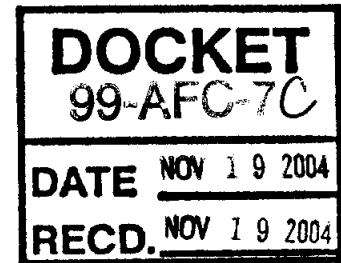


CALIFORNIA ENERGY COMMISSION

1516 NINTH STREET
SACRAMENTO, CA 95814-5512

DATE: November 19, 2004

TO: Interested Parties

FROM: Nancy Tronaas, Compliance Project Manager

**SUBJECT: Pastoria Energy Facility (99-AFC-7C)
Staff Analysis of Proposed Modifications for a
Temporary Increase in Emissions during Commissioning**

On September 15, 2004, the California Energy Commission received a petition from the Calpine Corporation to amend the Energy Commission Decision for the Pastoria Energy Facility. The Pastoria Energy Facility project is a 750 MW combined cycle power plant located 6.5 miles east of the community of Grapevine in Kern County. The project was certified by the Energy Commission in December 2000, and is currently under construction.

The petition requests a temporary increase in hourly and daily oxides of nitrogen and carbon monoxide emissions during the commissioning phases that will include steam blows, tuning, and testing of all equipment prior to commercial electrical generation at the Pastoria Energy Facility.

Energy Commission staff reviewed the petition and assessed the impacts of this proposal on environmental quality, public health and safety, and proposes new air quality conditions of certification (AQ-87 and -88). It is staff's opinion that, with the implementation of the new conditions, the project will remain in compliance with applicable laws, ordinances, regulations, and standards and that the proposed modifications will not result in a significant adverse direct or cumulative impact to the environment (Title 20, California Code of Regulations, Section 1769).

The amendment petition has been posted on the Energy Commission's webpage at www.energy.ca.gov/sitingcases. Staff's analysis is attached for your information and review. Staff's analysis and the order (if the amendment is approved) will also be posted on the webpage. Energy Commission staff intends to recommend approval of the petition at the December 15, 2004 Business Meeting of the Energy Commission.

If you have comments on this proposed modification, please submit them to me at the address below prior to December 14, 2004:

California Energy Commission
Attn: Nancy Tronaas
1516 9th Street, MS 2000
Sacramento, CA 95814

Comments may be submitted by fax to (916) 654-3882, or by e-mail to ntronaas@energy.state.ca.us. If you have any questions, please contact Nancy Tronaas, Compliance Project Manager, at (916) 654-3864.

Attachment

PASTORIA ENERGY FACILITY (99-AFC-7C)
Petition for a Temporary Increase in Commissioning Emissions
Air Quality Staff Analysis
Prepared by: William Walters, P.E.
November 16, 2004

Amendment Request

On March 19, 2004 Calpine Corporation Pastoria Energy Facility, LLC (PEF or Project Owner) submitted to the Energy Commission a proposed amendment to the Pastoria Energy Facility (PEF) Project (PEF 2004a) in order to request a revision to the air emissions offset package and request new conditions to address temporary high emission levels during initial commissioning. Due to potential New Source Review permit issues it was determined that the initial commissioning emission issue would be taken up as a variance request at the District level rather than a permit modification (similar to previous cases such as the Elk Hills Power Project); therefore, on September 14, 2004, the Project Owner submitted to the Energy Commission a revised proposed amendment to address initial commissioning emissions (PEF 2004c). The revised amendment request includes two Variance applications submitted to the San Joaquin Valley Unified Air Pollution Control District (District) for PEF commissioning activities (one Variance application for each Power Block). This staff analysis only addresses the revised commissioning emissions amendment request. The offset package amendment request was analyzed separately.

Background

In November 1999, Pastoria Energy Facility, LLC (owner), a subsidiary of Enron North America Corporation, proposed to construct and operate a 750 megawatt (MW) combined cycle project in southern Kern County, approximately 30 miles south of Bakersfield, California and approximately 6.5 miles east of Interstate 5 near the base of the Tehachapi Mountains. The PEF was certified in December 2000 (CEC 2000a), and in June 2001 the Energy Commission approved a transfer of ownership of PEF from the Enron Corporation to the Calpine Corporation. Power Block I consists of two natural gas fired 168 MW General Electric 7FA type combustion turbine generators (CTGs), two heat recovery steam generators (HRSGs), and one 185 MW steam turbine generator (STG). Power Block II consists of one 168 MW General Electric 7FA CTG unit exhausting into a HRSG which drives a separate 90 MW STG. The PEF will use 24 cooling tower cells, arranged back-to-back in two tower banks. One bank will contain 16 cells and the other bank will contain 8 cells. There have been two previous project amendments that have requested the modification of operational air quality requirements and one previously requested administrative modification. The first of these requested project amendments, approved in January 2002, concerned the reduction of the estimated turbine PM₁₀ and NO_x emissions and a resulting revision in the proposed air emission offset package. The second of these requested project amendments, approved in July 2002, concerned a revision to the project's cooling tower

emissions and resultant change to the required PM10 emission offset package. The administrative amendment request, approved in October 2001, concerned the required timing for the surrender of emission credits. Additionally, another project amendment concerning another revision to the project's proposed air emission offset package is currently being processed by staff.

The current schedule for PEF is for Power Block II to complete construction between the 4th quarter of 2004 and the 1st quarter of 2005. Construction of Power Block I is scheduled for completion between the 2nd and 3rd quarters of 2005. PEF is expected to be online in February 2005.

Commissioning Variance Background

Neither the original District Determination of Compliance, nor the original Staff Assessment (CEC 2000b) evaluated commissioning emissions or provided Conditions of Certification to address emission requirements during commissioning. Emissions of nitrogen oxides (NOx), carbon monoxide (CO) and volatile organic compounds (VOC) are known to be elevated during commissioning, particularly in the early phases of commissioning prior to the installation and operation of the pollution control equipment. The Project Owner has submitted Variance petitions to the District and is requesting to amend the Energy Commission decision in order to maintain project compliance with emission requirements during the commissioning period. The District granted the variance orders, subject to eighteen conditions, on October 13, 2004 (SJVEC 2004).

Laws, Ordinances, Regulations and Standards (LORS)

LORS identified in the Energy Commission decision for the Pastoria project also apply to this amendment request. The project would continue to remain in compliance with all applicable LORS with the requested changes.

Analysis

There will be two phases of commissioning for each Power Block during which emissions of NOx, CO, and ammonia slip from each CTG/HRSG stack will at times exceed some limits specified in the District permit conditions and CEC conditions of certification. Limits for opacity will likely also be exceeded for a total period of less than 24 hours during the initial firing of the CTGs, at the CTG/HRSG stack and at the lube oil vents that service the CTGs and electrical generator. To determine emission limits during commissioning for Power Blocks I and II, the estimated maximum daily excess NOx and CO emissions were derived from the Sunrise Power Project (99-AFC-4), which is also equipped with 168 MW General Electric 7FA natural gas-fired turbine generating units. Table 1 shows a summary of actual daily emissions emitted from the facility from each of the Sunrise CTG's during commissioning Phase I.

**Table 1
Summary of Actual Daily Emissions from Sunrise Power Project
During Commissioning Phase I**

Date	Unit #1		Unit #2		Facility wide	
	CO (lbs/day)	NOx (lbs/day)	CO (lbs/day)	NOx (lbs/day)	CO (lbs/day)	NOx (lbs/day)
3/16/03	198.40	170.00	0.00	0.00	198.40	170.00
3/17/03	2,501.10	1,113.50	3,292.90	1,602.30	5,794.00	2,715.80
3/18/03	495.10	329.40	10,314.11	3,723.13	10,809.21	4,052.53
3/19/03	6,287.87	3,283.61	1,745.99	648.67	8,033.86	3,932.28
3/20/03	7,470.81	829.61	294.03	87.38	7,764.84	917.00
3/21/03	1,528.88	468.14	5,548.17	635.24	7,077.05	1,103.38
3/22/03	5,241.85	1,841.31	2,817.90	1,110.33	8,059.75	2,951.64
3/23/03	4,691.45	1,656.79	4,852.63	1,617.91	9,544.08	3,274.70
3/24/03	480.51	150.29	514.56	154.81	995.07	305.10

Note: Commissioning Phase II emissions did not produce the maximum emissions from which the daily emissions for the PEF were estimated, and have therefore not been presented in this table.

Source: PEF 2004c, Attachment D.

The estimated daily emission rates expected from commissioning activities for the PEF were conservatively based upon the highest daily CTG emission rate experienced by the Sunrise facility during commissioning, as shown in bold in Table 1. However, while the PEF and Sunrise CTG units are very similar, they are not the exactly the same. Additionally, other equipment, such as the control equipment, HRSG, STG, auxiliary and support equipment are also not the same. Furthermore, commissioning activities are unique to each piece of equipment. Therefore, PEF increased the estimated excess daily emission rates from the actual maximum rates measured for Sunrise by 20 percent to account for potential differences in emission rates. Estimated excess daily emissions for commissioning are calculated as follows:

- 3,723.13 lbs/day NOx (from Sunrise data) x 1.20 = 4,468 or approx. 4,500 lbs/day NOx
- 10,314.11 lbs/day CO (from Sunrise data) x 1.20 = 12,377 or approx. 12,500 lbs/day CO

The proposed maximum hourly emission rates for NOx and CO during commissioning of each CTG were also derived from a similar facility. Maximum hourly emission rates are based on commissioning one turbine while all other turbines are at or below current permit limits. The requested commissioning emission limits are provided in Table 2, which shows the current hourly permit emissions limits and the requested commissioning emissions limits. No revised emission limits for VOC, PM10, or SO₂ have been requested.

**Table 2
Original and Proposed PEF Commissioning Emission Limits**

Pollutant	Turbine/HRSG Operating Emission Limits (Lbs/hour) ^a	Turbine/HRSG Startup/Shutdown Emissions Limits (Lbs/hour) ^b	Proposed Commissioning Emission Limits for each CTG (Lbs/hour) ^c	Proposed Commissioning Emission Limits for all 3 CTGs (Lbs/hour) ^d
NO _x	17.03	130	308	342
CO	24.92	1,235	2,527	2,576

a. From Condition of Certification AQ-17.
b. From Condition of Certification AQ-15.
c. Derived from the Los Medanos Energy Facility (LMEC) NO_x and CO permit limits of 616 lbs/hour and 5,053.8 lbs/hour, respectively, for two units during commissioning activities (PEF 2004b, Table 6-1).
d. Combined emission rates from all three (3) CTGs assumes commissioning of one CTG while all other turbines are at current permit limits (AQ-17). Example – NO_x: 308 Lbs/hour (commissioning) x 2 turbines x 17.03 Lbs/hour (normal operations) = 342 Lbs/hour.

Source: CEC 2000b, PEF 2004b, 2004c.

As can be seen in Table 2, the potential maximum hourly commissioning emissions far exceed current hourly permit limits, thus necessitating this amendment request.

The requested commissioning emission limits are reasonable in comparison to the commissioning emission limits that have been allowed recently for other licensed projects. Additionally, these emission limits would only be effective during the initial commissioning period.

The commissioning period for Power Block II consists of two phases: Phase I is a cleanup period when both the CTGs and HRSGs are operated without the SCR being installed, and Phase 2 is a startup, tuning and synchronization period when the catalysts are installed. Commissioning of Power Block II is expected to be completed within 90 days, although this may not occur during 90 consecutive days. The estimated schedule for first fire of Power Block II is December 15, 2004, with normal operations beginning on March 15, 2005. The requested variance is from December 1, 2004 until October 31, 2005, with commissioning activities not to exceed a total of 90-cumulative operating days.

Power Block I will be constructed, commissioned and put into commercial operation after Power Block II. The initial commissioning of Power Block I would consist of a series of reduced load firing and system-tuning operations under various operating conditions. These procedures include clearing debris from the two HRSGs and ducting before emission control catalysts are installed, cleaning the mill scale from the steam line, tuning both CTG's combustors, tuning control systems, providing for controlled initial operation of the steam generator and synchronizing to the electrical grid. Commissioning of Power Block I is expected to be completed within 120 days, although this may not occur during 120 consecutive days but rather be divided into two or more periods spanning 120 days. The estimated schedule for first fire of Power Block I is April 1, 2005, with normal operations beginning on July 1, 2005. The requested variance is from 12/1/04 until 10/31/05 with commissioning activities not to exceed a total of 120-cumulative operating days.

Impact Analysis

The Project Owner provided a revised modeling analysis of the potential worst-case short-term NO₂ and CO emission impacts. Table 3 provides the results of the Project Owner's modeling analysis, which assumes that one turbine would be undergoing commissioning and two turbines would be operating at full load.

Table 3
Commissioning Emissions Short-Term Impact Modeling Results

Pollutant	Maximum Impact (ug/m ³)	Background (ug/m ³)	Total (ug/m ³)	Limiting Ambient Air Quality Standard (ug/m ³)
NO ₂ 1-hour	259	165	424	470
CO 1-hour	3,849	18,400	22,249	23,000
CO 8-hour	940	6,670	7,610	10,000

Source: PEF 2004c, Attachment E.

This analysis shows that no exceedances of the short-term NO₂ or CO standards are expected to occur as a result of the commissioning activities.

Staff reviewed the assumed exhaust conditions in the Project Owner's modeling files and found the exhaust temperature assumptions and velocity assumptions used to be reasonably consistent with the initial commissioning assumed values used in other current siting cases. The NO_x-Ozone Limiting Method modeling input assumptions, such as the ozone input file (Arvin 1996) and source of maximum background NO₂ concentrations (Bakersfield), are considered conservative and likely overestimate the impacts that would be determined using more recent ozone concentration data and more representative NO₂ background values from the closest monitoring station (i.e. from Arvin). The only significant non-conservative assumption is use of the NO_x-OLM model default initial NO₂ fraction assumption of 0.10. However, considering the other conservative assumptions used in the modeling analysis, and the conservative NO₂ formation assumptions in the NO_x-OLM model, staff is satisfied that the proposed maximum NO_x emission levels should not cause an exceedance of the 1-hour NO_x California Ambient Air Quality Standards.

Mitigation

For projects now being licensed, staff is recommending that the commissioning emissions be included in the emissions totals for the determination of offset requirements. This means that if a source has a quarterly emission limit to which they are applying emission offsets, the commissioning emissions would be assumed to be counted under that emissions limitation. However, this project was licensed prior to current staff procedures for counting commissioning emissions.

The PEF will exceed the permitted daily NO_x emission rates during the commissioning period of Power Blocks I and II. After the commissioning of each Power Block is complete, and actual excess NO_x emissions have been determined for each unit, PEF proposes to surrender pre- or post -1990 NO_x ERCs to the District equal to 20 percent of the excess emissions over one ton. The excess emissions will be determined within 30 days after completion of the commissioning period and submitted to the District for review. The daily emission limits will be used as the basis for determining excess emissions. This approach is more conservative than using a quarterly emission limit approach, and may require the PEF to retire more NO_x ERCs than required for projects now being licensed.

No short-term NO₂ impacts were found to occur from initial commissioning activities and any additional ERCs required for the project would result in a long-term net air quality improvement for the air basin. Therefore, staff accepts the District's Variance as providing acceptable NO₂ mitigation for the commissioning emissions.

Per the District's New Source review policy, no mitigation is required for CO because the region is in attainment for CO and ambient impacts during commissioning will not be significant. However, the District requires mitigation when cumulative excess emissions during a variance period exceed one ton per pollutant from an emissions unit. A typical level of mitigation from past variance proceedings in the District requires offsets of 20 percent of excess emissions above one ton.

The maximum opacity expected during commissioning of the CTGs, CTG lube oil vents, and CTG generator lube oil vents is 80 percent. This would violate Condition of Certification AQ-4 (Authority to Construct Condition #4) and District Rule 2201, which limits the opacity to no greater than five percent, except for three minutes in any hour. No mitigation is required, although a variance from the conditions of certification is required.

Note that no daily emission limit (lbs/day) is set for ammonia slip and no offset mitigation is typically required to ammonia emissions from SCR units, therefore no mitigation is required for the potential short-term excess ammonia emissions that may occur during initial commissioning.

Conclusions and Recommendations

The PEF requires higher emission limits during the initial commissioning period. Staff acknowledges the necessity for this amendment and accepts, with some minor changes, the Conditions of Certification proposed by the Project Owner to address this issue. This conclusion is consistent with those made for other similar project amendment requests for projects located within this District's jurisdiction (e.g. Elk Hills Power Project).

Proposed New Conditions of Certification

The following new conditions of certification, with consolidation of the Project Owner's proposed conditions AQ-87 and AQ-88, are proposed as part of the variance request (PEF 2004c, Attachment C):

New text is underlined.

AQ-87 Relief granted by the San Joaquin Valley Unified Air Pollution Control District Hearing Board on October 13, 2004 in Regular Variance Docket No. S-04-48R and Docket No. S-04-49R shall apply to Conditions of Certification AQ-4, AQ-12, AQ-14 through AQ-17, AQ-19, AQ-24, AQ-28 through AQ-30 and AQ-37. The Project Owner shall comply with all requirements and conditions incorporated into these regular variances.

Verification: The Project Owner shall submit copies of all notifications and reports required under these regular variances to the CPM. The Project Owner shall notify CPM within 5 days of any requested changes to these variances.

AQ-88 During the commissioning periods of both Power Block I and Power Block II, emission rates from each CTG shall not exceed 308 lbs/hour of NOx and 2,527 lbs/hour of CO, and the combined emission rates from all three CTGs shall not exceed 342 lbs/hour of NOx and 2,577 lbs/hour of CO.

Verification: The Project Owner shall provide, within 24 hours of occurrence, notification to the CPM of any noncompliance with the commissioning emission limits.

REFERENCES

California Energy Commission (CEC). 2000a. Commission Decision on the Pastoria Energy Facility Project (Docket No. 99-AFC-7). December 21, 2000.

California Energy Commission (CEC). 2000b. Final Staff Assessment – Pastoria Energy Facility Project (99-AFC-7). September 2000.

Calpine Corporation Pastoria Energy Facility, LLC (PEF). 2004a. Pastoria Energy Facility Amendment Request 2004-0437 Data Responses (Docket No. 99-AFC-7C), June 24, 2004.

Calpine Corporation Pastoria Energy Facility, LLC (PEF). 2004b. Pastoria Energy Facility Amendment Request 2004-0437 Data Responses (Docket No. 99-AFC-7C), June 24, 2004.

Calpine Corporation Pastoria Energy Facility, LLC (PEF). 2004c. Petition for Post

Certification Amendment for Project Commissioning Activities. Pastoria Energy Facility (Docket No. 99-AFC-7C), September 14, 2004.

San Joaquin Valley Air Pollution Control District (District). 2004. Order Granting a Regular Variance. Docket No. S-04-48R and S-04-49R. Granted on October 13, 2004.