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June 29, 2007

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Subject: Tesla Power Plant (01-AFC-21C)  
Data Responses

<b>DOCKET</b> 01-AFC-21C	
<b>DATE</b>	JUN 29 2007
<b>RECD.</b>	JUN 29 2007

On behalf of FPL Energy, enclosed are an original and 12 copies of the Post Certification Amendment Data Responses, dated June 2007. Please direct any questions regarding this material to either Kevin Washington of FPL Energy at (561) 691-2877 or me at (510) 587-7787.

Sincerely,

A handwritten signature in black ink, appearing to read "David A. Stein".

David A. Stein, PE  
Vice President

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# **Tesla Power Project (01-AFC-21C)**

## **Data Responses**

Submitted by:  
**FPL Energy**

June 2007



155 Grand Avenue, Suite 1000  
Oakland, California 94612

# Data Responses

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The Applicant is providing data responses in reply to the data request received by CEC Staff on February 2, 2007. The data responses are in the same order as the data requests provided by the CEC.

**Technical Area:** Air Quality  
**Author:** Brewster Birdsall

## **BACKGROUND**

### **Describe PM<sub>2.5</sub> Impacts**

The U.S. EPA recently revised the national ambient air quality standards (NAAQS) for particulate matter less than 2.5 micrometers (PM<sub>2.5</sub>) downward to 35 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) 24-hour average concentration (see Federal Register Vol. 71, No. 200, p. 61144, October 17, 2006; effective December 18, 2006). The previous standard was 65  $\mu\text{g}/\text{m}^3$ .

The Air Quality Modeling Supplement of the November 2006 petition for the post-certification amendment shows the impacts of particulate matter less than 10 micrometers (PM<sub>10</sub>), but does not show impacts of PM<sub>2.5</sub>. A comparison of project PM<sub>2.5</sub> impacts and applicable national and California ambient air quality standards should be included with the petition. To accomplish this, the PM<sub>2.5</sub> emission rate for the cooling tower should be estimated. This is especially relevant given the proposed change in cooling tower emission limits.

## **DATA REQUEST**

1. Please quantify the PM<sub>2.5</sub> emission rate for the proposed cooling tower.

### **Response:**

PM<sub>2.5</sub> emissions from the proposed cooling towers are estimated using a fraction derived by the South Coast Air Quality Management District (SCAQMD, 2006). SCAQMD determined that 60% of PM<sub>10</sub> emissions from cooling towers are considered to be in the PM<sub>2.5</sub> range. This value was determined from PM profiles available in the California Air Resources Board (CARB) California Emission Inventory Data and Reporting System (CEIDARS). The PM profiles available in CEIDARS are established by the US EPA through source testing (personal phone conversation with Vijay Bhargava, 2007). Assuming that PM<sub>2.5</sub> emissions account for 60% of the PM<sub>10</sub> emissions, the cooling tower emission rate for a single cell is estimated to be 0.12 lb/hr (0.015 g/s). The project includes a total of 22 cooling tower cells, which would have a total emission rate of 2.64 lb/hr (0.34 g/s).

2. Please provide an air dispersion modeling analysis of the PM<sub>2.5</sub> impacts of all project sources including a comparison of PM<sub>2.5</sub> impacts with applicable ambient air quality standards and thresholds.

### **Response:**

Air dispersion modeling from project sources was previously completed for PM<sub>10</sub> impacts. Project related PM<sub>2.5</sub> impacts are assumed to be equivalent to PM<sub>10</sub> impacts, except for the impacts due to cooling tower emissions. PM<sub>10</sub> impacts from the cooling towers were isolated in the previous modeling. Since impacts are directly scalable to emissions, 60% of the cooling tower PM<sub>10</sub> impacts are assumed to be PM<sub>2.5</sub>. Project PM<sub>2.5</sub> impacts were determined

by multiplying PM<sub>10</sub> cooling tower impacts by 0.6, then adding this value to the impacts from all sources other than the cooling towers. Table 1 displays the maximum predicted PM<sub>2.5</sub> impact and total predicted concentrations in comparison to the National and California Ambient Air Quality Standards (NAAQS and CAAQS). Background concentrations at the Stockton-Hazelton Street monitoring station exceed both the NAAQS and CAAQS. PM<sub>2.5</sub> emissions from TPP will not cause a violation of the standards.

**TABLE 1**  
*NAAQS and CAAQS Compliance for PM<sub>2.5</sub>*

<b>Averaging Period</b>	<b>Maximum Predicted TPP Impact (µg/m<sup>3</sup>)</b>	<b>Background Concentration (µg/m<sup>3</sup>)*</b>	<b>Total Concentration(µg/m<sup>3</sup>)</b>	<b>NAAQS (µg/m<sup>3</sup>)</b>	<b>CAAQS (µg/m<sup>3</sup>)</b>
24-Hour	6.4	42	48.4	35	
Annual	1.0	13.2	14.2	15	12

\* Highest values during the period 2004-2006 from Stockton-Hazelton Street monitoring station were used.

**Attachment DR-2**  
**DISPERSION MODELING CALCULATIONS**

**TESLA CUMULATIVE MODEL RUNS**

PM<sub>2.5</sub> Impact Calculations

Assuming Cooling Tower Emissions: PM<sub>2.5</sub> = 60% PM<sub>10</sub>

		PM <sub>10</sub>			PM <sub>2.5</sub>			
1997	Max. Impact <sup>a</sup>	Max. Cooling Tower (CT) <sup>b</sup>	Max. Cooling Tower (CT) <sup>b</sup>	Max. Impact <sup>a</sup>	Background <sup>c</sup>	Total	NAAQS	CAAQS
24-hr	10.59299	10.53598	6.321588	6.378598	42	48.4	35	
Annual	1.57069	1.42019	0.852114	1.002614	13.2	14.2	15	12

<sup>a</sup> This includes all TPP sources, East Altamont and Wellhead Electric gas turbines

<sup>b</sup> CT max. at same location and time as all source max.

<sup>c</sup> 3 yr average of 98th percentile for 24-hr background conc. from Stockton-Hazelton

## BACKGROUND

### Status of Emission Reduction Credit Ownership

The project license depends on an emission reduction credit (ERC Certificate #821) that is presently owned by Waste Management of Alameda County for PM<sub>10</sub> emission reductions that are expected to occur at the Altamont Landfill. Attachment B of the petition shows that Midway Power holds an option to purchase this ERC from Waste Management and that the option expires March 31, 2007. It is not clear if the project owner intends to purchase the ERC before the option agreement expires.

## DATA REQUEST

3. Please describe the proposed timing and strategy for securing ownership of the Altamont Landfill ERC and the likelihood of extending the expiration date for the option contract beyond March 31, 2007.

### **Response:**

Midway Power has extended the option for the Altamont Landfill ERC prior to expiration. The final purchase will occur subsequent to issuance of the CEC amendment and prior to BAAQMD issuance of the Authority to Construct for the project.

## BACKGROUND

### Mitigation for PM<sub>10</sub> and PM<sub>2.5</sub> Impacts

The proposed amendment would require the project owner to surrender additional PM<sub>10</sub> emission reduction credits to satisfy Bay Area Air Quality Management District (BAAQMD) offset requirements for cooling tower emissions. Sulfur dioxide (SO<sub>2</sub>) ERCs would be used to meet the PM<sub>10</sub> offset requirements and mitigate project PM<sub>10</sub> impacts. This requires inter-pollutant trading to exchange SO<sub>2</sub> reductions for PM<sub>10</sub> emissions, and the applicant proposes a ratio of 3-to-1. This ratio has not yet been analyzed by the Energy Commission staff for this project because inter-pollutant trading of SO<sub>2</sub> credits was not proposed for the 2004 project license. A review of the BAAQMD Emission Bank Status website<sup>1</sup> shows that Midway Power, LLC now owns 51.75 tons per year (tpy) of SO<sub>2</sub> reductions in ERC #1000 and other SO<sub>2</sub> credits that were not contemplated in the 2004 decision. These credits change how the project would comply with BAAQMD regulations and the Energy Commission's CEQA mitigation. The April 2003 Final Staff Assessment included AIR QUALITY Tables 19 and 20, which showed how ERCs would be effective for CEQA mitigation. These tables and the recommended mitigation, primarily in Condition of Certification AQ-C7, will need to be updated to reflect the changes in ERCs. Staff can prepare the necessary revisions to AQ-C7, if the ERC information and proposed mitigation is now up-to-date. The petition did not identify any proposed modifications to Conditions of Certification AQ-C6 through AQ-C9 related to CEQA mitigation of project operations.

<sup>1</sup> [http://www.baaqmd.gov/pmt/emissions\\_banking/banking.htm](http://www.baaqmd.gov/pmt/emissions_banking/banking.htm)

## DATA REQUEST

4. Please provide an analysis or a summary of past project analyses that justifies use of a 3-to-1 inter-pollutant trading ratio for exchanging SO<sub>2</sub> reductions for PM<sub>10</sub> emissions in the jurisdiction of the Bay Area Air Quality Management District.

### **Response:**

Inter-pollutant offset programs are not new to California or nationwide new source review programs. Since the early 1980's, air agencies, including the California Air Resources Board, have been involved in developing background data to support inter-pollutant offset schemes. A summary of chronological data is as follows:

- March 1980 – the CARB (Research Division) publishes a report entitled “Methodology for Calculation of Inter-Pollutant Trade-Off Ratios”. Sample calculations for several areas were presented, including the Pittsburg, Ca., (east San Francisco Bay area). The summary table for this area estimates the appropriate offset ratio for TSP when providing SO<sub>2</sub> emissions reductions is 2.2:1.
- May 1986 – CARB responds to the San Joaquin Valley APCD's request to develop inter-pollutant offset ratios for various pollutants. Several tables are presented in this report for the following areas; Stockton, Fresno, Visalia, Oildale, and Bakersfield. The report concludes that a reasonable offset ratio for PM<sub>10</sub> when providing SO<sub>2</sub> emissions reductions or credits ranges from 0.6:1 to 3.2:1, with an overall average ratio of 1.46:1.
- March 1988 – CARB TSD staff present a memo to SSD staff concerning recommendations for PM<sub>10</sub> inter-pollutant offset ratios. CARB states “If it is assumed that the gas emissions are fully converted to PM<sub>10</sub>, one pound of SO<sub>x</sub> or NO<sub>x</sub> emissions would form about 2.5 pounds of PM<sub>10</sub> in the form of sulfate or nitrate salts...”. This would indicate that an offset ratio on the order of 2.5:1 would be appropriate when PM<sub>10</sub> emissions are being offset by SO<sub>2</sub> reduction credits.

Other documents and decisions include:

- April 1989 – The CEC grants a SPPE for the Mojave Cogeneration Project (Docket 88-SPPE-2), which proposes to use an inter-pollutant offset scheme using SO<sub>x</sub> and NO<sub>x</sub> emissions reductions to offset particulate matter emissions increases.
- November 2000 – CARB publishes a guidance document, which delineates a series of summaries of offset packages for licensed power plant projects. The use of SO<sub>2</sub> inter-pollutant offset schemes for mitigation of PM<sub>10</sub> emissions increases include:
  - Delta Energy Center – partially offsets its PM<sub>10</sub> emissions of 376.7 tons by using 280.4 tons of SO<sub>2</sub> (ratio unspecified).

- Morro Bay Power Plant proposes an on-site inter-pollutant offset strategy which uses 99.86 tons of SO<sub>x</sub> at a ratio of 1:1 to offset an equivalent amount of PM<sub>10</sub> emissions increases.
- February 2001 – Bay Area AQMD staff propose a 3:1 SO<sub>2</sub>/ PM<sub>10</sub> inter-pollutant offset ratio for the Potrero Unit 7 project. District staff indicates that the 3:1 offset ratio is consistent with their previous actions as well as the 1992 SAI report for Contra Costa County. In addition, BAAQMD staff clearly indicate that the ratio should be based on the winter PM episode data, not annual average data. Use of the winter period PM<sub>10</sub> data is also supported by data presented in the CARB Almanac-2006, Chapter 2, which indicates for the San Francisco Bay Area, that there is “a strong seasonal variation in PM, with higher PM<sub>10</sub> and PM<sub>2.5</sub> concentrations in the fall and winter months. In the winter, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations remain elevated for extended periods. These higher concentrations are caused by increased activity for some emission sources and meteorological conditions that are conducive to the build-up of PM.” CARB presents data which indicates that for the Bay Area region, that the estimated secondary portion of PM<sub>2.5</sub> (from SO<sub>x</sub> and NO<sub>x</sub>) is approximately 40%, which results in an inter-pollutant offset ratio of 2.5:1. In addition, CARB presents figures which clearly indicate that the peak PM<sub>10</sub> and PM<sub>2.5</sub> periods are during the winter time frame.
- August 2001 – Sierra Research prepares a technical response on the calculation of inter-pollutant ratios for the GWF Henrietta Project (southern San Joaquin Valley). The technical response proposes to offset PM<sub>10</sub> emissions with SO<sub>2</sub> emissions reductions or credits. The report indicates that the appropriate ratio ranges from 1.17:1 to 1.64:1, with an average of 1.4:1.
- February 2002 – CH2M staff prepare a data response for the Cosumnes Power Plant project defending the use of an inter-pollutant offset ratio of 1.5:1 (SO<sub>2</sub>/ PM<sub>10</sub>).
- August 2002 – Bay Area AQMD staff analysis in the FDOC for the East Altamont Energy Center concludes that a ratio of 3:1 is sufficient to produce a net air quality benefit when using SO<sub>2</sub> emissions reductions or credits to mitigate PM<sub>10</sub> emissions increases.
- December 2004 – CEC staff indicates that the Pastoria Energy Facility (99-AFC-7C) has agreed to an offset ratio for SO<sub>2</sub>/ PM<sub>10</sub> of 2.9:1, and that such a ratio would be beneficial to air quality. Condition AQ-26 contains ratio values higher than 2.9:1 based upon the proposed use of SO<sub>2</sub> reductions occurring within 15 miles, as well as reductions occurring at distances greater than 15 miles, i.e., 3.1:1 to 3.4:1.

Based on the above summary and consultation with BAAQMD, the proposed SO<sub>2</sub>/ PM<sub>10</sub> offset ratio of 3:1 is more than sufficient to provide a net air quality benefit.

5. Please verify whether the CEQA mitigation provided by holdings of ERCs is up-to-date (currently shown as of October 10, 2006 in Attachment B of the petition).

**Response:**

Yes, the summary provided October 10, 2006 as Attachment B is up-to-date.

6. Please identify any proposed changes to Condition of Certification AQ-C7, related to CEQA mitigation, if necessary. For example, update as needed any information related to the Air Quality Mitigation Agreement or ERCs owned in the bank administered by the San Joaquin Valley Air Pollution Control District.

**Response:**

Midway Power is not proposing any specific changes to Condition of Certification AQ-C7.

7. Please identify any proposed changes to Conditions of Certification AQ-C6 through AQ-C9 related to CEQA mitigation of project operations, if necessary.

**Response:**

Midway Power is not proposing any specific changes to Conditions of Certification AQ-C6 through AQ-C9.

**BACKGROUND****Revised NO<sub>x</sub> and CO Startup Emissions**

Proposed changes to Condition of Certification AQ-27 deal with the nitrogen oxide (NO<sub>x</sub>) and carbon monoxide (CO) hourly emission limits during normal operations including startups and shut-downs. The changes to the emissions of all four combustion turbines (CTGs) and heat recovery steam generators (HRSGs) should be explained in more detail.

The proposal to limit normal operations to 640 lb/hr of NO<sub>x</sub> in AQ-27 exceeds the maximum emissions expected to occur during commissioning in AQ-13 (622 lb/hr of NO<sub>x</sub>). It is not clear why NO<sub>x</sub> emission limits for normal operations should exceed those for commissioning. Additionally, the daily NO<sub>x</sub> limits in AQ-13 exceed those requested in AQ-28. The Project Owner's December 2005 request to BAAQMD for modification of the Final Determination of Compliance indicates that the commissioning limits in AQ-13 should equal the maximum emission limits in AQ-27 and AQ-28.

Table 2-1 of the Air Quality Modeling Supplement shows normal operating emissions of NO<sub>x</sub> at 190 lb/hr and 130 lb/hr per CTG during startup and normal operation, respectively, but the basis for the 130 lb/hr rate is not explained. Condition of Certification AQ-26 constrains simultaneous startup of two CTGs until the first pair of the other two CTGs reach normal operation. This means that combined NO<sub>x</sub> emissions should be about 411.3 lb/hr (2 @ 190 lb/hr plus 2 @ 15.67 lb/hr) instead of 640 lb/hr requested in AQ-27. CO emissions

should be about 2,238.16 lb/hr (2 @ 1,100 lb/hr plus 2 @ 19.08 lb/hr) instead of 2,770 lb/hr requested in AQ-27.

## DATA REQUEST

8. Please provide the basis for the NO<sub>x</sub> and CO combined emission and calculations supporting the proposed emission limits in AQ-27, and revise the proposed limits in AQ-27 and AQ-13, as needed.

### **Response:**

The startup curves for NO<sub>x</sub> and CO are attached for reference. A simultaneous start of the two 2 x 1 pairs would result in combined NO<sub>x</sub> emissions of 640 lb/hr (2 pairs x 320 lb/hr/pair) during a cold start and combined CO emissions of 2770 lb/hr (2 pairs x 1385 lb/hr/pair) during a warm start.

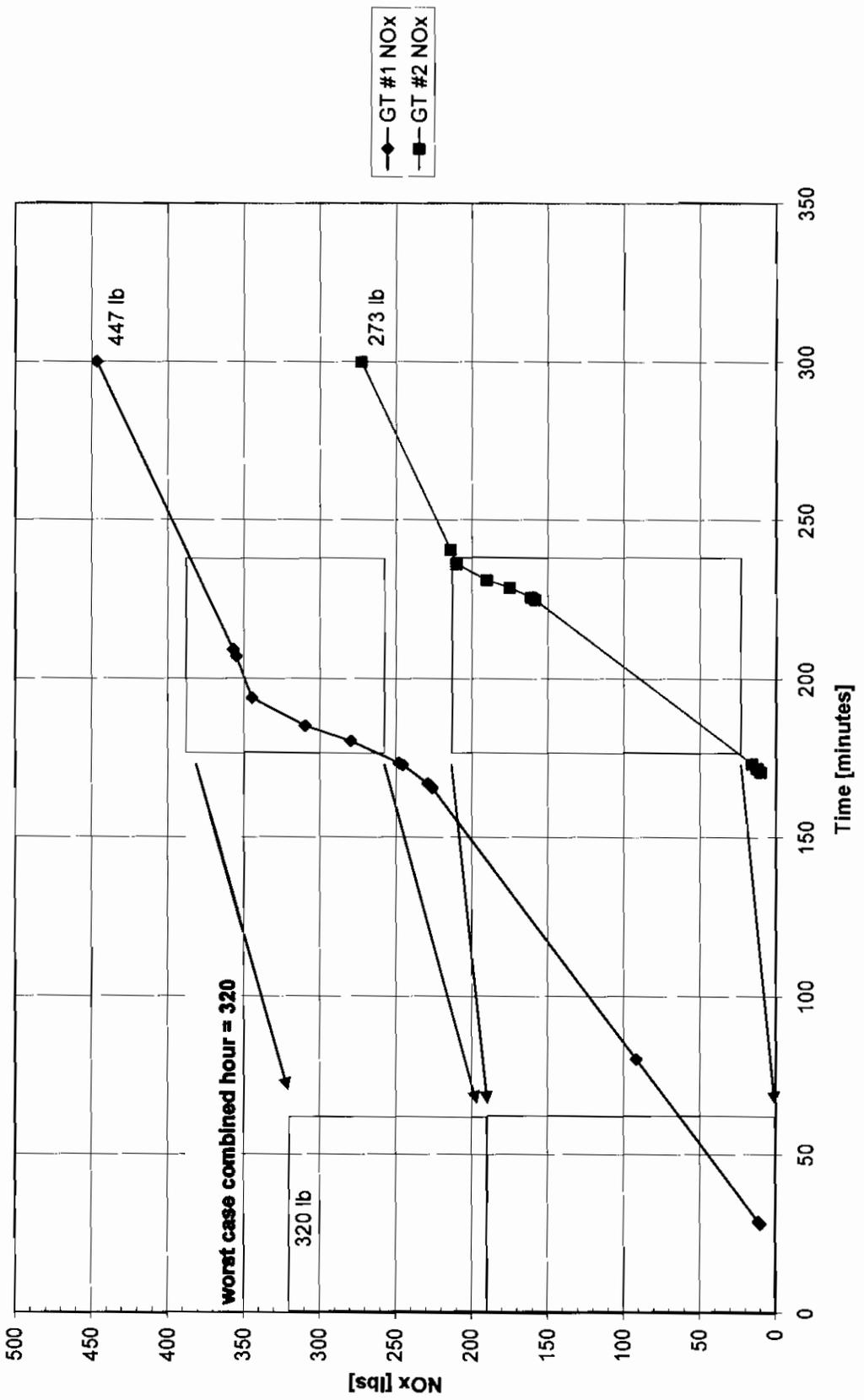
The original amendment request submitted to the BAAQMD and CEC incorrectly noted that only two of the four combustion turbines would need to emit at levels that exceed the normal operating limit of 15.67 lb/hr. As can be seen from an examination of the startup curves provided with the amendment application, the intended startup sequence will require a limited period of time when all four units would emit at higher levels. Accordingly, Midway Power has requested and the BAAQMD has agreed to the deletion of condition AQ-26 in its entirety to accommodate this limited period of operation. Midway Power is similarly requesting that the CEC also delete condition AQ-26.

Midway Power has performed air quality modeling that is consistent with the requested higher combined emission rate during startup. This modeling demonstrates that all applicable air quality standards will be met during startups.

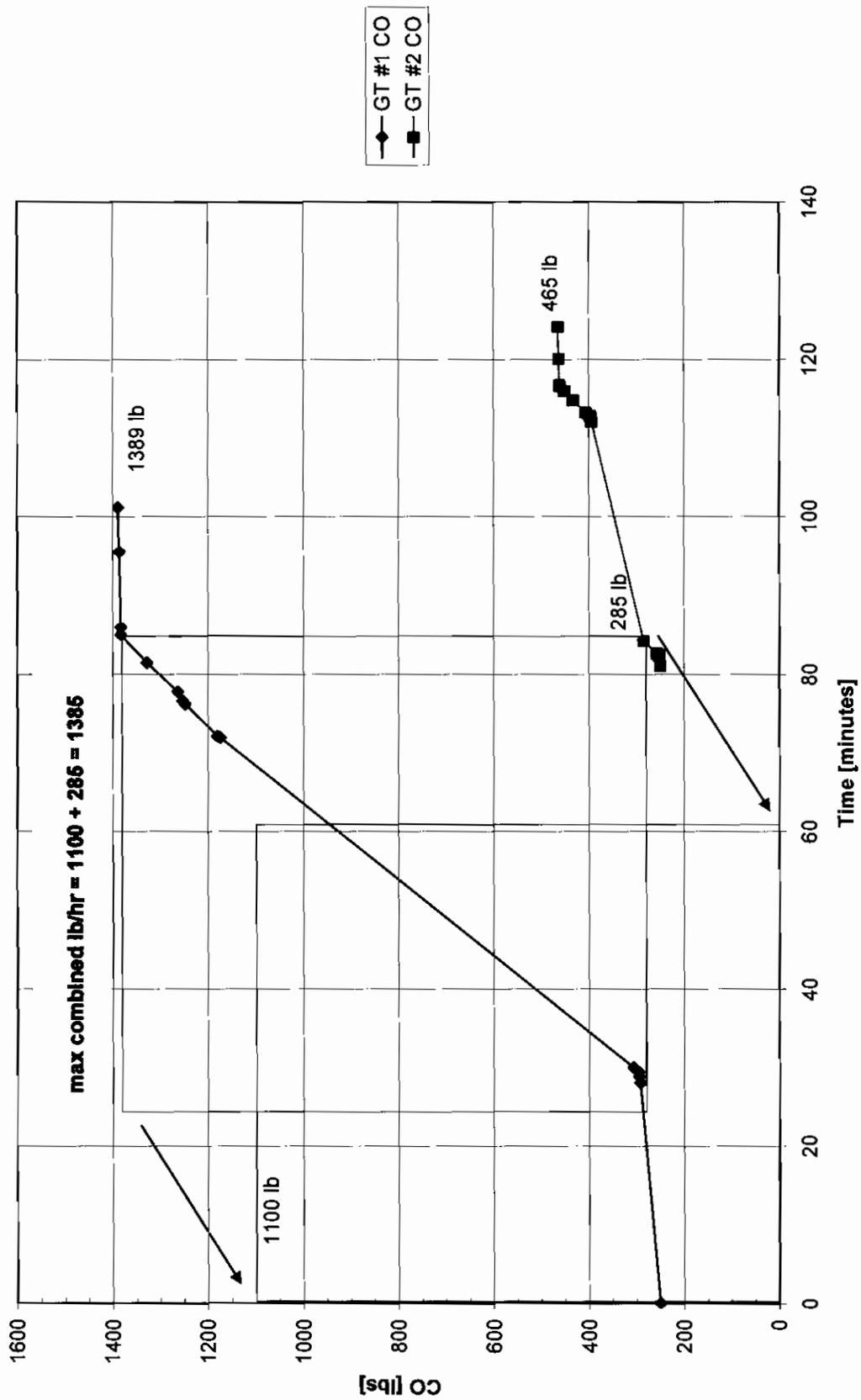
**Attachment DR-8**

**WORST CASE STARTUP CURVES FOR NO<sub>x</sub> (COLD START) AND CO  
(WARM START)**

### Cold Start 207FA NOx



### Warm Start 207FA CO



9. Please verify that the emission limits in AQ-27 and AQ-28 in the petition are correct given the expected commissioning emissions in AQ-13 and operating constraints of AQ-26.

**Response:**

The emission limits as proposed are correct. Please refer to the attached cold start and warm start profiles attached. The NO<sub>x</sub> profile demonstrates that each 2 x 1 unit would result in a maximum one-hour NO<sub>x</sub> emission rate of 320 lb/hr. A simultaneous start of two pairs of 2 x 1 units would result in a total NO<sub>x</sub> emission rate of 640 lb/hr (2 x 320 lb/hr/pair). Similarly the CO profile demonstrates that each 2 x 1 unit would result in a maximum one-hour CO emission of 1385 lb/hr. A simultaneous start of two pairs of 2 x 1 units would result in total CO emission rate of 2770 lb/hr (2 x 1385 lb/hr/pair). Since the requested startup sequence will require a limited period when all four units will emit in excess of the normal operation emission limits, Midway Power has requested and the BAAQMD has agreed to delete Condition AQ-26.

## BACKGROUND

### Cumulative Sources

The Air Quality Modeling Supplement Section 3.1 (p. 4) in the petition identifies “other sources” (East Altamont Energy Center and Wellhead Electric power plant) beyond Tesla that were considered in the modeling. It is not clear if this inventory of sources represents the results of a complete survey for all possible sources necessary for a complete cumulative analysis. The cumulative impact analysis should address all “reasonably foreseeable” future projects (i.e., permitted or with an application under review by any local air district, including sources not yet operating). The petition should address “cumulative sources” in a manner consistent with the Energy Commission Data Adequacy requirement to investigate sources within 6 miles (approximately 10 kilometers).

## DATA REQUEST

10. Please describe the process used to identify the cumulative “other sources” in the Air Quality Modeling Supplement and verify that the impacts analysis includes all sources including “reasonably foreseeable” future projects in a manner consistent with Energy Commission requirements.

**Response:**

Other sources included in the cumulative impact analysis were identified in the original AFC for TPP. East Altamont Energy Center and Wellhead Electric were included in the Air Quality Modeling Supplement for consistency with the original AFC modeling. Requests were made in February 2007 to both the Bay Area Air Quality Management District (BAAQMD) and the San Joaquin Valley Air Pollution Control District (SJVAPCD) to identify sources not yet constructed or currently in the application process within 10 km (6 miles) of TPP. BAAQMD and SJVAPCD each responded that there are no other future projects planned that would contribute PM<sub>10</sub> emissions in the foreseeable future.

## References

SCAQMD, 2006. Final Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds. URL:[http://www.aqmd.gov/ceqa/handbook/PM2\\_5/PM2\\_5.html](http://www.aqmd.gov/ceqa/handbook/PM2_5/PM2_5.html)

Personal Phone conversation with Vijay Bhargava at CARB. March 15, 2007.