroxide: Hydrogen sulfide = 6:1

C. <u>Chemical Injection Rate Calculations</u>

Chemical injection rates for abatement of excess H_2S emissions will be calculated as follows:

1. Sodium hydroxide injection rate:

Gal 50% (wt) NaOH/hour= lbs H_2S (to abate)/hour X 4.7 lbs NaOH/1 lb H_2S X .19 gal/lb. NaOH 100% (wt)

-or-

Gal 30% (wt) NaOH/hour= lbs H_2S (to abate)/hour X 4.7 lbs NaOH/1 lb H_2S X .33 gal/lb. NaOH 100% (wt)

-or-

Gal 25% (wt) NaOH/hour= lbs H_2S (to abate)/hour X 4.7 lbs NaOH/1 lb H_2S X .38 gal/lb. NaOH 100% (wt)

2. Hydrogen peroxide injection rate:

Gal. 35% (wt) H_2O_2/hour = lbs H_2S (to abate)/hour X 6 lbs H_2O_2/1 lb H_2S X .3 gal/lb H_2O_2 100% (wt)

Example

How many gallons of 30% sodium hydroxide (NaOH) solution are required to abate 5#/hr H_2S emissions?
Answer: (5#/hr H_2S) (4.7# NaOH/# H_2S) (.33 gal/#NaOH 100% [wt]) =7.8 gal/hr NaOH 30% [wt]

How many gallons of 35% hydrogen peroxide (H_2O_2) solution are required to abate 5#/hr H_2S emissions?
Answer: (5#/hr H_2S) (6# H_2O_2/# H_2S) (.3gal/# H_2O_2 100% [wt]) =9 gal/hr H_2O_2 35% [wt]

III. Steam Production Determination

A. Determining Steam Mass Flow Rate During Air Drilling

Steam mass flow rate determinations while air drilling will be accomplished using the condensable/non-condensable formula shown below:

Steam flow #/hr = g condensate/g non-condensables X air injection rate (#/hr)

The condensable/non-condensable ratio will be determined by first condensing a sample of the steam/compressed air mixture from the blooie line. The condensable portion will be recovered and measured in a graduated cylinder using a 1 g/cc density, the weight of the condensate being equivalent to the volume in the graduated cylinder. The non-condensable gas portion will be measured by either a graduated gas-measuring syringe or a wet test meter. The gas volume will be corrected for standard temperature and pressure (STP) and a density factor of 1.11 g/liter will be applied to the corrected volume to determine the mass of the non-condensable gases.

The gas volume correction is based on the ideal gas law. The standard volume can be determined using the following equation:

$$V_s = \frac{Pm}{Ps} x \frac{Ts}{Tm} x\ V_m$$

\

where given two sets of pressure (P), volume (V), and temperature (T), [P_m, V_m, T_m] and [P_s, V_s, T_s], subscripts "m" and "s" are the measured and standard values, respectively, where º K = º C + 273.16, and T_s = 0º C = 273.16 º K and P_s = 760 mm of Hg.

The air injection flow is determined from the air compressor meter run and conversion tables possessed by the compressor company on site. The air flow in cubic feet per minute (CFM) is converted to lbs/hr using the following formula:

lbs air/hour = CFM X 4.17# per hr/CFM

Example

A steam well being drilled with compressed air injected as the circulation medium was sampled at the blooie line for a condensable/noncondensable (C/NC) ratio determination. The condensable portion of the sample was 25 cc, the measured non-condensable portion was 5.75 L at 35 degrees C, and the barometric pressure was 740 mm Hg that day. The air compressor operator reported an air injection rate of 2400 cubic feet of air per minute at the time the sample was collected.

What is the standard volume of the measured non-condensable portion of the sample?

Answer: Convert º C to º K and solve.

$$\mathbf{V_s = \frac{Pm}{Ps} x \frac{Ts}{Tm} x\ V_m}$$

$$V_s = \frac{740 \text{ mm Hg}}{760\ mm\ Hg} x \frac{273.16\ ^{o}K}{35+273.16\ ^{o}K} x\ 5.75L$$

$$V_s = 5\ L$$

What is the air injection rate in pounds/hour?

Answer: (2400CFM) (4.17#/hr/CFM)=10008 #/hr air

What is the steam mass flow rate?

Answer: {25g condensate/ [(5 L air) (1.1 g/L)]} 10008=45490 #/hr steam

B. Unrestricted Mass Flow Determination

Prior to the completion of a well there are routine occasions which require removal of the drill string (pipe) from the well bore (e.g., bit changes, etc.). During steam production, the removal of the drill string constitutes the removal of an obstruction that restricts steam flow, thereby allowing increased mass flow. Obviously, an increase in mass flow of steam at a given concentration of H_2S will increase H_2S mass emissions. Therefore, chemical abatement must be adjusted by the percentage increase of the steam mass flow when the string is removed.

For purposes of this plan, restricted steam production that was determined while drilling will be stated to have increased by a percentage amount directly proportional to the cross sectional area that the drillpipe occupies while drilling to the cross sectional area of the well bore. For purposes of this plan, the well will be considered to be flowing unrestricted when all the drillpipe, tools, and bit have been landed on the drilling rig floor.

Example:

For the example cited above in IIIA, the well was being drilled with 4-1/2 inch drillpipe using an 8-1/2 inch bit. During trips out of this particular well three restriction factors will apply:

1. **Drilling in open hole**
2. **At the transition from open hole to 9-5/8 inch casing**
3. **At the casing lap from 9-5/8 inches to 13-3/8 inches**

Restriction factor 1
What percentage restriction does the drill string impose on steam flow while drilling?

Answer: Using $A = \pi r^2$ for calculating the cross sectional areas involved,
Drillpipe: A= (3.14) (2.25 in)^2 = 15.9 in^2
Well bore: A= (3.14)(2.25 in)^2 = 56.7 in^2

Percent restriction: $\frac{15.9\ in2}{56.7\ in2}(100) =$ **28%**

Restriction factor 2
What percentage restriction does the drill string impose on steam flow when pulled out of open hold and passing through the 9-5/8 inch casing?

Answer: Using $A = \pi r^2$ for calculating the cross sectional areas involved,

Drillpipe: A= (3.14) (2.25 in)^2 = 15.9 in^2

Casing: A= (3.14) (4.81 in)^2 = 72.6 in^2

Percent restriction: $\frac{15.9\ \text{in2}}{72.6\ \text{in2}}(100) =$ **22%**

Restriction factor 3

What percentage restriction does the drill string impose on steam flow after being pulled out of the 9-5/8 inch casing through the casing lap and into the 13-3/8 inch casing?

Answer: Using $A = \pi r^2$ for calculating the cross sectional areas involved,

Drillpipe: A= (3.14) (2.25 in)^2 = 15.9 in^2

Casing: A= (3.14) (6.69 in)^2 = 140.5 in^2

Percent restriction: $\frac{15.9\ \text{in2}}{140.5\ \text{in2}}(100) =$ **11%**

<u>Application</u>

The percentage restriction factors will be considered in the following manner for trips in and out of the well starting with the established flow rate cited for the example in IIIA above:

Example:

What would the unrestricted flow rate be after the drill string is removed from the well?

Answer: Using the 28% restriction factor that was established while drilling in IIIB1. The unrestricted flow rate would be:

1.28 (45490 #/hr steam) = 58227 #/hr steam

Example:

What would the restricted flow rate be while tripping through the 9-5/8 inch casing?

Answer: Comparing the 22% restriction factor that was established for the 9-5/8 inch casing in IIIB2 to the 28% restriction factor that was established while drilling in IIIB1 a 6% increase in flow rate would be expected (i.e., 28%-22% = 6%). So, the restricted flow rate while tripping through the 9-5/8 inch casing would be:

1.06 (45490 #/hr steam) = 48220 #/hr steam

Example:

What would the restricted flow rate be while tripping through the 13-3/8 inch casing?

Answer: Comparing the 11% restriction factor that was established for the 13-3/8 inch casing in IIIB3 to the 28% restriction factor that was established while drilling in IIIB1 a 17% increase in flow rate would be expected (i.e., 28%-11% = 17%). So, the restricted flow rate while tripping through the 13-3/8 inch casing would be:

1.17 (45490 #/hr steam) = 53223 #/hr steam

C. Mass Flow Determination by Critical Flow

Total steam production may be determined by measuring the temperature and pressure upstream of a throttling orifice plate and using the following equation from L.K. Spink, "Principles and Practices of Flow Meter Engineering," Ninth Edition, pg. 382.

$$W_h = 359\ Y_t\ S_p\ D_2\ F_a \sqrt{\frac{Pf}{V}\ 1} \text{ (where)}$$

W_h = hourly rate of flow in pounds/hr.

Y_t = expansion factor for throttling orifices.

$S_p = K_o$ beta^2.

D = actual inside diameter of the blooie line.

F_a = orifice temperature expansion factor.

Pf_1 = upstream pressure (psia).

V = Specific weight of flowing fluid

This method requires substantial rig time and is generally reserved for the initial production tests after the well is completed or after large steam entries during air drilling.

Example
Calculate flow rate for 4 inch orifice test using following data:
Upstream pressure = 96 psia
Temp = 380ºF (sat)
YtSp = Combined factor from tables = .096
D = 10 inches
V from tables = .4468
Fa from tables = 1.004

Answer: $359(.96)(10^2)(1.004)\sqrt{\frac{96}{.4468}} = 50720$ **#/hr**

IV. H_2S Concentration Determination

H_2S determinations will be accomplished by using a wet chemical testing method. This technique requires a steam sample to be extracted from the blooie line at a point upstream of any abatement chemical injection points or throttling orifice plates. This steam sample is then condensed, scrubbed, and collected in a gas-washing bottle containing dilute sodium hydroxide or ammonium hydroxide. This sample will then be analyzed for the sulfide ion using the silver electrode potentiometric method. Quantitative results can then be obtained by applying the following formula:

$$H_2S\ ppm_w = \frac{ml\ AgN03\ X\ \frac{10\text{-}^3 g.\ H_2S}{1\ ml\ AgN0_3}\ X\ \frac{g.\ condensate + NaOH(orNH_40H)}{g.\ condensate}\ X\ 10^6 ppm_w}{g\ titrated\ sample}$$

Example A steam well is sampled as described and the condensate is determined to weigh 128 g while the combined weight of the condensate plus the NaOH solution weighs in at 150 g. A portion of the sample that was titrated to the end point with 4.5 mL of AgNO3 by the silver electrode method weighted 21 g.

What is the H_2S concentration in the steam?

Answer: $$\frac{(4.5\ mL\ AgNO3)(10^{-3}\ g\ H_2S/1\ mL\ AgNO3)(150\ g\ cond. + NaOH\ /128\ g\ cond)(10^6 ppm_w)}{21\ g\ cond.} = 251\ ppm_w\ H_2S$$

Calculations and results are recorded on a special Wet Test Determination Sheet (see attachments).

V. H_2S Mass Flow Determination

A. Mass flow rates of H_2S are determined by multiplying the mass steam flow by the H_2S concentration measured from the blooie line upstream of the chemical injection.

Example

What is the H_2S mass flow of a steam well flowing at 45490 #/hr with H_2S concentration of 251 ppm_w H_2S?

Answer: $$\frac{(45490\ \#/hr\ steam)\ (251 ppm_w\ H_2S)}{10^6\ ppm_w} = 11.4\ \#/hr\ H_2S$$

B. Open-hole H_2S mass flows are determined by multiplying (A) above by the percentage amount discussed in Section III B.

Example

What is the unrestricted H_2S mass flow rate of the same well assuming the H_2S concentration is 251 ppm_w?

Answer: $$\frac{(1.28\ restriction\ factor)(45490\ \#/hr\ steam)(251\ ppm_w\ H_2S)}{10^6\ ppm_w} = 14.6\ \#/hr\ H_2S$$

VI. Sampling Frequency

Unless otherwise specified by permit conditions, sampling frequency will be as follows:

1. H_2S concentration, steam mass flow and H_2S mass flow will be determined upon the initial steam entry.

2. H_2S concentration, steam mass flow, and H_2S mass flow will be determined with each additional significant steam entry. For purposes of definition, a significant steam entry is defined as one that raises the mass flow of hydrogen sulfide by one pound or more per hour.
3. H_2S concentrations, steam mass flow, and H_2S mass flow will be verified at least four times each 24 hours once steam production has begun.

VII. Other Emissions

A. Serpentine and Red/Pink Plume

On commencement of air drilling in significant serpentine or upon experiencing red/pink plume exiting the cyclone, the well logger red/pink plume exiting the cyclone, the well logger shall immediately obtain bulk samples of the drilled material and log the event in the abatement logbook. The drilled material shall be analyzed for asbestos content using TEM, SEM or PLM (ARB Method 435 Procedures). "Experiencing a pink/red plume" shall mean a plume of greater than 5% opacity lasting for 30 or more seconds. For the purpose of defining a "significant serpentine deposit" during geothermal air drilling, "significant serpentine" shall mean: drill cutting samples from two consecutive ten-foot interval-drilling sections identified as having 10% or greater serpentine content.
The LCAQMD shall be promptly notified by phone at 707-263-7000, provided a portion of the divided bulk samples of the drilled material, and unless otherwise agreed upon in writing, notified of the bulk asbestos analysis results within ten working days of sampling. Bulk Samples collected upon experiencing a pink/red plume shall be promptly analyzed by XRF or other acceptable means to include at a minimum arsenic, chrome, nickel and cadmium. BRP shall, to the extent practical, attempt to collect a sample of the particulate from the pink/red plume and/or assist the LCAQMD in such an attempt for analysis as described.

During drilling in significant serpentine or while experiencing a pink/red plume, visible emissions shall not exceed Ringelmann 0.25 (5% opacity) for detached plume at the cyclone. BRP shall: 1) increase down hole misting, 2) increase water loading at the venturi, 3) reduce the drilling rate, 4) use wetting agents, and/or 5) implement additional solids filtration of working water. Such additional effort shall continue until drilling is clear of significant serpentine or drilling conditions contributing to the formation of pink/red plume.

VIII. Documentation

A permanent, bound log book showing the following information entered in ink at least four times daily will be kept at the drilling site and be available for inspection by district personnel:

1. Well Name, Date & Time

2. Steam flow rate

3. Air injection rate (from compressor company)

4. H_2S ppm_w from the latest wet chemical test

5. Mass H_2S emissions abated and unabated

6. Injection rate of abatement chemicals

7. Chemical storage

8. "Remarks" column, rig status, equipment breakdowns, notable odor, etc.

9. Abatement technician initials

(See attached sample of Log Book Format)

IX. Quality Assurance/Quality Control

A. Laboratory/Chemical Analysis/Mass Flow Determination

To ensure accurate and consistent results:

1. All lab equipment will be kept clean and in proper working condition.
2. All analysis and procedures will be performed with care using accepted methods and employing good laboratory techniques.
3. Two portions of all samples collected for analysis will be titrated and the results averaged for reporting purposes.
4. All samples will be analyzed promptly after collection.
5. Non-condensable temperature will be measured with a mercury (Hg) thermometer.
6. Barometric pressure will be measured with a properly calibrated aneroid barometer.

B. Chemical Metering Pumps

To ensure accurate delivery rates:

1. All pumps will be delivery-rate tested and a performance curve will be graphed and posted with this performance plan prior to rigging up system and placing pumps into service.
2. Daily calibration checks are made frequently during pump operation.:
    a. For piston-type positive displacement pumps, the manufacturer's stated performance curves are utilized for initial pump delivery rate settings and then verified with a draw-down tube at least twice per shift.
    b. Variable speed gear-type positive displacement pumps are equipped with tachometers and flow meters. Initial pump settings are established utilizing the latest graphed performance curve in conjunction with tachometer and flow meter readings. Delivery rates are then verified with a draw-down tube at least twice per shift.

X. Notification

1. Abatement personnel will notify the LCAQMD prior to the commencement of air drilling operations.
2. Abatement personnel will notify the LCAQMD upon initial steam entry.
3. Abatement personnel will notify the LCAQMD on the commencement of air drilling in significant serpentine or upon experiencing red/pink plume.
4. The LCAQMD will be notified in the event of any mechanical breakdown that would affect the implementation of this H_2S Abatement Performance Plan for compliance with Rule 510.
5. The LCAQMD will be notified at least 24 hours prior to the commencement of any planned hot/live liner operations. No operations of this type will be performed on weekends or major holidays.

ATTACHMENTS

PUMP SPECIFICATIONS

Type: Variable Piston Stroke Positive Displacement Pumps

Manufacturer: Pulsafeeder, Rochester, New York

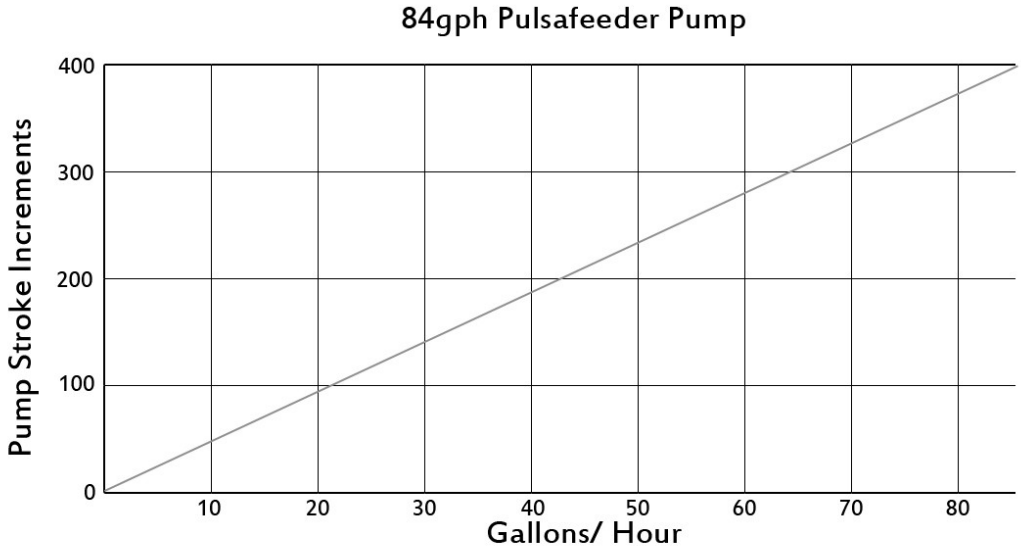
Model: 7120 Series ½ HP 0-84 gph capacity

Type: Variable Speed Positive Displacement Gear Pumps

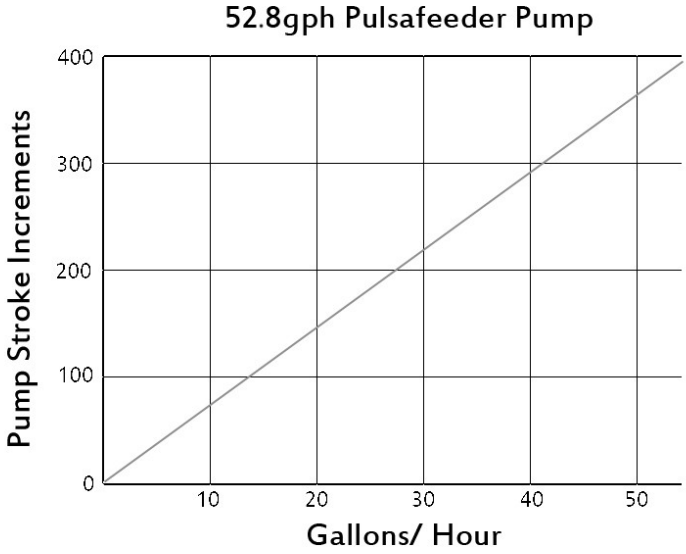
Manufacturer: Pulsafeeder, Rochester, New York

Model: ECO series 1½-2 HP 0-1200 gph

Manufacturers Stated Performance Curve for 7120 Series 84gph Pulsafeeder Pump

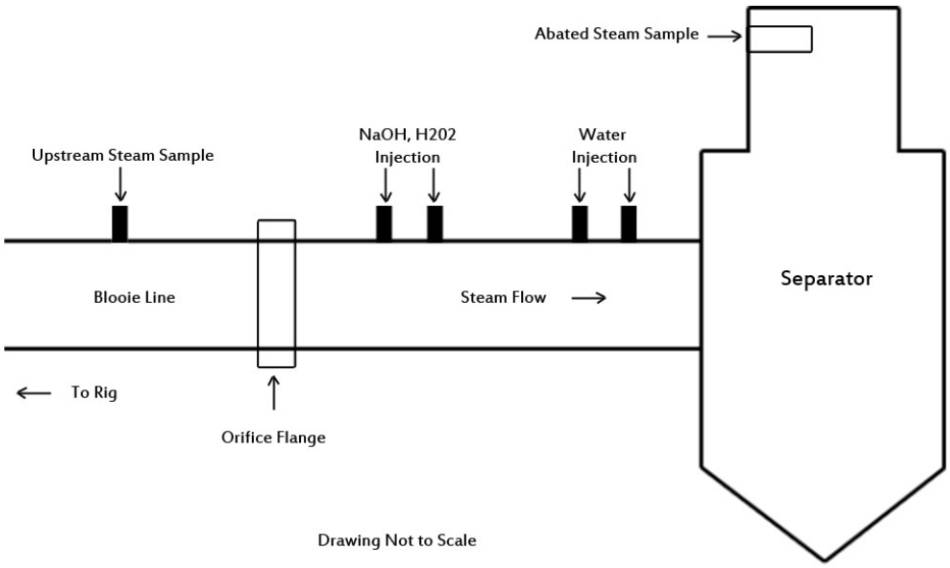


Manufacturers Stated Performance Curve for 7120 Series 52.8gph Pulsafeeder Pump



HYDROGEN SULFIDE ABATEMENT PLAN
(Caustic/Peroxide Method)

Schematic of Blooie Line Injection Points



Schematic of Blooie Line and Cyclone Separator

H_2S Determination Worksheet

Operator/Well _____ Sampling Conditions:

Date/Time _____ Temp/Pressure_____

Technician _____ Flow Rate_____

Results_____

Remarks: _____

Sample & Titration Data:

Scrubbing Agent: NaOH
Titrant: $AgNO_3$

A. Sample Bottle	_____ g		
B. Bottle + NaOH	_____ g		
C. Bottle + NaOH + Condensate	_____ g		
Beaker + Sample	_____ g		_____ g
Beaker	_____ g		_____ g
D. Sample #1	_____ g	#2	_____ g
Burette Final	_____ mL		_____ mL
Burette Initial	_____ mL		_____ mL
E. Total Titrant	_____ mL		_____ mL

<u>CALCULATIONS</u> $H_2S\ ppm_w = \frac{E[\frac{(C-A)}{(C-B)}]10^3}{d}$

#1 #2

Example: Abatement Log

Well Name	Steam Production	Air Injection Rate		H2S Data			Chemical Injection (gal/hr)		Chemical Storage (gal)		Remarks & Rig Status, Flow Tests, Upset conditions, Notable Odors, etc.	Tech Initials
Date/Time	#/hour	CFM	#/hour	ppmw	#/hour	Amount Abated #/hr	NaOH	H2O2	NaOH	H2O2		

APPENDIX D
NOISE

BRP STEAM PROJECT
NOISE ASSESSMENT

Bottle Rock Power, LLC

7385 High Valley Road,

PO Box 326

Cobb, CA

September 23, 2009

Prepared for:
RMT, Inc.
4 West Fourth Avenue, Suite 303
San Mateo, CA 94402

Prepared by:
Fred M. Svinth, Assoc. AIA
ILLINGWORTH & RODKIN, INC.
Acoustics _ Air Quality
505 Petaluma Boulevard South
Petaluma, CA 94952
(707) 766-7700

Job No. 09-081

I. INTRODUCTION/SETTING

This report documents and discusses the results of a noise monitoring survey and engineering noise controls for the development of future well pads 1-32 (east pad) and 2-32 (west pad) and associated pipeline and access roads at the Binkley Lease (see Figure 2) and the potential for a change in noise at the power plant due to an increase in the power plant capacity from approximately 15 MW to 55MW at the Bottle Rock Power Plant at the Geysers Geothermal Area in Lake County California. Sensitive receptors in the area include nearby residents and recreationists. Recreational opportunities are widely dispersed, however; the project area lands are privately owned and recreational opportunities tend to be concentrated closer to Clear Lake, approximately 16 miles away. Residences would be sensitive to noise generation and are scattered at very low densities on the north, east, and south sides of the property. Other sensitive receptors such as hospitals, schools, and convalescent homes lie outside the boundaries for potential noise impacts from the project.

Noise monitoring surveys were conducted at the power plant, the proposed well pad sites, and at three noise-sensitive land uses near the proposed in the well pads to document existing noise levels at these locations. The range of noise characteristics emitted due to the development of the well pads and the increased capacity of the power plant are documented. Audible noise from the existing switchyards and overhead transmission lines that would be affected by the project is along discussed and estimates of the future audible noise levels that would result from existing and proposed switchyards and transmission lines are made. Based on the acoustical effects of topographic and distance attenuation between source (well pads and power plant) and receiver (residences) locations, noise levels produced by the project, during both construction and operation, at the adjacent residences (i.e. noise sensitive uses) are presented, along with measures to mitigate identified environmental noise impacts due to the development of the project to a level of insignificance. Persons not familiar with environmental noise analysis are referred to Appendix A for additional discussion.

II. REGULATORY BACKGROUND

LAKE COUNTY GENERAL PLAN

The goal of the Lake County General Plan Noise Element is to, 'protect County residents from the harmful exposure of excessive noise and prevent incompatible land uses from encroaching upon existing and planned land uses'. To achieve this goal the Noise Element sets forth the following policies relevant to the subject project:

<u>Policy N-1.1</u> ***Noise Compatibility Guidelines***

> The County shall consider the compatibility of proposed land uses, utilizing the standards in Table 8-1, with the noise environment when preparing or revising community and/or specific plans and when reviewing development proposals. Where proposed land uses are likely to produce noise levels exceeding the "normally acceptable" criteria (e.g. "conditionally acceptable", "normally unacceptable"), the County shall require an acoustical analysis prior to development approval to ensure noise mitigation measures are included. Land uses should be prohibited from locating in areas with a noise environment within the "unacceptable" range. A review of standards in Table 8-1 shows that noise levels of 60 dBA CNEL or below are considered normally acceptable fro low-density single-family residential use.

Policy N-1.2 ***Sensitive Receptors***

The County shall prohibit the development of new commercial, industrial, or other noise generating land uses adjacent to existing residential uses, and other sensitive noise receptors such as schools, health care facilities, and libraries if noise levels are expected to exceed 65 dBA Community Noise Equivalent (CNEL) measured at the property line of the noise sensitive land use unless effective mitigation measures are incorporated into the project design.

LAKE COUNTY NOISE ORDINANCE

The Lake County Municipal Code, Chapter 21, Article 41, Section 21-41.11 sets forth noise performance standards to promote compatibility among various land uses within the County as follows:

41.11 Noise: Maximum sound emissions for any use shall not exceed equivalent sound pressure levels in decibels, A-Weighted Scale, for any one (1) hour as stipulated in Table 11.1[a]. These maximums are applicable beyond any property lines of the property containing the noise. (Note: Equivalent sound pressure level (Leq) is a measure of the sound level for any one (1) hour. It is the energy average of all the various sounds emitted from the source during the hour. A-weighted scale is used to adjust sound measurements to simulate the sensitivity of the human ear.)

Table 11.1 Maximum one-hour equivalent sound pressure levels (A-Weighted - dBA)

Time of Day	Receiving Property Zoning District		
	Residential*	Commercial	Industrial
7 am - 10 pm	55	60	65
10 pm - 7 am	45	55	60

*Note: The Residential category also includes all agricultural and resource zoning districts.

(a) In the event the receiving property or receptor is a dwelling, hospital, school, library or nursing home, even though it may be otherwise zoned for commercial or industrial and related uses, maximum one-hour equivalent sound pressure received shall be as indicated in Table 11.2[b].

Table 11.2 Maximum one-hour equivalent sound pressure levels (A-Weighted - dBA)

Time of Day	Level
7 am - 10 pm	57
10 pm - 7 am	50

(b) Noises of short duration: For noises of short duration or impulsive character, such as hammering, maximum one-hour sound pressure levels permitted beyond the property of origin shall be seven decibels less than those listed in Table 11.2 above[c].

(c) Noises of unusual periodic character: For noises of unusual periodic character, such as humming, screeching, and pure tones, the median octave band sound pressure levels as indicated in Table 11.3 shall not be exceeded beyond the property of origin when the receiving property is zoned residential or is occupied by a dwelling, hospital, school, library, or nursing home.

[a] For residential receptors these daytime and nighttime limits equate to a CNEL of 56 dBA.
[b] These daytime and nighttime limits equate to a CNEL of 59 dBA.
[c] These daytime and nighttime limits (with a 7 dBA reduction) equate to a CNEL of 52 dBA.

Table 11.3 Median octave band sound pressure levels

Octave Band Center Frequency, Hz	7 am - 10 pm	10 pm - 7 am
31.5	68	65
63	65	62
25	61	56
250	55	50
500	52	46
1,000	49	43
2,000	46	40
4,000	43	37
8,000	40	34

(d) Additional allowance: When the receiving property is zoned commercial or industrial and is not a dwelling, hospital, school, library, or nursing home, an additional sound decibel emission above the pressure levels specified in Table 11.3 above shall be permitted as indicated in Table 11.4.

Table 11.4 Additional allowance

Receiving Property Zone	Additional Decibels Allowed
Commercial	5
Industrial	10

(e) Exemptions: Local noise standards set forth in this Section do not apply to the following situations and sources of noise provided standard, reasonable practices are being followed:

1. Emergency equipment operated on an irregular or unscheduled basis.
2. Warning devices operated continuously for no more than five (5) minutes.
3. Bells, chimes, or carillons.
4. Non-electronically amplified sounds at sporting, amusement, and entertainment events.
5. Construction site sounds between 7:00 am and 7:00 pm[d].
6. Lawn and plant care machinery fitted with correctly functioning sound suppression equipment and operated between 7:00 am and 8:00 pm.
7. Aircraft when subject to federal or state regulations.
8. Agricultural equipment when operated on property zoned for agricultural activities.

(f) Exceptions: Upon written application from the owner or operator of an industrial or commercial noise source, the Zoning Administrator or Planning Commission, as part of a use permit approval, may conditionally authorize exceptions to local noise emission standards in the following situations:

1. Infrequent noise.
2. Noise levels at or anywhere beyond the property lines of the property of origin when exceeded by an exempt noise, as listed in Section (e) above, in the same location.
3. If after applying Best Available Control Technology (BACT), a use existing prior to the effective date of this ordinance is unable to conform to the standards established by this section.

[d] By exempting daytime (7am to 7 pm) construction noise from the one-hour equivalent sound pressure levels listed in Tables 11.1 and 11.2 and section 41.11c, the allowable CNEL level for construction noise is effectively increased to the hourly daytime level minus 3 dB, thus making a CNEL in excess of 60 dBA allowable.

STATE CEQA GUIDELINES

The California Environmental Quality Act (CEQA) contains guidelines to evaluate the significance of effects of environmental noise attributable to a proposed project. CEQA asks whether the proposed project would result in:

- Exposure of persons to or generation of noise levels in excess of standards established in the local General Plan or Noise Ordinance, or applicable standards of other agencies?
- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?
- For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

CEQA does not define what noise level increase would be considered substantial. Typically, in high noise environments (i.e. greater than 60 dBA, CNEL or Ldn), an increase by more than 3 dB Ldn due to the project, would be considered a significant impact. Where the existing noise levels are lower (i.e. less than 60 dBA, CNEL or Ldn), a 5 dB increase can be tolerated before significance occurs.

III. EXISTING NOISE MEASUREMENT SURVEY

To evaluate the existing noise level produced by the power plant, the ambient noise environment at the closest noise sensitive (residential) receptors to the proposed well pads, and the ambient noise environment at the well pads themselves, I&R conducted six (6) continuous long term noise measurements between July 15th and 17th, 2009 at the following locations (see Figures 1 and 2 for the approximate measurement locations):

LONG TERM MEASUREMENT LOCATION DESCRIPTIONS

LT-1: Near the power plant entrance at the northern periphery with a clear view of the much of the noise generating equipment. Geographic Positioning System (GPS) data places this measurement at 38º 50’ 9.13” N latitude and 122º 46’ 6.44”W longitude.

LT-2: In a tree near the Jadiker residence (Residence 1). GPS data places this measurement at 38º 50’ 57.98” N latitude and 122º 47’ 15.60” W longitude, indicating that this location is about 7400 feet from the power plant, 1600 feet from Well Pad 1-32, and 1900 feet from Well Pad 2-32.

LT-3: In a tree near the closest of the Mahnke family residences (Residence 2) to the Well Pads. GPS data places this measurement at 38º 51’ 8.05” N latitude and 122º 46’ 47.70” W longitude, indicating that this location is about 6800 feet from the power plant, 3700 feet from Well Pad 1-32, and 1700 feet from Well Pad 2-32.

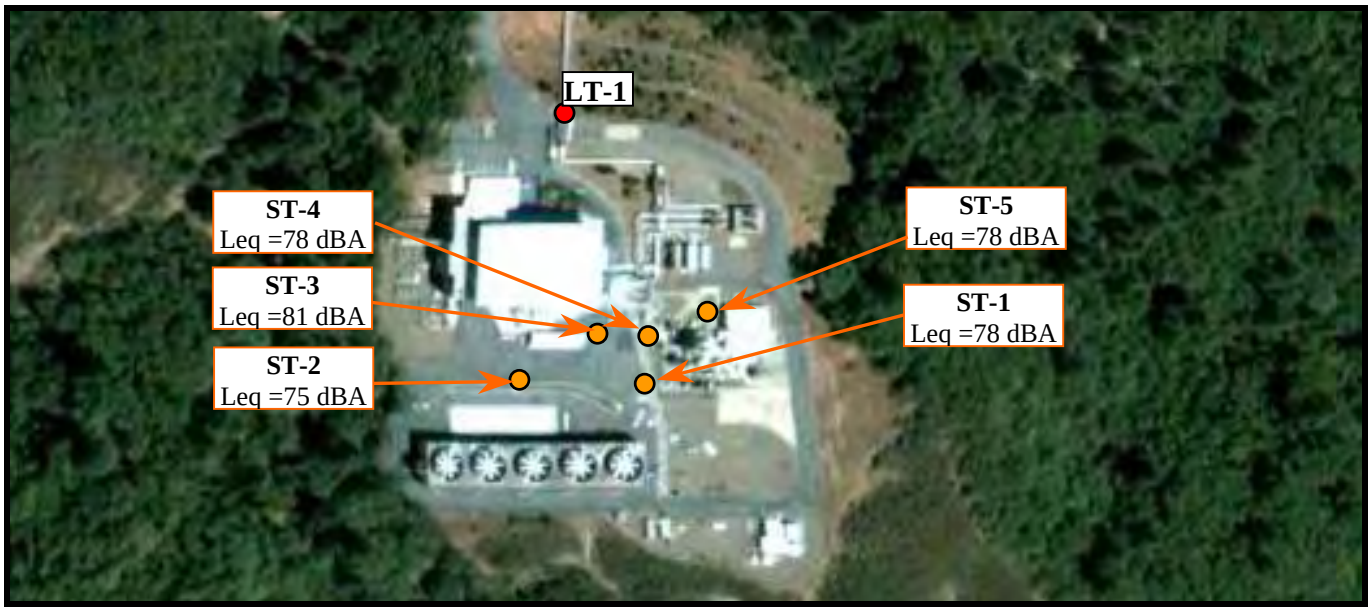


FIGURE 1: NOISE MEASUREMENTS AT POWER PLANT

LT-4: In a tree near the Fidge residence (Residence 3). GPS data places this measurement at 38º 50' 47.37" N latitude and 122º 46' 25.95" W longitude, indicating that this location is about 4200 ft. from the power plant, 4500 ft. from Well Pad 1-32, and 2300 ft. from Well Pad 2-32.

LT-5: In a tree near the center of the Well Pad 2-32. GPS data places this measurement at 38º 50'51.08" N latitude and 122º 46' 53.61" W longitude, indicating that this location is about 5600 feet from the power plant.

LT-6: In a tree in the upper portions of Well Pad 1-32. GPS data places this measurement at 38º 50'41.20" N latitude and 122º 47' 20.36" W longitude, indicating that this location is about 6700 feet from the power plant.

Additional short-term noise measurements were conducted at the power plant to document the change in noise levels in various outdoor areas within the plant grounds. The locations of these short-term measurements are shown in Figure 1. The measurements were made using Larson-Davis Laboratories (LDL) precision Type 1 model 820 or 700 sound level meters fitted with a ½-inch pre-polarized condenser microphones and windscreens. The time signatures of all meters were synchronized to allow simultaneous measure periods between the various locations and all meters were calibrated before and after installation with an LDL acoustical calibrator. During the measurement period the weather was clear with low humidity levels, no precipitation, and typical summertime wind conditions. Daytime temperatures ranged from the mid- to high-ninety degrees Fahrenheit range and nighttime temperatures ranged from the upper fifties to low sixty to degrees Fahrenheit.

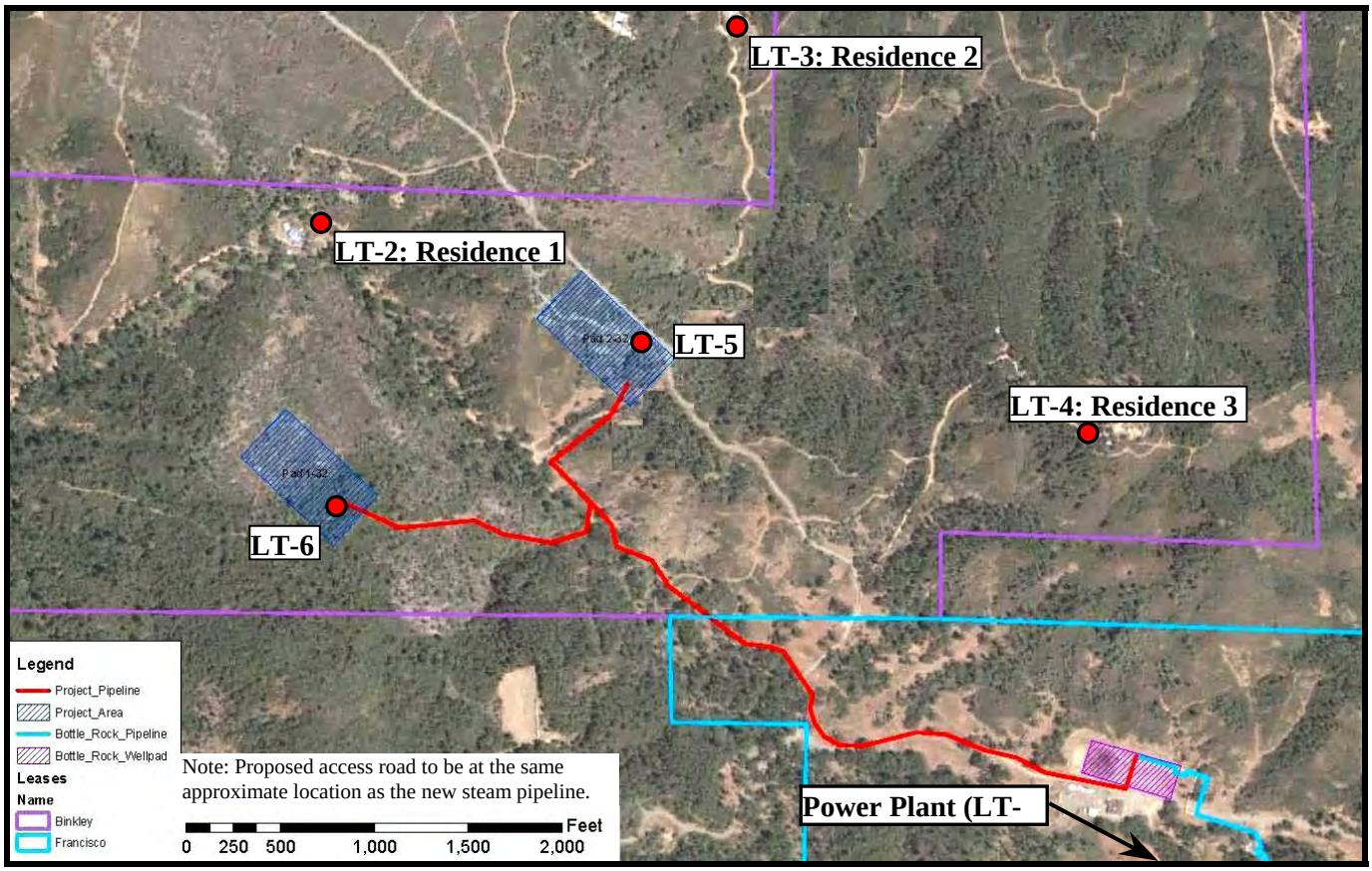


FIGURE 2: MEASUREMENT LOCATIONS LT-2 TO 6 AND RECEIVER LOCATIONS

III.a POWER PLANT MEASUREMENT RESULTS

One long-term (48 hour) measurement was made at location LT-1, which was positioned on the northern perimeter of the power plant (see Figure 1) between 10 am on July 15th and 10am on July 17th, 2009, the results of this measurement are shown on Chart 1 in Appendix B on an hourly basis. The hourly trends shown on these charts include the energy equivalent noise level (L_{eq}), and the noise levels exceeded 01, 10, 50 and 90 percent of the time (indicated as $L_{1,}$ L_{10}, L_{50} and L_{90}). The L_{eq} noise level is typically considered the average noise level, while the L_1 is considered the intrusive level, the L_{50} is considered the median noise level and the L_{90} is considered the background noise level. A review of Chart 1 demonstrates the relative constancy of the noise levels produced by the operation of the power plant at its northern perimeter, producing an average sound level of 64 dBA day and night, resulting in an average day/night noise level (L_{dn}) of 71 dBA at the measurement location.

The average (L_{eq}) noise levels at the short-term measurement locations at outdoor areas in the interior of the plant site are shown on Figure 1, they were 78 dBA at ST-1, 75 dBA at ST-2, 81 dBA at ST-3, 78 dBA at ST-4, and 78 dBA at ST-5, during the period in which these short term measurements were made, the average (L_{eq}) noise level at location LT-1 was constant at 64 dBA. Based on the differential between L_{eq} noise level at the long term and short-term measurement location and considering the relative constancy of the noise levels measured over the 48 hour period, the L_{dn} at outdoor areas in the interior of the plant site has been calculated to range from 82 to 88 dBA.

III.b NOISE SENSITIVE RECEIVER AND WELLPAD MEASUREMENTS

Long-term (48 hour) measurements were made at locations LT-2, 3, 4, 5, and 6, at the closest identified noise sensitive receivers and at the proposed well pad sites (see Figure 2) between 12pm on July 15th and 12pm on July 17th, 2009. The results of these measurements are shown on Charts 2 through 6 in Appendix B on an hourly basis and discussed below:

Location LT-2

Chart 2 in Appendix B presents the ambient sound levels measured at location LT-2, near the Jadiker residence (Residence 1). The measurement results show that the levels of all noise metrics varied throughout the measurement period, with generally increased noise levels in the morning and afternoon. These increases are likely due to residential activities and typical diurnal variations wind induced noise in nearby vegetation. An increase in noise was also noted in the midnight hour of July 17th, and while the source of this noise is unknown, it may have been produced by woodland animals, or by the resident. The average daytime and nighttime L_{eq} levels during the measurement period ranged from 32 to 47 dBA and 27 to 46 dBA, respectively, with an average daytime noise level of 41 dBA and an average nighttime noise level of 37 dBA. The Ldn at this monitoring location was calculated to be 44 dBA.

Location LT-3

Chart 3 in Appendix B presents the ambient sound levels measured at location LT-3, near the closest of the Mahnke family residences to the proposed well pads (Residence 2). This home was unoccupied at the time of the measurement survey, though some maintenance work was reportedly planned at the residence on the opposite side of the property from the measurement location. The measurement results show that, as with the measurement at LT-2, noise levels increased in the morning and afternoon, likely due to the planned maintenance activities and typical diurnal variations wind induced noise in nearby vegetation. The increase in noise noted in the midnight hour of July 17th at location LT-2 was also found at this location, indicating that the noise may have been produced at some distance from the measurement site. The average daytime and nighttime L_{eq} levels during the measurement period ranged from 36 to 43 dBA and 35 to 42 dBA, respectively, with an average daytime noise level of 40 dBA and an average nighttime noise level of 37 dBA. The Ldn at this monitoring location was calculated to be 44 dBA.

A further review of Chart 3 shows that the background and average noise levels at this location were limited to between 35 and 36 dBA, indicating that a source of continuous background sound, such as is produced by source of electrical or mechanical noise, or constant wind in vegetation. One possible source of this noise is that produced by the operation of the Bottle Rock Power Plant. However, based on calculations using the inverse square law relationships for sound attenuation[e], the results of the long and short-term measurements conducted at the power plant, and the distance from the measurement location to the power plant (see long term measurement location descriptions), without consideration of any noise shielding from intervening terrain, the sound level at LT-3 due to power plant noise was found

[e] The inverse square law for sound attenuation with distance yields a six (6) dB sound level reduction for each doubling of the distance from the source and is mathematically expressed as $L_{rec} = L_{source} - 20xLog(D_{rec}/D_{source})$

to be between 33 and 34 dBA, with a possible contribution of 40 dBA to the measured Ldn. A review of the topography between this measurement site and the power plant indicate that there are significant terrain features which would be expected to reduce this sound level further, to a level well below the measured 35 and 36 dBA background noise level. Considering this, and that the home was unoccupied at the time when measurements were made, the observed continuous background sound level is judged to be produced by an additional noise source, unrelated the operation of the Bottle Rock power plant.

Location LT-4

Chart 4 in Appendix B presents the ambient sound levels measured at location LT-4, near the Fidge residence (Residence 3). The measurement results show that noise levels increased in the morning, afternoon, and evening likely due resident activities. The increase in noise noted in the midnight hour of July 17th at location LT-2 and LT-3 was also found at this location, further indicating that this noise may have been produced at some distance from the measurement site. The average daytime and nighttime L_{eq} levels during the measurement period ranged from 38 to 46 dBA and 38 to 43 dBA, respectively, with an average daytime noise level of 43 dBA and an average nighttime noise level of 39 dBA. The Ldn at this monitoring location was calculated to be 46 dBA.

A further review of Chart 4 shows that the background and average noise levels at this location were limited to between 37 and 38 dBA, in a similar fashion to those at location LT-3. Based on the use of the inverse square law relationships, the results of the long and short-term measurements conducted at the Bottle Rock Power Plant, and considering the distance from the this location to the power plant (see long term measurement location descriptions), without consideration of any noise shielding from intervening terrain, the sound level at LT-4 due to power plant noise was found to be between 37 and 38 dBA. A review of the topography between this measurement site and the power plant indicate that there are no significant terrain features between the power plant and measurement site, and therefore the measured continuous background sound level is judged to be due to power plant noise. The measured level of constant background noise (37 to 38 dBA), is calculated to produce an Ldn of 44 dBA at this location.

Location LT-5

Chart 5 in Appendix B presents the ambient sound levels measured at location LT-5, near the center of the Well Pad 2-32. The measurement results show that noise levels vary throughout the day and night, likely fluctuating due to typical diurnal variations wind induced noise in nearby vegetation. The increase in noise noted in the midnight hour of July 17th at location LT-2, LT-3 and LT-4 was also found at this location, but this increase is not as apparent as at the other locations. The results of this measurement also show that, while the minimum noise levels at this location were limited to between 24 and 25 dBA, the noise signature of the background and average noise levels do not indicate a source of continuous background sound, such as at location LT-3 and LT-4. The average daytime and nighttime L_{eq} levels during the measurement period ranged from 26 to 39 dBA and 28 to 35 dBA, respectively, with an average daytime noise level of 35 dBA and an average nighttime noise level of 31 dBA. The Ldn at this monitoring location was calculated to be 38 dBA.

Location LT-6

Chart 6 in Appendix B presents the ambient sound levels measured at location LT-6, near the center of the Well Pad 1-32. The measurement results show a wide variation in noise levels throughout the day and night, likely fluctuating due to typical diurnal variations wind induced noise in nearby vegetation. Heightened noise levels were measured on both nights between 11 pm and 4 am. Considering the remote location of the measurement relative the Bottle Rock Power plant, this increase in noise is judged to either be due to increase vegetation or other woodland noise, or noise from Calpine operations at the well pads to the above and west of the measurement location. The increase in noise noted in the midnight hour of July 17th at location LT-2, LT-3 and LT-4 was also found at this location, with a higher level of maximum noise at this location than at the others. Based on this finding and that at the next highest noise during the midnight hour occurred at LT-2, the source of this noise likely originated to the west of the project site. The results of this measurement do not show any limiting trend in measured background or average noise levels. The average daytime and nighttime L_{eq} levels during the measurement period ranged from 30 to 46 dBA and 26 to 51 dBA, respectively, with an average daytime noise level of 39 dBA and an average nighttime noise level of 46 dBA. The Ldn at this monitoring location was calculated to be 51 dBA.

IV. PROJECT GENERATED NOISE

There are many noise sources that are associated with the development of geothermal energy. In general they may be divided into three categories:

a. Noise associated with the well pad development and operation,
b. Noise associated with the steam pipelines and,
c. Noise associated with the operation of the power plant.

The noise levels associated with each of these categories of activity are discussed below:

IV.a WELL PAD DEVELOPMENT

Noise is generated at the well site in four distinct time periods. These may be classified as follows:

1. The preparation and grading of the well pad and access roads to the pad,
2. Drilling rig transport, erection, dismantling, and removal.
3. Well drilling operations.
4. Well maintenance, production testing and connection to of the well and the time during which the well is connected to the power plant and begin to be used for power generation.

Noise produced during each of these periods is discussed below;

IV.a.1 WELL PAD PREPARATION

Site preparation for a well pad consists of clearing the prescribed pad area, leveling the ground and providing a firm base for the drilling rig, engines and ancillary equipment. A sump hole is also dug to receive the cuttings and other waste products. Access roads must also be provided to the well pad. During site preparation there is typically a large amount of truck and other vehicular traffic to and from the site. Typical equipment for use in site preparation includes, crawler tractors, scrapers, water trucks, motor graders, backhoes, and both heavy and light trucks. Representative octave band noise

spectra and A-weighted noise levels at 50 feet for these vehicles and equipment are presented in Figures 1, 2 and 3 in Appendix B. Figure 1 shows the octave band sound levels for two configurations of a D8 class crawler tractor for typical operating conditions with the tractor pushing dirt up and down a 9% slope. Figure 2 shows Noise generated by a large Caterpillar Type 657 scraper at 50 ft. under full load conditions, uphill and downhill on a 7% grade. Figure 3 shows estimates of the sound levels produced during site preparation based on typical operational levels and duty cycles during this work[1]. Based on a review of this data noise levels at during site preparation would range from 70 to 95 dBA, with average noise levels of about 80 to 85 dBA at 50 feet from the center of operations. These noise levels would vary significantly during the day and lower during night hours.

IV.a.2 Drilling Rig Set-up and Removal

The erection of a drilling rig and the placement of the generator, mud pumps, air compressors and remaining equipment typically takes three to four days and removal of this equipment typically takes two to three days, depending on whether rigging up activities occur continuously or take place only during daylight hours. Based on findings of previous noise surveys, continuous (daytime and nighttime) rig set-up/removal produces an average Ldn of 75 dBA at 120 feet over 2 days of activity, while daytime only rig set-up/removal activities produces an average Ldn of 67 dBA at 120 feet over 2 days of activity[2].

IV.a.3 Drilling Operations

Noise associated with well-drilling activities can be divided into the categories of mud and air drilling and production testing. The activities and the noise levels associated with each without significant noise mitigation are discussed below:

- For mud drilling the drilling fluid (mud) is circulated through the drill string via a large high volume pump called the mud pump through several pipes and a large hose (rotary hose), which is attached to the drill string above the swivel mechanism. The dominant source of noise for mud drilling this operation comes from the diesel engines, which are used to supply power to the drill rig. Mixed in are additional noises from the mud pumps, the turntable, braking noise, chain and pipe slapping, noise from unlubricated metal parts and also from the draw works. The range in sound pressure levels during this phase can vary from 70 to 80 dBA at 100 feet[3]. Continuous (daytime and nighttime) activities during mud drilling has been documented to produce an average Ldn level of 78 dBA at 120 feet over a period of 33 days[2]. Octave band spectrum sound pressure levels associated with un-mitigated mud drilling at 100 feet are given in Figure 4 in Appendix B.

- When the drill string begins to encounter steam-bearing formations, compressed air is used as the circulating fluid to cool the tool bit and bring cuttings and debris to the surface. Diesel engines and air compressors are used for this operation. For this operation the mud pumps are turned off and the noise produced by the air compressors and their engines is added back to the noise created by the electrical generators and their engines. The effect of turning off the mud pumps and turning on the air compressors does not appreciably affect the overall sound pressure level produced by the drilling operations. With the range in sound pressure levels during this phase remaining at between 70 to 80 dBA at 100 feet.[4]

- Drilling does not stop when steam is encountered. Drilling operations (now called Air Drilling) continue until sufficient quantities of steam have been found or the operation is abandoned. Steam is vented to the air during drilling operations through a blooie line and blooie (centrifugal) silencer, which both quiets the steam noise and to remove particles from the steam flow. During air drilling operations the sound generated by the steam flow becomes the dominant source of noise. Sound pressure levels at 100 feet for air operations with a blooie line alone typically range from 95 to 108 dBA with an average value of 103 dBA. Adding a blooie silencer without water- injection reduces noise levels at 100 feet to between 87 to 108 dBA, with an average value of 92 dBA and injecting water upstream of the silencer reduces noise levels at 100 feet to between 80 to 108 dBA with an average value of 88 dBA.[5] Continuous (daytime and nighttime) activities during air drilling has been documented to produce an average Ldn level of 87 dBA at 120 feet from the well head over a period of 11 days[2]. Octave band sound pressure levels associated with air drilling at 100 feet are given in Figure 5 in Appendix B.

- After drilling is completed the wells must be cleaned out and tested to determine their suitability for commercial steam production. When a well is vented the noise created is produced by the high-speed flow of the steam itself. Noise due to a free jet (air flowing from a pipe is referred to as a free jet) is directional and very dependent on the jet velocity. The sound level associated with free jets averages about 108 dBA. Octave band sound pressure levels associated with free jets at 100 feet are given in Figure 6 in Appendix B. Because free jets produce such high noise levels a muffler is typically employed to reduce environmental noise emissions. Some methods which have been used to reduce this noise include slow expansion of a pipe diameter (called a diffuser), injection of water into the stream which decreases the volume of the stream and thus reduces the velocity, the use of blooie silencers which reduce the stream through an expansion chamber from one pipe size to that of a larger size, and finally through the use of rock mufflers which reduce the steam velocity by causing the steam to impact directly onto a bed of rocks and subsequently discharge through a large open area. Depending on the type and performance of the muffler used the average sound level produced during steam venting may be reduced by 20 to 50 dBA[6], for a possible range of 58 to 88 dBA during steam venting. Continuous (daytime and nighttime) activities during product testing have been documented to produce an average Ldn of 89 dBA at 120 feet over a period of 4 days[2].

IV.a.4 WELL MAINTENANCE

During normal operation of the completed well it may be vented through a small bleeder line to the atmosphere to prevent the possibility of having to clean out the well, a costly operation, and to keeps the temperature of the well more stable. Bleed lines, if allowed to vent freely to the atmosphere are a significant source of noise at the well site after drilling operations have ceased. Noise Data for muffled and unmuffled bleed lines are presented in Figure 7 in Appendix B[7]. Bleed lines may be from ¼ to 1 inch in diameter, producing sound lines for unmuffled (open) conditions of between 65 to 76 dBA for ¼ inch lines to 92 dBA for 1-inch lines at 100 feet. Figure 7 shows that, dependant on their type and performance, mufflers may be used to reduce these levels to between 32 and 66 dBA at 100 feet for ¼ inch bleed lines, and to between 44 to 59 dBA at 100 feet for 1-inch bleed lines.

Little noise, other than that associated with condensate bleed lines, is generated during normal well operations, however there are times when free venting may occur at the well site. This may happen when a valve must be changed at the wellhead. This event occurs at intervals of about two years. Valve replacement typically takes about four hours to complete, during which time the steam must be freely vented. The data shown in Figure 6 and discussed under well cleanout and production testing, above, applies during these conditions under worst-case situations. Nighttime valve replacement may produce similar Ldn levels as those documented for product testing, with an average Ldn of 89 dBA at 120 feet from the wellhead.

IV.b STEAM PIPELINE NOISE

There are two periods in the lifetime of a steam pipeline, which may be identified in terms of noise. The first period occurs during the construction of the pipeline and the second during its normal use. During Pipeline construction the sounds of bulldozer, trucks, welding rigs, cranes and other construction equipment will be present during daytime construction hours. The construction period of a pipeline is typically measured in terms of weeks, rather than days or months. Noise levels generated by construction equipment during this period are shown in Figure 8. When a new pipeline is connected to an existing pipeline steam must be vented to clear the line, this event typically only occurs once in the startup of the pipeline. The data shown in Figure 6 and discussed under well cleanout and production testing, above, applies during these conditions.

Steam traveling though a typical pipeline from the well to the plant produces only moderate noise levels of 50 dBA at 100 feet. During the operation of a pipeline it sometimes becomes necessary to close down the plant for a long period of time, such as during planned maintenance outages, or unplanned shutdowns. When the facility restarts there may be an extended period in which pipelines are cleared and open venting to the atmosphere may occur.

IV.c CHANGES IN POWER PLANT OPERATIONAL NOISE

The current noise levels produced at the power plant are documented in Section III.a, however the proposed project modifications are estimated to increase the power output of the plant from its current rating of 15 Megawatts (MW) to 55 MW. Based on the results of our current noise survey, which found a constant L_{eq} noise level at the long term monitoring position for the current plant output of 15 MW at 64 dBA and a review of the results of a prior (1986) noise survey[8] at the same location of 66 dBA L_{eq} with the plant operating at 28 MW, we estimate that noise produced by the plant at it's northern perimeter may increase by 3 dBA due to an increase in power from 15 to 55 MW.

The 1986 noise survey report also states that,

> *"…this half load [28 MW] condition presents a worse case when compared to a full load. A noise level increase is experienced within the turbine generator building due to the restriction of the supply steam through the turbine control valves. It is suspected that turbine generator loads below half would result in even higher noise levels."*[9]

This statement indicates that increasing the output of the plant would not be expected to result in higher noise levels within the interior of the plant, and may actually reduce the noise exposure to plant workers.

Increased Switchyard and Transmission Line Noise

In addition to the above the above changes in operational noise at the power plant, it is possible that audible noise from the existing switchyards and overhead transmission lines could be increased due to the increase in plant output.

Audible noise from a transmission line may result from corona. Corona is a phenomenon associated with all transmission lines. Under certain conditions, the localized electric field near energized components and conductors can produce a tiny electric discharge, or corona, that causes the surrounding air molecules to ionize, or undergo a slight localized change of electric charge. Corona is a function of the electric field gradient, which is the rate at which the electric field changes and is directly related to the line voltage. The electric field gradient is greatest at the surface of the conductor. Large-diameter conductors have lower electric field gradients at the conductor surface and, hence, lower corona than smaller conductors, everything else being equal. Also, irregularities (such as nicks and scrapes on the conductor surface) or sharp edges on suspension hardware concentrate the electric field at these locations and, thus, increase corona at these spots. Similarly, contamination on the conductor surface, such as dust or insects, can cause irregularities that are a source for corona. Raindrops, snow, fog, and condensation are also sources of irregularities. Corona typically becomes a design concern for transmission lines having voltages of 345 kV and above. Research by the Electric Power Research Institute (EPRI, 1982) has shown that the fair-weather audible noise from modern transmission lines to be generally indistinguishable from background noise at the edge of a right-of-way of 100 feet or more.

An additional source of audible noise is transformer hum caused by extension and contraction of the core laminations when magnetized. In comparison to transmission line conductors, connections within the switchyard contain fewer imperfections and therefore, are less of a contributing factor to audible noise than the incoming transmission lines. At the plant itself the sound level attributable to transformer hum would well below that produced by plant operational noise and therefore, will not add any appreciable audible noise to the noise levels at the plant.

V. EVALUATION OF NOISE AT RESIDENTIAL RECIEVERS

Using the well pad, steam pipeline, access road, and receiver locations previously described, and/or shown in Figure 2, in conjunction with topographical information obtained via Goggle Earth, cross-sections have been developed to determine the direct line form the center of the proposed well pads, and the closest areas of the proposed pipeline and access road to the identified receiver locations to determine the relative barrier effect provided by the intervening terrain from a point 10 feet above ground level at the well pad to a point 5 feet above ground level at the receiver locations. A graphical representation of the line of sight analysis from the proposed well pads to the residential receivers is shown in Charts 7a through 9b in Appendix B.

The results of this analysis were used to determine the relative barrier effect provided by the intervening

terrain through the determination of the path length difference between the path which sound actually travels over the terrain between the well pad and the receivers (i.e. the diffracted path) and the line-of sight path from well pad to the receivers. From this analysis the barrier effect provided by the intervening terrain between Pad 1-32 and the Residences 1, 2, and 3 has been, respectively, calculated to be 12, 22, and 0 dBA. For the intervening terrain between Pad 2-32 and the Residences 1, 2, and 3 the barrier effect has been, respectively, calculated to be 18, 20, and 0 dBA[f].

Using the results of these terrain barrier calculations and the "inverse square law" yields a six (6) dB sound level reduction for each doubling of the distance from a given source, the total estimated distance and terrain attenuation expected between the well pads and Residences 1, 2, and 3 have been calculated to range from 26 dBA (Pad 2-32 to Residence 3)[g] to 52 dBA (Pad 1-32 and Residence 2) [h].

Pipeline, Access Road and Well Pad Development

Construction of the access roads, steam pipeline and leveling of well pads is expected to only occur during daytime hours, producing maximum noise levels of up to 95 dBA, with average noise levels of about 80 to 85 dBA at 50 feet from the center of operations. During site work only a given number of vehicles operate at anyone time and not all operate in a manner, which produces maximum noise at any given instant. Based on a worst case consideration that maximum construction noise conditions (95 dBA at 50 feet) may occur for two hours per day and average construction noise conditions (85 dBA at 50 feet) may take place for the rest of a 10 hour work day, and taking into account the barrier effect provided by the intervening terrain and the attenuation provided by the distance from the construction activity, the respective CNEL at Residences 1, 2, and 3 has been calculated to be 38, 33, and 42 dBA for average conditions and 44, 39, and 47 dBA for maximum noise conditions. This level of noise would not exceed the 60 dBA CNEL standard at the adjacent noise sensitive uses.

Well Pad Operational Noise Levels

The project proposes two simultaneous drilling operations at any one time, with these two operations occurring either on the same pad or on separate pads. Further, product testing, the noisiest of the drilling phases, would only occur at one drill rig at a time. With the noise produced by the operation of two rigs at the same phase of drilling activities on one pad, the average CNEL[i] produced at 120 feet from the acoustic center of the two rigs would be 81 dBA during mud drilling and 90 dBA during air drilling.[j] Using the same analysis, the CNEL during rig erection with daytime and nighttime operations would be 78 dBA at 120 feet, and 70 dBA at 120 feet with daytime only operations. Product testing would not occur concurrently, thus the Noise level the average CNEL produced at 120 feet from the acoustic center of the two rigs would be 89 dBA.

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[f] Our analysis shows that Residence 3 (the Fidge Residence) has a clear line of sight to both well pads, and will also have a clear view of some portions of the pipeline and roadway developments.

[g] 0 dB terrain shielding, at an estimated distance of 2300 feet.

[h] Significant (22 dB) terrain shielding, at an estimated distance of 3700 feet.

i The L_{dn} and CNEL 24 hour noise metrics are typically within 1 dBA of each other for the same noise source, thus they are used interchangeably in this analysis.

[j] Sound levels for each of the phases are been added on an energy basis. A decibel is a logarithmic unit of measurement such that the noise emitted from two drilling rigs and the same operational phase would not equal 2x the level of a single rig, but the level of a single rig +3 dB, or $L_{new} = 10\log(10^{a/10}+10^{b/10})$, where a and b are the decibel values to be added.

Based on the above noise levels, the total estimated distance and terrain attenuation expected between the well pads and residences, and considering the worst case scenario of two concurrent drilling operations on the same well pad, the expected average CNEL noise levels at Residences 1, 2 and 3 for the typical activities during an entire drilling cycle have been calculated. The results of this analysis are presented in Table 1, following:

Table 1: Average CNEL levels for Single Pad dual Well Drilling at 1-32 and 2-32

Major Activities		Day/Night Levels (CNEL, dBA) at Res. 1		Day/Night Levels (CNEL, dBA) at Res.2		Day/Night Levels (CNEL, dBA) at Res. 3	
		1-32(west)	2-32(east)	1-32(west)	2-32(east)	1-32(west)	2-32(east)
Rig Setup & Removal	Daytime Only	36	28	18	27	39	44
	Day & Nighttime	44	36	26	35	47	52
Mud Drilling		47	39	29	28	50	55
Air Drilling		56	48	38	47	59	64
Product Testing		57	49	39	48	60	65

Note: For product testing, other rig was presumed to be air drilling

A review of Table 1 indicates that under the worst-case dual single pad concurrent well drilling scenario, Residence 3 will be most affected by drilling noise, with noise levels exceeding the 60 dBA CNEL during product testing and air drilling. Residence 2 is the least affected by well pad noise, with no noise conditions exceeding 50 dBA CNEL.

Increased Power Plant Noise

Based on the analysis on pages 9 and 10 (above), increasing the power output of the plant from 15 MW to 55 MW is estimated to increase noise levels at the plant perimeter by 3 dBA. Based on the current measured noise levels at the plant perimeter (see measurement LT-1 results) and considering the worst case condition with only distance attenuation to Residences 2 and 3[k], the potential Ldn at these residences due to the operation of the power plan may increase from current respective levels of 40, and 44 dBA Ldn to future respective levels of 44, and 47 dBA Ldn. This level of noise would not exceed the 50 dBA Ldn standard established under the current power plant Use Permit.

Switchyard and Transmission Line Noise

Based on the discussion presented on page 10, increased noise from the transmission lines and switchyards due to the project would not measurably increase noise levels at the plant itself or at the adjacent noise sensitive residential uses.

VI. NOISE IMPACT ANALYSIS

SIGNIFICANCE CRITERIA

This noise analysis uses applicable criteria from the State CEQA Guidelines, and the Lake County General Plan and Noise Ordinance Standards. According to these criteria, the project would have a significant noise impact if it would:

[k] Based on the noise measurement data, these residences may be affected by background noise due to power plant operation.

- Expose persons to or generate noise levels in excess of standards established in the local General Plan or Noise Ordinance, or applicable standards of other agencies. Based on an analysis of the General Plan Noise Element and Noise Ordinance (see Section II, regulatory Background, particularily footnotes a through d), a level of 60 dBA CNEL from both construction and operational noise as the standard of significance.
- Expose persons to, or generate excessive groundborne vibration or groundborne noise levels.
- Generate a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project. In noise environments greater than 60 dBA Ldn/CNEL an increase of more than 3 dB in the Ldn/CNEL, due to the project, would be considered a significant impact, and where the existing noise levels are less than 60 dBA Ldn/CNEL, a 5 dB increase can be tolerated before significance occurs.
- Generate a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.
- For a project located within an airport land use plan, or where such a plan has not been adopted, within two miles of a public airport or public use airport, the project would expose people residing or working in the project area to excessive noise levels.
- For a project within the vicinity of a private airstrip, the project would expose people residing or working in the project area to excessive noise levels.

LESS-THAN-SIGNIFICANT IMPACTS

Based on the findings of the proceeding analyses, the proposed project would have no or less-than-significant impacts for the following significance criteria.

- *Expose persons to or generate excessive groundborne vibration or groundborne noise levels.* Potential ground borne vibration-inducing activities at the project are expected to include site preparation work, and rock drilling. For structural damage, the California Department of Transportation uses a vibration limit of 12.7 mm/sec (0.5 inches/sec), ppv, for buildings which are structurally sound and designed to modern engineering standards, 5 mm/sec (0.2 inches/sec), ppv, for buildings that are found to be structurally sound but where structural damage is a major concern, and a conservative limit of 2 mm/sec (0.08 inches/sec), ppv, for historic buildings or buildings that are documented to be structurally weakened.

  Activities, such as drilling and other high-power or vibratory tools, excavation, grading and rolling stock equipment (tracked vehicles, compactors, etc.) may generate ground borne vibration in the immediate vicinity. At a normalized distance of 25 feet, ground drilling and excavation can generate vibration levels of 0.09 inches/sec, ppv, vibratory rollers can generate vibration levels of 0.2 inches/sec, ppv, bulldozers can generate vibration levels of 0.003 to 0.09 inches/sec, ppv, and loaded heavy truck passbys can generate vibration levels of 0.08 inches/sec, ppv. The vibration levels at the adjacent uses would vary depending on project conditions such as soil conditions, construction methods, and equipment used, however groundborne vibration from project construction would not be expected to exceed accepted criteria at any adjacent uses. This would be a less than significant impact.
- *Generate a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.*

The noise generated from the development of access roads, steam pipelines and well pads, along with drilling activities at the well pads, can be generally characterized as construction related and would be temporary in nature. The only permanent, and continuous, source of noise proposed by project is increased noise from the power plant, which will not result in a significant increase in noise at the nearest noise sensitive (residential) uses, or exceed County General Plan Noise Element standards at adjacent residential uses or Noise Ordinance standard for continuous operational noise at these residential uses. Occasional well maintenance and stream pipeline noise may occur, however this noise will also be transitory in nature and is not considered a permanent increase ambient noise. Therefore, noise due to the continuous operations on the project site, would not generate a significant impact on existing residences in the vicinity of the project.

- *For a project located within an airport land use plan, or where such a plan has not been adopted, within two miles of a public airport or public use airport, the project would expose people residing or working in the project area to excessive noise levels.*
  No existing or proposed public or public-use airports are located within two miles of the site and aircraft operations would not expose persons to excessive aircraft noise. Thus, aircraft operations would not result in a noise impact on the project site.
- *For a project within the vicinity of a private airstrip, the project would expose people residing or working in the project area to excessive noise levels.*
  The project site is not in the vicinity of any private airstrip. No noise impact would result.

IMPACT ANALYSIS

Impact 1 Well Drilling Noise

Drilling operations, which are considered construction related activities, at the proposed well pads would temporarily increase ambient noise levels at adjacent noise sensitive uses. Full implementation of the following mitigation measures would reduce the impact of this noise on the adjacent noise sensitive uses to an insignificant level.

Mitigation Measure 1a: Limit hours of Product Testing.

Based on the analysis presented in the proceeding sections of this report, limiting product testing to the hours between 7 am and 7 pm would decrease the CNEL produced by 4 dBA at the adjacent residences.

Mitigation Measure 1b: Implement Well Drilling and Testing Noise Control Measures.

The following noise control measures should be used to further reduce well drilling and product testing noise at the adjacent residential uses:

1. Control venting noise by reducing the velocity of the steam stream. This may be accomplished through one, or more, of the following methods;
   a) The use of blooie silencers, which reduce the stream through an expansion chamber from one pipe size to that of a larger size, along with water injection to decrease the stream volume and velocity during air drilling, and
   b) The use of rock mufflers, which reduce the steam velocity by causing the steam to impact directly onto a bed of rocks and subsequently discharge through a large open area, or other, acoustically equivalent, methods during product testing.

To ensure that the optimum degree of noise control has been incorporated in the drilling plan, the acoustical performance of the selected of venting noise control system should be reviewed by a qualified acoustical specialist.

2. Install a noise barrier wall, which blocks the direct line of sight by a minimum of twenty-five degrees (25°) left and right (for a total of 50°) to the adjacent residences from blooie line silencer/muffler at the perimeter of the well pad. An example of this type of noise barrier placement for a conceptual pad arrangement is shown in Figure 9, Appendix B. The wall should have a minimum wall height of 10 feet above the blooie line silencer/muffler outlet or 20 feet in total height, whichever is greatest, and a minimum Sound Transmission Class (STC) rating of 25. The wall may be constructed of removable weather proof noise barrier blankets strung between pipe sections, in a similar fashion (only higher) as has been used at the Francisco well pad (see Appendix B, Figures 10 & 11 for photos of Francisco pad barrier). To ensure that type and placement of the noise barrier meets the above height, shielding, and STC requirements, a qualified acoustical specialist should review the placement, dimensions and type of wall system for each well pad.
3. Limit the hours of large truck traffic, defined as vehicles over one (1) ton in weight, to the hours of 7:00 a.m. to 7:00 p.m., except when setting casing and emergency situations.
4. Do not lay drill pipes in bins between the hours of 7 p.m. and 7 a.m.
5. Install noise barrier blankets with a minimum STC rating of 20 at the perimeter of the rig, and on the derrick itself such that the placement of the barriers do not interfere with running drill pipe.
6. Reduce mechanical sources of noise associated with the drilling of geothermal wells through the use of properly designed mufflers and enclosures.
7. Use electric drill rigs and mud pumps with engines and derricks shielded by, or wrapped in, noise control barrier enclosures.
8. Install noise barrier blankets with a minimum STC rating of 20 at the perimeter of the rig, and on the derrick itself such that the placement of the barriers do not interfere with running drill pipe.

Significance after Mitigation

Implementation of the above mitigation measures will significantly reduce the effects of well drilling noise on existing noise sensitive receptors (residences) in the area to below a CNEL of 60 dBA. Calculated noise levels for the worst case scenario with two concurrent drilling operations on the same well pad at Residences 1, 2 and 3 for activities during an entire drilling cycle with the above mitigation measures implemented are shown in Table 2, below.

Table 2: Average CNEL levels for Single Pad dual Well Drilling at 1-32 and 2-32 with Implementation of Mitigation Measures.

Major Activities		Day/Night Levels (CNEL, dBA) at Res. 1		Day/Night Levels (CNEL, dBA) at Res.2		Day/Night Levels (CNEL, dBA) at Res. 3	
		1-32(west)	2-32(east)	1-32(west)	2-32(east)	1-32(west)	2-32(east)
Rig Setup & Removal	Daytime Only	33	26	17	20	25	31
	Day & Nighttime	41	34	25	28	33	39
Mud Drilling		44	37	28	31	36	42
Air Drilling		53	46	37	40	45	51
Product Testing		52	45	36	39	43	50

Note: For product testing, other rig was presumed to be air drilling

APPENDIX A:
FUNDAMENTAL CONCEPTS OF ENVIRONMENTAL ACOUSTICS

Noise may be defined as unwanted sound. Noise is usually objectionable because it is disturbing or annoying. The objectionable nature of sound may be caused by either its *pitch* or its loudness. *Pitch* is the height or depth of a tone or sound, depending on the relative rapidity (frequency) of the vibrations by which it is produced. Higher pitched signals sound louder to humans than sounds with a lower pitch. *Loudness* is intensity of sound waves combined with the reception characteristics of the ear. Intensity may be compared with the height of an ocean wave in that it is a measure of the amplitude of the sound wave.

In addition to the concepts of pitch and loudness, there are several noise measurement scales that are used to describe noise in a particular location. *A decibel (dB)* is a unit of measurement that indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10-decibel increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. Technical terms are defined in Table 1. There are several methods of characterizing sound. The most common in California is the *A-weighted sound level or dBA.* This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Representative outdoor and indoor noise levels in units of dBA are shown in Table 2.

Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This energy-equivalent sound/noise descriptor is called L_{eq}. The most common averaging period is hourly, but L_{eq} can describe any series of noise events of arbitrary duration.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about plus or minus 1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends upon the distance the receptor is from the noise source. Close to the noise source, the models are accurate to within about plus or minus 1 to 2 dBA.

Since the sensitivity to noise increases during the evening and at night -- because excessive noise interferes with the ability to sleep -- 24-hour descriptors have been developed that incorporate artificial noise penalties added to quiet-time noise events. The *Day/Night Average Sound Level, Ldn,* is a measure of the cumulative noise exposure in a community, with a 10 dB penalty added to nighttime (10:00 pm - 7:00 am) noise levels.

TERM	DEFINITIONS
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted, unless reported otherwise.
L_{01}, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Equivalent Noise Level, L_{eq}	The average A-weighted noise level during the measurement period.
Day/Night Noise Level, Ldn	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 pm and 7:00 am.
L_{max}, L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Definitions Of Acoustical Terms | **Table 1**

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Effects of Noise

Sleep and Speech Interference: The thresholds for speech interference indoors are about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Outdoors the thresholds are about 15 dBA higher. Steady noise of sufficient intensity; above 35 dBA, and fluctuating noise levels above about 45 dBA have been shown to affect sleep. Interior residential standards for multi-family dwellings are set by the State of California at 45 dBA Ldn. Typically, the highest steady traffic noise level during the daytime is about equal to the Ldn and nighttime levels are 10 dBA lower. The standard is designed for sleep and speech protection and most jurisdictions apply the same criterion for all residential uses. Typical structural attenuation is 12-17 dBA with open windows. With closed windows in good condition, the

noise attenuation factor is around 20 dBA for an older structure and 25 dBA for a newer dwelling. Sleep and speech interference is therefore possible when exterior noise levels are about 57-62 dBA Ldn with open windows and 65-70 dBA Ldn if the windows are closed. Levels of 55-60 dBA are common along collector streets and secondary arterials, while 65-70 dBA is a typical value for a primary/major arterial. Levels of 75-80 dBA are normal noise levels at the first row of development outside a freeway right-of-way. In order to achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed, those facing major roadways and freeways typically need special glass windows.

At a Given Distance From Noise Source	A-Weighted Sound Level in Decibels	Noise Environments	Subjective Impression
	140		
Civil Defense Siren (100')	130		
Jet Takeoff (200')	120		Pain Threshold
	110	Rock Music Concert	
Diesel Pile Driver (100')	100		Very Loud
	90	Boiler Room Printing Press Plant	
Freight Cars (50') Pneumatic Drill (50')	80		
Freeway (100') Vacuum Cleaner (10')	70	In Kitchen With Garbage Disposal Running	Moderately Loud
	60	Data Processing Center	
Light Traffic (100') Large Transformer (200')	50	Department Store	
	40	Private Business Office	Quiet
Soft Whisper (5')	30	Quiet Bedroom	
	20	Recording Studio	
	10		Threshold of Hearing
	0		

Typical Sound Levels Measured In The Environment And Industry — **Table 2**

ILLINGWORTH & RODKIN, INC./Acoustical Engineers

Annoyance: Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that the causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The Ldn as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise and ground transportation noise. There continues to be disagreement about the relative annoyance of these different sources. When measuring the percentage of the population highly annoyed, the threshold for ground vehicle noise is about 55 dBA Ldn. At an Ldn of about 60 dBA, approximately 2 percent of the population is highly annoyed. When the Ldn increases to 70 dBA, the percentage of the population highly annoyed increases to about 12 percent of the population. There is, therefore, an increase of about 1 percent per dBA between an Ldn of 60-70 dBA. Between an Ldn of 70-80 dBA, each decibel increase increases by about 2 percent the percentage of the population highly annoyed. People appear to respond more adversely to aircraft noise. When the Ldn is 60 dBA, approximately 10 percent of the population is believed to be highly annoyed. Each decibel increase to 70 dBA adds about 2 percentage points to the number of people highly annoyed. Above 70 dBA, each decibel increase results in about a 3 percent increase in the percentage of the population highly annoyed.

APPENDIX B:
NOISE DATA - CHARTS AND FIGURES

Chart 1: Measured Noise Levels at LT-1

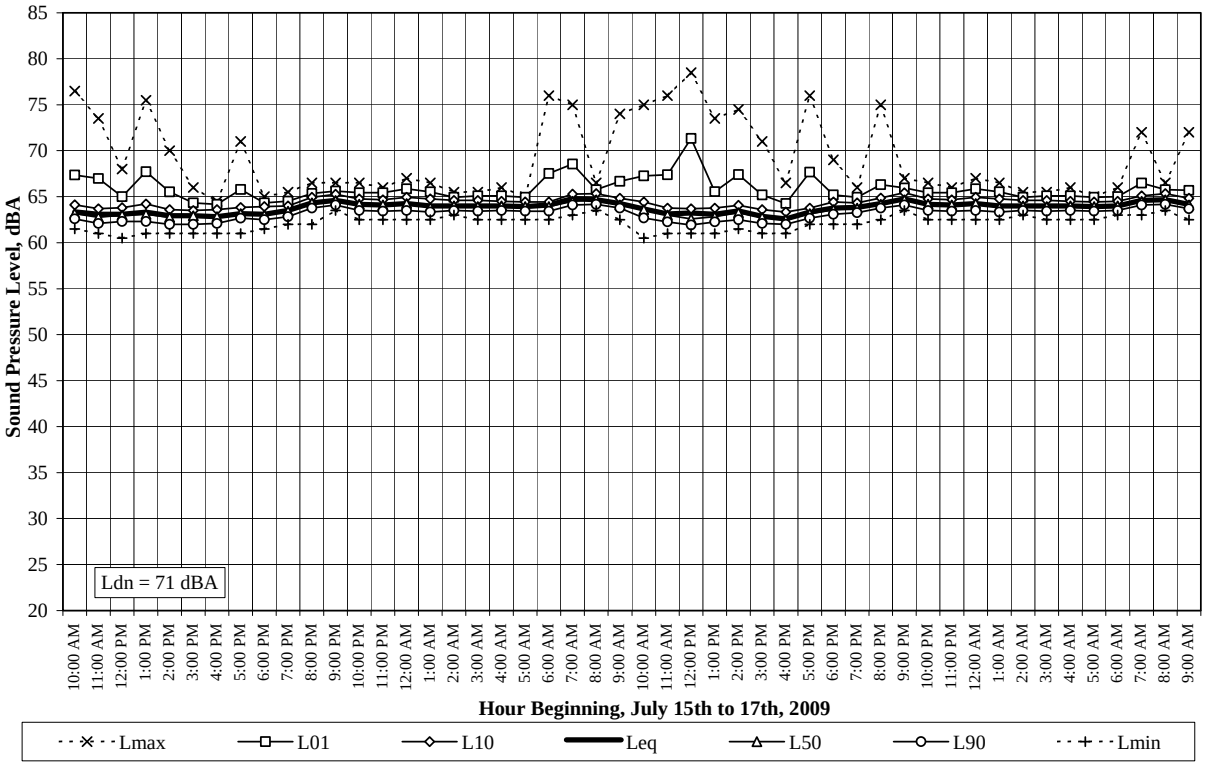


Chart 2: Measured Noise Levels at LT-2

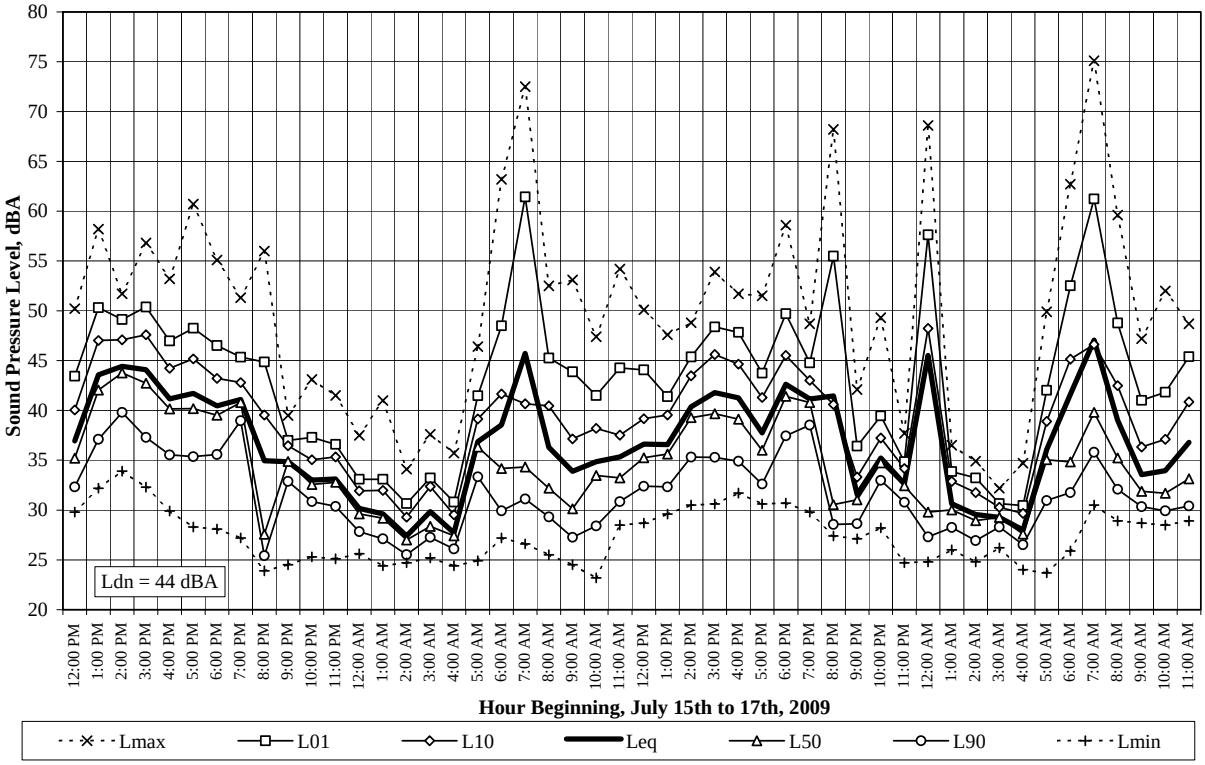


Chart 3: Measured Noise Levels at LT-3

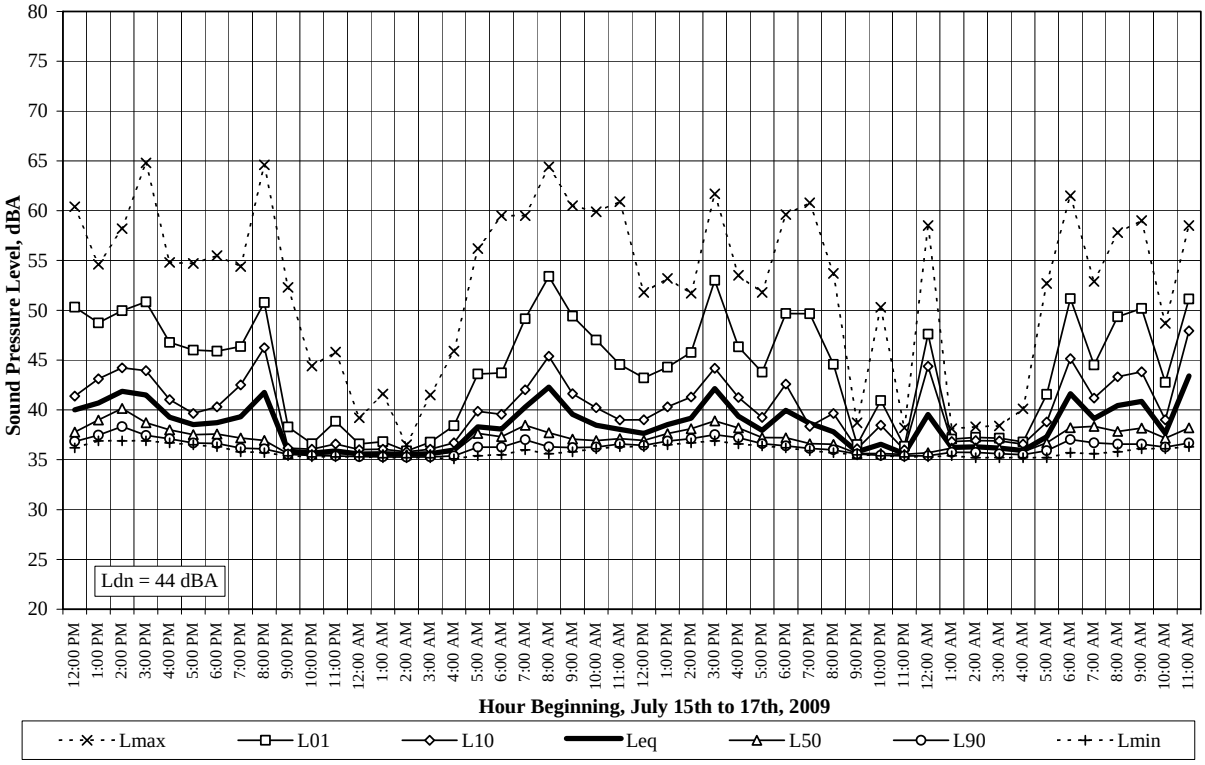


Chart 4: Measured Noise Levels at LT-4

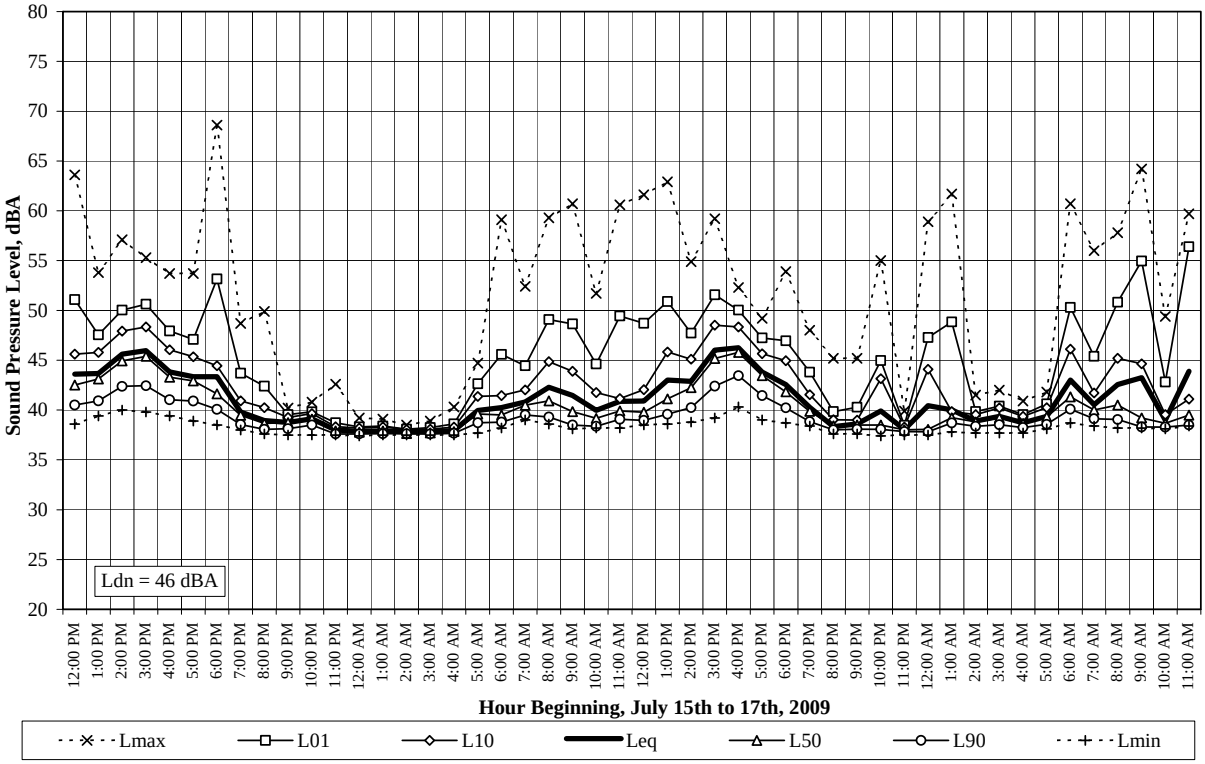


Chart 5: Measured Noise Levels at LT-5

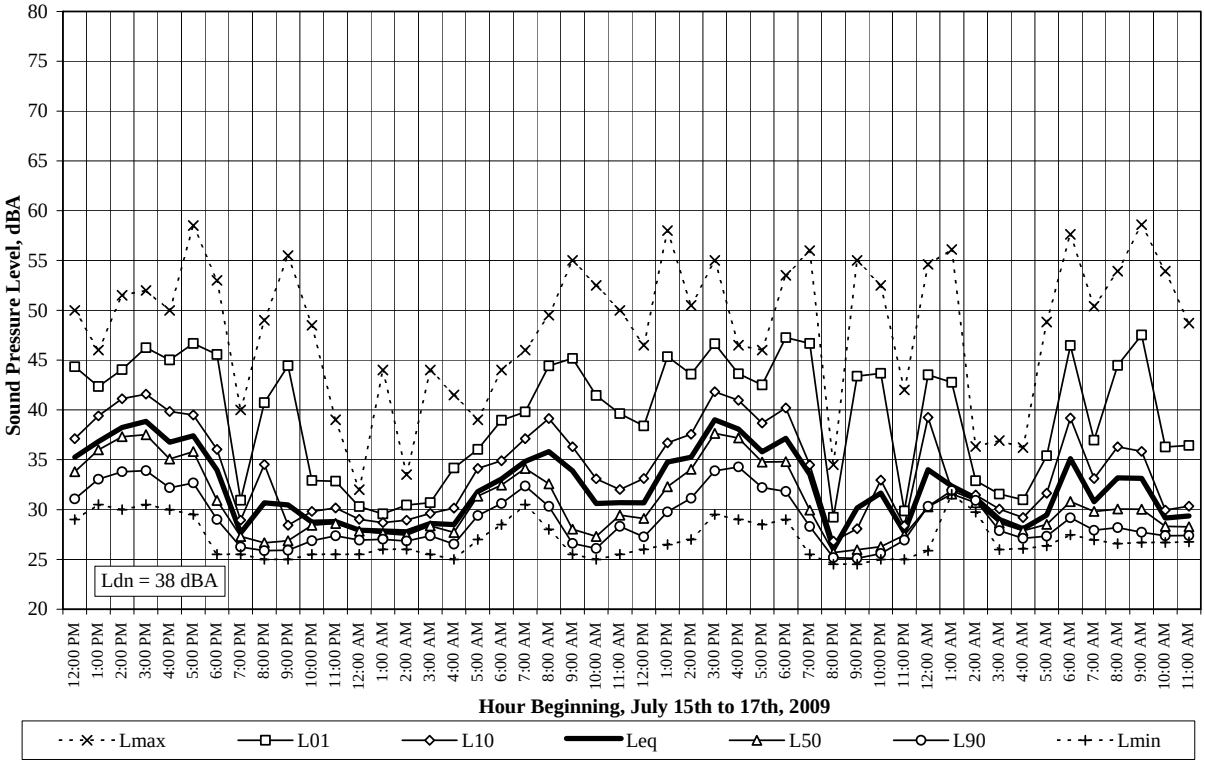
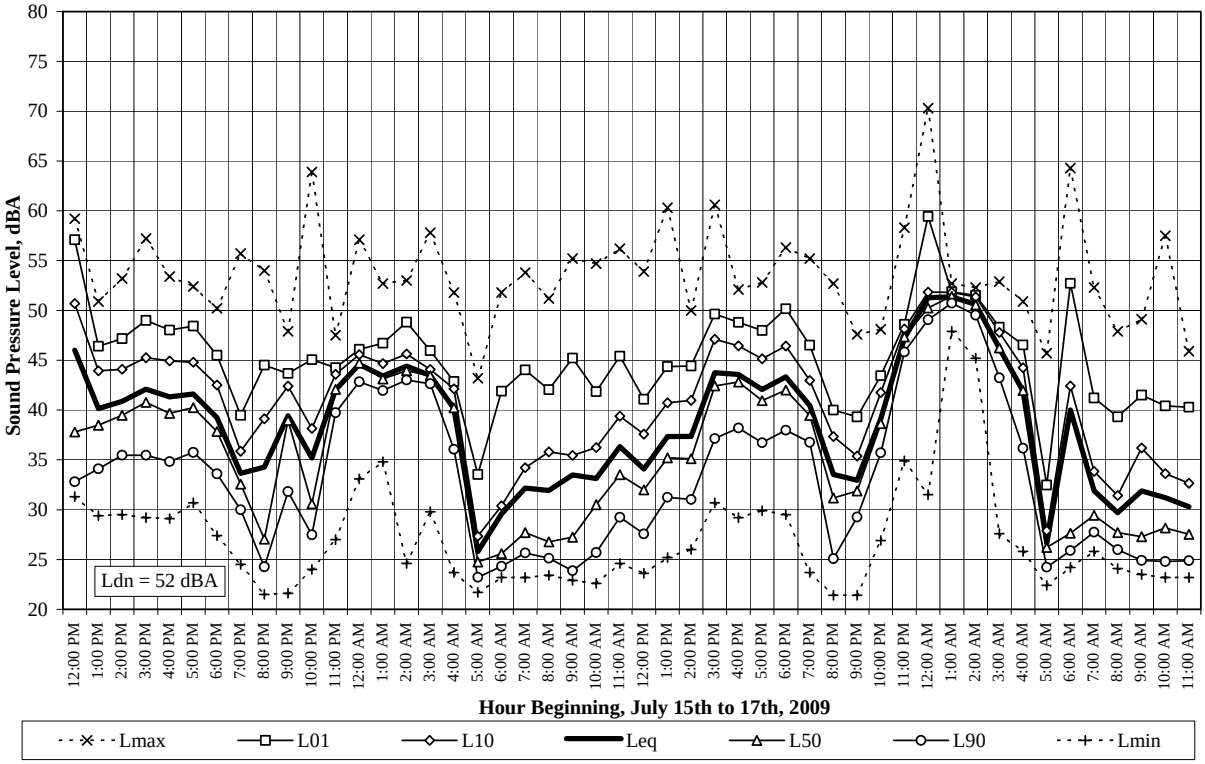


Chart 6: Measured Noise Levels at LT-6



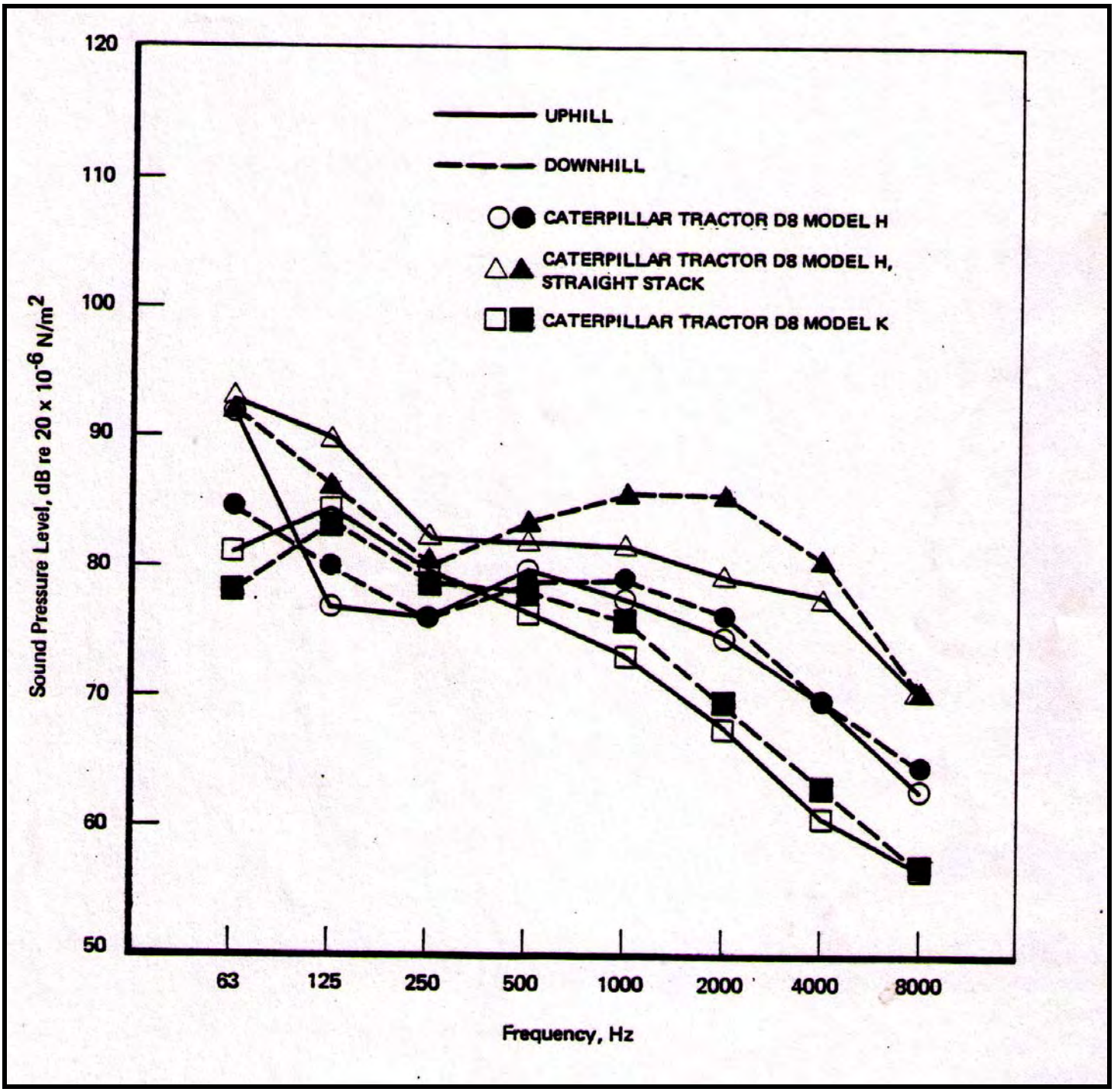


Figure 1: Octave band sound levels for two configurations of a D8 class crawler tractor

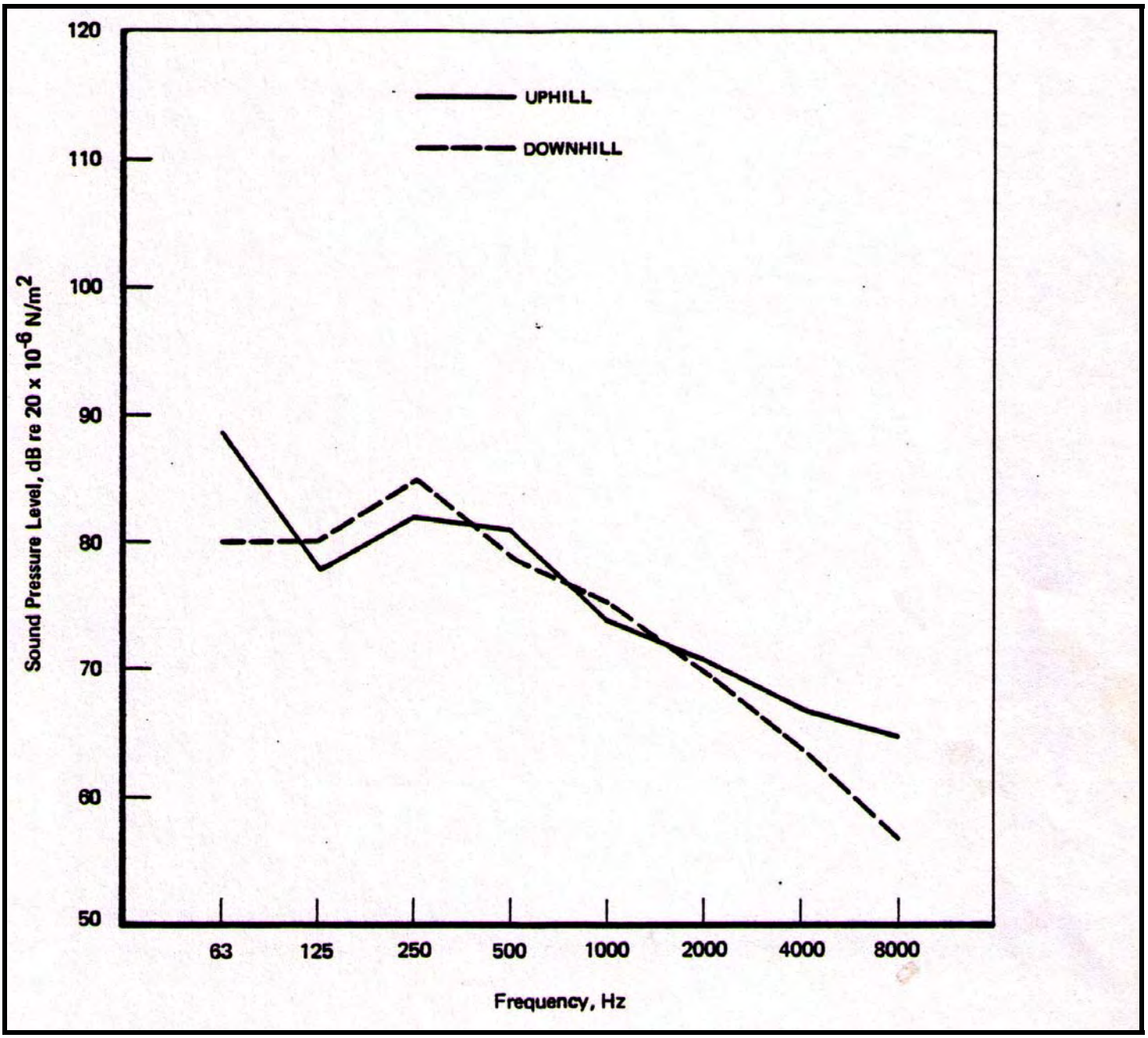


Figure 2: Noise generated by a Caterpillar Type 657 scraper at 50 ft.

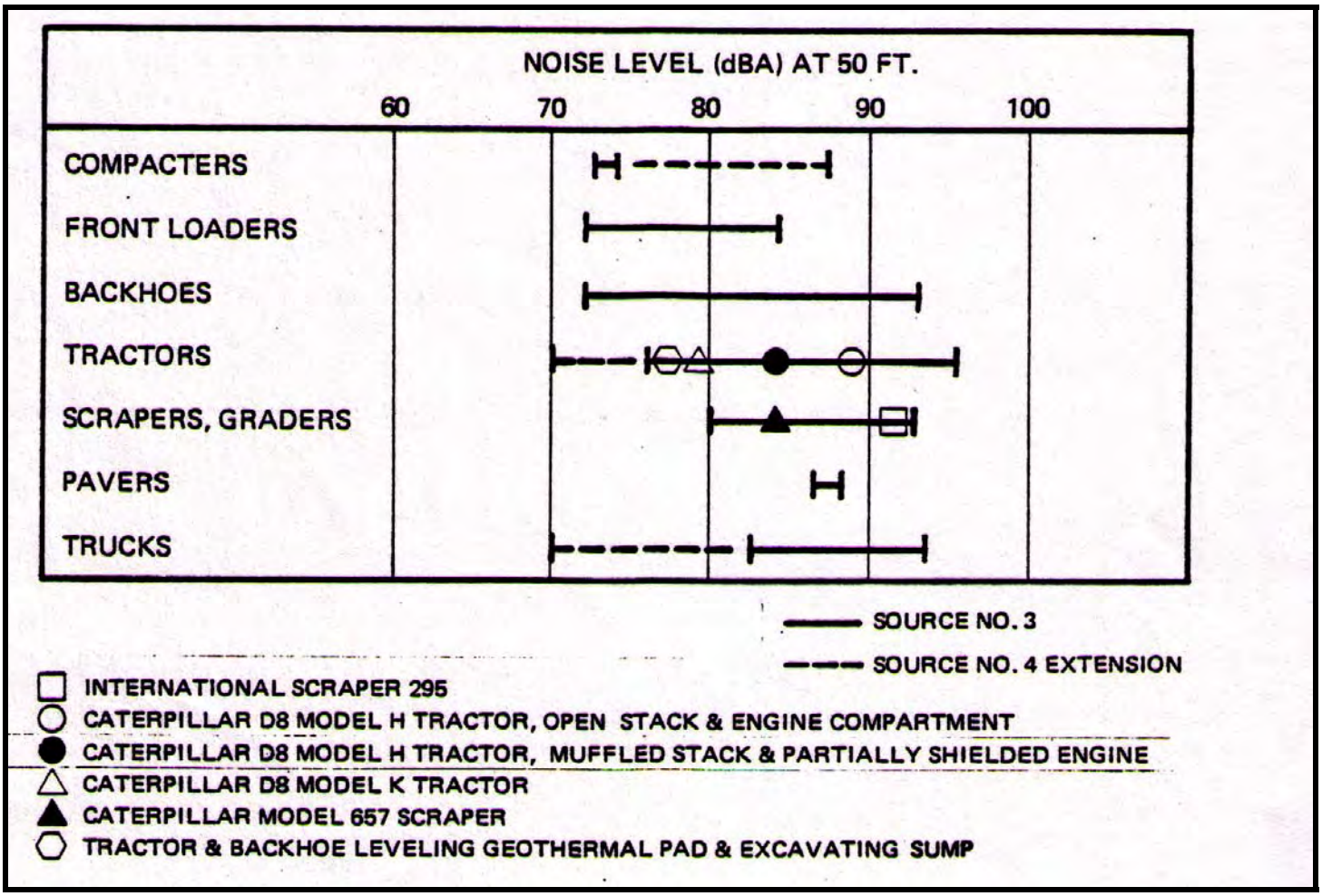


Figure 3: Typical Site Preparation Sound Levels

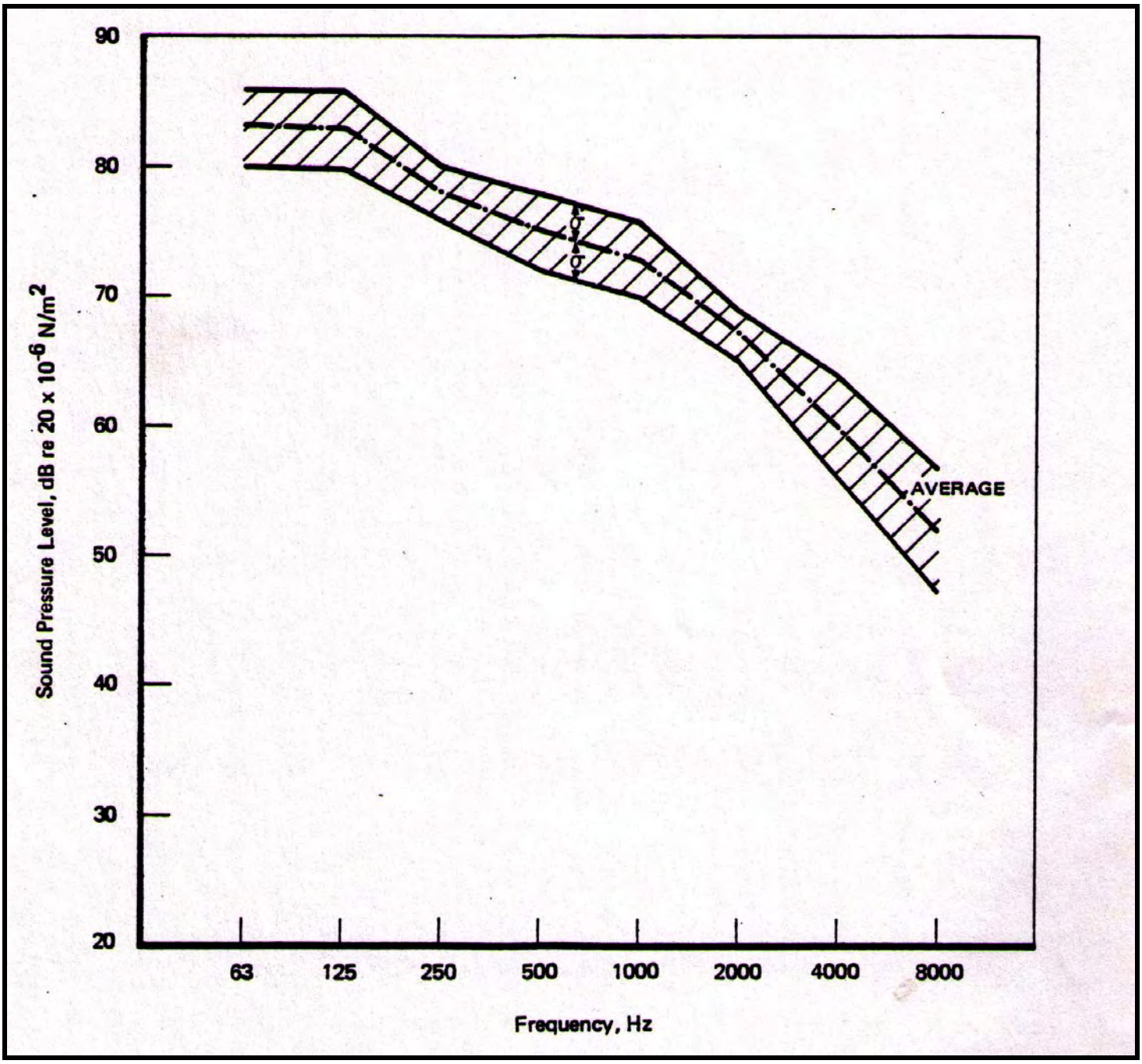


Figure 4: Octave band spectrum for mud drilling at 100 feet

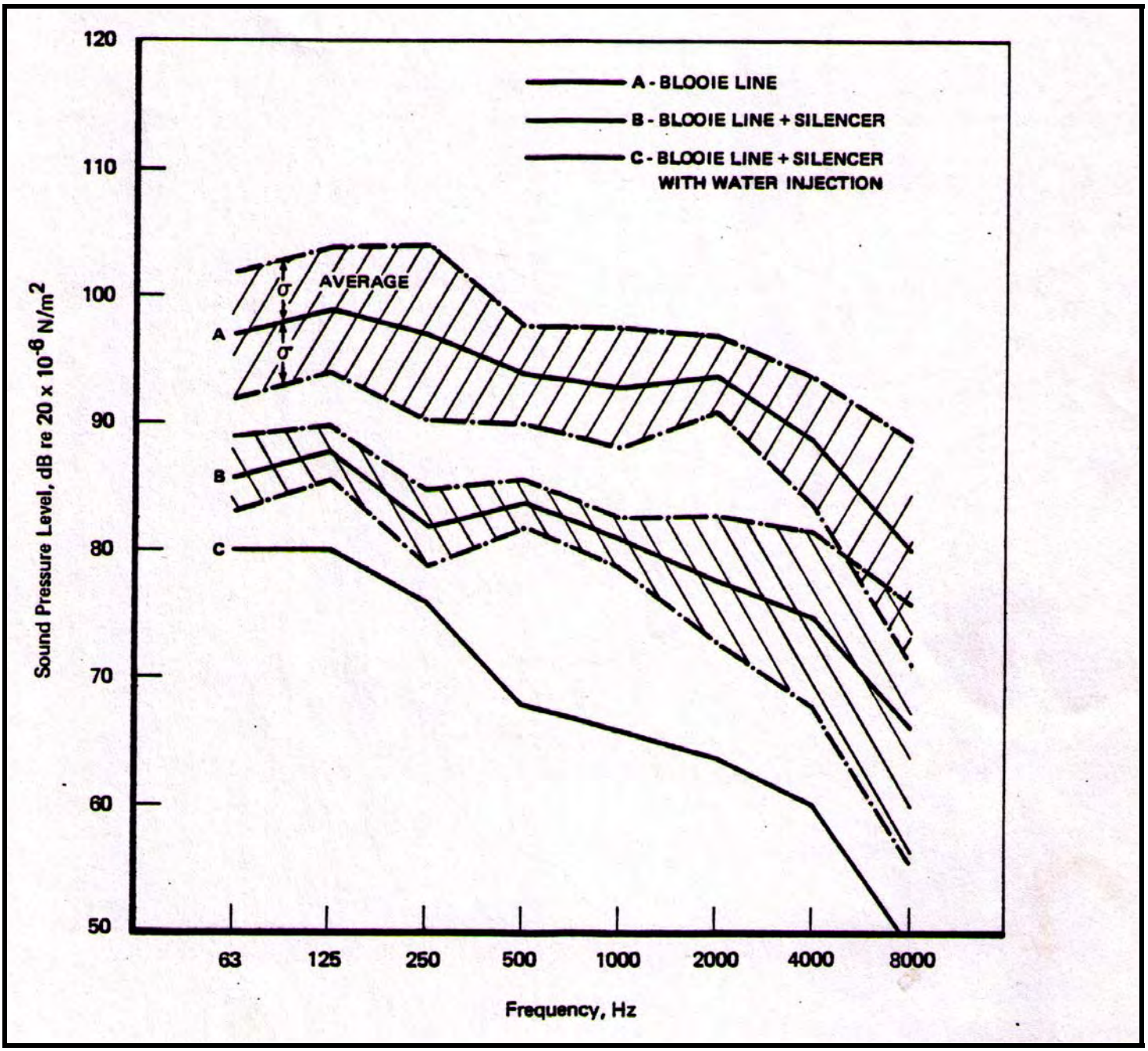


Figure 5: Octave band spectrum for air drilling at 100 feet

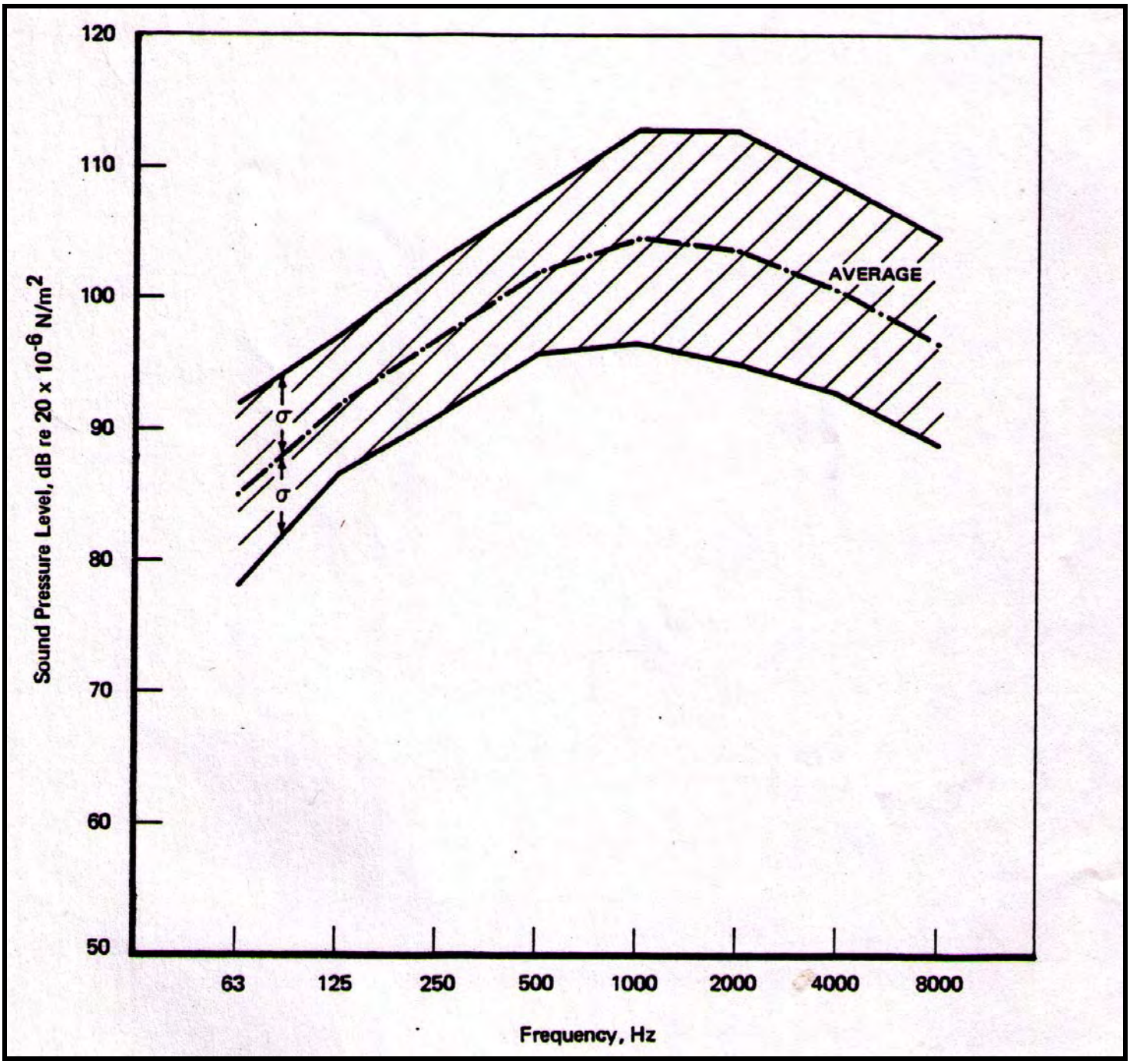


Figure 6: Octave band spectrum for free jets (unmuffled steam discharge) at 100 feet

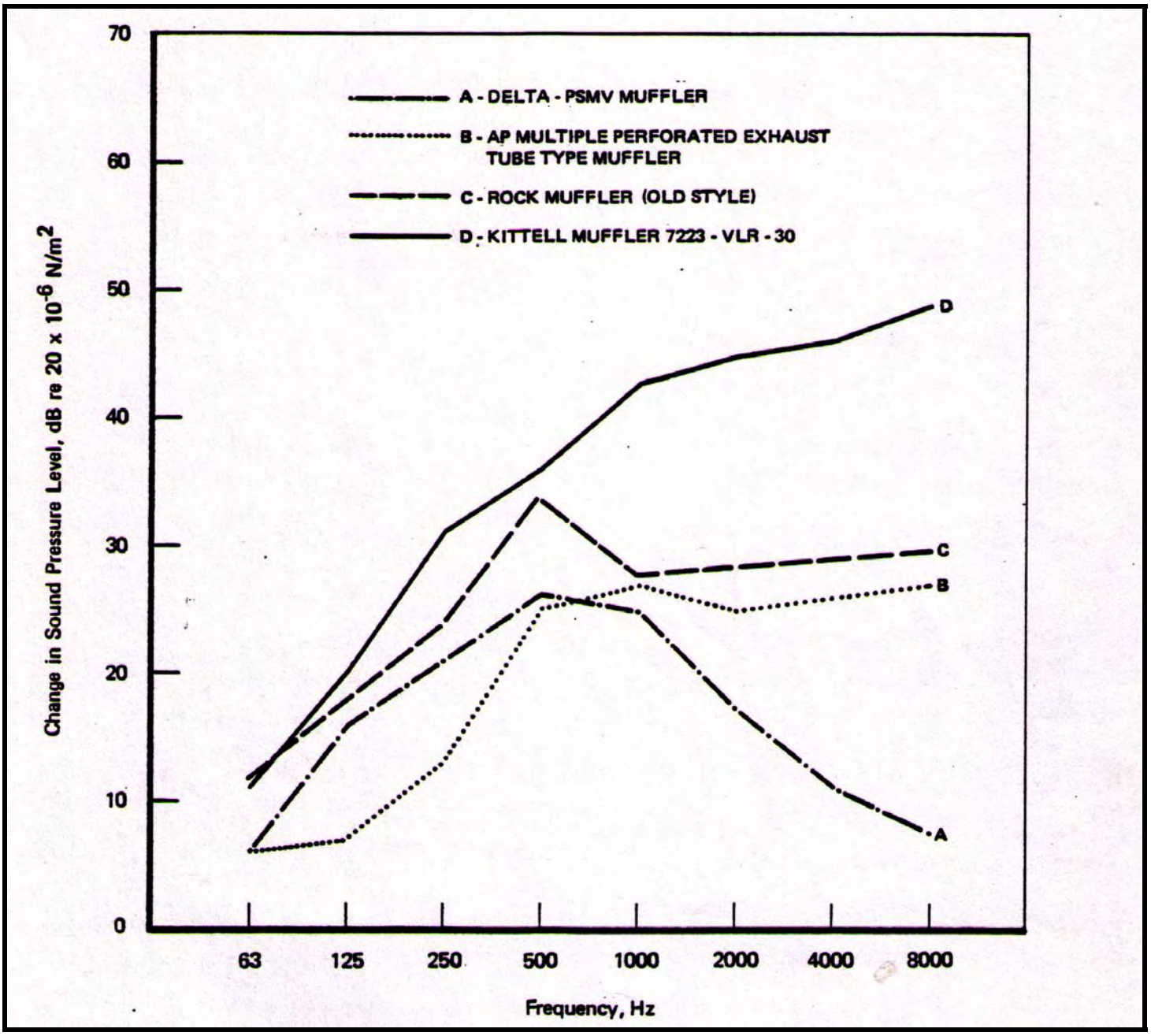


Figure 7: Octave band spectrum for various steam discharge mufflers

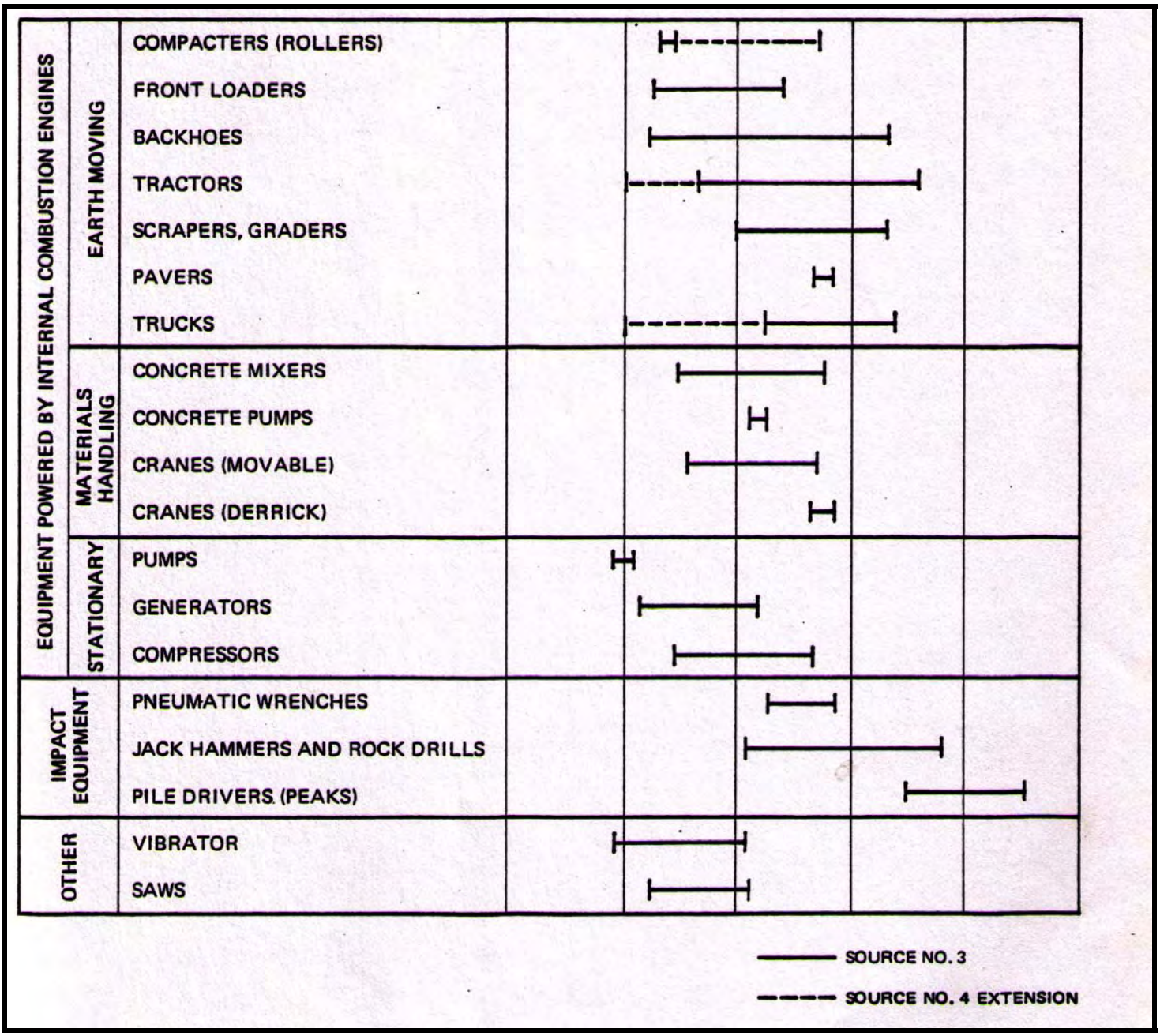


Figure 8: Typical Pipeline Construction Noise levels

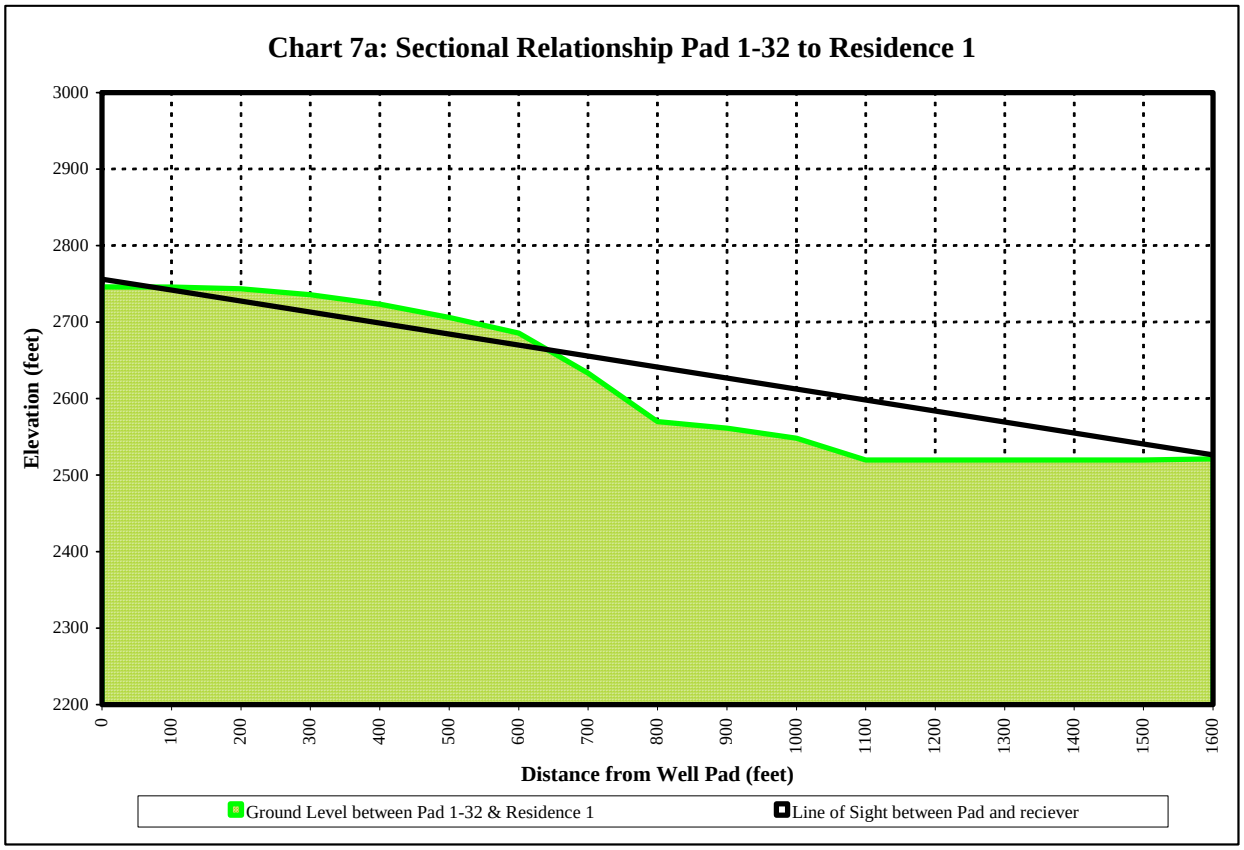


Chart 7a: Sectional Relationship Pad 1-32 to Residence 1
Elevation (feet)
3000
2900
2800
2700
2600
2500
2400
2300
2200
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600
Distance from Well Pad (feet)
Ground Level between Pad 1-32 & Residence 1
Line of Sight between Pad and reciever

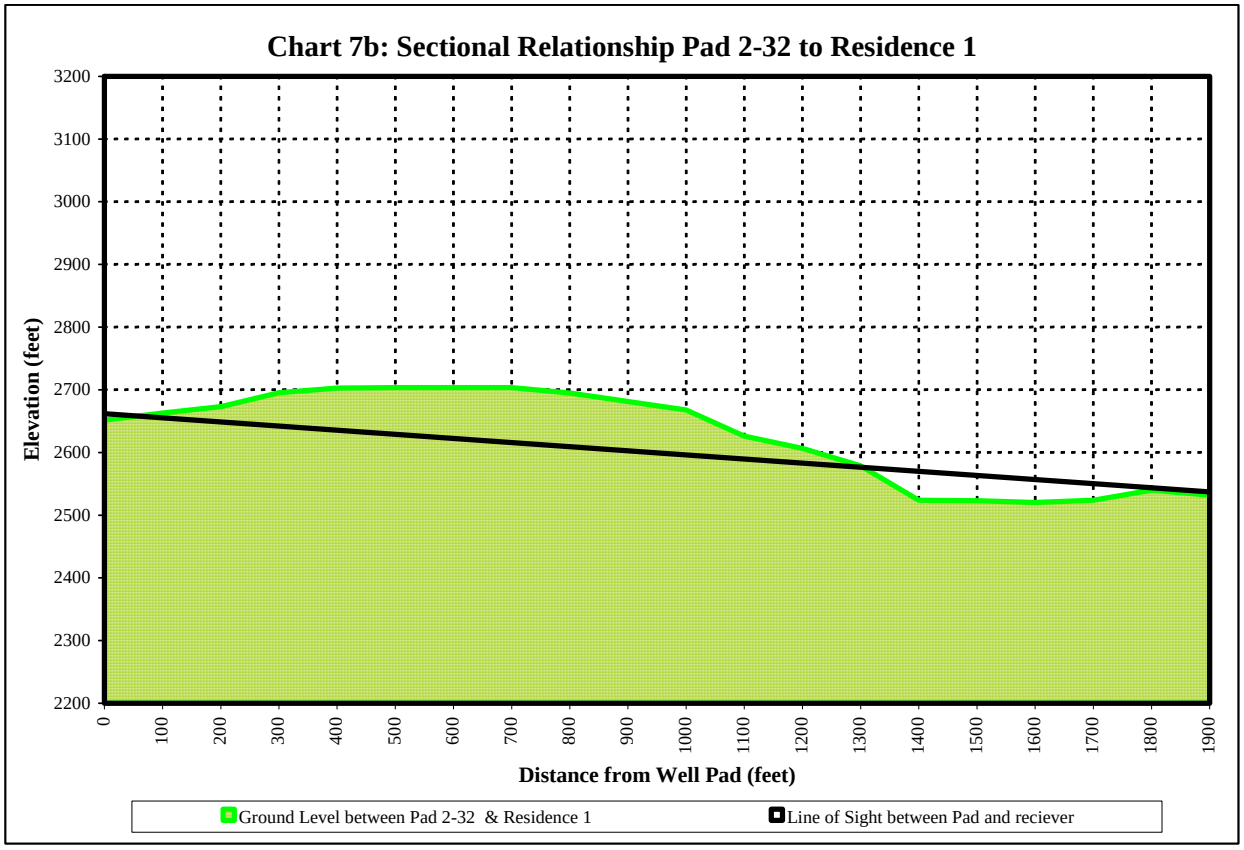


Chart 7b: Sectional Relationship Pad 2-32 to Residence 1
Elevation (feet)
3200
3100
3000
2900
2800
2700
2600
2500
2400
2300
2200
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
Distance from Well Pad (feet)
Ground Level between Pad 2-32 & Residence 1
Line of Sight between Pad and reciever

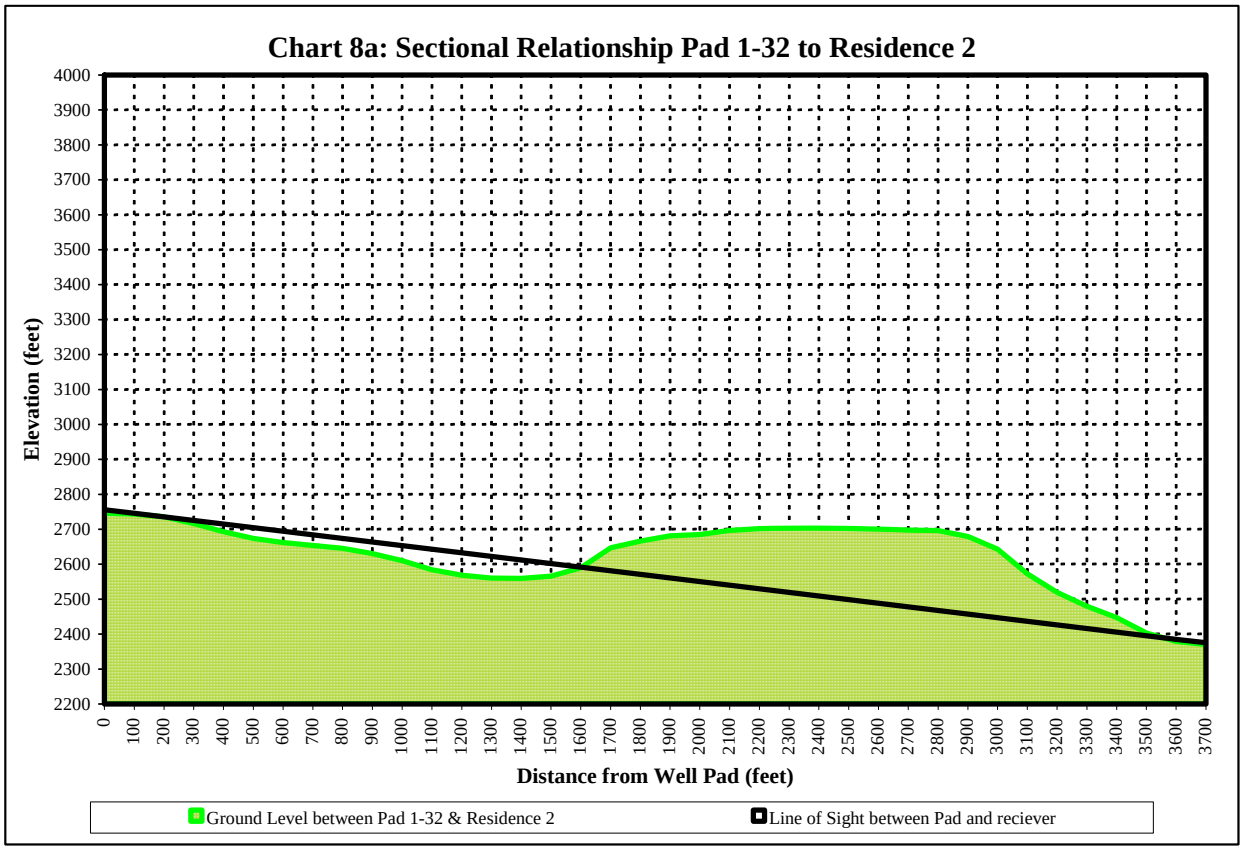


Chart 8a: Sectional Relationship Pad 1-32 to Residence 2
Elevation (feet)
4000
3900
3800
3700
3600
3500
3400
3300
3200
3100
3000
2900
2800
2700
2600
2500
2400
2300
2200
0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400 2500 2600 2700 2800 2900 3000 3100 3200 3300 3400 3500 3600 3700
Distance from Well Pad (feet)
Ground Level between Pad 1-32 & Residence 2
Line of Sight between Pad and reciever

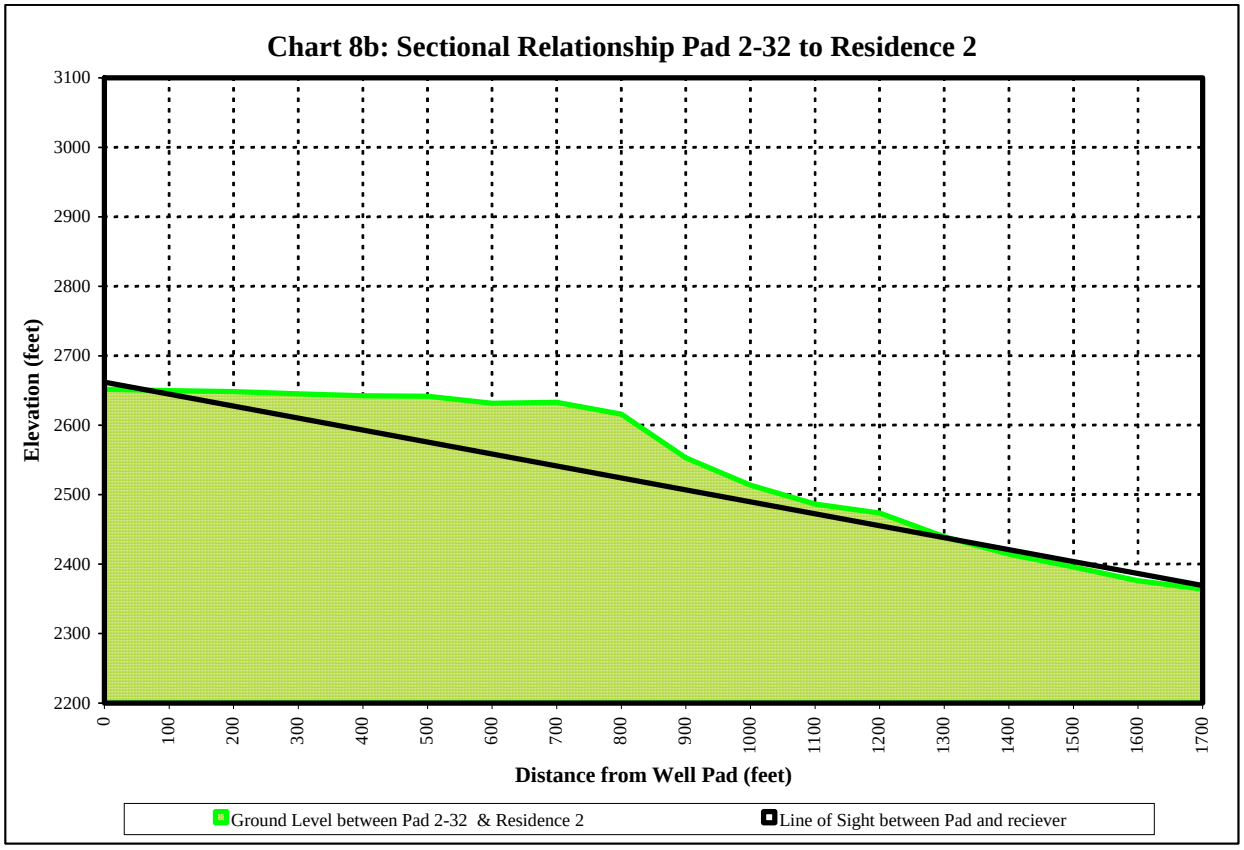


Chart 8b: Sectional Relationship Pad 2-32 to Residence 2
Elevation (feet)
3100
3000
2900
2800
2700
2600
2500
2400
2300
2200
0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700
Distance from Well Pad (feet)
Ground Level between Pad 2-32 & Residence 2
Line of Sight between Pad and reciever

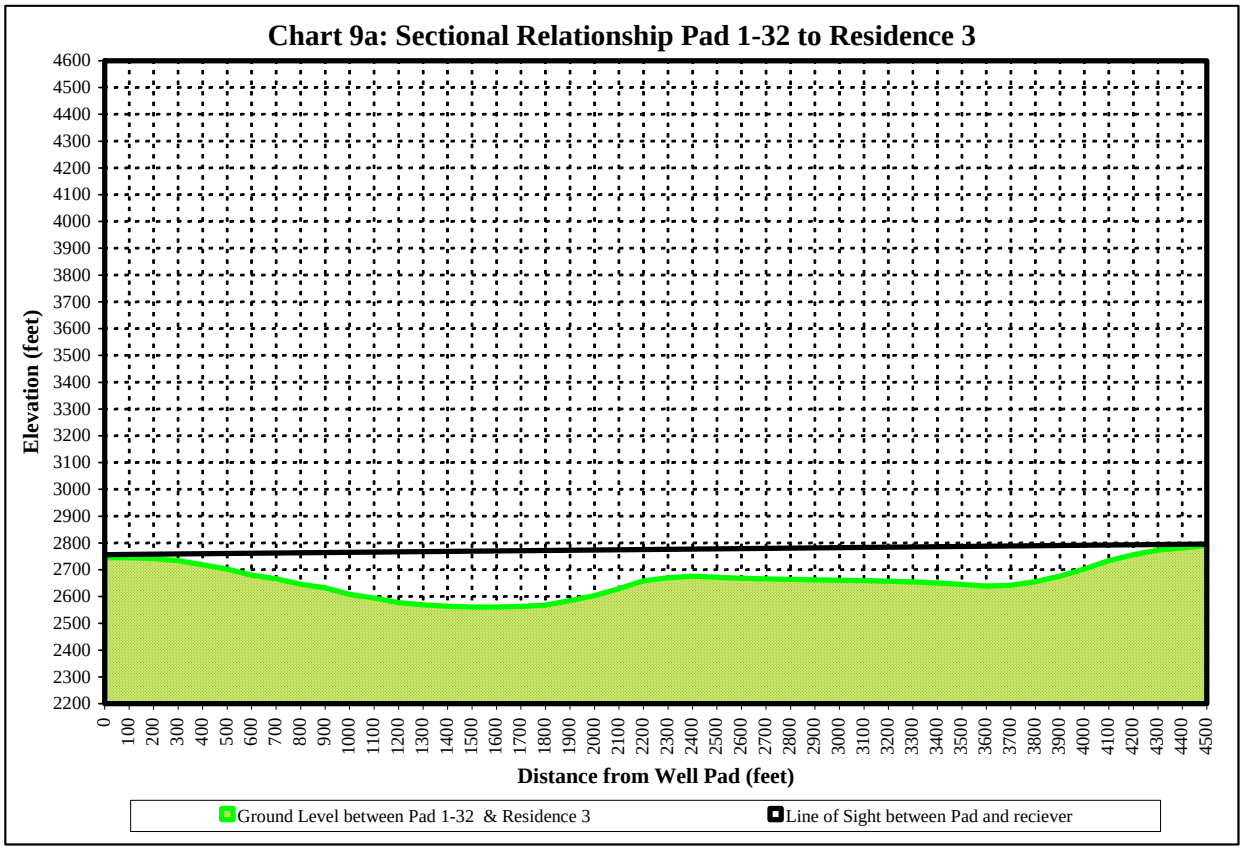


Chart 9a: Sectional Relationship Pad 1-32 to Residence 3
Elevation (feet)
Distance from Well Pad (feet)
Ground Level between Pad 1-32 & Residence 3
Line of Sight between Pad and reciever

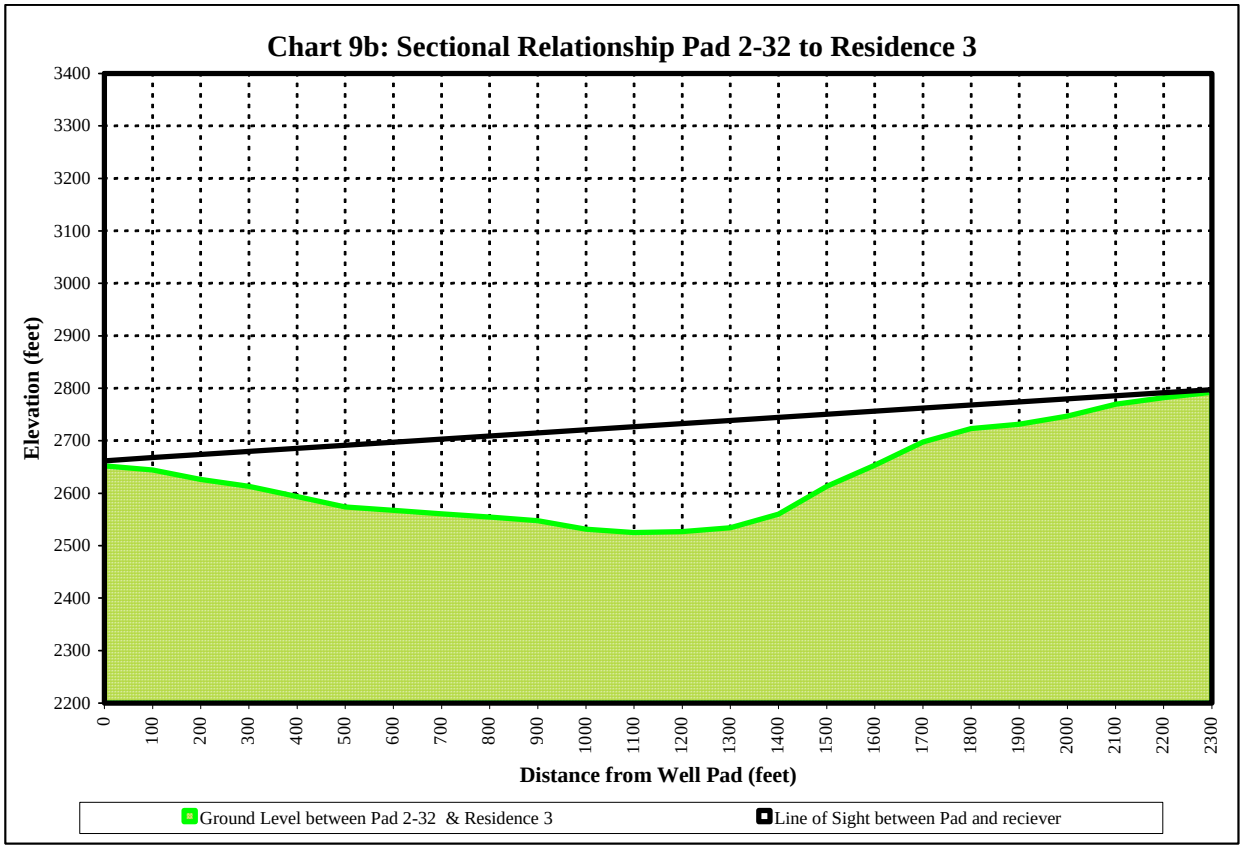


Chart 9b: Sectional Relationship Pad 2-32 to Residence 3
Elevation (feet)
Distance from Well Pad (feet)
Ground Level between Pad 2-32 & Residence 3
Line of Sight between Pad and reciever

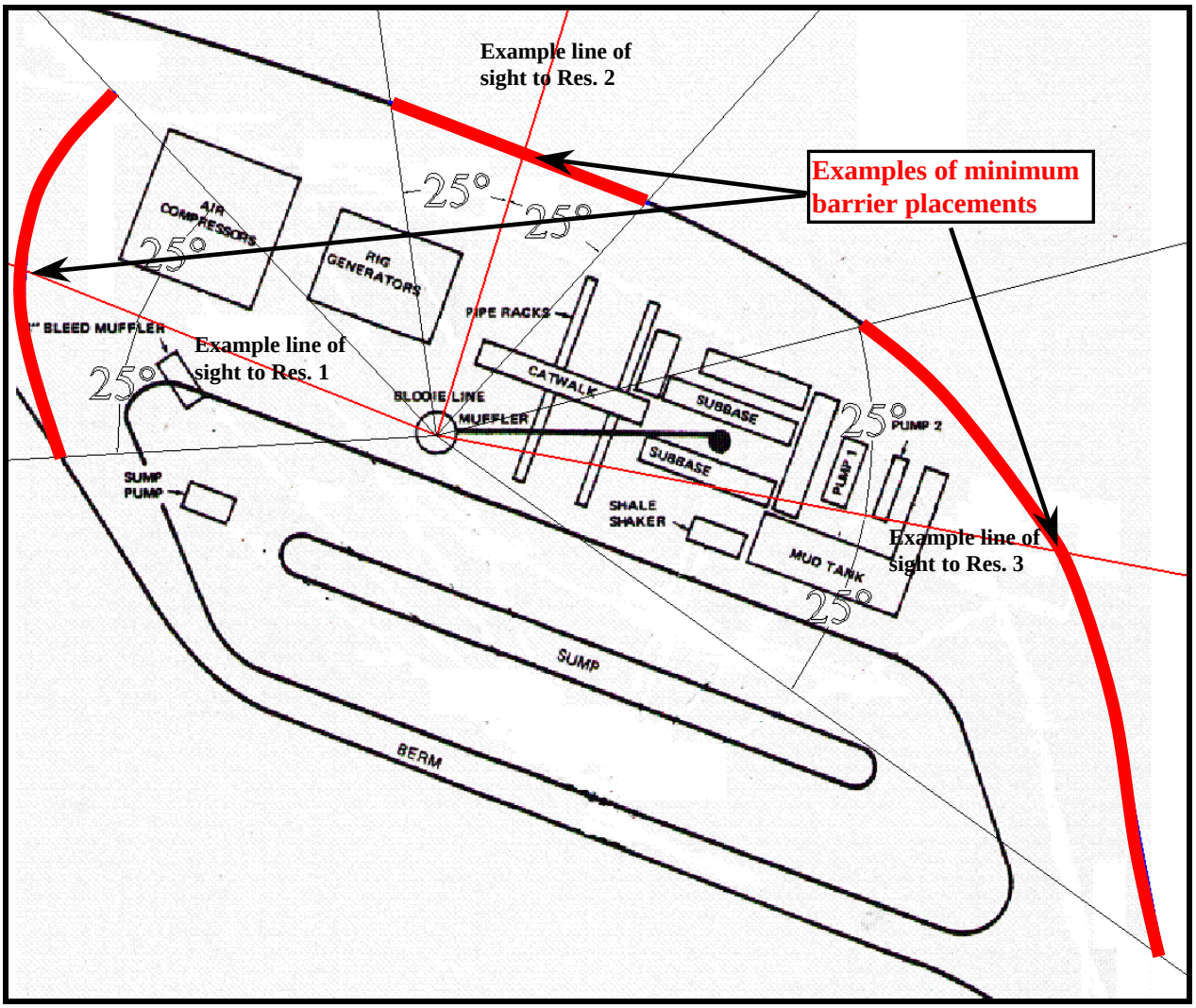


Figure 9: Example Minimum Noise Barrier Placement for a Conceptual Well Pad

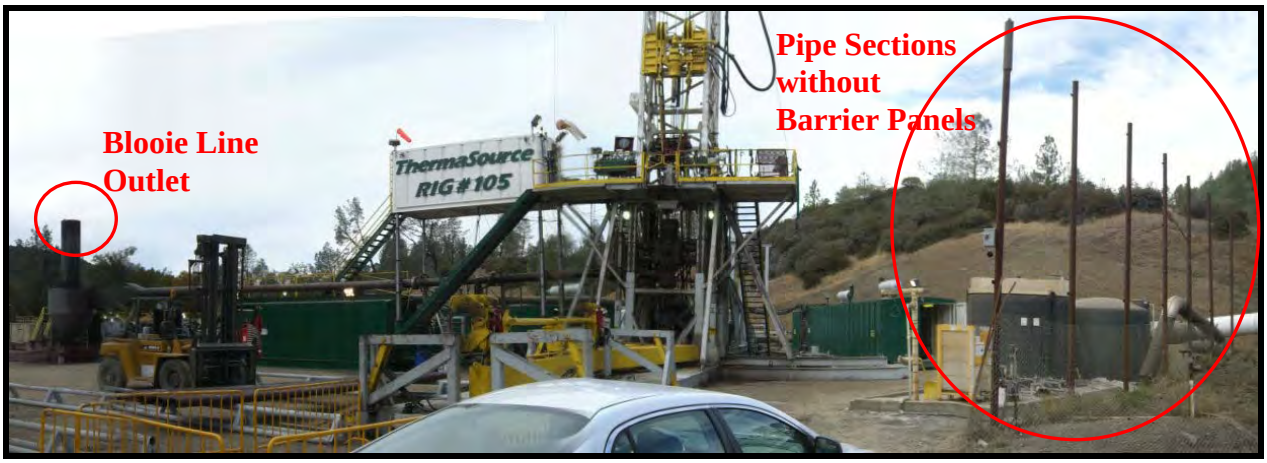


Figure 10: Francisco well pad pipe section wall <u>without</u> barrier panels in place

Figure 11: Francisco well pad pipe section wall <u>with</u> barrier panels in place

REFERENCES

[1] Marshall Long/Acoustics, *Evaluation of Noise Associated with Geothermal Development Activities*, Department of Energy, Office of the Environment, 1982), pp 21,22,24.
[2] Illingworth & Rodkin, *Evaluation of Steam Well Drilling Noise On Residential Uses*, November 14, 2008, p 5.
[3] Marshall Long/Acoustics, p 32.
[4] Marshall Long/Acoustics, p 36.
[5] Marshall Long/Acoustics, p 40.
[6] Marshall Long/Acoustics, p 49.
[7] Marshall Long/Acoustics, p 58.
[8] Noise Survey Report March 1986, Department of Water Resources, Delta Field Division, Bottlerock Power Plant, p 4, Appendix A
[9] Noise Survey Report, p.4

APPENDIX E
BIOLOGICAL RESOURCES

BIOLOGICAL RESOURCES ASSESSMENT
BRP STEAM PROJECT

Lake County, California

Prepared for:

Bottle Rock Power, LLC
7385 High Valley Road
P.O. Box 326
Cobb, CA 95426

and

RMT, Inc.
4 West Fourth Avenue, Suite 303
San Mateo, CA 94402

Prepared by:

Zander Associates
4460 Redwood Hwy, Suite 16-240
San Rafael, CA 94903

September 2009

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1.0 INTRODUCTION

BRP GeoResource, LLC proposes to construct and operate a new well field, steam gathering facilities, and access roads in the vicinity of the Bottle Rock Power Plant located in the Lake County portion of the Geysers Known Geothermal Resource Area (KGRA). The proposed BRP Steam Project is intended to augment existing steam supply to the Bottle Rock Power Plant. This report was prepared by Zander Associates to describe existing vegetation communities, habitat types, waters of the United States and wetlands in the project area; to document the occurrence and potential for special status species based on seasonally-timed field reconnaissance and surveys; and to assess potential project impacts to biological resources and recommend feasible mitigation measures based on the current project plans.

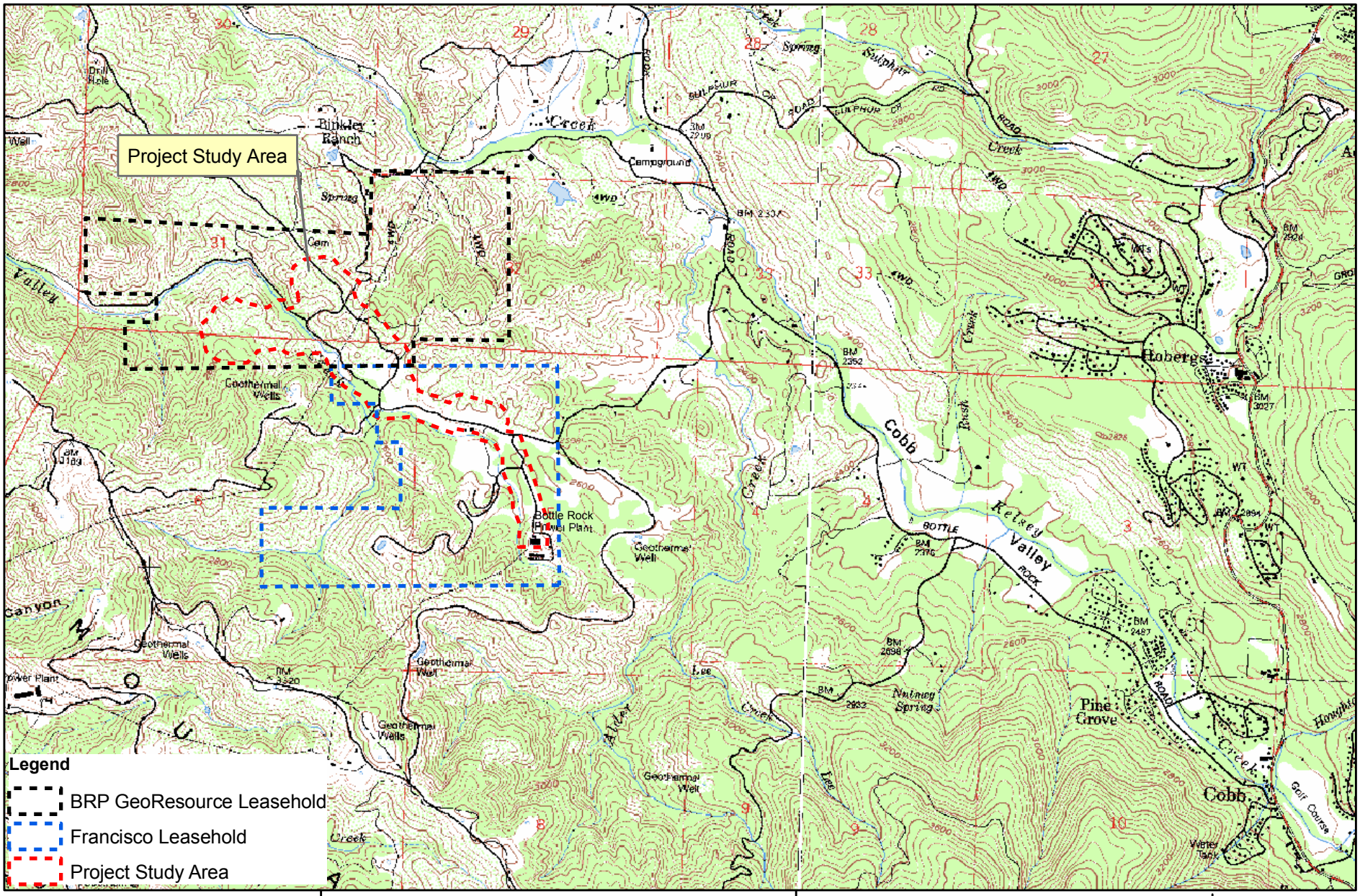
2.0 PROJECT CHARACTERISTICS

Development of the BRP Steam Project is proposed on the BRP GeoResource and Francisco leaseholds just northwest of the existing Bottle Rock Power Plant at the Geysers in Lake County (see Figure 1). Bottle Rock Road and Cobb Valley are located approximately 1.6 miles to the east of the area. The town of Cobb lies about 3.8 miles to the southeast. The project area is located on The Geysers USGS 7.5 minute quadrangle in Section 31, Township 12 North, Range 8 West.

Two new well pads designed to accommodate up to 24 wells, including a maximum of 22 production wells and two injection wells, would be constructed in the vicinity of High Valley Road and High Valley Creek. The westerly of the two pads would be located to the west and upslope of the creek, with the other pad directly adjacent to High Valley Road upslope to the east (see Figure 2). Access to the East pad would be provided by the existing, paved High Valley Road with a new connector road from the East pad to the West pad proceeding downslope to the west, crossing the creek, and then traversing the westerly slope above the creek to the pad location. Steam gathering and injection pipelines would extend down to Saw Mill Road from both pads where they would join and parallel Saw Mill Road for approximately 1,000 linear feet to the southeast, jog cross country in an easterly direction for approximately ¼-mile to High Valley Road, and then parallel High Valley Road to the existing Francisco well pad on the Francisco leasehold. New steam gathering and injection pipelines would eventually be required from the Francisco well pad to the main tie-in to the plant, and would be constructed parallel and adjacent to the existing steam gathering pipeline from the Francisco pad to the tie-in for the plant.

3.0 METHODS

Zander Associates compiled and reviewed available relevant background information addressing biological resources in the vicinity of the study area. We queried the current California Natural Diversity Data Base (CNDDB 2009) for records of special-status species and sensitive resources within a 10-mile radius on The Geysers, Kelseyville, Clear Lake Highlands, Whispering Pines, Hopland, Lower Lake, Asti, Middletown, Geyserville, Jimtown, Mt. St. Helena and Detert Reservoir USGS 7.5-minute quadrangles.



Zander Associates
Environmental Consultants
4460 Redwood Hwy, Suite 16-240
San Rafael, CA 94903

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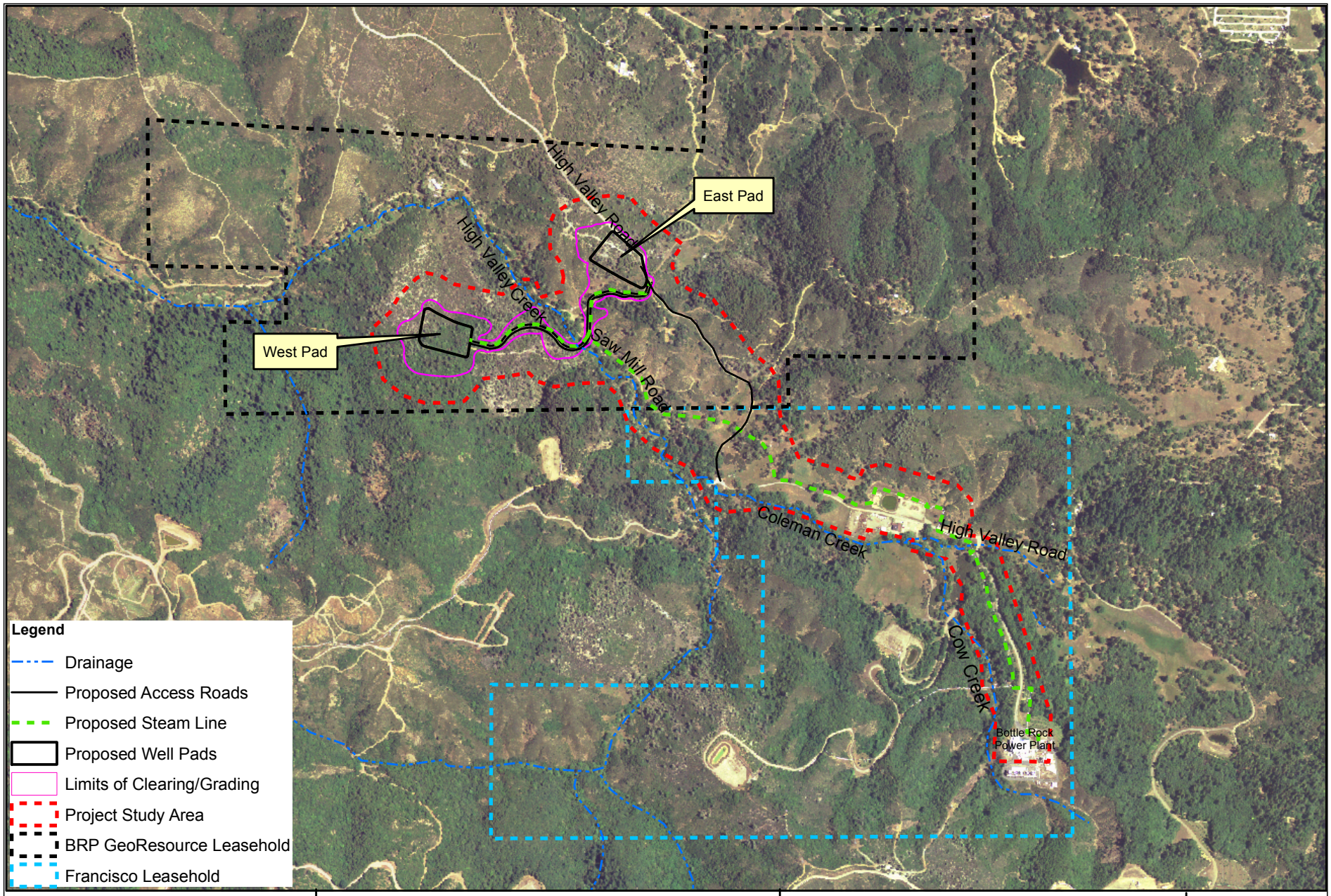
Site Location
BRP Steam Project
The Geysers, California

9/09

Figure
1



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N

0 0.1 0.2 0.4 Miles

Project Plan and Study Area
BRP Steam Project
The Geysers, California

9/09

Figure
2

We also reviewed the California Native Plant Society's (CNPS) *Electronic Inventory of Rare and Endangered Plants of California* for these same quadrangles and the most recent list of "Special Animals" issued by the California Department of Fish and Game (CDFG) in July 2009. We contacted representatives from the Bureau of Land Management (BLM), California Energy Commission (CEC), CDFG and U.S. Army Corps of Engineers (Corps) to describe the project and solicit their input on our work. In addition, a previous study, entitled *Rare Plant Survey on the Portion of Federal Lease CA5632 on the Binkley Ranch* (Osterling 1980), covered an almost identical area as the current study area. Relevant information from that survey and other environmental documents from the same period is included and cited in this report. A list of special status plant and animal species that could potentially occur within a 10-mile radius of the study area based on this background review is provided in Appendix A.

A specific project area of approximately 138 acres was established based on a 250-foot buffer beyond designated clearing and grading limits for the new well pads and linear project elements. Focused plant surveys, vegetation mapping and a preliminary wetlands delineation were completed within this project area.

Zander Associates consulting botanist, Ms. Jane Valerius, first visited the area for an initial site orientation reconnaissance and early season plant survey on April 16, 2008. Ms. Valerius conducted general floristic surveys and directed surveys for special status plants on April 16, May 14, June 16 and July 30, 2008. Ms. Valerius and Zander Associates Principal, Mr. Michael Zander, returned to the site on March 12, April 16, and May 14-15, 2009 to initiate a second season of plant surveys and vegetation mapping. On June 10-11, 2009, Ms. Valerius again visited the site, accompanied by Zander Associates Senior Biologist, Ms. Erin Avery, for a late spring/early summer reconnaissance and wetlands assessment. Mr. Zander conducted a follow up reconnaissance on July 15, 2009 to review specific project elements (e.g. modified High Valley Creek crossing location and ephemeral tributaries on well pad sites) on the ground.

Special status plant surveys were conducted in accordance with California Department of Fish & Game (CDFG) guidelines and were completed at the time when special status plants that could potentially occur on the property were in flower or otherwise most identifiable. During each visit, one or two biologists systematically traversed the areas proposed for development (i.e. the two well pad sites and the existing and proposed access road and steam line alignments plus approximately 250 feet beyond the development limits) but also conducted general surveys of the surrounding areas. As required by CDFG guidelines, plant surveys were floristic in that all species identifiable at the time of the surveys were recorded and all plants were identified to a level at which their rarity status could be determined. A list of plant species observed during the surveys and expected to occur in the area (in conformance with CEC data requirements) is provided in Appendix A. Botanical nomenclature used in this report conforms to Hickman (1993) for plants and updated to current taxonomy using the Jepson Flora Project Jepson Online Interchange (http://ucjeps.berkeley.edu/interchange.html). Vegetation community descriptions are based on Holland (1986) and a modified version of Holland (1986) and Sawyer and Keeler-Wolf (1995) for vegetation communities. We also considered plant community types described specifically for the Mayacmas Mountains (Neilson 1981), for the KGRA (Nelson et al 1985), and for the project area (Ecoview 1988).

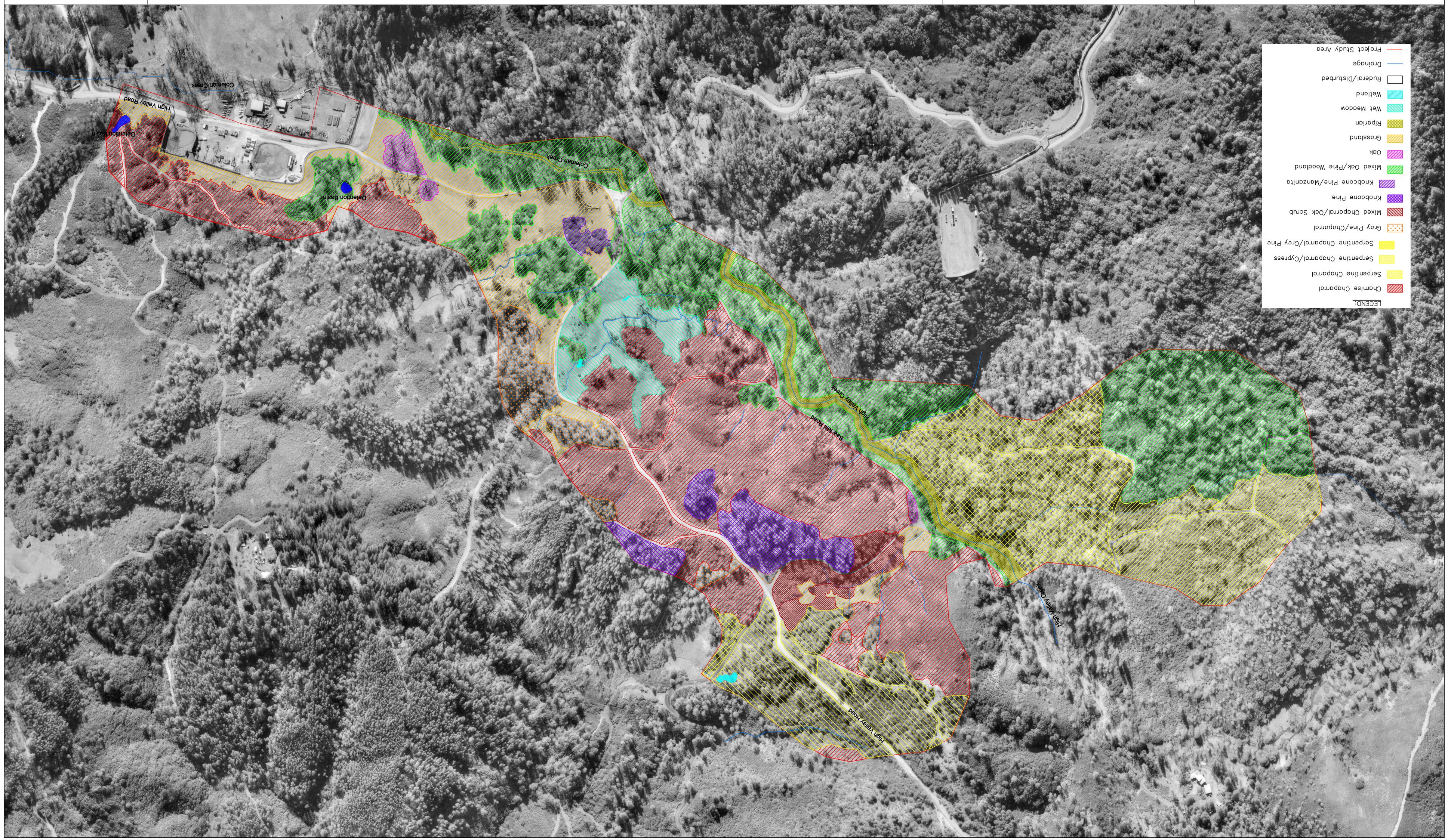
Zander Associates consulting wildlife biologist, Mr. Jon Winter, visited the study area on July 30 and 31, 2008 to evaluate existing habitats for the potential to support the list of target species developed. Mr. Winter also visited specific areas, notably the affected reach of High Valley Creek, on June 10 & 11, 2009 to check the riparian corridor for yellow warbler and other sensitive bird species. On the afternoon of June 10, Mr. Winter walked approximately 0.5-mile along the bottom of the creek and on both sides looking for birds and listening for calls. During both the morning and afternoon of June 11, he returned to the area, walking for approximately one mile along the road parallel to the creek looking and listening for warblers and other species. No other focused surveys for special status animals were conducted for this assessment, but direct observations of wildlife and/or wildlife sign (scat, burrows, tracks, molted feathers, nests, etc.) were recorded during the field assessment. A list of wildlife species observed or expected to occur in the area is provided in Appendix A.

Waters of the United States and wetlands delineation field work conducted by Ms. Valerius and Ms. Avery on June 10 and 11, and by Mr. Zander on July 15, 2009 followed the routine on-site determination method described in the 1987 *Wetlands Delineation Manual* (Environmental Laboratory 1987) and the Arid West Supplement (U.S. Army Corps of Engineers 2008). We evaluated all areas within the project boundaries (i.e. limits of grading, linear features) plus areas approximately 250 beyond those boundaries. Both formal sampling records (i.e. data points) and informal observations of vegetation, soils, and hydrology were made at various locations to determine the presence or absence of wetlands and to determine wetland-non-wetland boundaries. Data point locations and the boundaries of wetlands were mapped using a submeter-accurate GPS receiver (i.e., Trimble GeoXT). Data from the GPS unit were then transferred to AutoCAD map files in the office. Other water features (i.e., stream channels) were mapped by "ground-truthing" and interpreting imagery on aerial photographs and/or topographic maps and mapping directly on these media in the field. The widths of the channels between ordinary high water marks were visually estimated. The other waters linework was then digitized into the AutoCAD file. The acreages of the jurisdictional area polygons were calculated using AutoCAD. The lengths of the stream channels were measured from the topographic maps and aerial photos.

A map of the general vegetation communities in the project area is provided on Figures 3 and 4 and a preliminary wetlands delineation map is included as Figure 5. Resumes of the field biologists involved in this assessment are attached in Appendix B.

4.0 REGIONAL OVERVIEW

The project is located along the southeasterly flank of the Mayacmas Mountains in southwestern Lake County. The Mayacmas are a northwest-southeast trending range at the easterly edge of the California Coast Ranges characterized by geologically and topographically complex and rugged terrain with a wide array of slopes, exposures, elevational gradients, soil types, hydrologic regimes and microclimatic variations. These factors have influenced the development of an extremely varied vegetation mosaic with unique natural community types and wildlife habitats.



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San Rafael, CA 94903

Scale: 1" = 200'

Vegetation Types
BRP Steam Project
The Geysers, California
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Figure
3

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Environmental Consultants
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N

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Vegetation Types in Power Plant Area
BRP Steam Project
Geysers, California

9/09

Figure
4

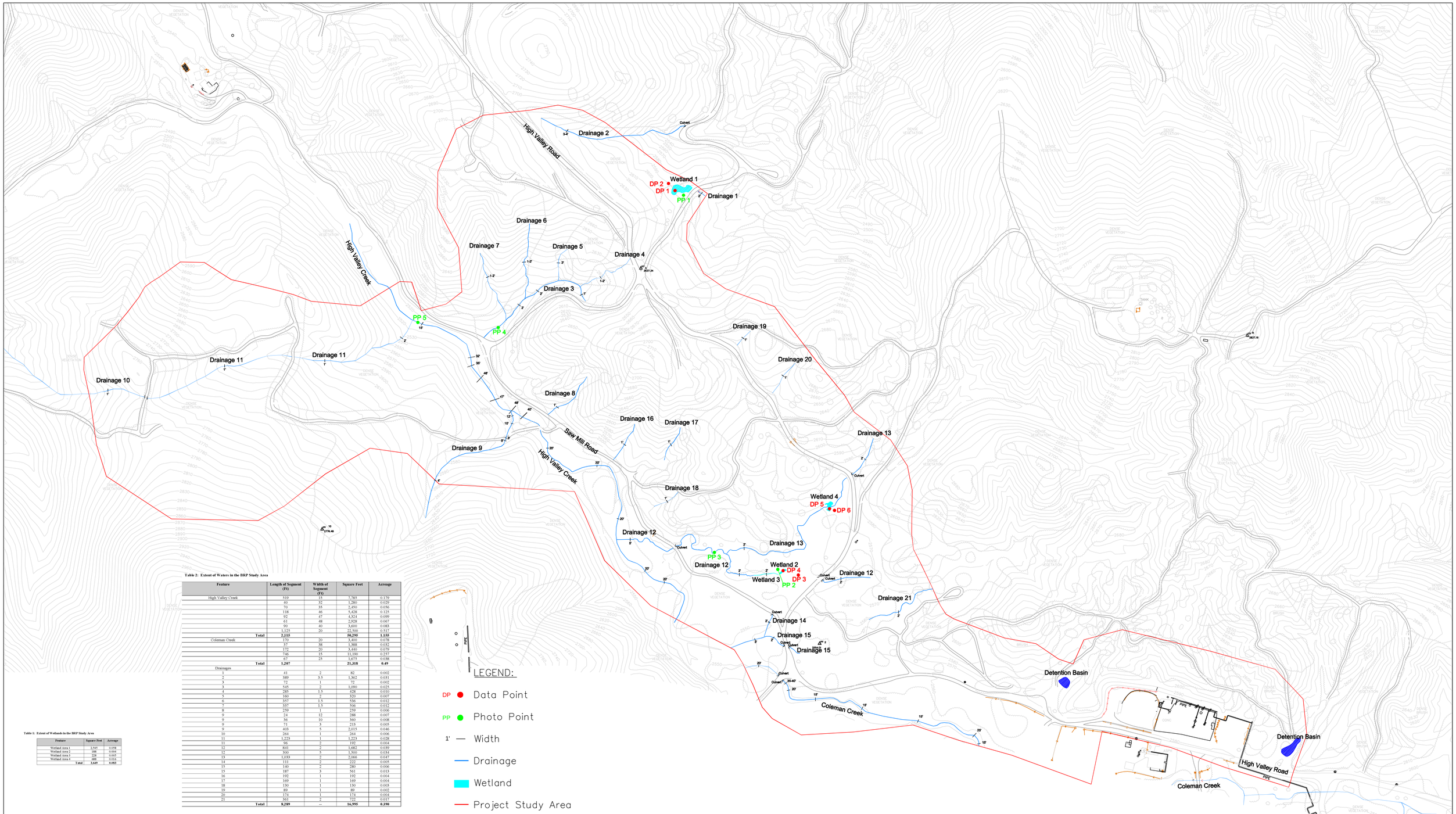

Table 2: Extent of Waters in the BRP Study Area

Feature	Length of Segment (Ft)	Width of Segment (Ft)	Square Feet	Acreage
High Valley Creek	519	15	7,785	0.179
	40	32	1,280	0.029
	70	35	2,450	0.056
	118	46	5,428	0.125
	92	47	4,324	0.099
	61	48	2,928	0.067
	90	40	3,600	0.083
	1,125	20	22,500	0.517
Total	**2,115**		**50,295**	**1.155**
Coleman Creek	170	20	3,400	0.078
	37	38	1,388	0.032
	172	20	3,440	0.079
	746	15	11,190	0.257
	67	25	1,675	0.038
Total	**1,207**		**21,318**	**0.49**
Drainages				
1	41	2	82	0.002
2	389	3.5	1,362	0.031
3	72	1	72	0.002
3	545	2	1,090	0.025
4	285	1.5	428	0.010
5	160	2	320	0.007
6	357	1.5	536	0.012
7	337	1.5	506	0.012
8	259	1	259	0.006
9	24	12	288	0.007
9	36	10	360	0.008
9	71	3	213	0.005
9	403	5	2,015	0.046
10	264	1	264	0.006
11	1,223	1	1,223	0.028
11	96	2	192	0.004
12	841	2	1,682	0.039
12	300	5	1,500	0.034
13	1,033	2	2,066	0.047
14	111	2	222	0.005
15	140	2	280	0.006
15	187	3	561	0.013
16	192	1	192	0.004
17	169	1	169	0.004
18	130	1	130	0.003
19	89	1	89	0.002
20	174	1	174	0.004
21	361	2	722	0.017
Total	**8,289**	--	**16,995**	**0.390**

Table 1: Extent of Wetlands in the BRP Study Area

Feature	Square Feet	Acreage
Wetland Area 1	2,545	0.058
Wetland Area 2	188	0.004
Wetland Area 3	228	0.005
Wetland Area 4	688	0.016
Total	**3,649**	**0.083**

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Scale: 1" = 200'

Preliminary Wetland Delineation
BRP Steam Project
The Geysers, California

9/09

Figure
5

4.1 Terrestrial Communities

The region in general supports a variety of brushlands, grasslands, marshland, riparian, woodland and forest communities. Chaparral is the most widespread vegetation with several types of manzanita (*Arctostaphylos* spp.), chamise (*Adeonstoma fasiculatum*) and scrub oak (*Quercus* spp.)-dominated communities represented. The various chaparral/brushland types are often clearly distinguishable depending on slope, exposure, elevation and substrate, especially serpentine, but also grade into one another to form intermediate and mixed stands.

Grassland and herbaceous communities *per se* are more limited in distribution, but elements of both native and non-native grasslands can be found scatted throughout the region as understory components of other communities. Where they occur on their own, grasslands are typically dominated by introduced European annuals with California Prairie perennial bunchgrasses and other natives mixed in or found as dominant stands in less disturbed areas. Mesic or wet meadow grasslands, which have abundant moisture into July and are quite distinctive in species composition, can also be found in isolated sites scattered throughout the region.

Natural freshwater marshes, typically found where a perennial surface or subsurface water source is available, are even more limited in distribution but are well-represented along the southeastern shores of Clear Lake. A very large marshland vernal pool known as Boggs Lake (designated by the CNDDB as a Northern Volcanic Ash Vernal Pool) is located approximately eight miles south of Clear Lake and about three miles north of the BRP Steam project area. The lake surface covers about 90 acres when it is full and lies in a volcanic depression lined with volcanic ash a few feet deep which has compacted to become impervious to water.

Riparian habitats are associated with perennial and, to a lesser extent, intermittent or ephemeral streams flowing through the area. Distinctive, dense riparian woodland dominated by moisture-dependant trees and shrubs can be found in bands of varying widths along perennial stream courses but these bands give way to a less well-defined stream-associated canopy in upstream reaches where seasonal flow is more limited.

Woodlands, mostly dominated by various oaks and pines with moderate to sparse ($\pm$50%) overstory canopy cover, are often found in areas intermediate between drier (xeric), exposed sites and sites with deeper, moister soils and exposures that can support a denser, forest community type. Cypress (*Cupressus* spp.) woodlands, often in combination with knobcone and gray pine (*Pinus attenuata* and *P. sabiniana*) are a distinctive community type in the region, usually restricted to serpentine soils. Forested areas are characterized by relatively dense stands of trees whose canopy cover exceeds 50% and can be comprised of conifers, broad-leaved species or a combination of both.

4.2 Aquatic Biological Resources

Numerous streams have their headwaters in the Mayacmas Mountains with some flowing westerly, primarily within the Russian River watershed, and others flowing on the east side of the watershed divide toward Clear Lake. These streams, especially in their downstream, more perennial reaches support the primary aquatic habitats in the region. Anadromous fish spawning habitat (e.g. steelhead central California coast ESU) can be found in some reaches of the Russian

River watershed (e.g. Squaw Creek on the westerly side of the Mayacmas divide) but the Clear Lake drainages are limited to inland species such as rainbow trout (*Salmo gairdneri*), California roach (*Lavinia symmetricus*) and California sucker (*Catostomas occidentalis*). Sensitive aquatic habitat elements listed in the CNDDB for the Clear Lake drainages in the region include Clear Lake Drainage Resident Trout Streams and Clear Lake Drainage Cyprinid/Catostomid Streams. Clear Lake, the largest natural lake located entirely in California, supports over 20 fish species. Large natural freshwater marshlands such as Anderson Marsh at the southeast corner of Clear Lake and Boggs Lake (discussed above) are rare in the region but also provide aquatic habitats for plants and wildlife. A range of amphibians, reptiles and invertebrate species, dependant on aquatic habitats for at least part of their life cycle, can be found associated with these perennial streams, lakes and marshlands.

4.3 Sensitive Biological Resources

Several natural community types known to occur in the region including mixed serpentine chaparral, serpentine bunchgrass, Sargent cypress (*Cupressus sargentii*) and valley oak (*Quercus lobata*) woodlands, California oatgrass (*Danthonia californica*), blue wildrye (*Elymus glaucus*), and purple needle grass (*Nassella pulchra*) grasslands and others have been considered high priorities for inventory in the CNDDB (CDFG 2003). Following publication of the second edition of *A Manual of California Vegetation* (anticipated before the end of 2009), species alliances will be used to assign global and state rankings for rarity using the Natural Heritage methodology developed by Nature Serve (CDFG 2007). In the interim, species alliances assigned certain ranking categories (G1-G3) are considered high priorities for CNDDB listing (see listing of alliances at: http://www.dfg.ca.gov/biogeodata/vegcamp/natural_communities.asp) A current query of the CNDDB lists eleven natural communities assigned global and state rarity rankings within Lake County as indicated in Table 1 below.

Waters of the United States and wetlands including freshwater marshes, seeps and springs, riparian wetlands and vernal pools would all be considered sensitive resources, especially in the context of state and federal policies against no net loss of wetlands. Jurisdictional waters are also associated with seasonal stream courses and tributary drainages, even in the absence of flow throughout most of the year. Site-specific delineation is required to determine the nature and extent of these resources on the ground. Permits for filling waters and wetlands typically require mitigation to compensate for losses of these resources.

Special-status ("sensitive") species include plants and animals listed, proposed for listing, or candidates for listing as threatened or endangered by the U.S. Fish and Wildlife Service (USFWS); those listed or proposed for listing as rare, threatened or endangered by CDFG; species that are considered as sensitive by the U. S. Forest Service (Forest Service Manual §2670) and the U. S. Bureau of Land Management (BLM 6840 Manual), plants occurring on the CNPS Electronic Inventory of Rare and Endangered Vascular Plants of California; and animals designated as "Species of Special Concern" or Fully Protected by CDFG. Nesting migratory birds and raptors, protected by the Migratory Bird Treaty Act (16 USC 703) and the California Fish and Game Code (Section 3503.5), are also afforded special-status. A list of potential special-status species occurring within a 10-mile radius of the project area is provided in Appendix A.

Table 1: CNDDB Sensitive Natural Communities for Lake County

Natural Community	Global Rank[1]	State Rank[1]
Central Valley drainage rainbow trout/cyprinid stream	G?	S?
Clear Lake drainage cyprinid/catostomid stream	G?	S?
Clear Lake drainage resident trout stream	G?	S?
Clear Lake drainage seasonal lakefish spawning stream	G?	S?
Coastal and valley freshwater marsh	G3	S2.1
Great valley mixed riparian forest	G2	S2.2
Northern basalt flow vernal pool	G3	S2.2
Northern interior cypress forest	G2	S2.2
Northern vernal pool	G2	S2.1
Northern volcanic ash vernal pool	G1	S1.1
Serpentine bunchgrass	G2	S2.2

Source: CNDDB, July 2009

1. Explanation

Global Rank
- G1 = Extremely endangered
- G2 = Endangered
- G3 = Restricted range
- G? = Do not have enough information to rank

State Rank
- S1 = Extremely endangered
- S2 = Endangered
- S3 = Restricted range
- S4 = Apparently secure
- S5 = Demonstrably secure
- S? = Undetermined

.1 = Seriously endangered in California
.2 = Fairly endangered in California

5.0 PROJECT STUDY AREA

The 138-acre project area is rugged with relatively steep slopes trending away from the central, prominent High Valley Creek drainage and its tributaries. Elevations vary from 2,500 to 2,800 feet (ft) above mean sea level (MSL), with prominent serpentinite outcrops at the higher elevations. Six soil units have been mapped in the area: Henneke-Montara-Rock outcrop complex, 15 to 50 percent slopes; Maymen-etsel-mayacama complex, 15 to 30 percent slopes; Maymen-etsel-mayacama complex, 30 to 75 percent slopes; sleeper variant-sleeper loams, 5 to 15 percent slopes; speaker-sanhedrin gravelly loams, 50 to 75 percent slopes; and talmage very gravelly sandy loam (Natural Resource Conservation Service (NRCS) 2008, Appendix A). Plant communities and wildlife habitats occurring in the project area are described below.

5.1 Plant Communities and Wildlife Habitats

The project study area is comprised of a diverse mosaic of shrub, woodland, riparian and grassland communities that can be segregated into eight vegetation types including three chaparral communities, three woodland or forest communities and two grassland types. The three chaparral communities are: serpentine chaparral, mixed (non-serpentine) chaparral and chamise chaparral. The three woodland types are: knobcone pine forest, mixed oak/pine woodland and riparian woodland. Mixed grasslands (that include both non-native annual and native perennial grasses and an assortment of native and non-native annual and perennial herbaceous species) and mesic meadow grasslands are also found in the study area. Each of the eight vegetation types and associated wildlife habitats are described in more detail below.

5.1.1 Mixed Serpentine Chaparral/Leather Oak Series

Mixed serpentine chaparral corresponds most closely with the leather oak series described by Sawyer and Keeler-Wolf (1995). Within the study area this community type is dominated by evergreen shrubs such as leather oak (*Quercus durata* var. *durata*), white-leafed manzanita (*Arctostaphylos viscida*) and musk brush (*Ceanothus jepsonii* var. *jepsonii*). Leather oak and musk brush are considered to be serpentine endemics, which are plants that are restricted to, or are most commonly found on, serpentine soils. Trees species that also occur in this type are Sargent cypress and gray or foothill pine (*Pinus sabiniana*). Sargent cypress is a serpentine endemic and gray pine is commonly associated with serpentine. Other plant species that occur on serpentine and non-serpentine soils in this vegetation type include chamise, toyon (*Heteromeles arbutifolia*), MacNab cypress (*Cupressus macnabiana*), common manzanita (*Arctostaphylos manzanita* ssp. *manzanita*), buck brush (*Ceanothus cuneatus*), knobcone pine (*Pinus attenuata*), and California bay (*Umbellularia californica*). Native grass species found in this area include oniongrass (*Melica californica*), squirreltail (*Elymus elymoides*), foothill needlegrass (*Nasella lepida*) and California fescue (*Festuca californica*). Herbaceous plants associated with serpentine soils that occur in the study area include sickle-leaved onion (*Allium falcifolium*), Mt. St. Helena morning glory (*Calystegia collina* ssp. *oxyphylla*), three-fingered morning glory (*Calystegia collina* ssp. *tridacylosa),* serpentine collomia (*Collomia diversifolia),* serpentine bird's-beak (*Cordylanthus tenuis* ssp. *brunneus),* Coast range dwarf flax (*Hesperolinon disjuctum*), flame ragwort (*Packera greenei*), and one-sided jewelflower (*Streptanthus glandulosus* ssp. *secundus*). Mt. St. Helena morning glory, serpentine collomia and serpentine bird's-beak are CNPS List 4 plant species, which are plants of limited distribution and are on a watch list. Three-fingered morning glory is a CNPS List 1B.2 species which is a list of plants considered to be rare, threatened, or endangered in California and elsewhere.

Other native plant species found in this type which occur on serpentine and non-serpentine soils include Indian warrior (*Pedicularis densiflora*), scarlet fritillary (*Fritillaria recurva*), rock sedge (*Carex brevicaulis*), Napa cryptantha (*Crypthantha hispidula*), narrow-leaf onion (*Allium amplectens*), red-ribbons (*Clarkia concinna* ssp. *concinna*), Ithuriel's spear (*Triteleia laxa*), Indian pink (*Silene californica*), woolly sunflower (*Erophyllum lanatum* var. *achillaeoides*) and death camas (*Zygadenus fremontii*). An invasive, non-native grass species that occurs along the access roads is cheatgrass (*Bromus tectorum*).

The approximate northerly half of the West pad site, most of the main access road alignment to the West pad site and the northern portion of the East pad site are comprised mainly of the mixed serpentine chaparral vegetation type. According to the *Custom Soil Resource Report for Lake County, California Binkley Well Pad Locations (U. S. Department of Agriculture [USDA] Natural Resources Conservation Service [NRCS] 2009)* soils in the serpentine chaparral communities are primarily Henneke-Montara-Rock outcrop complex, 15 to 50 percent slopes. The Henneke and Montara soils are formed in material weathered from serpentinitic rock. Rock outcrop consists of hard, fractured, serpentinitic rock occurring as small masses of intruding bedrock or as detached stones and boulders. Included in this mapping unit are small areas of Dubakella, Maxwell, Millsholm, and Okiota soils. Dubakella soils formed in material weathered from serpentinite and peridotite. Maxwell soils formed in alluvium derived from serpentinitic rock and consist of very deep, somewhat poorly drained soils in basins and on basin rims. Millsholm soils formed in material weathered from sandstone and shale and Okiota soils formed in material weathered from serpentinitc rock (USDA NRCS 2009).

A diversity of common wildlife species occurs in both serpentine and non-serpentine chaparral habitats. Bird species commonly found locally in mixed chaparral habitats (based on counts since 2002 associated with the Bottle Rock Power Plant) include California towhee (*Pipilo crissalis*), California thrasher (*Toxostoma redivivum*), wrentit (*Chamaea fasciata*), scrub-jay (*Aphelocoma californica*), spotted towhee (*Pipilo maculatus)*, Bewick's wren (*Thryomanes bewickii*), all of which nest in this habitat. Small mammals include brush rabbit (*Sylvilagus bachmanii*), deer mouse (*Peromyscus sp.)*, black-tailed jackrabbit (*Lepus californicus*), California kangaroo rat (*Dipidomys californicus)*, Sonoma chipmunk (*Tamias sonomae*), black-tailed deer (*Odocoileus hemionus*), bobcat (*Lynx rufus*), gray fox (*Urocyon cenereoargenteus*) and spotted skunk (*Spilogale gracilis*). Typical reptiles include western fence lizard, (*Sceloporus occidentalis*) and western rattlesnake (*Crotalus viridis*).

5.1.2 Mixed (Non-Serpentine) Chaparral/Scrub Oak

This vegetation community type combines several chaparral types including northern mixed chaparral and mesic north slope chaparral (Holland 1986). These vegetation types correspond to the scrub oak, mixed scrub oak, scrub oak-chamise, and interior live oak shrub series (Sawyer and Keeler-Wolf 1995). Areas mapped with this vegetation type include areas where manzanitas are dominant to areas where there is a mixture of shrub species including scrub oak (*Quercus berberidifolia*), common manzanita (*Arctostaphylos manzanita* ssp. *manzanita*), hoary manzanita (*Arctostaphylos canescens* ssp. *canescens*), white manzanita (*Arctostaphylos visicida*), wedgeleaf ceanothus (*Ceanothus cuneatus*), California lilac (*Ceanothus foliosus*), deerbrush (*Ceanothus integerrimus)*, mountain mahogany (*Cercocarpus betuloides)*, yerba santa (*Eriodictyon californica*), toyon (*Heteromeles arbutifolia*), coyote brush (*Baccharis pilularis*), silk tassel (*Garrya* spp.), chaparral pea (*Pickeringia montana*) and the shrub form of interior live oak (*Quercus wislizenii* var. *frutescens*).

Open areas between dense shrub communities can support habitat for subshrub and herbaceous plants such as coyote mint (*Monardella odoratissima*), beardtongue (*Penstemon heterophyllus*), lupines (*Lupinus albifrons*, *L. nanus*, and *L. bicolor*), lomatiums *(*Lomatium *dasycarpum* and *L. utriculatum*), bitterroot (*Lewisia rediviva*), Kelloggi's yampa (*Perideridia kelloggii*), phacelia (*Phacelia heterophylla* ssp. *virgata*) and larkspur (*Delphinium variegatum* ssp. *variegatum*).

Common native grass species include California fescue (*Festuca californica*), bluegrass (*Poa secunda*), California brome (*Bromus carinatus*), blue wildrye (*Elymus glaucus*), squirreltail (*Elymus elymoides*) and needlegrass (*Nasella lepida*). Non-native grasses and forbs also occur in the openings mixed in with the native species.

The southern and westerly portions of the East pad site are comprised of the mixed (non-serpentine) chaparral/scrub habitat type with scattered oaks, gray pine and knobcone pine merging into the chamise chaparral type (see below) on higher, more exposed slopes. According to the *Custom Soil Resource Report for Lake County, California Binkley Well Pad Locations (U. S. Department of Agriculture [USDA]Natural Resources Conservation Service [NRCS] 2009)*, soils in this area are mapped as Maymen-Etsel-Mayacama complex, 30 to 75 percent slopes. Maymen at Etsel soils are formed in material weathered from sandstone or shale. Mayacama soils are formed in material weathered from sandstone. This mapping unit includes small areas of Henneke, Millsholm, Montara, Neuns, Sanhedrin, Snook and Speaker soils and rock outcrop so this mapping unit also includes some serpentine soils. The Henneke and Montara soils are formed in material weathered from serpentinitic rock. Millsholm soils formed in material weathered from sandstone and shale. Neuns soils formed in material weathered from sandstone, metamorphosed sandstone, or greenstone. Sanhedrin, Snook and Speaker soils formed in material weathered from sandstone or shale (USDA 1989).

5.1.3 Chamise Chaparral/Chamise Series

Areas dominated by chamise (*Adenostoma fasciculatum*) are mapped as Chamise Chaparral (Holland 1986) and are equivalent to the Chamise series of Sawyer and Keeler-Wolf (1995). Chamise is the dominant species in this community type with greater than 60% cover. If chamise cover is between 30-60% cover and another species has 30-60% cover, then the stand falls into a separate community type or mixed series (Sawyer and Keeler-Wolfe 1995). Other plant species within this type contribute a very small percentage of the overall cover and there is generally little to no understory vegetation. Other species that may occur in this type are manzanitas, several species of buckbrush (*Ceanothus* spp.), poison oak, scrub oak, shrubby interior live oak (*Quercus wislizenii* ssp. *frutescens*), and yerba santa (*Eriodictyon californicum*). Herbaceous species could include grasses and forbs found in the adjacent non-native grassland areas. Chamise chaparral communities area adapted to repeated fires by stump sprouting and mature stands are densely interwoven with very little herbaceous understory or litter (Holland 1986).

5.1.4 Knobcone Pine Forest/Knobcone Pine Series

Knobcone pine forest (Holland 1986), or knobcone pine series (Sawyer and Keeler-Wolf 1995) is dominated by knobcone pine (*Pinus attenuata*). In some stands the pine trees are dense and there are few other species present. Other areas are more open and have a sparse or thick shrub layers. Knobcone pine is typically found on shallow, dry and rocky sites and often on serpentine. These trees are adapted to frequent fires, which is required for the cones to open. Stands of knobcone pine are often even-aged and related to fire frequency. Understory species that can occur in this type are canyon live oak (*Quercus chrysolepsis*), manzanitas (*Arctostaphylos* spp.) and interior live oak (*Quercus wislizenii*), chamise and buckbrush (*Ceanothus* spp.).

A knoll dominated by knobcone pine occurs south of the East pad site and another small stand of knobcone pine occurs downslope of the West pad site. Individuals of knobcone pine also occur scattered throughout the chaparral and mixed woodland communities.

5.1.5 Mixed Oak/Pine Woodland

The mixed oak/pine woodland includes a mixture of oaks and other hardwood species interspersed with various pines and other conifers. This community type does not correspond directly to any types described by Holland (1986) or Sawyer and Keeler-Wolf (1995). This community is a combination of several different Holland (1986), Neilson (1981) and Nelson (1986) community types including black oak woodland, Oregon oak woodland, interior live oak woodland, open foothill pine woodland, mixed north slope cismontane woodland, yellow pine forest, mixed evergreen forest and broadleaved upland forest. Within the study area this vegetation type occurs mainly in less-exposed, more mesic (e.g. northerly) slopes, lower elevations and flatter areas. Mixed woodlands of varying composition and canopy density are found along the road leading from the Bottle Rock Plant to the well pad sites, along High Valley Creek and on the north-facing, non-serpentine slopes in the West pad area. Oak species that occur in the study area include black oak (*Quercus kelloggii*), coast live oak (*Q. agrifolia*), valley oak (*Q. lobata*), Oregon white oak (*Q. garryana*), interior live oak and canyon live oak (Q. *chrysolepis*). Ponderosa pine (*Pinus ponderosa*) occurs in this type, occasionally as a dominant species, especially along High Valley Creek near the southern portion of the study area. Douglas fir (*Pseudotsuga menziesii*), madrone (*Arbutus menziesii*), California nutmeg (*Torreya californica*) and California bay (*Umbellularia californica*) are common associates, especially in more mesic areas. Both knobcone pine and gray pine are also found in the mixed woodland community, typically on the drier slopes and more exposed areas. Manzanitas are a common understory shrub along with poison oak (*Toxicodendron diversilobum*). The more open woodland type includes many grass and forb species including wild oats (*Avena* spp.), bromes (*Bromus* spp.), annual ryegrass (*Lolium multiflorum*), foothill needlegrass (*Nasella lepida*), blue *wildrye (Elymus glaucus)*, yarrow (*Achillea millefolium*), California poppy (*Eschscholzia californica*), blue dicks (*Dichelostemma capitatum* ssp. *capitatum*), red thistle (*Cirsium occidentale* var. *venustum)*, buckwheat *(Eriogonum nudum*), and clarkias (*Clarkia* spp.).

The importance of oak/pine woodlands and mixed oak habitats to wildlife has been well established. Verner (1980) reported about 110 species of birds that occur in California during the breeding season and utilize habitats where oaks form a significant part of the canopy. The acorn mast produced by oaks is utilized by squirrels, deer mice, black-tailed deer, and 30 of the bird species reported by Verner (1980) are known to include acorns in their diets. Black-tailed deer are often dependent on acorns in the fall and winter months, sometimes to the extent that without this food resource, population declines can result. The oak canopy, understory, leaf litter, bark surfaces and limb and trunk cavities provide important foraging and breeding habitats for a diverse array of species. Valley oak dominated areas provide food and cover for extensive populations of deer mice, voles, ground squirrels, black-tailed jackrabbits, and black-tailed deer. The rodent and jackrabbit populations in turn become an important prey base for red-tailed and red-shouldered hawks (*Buteo jamaicensis & B. lineatus*), golden eagles (*Aquila chrysaetos*), foxes and weasels.

5.1.6 Riparian Woodland

Limited riparian woodland occurs along High Valley Creek, which bisects the study area. In the southern portion of the study area between the Bottle Rock power plant and the entrance gate to the BRP Steam leasehold, High Valley Creek has a canopy of mostly valley oaks with some ponderosa and gray pine and California bay. Along Saw Mill Road and at the location where a "pioneer" access road crosses High Valley Creek toward the West pad site, there are sparse willows (*Salix* spp.), big-leaf maple (*Acer macrophyllum*), ash (*Fraxinus latifolia*) and white alder (*Alnus rhombifolia*). The upstream reaches of the creek have little to no wetland vegetation but downstream of the existing "pioneer" creek crossing, there are large patches of torrent sedge (*Carex nudata*), scouring rush (*Equisetum laevigatum*), saturated substrates and intermittent flow into the summer months. Other wetland plants that occur in scattered patches include rushes (*Juncus* spp.), curly dock (*Rumex crispus*), mugwort (*Artemisia douglasiana*), and bent grass (*Agrostis scabra*).

Riparian woodland habitats support a complex wildlife community and provide food, water, migration corridors, escape, nesting and thermal cover for a large number of species, many of which are totally dependent on these habitats for survival. The linear nature of these habitats also tends to maximize the edge effect between riparian and non-riparian zones creating ecotones that are heavily used by a host of species. The greater availability of moisture and organic debris in riparian systems promotes both plant and insect growth which are prominent factors in the establishment of complex food webs that support a high level of species diversity. Animal species that are common to riparian habitats include moisture dependant amphibians such as the California newt (*Taricha torosa*) and Pacific tree frog (*Pseudacris regilla*). Reptiles such as western skinks (*Eumeces skiltonianus*) and alligator lizards *(Elgaria sp*.) are often found in the leaf litter, downed tree branches and fallen logs in riparian habitats. Birds including song sparrows (*Melospiza melodia*), yellow warblers (*Dendroica petechia*), dark-eyed juncos (*Junco hyemalis*) and Wilson's warblers (*Wilsonia pusilla*) are frequently found in riparian areas. Small, typically nocturnal mammals including raccoons (*Procyon lotor*), skunks (*Mephitis mephitis*), opossums (*Didelphis virginiana*) and ringtails (*Bassariscus astutus*) often use riparian corridors for movement and foraging.

5.1.7 Mixed Grasslands/California Annual Grassland Series

Non-native grassland (Holland 1986) or California annual grassland series (Sawyer and Keeler-Wolf 1995) is composed of non-native and native grasses and forbs with the non-native component being dominant. Grasslands that support a mix of non-native annual and native perennial grasses and an assortment of native and non-native annual and perennial herbaceous species occur in open and disturbed areas mainly along the access roads within the study area. Both native and non-native grasses also occur as understory herbaceous vegetation within the shrub and woodland communities on the site. Non-native grass species found on the site include wild oats (*Avena* spp.), bromes (*Bromus hordeaceus, B. diandrus, B. madritensis* spp. *rubens*), hare barley (*Hordeum murinum ssp. leporinum*), annual ryegrass (*Lolium multiflorum*), vernal grass (*Anthoxanthum odoratum*), European hair grass (*Aira caryophyllea*), orchard grass (*Dactylis glomerata*), false brome (*Brachypodium distachyon*), annual fescue (*Vulpia microstachys*), dogtail grass (*Cynosurus echinatus*), and rattail fescue (*Vulpia myuros*). Non-native forb species found on the site include filaree (*Erodium* spp.), yellow starthistle (*Centaurea*

solstitialis), yellow rocket (*Barbarea orthocerus*), pineapple weed (*Chamomilla suaveolens*), hill lotus (*Lotus humistratus*), bur clover (*Medicago polymorpha*), dandelion (*Taraxacum officinale*), and mullein (*Verbascum thapsus*).

Native grass species that occur in this type include California fescue, bluegrass, California brome, blue wildrye, squirreltail, and needlegrass. Native forb species that occur in this type include clarkias, California poppy, goldfields (*Lasthenia californica*), blue dicks, elegant brodiaea (*Brodiaea elegans*), yarrow, red maids (*Calandrinia ciliata*), mariposa lily (*Calochortus vestae*), golden globelily (*Calochortus amabilis*), red thistle, gypsum springbeauty (*Claytonia gypsophiloides*), Chinese houses (*Collinsia heterophylla*), buckwheat (*Eriogonum nudum*), baby blue eyes (*Nemophila menziesii* ssp. *menziesii*), California buttercup (*Ranunculus californica*), sanicle (*Sanicula bipinnatifida* and *S. crassicaulis*) and mule's ears (*Wyethia glabra*). California fescue occurs commonly as an understory herbaceous species in the woodland communities, in particular in areas where foothill pine is common. California oatgrass, meadow barley, annual hairgrass are also associated with mesic areas (see below) which may or may not be wetland communities. California brome, blue wildrye, bottlebrush squirreltail, big squirreltail grass and oniongrass are all common grasses on the BRP Steam leasehold and occur in the shrub and woodland communities as understory herbaceous vegetation. They also occur in the non-native annual grassland community but are a minor component rather than a dominant component of the grassland.

The relatively sparsely distributed grasslands in the BRP Steam leasehold study area provide some foraging habitat for a variety of animals. The numerous invertebrate species often found in grasslands provide a food source for lizards, birds, and some small mammals, including some bats. Many of these animals, in turn, serve as prey for larger species, including raptors. Animals commonly found in grasslands include ringneck snake (*Diadophis punctatus*), gopher snake (*Pituophis melanoleucus*), red-tailed hawk, western meadowlark (*Sturrnella neglecta*), western harvest mouse (*Reithrodontomys megalotis*), Botta pocket gopher (*Thomomys bottae*), broad-handed mole (*Scapanus latimanus*), black-tailed jack rabbit, coyote (*Canis latrans*), bobcat, and black-tailed deer.

5.1.8 Mesic Meadow

The main mesic meadow community type on the BRP Steam lease occurs on the western side of High Valley Road just north of the junction of High Valley Road and Sawmill Road. This open grassland/meadow community also has two drainage features and two mapped wetland areas. This is an open grassland community with a mixture of grass and forb species that include wetland and upland plant species. Mesic grasses in this community type include California oatgrass, meadow barley, annual hairgrass, and tall fescue (*Festuca arundinacea*). Rushes and sedges also occur in the more mesic portions of the meadow and include iris-leaved rush (*Juncus xiphioides* and *J. ensifolius*), spreading rush (*Juncus patens*), slender rush (*Juncus tenuis*) and clustered field sedge (*Carex praegracilis*). Mixed in with the mesic grasses were both native and non-native grass species associated with uplands such as needlegrass, sweet vernal grass (*Anthoxanthum odoratum*), orchard grass (*Dactylis glomerata*), soft chess (*Bromus hordeaceus*), ripgut brome (*Bromus diandrus*), wild oats (*Avena barbata* and *A. sativa*), medusa head grass (*Taeniatherum caput-medusae*), and silver European hairgrass (*Aira caryophyllea*). Forb species in this area include cream cups (*Platystemon californicus*), white hayfield tarplant (*Hemizonia*

congesta ssp. *luzulifolia*), clarkia (*Clarkia amoena* ssp. *amoena* and *C. purpurea* ssp. *quadrivulnera*), poppy (*Eschscholzia californica*), California buttercup (*Ranunculus californica*), and Kellogg's yampa (*Perideridia kelloggii*). Another mesic meadow (Wetland Area 1) occurs to the east of the East pad along an unpaved road just outside of the study area boundary (see Figures 3 & 5).

5.2 Aquatic Environments, Wetlands and Waters of the U.S.

High Valley Creek, a tributary of the Kelsey Creek watershed that ultimately drains into Clear Lake, is the prominent water feature in the study area. Several locally-named tributaries, including Coleman Creek and Cow Creek, comprise its headwaters and branch into the main stem just west of the Francisco pad. These sections of stream channel are ephemeral through most of the study area with the main stem of High Valley Creek becoming intermittent to perennial as it progresses toward its confluence with Kelsey Creek well to the north of the BRP Steam leasehold. As noted above, the upstream reaches of High Valley Creek and its tributaries support little to no instream wetland vegetation. However, hydrophytic (moisture dependent) vegetation increases within the limits of the ordinary high water line which can extend to over 20 feet wide in the downstream reaches.

Numerous ephemeral hillside drainages connect with High Valley Creek but most of these flow only in response to rain events. These hillside drainages are typically narrow, averaging between one-foot and three-feet wide and generally lack wetland vegetation or the vegetation cover is patchy. The channel beds are rocky and occur mostly on steep slopes so that water flows quickly and does not usually pond. Temporary ponding may occur in the rainy season in portions of drainages where the slope is reduced.

Four seasonal wetland areas were identified within the study area for the project (see Figure 5). Wetland Area 1 is a seep-type wetland located just to the north of the clearing and grading limits for the East pad on a serpentine slope. It appears that this may have also been a slide area because the soils were deep and loamy and were probably deposited on top of the serpentine. At the time of the June 10, 2009 field delineation the soils at this location were moist to saturated to within three inches of the surface. Plant species were obligate to facultative wetland plants such as stream trefoil (*Lotus oblongifolius*), large common monkeyflower *(Mimulus guttatus*), meadow barley *(Hordeum brachyantherum),* California oatgrass, and annual hairgrass (*Deschampsia danthonioides*). Soils in the adjacent upland area were shallow and rocky with no soil saturation and plants were dominated by upland species such as hill lotus (*Lotus humistratus*), bird's-beak (*Cordylanthus pilosus*), and hayfield tarplant (*Hemizonia congesta* ssp. *luzulifolia*).

Wetland Areas 2 & 3 occur in the mesic meadow community west of High Valley Road and northeast of Sawmill Road. Wetland Area 2 occurs in a depression within a larger ephemeral flow area of the mesic meadow. The flow area through the meadow comprises a portion of Drainage 12, but the topography is relatively flat and there is no bed, bank or channel. Wetland Area 3 is a long narrow depression that marks the point in the landscape where Drainage 12 begins cutting a bed, bank and channel again. Soils at both locations had redoximorphic features (mottles) indicating hydric soil conditions along with algal matting or biotic crust indicating standing water and evidence of wetland hydrology. The dominant plant species was spreading

rush and associated wetland plants were annual hairgrass, curly dock (*Rumex crispus*), and sedge (*Carex* sp.).

Wetland Area 4 also occurs in the mesic meadow community associated with another ephemeral drainage (Drainage 13). Soils had mottles with algal matting as biotic crust for wetland hydrology. The dominant plant species was spreading rush, a facultative plant species, along with associated obligate to facultative wetland plants such as large common monkeyflower and clustered field sedge.

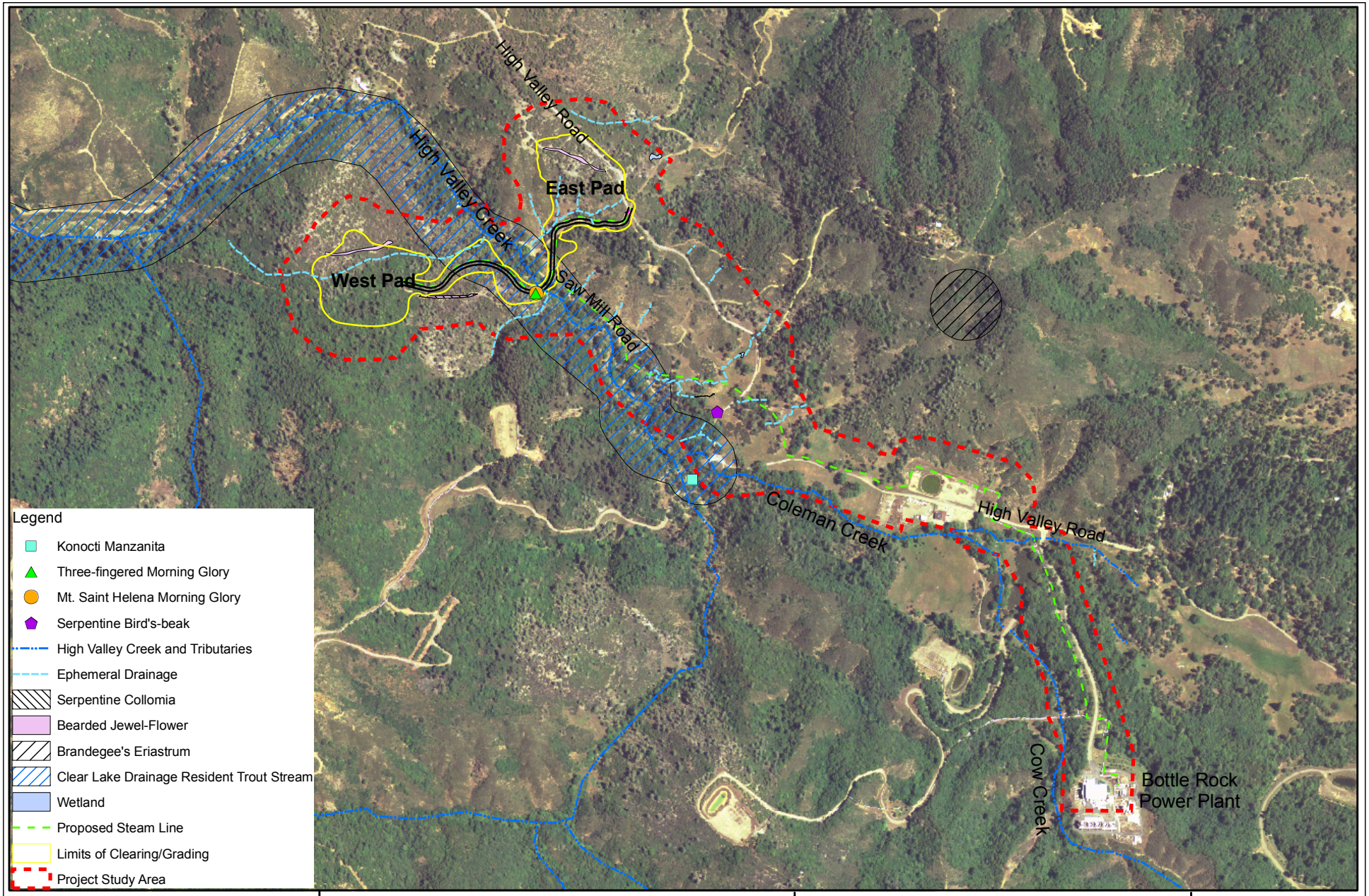
The CNDDB designates High Valley Creek as a Clear Lake Drainage Resident Trout Stream through the project area to its fork with the Coleman Creek tributary (see Figure 6). Systematic studies have identified other species of fish associated with rainbow trout (*Salmo gairdneri*) in the Kelsey Creek drainage including California roach, California sucker, squawfish (*Ptychocheilus grandis*) and introduced brown trout (*Salmo trutta*) (Taylor 1977; Price & Kubicek 1975). It is also possible that the Clear Lake hitch (*Lavinia exilicauda chi*), a fish species of special concern, endemic to Clear Lake and its tributary drainages, could be found in High Valley Creek (see below). Water-dependant invertebrates, reptiles and amphibians, including, potentially the foothill yellow legged frog (*Rana boylii*) and the northwestern pond turtle (*Actinemys marmorata marmorata*), both also species of special concern, could also be found in the creek (see below).

6.0 SPECIAL STATUS AND COMMERCIAL/RECREATIONAL SPECIES

For this assessment, special status species are defined as: those plants and animals listed, proposed for listing, or candidates for listing as threatened or endangered by the U.S. Fish and Wildlife Service (USFWS); those listed or proposed for listing as rare, threatened, endangered or fully protected by CDFG; species that are considered sensitive by the U.S. Forest Service (Forest Service Manual §2670) and the U.S. Bureau of Land Management (BLM 6840 Manual), plants occurring on the CNPS Electronic Inventory of Rare and Endangered Vascular Plants of California (2008); and animals designated as "Species of Special Concern" by CDFG. Nesting migratory birds and raptors, protected by the Migratory Bird Treaty Act (16 USC 703) and the California Fish and Game Code (Section 3503.5), are also afforded special-status. Wildlife species valued for hunting are the primary commercial and recreational species known in the area. A discussion of the special status and recreational species observed or determined to potentially occur in the area follows.

6.1 Special Status Plants

Fifty-one special-status plant species are recorded from the search area in the CNDDB (Appendix A). One additional plant, Napa lomatium (*Lomatium repostum*), was recorded from surveys conducted for the 1980 Draft Environmental Impact Report for the Bottle Rock Power Plant (California Energy Commission 1980) and is also included in the target list. Special status plants listed in the CNDDB with reasonable potential to be associated with habitats in the study area (i.e. that occur within a three-mile radius) are: dimorphic snapdragon (*Antirrhinum subcordatum*), Sonoma canescent manzanita (*Arctostaphylos canescens* ssp. *sonomensis*), Konocti manzanita (*Arctostaphylos manzanita* ssp. *elegans*), Rincon ridge ceanothus (*Ceanothus confusus*), serpentine cryptantha (*Cryptantha clevelandii* var. *dissita*), Brandegee's eriastrum



Zander Associates
Environmental Consultants
4460 Redwood Hwy, Suite 16-240
San Rafael, CA 94903

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Special Status Biological Resources
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Figure
6

(*Eriastrum brandegeeae*), Greene's narrow-leaved daisy (*Erigeron greenei*), Snow Mountain buckwheat (*Eriogonum nervulosum*), glandular western flax (*Herperolinon adenophylum*), Colusa layia (*Layia septentrionalis*), Cobb Mountain lupine (*Lupinus sericatus*) and Sonoma beardtongue (*Penstemon newberryi* var. *sonomensis*). Loch Lomond button-celery (*Eryngium constancei*), few-flowered navarretia (*Navarretia leucocephala* ssp. *pauciflora*), Lake County stonecrop (*Sedella leiocarpa*) and marsh checkerbloom (*Sidalcea oregana* ssp. *hydrophila*) are also recorded within a three mile radius, but it is unlikely that these plants would occur within the study area because suitable habitat for each is lacking.

Brandegee's eriastrum, a CNPS List 1B species, is the only special-status plant with a CNDDB-recorded occurrence in relatively close proximity to the study area (see Figure 6). We searched the CNDDB-mapped area for this species during our May site visit, contacted CDFG personnel (Ms Roxanne Bitman) for updated latitude and longitude coordinates prior to our June visit, and located the specific coordinates for the 1983 record on the ground using a Trimble GPS unit during our June surveys. The site was overgrown with shrubs, primarily chamise, and was no longer an opening. No species of *Eriastrum* were found and it appears that any suitable habitat at that location has been replaced with a chaparral shrub community.

We observed six special status plant species within the project study area: Konocti manzanita (*Arctostaphylos manzanita* ssp. *elegans*), Mt. Saint Helena morning glory (*Calystegia collina* ssp. *oxypylla*), three-fingered morning glory (*Calystegia collina* ssp. *tridacylosa),* serpentine collomia (*Collomia diversifolia),* serpentine bird's-beak (*Cordylanthus tenuis* ssp. *brunneus)* and bearded jewel-flower (*Streptanthus barbiger)* (see Figure 6). Konocti manzanita and three-fingered morning glory are CNPS List 1B.2 species, which is a list of plants considered to be rare, threatened, or endangered in California and elsewhere. Impacts to these species must be addressed in any environmental review of the project. Mt. St. Helena morning glory, serpentine collomia, serpentine bird's-beak and bearded jewel-flower are CNPS List 4 plant species, which are plants of limited distribution and are on a watch list. CNPS recommends that impacts to List 4 species also be considered during environmental review.

Konocti manzanita was observed growing with common manzanita on the southwest side of High Valley Creek at the edge of the 250-foot survey boundary used for the delineation of waters of the U.S., including wetlands. Approximately 15 to 20 individuals occur in this area. These individuals should not be impacted by the proposed project as they are at the outer edge of the study area and not within any proposed development area.

Mt. Saint Helena morning glory and three-fingered morning glory were observed growing in the "pioneer" access road to the West pad site west of High Valley Creek. Approximately 10 individuals of Mt. St. Helena morning glory and 10-20 individuals of three-fingered morning glory were observed in the road. These two species appear to be adapted to disturbance as they were observed growing along the road edge that had recently been cleared for access.

Serpentine collomia was also observed growing in the middle of the pioneer access road to the West pad and in another graded road south of the West pad. Approximately 20 or more individuals of this species were observed. This species also appears to be adapted to disturbance. Serpentine bird's-beak was observed in a non-native grassland off the side of High Valley Road.

Approximately 20 to 30 individuals of this species were observed in this area. Serpentine bird's-beak is not likely to be impacted by the project as the road at this location would probably not need to be improved or altered for the project.

Bearded jewel-flower was observed also growing in the open areas, mostly in the unpaved roads within the project area. This species is widespread in the serpentine areas. Individuals are scattered throughout the serpentine and an estimate of numbers was not attempted, but there were between 50 to 100 individuals observed in the overall project area. As with Mt. St. Helena morning glory, serpentine collomia and serpentine bird's-beak, bearded jewel-flower appears to be an opportunistic species in disturbed and open areas. These species most likely benefit from the lack of competition with other plants when areas are open by road cuts or other disturbance.

Although not directly observed within the study area, Sonoma canescent manzanita (*Arctostaphylos canescens* ssp. *sonomensis*), a CNPS List 1B species, also has the potential to occur in the vicinity of the project. A closely related subspecies, Hoary manzanita (*Arctostaphylos canescens* ssp. *canescens*) was observed in the study area. The difference in the subspecies has to do with the fruit. Not all of the shrubs within the study area had fruit at the time of the survey. It is possible that the special status subspecies of these more common species could be present within the study area, however the shrubs would have to be in fruit to be positively identified to subspecies.

A common species of soaproot (*Chlorogalum pomeridanum* var. *pomeridianum*) was observed through the project area. Dwarf soaproot (*Chlorogalum pomeridianum* var. *minus*), is a CNPS List 1B species that occurs on serpentine. The main characteristic that distinguishes these two varieties are the bulb coat. Dwarf soaproot has a bulb coat with membranous or with few coarse fibers. Common soaproot has a bulb coat with many coarse fibers. Several individuals of soaproot within the serpentine areas were examined to determine if the bulb coat was membranous or fibrous. All of the plants examined had fibrous bulb coats. However, dwarf soaproot is also typically much smaller than the common soaproot. The project area supports potential habitat for dwarf soaproot but no direct evidence (i.e. bulb coat) was observed to indicate that dwarf soaproot is present.

No special status plants were found in the study area during the June 1980 site surveys conducted by Ralph Osterling and Charles Patterson (Osterling 1980). As part of the 1980 survey two species of *Strepthanthus* were found: *Strepthanthus breweri* and *S. glandulosa*; in addition two species of *Hesperolinon*: *Hesperolinon spergulinum* and *H. clevelandii*. None of these species has a special status although the species of Strepthanthus identified in the 1980 study were not identified to variety or subspecies and one variety of *Streptanthus breweri* (var. *hesperidis*), has the potential to occur in the area based on the presence of potential habitat. Two species of *Streptanthus* were found during the 2008 and 2009 surveys: one-sided jewelflower or *Strepthanthus glandulosus* ssp. *secundus* which is not a special status plant species and bearded jewel-flower (*Streptanthus barbiger*), which is a CNPS List 4 species (described in more detail above).

6.2 Special Status Animals

We evaluated 17 animal species from CNDDB and other records for their potential to occur in the study area. A list of the species evaluated is provided in Appendix A along with a summary of our findings. No special-status animals (except for nesting raptors and migratory birds—see below) are likely to occur in the habitats associated with the pads or along the road alignments. However, as noted above, the adjacent reach of High Valley Creek is located at the headwaters of a designated Clear Lake Drainage Resident Trout Stream and supports wetlands and riparian habitats. During our seasonal visits in 2009, the creek maintained some flow well into July and especially in more downstream areas, there was patchy but relatively well-developed instream vegetative cover and riparian canopy. Special-status wildlife, dependant on aquatic and riparian environments, like the Clear Lake hitch, foothill yellow-legged frog and northwestern pond turtle in addition to other aquatic species may be associated with habitats in the streamzone. The ringtail, a California Fully Protected Species could potentially occur in the region and use High Valley Creek as a movement corridor. Trees and shrubs in the project area may also provide nesting opportunities for raptors (birds of prey) and other species.

Clear Lake hitch (called *chi* by the native Pomo) are a California Species of Special Concern (SSC) endemic to Clear Lake and its drainages, most often found in slow warm water, but also found in cool and clear, low-gradient streams, hiding among aquatic vegetation in sandy runs or pools. In the lake environment hitch may occupy different spaces depending upon age. Juveniles typically live in shallow vegetated areas near shore, while the older fish (>80 days) live in deeper offshore waters. Spawning typically happens in the lake's tributaries and may begin as early as February and end as late as July. When spawning adults reach a suitable riffle for breeding one female may be surrounded by 1-5 males. A ripe female releases her eggs into the current and the males immediately fertilize the eggs. The eggs then settle into the gravel substrate where the size of the ova will increase and help lodge it into the rock particles. In 3-7 days the embryos hatch, and 3-4 days after the hatch the embryos begin to swim freely. The young hitch may swim downstream or reside within the stream (assuming it is a perennial reach) under the cover of aquatic plants. Hitch generally live for a total of 4-6 years.

The foothill yellow-legged frog is another California SSC species that can be found from northern Oregon, along the west coast of California and into Baja California. It is a medium-sized frog that varies in coloration but is typically dark to light gray, brown, green, or yellow and can be plain or mottled with brick or reddish pigments in appearance. The species prefers partially shaded, clear, cool streams and riffles with a rocky substrate in a variety of woodland habitats and needs at least some cobble-sized substrate for egg-laying. Tadpoles emerge in about five days and require three to four months to attain metamorphosis. Foothill yellow-legged frogs are rarely encountered far from permanent water and probably spend most of their time in or near streams at all seasons.

The northwestern pond turtle is also a California SSSC species. It is the only native aquatic (freshwater) turtle found in California. Western pond turtles are found in freshwater habitats throughout most of the state (west of the Sierra Nevada crest) up to elevations of about 4,700 feet. They require some slow or slack water aquatic habitat, and are uncommon in high-flow streams. Western pond turtle presence seems to be associated with the presence of basking sites and hatchlings require shallow water habitat with dense algal vegetation in which to forage.

Western pond turtles leave aquatic sites to reproduce, aestivate and overwinter, and so upland habitat is an important life history component for the species. Western pond turtles are known to travel up to 100 meters upland from their aquatic habitat in search of a nesting location. These turtles require an upland oviposition site in clay or sandy soils in the vicinity of the aquatic site and may overwinter on land or may remain active in water during the winter season depending on factors poorly understood at this time.

Ringtails are small, nocturnal and secretive carnivores related to the raccoon that establish dens in many habitat types, typically in rocky areas with abundant cover. They feed on small vertebrates, acorns and insects and use riparian corridors for movement and foraging at night. The ringtail is listed as a Fully Protected Species in California. There are no known sightings of ringtails in the vicinity but the High Valley Creek corridor provides potential movement, hunting and foraging habitat for the species.

Raptors, migratory bird species and bats may nest in trees in the project area, primarily the larger oaks and pines, but also possibly smaller trees and shrubs. There are records of purple martin nests from nearby areas associated with the Bottle Rock Power Plant. Active nests of raptors and migratory birds are protected under the California Fish and Game Code (Section 3503.5) and the Migratory Bird Treaty Act (16 USC 703). In practice, abiding by the Migratory Bird Treaty Act and the Fish and Game Code usually means to avoid removal of trees with active nests until such time as the young have fledged and the nest is abandoned (see discussion below).

6.3 Fish and Wildlife Species with Commercial/Recreational Value

Several wildlife species known to occur in the general project vicinity have commercial and/or recreational value, primarily for hunting, including black-tailed deer, California quail (*Callipepla californica*), mountain quail (*Oreortyx pictus*), mourning dove (*Zenaida macroura*), band-tailed pigeon (*Columba fasciata)*, wild turkey (*Meleagris gallopavo*), black-tailed jack rabbit (*Lepus californicus*), brush rabbit (*Sylvilagus bachmani*) and western gray squirrel (*Sciurus griseus*). Black bears (*Ursus americanus*) are also occasionally seen in the area and introduced wild boars (*Sus scrofa*), which are now widespread over large parts of the state, may occur in the region. However, we have seen no evidence of wild boar (they often tear up large patches of ground while feeding, sometimes impacting sensitive plant communities) anywhere in the vicinity of the project during our field studies in 2008 or 2009. High Valley Creek's designation as a Clear Lake Drainage Resident Trout Stream and other potential fisheries resources were discussed above.

7.0 PROJECT IMPACTS & MITIGATION MEASURES

7.1 Impact Overview

The direct loss of vegetation and wildlife habitat, drainages, wetlands and special status species from project construction would be the primary impact on biological resources. Discharges and increased sedimentation into the local High Valley Creek watershed and indirect effects on wildlife from increased noise (from vehicles, heavy equipment, drill rigs, etc) and glare (e.g. 24-hour lighting during drilling) could also occur during construction. Operation of the project once the pads, wells, associated facilities (e.g. sumps), steamlines and access roads are in place would

result in relatively minor additional impacts, especially with best management practices in place to reduce or eliminate venting into sensitive areas, blow outs, fluid discharges, noise and other potentially negative operational effects. Decommissioning could result in restoration of the disturbed well pad and road areas, but some residual disturbance, especially on serpentine cut slopes would likely remain over time.

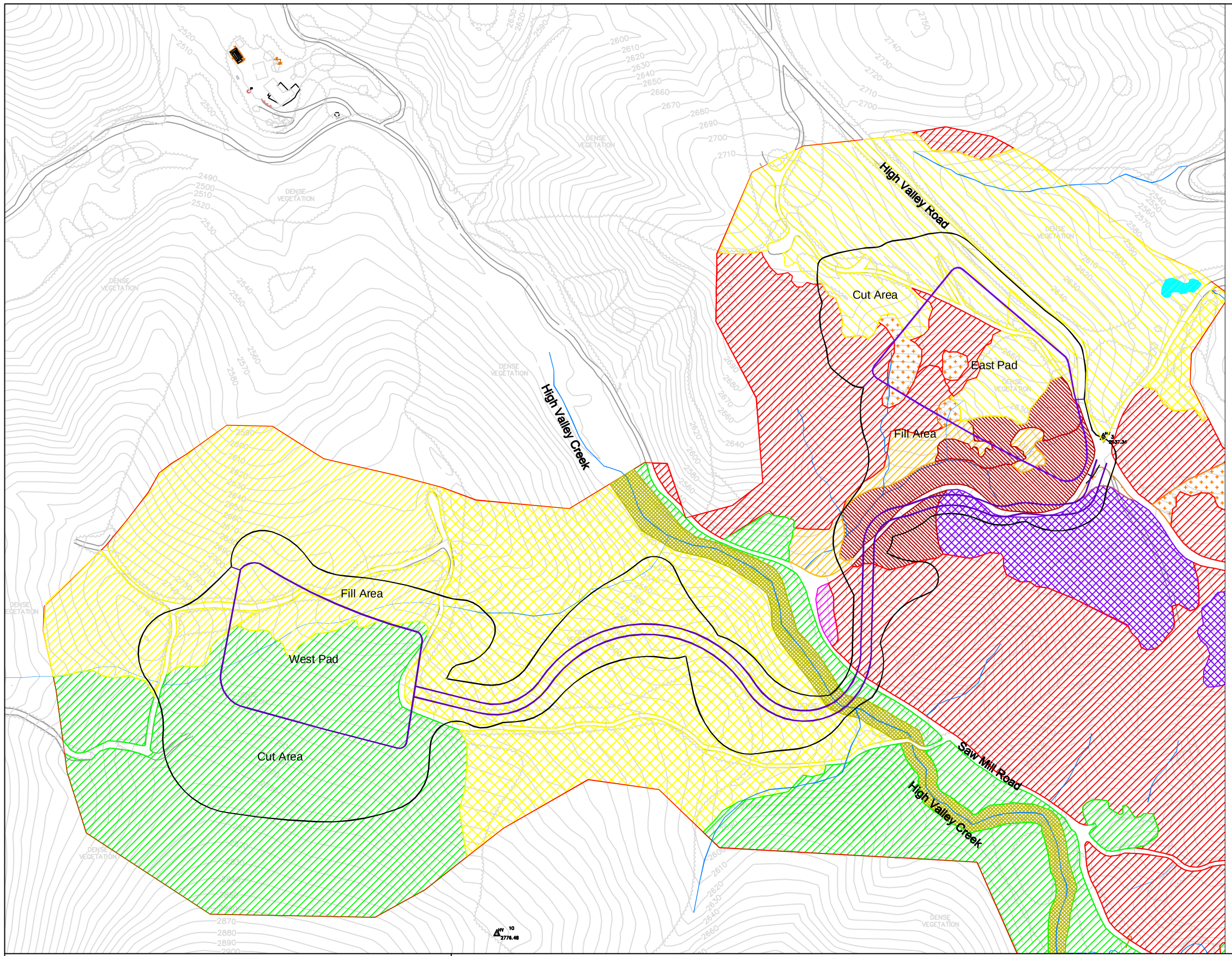
7.2 Construction

7.2.1 Impacts

Construction impacts to biological resources would result from clearing and grading (cut and fill) for the two new well pads and the access road connecting them (see Figure 7). Approximately 21.6 acres of vegetation and wildlife habitat could be directly removed within the limits of grading based on the most current grading plans for the project (Environ Strategy, August 21, 2009). Some direct losses of wildlife would likely also occur as a result of vegetation removal with smaller, more sedentary species (e.g. reptiles, small mammals) likely to be eliminated or displaced. However the affected wildlife habitat types are widespread in the project area and common species populations should not be significantly impacted. No special-status terrestrial wildlife species are known to occur in the area, but nesting raptors, migratory birds and bats would be of particular concern if any construction-related activities occur during the nesting season (typically February through July). The ringtail could also potentially use the area, especially the High Valley Creek corridor, but such a secretive, nocturnal animal would not likely be found in proximity to ongoing human activities and no significant impacts on this species are expected.

Approximately eight acres, primarily comprised of chaparral, chamise and woodland communities, could be affected for each pad and associated cut and fill slopes while new access road grading to the West pad could affect approximately 5.3 acres, mostly in gray pine and serpentine.. West pad clearing and grading could also affect some special-status serpentine plants including Mt. Saint Helena morning glory, three-fingered morning glory, serpentine collomia, bearded jewel-flower and possibly Sonoma canescent manzanita, although this latter species was not directly observed in the study area. The High Valley Creek crossing could affect approximately 72 linear feet of stream channel and approximately 0.08-acre of streamzone wetland/riparian habitat including potential habitat for special-status aquatic wildlife (e.g. foothill yellow-legged frog, northwestern pond turtle). Approximately 0.08-acre (2,380 linear feet) of ephemeral drainages (potential waters of the U.S.) within the grading limits could also be affected. A breakdown of the areas affected by clearing and grading for the pads and new access roads is provided below on Table 2.

Grading-related activities (e.g. heavy equipment movement outside of designated grading limits and work areas), side-casting, stock-piling, dumping or other types of discharges or placement of soil, rock and other construction materials could impact plant communities and sensitive resources (e.g. wet meadows, riparian habitat, wetlands) and increase sedimentation into the local High Valley Creek watershed. Staging and equipment storage areas also have the potential for both direct (vegetation removal/disturbance) and indirect (oil, grease and fluid discharges, sedimentation) impacts on vegetation and wildlife. However during well drilling, all machinery,



LEGEND:

- Chamise Chaparral
- Serpentine Chaparral
- Serpentine Chaparral/Cypress
- Serpentine Chaparral/Grey Pine
- Gray Pine/Chaparral
- Mixed Chaparral/Oak Scrub
- Knobcone Pine
- Mixed Oak/Pine Woodland
- Oak
- Grassland
- Riparian
- Wetland
- Drainage
- Limits of Clearing/Grading
- Project Study Area

Scale: 1" = 250'

Zander Associates
Environmental Consultants
4460 Redwood Hwy, Suite 16-240
San Rafael, CA 94903

Clearing and Grading Impacts
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Figure 7

Table 2: Summary of Project Impacts

Habitat	**Area Impacted**		
	West Pad	**Road**	**East Pad**
Terrestrial Communities	**(acres)**		
Mixed Serpentine Chaparral	2.59	4.34	3.22
Mixed (Non-Serpentine) Chaparral/Scrub Oak	0	0	2.26
Chamise Chaparral	0	0.74	1.61
Knobcone Pine Forest	0	0	0.37
Mixed Oak Woodland	5.81	0.08	0
Riparian Woodland	0	0.08	0
Mixed Grasslands	0	0.05	0.44
Mesic Meadow	0	0	0
Total	**8.40**	**5.29**	**7.90**
Drainages	**(square feet)**		
Drainage 3			982
Drainage 4			426
Drainage 5			320
Drainage 6			534
Drainage 7			82.5
Drainage 10	33		
Drainage 11	1,129		
High Valley Creek		3,456	
Total	**1,162**	**3,456**	**2,345**

drilling platforms, and oil and fuel storage areas on the well pads would be in contained areas to prevent direct runoff. In addition, a sumpless, closed loop drilling process would be used for well drilling with liquid and solid waste from the process contained within a compartmentalized series of tanks or mud pit system. Blowout prevention equipment (BOPE) would be installed, tested, and ready for use while drilling the well to ensure that any geothermal fluids encountered do not flow uncontrolled to the surface.

Installation of a steam line for approximately 1,000 feet alongside Saw Mill Road and then for about ¼-mile cross country to High Valley Road could also result in removal of vegetation and potential for encroachment into the High Valley Creek streamzone and the mesic (wet) meadow area between the two roads. Surface disturbance and fill associated with the cross-country section of steam line could affect several ephemeral drainages and seasonal wetlands in the meadow in that area. However, the pipeline would be placed on piers and stanchions and no maintenance road is proposed along this section of pipeline.

Construction-related biological resource impacts resulting from installation of new steam line along the existing paved section of High Valley Road to the Francisco pad, and eventually parallel to the existing steam line to the power plant, should be limited since the pipeline will be placed on stanchions without significant new ground disturbance and these areas are already disturbed from previous development activities. No significant improvements to High Valley Road (beyond possible resurfacing) are anticipated since it already meets design standards.

Indirect effects of increased noise (from vehicles, heavy equipment, drill rigs, etc) and glare (24-hour lighting) could also occur during construction. Excessive steam venting during well drilling and testing could potentially affect adjacent vegetation, primarily through thermal impacts (e.g. scorching, burning) as a result of direct exposure to high temperature/pressure steam, but also through potential exposure to high concentrations of boron in the steam. However, un-regulated venting of steam to the atmosphere is not anticipated and industry-standard abatement technologies would be employed during drilling and well testing. Well drilling and testing is expected to occur on a 24-hour a day basis for 60-90 days beyond initial clearing and grading. These activities would extend the duration of indirect and temporary effects, especially on more sensitive and nocturnal wildlife.

7.2.2 Mitigation Measures

Project plans call for an ultimate operational pad area of about 3.2 acres for both the West and East pads with restoration of the remaining areas disturbed by grading. Approximately 4.8 acres of cut and fill on the West pad and 3.9 acres of cut and fill on the East pad would be candidates for restoration. In addition, a disturbed area of up to 40 feet wide on each side of the new access road to the West pad would also need to be revegetated. Cut slopes, especially in serpentinite are very difficult to restore; exposed (cut) subsurface and rock horizons are typically moisture and nutrient limited and serpentinite has a low calcium-magnesium ratio that can be toxic to many plants. Fill from serpentine soils can also be problematic for the same reasons, but past experience in the KGRA has demonstrated that restoration on serpentine fill slopes is feasible following appropriate methods.[1] Those methods include:

- careful removal and temporary stockpiling of the relatively thin topsoil (A horizon) layers in areas to be graded to preserve seed bank, microorganisms and other beneficial attributes of native soils;
- assessment of the calcium/magnesium ratios of fill soils and possible amendments (e.g. with gypsum) to ameliorate the calcium/magnesium imbalance;
- application of adequate depths of fill soils (more than a foot) over serpentine or rocky areas targeted for revegetation to allow an ample rooting zone;
- site-specific seed collection of local, especially serpentine plants, off-site propagation and reintroduction into the target restoration area as liners;
- initial hydroseeding/mulching for erosion control using native grasses and other annuals specifically adapted to serpentine soils such as California barley (*Hordeum californicum*).

[1] Rocky Thompson, Restoration Planner, Center for Social and Environmental Stewardship (formerly Circuit Rider Productions), telephone conversation, July 30, 2009.

Implementation of appropriate drainage, winterization and site restoration measures on fill slopes based on a site-specific restoration plan for each pad and the new access road area that incorporates the methods above should reduce impacts from vegetation and habitat losses as revegetation progresses. However, the areas of the well pads (approximately six acres) and cut slopes (approximately 5.43 acres), especially on the East pad, would likely remain barren, or at least sparsely vegetated over time. Since the vegetation communities displaced by the pads and cut slopes (serpentine chaparral, mixed woodland, mixed chaparral, chamise and non-native grasslands) are relatively common and widespread in the area, and since longer-term losses would be relatively minor with implementation of a site-specific restoration plan, this impact is not considered significant.

Seasonally timed pre-construction plant surveys, conducted within staked/flagged limits of clearing, grading or work areas could eliminate or reduce potential impacts on Mt. St. Helena morning glory, serpentine collomia, serpentine bird's-beak, bearded jewel-flower, Sonoma canescent manazanita and other special-status serpentine plants. If any special-status plant species are identified, they should be tagged and avoided if feasible. If avoidance is not possible, the plants should be salvaged through a seed collection program. Seeds could be included in the restoration mix or propagated and individuals re-planted in an appropriate restoration area. Most of these species appear to be opportunistic in disturbed and open areas and most likely benefit from the lack of competition with other plants when areas are open by road cuts or other disturbance. Reintroducing them into appropriate areas as part of the restoration plan could offset losses incurred by clearing and grading.

Disturbance in the riparian zone of High Valley Creek should be limited to the minimum area necessary for construction of the new access road and stream crossing. Large mature riparian trees (e.g. alders, ash, valley oaks) and extensive areas of wetland/riparian understory vegetation should be avoided to the maximum extent possible. Where unavoidable, losses of riparian trees and shrubs and riparian habitat could be offset by implementation of a site-specific riparian/restoration plan that could include tree replacement planting at suitable ratios (2:1), willow sprigging and understory revegetation, especially in open or disturbed areas (e.g. temporarily cleared areas for bridge construction, "pioneer" road crossing area). Culverts (currently sized at 60-inch diameter) should be large enough to allow unimpeded flow during maximum projected storm events and designed to allow cobble and gravel substrates to form in the streambed through the culvert (e.g. arched culverts). A clear span bridge alternative could further reduce instream effects but would not be necessary (nor the extra expense warranted) if culverts are adequately sized and positioned in the streambed.[2] Any work in or near the streamzone should also take place during the driest part of the year when no active flow or residual ponding are likely to occur in this reach of High Valley Creek. Proper timing combined with all appropriate best management practices and erosion control measures for work in streamzones should reduce sedimentation and potential effects on sensitive aquatic species (e.g. foothill yellow-legged frog, northwestern pond turtle). However permanent loss of the section of streamzone wetlands and natural channel affected by the creek crossing itself (an estimated area of 3,500 square feet) would likely require compensation to meet state and federal "no net loss" policies for waters and wetlands (see below).

[2] Pardee Bardwell, BLM Biologist, telephone conversation, June 17, 2009. Kelley Barker, CDFG Biologist, telephone conversation, July 2, 2009.

The new steamline section along Saw Mill Road should follow existing contours as close to the road as feasible to reduce the need for substantial additional grading. Foundations, stanchions, pipelines and other components should be installed from the existing road (e.g. with cranes) wherever feasible to minimize additional disturbance. Tree and other vegetation removal should be kept to the minimum necessary with designated areas for replacement plantings for trees and shrubs to be removed (possibly on the stream side of the road). Diversion (drift) fences and/or silt fencing should be placed along work areas adjacent to High Valley Creek to both discourage overland movement of riparian species (e.g. pond turtles) into the construction zone and reduce sedimentation in the creek. The ¼-mile cross country section of steamline in the vicinity of the mesic meadow should be routed through chamise chaparral on higher ground along the perimeter of the area to the greatest extent feasible. Where encroachment into the meadow area is unavoidable, cranes or equivalent types of equipment should be used to place piers and stanchions. Work should be conducted during the driest season of the year and fill in any mapped waters or wetland areas should be avoided. No maintenance road should be constructed through the area. A qualified biologist with authority to recommend minor adjustments to the alignment and/or pier placement should be on site during construction to assure that any sensitive areas are avoided.

All clearing and grading limits, stockpile locations, equipment storage and staging areas and other work areas should be clearly designated in the field prior to construction. Suitable symbolic barriers (e.g. orange construction fencing, limit line staking) should be placed along the borders of these areas, including the pad sites, all affected sections of Saw Mill Road and High Valley Creek in the study area and the wet meadow area between Saw Mill Road and High Valley Road. The barriers should be placed with adequate setbacks to discourage encroachment into otherwise undisturbed habitat, especially the riparian zone, by construction equipment or personnel. Appropriate erosion control measures (e.g. silt fencing, wattles, jute netting, straw bales) should be sited and placed in all work areas in conformance with an approved Stormwater Pollution and Prevention Plan (SWPPP) to reduce sedimentation in the creek. Storage and staging areas should be located and planned so that runoff and/or sediment, fuel leaks or other discharges can be contained within a defined perimeter.

Standard procedures to protect nesting raptors, migratory birds and bats, especially in the riparian canopy and woodland areas associated with High Valley Creek, should be implemented during clearing, grading and project construction. If tree removal and/or significant vegetation clearing, grading, well-drilling and testing are necessary during the nesting season for raptors, bats and migratory birds (typically February through July), an assessment of roosting/nesting activity in trees and other vegetation to be removed and within 250 feet of work areas should be conducted by a qualified biologist prior to those activities. If active nests are found and the biologist determines that tree removal or other construction activities would disturb the nest or have the potential to cause abandonment, those activities should be avoided until the young have fledged as determined through monitoring of the nest. Once the young have fledged, construction activities can resume in the vicinity.

The High Valley Creek crossing and filling of the ephemeral drainages on the two pads noted above would likely require authorization from federal and state agencies including the U.S. Army Corps of Engineers (Corps), the California Regional Water Quality Control Board

(RWQCB) and CDFG. A Corps (Section 404) permit, or possibly a Letter of Permission (LOP) would probably be required as would CDFG review and authorization (under Section 1600 of the California Fish and Game Code).[3] The RWQCB would also need to issue (Section 401) water quality certification for the Corps permit. Some of the ephemeral tributary drainages (or certain sections) may or may not qualify as jurisdictional waters; a preliminary wetlands delineation report and request for confirmation based on the work completed for this study has been prepared and will be submitted to the Corps for a formal jurisdictional determination. Compensatory mitigation to meet a "no net loss" standard for impacts to waters of the United States and wetlands is typically required by the Corps and other agencies. Opportunities for wetland restoration, enhancement and establishment/creation exist on both the BRP Steam and Francisco leaseholds, primarily associated with High Valley Creek and its tributaries. A mitigation plan to compensate for the loss of approximately 6,963 square feet (0.16-ac) of fill in waters/wetlands could include stream channel widening at appropriate (e.g. previously disturbed) locations, creation and/or enhancement of tributary drainages associated with diverted runoff, pond creation in areas with adequate seasonal flow and other methods. Alternatively, local mitigation banks and in lieu fees may be considered. The appropriate mitigation to meet the no net loss standard will ultimately be determined through the Corps (and other agency) approval process.

7.3 Operation and Maintenance

7.3.1 Impacts

Biological resource impacts associated with operation and maintenance of the well pads, steamlines and access roads include the potential for increased/ongoing noise and human disturbance, steam venting, fluid discharges, contamination and erosion from runoff. With the exception of the cross country section of steamline between Saw Mill and High Valley Roads, all facilities would be accessible by road so that additional surface disturbance should be minimal. As with well drilling and testing, industry-standard technologies, procedures and best management practices would be employed during operation to address these potentially negative operational effects. A 15 mile per hour speed limit would be enforced to slow activity on roads and reduce noise and dust (and the potential for wildlife road kills). No off road vehicles or uses would be allowed without specific authorization. All machinery, drilling platforms, and oil and fuel storage areas on the well pads would be in contained areas to prevent direct runoff. In addition to thermal effects, boron concentrations in the steam may be sufficiently high to cause vegetation damage. However, steam venting to the atmosphere is not part of the normal operations of geothermal wells and power plants and the risk of vegetation exposure to steam is expected to be low.

7.3.2 Mitigation

For the cross-county steamline section between Saw Mill and High Valley Roads, any required maintenance or repairs should be done by workers on foot (or by the use of cranes or equivalent) to avoid additional disturbance. To the greatest extent feasible, all maintenance activities should

[3] Peck Ha, Regulatory Project Manager, USACE Sacramento District, telephone conversation, June 30, 2009. Kelley Barker, CDFG Biologist, telephone conversation, July 2, 2009.

be limited to the driest part of the year in that area. No additional mitigation for operation and maintenance should be necessary.

7.4 Decommissioning

7.4.1 Impacts

Abandonment of the well pads and possibly all or sections of the access road and steamlines would introduce new, relatively short-term impacts, primarily on local wildlife because of heightened construction activity (noise and increased human activity). Heavy equipment and associated noise and surface disturbance would be required to plug the well bore, remove the well head and cut the casing below the ground surface. Removal of steamline would also increase localized construction activity, but probably require less new surface disturbance except possibly in the cross-country section between Saw Mill and High Valley Roads. Restoration of the well pad and access road sites would involve removing surface installations and materials, transporting them to a designated offsite location, recontouring and scarifying (decompacting) the pad and road surfaces and revegetating the area. Without additional (imported) fill material, soils on the pad and road sites would likely be limited in their ability to respond to restoration. The potential for erosion and sedimentation would increase as a result of surface disturbance.

7.4.2 Mitigation

The same approach to pad and road restoration as recommended for the areas disturbed by construction should be followed. As with those areas, some potential pad reclamation areas would likely remain barren, or at least sparsely vegetated over time. Installation of appropriate drainage and erosion and sediment control features would be critical to assure that site reclamation does not create additional downstream impacts. As with pipeline construction through the mesic meadow area, cranes or equivalent types of equipment should be used to remove pipeline segments, piers and stanchions. Work should be conducted during the driest season of the year and encroachment into- any mapped waters or wetland areas should be avoided.

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APPENDIX A

Species Tables

Table A-1: Special Status Plant and Animal Species Evaluated for Potential to Occur in the Project Area

Table A-2: Plant Species Observed Within the Binkley Lease Regional Area. July 2009

Table A-3: Wildlife Species Observed or Expected to Occur in the Vicinity of the Binkley Lease

TABLE A-1: Special Status Plant and Animal Species Evaluated for Potential to Occur in the Project Area*

Plant Species	Status [1] Fed/CA/CNPS	Habitat/Distribution	Findings[2]
Amsinckia lunaris Bent-flowered fiddleneck	-/-/1B.2	Coastal bluff scrub, cismontane woodland, grassland. Blooms March-June.	Recorded occurrences on the Whispering Pines and Middletown quads. Potential habitat in project area. Not observed during surveys.
Antirrhinum subcordatum Dimorphic snapdragon	-/-/4.4	Chaparral, lower montane coniferous forest/sometimes serpentine. Blooms April-July.	Recorded occurrence on the Whispering Pines quad. Potential habitat in project area. Not observed during surveys
Arctostaphylos canescens ssp. *sonomensis* Sonoma manzantia	-/-/1B.2	Chaparral, lower montane coniferous forest/ sometimes serpentine. Blooms January-April.	Recorded occurrences on the Whispering Pines quad and from Cobb Mtn. Potential habitat in project area. Not observed during surveys
Arctostaphylos manzanita ssp. *elegans* Konocti manzanita	-/-/1B.3	Chaparral, cismontane woodland, lower montane coniferous forest/ volcanic. Blooms March-May.	Present within 250-foot radius of High Valley Road north of power plant. Occurs along High Valley Creek on the southwest side of the road that goes west from the split to Sawmill Road (see map).
Astragalus rattanii var. *jepsonianus* Jepson's milk-vetch	-/-/1B.2	Chaparral, cismontane woodland, grassland/often serpentine. Blooms April-June.	Potential habitat in project area. Not observed during surveys
Brodiaea coronaria ssp. *rosea* Indian Valley brodiaea	-/E/1B.1	Closed-cone coniferous forest, chaparral, cismontane woodland, grassland/serpentinite. Blooms May-June.	One CNDDB record from Whispering Pines quad. Potential habitat in project area. Not observed during surveys
Calystegia collina ssp. *oxyphylla* Mt. Saint Helena morning glory	-/-/4.2	Chaparral, lower montane coniferous forest, grassland/ serpentinite. Blooms April-June.	Present in study area - found along access road to West pad.
Calystegia collina ssp. *tridacylosa* Three-fingered morning glory	-/-/1B.2	Chaparral, lower montane coniferous forest, grassland/ serpentinite. Blooms April-June.	Present in study area - found along access road to West pad.
Ceanothus confusus Rincon Ridge ceanothus	-/-/1B.1	Closed-cone coniferous forest, chaparral, cismontane woodland/ volcanic or serpentinite. Blooms February-April.	Recorded occurrences on the Whispering Pines quad and from Cobb Mtn. Potential habitat in project area. Not observed during surveys
Ceanothus divergens Calistoga ceanothus	-/-/1B.2	Chaparral (serpentinite or volcanic, rocky). Blooms February-March.	Recorded occurrence in Lake County on the Mount St. Helena quad near Chicago Mine in Mayacmas Mountains. Potential habitat in project area. Not observed during surveys
Chlorogalum pomeridianum var. *minus* Dwarf soaproot	-/-/1B.2	Chaparral (serpentinite). Blooms May-August.	Recorded occurrences on Whispering Pines quad. Potential habitat in project area. Not observed during surveys
Collomia diversifolia Serpentine collomia	-/-/4.3	Chaparral, cismontane woodland/ serpentinite, rocky or gravelly. Blooms May to June.	Present in project area - found on access road to West pad site.

Plant Species	Status [1] Fed/CA/CNPS	Habitat/Distribution	Findings[2]
Cordylanthus tenuis ssp. brunneus Serpentine bird's-beak	-/-/4.3	Closed-cone coniferous forest, chaparral, cismontane woodland/ usually serpentinite. Blooms July-August.	Present in project area - found in study area along Binkley/High Valley access road.
Cryptantha clevelandii var. *dissita* Serpentine cryptantha	-/-/1B.1	Chaparral (serpentintie). Blooms April-June.	One occurrence mapped along Bottle Rock Road 3 miles north of Cobb Mtn is from a 1954 collection by Crampton. Potential habitat in project area. Not observed during surveys
Dichanthelium lanuginosum var. *thermale* Geysers dichanthelium	-/E/1B.1	Closed-cone coniferous forest, riparian forest, grassland/ geothermally- altered soil, sometimes streamside. Blooms June-August.	No suitable habitat in project area.
Eriastrum brandegeae Brandegee's eriastrum	-/-/1B.2	Chaparral, cismontane woodland/volcanic, sandy. Blooms April-August.	CNDDB has recorded location at High Valley Road/Glenbrook in project area. Extensive surveys in 2009 did not find this occurrence. Reference location is now overgrown and species not present here based on 2009 surveys.
Erigeron greenei Greene's narrow-leaved daisy	-/-/1B.2	Chaparral (serpentinite or volcanic). Blooms May-September.	Recorded occurrences on the Whispering Pines and Detert Reservoir quads. The Whispering Pines occurrence is only known from a 1940 collection by Baker. Not observed during surveys
Eriogonum nervulosum Snow Mountain buckwheat	-/-/1B.2	Chaparral (serpentinite). Blooms June-September.	Recorded occurrences in Cobb Mtn vicinity along the Lake/Sonoma County line in Mayacmas Mtns. Potential habitat in project area. Not observed during surveys
Eryngium constancei Loch Lomond button-celery	E/E/1B.1	Vernal pools. Blooms April-June.	Recorded from Loch Lomond and Clear Lake. No suitable habitat in project area.
Fritillaria pluriflora Adobe-lily	-/-/1B.2	Chaparral, cismontane woodland, foothill grassland. Blooms February-April.	Potential habitat in project area. Not observed during surveys
Gratiola heterosepala Boggs Lake hedge-hyssop	-/E/1B.2	Marshes and swamps (lake margins), vernal pools/clay. Blooms April-August.	Known from Boggs Lake. No suitable habitat in project area.
Harmonia hallii Hall's harmonia	-/-/1B.2	Chaparral. Blooms April-June.	Known occurrence near Middletown. Potential habitat in project area. Not observed during surveys
Hesperolinon adenophyllum Glandular western flax	-/-/1B.2	Chaparral, cismontane woodland, grassland/ usually serpentinite. Blooms May-August	Recorded occurrences near Cobb Valley, Glenbrook and Boggs Lake. Potential habitat in project area. Not observed during surveys
Hesperolinon bicarpellatum Two-carpellate western flax	-/-/1B.2	Chaparral (serpentinite). Blooms May-July.	Recorded occurrences near Middletown, Harbin Springs, Howard Springs. Potential habitat in project area. Not observed during surveys

Plant Species	Status [1] Fed/CA/CNPS	Habitat/Distribution	Findings[2]
Hesperolinon didymocarpum Lake County western flax	-/-/1B.2	Chaparral, cismontane woodland, valley and foothill grassland. Blooms May-July.	Six occurrences recorded on Middletown quad. Potential habitat in project area. Not observed during surveys
Hesperolinon sp. nov. *"serpentinum"* Napa western flax	-/-/1B.1	Chaparral. Blooms May-July.	Recorded occurrence near Clear Lake. Potential habitat in project area. Not observed during surveys
Horkelia bolanderi Bolander's horkelia	-/-/1B.2	Chaparral, lower montane coniferous forest, meadows & seeps, grassland/edges, vernally mesic areas. Blooms June-August.	Records from Boggs Lake and other locations. No suitable habitat in project area.
Imperata brevifolia California satintail	-/-/2.1	Chaparral, coastal scrub, Mojavean desert scrub, meadows and seeps (often alkali), riparian scrub/mesic. Blooms September-May.	One 1928 record from Siegler Springs on Whispering Pines quad. No suitable habitat in project area.
Lasthenia burkei Burke's goldfields	E/E/1B.1	Meadows and seeps (mesic), vernal pools. Blooms April-June.	Recorded from south of Hidden Valley Lake. Potential habitat in project area. Not observed during surveys.
Layia septentrionalis Colusa layia	-/-/1B.2	Chaparral, cismontane woodland, grassland/sandy, serpentinite. Blooms April-May.	Records from Lakeport, Kelseyville, Highland Springs. Potential habitat in project area. Not observed during surveys.
Legenere limosa Legenere	-/-/1B.1	Vernal pools. Blooms April-June	Recorded from Boggs Lake, Snow Lake and Steinhart Lake. Potential habitat in project area. Not observed during surveys.
Leptosiphon jepsonii Jepson's leptosiphon	-/-/1B.2	Chaparral, cismontane woodland/ usually volcanic. Blooms April-May	Recorded from Collayomi Valley and Mount St. Helena. Potential habitat in project area. Not observed during surveys
Limnanthes floccosa ssp.*floccosa* Woolly meadowfoam	-/-/4.2	Chaparral, cismontane woodland, grassland, vernal pools/vernally mesic. Blooms March-May (June)	One record from near Kelseyville. No suitable habitat in project area.
Lomatium repostum Napa lomatium	-/-/4.3	Chaparral, cismontane woodland/serpentinite. Blooms March-June	No records in CNDDB but 1980 EIR has a record of occurrence on Bottle Rock Power Plant site. Potential habitat in project area. Not observed during surveys
Lupinus sericatus Cobb Mountain lupine	-/-/1B.2	Broadleafed upland forest, chaparral, cismontane woodland, lower montane coniferous forest. Blooms March-June	Recorded occurrences from Cobb Mtn, Boggs Mtn and other nearby locations. Potential habitat in project area. Not observed during surveys
Mielichhoferia elongata Elongate copper-moss	-/-/2	Cismontane woodland (metamorphic rock, usually vernally mesic).	One record from Sulfur Hot Springs near Anderson Springs on Whispering Pines quad. No suitable habitat in project area.

Plant Species	Status [1] Fed/CA/CNPS	Habitat/Distribution	Findings[2]
Navarretia leucocephala ssp. bakeri Baker's navarretia	-/-/1B.1	Cismontane woodland, meadows and seeps, vernal pools, valley and foothill grassland, lower montane coniferous forest. Blooms April-July.	Recorded occurrences from Loch Lomond, Middletown, Lower Lake. Potential habitat in project area. Not observed during surveys
Navarretia leucocephala ssp. *pauciflora* Few-flowered navarretia	E/T/1B.1	Vernal pools (volcanic ash flow). Blooms May-June.	Recorded occurrences from Loch Lomond, Lower Lake. No suitable habitat in project area.
Navarretia leucocephala ssp. *plieantha* Many-flowered navarretia	E/E/1B.2	Vernal pools (volcanic ash flow). Blooms May-June.	Recorded occurrences from Boggs Lake, Loch Lomond. No suitable habitat in project area.
Orcuttia tenuis Slender orcutt grass	T/E/1B.1	Vernal pools. Blooms May-September or October.	Recorded occurrences from Boggs Lake and Steinhart Lakes. No suitable habitat in project area.
Penstemon newberryi var. *sonomensis* Sonoma beardtongue	-/-/1B.3	Chaparral (rocky). Blooms April-August.	One recorded occurrence from Cobb Mtn. Potential habitat in project area. Not observed during surveys
Potamogeton zosteriformis Eel-grass pondweed	-/-/2.2	Marshes and swamps (assorted freshwater). Blooms June-July.	One recorded occurrence from Clear Lake. No suitable habitat in project area.
Sedella leiocarpa Lake County stonecrop	E/E/1B.1	Cismontane woodland, grassland, vernal pools/ vernally mesic depressions in volcanic outcrops. Blooms April-May.	Recorded occurrences from Lower Lake, Snows Valley, High Valley. No suitable habitat in project area.
Sidalcea oregana ssp. *hydrophila* Marsh checkerbloom	-/-/1B.2	Meadows & seeps, riparian forest. Blooms July-August.	Recorded occurrences from Glenbrook, Cobb Mtn, Hobergs Resort. Potential habitat in project area. Not observed during surveys.
Streptanthus barbiger Bearded jewel-flower	-/-/4.2	Chaparral (serpentinite). Blooms May to July.	Present in project area - found on serpentine in and along roadsides in west and East pad areas.
Streptanthus brachiatus ssp. *brachiatus* Socrates mine jewel-flower	-/-/1B.2	Chaparral, cismontane woodland/ serpentinite. Blooms May-July.	No records of this species from Lake County. Not observed during surveys.
Streptanthus brachiatus ssp. *hoffmanii* Freed's jewel-flower	-/-/1B.2	Chaparral, cismontane woodland/ serpentinite. Blooms May-July.	Recorded occurrences on Whispering Pines quad. Potential habitat in project area. Not observed during surveys.
Streptanthus breweri var. *hesperidis* Green jewel-flower	-/-/1B.2	Chaparral (openings), cismontane woodland/ serpentinite. Blooms May-July.	Recorded occurrences on Whispering Pines, Lakeport, Middletown quads. Potential habitat in project area. Not observed during surveys.
Streptanthus morrisonii ssp. kruckebergii Kruckeberg's jewel-flower	-/-/1B.2	Cismontane woodland, serpentinite. Blooms April-July.	Recorded occurrences from Whispering Pines, The Geysers quads. Potential habitat in project area. Not observed during surveys

Plant Species	Status [1] Fed/CA/CNPS	Habitat/Distribution	Findings[2]
Streptanthus vernalis Early jewel-flower	-/-/1B.2	Chaparral, closed-cone coniferous forest. Blooms March-May.	One recorded occurrence on Detert Reservoir USGS quad near Three Peaks. Potential habitat in project area. Not observed during surveys
Tracyina rostrata Beaked tracyina	-/-/1B.2	Cismontane woodland, valley and foothill grassland. Blooms May-June.	One recorded occurrence from Lakeport area. Potential habitat in project area. Not observed during surveys
Viburnum ellipticum Oval-leaved viburnum	-/-/2.3	Chaparral, cismontane woodland, lower montane coniferous forest. Blooms May-June.	No records of this species in Lake County. Not observed during surveys.
Animal Species	**Status [1] Fed/CA//BLM**	**Habitat/Distribution**	**Findings[2]**
Archoplites interruptus Sacramento perch (within native range only)	-/SSC/--	Historically found in the sloughs, slow-moving rivers and lakes of the Central Valley. Prefers warm water. Aquatic vegetation is essential for young. Tolerates wide range of physio-chemical water conditions.	Project site not within the native range of this species. No suitable perennial aquatic habitat in or adjacent to project area.
Oncorhynchus mykiss irideus Steelhead – Central California ESU	T/--/--	Coastal basins in clear, well-oxygenated perennial rivers and streams with special sediment characteristics from the Russian River south to Soquel Creek.	Drainage to Clear Lake not in a coastal basin; does not support anadromous fishery.
Lavinia exilicauda chi Clear Lake hitch	--/SSC/--	Found only in Clear Lake, Lake Co. and associated ponds. Spawns in streams flowing into Clear Lake.	Potential for spawning habitat to occur in High Valley Creek drainage.
Rana boylii Foothill yellow-legged frog	--/SSC/S	Partially shaded, shallow streams and riffles with a rocky substrate in a variety of habitats; needs at least some cobble-sized substrate for egg-laying; needs at least 15 weeks to attain metamorphosis.	Potential habitat in perennial (primarily downstream) reaches of High Valley Creek drainage.
Actinemys marmorata marmorata Northwestern pond turtle	--/SSC/--	Prefers slow moving or quiet permanent aquatic habitats which provide basking sites. If water begins to dry up the turtles move to places where there is deeper water and cover. They rarely nests more than ¼-mile from permanent water.	Potential habitat in adjacent High Valley Creek. A northwestern pond turtle was seen on 24 April 2008 along a small tributary of High Valley Creek located about 1 mile SE of the Binkley site. This individual was only about 2-feet from the tributary.

Animal Species	Status [1] Fed/CA//BLM	Habitat/Distribution	Findings[2]
Aquila chrysaetos Golden eagle (nesting and nonbreeding wintering)	--/FP/S	Rolling foothills, mountain areas, sage-juniper flats and desert.	Potential foraging habitat but unlikely to nest in project area.
Haliaeetus leucocephalus Bald eagle (nesting and wintering)	D/E/--	Found near large bodies of open water such as lakes, marshes, seacoasts and rivers. Nests at the top of tall, sturdy trees.	Potential to occur in adjacent woodlands. They have occurred at McCreary and Indian Valley Reservoirs, Lake Pillsbury and Bucksnort Creek. Most of the records in the CNDDB were prior to 1995.
Falco peregrinus anatum American peregrine falcon (nesting)	D/E/--	Near wetlands, lakes, rivers or other water; on cliffs, banks, dunes, mounds. Also human-made structures. Nest consists of a scrap on a depression or ledge in an open site.	Historic nesting sites (eyrie) in Sonoma County near Mt. St. Helena but no suitable nesting sites in project area. Occasional observations hunting and foraging in area.
Progne subis Purple martin (nesting)	--/SSC/--	Open or logged forests, towns, farms. Nests in tree hollows, buildings, martin houses. Most often breed in northern California in burned over mixed conifer forests in snags with abandoned woodpecker cavities. A highly local nesting species in Lake County.	Potential to occur in adjacent woodlands. Pair nested in a large valley oak (*Quercus lobata*) just west of the Bottle Rock administration building (about one mile SE of the Binkley well pads) in 2002. Former nest tree fell in 2003 and martins disappeared until 2007. No observations of this species in 2008.No suitable snags for martin breeding around Binkley pads.
Coccyzus americanus occidentalis Western yellow-billed cuckoo (nesting)	C/E/--	Requires dense riparian willow and cottonwood bottomlands. Presumed extinct in the coast range. There are no reliable records since 1973.	Unlikely in study area. No dense riparian habitat present along High Valley Creek. Formerly nested at the south end of Clear Lake (Gaines and Laymon 1984).
Dendroica petechia brewsteri Yellow warbler (nesting)	--/SSC/--	Breeds and forages in riparian woodlands, montane chaparral, open ponderosa pine, and mixed coniferous habitats with substantial brush. Found in riparian deciduous habitats in summer.	Not recorded within 10-mile radius of project area but suitable habitat present. Focused surveys did not find the species present along High Valley Creek
Antrozous pallidus Pallid bat	--/SSC/S	Variety of habitats, most common in open, dry shrublands and grassland habitats with rocky areas for roosting. Very sensitive to disturbance at its roost sites. Most often roosts in caves, mines, rock crevices, old buildings and occasionally in hollow trees and is very sensitive to high temperatures.	Potential to roost in suitable niches adjacent to study area, especially crags and woodlands. Potential foraging but not roosting habitat present at well pad sites.

Animal Species	Status [1] Fed/CA//BLM	Habitat/Distribution	Findings[2]
Corynorhinus townsendii Townsend's western big-eared bat	--/SSC/S	Humid coastal regions of northern and central California; roosts in caves, mines, buildings, etc.	Potential to roost in suitable niches adjacent to study area, especially crags and woodlands. Potential foraging but not roosting habitat present at well pad sites.
Lasiurus blossevilli Western red bat	--/SSC/--	Broad-leafed woodlands, often in riparian areas and edge habitats. Roosts from 2-40 feet above the ground. Tends to be solitary.	Species is widespread but only known locally from Ettawa Springs. Potential to roost in suitable niches adjacent to study area.
Myotis evotis Long-eared myotis	--/--/S	Found in all brush, woodland and forest habitats from sea level to about 9000'. Prefers coniferous woodlands and forests. Nursery colonies in buildings, crevices, space under bark and snags. Caves used primarily as night roosts.	Potential to roost in suitable niches adjacent to study area, especially crags and woodlands. Potential foraging but not roosting habitat present at well pad sites.
Myotis thysanodes Fringed myotis	--/--/S	In a wide variety of habitats, optimal habitats are pinyon-juniper, valley foothill hardwood and hardwood-conifer. Uses caves, mines, buildings or crevices for maternity colonies and roosts.	Potential to roost in suitable niches adjacent to study area, especially crags and woodlands. Potential foraging but not roosting habitat present at well pad sites.
Bassariscus astutus Ring-tailed cat	--/FP/--	Found in various riparian habitats and in forest and shrub habitats. Uses riparian corridors for movement.	No known sightings in leasehold area but potential to use High Valley Creek corridor.

1. Status Explanations

Federal (Fed):

E	Listed as endangered under the federal Endangered Species Act
T	Listed as threatened under the federal Endangered Species Act
D	Delisted under the federal Endangered Species Act
C	Candidate for listing under the federal Endangered Species Act
--	No designation.

California Native Plant Society (CNPS):

1A	Plants listed as presumed extinct in California
1B	Plants listed as rare, threatened or endangered in California and elsewhere
2	Plants rare in California but more common elsewhere
4	Plants of limited distribution – a watch list

California State (CA):

R	Listed as rare under the California Endangered Species Act
E	Listed as endangered under the California Endangered Species Act
T	Listed as threatened under the California Endangered Species Act
SSC	California Department of Fish and Game species of special concern
FP	Fully Protected in Fish and Game Code
--	No designation

Bureau of Land Management (BLM)

S	Sensitive
--	No designation

2. Findings based on literature review, assessment of habitat types present, directed field surveys, and knowledge of species habitat requirements.

TABLE A-2: Plant Species Observed Within the Binkley Lease Regional Area. July 2009**

(Family, genus and species names in parentheses are older names that have been replaced. The current taxonomy based on the Jepson Herbarium is used.)

FAMILY	Scientific Name	Common Name
Azollaceae		
(formerly Salviniaceae)	*Azolla filiculoides*^	Water fern
Blechnaceae: Deer Fern Family		
	*Woodwardia fimbriata**	Giant chain fern
Dennstaeditiaceae: Bracken Family		
	Pteridium aquilinum var. *pubescens**	Bracken fern
Dryopteridaceae		
	*Polystichum californicum**	California sword fern
	Polystichum munitum^	Western sword fern
Equisetaceae: Horsetail Family		
	*Equisetum arvense**	Common horsetail
	Equisetum hyemale>	Rough horsetail
	*Equisetum laevigatum**	Scouring rush
	Equisetum telmateia ssp. *braunii**	Giant horsetail
Polypodiaceae: Polypody Family		
	Polypodium californicum^	California polypody
Pteridaceae: Brake Fern Family		
	Adiantum jordanii^	California maidenhair
	Aspidotis densa (Onychium densum^)*	Indian's dream
	*Pellaea andromedifolia**	Coffee fern
	*Pellaea mucronata**	Bird's-foot fern
	Pityrogramma triangularis^	Goldenback fern
Selaginellaceae: Spike-Moss Family		
	Selaginella wallacei^	Wallace's spike-moss
	Selaginella sp.^	Spike-moss
Cupressaceae: Cypress Family		
	*Cupressus macnabiana**	MacNab cypress
	*Cupressus sargentii**	Sargent's cypress
Pinaceae: Pine Family		
	*Pinus attenuata**	Knobcone pine
	*Pinus contorta**	Lodgepole pine
	Pinus coulteri^	Coulter pine
	*Pinus lambertiana**	Sugar pine
	*Pinus ponderosa**	Ponderosa pine
	*Pinus sabiniana**	Foothill pine
	*Pseudotsuga menziesii**	Douglas Fir
Taxaceae: Yew Family		
	*Torreya californica**	California nutmeg
Aceraceae: Maple Family (see Sapindaceae)		
	*Acer macrophyllum**	Bigleaf maple
Adoxaceae: Muskroot Family		
(formerly in Caprifoliaceae)	*Sambucus nigra* ssp. *canadensis (S. mexicana)**	Blue elderberry

FAMILY	Scientific Name	Common Name
Anacardiaceae: Sumac Family		
	*Toxicodendron diversilobum**	Poison oak
	Rhus aromatica (Rhus trilobata)^	Squaw bush
Apiaceae: Parsley or Carrot Family		
	Angelica sp. ^	Angelica
	Foeniculum vulgare>	fennel
	*Lomatium dasycarpum**	Woolly lomatium
	Lomatium marginatum^	Lomatium
	Lomatium repostum^+	Napa lomatium
	*Lomatium utriculatum**	Common lomatium
	*Osmorhiza berteroi (O. chilensis)**	Sweet cicely
	*Perideridia kelloggii**	Kellogg's yampa
	*Sanicula bipinnatifida**	Purple sanicle
	*Sanicula crassicaulis**	Pacific sanicle
	*Torilis arvensis**	Field hedge parsley
	Torilis nodosa^	Knotted hedge parsley
Apocynaceae: Dogbane Family		
(formerly in Asclepiadaceae: Milkweed Family)	*Asclepias cordifolia*^	Glaucus milkweed
(formerly in Asclepiadaceae: Milkweed Family)	*Asclepias eriocarpa**	Indian milkweed
(formerly in Asclepiadaceae: Milkweed Family)	*Asclepias fascicularis**	Narrow-leaf milkweed
Asteraceae: Sunflower Family		
	Achillea millefolium (Achillea borealis ssp. californica^)*	Yarrow
	Agoseris heterophylla *	Annual mountain dandelion
	*Agoseris retrorsa**	Spearleaf mountain dandelion
	*Artemisia douglasiana**	Mugwort
	Artemisia ludoviciana^	Western mugwort
	Brickellia californica^	Californiabrickelia
	*Calycadenia pauciflora**	Smallflower western rosinweed
	*Carduus pycnocephalus**E	Italian thistle
	Centaurea melitensis^E	Napa thistle
	*Centaurea solstitialis**E	Yellow star thistle
	*Centromadia fitchii (Hemizonia fitchii)**	Fitch's tarplant
	*Centromadia pungens (Hemizonia pungens)**	Common spikeweed
	Chaenactis glabriuscula var. *heterocarpha (C. glabriuscula* var. *gracilenta)*^	Yellow pincushion
	*Chamomilla suaveolens**E	Pineapple weed
	Cirsium occidentale var. *occidentale (Cirsium coulteri)*^	Coulter's thistle
	Cirsium occidentale var. *venustum* (Cirsium proteanum^)*	Red thistle
	*Cirsium vulgare**E	Bull thistle

FAMILY	Scientific Name	Common Name
	Ericameria nauseosa (Chrysothamnus nauseosus)^	Rubber rabbitbrush
	Erophyllum lanatum var. *achillaeoides**	Woolly sunflower
	*Euthamia occidentalis**	Western flat-topped goldenrod
	*Gamochaeta pupurea (Gnaphalium purpureum)**	Cudweed
	Gnaphalium californicum^	California cudweed
	Hemizonia congesta ssp. *clevelandii**	Hayfield tarplant
	Hieracium albiflorum^	Hawkweed
	Hemizonia congesta ssp. *luzulifolia* (Hemizonia luzulaefolia* ssp. *rudis*^)*	White hayfield tarplant
	*Hypochaeris glabra**E	Smooth cat's-ear
	*Hypochaeris radicata**E	Rough cat's-ear
	Lasthenia california (Baeria chrysostoma*^)*	Golden fields
	*Madia anomala**	Tarplant
	*Madia gracilis**	Slender tarplant
	*Madia exigua**	Small tarplant
	*Micropus californicus**	cottontop
	*Packera greenei**	Flame ragwort
	*Rigiopappus leptocladus**	wireweed
	*Senecio aronicoides**	butterweed
	Senecio vulgaris^	Common groundsel
	Sonchus asper^	Sow thistle
	Stephanomeria virgata^	Tall stephanomeria
	*Taraxacum officinale**E	Dandelion
	*Wyethia glabra**	Coast mule's-ears
	*Wyethia helenoides**	Gray mule's ears
	Xanthium sp.^	cocklebur
Betulaceae: Birch Family		
	*Alnus rhombifolia**	White alder
Boraginaceae: Borage Family		
	Amsinckia menziesii var. *intermedia* (Amsinckia intermedia*^)*	Fiddleneck
	*Cryptantha hispidula**	Napa cryptantha
	Cynoglossum occidentale^	Western houndstongue
(formerly in Hydrophyllaceae)	*Emmenanthe penduliflora* var. *penduliflora**	Whispering bells
(formerly in Hydrophyllaceae)	*Eriodictyon californicum**	Yerba santa
(formerly in Hydrophyllaceae)	*Nemophila heterophylla**	White nemophila
(formerly in Hydrophyllaceae)	*Nemophila menziesii* ssp. *menziesii**	Baby blue eyes
(formerly in Hydrophyllaceae)	*Nemophila pedunculata*>	Littlefoot nemophila
(formerly in Hydrophyllaceae)	*Phacelia heterophylla* ssp. *virgata**	Phacelia
	*Plagiobothrys bracteatus**	Bracted popcornflower
	Plagiobothrys cognatus^	popcornflower
	*Plagiobothrys nothofulvus**	Rusty popcornflower
	Plagiobothrys stipitatus var. *micranthus**	Stalked popcornflower
Brassicaceae: Mustard Family		

FAMILY	Scientific Name	Common Name
	Arabis glabra var. *glabra**	Tower mustard
	Athysanus pusillus^	Common sandweed
	*Barbarea orthoceras**	American yellowrocket
	*Brassica nigra**E	Black mustard
	*Brassica rapa**E	Field mustard
	Capsella bursa-pastoris^E	Shepherd's purse
	Cardamine californica (Dentaria californica var. *cardiophylla)*^	California toothwort
	*Cardamine oliogsperma**	Bittercress
	Draba verna^	Spring witlowgrass
	Rorippa nasturtium-aquaticum (Nasturtium officinale)^	Water cress
	Streptanthus barbiger>+*	Bearded jewel-flower
	Streptanthus breweri#	Jewel-flower
	Streptanthus glandulosus ssp. *secundus**	One sided jewelflower
	Streptanthus glandulosus#	Jewel-flower
	*Thysanocarpus curvipes**	Fringe pod
Calycanthaceae: Sweet-Shrub or Calycanthus Family		
	*Calycanthus occidentalis**	Spicebush
Caprifoliaceae: Honeysuckle Family		
	Arenaria serpyllifolia^E	sandwort
	*Lonicera interrupta**	Chaparral honeysuckle
	Symphoricarpos albus ssp. *laevigatus**	Snowberry
	*Symphoricarpos mollis**	Creeping snowberry
Caryophyllaceae: Pink Family		
	Cerastium fontanum ssp. *vulgare (Cerastium vulgatum)*^E	Big chickweed
	Cerastium glomeratum (Cerastium viscosum*^)E	Mouse ear chickweed
	*Minuartia douglasii**	Douglas' sandwort
	*Petrorhagia nanteuilii**E	Petrohagia
	Petrorhagia prolifera (Tunica prolifera)^	Childing pink
	Silene gallica^	Common catchfly
	Silene laciniata ssp. *californica* (S. californica*^)*	Indian pink
	*Spergularia rubra**E	Sand spurrey
	Stellaria media^	Common chickweed
Ceratophyllaceae: Hornwort Family		
	Ceratophyllum demersum^	hornwort
Convolvulaceae: Morning-Glory Family		
	Calystegia collina ssp. *collina**	Coast range false bindweed
	Calystegia collina ssp. *oxyphylla+**	Mt. Saint Helena morning glory
	Calystegia collina ssp. *tridactylosa+**	Three-fingered morning glory
	*Calystegia malacophylla**	Morning glory
	Calystegia occidentalis ssp. *occidentalis**	Chaparral false bindweed
	Calystegia purpurata ssp. *purpurata (Convolvulus occidentalis* var.	Chaparral morning glory

FAMILY	Scientific Name	Common Name
	solanensis)^	
	Calystegia subacaulis ssp. *subacaulis**	Hillside false bindweed
(formerly in Cuscutaceae)	*Cuscuta californica**	Dodder
Cornaceae: Dogwood Family		
	*Cornus nuttallii**	Dogwood
Crassulaceae: Stonecrop Family		
	Dudleya cymosa^	Spreading dudleya
	Sedum spathulifolium^	Pacific stonecrop
Ericaceae: Heather Family		
	*Arbutus menziesii**	Madrone
	Arctostaphylos canescens ssp. *canescens**	Hoary manzanita
	Arctostaphylos glandulosa^	Eastwood manzanita
	Arctostaphylos manzanita ssp. *elegans*+*	Konocti manzanita
	Arctostaphylos manzanita ssp. *manzanita**	Common manzanita
	Arctostaphylos stanfordiana^	Stanford manzanita
	Arctostaphylos viscida ssp. *pulchella**	Whitestem manzanita
(formerly in Pyrolaceae)	*Pyrola picta*^	Leafless wintergreen
Euphorbiaceae: Spurge Family		
	*Eremocarpus setigerus**E	Doveweed
	*Euphorbia crenulata**	Chinese caps
Fabaceae: Pea Family		
	*Astragalus gambelianus**	Gambel's dwarf milkvetch
	Cercis occidentalis^	Western redbud
	Cytisus scoparius>	Scotch broom
	*Lathyrus angulatus**E	Angled pea
	*Lotus corniculatus**E	Bird's-foot trefoil
	Lotus crassifolius var. *crassifolius**	Big deervetch
	*Lotus humistratus**	Hill lotus
	*Lotus micranthus**	Small flower lotus
	Lotus oblongifolius var. *oblongifolius**	Narrow-leaved lotus
	Lotus purshianus var. *purshianus**	Spanish lotus
	Lotus scoparius *	Deer weed
	Lotus wrangelianus (L. subpinnatus)^	California lotus
	Lupinus adsurgens^	Lupine
	*Lupinus albifrons**	Silver lupine
	*Lupinus bicolor**	Dwarf lupine
	Lupinus microcarpus var. *densiflorus (L. densiflorus* var. *aureus)*^	Dense flowered lupine
	Lupinus sericatus^+	Cobb Mountain lupine
	*Lupinus nanus**	Sky lupine
	*Medicago polymorpha**E	Bur clover
	Pickeringia montana var. *montana**	Chaparral pea
	Trifolium albopurpureum var. *dichotomum**	Branched Indian clover
	Trifolium bifidum^	Pinole clover
	*Trifolium dubium**E	Little hop clover
	*Trifolium hirtum**E	Rose clover
	Trifolium microdon^	Thimble clover

FAMILY	Scientific Name	Common Name
	Trifolium variegatum var. *major*^	Variegated clover
	*Trifolium wildenovii** *(T. tridentatum^)*	Tomcat clover
	Vicia americana var. *americana*^	American vetch
	*Vicia sativa**E	Spring vetch
	*Vicia villosa**E	Hairy vetch
Fagaceae: Oak Family		
	Castanopsis semperivirens (C. chrysophylla)>	Bush chinquapin
	Quercus agrifolia var. *agrifolia**	Coast live oak
	*Quercus berberidifolia**	Scrub oak
	*Quercus chrysolepis**	Canyon live oak
	Quercus douglasii^	Blue oak
	Quercus dumosa^ (misidentified)	Scrub oak
	Quercus durata var. *durata**	Leather oak
	*Quercus garryana**	White oak
	*Quercus kelloggii**	Black oak
	*Quercus lobata**	Valley oak
	Quercus wislizenii var. *frutescens**	Interior live oak – shrub form
	Quercus wislizenii var. *wislizenii**	Interior live oak –tree
Garryaceae: Silk Tassel Family		
	*Garrya congdonii**	Chaparral silk tassel
	Garrya elliptica^	Silk tassel bush
	Garrya flavescens^	Ashy silk tassel
	*Garrya fremontii**	Fremont silk tassel
Gentianaceae		
	*Zeltnera muhlenbergii** *(Centaurium muhlenberii)**	Muehlenberg's centaury
Geraniaceae		
	*Erodium botrys**E	Long beaked filaree
	*Erodium cicutarium**E	Red-stemmed filaree
	Erodium brachycarpum (E. obtusiplicatum)^E	Shortfruit stork's bill
	Erodium sp.^E	Filaree
	*Geranium dissectum**E	Cut-leaf geranium
	Geranium molle^E	Dove's-foot geranium
Grossulariaceae: Gooseberry Family		
	Ribes divaricatum var. *pubiflorum**	Straggly gooseberry
	*Ribes menziesii**	Canyon gooseberry
	Ribes quercetorum^	Oak gooseberry
	Ribes roezlii var. *cruentum**	Gooseberry
Hypericaceae: St. John's Wort Family		
	*Hypericum concinnum**	Gold wire
Lamiaceae: Mint Family		
	Agastache urticifolia^	Nettle leaved horse mint
	Lepechinia calycina^	Pitcher age
	Monardella odoratissima ssp. pinetorum^	Mountina monardella
	*Monardella odoratissima**	Mountain monardella
	Monardella villosa ssp. *villosa**	Coyote mint

FAMILY	Scientific Name	Common Name
	Monardella viridis^	Green monardella
	Morrubium vulgare^	horehound
	Salvia columbariae^	chia
	Stachys ajugoides var. *ajugoides (S. rigida* ssp. *rivularis)*^	Bugle hedge nettle
	Stachys ajugoides var. *rigida* (Stachys rigida* ssp. *quercetorum^)*	Hedge nettle
	Trichostema laxum^	Blue curls
	*Trichostema simulatum**	Blue curls
Lauraceae: Laurel Family		
	*Umbellularia californica**	California bay laurel
Linaceae: Flax Family		
	Hesperolinon clevelandii#	Allen Springs dwarf flax
	*Hesperolinon disjunctum**	Coast range dwarf flax
	Hesperolinon spergulinum#	Dwarf flax
Loasaceae: Loasa Family		
	*Mentzelia dispersa**	Blazingstar
Malvaceae: Mallow Family		
	*Sidalcea diploscypha**	Fringed sidalcea
Meliaceae: Mahogany Family		
	Melia azedarach	Chinaberry tree
Montiaceae:		
	*Calandrinia ciliata**	Red maids
	Calyptridium quadripetalum^	Four petaled calyptridium
	Claytonia gypsophiloides (Montia gypsophiloides^)*	Gypsum springbeauty
	Claytonia perfoliata (Montia perfoliata^)*	Miner's lettuce
	*Lewisia rediviva**	bitterroot
Moraceae		
	Ficus carica^	Common fig
Myrsinaceae: Myrsine Family		
(formerly in Primulaceae)	*Anagallis arvensis*	Scarlet pimpernel
(formerly in Primulaceae)	*Trientalis latifolia*	Star-flower
Oleaceae: Olive Family		
	*Fraxinus latifolia**	Oregon ash
	Fraxinus dipetala^	Flowering ash
Onagraceae: Evening Primrose Family		
	*Camissonia graciliflora**	Hill suncup
	Clarkia affinis^	Clarkia
	Clarkia amoena ssp. *amoena**	Farewell to spring
	Clarkia concinna ssp. *concinna**	Red ribbons
	Clarkia purpurea ssp. *quadrivulnera**	Four spotted clarkia
	Clarkia rhomboidea	Forest clarkia
	*Epilobium brachycarpum.**	Willow herb
	*Epilobium densilforum**	Dense-flowered willow herb
	Epilobium minutum^	Willow herb
	*Gayophytum diffusum**	Happy plant

FAMILY	Scientific Name	Common Name
	Gayophytum humile^	Dwarf groundsmoke
Papaveraceae: Poppy Family		
	*Eschscholzia californica**	California poppy
	*Platystemon californicus**	Cream cups
	*Dendromecon rigida**	Bush poppy
	*Dicentra formosa**	Bleeding heart
Philadelphaceae: Mock Orange Family		
	*Philadelphus lewisii**	Wild mock orange
Phrymaceae:		
(formerly in Scrophulariaceae)	*Mimulus aurantiacus*^	Sticky monkeyflower
(formerly in Scrophulariaceae)	*Mimulus cardinalis*^	Scarlet monkeyflower
(formerly in Scrophulariaceae)	*Mimulus guttatus**	Monkeyflower
(formerly in Scrophulariaceae)	*Mimulus kelloggii**	Kellogg's monkeyflower
(formerly in Scrophulariaceae)	*Mimulus layneae**	Layne's monkeyflower
Plantaginaceae: Plaintain Family		
(formerly in Scrophulariaceae)	*Antirrhinum vexillocalyculatum* ssp. *vexillocalyculatum**	snapdragon
(formerly in Scrophulariaceae)	*Antirrhinum virga*^+	Tall snapdragon
(formerly in Scrophulariaceae)	*Collinsia heterophylla**	Chinese houses
(formerly in Scrophulariaceae)	*Collinsia sparsiflora**	Few-flowered collinsia
(formerly in Scroiphulariaceae)	*Penstemon newberryi* var. *sonomensis*^+	Sonoma beard-tongue
(formerly in Scrophulariaceae)	*Penstemon heterophyllus**	Beardtongue
	*Plantago erecta**	Foothill plantain
	*Plantago lanceolata**E	English plantain
Polemoniaceae: Phlox Family		
	*Allophyllum divaricatum**	Purple false gilyflower
	*Allophyllum gilioides**	Blue false gilia
	*Collomia diversifolia**+	Serpentine collomia
	Gilia capitata ssp. *capitata**	Blue field gilia
	*Leptosiphon androsaceus**	Shower gilia
	*Leptosiphon bicolor**	True baby stars
	Navarretia divaricata ssp. *vividior**	Bushy blazingstar
	*Navarretia intertexta**	Needleleaf navarretia
	*Navarretia mellita**	Navarretia
	*Navarretia squarrosa**	Skunkweed
Polygalaceae: Milkwort Family		
	*Polygala californica**	California milkwort
	Polygala cornuta>	Milkwort
Polygonaceae: Buckwheat Family		
	Chorizanthe membranacea^	Pink spineflower
	Eriogonum dasyanthemum^	Chaparral buckwheat
	Eriogonum nervulosum^+	Snow mountain buckwheat
	Persicaria amphibia (Polygonum amphibium)^	Water smartweed
	Polygonum amphibium var. stipulaceum^	Water smartweed
	Eriogonum nudum var. *nudum**	Nude buckwheat
	*Eriogonum vimineum**	Wicker-stemmed Eriogonum

FAMILY	Scientific Name	Common Name
	*Rumex acetosella**E	Sheep sorrel
	*Rumex crispus**E	Curly dock
Primulaceae: Primrose Family		
	*Dodecatheon hendersonii**	Shooting star
Ranunculaceae: Buttercup Family		
	*Aquilegia formosa**	Red columbine
	Clematis lasiandra^	Chaparral clematis
	Delphinium variegatum ssp. *variegatum**	Royal larkspur
	Ranunculus aquatilis var. *hispidulus*^	Aquatic buttercup
	*Ranunculus californicus**	California buttercup
	Ranunculus occidentalis	Western buttercup
	*Thalictrum fendleri**	Meadow rue
Rhamnaceae: Buckthorn family		
	*Ceanothus cuneatus**	Wedgeleaf ceanothus
	*Ceanothus foliosus**	California lilac
	*Ceanothus integerrimus**	deerbrush
	Ceanothus jepsonii var. *albiflorus**	Musk brush
	Ceanothus leucodermis^	Whiteleaf California lilac
	Ceanothus parryi^	Parry's ceanothus
	Ceanothus oliganthus var. *sorediatus*>	Jimbush
	Ceanothus velutinus^	Tobacco bush
	Frangula californica ssp. *occidentalis (Rhamnus californica* ssp. *occidentalis)**	Coffeeberry
	Frangula californica ssp. *tomentella (Rhamnus tomentella)**	Chaparral coffeeberry
	Rhamnus crocea>	Redberry
Rosaceae: Rose Family		
	*Adenostoma fasciculatum**	Chamise
	*Aphanes occidentalis**	Lady's mantle
	*Cercocarpus betuloides**	Mountain mahogany
	*Fragaria vesca**	Wood strawberry
	*Heteromeles arbutifolia**	Toyon
	Holodiscus discolor var. *delnortensis (H. boursieri)*^	Bush rock spirea
	*Holodiscus discolor**	Bush rock spiraea
	*Physocarpus capitatus**	Ninebark
	*Potentilla gracilis**	Slender cinquefoil
	Prunus virginiana var. *demissa**	Western choke-cherry
	*Rosa californica**	California rose
	*Rosa spithamea**	Ground rose
	*Rubus discolor**E	Himalayan blackberry
	Rubus leucodermis^	Wild raspberry
	*Rubus ursinus**	California blackberry
Rubiaceae: Madder Family		
	*Galium aparine**E	Goose-grass
	Galium bolanderi^	Bolander's bedstraw
	*Galium californicum**	California bedstraw, cleavers
	Galium divaricatum^	Lamarck's bedstraw

FAMILY	Scientific Name	Common Name
	Galium nuttallii^	Climbing bedstraw
	*Galium porrigens**	Climbing bedstraw
	Galium trifidum^	Trifid bedstraw
	*Sherardia arvensis**E	Sherardia
Sapindaceae: Soapberry Family		
(formerly in Aceraceae)	*Acer macrophyllum**	Bigleaf maple
(formerly in Hippocstanaceae)	*Aesculus californica**	California buckeye
Salicaceae: Willow Family		
	Populus fremontii^	Fremont's cottonwood
	Salix breweri^	Brewer willow
	Salix exigua (S. hindsiana)^	Sandbar willow
	*Salix laevigata**	Red willow
	Salix lasiandra	Yellow willow
	*Salix lasiolepsis**	Arroyo willow
	Salix sp.*	Willows
Saxifragaceae: Saxifrage Family		
	*Lithophragma affine**	Woodland star
	Lithophragma heterophyllum^	Hill star
	*Saxifraga californica**	California saxifrage
Scrophulariaceae: Figwort Family		
	*Castilleja attenuata**	Valley tassels
	Castilleja exerta ssp. *exerta**	Purple owl's-clover
	Castilleja foliolosa^	Woolly Indian paintbrush
	Castilleja rubicundula ssp. *lithospermoides**	Cream sacs
	*Cordylanthus pilosus**	Bird's-beak
	Cordylanthus tenuis ssp. *brunneus**+	Serpentine bird's-beak
	*Pedicularis densiflora**	Indian warrior
	Scrophularia californica ssp. *floribunda*^	California figwort
	Triphysaria versicolor ssp. *faucibarbata*^	Yellow owl's-clover
	*Verbascum thapsus**E	Mullein
Solanaceae: Nightshade Family		
	Solanum furcatum^E	Solanum
Urticaceae		
	Parietaria pennsylvanica^	pellitory
	Urtica dioica ssp. *holosericea*^	Horse nettle
Valerianaceae: Valerian Family		
	Plectritis sp.	Plectritis
Verbanaceae: Vervain Family		
	Verbena lasiostachys var. *septentrionalis*^	Western verbena
Violaceae: Violet Family		
	Viola purpurea ssp. *quercetorum**	Yellow violet
Viscaceae: Mistletoe Family		
	*Phoradendron villosum**	Oak mistletoe
Vitaceae: Grape Family		
	Vitis californica^	California wild grape
Agavaceae		
(formerly in Liliaceae)	*Chlorogalum pomeridianum* var.	Soaproot

FAMILY	Scientific Name	Common Name
	*pomeridianum**	
Alliaceae		
(formerly in Liliaceae)	*Allium amplectens**	Narrowleaf onion
(formerly in Liliaceae)	*Allium falcifolium**	Coast flatstem onion
Araceae		
(formerly Lemnaceae)	*Spirodela punctata (S. oligorrhiza)*^	duckmeat
Cyperaceae: Sedge Family		
	*Carex amplifolia**	Big-leaf sedge
	*Carex brevicaulis**	Rock or short-stem sedge
	*Carex dudleyi**	Dudley's sedge
	*Carex hoodii**	Hood's sedge
	*Carex nudata**	Torrent sedge
	*Carex praegracilis**	Clustered field sedge
	*Carex serratodens**	Twotooth sedge
	*Carex subfusca**	Rusty slender sedge
	*Eleocharis macrostachya**	Spikerush
	*Cyperus eragrostis**	Umbrella sedge
	Cyperus spp.^	sedge
	Schoenoplectus acutus (Scirpus acutus)^	Common tule
	Scirpus microcarpus^	bulrush
Hydrocharitaceae: Waterweed Family		
	Elodea canadensis^	Common waterweed
Iridaceae: Iris Family		
	*Iris macrosiphon**	Bowl-tubed iris
	Sisyrinchium bellum^	Blue eyed grass
Juncaceae: Rush Family		
	Juncus balticus^	Baltic rush
	Juncus bufonius^	Toad rush
	*Juncus effusus**	Common rush
	*Juncus ensifolius**	Swordleaf rush
	*Juncus mexicanus**	Mexican rush
	*Juncus patens**	Spreading rush
	*Juncus tenuis**	Slender rush
	*Juncus xiphioides**	Iris-leaved rush
	Luzula comosa (Luzula subsessilis*^)	Wood rush
Liliaceae: Lily Family		
	*Calochortus amabilis**	Golden globelily
	Calochortus superbus^	Mariposa lily
	*Calochortus vestae**	Mariposa lily
	Disporum hookeri (D. hookeri var. *trachyandrum)*	Fairy bells
	*Erythronium californicum**	Fawn lily
	*Fritillaria recurva**	Scarlet fritillary
	Lilium columbianum>	Columbia lily
Melanthiaceae		
(formerly in Liliaceae)	*Zigadenus fremontii**	Death camas
Orchidaceae: Orchid Family		
	Piperia elegans (Habenaria elegans)^	Rein orchid
Poaceae: Grass Family		

FAMILY	Scientific Name	Common Name
	*Agrostis scabra**	Bent grass
	*Aira caryophyllea**	Silver European hairgrass
	*Anthoxanthum odoratum**	Sweet vernal grass
	*Avena barbata**	Wild oats
	*Avena fatua**	Wild oat
	*Brachypodium distachyon**	False brome
	Briza maxima^	Large quaking grass
	Briza minor^	Small quaking grass
	*Bromus carinatus**	California brome
	*Bromus diandrus**	Ripgut brome
	Bromus hordeaceus(Bromus mollis*^)	Soft chess
	Bromus madritensis ssp. *rubens** *(Bromus rubens*^)*	Red brome
	*Bromus tectorum**	Cheatgrass
	Bromus vulgaris^	Brome
	Calamagrostis canadensis^	Bluejoint
	Cynodon dactylon>	Bermuda grass
	*Cynosurus echinatus**	Dogtail grass
	*Dactylis glomerata**	Orchard grass
	*Danthonia californica**	California oatgrass
	Deschampsia caespitosa^	California or tufted hairgrass
	*Deschampsia danthonioides**	Annual hairgrass
	*Elymus elymoides** *(Sitanion hystrix*^)*	Bottlebrush squirreltail
	*Elymus glaucus**	Blue wildrye
	*Elymus multisetus**	Big squirreltail grass
	*Elytrigia elongata**E	Tall wheatgrass
	*Festuca arundinacea**E	Tall fescue
	*Festuca californica**	California fescue
	*Festuca idahoensis**	Idaho fescue
	Gastridium ventricosum^	nitgrass
	*Hordeum brachyantherum**	Meadow barley
	Hordeum depressum^	Low barley
	Hordeum marinum ssp. *gussoneanum**E	Mediterranean barley
	Hordeum murinum ssp. *leporinum**E	Hare barley
	Lamarckia aurea^	Goldentop grass
	Leymus triticoides (Elymus triticoides)^	Creeping wildrye
	*Lolium multiflorum**E	Annual ryegrass
	*Melica californica**	California melic
	*Melica geyeri**	Melic, oniongrass
	*Melica imperfecta**	Melic, oniongrass
	*Nassella lepida**	Foothill needlegrass
	*Nassella pulchra**	Purple needlegrass
	Poa annua^E	Annual bluegrass
	*Poa bulbosa**E	bluegrass
	Poa palustris	Fowl bluegrass
	*Poa pratensis**E	Kentucky bluegrass
	*Poa secunda** *(Poa scabrella>)*	Bluegrass
	Polypogon interruptus^E	Beard grass

FAMILY	Scientific Name	Common Name
	Polypogon monspeliensis^E	Rabbitsfoot grass
	*Taeniatherum caput-medusae**E	Medusahead grass
	Vulpia bromoides (Festuca dertonensis)^E	Six-weeks fescue
	*Vulpia microstachys**E	Annual fescue
	*Vulpia myuros**E	Rattail fescue
Potamogetonaceae: Pondweed Family		
	Potamogeton natans^	Broad leafed pondweed
Themidaceae		
(formerly in Liliaceae)	*Brodiaea californica*^	California clusterlily
(formerly in Liliaceae)	*Brodiaea elegans**	Elegant brodiaea
(formerly in Liliaceae)	*Dichelostemma capitatum* ssp. *capitatum**	Blue dicks
(formerly in Liliaceae)	*Dichelostemma congestum (Brodiaea congesta; Brodiaea pulchella))*^	Fork-toothed ookow
(formerly in Liliaceae)	*Triteleia laxa (Brodiaea laxa)*^	Ithuriel's spear
Typhaceae: Cattail Family		
	Typha angustifolia^	Narrow-leaved cattail
	*Typha latifolia**	Broad-leaved cattail

**** = Plants on this list include species observed during various surveys conducted on or in the vicinity of the project area as follows:**

* = Observed within study area during 2008-2009 surveys, Zander Associates.
# = Observed in 1980 Osterling Survey titled *Rare Plant Survey on the Portion of Federal Lease CA5632 on the Binkley Ranch.*
^ = Chambers Group 1991 Draft EIR for Proposed Geothermal Development for Certain State Lands
> = Gennis & Associates Initial Environmental Study Bottle Rock Road July 1980

+ = Special status plant
E = Exotic or non-native plant species

Table A-3: Wildlife Species Observed or Expected to Occur in the Vicinity of the Binkley Lease

Scientific Name	Common Name
Mammals	
Sorex trowbridgei	trowbridge shrew
Scapanus latimanus	California mole
Myotis spp; Eptesicus spp	bats (several species)
Sylvilagus bachmani	brush rabbit
Lepus californicus	black-tailed jack rabbit
Eutamias sonomae	Sonoma chipmunk
Sciurus griseus	western gray squirrel
Spermophilus beecheyi	California ground squirrel
Dipodomys heermanni	Herman's kangaroo rat
Reithrodontomys megalotis	western harvest mouse
Peromyscus boyloi	brush mouse
Peromyscus truei	pinyon mouse
Peromyscus maniculatus	deer mouse
Neotoma fuscipes	dusky-footed woodrat
Microtus californicus	California vole
Didelphis virginiana	Virginia opossum
Mephitis mephitis	striped skunk
Spilogale gracilis	spotted skunk
Canis latrans	coyote
Urocyon cinereoargenteus	gray fox
Bassariscus astutus	ringtail
Procyon lotor	raccoon
Felis concolor	mountain lion
Lynx rufus	bobcat
Odocoileus hemionus columbianus	Columbian black-tailed deer
Ursus americanus	black bear
Birds	
Ardea herodias	great blue heron
Butorides virescens	green heron
Anas platyrhynchos	mallard
Cathartos aura	turkey vulture
Accipiter cooperii	Cooper's hawk
Buteo jamaicensis	red-tailed hawk
Buteo lineatus	red-shouldered hawk
Aquila chrysaetos	golden eagle
Falco peregrinus	peregrine falcon
Falco sparverius	American kestrel
Falco columbarius	merlin
Oreortyx pictus	mountain quail

Scientific Name	Common Name
Meleagris gallopavo	wild turkey
Callipepla californica	California quail
Charadrius vociferus	killdeer
Actitis macularia	spotted sandpiper
Columba fasciata	band-tailed pigeon
Zenaida macroura	mourning dove
Tyto alba	barn owl
Otus asio	western screech owl
Bubo virginianus	great horned owl
Glaucidium californicum	northern pygmy owl
Phalaenoptilus nuttallii	common poor-will
Chaetura vauxi	Vaux's swift
Archilochus alexandri	black-chinned hummingbird
Calypte anna	Anna's hummingbird
Selasphorus sasin	Allen's hummingbird
Ceryle alcyon	belted kingfisher
Melanerpes formicivorus	acorn woodpecker
Melanerpes lewis	Lewis's woodpecker
Picoides pubescens	downy woodpecker
Picoides villosus	hairy woodpecker
Picoides nuttallii	Nuttall's woodpecker
Dryocopus pileatus	pileated woodpecker
Colaptes auratus	northern flicker
Sphyrapicus ruber	red-breasted sapsucker
Tyrannus verticalis	western kingbird
Myiarchus cinerascens	ash throated flycatcher
Sayornis nigricans	black phoebe
Empidonax difficilis	Pacific-slope flycatcher
Contapus sordidulus	western wood pewee
Contopus cooperi	olive-sided flycatcher
Stelgidopteryx serripennis	northern rough-winged swallow
Petrochelidon pyrrhonota	cliff swallow
Hirundo rustica	barn swallow
Tachycineta thalassina	violet-green swallow
Tachycineta bicolor	tree swallow
Progne subis	purple martin
Aphelocoma coerulescens	scrub jay
Cyanocitta stelleri	Stellar's jay
Poecile rufescens	chestnut-backed chickadee
Corvus corax	common raven
Corvus brachyrhynchos	American crow
Baeolophus inornatus	oak titmouse
Psaltriparus minimus	bushtit

Scientific Name	Common Name
Sitta carolinensis	white-breasted nuthatch
Sitta canadensis	red-breasted nuthatch
Sitta pygmaea	pygmy nuthatch
Certhia americana	brown creeper
Chamaea fasciata	wrentit
Troglodytes aedon	house wren
Cinclus mexicanus	dipper
Thryomanes bewickii	Bewick's wren
Taxostoma redivivum	California thrasher
Catharus guttatus	hermit thrush
Ixoreus naevius	varied thrush
Turdus migratorius	American robin
Sialia mexicana	western bluebird
Polioptila caerulea	blue-gray gnatcatcher
Bombycilla cedrorum	Cedar waxwing
Sturnus vulgaris	starling
Vireo cassinii	Casin's vireo
Vireo huttoni	Hutton's vireo
Vermivora celata	orange-crowned warbler
Vermivora ruficapilla	Nashville warbler
Dendroica petechia	yellow warbler
Dendroica nigrescens	black-throated gray warbler
Dendroica townsendi	Townsend's warbler
Dendroica occidentalis	hermit warbler
Dendroica coronata	yellow-rumped warbler
Oporornis tolmiei	MacGillivray's warbler
Willsonia pusilla	Wilson's warbler
Agelaius phoeniceus	red-winged blackbird
Icterus bullockii	Bullock's oriole
Euphagus cyanocephalus	brewer's blackbird
Molothrus ater	brown-headed cowbird
Piranga ludoviciana	western tanager
Pheucticus melanocephalus	black-headed grosbeak
Passerina amoena	lazuli bunting
Carpodacus purpureus	purple finch
Carpodacus mexicanus	house finch
Carduelis tristis	American goldfinch
Carduelis psaltria	lesser goldfinch
Pipilo maculatus	spotted towhee
Pipilo crissalis	California towhee
Chondestes grammacus	lark sparrow
Aimophila ruficeps	rufous-crowned sparrow

Scientific Name	Common Name
Spizella passerina	chipping sparrow
Amphispiza belli	sage sparrow
Melospiza melodia	song sparrow
Passerella iliaca	fox sparrow
Zonotrichia atricapilla	golden-crowned sparrow
Zonotrichia leucophrys	white-crowned sparrow
Junco hyemalis	dark-eyed junco
Reptiles	
Thamnophis couchi	western aquatic garter snake
Sceloporus occidentalis	western fence lizard
Pituophis melanoleucus	gopher snake
Cnemidophorus tigris	western whiptail
Crotalus viridis	western rattlesnake
Actinemys marmorata	western pond turtle
Amphibians	
Hyla regilla	Pacific tree frog
Taricha rivularis	red-bellied newt
Taricha torosa	California newt
Rana boylei	foothill yellow-legged frog
Fish	
Catostomus occidentalis occidentalis	Sacramento sucker
Lavinia exilicauda chi	Clear Lake hitch
Salmo gairdnerii	rainbow trout
Salmo trutta	brown trout

APPENDIX B

Resumes of Field Biologists Involved in this Assessment

MICHAEL J. ZANDER

Principal Environmental Scientist

Mr. Zander is a biologist with 30 years of professional experience in the environmental consulting field. He specializes in natural resource analysis and biological evaluation but is also well-versed in the planning and legal aspects of land use and development. As a project manager, Mr. Zander has directed numerous planning and technical studies, environmental impact assessments and mitigation/restoration plans. As a seasoned biologist, he has conducted sensitive species surveys, habitat evaluations, wetlands assessments and mitigation/monitoring programs. He regularly serves as a principal liaison between clients and regulatory agencies to resolve issues and avoid conflicts between land use and environmental objectives. Mr. Zander can provide:

- strong negotiation skills relative to natural resource issues
- project management expertise for technical studies and CEQA/NEPA compliance
- special-status species evaluation, consultation, management planning and permitting
- habitat management/conservation planning
- wetlands assessment, delineation and permitting
- mitigation/restoration/monitoring program development and implementation

EDUCATION

M.A., Applied Plant Taxonomy, Royal Botanic Gardens, Kew, London, England, 1980
Fulbright Graduate Research Program, Royal Botanic Gardens, Kew, London, England, 1975-1976
B.A. (Honors), Biological Sciences, University of California, Santa Cruz, 1975

TRAINING

Jurisdictional Delineation of Waters of the United States, including Wetlands
24-hour safety training in accordance with 29 CFR part 1910.120

EMPLOYMENT HISTORY

1992 - present: Zander Associates, Partner & Principal Biologist
1984 - 1992: Harding Lawson Associates, Principal Environmental Scientist
1980 - 1984: Environmental Science Associates/Madrone Associates, Senior Associate
1976 - 1980: The National Trust, London, England, Program Coordinator
1975 - 1976: Royal Botanic Gardens, Kew, London, England, Fulbright Fellow
1973 - 1975: University of California, Santa Cruz, Arboretum, Instructor/Manager

REPRESENTATIVE PROJECTS

Napa Pipe Redevelopment Project: Coordinated biological resource assessment, wetland delineation, resource planning and permitting for a 154-acre redevelopment project along the banks of the Napa River in Napa County. Site is a former industrial pipe manufacturing facility with seawalls and drydocks along the river that will be converted into a river park and recreational area. Existing sloughs and marshlands on site will be preserved and enhanced. Worked with team of architects, landscape architects and engineers to incorporate natural resource elements into site planning design with emphasis on stormwater design. Corps of Engineers and Department of Fish and Game permits are required for work along river. Client: Napa Redevelopment Partners

Sand Hill Estates: Principal biologist for project to develop five estate lots on 90-acre parcel with over 60 acres dedicated as permanent open space. Headwater streams and a unique blue oak woodland on the site will be preserved through a conservation easement and a management plan is being prepared that includes stream restoration, creation of new wetlands, red-legged frog and western pond turtle protection and other measures. Permits from the US Army Corps of Engineers, US Fish and Wildlife Service and California Department of Fish and Game will be obtained. Client: Buno Pati

Fort Ord Biological Resource Management Planning: Served as Principal Biological Consultant to the Fort Ord Reuse Authority, providing natural resource guidance for development of a base-wide Habitat Conservation Plan for the 27,686-acre former military base. Chaired the Coordinated Resource Management and Planning program for five years, which provided a forum for dialogue and information sharing among state and federal resource agencies, habitat managers and stakeholders. Client: Fort Ord Reuse Authority.

Pebble Beach Company Del Monte Forest Plan: Provides biological and regulatory expertise in support of Pebble Beach Company's ongoing conservation and development planning in the Del Monte Forest of the Monterey Peninsula. Assists with planning for preservation and management of Monterey pine forest, coastal dune, wetland and other habitat types and special-status species that occur in the forest. Regularly coordinates with resource managers and regulatory agencies. Client: Pebble Beach Company.

Chatsworth Reservoir Wetland/Riparian Restoration Plan: Managed project to plan, design and permit streamzone and wetland restoration within 1300-acre former water supply reservoir site in City of Los Angeles. Site is degraded but with restoration potential as offsite mitigation for impacts in other areas. Worked with team of engineers, hydrologists, geologists and landscape architects to design plan. Coordinated with City agencies including Department of Water & Power, Recreation and Parks and Office of City Attorney. Also coordinated with Corps of Engineers and Department of Fish and Game for plan approval and permitting. Client: Browning Ferris Industries of California, Inc.

Big Sulphur Creek Water Supply Reservoir: Served as Principal-in-Charge of a multidisciplinary environmental study for a proposed dam and water supply reservoir on Big Sulphur Creek at the Geysers in Sonoma County. Reinjection water was needed to enhance steamfield production for the Northern California Power Agency's power plant. Studies and evaluation for a joint EIS/EIR were completed over several years with the Bureau of Land Management and Sonoma County acting as lead agencies (pursuant to NEPA & CEQA respectively). Comprehensive biological resource studies, including instream fisheries analyses were required. Regular coordination with resource and regulatory agencies was required. Client: NCPA

Harwood Biomass Power Plant EIR: Principal-in-charge of preparation of Draft and Final Environmental Impact Report evaluating impacts of siting and operating 12.5 MW wood waste power plant in City of Willits. Project involved comprehensive air quality, traffic and hazards analyses and full community involvement program. Client: City of Willits.

Geothermal Resource Management Plan and Program EIR: Managed comprehensive planning and environmental study of geothermal resource development in Sonoma County portion of KGRA. Provided input for updated management plan to serve as guidance for resource development. Client: Sonoma County Planning Department

Lower Arroyo Seco Restoration Project: Principal-in-charge of program to restore channelized portion of Arroyo Seco in Pasadena to diverse riparian community. Managed all phases of planning and permitting for the project, including agency coordination, CEQA review and condition compliance. Organized and conducted five-year monitoring program to demonstrate success according to pre-established performance criteria. Obtained final approval from regulatory agencies for project's conformance with all criteria. Client: Browning Ferris Industries and City of Pasadena

Monterey Peninsula Country Club Shoreline Restoration: Served as Principal-in-Charge for restoration of coastal scrub and terrace prairie habitat along a mile section of the 17-Mile Drive adjacent to Monterey Bay. Project involved eradication of non-native invasive species, minor grading and recontouring, introduction of appropriate native materials propagated from local stock, protection and management of a state-listed rare and a federally-listed endangered plant species, and long-term monitoring. Obtained permits for project and maintains ongoing dialogue with California Department of Fish and Game. Client: Monterey Peninsula Country Club

Spanish Mine Constraints Analysis: Conducted biological assessment/constraints analysis of several-thousand-acre tract of land in Sierra Nevada Mountains proposed for development of mining and milling operation. Client: Homestake Mining Company

East Garrison Land Use Assessment: Principal Investigator for a project to evaluate modifications to the land use plan for former Fort Ord. Project involved redesignation of over 200 acres of open space preserve for development in exchange for over 400 acres of new habitat lands. Required active coordination with representatives from U.S. Army, U. S. Fish and Wildlife Service, state and local elected officials and others. Assessment demonstrated benefits of proposed exchange and resulted in Army and U.S. Fish and Wildlife Service approval. Client: County of Monterey

Sunshine Canyon Landfill: Assisted with baseline biological and wetlands assessment, planning, environmental (CEQA) review and permitting for expansion and closure of major regional solid waste landfill facility in northern Los Angeles County. Coordinated with resource agencies on impact assessment and mitigation requirements for project. Working with client, engineers, City of Los Angeles and resources agencies to implement and monitor comprehensive wetland and riparian mitigation program on 1,200-acre natural reserve. Client: Browning Ferris Industries of California, Inc.

Coastal Habitat Conservation Plan: Project manager for development of a coastwide Habitat Conservation Plan for the City of Sand City in Monterey County, California. A reasonable development footprint was proposed as part of the study and protection measures were developed for several federally-listed species known to occur in the area. The draft HCP was prepared in consultation with the U.S. Fish and Wildlife Service, California State Parks, Department of Fish and Game and local land owners. Client: City of Sand City

Cogswell Sediment Placement Site EA: Prepared Environmental Assessment (EA) to evaluate sediment removal and disposal alternatives for approximately 5.6 million cubic yards of sediment stored behind Cogswell Dam in the Angeles National Forest. The environmental effects of various alternatives including dredging, dewatering and excavation, on-site disposal, off-site transport, sluicing downstream and reduced (partial) removal were considered. Client: County of Los Angeles Department of Public Works

Silver Creek Valley Country Club: Served as Principal-in-charge for baseline biological assessment, agency negotiation and permitting for a 1500-acre residential community in San Jose. Site supported serpentine grasslands and several state and federal listed species of plants and animals. Corps and US Fish and Wildlife Service permits obtained. Client: Shea Homes

Fallen Leaf Lake Lodge Rehabilitation Plan: Managed study of proposed removal of old buildings and campsites, construction of new cabins, renovation of lodge and recreation hall, and road relocation for lodge in Lake Tahoe Basin. Client: California Tahoe Regional Planning Agency

Maritime Facilities Permit Assistance: Worked to identify and resolve major permit compliance issues related to large-scale development in the Port of San Francisco. Extensive coordination with San Francisco Bay Conservation and Development Commission and City of San Francisco Planning Department. Client: Port of San Francisco

MEMBERSHIPS

Association of Environmental Professionals
California Native Plant Society
Linnean Society of London
Bay Planning Coalition

JANE E. VALERIUS
Consulting Botanist

Jane Valerius has a Master of Science degree in Ecology and is a plant ecologist and wetlands specialist with more than 28 years of highly professional experience both in conducting field studies and in managing projects. Ms. Valerius is proficient in conducting vegetation and biotic surveys, rare plant surveys, and wetland delineations. Ms. Valerius has designed mitigation monitoring plans for wetlands and prepared environmental impact assessments to support development of public works projects, residential communities, landfill and mining expansion, and energy and water resource facilities.

EDUCATION

⇒ Master of Science, Range Ecology, Colorado State University, Fort Collins, CO, May 1982
⇒ Bachelor of Arts, Environmental Biology, University of Colorado, Boulder, CO, December 1977

QUALIFICATIONS

- Over 28 years of experience conducting ecological, botanical and wetland studies in California, Oregon, Idaho, Colorado, Wyoming, Utah, Arizona, and North Dakota.
- Specialize in flora of the western United States; conducted special status plant surveys according to California Department of Fish and Game protocol for Marin, Sonoma, Mendocino, Napa, Solano, Contra Costa, Alameda, San Joaquin, Merced, Fresno, Butte, Eldorado, Amador, Sacramento, Yolo, San Bernardino, San Mateo, Siskiyou and other counties.
- Extensive experience with wetland delineations, permitting, mitigation plans, creation and construction of wetlands, including vernal pools.
- Work with the San Francisco, Sacramento and Los Angeles U. S. Army Corps of Engineers districts. Experience with NEPA/CEQA.
- Prepare restoration, revegetation, and reclamation plans. Prepare exotic pest plant control plans.
- Manage and prepare open space management plans.
- Monitor environmental compliance of mining operations, transmission line, and residential development projects.
- Active in professional organizations including past Director-at-Large for the Society for Ecological Restoration (1994-1997), member of the California Native Plant Society, California Exotic Pest Plant Council, California Botanical Society and Society for Wetland Scientists.

EMPLOYMENT HISTORY

Principal	1/10/98-present	Jane Valerius, Environmental Consulting Sebastopol, CA
Senior Consultant/ *Project Manager*	1995-1/9/98	Resource Management International, Inc. San Rafael, CA
Botanist/Project Manager	1991-1995	Western Ecological Services Company, Inc. Novato, California
Environmental Specialist	11/1989-1991	U. S. Army Corps of Engineers, Environmental Branch, San Francisco, CA
Technician	9/89-11/89	LSA & Associates, Pt. Richmond, CA
Senior Env. Specialist	1986-1989	Wyoming Dept. of Environmental Quality Lander and Cheyenne, Wyoming
Research Associate	1979-1986	Keammerer Ecological Consultants, Inc. Boulder, Colorado

REPRESENTATIVE PROJECTS

Binkley Lease Area, The Geysers, Lake County, CA. Conducted seasonal protocol surveys for special status plants and a description of vegetation habitats for the proposed east and west pad sites and surrounding area. Surveys were conducted in 2008.

Pine Grove Resort and Spa, Lake County, CA. Conducted seasonal protocol surveys for special status plants and a description of vegetation habitats for the 28-acre Pine Grove Resort and Spa located at 15965 Bottle Rock Road, near Cobb, California in Lake County. Surveys were conducted in 2007.

Upper American River Project, Sacramento Municipal Utility District (SMUD). Provided expertise on issues related to special status plants, wetlands, and vegetation mapping for the Technical Study Groups as part of the hydrologic relicensing process for SMUD's UARP project in 2002. I was a subconsultant to Duke Engineering who was hired by SMUD to assist with the relicensing. In 2003 I worked with other botanists from Duke Engineering on conducting rare plant surveys along the transmission line from Loon Lake to Folsom Reservoir. The majority of the surveys were conducted from south of Placerville to Loon Lake in Eldorado County. Surveys were coordinated with the El Dorado National Forest botanist, the California Native Plant Society and the California Department of Fish and Game. Location of significant weed infestations were also mapped during the special status plant surveys.

California-Oregon Transmission Project (COTP). Conducted weekly environmental compliance inspections of the transmission line from Tracy, CA to the Tesla substation. Conducted wetland mitigation monitoring and data collection for the Edson Creek restoration project in McCloud, CA which was mitigation for impacts to wetlands by one of the transmission line towers. Collected vegetation cover and species diversity data for vernal pool mitigation at Millville Plains outside of Redding, CA which was also mitigation for the transmission line. Part of this work was done when I was an employee of Resource Management International (RMI). More recently I conducted a wetland delineation and rare plant surveys for a proposed fiber optic line and other work proposed along the Tracy to Tesla substations. This works was done as an associate staff to Navigant Consulting (formerly RMI).

Yuba County Water District Forbestown Ditch Project, Butte and Yuba Counties, CA. Conducted surveys for rare plants in 2004 along the proposed pipeline route for the Forbestown ditch located in Butte County. Surveys were coordinated with the Plumas National Forest botanist. Surveys included mapping of weeds within the project area. This information will be used to develop the environmental review documents (CEQA/NEPA) for the pipeline project. I am a subcontractor to Navigant Consulting, Inc., who is working for Bookman-Edmondson (BE), a division of GEI Consultants, Inc... The Yuba County Water District is BE's client.

McClellan Air Force Base, Lincoln, and Davis Communications Facilities, Sacramento and Yolo Counties, CA. Conducted special status plant surveys for over 80 vernal pools for two sequential years for these three sites. Also monitored the special status plant populations at the Davis site which included Colusa grass (*Neotapfia colusana*) and Crampton's tuctoria (*Tuctoria mucronata*).

Hghway 59 Landfill, Merced County, CA. Conducted special status plant surveys for a proposed landfill project near the city of Merced for a 300-acre area with over 100 vernal pools. Surveys were conducted for the preparation of the biological section of an EIR. Also managed the preparation of the wetland mitigation plan and assisted the County with agency coordination on endangered species issues, specifically for fairy shrimp.

City of Willits, Wastewater Treatment/Water Reclamation Project, Mendocino County, CA. Conducted surveys for special status plants for the 160-acre original project area and an additional 125-acre proposed mitigation site for the City of Willit's proposed constructed wetlands treatment facility. Also conducted wetland delineations and wrote the botanical and wetland sections of the EIR for the project. I also monitor populations of Baker's meadowfoam, a state listed rare plant, on the project site. This includes monitoring of a seeded plot as part of an experimental program to establish new populations of Baker's meadowfoam as mitigation for impacts resulting from construction of the new wastewater treatment project.

Geysers Recharge Project, Sonoma County, California. One of a team of botanists that conducted full season botanical surveys as part of the City of Santa Rosa's environmental review for their proposed project to convey reclaimed water for injection into the Geysers steamfields. The pipeline will be up to 48 inches in diameter and is part of the Santa Rosa Geysers Recharge project which will extend from the Laguna Subregional Water Reclamation Facility (southwest of downtown Santa Rosa) to the Geysers steamfields (northeast of Healdsburg). Several proposed alignments for the pipeline were surveyed.

City of Fairfield, Fairfield Mitigation Bank. Conducted rare plant surveys and a wetland delineation off of Hwy 113 just north of Hwy 12. The site consisted of numerous vernal pools. Dwarf downingia (*Downingia pusilla*) was found in 2 of the larger vernal pools. The City of Fairfield is proposing to use the site as a mitigation bank.

Golden Gate Bridge, Scoping Ecological Risk Assessment Under Phase II Remedial Investigation, San Francisco, CA. An ecological risk assessment was conducted at the Golden Gate Bridge as part of a Phase II Remedial Investigation/Feasibility Study for lead-bearing sandblast media and soil within an area beneath the north and south approaches to the Bridge. Prepared a report discussing the botanical resources based on past reports and surveys supplemented by current field work to confirm and update the past research. Prepared a vegetation map to characterize an area one-half mile around the study sites. Researched rare plant occurrences within the study area and one-half mile survey area. Identified potential Mission blue butterfly habitat based on the presence of larval host plant species (lupines).

Solano Garbage Company and Potrero Hills Landfill, Environmental Assessment, Permitting and Restoration Services. Conducted rare plant surveys for Contra Costa goldfields (*Lasthenia conjugens*) on the Potrero Hills landfill property located in City of Suisun City, Solano County, CA. Also found *Atriplex joaquiniana* and *Atriplex cordulata*. Currently monitoring the populations of special status plants and responsible for the wetland mitigation vegetation monitoring. Conducted a wetland delineation and rare plant surveys on approximately 500-acres adjacent to the landfill that is part of their proposed expansion area.

ERIN C. AVERY

Senior Biologist

Ms. Avery is a biologist specializing in plant ecology and natural resource analysis. She has worked with clients and resource agencies performing a variety of environmental planning functions, and has practical experience in the preparation of habitat conservation plans, habitat protection plans, biological resource assessments and impact analyses. Ms. Avery conducts rare plant surveys and has participated in numerous wetland assessments and wildlife surveys. She has developed, implemented and monitored mitigation and restoration plans and has performed assessments of environmentally sensitive habitat areas (ESHAs) under jurisdiction of the California Coastal Commission. Ms. Avery has extensive experience using GPS to map natural resources and to conduct resource analyses. She has a working understanding of environmental regulations including the California Environmental Quality Act (CEQA), the National Environmental Policy Act (NEPA), the Clean Water Act (CWA) and the California Coastal Act. Her experience includes:

- biological resource assessment, vegetation community mapping, sensitive species surveys
- wetland assessments
- project review for compliance with environmental regulations
- understanding of wetlands and endangered species permitting requirements and procedures
- preparation of environmental documents, including habitat conservation and habitat protection plans
- development of habitat mitigation, management and restoration plans
- use of GPS/GIS for mapping and resource analysis
- mitigation/restoration monitoring

EDUCATION

B.S. (Honors, Hewlett-Packard Scholastic Scholarship), Plant Biology: Ecology and Evolution, University of California, Santa Cruz, 2001

TRAINING

- Delineation of Jurisdictional Waters of the U.S., including Wetlands on the California Coast: Legal and Ecological Protocols for Diverse and Changing Landscapes, WSP Environmental Strategies and Coastal Training Program, 2008
- CEQA Basics Workshop, AEP, 2007
- Defining and Delineating Maritime Chaparral on California's Central Coast, Coastal Training Program, 2007
- Yadon’s Piperia Recovery Workshop, Coastal Training Program, 2005
- Mitigation-Related Restoration and Management of California’s Maritime Chaparral, Coastal Training Program, 2005
- Ecology and Conservation of California’s Coastal Freshwater Wetlands, Coastal Training Program, 2004
- Rapid Assessment Protocol for Vegetation Monitoring, California Native Plant Society, 2003

- Revegetation/Restoration Planning Course, California Society for Ecological Restoration, 2002

EMPLOYMENT HISTORY

2003 – present:	Zander Associates, Senior Biologist
2002 – 2003:	California Coastal Commission, Volunteer
2001 – 2004:	Central Coast Wilds, Assistant Manager of Native Restoration Nursery
2003 – 2004:	Nature Conservancy, Hamilton Range, Vegetation Monitor
2002 – 2003:	Conservation Biologist Workgroup funded by the UC Department of Agriculture and Natural Resources, Restoration Analyst
2001 – 2002:	UC Santa Cruz, Assistant Manager of Research Greenhouses
2001 – 2002:	UC Santa Cruz, Ecology and Evolution Department, Soil Analyst
1998 – 2001:	Swanton Berry Farm, Farm Laborer/Sales/Delivery
1992 – 1994:	Youth Ecology Corps, Sustainable Landscape Design Restoration Crew Leader

REPRESENTATIVE PROJECTS

Monterey Peninsula Country Club Shore Course Improvement and Restoration Program, Pacific Grove, California: Coordinated implementation of the Shore Course Improvement and Restoration Program, which included restoration of approximately 50 acres of coastal scrub and coastal terrace prairie habitat and habitat supporting one federally endangered plant species - coastal dunes milk vetch (*Astragalus tener titi*) - and one state rare species - Pacific Grove clover (*Trifolium polydon*). Worked with plant propagators to determine annual planting needs, worked with golf course staff to identify needed maintenance, developed remedial solutions for problem areas, conducted annual monitoring pursuant to the approved restoration plan. Client: Monterey Peninsula Country Club.

Fort Ord Parker Flats Burn Coordination: Coordinated efforts of the parties involved in the 2005 Parker Flats training burn required as a condition of the Parker Flats/East Garrison Land Swap. Organized coordination meetings with fire agencies, contractors, and resource agencies in preparation for the burn. Monitored implementation of the pre- and post-burn activities. Client: Fort Ord Reuse Authority.

East Garrison Condition Compliance and Monitoring: Assisted with preparation of documents and coordination of required pre-construction surveys for the East Garrison Development Project on former Fort Ord. Developed and implemented mitigation and monitoring plan for the state threatened and federally endangered plant species - sand gilia (*Gilia tenuiflora* ssp. *arenaria*). Participated in salvage activities of the federally threatened California tiger salamander (*Ambystoma californiense*). Prepared brochure for contractors describing sensitive biological resources, conducted pre-construction information talks, organized pre-construction surveys for bats and nesting birds and reported results for the County of Monterey. Client: East Garrison Partners.

Pebble Beach Yadon's Piperia Census: Assisted in the delineation and census of populations of the federally threatened plant species Yadon's piperia (*Piperia yadonii*) on Pebble Beach Company-owned lands within the Del Monte Forest in Monterey. The census took place over a two year period and included over 2,000 acres. Client: Pebble Beach Company.

JON WINTER

Jon Winter is a wildlife biologist with more than 33 years of professional experience in a variety of capacities with the U.S. Forest Service, National Park Service, California Department of Fish and Game, the Point Reyes Bird Observatory, and private consulting. Over the past three decades, Mr. Winter has established expertise in rare and endangered species inventories, wildlife habitat analysis, forest ecology, and avian population assessments, terrestrial and wetlands ecology on projects throughout California with particular strength in the Sierra Nevada, as well as in Nevada, Arizona, South America, and Antarctica. He also has a sound knowledge of wildlife mitigation issues related to CEQA, NEPA, and his familiarity with the both state and federal Endangered Species Acts is supplemented with considerable practical experience in mitigation planning. As a field studies manager and researcher, Mr. Winter is accomplished in a wide range of survey techniques, including radio-telemetry, small mammal trapping, special status amphibian surveys, bird banding, and is expert at mitigation design and evaluation. Project management experience includes several multi-year mitigation and planning efforts including one with a six figure budget.

EDUCATION

M.A., Ecology and Systematic Biology
San Francisco State University - San Francisco, CA 1986

B.A., Biology (zoology)
Sonoma State University - Rohnert Park, CA 1975

PROFESSIONAL HISTORY

Principal Wildlife Biologist
Jon Winter & Associates
Since 1998

Resource Management International, Inc.
4340 Redwood Hwy.
Suite B
San Rafael, CA 94903
Associate Wildlife Biologist 1995-1998

Western Ecological Services Company, Inc.
4340 Redwood Hwy.
Suite B
San Rafael, CA 94903
Senior Wildlife Biologist 1991-1995

Consulting Wildlife Biologist 1988-1991

National Park Service
Senior Project Biologist 1985-1988

California Department of Fish and Game
Contract Wildlife Biologist 1979-1984

U.S. Forest Service
Wildlife Biologist 1978

REPRESENTATIVE EXPERIENCE

Wildlife and Management Experience

City of Santa Rosa
Geysers Recharge Waste Water Treatment Pipeline
1998-2002
Conducted the Northern Spotted Owl surveys to protocol standards for the Geysers Waste Water Pipeline ROW for the City of Santa Rosa. Also conducted raptor surveys on entire ROW and its alternatives.

City of Petaluma
Lafferty Ranch Park EIR
1998-2000
Wrote the wildlife section for the revised DEIR for the Lafferty Ranch Park. DEIR was subjected intense public and legal scrutiny which necessitated producing an comprehensive and thorough environmental document.

City of Willits
Wastewater Treatment Plant EIR
2002
Wrote the wildlife section for the DEIR for the City of Willits wastewater treatment plant. The DEIR was complex because the system chosen by the City was a wetland filtering system that created a complex series of interconnected holding ponds that served to treat the affluent as well as create wetlands for wildlife. Only two such systems were in operation in California at the time.

Calpine Corporation
Geysers Waste Water Recharge Project
2000-2001
Conducted Northern Spotted Owl surveys to protocol standards and raptor nest surveys for Calpine Corporation's section of the Geysers Waste Water Recharge Project in the Geysers, Sonoma and Lake Counties.

Cloverdale Bypass Mitigation Project
State of California
Caltrans
1999-2001
Undertook monitoring of 23 bird census plots that were each run four times during winter and spring count periods. Project data when analyzed with on going vegetation plots will be used as part of the mitigation performance standards delineated in the Cloverdale Bypass mitigation plan.

Monte Rio Waste Water Pollution Control EIR
City of Monte Rio, Sonoma County, CA
1998-1999
Wrote the wildlife section for the Monte Rio Waste Water treatment project EIR. Project was complicated involving a number of special status species issues in the Russian River watershed.

National Park Service
Yosemite National Park
1979-1988
Conducted and supervised a ten year research program on the Great Gray Owl in Yosemite National Park. Responsibilities included overseeing field research on ecology and visitor impacts, planning field investigations for nine summer interns, and biologists and coordinating the research for three UC Davis graduate students. Project included trapping and the extensive use of radio-telemetry.

Spotted Owl RD&A Program
U. S. Forest Service
Mendocino National Forest
1989
Coordinated and supervised eight field crews for the U. S. Forest Service on the Mendocino National Forest who monitored and surveyed 41 sites for Spotted Owls. Also coordinated additional surveys for timber planning purposes.

Wildlife Monitoring
U.S. Renewables Group
Geysers Geothermal Steam Field, Sonoma/Lake Cos.
2002-Present
Monitored 100 bird and mammal nest boxes three times annually. Conducted wildlife counts at wildlife guzzlers three times annually. Assessed deer use of site and collected plant material for boron residue analysis.

Wildlife Mitigation Monitoring
Pacific Gas and Electric Company/UNOCAL
The Geysers Geothermal Steam Field, Sonoma Co.
1986-87
Conducted nest box use surveys and wildlife censuses in the Geysers, Sonoma County, for Pacific Gas and Electric Company, as part of its geothermal licensing agreements. Assisted in developing and implementing a mitigation plan for UNOCAL in the Geysers as part of its mitigation agreements with Lake County for the construction of steam transmission pipelines.

Palm Tract Waterfowl Habitat Mitigation Plan
Transmission Agency of Northern California
Contra Costa County, California
1993-2002
Co-authored a multi-species management plan to mitigate impacts resulting from the construction and operation of a 500-kV interstate transmission line. The plan included purchase of a 1,200-acre farm in Contra Costa County, and converting 130 acres of the property into a seasonal wetland for waterfowl nesting and brood ponds. The plan also provides recreational access to the site for fishing, hunting, and nature study, while still allowing productive agricultural lands to remain viable. Developed a detailed, nine-year monitoring plan with success criteria to ensure conformity with regulatory mitigation requirements. Negotiated the conservation easement plan with the California Department of Fish and Game to lay the groundwork for integrating farm management with a supplemental waterfowl food program involving two million pounds of waterfowl food per year.

Special-Status Amphibian Surveys
Various Land Developers
California
Since 1991
Conducted surveys for California tiger salamander, western pond turtle, and red-legged frog in Napa and Sonoma counties and for foothill yellow-legged frog in the Sierra Nevada for several development projects.

Red-legged Frog surveys at Altamont Pass, Alameda Co., March 1994; Brentwood Zone II pipeline ROW, Contra Costa Co., April 1996; Sky Valley Ranch, Solono Co., March 1994 & Feb 1995; sensitive amphibian surveys for the Paradise Irrigation District, Butte Co., March 1993; Redwood Business Park, Petaluma, September 1997; McClellan AFB, Sacramento, June 1997; Dykstra Ranch, Half Moon Bay, July 1997; Camp Evers Creek assessment, Scotts Valley, Santa Cruz Co., May 2000; Yuba Co., Water District Forbestown Ditch, Butte Co., May 2004; Red-legged Frog mitigation assessment Tracy-Tesla Fiber Optics project, San Joaquin Co., Feb 2004.

Hamilton Air Field Reclamation Project
California Clapper Rail Surveys
LSA
Point Richmond, CA
1998
Participated in protocol-level surveys for California Clapper Rails as part of the reclamation effort on Hamilton Air Field in Marin County. Surveys were part of a plan to return tidal habitats to the site as part of an expansion of north bay marshes.

Clapper Rail Surveys
Monk & Associates
San Rafael, CA
2007
Assisted in conducting California Clapper Rail surveys to protocol standards for a planned development on Smith Ranch Road, San Rafael. Five complete surveys done at request of USFWS.

City of Petaluma
Petaluma Waste Water Treatment Plant
EcoBridges Environmental
Petaluma, CA
2006
Conducted California Clapper Rail surveys to protocol standards at the Petaluma Waste Water Treatment plant as part of the City of Petaluma's plant expansion. March-April 2006.

Spinnaker Lagoon Water Management Plan: Phase I Monitoring Program Report
City of San Rafael, California
Marin County, California
1993, 1996
Analyzed a three-year data set on waterfowl and their response to changing water quality in a man-made lagoon in Marin County, California. The analysis was part of a long-term water quality monitoring project addressing the impacts of a new water management plan.

Special-Status Mammal Surveys
Various Clients
California
1994-1999
Participated in salt marsh harvest mouse surveys in several marshes in the greater S.F. Bay Area. Efforts included trapping to USFWS protocol standards. Trapping experience includes Spinnaker Lagoon, Marin Co., (1994,1995,1997,1998); Renzel Marsh, Santa Clara Co., (1996); Shell Marsh, Martinez, Contra Costa Co., (1994), Suisun Marsh, Solano Co., (1999). Total experience with salt marsh harvest mouse trapping is 8945 trap nights.

McClellan Air Force Base-Special-Status Species Monitoring
U.S. Air Force/ DOD/ Lincoln and Davis Communication Sites, California
1994-1996
Assisted in conducting burrowing owl (winter and summer) and fairy shrimp surveys on McClellan Air Force Base and two nearby communication sites. The results of the survey and other resource studies were used to prepare an ecological risk assessment and a natural resource management plan for federal properties slated for closure.

Yosemite Lakes Estates-Heron/Egret Nesting Habitat Mitigation Plan
California Star Resorts, Inc
Merced County, California
1991
Wrote a habitat conservation plan for the loss of a heron rookery at a land development site in Merced. The 705-acre site was slated for a golf course and residential development.

Timber Harvest Planning
U.S. Forest Service
Stanislaus National Forest, California
1978
Evaluated the impacts of timber harvest plans on wildlife habitats for the U. S. Forest Service and developed a habitat analysis matrix for this purpose.

Rush Ranch Range Monitoring and Upland Nesting Habitat Study
Solano County Farmlands and Open Space Foundation
Rush Ranch, Solano County, California
1992-1997
Conducted a five-year monitoring study of a management plan designed to minimize cattle grazing impacts on upland waterfowl, pheasant, and raptor nesting habitat on a 2,000-acre ranch and open space district in Solano County. Grazed and ungrazed study plots were established and monitored for comparative nesting use and grazing impacts. Also evaluated the quality of waterfowl brood water. The results of the monitoring study were used to modify the grazing management plan to improve upland nesting habitat without adversely effecting livestock grazing requirements.

Pacific Shores Center-Wetland Enhancement
and Mitigation Compliance Plan
Jones Lang Wootton Realty Advisors
Redwood City, California
1994-2001
Helped develop a wetland enhancement and mitigation monitoring plan for an commercial office park proposed along the shoreline of San Francisco Bay in Redwood City. The plan focused on the removal of contaminated fill from a old disposal area, restoring normal tidal flows to the site to mitigate for the fill of wetlands, and improving wildlife habitat for threatened and endangered species. Also designed a program to monitor the site for three federally listed endangered species over a ten year horizon.

Bird Strike Hazards to Aircraft
U.S. Public Health Service
San Francisco, California (Bay Area)
1969-1971
Participated in a multi-year study to analyze bird-strike hazards to aircraft in the San Francisco Bay and assisted in developing recommendations to reduce this hazard.

Northern and California Spotted Owl Surveys
Since 1989
Conducted numerous surveys for both Northern and California Spotted Owls in most of which were done according to protocol standards. Work done in the Sierra Nevada and the coast range. Many involved timber harvest reqirements but others needed to conform to USFWS impact assessments. Extensive experience with owl biology in general.

Seabird Research
National Science Foundation
Falkland Current, Argentina
1972
Assisted in conducting at-sea transects in South America and in sub-Antarctica waters to evaluate seabird populations and shorebird populations on the coast of Argentina and Tierra del Fuego on a National Science Foundation grant.

Burrowing Owl Surveys
Various Clients
California
1990-Present
Performed a number of surveys for burrowing owls including trapping, attaching radio transmitters, translocating burrowing owls to new mitigation sites. Experience included Southern Pacific Railroad, Imperial Co., (1993), and Department of Defense, Sacramento Co., (1995), Oracle Software, San Mateo Co., (1998), Potrero Hills, Solano Co., (1998) Brentwood, Contra

Costa Co., (1998), Livermore, Alameda Co., (1999) Hamilton AFB, Marin Co., (1999), Tracy, San Joaquin Co., (1999), San Jose, San Mateo Co., (2000), Sears Point, Sonoma Co., (2000), Alviso, Santa Clara Co., (2000), Milpitas, Santa Clara Co., (2001) Tracy, San Joaquin Co., (2002), Travis AFB, Solano Co., (2003), San Jose, Santa Clara Co., (2005), Newark, Alameda Co., (2005) San Ramon, Contra Costa Co., (2005), Antioch, Contra Costa Co., (2005).

Great Gray Owl Habitat Survey
U.S. Forest Service
Stanislaus National Forest, California
1982
Developed a quantitative methodology for evaluating great gray owl habitat in the Sierra Nevada. The study was conducted to support the U.S. Forest Service timber harvest planning process.

Great Gray Owl Survey
Plumas National Forest
U.S. Forest Service
Quincy, CA
2004-05
Conducted protocol surveys for Great Gray Owl on a two year contract for the U. S. Forest Service on the Plumas National Forest and assessed habitat suitability for this species in areas where timber harvest was being planned.

Great Gray Owl Habitat Assessment
Plumas National Forest
Quincy, CA
2000
Assisted in assessing Great Gray Owl habitat on the Plumas National Forest. Looked at 25 meadow systems mostly on the east side of the forest and made recommendations for management.

Great Gray Owl Habitat Assessment
Plumas National Forest
Feather River Ranger District
June 2001
Assessed four meadow systems on the Feather River Ranger District for the possible presence of Great Gray Owls and assessed the habitat on each meadow for suitability.

Great Gray Owl Habitat Assessment
Southern California Edison Corp.
Shaver Lake, CA
2005
Assessed Great Gray Owl habitat on Southern California Edison Corporation lands in Fresno County. Assessment intended to improve the management of these lands for Great Gray Owls while still allowing timber harvest to take place.

Special-Status Wildlife Use of Rice Cultivation Lands in California's Central Valley
California Rice Industry Association
California
1992, 1994, 1997
Assessed the value of rice farming for special-status wildlife species in the Central Valley on behalf of the California Rice Industry Association. The report was widely circulated and often cited in the press and periodicals.

Environmental Attributes of Rice Cultivation in California
California Rice Promotion Board
Yuba City, California
1991
For the California Rice Promotion Board, assisted in assessing the environmental attributes of rice cultivation to wildlife, fisheries, air, water quality, soils, and agricultural productivity in California.

Consumnes River Project-Wildlife Surveys
ESA Planning Services
Consumnes River Watershed, California
1991
As a subconsultant, mapped the distribution of special-status wildlife species, fire history, and wildlife habitat classifications of the Consumnes River watershed. The mapping was done to support a major resource preservation project proposed by The Nature Conservancy.

Wild Horse Valley Ranch Biotic Surveys
SWA Group, Inc
Napa County, California
1992-1993
Conducted a two-year avian population assessment of special-status species, including northern spotted owls, on the Wild Horse Valley Ranch in Napa County. The surveys conformed to U.S. Fish and Wildlife Service protocols for the northern spotted owl. The results of the surveys were incorporated into a proposal to develop the ranch property.

California Street-Environmental Assessment
Shorenstein Company
San Francisco, California
1994
Assessed the impact of removing and replacing a high-rise building sign on nesting peregrine falcons. Made recommendations for timing of construction and coordinated construction activities with the U.S. Fish and Wildlife Service.

Environmental Impact Reports
Nichols Berman
Sonoma County, California
1991
Wrote the wildlife sections of an Environmental Impact Report (EIR) addressing the incorporation of the City of Windsor in Sonoma County, California. Prepared several EIRs and Environmental Assessments for a broad spectrum of other projects including and commercial office site, a vehicle dismantling site and quarry mining expansion.

Bottle Rock Power Plant
U.S. Renewables Corp.
Zander Associates
Cobb, CA
2002-Present
Monitored 102 bird nest boxes for reproductive success and utilization 3 times/year. Did deer utilization and guzzler counts and collected vegetation for boron contamination. Compiled annual reports on the results. Part of an ongoing relicensing project that has been run since 1987.

Mining Industry

Wildlife Studies for Windsor Lakes Concept Plan
Kaiser Sand and Gravel Company
Sonoma County, California
1991-1992
As part of a study team, evaluated wildlife use of abandoned gravel pits in support of Kaiser San and Gravel Company's effort to reclaim the pits adjacent to the Russian River. The goal was to develop a plan that integrated the restoration of agricultural land with newly created riparian habitat, with enhanced public access and recreational activities. As part of the plan, also wrote a wildlife mitigation monitoring program for one of the closed pits.

Natural Gas and Energy Industry

Spotted Owl Surveys for PGT Pipeline Expansion Project
Harding Lawson Associates
Northern California
1990
Conducted northern spotted owl surveys on an 80-mile section the right-of-way for the proposed Pacific Gas Transmission/Pacific Gas & Electric Company pipeline expansion project in California. The surveys were conducted using formal U.S. Fish and Wildlife Service and California Department of Fish and Game protocols.

Alturas Biomass Plant
City of Alturas, California
Navigant Consulting
June 2006
Assessed several alternative transmission line alternatives from a proposed biomass power plant in Alturas. Swainson's Hawk, Tricolored Blackbird, Sandhill Crane, Bank Swallow, Bald Eagle, and Prairie Falcon were among the species of concern.

PROFESSIONAL MEMBERSHIPS

American Ornithologists' Union
Cooper Ornithological Society
Point Reyes Bird Observatory (Research Associate)
Raptor Research Foundation
Western Field Ornithologists
Wildlife Society

PERMITS AND CERTIFICATIONS

Federal Bird Banding Permit
Memorandum of Understanding from the California Department of Fish and Game to trap and handle reptile and amphibian Species of Special Concern
Valid 10a permit for Sonoma Tiger Salamander
Certified in Wildlife Habitat Relationships Model
Valid state and federal collecting permit
U.S. Fish and Wildlife Service Special Purpose Salvage Permit

ZANDER ASSOCIATES

Environmental Consultants

May 21, 2010

Bob Giguiere
Bottle Pock Power, LLC
PO Box 326
Cobb, CA 95426

Supplemental Spring Plant Survey
BRP Steam Project

Dear Bob:

At your direction, Zander Associates has completed a supplemental spring plant survey within the revised east and west pad grading limits on the BRP Steam project site. Zander Associates Consulting Botanist, Ms. Jane Valerius visited the site on May 19, 2010 (optimum timing for the spring blooming season given the abundant spring rainfall) to conduct a one-day, focused survey to supplement our previous work conducted in 2008 and 2009. Following are the background, methods and results of the work.

Background

During 2008 and 2009, Zander Associates biologists conducted comprehensive field surveys in the BRP Steam project area and documented that work in our *Biological Resources Assessment, BRP Steam Project* prepared for Bottle Rock Power, LLC and RMT, Inc. (Zander Associates, September 2009). In the interim, grading plans for the east and west drill pads for project were revised to reduce various environmental effects. While the revised locations for both pad sites remain within the study area established as limits for our 2008 and 2009 field work, the buffer area (250 feet beyond grading limits) for the west pad now extends beyond those original limits. Thus, the need for supplemental surveys within an approximately 5.7-acre area southerly of the west pad was identified through Lake County's environmental review process for the project.

Methods

Prior to conducting the survey, we reviewed and updated our existing records for the site. We also coordinated with the current project engineer (Fallon Engineering) to obtain rectified grading plans for overlaying onto our aerial vegetation mapping.

Surveys for special status plants were conducted on May 19, 2010 by Zander Associates Consulting Botanist, Ms. Jane Valerius. Ms. Valerius is a seasoned field botanist who is very

4460 Redwood Hwy, Suite 16-240, San Rafael, CA 94903
Telephone: (415) 897-8781
Fax: (415) 814-4125

familiar with the BRP Steam project area, having conducted floristic work on the project over the two previous field seasons.

Ms. Valerius initially completed a general reconnaissance to assess study area conditions, checking vegetation patterns and blooming status from accessible vantage points (e.g. the access road through the knobcone pine [*Pinus attenuata*] knoll at the top of the east pad site; the pioneer ranch road from the west side of High Valley Creek through the west pad site). She then walked meandering transects (as understory density and slope allowed) through the 250 foot buffer area for the west pad, which extends on gently to steep sloping ground through mixed woodland and chaparral to the south of the existing pioneer ranch road (see Revised Figure 3, attached). Her focus was to observe general vegetation characteristics, note any species not identified in previous surveys, and identify any special status plants that might occur in the expanded study area. The survey was well timed as the majority of plant species in the area were in flower and identifiable. There were some species that had not yet flowered but they had been identified in previous surveys.

Results

Vegetation types within the expanded area are mixed oak-pine woodland and serpentine chaparral (see Revised Figure 3, attached). These types were described in detail in our previous report. Following is a brief description of species observed in each vegetation type during the May 19, 2010 site visit.

The mixed oak-pine woodland portion of the expanded survey area has a very dense canopy cover of mostly oaks (*Quercus chrysolepis, Q. kelloggii, Q. agrifolia, Q. wislizenii*) and madrone (*Arbutus menziesii)* with some California bay (*Umbellularia californica*), Douglas fir (*Pseudotsuga menziesii*) and occasional ponderosa pine (*Pinus ponderosa),* foothill pine *(Pinus. sabiniana*), knobcone pine, and California nutmeg (*Torreya californica)*. Other tree and shrub species noted in this type include whitestem manzanita (*Arctostaphylos visicida*), common manzanita (*Arctostaphylos manzanita ssp. manzanita*), California lilac (*Ceanothus foliosus*) and poison oak (*Toxicodendron diversilobum*). There is very little herbaceous vegetation within this type due to the dense canopy cover. Within the dense portions of this type there may be poison oak and star flower (*Trientalis latifolia*). Other species observed when the canopy is open or if there is a disturbed area were fawn lily (*Erythronium californicum*), death camas (*Zigadenus fremontii),* and gold wire (*Hypericum concinnum)* along with various grasses. No special status plants were observed in the expanded area.

A portion of the expanded area also includes serpentine chaparral with sparse foothill pine canopy cover. More open areas are dominated by whitestem manzanita, leather oak (*Quercus durata* var. *durata*), musk brush (*Ceanothus jepsonii* var. *jepsonii*) and California fescue (*Festuca californica*). In addition to some cover by foothill pine, there are also scattered occurrences of Sargent cypress (*Cupressus sargentii*). Open areas that have fewer shrubs and grasses also have coast flatstem onion (*Allium falcifolium*), Indian's dream (*Aspidotis densa*), rock or short-stem sedge (*Carex brevicalulis*), cryptantha (*Crypthantha hispidula*), narrow-

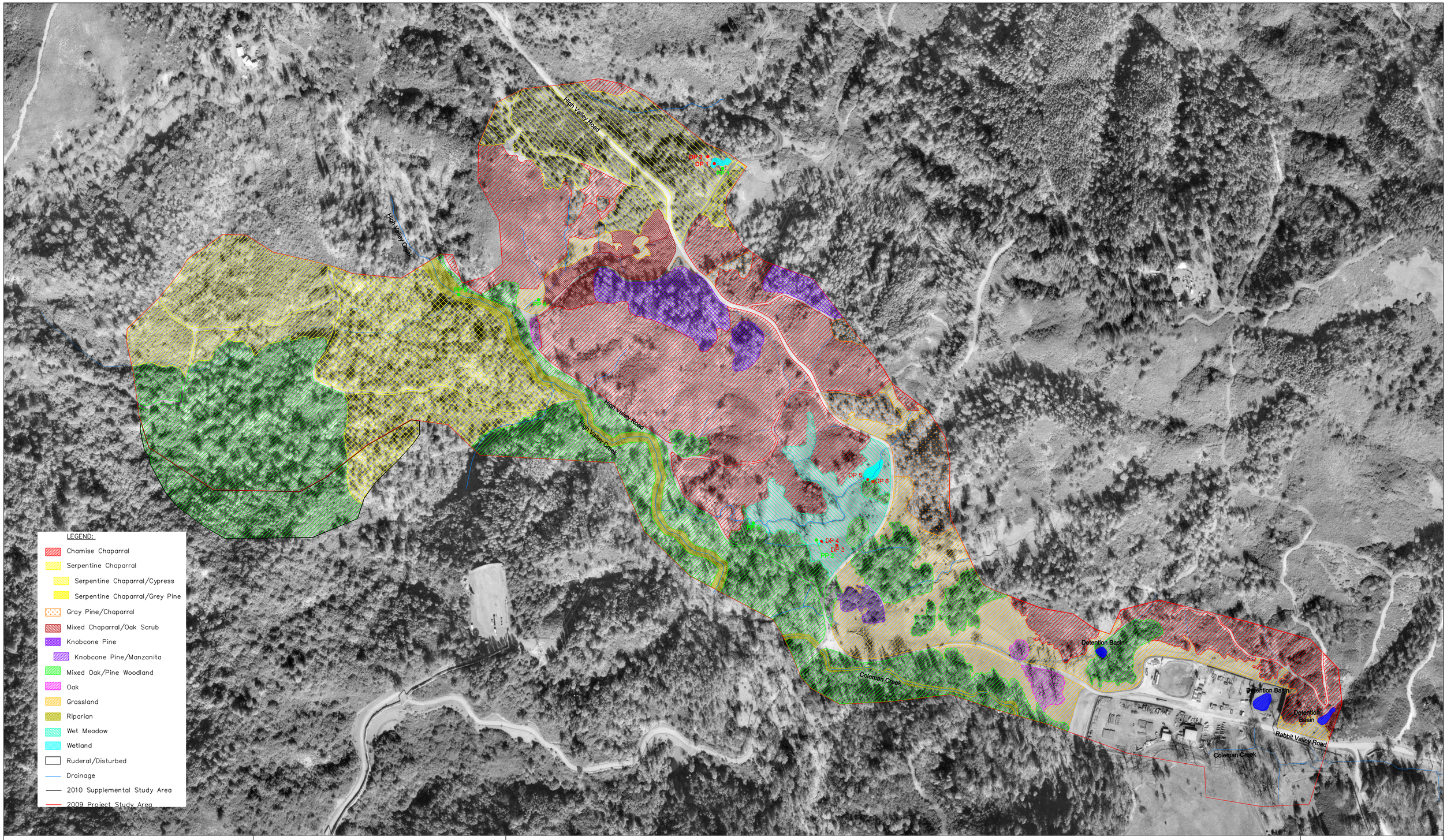
leaf onion (*Allium amplectens*), bluegrass (*Poa secunda*), oniongrass (*Melica* spp.), squirreltail (*Elymus elymoides*) and foothill needlegrass (*Nasella lepida*). Scattered individuals of a species of jewelflower were also observed in openings but were not yet in flower. However, based on the leaf shape, review of herbarium material on the Jepson website, and observations during previous surveys, these are likely to be the common one-sided jewelflower (*Streptanthus glandulosus* ssp. *secundus*) and/or possibly bearded jewelflower (*Streptanthus barbiger)*, a California Native Plant Society (CNPS) List 4 species (plants of limited distribution and on a watch list). A subsequent visit later in the season, during the jewelflower blooming period (June-July), would be necessary for a definitive identification.

We trust that this assessment will assist you with your County environmental review process. Please call me if you have any questions.

Sincerely,

Michael Zander
Principal

Attachments: Figure 3 Revised



Zander Associates
Environmental Consultants
4460 Redwood Hwy, Suite 16-240
San Rafael, CA 94903

Scale: 1" = 200'

Vegetation Types
BRP Steam Project
The Geysers, California

5/10

Figure
3
Revised

Sandra M, Zander Associates 7/29/2009 1:17 PM wetland 07 23 09.dwg

NORTHWEST BIOSURVEY
Environmental & Planning Services
15865 Rainbow Drive, P.O. Box 191, Cobb CA 95426

Phone (707) 928-1985 Fax (707) 928-1986
nwbio@mchsi.com

December 15, 2009

Mark Winsor, PhD
Senior Environmental Planner
EDAW Inc.
150 Chestnut Street
San Francisco, CA 94111

RE: Bottle Rock Power Steam Project: Completion of Northwest Biosurvey Task 2

Dear Dr. Winsor:

Northwest Biosurvey has completed "Task 2", evaluations of site conditions, database review, and peer review of environmental documentation, for the Bottle Rock Power Steam Project as defined in our consultant agreement. The results of these evaluations are summarized below.

Task 2.1; Field Evaluation of Existing Conditions: Northwest Biosurvey has completed all site visits of the project area necessary for evaluation of site conditions, plant communities, soils, waterways, and topography required for the peer review of the biological and hydrological studies conducted by Zander and Associates. Completion of this task required four days of field work within the project leasehold conducted on the following dates: 10/19/09; 10/26/09; 11/19/09; 11/23/09. The results of this field work are incorporated into Task 2.3 (peer review) discussed below.

Task 2.2; Literature Review: A copy of the most recent California Natural Diversity Database overlay of the U.S.G.S. Quadrangle was obtained and used to identify all known populations of sensitive plants and wildlife within the project area. In addition, we conducted analyses of the California Native Plant Society on-line inventory and California Department of Fish and Game *Wildlife Habitat Relations* database. Information from each of these sources was used in completion of the peer review discussed in Task 2.3.

Task 2.3; Peer Review: A systematic review was conducted of the following document prepared by Zander and Associates: *Biological Resources Assessment BRP Steam Project – September 2009*

(hereafter referred to as the "Zander report"). In addition to biological resources, the Zander report includes a delineation of Waters of the U.S. which we included in our field work and peer review.

Our review systematically focuses on each of the Sections addressed in the Zander Report; using the section numbering and titles used in that report. The review is presented below with the specific comments preceded by a general overview.

2.3.1 General Overview: Based on our systematic review of the Zander report in conjunction with extensive field review of the BRP project area, it is our opinion that the Zander report was conducted in a manner that meets all current professional standards for biological assessments conducted for local, state, and federal agencies. For the project as it is currently known to us, there are no apparent data gaps in the report with the exception of the sensitive herptile survey which was beyond the scope of the Zander report. This survey was subsequently conducted by Northwest Biosurvey.

2.3.2 Specific Review: The following section numbers and titles pertain to those used in the Zander report.

2.0 Project Characteristics: The project description presented in this section accurately represents the project as it is known to us at the time of this review.

3.0 Methods:

- **Presurvey Research:** The presurvey research used in the report included the most recent CNDDB overlay of the project area and included a 10-mile radius query for sensitive species. A CNPS Electronic Inventory review was completed. Pertinent state and federal agencies were contacted for review input. Previously-completed environmental reports conducted for this site during previous decades were obtained and reviewed. These actions constitute a systematic review of available data consistent with professional standards.
- **Field Surveys:** Eleven site visits were conducted for the botanical survey between April 16 and July 15, 2009. This greatly exceeds (by a factor of 2) the minimum number of visits that would normally suffice for a systematic botanical field survey. Habitat surveys for birds with sensitive regulatory status were conducted by a qualified ornithologist on July 30 and 31, 2009. A delineation of waters of the U.S. was conducted by a qualified biologist on June 10 and 11 and July 15, 2009, following the required federal protocol. Based on our review, all field work was conducted by qualified individuals following required protocol. The number of field visits greatly exceeds the required minimum and spans the entire growing season as required by Department of Fish and Game protocol.

Northwest Biosurvey did not conduct a floristic-level botanical survey as part of our review and cannot directly assess the accuracy of the surveys. However, we are very familiar with sensitive wildlife and plants of the project area. We are based in the town of Cobb, approximately 3 miles from the site, and have conducted extensive field work within the surrounding area over a 30-year period. Based on our experience, the species identified, including those with sensitive regulatory status, are consistent with those we would expect to find within the project area.

4.0 Regional Overview: This section provides generalized educational information for lay reviewers that is standard in many biological assessments. It assists in interpreting the more detailed sections that follow. Maps of Vegetation and Delineation of Waters of the U.S. presented in this section will be addressed in the appropriate sections below.

5.0 Project Study Area: This section provides a necessary overview of terrain and soils within the project area. No soils map is provided and this is a standard inclusion in most biological assessments; however, the soils within each of the mapped plant communities is described in detail.

5.1 Plant Communities and Wildlife Habitats: This section provides a detailed description of each of the plant communities present within the survey area. These are mapped in Figures 3 and 4. Northwest Biosurvey systematically surveyed the entire project area with copies of the vegetation maps and plant community descriptions in hand. The community descriptions used are consistent with those we use for these communities and based on the vegetation identifiable at the time of our field work, the descriptions appear accurate. We carefully reviewed the mapping against field conditions and concur with the community boundaries shown.

- **Riparian Mapping:** As part of the work we were asked to perform, Northwest Biosurvey independently mapped the riparian community using criteria specified by EDAW, the prime EIR consult. This criteria focuses on the California Department of Fish and Game Definition which defines riparian as either the outer dripline of riparian vegetation or the outer edge of the channel. Northwest Biosurvey staff mapped all riparian edges with a GPS to produce **Figure 1**[1]. The riparian habitat mapped in this way is shown as translucent dark blue overlaid on the riparian habitat mapped by Zander and Associates defined by a yellow outline. The new criteria is clearly more conservative than that used by Zander. The Zander definition appears to include all adjacent valley oak woodland. Since there are valley oak and valley oak woodland within the valley portions of the survey area that are not associated with riparian habitat, we decided to avoid the subjectivity of determining where to include this woodland along stream channels. Both the Zander approach and the EDAW/Northwest Biosurvey approach are legitimate. However, as mentioned, the approach used here is more conservative with its strict restriction to true riparian trees and shrubs (white alder, Oregon

[1] Figure 1 was created by overlaying the Zander and Associates vegetation and waters of the U.S. maps over a 2007 color orthophoto covering a sufficient area to include the entire survey area (Zander Figures 3, 4, and 5).

ash, willows, blackberry, sedges and rushes). The Zander mapping may be more appropriately referred to as riparian influence zone.

5.2 Aquatic Environments, Wetlands and Waters of the U.S.: Northwest Biosurvey inspected all waters of the U.S. mapped in the Zander Associates Delineation Map (Zander Figure 5). We concur with this mapping with the minor exception that we have added a small segment of connecting waterway along High Valley Creek. This segment is shown in light blue on our Figure 1. It is important to note that the U.S. Army Corps of Engineers is the final arbiter of the correctness of the delineation. Standard review protocol for all delineations is for the Corps to conduct a Jurisdictional Determination, usually in the field, during which Corps staff approves the delineation or requires modifications. Once that Jurisdictional Determination has been conducted and the final map approved, it becomes the official map of wetlands for a project upon which all future permitting is based.

6.0 SPECIAL STATUS AND COMMERCIAL/RECREATIONAL SPECIES

6.1 Special Status Plants: As discussed in our Section 3.0 – Field Surveys, Northwest Biosurvey did not conduct an in-season, floristic-level botanical survey for this project. We cannot directly determine whether all special status plants were found during the Zander Associates field work; however, the Zander field team met or exceeded all survey requirements and the work was conducted by a competent field biologist. The sensitive species identified are consistent with those we would expect to find in this location within the habitats present. We were able to verify the presence of woody sensitive plants identifiable throughout the year (Konocti manzanita[2]).

6.2 Special Status Animals: Northwest Biosurvey concurs with the possible presence of the two species listed in the Zander report: foothill yellow-legged frog and northwestern pond turtle. However, we believe that it is very unlikely that Clear Lake Hitch are present.

- **Clear Lake Hitch:** Migrating Clear Lake hitch have been monitored by the *Chi Council for Clear Lake Hitch* (a local volunteer group) since 2005[3]. High Valley Creek is tributary to Kelsey Creek which has been included in the monitoring program since its inception. We spoke with Peter Windrem, Chairman of the Chi Council regarding presence of hitch in Kelsey Creek[4]. According to Mr. Windrem, the Main Street Bridge in Kelseyville is an impassible barrier to upstream hitch migration and no hitch have been observed upstream of this barrier. Regardless of the presence of this comparatively recent barrier (~30-40 years), Mr. Windrem agrees with us that the species would not be able to pass Kelsey Creek Falls several miles below the High Valley and Kelsey Creek confluence. It is very unlikely that the species was

[2] The species is distinguished from common manzanita by the presence of sticky berries which are identifiable (under a dissecting microscope) throughout the year if they can still be found on the plant.
[3] http://lakelive.info/chicouncil.
[4] Personal communication 12/16/09.

ever present above this natural impediment which has almost certainly been present since the Pleistocene era ~11,000 years ago.

- **Foothill Yellow-legged Frog:** Northwest Biosurvey conducted a sensitive herptile (reptile and amphibian) survey along High Valley Creek and adjacent tributaries during two days of field work in November of 2009. The herptile survey report will be submitted separately. The survey area included all of High Valley Creek within the surveyarea. In addition to surveys conducted at this site, we included a Geysers area control site where we have found the species during previous surveys[5]. While habitat for this species along wetted portions of High Valley Creek appeared excellent during the survey, we did not find foothill yellow-legged frogs. We did find the species at the control site at the end of the November survey.

  Due to the known presence of the species in Kelsey Creek, downstream of the project area and to the presence of apparently suitable habitat during the survey, we believe that if the species is present, it is probably seasonally present in low numbers. According to Zander Associates[6] High Valley Creek contained wetted segments well into July. Water was present in the creek at the time of our survey but it appears that this was the result of recent rainfall within the previous 3 weeks. If these frogs are seasonally present, it is unlikely that they would move into the site from downstream locations until early spring.

- **Northwestern Pond Turtle:** We did not find northwestern pond turtle during the survey; however, it is unlikely that the species would be present and observable in November. The species is known to be present in Kelsey Creek and, based on personal communication with Michael Zander, the species was observed in High Valley Creek by Jon Winter[7] during surveys conducted in previous years.

  Northwestern pond turtles disperse widely through the stream systems where they are present and would be present in High Valley Creek between early spring and mid-July or as late into the year as ponded water is present.

7.0 PROJECT IMPACTS & MITIGATION MEASURES

7.1 Impact Overview: See below.

7.2 Construction: We concur with Zander and Associates that the greatest impacts associated with the project will result from construction, primarily clearing and grading. Zander's Figure 7 shows project components overlain on the vegetation map, and total lost acreage is shown in

[5] T11NR9W, Sec. 13 - Tributary to Big Sulphur Creek (38°48.413'N 122°49.314'W).
[6] Zander Report Section 6.2 pp 17, paragraph 1).
[7] Mr. Winter conducted bird habitat surveys for Zander Associates as part of their work on this project.

Zander's Table 2. This depiction is accurate based on our current understanding of the project design and on our field work confirming the accuracy of Zander's vegetation mapping.

7.2.2 Mitigation Measures: The construction phase mitigation measures proposed by Zander and Associates are consistent with professional standards for habitat loss associated with similar projects. Northwest Biosurvey has served as the primary biological consultant to the principal geothermal companies operating in the Geysers over the past 12 years. The mitigation measures proposed in Zander's report are consistent with those we have recommended for similar projects.

Zander and Associates do not attempt to assess whether the impacts would be significant within the context of the CEQA Guidelines. This level of environmental assessment is often left to the local agency preparing the CEQA document (although we typically do state whether we believe impacts will be significant in our biological assessments). It should be noted that determining the level of significance of an environmental impact is highly subjective and, in our experience, varies widely among local agencies. The mitigation measures proposed by Zander and Associates provide the greatest amount of mitigation possible for the project as proposed.

Based on our review of the project with respect to the biological resources present within the project area, it does not appear that the project engineers have considered impacts to biological resources in their design and location of the project components. We believe that the project would benefit significantly from the development of project alternatives that would minimize the very large amount of cut and fill currently being proposed. Additionally, an effort should be made to locate the proposed pads and access roads to minimize loss of woodland and avoidance of serpentine plant communities. Without design changes demonstrating an attempt to avoid sensitive biological resources, we believe the project has a potential to result in significant environmental impacts within the context of the CEQA Guidelines.

7.3 Operation and Maintenance

7.3.1 Impacts: Operation and maintenance impacts associated with geothermal development are well understood based on the 30-year history of development in the Geysers. We concur with Zander and Associates that the greatest potential for environmental impact related to operation and maintenance is spills and traffic.

7.3.2 Mitigation: The mitigation proposed by Zander and Associates is appropriate.

7.4 Decommissioning

7.4.1 Impacts: The impacts associated with decommissioning are appropriately addressed by Zander and Associates. It should be noted that the magnitude of these impacts is directly related to the scale of the cut and fill involved in the construction phase (see our review of Section 7.2.2, paragraph 3, above).

7.4.2 Mitigation: We concur with the measures recommended by Zander and Associates. We would add that based on the current project design, the revegetation being proposed would not replace the type and scale of the plant communities that would be removed during project construction based on the current project design. With regard to implementation, we would note that decommissioning occurs at the end of a project when the permitee has the least commitment to mitigation, or occasionally after project abandonment. Assurance of successful decommissioning should require the maintenance of a completion bond or other financial assurance held by a third party not associated with the permitee. The assurance should be sufficient to cover the entire cost of decommissioning in dollars estimated to be sufficient at the time that decommissioning will occur as determined by regular reviews throughout the life of the project.

SUMMARY

Based on our systematic review of the Zander and Associates biological assessment and on our confirming field review of the project and surrounding survey area, it is our opinion that the biological assessment completed by Zander and Associates meets or exceeds professional standards for this work. Minor recommendations are made throughout the body of this review. Of particular note is our recommendation to the project proponent, BRP, that project alternatives should be developed minimizing the amount of cut and fill currently being proposed and attempting to relocate or re-orient project components to minimize impacts to woodlands and serpentine plant communities (see our Section 7.2.2, paragraph 3 above).

Prepared by:

ORINGINAL SIGNED

Steve Zalusky
Principal Biologist

EXHIBIT 4.6-8

HABITAT EVALUATION AND SURVEY FOR FOOTHILL YELLOW-LEGGED FROG (*Rana boylii*) AND NORTHWESTERN POND TURTLE (*Actinemys marmorata ssp. marmorata*)

BOTTLE ROCK POWER STEAM PROJECT

1.0 PURPOSE OF SURVEY

This survey has been conducted as part of the environmental review for expansion of the Bottle Rock Power steam field. The intent of this survey is to determine whether yellow-legged frogs (*Rana boylii)* or western pond turtles (*Actinemys marmorata ssp. marmorata*) are present within portions of the High Valley Creek corridor in the project survey area (shown in Figure 4.6-5 of the EIR).

2.0 AREA SURVEYED

2.1 <u>Location</u>: The portions of High Valley Creek included within the survey are located in T11N R8W Sec. 6, and T10N R8W Sec. 31 of The Geysers, CA 7½' Topographic Map. The stream segment is bounded between 38°50.168N, 122°46.151'W and 38°50.819'N, 122°47.09'W. A Geysers control site (where we have previously found foothill yellow-legged frogs) was included in the survey. The control site is located in a tributary to Big Sulphur Creek; T11N R9W Sec. 12 of The Geysers, CA 7½' Topographic Map (38°48.413'N, 122°49.314'W). These sites are shown in **Figure 1**.

2.2 <u>Description of Survey Sites and Setting within 1.6 km (1 mile)</u>:

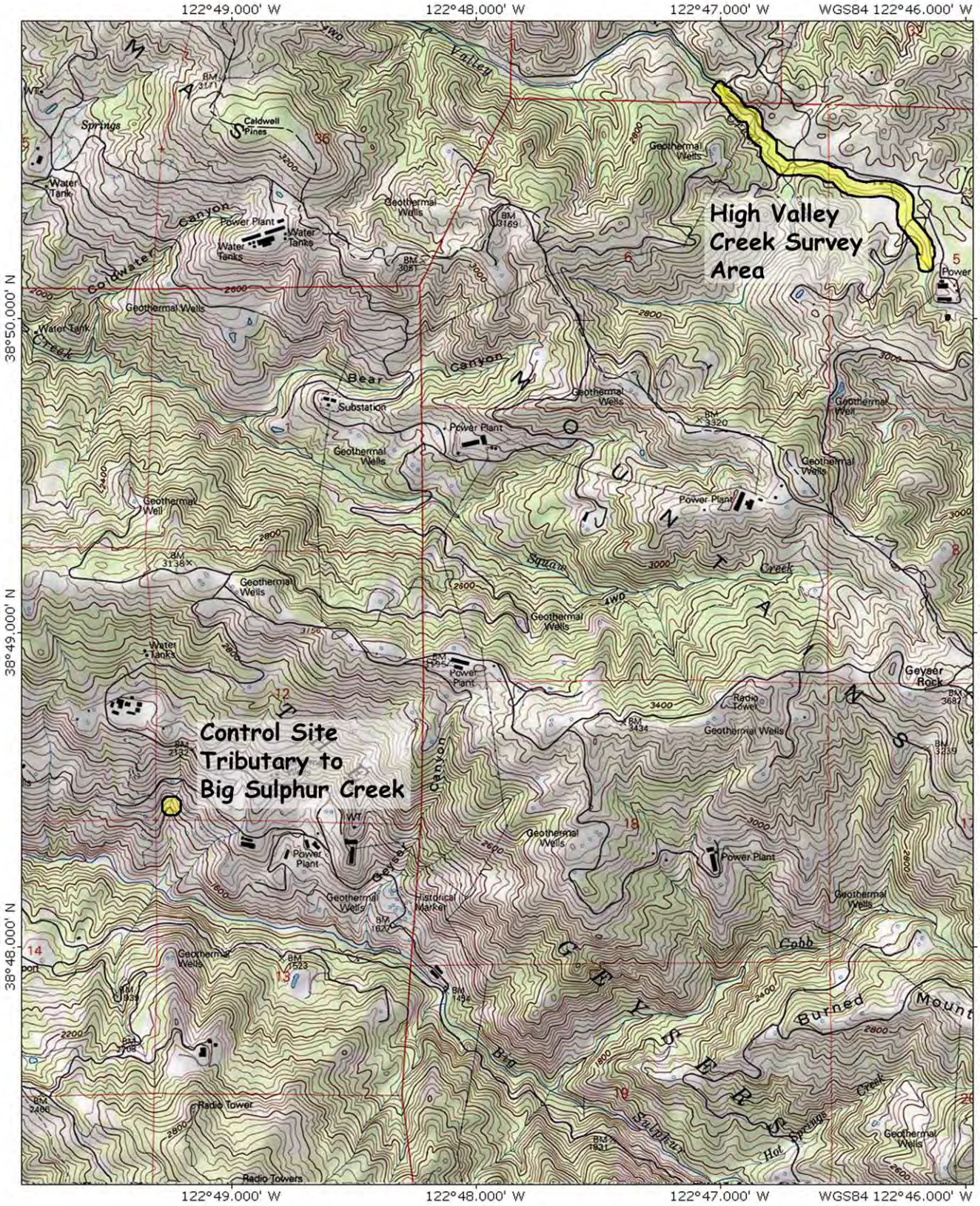
The segment of High Valley Creek within the survey area extends approximately 2,500 feet from southeast (upstream) to southwest. The active channel ranges from six to eight feet in width with pools up to 18 inches in depth, six feet wide and as much as 20 feet long. The banks support dense willow shrub (narrow-leaved and red willow) where adjacent banks are low enough to support riparian vegetation. The riparian and aquatic herptile habitat consists of a narrow band along the edges of High Valley Creek. This immediately gives way to the surrounding zonal vegetation. Surrounding vegetation communities are described in detail in Section 4.6 – *PLANT COMMUNITIES AND HABITATS PRESENT WITHIN THE PROJECT AREA*. These same communities extend into the steep surrounding terrain within the 1.6 km perimeter "survey setting" area.

The Geysers control site (a tributary to Big Sulphur Creek) consists of a high gradient perennial stream within a deep canyon containing waterfalls into deep clear pools. The site contains little riparian vegetation due to the very steep banks of this deeply incised stream. Dense shade is provided by the steep canyon walls.

3.0 METHODS

The methods used in this survey are primarily based on the "*TES Standardized Approach for Habitat Assessment and Visual Encounter Surveys for the Foothill Yellow-Legged Frog (Rana boylii)*"[1]. However, actual field survey technique relies on the more intensive "2005 Revised Guidance on Site Assessment and Field Surveys for the California Red-legged Frog (Rana aurora draytonii)", as distributed by the Field Supervisor of the Sacramento Field Office. The survey was expanded to include northwestern pond turtle (Actinemys *marmorata ssp. marmorata*). This species is readily apparent when present during aquatic herptile (reptile and amphibian) surveys, but requires more intensive stealth in approaching survey sites preceded by initial long- distance binocular survey.

[1] Craig P. Seltenrich, et al., Pacific Gas and Electric Company Technical and Ecological Services, May 2002.



NORTHWEST BIOSURVEY
P.O. Box 191
Cobb, CA 95426
(707) 928-1985

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HERPTILE SURVEY SITES

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06/27/10

3.1 Pre-Survey Research: Prior to the survey, the California Natural Diversity Database (CNDDB) overlay for The Geysers, CA 7½' Topographic Map was reviewed. Mapped populations of foothill yellow-legged frog occur in Squaw Creek and Big Sulphur Creek within the Russian River Drainage. The closest known population is in Squaw Creek two miles west and beyond the intervening ridge of the Mayacmas Mountains. Western pond turtles occur in Big Sulphur Creek approximately 5 miles to the south, beyond the intervening ridge of the Mayacmas Mountains.

3.2 Survey Dates: Surveys were carried out on 10-26-09 and 11-23-09 at the High Valley Creek site, and 11-19-09 at the control site. This time span was based on contract signing and project completion dates defined by the client. The control site was included in the survey due to the low temperatures and lateness of the season.

3.3 Environmental Conditions:

- **Air temperatures** during the survey ranged from 65°F to 72°F.
- **Water temperature** within pools ranged from 48°F in the morning to 53°F in the mid-to-late afternoon.

3.4 Field Staff: The principal staff involved in the survey is Steve Zalusky of Northwest Biosurvey. Mr. Zalusky has a Bachelor of Science Degree in Zoology, a Master of Science Degree in Biology specializing in herpetology, and more than 30 years of experience as a field biologist in the government and private sectors.

Field surveys and final report review were conducted with the assistance of Danielle Zalusky, Northwest Biosurvey principal planner. Ms. Zalusky has over 20 years of experience as a planner in local government and the private sector.

3.5 Survey Procedure: All surveys were carried out using a standardized survey protocol. Prior to approaching a site, an effort was made to listen for calling frogs. The site was then viewed at a distance with binoculars in an attempt to view frogs or turtles before they could be disturbed by human presence.

Close-up surveys were carried out following the period of listening and scanning. Banks were walked slowly in an attempt to view herptiles before they jumped into the water. In instances where frogs leaped into the water without emitting a "squawk" (and thereby identifying themselves as bull frogs), an effort was made to mark the location of the channel bottom where the frog hid beneath detritus and then wait for it to resurface.

During surveys, loose objects on shore were carefully lifted and replaced in an effort to observe frogs and other herptiles. Egg masses were not observed during the survey. Any amphibian larvae present were identified and recorded. No night-time surveys were conducted.

4.0 SURVEY RESULTS

- **Foothill Yellow-legged Frog:** No foothill yellow-legged frogs were found within the High Valley Survey area during the survey. Three adult foothill yellow-legged frogs were observed at the control site on 11-19-10.
- **Western Pond Turtle:** No western pond turtles were observed at either location during the survey.
- **Other aquatic herptiles observed:** None.

APPENDIX A

HERPTILE SURVEY FORMS

Site HVC
Habitat

Appendix D.
California Red-legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by _____ (USWS Field Office) (date) (biologist)

Date of Site Assessment: 11/23/09 (mm/dd/yyyy)

Site Assessment Biologists: Zalusky (Last name) Steve (first name) _____ (Last name) _____ (first name)

Zalusky (Last name) Danielle (first name) _____ (Last name) _____ (first name)

Site Location: High Valley Creek, Lake Co. 38°50.788'N 122°47.084'W
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S). Wpt 13

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Bottle Rock Power
Brief description of proposed action: Geothermal project

1) Is this site within the current or historic range of the CRF (circle one)? (YES) NO

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one)? YES (NO)
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(if multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND:

Size: _____ Maximum depth: _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Perennial or Ephemeral *(circle one)*. If ephemeral, date it goes dry: _____

Site HVC
Hab.

Appendix D.
California Red-legged Frog Habitat Site Assessment Data Sheet

STREAM:

Bank full width: 15'
Depth at bank full: 18"
Stream gradient: steep

Are there pools (circle one)? (YES) NO
If yes,
Size of stream pools: 7' x 20'
Maximum depth of stream pools: 18"

Characterize non-pool habitat: run, riffle, glide, other: Pool-riffle pattern every 30'

Vegetation: emergent, overhanging, dominant species: Primarily zonal Doug fir - canyon live oak with scattered clumps of white alder & shining willow

Substrate: Boulder w/ sand & gravel

Bank description: Steep, high gradient

(**Perennial**) **or Ephemeral** *(circle one)*. **If ephemeral, date it goes dry:** _____

Other aquatic habitat characteristics, species observations, drawings, or comments:

Photo 1

Riparian limited to channel width, consists of willow, alder, in-channel rushes surrounded by zonal plant comm., incl. Doug fir-pond pine-black oak forest & Survey area extends 200' upstream.

*also includes knobcone pine chaparral.

Necessary Attachments:

1. **All field notes and other supporting documents**
2. **Site photographs**
3. **Maps with important habitat features and species location**

Site HVC
DL

Appendix E.
California Red-legged Frog Survey Data Sheet

Surveys reviewed by: _____ (FWS Field Office) _____ (date) _____ (biologist)

Date of Survey: 10/26/09 (mm/dd/yyyy) **Survey Biologist:** Zalusky (Last name) Steve (first name)

Survey Biologist: _____ (Last name) _____ (first name)

Site Location: Lake Co., High Valley Creek N 38° 50.652' W122°46.922'-Wpt 2 N 38° 50.691' W122° 46.960'-Wpt 1
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Bottle Rock Power
Brief description of proposed action: Geothermal project

Type of Survey (circle one): (DAY) NIGHT BREEDING (NON-BREEDING)

Survey number (circle one): (1) 2 3 4 5 6 7 8

Begin Time: 10:30 AM **End Time:** 12:22 PM

Cloud cover: None **Precipitation:** None

Air Temperature: 72°F **Water Temperature:** 48°F

Wind Speed: 0-2 mph **Visibility Conditions:** Good

Moon phase: NA **Humidity:** Moderate

Description of weather conditions: Cold, clear

Brand name and model of light used to conduct surveys: NA

Were binoculars used for the surveys (circle one)? (YES) NO
Brand, model, and power of binoculars: Swift 10 x 42

Site 4VC
D1

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of Indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
none					

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: _____

Other notes, observations, comments, *etc.*

Wpt 1 – survey time Wpt 2 – beginning of flow

Necessary Attachments:

4. All field notes and other supporting documents
5. Site photographs
6. Maps with important habitat features and species locations

Site HVC
DZ

Appendix E.
California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____ (FWS field Office) _____ (date) _____ (biologist)

Date of Survey: 11/23/09 (mm/dd/yyyy) **Survey Biologist:** Zalusky (Last name) Steve (first name)
Survey Biologist: Zalusky (Last name) Danielle (first name)

Site Location: Lake Co., High Valley Creek, 38°50.788'N 122°47.084'W
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Battle Rock Power
Brief description of proposed action: Geothermal project

Type of Survey (circle one): DAY NIGHT **BREEDING NON-BREEDING**

Survey number (circle one): 1 2 3 4 5 6 7 8

Begin Time: 12:05 P **End Time:** 2:05 PM

Cloud cover: None **Precipitation:** None

Air Temperature: 66°F **Water Temperature:** 40.5°F

Wind Speed: 0 mph + gusts to 3.2 mph **Visibility Conditions:** Good

Moon phase: NA **Humidity:** Moderate

Description of weather conditions: Clear, cool

Brand name and model of light used to conduct surveys: NA

Were binoculars used for the surveys (circle one)? YES NO
Brand, model, and power of binoculars: Swift 10x42

Site HVC
DZ

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of Indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
None					

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: _____

_____
_____
_____
_____

Other notes, observations, comments, *etc.*

Necessary Attachments:

4. All field notes and other supporting documents
5. Site photographs
6. Maps with important habitat features and species locations

6

Control Site
Habitat

Appendix D.
California Red-legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by _____
(FWS Field Office) (date) (biologist)

Date of Site Assessment: 11/19/09
(mm/dd/yyyy)

Site Assessment Biologists: Zalusky Steve _____
(Last name) (first name) (Last name) (first name)

_____ _____
(Last name) (first name) (Last name) (first name)

Site Location: Lake Co, Tributary to Big Sulphur Ck; N38°48.413' W122°49.314'
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Battle Rock Power
Brief description of proposed action: Geothermal project

1) Is this site within the current or historic range of the CRF (circle one)? YES NO

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one)? YES NO
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(if multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND:

Size: _____ Maximum depth: _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Perennial or Ephemeral *(circle one)*. If ephemeral, date it goes dry: _____

7

Control Site
Hab.

Appendix D.
California Red-legged Frog Habitat Site Assessment Data Sheet

STREAM:

Bank full width: 4'
Depth at bank full: up to 4'
Stream gradient: 60%

Are there pools (circle one)? (YES) NO
If yes,
Size of stream pools: 10' x 15'
Maximum depth of stream pools: up to 4'

Characterize non-pool habitat: run, riffle, glide, other: waterfall to 20'

Vegetation: emergent, overhanging, dominant species: no riparian

Substrate: bedrock

Bank description: near vertical

(**Perennial**) **or Ephemeral** *(circle one)*. If ephemeral, date it goes dry: _____

Other aquatic habitat characteristics, species observations, drawings, or comments:

This is an off-site control point.

Necessary Attachments:

1. All field notes and other supporting documents
2. Site photographs
3. Maps with important habitat features and species location

8

Control Site
Day 1

Appendix E.

California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____ (USFWS field office) _____ (date) _____ (biologist)

Date of Survey: 11/19/09 (mm/dd/yyyy) **Survey Biologist:** Zalusky (Last name) Steve (first name)

Survey Biologist: _____ (Last name) _____ (first name)

Site Location: Lake Co., Trib. to Big Sulphur Creek, N38°48.413' W122°49.314'
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Bottle Rock Power
Brief description of proposed action: Geothermal Project

Type of Survey (circle one): (DAY) NIGHT BREEDING (NON-BREEDING)

Survey number (circle one): (1) 2 3 4 5 6 7 8

Begin Time: 1:15 PM **End Time:** 2:00 PM

Cloud cover: Clear **Precipitation:** None

Air Temperature: 70°F **Water Temperature:** 60°F

Wind Speed: 0-2 mph **Visibility Conditions:** Good

Moon phase: NA **Humidity:** Moderate

Description of weather conditions: Clear, warm

Brand name and model of light used to conduct surveys: Na

Were binoculars used for the surveys (circle one)? (YES) NO
Brand, model, and power of binoculars: Swift 10 x 42

9

Control Site
D1

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of Indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
Rana boylii	3	O	Adult	3-4cm	High

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: None

Other notes, observations, comments, *etc.*

Necessary Attachments:

4. All field notes and other supporting documents
5. Site photographs
6. Maps with important habitat features and species locations

APPENDIX F
HYDROLOGY AND WATER QUALITY

Water Resources Addendum for the Petition to Amend

The California Energy Commission Final Decision on Bottle Rock Power Plant (79-AFC-4C)

February 2010

Prepared for:
Bottle Rock Power, LLC
7385 High Valley Road
Cobb, CA 95426

Prepared by:
RMT Inc.
4 West Fourth Avenue, Suite 303
San Mateo, California 94402

Water Resources Addendum for the Petition to Amend

The California Energy Commission Final Decision on Bottle Rock Power Plant (79-AFC-4C)

February 2010

Prepared for:
Bottle Rock Power, LLC
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Cobb, CA 95426

Prepared by:
RMT Inc.
4 West Fourth Avenue, Suite 303
San Mateo, California 94402

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1.2 Environmental Impact Analysis 1-2
2: Conditions of Certification 2-1
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APPENDIX A: Water Supply Test Well Construction and Aquifer Test Summary
APPENDIX B: Aquifer Test Letter Report

LIST OF FIGURE

Figure 1: Waterways, Springs, and Wells in the Project Area 1-3

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1: Introduction

This report is an addendum to the Water Resources section, Section 4.17 of the Petition to Amend (PTA), submitted on September 30, 2009 to the California Energy Commission (RMT 2009). Up to 80 gallons per minute (gpm) of water are needed for the Bottle Rock Power (BRP) Steam Project during construction, for drilling, general dust control, and control of serpentinite dust. There were uncertainties in the PTA as to the potential effects of groundwater extraction because the source of water was not yet fully known at the time the PTA was submitted.

The uncertainties were specifically related to the following questions that are part of Section 4.17.2.1 CEQA Significance Criteria:

> *Would the project substantially deplete groundwater supplies or interfere with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of preexisting nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted)?*
>
> *Would the project cause substantial well interference with existing wells, and/or induced groundwater recharge where nearby streams begin to lose substantial water to the groundwater aquifer?*

Significant new information has recently been collected during recent testing of the groundwater aquifer by pumping of a test water supply well, PTW-1. The location of the test well is shown in Figure 1, and in more detail in Figure 1 of Appendix B. The new information, with details provided in Appendices A and B, helps to clarify water resources questions that arose during preparation of the PTA, with respect to the potential effects of pumping groundwater.

The following analysis clarifies the uncertainties that previously existed in the PTA regarding effects of groundwater pumping on water resources. Only the revised portions of the PTA are presented here.

1.1 Aquifer Test Location

Water for construction and drilling would be obtained from one or more water supply wells. A water supply well, based on information obtained from the test well, would be a 5-inch diameter PVC well with 0.020-inch slotted screen from 98.5 to 138.5 feet, encompassing a highly fractured permeable zone in the greywacke bedrock. The pump details have not yet been selected. A detailed geologic boring log and well construction details for the test well are presented in Appendix B.

A constant rate aquifer test was conducted for 49 hours at a rate of 80 gpm. The details of the aquifer test analysis are presented in Appendix B. The aquifer test results yielded values of 932 ft^2/day for transmissivity and 28 ft/day for hydraulic conductivity.

The aquifer test indicated that the fractured bedrock aquifer acts like a confined, permeable aquifer, capable of yielding 80 gpm or more. The upper 90 feet of bedrock is apparently not

fractured sufficiently to transmit drawdown effects during the pumping test. As a result, there is no evidence that drawdown is transmitted upward to shallow groundwater or the creek.

1.2 Environmental Impact Analysis

1.2.1 CONSTRUCTION IMPACTS

Dust Control

Future water usage for drilling and for well pad construction was summarized in Section 4.17.2.2 of the PTA (RMT, 2009). Recently obtained geologic data indicate that serpentine rock would not be uncovered during construction of the West Well Pad (EnvironStrategy 2009), and therefore, the pad area would not require misting for suppression of serpentine dust. Watering for dust control would still be needed but at a lower rate of water application. The East Well Pad would still require misting for serpentinite. Estimates of water needs for well pad construction activities have been revised downward, to be 115,000 gallons per day (80 gallons per minute [gpm]) or less for dust control for construction, traffic, and for serpentine rock misting, over a period of approximately 120 days during 2010 for the East Well Pad. Current plans are for the West Well Pad to be constructed in 2011. The West Well Pad construction will require only dust control for construction and traffic, not serpentine rock misting; the water requirements are estimated to be approximately 79,000 gallons per day for the West Pad construction.

Well Drilling

After well pad construction ends, well drilling will begin. Water use will decrease to an estimated 40,000 gallons per day. This number is a high estimate and would only be the case during mud drilling with lost circulation, and not for the entire 60 to 90 days per well, over a period of three to four years.

High Valley Creek

There is no indication that pumping at the depth of the water supply well would affect water levels in the shallow water table or creek. The water levels in the creek were closely monitored during the 2-day aquifer test and they showed no effect from pumping. As a result, no impacts to the water supply or to adjacent riparian vegetation are expected.

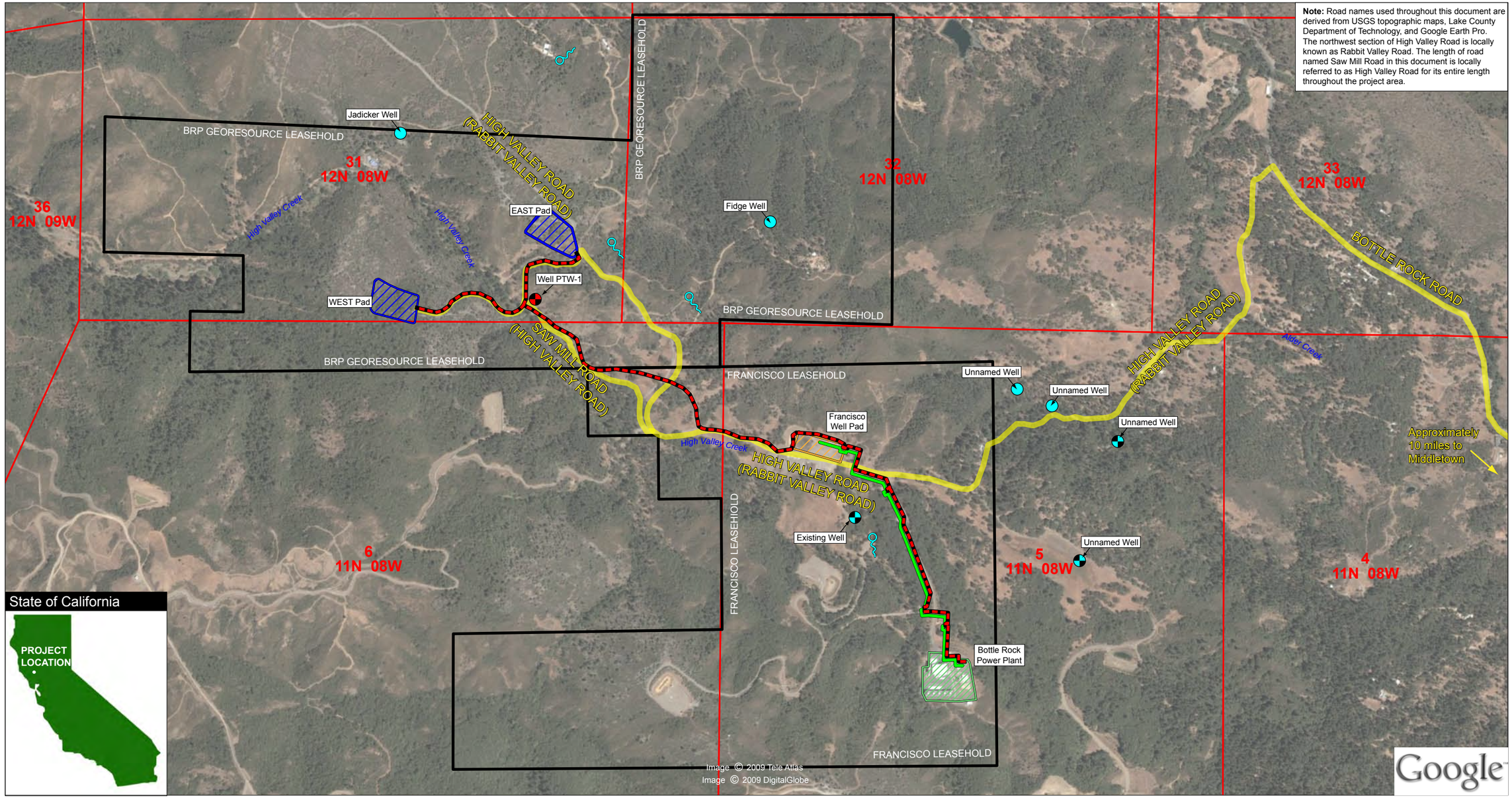
Springs

Springs located above the valley floor would not be expected to be affected by the pumping of a water supply well because there was no effect observed in water levels in shallow groundwater at the valley floor during the aquifer test at PTW-1. Springs located on the hillside are higher in elevation and more distant from the bedrock aquifer being pumped, and would be even further removed hydraulically. No impacts to springs are expected.

Other Water Supply Wells

No water supply wells are expected to be affected by the pumping of the new water supply well, at the projected pumping rates because of the location of the wells and springs and the lack of

Figure 1: Waterways, Springs, and Wells in the Project Area



SOURCE: Google Earth Pro 2009, Lake County Department of Information Technology 2003, and RMT Inc. 2009

Aerial imagery flown in 2004

LEGEND

- Proposed Steam Pipeline
- Existing Bottle Rock Pipeline
- Primary Access Route
- Existing Drilled Well
- Resident Spring Well
- Test Well
- Spring
- Proposed Well Pad
- Existing Francisco Well Pad
- Existing Bottle Rock Power Plant
- USGS Section Boundary
- Leasehold Boundary

0 500 1,000 1,500 Feet

RMT • ENVIRONMENT • ENERGY • ENGINEERING

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effect during the aquifer test. Only one water supply well, at the Jadicker residence, occurs within a reasonable (0.5 mile) radius of the Project well. The Jadicker well is located approximately 1,700 feet northwest of the Project water supply well (PTW-1). The "spring well" at this location is a spring with a water supply pipe inserted into the spring, located on a hillside more than 40 feet above High Valley Creek. The location of the Jadicker spring well on the hillside implies that the water flowing to the spring is derived from a higher elevation, and is not connected to the fractured bedrock aquifer the Project Well is utilizing. This lack of connection is evident because the water level in PTW-1 is below ground surface in the valley floor, and far beneath the elevation of the Jadicker spring well. This hydraulic condition also implies that water flowing to the Jadicker well would not be affected by pumping of the fractured bedrock aquifer below, at a depth of more than 100 feet below ground surface, because the aquifer test at PTW-1 showed no response to pumping in the shallow groundwater or the creek. The Jadicker spring well would be expected to be even farther removed hydraulically than the shallow groundwater near the test well, since the well is located more than 1,700 feet distant and is above the valley floor.

Other residences with wells that are beyond the 0.5 mile radius would be even more removed hydraulically from the Project's pumping than the Jadicker well. For example, the Fidge residence well is located across a ridge (drainage divide) from the test well and is more than 0.5 miles distant. The "Existing Well" shown just south of the Francisco Well Pad is a water supply well owned by BRP used for the existing BRP plant facility and is over 4,000 feet southeast of well PTW-1. Four other "Unnamed Wells" identified on Figure 1 are more than 5,000 feet southeast of PTW-1, and three of the four unnamed wells are separated from PTW-1 by a ridge and a drainage divide. No impacts to the BRP existing well or the four unnamed wells are expected, based on the long separation distance from well PTW-1, the presence of a hydraulic divide, and the limited, local drawdown experienced during the aquifer test.

No impacts to other water supply wells would occur.

No other portions of Section 4.17 of the PTA are affected by the new information.

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2: Conditions of Certification

2.1 Proposed Conditions of Certification

The COCs applicable to BRPP were originally adopted by the CEC in 1980. In April 1993, the CEC approved an amendment to the COCs that modified the monitoring and reporting requirements in consideration of BRPP's shut down status (Order 93-0426-02). The COCs were modified again in 2006 in conjunction with the refurbishment and restart of the facility (Order 06-1213-12).

The project owner proposes the existing COC Soil & Water-7 be updated to reflect current sampling locations. Previous sampling locations identified in the existing COC Soil & Water-7 have not been sampled due to access issues. Text proposed to be deleted is shown in ~~strikethrough~~ and added text is <u>underlined</u>.

SOIL & WATER-7 The project owner shall continue groundwater sampling at ~~Nance Spring, Union Oil Spring,~~ Coleman Well, ~~Jadiker Spring, and~~ Francisco Well, and <u>Barrett Spring</u>. Sampling shall be conducted in April, July, and October of each year. Protocol: Each groundwater sample shall be analyzed for boron, sodium, sulfate, calcium-magnesium hardness, pH, alkalinity, settlable solids, non-filterable residue, turbidity, specific electrical conductivity, magnesium, calcium, copper, iron, lead, manganese, and zinc.

<u>Verification</u>: The project owner shall include the results and a discussion of the year's monitoring in the BRMMSR.

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3: References

RMT, Inc. 2009. Petition to Amend, Bottle Rock Geothermal Plant. Prepared for California Energy Commission. September 2009.

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APPENDIX A:
Water Supply Test Well Construction and Aquifer Test Summary

WATER SUPPLY TEST WELL INSTALLATION

The test well (PTW-1) is located midway between the East and West Well Pads, in the lowland approximately 80 feet from High Valley Creek, along High Valley Road. The location of the well is shown in Figure 1, and in more detail in Figure 1 of Appendix B. The well is located in an area of thin gravelly loam alluvium, generally one to two feet thick but 12 feet thick at the well, overlying greywacke bedrock. No water was encountered during boring in the upper 70 feet of boring.

A substantially fractured greywacke bedrock zone was encountered from 101 to 134 feet bgs, which produced a high volume of water. A US Geological Survey report includes a geologic map of the area from McLaughlin (1978), which shows the location of well PTW-1 to be within approximately 100 feet of a known fault. The fault may be the cause of the highly fractured bedrock that occurs at the 101 to 134 foot depth.

The water supply test well is screened from 98.5 to 138.5 feet, encompassing the highly fractured and permeable zone in the greywacke bedrock. A detailed geologic boring log and well construction details are presented in Appendix B.

AQUIFER TESTING

A recently completed aquifer test has revealed important aquifer information regarding the hydraulic conductivity of the aquifer in the fractured bedrock, and information regarding the hydraulic isolation of the producing zone (at 101 to 134 feet bgs) from the surface. The aquifer test was conducted on the newly-installed water supply test well PTW-1, and it included a step drawdown test and a constant rate test. Details of the aquifer test are presented in Appendix B.

The step drawdown test was conducted first to identify a sustainable constant rate of pumping for the constant rate test. Discharge from the well was routed approximately 500 feet down gradient and approximately 100 feet on the far side (south) of High Valley Creek. Based on the results for the step drawdown test, a pumping rate of 80 gpm was selected for the constant rate test.

After an overnight recovery period during which the test well reached essentially full recovery, the constant rate test was started on December 15, 2009 and was monitored at three key locations:

- The pumped well (PTW-1)
- A shallow test well (PTW-2) located 80 feet southwest of the pumping well and screened from 5 to 10 feet bgs in the alluvium directly above bedrock
- High Valley Creek adjacent to (within 20 feet) of the shallow test well

A shallow test well (PTW-2) was installed at the water table near High Valley Creek, so that it could monitor shallow groundwater levels that are likely to be important for trees and riparian vegetation alongside the creek. Monitoring the water level in the shallow test well was intended to evaluate whether pumping well PTW-1, screened deeper in the bedrock, might have any effect on shallow groundwater levels.

The constant rate aquifer test was conducted for 49 hours at a rate of 80 gpm, and then for an additional 5 hours during the recovery phase after cessation of pumping. The pumping rate was

selected to match the water needs during the most water-intensive portion of well pad construction, when water use would be highest.

Aquifer Test Results

The water level in the pumping test well decreased rapidly within the first minute, and then continued to decline slowly over time, reaching a drawdown value of approximately 29 feet within about 5 hours after startup. Rapid water level decline in the first minute is typical in pumped wells, and is due to the removal of water stored in the well casing. The water level then continued to fall slowly during the remainder of the 49-hour test, to a maximum value of approximately 28 feet at the end of the test. Although the drawdown did not reach an equilibrium level during the 49-hour test, the rate of decline was approaching equilibrium, and it is expected that the total drawdown under equilibrium conditions would not exceed 35 feet in the pumping well.

There was no discernable response of the water level in the shallow well during the test. Similarly there was no apparent response in the level of the creek based on pressure transducer measurements taken every minute throughout the test. Small variations of approximately 0.1 to 0.2 feet occurred in the shallow well and the creek, following a short period of rain on December 16 (the second day of the test) when approximately 0.85 inch of rain fell. The water level in the shallow test well and the creek both rose and then slowly declined following the rain. Otherwise, the water levels in the shallow groundwater and the creek remained essentially constant.

Aquifer test analysis was conducted to obtain estimates of aquifer transmissivity, hydraulic conductivity, and storage coefficient. The details of the aquifer test analysis are presented in Appendix C. The aquifer test results yielded values of 932 ft^2/day for transmissivity and 28 ft/day for hydraulic conductivity.

In summary, there was no evidence of any effect of pumping on the water levels in the shallow groundwater or in the creek.

CONCEPTUAL MODEL OF RESPONSE TO PUMPING

A conceptual model of hydrogeologic conditions is includes the concepts that away from fault zones, low permeability greywacke, greenstone, and serpentenite bedrock of the Franciscan Formation yields small amounts of groundwater to wells, in the range of less than 2 gpm. Within the fault zone associated with the 101 - 134 foot deep fractured bedrock of the Project water supply well (PTW-1), permeability and water yield are high, yielding more than 80 gpm. The upper 90 feet of bedrock are apparently not fractured sufficiently to yield water or to transmit drawdown effects during the pumping test. As a result, there is no evidence that drawdown is transmitted upward to the surface or to higher elevations on the hillsides.

REFERENCE

McLaughlin, Robert J., 1978. Preliminary geologic map and structural sections of the central Mayacmas Mountains and The Geysers steam field, Sonoma, Lake, and Mendocino counties, California. USGS Open-File Report 78-389.

APPENDIX B:
Aquifer Test Letter Report

environ strategy consultants, inc.

One Technology Drive, Ste. B-123
Irvine, California 92618
tel 949.486.0884
fax 949.486.0885
environstrategy.com

January 18, 2009

Mr. Brian Harms
General Manager
BRP Steam Holdco, LLC
P.O. Box 1250
Cobb, California 95426

Project No. 484-I

Aquifer Test Letter Report
Bottle Rock Binkley Lease
7385 High Valley Road
Cobb, California 95426

Dear Mr. Harms:

Environ Strategy Consultants, Inc. (Environ Strategy), on behalf of Bottle Rock Power (BRP) is pleased to present this Aquifer Test Letter Report (Report) for the above-referenced site. The purpose of the aquifer test was to first determine the sustainable amount of groundwater available for construction, drilling, general dust control and serpentine dust control and second to evaluate whether alluvial groundwater was in hydraulic communication with the lower fractured bedrock aquifer.

The well installation activities and aquifer test were conducted in accordance with Lake County and the State of California Environmental Protection Agency Guidance Manual for Ground Water Investigations. This Report presents the results of the well installation and aquifer test procedures, test results and conclusions.

Well Locations and Construction

Well locations are shown on Figure 1. Geologic logs and well construction details are presented in the Attachment. A hydrogeologic section including the wells PTW-1, PTW-2, and High Valley Creek is shown in Figure 2.

Aquifer Testing

An aquifer test was conducted using PTW-1 as the pumping well, PTW-2 as an observation well, and High Valley Creek as an additional observation station. Continuously recording transducers were placed at 95 feet in PTW-1, 10 feet in PTW-2, and at the bed-level of the creek. All data from the test are summarized on Figure 3, where they are plotted against a common linear time axis.

Groundwater pumping test procedures

The test was conducted over five days, and included establishing pre-test static water levels in wells and the creek before pumping began. A continuous step drawdown test was then conducted at successive pumping rates of approximately 25, 50 and 80 gpm. The water level in the pumping well was allowed to return to the pre-test static level and a constant rate drawdown test was conducted at 80 gpm for approximately 49 hours.

Water level observations

Water levels (elevations) in both wells and the creek were recorded continuously by transducer and periodically by hand throughout the test period, and include five measurement intervals: static, step test, first recovery, constant rate test, and second recovery. These data are shown on Figure 3, along with the pumping test intervals and rates; and also on Figures 6, 7 and 8 in expanded format.

Barometric pressure, rainfall, and recharge

Significant rainfall occurred during the constant rate test, producing elevated creek levels, followed by recharge recorded in PTW-1 and PTW-2 during the test. Note the downward trend of water levels in PTW-2 until reversed by recharge at hour-16 of the test period. Rainfall and barometric pressure records from a regional monitoring station were obtained and are plotted for reference on Figure 3.

Time-drawdown data analysis

Semi-log time-drawdown and recovery analyses were performed for the pumping well PTW-1, and are shown in Figures 4 and 5, respectively. The pumping well was utilized for the analysis because no measurable drawdown was observed in the observation well, PTW-2. The drawdown analysis indicates that casing storage was overcome in the initial 3 minutes of pumping, and drawdown thereafter reflects aquifer transmissivity. The drawdown analysis yielded values of 933 ft^2/day for transmissivity and 28 ft/day for hydraulic conductivity. Analysis of the well recovery yielded a similar transmissivity value.

Pumping test discharge water quality

Water samples were collected for general minerals analysis at the beginning and end of the constant rate test. The results are presented in Table 1. No significant differences are apparent in the analyses, indicating a single groundwater source.

Summary of Test Results and Conclusions

Figure 2 summarizes our current understanding of the geology and groundwater relationships in the immediate vicinity of the wells. PTW-1 is a bedrock well, screened across a highly

fractured producing zone between depths 101 and 134 feet. Based on the test results, the producing zone acts like a confined aquifer with a potentiometric surface at about 7 to 8-feet bgs, capable of yielding 80 gpm or more. The rock above the zone produces little or no water. PTW-2 is a shallow well screened in alluvium, which communicates with High Valley Creek during periods of flow. It appears that the alluvial aquifer, including the creek, does not communicate with the confined aquifer encountered in the deeper well; no measurable drawdown was produced at the shallow observation well PTW-2 by pumping from PTW-1.

Respectfully submitted,

Margaret Patrick, PG 7620
Senior Geologist

Kevin O'Malley
Senior Project manager

Kent McMillan, PhD
CEG 1152; CHG 435
Consultant Hydrogeologist

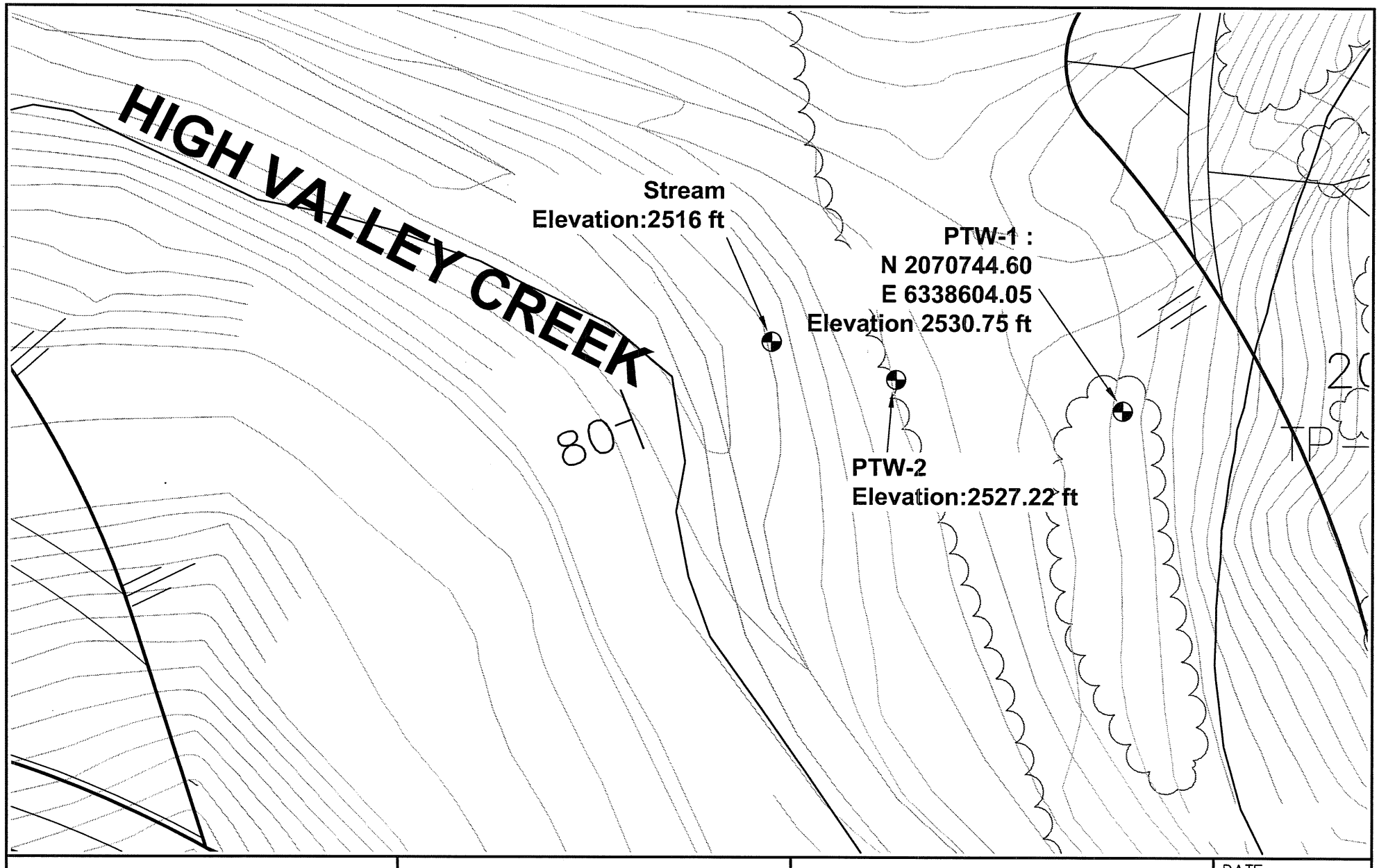
John McNamara
C.E.G. 1725
Principal Engineering Geologist

Figure 1: Site Plan
Figure 2: Hydrogeologic Diagram
Figure 3: All-Data Plot
Figure 4: PTW-1 Drawdown Analysis
Figure 5: PTW-1 Recovery Analysis
Figure 6: PTW-2 and Stream Groundwater Elevations
Figure 7: PTW-1, PTW-2 and Stream Groundwater Elevations vs. Time
Figure 8: PTW-1 Step Pump Test Drawdown vs. Time

Table 1: General Minerals Chemistry

Attachment: Well Logs

FIGURES



N

40 0 40

SCALE: 1" = 40'

environ strategy consultants, inc.

One Technology Drive, Suite B-123
Irvine, California 92618

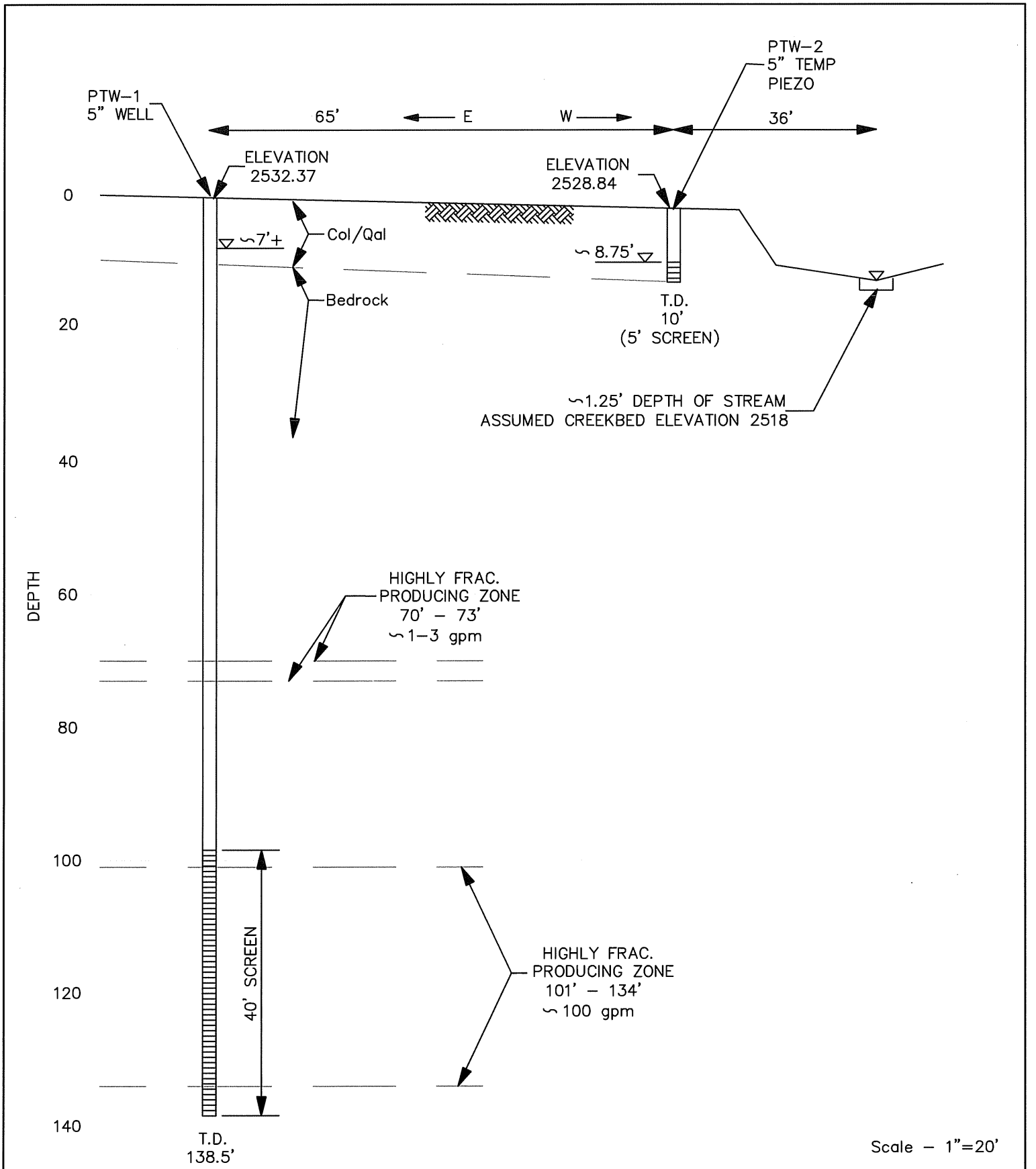
Figure 1
WELL LOCATIONS

BRP Binkley Lease
7385 High Valley Road
Cobb, CA 95426

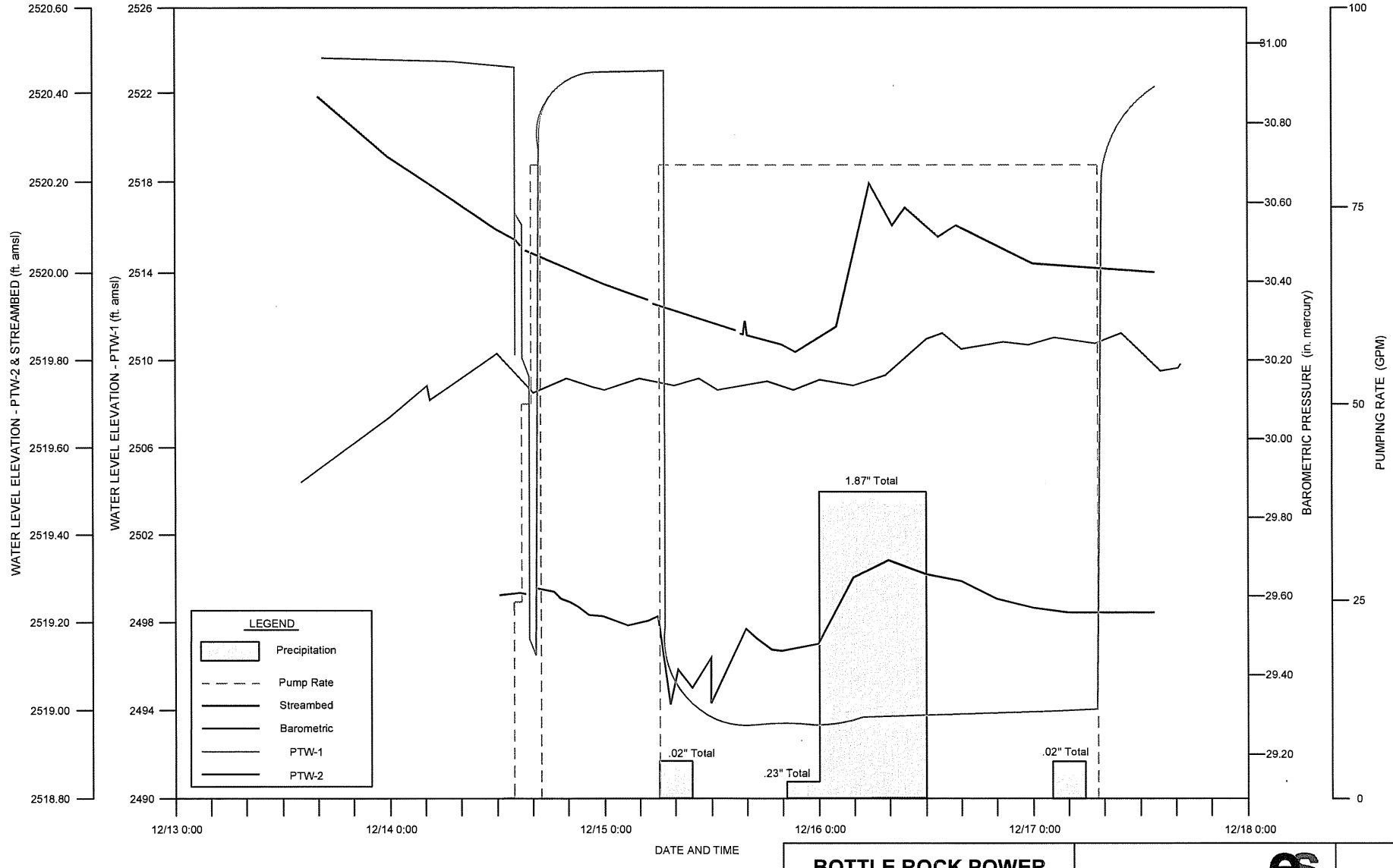
DATE
12/23/09

PROJECT NO.
484-I

FILE NO.
C-GEO-wells.dwg



environ strategy consultants, inc. One Technology Drive, Suite B–123 Irvine, California 92618	FIGURE 2 HYDROGEOLOGIC DIAGRAM Bottle Rock Power P O Box 1250 Cobb, California	DATE 12/07/09 PROJECT NO. 484 FILE NO. 484–HD



SEE FIGURES 6, 7 & 8

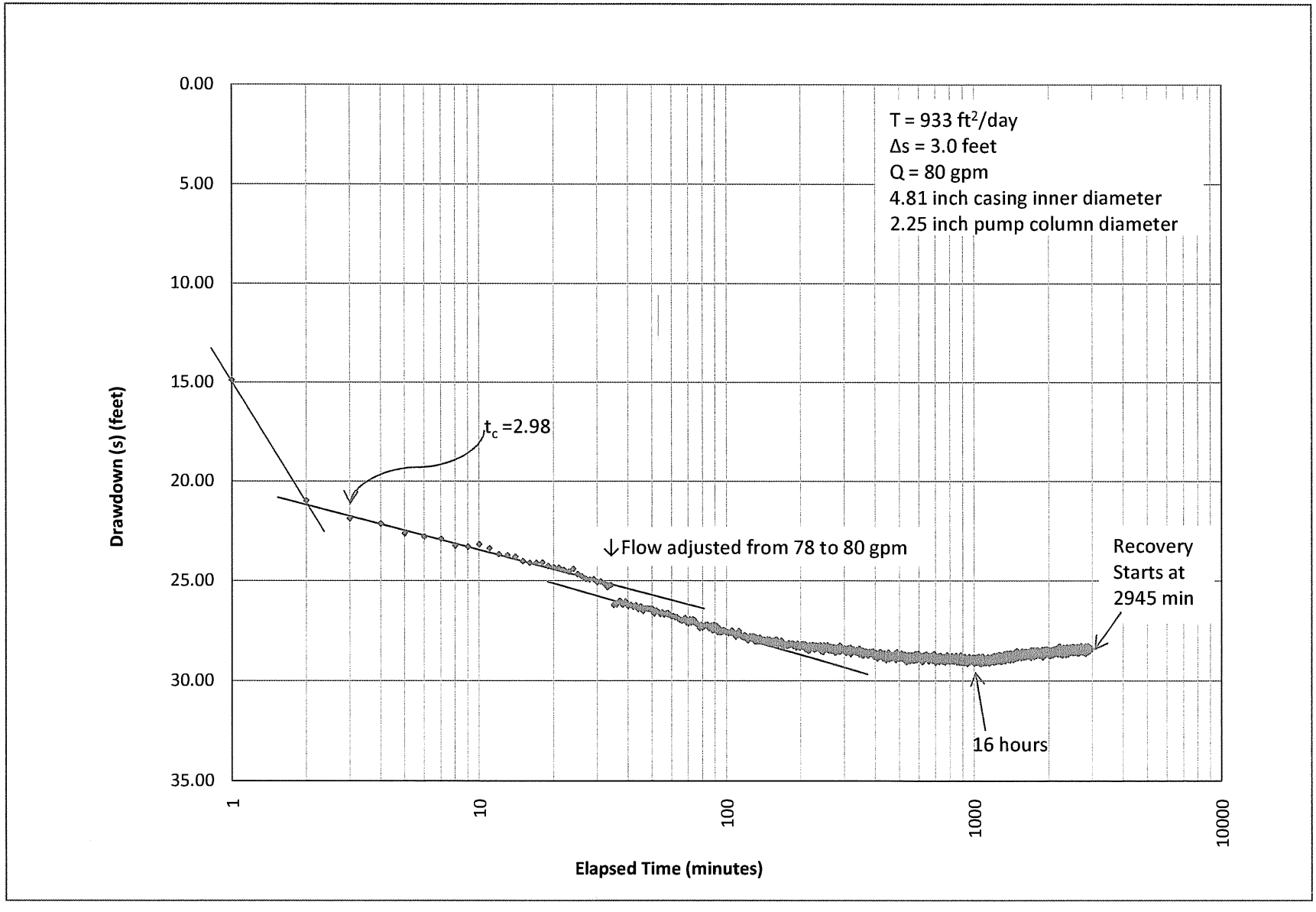
BOTTLE ROCK POWER
7385 High Valley Road
COBB, CA 95426

environ strategy consultants, inc.
One Technology Drive, Ste. B-123
Irvine, California 92618

FIG. 3

Figure 4

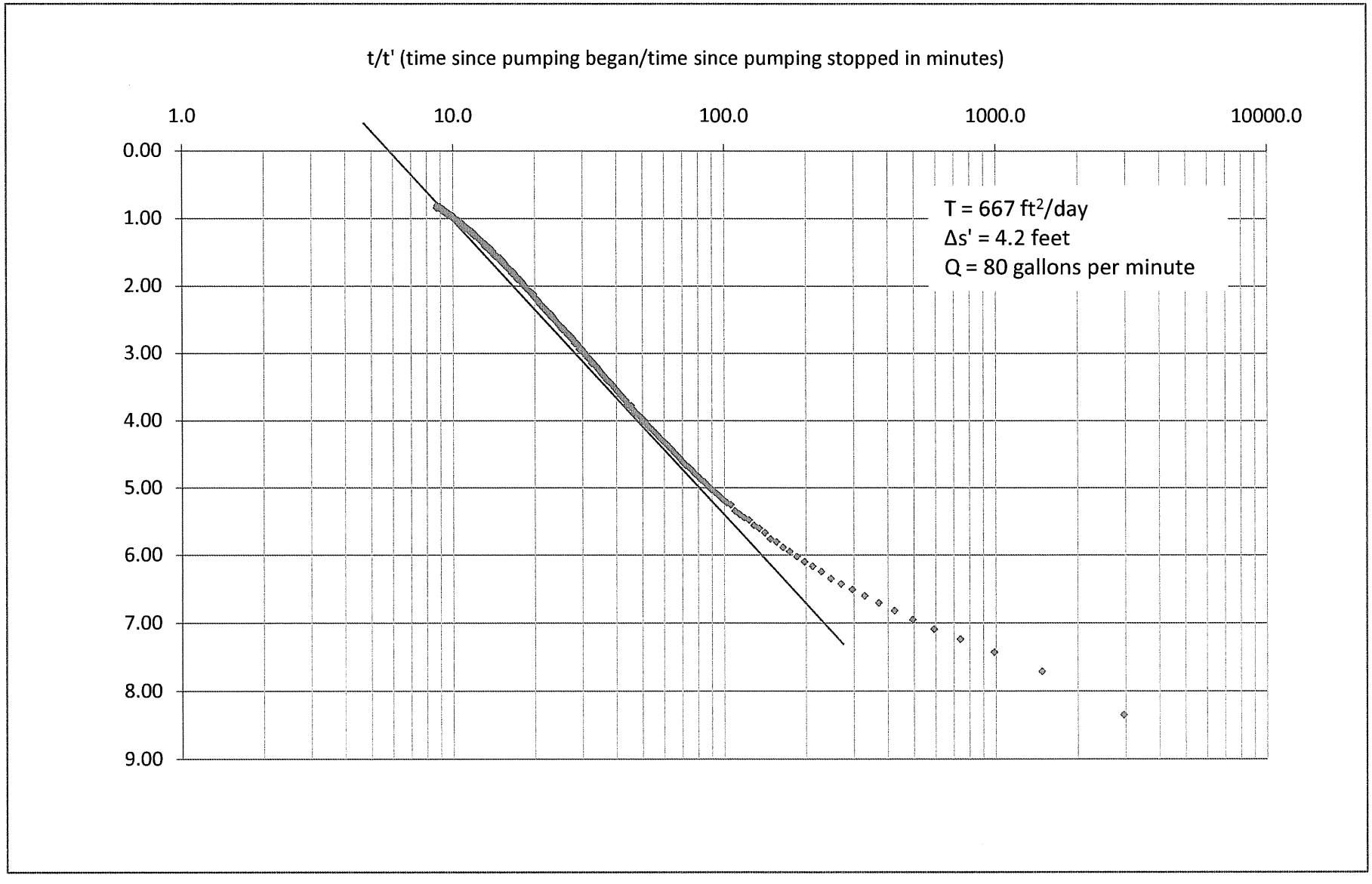
PTW-1 Drawdown vs. Time (Semi-Log)
BRP Binkley Lease
Cobb, CA



environ strategy consultants, inc.

Figure 5

PTW-1 Recovery Curve
BRP Binkley Lease
Cobb, California



environ strategy consultants, inc.

Figure 6

PTW-2 and Stream Groundwater Elevations
BRP Binkley Lease
Cobb, CA

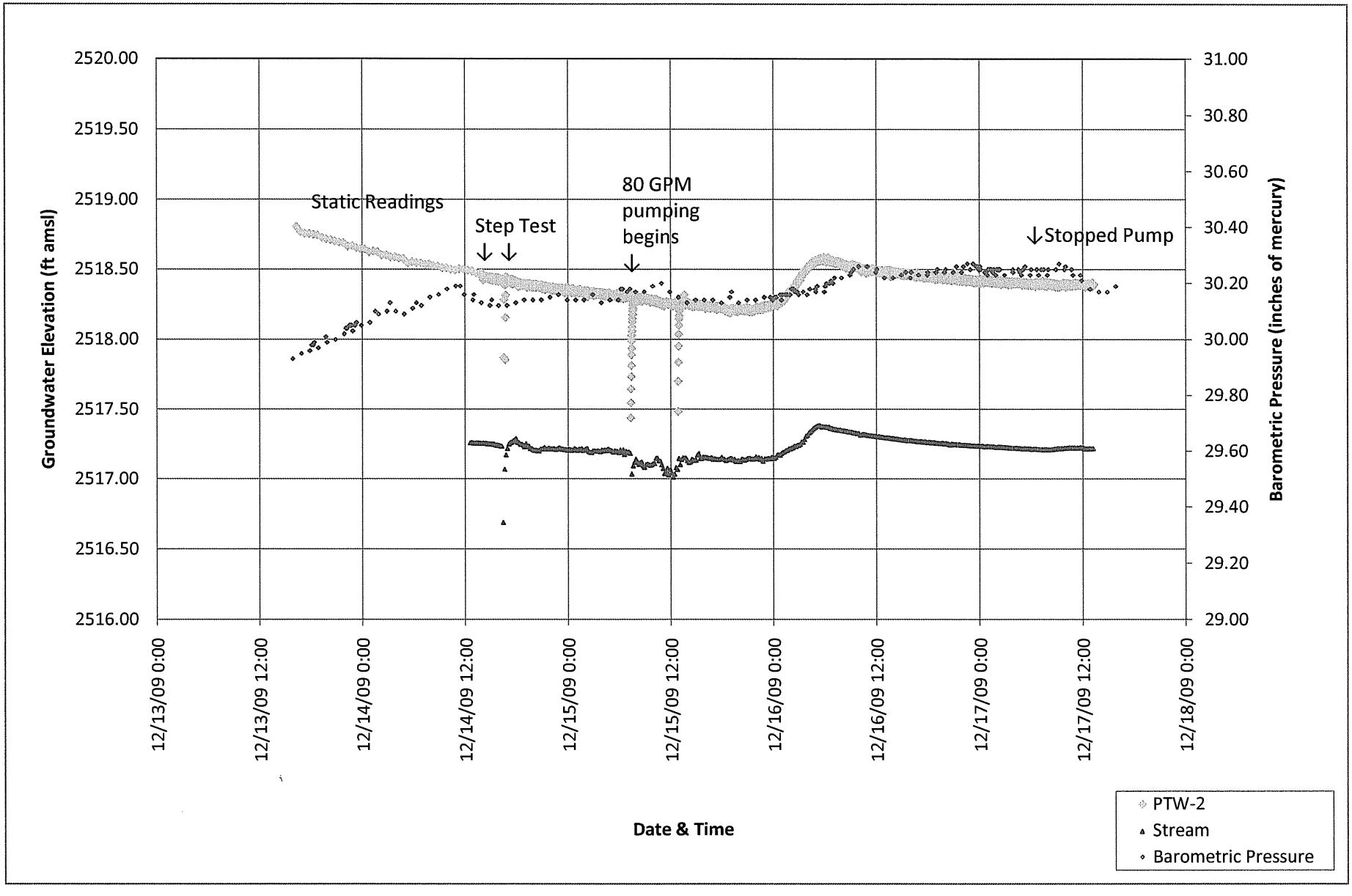


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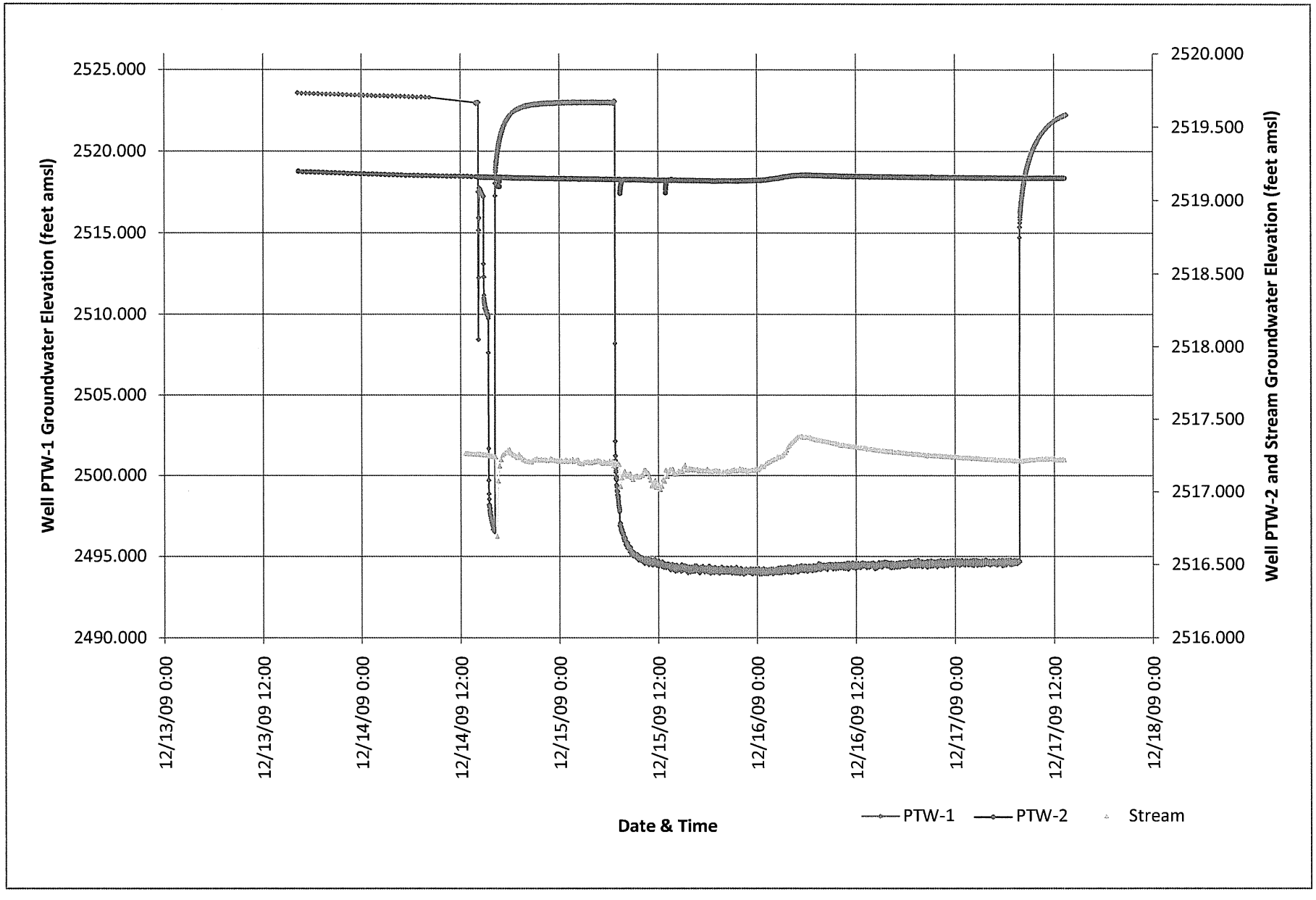
Figure 7

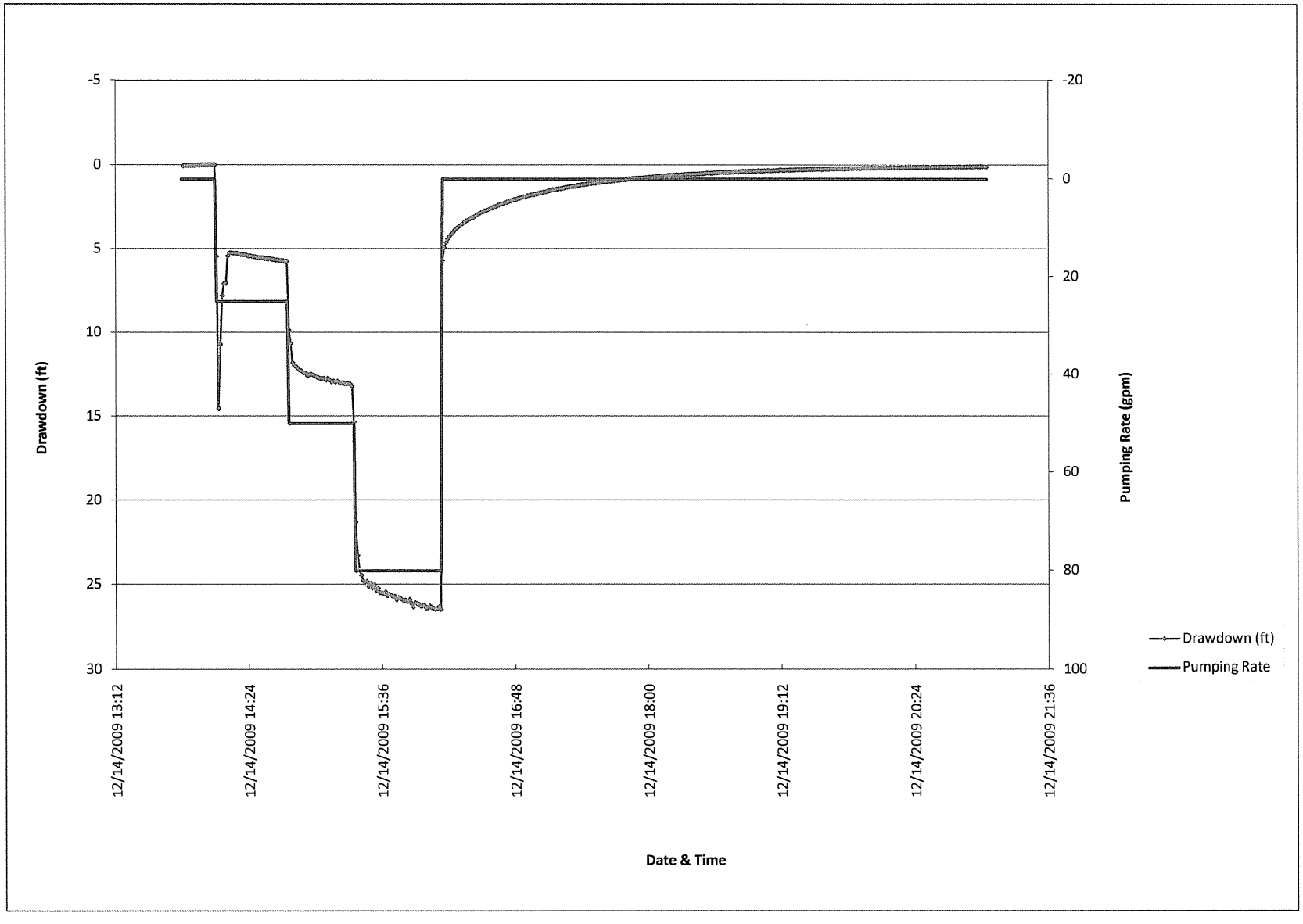
Groundwater Elevation vs. Time (PTW-1, PTW-2, and Stream)
BRP Binkley Lease
Cobb, CA



environ strategy consultants, inc.

Figure 8

PTW-1 Step Rate Test (Drawdown vs. Time)
BRP Binkely Lease
Cobb, CA



environ strategy consultants, inc.

TABLE

Table 1
Summary of Groundwater General Minerals Analyses Well PTW-1
Bottlerock Power LLC
Cobb, California

Sample ID	Date Sampled	Time Collected	General Minerals (mg/l)											
			Calcium	Magnesium	Chloride	Fluoride	Nitrate as N	Sulfate	Hardness as $CaCO_3$	Total Dissolved Solids (Glass Fiber)	Total Suspended Solids (Glass Fiber)	Total Nitrogen	Total Kjeldahl Nitrogen	Nitrite as N
PTW-1 Initial	12/15/2009	7:00 AM	26	24	3.5	0.18	<0.1	4.0	160	240	1.8	<0.3	<0.2	<0.05
PTW-1 Final	12/17/2009	7:47 AM	27	25	2.9	0.21	<0.1	5.5	170	240	<1.1	<0.3	<0.2	<0.05

Notes:

Chloride, Fluoride, Nitrate as N and Sulfate by U.S. EPA Method 300.0
Calcium and Magnesium by U.S. EPA method 6010B
Total Suspended Solids by U.S. EPA method 160.2
Total Kjeldahl Nitrogen by U.S. EPA method 351.2
Nitrite as N by U.S. EPA method 353.2
Total Nitrogen (Calculated)
Hardness by CaCO3 (Calculated)
mg/l = milligrams per liter or parts per million

ATTACHMENT

WATER SUPPLY WELL: PTW-1

LOGGED BY:John Cook, P.G. CHECKED BY: John Cook, P.G. DATE STARTED: 12/02/09 DATE FINISHED: 12/02/09	DRILLING COMPANY: Weeks Drilling & Pump DRILLING FOREMAN: TIM DRILLING RIG: ATLAS-COPCO AIR ROTARY DRILLING METHOD: Downhole Air Rotary BORING DEPTH: 138.5 Feet	BORING NO: PTW-1 PROJECT NAME:BRP Water Supply Well PROJECT NO: 484-I SITE LOCATION: Int. High Valley Rd. / Lee Rd. SURFACE ELEVATION: 2528

Depth	Sample Number	Blow Count	OVM (ppm)	Well Details	Soil Class (USCS)	Description
0		No Samples Collected (Boring logged by drill cuttings)		Neat Cement Grout		**COLLUVIUM:** fine silty SAND (SP–SM), Brown–Yellowish brown, moist, dense, weathered J–kf (Greywacke), sandstone fragments that are very angular and friable, some rootholes and rootlets noted
5				Neat Cement Grout		**ALLUVIUM:** coarse gravelly SAND (SP–GP), light grayish green – dark gray, moist, very dense, gravels are weathered J–kf (Graywacke), sandstone that are sub rounded with white quartz veins.
▽						Note after completion of well static water level was gauged to approximately 8 feet.
10						J–kf (Graywacke) sandstone, gray to light gray, well indurated, slightly fractured, massive beds, old fractures filled with white quartz viens 1/4"–1/2" thick, dry
15						
20				Bentonite Chips		Gray to dark gray, well indurated, massive beds, white to reddish brown chert and quartz veins, dry
25						

WATER SUPPLY WELL: PTW-1

LOGGED BY:John Cook, P.G. CHECKED BY: John Cook, P.G. DATE STARTED: 12/02/09 DATE FINISHED: 12/02/09	DRILLING COMPANY: Weeks Drilling & Pump DRILLING FOREMAN: TIM DRILLING RIG: ATLAS-COPCO AIR ROTARY DRILLING METHOD: Downhole Air Rotary BORING DEPTH: 138.5 Feet	BORING NO: PTW-1 PROJECT NAME:BRP Water Supply Well PROJECT NO: 484-I SITE LOCATION: Int. High Valley Rd. / Lee Rd. SURFACE ELEVATION: 2528

Depth	Sample Number	Blow Count	OVM (ppm)	Well Details	Soil Class (USCS)	Description
25						
30						Red chert veins 1' thick @ 32'
35				Bentonite Chips		
40						White to light green Quartz fragments, fractured and dry at 43'
45						
50						

WATER SUPPLY WELL: PTW-1

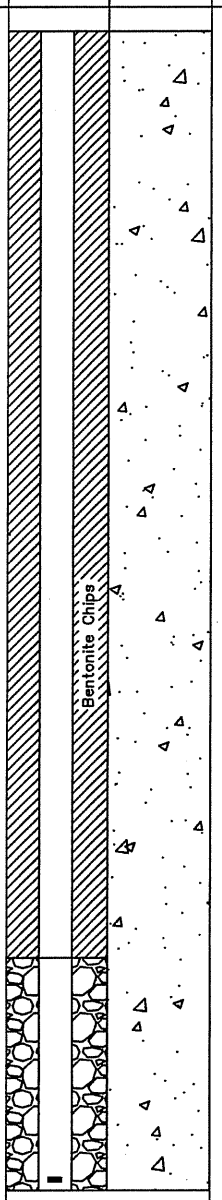
LOGGED BY:John Cook, P.G. CHECKED BY: John Cook, P.G. DATE STARTED: 12/02/09 DATE FINISHED: 12/02/09	DRILLING COMPANY: Weeks Drilling & Pump DRILLING FOREMAN: TIM DRILLING RIG: ATLAS-COPCO AIR ROTARY DRILLING METHOD: Downhole Air Rotary BORING DEPTH: 138.5 Feet	BORING NO: PTW-1 PROJECT NAME:BRP Water Supply Well PROJECT NO: 484-I SITE LOCATION: Int. High Valley Rd. / Lee Rd. SURFACE ELEVATION: 2528

Depth	Sample Number	Blow Count	OVM (ppm)	Well Details	Soil Class (USCS)	Description
50						
55						Brown to red brown chert seams 1'-3' thick, fractured
60				Bentonite Chips		
65						
70						highly fractured zone of J-kf (Graywacke) sandstone, wet, gray - dark gray with secondary white quartz veins, water entering boring @ appoximately 1-3 gpm
						Gray to greenish gray, dry, well indurated, massive beds, with greenish gray quartz veins with iron pyrite noted
75						

WATER SUPPLY WELL: PTW-1

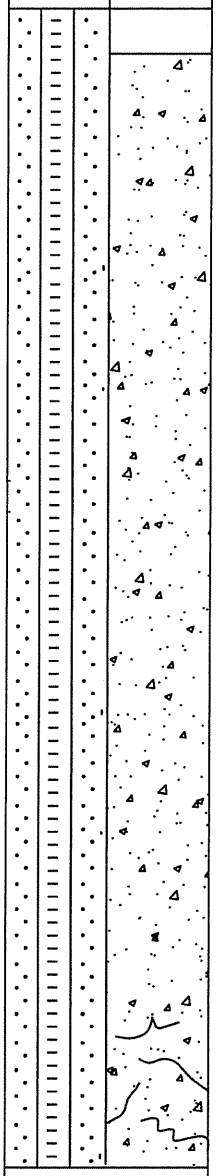
LOGGED BY:John Cook, P.G. CHECKED BY: John Cook, P.G. DATE STARTED: 12/02/09 DATE FINISHED: 12/02/09	DRILLING COMPANY: Weeks Drilling & Pump DRILLING FOREMAN: TIM DRILLING RIG: ATLAS-COPCO AIR ROTARY DRILLING METHOD: Downhole Air Rotary BORING DEPTH: 138.5 Feet	BORING NO: PTW-1 PROJECT NAME:BRP Water Supply Well PROJECT NO: 484-I SITE LOCATION: Int. High Valley Rd. / Lee Rd. SURFACE ELEVATION: 2528

Depth	Sample Number	Blow Count	OVM (ppm)	Well Details	Soil Class (USCS)	Description
75						
80						Gray to greenish gray, dry, well indurated, massive beds, with greenish gray quartz veins and iron pyrite
85						
90				Bentonite Chips		
95						White chert veins at 97'
100						



WATER SUPPLY WELL: PTW-1

LOGGED BY:John Cook, P.G. CHECKED BY: John Cook, P.G. DATE STARTED: 12/02/09 DATE FINISHED: 12/02/09	DRILLING COMPANY: Weeks Drilling & Pump DRILLING FOREMAN: TIM DRILLING RIG: ATLAS-COPCO AIR ROTARY DRILLING METHOD: Downhole Air Rotary BORING DEPTH: 138.5 Feet	BORING NO: PTW-1 PROJECT NAME:BRP Water Supply Well PROJECT NO: 484-I SITE LOCATION: Int. High Valley Rd. / Lee Rd. SURFACE ELEVATION: 2528

Depth	Sample Number	Blow Count	OVM (ppm)	Well Details	Soil Class (USCS)	Description
100						Gray to greenish gray, dry, well indurated, massive beds, with greenish gray secondary quartz veins and iron pyrite
105						
						Dark gray to black, highly fractured with smooth polished sandstone fracture planes by water flow, water gushing out at 100 gpm from below 100' (J-kf) graywacke fragments 1" - 8" long caving into borehole were flushed to surface
110						
115						
120						Some (J-kf) graywacke with minor serpentine melange at 122', highly fractured with mottled appearance, dark green-black wet
125						

WATER SUPPLY WELL: PTW-1

LOGGED BY:John Cook, P.G. CHECKED BY: John Cook, P.G. DATE STARTED: 12/02/09 DATE FINISHED: 12/02/09	DRILLING COMPANY: Weeks Drilling & Pump DRILLING FOREMAN: TIM DRILLING RIG: ATLAS-COPCO AIR ROTARY DRILLING METHOD: Downhole Air Rotary BORING DEPTH: 138.5 Feet	BORING NO: PTW-1 PROJECT NAME:BRP Water Supply Well PROJECT NO: 484-I SITE LOCATION: Int. High Valley Rd. / Lee Rd. SURFACE ELEVATION: 2528

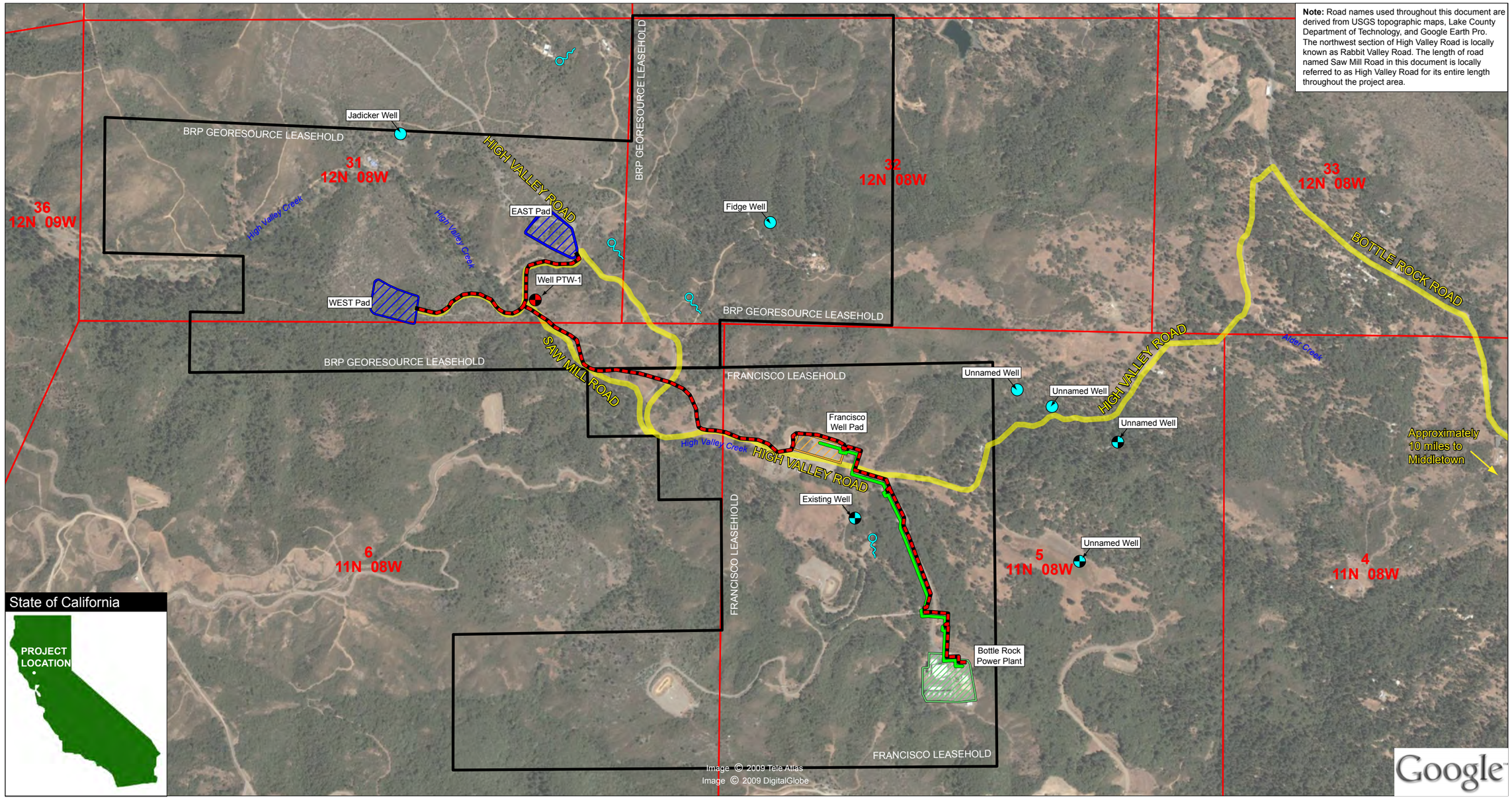
Depth	Sample Number	Blow Count	OVM (ppm)	Well Details	Soil Class (USCS)	Description
125						
130						
135						Greenish gray, well indurated, wet, massive beds, with quartz veins and chert seams
						End of Boring @ 138.5'
140						

WATER SUPPLY WELL: PTW-2

LOGGED BY:John Cook, P.G. CHECKED BY: John Cook, P.G. DATE STARTED: 12/02/09 DATE FINISHED: 12/02/09	DRILLING COMPANY: Weeks Drilling DRILLING FOREMAN: TIM DRILLING RIG: ATLAS-COPCO AIR ROTARY DRILLING METHOD: Backhoe Excavation BORING DEPTH: 138.5 Feet	BORING NO: PTW-2 PROJECT NAME:BRP Water Supply Well PROJECT NO: 484-I SITE LOCATION: Int. High Valley Rd. / Lee Rd. SURFACE ELEVATION: 2526

Depth	Sample Number	Blow Count	OVM (ppm)	Well Details	Soil Class (USCS)	Description
0	No Samples Collected					**COLLUVIUM:** Brown – Yellowish Brown fine clayey SAND (SC–ML), with weathered J–kf (Greywacke) sandstone fragments that are very angular and friable, very moist, loose, poorly graded, rootholes with < ¼" dia. roots
5						**ALLUVIUM:** Brown – light Brown gravelly medium SAND (SP–GP), dense, very moist to wet, with 8' dia. gravels ½"– 4" dia. of J–kgw graywake sandstone that are well rounded, some decayed wood fragments noted
10						Graywacke Sandstone (J-kgw), gray - dark gray, dense, well indurated with secondary white quartz seams ¼" thick, dry - damp
15						
20						
25						

Figure 1: Waterways, Springs, and Wells in the Project Area



SOURCE: Google Earth Pro 2009, Lake County Department of Information Technology 2003, and RMT Inc. 2009

Aerial imagery flown in 2004

LEGEND

- Proposed Steam Pipeline
- Existing Bottle Rock Pipeline
- Primary Access Route
- Existing Drilled Well
- Resident Spring Well
- Proposed Well
- Spring
- Proposed Well Pad
- Existing Francisco Well Pad
- Existing Bottle Rock Power Plant
- USGS Section Boundary
- Leasehold Boundary

N W E S

0 500 1,000 1,500 Feet

RMT ENVIRONMENT • ENERGY • ENGINEERING

APPENDIX G
HAZARDOUS MATERIALS

RECEIVED
MAY 01 2009
BY:

BOTTLE ROCK POWER

HAZARDOUS MATERIAL BUSINESS PLAN

HAZARDOUS MATERIALS BUSINESS PLAN INFORMATION SHEET

For use by Unidocs Member Agencies or where approved by your Local Jurisdiction
Authority Cited: Ch. 6.95 HSC; Title 19, Div. 2, CCR; Title 22, Div. 4.5, CCR

All facilities in Unidocs member jurisdictions that use or store hazardous materials *(defined as either virgin or waste materials)* in any quantity are required to report such use or storage to the appropriate local agency. The amount of detail required to be reported depends on whether or not a facility is subject to state Hazardous Materials Business Plan (HMBP) reporting requirements. Facilities subject to HMBP reporting requirements must complete and submit to their local agency a HMBP. All other facilities handling hazardous materials, unless specifically exempted by their local agency, must complete and submit a Hazardous Materials/Waste Registration Form.

The attached **Matrix Inventory Format Hazardous Materials Business Plan** is the preferred format for HMBP reporting. *[This form was developed by the Certified Unified Program Agency (CUPA) as an alternative version of the Unified Program Consolidated Form (UPCF). Businesses have the option to use it or the UPCF adopted in state regulations. The CUPA or Participating Agency (PA) must accept the state UPCF and cannot require a business to use the alternative version developed by the CUPA. The CUPA and PA can require businesses to provide additional information on either the UPCF or a supplemental page to that document.]* A HMBP including the standard UPCF One-Chemical-Per-Page Inventory Format is available at **www.unidocs.org**. If you wish to use forms other than those included in this document, or the Unidocs standard UPCF Hazardous Material Business Plan, please contact your local implementing agency for guidance. Depending upon the nature of storage/handling of hazardous materials at the facility, additional information may be required to be submitted as Appendices to the HMBP. Examples of such Appendices could include:

- For underground storage tanks (UST), Unified Program Consolidated Forms (UPCF) UST - Facility and UST - Tank pages;
- California Accidental Release Prevention (CalARP) Program Registration Form;
- Toxic Gas Registration Form;
- UPCF Onsite Hazardous Waste Treatment Forms;
- Storm Water Pollution Prevention Plan; etc.

What is a Hazardous Materials Business Plan?

A HMBP is a document containing detailed information on the storage of hazardous materials at a facility. Chapter 6.95 of the California Health and Safety Code (HSC) requires that facilities which use or store such materials at or above reporting thresholds *(see below)* submit this information.

What is the purpose of the Hazardous Materials Business Plan?

The intent of the Business Plan is to satisfy federal and state Community Right-To-Know laws and provide detailed information for use by emergency responders. All persons at the facility qualified to serve as emergency coordinators must be thoroughly familiar with the contents and use of the HMBP, with the operations and activities of the facility, and with the locations of all hazardous materials records maintained by the facility.

This Hazardous Materials Business Plan has been developed to assist you in complying with the State requirements and to provide the fire department adequate information about the type, quantity of—and management practices regarding—hazardous materials that are stored at your facility. Along with applicable modules and appendices, it is intended to additionally satisfy some or all of the reporting requirements for the following programs: Hazardous Materials Storage; CalARP Program Registration; Toxic Gas Ordinance; Hazardous Waste Generator Registration; Hazardous Waste Contingency Plan; Urban Runoff; and aboveground storage tank Spill Prevention Control and Countermeasure Plan.

Who must complete a Hazardous Materials Business Plan?

The owner of a facility must complete a HMBP and submit a copy to the local agency for each site that handles any individual hazardous material or mixture containing a hazardous material which has a quantity at any time during the reporting year equal to or greater than:

1. 500 pounds for **solid hazardous materials**. [HSC §25503.5(a)]
2. The following amounts for **liquid hazardous materials:**
   a. Lubricating oil as defined by HSC §25503.5(b)(2)(B): 55 gallons of any type <u>or</u> 275 gallons aggregate quantity on site. HSC §25503.5(b)(2)(A)]
   b. All others, including waste oil: 55 gallons. [HSC §25503.5(a)]
3. The following amounts of **hazardous material gases:**
   a. Oxygen, Nitrogen, or Nitrous Oxide stored/handled at a physician, dentist, podiatrist, veterinarian, or pharmacist's place of business: 1,000 cubic feet of each material on site. [HSC §25503.5(b)(1)]
   b. All others: 200 cubic feet. [HSC §25503.5(a)]
4. Amounts of **radioactive materials** requiring an emergency plan under Parts 30, 40, or 70 of Title 10 Code of Federal Regulations or equal to or greater than applicable amounts specified in items 1, 2, or 3, above, whichever amount is smaller. [HSC §25503.5(a)]
5. Applicable federal threshold planning quantities for **extremely hazardous substances** listed in 40 CFR Part 355, Appendix A.

Note: **Retail (Consumer) Products** packaged for direct distribution to, and use by, the general public are exempt from HMBP requirements except where the local agency determines otherwise pursuant to HSC §25503.5(c)(1). *[Local agency interpretation is that materials qualify for this exemption only if the following requirements are met: (1) The product is not dispensed from containers at the storage facility; (2) The product is stored in a "retail display area" as defined by the 1994 California Fire Code (e.g. Quarts of oil sitting in a display area for sale at a service station are exempt, but oil used by a mechanic in the service bay is not exempt.); (3) containers are no larger than 5 gallons (liquids) or 100 pounds (solids); and (4) Handling of the product does not present unacceptable risk to public health, safety, or the environment.]*

What if I don't handle any hazardous materials in amounts requiring a HMBP?

Facilities that are not required to complete a HMBP are still required to register their hazardous materials with the local agency using the Hazardous Materials/Waste Registration Form. The local agency will then evaluate the storage or use and notify you of any permits or storage/use fees that may apply. ***(Note: The local agencies reserve the right to require a HMBP for any facility upon determination that the manner of use or storage of hazardous materials is such that additional information is necessary for emergency response purposes.)***

What information is required to be submitted with the Hazardous Materials Business Plan?

The HMBP must contain the following elements:

- Business Activities *(Form and instructions attached)*
- Business Owner/Operator Identification *(Form and instructions attached)*
- Hazardous Materials Inventory *(Forms and instructions attached)*
- Facility Map(s) *(Sample form and instructions attached)*
- Emergency Response/Contingency Plan *(Sample forms and instructions attached)*
- Employee Training Plan *(Sample form and instructions attached)*
- Recordkeeping *(Sample form and instructions attached)*

How often do I have to update or recertify my Hazardous Materials Business Plan?

Within 30 days of the occurrence of any of the following events, the HMBP shall be revised and the revisions submitted to the local agency: (1) There is a 100% or more increase in the quantity of a previously disclosed material; (2) The facility begins handling a previously undisclosed material at or above the aforementioned HMBP amounts; (3) The facility changes address; (4) Ownership of the facility changes; or (5) There is a change of business name. [HSC §25510]

Additionally, if the local agency determines that the HMBP is deficient in any way, the plan shall be revised and the revisions submitted to the local agency within 30 days of the notice to submit a corrected plan. [HSC §25505(a)(2)]

Without regard to the above events, the owner, operator, or officially designated representative of the facility must complete and submit to the local agency a Hazardous Materials Business Plan Certification Form [or a copy of your current HMBP with an updated certification signature and date at the bottom of OES Form 2730, the Business Owner/Operator Identification form (i.e. page 5 of this packet)] annually. [HSC §25503.3(c)] Hazardous Materials Business Plan Certification Forms are available from your local agency or on the Internet at **www.unidocs.org**.

Who is my local agency?

Refer to the table below. Jurisdiction is determined by whether the facility is located within city limits or in an unincorporated area.

City/Area	Local Agency Name	Address	Telephone Number
Lakeport, CA	Health Services / Environmental Health Division	922 Bevins Court Lakeport, CA 95453	Off. (707) 263-1164 Fax (707) 263-1681

UNIFIED PROGRAM CONSOLIDATED FORM
FACILITY INFORMATION
BUSINESS ACTIVITIES

I. FACILITY IDENTIFICATION

FACILITY ID # *(Agency Use Only)* 1.

EPA ID # (Hazardous Waste Only) 2.
CAL000307976

BUSINESS NAME (Same as Facility Name or DBA - Doing Business As) 3.
BOTTLE ROCK POWER, LLC

II. ACTIVITIES DECLARATION

NOTE: If you check YES to any part of this list, please submit the Business Owner/Operator Identification page (OES Form 2730).

Does your facility...		If Yes, please complete these pages of the UPCF...
A. HAZARDOUS MATERIALS		
Have on site (for any purpose) hazardous materials at or above 55 gallons for liquids, 500 pounds for solids, or 200 cubic feet for compressed gases (include liquids in ASTs and USTs); or the applicable Federal threshold quantity for an extremely hazardous substance specified in 40 CFR Part 355, Appendix A or B; or handle radiological materials in quantities for which an emergency plan is required pursuant to 10 CFR Parts 30, 40 or 70?	☒ YES ☐ NO 4.	HAZARDOUS MATERIALS INVENTORY - CHEMICAL DESCRIPTION (OES 2731)
B. UNDERGROUND STORAGE TANKS (USTs)		
1. Own or operate underground storage tanks?	☐ YES ☒ NO 5.	UST FACILITY (Formerly SWRCB Form A) UST TANK (one page per tank) (Formerly Form B)
2. Intend to upgrade existing or install new USTs?	☐ YES ☒ NO 6.	UST FACILITY UST TANK (one per tank) UST INSTALLATION - CERTIFICATE OF COMPLIANCE (one page per tank) (Formerly Form C)
Need to report closing a UST?	☐ YES ☒ NO 7.	UST TANK (closure portion – one page per tank)
C. ABOVE GROUND PETROLEUM STORAGE TANKS (ASTs)		
Own or operate ASTs above these thresholds: ---any tank capacity is greater than 660 gallons, or ---the total capacity for the facility is greater than 1,320 gallons?	X YES NO 8.	NO FORM REQUIRED TO CUPAs
D. HAZARDOUS WASTE		
1. Generate hazardous waste?	☒ YES ☐ NO 9.	EPA ID NUMBER – provide at the top of this page
2. Recycle more than 100 kg/month of excluded or exempted recyclable materials (per HSC §25143.2)?	☐ YES ☒ NO 10.	RECYCLABLE MATERIALS REPORT (one per recycler)
3. Treat hazardous waste on site?	☐ YES ☒ NO 11.	ONSITE HAZARDOUS WASTE TREATMENT - FACILITY (Formerly DTSC Forms 1772) ONSITE HAZARDOUS WASTE TREATMENT - UNIT (one page per unit) (Formerly DTSC Forms 1772 A,B,C,D and L)
4. Treatment subject to financial assurance requirements (for Permit by Rule and Conditional Authorization)?	☐ YES ☒ NO 12.	CERTIFICATION OF FINANCIAL ASSURANCE (Formerly DTSC Form 1232)
5. Consolidate hazardous waste generated at a remote site?	☐ YES ☒ NO 13.	REMOTE WASTE / CONSOLIDATION SITE ANNUAL NOTIFICATION (Formerly DTSC Form 1196)
6. Need to report the closure/removal of a tank that was classified as hazardous waste and cleaned onsite?	☐ YES ☒ NO 14.	HAZARDOUS WASTE TANK CLOSURE CERTIFICATION (Formerly DTSC Form 1249)
E. LOCAL REQUIREMENTS		
(You may also be required to provide additional information by your CUPA or local agency.)		15.

Business Activities Page Instructions

You must submit the Business Activities page with all submittals. [Note: Numbering of these instructions follows the Unified Program Consolidated Form (UPCF) data element numbers on the Business Activities page. These data element numbers are used for electronic submittal and are the same as the numbering used in 27 CCR, Appendix C, the Unified Program Data Dictionary.] Please number all pages of your submittal.

1. FACILITY ID NUMBER - This number is for agency use only. Leave this space blank.
2. EPA ID NUMBER - If you generate, recycle, or treat hazardous waste, enter your facility's 12-character U.S. Environmental Protection Agency (U.S. EPA) or California Identification number. For facilities in California, the number usually starts with the letters "CA." If you do not have an ID number, contact the Department of Toxic Substances Control (DTSC) at 1-800-618-6942 to obtain one.
3. BUSINESS NAME - Enter the complete Facility Name.
4. HAZARDOUS MATERIALS ONSITE - Check the appropriate box to indicate whether you have any hazardous material on site in a quantity subject to Hazardous Materials Business Plan reporting requirements (please refer to the above Hazardous Materials Business Plan Information Sheet).
5. OWN OR OPERATE UNDERGROUND STORAGE TANK (UST) - Check the appropriate box to indicate whether you own or operate USTs containing hazardous substances as defined in Health and Safety Code (HSC) §25316. If "YES", and you do not already have on file with your local agency a UST Facility page, UST Tank page for each tank, written UST Monitoring Plan, and UST Response Plan, then you must submit those documents. (There are no UPCF pages for the monitoring and response plans.)
6. UST INSTALLATION/UPGRADE - Check the appropriate box to indicate whether you have installed or upgraded USTs containing hazardous substances as defined in HSC §25316. If "YES," then you must submit to your local agency a UST Installation - Certificate of Compliance page for each tank in addition to the UST Facility and Tank pages.
7. UST CLOSURE - Check the appropriate box if you are closing a UST and complete the closure portion of the UST Tank page for each tank.
8. OWN/OPERATE ABOVEGROUND PETROLEUM STORAGE TANK (AST) - Check the appropriate box to indicate whether your facility stores petroleum aboveground in any tank greater than 660 gallons capacity or has aggregate aboveground petroleum storage greater than 1,320 gallons. (There is no UPCF page for ASTs.) The following are exempt from this requirement:
   - Pressure vessels or boilers subject to Division 5 of the Labor Code;
   - Tanks containing hazardous waste if a hazardous waste facility permit has been issued by DTSC;
   - Aboveground oil production tanks regulated by the Division of Oil and Gas;
   - Certain oil-filled electrical equipment, including, but not limited to, transformers, circuit breakers, and capacitors.
9. HAZARDOUS WASTE GENERATOR - Check the appropriate box to indicate whether your facility generates a waste that meets any of the hazardous waste criteria adopted pursuant to HSC §25141.
10. RECYCLE - Check the appropriate box to indicate whether your facility recycles more than 100 kilograms (approximately 220 pounds or 27 gallons) per month of recyclable material under a claim that the material is excluded or exempt per HSC §25143.2. If you check "YES," and you do not already have a current Recyclable Materials Report on file with your Certified Unified Program Agency (CUPA), then you must also submit that report to the CUPA. Check "NO" if you only send recyclable materials to an offsite recycler.
11. ONSITE HAZARDOUS WASTE TREATMENT - Check the appropriate box to indicate whether your facility engages in regulated onsite treatment of hazardous waste. If you check "YES," and you do not already have current Onsite Hazardous Waste Treatment Notification - Facility and Onsite Hazardous Waste Treatment Notification - Unit documents on file with your CUPA, then you must submit those forms to the CUPA.
12. FINANCIAL ASSURANCE - Check the appropriate box to indicate whether your facility has Permit by Rule (PBR) and/or Conditionally Authorized (CA) operations subject to financial assurance requirements for closure of an onsite treatment unit. If you check "YES," and you do not already have current "Certification of Financial Assurance" on file with your CUPA, then you must submit that form to the CUPA.
13. HAZARDOUS WASTE REMOTE CONSOLIDATION SITE - Check the appropriate box to indicate whether your facility consolidates hazardous waste generated at a remote site. By answering "YES," you are indicating that you are a hazardous waste generator that collects hazardous waste initially at remote sites and subsequently transports the hazardous waste to a consolidation site you also operate. If you check "YES," and you do not already have current "Remote Waste Consolidation Site Annual Notification" page on file with your CUPA, then you must submit that form to the CUPA.
14. HAZARDOUS WASTE TANK CLEANING - Check the appropriate box if any tank has been cleaned onsite per Title 22, Div. 4.5, Ch. 32, CCR. If you check "YES," then you must submit a Hazardous Waste Tank Closure Certification to your local agency.
15. LOCAL REQUIREMENTS - Check with your local agency before submitting this document to determine if any supplemental information is required.

UNIFIED PROGRAM CONSOLIDATED FORM
FACILITY INFORMATION

BUSINESS OWNER/OPERATOR IDENTIFICATION

I. IDENTIFICATION

FACILITY ID # (Agency Use Only) 1.

BEGINNING DATE 100.: 01/01/2007

ENDING DATE 101.: 12/31/2007

BUSINESS NAME (Same as FACILITY NAME or DBA – Doing Business As) 3.: BOTTLE ROCK POWER, LLC

BUSINESS PHONE 102.: 707-928-4578

BUSINESS SITE ADDRESS 103.: 7385 HIGH VALLEY ROAD

CITY 104.: COBB

CA

ZIP CODE 105.: 95426

DUN & BRADSTREET 106.: 61-070-5733

SIC CODE (4 digit #) 107.: 4911

COUNTY 108.: LAKE

BUSINESS OPERATOR NAME 109.: BOTTLE ROCK POWER, LLC

BUSINESS OPERATOR PHONE 110.: 707-928-4578

II. BUSINESS OWNER

OWNER NAME 111.: BOTTLE ROCK POWER, LLC

OWNER PHONE 112.: 707-928-4578

OWNER MAILING ADDRESS 113.: P. O. BOX 326

CITY 114.: COBB

STATE 115.: CA

ZIP CODE 116.: 95426

III. ENVIRONMENTAL CONTACT

CONTACT NAME 117.: ARON THOMAS

CONTACT PHONE 118.: 707-928-4578

CONTACT MAILING ADDRESS 119.: P. O. BOX 326

CITY 120.: COBB

STATE 121.: CA

ZIP CODE 122.: 95426

IV. EMERGENCY CONTACTS

-PRIMARY-	-SECONDARY-
NAME 123.: KARON THOMAS	NAME 128.: KEVIN BENNETTO
TITLE 124.: COMPLIANCE MANAGER	TITLE 129.: PLANT MANAGER
BUSINESS PHONE 125.: 707-928-4578	BUSINESS PHONE 130.: 707-928-4578
24-HOUR PHONE* 126.: 707-671-6575	24-HOUR PHONE* 131.: 707-841-7797
PAGER # 127.:	PAGER # 132.:

ADDITIONAL LOCALLY COLLECTED INFORMATION: 133.

Property Owner: BOTTLE ROCK POWER, LLC

Phone No.: 707-928-4578

Billing Address: P. O. BOX 326 COBB, CA 95426

Certification: Based on my inquiry of those individuals responsible for obtaining the information, I certify under penalty of law that I have personally examined and am familiar with the information submitted and believe the information is true, accurate, and complete.

SIGNATURE OF OWNER/OPERATOR OR DESIGNATED REPRESENTATIVE: Aron Thomas

DATE 134.: 6/2/08

NAME OF DOCUMENT PREPARER 135.: Karon Thomas

NAME OF SIGNER (print) 136.: Karon Thomas

TITLE OF SIGNER 137.: Compliance Manager

* See Instructions on next page.

Business Owner/Operator Identification Page (OES Form 2730) Instructions

Except when using the Hazardous Materials Business Plan Certification Form, you must submit the Business Activities page, the Business Owner/Operator Identification page, and Hazardous Materials - Chemical Description pages with all hazardous materials inventory submittals. (Note: Numbering of these instructions follows the UPCF data element numbers on the Owner/Operator page.)

1. FACILITY ID NUMBER - This number is for agency use only. Leave this space blank.
3. BUSINESS NAME - Enter the complete Facility Name.
100. BEGINNING DATE - Enter the beginning year and date of the report.
101. ENDING DATE - Enter the ending year and date of the report.
102. BUSINESS PHONE - Enter the phone number, including area code and any extension.
103. BUSINESS SITE ADDRESS - Enter the street address where the facility is located, including building number, if applicable. Post office box numbers are not acceptable. This information must provide a means to locate the facility geographically.
104. CITY - Enter the city or unincorporated area in which the facility is located.
105. ZIP CODE - Enter the 5 or 9 digit zip code for the facility.
106. DUN & BRADSTREET - If the business has a D&B number, enter it here.
107. SIC CODE - Enter the 4 digit Standard Industrial Classification Code number for the facility's primary business activity.
108. COUNTY - Enter the name of the county in which the facility is located.
109. BUSINESS OPERATOR NAME - Enter the name of the facility operator.
110. BUSINESS OPERATOR PHONE - Enter the operator's phone number, including area code and any extension.
111. OWNER NAME - Enter the name of the facility owner, if different from the operator.
112. OWNER PHONE - Enter the owner's phone number, including area code and any extension.
113. OWNER MAILING ADDRESS - Enter the owner's street or P.O. box mailing address, if different from the site address.
114. OWNER CITY - Enter the name of the city for the owner's mailing address.
115. OWNER STATE - Enter the 2 character state abbreviation for the owner's mailing address.
116. OWNER ZIP CODE - Enter the 5 or 9 digit zip code for the owner's mailing address.
117. ENVIRONMENTAL CONTACT NAME - Enter the name of the person, if different from the Business Owner or Operator, who will receive all environmental correspondence and will respond to enforcement activity.
118. CONTACT PHONE - Enter the environmental contact's phone number, including area code and any extension.
119. CONTACT MAILING ADDRESS - Enter the street or P.O. box mailing address where all environmental contact correspondence should be sent, if different from the site address.
120. CITY - Enter the name of the city for the environmental contact's mailing address.
121. STATE - Enter the 2 character state abbreviation for the environmental contact's mailing address.
122. ZIP CODE - Enter the 5 or 9 digit zip code for the environmental contact's mailing address.
123. PRIMARY EMERGENCY CONTACT NAME - Enter the name of a representative (i.e. Emergency Coordinator) who can be contacted in case of an emergency involving hazardous materials at the facility. This person shall have full facility access, site familiarity, and authority to make decisions for the business regarding incident mitigation.
124. TITLE - Enter the title of the primary Emergency Coordinator.
125. BUSINESS PHONE - Enter primary Emergency Coordinator's business phone number, including area code and any extension.
126. 24-HOUR PHONE - Enter a phone number that will be answered 24 hours a day. If not the primary Emergency Coordinator's home phone number, then the number of an answering service able to immediately contact the primary Emergency Coordinator must be provided. Please note that this is a public document, so any telephone number provided is available to the general public any time a review of your facility's records is conducted.
127. PAGER NUMBER - Enter the pager number for the primary Emergency Coordinator, if available.
128. SECONDARY EMERGENCY CONTACT NAME - Enter the name of a secondary Emergency Coordinator who can be contacted in the event that the primary Emergency Coordinator is not available. The contact shall have full facility access, site familiarity, and authority to make decisions for the business regarding incident mitigation.
129. TITLE - Enter the title of the secondary Emergency Coordinator.
130. BUSINESS PHONE - Enter secondary Emergency Coordinator's business phone number, including area code and any extension.
131. 24-HOUR PHONE - Enter a phone number for the secondary Emergency Coordinator. See instructions for item 123, above.
132. PAGER NUMBER - Enter the pager number for the secondary Emergency Coordinator, if available.
133. ADDITIONAL LOCALLY COLLECTED INFORMATION - Enter the name and phone number for the property owner. Enter the complete mailing address to which bills for permit fees should be sent, if different from items 119-122, above.

SIGNATURE OF OWNER/OPERATOR OR DESIGNATED REPRESENTATIVE - The Business Owner/Operator, or officially designated representative of the Owner/Operator, shall sign in the space provided. This signature certifies that the signer is familiar with the information submitted, and that based on the signer's inquiry of those individuals responsible for obtaining the information, it is the signer's belief that the submitted information is true, accurate, and complete.

134. DATE - Enter the date that the document was signed.
135. NAME OF DOCUMENT PREPARER - Type or print the full name of the person who prepared the Business Plan information.
136. NAME OF SIGNER - Type or print the full name of the person signing this document.
137. TITLE OF SIGNER - Enter the title of the person signing this document.

Date: 06/02/08

Non-Waste Hazardous Materials Inventory Statement

For use by Unidocs Member Agencies or where approved by your Local Jurisdiction

Business Name: BOTTLE ROCK POWER, LLC
(Same as Facility Name or DBA)

Type of Report on This Page: ☐ Add; ☐ Delete; ☒ Revise

Chemical Location: Power Plant and Yard Area
(Building/Storage Area)

EPCRA Confidential Location? ☐ Yes; ☒ No
Trade Secret Information? ☐ Yes; ☒ No

Facility ID # (Agency Use Only)

1. Haz. Class	2. Map and Grid or Location Code	3. Common Name	4. Hazardous Components (For mixtures only) Chemical Name	% Wt.	EHS	CAS No.	5. Type and Physical State	6. Quantities Max. Daily	Average Daily	Largest Cont.	7. Units	8. Storage Codes Storage Pressure	Storage Temp.	9. Hazard Categories
3	Page 9 N-6	Transformer Mineral oil CAS No.: 64742536 ☐ EHS			☐		☒ pure ☐ mixture ☐ solid ☒ liquid ☐ gas	12,066 Curies: (If radioactive)	12,066 Days On Site: 365	12,066 Storage Container:* A	☒ gallons ☐ pounds ☐ cu. feet ☐ tons	☐ ambient ☒ > amb. ☐ < amb.	☐ ambient ☒ > amb. ☐ < amb. ☐ cryogenic	☒ fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
3	Page 9 B-26	Transformer Mineral oil CAS No.: 64742536 ☐ EHS			☐		☒ pure ☐ mixture ☐ solid ☒ liquid ☐ gas	813 Curies: (If radioactive)	813 Days On Site: 365	813 Storage Container:* A	☒ gallons ☐ pounds ☐ cu. feet ☐ tons	☐ ambient ☒ > amb. ☐ < amb.	☐ ambient ☒ > amb. ☐ < amb. ☐ cryogenic	☒ fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
3	Page 9 P-24	Transformer Mineral oil CAS No.: 64742536 ☐ EHS			☐		☒ pure ☐ mixture ☐ solid ☒ liquid ☐ gas	337 Curies: (If radioactive)	337 Days On Site: 365	337 Storage Container:* A	☒ gallons ☐ pounds ☐ cu. feet ☐ tons	☐ ambient ☒ > amb. ☐ < amb.	☐ ambient ☒ > amb. ☐ < amb. ☐ cryogenic	☒ fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
3	Page 9 C-23	Diesel Fuel CAS No.: 68476346 ☐ EHS			☐		☒ pure ☐ mixture ☐ solid ☒ liquid ☐ gas	450 Curies: (If radioactive)	450 Days On Site: 365	500 Storage Container:* A	☒ gallons ☐ pounds ☐ cu. feet ☐ tons	☒ ambient ☐ > amb. ☐ < amb.	☒ ambient ☐ > amb. ☐ < amb. ☐ cryogenic	☒ fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
8	Page 9 S-21	Caustic Soda CAS No.: ☐ EHS	Sodium Hydroxide Water Sodium Chloride	25 74 1	☐ ☐ ☐	1310-73-2 7732-18-5 7647-14-5	☐ pure ☒ mixture ☐ solid ☒ liquid ☐ gas	3000 Curies: (If radioactive)	3000 Days On Site: 365	22000 Storage Container:* A	☒ gallons ☐ pounds ☐ cu. feet ☐ tons	X ambient ☐ > amb. ☐ < amb.	X ambient ☐ > amb. ☐ < amb. ☐ cryogenic	☐ fire ☐ reactive ☐ pressure release X acute health ☐ chronic health ☐ radioactive
2	Page 9 R-8 Turb/Gen 3rd floor	Hydrogen CAS No.: 0133740 ☐ EHS			☐		X pure ☐ mixture ☐ solid ☐ liquid X gas	1200 Curies: (If radioactive)	1200 Days On Site: 365	1200 Storage Container:* R	☐ gallons ☐ pounds X cu. feet ☐ tons	☐ ambient X > amb. ☐ < amb.	X ambient ☐ > amb. ☐ < amb. ☐ cryogenic	X fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive

* Storage Codes

Code	Storage Type	Code	Storage Type	Code	Storage Type	Code	Storage Type	Code	Storage Type	Code	Storage Type
A	Aboveground Tank	D	Steel Drum	G	Carboy	J	Bag	M	Glass Bottle or Jug	P	Tank Wagon
B	Belowground Tank	E	Plastic/Non-metallic Drum	H	Silo	K	Box	N	Plastic Bottle or Jug	Q	Rail Car
C	Tank Inside Building	F	Can	I	Fiber Drum	L	Cylinder	O	Tote Bin	R	Other

If EPCRA, sign below: _____

Date: 06/02/08

Non-Waste Hazardous Materials Inventory Statement

For use by Unidocs Member Agencies or where approved by your Local Jurisdiction

Business Name: BOTTLE ROCK POWER, LLC
(Same as Facility Name or DBA)

Type of Report on This Page: ☐ Add; ☐ Delete; X Revise

Chemical Location: Power Plant and Yard Area
(Building/Storage Area)

EPCRA Confidential Location? ☐ Yes; X No
Trade Secret Information? ☐ Yes; X No

Facility ID # (Agency Use Only)

1. Haz. Class	2. Map and Grid or Location Code	3. Common Name	4. Hazardous Components (For mixtures only) Chemical Name	% Wt.	EHS	CAS No.	5. Type and Physical State	6. Quantities Max. Daily	Average Daily	Largest Cont.	7. Units	8. Storage Codes Storage Pressure	Storage Temp.	9. Hazard Categories
2	Page 18 Q-2 SF6 Breaker	Sulfur Hexafluoride			☐		X pure ☐ mixture	550	550	550	☐ gallons ☐ pounds X cu. feet ☐ tons	☐ ambient X > amb. ☐ < amb.	X ambient ☐ > amb. ☐ < amb. ☐ cryogenic	☐ fire ☐ reactive ☐ pressure release X acute health ☐ chronic health ☐ radioactive
		CAS No.: 2551624 ☐ EHS					☐ solid X liquid ☐ gas	Curies: (If radioactive)	Days On Site: 365	Storage Container:* A				
6	Page 18 M-25 Stretford Building	SODIUM METAVANADATE			☐		X pure ☐ mixture	832	600	418	☐ gallons X pounds ☐ cu. feet ☐ tons	X ambient ☐ > amb. ☐ < amb.	X ambient ☐ > amb. ☐ < amb. ☐ cryogenic	☐ fire ☐ reactive ☐ pressure release X acute health ☐ chronic health ☐ radioactive
		CAS No.: 20740-98-1 ☐ EHS					X solid ☐ liquid ☐ gas	Curies: (If radioactive)	Days On Site: 365	Storage Container:* O				
5	Page 18 M-25 Stretford Building	ADA	ANTHRAQUINONE DISULFONIC ACID DISODIUM SALT	26	☐	853-57-8	☐ pure X mixture	700	500	400	X gallons ☐ pounds ☐ cu. feet ☐ tons	X ambient ☐ > amb. ☐ < amb.	X ambient ☐ > amb. ☐ < amb. ☐ cryogenic	☐ fire ☐ reactive ☐ pressure release X acute health ☐ chronic health ☐ radioactive
			ADA ISOMERS	2.0	☐	71461-97-7								
			SODIUM SULFATE	1.0	☐	7757-82-6	☐ solid X liquid ☐ gas	Curies: (If radioactive)	Days On Site: 365	Storage Container:* O				
		CAS No.: ☐ EHS	WATER	71	☐	7732-18-5								
N/A	Page 18 M-25 Stretford Building	VERSENOL * AG FE CHELATE	Sodium Salt of Iron (HEDTA)	25	☐	017084-02-5	☐ pure X mixture	495	350	55	X gallons ☐ pounds ☐ cu. feet ☐ tons	X ambient ☐ > amb. ☐ < amb.	☐ ambient ☐ > amb. X < amb. ☐ cryogenic	☐ fire ☐ reactive ☐ pressure release X acute health ☐ chronic health ☐ radioactive
			Disodium	1	☐	062099-15-4								
			Sodium Nitrate	16	☐	007631-99-4	☐ solid X liquid ☐ gas	Curies: (If radioactive)	Days On Site: 365	Storage Container:* 1				
		CAS No.: ☐ EHS	Ammonium Nitrate	1	☐	006484-52-2								
			Sodium Glycolate	1	☐	002836-32-0								
			Water	56	☐	007732-18-5	☐ pure ☐ mixture				☐ gallons ☐ pounds ☐ cu. feet ☐ tons	☐ ambient ☐ > amb. ☐ < amb.	☐ ambient ☐ > amb. ☐ < amb. ☐ cryogenic	☐ fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
		CAS No.: ☐ EHS					☐ solid ☐ liquid ☐ gas	Curies: (If radioactive)	Days On Site:	Storage Container:*				
N/A	Page 18 M-13 Storage Bldg.	Ethylene Glycol			☐		X pure ☐ mixture	55	55	55	X gallons ☐ pounds ☐ cu. feet ☐ tons	X ambient ☐ > amb. ☐ < amb.	X ambient ☐ > amb. ☐ < amb. ☐ cryogenic	☐ fire ☐ reactive ☐ pressure release X acute health ☐ chronic health ☐ radioactive
		CAS No.: 107211 ☐ EHS					☐ solid X liquid ☐ gas	Curies: (If radioactive)	Days On Site: 365	Storage Container:* D				

* Storage Codes:

Code	Storage Type	Code	Storage Type	Code	Storage Type	Code	Storage Type	Code	Storage Type	Code	Storage Type
A	Aboveground Tank	D	Steel Drum	G	Carboy	J	Bag	M	Glass Bottle or Jug	P	Tank Wagon
B	Belowground Tank	E	Plastic/Non-metallic Drum	H	Silo	K	Box	N	Plastic Bottle or Jug	Q	Rail Car
C	Tank Inside Building	F	Can	I	Fiber Drum	L	Cylinder	O	Tote Bin	R	Other

If EPCRA, sign below: _____

Date: 01/03/08

Non-Waste Hazardous Materials Inventory Statement

For use by Unidocs Member Agencies or where approved by your Local Jurisdiction

Business Name: BOTTLE ROCK POWER, LLC
(Same as Facility Name or DBA)

Type of Report on This Page: ☐ Add; ☐ Delete; X Revise

Chemical Location: Power Plant and Yard Area
(Building/Storage Area)

EPCRA Confidential Location? ☐ Yes; X No
Trade Secret Information? ☐ Yes; X No

Facility ID # (Agency Use Only)

1. Haz. Class	2. Map and Grid or Location Code	3. Common Name	4. Hazardous Components (For mixtures only) Chemical Name	% Wt.	EHS	CAS No.	5. Type and Physical State	6. Quantities Max. Daily	Average Daily	Largest Cont.	7. Units	8. Storage Codes Storage Pressure	Storage Temp.	9. Hazard Categories
3	Page 18 M-13 Storage Bldg.	Kroil Oil	Petroleum Base Oil	40	☐	64742467	☐ pure X mixture	25	25	55	X gallons ☐ pounds ☐ cu. feet ☐ tons	X ambient ☐ > amb. ☐ < amb.	X ambient ☐ > amb. ☐ < amb. ☐ cryogenic	X fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
			Aliphatic Petroleum Distillate	5	☐	78922								
			Petroleum Solvent	5	☐	64742956	☐ solid X liquid ☐ gas	Curies: (If radioactive)	Days On Site: 365	Storage Container:* D				
		CAS No.: ☐ EHS	Aliphatic Hydrocarbon Solvent	5	☐	111762								
			Non-Hazardous Proprietary Mixture	10	☐	N/A								
			Petroleum Naptha	30	☐	64742478	☐ pure ☐ mixture				☐ gallons ☐ pounds ☐ cu. feet ☐ tons	☐ ambient ☐ > amb. ☐ < amb.	☐ ambient ☐ > amb. ☐ < amb. ☐ cryogenic	☐ fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
			Hydrocarbon Solvent	5	☐	123422								
					☐		☐ solid ☐ liquid ☐ gas	Curies: (If radioactive)	Days On Site:	Storage Container:*				
		CAS No.: ☐ EHS			☐									
					☐									
3	Page 18 M-13 Storage Bldg.	Texaco Regal Oil RO 32	Lubricating base oils	>98	☐	64742014	☐ pure X mixture	110	55	55	X gallons ☐ pounds ☐ cu. feet ☐ tons	X ambient ☐ > amb. ☐ < amb.	X ambient ☐ > amb. ☐ < amb. ☐ cryogenic	X fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
					☐	64742547								
					☐	64742627	☐ solid X liquid ☐ gas	Curies: (If radioactive)	Days On Site: 365	Storage Container:* D				
		CAS No.: ☐ EHS			☐	64742650								
			Proprietary Additives	<2	☐									
3	Page 18 M-13 Storage Bldg.	Chevron Gear Oil	Lubricating base oils	98	☐	64742014	☐ pure X mixture	110	55	55	X gallons ☐ pounds ☐ cu. feet ☐ tons	X ambient ☐ > amb. ☐ < amb.	X ambient ☐ > amb. ☐ < amb. ☐ cryogenic	X fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
					☐	64742547								
					☐		☐ solid X liquid ☐ gas	Curies: (If radioactive)	Days On Site: 365	Storage Container:* D				
		CAS No.: ☐ EHS			☐									
					☐									
3	Page 18 Q-12 Turb/Gen Bldg. 1st floor (clean tk)	CHEVRON GST OIL ISO 32 (Turbine lube oil)			☐		X pure ☐ mixture	300	300	4000	X gallons ☐ pounds ☐ cu. feet ☐ tons	X ambient ☐ > amb. ☐ < amb.	X ambient ☐ > amb. ☐ < amb. ☐ cryogenic	X fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
					☐									
		CAS No.: 64742547 ☐ EHS			☐		☐ solid X liquid ☐ gas	Curies: (If radioactive)	Days On Site: 365	Storage Container:* A				
					☐									
3	Page 18 R-11 Turb/Gen Bldg. 2nd floor (turb reservoir)	CHEVRON GST OIL ISO 32 (Turbine lube oil)			☐		X pure ☐ mixture	2200	2200	2510	X gallons ☐ pounds ☐ cu. feet ☐ tons	X ambient ☐ > amb. ☐ < amb.	X ambient ☐ > amb. ☐ < amb. ☐ cryogenic	X fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
					☐									
		CAS No.: 64742547 ☐ EHS			☐		☐ solid X liquid ☐ gas	Curies: (If radioactive)	Days On Site: 365	Storage Container:* A				
					☐									

* Storage Codes

Code	Storage Type	Code	Storage Type	Code	Storage Type	Code	Storage Type	Code	Storage Type	Code	Storage Type
A	Aboveground Tank	D	Steel Drum	G	Carboy	J	Bag	M	Glass Bottle or Jug	P	Tank Wagon
B	Belowground Tank	E	Plastic/Non-metallic Drum	H	Silo	K	Box	N	Plastic Bottle or Jug	Q	Rail Car
C	Tank Inside Building	F	Can	I	Fiber Drum	L	Cylinder	O	Tote Bin	R	Other

If EPCRA, sign below: _____

Date: 006/02/08

Non-Waste Hazardous Materials Inventory Statement

For use by Unidocs Member Agencies or where approved by your Local Jurisdiction

Business Name: BOTTLE ROCK POWER, LLC
(Same as Facility Name or DBA)

Type of Report on This Page: ☐ Add; ☐ Delete; X Revise

Chemical Location: Power Plant and Yard Area
(Building/Storage Area)

EPCRA Confidential Location? ☐ Yes; X No
Trade Secret Information? ☐ Yes; X No

Facility ID # (Agency Use Only)

1. Haz. Class	2. Map and Grid or Location Code	3. Common Name	4. Hazardous Components (For mixtures only) Chemical Name	% Wt.	EHS	CAS No.	5. Type and Physical State	6. Quantities Max. Daily	Average Daily	Largest Cont.	7. Units	8. Storage Codes Storage Pressure	Storage Temp.	9. Hazard Categories
5	Page 18, S-23	Hydrogen Peroxide	Hydrogen Peroxide	50	☐	7722-84-1	☐ pure X mixture	400	400	400	X gallons ☐ pounds ☐ cu. feet ☐ tons	X ambient ☐ > amb. ☐ < amb.	X ambient ☐ > amb. ☐ < amb. ☐ cryogenic	☐ fire ☐ reactive ☐ pressure release X acute health ☐ chronic health ☐ radioactive
			Water	50	☐	7732-18-5								
		CAS No.: ☐ EHS			☐		☐ solid X liquid ☐ gas	Curies: (If radioactive)	Days On Site:	Storage Container:* O				
NR	Page 18 M-25	Sodium Carbonate Anhydrous			☐		X pure ☐ mixture	16,200	6,000	50	☐ gallons X pounds ☐ cu. feet ☐ tons	X ambient ☐ > amb. ☐ < amb.	X ambient ☐ > amb. ☐ < amb. ☐ cryogenic	☐ fire ☐ reactive ☐ pressure release X acute health ☐ chronic health ☐ radioactive
		CAS No.: 497-19-8 ☐ EHS			☐		☐ solid ☐ liquid ☐ gas	Curies: (If radioactive)	Days On Site:	Storage Container:*				
					☐		☐ pure ☐ mixture				☐ gallons ☐ pounds ☐ cu. feet ☐ tons	☐ ambient ☐ > amb. ☐ < amb.	☐ ambient ☐ > amb. ☐ < amb. ☐ cryogenic	☐ fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
		CAS No.: ☐ EHS			☐		☐ solid ☐ liquid ☐ gas	Curies: (If radioactive)	Days On Site:	Storage Container:* R				
		Sulfur Hexafluoride			☐		☐ pure ☐ mixture				☐ gallons ☐ pounds ☐ cu. feet ☐ tons	☐ ambient ☐ > amb. ☐ < amb.	☐ ambient ☐ > amb. ☐ < amb. ☐ cryogenic	☐ fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
		CAS No.: ☐ EHS			☐		☐ solid ☐ liquid ☐ gas	Curies: (If radioactive)	Days On Site:	Storage Container:* A				

* Storage Codes

Code	Storage Type	Code	Storage Type	Code	Storage Type	Code	Storage Type	Code	Storage Type	Code	Storage Type
A	Aboveground Tank	D	Steel Drum	G	Carboy	J	Bag	M	Glass Bottle or Jug	P	Tank Wagon
B	Belowground Tank	E	Plastic/Non-metallic Drum	H	Silo	K	Box	N	Plastic Bottle or Jug	Q	Rail Car
C	Tank Inside Building	F	Can	I	Fiber Drum	L	Cylinder	O	Tote Bin	R	Other

If EPCRA, sign below: _____

Date: 06/028/08

Non-Waste Hazardous Materials Inventory Statement

For use by Unidocs Member Agencies or where approved by your Local Jurisdiction

Business Name: BOTTLE ROCK POWER, LLC
(Same as Facility Name or DBA)

Type of Report on This Page: ☐ Add; ☐ Delete; X Revise

Chemical Location: Steam Field Office /Francisco Well Pad
(Building/Storage Area)

EPCRA Confidential Location? ☐ Yes; X No
Trade Secret Information? ☐ Yes; X No

Facility ID # (Agency Use Only)

1. Haz. Class	2. Map and Grid or Location Code	3. Common Name	4. Hazardous Components (For mixtures only) Chemical Name	% Wt.	EHS	CAS No.	5. Type and Physical State	6. Quantities Max. Daily	Average Daily	Largest Cont.	7. Units	8. Storage Codes Storage Pressure	Storage Temp.	9. Hazard Categories
3	Page 19 K-15	Gasoline (Unleaded)			☐		☐ pure X mixture	450	450	550	X gallons ☐ pounds ☐ cu. feet ☐ tons	X ambient ☐ > amb. ☐ < amb.	X ambient ☐ > amb. ☐ < amb. ☐ cryogenic	X fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
		CAS No.: 86290815 ☐ EHS			☐		☐ solid X liquid ☐ gas	Curies: (If radioactive)	Days On Site: 365	Storage Container:* A				
3	Page 19 P-15	Diesel Fuel			☐		X pure ☐ mixture	450	450	500	X gallons ☐ pounds ☐ cu. feet ☐ tons	X ambient ☐ > amb. ☐ < amb.	X ambient ☐ > amb. ☐ < amb. ☐ cryogenic	X fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
		CAS No.: 68476346 ☐ EHS			☐		☐ solid X liquid ☐ gas	Curies: (If radioactive)	Days On Site: 365	Storage Container:* A				
3	Page 19 P-18	Diesel Fuel			☐		X pure ☐ mixture	450	450	550	X gallons ☐ pounds ☐ cu. feet ☐ tons	X ambient ☐ > amb. ☐ < amb.	X ambient ☐ > amb. ☐ < amb. ☐ cryogenic	X fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
		CAS No.: 68476346 ☐ EHS			☐		☐ solid X liquid ☐ gas	Curies: (If radioactive)	Days On Site: 365	Storage Container:* A				
3	Page 19 I-15	Diesel Fuel			☐		☐ pure ☐ mixture	900	900	1000	X gallons ☐ pounds ☐ cu. feet ☐ tons	X ambient ☐ > amb. ☐ < amb.	X ambient ☐ > amb. ☐ < amb. ☐ cryogenic	X fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
		CAS No.: 684763346 ☐ EHS			☐		☐ solid X liquid ☐ gas	Curies: (If radioactive)	Days On Site: 365	Storage Container:* A				
NR	Page 19 X-13	Sodium Hydroxide	Sodium Hydroxide	25	☐	124-68-5	☐ pure X mixture	700	500	330	☐ gallons ☐ pounds ☐ cu. feet ☐ tons	☐ ambient ☐ > amb. ☐ < amb.	☐ ambient ☐ > amb. ☐ < amb. ☐ cryogenic	☐ fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
		CAS No.: ☐ EHS			☐		☐ solid X liquid ☐ gas	Curies: (If radioactive)	Days On Site: 365	Storage Container:* O				
3	Page 19 J-9	Geogard 8872	2-Amino-2-methyl-1-propanol + 5% water.	7.4	☐	124-68-5	☐ pure X mixture	1320	660	330	☐ gallons ☐ pounds ☐ cu. feet ☐ tons	☐ ambient ☐ > amb. ☐ < amb.	☐ ambient ☐ > amb. ☐ < amb. ☐ cryogenic	☐ fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
		CAS No.: ☐ EHS			☐		☐ solid X liquid ☐ gas	Curies: (If radioactive)	Days On Site: 365	Storage Container:* O				

* Storage Codes

Code	Storage Type	Code	Storage Type	Code	Storage Type	Code	Storage Type	Code	Storage Type	Code	Storage Type
A	Aboveground Tank	D	Steel Drum	G	Carboy	J	Bag	M	Glass Bottle or Jug	P	Tank Wagon
B	Belowground Tank	E	Plastic/Non-metallic Drum	H	Silo	K	Box	N	Plastic Bottle or Jug	Q	Rail Car
C	Tank Inside Building	F	Can	I	Fiber Drum	L	Cylinder	O	Tote Bin	R	Other

If EPCRA, sign below:

Date: 06/08/08

Non-Waste Hazardous Materials Inventory Statement

For use by Unidocs Member Agencies or where approved by your Local Jurisdiction

Business Name: BOTTLE ROCK POWER, LLC
(Same as Facility Name or DBA)

Type of Report on This Page: ☐ Add; ☐ Delete; X Revise

Chemical Location: Coleman Well Pad
(Building/Storage Area)

EPCRA Confidential Location? ☐ Yes; X No
Trade Secret Information? ☐ Yes; X No

Facility ID # (Agency Use Only)

1. Haz. Class	2. Map and Grid or Location Code	3. Common Name	4. Hazardous Components (For mixtures only) Chemical Name	% Wt.	EHS	CAS No.	5. Type and Physical State	6. Quantities Max. Daily	Average Daily	Largest Cont.	7. Units	8. Storage Codes Storage Pressure	Storage Temp.	9. Hazard Categories
NR	Page 20 P-12	Geo Gard 8872	2-Amino-2-methyl-1-propanol + 5% water	7.4	☐	124-68-5	☐ pure X mixture	1320	660	330	X gallons ☐ pounds ☐ cu. feet ☐ tons	X ambient ☐ > amb. ☐ < amb.	X ambient ☐ > amb. ☐ < amb. ☐ cryogenic	☐ fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
		CAS No.: ☐ EHS					☐ solid X liquid ☐ gas	Curies: (If radioactive)	Days On Site: 365	Storage Container:* O				
3	Page 20 P-13	Geogard 8844	Isopropyl Alcohol	5+-2	☐	67-63-0	☐ pure X mixture	1320	660	330	X gallons ☐ pounds ☐ cu. feet ☐ tons	X ambient ☐ > amb. ☐ < amb.	X ambient ☐ > amb. ☐ < amb. ☐ cryogenic	X fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
			Acetic acid	3+-2	☐	64-19-7								
		CAS No.: ☐ EHS					☐ solid X liquid ☐ gas	Curies: (If radioactive)	Days On Site: 365	Storage Container:* O				
					☐		X pure ☐ mixture				☐ gallons X pounds ☐ cu. feet ☐ tons	X ambient ☐ > amb. ☐ < amb.	X ambient ☐ > amb. ☐ < amb. ☐ cryogenic	☐ fire ☐ reactive ☐ pressure release X acute health ☐ chronic health ☐ radioactive
		CAS No.: ☐ EHS					☐ solid ☐ liquid ☐ gas	Curies: (If radioactive)	Days On Site:	Storage Container:*				
					☐		☐ pure ☐ mixture				☐ gallons ☐ pounds ☐ cu. feet ☐ tons	☐ ambient ☐ > amb. ☐ < amb.	☐ ambient ☐ > amb. ☐ < amb. ☐ cryogenic	☐ fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
		CAS No.: ☐ EHS					☐ solid ☐ liquid ☐ gas	Curies: (If radioactive)	Days On Site:	Storage Container:*				
					☐		☐ pure ☐ mixture				☐ gallons ☐ pounds ☐ cu. feet ☐ tons	☐ ambient ☐ > amb. ☐ < amb.	☐ ambient ☐ > amb. ☐ < amb. ☐ cryogenic	☐ fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
		CAS No.: ☐ EHS					☐ solid ☐ liquid ☐ gas	Curies: (If radioactive)	Days On Site:	Storage Container:*				
					☐		☐ pure ☐ mixture				☐ gallons ☐ pounds ☐ cu. feet ☐ tons	☐ ambient ☐ > amb. ☐ < amb.	☐ ambient ☐ > amb. ☐ < amb. ☐ cryogenic	☐ fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
		CAS No.: ☐ EHS					☐ solid ☐ liquid ☐ gas	Curies: (If radioactive)	Days On Site:	Storage Container:*				

* Storage Codes

Code	Storage Type	Code	Storage Type	Code	Storage Type	Code	Storage Type	Code	Storage Type	Code	Storage Type
A	Aboveground Tank	D	Steel Drum	G	Carboy	J	Bag	M	Glass Bottle or Jug	P	Tank Wagon
B	Belowground Tank	E	Plastic/Non-metallic Drum	H	Silo	K	Box	N	Plastic Bottle or Jug	Q	Rail Car
C	Tank Inside Building	F	Can	I	Fiber Drum	L	Cylinder	O	Tote Bin	R	Other

If EPCRA, sign below: _____

Date: 06/028/08

Non-Waste Hazardous Materials Inventory Statement

For use by Unidocs Member Agencies or where approved by your Local Jurisdiction

Business Name: BOTTLE ROCK POWER, LLC
(Same as Facility Name or DBA)

Type of Report on This Page: ☐ Add; ☐ Delete; X Revise

Chemical Location: West Coleman Well Pad

EPCRA Confidential Location? ☐ Yes; X No
Trade Secret Information? ☐ Yes; X No

Facility ID # (Agency Use Only)

1. Haz. Class	2. Map and Grid or Location Code	3. Common Name	4. Hazardous Components (For mixtures only) Chemical Name	% Wt.	EHS	CAS No.	5. Type and Physical State	6. Quantities Max. Daily	Average Daily	Largest Cont.	7. Units	8. Storage Codes Storage Pressure	Storage Temp.	9. Hazard Categories
3	Page 21 T-16	Geogard 8844	Isopropyl Alcohol	5+-2	☐	67-63-0	☐ pure X mixture	660	450	330	X gallons ☐ pounds ☐ cu. feet ☐ tons	X ambient ☐ > amb. ☐ < amb.	X ambient ☐ > amb. ☐ < amb. ☐ cryogenic	X fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
			Acetic Acid	3+-2	☐	64-19-7								
		CAS No.:			☐		☐ solid X liquid ☐ gas	Curies: (If radioactive)	Days On Site: 365	Storage Container:* O				
NR	Page 21 S-17	Geogard 8872	2-Amino-2-methyl-1-propanol + 5% water	7.4	☐	124-68-5	X pure ☐ mixture	660	450	330	X gallons ☐ pounds ☐ cu. feet ☐ tons	X ambient ☐ > amb. ☐ < amb.	X ambient ☐ > amb. ☐ < amb. ☐ cryogenic	☐ fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
		CAS No.:			☐		☐ solid X liquid ☐ gas	Curies: (If radioactive)	Days On Site: 365	Storage Container:* O				
					☐		X pure ☐ mixture				☐ gallons ☐ pounds ☐ cu. feet ☐ tons	☐ ambient ☐ > amb. ☐ < amb.	☐ ambient ☐ > amb. ☐ < amb. ☐ cryogenic	☐ fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
		CAS No.:			☐		☐ solid X liquid ☐ gas	Curies: (If radioactive)	Days On Site:	Storage Container:*				
					☐		☐ pure ☐ mixture				☐ gallons ☐ pounds ☐ cu. feet ☐ tons	☐ ambient ☐ > amb. ☐ < amb.	☐ ambient ☐ > amb. ☐ < amb. ☐ cryogenic	☐ fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
		CAS No.:			☐		☐ solid X liquid ☐ gas	Curies: (If radioactive)	Days On Site:	Storage Container:*				
					☐		☐ pure ☐ mixture				☐ gallons ☐ pounds ☐ cu. feet ☐ tons	☐ ambient ☐ > amb. ☐ < amb.	☐ ambient ☐ > amb. ☐ < amb. ☐ cryogenic	☐ fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
		CAS No.:			☐		☐ solid ☐ liquid ☐ gas	Curies: (If radioactive)	Days On Site:	Storage Container:*				

*

Code	Storage Type	Code	Storage Type	Code	Storage Type	Code	Storage Type	Code	Storage Type	Code	Storage Type
A	Aboveground Tank	D	Steel Drum	G	Carboy	J	Bag	M	Glass Bottle or Jug	P	Tank Wagon
B	Belowground Tank	E	Plastic/Non-metallic Drum	H	Silo	K	Box	N	Plastic Bottle or Jug	Q	Rail Car
C	Tank Inside Building	F	Can	I	Fiber Drum	L	Cylinder	O	Tote Bin	R	Other

If EPCRA, sign below:

Non-Waste Hazardous Materials Inventory Statement Instructions
(Modified UPCF Hazardous Materials Inventory - Chemical Description Page)

All non-waste hazardous materials stored at the facility must be listed on the Non-Waste Hazardous Materials Inventory Statement [or the Unified Program Consolidated Form (UPCF) Hazardous Materials Inventory - Chemical Description form (available on the Internet at **www.unidocs.org**)]. This form allows you to report up to six chemicals on a single page. Do not list hazardous wastes on this form.

You must complete a separate inventory line for each individual hazardous material that you handle at your facility in an aggregate quantity subject to Hazardous Materials Business Plan reporting requirements (please refer to the Hazardous Materials Business Plan Information Sheet). The completed inventory must reflect **all** hazardous materials at your facility, reported **separately** for each building or outside storage area, with **separate** inventory lines for unique occurrences of physical state, storage temperature, or storage pressure. Trade secret materials must be listed on separate pages. Where the aggregate quantities of some hazardous materials are below the Business Plan threshold reporting quantity, report the general hazard class of the materials (e.g. "Misc. Flammable Liquids"), rather than the Common Name, and the aggregate quantity of all hazardous materials having this hazard class which individually are below the threshold reporting quantity. Make additional copies of this form if needed. Your local agency may be capable of accepting electronic reporting of this information. Contact your local agency for details.

1. DATE - In the space at the top left side of the form, enter the date this inventory statement page was prepared.
2. BUSINESS NAME - Enter the complete Facility Name.
3. TYPE OF REPORT ON THIS PAGE - Indicate whether the material is being added to the inventory, deleted from the inventory, or if the information previously submitted is being revised. (Note: You may leave this blank if you resubmit your entire inventory annually.)
4. PAGE NUMBER - Number each page of the inventory appropriately.
5. CHEMICAL LOCATION - Enter the name of the building or outside area where the hazardous materials reported on this page are handled. A chemical stored at the same pressure and temperature in multiple locations in one building or area can be reported on a single line.
6. EPCRA CONFIDENTIAL LOCATION - You must check "Yes" to keep chemical location information confidential. If you do not wish to keep chemical location information confidential check "No." If "Yes," a signature is required on the line provided at the bottom of the form.
7. TRADE SECRET INFORMATION- Check "Yes" if the information in this section is declared a trade secret, "No" if it is not. If "Yes," and the business is subject to EPCRA, disclosure of designated Trade Secret information is bound by 40 CFR and the business must submit a "Substantiation to Accompany Claims of Trade Secrecy" form to the United States Environmental Protection Agency.
8. FACILITY ID NUMBER - This number is for agency use only. Leave this space blank.
9. HAZARD CLASS - In Column 1 of the inventory table, provide the primary U.S. Department of Transportation (DOT) numerical hazard class for the material being reported on each line.
10. MAP & GRID OR LOCATION CODE - In Column 2, enter the page number of the Storage Map where the location of the hazardous material is shown, along with the grid coordinates from your Storage Map that correspond to the location of the hazardous material. If applicable, multiple grid coordinates can be listed. If you do not use a grid system, enter the Location Code shown on your Storage Map.
11. COMMON NAME, CAS NUMBER, & EHS - In Column 3, enter the following information:
    - COMMON NAME - The Common Name or Trade Name of the hazardous material or mixture (e.g. Gasoline, Acme Super Solvent).
    - EHS - If the material is considered an Extremely Hazardous Substance as defined in 40 CFR, Part 355, Appendix A, check the EHS box.
    - CAS NUMBER - Enter the Chemical Abstract Service (CAS) number for the hazardous material. For mixtures, enter the CAS number of the mixture if it has been assigned a number distinct from its components. If the mixture has no CAS number, leave this column blank and report the CAS numbers of the individual hazardous components in the appropriate section, below.
12. HAZARDOUS COMPONENTS - (Note: If the material is not a mixture, skip Column 4 and go directly to Column 5.) In column 4, enter the following information regarding Hazardous Components that make up the material listed in Column 3:
    - CHEMICAL NAME - If the Chemical Name is the same as the Common or Trade Name shown in Column 3, you may leave this space blank. If the material is a mixture, list the chemical name of each hazardous component in the mixture ranked by percent weight (refer to the MSDS or manufacturer). All hazardous components present at greater than 1% by weight if non-carcinogenic, or 0.1% by weight if carcinogenic, must be reported. If more than five hazardous components exceed these percentages, you may attach an additional sheet of paper to report the required information.
    - % BY WEIGHT - Enter the percentage weight of each hazardous component. If a range of percentages is available, report the highest percentage in that range.
    - EHS - Check the box provided if the component of the mixture is considered an Extremely Hazardous Substance.
    - CAS NUMBER - List the Chemical Abstract Service (CAS) number for each hazardous component.
13. TYPE & PHYSICAL STATE - In column 5, identify the material type and physical state by checking the "pure" or "mixture box and the "solid", "liquid", or "gas" box.
14. QUANTITIES - In the appropriate spaces within column 6, list:
    - MAXIMUM DAILY AMOUNT* - Enter the maximum amount of the hazardous material or mixture handled in this building or outside area at any one time over the course of the year. This amount must contain, at a minimum, last year's reported inventory with the reflection of additions, deletions, or revisions projected for the current year.
    - AVERAGE DAILY AMOUNT* - Calculate the average daily amount of the hazardous material or mixture in this building or outside area. If this is a material that is new to this location, the amount should be the average daily amount you project to be on hand during the course of the year.
    - LARGEST CONTAINER* - Enter the volume of the largest container in which the material is handled at the location.
    - CURIES - If the material is radioactive, use the space provided to report the activity in curies.
    - DAYS ON SITE - Enter the total number of days (e.g. 365) during the year that the material is on site.
    - STORAGE CONTAINER - Using the container codes listed at the bottom of the inventory statement, list every type of container in which the material is stored/handled.

    * Except for Curies, units of measure must be the same as that indicated in Column 7.
15. UNITS - In column 7, check the appropriate unit of measure: gallons for liquids, pounds or tons for solids, and cubic feet for gases. If the material is a federally defined EHS and is not a mixture, all amounts must be reported in pounds.
16. STORAGE CODES - In the appropriate spaces within Column 8, list:
    - STORAGE PRESSURE - Check the box that best describes the pressure at which the material is stored: ambient (standard), > amb. (greater than ambient), < amb. (less than ambient), or cryogenic.
    - STORAGE TEMPERATURE - Check the box that best describes the temperature at which the material is stored.
17. HAZARD CATEGORIES - In column 9, check the box(es) to describe all physical, health, and radioactivity hazards associated with the hazardous material.

PHYSICAL HAZARDS	HEALTH HAZARDS
Fire: Flammable Liquids and Solids, Combustible Liquids, Pyrophorics, Oxidizers	**Acute Health (Immediate):** Toxics, Highly Toxics, Irritants, Sensitizers, Corrosives, other hazardous chemicals with an adverse effect with short-term exposure
Reactive: Unstable Reactives, Organic Peroxides, Water Reactives, Radioactives	
Pressure Release: Explosives, Compressed Gases, Blasting Agents	**Chronic Health (Delayed):** Carcinogens, other chemicals with an adverse effect with long-term exposure

Date: 06/02/08

Hazardous Waste Inventory Statement

For use by Unidocs Member Agencies or where approved by your Local Jurisdiction

Business Name: BOTTLE ROCK POWER, LLC
(Same as Facility Name or DBA)

Type of Report on This Page: ☐ Add; ☐ Delete; X Revise

Chemical Location: Plant Yard Area
(Building/Storage Area)

EPCRA Confidential Location? ☐ Yes; X No
Trade Secret Information? ☐ Yes; X No

Facility ID # (Agency Use Only)

1. Haz. Class	2. Map and Grid or Location Code	3. Waste Stream Name	4. Hazardous Components: Chemical Name	% Wt.	EHS	CAS No.	5. Type and Physical State	6. Quantities: Max. Daily	Average Daily	Largest Cont.	7. Annual Waste Amount	8. Units	9. Storage Codes: Storage Pressure	Storage Temp.	10. Hazard Categories
9	Page 18 K-21 (Waste Bins)	Stretford Co-Product Sulfur Cake	Sulfur	60	☐		☒ waste	48	32	8	270	☐ gallons ☐ pounds ☐ cu. feet X tons	X ambient ☐ > amb. ☐ < amb.	X ambient ☐ > amb. ☐ < amb. ☐ cryogenic	X fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
			Water	40	☐										
		Management Method: X Shipped Off-site ☐ Recycled On-site ☐ Treated On-site			☐		X solid ☐ liquid ☐ gas	Curies: (If radioactive)	Days On Site: 365	Storage Container:* O	State Waste Code: 441				
NON RCRA	Page 18 M-14 Storage Bldg.	Lubricating oil & water	Petroleum Base Oil	70	☐	64742467	☒ waste	220	5	55	440	X gallons ☐ pounds ☐ cu. feet ☐ tons	X ambient ☐ > amb. ☐ < amb.	X ambient ☐ > amb. ☐ < amb. ☐ cryogenic	X fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
			Water	30	☐	007732-18-5									
		Management Method: X Shipped Off-site ☐ Recycled On-site ☐ Treated On-site			☐		☐ solid X liquid ☐ gas	Curies: (If radioactive)	Days On Site: 365	Storage Container:* D	State Waste Code: 221				
NON RCRA	Page 18 M-14	Geothermal Debris			☐		☒ waste	55	20	55	165	X gallons ☐ pounds ☐ cu. feet ☐ tons	X ambient ☐ > amb. ☐ < amb.	X ambient ☐ > amb. ☐ < amb. ☐ cryogenic	☐ fire ☐ reactive ☐ pressure release ☐ acute health X chronic health ☐ radioactive
		Management Method: X Shipped Off-site ☐ Recycled On-site ☐ Treated On-site			☐		X solid ☐ liquid ☐ gas	Curies: (If radioactive)	Days On Site: 365	Storage Container:* D	State Waste Code: 181				
NON RCRA	Page 18 E-24	Geothermal Debris			☐		☒ waste	3	3	5	12	☐ gallons ☐ pounds ☐ cu. feet X tons	X ambient ☐ > amb. ☐ < amb.	X ambient ☐ > amb. ☐ < amb. ☐ cryogenic	☐ fire ☐ reactive ☐ pressure release ☐ acute health X chronic health ☐ radioactive
		Management Method: X Shipped Off-site ☐ Recycled On-site ☐ Treated On-site			☐		X solid ☐ liquid ☐ gas	Curies: (If radioactive)	Days On Site:	Storage Container:* R	State Waste Code: 181				
NON RCRA	Page 18 G-14	Lubricating oil & water	Petroleum Base Oil	70	☐	64742467	☒ waste	110	5	55	55	X gallons ☐ pounds ☐ cu. feet ☐ tons	X ambient ☐ > amb. ☐ < amb.	X ambient ☐ > amb. ☐ < amb. ☐ cryogenic	X fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
			Water	30	☐	007732-18-5									
		Management Method: X Shipped Off-site ☐ Recycled On-site ☐ Treated On-site			☐		☐ solid X liquid ☐ gas	Curies: (If radioactive)	Days On Site: 365	Storage Container:* D	State Waste Code: 221				
					☐		☐ waste					☐ gallons ☐ pounds ☐ cu. feet ☐ tons	☐ ambient ☐ > amb. ☐ < amb.	☐ ambient ☐ > amb. ☐ < amb. ☐ cryogenic	☐ fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
		Management Method: Shipped Off-site ☐ Recycled On-site ☐ Treated On-site			☐		☐ solid ☐ liquid ☐ gas	Curies: (If radioactive)	Days On Site:	Storage Container:*	State Waste Code:				

* Code	Storage Type	Code	Storage Type	Code	Storage Type	Code	Storage Type	Code	Storage Type	Code	Storage Type
A	Aboveground Tank	D	Steel Drum	G	Carboy	J	Bag	M	Glass Bottle or Jug	P	Tank Wagon
B	Belowground Tank	E	Plastic/Nonmetallic Drum	H	Silo	K	Box	N	Plastic Bottle or Jug	Q	Rail Car
C	Tank Inside Building	F	Can	I	Fiber Drum	L	Cylinder	O	Tote Bin	R	Other

If EPCRA, sign below:

Date: 06/02/08

Hazardous Waste Inventory Statement

For use by Unidocs Member Agencies or where approved by your Local Jurisdiction

Business Name: BOTTLE ROCK POWER, LLC
(Same as Facility Name or DBA)

Type of Report on This Page: ☐ Add; ☐ Delete; X Revise

Chemical Location: Plant Yard Area
(Building/Storage Area)

EPCRA Confidential Location? ☐ Yes; X No
Trade Secret Information? ☐ Yes; X No

Facility ID # (Agency Use Only)

1. Haz. Class	2. Map and Grid or Location Code	3. Waste Stream Name	4. Hazardous Components: Chemical Name	% Wt.	EHS	CAS No.	5. Type and Physical State	6. Quantities: Max. Daily	Average Daily	Largest Cont.	7. Annual Waste Amount	8. Units	9. Storage Codes: Storage Pressure	Storage Temp.	10. Hazard Categories
NON RCRA	Page 19 O-18	Lubricating oil & water	Petroleum Base Oil	90	☐	64742467	☒ waste	50	5	55	440	X gallons ☐ pounds ☐ cu. feet ☐ tons	X ambient ☐ > amb. ☐ < amb.	X ambient ☐ > amb. ☐ < amb. ☐ cryogenic	X fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
			Water	5	☐	007732-18-5									
		Management Method: X Shipped Off-site ☐ Recycled On-site ☐ Treated On-site			☐		☐ solid X liquid ☐ gas	Curies: (If radioactive)	Days On Site: 365	Storage Container:* D	State Waste Code: 221				
NON RCRA	Page 19 O-18	Geothermal Debris			☐		X waste	9	5	10	12	☐ gallons ☐ pounds ☐ cu. feet X tons	X ambient ☐ > amb. ☐ < amb.	X ambient ☐ > amb. ☐ < amb. ☐ cryogenic	☐ fire ☐ reactive ☐ pressure release ☐ acute health ☐ chronic health ☐ radioactive
		Management Method: X Shipped Off-site ☐ Recycled On-site ☐ Treated On-site			☐		X solid ☐ liquid ☐ gas	Curies: (If radioactive)	Days On Site: 365	Storage Container:* R	State Waste Code: 181				

* Storage Codes:

Code	Storage Type	Code	Storage Type	Code	Storage Type	Code	Storage Type	Code	Storage Type	Code	Storage Type
A	Aboveground Tank	D	Steel Drum	G	Carboy	J	Bag	M	Glass Bottle or Jug	P	Tank Wagon
B	Belowground Tank	E	Plastic/Nonmetallic Drum	H	Silo	K	Box	N	Plastic Bottle or Jug	Q	Rail Car
C	Tank Inside Building	F	Can	I	Fiber Drum	L	Cylinder	O	Tote Bin	R	Other

If EPCRA, sign below: _____

Hazardous Waste Inventory Statement Instructions
(Modified UPCF Hazardous Materials Inventory - Chemical Description Page)

All hazardous wastes handled at the facility must be listed on the Hazardous Waste Inventory Statement [or the Unified Program Consolidated Form (UPCF) Hazardous Materials Inventory - Chemical Description form (available on the Internet at **www.unidocs.org**)]. This form allows you to report up to six wastes on a single page. Do not list non-waste hazardous materials on this form.

You must complete a separate inventory line for each individual hazardous waste that you handle at your facility in an aggregate quantity subject to Hazardous Materials Business Plan reporting requirements (please refer to the Hazardous Materials Business Plan Information Sheet). The completed inventory must reflect **all** hazardous wastes at your facility, reported **separately** for each building or outside storage area, with **separate** inventory lines for unique occurrences of physical state, storage temperature, or storage pressure. Trade secret wastes must be listed on separate pages. Make additional copies of this form if needed. Your local agency may be capable of accepting electronic reporting of this information. Contact your local agency for details.

1. DATE - In the space at the top left side of the form, enter the date this inventory statement page was prepared.
2. BUSINESS NAME - Enter the complete Facility Name.
3. TYPE OF REPORT ON THIS PAGE - Indicate whether the waste is being added to the inventory, deleted from the inventory, or if the information previously submitted is being revised. (Note: You may leave this blank if you resubmit your entire inventory annually.)
4. PAGE NUMBER - Number each page of the inventory appropriately.
5. CHEMICAL LOCATION - Enter the name of the building or outside area where the hazardous wastes reported on this page are handled. A waste stored at the same pressure and temperature in multiple locations in one building or area can be reported on a single line.
6. EPCRA CONFIDENTIAL LOCATION - You must check "Yes" to keep chemical location information confidential. If you do not wish to keep chemical location information confidential check "No." If "Yes," a signature is required on the line provided at the bottom of the form.
7. TRADE SECRET INFORMATION- Check "Yes" if the information in this section is declared a trade secret, "No" if it is not. If "Yes," and the business is subject to EPCRA, disclosure of designated Trade Secret information is bound by 40 CFR and the business must submit a "Substantiation to Accompany Claims of Trade Secrecy" form to the United States Environmental Protection Agency.
8. FACILITY ID NUMBER - This number is for agency use only. Leave this space blank.
9. HAZARD CLASS - In Column 1 of the inventory table, provide the primary U.S. Department of Transportation (DOT) numerical hazard class for the waste being reported on each line.
10. MAP & GRID OR LOCATION CODE - In Column 2, enter the page number of the Storage Map where the location of the hazardous waste is shown, along with the grid coordinates from your Storage Map that correspond to the location of the hazardous waste. If applicable, multiple grid coordinates can be listed. If you do not use a grid system, enter the Location Code shown on your Storage Map.
11. WASTE STREAM NAME & MANAGEMENT METHOD - In Column 3, enter the following information:
    - WASTE STREAM NAME - The Common Name of the hazardous waste (e.g. Used Oil, Spent Solvent).
    - MANAGEMENT METHOD - Check the appropriate box(es) to indicate how you manage the waste.
12. HAZARDOUS COMPONENTS - In column 4, enter the following information regarding Hazardous Components that make up the waste listed in Column 3:
    - CHEMICAL NAME - List the chemical name of each hazardous component in the mixture ranked by percent weight. All hazardous components present at greater than 1% by weight if non-carcinogenic, or 0.1% by weight if carcinogenic, must be reported. If more than five hazardous components exceed these percentages, you may attach an additional sheet of paper to report the required information.
    - % BY WEIGHT - Enter the percentage weight of each hazardous component. If a range of percentages is available, report the highest percentage in that range.
    - EHS - Check the box provided if the component of the mixture is considered an Extremely Hazardous Substance as defined in 40 CFR, Part 355, Appendix A.
    - CAS NUMBER - List the Chemical Abstract Service (CAS) number for each hazardous component.
13. TYPE & PHYSICAL STATE - In column 5, identify the physical state by checking the "solid", "liquid", or "gas" box.
14. QUANTITIES - In the appropriate spaces within column 6, list:
    - MAXIMUM DAILY AMOUNT* - Enter the maximum amount of the hazardous waste handled in this building or outside area at any one time over the course of the year. This amount must contain, at a minimum, last year's reported inventory with the reflection of additions, deletions, or revisions projected for the current year.
    - AVERAGE DAILY AMOUNT* - Calculate the average daily amount of the hazardous waste or mixture in this building or outside area. If this is a waste that is new to this location, the amount should be the average daily amount you project to be on hand during the course of the year.
    - LARGEST CONTAINER* - Enter the volume of the largest container in which the waste is handled at the location.
    - CURIES - If the waste is radioactive, use the space provided to report the activity in curies.
    - DAYS ON SITE - Enter the total number of days (e.g. 365) during the year that the waste is on site. (Note: This does not refer to the accumulation time limit for individual waste containers.)
    - STORAGE CONTAINER - Using the container codes listed at the bottom of the inventory statement, list every type of container in which the waste is stored/handled.

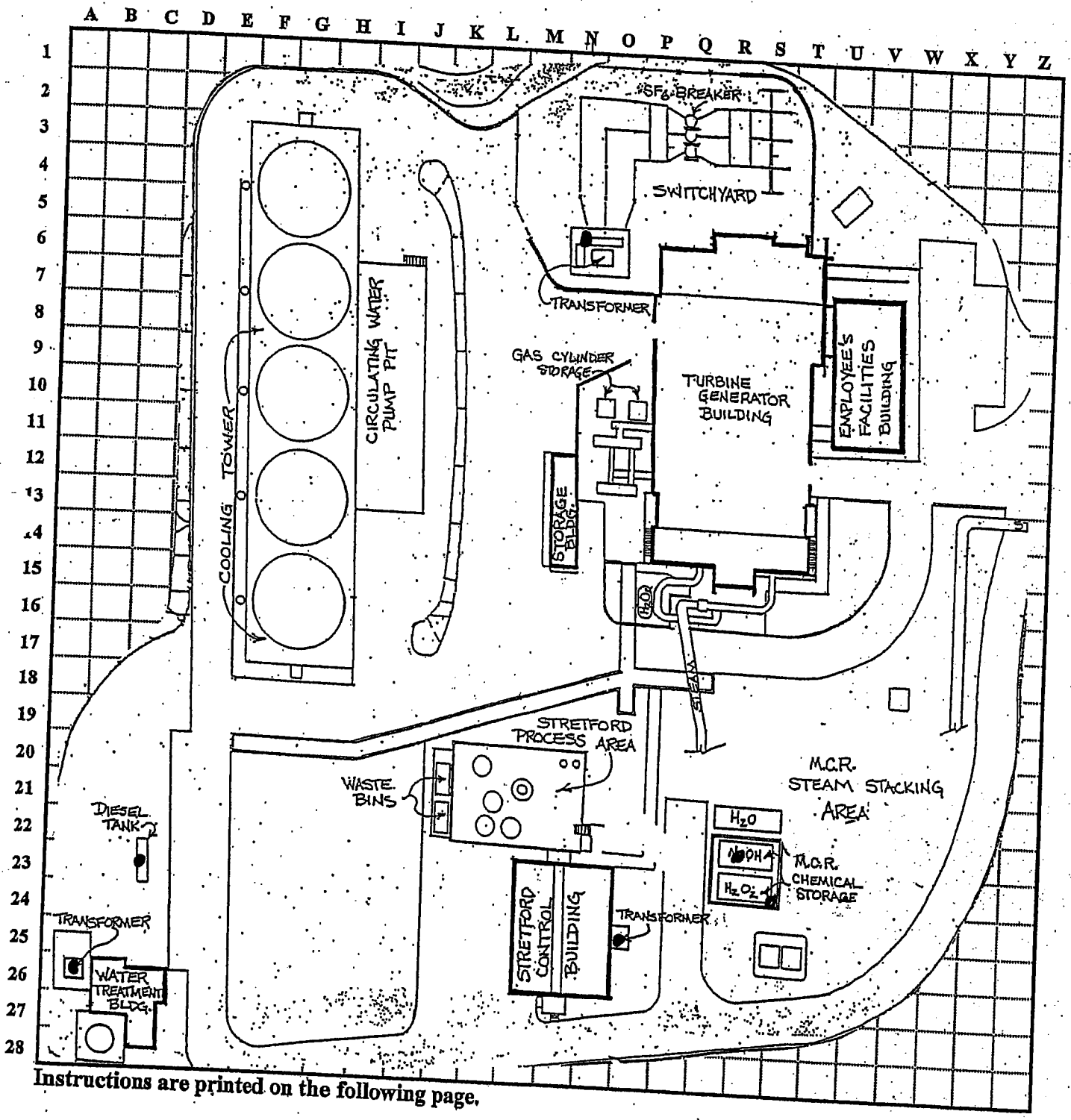
    * Except for Curies, units of measure must be the same as that indicated in Column 8.
15. ANNUAL WASTE AMOUNT - Enter the total quantity of this waste generated annually. Use the same unit of measure as that indicated in Column 8.
16. UNITS - In column 8, check the appropriate unit of measure: gallons for liquids, pounds or tons for solids, and cubic feet for gases. If the waste is a federally defined EHS and is not a mixture, all amounts must be reported in pounds.
17. STORAGE CODES - In the appropriate spaces within Column 9, list:
    - STORAGE PRESSURE - Check the box that best describes the pressure at which the waste is stored: ambient (standard), > amb. (greater than ambient), < amb. (less than ambient), or cryogenic.
    - STORAGE TEMPERATURE - Check the box that best describes the temperature at which the waste is stored.
18. HAZARD CATEGORIES - In column 10, check the box(es) to describe all physical, health, and radioactivity hazards associated with the hazardous waste.

PHYSICAL HAZARDS	HEALTH HAZARDS
Fire: Flammable Liquids and Solids, Combustible Liquids, Pyrophorics, Oxidizers	**Acute Health (Immediate):** Toxics, Highly Toxics, Irritants, Sensitizers, Corrosives, other hazardous chemicals with an adverse effect with short-term exposure
Reactive: Unstable Reactives, Organic Peroxides, Water Reactives, Radioactives	
Pressure Release: Explosives, Compressed Gases, Blasting Agents	**Chronic Health (Delayed):** Carcinogens, other chemicals with an adverse effect with long-term exposure

Facility Site Plan/Storage Map
(Hazardous Materials Business Plan Module)

Site Address: _____

Date Map Drawn: ___/___/___. Map Scale: _____



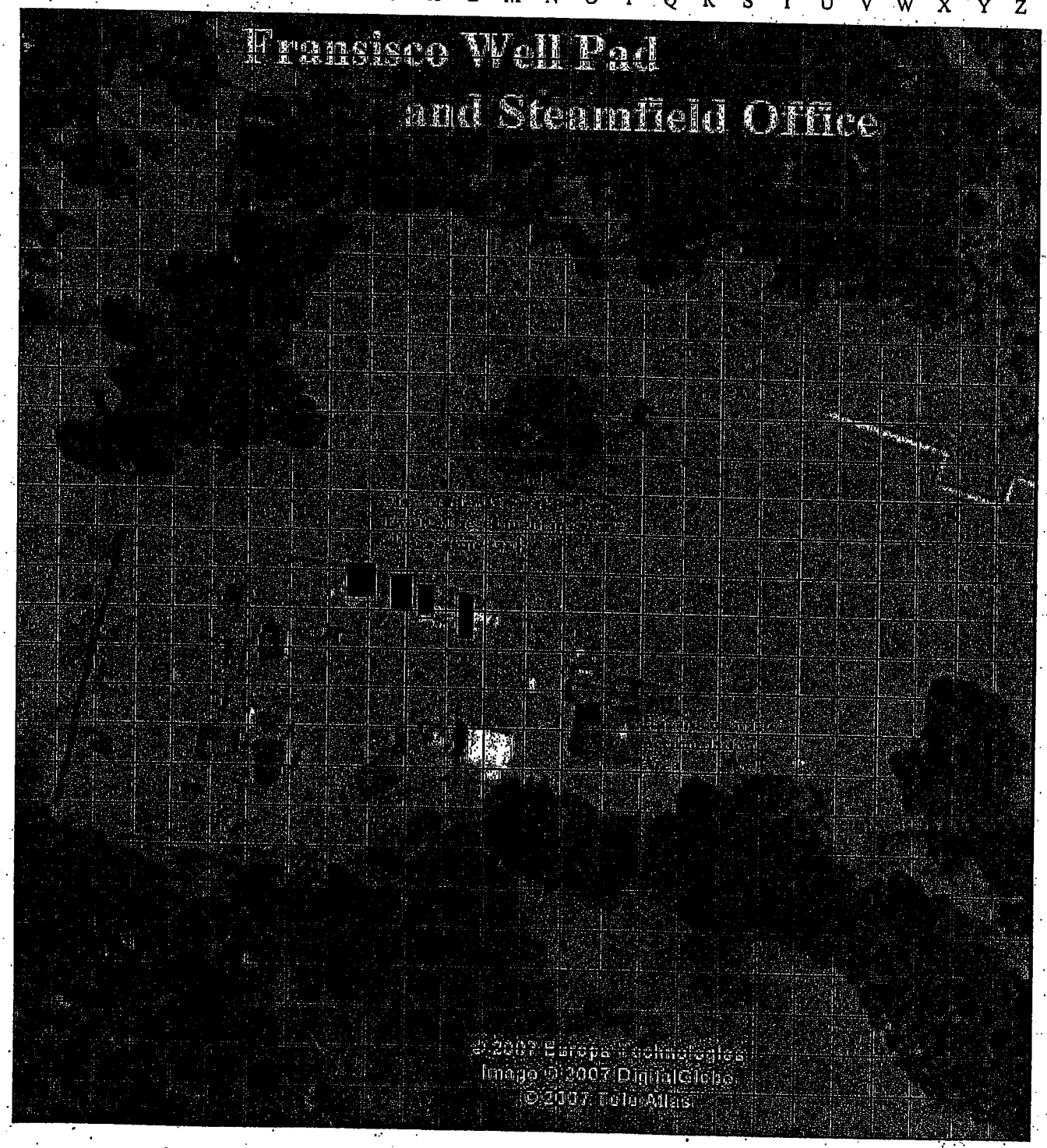
Instructions are printed on the following page.

Facility Site Plan/Storage Map

(Hazardous Materials Business Plan Module)

Site Address: 7385 High Valley Rd Cobb, CA 95426

Date Map Drawn: 1/2/08 Map Scale: _____

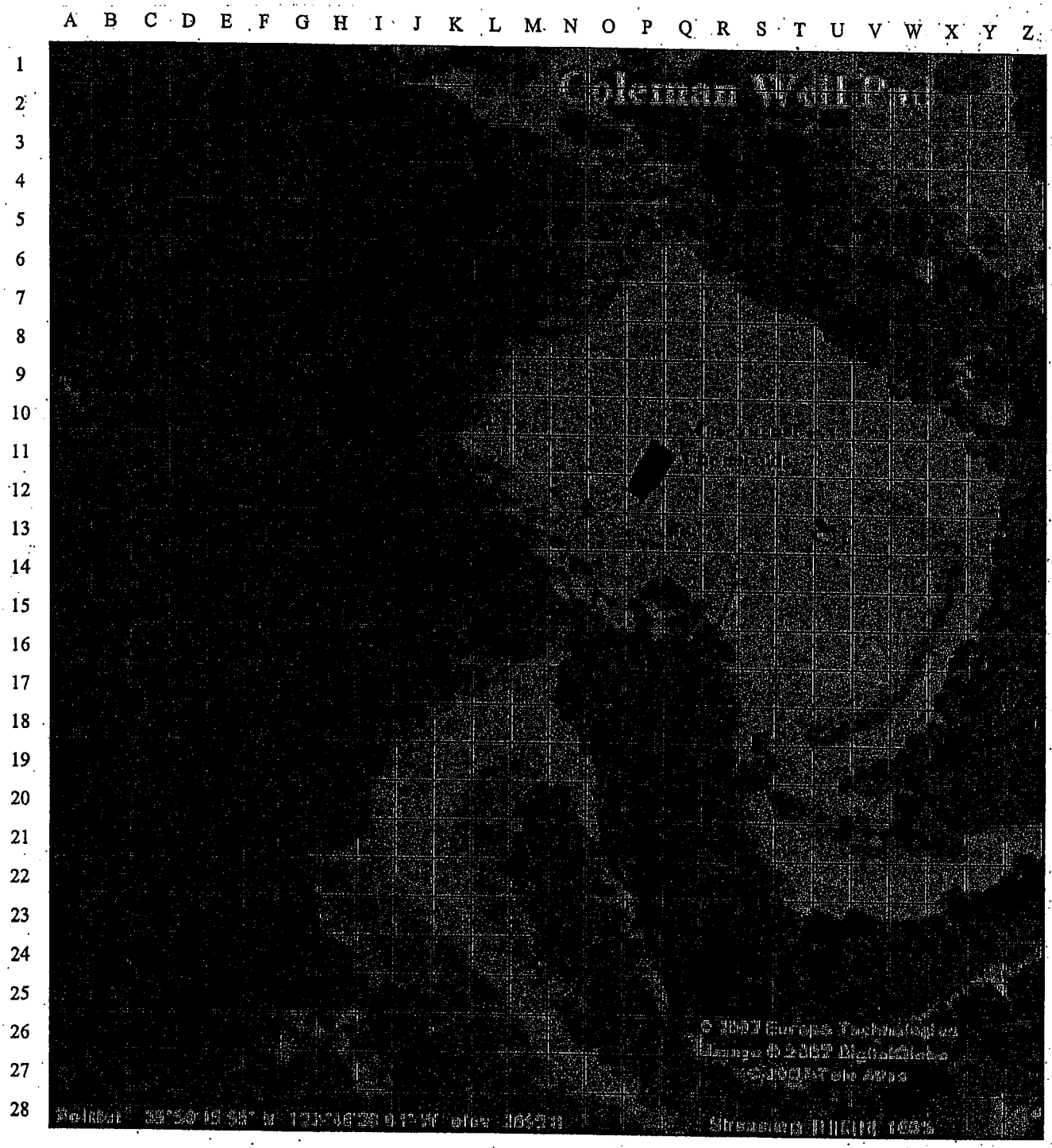


Facility Site Plan/Storage Map

(Hazardous Materials Business Plan Module)

Site Address: 7385 High Valley Road Cobb, CA 95426

Date Map Drawn: 1/2/08 Map Scale: _____

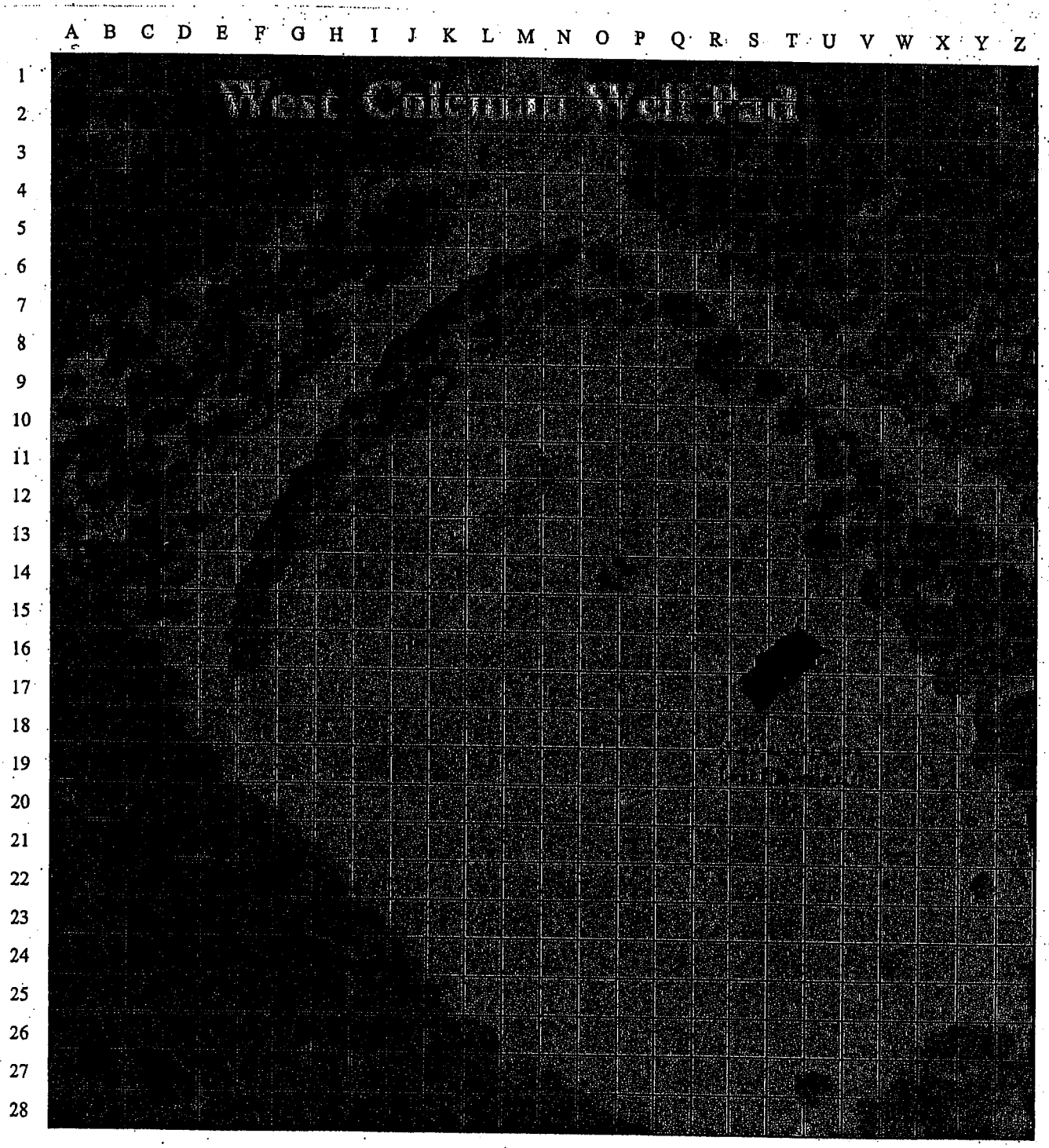


Facility Site Plan/Storage Map

(Hazardous Materials Business Plan Module)

Site Address: 7385 High Valley Road Cobb, CA 95426

Date Map Drawn: 1/2/08 Map Scale: _____



Facility Site Plan and Storage Map Instructions
(Hazardous Materials Business Plan Module)

A Site Plan (public document) and Storage Map (confidential document) must be included with your HMBP. For relatively small facilities, these documents may be combined into one drawing. However, if combined, the combined Site Plan/Storage Map will become a public document. If you are concerned about displaying the storage locations of hazardous materials to the public, you must provide a separate facility Storage Map. Since these drawings are intended for use in emergency response situations, larger facilities *(generally those with complex and/or multiple buildings)* should provide an overall site plan and a separate storage map for each building/storage area. A blank Facility Site Plan/Storage Map sheet has been provided on the previous page. You may complete that page or attach any other drawing(s) that contain(s) the information required below:

1. **Site Plan (public document):** This drawing shall contain, <u>at a minimum</u>, the following information:

   a. An indication of North Direction;
   b. Approximate scale *(e.g. "1 inch = 10 feet".)*;
   c. Date the map was drawn;
   d. All streets bordering the facility;
   e. Locations of all buildings and other structures;
   f. Parking lots and internal roads;
   g. Hazardous materials loading/unloading areas;
   h. Outside hazardous materials storage or use areas;
   i. Storm drain and sanitary sewer drain inlets;
   j. Wells for monitoring of underground tank systems;
   k. Primary and alternate evacuation routes, emergency exits, and primary and alternate staging areas.

2. **Storage Map (confidential):** The map(s) shall contain, <u>at a minimum</u>, the following information:

   a. General purpose of each section/area within each building *(e.g. "Office Area", "Manufacturing Area", etc.)*;
   b. Location of each hazardous material/waste storage, dispensing, use, or handling area *(e.g. individual underground tanks, aboveground tanks, storage rooms, paint booths, etc.)*. Each area shall be identifiable by a Grid Number, to be used in item 204 on the Hazardous Materials Inventory - Chemical Description pages of the Business Plan.
   c. For tanks, the capacity limit in gallons and common name of the hazardous material contained in each tank.
   d. Entrances to and exits from each building and hazardous material/waste room/area;
   e. Location of each utility emergency shut-off point *(i.e. gas, water, electric.)*;
   f. Location of each monitoring system control panel *(e.g. underground tank monitoring, toxic gas monitoring, etc.)*.

Emergency Response/Contingency Plan

(Hazardous Materials Business Plan Module)

Authority Cited: HSC, Section 25504(b); Title 22, Div. 4.5, Ch. 12, Art. 3 CCR

All facilities that handle hazardous materials in specified quantities must have a written emergency response plan. In addition, facilities that generate 1,000 kilograms or more of hazardous waste per month, or accumulate more than 6,000 kilograms of hazardous waste on-site at any one time, must prepare a contingency plan. Because the requirements are similar, they have been combined in a single document, provided below, for your convenience. This plan is a required module of the Hazardous Materials Business Plan (HMBP). **If you already have a plan that meets these requirements, you should not complete the blank plan, below, but you must include a copy of your existing plan as part of your HMBP.**

This site-specific Emergency Response/Contingency Plan is the facility's plan for dealing with emergencies and shall be implemented immediately whenever there is a fire, explosion, or release of hazardous materials that could threaten human health and/or the environment. **At least one copy of the plan shall be maintained at the facility for use in the event of an emergency and for inspection by the local agency.** Within Santa Clara County, hospitals and police agencies have delegated receipt of these plans to the local agencies administering Hazardous Materials Business Plans, so additional copies need not be submitted. However, a copy of the plan and any revisions must be provided to any contractor, hospital, or agency with whom special (i.e. contractual) emergency services arrangements have been made *(see section 3, below)*.

1. Evacuation Plan:

a. The following alarm signal(s) will be used to begin evacuation of the facility *(check all that apply)*:

☐ Bells; ☐ Horns/Sirens; **X** Verbal *(i.e. shouting)*; **X** Other *(specify)* **Radio contact/ Cell phone**

b. **X** Evacuation map is prominently displayed throughout the facility.

Note: A properly completed HMBP Site Plan satisfies contingency plan map requirements. This drawing (or any other drawing that shows primary and alternate evacuation routes, emergency exits, and primary and alternate staging areas) must be prominently posted throughout the facility in locations where it will be visible to employees and visitors.

2. a. Emergency Contacts*:

Fire/Police/Ambulance	Phone No. **911**
State Office of Emergency Services	Phone No. **(800) 852-7550**

b. Post-Incident Contacts*:

Fire Department Hazardous Materials Program	Phone No.: **(707) 928-5411**
Lake County Environmental Health Divison	Phone No. **(707) 236-1164**
California EPA Department of Toxic Substances Control	Phone No. **(800) 728-6942**
Cal-OSHA Division of Occupational Safety and Health	Phone No. **(916) 274-5751**
Air Quality Management District	Phone No. **(707) 263-7000**
Regional Water Quality Control Board	Phone No. **(916) 464-4708**

**** These telephone numbers are provided as a general aid to emergency notification. Be advised that additional agencies may be required to be notified.***

c. Emergency Resources:

Poison Control Center	Phone No. **(800) 876-4766**
Nearest Hospital: Name: **Sutter Lakeside**	Phone No.: **(707) 262-5000**
Address: **5176 Hill Road**	City: **Lakeport, CA**

3. Arrangements With Emergency Responders:

If you have made special (i.e. contractual) arrangements with any police department, fire department, hospital, contractor, or State or local emergency response team to coordinate emergency services, describe those arrangements below:

Bottle Rock management has meet several times with the South Lake Fire Marshall and the Cobb fire department. Both have ensured Bottle Rock that they would be the first responders and no contractual agreements was/is required.

4. Emergency Procedures:

Emergency Coordinator Responsibilities:

a. Whenever there is an imminent or actual emergency situation such as a explosion, fire, or release, the emergency coordinator *(or his/her designee when the emergency coordinator is on call)* shall:
   i. Identify the character, exact source, amount, and areal extent of any released hazardous materials.
   ii. Assess possible hazards to human health or the environment that may result from the explosion, fire, or release. This assessment must consider both direct and indirect effects *(e.g. the effects of any toxic, irritating, or asphyxiating gases that are generated, the effects of any hazardous surface water run-off from water or chemical agents used to control fire, etc.)*.
   iii. Activate internal facility alarms or communications systems, where applicable, to notify all facility personnel.
   iv. Notify appropriate local authorities *(i.e. call 911)*.
   v. Notify the State Office of Emergency Services at 1-800-852-7550.
   vi. Monitor for leaks, pressure build-up, gas generation, or ruptures in valves, pipes, or other equipment shut down in response to the incident.
   vii. Take all reasonable measures necessary to ensure that fires, explosions, and releases do not occur, recur, or spread to other hazardous materials at the facility.

b. Before facility operations are resumed in areas of the facility affected by the incident, the emergency coordinator shall:
   i. Provide for proper storage and disposal of recovered waste, contaminated soil or surface water, or any other material that results from a explosion, fire, or release at the facility.
   ii. Ensure that no material that is incompatible with the released material is transferred, stored, or disposed of in areas of the facility affected by the incident until cleanup procedures are completed.
   iii. Ensure that all emergency equipment is cleaned, fit for its intended use, and available for use.
   iv. Notify the California Environmental Protection Agency's Department of Toxic Substances Control at Lake County Environmental Health Services and the local fire department's hazardous materials program that the facility is in compliance with requirements b-i and b-ii, above.

Responsibilities of Other Personnel:

On a separate page, list any emergency response functions not covered in the "Emergency Coordinator Responsibilities" section, above. Next to each function, list the job title or name of each person responsible for performing the function. Number the page(s) appropriately.

5. Post-Incident Reporting/Recording:

The time, date, and details of any hazardous materials incident that requires implementation of this plan shall be noted in the facility's operating record.

Within 15 days of any hazardous materials emergency incident or threatened hazardous materials emergency incident that triggers implementation of this plan, a written Emergency Incident Report, including, but not limited to a description of the incident and the facility's response to the incident, must be submitted to the California Environmental Protection Agency's Department of Toxic Substances Control, the Lake County Environmental Health Services and the local fire department's hazardous materials program. The report shall include:

a. Name, address, and telephone number of the facility's owner/operator;
b. Name, address, and telephone number of the facility;
c. Date, time, and type of incident *(e.g. fire, explosion, etc.)*;
d. Name and quantity of material(s) involved;
e. The extent of injuries, if any;
f. An assessment of actual or potential hazards to human health or the environment, where this is applicable;
g. Estimated quantity and disposition of recovered material that resulted from the incident;
h. Cause(es) of the incident;
i. Actions taken in response to the incident;
j. Administrative or engineering controls designed to prevent such incidents in the future.

6. Earthquake Vulnerability: [19 CCR §2731(e)]

Identify any areas of the facility and mechanical or other systems that require immediate inspection or isolation because of their vulnerability to earthquake-related ground motion:

Bottle Rock Power Plant has very limited (if any) earthquake vulnerability. The facility was designed and constructed by the California Department of Water Resources, who designed the facility to withstand an 8.0 (Richter scale) earthquake.

7. Emergency Equipment:

2 CCR §66265.52(e) [as referenced by 22 CCR §66262.34(a)(4)] and the Hazardous Materials Storage Ordinance require that emergency equipment at the facility be listed. Completion of the following Emergency Equipment Inventory Table meets this requirement.

EMERGENCY EQUIPMENT INVENTORY TABLE

1. Equipment Category	2. Equipment Type	3. Locations *	4. Description**
Personal Protective Equipment, Safety Equipment, and First Aid Equipment	X Cartridge Respirators	Pg18 / R-8	Half Face masks – mainly H2S usage
	X Chemical Monitoring Equipment *(describe)*	Pg18 / M-20	Numerous chemical analysis equipment
	X Chemical Protective Aprons/Coats	Pg18 / M-20	Standard equipment for employee safety
	X Chemical Protective Boots	Pg18 / M-20	Standard equipment for employee safety
	X Chemical Protective Gloves	Pg18 / M-20	Standard equipment for employee safety
	X Chemical Protective Suits *(describe)*	Pg18 / M-20	Standard equipment for employee safety
	X Face Shields	Pg18 / M-20	Standard equipment for employee safety
	X First Aid Kits/Stations *(describe)*	Pg18/R-8, M-20, T-6	Zee First Aid Cabinets
	X Hard Hats	Pg18/R-8, T-6	North, Type 1, Class E
	X Plumbed Eye Wash Stations	Numerous	Each eye wash also has a shower
	X Portable Eye Wash Kits *(i.e. bottle type)*	In vehicles	4 oz saline solution
	X Respirator Cartridges *(describe)*	Pg18 / R-8	H2S, all purpose
	X Safety Glasses/Splash Goggles	Pg18/ R-8, M-20	Standard equipment for employee safety
	X Safety Showers	Numerous	Attached with the eye wash stations
	☐ Self-Contained Breathing Apparatuses (SCBA)		SCBA are currently being discussed for confined space rescue requirements.
	☐ Other *(describe)*		
Fire Extinguishing Systems	X Automatic Fire Sprinkler Systems	Pg18/G-17, N-12, N-6, R-12	Deluge sprinkler system activated by heat strips/sensors for the cooling tower cells, hydrogen sampling, main transformer, and Stretford containment.
	X Fire Alarm Boxes/Stations	Pg18/G-17, N-12, N-6, R-12	Deluge sprinkler system activated by heat strips/sensors for the cooling tower cells, hydrogen sampling, main transformer, and Stretford containment.
	X Fire Extinguisher Systems *(describe)*	Pg18/Q-12	CO2 system for lube oil storage and sump
	X Other *(describe)*	Numerous	Portable A-B-C extinguishers are located throughout the facility and fire gun nozzles are located at the cooling tower
Spill Control Equipment and Decontamination Equipment	X Absorbents *(describe)*	Pg18 N-26, Pg10 V- 25	Mainly used for oil containment (PIG blankets, clay based absorbent)
	X Berms/Dikes *(describe)*	Numerous	ALL oil storage and chemical tanks are bermed. Bails of hay, sock boom, plastic sheeting.
	☐ Decontamination Equipment *(describe)*		
	X Emergency Tanks *(describe)*	Pg18/Q12	There are 2 emergency storage tanks for lube oil
	X Exhaust Hoods	Pg18/M-20	The hood is used during chemical analysis of the Stretford solution
	☐ Gas Cylinder Leak Repair Kits *(describe)*		
	☐ Neutralizers *(describe)*		
	X Drums	Numerous	Drums are stationed near the lube oil stora ge areas
	X Sumps *(describe)*	Pg18/ P-1/Q-12	There is a lube oil sump tank in the basement that is used during an emergency
	☐ Other *(describe)*		

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Communications and Alarm ystems	X Chemical Alarms *(describe)*	Pg18/R-8	For the generator hydrogen system
	X Intercoms/ PA Systems	Numerous	Paging system is through the telephone system
	X Portable Radios	Numerous	Operators/Admin/Management use Motorolas
	X Telephones	Pg18/R-8, T-6	Tadiran Telcon system
	Underground Tank Leak Detection Monitors		
	☐ Other *(describe)*		
Additional Equipment *(Use Additional Pages if Needed.)*	X Spill Kits	Numerous	Fully stocked spill kits are placed trough out the plant area.
	☐		
	☐		
	☐		
	☐		
	☐		

* *Use the map and grid numbers from the Storage Map prepared earlier for your HMBP.*

** *Describe the equipment and its capabilities. If applicable, specify any testing/maintenance procedures/intervals. Attach additional pages, numbered appropriately, if needed.*

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Employee Training Plan

(Hazardous Materials Business Plan Module)

Authority Cited: HSC, Section 25504(c); Title 22, Div. 4.5, Ch. 12, Art. 3 CCR

All facilities that handle hazardous materials must have a written employee training plan. This plan is a required module of the Hazardous Materials Business Plan (HMBP). A blank plan has been provided below for you to complete and submit if you do not already have such a plan. **If you already have a brief written description of your training program that addresses all subjects covered below, you are not required to complete the blank plan, below, but you must include a copy of your existing document as part of your HMBP.**

Check all boxes that apply. *[Note: Items marked with an asterisk (*) are required.]*:

1. **Personnel** are trained in the following procedures:

X	Internal alarm/notification *
X	Evacuation/re-entry procedures & assembly point locations*
X	Emergency incident reporting
X	External emergency response organization notification
X	Location(s) and contents of Emergency Response/Contingency Plan
X	Facility evacuation drills, that are conducted at least *(specify)* **Semi-Annually** *(e.g. "Quarterly", etc.)*

2. **Chemical Handlers** are additionally trained in the following:

X	Safe methods for handling and storage of hazardous materials *
X	Location(s) and proper use of fire and spill control equipment
X	Spill procedures/emergency procedures
X	Proper use of personal protective equipment *
X	Specific hazard(s) of each chemical to which they may be exposed, including routes of exposure *(i.e. inhalation, ingestion, absorption)* *
X	**Hazardous Waste Handlers/Managers** are trained in all aspects of hazardous waste management specific to their job duties *(e.g. container accumulation time requirements, labeling requirements, storage area inspection requirements, manifesting requirements, etc.)* *

3. **Emergency Response Team Members** are capable of and engaged in the following:

X	Personnel rescue procedures
X	Shutdown of operations
X	Liaison with responding agencies
X	Use, maintenance, and replacement of emergency response equipment
X	Refresher training, which is provided at least annually *
X	Emergency response drills, which are conducted at least *(specify)* Semi-Annually *(e.g. "Quarterly", etc.)*

Record Keeping
(Hazardous Materials Business Plan Module)

All facilities that handle hazardous materials must maintain records associated with their management. A summary of your recordkeeping procedures is a required module of the Hazardous Materials Business Plan (HMBP). A blank summary has been provided below for you to complete and submit if you do not already have such a document. **If you already have a brief written description of your hazardous materials recordkeeping systems that addresses all subjects covered below, you are not required to complete this page, but you must include a copy of your existing document as part of your HMBP.**

Check all boxes that apply. The following records are maintained at the facility. *[Note: Items marked with an asterisk (*) are required.]*:

X	Current employees' training records *(to be retained until closure of the facility)* *
X	Former employees' training records *(to be retained at least three years after termination of employment)* *
X	Training Program(s) *(i.e. written description of introductory and continuing training)* *
X	Current copy of this Emergency Response/Contingency Plan *
X	Record of recordable/reportable hazardous material/waste releases *
X	Record of hazardous material/waste storage area inspections *
X	Record of hazardous waste tank daily inspections *
X	Description and documentation of facility emergency response drills

Note: The above list of records does not necessarily identify every type of record required to be maintained by the facility.

A copy of the Inspection Check Sheet(s) or Log(s) used in conjunction with required routine self-inspections of your facility must be submitted with your HMBP. *(Exception: Available from your local agency is a Hazardous Materials/Waste Storage Area Inspection Form that you may use if you do not already have your own form. If you use the example provided, you do not need to attach a copy.)*

Check the appropriate box:

☐	We will use the Unidocs "Hazardous Materials/Waste Storage Area Inspection Form" to document inspections.
X	We will use our own documents to record inspections. ***(A blank copy of each document used must be attached to this HMBP.)***