

KERN RIVER COGENERATION PROJECT (82-AFC-2C)

Petition to allow the installation of Enhanced Dry Low NOx Combustors

Air Quality Staff Analysis

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INTRODUCTION

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

LAWS, ORDINANCES, REGULATIONS AND STANDARDS

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

ANALYSIS

On August 24, 1983, the Commission granted KRCC a license to build and operate the Kern River project, a 300 MW power plant in Kern County consisting of four natural gas fired General Electric Frame 7EA combustion turbines and heat recovery steam generators (HRSGs). Each HRSG was designed to deliver 450,000 lbs/hr steam at 80% quality to the surrounding oil field for thermal enhanced oil recovery. Kern River has been in operation since August 1, 1985, delivering steam to the oil field and electric power to the grid.

Rule 4703 limits the emissions of Oxides of Nitrogen (NOx) and Carbon Monoxide (CO) from stationary gas turbines. The Kern River turbines are currently in compliance with the emission limits and monitoring requirements of this rule. KRCC 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% O2 by 2008 or the first major overhaul which is planned to be completed by April 30, 2008.

KRCC 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% O2. The District has already issued the permit to operate (PTO) for Kern River 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.

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**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 (Nitrogen Dioxide) (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 Kern River 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-18.

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-18 Pollutant emissions from each combustion turbine shall not exceed the following limits except during times of startup or shutdown as defined in Condition AQ-17:

Gas Fired Case:

Particulates

- 5.0 lbm/hr as PM10
- 120.0 lbm/day as PM10

Sulfur Compounds

- 0.9 lbm/hr as SOx (as SO₂)
- 21.6 lb/day as SOx (as SO₂)
- 0.6 lbm/hr as SO4

Oxides of Nitrogen

(NOx emissions valid through April 30, 2008; then superseded by the

- 1629.6 lbm/day as NO2
- 67.9 lbm/hr as NO2, 3 hour rolling average
- 16.4 ppmv at 15% O2, 3 hour rolling average
- Not to exceed

<u>emission limits below)</u>	- 79.7lbm/hr, 1 hour average
Hydrocarbons	-12.0 lbm/hr (Non-methane) - 288.0 lbm/day
Carbon Monoxide	-1056 lbm/day and - 25 ppmv at 15% O ₂ - 44.0 lbm/hr 3-hour rolling average

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.**

Protocol: For nitrogen dioxide, the Kern River Cogeneration Company (KRCC) shall identify the following for each day of operation, except during times of start up or shutdown, as defined in Condition AQ-17:

- (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, KRCC 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-17.

For particulate matter (PM₁₀), sulfur compounds (SO₂ and SO₄) and non-methane hydrocarbons, KRCC shall determine through the initial source test, the fuel-based emission factors (lbs/mmBtu) for each pollutant. Using these factors, KRCC 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). KRCC 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-17.

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

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