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PROPOSED
02-19-2009

AUTHORITY TO CONSTRUCT ENGINEERING EVALUATION

Application No.:	A/C 21738
Date:	February 19, 2009
Evaluation by:	Bruce Nixon

A. FACILITY NAME:

Sacramento Power Authority (SPA)

B. LOCATION OF EQUIPMENT:

3215 47th Avenue
Sacramento

C. PROPOSAL:

SPA is proposing to replace the master control system (hardware and software) for the operation of the turbine, duct burner and all related facility equipment. SPA is requesting to modify the current Permits to Operate to increase (1) the allowable hourly and daily NOx and CO emission limits and (2) the allowable NOx concentration for a short period of time. The increased emission limits would be applicable for approximately eleven days during the "commissioning" period of the facility when the new master control system begins operation.

D. DISCUSSION:

The modification will replace the current gas turbine and duct burner control system (Teleperm XP/Bailey Infi-90) with the Siemens T-3000 control system. Significant portions of the Teleperm XP/Bailey Infi-90 control system are now obsolete and the Teleperm XP/Bailey Infi-90 manufacturers have stopped support of the system. As a result, many replacement parts are no longer available. In order to maintain the current level of reliability, a complete digital control system replacement is required. The project entails the removal of all system hardware down to the individual input/output cards and replacement with new hardware. New software will be loaded into the new system computers to mimic the control dynamics of the old system. At this point, tuning will be required that includes all gas turbine control elements as well as steam turbine and balance-of-plant control elements. Tuning will modify the new software algorithms to allow functionality similar to what the old software provided. Tuning of the various control elements will allow technicians to operate the plant as they have been trained to do. The tuning procedure consists of commissioning activities in the various operating modes, including operating the dry low-NOx combustor in "diffusion" mode up to full load, rather than switching to the low-NOx "pre-mix" mode, while tuning and adjustments to the operating system are performed. SPA is therefore requesting a commissioning period in order to complete the necessary tuning. During tuning and commissioning, NOx and CO emissions will exceed emission limits specified in the current P/O Nos. 14071 and 14072.

For this permit action the current Permit to Operate No. 14072 for the gas turbine will be modified to No. 21738. The current Permit to Operate numbers for the duct burner, air pollution control system - NOx and air pollution control system - CO will not be changed.

Note that there will be no change in the quarterly NOx and CO emission limits during the commissioning period. All NOx and CO hourly and daily emissions that are greater than current emission limits will be counted in the quarterly NOx and CO mass emission limits. This will be the limiting condition for the amount of time that the gas turbine and duct burner can operate at elevated NOx and CO emission levels during the commissioning period. No other limits will be placed on the number of operational hours of the gas turbine and duct burner during the commissioning period. It is not possible to accurately set a limit on the number of hours it will take to complete the commissioning period because of unforeseen problems that may occur during the process.

The following is a discussion of the new permit conditions that will be applicable during the commissioning period that will minimize NOx and CO emissions.

1. Definition of Commissioning Period

The commissioning period is defined as follows:

"The commissioning period shall commence when all mechanical, electrical and control systems are installed and the gas turbine is first fired. The commissioning period shall terminate when the SPA facility has successfully completed performance testing, tuning and shakedown operations and compliance is demonstrated by continuous emissions monitoring equipment."

2. Reduce NOx and CO Emissions as Early in the Commissioning Period as Feasible

At the earliest feasible opportunity, in accordance with recommendations of the equipment manufacturers and the construction contractor, the gas turbine combustors shall be tuned to minimize emissions of CO and NOx.

At the earliest feasible opportunity, in accordance with recommendations of the equipment manufacturers and the construction contractor, the Selective Catalytic Reduction (SCR) system shall be adjusted and operated to minimize emissions of NOx.

3. NOx and CO Emissions Monitoring

During the commissioning period, compliance with NOx and CO emission limits for the gas turbine and duct burner shall be demonstrated through the use of properly operated and maintained continuous emission monitoring systems and continuous parameter monitoring systems for the following:

Firing hours of the gas turbine and duct burner
Fuel flow rates to the gas turbine and duct burner

Stack gas NOx emission concentrations
Stack gas CO emission concentrations
Stack gas O2 concentrations

The monitored parameters shall be recorded at least once every 15 minutes (excluding normal calibration periods or when the monitored source is not in operation) for the gas turbine and duct burner. Previously approved methods shall be used to calculate heat input rates, NOx and CO mass emission rates, and NOx and CO emission concentrations, summarized for each clock hour and each calendar day. All records shall be retained on site for at least 5 years from the date of entry and made available to SMAQMD personnel upon request.

The continuous emission and parameter monitors shall be installed, calibrated and operational prior to firing of the gas turbine and duct burner with the new control system. After initial firing of the gas turbine and duct burner, the detection range of these continuous emission monitors shall be adjusted as necessary to accurately measure the resulting range of NOx and CO emission concentrations.

4. Minimize Operation Time When the SCR System Is Not Being Used to Control NOx

The total number of firing hours of the gas turbine and duct burner without control of NOx emissions by the SCR system shall not exceed 100 hours during the commissioning period. Such operation of the gas turbine and duct burner shall be limited to discrete commissioning activities that can only be properly executed without the SCR system fully operational. The number of firing hours of the gas turbine and duct burner without control of NOx emissions by the SCR system shall be recorded on an hourly basis during the commissioning period.

5. Proposed Change to NOx Concentration Limit

The following table shows the current NOx concentration emission limit and the proposed NOx concentration emission limit during the commissioning period.

Concentration of nitrogen oxides (NOx) emissions from the gas turbine and duct burner shall not exceed the following limit:

Pollutant	Maximum Allowable NOx Concentration Gas Turbine and Duct Burner ppmv at 15% O2, averaged over any consecutive 3 hour period	
	Current Permit Limit	Proposed Permit Limit Applicable During the Commissioning Period
NOx	3	No limit

6. Proposed Change to Hourly Emission Limits

The following table shows the current hourly emission limits and the proposed hourly emission limits during the commissioning period.

Hourly mass emissions from the gas turbine and duct burner shall not exceed the following limits:

Pollutant	Maximum Allowable Emissions Gas Turbine and Duct Burner lb/hour, averaged over any consecutive 3 hour period	
	Current Permit Limits	Proposed Permit Limits During the Commissioning Period
ROC	9.01	9.01 (no change)
NOx	17.76	360
SO2	0.97	0.97 (no change)
PM10	7.00	7.00 (no change)
CO	10.81	500

7. Proposed Change to Daily Emission Limits

The following table shows the current daily emission limits and the proposed daily emission limits during the commissioning period.

Daily mass emissions from the gas turbine and duct burner shall not exceed the following limits:

Pollutant	Maximum Allowable Emissions Gas Turbine and Duct Burner lb/day	
	Current Permit Limits	Proposed Permit Limits During the Commissioning Period
ROC	146.7	146.7 (no change)
NOx	384.5	1500

	Maximum Allowable Emissions Gas Turbine and Duct Burner lb/day	
SO2	21.8	21.8 (no change)
PM10	142.1	142.1 (no change)
CO	326.9	1875

E. EQUIPMENT DESCRIPTION:

Gas Turbine
A/C No. 21738
[SMAQMD Rule 201 current Permit to Operate No. 14072]
Manufacturer: Siemens
Model No.: V84.2
Type: Combined Cycle
Nominal Rating: 103 MW
Heat Input Rating: 1410 MMBTU/hour
Fuel: Natural Gas

Duct Burner for Heat Recovery Steam Generator
[SMAQMD Rule 201 current Permit to Operate No. 14071]
Heat Input Rating: 200 MMBTU/hour
Fuel: Natural Gas

Air Pollution Control System - NOx
[SMAQMD Rule 201 current Permit to Operate No. 11458]
Control Device: Selective Catalytic Reduction
Manufacturer: Nooter/Eriksen
Venting: Gas Turbine and Duct Burner

Air Pollution Control System - ROC and CO
[SMAQMD Rule 201 current Permit to Operate No. 11459]
Control Device: Oxidation Catalyst
Manufacturer: Nooter/Eriksen
Venting: Gas Turbine and Duct Burner

F. PROCESS RATE:

There are no proposed changes to the existing process rate.

The gas turbine may combust natural gas at a maximum rate of 1410 MMBTU/hour.

The duct burner may combust natural gas at a maximum rate of 200 MMBTU/hour.

G. OPERATING SCHEDULE:

There are no proposed changes to the existing operating schedule.

The gas turbine and duct burner can operate 24 hours/day and 365 days/year.

H. CONTROL EQUIPMENT EVALUATION:

There are no proposed changes to the existing air pollution control systems.

For the previous air pollution control equipment evaluation see Engineering Evaluations for A/C Nos. 11456, 11457, 11458 and 11459 [see document titled *Final Determination of Compliance for the Campbell Soup Cogeneration Project August 19, 1994* (LAN location is L:\SSD FOLDERS\Permitting\Permits\21501-22000\SPA CSC FDOC Initial 08-19-1994.doc)]

I. EMISSIONS CALCULATIONS:

1. HISTORIC POTENTIAL TO EMIT:

This permit action is classified as a "non-major" modification by the definition in SMAQMD Rule 202 Section 221. Based on a classification as a "non-major" modification, the Historic Potential Emissions are then equal to the potential to emit prior to the modification, as specified by the definition in SMAQMD Rule 202 Section 219.1.

Pollutant	Maximum Allowable Emissions (A) Combined Emissions from: Gas Turbine and Duct Burner and Cooling Tower				
	Quarter 1 lb/quarter	Quarter 2 lb/quarter	Quarter 3 lb/quarter	Quarter 4 lb/quarter	Total lb/year
ROC	8,792	8,898	13,264	8,968	39,922
NOx	24,209	24,545	26,321	24,725	99,800
SO2	1,814	1,836	1,944	1,853	7,447
PM10	11,015	10,160	12,294	11,619	45,088
CO	21,265	21,601	22,803	21,708	87,377

2. PROPOSED POTENTIAL TO EMIT:

The proposed potential to emit on a quarterly basis will be unchanged from the Historic

Potential to Emit

Pollutant	Maximum Allowable Emissions (A) Combined Emissions from: Gas Turbine and Duct Burner and Cooling Tower				
	Quarter 1 lb/quarter	Quarter 2 lb/quarter	Quarter 3 lb/quarter	Quarter 4 lb/quarter	Total lb/year
ROC	8,792	8,898	13,264	8,968	39,922
NOx	24,209	24,545	26,321	24,725	99,800
SO2	1,814	1,836	1,944	1,853	7,447
PM10	11,015	10,160	12,294	11,619	45,088
CO	21,265	21,601	22,803	21,708	87,377

3. CALCULATION OF BACT TRIGGER:

NEI (BACT) = Net Emissions Increase for BACT purposes
= Proposed Potential to Emit - Historic Potential to Emit

MPE = Maximum Potential Emissions based on a 24-hour day operation

Pollutant	NEI (BACT) lb/qtr	Is NEI (BACT) > 0?	MPE (A) lb/day	BACT Trigger lb/day	Is BACT Required? (B)
ROC	0	No	146.7	≥ 10	No
NOx	0	No	384.5	≥ 10	No
SO2	0	No	21.8	≥ 10	No
PM10	0	No	151.8	≥ 10	No
CO	0	No	326.9	≥ 550	No

(A) This is the MPE (lb/day) excluding the commissioning period.
(B) BACT is only required if both the quarterly Net Emissions Increase (NEI) is greater than 0 and the daily Maximum Potential Emissions (MPE) are greater than or equal to the BACT trigger level.

4. CALCULATION OF OFFSET TRIGGER FOR ROC AND NOx:

[ ] indicates active permit

Permit No.	Emissions Unit	Stationary Source Potential to Emit lb/quarter	
		ROC	NOx
P/O 11456	Gas Turbine	Modified to P/O 14072	
P/O 11457	Duct Burner	Modified to P/O 14071	
P/O 11458	APC SCR NOx	See A/C 21738	
P/O 11459	APC Oxidation CO	See A/C 21738	
P/O 13316	Cooling Tower	See A/C 21738	
P/O 14071	Duct Burner	See A/C 21738	
P/O 14072	Gas Turbine	Modified to A/C 21738	
A/C 21738	Gas Turbine	13,264	26,321
	Total	13,264	26,321
	Offset Trigger Level	≥ 5,000	≥ 5,000

5. CALCULATION OF OFFSET TRIGGER FOR SO2, PM10 AND CO:

indicates active permit

Permit No.	Emissions Unit	Stationary Source Cumulative Emission Increase Since 01-01-77 lb/quarter		
		SO2	PM10	CO
P/O 11456	Gas Turbine	Modified to P/O 14072		
P/O 11457	Duct Burner	Modified to P/O 14071		
P/O 11458	APC SCR NOx	See A/C 21738		
P/O 11459	APC Oxidation CO	See A/C 21738		
P/O 13316	Cooling Tower	See A/C 21738		
P/O 14071	Duct Burner	See A/C 21738		
P/O 14072	Gas Turbine	Modified to A/C 21738		

Permit No.	Emissions Unit	Stationary Source Cumulative Emission Increase Since 01-01-77 lb/quarter		
		SO2	PM10	CO
A/C 21738	Gas Turbine	1,944	12,294	22,803
	Total	1,944	12,294	22,803
	Trigger Level	≥ 13,650	≥ 7,500	≥ 49,500

6. CALCULATION OF EMISSION OFFSETS FOR ROC AND NOx:

ROC: Emission offsets are triggered for ROC.
The proposed quarterly increase in ROC emissions is 0 lb ROC/quarter.
Therefore, the amount of offsets required is 0 lb ROC/quarter.

NOx: Emission offsets are triggered for NOx.
The proposed quarterly increase in NOx emissions is 0 lb NOx/quarter.
Therefore, the amount of offsets required is 0 lb NOx/quarter.

7. CALCULATION OF EMISSION OFFSETS FOR SO2, PM10 AND CO:

SO2: Emission offsets are not triggered for SO2.

PM10: Emission offsets are triggered for PM10.
The proposed quarterly increase in PM10 emissions is 0 lb NOx/quarter.
Therefore, the amount of offsets required is 0 lb PM10/quarter.

CO: Emission offsets are not triggered for CO.

J. COMPLIANCE WITH RULES AND REGULATIONS:

1. California Health and Safety Code Section 42301.6:

The proposed equipment is not located within 1000 feet of a K–12 school. Therefore, the California Health and Safety Code Section 42301.6 requirements for public noticing do not apply.

2. SMAQMD Rule 202 - New Source Review:

Section 112 - Exemption - Notification Requirements

The increase in Potential to Emit associated with this permit action does not exceed the following levels requiring public noticing.

However, this permit action will be processed using SMAQMD Rule 202 Section 404 *Enhanced New Source Review* and therefore the notification exemption of Section 112 is not applicable.

The procedural requirements in SMAQMD Rule 207 Sections 401 through 408 will be used. The preliminary decision on the Authority to Construct will be published in the Sacramento Bee specifying a 30 day public comment period.

Pollutant	Increase in Potential to Emit Level Requiring Public Noticing lb/quarter
ROC	≥ 5,000
NOx	≥ 5,000
SO2	≥ 13,650
PM10	≥ 7,500
CO	≥ 49,500

Section 301 - BACT

BACT is not triggered for ROC, NOx, SO2, PM10 and CO for this permit action.

Section 302 - Offsets

Offsets are triggered for ROC, NOx and PM10 but not for SO2 and CO.

ROC: The proposed quarterly increase in ROC emissions is 0 lb ROC/quarter. Therefore, the amount of offsets required is 0 lb ROC/quarter.

NOx: The proposed quarterly increase in NOx emissions is 0 lb NOx/quarter. Therefore, the amount of offsets required is 0 lb NOx/quarter.

PM10: The proposed quarterly increase in PM10 emissions is 0 lb NOx/quarter. Therefore, the amount of offsets required is 0 lb PM10/quarter.

Section 305 – Ambient Air Quality Standards

Emissions from a new or modified stationary source shall not prevent or interfere with the attainment or maintenance of any ambient air quality standard. The commissioning period will result in temporary increases of NOx and CO emissions. As such, the applicant conducted an air quality impact analysis using U.S. EPA's AERMOD air quality modeling software to determine the potential ambient impacts. Impacts were analyzed relative to the 1-hour NO2, 1-hour CO and 8-hour CO ambient air quality standards. The results from the air quality impact analysis, in the following table, demonstrate that the commissioning period will not prevent or interfere with the attainment or maintenance of ambient air quality standards.

Maximum Ambient Impacts (ug/m3)						
Pollutant	Averaging Time	SPA Project Impact (ug/m3)	Background Concentration (ug/m3)	Total Impact (ug/m3)	State AAQS (ug/m3)	Federal AAQS (ug/m3)
NO2	1-hour	182	147	329	339	--
CO	1-hour	3,637	5,470	9,107	23,000	40,000
CO	8-hour	1,775	4,889	6,664	10,000	10,000

(A) AAQS is ambient air quality standard.

Section 307 - Denial, Failure to Meet CEQA

The SMAQMD utilizes the *Guide to Air Quality Assessment in Sacramento County, SMAQMD, July 2004* as a guide during the initial study phase of a proposed project to determine the level of review necessary under CEQA.

a. ROG and NOx: The average daily increase in emissions from this permitting action is 0 lb/day of ROG and 0 lb/day of NOx. These emission levels are below the CEQA review trigger levels of 65 lb/day.

   There will be no increase in the quarterly mass emissions of ROC and NOx. Therefore, the daily average increase for the quarter will be 0 lb/day.

b. Other pollutants: This permitting action does not result in emission increases that could lead to violations of any applicable California Ambient Air Quality Standards.

c. Toxic Air Contaminants (TACs): This permitting action is not subject to T-BACT because there are no increases in TACs and therefore the cancer health risk from this permitting action does not exceed 1 in 1 million.

d. Cumulative TACs: The emission of TACs from this permitting action, when combined with TACs from any nearby sources identified in the CARB Toxics Hot Spot Program (AB2588), does not result in a cumulative health risk greater than 10 in one million.

This permitting action does not exceed any of the criteria above, therefore the project does not require further CEQA review.

Section 404 - Enhanced New Source Review

This permit action will be processed using SMAQMD Rule 202 Section 404 Enhanced New

Source Review. The procedural requirements in SMAQMD Rule 207 Sections 401 through 408 will be used. There will be a Sacramento Bee public notice requesting comments within a 30 day review period. The U.S. EPA Region 9 will have a 45 day review period.

The use of the Enhanced New Source Review process will allow this permit action to be incorporated into the facility's Title V permit through a Title V administrative permit amendment (see SMAQMD Rule 207 Section 202.5).

3. Federal Prevention of Significant Deterioration (PSD):

A PSD analysis is not required because there are no emissions of an attainment pollutant that exceed the following levels -

Attainment Pollutants within the SMAQMD	Primary PSD Applicability Level (A) (i.e. federal PSD "major" source level) tons/year	Secondary PSD Applicability Level (B) (i.e. federal PSD "significance" level) tons/year
NO2	≥ 250	≥ 40
SO2	≥ 250	≥ 40
CO	≥ 250	≥ 100

(A) Except that the "major" source level is ≥ 100 tons/year for stationary sources listed in 40 CFR 51.166(b)(1)(i)(a).
(B) If emissions of one of the "attainment" pollutants qualifies the stationary source as a federal PSD "major" source, then PSD is also applicable to any other "attainment" pollutant that exceeds the federal PSD "significance" level for **both** (1) the project emissions increase **and** (2) the facility net emissions increase.

4. Prohibitory Rules

SMAQMD Rule 401 - Ringelmann Chart

Visible emissions from the gas turbine and duct burner are expected to comply with the 20% opacity requirement of this rule.

SMAQMD Rule 402 - Nuisance

Health Risk Assessment (HRA):

The master control system replacement project will not result in an increase in any toxic air pollutants on a quarterly basis. Therefore, there will not be an increase in cancer risk or noncarcinogenic hazard indices.

Rule 406 - Specific Contaminants

Emissions from the gas turbine and duct burner are expected to comply with the emissions limit of 0.2% by volume sulfur compounds as SO2 and 0.1 grains/dscf of other combustion gases calculated at 12% CO2:

Rule 413 - Stationary Gas Turbines

The gas turbine has continuously complied with the maximum 9 ppmvd NOx requirement of this rule since initial startup. No changes are proposed that would affect future continuing compliance.

Rule 420 - Sulfur Content of Fuels

This rule limits the sulfur content of gaseous fuels to less than 50 grains of sulfur compounds per 100 cubic feet, calculated as hydrogen sulfide. The commercial natural gas combusted by the gas turbine and duct burner has a typical sulfur content that is much less than 0.5 grains per 100 cubic feet, calculated as hydrogen sulfide and is expected to comply.

5. Federal New Source Performance Standard (NSPS):

The gas turbine is subject to 40 CFR 60 Subpart GG *Standards of Performance for Stationary Gas Turbines* (begin at 60.330). The gas turbine has complied with the requirements since initial startup. No new requirements are applicable based on this current permitting action.

The gas turbine is not subject to 40 CFR 60 Subpart KKKK *Standards of Performance for Stationary Combustion Turbines* (begin at 60.4300) because there is no increase in emissions based on this current permitting action. Subpart KKKK would only become applicable if the modification resulted in an increase in a regulated emission (NOx or CO).

6. Federal National Emission Standards For Hazardous Air Pollutants (NESHAP):

The SPA facility is not a major source of HAP emissions and therefore is not subject to 40 CFR 63 Subpart YYYY *National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines* (begin at 63.6080).

7. California Air Toxic Control Measure (ATCM):

There are no California ATCMs applicable to the gas turbine and duct burner.

F. RECOMMENDATION:

1. **PRELIMINARY DECISION** - An Authority to Construct to allow increased hourly and daily NOx and CO emissions during the commissioning period of the new facility master control system should be issued to Sacramento Power Authority (SPA) with the following conditions.

2. **ENHANCED NEW SOURCE REVIEW PROCESSING** - Following the procedures in

SMAQMD Rule 207 Sections 401 through 408:

a. Publish a public notice in the Sacramento Bee newspaper regarding the preliminary decision to issue the Authority to Construct allowing a 30 day comment period.

b. Send to U.S. EPA Region 9 the draft engineering evaluation and Authority to Construct allowing a 45 day comment period.

Refer to conditions on Authority to Construct No. 21738

Reviewed by: _____ **Date:**

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