URS

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08-AFC-6	
DATE	JUN 14 2010
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June 14, 2010

Dockets Unit
California Energy Commission
1516 Ninth Street, MS 4
Sacramento, CA 95814

RE: Willow Pass Generating Station
Application for Certification 08-AFC-6

On behalf of Mirant Willow Pass, LLC, the applicant for the Willow Pass Generating Station (WPGS), we are pleased to submit the *Work Plan for Focused Site Investigation and Focused Heath Risk Assessment*. This document is submitted electronically to the Docket Unit and the Proof of Service list, and one print copy will be sent to the Docket Unit.

This Work Plan was prepared by AMEC Geomatrix on behalf of the former owner of the site, PG&E, to address Data Requests 73 through 75. The Work Plan includes collection of soil vapor and groundwater samples, and preparation of a focused Health Risk Assessment that includes a Human Health Risk Assessment and a Screening-Level Ecological Risk Assessment.

Please include this document in the AFC record.

URS Corporation

Kathy Rushmore
Project Manager

Attachment

CC: Felicia Miller
Alvin Greenberg

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Pacific Gas and Electric Company®

David Harnish
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April 15, 2010

Mr. Jonathan Sacks
Project Director,
Mirant Corporation
1155 Perimeter Center West
Atlanta, GA 30338

Subject: ***Work Plan for Focused Site Investigation and Human Health Risk Assessment***
Willow Pass Generating Station
Mirant Pittsburg Power Plant
Pittsburg, California

Dear Jon:

PG&E is pleased to submit the enclosed *Work Plan for Focused Site Investigation and Human Health Risk Assessment* for the Willow Pass Generating Station (WPGS) at Mirant's Pittsburg Power Plant. This report was prepared by AMEC Geomatrix in order to respond to data requests Mirant received from the California Energy Commission (CEC) Staff as part of its review of the Application for Certification for the WPGS project. We understand that Mirant will submit the enclosed report to CEC Staff for its use in preparing a Preliminary Staff Assessment for the WPGS project.

With completion of the investigation to respond to the CEC Staff data requests, PG&E will turn its attention to completing DTSC investigation and remediation requirements for the WPGS project area.

Please contact Ken Simas at (925) 997-6093 if you have any questions regarding the enclosed report.

Sincerely,

David Harnish
Manager, Environmental Remediation

cc: Barbara Benson, PG&E
Ken Simas, P.G., WAU & Company
Jennifer Patterson, P.E., AMEC Geomatrix, Inc.

Enclosure: Work Plan for Focused Site Investigation and Human Health Risk Assessment

April 15, 2010

Project 15386.000

David Harnish
Pacific Gas & Electric Company
Environmental Services Department
3401 Crow Canyon Road
San Ramon, CA 94583

Subject: **Work Plan for Focused Site Investigation and Focused Health Risk Assessment**
Willow Pass Generating Station
Mirant Pittsburg Power Plant
Pittsburg, California

Dear Mr. Harnish:

On behalf of the Pacific Gas and Electric Company (PG&E), AMEC Geomatrix (AMEC), has prepared this work plan to conduct soil vapor and groundwater sampling, and prepare a focused health risk assessment (HRA) that includes a human health risk assessment (HHRA) and a screening-level ecological risk assessment (SLERA) at the Willow Pass Generating Station (the site; WPGS) which is located within the Pittsburg Power Plant (PPP) property at 696 West 10th Street, Pittsburg California (Figure 1). This work plan has been prepared in response to the April 28, 2009 *Willow Pass Generating Station, Data Requests Set 2*, issued by the California Energy Commission (CEC) staff (CEC, 2009). The additional data are required for CEC Staff to complete its review of the Application for Certification (AFC; URS, 2008a) submitted by Mirant Willow Pass, LLC (Mirant Willow Pass), an affiliate of the current owner, Mirant Delta, LLC (Mirant Delta), for construction and operation of the proposed WPGS facility. PG&E is conducting this work because it retained certain defined responsibility to remediate, as necessary, hazardous substance releases that were present at the time of its sale of the PPP in 1999.

This work plan includes a summary of background information for the site, the proposed scope of work for the additional investigation, an outline of a focused short-format HHRA and SLERA, and a proposed schedule for completion of the work.

BACKGROUND INFORMATION

The site history, site lithology and hydrogeology, and previous environmental investigations performed at the site are summarized below.

Site Setting

The WPGS is located within the PPP property located on the west side of the City of Pittsburg within Contra Costa County. The site is bounded by Suisun Bay and PPP operational areas to the north, the PPP tank farm to the east, a PG&E switchyard to the south, and PPP operational

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areas to the west. The area surrounding the PPP is a mixture of residential, industrial, commercial, and undeveloped land.

Site History

The PPP site was undeveloped and used for grazing and dairy farming prior to the 1950s. In 1951, PG&E purchased approximately 280 acres and began building the PPP; several other parcels of land were obtained between 1972 and 1979 (CDM, 1997) and additions to the PPP were constructed through 1977 (CDM, 1997). The power plant is a fossil-fuel powered steam turbine electric generation facility, designed to use either natural gas or fuel oil to fire boilers in three generation units. Currently, the power plant uses natural gas to fuel the power plant.

The PPP is comprised of several types of buildings, parking lots, a hazardous waste storage area, power generating Units 1 through 7, closed Class I surface impoundments, one active Class II surface impoundment, a tank farm containing 16 above ground storage tanks (ASTs) and one Cutter Stock tank, two cooling towers with a cooling water canal for Unit 7 (URS, 2008b).

In 1999, PG&E sold the PPP to Mirant Delta, previously named Southern Energy Delta, LLC. Mirant Willow Pass has proposed constructing a new power plant facility, the WPGS, on approximately 26 acres of the PPP. The outline of the WPGS site boundary within the larger PPP property is shown on Figure 2. The main portion of the WPGS, 23.5-acres, is generally located west of the existing fuel storage tanks 2 through 6. The northern portion of the WPGS site, 2.5-acres, is generally located north of the existing fuel storage Tank 1 and was included to preserve existing riparian water rights; no land disturbance will occur within this area.

The WPGS is currently occupied by the existing retired power generation Units 1 through 4, an unused surface impoundment (the air preheater wash pond), an administration building, hazardous materials and storage building, an unused 150,000-barrel Number 6 fuel oil AST (Tank 7), temporary buildings, and other ancillary facilities (URS, 2008b). The air preheater wash pond, identified as a former solid waste management unit, obtained clean closure status from DTSC in 2005 (DTSC, 2005).

Future Site Use

Mirant Willow Pass has submitted an AFC to the CEC to construct a new power generation facility on the site. The new facility will consist of two natural-gas fired power generation units. These, along with ancillary structures, will be constructed in the central portion of the site at the location of and west of existing Tank 7 (Figure 3; URS, 2008a). The proposed office/warehouse building will be constructed in the southeast portion of the site. No construction activities are planned for the northern 2.5-acre portion of the site.

Site Lithology and Hydrogeology

The PPP is located on the northern flank of the Mount Diablo foothills at the edge of the Suisun Bay. The MLGS site is a flat-lying former tidal marsh (Fluor Daniel GTI, 1998). Based on the

lithology encountered during previous environmental investigations, the site overlies unconsolidated, interbedded coarse- to fine-grained sediments. In general, the fine-grain sediment content increases with depth within in the top approximately 18 feet of soil, the maximum depth drilled for which boring logs are available.

During drilling activities at the site, first groundwater was observed in soil cores between approximately 4.5 and 15 feet below ground surface (bgs). Static depth to water in groundwater monitoring wells screened within the top 15 feet ranged between approximately 4.5 to 8.5 feet bgs. The groundwater flow direction is north towards Suisun Bay. A portion of the upper aquifer along the edge of the Suisun Bay is tidally influenced, which temporarily and locally reverses the groundwater gradient to the south during high tide events (Fluor Daniel GTI, 1998).

Previous Environmental Investigations

PG&E conducted a Phase I Environmental Site Assessment (ESA) and Phase II sampling prior to divestiture of the PPP to Mirant Delta. To initially evaluate the site, PG&E contracted Camp Dresser and McKee (CDM) to conduct a Phase I ESA (CDM, 1997) for the entire PPP. Based on the results of the initial Phase I, PG&E contracted Fluor Daniel GTI to complete a Phase II environmental investigation and baseline HRA on the entire PPP (Fluor Daniel GTI, 1998). In 2008, URS conducted a Phase I ESA on behalf of Mirant Willow Pass in support of the AFC submitted to the CEC for the proposed WPGS (URS, 2008b).

OBJECTIVES

The objective of the proposed investigation is to collect additional data and to conduct a focused HHRA and SLERA using the new and historical data from within the WPGS site footprint in response to the CEC's data request. Specifically, the CEC requested the following:

- Soil vapor sampling at the site to be conducted based on DTSC guidance relating to collecting and analyzing soil vapor samples;
- A SLERA comparing site groundwater data to environmental screening levels (ESLs) developed by the Regional Water Quality Control Board, San Francisco Bay Region (Water Board; 2008).
- A revised HHRA including only soil, groundwater, and soil vapor data from within the WPGS footprint.

According to the 1997 Phase I ESA, chlorinated solvents (trichlorethene (TCE) and 1,1,1-trichloroethane) were reportedly used for cleaning electrical equipment outside of Units 5 through 7 (located outside of the WPGS site footprint), although the exact location of the concrete bermed area where this occurred is not known. TCE has been detected at low concentrations in soil samples collected at several locations within the PPP property; however, TCE has not been detected in soil within the WPGS Site.

Existing analytical data do not indicate a source of volatile organic compounds (VOCs) at the site. The only VOCs detected in soil above laboratory reporting limits are toluene (one location at a concentration of 0.006 milligrams per kilogram [mg/kg]) and xylenes (one location at a

concentration of 0.009 mg/kg). No VOCs were detected in groundwater samples collected from within the site footprint.

In the absence of a known VOC source(s) within the site, AMEC proposes to address the CEC data request by collecting soil vapor samples on a grid pattern only within future operational areas of the site for use in the HHRA. Soil vapor samples will be collected at an approximate 100-foot spacing in the footprint of the proposed office/warehouse building, based on the existing proposed WPGS layout, and at an approximate 200-foot spacing in the central portion of the site, which will be occupied by the power generating units. The general grid spacing has been adjusted, where necessary, to work around areas with limited or no access due to existing structures (e.g., Fuel Tank No. 7 and existing power generation Units 1 through 4). No soil vapor sampling is proposed for the northern portion of the site since no construction activities are planned in this area. The soil vapor data will be used to evaluate the potential for vapor intrusion and potential exposures to hypothetical workers in a trench setting.

In addition to collecting the requested soil vapor data, groundwater data will be collected at various locations along the northern (downgradient) WPGS site boundary. This will provide information regarding current downgradient groundwater conditions for use in evaluating the potential ecological impact to aquatic receptors in Suisun Bay. This new soil vapor and groundwater data along with historical soil and groundwater data will serve as the basis for the focused HHRA and SLERA.

SCOPE OF WORK

To accomplish the objectives outlined above, AMEC proposes to collect groundwater samples at 6 locations and soil vapor samples at 25 locations. The proposed investigation locations are shown on Figure 3 and the proposed sampling and analysis plan is outlined in Table 1. Table 1 also presents the data objective for each boring. A summary is presented below:

- Grab groundwater samples will be collected from 6 borings (GGW-01 through GGW-06) to assess potential groundwater impacts at the downgradient site boundary.
- Soil vapor samples will be collected from 25 borings (SV-01 through SV-25) to assess the presence of volatile constituents in shallow soil vapor beneath the site.

Additional samples may be collected during field activities or additional sample analyses conducted to supplement previous sampling results.

Pre-Field Activities

Prior to conducting field activities, AMEC will obtain boring permits from Contra Costa County Environmental Health Department (CCEHD), mark proposed drilling locations, contact Underground Service Alert (USA), and retain a utility location contractor to clear the boring locations for utilities. All proposed locations will also be cleared with PPP plant operations. Additionally, AMEC will prepare a site-specific health and safety plan.

Field Activities

AMEC will retain a California-licensed driller to perform drilling activities. All boreholes will be advanced using a hand auger to a depth of 5 feet bgs to clear for utilities. Soil will be continuously cored for lithologic logging. A lithologic log will be prepared for each boring by a trained field geologist under the supervision of a California Professional Geologist using visual-manual procedures of the American Society for Testing and Materials (ASTM) Standard D2488-90 for guidance, which is based on the Unified Soil Classification System (USCS). Non-dedicated downhole sampling equipment will be steam cleaned or triple-washed between each soil boring location and prior to reuse. Field screening of soil samples for organic vapors will be performed using a portable photoionization detector (PID) and any detections will be logged.

Soil Vapor Sampling Activities

The following sections describe the soil vapor sampling activities.

Soil Vapor Probe Installation

As described above, a boring will be advanced using a hand auger at each location to approximately 5 feet bgs. Semi-permanent soil vapor points will be installed within the soil boring at an approximate intake depth of 4 to 5 feet bgs. The midpoint of the soil vapor sampling intervals may be shifted to improve sample recovery if a coarser stratigraphic zone is within +/– 1.5 feet of the proposed screening intervals. The semi-permanent soil vapor points will be installed using the *Advisory—Active Soil Gas Investigations (Advisory*), jointly issued by the California Department of Toxic Substances Control (DTSC) and the California Regional Water Quality Control Board, Los Angeles Region (DTSC/RWQCB, 2003) as a guidance. Each probe will be constructed with new, ¼-inch-diameter Teflon tubing fitted with a filter at the bottom to prevent particulate infiltration. A 1-foot-thick layer of sand filter pack consisting of No. 3 sand will be placed around each screen. Following installation of the sand pack, a 6-inch-thick lift of dry bentonite will be backfilled into the borehole and the borehole will be backfilled to the surface in 6-inch-thick lifts with hydrated bentonite. A valve will be fitted to the aboveground end of the tubing. The valve will be kept closed until purging and sampling. All reusable components will be properly decontaminated between use at each soil vapor sample location. Each soil vapor sampling point will be covered with a traffic cone after installation.

Purge Volume Calculation

The semi-permanent soil vapor points will sit idle for 48 hours before conducting the leak test and sample collection procedures. In addition, sampling will not be performed during or within 5 days of a significant rain event, defined as ½-inch or greater.[1]

Soil vapor samples will be collected in SUMMA™ canisters for VOC analysis using EPA Method TO-15. Because analyses will be conducted at a fixed laboratory (i.e. analytical results will not

[1] Based on recommendations provided by DTSC during a June 2009 Active Soil Gas Advisory Workshop.

be immediately available), a purge volume test is not possible and the default of removing three purge volumes will be used (DTSC and LARWQCB, 2003).

Soil Vapor Probe Purging

Prior to sampling, three volumes of air will be purged using a disposable plastic syringe or a pump equipped with a flow meter in order to avoid sampling ambient air from the tubing and sand pack. One purge volume will be calculated based on the volume of the void space in the tubing plus an estimate of the void space in the sand pack.

Vapor will be purged from each probe using an estimated flow rate of between 100 to 200 milliliters per minute (mL/min) to prevent ambient air intrusion, limit stripping, and to reduce variability in purge rates (DTSC and LARWQCB, 2003). The purge volume for each probe will be recorded on field documentation forms.

Shut-in Test

After the soil vapor probes have been purged, a "shut-in" test will be applied to all above ground sampling equipment. A vacuum between 10 and 15 inches of mercury will be applied to the above ground sampling train. The vacuum with be monitored for approximately one minute. If the vacuum dissipates during the shut-in test, all above ground fittings will be tightened and the test will be repeated.

Leak Testing

A leak test will be conducted during sampling at each soil vapor sampling location using helium as a tracer compound. A known concentration of helium is applied into a shroud over the sample location. Following purging, an additional 200 milliliters of vapor will be purged into a Tedlar bag and the helium concentration in the Tedlar bag will be measured with a handheld field helium detector and recorded on field documentation forms. If the helium concentration is greater than 10 percent of the helium measured in the shroud, the surface of the sample probe will be resealed and soil vapor will be purged again. Another leak test will be conducted and sample collection will proceed when the helium concentration is less than 10 percent. Following collection of the soil vapor sample in a canister, an additional soil vapor sample will be collected in a tedlar bag and monitored for helium. If both pre- and post-sampling tedlar bags contain helium at concentrations less than 10 percent of the shroud concentration, then the sample will have passed the leak test and will be considered valid and representative of subsurface conditions. As part of additional quality assurance, approximately 10 percent of the samples collected in summa canisters also will be analyzed for helium.

Soil Vapor Sample Collection

After the points have been purged, a one-liter SUMMA™ canister equipped with a flow controller (regulating flow to between 100 to 200 milliliters per minute [mL/min]) will be fitted to each semi-permanent probe. All fittings will be wrapped in silicone tape to limit the possibility of ambient air infiltration. A sample then will be collected into the laboratory-supplied SUMMA™ canister by opening the canister and allowing it to fill almost completely, leaving a slight vacuum present in

the container (i.e., approximately -2 to -7 inches of mercury). After sampling, the valve will be closed and secured and the SUMMA™ canister will be placed in a box pending shipment to the analytical laboratory under AMEC chain-of-custody procedures.

Ambient Air Sampling

To assess the concentrations of target chemicals in ambient air, one ambient air sample will be collected in an upwind direction during each day of sampling. The ambient air samples will be collected in six-liter SUMMA™ canisters equipped with 8-hour flow controllers to provide a time-weighted average of the ambient conditions encountered during work hours. The samples will be placed near ground level and submitted to the analytical laboratory to be analyzed for VOCs using EPA Method TO-15. Barometric pumping is known to drive ambient air into soil. In addition, in the instance of a leak in the sample train, ambient air samples can be used to assess the constituents, if any, that would have entered the soil vapor sample.

Field Duplicate Sample

One field duplicate sample will collected each day of sampling. Duplicate samples will be collected simultaneously with the primary samples using a T-joint for SUMMA™ canister samples. The duplicate samples will be stored in the manner of the primary samples and submitted to the analytical laboratory as blind duplicate samples for analysis.

Soil Vapor Point Destruction

Following the soil vapor sampling activities described above, each soil vapor point will be covered with a traffic cone. After the receipt of the analytical data, each soil vapor point will be destroyed by removing all materials using hand augers. The boreholes will then be filled with grout using a tremie pipe, according to CCEHD requirements. AMEC will use a global positioning system (GPS) unit to collect location information for all boring locations. The GPS unit to be used has an accuracy of approximately +/– 1 foot in the horizontal plane, and approximately +/– 3 feet in elevation.

Groundwater Sampling Activities

Borings for the sampling of groundwater will be advanced beyond 5 feet bgs using a direct-push drill rig equipped with a dual-tube direct-push sampling system. AMEC will collect grab groundwater samples from first-encountered groundwater at the five borings indicated on Table 1. The exact depth intervals to be sampled will be determined in the field, based on the depth to groundwater and lithologic observations. Once the sampling interval has been determined, the lower drive casing will then be lifted approximately 5 feet to allow groundwater to flow into the borehole. Then a pre-pack well screen, attached to PVC riser, will be installed into the outer drive casing. The groundwater sample will be collected through the pre-pack well screen which will help filter out excess fines from the groundwater sample. If adequate groundwater recharge occurs, AMEC will purge at a low-flow rate to reduce turbidity prior to collecting a groundwater sample at each location. If groundwater recharge is insufficient to allow for purging prior to sampling, a sample will be collected without purging. Prior to sample collection, water quality

parameters (pH, dissolved oxygen, oxidation/reduction potential, electrical conductivity, and temperature) will be recorded using a water quality meter equipped with a flow-through cell.

Groundwater samples will be collected in appropriate new, laboratory supplied containers, labeled, placed in an ice-chilled cooler, and transported to a state-certified analytical laboratory under AMEC chain-of-custody procedures.

Following completion of groundwater sampling activities, the drilling contractor will fill the borings with grout using a tremie pipe, according to CCEHD requirements. AMEC will use a global positioning system (GPS) unit to collect location information for all boring locations. The GPS unit to be used has an accuracy of approximately +/– 1 foot in the horizontal plane, and approximately +/– 3 feet in elevation.

Soil Vapor Sample Analysis

Samples will be analyzed by Air Toxics, Ltd. of Folsom, California, a California-certified analytical laboratory. Soil vapor samples will be analyzed for VOCs using EPA Method TO-15 and helium using EPA Method ASTM D1946.

Groundwater Sample Analysis

Samples will be analyzed by Creek Environmental Laboratories, Inc., of San Luis Obispo, California, a California-certified analytical laboratory. Groundwater samples will be analyzed for the constituents indicated on Table 1 using the following methods:

- TPH quantified as diesel (TPHd) and motor oil (TPHmo) using EPA Method 8015M with silica gel preparation. Groundwater samples will be analyzed prior to and after filtering in the laboratory using a 0.7-micron glass fiber filter;
- VOCs using EPA Method 8260B;
- PAHs using EPA Method 8270C with selective ion monitoring (SIM). Groundwater samples will be analyzed prior to and after filtering in the laboratory using a 0.7-micron glass fiber filter; and
- Metals using EPA Method 200.8/7470. Groundwater samples will be filtered in the field with a 0.45-micron filter prior to metals analysis.

Investigation Waste Management

Soil cuttings, purge water, and rinse water generated during drilling will be temporarily stored at the WPGS in labeled, Department of Transportation (DOT)–approved 55-gallon drums, pending profiling, transportation, and off-site disposal or recycling at an appropriate facility. All waste containers will be clearly labeled with generator contact and phone number, drilling location(s), and date of generation. PG&E will be responsible for arranging for waste profiling and disposal.

Any disposable personal protection equipment (e.g., gloves, Tyvek® clothing, etc.) will be disposed as non-hazardous waste in the municipal trash.

Quality Assurance and Quality Control Methodology

Field quality assurance/quality control (QA/QC) samples for chemical analysis will include the following:

- one groundwater blind field duplicate,
- one trip blank to accompany groundwater samples,
- one soil vapor blind field duplicate for TO-15 analysis per soil vapor sampling day (described above),
- one ambient air sample per soil vapor sampling day for TO-15 analysis (described above).

QA/QC procedures will include adherence to protocols for field sampling and decontamination procedures, as well as collection and laboratory analysis of controlled standards, matrix spike samples, and field duplicate samples to evaluate accuracy and precision. Data validation will include a data completeness check of each data package, and a thorough review of all laboratory reporting forms.

FOCUSED HEALTH RISK ASSESSMENT

After the supplemental soil vapor and groundwater data from the WPGS footprint have been received and validated, the data will be used along with the existing data to prepare a focused HRA. The focused HRA will be organized in a manner consistent with U.S. EPA and California Environmental Protection Agency (Cal/EPA) referenced guidance documents and will include data evaluation, exposure assessment, toxicity assessment, and risk characterization. The objectives of the risk assessment are to:

- provide an analysis of the potential for adverse human and ecological health effects as a result of exposure to chemicals detected in environmental media at the site under current conditions and as part of future site use as a power plant;
- identify the media and chemicals detected at the site that may require further evaluation, risk management, and/or remediation measures to limit potential exposures under current and future uses; if the theoretical risk and hazards are above acceptable regulatory levels; and
- provide a basis for evaluating whether remedial action or risk management measures are necessary to mitigate the estimated health risks.

As an initial step, the analytical data from within the site boundaries and site characteristics will be evaluated to identify the constituents that are potentially related to the site and for which there are data of sufficient quality to be used in the HRA.

The method for evaluating data usability for the HRA will be in general accordance with the procedures outlined in the U.S. EPA publication *Guidance for Data Usability in Risk Assessment*

– *Parts A and B* (U.S. EPA, 1992). Data judged to be of sufficient quality will be tabulated to summarize the frequency of detection, range of detection limits, and range of detected values. With the exception of essential nutrients (e.g., iron, potassium, and sodium), chemicals that are present at greater than 5 percent detection frequency in each media will be considered chemicals of potential concern (COPCs). For metals in soil, available site-specific background data will be used to distinguish site-related constituents from naturally-occurring constituents in the identification of COPCs.

The hypothetical receptors that will be assessed include the following, as specified by the CEC in its data request:

- the trenching and excavation worker during construction;
- other construction workers;
- the off-site public during construction;
- the on-site worker during operations;
- the off-site worker during operations; and
- the off-site public during operations.

Based on existing data, a preliminary site conceptual model (SCM) for the WPGS facility is presented as Figure 4. The preliminary SCM depicts current information about potential chemical sources, potential migration pathways, potential exposure routes, and the potential exposure pathways by which the hypothetical receptors may potentially come into contact with COPCs in the environment. If conditions are different from current information about the site, the preliminary SCM will be revised as warranted. The following potential exposure pathways for each hypothetical receptor will be evaluated:

- the trenching and excavation worker during construction – incidental ingestion and dermal contact with COPCs in soil, inhalation of particulates in ambient air, inhalation of VOCs in a trench from soil vapor and/or shallow groundwater, and dermal contact with shallow groundwater.
- other construction workers – incidental ingestion and dermal contact with COPCs in soil, inhalation of particulates in ambient air, and inhalation of volatile COPCs in ambient air;
- the off-site public during construction – inhalation of particulates or VOCs in ambient air during construction-related activities;
- the on-site worker during operations – for outdoor workers, incidental ingestion and dermal contact with COPCs in soil, inhalation of particulates in ambient air, and inhalation of volatile COPCs in ambient air; and for indoor workers, inhalation of VOCs in indoor air volatilized from soil vapor;
- the off-site worker during operations – inhalation of particulates in ambient air

- the off-site public during operations – inhalation of particulates in ambient air

Potable use of shallow groundwater (ingestion and dermal contact) is considered an incomplete exposure pathway because drinking water in the area of the site is provided by a municipal source.

The analysis will include the estimation of the hypothetical exposure point concentrations (EPCs) of all COPCs using the Upper-Bound Confidence Limit (UCL) of the arithmetic mean to estimate a reasonable maximum exposure (RME) for each hypothetical scenario. If the calculated 95% UCLs exceed the maximum detected value, the maximum value will be used as the EPC. Distributional tests and UCLs will be calculated using U.S. EPA's ProUCL software, version 4.00.02 (U.S. EPA, 2007).

The "Annual Average Daily Dose" (AADD) or "Lifetime Average Daily Dose" (LADD) will be used to quantify hypothetical potential exposure in the HHRA. The AADD is used as a standard measure for characterizing long-term noncarcinogenic effects. The LADD, which addresses hypothetical exposures that may occur over varying durations from a single event to an average 70-year human lifetime, is used to estimate potential carcinogenic risk. Equations for calculating AADD and LADD published by the U.S. EPA will be used (U.S. EPA, 1989, 1991, 1997, 2002, and 2004a).

Hypothetical potential exposure assumptions used in the daily intake calculations will be based on information contained in U.S. EPA and Cal-EPA DTSC risk guidance, site-specific information, and professional judgment, and will represent upper-bound conservative values under a RME scenario. Tables 2 through 7 present the hypothetical potential exposure parameters and values for each receptor.

Available acute and chronic toxicity criteria to be used in the HHRA will be presented in tabular summaries and will be selected according to the following hierarchy:

1. OEHHA, 2010, Cal/EPA Toxicity Criteria Database, on-line database;

2. U.S. EPA Integrated Risk Information System (IRIS) on-line database, 2010;

3. U.S. EPA, 2008, Regional Screening Levels; and

4. U.S. EPA, 2004b, Region 9 Preliminary Remediation Goals (PRGs).

Finally, the results of the COPC analysis, hypothetical exposure assessment, and toxicity evaluation will be integrated to estimate the possible likelihood of an adverse health effect for the hypothetical receptors identified for the assessment. Potential noncarcinogenic health effects will be expressed in terms of a "hazard quotient," which is equal to the estimated level of exposure (or dose) divided by the RfD. As a screening approach, hazard quotients will be conservatively summed for all COPCs to calculate a hazard index assuming they all affect the same health effect endpoint. A hazard quotient or hazard index less than or equal to one (1)

indicates that the predicted potential exposure should not result in noncarcinogenic health effects. Theoretical excess lifetime cancer risks will be calculated by multiplying the estimated level of exposure (dose) over a lifetime by the chemical-specific cancer slope factor. As with the hazard index, the theoretical estimated cancer risks for each chemical and potential exposure pathway will be summed to estimate the total excess lifetime cancer risk for the hypothetically exposed individual. In discussing the results of the HRA, theoretical carcinogenic risks will be compared with the acceptable risk range of 1×10^{-6} to 1×10^{-4}. The estimates of theoretical risk and hazard will be presented and summarized in tables.

SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT

As previously discussed, a portion of the site lies immediately south of Suisun Bay. Because the groundwater gradient is generally to the north and is influenced by tidal action in Suisun Bay, a screening-level ecological risk assessment (SLERA) will be performed to evaluate whether constituents suspected to be derived from the site pose a potential risk to hypothetical aquatic receptors from the migration of groundwater into Suisun Bay.

Representative concentrations in groundwater along the northern (downgradient) boundary of the site will be compared to applicable ESLs developed by the Water Board, specifically Table F-1b and F-4a, where groundwater is not a current or potential drinking water resource.

This represents a conservative approach since most of the WPGS site is located several hundred feet south (upgradient) of Suisun Bay. If any groundwater impacted by COPCs related to the WPGS site was found to be potentially migrating toward Suisun Bay, the COPC concentrations in groundwater approaching the bay would be expected to be significantly reduced from the concentrations found at the boundary of the WPGS site due to attenuation.

REPORTING

Following completion of field activities, sample analysis, validation of the analytical laboratory results, and analysis of the data, AMEC will prepare a report summarizing the sampling methods and results and presenting the results of the HHRA and SLERA. The report will contain:

- a description of the WPGS background information and previous site investigations, field activities, analytical results, HHRA, SLERA, and conclusions;
- a site map depicting sampling locations;
- data tables summarizing the soil and groundwater data, including both historical data and data obtained during this investigation;
- analytical laboratory reports and chain-of-custody forms;
- the EPCs for all COPCs found on the WPGS site;
- a list of all potential exposure pathways and assumptions for all hypothetical receptors assessed;

- a table that includes all physical parameters and toxicity values for all COPCs assessed;
- tables showing the results for theoretical cancer risk, acute hazard index, and chronic hazard index by COPCs and by potential exposure pathway;
- and a table comparing representative concentrations of COPCs in groundwater to their respective aquatic habitat ESLs.

SCHEDULE

We anticipate that the field activities will begin approximately 1-2 weeks after receiving CEC comments and/or approval of this work plan, depending on contractor availability, and will require 10 days to complete. We currently anticipate field work to be conducted in late February. Based on this planned schedule, we expect to submit the draft investigation report along with the HHRA/SLERA to CEC by May 1, 2010.

Please contact either of the undersigned if you have any questions.

Sincerely yours,
AMEC Geomatrix, Inc.

Robert H. Cheung
Senior Toxicologist

Jennifer L. Patterson, PE
Senior Engineer

RHC/JLP/jh
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cc: Ken Simas, PG, WAU & Company

Attachments:
References
Tables 1-7
Figures 1-4

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TABLES

TABLE 1

SAMPLING AND ANALYSIS PLAN

Willow Pass Generating Station
Mirant Pittsburg Power Plant
Pittsburg, California

Sampling Location[1]	Objective	Media	Sample Depths to be Analyzed (feet bgs)	VOCs [2]	TPHd [3]	TPHmo [3]	Naphthalene [4]	PAHs [5]	Metals [6]
GGW-01	Assess the presence of COPCs in groundwater at downgradient site boundary.	GW	Water Table [7]	X	X	X		X	X
GGW-02 [8]	Assess the presence of COPCs in groundwater at downgradient site boundary.	GW	Water Table [7]	X	X	X		X	X
GGW-03	Assess the presence of COPCs in groundwater at downgradient site boundary.	GW	Water Table [7]	X	X	X		X	X
GGW-04	Assess the presence of COPCs in groundwater at downgradient site boundary.	GW	Water Table [7]	X	X	X		X	X
GGW-05	Assess the presence of COPCs in groundwater at downgradient site boundary.	GW	Water Table [7]	X	X	X		X	X
GGW-06	Assess the presence of COPCs in groundwater at downgradient site boundary.	GW	Water Table [7]	X	X	X		X	X
SV-01	Assess the presence of volatile constituents in shallow soil vapor beneath the proposed power generation units.	SV	5[9]	X			X		
SV-02	Assess the presence of volatile constituents in shallow soil vapor beneath the proposed power generation units.	SV	5[9]	X			X		
SV-03	Assess the presence of volatile constituents in shallow soil vapor beneath the proposed power generation units.	SV	5[9]	X			X		

TABLE 1

SAMPLING AND ANALYSIS PLAN
Willow Pass Generating Station
Mirant Pittsburg Power Plant
Pittsburg, California

Sampling Location[1]	Objective	Media	Sample Depths to be Analyzed (feet bgs)	VOCs [2]	TPHd [3]	TPHmo [3]	Naphthalene [4]	PAHs [5]	Metals [6]
SV-04	Assess the presence of volatile constituents in shallow soil vapor beneath the proposed power generation units.	SV	5[9]	X			X		
SV-05	Assess the presence of volatile constituents in shallow soil vapor beneath the proposed power generation units.	SV	5[9]	X			X		
SV-06	Assess the presence of volatile constituents in shallow soil vapor beneath the proposed power generation units.	SV	5[9]	X			X		
SV-07	Assess the presence of volatile constituents in shallow soil vapor beneath the proposed power generation units.	SV	5[9]	X			X		
SV-08	Assess the presence of volatile constituents in shallow soil vapor beneath the proposed power generation units.	SV	5[9]	X			X		
SV-09	Assess the presence of volatile constituents in shallow soil vapor beneath the proposed power generation units.	SV	5[9]	X			X		
SV-10	Assess the presence of volatile constituents in shallow soil vapor beneath the proposed power generation units.	SV	5[9]	X			X		
SV-11	Assess the presence of volatile constituents in shallow soil vapor beneath the proposed power generation units.	SV	5[9]	X			X		

TABLE 1

SAMPLING AND ANALYSIS PLAN
Willow Pass Generating Station
Mirant Pittsburg Power Plant
Pittsburg, California

Sampling Location[1]	Objective	Media	Sample Depths to be Analyzed (feet bgs)	VOCs [2]	TPHd [3]	TPHmo [3]	Naphthalene [4]	PAHs [5]	Metals [6]
SV-12	Assess the presence of volatile constituents in shallow soil vapor beneath the proposed power generation units.	SV	5[9]	X			X		
SV-13	Assess the presence of volatile constituents in shallow soil vapor beneath the proposed power generation units.	SV	5[9]	X			X		
SV-14	Assess the presence of volatile constituents in shallow soil vapor beneath the proposed power generation units.	SV	5[9]	X			X		
SV-15	Assess the presence of volatile constituents in shallow soil vapor beneath the proposed power generation units.	SV	5[9]	X			X		
SV-16	Assess the presence of volatile constituents in shallow soil vapor beneath the proposed office/administration building location.	SV	5[9]	X			X		
SV-17	Assess the presence of volatile constituents in shallow soil vapor beneath the proposed office/administration building location.	SV	5[9]	X			X		
SV-18	Assess the presence of volatile constituents in shallow soil vapor beneath the proposed office/administration building location.	SV	5[9]	X			X		

TABLE 1

SAMPLING AND ANALYSIS PLAN
Willow Pass Generating Station
Mirant Pittsburg Power Plant
Pittsburg, California

Sampling Location[1]	Objective	Media	Sample Depths to be Analyzed (feet bgs)	VOCs [2]	TPHd [3]	TPHmo [3]	Naphthalene [4]	PAHs [5]	Metals [6]
SV-19	Assess the presence of volatile constituents in shallow soil vapor beneath the proposed office/administration building location.	SV	5[9]	X			X		
SV-20	Assess the presence of volatile constituents in shallow soil vapor beneath the proposed office/administration building location.	SV	5[9]	X			X		
SV-21	Assess the presence of volatile constituents in shallow soil vapor beneath the proposed office/administration building location.	SV	5[9]	X			X		
SV-22	Assess the presence of volatile constituents in shallow soil vapor beneath the proposed office/administration building location.	SV	5[9]	X			X		
SV-23	Assess the presence of volatile constituents in shallow soil vapor beneath the proposed office/administration building location.	SV	5[9]	X			X		
SV-24	Assess the presence of volatile constituents in shallow soil vapor beneath the proposed office/administration building location.	SV	5[9]	X			X		

TABLE 1

SAMPLING AND ANALYSIS PLAN
Willow Pass Generating Station
Mirant Pittsburg Power Plant
Pittsburg, California

Sampling Location[1]	Objective	Media	Sample Depths to be Analyzed (feet bgs)	VOCs [2]	TPHd [3]	TPHmo [3]	Naphthalene [4]	PAHs [5]	Metals [6]
SV-25	Assess the presence of volatile constituents in shallow soil vapor beneath the proposed office/administration building location.	SV	5[9]	X			X		

TABLE 1

SAMPLING AND ANALYSIS PLAN
Willow Pass Generating Station
Mirant Pittsburg Power Plant
Pittsburg, California

Notes:
1. Sample locations are shown on Figure 3.
2. Groundwater samples will be analyzed for VOCs using EPA Method 8260B. Soil vapor samples will be analyzed for VOCs using EPA Method TO-15.
3. Groundwater samples will be analyzed for TPHd and TPHmo using EPA Method 8015M both before and following laboratory filtration using a 0.7-micron glass fiber filter. A silica gel cleanup will be performed prior to both analyses.
4. Soil vapor samples will be analyzed for naphthalene using EPA Method TO-17.
5. Groundwater samples will be analyzed for PAHs using EPA Method 8270C with selective ion monitoring (SIM) before and following laboratory filtration using a 0.7-micron glass fiber filter.
6. Groundwater samples will be analyzed for metals using EPA Method 200.8/7470 following field filtration using a 0.45-micron filter.
7. The anticipated sampling interval will be from first water (anticipated to be at approximately 5 feet bgs) to approximately 5 feet below.
8. A blind duplicate groundwater sample will be collected at the GGW-02 location.
9. Sampling depth may be shifted ±1.5 feet from target depth based on lithology.

Abbreviations:
bgs = feet below ground surface
COPC = constituents of potential concern
EPA = U. S. Environmental Protection Agency
GW = groundwater
PAHs = polynuclear aromatic hydrocarbons
SV = soil vapor
TPHd = total petroleum hydrocarbons quantified as diesel
TPHmo = total petroleum hydrocarbons quantified as motor oil
VOCs = volatile organic compounds

TABLE 2

HYPOTHETICAL EXPOSURE PARAMETERS FOR TRENCH WORKER

Willow Pass Generating Station
Mirant Pittsburg Power Plant
Pittsburgh, California

Exposure Parameter	Units	Reasonable Maximum Exposure
GENERAL EXPOSURE PARAMETERS		
Exposure Frequency (EF)	days/year	Value: 20 Rationale: Professional judgment assumed for a trench worker
Exposure Duration (ED)	years	Value: 1 Rationale: U.S. EPA, 2002
Body Weight (BW)	kg	Value: 70 Rationale: DTSC, 1996; U.S. EPA, 1991; U.S. EPA, 2002
Averaging Time (AT)	days	Value: 25,550 (carcinogens) 365 (noncarcinogens) Rationale: DTSC, 1996; U.S. EPA, 1991; U.S. EPA, 2002
PATHWAY-SPECIFIC PARAMETERS		
Incidental Soil Ingestion		
Soil Ingestion Rate (IR_s)	mg/day	Value: 480 Rationale: U.S. EPA 2002
Dermal Contact with Soil		
Exposed Skin Surface Area (SA_s)	cm^2/day	Value: 5,800 Rationale: U.S. EPA 2002
Soil-to-Skin Adherence Factor (SAF)	mg/cm^2	Value: 0.51 Rationale: U.S. EPA 2002
Absorption Fraction (ABS)	unitless	Value: Chemical-specific Rationale: U.S. EPA, 2004
Inhalation of Vapors in Ambient Air		
Inhalation Rate (IHR_a)	m^3/hr	Value: 2.5 Rationale: U.S. EPA, 2002b; U.S. EPA 1997a
Exposure Time (ET)	hours/day	Value: 8 Rationale: DTSC, 1996; U.S. EPA, 1991; Standard work day

TABLE 2

HYPOTHETICAL EXPOSURE PARAMETERS FOR TRENCH WORKER

Willow Pass Generating Station
Mirant Pittsburg Power Plant
Pittsburgh, California

Exposure Parameter	Units	Reasonable Maximum Exposure	
Inhalation of Suspended Soil Particulates			
Particulate Emission Factor (PEF)	m^3/kg	Value:	2.0×10^7
		Rationale:	DTSC, 1999; corresponds to the PM10 Ambient Air Quality Standard of 50 µg/m^3; also consistent with U.S. EPA, 2002, recommended PEF for construction activities other than unpaved road traffic (3.6×10^7 m^3/kg)
Inhalation Rate (IHR_a)	m^3/hr	Value:	2.5
		Rationale:	U.S. EPA, 2002, U.S. EPA, 1997
Exposure Time (ET)	hours	Value:	8
		Rationale:	DTSC, 1996; U.S. EPA, 1991; Standard work day
Inhalation of Volatiles in Trench Ambient Air			
Exposure Time (ET)	hours/day	Value:	2
		Rationale:	Professional judgment
Event Frequency (EV)	event/day	Value:	1
		Rationale:	Professional judgment
Exposure Frequency (EF)	days/year	Value:	20
		Rationale:	Professional judgment
Inhalation Rate (IHRa)	m^3/hr	Value:	2.5
		Rationale:	DTSC, 1996; U.S. EPA, 1991; Standard work day
Dermal Contact with Groundwater			
Event Time (ET)	hours/day	Value:	0.5
		Rationale:	Professional judgment; based on incidental contact
Event Frequency (EV)	event/day	Value:	1
		Rationale:	Professional judgment
Exposure Frequency (EF)	days/year	Value:	20
		Rationale:	Professional judgment

TABLE 2

HYPOTHETICAL EXPOSURE PARAMETERS FOR TRENCH WORKER

Willow Pass Generating Station
Mirant Pittsburg Power Plant
Pittsburgh, California

Exposure Parameter	Units	Reasonable Maximum Exposure
Exposed Skin Surface Area (SA_s)	cm^2	Value: 7,000 Rationale: U.S. EPA, 1997. Assuming that workers stand in ~2 feet of water; thus, forearms, hands, lower legs, and feet (30.6% of total body area, 23,000 cm^3) are exposed.

Abbreviations
cm^2 = squared centimeters
kg = kilogram
mg/cm^2 = milligrams per squared centimeters
mg/day = milligrams per day
m^3/hr = cubic meters per hour
m^3/kg = cubic meters per kilogram

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TABLE 3

HYPOTHETICAL EXPOSURE PARAMETERS FOR CONSTRUCTION WORKER

Willow Pass Generating Station
Mirant Pittsburg Power Plant
Pittsburgh, California

Exposure Parameter	Units	Reasonable Maximum Exposure
GENERAL EXPOSURE PARAMETERS		
Exposure Frequency (EF)	days/year	Value: 250 Rationale: U.S. EPA, 2002
Exposure Duration (ED)	years	Value: 1 Rationale: U.S. EPA, 2002
Body Weight (BW)	kg	Value: 70 Rationale: DTSC, 1996; U.S. EPA, 1991; U.S. EPA, 2002
Averaging Time (AT)	days	Value: 25,550 (carcinogens) 365 (noncarcinogens) Rationale: DTSC, 1996; U.S. EPA, 1991; U.S. EPA, 2002
PATHWAY-SPECIFIC PARAMETERS		
Incidental Soil Ingestion		
Soil Ingestion Rate (IR_s)	mg/day	Value: 480 Rationale: U.S. EPA 2002
Dermal Contact with Soil		
Exposed Skin Surface Area (SA_s)	cm^2/day	Value: 5,800 Rationale: U.S. EPA 2002
Soil-to-Skin Adherence Factor (SAF)	mg/cm^2	Value: 0.51 Rationale: U.S. EPA 2002
Absorption Fraction (ABS)	unitless	Value: Chemical-specific Rationale: U.S. EPA, 2004
Inhalation of Vapors in Ambient Air		
Inhalation Rate (IHR_a)	m^3/hr	Value: 2.5 Rationale: U.S. EPA, 2002; U.S. EPA 1997
Exposure Time (ET)	hours/day	Value: 8 Rationale: DTSC, 1996; U.S. EPA, 1991; Standard work day

TABLE 3

HYPOTHETICAL EXPOSURE PARAMETERS FOR CONSTRUCTION WORKER

Willow Pass Generating Station
Mirant Pittsburg Power Plant
Pittsburgh, California

Exposure Parameter	Units	Reasonable Maximum Exposure
Inhalation of Suspended Soil Particulates		
Particulate Emission Factor (PEF)	m^3/kg	Value: 2.0×10^7 Rationale: DTSC, 1999; corresponds to the PM10 Ambient Air Quality Standard of 50 $\mu g/m^3$; also consistent with U.S. EPA, 2002, recommended PEF for construction activities other than unpaved road traffic (3.6×10^7 m^3/kg)
Inhalation Rate (IHR_a)	m^3/hr	Value: 2.5 Rationale: U.S. EPA, 2002, U.S. EPA, 1997
Exposure Time (ET)	hours	Value: 8 Rationale: DTSC, 1996; U.S. EPA, 1991; Standard work day

Abbreviations

cm^2 = squared centimeters
mg/cm^2 = milligrams per squared centimeters
m^3/hr = cubic meters per hour
kg = kilogram
mg/day = milligrams per day
m^3/kg = cubic meters per kilogram
$\mu g/m^3$ = micrograms per cubic meter

References

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TABLE 4

HYPOTHETICAL EXPOSURE PARAMETERS FOR OFF-SITE RESIDENTS DURING CONSTRUCTION AND OPERATIONS

Willow Pass Generating Station
Mirant Pittsburg Power Plant
Pittsburgh, California

Exposure Parameter	Units	Reasonable Maximum Exposure
GENERAL EXPOSURE PARAMETERS		
Exposure Frequency (EF)	days/year	Value: 350 Rationale: DTSC, 1996; U.S. EPA, 1991
Exposure Duration (ED)	years	Value: 1 during construction Value: During operations 6 (child) 24 (adult)
Body Weight (BW)	Kg	Value: 15 (child) 70 (adult) Rationale: DTSC, 1996; U.S. EPA, 1991
Averaging Time (AT)	Days	Value: 25,550 (carcinogens) 2,190 (child—noncarcinogens) 8,760 (adult—noncarcinogens) Rationale: DTSC, 1996; U.S. EPA, 1991
PATHWAY-SPECIFIC PARAMETERS		
Inhalation of Vapors in Ambient Air		
Inhalation Rate (IHR_a)	m^3/hr	Value: 0.42 (child) 0.83 (adult) Rationale: U.S. EPA, 1997 (child); DTSC, 1996 (adult)
Exposure Time (ET)	hours	Value: 24 Rationale: DTSC, 1996; U.S. EPA, 1991
Inhalation of Suspended Soil Particulates		
Inhalation Rate (IHR_a)	m^3/hr	Value: 0.42 (child) 0.83 (adult) Rationale: U.S. EPA, 1997 (child); DTSC, 1996 (adult)
Particulate Emission Factor (PEF)	m^3/kg	Value: 4.4×10^8 Rationale: U.S. EPA, 2002
Exposure Time (ET)	hours	Value: 24 Rationale: DTSC, 1996; U.S. EPA, 1991

TABLE 4

HYPOTHETICAL EXPOSURE PARAMETERS FOR OFF-SITE RESIDENTS DURING CONSTRUCTION AND OPERATIONS

Willow Pass Generating Station
Mirant Pittsburg Power Plant
Pittsburgh, California

Abbreviations

kg = kilograms
m^3/hr = cubic meters per hour
m^3/kg = cubic meters per kilogram

References

Department of Toxic Substances Control (DTSC), 1996, Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities (corrected and reprinted): Office of the Scientific Advisor, California Environmental Protection Agency (Cal/EPA), Sacramento, California.

U.S. Environmental Protection Agency (U.S. EP), 1991, Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors: Office of Emergency and Remedial Response, Washington, D.C.

U.S. EPA, 1997, Exposure Factors Handbook, Volume 1: Office of Research and Development, Washington, D.C.

U.S. EPA, 2002, Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites: Office of Solid Waste and Emergency Response, December.

TABLE 5

HYPOTHETICAL EXPOSURE PARAMETERS FOR ON-SITE OUTDOOR WORKER

Willow Pass Generating Station
Mirant Pittsburg Power Plant
Pittsburgh, California

Exposure Parameter	Units	Reasonable Maximum Exposure
GENERAL EXPOSURE PARAMETERS		
Exposure Frequency (EF)	days/year	Value: 250 Rationale: DTSC, 1996; U.S. EPA, 1991
Exposure Duration (ED)	years	Value: 25 Rationale: DTSC, 1996; U.S. EPA, 1991
Body Weight (BW)	kg	Value: 70 Rationale: DTSC, 1996; U.S. EPA, 1991
Averaging Time (AT)	days	Value: 25,550 (carcinogens) 9125 (noncarcinogens) Rationale: DTSC, 1996; U.S. EPA, 1991
Pathway-Specific Parameters		
Incidental Soil Ingestion		
Soil Ingestion Rate (IR_s)	mg/day	Value: 100 Rationale: DTSC, 1996; U.S. EPA, 1991; U.S. EPA, 2002
Dermal Contact with Soil		
Exposed Skin Surface Area (SA_s)	cm^2/day	Value: 3,300 Rationale: U.S. EPA, 2002; U.S. EPA, 2004
Soil-to-Skin Adherence Factor (SAF)	mg/cm^2	Value: 0.2 Rationale: U.S. EPA, 2002; U.S. EPA, 2004
Absorption Fraction (ABS)	unitless	Value: Chemical-specific Rationale: U.S. EPA, 2004
Inhalation of Vapors in Ambient Air		
Inhalation Rate (IHR_a)	m^3/hr	Value: 1.6 Rationale: U.S. EPA, 1997
Exposure Time (ET)	hrs/day	Value: 8 Rationale: DTSC, 1996; U.S. EPA, 1991; Standard work day

TABLE 5

HYPOTHETICAL EXPOSURE PARAMETERS FOR ON-SITE OUTDOOR WORKER

Willow Pass Generating Station
Mirant Pittsburg Power Plant
Pittsburgh, California

Exposure Parameter	Units	Reasonable Maximum Exposure
Inhalation of Suspended Soil Particulates		
Particulate Emission Factor (PEF)	m^3/kg	Value: 1.32×10^9 Rationale: Estimated
Inhalation Rate (IHR_a)	m^3/hr	Value: 1.6 Rationale: U.S. EPA, 1997
Exposure Time (ET)	hrs/day	Value: 8 Rationale: DTSC, 1996; U.S. EPA, 1991; Standard work day

Abbreviations

cm^2/day = square centimeters per day
hrs/day = hours per day
kg = kilograms
m^3/hr = cubic meters per hour
m^3/kg = cubic meters per kilogram
mg/cm^2 = milligrams per square centimeters
mg/day = milligrams per day

References

Department of Toxic Substances Control (DTSC), 1996, Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities (corrected and reprinted), Office of the Scientific Advisor, Department of Toxic Substances Control, Sacramento, California.

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U.S. EPA, 2004, Risk Assessment Guidance for Superfund (RAGS): Volume 1 – Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Final, Office of Superfund Remediation and Technology Innovation, July.

TABLE 6

EXPOSURE PARAMETERS FOR ON-SITE INDOOR WORKER

Willow Pass Generating Station
Mirant Pittsburg Power Plant
Pittsburgh, California

Exposure Parameter	Units	Reasonable Maximum Exposure
GENERAL EXPOSURE PARAMETERS		
Exposure Frequency (EF)	days/year	Value: 250 Rationale: DTSC, 1996; U.S. EPA, 1991
Exposure Duration (ED)	years	Value: 25 Rationale: DTSC, 1996; U.S. EPA, 1991
Body Weight (BW)	kg	Value: 70 Rationale: DTSC, 1996; U.S. EPA, 1991
Averaging Time (AT)	days	Value: 25,550 (carcinogens) 9,125 (noncarcinogens) Rationale: DTSC, 1996; U.S. EPA, 1991
PATHWAY-SPECIFIC PARAMETERS		
Inhalation of Vapors in Indoor Air		
Inhalation Rate (IHRa)	m^3/hr	Value: 1.6 Rationale: U.S. EPA, 1997
Exposure Time (ET)	hours/day	Value: 8 Rationale: DTSC, 1996; U.S. EPA, 1991

Abbreviations
kg = kilograms m^3/hr = cubic meters per hour

Reference

Department of Toxic Substances Control (DTSC), 1996, Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities (corrected and reprinted), Office of the Scientific Advisor, California Environmental Protection Agency (Cal/EPA), Sacramento, California.

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TABLE 7

HYPOTHETICAL EXPOSURE PARAMETERS FOR OFF-SITE WORKER DURING OPERATIONS

Willow Pass Generating Station
Mirant Pittsburg Power Plant
Pittsburgh, California

Exposure Parameter	Units	Reasonable Maximum Exposure
GENERAL EXPOSURE PARAMETERS		
Exposure Frequency (EF)	days/year	Value: 250 Rationale: DTSC, 1996; U.S. EPA, 1991
Exposure Duration (ED)	years	Value: 25 Rationale: DTSC, 1996; U.S. EPA, 1991
Body Weight (BW)	Kg	Value: 70 Rationale: DTSC, 1996; U.S. EPA, 1991
Averaging Time (AT)	days	Value: 25,550 (carcinogens) 9125 (noncarcinogens) Rationale: DTSC, 1996; U.S. EPA, 1991
PATHWAY-SPECIFIC PARAMETERS		
Inhalation of Vapors in Ambient Air		
Inhalation Rate (IHR_a)	m^3/hr	Value: 1.6 Rationale: U.S. EPA, 1997
Exposure Time (ET)	hrs/day	Value: 8 Rationale: DTSC, 1996; U.S. EPA, 1991; Standard work day
Inhalation of Suspended Soil Particulates		
Inhalation Rate (IHR_a)	m^3/hr	Value: 1.6 Rationale: U.S. EPA, 1997
Particulate Emission Factor (PEF)	m^3/kg	Value: 4.4×10^8 Rationale: U.S. EPA, 2002
Exposure Time (ET)	hrs/day	Value: 8 Rationale: DTSC, 1996; U.S. EPA, 1991; Standard work day

TABLE 7

HYPOTHETICAL EXPOSURE PARAMETERS FOR OFF-SITE WORKER DURING OPERATIONS

Willow Pass Generating Station
Mirant Pittsburg Power Plant
Pittsburgh, California

Abbreviations

kg = kilograms
m^3/hr = cubic meters per hour
m^3/kg = cubic meters per kilogram

References

Department of Toxic Substances Control (DTSC), 1996, Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities (corrected and reprinted): Office of the Scientific Advisor, California Environmental Protection Agency (Cal/EPA), Sacramento, California.

U.S. Environmental Protection Agency (U.S. EP), 1991, Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors: Office of Emergency and Remedial Response, Washington, D.C.

U.S. EPA, 1997, Exposure Factors Handbook, Office of Health and Environmental Assessment, Washington, D.C.

U.S. EPA, 2002, Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites: Office of Solid Waste and Emergency Response, December.

FIGURES

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Note: Base map from USGS Honker Bay and Antioch North, California topographic quadrangles.

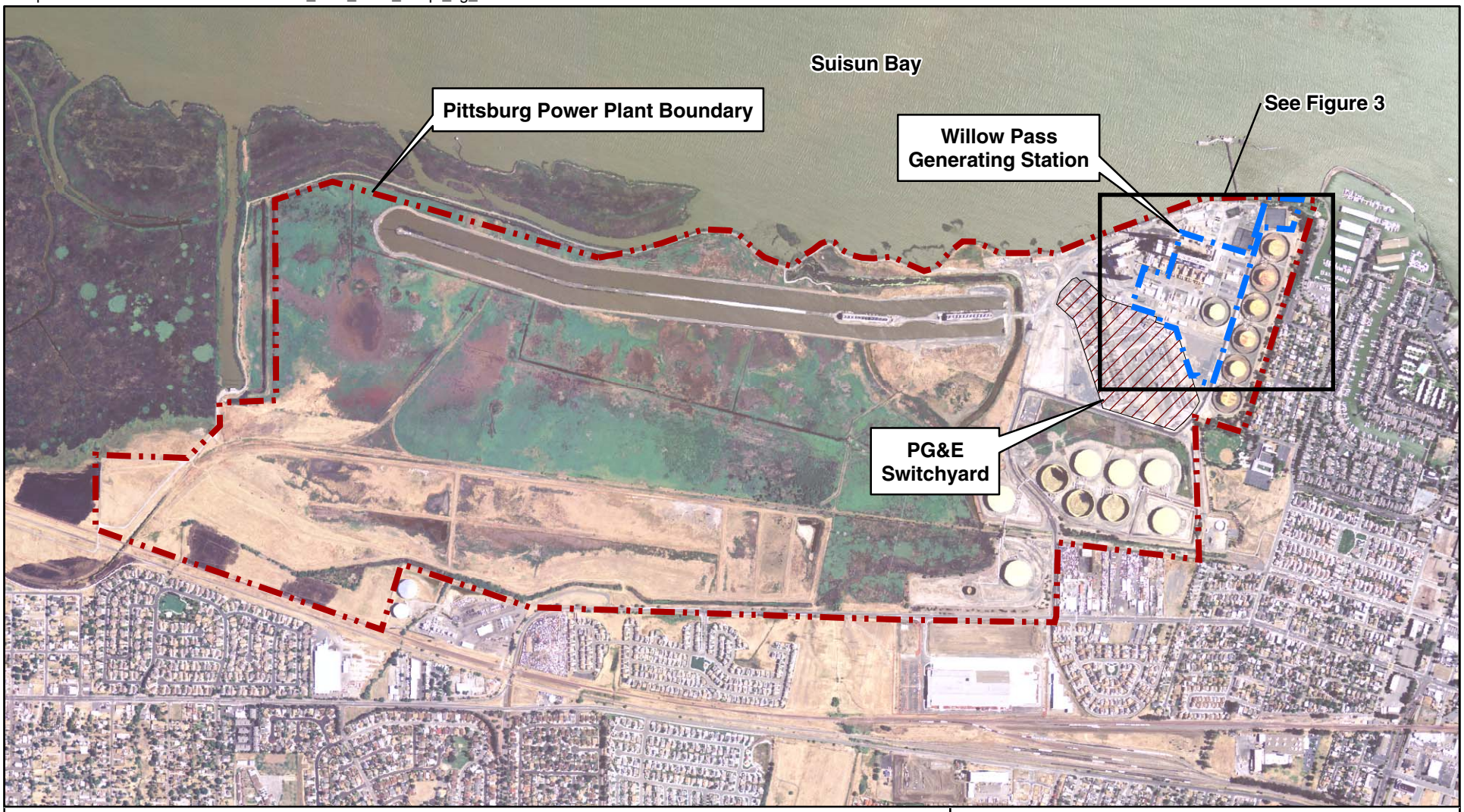
N

0 5,000 Feet

SITE LOCATION MAP
Willow Pass Generating Station
Pittsburg Power Plant
Pittsburg, California

By: JMS	Date: 1/8/2010	Project No. 15386.000
AMEC Geomatrix	Figure 1	

File path: S:\15300\15386\15386.000\task_2\09_1221_fsiwp_fig_02.mxd



N

0 1,500 Feet

SITE PLAN AND FACILITY LAYOUT
Willow Pass Generating Station
Pittsburg Power Plant
Pittsburg, California

By: JMS	Date: 1/8/2010	Project No. 15386.000
AMEC Geomatrix		Figure 2

Suisun Bay

GGW-01
SV-01
SV-02
SV-03
SV-04
SV-05
SV-06
SV-07
SV-08
SV-09
SV-10
SV-11
SV-12
SV-13
SV-14
SV-15
SV-16
SV-17
SV-18
SV-19
SV-20
SV-21
SV-22
SV-23
SV-24
SV-25
GGW-02
GGW-03
GGW-04
GGW-05
GGW-06

Proposed Power Generation Units and Ancillary Structures

Proposed Office/ Warehouse Building

Explanation

- Proposed grab groundwater sampling location
- Proposed soil vapor sampling location
- Previous sampling location
- Willow Pass Generating Station project boundary
- Pittsburg Power Plant boundary
- PG&E switchyard
- Proposed power generation units and ancillary structures*
- Proposed office/warehouse building*

*See AFC Figure 2.3-1 and Figure 2.5-1 (URS, 2998a)

N

0 200 400 Feet

Aerial image from USGS digital orthophoto dated April 2008.

PROPOSED SAMPLE LOCATIONS
Willow Pass Generating Station
Pittsburg Power Plant
Pittsburg, California

By: JMS	Date: 2/25/2010	Project No. 15386.000
AMEC Geomatrix	Figure 3	

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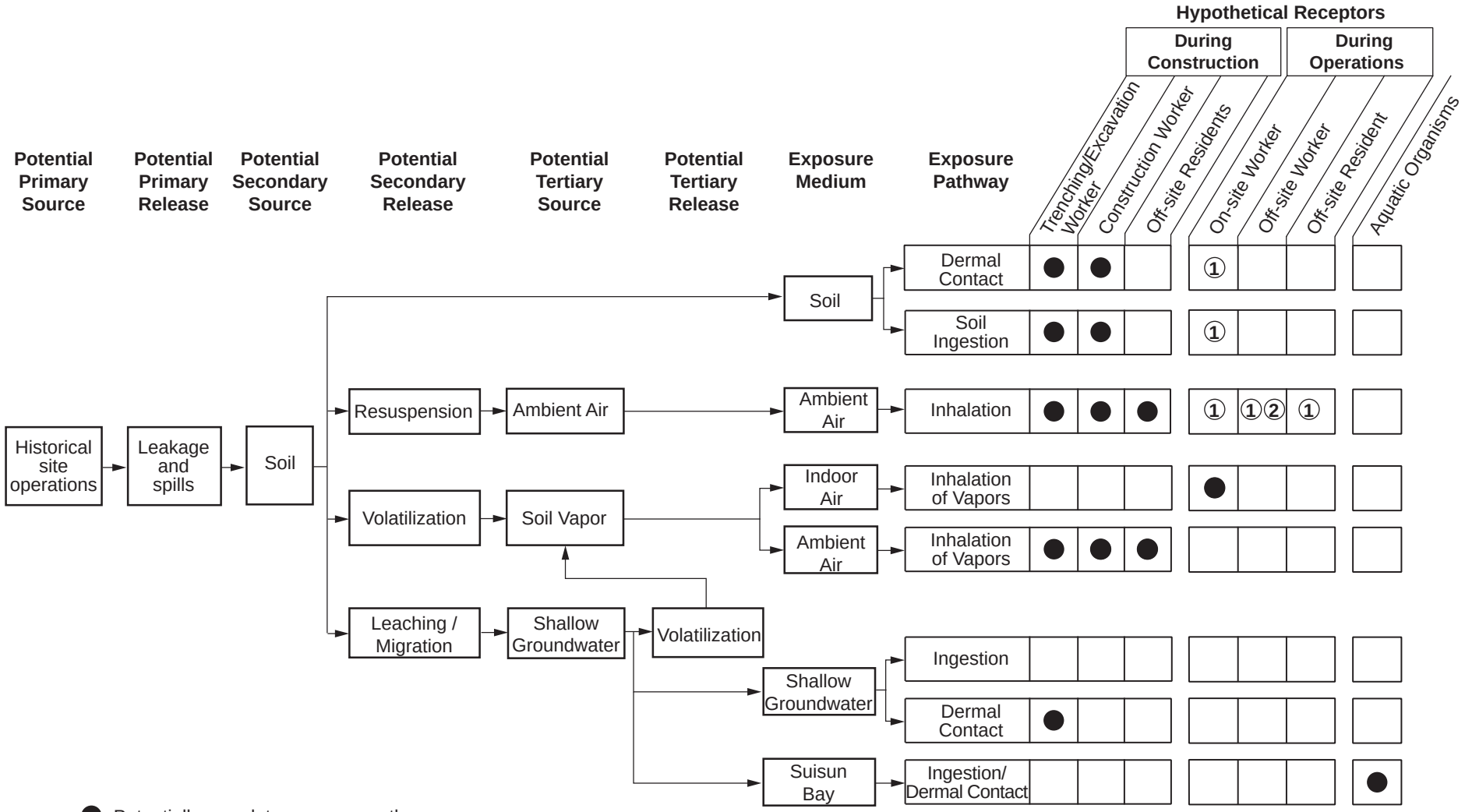
S:\15300\15386\15386.000\task_2\09_1221_fsiwp_fig_04.ai



● Potentially complete exposure pathway.

① This pathway may not be complete once construction is finished because the majority of the site will be covered by power blocks and associated infrastructure, buildings, tanks, pavement, gravel, and compacted soil. However, potential exposure (assuming the site will not be covered) during operations will be evaluated.

② This pathway will be evaluated qualitatively because exposure during operations for off-site workers is expected to be less than off-site residents and on-site workers.

PRELIMINARY SITE CONCEPTUAL MODEL
Willow Pass Generating Station
Mirant Pittsburg Power Plant
Pittsburg, California

By: RC	Date: 01/27/2010	Project No. 15386.000
AMEC Geomatrix	Figure **4**	

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA
1516 NINTH STREET, SACRAMENTO, CA 95814
1-800-822-6228 – WWW.ENERGY.CA.GOV

APPLICATION FOR CERTIFICATION
FOR THE WILLOW PASS
GENERATING STATION

Docket No. 08-AFC-6

PROOF OF SERVICE
(Revised 4/19/2010)

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DECLARATION OF SERVICE

I, Kathy Rushmore, declare that on June 14, 2010, I served and filed copies of the attached *Work Plan for Focused Site Assessment and Focused Health Risk Assessment, Willow Pass Generating Station*. The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at: **[http://www.energy.ca.gov/sitingcases/willowpass/index.html]**. The document has been sent to both the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit, in the following manner:

(C*heck all that Apply*)

For service to all other parties:

_**X**_ sent electronically to all email addresses on the Proof of Service list;

__ by personal delivery or by depositing in the United States mail at San Francisco, California with first-class postage thereon fully prepaid and addressed as provided on the Proof of Service list above to those addresses **NOT** marked "email preferred."

AND

For filing with the Energy Commission:

__ **X** _ **sending two original paper copies and one electronic copy, mailed to the address below:**

OR

___ depositing in the mail an original and 12 paper copies, as follows:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 08-AFC-6
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512
docket@energy.state.ca.us

I declare under penalty of perjury that the foregoing is true and correct.