

Pico Power Project

***Appendix 8.1-F
Evaluation of Best Available
Control Technology***

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Appendix 8.1F

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To evaluate BACT for the proposed turbine, the guideline for large gas turbines (> 50 MW) in the BAAQMD BACT/TBACT Workbook (1-24-02) was reviewed. The relevant BACT determinations for this analysis are shown in Table 8.1F-1.

Table 8.1F-1. BAAQMD BACT guideline for small gas turbines (< 50 mw, combined cycle).

Pollutant	BACT	Typical Technology
Nitrogen Oxides	1. 2.5 ppm dry @ 15% O ₂ , 3 hr avg	1. SCR + DLN, or SCONOX
	2. 3 ppm dry @ 15% O ₂ , 3 hr avg	2. SCR + DLN
Sulfur Dioxide	1. ND	1. ND
	2. Natural gas fuel	2. PUC regulated gas
Carbon Monoxide	1. ND	1. ND
	2. 4 ppm dry @ 15% O ₂ , 3 hr avg	2. Catalytic oxidation
POC	1. ND	1. ND
	2. 2 ppm dry @ 15% O ₂	2. Catalytic oxidation, or DLN
PM ₁₀	1. ND	1. ND
	2. Natural gas fuel	2. PUC regulated gas

1. Technologically feasible and cost effective
2. Achieved in practice

The Electric Power Research Institute recently published a report titled "*Recent Trends in Gas Turbine Environmental Permitting*", L. Angello, EPRI, 12-13-01. This data is summarized in Table 8.1F-2.

Additionally, the CEC-ARB "Guidance for Power Plant Siting and BACT" was consulted. Relevant data are summarized in Table 8.1F-3.

Additionally, EPA Region XI has recently published a series of BACT determinations for gas turbine based power plant facilities. These determinations can be found in the Federal Register (66 FR 19480, April 16, 2001). These determinations are summarized in Table 8.1F-4, along with BACT determinations derived from recently issued permits for facilities using turbines similar to those proposed for the Pico plant.

The Pico Project proposes to use dry low-NO_x combustors with selective catalytic reduction that will achieve a NO_x exhaust concentration of 2.0 ppmv or less (annual average) and 2.5 ppm short term average, and a CO exhaust concentrations of 6 ppmv or less. The turbines will be fueled with natural gas to minimize SO₂ and PM₁₀ emissions. These pollutant levels will achieve emission levels consistent with the BAAQMD, CARB-CEC, and EPA Region XI BACT guidelines.

Table 8.1F-2. Gas turbine control technology summary per EPRI, 12-13-01.

Facility/Location	Operating Status	Equipment/Rating	Emissions Limits	Comments
Hermiston Generating Hermiston, OR.	Operational	2-GE Frame 7FA Combined Cycle	NOx 4.5 ppm, 24 hr avg CO 15 ppm, 8 hr avg PM10, 0.1 gr/dscf VOC, not specified SO2, not specified	
El Dorado Energy Boulder City, NV	Operational	2- Westinghouse 501F Combined Cycle	NOx 3.5 ppm, 3 hr avg NOx 3.7 ppm DB on CO 2.6 ppm, 3 hr avg CO 3.5 ppm DB on VOC, unknown SO2, natural gas PM10, unknown NH3 10 ppm slip	Natural gas must be pipeline quality
Cane Island Power Osceola County, FL.	Recently Permitted	1 - GE Frame 7FA Combined Cycle	NOx 3.5 ppm, 3 hr avg CO 12 ppm CO 20 ppm DB on VOC 1.4 ppm VOC 4 ppm DB on SOx natural gas w/S <20 gr/100 scf NH3 5 ppm slip	Natural gas must be pipeline quality
Otay Mesa Generating San Diego County, CA.	Recently Permitted	2- Frame 7FA or equivalent	NOx 2 ppm, 3 hr avg CO 6 ppm, 3 hr avg VOC 2 ppm, 1 hr avg SOx, natural gas PM10, natural gas NH3 10 ppm, 1 hr avg	Natural gas must be pipeline quality

Table 8.1F-3. Summary of BACT recommendations from ARB-CEC BACT guidance (combined cycle).

NOX	CO	VOC	SOx	PM10
2.5 ppm dry @ 15% O ₂ , 1 hr avg	6 ppm dry @15% O ₂ 3 hr avg	2 ppm dry @ 15% O ₂ 3 hr avg	Natural Gas Fuel Fuel S< 1gr/100 scf	Natural Gas Fuel
2.5 ppm dry @15% O ₂ , 3 hr avg				
5 ppm NH3 slip @ 15% O ₂				

Table 8.1F-4. Gas turbine BACT determinations per EPA region IX (66 FR 19480, 4-16-01), and other BACT data.

Facility/Location	Decision Date	Rating/Fuel	NO _x Limit/Control Technology	CO Limit/Control Technology
Las Vegas Cogen	11/13/00	240 MW, Natural Gas	2.0 ppm (water injection and SCR)	2.0 ppm (CO catalyst)
Los Esteros Energy Center	12/31/01	194.8 MW, Natural Gas	2.5 ppm (water injection and SCR)	5.2 ppm (CO Catalyst)
Elk Hills Power LLC California	2/5/01	500 MW, Natural Gas	2.5 ppm (dry low-NO _x burners w/ SCR or SCONOX)	4 ppm w/Catalytic Oxidation and Good Combustion Practices
Pastoria Energy Facility California	2/12/01	750 MW, Natural Gas	2.5 ppm (dry low-NO _x technology w/SCR or Xenon Catalyst)	6 ppm w/Catalytic Oxidation and Good Combustion Practices
Blythe Energy Project LLC California	3/5/01	520 MW, Natural Gas	2.5 ppm (dry low-NO _x combustor w/SCR)	5 ppm (Proper Design and Good Combustion Practices)

The USEPA RACT-BACT-LAER Clearinghouse (RBLC) was also consulted to review recent USEPA BACT decisions for gas-fired gas turbines. These recent BACT decisions are summarized in Table 8.1F-5.