SYCAMORE COGENERATION PROJECT (84-AFC-6)

Petition to allow the installation of Enhanced Dry Low NOx Combustors
Air Quality Staff Analysis
Prepared by: Joseph M. Loyer
February 8, 2008

INTRODUCTION

The Sycamore Cogeneration Company (SCC) submitted a petition on September 10, 2007 to the California Energy Commission (Commission) to amend conditions of certification to allow the installation of enhanced dry low NOx combustors in units 1, 2, 3 and 4 at the Sycamore Cogeneration Power Project (Sycamore). This would allow SCC to comply with the San Joaquin Valley Air Pollution Control District (District) retro-fit rule 4703.

LAWS, ORDINANCS, REGULATIONS AND STANDARDS

No laws, ordinances, regulations, or standards will affect the petitioned amendment requests.

ANALYSIS

SCC was granted a license to operate in December of 1986 for a 300 MW cogeneration project in Kern County, California. The facility consists of four 75-MW natural gas combustion turbines with unfired heat recovery steam generators (HRSG) and currently equipped with Dry Low NOx (DLN) combustors to minimize NOx (oxides of nitrogen) emissions to 16 ppm @ 15% O_2 . The HRSGs are capable of delivering 450,000 pounds/hour of steam to the adjacent oil field for use in TEOR activities and ancillary equipment. SCC has petitioned the Energy Commission for a number of modifications that have been granted. These include minor modifications to the heat-input rates and emission sampling procedures, eliminating oil as a backup fuel for the combustion turbines, and the installation of DLN combustors. Since initial operation, SCC has demonstrated compliance with all permit restrictions with the District, the Energy Commission, and the U.S. Environmental Protection Agency (EPA).

Rule 4703 limits the emissions of NOx and carbon monoxide (CO) from stationary gas turbines. The Sycamore turbines comply with the emission limits and monitoring requirements of this rule. SCC has chosen to undertake what is referred to in Rule 4703 as the "Enhanced Option", which requires NOx emissions to be controlled to 3 ppmv @ 15% O_2 by 2008 or the first major overhaul which is planned to be completed by April 30, 2008.

SCC is petitioning the Energy Commission to allow the installation in units 1, 2, 3 and 4 of the new General Electric enhanced dry low NOx (DLN1+) combustors. These new combustors are guaranteed to control the NOx emissions from GE Frame 7EA turbines to no more than 3 ppm @ 15% O_2. The District has already issued the permit to operate (PTO) for Sycamore which incorporates the new, lower NOx emission rates

shown in AIR QUALITY Table 1 (below). No other modifications to emission limits or equipment are requested.

AIR QUALITY Table 1
Existing and Proposed NOx Emission Limits

Existing NOx Emission Limits	Proposed NOx Emission Limits
1629.6 lbm/day	552.8 lbm/day
67.9 lbm/hr as NO2 (3 hr rolling average)	12.4 lbm/hr as NO2 (3 hr rolling average)
16.4 ppmv at 15% O2 (3 hr rolling average)	3 ppmv at 15% O2 (3 hr rolling average)
79.7 lbm/hr (1 hour average)	Limit superseded

The NOx offsets originally provided for the Sycamore project were to mitigate an emission based on the 79.7 lbm/hr emission limit. The proposed emission limit of 12 lbm/hr averaged over 3 hours has a maximum potential of 36 lbm in any one hour. Therefore, the emission limit of 79.7 lbm/hr can not be exceeded with the new proposed permit limit. Thus, staff concurs with the District in determining that the 79.7 lbm/hr limit is unnecessary as the 12 lbm/hr limit that supersedes it is more restrictive and poses no risk of a significant impact to the ambient air quality.

CONCLUSIONS AND RECOMMENDATIONS

Staff has analyzed the proposed changes and concludes that there are no new or additional significant impacts associated with approval of the petition. Staff concludes that the proposed changes are based on information that was not available during the original licensing process. Staff concludes that the proposed language retains the intent of the original Commission Decision and Conditions of Certification. Staff recommends the following modifications to condition of certification AQ-19.

PROPOSED MODIFICATIONS TO CONDITIONS OF CERTIFICATION

Staff has proposed modification to the air quality conditions of certification as shown below. (Note: deleted text is in ~~strikethrough~~, new text is **bold and underlined**)

AQ-19 Pollutant emissions from each combustion turbine prior to being retrofitted with the DLN combustors shall not exceed the following limits, except during times of start up or shutdown, as defined in Condition AQ-18:

Gas Fired Case:
Particulates - 5.0 lbm/hr as PM10
Sulfur Compounds - 0.5 lbm/hr as SO2
- 0.6 lbm/hr as SO4
Oxides of Nitrogen - 140.0 lbm/hr as NO2
Hydrocarbons - 2.5 lbm/hr (Non-meth)
Carbon Monoxide - 392 lbm/day

Pollutant emissions from each DLN CTG shall not exceed the following limits, except during times of start up or shutdown, as defined in Condition AQ-18:

Gas Fired Case:	
Particulates	- 5.0 lbm/hr as PM10
	- 120.0 lbm/day as PM10
Sulfur Compounds	- 0.5 lbm/hr as SO2
	- 0.6 lbm/hr as SO4
Oxides of Nitrogen	- 1629.6 lbm/day as NO2
(NOx emissions valid	- 67.9 lbm/hr as NO2, 3 hour rolling average
through April 30, 2008;	- 16.4 ppmv at 15% 02, 3 hour rolling average
then superseded by the	Not to exceed
emission limits below)	- 79.7lbm/hr, 1 hour average
Hydrocarbons	- 2.5 lbm/hr (Non-methane)
Carbon Monoxide	- 1056 lbm/day and 25 ppmv at 15% O2

After April 30, 2008, the emissions of oxides of nitrogen from each combustion turbine shall not exceed the following limits (these limits are to supersede the NOx emission limits shown above):

Oxides of Nitrogen - 552.8 lbm/day and
- 12.4 lbm/hr as NO2 and 3 ppmv at 15% O2
calculated on a 3 hour rolling average.

For nitrogen dioxide, the Sycamore Cogeneration Company (SCC) shall identify the following for each day of operation, except during times of start up or shutdown, as defined in Condition AQ-18:

(1) The daily maximum hourly mass emission rate (lbs/hr),
(2) The daily maximum rolling 3-hour average mass emission rate (lbs/hr) and
(3) The total daily mass emissions (lbs/day).

For carbon monoxide, SCC shall identify the total daily mass emissions (lbs/day) for each day of operation, except during times of start up or shutdown, as defined in Condition AQ-18.

For particulate matter (PM10), sulfur compounds (SO2 and SO4) and non-methane hydrocarbons, SCC shall determine through the initial source test, the fuel-based emission factors (lbs/mmBtu) for each pollutant. Using these factors, SCC shall determine the maximum allowable fuel input rate (mmBtu/hr) that would comply with the above stated emission limits (lbs/hr) (i.e., emission limit / emission factor = fuel input rate). SCC shall then compare these fuel input rates (as determined above) with the actual daily maximum fuel input rate (mmBtu/hr) for each day of operation, except during times of start up or shutdown, as defined in Condition AQ-18.

SCC shall submit all excess emission reports and break down reports to demonstrate compliance with all concentration limits.

Verification: SCC shall submit quarterly emission reports with all the information identified in the above protocol to the CEC compliance project manager.