CALPINE

LOS ESTEROS CRITICAL ENERGY FACILITY
800 THOMAS FOON CHEW WAY
SAN JOSE, CALIFORNIA 95134

DOCKET
03-AFC-2C
DATE Sep 8 2005
RECD. May 22 2006

September 8, 2005

Mr. Lance Shaw
Compliance Project Manager
Systems Assessment & Facility Siting Division
California Energy Commission
1516 Ninth Street, MS-15
Sacramento, CA 95814

RE: RESPONSE TO AIR AMENDMENT DATA REQUEST

Dear Mr. Shaw:

Please find attached LECEF, LLC responses to the Commission Staff's Data Request dated August 10, 2005.

Please contact me at (408) 361-4954 if you have any questions regarding this submittal.

Sincerely,

Chuck Spandri
Compliance Manager
Calpine South Bay Projects

Enclosures

cc: Jeff Harris ES&H
Barbara McBride Calpine

Los Esteros Critical Energy Facility (03-AFC-2C)
Air Quality Data Requests:
Petition to Modify Air Quality Conditions of Certification

Prepared by Gabriel D. Taylor
August 2005

On June 22, 2005, Calpine Corporation (Calpine) submitted a petition to amend the Energy Commission Decision air quality conditions of certification for the Los Esteros Critical Energy Facility (LECEF) to effect seven separate modifications to the Decision (Calpine 2005). The seven requested modifications can be summarized as follows:

- Modify the ammonia slip testing methodology (AQ-19b),
- Increase the permitted heat rate (AQ-24a),
- Increase the permitted fuel sulfur content (AQ-24b),
- Decrease the frequency of source testing (AQ-26),
- Eliminate sulfur acid mist source testing (AQ-27),
- Correct a reference in the periodic reporting requirement (AQ-34), and
- Delete the satisfied offset condition (AQ-35)

Staff has the following Data Requests concerning this petition. These data requests reflect the discussions during the teleconference between California Energy Commission (CEC) staff and Calpine on August 3, 2005 (CEC 2005b). The participants in that teleconference were: Gabriel Taylor (CEC, Air Quality Engineer), Dana Petrin (Calpine, Compliance Manager), Barbara McBride (Calpine, Environmental Director), Lance Shaw (CEC, Compliance Project Manager), Mike Ringer (CEC, Air Quality Unit Supervisor) and Bob Worl (CEC, Siting Project Manager). See attached Report of Communication.

BACKGROUND

On page 3 of the petition, Calpine states that the requested changes "*...are based on new information that was learned as a result of operating experience gained at the facility and was not known at the time of certification.*" It is not clear from this language whether Calpine is referencing the original certification proceedings or the more recent recertification proceedings. The application for recertification (AFC) for the Energy Commission conditions of certification was submitted in December 2003 (Los Esteros 2003, 03-AFC-2C) and the Energy Commission recertified the Los Esteros Critical Energy Facility simple cycle configuration (Phase 1) on March 16, 2005.

In that AFC, Calpine included justification for increasing the SO_2 limits, the fuel sulfur limit, and the heat rate for the combined cycle configuration (Phase 2) of the project, but did not propose any of those changes for the existing simple cycle configuration of the equipment.

Section 1769(C) states, "*If the modification is based on information that was known by the petitioner during the certification proceeding, an explanation why the issue was not raised at the time...*" is required. It is staff's understanding that many of the modifications

were previously requested for these turbines in relation to their conversion to combined cycle.

DATA REQUEST

1. Please provide an explanation why each of the requested seven modifications was not raised at the time of the simple cycle project recertification, or during that recertification process prior to final approval on March 16, 2005.

This data request is posed in two parts.

First, the data request asks for an explanation of why each of the seven proposed modifications were not raised at the time of the simple cycle project recertification.

LECEF, LLC applied for recertification of the LECEF facility on December 30, 2003. These proposed modifications were not included in this Application for Certification because LECEF did not become operational until March 7, 2003. LECEF LLC was still studying the initial operation and performance of the LECEF and had not made a determination regarding the need for any of the seven proposed modifications.

Second, the data request asks for an explanation why each of the seven proposed modifications were not raised during the recertification process prior to final approval on March 16, 2005.

In fact, these same proposed modifications were raised during the recertification process. Specifically, on August 28, 2004, LECEF, LLC filed an amendment that was identical to the amendment now under consideration by the Commission. However, the amendment was withdrawn at the request of the Applicant and without objection from the Commission staff. At the time the Amendment was withdrawn on September 16, 2004 the Applicant stated expressly that the Application would be refiled at a later date. The Amendment was refiled on June 22, 2005.

2. Please also provide an explanation of the facts and circumstances that will allow the Energy Commission to make the required findings in 1769(a)(3)(D) concerning this matter.

Section 1769(a)(3)(D) provides that the Commission may approve a project modification if it finds "that there has been a substantial change in circumstances since the Commission certification justifying the change or that the change is based on information that was not available to the parties prior to Commission certification."

There has been a substantial change in circumstances and substantial new information since the Commission certified the facility on July 2, 2002. Since July 2002, the LECEF facility has been constructed and has commenced operation. The recently approved recertification of the LECEF project is also now final and non-appealable. Each of the requested changes is based on actual operating experience of the newly constructed facility – information that was not known to the parties when the project was certified.

The Amendment itself clearly sets forth the facts and circumstances that will allow the Commission to make the required findings in 1769(a)(3)(D). The Amendment states clearly that:

> The proposed changes to AQ-19b, 24, 26 and 27 are based on information learned after the completion of the certification process during the commissioning and operation phase of the project. Changes to AQ-28, 34, and 35 are dditional minor clarifications."

AQ19(b): As the Amendment explains, this modification is proposed in order "To maintain consistency throughout the Calpine plants and to implement an ammonia monitoring technique that is more accurate and operator friendly." This modification is based on actual operating experience at LECEF and other Calpine plants.

AQ24: As explained in the Amendment, the changes to condition AQ-24a and b are proposed to correct the hourly and daily maximum heat input limits to accurately reflect the operating capacity of the LM6000. In addition, the Applicant is requesting a change in the sulfur content limit because our gas supplier cannot guarantee meeting the total sulfur content of 0.25 gr/100scf.

AQ26: As explained in the Amendment, the changes to condition AQ-26 are based on the infrequent operation of these peaking facilities. (See LECEF's response to Data Request 6 below for a spreadsheet summarizing monthly hours of operation.) The District typically imposes an annual source test requirement on facilities assuming that the facility is in operation most of the year. The purpose of the source testing is to determine compliance with emission limits as a facility's equipment is operated over time. Since this facility is a peaking facility, it makes sense to only require source testing every 8,000 hours of operation, which is essentially equivalent to one year of operation. We are also requesting a time frame of sixty days from the completion of a source test to submit the results to the District. Past experience has indicated that source test vendors require more than thirty days to complete analyses and provide a report.

AQ27: As explained in the Amendment, the requested change in AQ-27 (to allow for the use of a calculation based on the total sulfur levels in the fuel to demonstrate compliance with SAM emission limits in Condition AQ-23) is based on discussions with BAAQMD. These discussions recognized that the method for measuring sulfuric acid mist would not result in a detection limit low enough to prove compliance with the emissions limits in Condition AQ-23. We are currently submitting calculations based on the fuel gas sulfur to comply with this condition. As long as we are in compliance with our fuel gas sulfur limit listed in Condition AQ-24c., the limit contained in AQ-23 listed above cannot be exceeded. Therefore, as long as compliance is demonstrated with Condition AQ-23 there is no need to conduct further source testing or calculations to prove compliance with this condition.

In summary each of the above described changes are based on actual operating experience with the LECEF and/or discussions with BAAQMD. These events occurred after certification of the LECEF facility and therefore, are based on information which was not known to the parties at the time the facility was certified.

BACKGROUND

Calpine requests that the required ammonia monitoring technique be changed to allow monitoring of ammonia slip concentration levels as opposed to ammonia molar ratios. Calpine claims that this methodology will be more accurate, user friendly, and more consistent with the required monitoring technique at other Calpine facilities.

DATA REQUEST

3. Please provide a clear description of the proposed ammonia slip monitoring technique, including a discussion of how the technique differs from the currently required technique.

The ammonia will be monitored as outlined in the attached equation.

This calculation is a mass balance calculation based on the inlet and outlet NOx to the SCR system and the ammonia fed to the SCR system. There is also a bias factor incorporated into the equation based on the source testing conducted at the facility. At the time of source testing the calculation is compared to the actual measured ammonia slip and correction factor is determined. The bias factor is then inserted into the Data Acquisition system to be used in the Ammonia slip Calculation. The factor is updated each time source testing is conducted. The existing permit condition requires that a molar ratio to be determined during source testing of the ammonia injection rate to the NOx inlet to the SCR system and that the facility remain below this molar ratio as a surrogate for NH3 slip. The calculation method proposed above is both more accurate and user friendly for the plant staff as it relates directly to the permit condition of 10 ppm NH3 slip. The calculation has been approved by the BAAQMD and is in use at our Delta Project facilities.

BACKGROUND

The current SO_2 emissions limits (in AQ-19f and AQ-22) are based on an assumed fuel sulfur content of 0.25 gr/100 scf, and a heat rate of 472.6 MMBtu as follows (BAAQMD 2002 and CEC 2005a):

(0.25 gr/100scf)(10^6 Btu/MMBtu)(2 lb-SO_2/lb-S)(1 lb/7000 gr)(1 scf/1022 Btu)
= 0.000699 lb-SO_2/MMBtu

(0.000699 lb-SO_2/MMBtu)(472.6 MMBtu/hr)
= **0.33 lb-SO_2/hr** (Condition AQ-19f)

(0.33 lb-SO_2/hr-start/stop)(1 start) + (0.33 lb-SO_2/hr)(23 hr)
= **7.9 lb-SO_2/day-turbine** (Condition AQ-22)

(7.9 lb-SO_2/day-turbine)(4 turbines)(365 days/year)(1 ton/2000 lb)
= **5.8 tons/year** (AQ-22)

Calpine is proposing to change the maximum heat rate (to 500 Btu/hr) and the maximum sulfur content (to 1 gr/100 scf).

DATA REQUEST

4. How does Calpine propose to prove compliance with the hourly, daily, and annual SO_2 emissions limits if the fuel sulfur content limit is increased to 1.0 gr/100 scf and the heat rate limit is increased to 500 Btu/hr?

Compliance with the hourly, daily and annual SO2 emissions limits will be determined by an emissions factor and fuel use. The emission factor will be determined during source testing.

5. Does Calpine propose changing, or amending at a later date, the hourly, daily, and/or annual SO_2 emissions limits? If yes, does Calpine propose providing SO_x emission reduction credits (ERC) to mitigate the additional permitted SO_2 emissions levels and their potential contribution to regional PM10 and PM2.5 levels?

Calpine will not increase the hourly, daily, and annual emission rates for SO2 in the future as a result of the current increase in fuel gas sulfur content.

BACKGROUND

Calpine proposes to change the source testing requirement to allow up to 8,000 operational hours in between required source tests. Calpine reasons that the source test requirement was intended for facilities that are in frequent operation, not for an infrequently operated peaking facility such as Los Esteros.

Staff is concerned that because Los Esteros does not operate frequently, such a modification could lead to excessively long periods between source tests.

DATA REQUEST

6. Please provide a summary of the monthly hours of operation for each turbine at Los Esteros since the facility began commercial operation.

   See attached spreadsheet.

7. Based on the above summary of monthly hours of operation, please estimate how many years between source tests would be allowed if the facility were only required to source test every 8,000 hours.

   Estimate is 6 years.

8. Please discuss if Calpine would accept a further limit on the maximum amount of time between source tests (e.g. a maximum of three years between source tests), in addition to the proposed hours of operation trigger.

Yes, Calpine would be willing to except a permit limit that requires source testing at least every three years, or a longer period if the CPM and the BAAQMD agree that a longer period is appropriate.

REFERENCES

BAAQMD 2002 (Bay Area Air Quality Management District). Final Determination of Compliance, Los Esteros Critical Energy Facility, Plant No. 13289. February 1, 2002.

Calpine 2001 (Calpine Corp.) Application for Certification for the Los Esteros Critical Energy Facility. Pleasanton, CA. August 2001.

Calpine 2005 (Calpine Corp.).Letter to Mr. Lance Shaw (CEC, Compliance Project Manager) from Mr. Dana Petrin (Calpine, Compliance Manager), "Re: Petition to Amend Los Esteros Critical Energy Facility's Conditions of Certification," Enclosed: *Petition for Insignificant Amendments to Operations Conditions of Certification*. San Jose, CA. June 22, 2005.

CEC 2005a (California Energy Commission). Los Esteros Critical Energy Project Commission Decision. P800-02-005. Sacramento, CA. July 2005.

CEC 2005b (California Energy Commission). *ROC: Los Esteros Amendment*. Sacramento, CA. August 3, 2005.

Los Esteros 2003 (Los Esteros Critical Energy Facility, LLC). Application for Certification for the Los Esteros Critical Energy Facility, Phase 1 Relicense and Phase 2 Combined-Cycle Conversion. December 2003.

Hours of Operation

Month	Unit #1	Unit #2	Unit #3	Unit #4	Total per Month	Average
March-03	65.92	66.85	62.07	72.82	267.65	66.91
April-03	48.10	47.95	47.53	50.93	194.52	48.63
May-03	50.65	44.67	17.35	42.80	155.47	38.87
June-03	23.45	12.05	9.13	35.42	80.05	20.01
July-03	205.09	185.10	193.76	177.33	761.28	190.32
August-03	168.72	159.80	167.68	172.94	669.14	167.28
September-03	154.23	133.48	129.92	142.52	560.15	140.04
October-03	153.00	116.12	144.42	142.75	556.28	139.07
November-03	25.92	57.53	19.80	27.63	130.88	32.72
December-03	52.13	55.34	51.45	48.63	207.55	51.89
January-04	20.92	26.55	25.82	25.95	99.23	24.81
February-04	62.05	36.30	34.32	43.78	176.45	44.11
March-04	39.97	86.15	31.73	88.30	246.15	61.54
April-04	56.65	55.00	53.89	56.15	221.69	55.42
May-04	95.45	78.95	89.12	91.63	355.15	88.79
June-04	116.85	116.03	116.43	115.87	465.18	116.30
July-04	180.77	179.23	175.05	180.47	715.52	178.88
August-04	189.77	207.97	199.20	185.70	782.64	195.66
September-04	188.07	207.52	199.50	195.13	790.22	197.55
October-04	140.20	160.55	144.00	139.62	584.37	146.09
November-04	248.94	255.35	195.70	248.83	948.82	237.20
December-04	217.14	212.12	232.47	224.20	885.92	221.48
January-05	92.70	95.53	102.82	99.82	390.87	97.72
February-05	31.37	26.60	35.12	37.70	130.79	32.70
March-05	13.89	15.75	19.45	20.17	69.25	17.31
April-05	32.47	19.45	31.48	32.80	116.20	29.05
May-05	57.47	72.83	74.39	70.90	275.59	68.90
June-05	54.53	53.10	49.63	52.50	209.76	52.44
July-05	244.51	255.32	255.13	243.63	998.59	249.65
Total Per Unit	3030.89	3039.18	2908.35	3066.92	12045.34	

August-05	167.28	
September-05	140.04	
October-05	139.07	
November-05	32.72	
December-05	51.89	3561.886
January-06	24.81	
February-06	44.11	
March-06	61.54	
April-06	55.42	
May-06	88.79	
June-06	116.30	
July-06	178.88	
August-06	195.66	
September-06	197.55	
October-06	146.09	
November-06	237.20	
December-06	221.48	5129.718

January-07	97.72		
February-07	32.70		
March-07	17.31		
April-07	29.05		
May-07	68.90		
June-07	52.44		
July-07	249.65		
August-07	167.28		
September-07	140.04		
October-07	139.07		
November-07	32.72		
December-07	51.89	6208.480	
January-08	24.81		
February-08	44.11		
March-08	61.54		
April-08	55.42		
May-08	88.79		
June-08	116.30		
July-08	178.88		
August-08	195.66		
September-08	197.55		
October-08	146.09		
November-08	237.20		
December-08	221.48	7776.312	
January-09	97.72		
February-09	32.70		
March-09	17.31		
April-09	29.05		
May-09	68.90		
June-09	52.44	8074.427	Estimated based soley on time
July-09	249.65		is once every 6 years
August-09	167.28		
September-09	140.04		
October-09	139.07		
November-09	32.72		
December-09	51.89		

Ammonia Slip Calculation:

NH3 slip (ppmvd @ 15% O2) = ((NH3 fed ppm - (NOx in ppm - NOx out ppm)) * ((20.9-15)/(20.9-O2))) * b

Where:

NH3 fed in ppm = ((NH3 injection rate, lb/hr * **a**) / (**Q** * **Fd** * 4.4096×10^{-8})) * ((20.9 - O2 %)/20.9)

4.4096×10^{-8} = (K-factor constant) corrects for the molecular weight of ammonia.

a = Ammonia Concentration (in % by wgt/100)

b = Correction Factor based on source test data

Q = Fuel Flow mmbtu/hr

Fd = 8710 scf/mmbtu

Note:

(1) Since LMEC does not have an inlet NOx analyzer, each time source testing is conducted, testing at the inlet to theSCR catalyst will be conducted and that number used for the inlet NOx concentration.