FOSTER WHEELER ENVIRONMENTAL CORPORATION

Mr. James Bartridge
Project Manager
California Energy Commission
1516 Ninth St.
MS-3000
Sacramento, CA. 95814

May 7, 2002

Attention: Dockets Unit

Re: Inland Empire Energy Center Project- Docket No. 01-AFC-017
Data Responses to CEC Staff Data Requests dated April 4, 2002

Dear Mr. Bartridge:

Enclosed are twenty-six (26) sets of the Data Responses for the Inland Empire Energy Center Project (original signed document and 25 copies). This data is submitted in response to the staff's Data Requests dated April 4, 2002. These responses address CEC staff concerns as delineated in Data Requests 180-188.

Additionally, the CD's containing the electronic version of the submitted responses (5 copies) as requested by staff will be submitted under separate cover.

Dated this 7th day of May, 2002.

Sincerely,

Richard B. Booth
Project Manager

Attachments

1940 E. Deere Avenue, Suite 200, Santa Ana, CA 92705
Tel: 949-756-7500 Fax: 949-756-7560

[redacted]

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

	)	Docket No. 01-AFC-17
APPLICATION FOR CERTIFICATION	)	
FOR THE INLAND EMPIRE ENERGY	)	PROOF OF SERVICE
CENTER	)	(Revised 02/01/02)
______________________________	)	

I, **Richard B. Booth**, declare that on **May 7, 2002**, I served copies of the attached **Responses to California Energy Commission Staff's Data Requests 1-161** by Federal Express, for delivery to Sacramento, by depositing such envelope in a facility regularly maintained by Federal Express with delivery fees fully provided for or delivered the envelope to a courier or driver of Federal Express authorized to receive documents at Foster Wheeler Environmental Corp., 1940 East Deere Ave., Suite 200, Santa Ana, CA 92705 with delivery fees fully provided, for delivery to the following:

DOCKET UNIT

Original signed document plus 25 copies.

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 01-AFC-17
DOCKET UNIT, MS-4
1516 Ninth Street
Sacramento, CA 95814-5512

In addition to the documents sent to
the Commission Docket Unit:

I, **Richard B. Booth**, declare that on **May 7, 2002**, I deposited copies of the attached **Responses to California Energy Commission Staff's Data Requests 1-161** in the United States mail at Santa Ana, CA with first class postage thereon fully prepaid and addressed to the following:

APPLICANT

Gregory A. Lamberg
Calpine Corporation
4160 Dublin Blvd.
Dublin, CA 94568-3139

Michael Hatfield
Calpine Corporation
4160 Dublin Blvd.
Dublin, CA 94568-3139

Jenifer Morris
NJ Resources, LLC
249 East Ocean Blvd., #408
Long Beach, CA 90802

COUNSEL FOR APPLICANT:

Jane Luckhardt
Ann Trowbridge
Downey, Brand, Seymour & Rower
555 Capitol Mall, 10th Floor
Sacramento, CA 95814-4686

INTERVENORS

CURE
C/O Marc D. Joseph, Esq.
Mark R. Wolfe, Esq.
Adams Broadwell Joseph & Cardozo
651 Gateway Blvd., Suite 900
South San Francisco, California 94080

Romoland School District
C/O Mark Luesebrink, Esq.
Jeffrey M. Oderman, Esq.
Rutan & Tucker , Attorneys at Law
611 Anton Blvd., 14th Fl.
Costa Mesa, CA 92626

INTERESTED AGENCIES

Eastern Municipal Water District
Attn: Dick Heil
2270 Trumble Road
P.O. Box 8300
Perris, CA 92572-8300

Independent System Operator
Jeffery Miller
151 Blue Ravine Road
Folsom, CA 95630

Electricity Oversight Board
Gary Heath, Executive Director
770 L Street, Suite 1250
Sacramento, CA 95814

Paul Clanon, Director
Energy Division
California Public Utilities Commission
505 Van Ness Avenue
San Francisco, CA 94102

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

Richard B. Booth

*   *   *   *

DATA RESPONSES 162 THROUGH 188

FOR

INLAND EMPIRE ENERGY CENTER

SUBMITTAL 4

Compiled by

FOSTER WHEELER ENVIRONMENTAL CORPORATION
1940 E. Deere Avenue, Suite 200
Santa Ana, CA 92705

May 7, 2002

TABLE OF CONTENTS

List of Tables

VISUAL (PLUME) RESPONSES

Request #180 – Visual Attachment 1 did not include all requested design data for the cooling tower. Please provide the design liquid-to-gas (L/G) mass flow ratio for the tower.

Response #180 – The cooling tower liquid-to-gas (L/G) mass flow ratio is 0.90:1.

Request #181 – Visual Attachment 1 did not include all requested exhaust data for the cooling tower. Only one case was provided and it did not reference the ambient conditions (temperature and relative humidity) for that case or identify whether duct firing was on or off for that case. In order to complete a plume modeling analysis staff requires, at a minimum, the exhaust conditions for one duct firing case and one non-duct firing case with referenced ambient conditions. Please provide cooling tower exhaust conditions, with the same parameters as provided in Visual Attachment 1, for one duct firing case and one non-duct firing case with the referenced corresponding ambient conditions (temperature and relative humidity). Please also provide the heat rejection rate (in MMBtu/hr or MW) for each case provided.

Response #181 – The information was provided for the single worst case for the cooling tower: a cold ambient condition (36°F, 66% relative humidity) with peaking operations (duct firing on). Since this worst case produced visible water vapor plume frequencies that the Applicant believed, from a screening-level perspective, were not significant, no refinement of the analysis was performed. However, in response to this request, the following information is provided regarding additional cases.

Table 181-1. Visible Water Vapor Plume Modeling Cooling Tower Parameters

	Case A	Case B	Case C	Case D	Case E	Case F
Ambient Temp	36°F	36°F	61°F	61°F	97°F	97°F
Ambient RH	66%	66%	65%	65%	31%	31%
Turbine Load	100%	100%	100%	100%	100%	100%
Duct Burners	Off	On	Off	On	Off	On
Inlet Fogging	Off	Off	On	On	On	On
PAG Steam Injection	Off	Off	Off	On	Off	On
Cells in Operation	14	14	14	14	14	14
Mass Flow lbs/min/cell	113,021	113,557	113,814	114,418	114,798	115,480
Exhaust Gas Temp	58°F	68°F	72°F	80°F	84°F	90°F
Assumed Exhaust Gas RH	100%	100%	100%	100%	100%	100%
Heat Rejection Rate (MMbtu/hr or MW)	1299	2012	1299	2003	1163	1910

Request #182 – Please explain why the HRSG exhaust temperature when duct firing provided in Visual Attachment 1 (i.e. 135.8°F) is reasonable and whether this temperature will create internal condensation during cold weather.

Response #182 – The analysis included as Visual Attachment 1 was prepared prior to the date when Calpine determined that it would need to maintain HRSG temperatures at or above 155°F under all operating conditions. Consequently, the visible plume modeling analysis included as Visual Attachment 1 overstates impacts due to the use of stack temperatures below the minimum levels that will actually be seen.

Request #183 – Please clarify the non-duct firing exhaust temperature. Is it 162.8°F as identified in Visual Attachment 1 or 190°F as provided in the plume modeling files.

Response #183 – The reference in Visual Attachment 1 to a temperature of 346°K (163°F) is correct; due to an error, the incorrect visible plume modeling files were provided to the CEC staff as part of Visual Attachment 1. The correct files have been provided to the staff electronically: please substitute IEEC_14E.dat and IEEC_14E.out for the incorrect files IEEC_14B.dat and IEEC_14B.out.

Request #184 – Please provide the ambient conditions (temperature and relative humidity) that correspond to the two HRSG exhaust operating cases provided in Visual Attachment 1.

Response #184 – The data presented for the two HRSG exhaust operating cases are worst case (for purposes of visual plume modeling) cold ambient cases: 36°F ambient temperature and 66% relative humidity.

Request #185 – Visual Attachment 1 indicated that the SCAQMD 1981 Riverside meteorological file was used along with relative humidity data from March AFB. However, the mixing height data from the SCAQMD meteorological file was replaced with a constant mixing height of 600 meters. Please explain why the SCAQMD meteorological file's mixing height data was modified.

Response #185 – For the purposes of the visible water vapor plume modeling only, the actual mixing height data contained in the meteorological data files provided by the South Coast AQMD were replaced with a constant mixing height of 600 meters to ensure that lower mixing heights would not interfere with (i.e., reduce the calculated formation of) visible plumes. This is because the ISCST3 model used to calculate the dispersion of the visible plume contains an algorithm which will set the pollutant (in this case, moisture) concentration to zero when the plume is above the inversion height. This modification to the meteorological data set is consistent with that used in visible water vapor plume analyses in other CEC proceedings.

Request #186 – The cooling tower plume modeling input file models a single exhaust condition for a single cell of the cooling tower. Please describe how the modeling output is adjusted to account for the facts that the cooling tower has a total of 16 cells, the cooling tower exhaust conditions vary as a function of the operating condition (i.e. duct firing or no duct firing), and they vary as a function of ambient temperature and relative humidity.

Response #186 – As has been the case with every other visible water vapor plume modeling analysis filed with the CEC by Calpine, the modeling system used is capable of predicting the formation of visible water vapor plumes from a single point source. The modeling input is not adjusted to reflect the number of cooling tower cells (14); rather, the modeling only predicts the frequency of plume formation from a single cell. It would be reasonable to assume that if a plume is predicted to occur from a single cell, then under the same meteorological and operating conditions a plume would be expected to be visible from all of the cells in the tower.

With respect to the plant operating conditions, as noted above in the response to Request #181, the single worst case operating condition with respect to visible plume formation (cold ambient condition, peak plant operations) was assumed to persist for 8760 hours per year. In response to the staff's request in Request #181, we have provided cooling tower modeling parameters for other, less severe, conditions.

Request #187 – The HRSG plume modeling input file models a single exhaust condition for duct firing and a single exhaust condition for non-duct firing. Please describe how the modeling output is adjusted to account for the fact that the HRSG exhaust moisture content varies as a function of the ambient temperature and relative humidity.

Response #187 – As in the case for the cooling tower, the HRSG plume modeling was performed based on stack parameters for the worst-case plume formation condition – cold ambient temperature. The addition of, and interpolation between, less severe conditions associated with HRSG plume formation would be expected to result in lower plume formation frequencies than those reported in Visual Attachment 1, and it was therefore not considered necessary to run additional cases as implied in the data request above..

Request #188 – The Applicant's modeling results often indicate that the plume width is greater in dimension than the plume length for both the cooling tower and the HRSG. However, during other hours there is no corresponding plume width while there are positive values for plume height and plume length. Staff does not consider these to be reasonable modeling results. Please describe how the model can find that the visible HRSG plumes are wider than they are long under rural dispersion conditions, and how the model can find plume height and length with no corresponding width.

Response #188 – There is no particular reason why visible plume width can not be larger than visible plume length.

Plumes whose width grows rapidly are generally associated with unstable or neutral stability conditions. These conditions imply rapid mixing with ambient air. A rapidly-mixed plume will have a much shorter visible length than a plume less-rapidly mixed, because water vapor saturation can't be maintained. In the extreme, given sub-saturated ambient air, a very, very rapidly mixed plume (picture a giant electric fan at the stack exit) will be very wide indeed, and have a visible length that approaches zero, regardless how much water vapor the plume contains.

The observance of no corresponding plume width, given a plume length and plume height in the model results, signifies that the plume is shorter than the downwind distance between the stack exit and the first receptor (for these results, 40 meters). The associated plume length given in the model results (40 meters) is actually an over-estimate of plume length. The problem can be solved by placing more receptors closer to the stack exit, to better resolve the dimensions of the plume. A precise accounting of the dimensions of extremely short plumes will not affect statistical results of the model by much, however, and will not affect the calculated frequency of visible plumes.

This issue has been addressed in a more recent version of MISTVUE through the use of additional receptors closer to the stack exit. However, as noted above, there is not any significant benefit to obtaining more detail regarding the dimensions of extremely short plumes which are not expected to have a significant visual impact.