

**Request to Amend the Elk Hills Power Project (99-AFC-1C)  
to Allow PM<sub>10</sub> ERC Tendering and  
Commissioning Emissions Increase  
Staff Analysis  
February 28, 2003**

## **Amendment Request**

On December 10, 2002, Elk Hills Power, LLC (EHP or project owner) submitted to the Energy Commission a proposed amendment to the Elk Hills Power Project (EHPP) (EHP 2002). The amendment proposes to allow EHP to “tender” rather than “surrender” PM<sub>10</sub> (particulate matter less than 10 microns in mean aerodynamic diameter) emission reduction credits (ERCs) to the San Joaquin Valley Air Pollution Control District (SJVAPCD or the District). Excess ERCs would be returned to EHP if EHP is able to justify a lower permitted PM<sub>10</sub> emission rate from the combustion turbine and heat recovery steam generator stack based on the initial performance tests. On December 17, 2002, the SJVAPCD issued a revised approval to EHP’s Authority to Construct (ATC) reflecting the possible revision of PM<sub>10</sub> emission rates and offset requirements. The amendment request also includes a commissioning emissions variance, which was granted by the District on November 13, 2002 (District 2002).

## **Background**

In February 1999, the project owner proposed to construct and operate a 500 megawatt (MW) combined cycle project in western Kern County, approximately 25 miles west of Bakersfield, California. The EHPP was certified in December 2000 (CEC 2000a). The original project design included two natural gas fired 7F type combustion turbine generators (CTG), two heat recovery steam generators with duct firing, a steam turbine generator, a six-cell cooling tower, and a diesel fired emergency engine. There have been no previous project amendments that have requested the modification of operational air quality requirements. The EHPP is expected to be online in June 2003.

## **ERC Tendering**

PM<sub>10</sub> ERCs have become scarce in the SJVAPCD and as a result, have also escalated in price. Recent operating data from turbines similar to those being installed at EHPP have shown that PM<sub>10</sub> emission rates may be lower than originally assumed during the licensing process. Thus, the amount of ERCs actually necessary to mitigate project air emission impacts may be less than the amounts that were originally required, which were based on equipment vendor guarantees. The project owner would like to have the flexibility to lower their permitted PM<sub>10</sub> emissions limits based on the results of initial source testing to determine actual facility PM<sub>10</sub> emissions. This, in turn, would reduce the quantity of ERCs that would need to be surrendered to mitigate project air impacts. Excess ERCs would be returned to EHP.

Prior to changing any permit levels or associated ERC requirements, EHP would be required to submit a separate amendment request to the Energy Commission and the District with the results of initial source testing and associated data regarding actual PM10 emission rates.

### Commissioning Variance

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 obtained a variance from the District and is requesting a similar amendment of the Energy Commission decision in order to maintain project compliance with emission requirements during the commissioning period.

### **Laws, Ordinances, Regulations and Standards (LORS)**

The California State Health and Safety Code, section 41700, requires that “no person shall discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property.”

The project would continue to remain in compliance with all applicable LORS with the requested changes.

### **Analysis**

#### ERC Tendering

The concept of tendering would allow EHP to turn over PM10 ERCs to the District prior to the commencement of facility operation, just as if the ERCs were to be surrendered. However, the District will not withdraw the ERCs from use until EHPP completes their initial source testing and determines if they can operate EHPP at a lower PM10 limit.

EHP has acquired sufficient ERCs to offset maximum permitted plant emissions for VOC, SOx, NOx, and PM10 on a quarterly basis. The District has required EHP to surrender ERC certificates for all calendar quarters at appropriate offset ratios prior to commencement of operation of the equipment covered by the District ATC. Once surrendered, these ERCs would be under the control of the District.

EHP's ATC permit contains hourly, daily, and rolling twelve-month emission limits for PM10. There was very little operating experience with the GE7FA gas turbines in 1999

when emission estimates and guarantees were used as the basis for the project's permits. However, recent experience at other facilities has shown that measured PM10 rates may be substantially lower. The difference between any new PM10 limits that may be requested and changes to current permit limits would be based solely on actual measurements at EHPP during initial source testing. There would be no physical modifications to the facility to achieve lower limits, nor any changes in operating conditions or assumptions. The request would be limited to PM10 emissions.

If the initial source tests indicate that EHPP can operate at lower PM10 limits, then EHP would be allowed to submit an amendment request to the District and the Energy Commission at that time. If that request is approved, EHP would identify any tendered ERC certificates that are surplus to the original PM10 offset requirements, and would request their return at full value.

EHP is proposing two modifications to the project's Conditions of Certification. The first is a change to Condition **AQ-21**, which would be modified to require the tendering, rather than the surrendering of ERC certificates to the District, prior to the commencement of operation. The second modification is the addition of new Condition **AQ-63**. This sets forth the procedure by which EHP would lower hourly, daily, and annual PM10 emission limits and thereby reduce the PM10 offset requirements set forth in Condition **AQ-21**. The changes and additions to Conditions of Certification are presented below.

On December 17, 2002, the SJVAPCD issued a revised approval to EHP's ATC reflecting the revision of PM10 emission rates and offset requirements as described above.

### Commissioning Variance

### Emissions

The requested commissioning emission limits are provided in Table 1, which shows the current hourly permit emissions limits and the requested commissioning emissions limits. No revised emission limits for PM10, SO2, or ammonia emissions have been requested.

**Table 1  
Original and Proposed EHPP Commissioning Emission Limits**

Pollutant	Turbine/HRSG Operating Emission Limits (lbs/hour) <sup>a</sup>	Turbine/HRSG Startup/Shutdown Emissions Limits (lbs/hour) <sup>b</sup>	Proposed Commissioning Emission Limits (Lbs/hour)
NO <sub>x</sub>	15.8	76	400/185 <sup>c</sup>
CO	12.5	38	4,000/75 <sup>c</sup>
VOC	4.0	---	200/20 <sup>c</sup>
a. From Condition of Certification AQ-15. b. From Condition of Certification AQ-13. c. Requested Phase I/Phase II emission limits.			

Source: CEC 2000a, EHP 2002.

As can be seen in Table 1, 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. Phase I, referred to as the “Steam Blow/Boilout” phase, would occur at the start of initial commissioning. Phase II, referred to as the “Testing and Tuning” phase, would occur later during the initial commissioning period and would account for most of the time during initial commissioning. The initial commission is stated to last up to 500 hours within a 120-day period for each turbine. The maximum initial commissioning emissions estimated by the project owner are provided in Table 2.

**Table 2  
Estimated Maximum Emissions During Commissioning (tons)**

Phase	NO <sub>x</sub>	CO	VOC
I Steam Blow/Boilout	18.3	11.2	1.0
II Testing and Tuning	49.0	24.2	3.7
Total Commissioning	67.3	35.5	4.8

Source: (EHP 2002)

It is possible that the actual emissions during commissioning will be substantially less than these conservative estimates.

### Impact Analysis

The project owner provided a revised modeling analysis of the potential worst-case short-term NO<sub>2</sub> and CO emission impacts. This modeling analysis did not use the normally accepted NO<sub>x</sub>-OLM (ozone limiting method) modeling approach to determine worst-case 1-hour NO<sub>2</sub> impacts. Therefore, staff also conducted a NO<sub>x</sub>-OLM screening analysis. The project owner’s CO modeling procedures and results were acceptable to Energy Commission staff. Table 3 provides the results of the project owner’s and staff’s modeling analyses.

**Table 3  
Commissioning Emissions Short-Term Impact Modeling Results**

Pollutant	Maximum Impact (ug/m <sup>3</sup> )	Background (ug/m <sup>3</sup> )	Total (ug/m <sup>3</sup> )	Limiting AAQS (ug/m <sup>3</sup> )
NO <sub>2</sub>				
1-hour (EHP)	320 <sup>a</sup>	97	417	470
1-hour (staff)	356 <sup>b</sup>	97	453	470
CO				
1-hour	4,418	2,941	7,359	23,000
8-hour	1,746	2,222	3,968	10,000

a. Assumes 75% NO<sub>x</sub> conversion to NO<sub>2</sub>.

b. NO<sub>x</sub>-OLM screening value using an initial 0.25 NO<sub>2</sub>/NO<sub>x</sub> ratio and a maximum 0.13 ppm ozone background.

Source: (Head 2003) and staff’s modeling analysis.

This analysis shows that no exceedances of the short-term NO<sub>2</sub> 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 them to be reasonably consistent with the values used in other current siting cases. The stack velocity was somewhat higher than that used for other projects and the stack temperature was somewhat lower, which when their effects are combined they generally negate each other in terms of over- or underestimating project impacts. Staff performed NO<sub>x</sub>-OLM screening runs using the project owner assumed exhaust conditions (results shown in Table 3), and using the same stack conditions assumed for another recent siting case, and determined that the difference was minor and that both modeling runs showed total impacts (project impact plus background) to be lower than the State 1-hour ambient air quality standards.

### Mitigation

For projects now being licensed, staff is requiring 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 current quarterly emissions limitations for the EHPP are approximately 35.6 tons for NO<sub>x</sub>, 8 tons for VOC, and 27.9 tons for CO. Equivalent 120-day emission totals would be approximately 47.4 tons for NO<sub>x</sub>, 10.7 tons of VOC and 37.2 tons of CO. Table 2 shows that the estimated commissioning VOC and CO emissions are less than the calculated quarterly limits extended to 120 days. The commissioning NO<sub>x</sub> emissions could cause an exceedance of quarterly emissions. The District's variance deals with this possibility by requiring NO<sub>x</sub> emission reduction credits (ERCs) in the amount of 20 percent of the excess determined to occur during the variance period be purchased and retired. The District's variance appears to use daily emission limits (condition 16f of the variance) as the basis for determining excess emissions. This approach is more conservative than using the quarterly emission limit approach, and may require the EHP to retire more NO<sub>x</sub> ERCs than is required for projects now being licensed.

No short-term NO<sub>2</sub> 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 NO<sub>2</sub> mitigation for the commissioning emissions.

### District's Variance

The District approved a commissioning emissions variance on November 13, 2002. Staff has found a number of potential issues regarding this variance. First, the District staff report, which was used as a basis for the excess emission value limits quoted in

the variance, does not seem to properly quote the hourly emission limits for the project. Second, the variance exempts startup and shutdowns during the initial commissioning period from any and all emission limit requirements. Third, the variance does not allow excess PM10 emissions but does allow excess visible emissions. These issues will be discussed in order:

1. The staff report for the variance quoted non-startup hourly permitted emission limits for the two turbine/HRSGs to be 51 lbs/hr for NO<sub>x</sub>, 38 lbs/hr for CO and 5.2 lbs/hour for VOC. The current permit shows that the hourly permitted emission limits to be 31.6 lbs/hour for NO<sub>x</sub>, 25 lbs/hour for CO, and 8 lbs/hour for VOC.
2. The variance exempts startup and shutdown periods during initial commissioning from any emission limitations. The variance indicates that no violations of State ambient air quality standards are likely to occur. However, that cannot be confirmed without reasonable startup and shutdown emission limits.
3. The variance specifically notes that it allows only excess NO<sub>x</sub>, CO, VOC and visible emissions. However, any visible emissions, unless from a visible NO<sub>x</sub> plume, are an indication of excess PM10 emissions. No provisions for excess PM10 emissions, in terms of lbs/hour, have been granted.

Staff has sought clarification of these issues with the District. Michael Carrera of the District indicated that they used the project owner's normal operating hourly emission estimates provided in the variance request without modification. The project owner has stated that these values were probably provided in error, but that they do not affect the variance conditions.

Mr. Carrera also indicated that the District's intent was to not provide specific startup/shutdown emission limits during the commissioning period. However, in order to ensure that no ambient air quality standards are exceeded, staff recommends the addition of AQ-65, which limits the hourly NO<sub>x</sub> and CO emissions to 400 and 4,000 lbs/hour respectively (the maximum hourly emissions, regardless of operating mode, during commissioning).

Mr. Carrera indicated that the visible emissions variance was meant to cover excess particulate emissions, although not formally stated, and that the excess visible emissions were supposed to only occur early in Phase I of the initial commissioning. Staff does not normally request additional PM10 mitigation for commissioning emissions, so staff will not require any additional mitigation for PM10, however, staff would like the opportunity to review the Visible Emissions Evaluation data gathered during the commissioning period.

## Conclusions And Recommendations

### ERC Tendering

Staff has analyzed the proposed changes to the EHPP Conditions of Certification and concludes that there will be no new emissions and no possibility of any significant air quality impacts associated with approving the request. Staff concludes that the proposed changes are based on new information that was not available during the original licensing proceedings. The proposed changes to the Conditions of Certification retain the intent of the original Commission Decision and Conditions of Certification. Therefore, staff recommends approval of the changes which are included below.

### Commissioning Variance

EHPP requires higher emission limits during the initial commissioning period. EHP has already received a Variance from the District that covers commissioning emissions. Staff acknowledges the necessity for this amendment and accepts, with some minor changes, the Condition of Certification proposed by the project owner to address this issue. Staff also recommends an additional Condition of Certification to limit NOx and CO emissions during startup/shutdown events that occur during commissioning.

## Proposed New and Revisions to Existing Conditions of Certification

~~Strikethrough~~ indicates deleted text and underline indicates replacement or new text.

### ERC Tendering

**AQ-21** Prior to commencement of operation ~~or upon startup~~ of S-3523-1-0, -2-0, & 3-0, emission offsets shall be tendered ~~surrendered~~ for all calendar quarters in the following amounts, at the offset ratio specified in Rule 2201 (6/15/95 version) Table 1, PM10 - Q1: 78,596 lb, Q2: 79,470 lb, Q3: 80,343 lb, and Q4: 80,343 lb; and surrendered for all calendar quarters in the following amounts, at the offset ratio specified in Rule 2201 (6/15/95 version) Table 1, SOx (as SO<sub>2</sub>) - Q1: 14,170 lb, Q2: 14,328 lb, Q3: 14,485 lb, and Q4: 14,485 lb; NOx (as NO<sub>2</sub>) - Q1: 65,353 lb, Q2: 66,079 lb, Q3: 66,805 lb, and Q4: 66,805 lb; and VOC - Q1: 10,967 lb, Q2: 11,089 lb, Q3: 11,211 lb, and Q4: 11,211 lb. [District Rule 2201]

**Verification:** The owner/operator shall submit copies of ERCs tendered or surrendered to the SJVUAPCD in the totals shown to the CPM prior to commencement of operation ~~or upon startup~~ of the CTGs or cooling tower.

**AQ-63** The project owner may lower hourly, daily, and rolling average twelve-month PM10 emission limits in Conditions AQ-15, AQ-16, AQ-17, and AQ-18, and thereby reduce PM10 offset requirements set forth in AQ-21, based on actual PM10 emissions demonstrated during initial source tests. Revised emission limits shall be submitted to the District within 60 days after the last unit is initially source tested. The District will

reflect revised limits in the permit to operate for the subject equipment. Any emission reduction credit certificates, or portions thereof, that were tendered to the District but are not needed to meet reduced PM10 offset requirements will be returned to the project owner at full value. The project owner shall indicate which emission reduction credit certificates are to be retired.

**Verification:** The project owner shall notify the CPM and District of any proposed changes in PM10 emission limits and indicate which ERC certificates are to be retired within 60 days after the last unit is initially source tested.

#### Commissioning Variance

**AQ-64** Relief granted by the San Joaquin Valley Air Pollution Control District Hearing Board on November 13, 2002 in Regular Variance Docket No. S-02-38R shall apply to Conditions of Certification AQ-5, AQ-13 through AQ-17, AQ-26, and AQ-27. The Project Owner shall comply with all requirements incorporated into the 19 conditions of this regular variance.

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

**AQ-65** During commissioning, emissions shall be limited to 400 lbs/hour of NO<sub>x</sub> and 4,000 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 startup/shutdown emission limits.

#### REFERENCES

California Energy Commission (CEC). 2000a. Commission Decision – Elk Hills Power Project (99-AFC-1). December 2000.

California Energy Commission (CEC). 2000b. Final Staff Assessment - Elk Hills Power Plant Project (99-AFC-1). April 2000.

San Joaquin Valley Air Pollution Control District (District). 2002. Order Granting a Regular Variance. Docket No. S-02-38R. Granted on November 13, 2002.

Elk Hills Power, LLC (EHP). 2002. Petition for Post Certification Amendment and Changes – Air Quality. Elk Hills Power Plant (Docket No. 99-AFC-1C), December 2002.

Head. 2003. Commissioning Emissions Revised Modeling Files and Results Spreadsheet. Elk Hills Power Plant (Docket No. 99-AFC-1C), received by e-mail from Sara Head of ENSR on February 6, 2003.