From: <Doug.Davy@CH2M.com>
To: <Jscott@energy.state.ca.us>
Date: 2/21/2007 10:46:57 AM
Subject: FW: Russell City Energy Center

Jeri,

Attached is the response of the National Park Service to our analysis of the Russell City Energy Center's Class I impacts analysis. As the attached e-mail states, the National Park Service does not believe that the Russell City project will cause adverse impacts to the nearest Class I areas to the Russell City project, which are Point Reyes National Seashore and Pinnacles National Monument. The Park Service will not issue formal comments.

Thanks very much,

Douglas M. Davy, Ph.D.
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-----Original Message-----
From: Gregory Darvin [mailto:darvin@atmosphericdynamics.com]
Sent: February 21, 2007 10:15 AM
To: 'Michael Hatfield'; bmcbride@calpine.com; Davy, Doug/SAC; 'Jeffery Harris'; 'Greggory L. Wheatland'; 'JMcLucas@calpine.com'
Subject: FW: Russell City Energy Center

The NPS has formally commented on the Class I analysis. I will forward this to the BAAQMD.
Doug or Gregg, do you want to forward this to the CEC?

Greg Darvin

-----Original Message-----
From: Dee_Morse@nps.gov [mailto:Dee_Morse@nps.gov]
Sent: Wednesday, February 21, 2007 10:07 AM
To: darvin@atmosphericdynamics.com
Cc: John_Notar@nps.gov; John_Bunyak@nps.gov
Subject: Fw: Russell City Energy Center

Gregory,

Based on the information provided in your email message below, we do not believe the proposed emission increases from the Russell City Energy Center will cause adverse impacts on resources at Point Reyes National Seashore or Pinnacles National Monument, (closest National Park Service Class I areas). Therefore, we will not be submitting comments regarding the Russell City Energy PSD permit application. Thank you for notifying us about this proposed project.

Dee Morse
Environmental Protection Specialist

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National Park Service
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CC: <mihatfield@calpine.com>, <glw@eslawfirm.com>, <JDH@eslawfirm.com>, <Darvin@atmosphericdynamics.com>, <bmcbride@calpine.com>

3.1.1.1 Impacts on Class I Areas

To assess the potential for air quality impacts at the nearest Class I areas, Point Reyes National Seashore (70 kilometers from the project site) and Pinnacles National Monument (145 kilometers from the project site), the CALPUFF long-range transport model was used. It should be noted that the RCEC project will offset the emissions increases of NO_x, POC, and PM10, such that any potential for air quality impacts at the Class I areas would me mitigated to a level of insignificance.

CALPUFF was run in a screening mode to assess the impacts to criteria pollutants, visibility and acid deposition on nearby wilderness areas. The screening mode of CALPUFF uses a 3-dimensional homogeneous meteorological field for simulating transport and dispersion of pollutants each hour. Worst-case time-averaged ambient impacts are assessed anywhere along a polar ring with a distance and elevation equivalent to the nearby Class I area or sensitive Class II area, as applicable. CALPUFF was used with the same meteorological data set that was approved in the May 2001 application for RCEC that was approved by the BAAQMD. Specifically, five years of hourly surface and upper air data from a single monitoring station are required to identify the worst-case impacts when applying CALPUFF in a screening model.

Surface observations from San Francisco International Airport and upper air data from Oakland for 1986-1990 were used in the analysis. The PCRAMMET meteorological preprocessor was used to process the data. Five years of SCRAM surface data was supplemented with precipitation, surface pressure, relative humidity, and precipitation type data from the NCDC SAMSON/HUSWO CD-ROMs data sets.

CALPUFF was run with the recommended defaults specified in the IWAQM Phase II summary report. User-defined options were specified as follows:

- Number of X grid cells = 2
- Number of Y grid cells = 2
- Grid spacing = 200 kilometers
- Number of vertical layers = 2
- Cell face heights = 0, 5000

Since the original application was made in May 2001, the application of CALPUFF has not changed. However, background extinction data from the Pinnacles and Point Reyes has changed for the revised analysis used the updated background data. The land use parameters of surface roughness length (Zo) and leaf index were calculated following FLM guidance.

The receptor grids are presented in Appendix 3.1B. This is consistent with EPA's recommended screening methodology to create 3 rings of receptors covering the range of distances to the class I area, irregardless of direction.

3.1.1.2 CALPOST Post-processing Options

Recognizing that the particulate matter consists of elemental and organic carbon, a weighted-average light extinction efficiency is used in the visibility analysis. The weighted-average extinction efficiency is calculated by first determining the proportional amount of elemental and organic carbon emissions, and then calculating

the weighted-average based upon the emission rates and individual light extinction efficiencies of these species.

Following the FLAG guidance for natural-gas fired combustion turbines, (http://www2.nature.nps.gov/air/Permits/emissions_controltech.cfm), the following assumptions identified below were incorporated into the modeling.

The proportional amount of elemental and organic carbon emissions is calculated as follows:

- 25 percent of PM emissions are filterable and 75 percent of PM emissions are condensable.
- All filterable PM will be considered elemental carbon (EC).
- Condensable PM will be considered organic carbon.
- Sulfate emissions as supplied by the applicant are 0.59 lbs/hr for each turbine.

Although building downwash is unlikely to have an impact at the Class I areas (distances of greater than 125 kilometers), building downwash parameters were included for completeness. Building downwash parameters were also obtained from the Class II area source modeling files.

The weighted light extinction was then calculated and applied to the PM10 impacts, identified as PMC (particulate matter – coarse) in the CALPOST post-processor. The weighted-average light extinction applied to particulates was calculated as follows:

$$\{(Q_{EC} \times Bext_{EC}) + (Q_{OC} \times Bext_{OC})\} / (Q_{EC} + Q_{OC})$$

where:

Q_{EC} = elemental carbon emission rate
Q_{OC} = organic carbon emission rate
EF_{EC} = extinction efficiency of elemental carbon
EF_{OC} = extinction efficiency of organic carbon

PM10 is emitted at a maximum short-term rate of 9.0 lb/hr. EC was calculated as 25 percent of PM10, due to the filterable fraction:

EC = 0.25 * 9.0 lb/hr = 2.25 lb/hr

The remaining 75 percent of PM10 is considered condensable.

Condensable PM10 = 0.75 * 9.0 lb/hr = 6.75 lb/hr

0.59 lb/hr are SO_4 and based on the remaining portion is considered organic carbon (OC).

6.75 lb/hr – 0.59 lb/hr = 6.16 lb/hr = OC

The modeled amount of PM10 modeled with CALPUFF consists of the sum of EC and OC:

PM10 (modeled) = 2.25 lb/hr + 6.16 lb/hr = 8.41 lb/hr

A weighted light extinction efficiency was then applied to the model-predicted PM10 concentration as applied in CALPOST. The weighted extinction efficiency was based upon the following values EC = 10, OC = 4, and Soil = 1 (PM10 is counted as soil). Hence, the weighted extinction efficiency was modeled as:

$$[(2.25 \text{ lb/hr} * 10) + (6.16 \text{ lb/hr} * 4)] / 8.41 \text{ lb/hr} = 5.61$$

CALPOST was used to compute light extinction, and calculate time-averaged deposition rates. The following options were selected for use in the post processing control file.

- Method 6: Compute Extinction from speciated PM measurements and user-specified RH factors.
- Monthly RH factors based upon seasonal values reported in FLAG Phase I guidance document
- Modeled species for visibility: sulfate, sulfuric acid nitrate, and PM10.

3.1.1.3 Nitrogen and Sulfur Deposition on Soils

Model-predicted deposition of nitrogen and sulfur from the proposed combustion turbine are compared with deposition analysis thresholds (DATs) as a method of determining if the impact from the proposed turbine will have an adverse effect upon resources located in nearby Class I areas that may be adversely affect by a change in air quality (i.e., air quality related values). The FLM's have established DATs, which are the additional amount of nitrogen or sulfur within a Class I area, below which estimated impacts from a proposed new or modified source are considered insignificant.

DATs are based upon natural background deposition, a variability factor, and a cumulative factor. Background values for both the Eastern and Western United States were determined from the range of deposition values that are both scientifically valid, as well as conservative. A background value of 0.25 kilogram per hectare per year (kg/ha/yr) was established for both nitrogen and sulfur in the Western United States. This value represents the low end of the regional range of values that are presented in estimates of regional natural background deposition.

Historical natural background values (i.e., before the influence of anthropogenic sources) are difficult to obtain. Hence, models are often used to estimate natural background values. The range of modeled historical deposition values often range + or – 50 percent or more between various studies for any given area. Hence, a 50 percent variability factor has been assigned to the natural background deposition values.

In developing the 1996 proposal for New Source Review Reform, the EPA determined that, as long as no individual source contribution exceeds 4 percent of a Class I increment, it is unlikely that the accumulation of source over time will exceed that increment. The FLMs have applied the 4 percent value used in the Class I increment significant impact levels to these new DATs.

Hence, the DATs for both nitrogen and sulfur (individually) in the Western United States are calculated as:

$$\text{DAT} = 0.25 \text{ kg/ha/yr} * (0.5) * (0.04) = 0.005 \text{ kg/ha/yr}$$

The DAT is deposition threshold, not necessarily an adverse impact threshold. The DAT is the additional amount of deposition that triggers a management concern, not necessarily the amount that constitutes an adverse impact to the environment.

Table 3.1-30 presents the results of the acid deposition analysis. The maximum model-predicted annual nitrogen and sulfur deposition rates (expressed in units of kilograms per hectare per year) are presented for each Class I and Class II area, as reported for each year modeled. In no cases did the maximum model-predicted impacts exceed the Federal Land Manager's Deposition Analysis Threshold of 0.005 kg/ha/yr for either nitrogen or sulfur. As such, a cumulative analysis is not warranted.

The maximum impacts are presented in Table 3.1-30, which demonstrate that all potential depositional impacts are less than significance.

TABLE 3.1-30
Summary of Acid Deposition Impacts

Class I Areas	Year	Nitrogen Deposition (kg/ha/yr)	Sulfur Deposition (kg/ha/yr)	UTM X (kilometer)	UTM Y (kilometer)	Elevation (meter)
Point Reyes	1986	1.09E-10	2.20E-11	630.009	4134.533	152.4
	1987	9.67E-11	1.91E-11	630.533	4135.467	152.4
	1988	1.09E-10	2.18E-11	628.903	4132.692	152.4
	1989	9.36E-11	1.87E-11	630.009	4135.533	152.4
	1990	9.53E-11	2.02E-11	634.163	4143.243	152.4
Pinnacles	1986	2.44E-11	6.53E-12	704.880	4094.258	457.2
	1987	2.33E-11	5.65E-12	699.613	4085.493	457.2
	1988	2.51E-11	6.53E-12	698.202	4083.361	457.2
	1989	2.26E-11	5.83E-12	698.202	4083.361	457.2
	1990	2.28E-11	6.15E-12	714.413	4115.177	457.2

3.1.1.4 Visibility Analysis

Visibility impacts, through the calculation of light extinction, are assessed using CALPUFF. CALPUFF is the IWAQM and FLAG recommended model for long-range transport. Since all Class I areas are more than 50 kilometers from the project site, a coherent plume analysis using VISCREEN was not performed for the Class I areas.

The methodology used to calculate the change in light extinction due to the proposed project followed the FLAG Phase I guidance (December 2000). Briefly, this method involves: calculating the reference level (also referred to as the natural background level), then calculating the single-source contribution (i.e., the contribution due to the proposed facility), and calculating the change in extinction. Reference levels were calculated by quantifying the hygroscopic component, non-hygroscopic component, and Rayleigh Scattering component. The hygroscopic component refers to the component of light extinction caused by sulfate and nitrates as a function of relative humidity. The non-hygroscopic component refers to those pollutants whose light extinction properties do not change as a function of relative humidity (e.g., organic carbon, soil, coarse particulate, and elemental carbon). Site-specific reference levels and f(RH) values used

were obtained from the FLAG Phase I guidance. CALPUFF calculates the natural background level; that value was used in the comparative analysis.

The contribution to light extinction from the facility itself was then quantified and compared with the 5 percent de minimis level. If the contribution from the proposed project does not exceed 5 percent light extinction, then no further visibility analysis is necessary.

Table 3.1-31 presents the results of the visibility impact assessment.

TABLE 3.1-31
Maximum Modeled Impacts in Protected Areas

Class I Area	b_{NO3} (mm^{-1})	b_{SO4} (mm^{-1})	b_{fine} (mm^{-1})	24-hour Average Visibility Impact (mm^{-1})	Percent Change in Extinction
Point Reyes NS	0.560	0.136	0.461	1.157	7.02%
Pinnacles NM	0.304	0.081	0.251	0.635	3.91%

There were no exceedances of the five percent threshold at Pinnacles National Monument. There were 15 days in the entire five-year period where the five percent de minimus level was exceeded at Point Reyes. This is equivalent to 0.8 percent of the days in the five-year period, roughly the 99th percentile. The proposed BART threshold level for visibility has been defined as the 98th percentile delta-decview. This value is equal to two percent of the days in the modeled period, or 36 days for a five-year period. If we re-examine the visibility modeling with a reduced ARC of receptors as recommended by EPA (+/- 90 degrees offset from Class I receptors), the maximum percent change in extinction is lowered to 6.84 percent, and we have an occurrence rate of 13 days (0.7 percent) where the five percent de minimus level is reached. Again, this is much less than the proposed BART level of 98th percentile.

Thus, during operation of the proposed project, potential visibility impacts to Pinnacles National Monument will be less than the five percent level of acceptable change. For Point Reyes National Seashore, the five percent extinction significance threshold is exceeded, but for only 15 days or less. Since the project will provide emission reduction credits for NO_x, POC, and PM10, it is expected that any modeled impacts at Point Reyes National Seashore would be mitigated to a level of insignificance.

3.1.1.5 Impacts on Soils and Vegetation

The projected impacts from all proposed criteria pollutant emissions were modeled at both Class I areas. As listed in Table 3.1-32, all impacts are well below the Significant Impact Levels (SIL) for all criteria pollutants and averaging periods.

TABLE 3.1-32
Criteria Pollutant Class I SILs and Increments

Pollutant	Averaging Interval	Modeled Impact Pinnacle	Modeled Impact Point Reyes	Class I Significant Impact Level	Class I PSD Increment

		($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
NO_2	Annual	0.003	0.014	0.1	2.5
SO_2	3-Hour	0.07	0.014	1.0	25
	24-Hour	0.02	0.09	0.2	5
	Annual	0.001	0.014	0.1	2
PM10	24-Hour	0.05	0.09	0.3	10
	Annual	0.004	0.008	0.2	5

Impacts on soils and vegetation for Class II areas were determined to be "insignificant" for the following reasons:

- No soils were identified in the project area, which are recognized to have any known sensitivity to the types or amounts of air pollutants expected to be emitted by the proposed facility.
- No vegetation species were identified in the project area, which are recognized to have any known sensitivity to the types or amounts of air pollutants expected to be emitted by the proposed facility.
- The facility emissions are expected to be in compliance with all applicable air quality rules and regulations.
- The facility impacts result in no violations of existing air quality standards, nor will the emissions cause an exacerbation of an existing violation of any quality standard.