

# CLASS 1 AQ IMPACTS

**From:** "Gary Rubenstein" <GRubenstein@sierraresearch.com>  
**To:** "John Yee" <JYee@aqmd.gov>, "Li Chen" <LChen@aqmd.gov>, "Keith Golden" <kgolden@energy.state.ca.us>, "Brewster Birdsall" <bbirdsall@aspenerg.com>, <cbruins@energy.state.ca.us>  
**Date:** 4/11/2005 6:24:25 PM  
**Subject:** FW: Inland Empire Modeling Comments

01-AFC-17C

Enclosed are our responses to recent questions from the Federal Land Managers regarding the Class I impacts analysis.

Gary

-----Original Message-----

**From:** Gary Rubenstein  
**Sent:** Monday, April 11, 2005 6:20 PM  
**To:** 'Mike McCorison'  
**Cc:** hgebhart@air-resource.com; Trent Procter; Clem D Lagrosa; Stewart.Kathleen@epamail.epa.gov; Gary Rubenstein; Tom W. Andrews; mihatfield@calpine.com  
**Subject:** RE: Inland Empire Modeling Comments

<b>DOCKET</b>	
01-AFC-17C	
<b>DATE</b>	APR 11 2005
<b>RECD.</b>	APR 15 2005

Mike - Enclosed are our responses to those preliminary comments. As you know, we're running against a tight timetable. If possible, we'd like to schedule a conference call or meeting later this week to go over these responses and attempt to reach resolution on all outstanding issues. Please give me or Tom Andrews a call at 916-444-6666 (or on my cell phone at 916-802-1375) so that we can set this up.

Gary

-----Original Message-----

**From:** Mike McCorison [mailto:mmccorison@fs.fed.us]  
**Sent:** Friday, April 01, 2005 10:13 AM  
**To:** Gary Rubenstein  
**Cc:** Mike McCorison; hgebhart@air-resource.com; Trent Procter; Clem D Lagrosa; Stewart.Kathleen@epamail.epa.gov  
**Subject:** Inland Empire Modeling Comments

Gary, Attached are our modeling consultant's unedited initial comments on the package we forwarded to them. It sounded from our conversation that you were willing to review the comments at this time and in this form.

The NPS is aware that we (FS) are also involved this project. While I have you on the line can you send a similar package to the you sent me on this project to Katie Stewart address below? thanks

Katie Stewart  
Environmental Scientist  
Air Division, Permits Office  
75 Hawthorne Street

NO SIG CLASS 1 IMPACTS

US EPA, Region 9  
San Francisco, CA 94105-3901

(See attached file: Inland Empire Questions & Comments (March 2005).doc)

Mike Mc Corison  
USFS Southern California  
Air Resource Specialist  
Angeles National Forest  
Voice 626-574-5286  
Mobile 626-437-0624  
Fax 626-574-5233

**CC:** "Gary Rubenstein" <GRubenstein@sierraresearch.com>, "Tom W. Andrews" <TAndrews@sierraresearch.com>, <mihatfield@calpine.com>, "Jenifer Morris" <jenifer@njr.net>



**CALPINE**

DUBLIN OFFICE  
4160 DUBLIN BOULEVARD, SUITE 150  
DUBLIN, CALIFORNIA 94568-3139  
925.479.6600  
925.479.7300 (FAX)

April 11, 2005

Mike McCorison  
U.S.F.S. Southern California  
Angeles National Forest  
701 North Santa Anita Avenue  
Arcadia, CA 91006

Subject: Response to Comments  
Inland Empire Energy Center Revised Class I Air Quality Impacts  
Analysis

Dear Mr. McCorison:

Please find attached responses prepared by Sierra Research to your informal questions in connection with the subject application.

As you may be aware, Calpine has entered into a commercial relationship with General Electric to provide a "launch site" for GE's new "H class" of engines at the Inland Empire Energy Center, licensed by the California Energy Commission on December 22, 2003. This project has received the support of the State of California as an important element in electricity supply to meet Southern California's additional demands in the next several years.

The GE H System™ is the world's most advanced combined cycle system capable of 60% efficiency, and as a result provides lower emissions per unit of electricity than the previously licensed GE 7FB engines. Although the nominal project output has been increased, the overall emissions profile will be approximately the same as for the currently approved project due to the higher efficiency of the new GE H System™, as well as from the elimination of duct-firing from the design.

We have followed the same procedures and guidance provided under the FLM review your offices conducted in our original application, and as noted in the attached comments, we are not aware of new FLM guidance that would require a different methodology for the project revisions. As you know, the FLMs previously concluded that no significant impacts were expected under the original guidance, and using the same procedures, and similar emissions, our modeling indicates the same results.

We have been working diligently with the District, who is supporting our project schedule. We are scheduled to begin construction this summer, and are seeking the Amendment approval from the CEC by June 22<sup>nd</sup>, 2005 at their regularly-scheduled meeting. The District has advised that they will need to issue the draft permit in mid-

Mike McCorison  
Page 2  
April 11, 2005

April to support the CEC schedule. In connection with the District's review, we had understood that the FLMs would be seeking to complete their review by April 15<sup>th</sup> in support of this District schedule.

We appreciate the attention by the National Park Service and US Forest Service attention to this application, and will be responsive to your requests for information with the goal of achieving this schedule. We would like to schedule a meeting or conference call with you to discuss these responses, and any further information the FLMs may require to complete its evaluation.

Sincerely,



Michael A. Hatfield  
Director, Business Development  
Calpine

cc: John Notar, National Park Service  
John Yee, SCAQMD  
Li Chen, SCAQMD  
Connie Bruins, California Energy Commission  
Keith Golden, California Energy Commission  
Brewster Birdsall, California Energy Commission  
Barbara McBride, Calpine  
Gary Rubenstein, Sierra Research

## FLM Questions/Comments on Inland Empire Class I Modeling Analysis

- Comment 1: The information provided to me for review does not contain any discussion of the proposed Inland Empire Project emissions. I will need to know the applicant's and/or SCAQMD's proposed allowable emissions limits on a mass basis in order to verify that the Class I modeling uses emissions that are consistent with the permit limits.
- Response 1: As part of the March 4, 2005 IEEC Class I impact analysis packages sent to the USFS and NPS, we included a copy of a February 2, 2005 SCAQMD permit application for the IEEC project. The SCAQMD permit application includes detailed emissions information for the IEEC project and the proposed new SCAQMD permit limits for the project. It is our understanding that while this information was provided to John Notar and Mike McCorison, it was not initially forwarded to the FLM's consultant. It is also our understanding, from Mike McCorison, that this information has now been provided to the FLM's consultant.
- Comment 2: The emissions input to CALPUFF and the emissions input to VISCREEN do not appear to match, particularly for NO<sub>x</sub> emissions. For example, the HRSG emissions in the CALPUFF inventory are 3.03 g/sec each (6.06 g/sec total), while VISCREEN uses a 13.47 g/sec total emissions value for NO<sub>x</sub>. The applicant should reconcile the emissions used in CALPUFF vs. VISCREEN.
- Response 2: As discussed in the March 4, 2005 IEEC Class I impact analysis sent to the USFS and NPS, the VISCREEN and CALPUFF modeling was performed using maximum daily and annual emissions, respectively. For the VISCREEN modeling, the 13.47 g/sec NO<sub>x</sub> emission rate referenced by the commentor represents the maximum daily combined NO<sub>x</sub> emission rate for the entire IEEC facility (i.e., gas turbines, auxiliary boiler, standby generator engines, and firepump engine). This emission rate corresponds to the facility-wide NO<sub>x</sub> emission total of 2,565.9 lbs/day shown in Table 5.2-21 of the March 4, 2005 package submitted to the USFS and NPS (2,565.9 lbs/day \* 453.6 g/lb \* day/24 hrs \* hr/3600 sec = 13.471 g/sec). For the CALPUFF modeling, a NO<sub>x</sub> emission rate of 3.30339 g/sec was used for each gas turbine. Consequently, the combined NO<sub>x</sub> emission rate for the two gas turbines of 6.0678 g/sec corresponds to the annual NO<sub>x</sub> emission rate for the gas turbines of 210.9 tons/yr shown in Table 5.2-21 (page 12 of Attachment 2) of the March 4, 2005 package submitted to the USFS and NPS (210.93 tons/yr \* 2000 lbs/ton \* 453.6 g/lb \* yr/365 days \* day/24 hrs \* hr/3600 sec = 6.0678 g/sec).

- Comment 3: The CALPUFF modeling was set up following the CALPUFF-Lite screening guidelines with receptors located at the distance to the Class I area, and in all directions from the source. However, the CALPOST processing does not appear to calculate impacts at all modeled receptors. The CALPUFF screening modeling approach requires that impacts in all directions be analyzed and compared to the applicable limits. The applicant should provide the CALPUFF results for receptors in all directions as required by the screening procedure. If the applicant wishes to restrict the modeling to only those receptors within the Class I area boundaries, then a refined CALPUFF analysis should be performed.
- Response 3: As discussed in the Class I impact analysis submitted to the USFS and NPS on March 4, 2005, the analysis was performed following the guidance provided by the FLMs for the Class I modeling analysis that was performed for the IEEC project in December 2002. For the December 2002 analysis, the CALPUFF modeling restricted the modeling to only those receptors within the Class I area boundaries. Because this approach was allowed by the FLMs for the 2002 analysis, this same approach was used for the March 4, 2005 analysis.
- Comment 4: The CALPOST visibility modeling uses a particulate matter (PM) extinction coefficient of 5.69, which I assume is intended to account for those PM emissions which may be elemental carbon or secondary organic aerosol. Such an approach is proper, but I would like to see how the applicant derived the 5.69 extinction value for PM. We probably have improved the data on PM speciation from gas turbines since the 2002 Inland Empire analysis was conducted.
- Response 4: The light extinction coefficient for PM of 5.69 used for the March 4, 2005 analysis was originally derived for the December 2002 IEEC Class I impact analysis. It is calculated based on the 2002 FLM guidance for natural gas-fired gas turbines (<http://www2.nature.nps.gov/air/Permits/flag/flagfreeindex.htm>) that 25% of the total particulate emissions is filterable (elemental carbon) and the remaining 75% of the total particulate is condensable (organic carbon). If sulfate emissions are included separately in the CALPUFF modeling analysis, the FLM guidance also allows for the removal of sulfate emissions during the calculation of the organic carbon emissions. We are not aware of newer FLM guidance regarding PM speciation for natural gas-fired gas turbines. The following detailed calculations show how the light extinction coefficient for PM was calculated for the December 2002 IEEC analysis:

Total PM<sub>10</sub> emissions for gas turbines = 17.857 lbs/hr (two gas turbines)

SO<sub>4</sub> emissions for gas turbines = 2.00 lbs/hr (two gas turbines)

Filterable PM (elemental carbon) = (0.25)(17.857 lbs/hr) = 4.464 lbs/hr

Condensable PM (organic carbon) = (0.75)(17.857 lbs/hr)-2.00 lbs/hr = 11.393 lbs/hr

Extinction coefficient for elemental carbon = 10

Extinction coefficient for organic carbon = 4

Extinction Coefficient for PM =

$[(4.464*10)+(11.393*4)]/(4.464+11.393) = \underline{5.69}$

Since the FLM methodology for speciation of particulate emissions for natural gas-fired gas turbine was first developed in 2002 and has not been updated, the approach used for the December 2002 IEBC Class I analysis remains relevant for the March 2005 analysis.

However, upon closer examination of this calculation, for the March 2005 analysis, the extinction coefficient for PM should be updated to account for the change in PM<sub>10</sub> emissions for the gas turbines. The following calculations show the revised particulate extinction coefficient.

Total PM<sub>10</sub> emissions for gas turbines = 20.00 lbs/hr (two gas turbines)

SO<sub>4</sub> emissions for gas turbines = 2.00 lbs/hr (two gas turbines)

Filterable (elemental carbon) = (0.25)(20.00 lbs/hr) = 5.00 lbs/hr

Condensable (organic carbon) = (0.75)(20.00 lbs/hr)-2.00 lbs/hr = 13.00 lbs/hr

Extinction coefficient for elemental carbon = 10

Extinction coefficient for organic carbon = 4

Extinction Coefficient for PM =

$[(5.00*10)+(13.00*4)]/(5.00+13.00) = \underline{5.67}$

Since the revised calculations only result in a particulate extinction coefficient change of approximately 0.4%, it is doubtful that this change will result in a noticeable change to the regional haze modeling results.

Comment 5: The San Jacinto and San Gorgonio Class I areas straddle the 50 km distance at which the CALPUFF model is normally applied. Because portions of these areas are beyond 50 km from the source, a CALPUFF visibility analysis to these areas is also appropriate. The applicant should provide a CALPUFF visibility analysis for San Jacinto and San Gorgonio as well, instead of relying only on the VISCREEN modeling. This should not be a significant burden to the

applicant as the CALPUFF modeling for these areas has already been done for the deposition calculations.

Response 5: As with the December 2002 Class I analysis performed for the IEEC project, the March 2005 Class I analysis performed VISCREEN rather than CALPUFF modeling for the San Jacinto and San Gorgonio Wilderness Areas because these areas are within 50 km of the project site. The FLMs did not object to this approach for the December 2002 analysis, and applied the same methodology for the current analysis. In addition, neither the Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report (December 1998) nor the Federal Land Managers' Air Quality Related Values Workgroup (FLAG) Phase I Report (December 2000) require both a coherent plume (VISCREEN) analysis and a regional haze/acid deposition analysis (CALPUFF) for Class I areas that straddle the 50 km distance from a project site. Consequently, we believe it is inappropriate to require both a VISCREEN and CALPUFF analysis for the San Jacinto and San Gorgonio Wilderness Areas, and the VISCREEN results submitted to the FLMs are sufficient to show that there are no significant Class I impacts expected for the IEEC project.

Comment 6: Despite the issues with the CALPUFF-Lite modeling raised above, the modeling predicts impacts exceeding the 5% visibility threshold at Joshua Tree (4 days over a 3 year period) and impacts exceeding the 0.005 kg/ha/yr DAT for nitrogen deposition at several Class I areas. My opinion is that once the applicant corrects the CALPOST modeling to include receptors in all directions as required under the screening procedure, the predicted impacts may be higher than reported. The applicant has also provided a qualitative discussion related to the deposition modeling arguing that the Daggett meteorological data used for the screening modeling does not properly describe plume transport at the project site. While the Daggett data may not be fully representative of plume transport from the project site, the appropriate option for the applicant to refute screening model results would be to provide a refined CALPUFF modeling study. Unless a refined modeling study is provided, my opinion is that the FLM must base any judgments about the project on the screening modeling results. The screening modeling results should not be dismissed results based solely on qualitative arguments, particularly when a valid quantitative modeling option exists, such as refined CALPUFF modeling.

Response 6: In 2002, the FLMs came to the conclusion that the IEEC project would not result in significant Class I impacts due to the limited number of days over a three-year period that the modeling analysis

showed that regional haze/acid deposition significance thresholds were exceeded, and due to the fact that the IEEC project will be fully offset by the South Coast AQMD permitting program. Since the 2002 and 2005 IEEC Class I analyses use the identical modeling methodology and have nearly identical modeling results, the 2005 analysis reached the same conclusion that the IEEC project would not result in significant Class I impacts.