

SUTTER POWER PROJECT AMENDMENT DRAFT STAFF ANALYSIS

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AMENDMENT REQUEST

On May 16, 2000, Calpine Construction Financing Company (CCFC) filed a petition to amend Air Quality Conditions of Certification AQ-32 and AQ-37 in the Sutter Power Project (SPP) Commission Decision, Docket No. 97-AFC-2. This petition was amended in a letter dated July 20, 2000.

The proposed modification of AQ-32 would eliminate the distinction between hot startups and cold startups and apply one set of emission limits to all startups. It would also correct apparent clerical errors in the Startup Emissions Table No. 11. SPP is proposing the following short-term startup emission limits in pounds per hour (lbs/hr) and pounds per start (lbs/start):

- NO_x — 175 lbs/hr. This is the same value in the current permit for maximum hourly emissions during a cold start. The requested modification would also apply this limit to hot startups, which are currently limited to 170 lbs/hr. Total lbs/start would be limited to 510.
- CO — 902 lbs/hr. This is the same value in the current permit for maximum hourly emissions during a hot start. Total lbs/start would be limited to 2514.
- VOC — 1.5 lbs/hr. This is the same value in the current permit for maximum hourly emissions during baseload operation of the gas turbine. Total lbs/start would be limited to 4.5.
- SO₂ — 3.7 lbs/hr. This is the baseload SO_x emission limit in the current permit. This number would replace the current figure of 2.7 lbs/hr that is erroneously shown in the current startup emissions table in the Startup column. Total lbs/start would be limited to 8.1.
- PM₁₀ — 9.0 lbs/hr. This is the baseload and startup PM₁₀ emission limit in the current permit. Total lbs/start would be limited to 27.

The proposed modification of condition AQ-32 would change the current ammonia injection rate limit of 25 pounds per hour (lbs/hr) specified in the current condition to an ammonia emission rate of 25 lbs/hr.

In order to achieve consistency of language, in addition to amending conditions AQ-32 and AQ-37, it is also necessary to modify conditions AQ-38 and AQ-40 to delete references to hot and cold startups and refer only to startups.

BACKGROUND

The background for the proposed modification of condition AQ-32 is as follows. During the siting process, there were certain assumptions made concerning hot and cold startups based on information available at the time. A key assumption was that for up to a 72 hour period after shutdown, a restart of a combustion gas turbine (CTG) could be considered a warm startup, and that the emissions would be lower than for a cold startup, defined as a restart occurring more than 72 hours after a CTG shutdown. In reviewing this assumption with the primary equipment vendors, it was determined that it was erroneous. In fact, it was determined that a CTG would cool down much more rapidly than estimated and be in a cold startup mode well before 72 hours had elapsed from the last shutdown event. Therefore, the assumption that hourly emissions would be lower within that entire 72-hour period of time was erroneous.

In order to correct this problem, CCFC could have requested that the definition of hot and cold startups be revised to reflect a lesser period of time from the previous CTG shutdown. The reason that CCFC asked to replace the hot and cold start definitions with a single set of emission limits to cover all starts was for simplicity of operation and monitoring.

The background for the proposed modification of condition AQ-37 is as follows. During the siting process, the Application for Certification (AFC) for the project proposed that the maximum hourly *emission* rate for ammonia would be 24.8 lbs/hr. This can be seen on page 8.1-26 of the AFC in Table 8.1-22. Somehow, the final conditions of certification in AQ-37 translated this into an ammonia *injection* rate of 25 lbs/hr. This clearly is an error in transferring the data from the AFC to the conditions of certification. It is also clear that the Energy Commission relied on the AFC data of 24.8 lbs/hr of ammonia emissions when it certified the project rather than the erroneous 25 lbs/hr ammonia injection rate contained in the conditions of certification, since there is no support in the record for the 25 lbs/hr limit on the ammonia injection rate. This is further confirmed by the fact that condition AQ-33, which refers to Best Available Control Technology (BACT) specifies a maximum of 10 parts per million (ppm) ammonia slip. The limit of 10 ppm ammonia slip is equivalent to 25 lbs/hr of ammonia emissions.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

The proposed amendment changes have no impact on federal, state and local LORS.

ANALYSIS

The requested changes to Condition of Certification AQ-32 in this amendment petition would have no significant impact on air quality. In conducting the original analysis for the SPP facility, the emission levels for all CTG startups were calculated using the higher emission rates of cold starts rather than warm starts. Therefore, cold start emission levels were used to evaluate the emissions impact from this project.

The applicant proposes eliminating the distinction between hot and cold startups and instead having a single set of emission limits for all startups. The emission limits that are proposed use the higher hourly levels for cold startups. However, the total emission limits per startup use the lower limit for hot startups. The daily limits for emissions remain unchanged. By having one set of startup emission limits, compliance with and enforceability of this condition becomes easier because the operator does not have to distinguish cold starts from hot starts every time turbine operation is initiated. The quantity of required air emission offsets is based on the daily and annual emission limits for the project. The daily and annual emission limits will remain the same, and therefore, the offsets specified in the Commission Decision will remain adequate if the proposed modifications of Condition of Certification AQ-32 are approved.

The purpose of the proposed modification of Condition of Certification AQ-37 is to correct an error in the condition as contained in the SPP Commission Decision. The 25 lbs/hr specified in the current condition is not intended to limit ammonia injection, but instead is intended to limit ammonia emissions which are a residual of the NOx control process. Staff believes that the record of the AFC proceedings make it clear that the current wording of the condition is erroneous and therefore agrees that the language of the condition should be modified to reflect the ammonia emission rate and not the injection rate.

CONCLUSION AND RECOMMENDATIONS

Based on the above analysis, staff concludes that this amendment would not cause any new or additional significant air quality impacts, and the changes are in conformance with all applicable LORS. Staff recommends approval of this amendment and proposes the following changes (additional language shown as underlined, deleted language shown with strikeout):

AQ-32 The following definitions and limitations shall apply (FRAQMD specific ATC Permit Condition b):

(1) CTG Sstartups are defined as the time period commencing with the introduction of fuel flow to the gas turbine and ending when the NOx concentrations do not exceed 2.5 ppmvd at 15% O2 averaged over 1-hour.

~~(2) Cold Startups are those that occur after the CTG has not been in operation for more than 72 hours.~~

~~(3)(2)~~ For each CTG, the Cold Startup a startup shall not exceed 180 consecutive minutes.

~~(4) Hot Startups are startups that are not Cold Startups.~~

~~(5) The maximum allowable NOx emissions for Hot and Cold Startups from each CTG shall not exceed 519 lb/day.~~

~~(6) For each CTG, the Hot Startup shall not exceed 60 consecutive minutes.~~

~~(7)~~ (3) Shutdowns are defined as the time period commencing with a 15 minute period during which the 15 minute average NOx concentrations exceed 2.5 ppmvd at 15% O₂ and ending when the fuel flow to the gas turbine is discontinued.

~~(8)~~ (4) For each CTG, ~~the a Ss~~ shutdown shall not exceed 60 consecutive minutes.

~~(9) The maximum duration of Cold Startups per CTG shall be 150 hours per year and 39 hours per calendar quarter.~~

~~(10)~~ (5) The maximum duration of Hot Ss startups per CTG shall be ~~250~~ 400 hours per year, and ~~63~~ 102 hours per calendar quarter.

~~(11)~~ (6) The maximum duration of Shutdowns per CTG shall be 300 hours per year, and 76 hours per calendar quarter.

~~(12)~~ (7) Compliance with the above yearly limits shall be calculated based on a rolling 12 month average.

~~(13)~~ (8) All emissions during startups and shutdowns shall be included in all calculations of daily and annual mass emissions required by this permit.

~~(14)~~ (9) For each CTG the maximum number of Duct Burner hours of operation shall not exceed 5,460 per calendar year.

~~(15)~~ (10) For each CTG the maximum number of Power Augmentation Steam Injection hours shall not exceed 2,000 per calendar year.

~~(16)~~ (11) For each CTG the maximum hourly emission rates (lbs/hr) ~~(for a cold startup not to exceed 120 minutes of uncontrolled emissions)~~ are given in the table below averaged over any rolling three-hour period, except for the NOx emission rate, which will be averaged over a one hour period. The emission limits in the Total Startup column are shown as pounds per startup:

Pollutant	CTG	CTG + Duct Burner	CTG + Duct Burner + Steam Injection	CTG + Steam Injection	Hot Start - up	Cold Start-up	Total Startup lbs/start	Shut-down
Nox	16.8	18.2	19.1	17.7	175 470	475	510	12.1
CO	16.7	20.1	34.3	30.9	902	838	2514	12.6
VOC	1.5	3.5	3.51	1.51	1.5 4.4	4.4	4.5	1.1
SO2	3.7	3.71	4.02	4.01	3.7 2.7	2.7	8.1	2.7
PM10	9.0	11.5	11.5	9.0	9.0	9.0	27	9.0

_____ (47)(12) For The maximum project daily emissions (lbs/day) are given in the table below:

	Total Emission Per CTG	Calpine Maximum SPP Daily Emissions
NOx	909	1817
CO	3264	6528
VOC	79	158
SO2	90	179
PM10	271	541

(18)(13) The maximum quarterly emissions for the facility are given in the table below:

	January-March lbs/quarter	April-June lbs/quarter	July-Sept. Lbs/quarter	October-December lbs/quarter
Nox	102,500	102,500	102,500	102,500
CO	241,600	241,600	241,600	241,600
VOC	11,850	11,850	11,850	11,850
SO2	15,750	15,750	15,750	15,750
PM10	46,200	46,200	46,200	46,200

(19)(14) The maximum annual calendar year emissions (tons/year) for the facility are given in the table below:

	Total Emissions per CTG	Calpine Annual SPP Emissions
NOx	102	205.86
CO	242	483.18
VOC	11.9	24.41
SO2	15.7	31.5
PM10	46.2	92.5

Verification: As part of the semi-annual Air Quality Report (as required by AQ-43), the project owner shall provide all data required in this condition. In the semi-annual Air Quality Reports (as required by AQ-43), the project owner shall indicate the date, time, and duration of any violation to the NO_x, and VOC limits presented in this condition. The project owner shall include in the semi-annual Air Quality Reports (as required by AQ-43) daily and annual emissions as required in this condition.

AQ-37 The maximum allowable ammonia ~~injection-emission~~ rate ~~to~~-from each of the SCR systems shall be 25 pounds per hour under normal operating condition. This rate may be adjusted based on source tests results. (FRAQMD specific ATC Permit Condition g)

Verification: Please refer to AQ-34 verification.

AQ-38 Within ninety days after beginning commercial operation of the SPP, ~~cold-startup,~~ ~~hot-startup,~~ and shutdown source tests shall be conducted to determine the emissions of CO and NO_x. The APCO may approve the use of the NO_x CEMS readings in lieu of source testing if annual Relative Accuracy Testing Audits (RATA) testing is provided. (FRAQMD specific ATC Permit Condition h).

Verification: Within ninety days after the start of commercial operation of the project, the project owner shall submit to the District and the CPM for review a detailed performance source test procedure designed to satisfy the requirements of this Condition. The project owner shall incorporate the District's and Commission's comments on or modifications to the procedure. The project owner shall also notify the District and the CPM within seven (7) working days before the project begins commercial operation and/or plans to conduct source test as required by this

Condition. Source test results shall be submitted to the District within 30 days of the date of the tests.

AQ-40 The project owner shall provide calendar quarterly reports to the District in a format determined in consultation with the District. The calendar quarterly reports shall include the following: CEMS and predictive algorithm emissions data; CTG and duct burner fuel use and operating hours; power augmentation steam injection rates and hours of operation; ammonia injection rates; emission control systems and CEMS hours of operation including the time, date, duration, and reason for any malfunctions of these systems; the number of ~~hot startups, cold startups,~~ and shutdowns; and the electrical and steam production rates. These data shall be averaged on a daily basis, except where required to demonstrate compliance with an emission limitation. (FRAQMD specific ATC Permit Condition j).

Verification: Within 30 days of the end of the calendar quarter, the project owner shall provide to the District and CPM the data required in this Condition.