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DOCKET
06-AFC-7
DATE MAR 23 2007
RECD. MAR 23 2007

March 23, 2007

Mr. John Kessler
Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

Re: Humboldt Bay Repowering Project (06-AFC-07):
Responses to CEC Staff Workshop Queries 8 and 23-27

Dear Mr. Kessler:

On behalf of the Pacific Gas and Electric Company, please find attached one original and 12 copies of a document titled *Responses to CEC Staff Workshop Queries 8 and 23-27* filed in support of the Application for Certification for the Humboldt Bay Repowering Project (06-AFC-07).

If you have any questions about this matter, please contact me at (916) 286-0278 or Susan Strachan at (530) 220-7038.

Sincerely,

Douglas M. Davy, Ph.D.
AFC Project Manager

Attachment

cc: G. Lamberg
S. Strachan

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA

APPLICATION FOR CERTIFICATION FOR THE HUMBOLDT POWER PLANT PROJECT	**DOCKET NO. 06-AFC-7** **PROOF OF SERVICE** **(REVISED 3/16/07)**

INSTRUCTIONS: All parties shall 1) send an original signed document plus 12 copies OR 2) mail one original signed copy AND e-mail the document to the web address below, AND 3) all parties shall also send a printed OR electronic copy of the documents that shall include a proof of service declaration to each of the individuals on the proof of service:

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DECLARATION OF SERVICE

I, Jeannette Harris, declare that on March 23, 2007, I deposited the required copies of the attached Responses to CEC Staff Workshop Queries 8 and 23-27 filed in support of the Application for Certification for the Humboldt Bay Repowering Project (06-AFC-07) in the United States mail at Sacramento, California with first-class postage thereon fully prepaid and addressed to those identified on the Proof of Service list above. I declare under penalty of perjury that the foregoing is true and correct.

OR

Transmission via electronic mail was consistent with the requirements of California Code of Regulations, title 20, sections 1209, 1209.5, and 1210. All electronic copies were sent to all those identified on the Proof of Service list above.

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

Jeannette Harris
[signature]

Supplemental Filing

Responses to CEC Staff Workshop Queries 8 and 23-27

In support of the

Application for Certification

for the

Humboldt Bay Repowering Project

Eureka, California

(06-AFC-7)

Submitted to the:

California Energy Commission

Submitted by:

Pacific Gas and Electric Company™

With Technical Assistance by:

CH2MHILL

Sacramento, California
March 2007

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Introduction

Attached are Pacific Gas and Electric Company's (PG&E) responses to the California Energy Commission (CEC) Staff's data requests 82 and 83 and also responses to workshop queries, or additional informal questions that were raised during the Data Request Response Workshop that was held on February 1, 2007. PG&E has provided responses to some of the identified workshop queries in previous submittals. This document provides additional responses, as identified below.

The workshop queries have been given unique workshop query (WSQ) numbers, listed by discipline and, within discipline, in the order in which they were discussed at the workshop. The WSQ responses appear in this document grouped with the data request responses that are for the same discipline. Because the workshop queries were not formally transmitted by the Staff in written form, they are listed here.

Air Quality

WSQ-23 Please provide the PM test data from the power plant in Chambersburg, Pennsylvania that uses the Wärtsilä technology.

WSQ-24a Please provide additional information on the acceptability of using the CTSCREEN model in conjunction with the AERMOD model for modeling air quality impacts in complex terrain in the context of applicable regulatory guidance.

WSQ-24b Please provide additional information on the acceptability of using the CTSCREEN model for receptors below stack top elevation.

WSQ-25 Please provide references for relating to the air quality impacts of biodiesel use.

WSQ-26 Please clarify whether the engines listed on the Wärtsilä internet site as using electrostatic precipitators for emissions control are diesel or residual fuel oil engines.

WSQ-27 Please provide additional information on the feasibility of using a fabric filter for emissions control on Wärtsilä engines.

Biological Resources

WSQ-8 Please identify additional mitigation for permanent impacts to freshwater marsh due to the California Coastal Commission's request to increase the mitigation ratio from 2:1 to 4:1 for this habitat type.

Cultural Resources

WSQ-11 Please provide a cultural resources survey of the wetland mitigation land proposed for the HBRP.

Air Quality (WSQ23-27)

Chambersburg PM test data

WSQ-23 *Please provide the PM test data from the power plant in Chambersburg, Pennsylvania that uses the Wärtsilä technology.*

Response: The PM test data from the Chambersburg plant is being provided under separate cover with a request for confidentiality.

CTSCREEN modeling with AERMOD

WSQ-24a *Please provide additional information on the acceptability of using the CTSCREEN model in conjunction with the AERMOD model for modeling air quality impacts in complex terrain in the context of applicable regulatory guidance.*

Response: The use of more refined modeling techniques for complex terrain impacts with AERMOD is specifically addressed in EPA's Appendix W[1] modeling guidance, as follows:

> Since AERMOD treats dispersion in complex terrain, we have merged sections 4 and 5 of appendix W, as proposed in the April 2000 NPR [Notice of Proposed Rulemaking]. And while AERMOD produces acceptable regulatory design concentrations in complex terrain, it does not replace CTDMPLUS for detailed or receptor-oriented complex terrain analysis, as we have made clear in *Guideline* section 4.2.2. CTDMPLUS remains available for use in complex terrain. [p. 68225]
>
> 4.2.2 Refined Analytical Techniques
>
> d. If the modeling application involves a well defined hill or ridge and a detailed dispersion analysis of the spatial pattern of plume impacts is of interest, CTDMPLUS, listed in Appendix A, is available. CTDMPLUS provides greater resolution of concentrations about the contour of the hill feature than does AERMOD through a different plume-terrain interaction algorithm. [p. 68233]

As discussed in the CTSCREEN users guide[2], CTSCREEN and CTDMPLUS are the same basic model.

> Since [CTDMPLUS] accounts for the three-dimensional nature of plume and terrain interaction, it requires detailed terrain and meteorological data that are representative of the modeling domain. Although the terrain data may be readily obtained from topographic maps and digitized for use in the CTDMPLUS, the required meteorological data may not be as readily available.
>
> Since the meteorological input requirements of the CTDMPLUS can limit its application, the EPA's Complex-Terrain-Modeling, Technology-Transfer Workgroup

[1] 40 CFR 51 Subpart W, as amended November 9, 2005 at 70 FR 68218, "Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions."

[2] USEPA, EPA-600/8-90-087, "User's Guide to CTDMPLUS: Volume 2. The Screening Mode (CTSCREEN)," October 1990.

> developed a methodology to use the advanced techniques of CTDMPLUS in situations where on-site meteorological measurements are limited or unavailable. This approach uses CTDMPLUS in a "screening" mode--actual source and terrain characteristics are modeled with an extensive array of predetermined meteorological conditions.
>
> This CTDMPLUS screening mode (CTSCREEN) serves several purposes in regulatory applications. When meteorological data are unavailable, CTSCREEN can be used to obtain conservative (safely above those of refined models), yet realistic, impact estimates for particular sources.

Therefore, the use of the CTSCREEN version of CTDMPLUS is consistent with EPA guidance.

CTSCREEN modeling for receptors

WSQ-24b *Please provide additional information on the acceptability of using the CTSCREEN model for receptors below stack top elevation.*

Response: CTSCREEN was used for receptors above stack base elevation but below stack top elevation because the CTDMPLUS user manual[3] does not indicate any restrictions on terrain elevations that may be addressed using the model. In fact, the CTDMPLUS manual indicates that the model may be used in flat terrain.

> 2.7.1 Receptors Not Influenced by Hills
>
> In theory (for stable/neutral conditions), the main subroutines of CTDMPLUS produce results which are identical to Flat-terrain results in the limit that the hill height goes to zero…The flat terrain algorithm simply performs a Gaussian plume computation which assumes that there is no mixing lid, that all receptors lie on a single ground-plane, and that plumes travel in straight lines. [p. 2-38]

However, EPA's Appendix W modeling guidance (cited above) includes the following definition of "complex terrain:"

> 4.1.b. Simple terrain, as used here, is considered to be an area where terrain features are all lower in elevation than the top of the stack of the source(s) in question. Complex terrain is defined as terrain exceeding the height of the stack being modeled.

To be consistent with the Appendix W definition of complex terrain, the 24-hour PM_{10} modeling for receptors at elevations between stack base and stack top has been reevaluated using AERMOD instead of CTSCREEN. The revised modeling produces identical results to those obtained previously. When AERMOD produces the highest results, building downwash is the main cause of highest or second highest impact and the maximum impacts always fall in the adjacent terrain which is at or below stack base. For CTSCREEN, the highest impacts always fall in terrain above stack height. The revised modeling files are being provided to Staff on CD under separate cover.

---

[3] USEPA, EPA-600/8-89/041, "User's Guide to the Complex Terrain Dispersion Model Plus Algorithms for Unstable Situations (CTDMPLUS): Volume 1. Model Description and User Instructions," March 1989.

Biodiesel impact information

WSQ-25 *Please provide references for relating to the air quality impacts of biodiesel use.*

Response: The website references, which were provided to Dr. Greenberg in an email message dated March 14, 2007, are as follows:

http://www.epa.gov/otaq/retrofit/techlist-biodiesel.htm

and

http://www.epa.gov/region09/waste/biodiesel/resources/analysis-biodiesel-impacts.pdf

Electrostatic precipitators

WSQ-26 *Please clarify whether the engines listed on the Wärtsilä internet site as using electrostatic precipitators for emissions control are diesel or residual fuel oil engines.*

Response: The electrostatic precipitator- (ESP-) equipped engines referenced on the Wärtsilä website are fueled with heavy fuel oil (HFO), or residual oil, and not with diesel fuel.

Fabric filter

WSQ-27 *Please provide additional information on the feasibility of using a fabric filter for emissions control on Wärtsilä engines.*

Response: At the CEC's March 12, 2007 workshop, the CEC Staff suggested that the Applicant revisit the potential for using particulate emission control devices to further reduce particulate emissions, especially during liquid fuel operation, on the HBRP engines.

There are four after-treatment technologies theoretically capable of reducing diesel particulate emissions from reciprocating internal combustion engines:

- Oxidation catalysts
- Diesel particulate filters
- Electrostatic precipitators (ESPs)
- Fabric filter baghouses

Each of these technologies is discussed further below.

Oxidation Catalysts

Oxidation catalysts can be used to control emissions of diesel particulate matter (DPM) and other toxic compounds in diesel exhaust. Oxidation catalysts are most effective in reducing emissions of gaseous organics and organic aerosols, and are less effective in reducing emissions of solid (filterable) particulate matter.[4] Oxidation catalysts are sensitive to the sulfur level of the fuel; however, the use of CARB ultra-low sulfur diesel fuel (15 ppmw) results in an exhaust gas sulfur concentration comparable to the use of natural gas.[5]

[4] The definition of DPM in the Air Toxic Control Measure for Stationary Compression Ignition Engines is based on filterable particulate matter.

[5] See SO_2 emissions calculations for natural gas firing and emergency diesel firing in Tables 8.1A-2 and 8.1A-3 of the HBRP AFC.

Oxidation catalysts typically reduce DPM emissions by approximately 20[6] to 25[7] percent. The HBRP engines will be equipped with oxidation catalysts; however, no credit has been taken for the reductions in DPM emissions associated with these devices because of the uncertainty in the control efficiency for both filterable particulate matter and organic aerosols. This uncertainty is related to two factors: (1) variability in source test results, and (2) the low uncontrolled emission factors associated with the HBRP engines.

Diesel Particulate Filters

Diesel particulate filters collect particulate matter, trap the material on the filter surface, and oxidize the particulates at high temperatures. The high temperatures may be achieved using just the exhaust heat from the engine, or from a supplemental heating source, depending on the characteristics of the engine, the particulate loading, and the engine's duty cycle. Diesel particulate filters typically reduce DPM emissions by 85 percent or more.[8] There are no diesel particulate filters that have been used on engines as large as those proposed for HBRP.[9] In developing the Compression Ignition Engine New Source Performance Standard (CI NSPS), EPA concluded that DPFs were not feasible for engines with a displacement of greater than 30 liters per cylinder.[10] This conclusion is discussed in correspondence between EPA and its consultant for development of the NSPS:

> During the development of the proposed NSPS, EPA met with the Engine Manufacturers Association (EMA) and the European Association of Internal Combustion Engine Manufacturers (Euromot) to obtain information about stationary CI engines and discuss draft concepts for the NSPS. Both groups had concerns about potentially requiring larger size stationary CI engines to meet the standards for nonroad diesel engines. One concern raised by Euromot during the meeting was the inability of very large stationary CI engines to meet the EPA emission standards for nonroad diesel engines. According to Euromot, these engines cannot use the same emission control technologies as nonroad engines, for example diesel particulate filter and exhaust gas recirculation, due to their large size. These large engines tend to operate several thousands of hours per year and at constant speed and load as opposed to nonroad engines that normally operate for a few hundred hours per year and often at transient conditions. These large engines are not produced in mass quantities, and only a few may be installed in the U.S. per year. No engines of this size were found to be located in the continental U.S. For these reasons, EPA feels it is more appropriate to regulate the owners and operators of these engines and is not requiring manufacturers to certify these engines… The requirement of 60 percent PM control or more is based on the capabilities of an electrostatic precipitator (ESP).[11]

---

[6] USEPA, OTAQ, "Technical Highlights: Questions and Answers on Using a Diesel Oxidation Catalyst in Heavy-Duty Trucks and Buses," EPA420-F-03-016, June 2003.

[7] Manufacturers of Emission Control Technology (MECA) website, http://www.meca.org/page.ww?section=Emission+Control+Technology&name=Off-Road+Diesel +Equipment.

[8] Clean Air Fleets website, http://www.cleanairfleets.org/ect.html.

[9] USEPA, OTAQ: "Summary and Analysis of Comments: Control of Emissions from Nonroad Diesel Engines, Comments by the Engine Manufacturers Association (EMA)." EPA420-R-04-008, May 2004.

[10] The HBRP engines have cylinders that displace 114 liters each.

[11] Memo from Bradley Nelson, Alpha-Gamma Technologies, Inc., to Jaime Pagán, EPA Energy Strategies Group, dated May 22, 2006.

Comments submitted on the proposed NSPS by a consultant in Alaska suggested that DPMs were feasible for these largest engines. However, this commenter added:

> A currently available technology, particulate filter traps, is suited to these large units, although the particulate removal efficiency is less than 60 percent. However, it must be noted that particulate emissions will already be reduced considerably by the use of low and ultra-low sulfur diesel fuel.[12]

A literature search was performed to determine whether particulate filters were available for this type of application. The largest engine found using a diesel particulate filter was about 4,000 hp, while the HBRP engines are rated at nearly 21,500 hp.

Electrostatic Precipitators

CARB does not identify ESPs as a potential control technology for DPM emissions. However, as discussed above, this technology was considered and evaluated by EPA in development of the CI NSPS. EPA concluded that ESPs were feasible and cost-effective when applied to diesel engines using heavy fuel oils.[13] EPA did not reach the same conclusion with respect to light fuel oils, such as CARB ultra-low sulfur diesel. When applied to diesel engines using heavy fuel oils, ESPs have the potential to reduce DPM emissions by approximately 60 percent. There are no data available to estimate the control efficiency for ESPs for diesel engines using CARB ultra-low sulfur diesel or similar light fuel oils.

ESPs remove particulate matter that is in particle form at the exhaust gas temperature. As a result, the ESP has the potential to remove only the filterable fraction (in-stack) of the particles. In the case of the HBRP engines, the filterable fraction will be less than 0.11 grams per brake-horsepower hour (gm/bhp-hr), and less than 5.56 lbs/hr.[14]

ESPs work by using an electric charge to ionize particulate matter and attract the particles to a plate that is periodically cleaned. Thus, the efficiency of an ESP is directly related to the resistivity of the target particles.[15] For engines similar in size to those proposed for HBRP, dry ESPs have been demonstrated only for engines using high sulfur and ash fuels such as heavy fuel oil (HFO) and Orimulsion,[16] which generate particles having good resistivity characteristics.

The particles collected using an ESP are released to a hopper by physically rapping the ESP collection plates to loosen the particles so that they will fall due to gravity. This is done while the ESP is in the gas stream and the combustion source is operating. Without an ability to ensure particle agglomeration on the plates, it is likely that a substantial fraction of the collected fine particulate matter from diesel combustion in the HBRP engines would be

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[12] Comments by Alfred K. Bohn, PE Proposed Rulemaking - Docket Number OAR-2005-0029: New Source Performance Standards for Stationary Compression Ignition Internal Combustion Engines, September 7, 2005.

[13] US EPA "Summary and Analysis of Comments", May 2004. Op.cit.

[14] Wärtsilä performance data, personal communication.

[15] USEPA, OAQPS, "Lesson 3: ESP Design Parameters and Their Effects on Collection Efficiency," http://yosemite.epa.gov/oaqps/EOGtrain.nsf/fabbfcfe2fc93dac85256afe00483cc4/6a234c29e34af9fa85256b66004ebeae/$FILE/12bles3.pdf.

[16] Orimulsion is a fossil fuel produced from bitumen. It typically has a sulfur content of over 2.5% (wt). See http://www.sovereign-publications.com/bitumene.htm.

reentrained during the rapping process, thus returning the collected particulate matter to the exhaust gas stream.

When used in the exhaust stream of gas-fired engines, an ESP could present a potential safety hazard by providing a source of ignition in situations where abnormally high concentrations of unburned gas are present in the exhaust system.[17]

Comments provided to EPA during the development of Subpart ZZZZ suggest that wet ESP technology would be effective in removing particulate matter from oil-fired combustion devices. Wet ESPs operate similarly to dry ESPs, except that instead of rapping the collector plates to remove the particles, the particles are washed from the collector walls by a spray of liquid.[18] Data presented by Hamon[19] suggests that for an oil-fired boiler, collection efficiencies of 79 to 95 percent may be achieved. However, the particulate emission rates for the oil-fired boiler are equivalent to inlet grain loadings of between 0.5 and 0.9 gr/scf, approximately twice as high as the exhaust particulate grain loadings for the HBRP engines.

Information provided by EPA on wet ESPs[20] lists the following considerations for their use:

- Temperature: Wet wire-plate ESPs are limited to operating at temperatures below the dew point of the exhaust gas (approximately 60°C or 140°F). Since the exhaust temperature of the Wärtsilä engines is expected to be on the order of 600 to 700°F, the engine exhaust would have to be cooled by 460 to 560°F before the exhaust gas could be passed through a wet ESP. This, in turn, would require the injection of approximately 53,000 scfm of ambient air (approximately 88 percent of the exhaust gas flow) into the exhaust of each engine, downstream of all of the catalyst systems. The electric load associated with this cooling would be significant, and would be in addition to the electric load required to ionize the particulate matter and charge the plates (discussed further below). The cooling air would also further dilute the particulate concentrations below the already-low levels expected, thus further reducing the expected control efficiency. The extremely low exhaust gas temperatures would reduce plume rise and decrease dispersion, thus reducing any potential benefits associated with reduced particulate emission rates.

- Water Use: Wet ESPs require a source of wash water to be injected or sprayed near the top of the collector plates. The wash system replaces the rapping mechanism used by dry ESPs. The water flows with the collected particles into a sump from which the fluid is pumped or drained. Although a portion of the fluid may be recycled to reduce the total amount of water required, this technology would create a new water use and wastewater disposal requirement for the project.

- Operating Conditions: ESPs in general are not well suited for use in processes which are highly variable because they are very sensitive to fluctuations in gas stream conditions (flow rates, temperatures, particulate and gas composition, and particulate loading). The Wärtsilä engines were selected for this project in part because of their ability to operate

17 Wärtsilä, personal communication.
18 EPA-CICA Fact Sheet, Wet Electrostatic Preciptator, Wire-Plate Type, downloaded from http://www.epa.gov/ttn/catc/dir1/fwespwpi.pdf.
19 Mastropietro, Robert A. Hamon Research-Cottrell, Inc. "The Use of Treatment Time and Emissions Instead of SCA and Efficiency for Sizing Electrostatic Precipitators," August 29, 1997.
20 EPA-CICA Fact Sheet, Wet Electrostatic Precipitator, op. cit.

> at any load and on either natural gas or diesel fuel, but these engine characteristics would produce the variable load conditions for which ESPs are not well suited. Consequently, to ensure that exhaust gas stream variability does not interfere with ESP performance, it would also be necessary to install 10 separate ESPs. The space required for these installations would likely preclude the ability to group the stacks to enhance dispersion, thus adding to the poorer dispersion already expected as a result of the cooler plumes.

Finally, comments provided to EPA during the NSPS rulemaking proceeding indicated that an ESP would require approximately 10 percent of the power generated by the engine being controlled to ionize the particulate matter and charge the plates.[21] This could result in a situation where one of the 10 engines proposed for the HBRP project was operating on diesel fuel solely to power the ESPs when the other engines are operated on diesel fuel.

At the March 12 workshop, reference was made to a description of an ESP used on a Wärtsilä diesel engine. The website reference is to the use of an ESP on a diesel engine fueled with a high ash fuel oil.[22] Wärtsilä estimates the post-treatment particulate emission rate at 50 mg/Nm^3 (dry, 15% O_2) or lower, using an ESP under these circumstances. This is equivalent to 0.03 gr/dscf at the nominal exhaust oxygen concentration of 13 percent for the HBRP engines during diesel firing. This is comparable to the level achieved by the HBRP engines using ultra-low sulfur diesel fuel without an ESP. This is also consistent with EPA's finding in the NSPS rulemaking for compression ignition engines, where the use of ultra-low sulfur fuel and engine modifications are presented as an alternative to the use of an ESP for particulate control.

> The final rule has been written considering the comments received and requires 60 percent PM reduction or an emission limit of 0.15 g/KW-hr (0.11 g/HP-hr). EPA believes the PM standard will be achievable through the use of lower sulfur fuel, on-engine controls, and aftertreatment. EPA believes that the PM percent reduction requirement is feasible through application of ESP.[23]

There is no evidence to suggest that the use of an ESP on the HBRP engines would achieve any significant reduction in particulates.

Fabric Filter Baghouses

Traditional fabric filter types are not designed to operate at the high flue gas temperatures of a reciprocating engine; maximum acceptable gas stream temperatures for fabric filter systems are on the order of 500°F.[24] Thus, the exhaust gas from the HBRP engines would need to be reduced by approximately 100°F to 200°F to enable the use of a fabric filter baghouse. This, in turn, would require the injection of approximately 19,000 scfm of ambient air (approximately 30 percent of the exhaust gas flow) into the exhaust of each engine, downstream of all of the catalyst systems. In addition to the electric load associated with this cooling, such a system would increase the size of the baghouse required because of

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[21] Comments by Alfred K. Bohn, op. cit.

[22] http://www.wartsila.com/,en,solutions,0,generalcontent,E2B96D7E-8B0F-4B77-814E-173EBE0978DE,5D037227-09A5-4C00-93E3-06FF36D75F6F,,.htm.

[23] USEPA, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines, Final Rule, 70FR39869.

[24] http://www.epa.gov/ttn/catc/dir1/cs6ch1.pdf.

the larger gas flow requiring treatment, and would require the use of larger-diameter stacks (approximately 10 percent) to accommodate the higher flow rates. The cooling air would also further dilute the particulate concentrations below the already-low levels expected, thus further reducing the expected control efficiency. The lower exhaust gas temperatures and larger diameter stacks would reduce plume rise and decrease dispersion, thus reducing any potential benefits associated with reduced particulate emission rates.

Fabric filter systems generally result in an increased backpressure of 5″ to 20″ w.c.[25] Wärtsilä has indicated that any increase in backpressure will result in a derate to the engines' performance.[26] Consequently, an additional engine may be required to meet the project objective of providing 163 MW of capacity for HBRP. Fabric filter systems are most effective in high-dust environments; the filter cake that deposits on the filters enhances the collection efficiency. In contrast to many other types of emission control systems, the collection efficiency of fabric filters is at its lowest when the filters are new and clean, and collection efficiency is enhanced over time.[27]

Fabric filter baghouses remove particles that are in solid form at the exhaust gas temperature. As a result, particle fabric filters have the potential to remove only the filterable fraction (in-stack) of the particles.

Fabric filter systems are typically constant-output devices. Thus, once designed and installed, the outlet grain loading does not vary with changes in the inlet grain loading. Typical inlet grain loadings in applications that use fabric filter systems are in the range of 0.5 to 10 grains per actual cubic foot. By comparison, the filterable particulate levels in the HBRP exhaust will be no higher than approximately 0.02 gr/acf, or more than 25 times lower than the typical inlet grain loadings for these systems.

There are no fabric filter control systems installed on any diesel engines of this size using light fuel oil.

[25] Ibid.

[26] Wärtsilä , personal communication.

[27] http://www.epa.gov/ttn/catc/dir1/ff-revar.pdf.

Biological Resources (WSQ8)

Freshwater marsh mitigation

WSQ-8 *Please identify additional mitigation for permanent impacts to freshwater marsh due to the California Coastal Commission's request to increase the mitigation ratio from 2:1 to 4:1 for this habitat type.*

Response: At the February 1, 2007 US Army Corps of Engineers (USACE) and California Coastal Commission (CCC) field visit to verify the HBRP wetland delineation, the CCC requested that the mitigation ratio for permanent impacts to freshwater marsh increase from 2:1 to 4:1. This ratio increase will be met through wetland creation at sites MIT-1 and MIT-2. In addition, PG&E proposes to include two new wetland mitigation areas to improve the overall quality of the contiguous wetland habitat areas. These areas are identified as MIT-4 and MIT-5 on Figure 2A (Attachment DR8-1).[28] This figure was previously filed as Attachment DR80-1. It is being submitted a second time to accompany this response. These figures are the same.

> MIT-4 covers 1.57 acres and contains existing degraded riparian wetlands vegetation. PG&E will enhance this wetland by removing non-native species and replacing them with natives.
>
> MIT-5 covers 0.13 acres and contains degraded wetlands that meet the CCC wetland criteria. It is surrounded by a mitigation area (MIT-2), which will consist of created wetlands as part of the HBRP project. Non-native species will be removed and replaced with native wetland species that will grade into the wetland vegetation in MIT-2.

Table 1 outlines the wetland impact acreages requiring mitigation, the mitigation ratios, including the revised 4:1 mitigation ratio for CCC wetlands, and mitigation acreage needs. The detailed Wetland Mitigation Plan, which is currently being prepared, will show the specific locations for each type of wetland to be mitigated. This plan will be submitted in April.

TABLE WSQ8-1
Verified Wetland areas, Impacts and Mitigation (acres) - Agency Verified acreages

	Coastal Commission Wetland	Drainages	Seasonal Wetlands	Riparian, Salt and Freshwater Marshes	Total
Total Wetland Acreage	5.691	0.306	0.333	19.904	26.352
Wetlands Avoided	2.233	0.232	0.206	19.850	22.588
Temporary Impacts	2.494	0.000	0.029	0.000	2.523

[28] MIT-3 on Figure 2A is also proposed as a wetland mitigation area.

TABLE WSQ8-1
Verified Wetland areas, Impacts and Mitigation (acres) - Agency Verified acreages

	Coastal Commission Wetland	Drainages	Seasonal Wetlands	Riparian, Salt and Freshwater Marshes	Total
Mitigation Ratios	1:1	1.5:1	2:1	4:1	
Mitigation Acreage for Temporary Impacts	2.494	0.0	0.058	0.0	2.552
Permanent Impacts	0.961	0.074	0.097	0.054	1.161
Mitigation Ratios	1:1	1.5:1	2:1	4:1	-
Mitigation Acreage for Permanent Impacts	0.961	0.111	0.194	0.216	1.324
Total Mitigation Acreage Needed	3.455	0.111	0.252	0.216	4.034

Attachment WSQ8-1

Wetland Mitigation Areas

Wetland	Acres
Coastal Commission Wetlands	
CCW-1	0.59
CCW-2	1.15
CCW-3	0.09
CCW-4	0.98
CCW-5	0.04
CCW-6	0.16
CCW-7	0.09
CCW-8	0.02
CCW-9	1.32
CCW-10	0.13
CCW-11	1.11
Total:	5.69
Drainage Ditch	
DD-1	0.124
DD-2	0.049
DD-3	0.006
DD-4	0.038
DD-5	0.021
DD-6	0.034
DD-7	0.02
DD-8	0.014
Total:	0.306
Freshwater Marsh	
FM-1	2.345
Riparian Marsh	
RM-1	1.573
Salt Marsh	
SM-1	0.299
SM-2	1.812
SM-3	8.915
SM-4	0.362
SM-5	2.255
SM-6	2.471
Total:	16.114
Seasonal Wetlands	
SW-1	0.104
SW-2	0.059
SW-3	0.002
SW-4	0.006
SW-5	0.043
SW-6	0.032
SW-7	0.018
SW-8	0.016
SW-9	0.002
SW-10	0.008
SW-11	0.008
SW-12	0.007
SW-13	0.005
SW-14	0.012
SW-15	0.011
Total:	0.333
Grand Total USACE Wetlands:	26.36

Mitigation Areas	Acres
MIT-1	0.61
MIT-2	1.03
MIT-3	2.26
MIT-4	1.57
MIT-5	0.13
Total	5.60

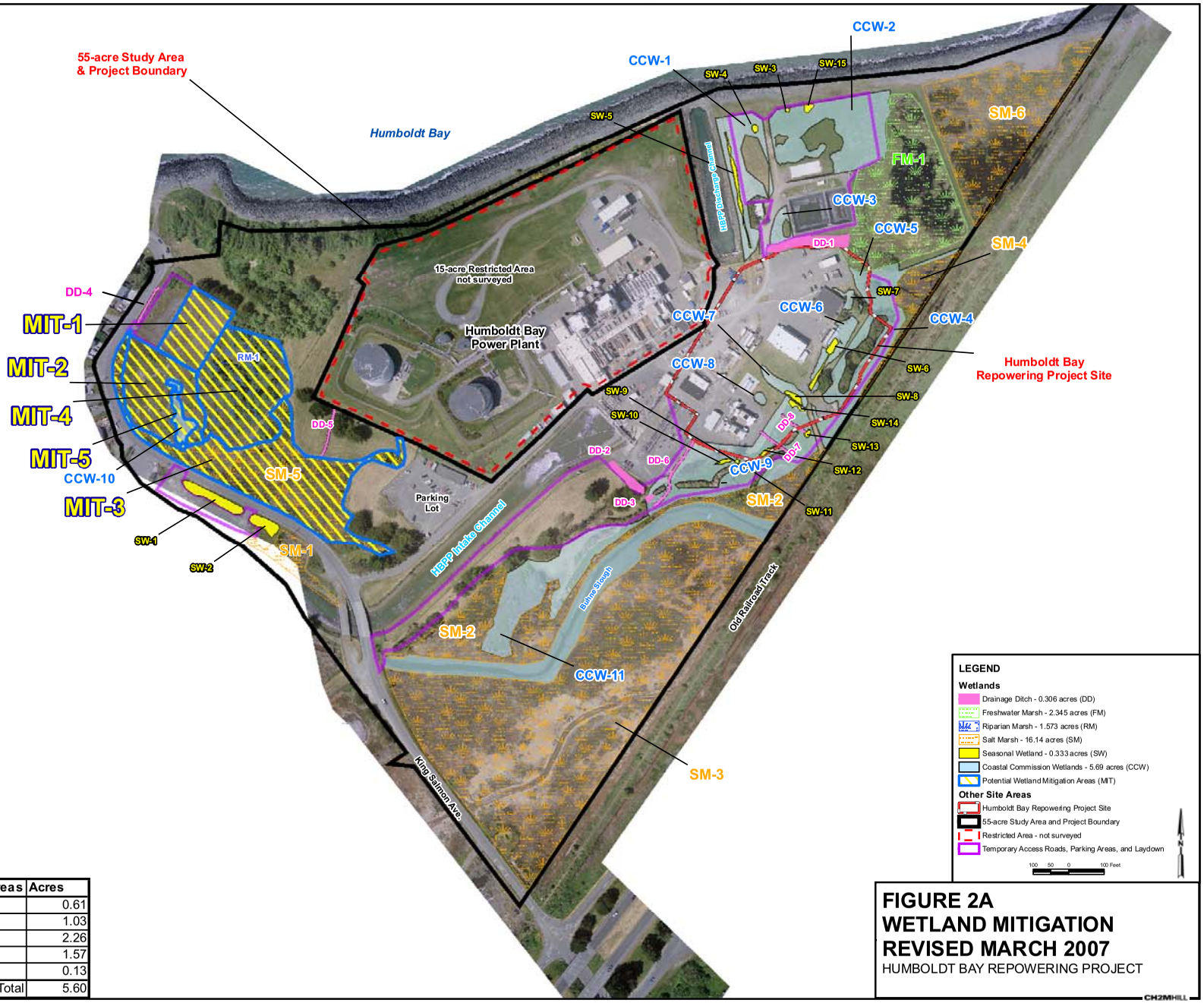

FIGURE 2A
WETLAND MITIGATION
REVISED MARCH 2007
HUMBOLDT BAY REPOWERING PROJECT

CH2MHILL

Cultural Resources (WSQ-11, DR82)

Wetland mitigation land survey

WSQ-11 *Please provide a cultural resources survey of the wetland mitigation land proposed for the HBRP.*

Response: PG&E has conducted a survey of all remaining portions of the PG&E parcel at Humboldt Bay Power Plant, including the lands proposed for wetland mitigation, and will file this report with the CEC by March 30. The survey did not result in the discovery of archaeological or historic sites in the project area.

Construction worker access trail

82. *Please provide information regarding the types of ground disturbing activities, if any, that may be necessary to construct the trail. Please survey the route for the Construction Worker Access Trails and provide the methodology, personnel, and results to staff. Please record any identified isolates or sites on a DPR 523 form and provide a copy of the form.*

Response: PG&E has conducted a survey of all remaining portions of the PG&E parcel at Humboldt Bay Power Plant, including the construction worker access trails, and will file this report with the CEC by March 30. The survey did not result in the discovery of archaeological or historic sites in the project area.

Geological Hazards and Resources (DR-83)

Seismic hazard assessment

83. *Please provide a fault hazard study, consistent with guidelines published by the California Board for Geologists and Geophysicists, that identifies and maps the surface traces of any active faults that may cross the project site. These faults include but are not limited to, the Buhne Point Fault and the Discharge Canal Fault, which were identified during geologic studies related to licensing of the nearby Independent Spent Fuel Storage Installation (ISFSI) Project. Techniques that could be used include, but are not limited to, trenching and logging, contouring of marker beds identified in boreholes, and seismic reflection studies. Alternatively, please provide a description of the seismic hazard assumptions used in the facility design to ensure the project would maintain stability and structural integrity.*

Response: This response will be provided in a future submittal on March 30, 2007.