



PUBLIC WORKSHOP NOTICE

September 27, 2006

TO: INTERESTED PARTIES
FROM: EXECUTIVE OFFICER / APCO
SUBJECT: **SECOND PUBLIC WORKSHOP - DRAFT
AMENDMENTS TO REGULATION 9, RULE 9:
NITROGEN OXIDES FROM STATIONARY GAS
TURBINES**

The staff of the Bay Area Air Quality Management District will conduct a second public workshop to review and discuss a second draft of potential amendments to Regulation 9, Rule 9: Nitrogen Oxides from Stationary Gas Turbines from **10:00 a.m. – 12:00 noon on October 13, 2006** in the 7th Floor Board of Directors meeting room at the District office located at 939 Ellis Street, San Francisco.

A public workshop was conducted to discuss possible amendments to Regulation 9, Rule 9 on May 31, 2006. Substantial input was received from affected parties during the workshop, and subsequent submittals from individual facilities clarified concerns about the technical feasibility and costs of the draft amendments. District Staff has considered this additional input, and developed revised draft amendments that are now available for additional review and input. These revised amendments directly address the concerns about technical feasibility, cost effectiveness, implementation schedules, compliance averaging periods, and inclusion of steam generation in the overall thermal efficiency of gas turbines.

This workshop notice summarizes the revisions to the proposed rule amendments, and supplements the original workshop report. Interested parties are encouraged to review a copy of the revised draft amendments to Regulation 9, Rule 9 dated September 18, 2006 and the original workshop report dated April 26, 2006 available at <http://www.baaqmd.gov/pln/ruledev/workshops.htm>, in addition to the information in this workshop notice. A copy of the March 28, 2006 proposed amendments to Regulation 9, Rule 9 is also available. For questions or comments on the potential amendments, please contact Guy A. Gimlen, Air Quality Engineer, at (415) 749-4734 or via e-mail at ggimlen@baaqmd.gov.

PUBLIC TRANSPORTATION

**MUNI -- #47 AND 49 NORTH AND SOUTH ON VAN NESS AVENUE
#38 EAST AND WEST ON GEARY BOULEVARD/O'FARRELL STREET
BART -- CIVIC CENTER STATION 8TH AND MARKET STREETS**

Attendees are encouraged to ride public transit, rideshare, bicycle, walk or use other non-motorized modes to and from the District.

BACKGROUND:

Control Measure SS-14 in the Bay Area 2005 Ozone Strategy committed the District to evaluate potential amendments to existing District rules for gas turbines. District staff subsequently drafted amendments to Regulation 9, Rule 9 that would strengthen existing requirements in the Bay Area, and published the proposed amendments and workshop report for comment by affected facilities and members of the public. A workshop was conducted on May 31, 2006 to review these draft amendments and receive public input. The major issues that emerged during this workshop fell into the following categories:

- Cost Effectiveness
- Implementation Timeline
- Thermal Efficiency Adjustments to NOx Emissions Limits
- Averaging Period for Compliance

Many facilities also provided written comments subsequent to the workshop, including cost estimates for retrofit projects that would be needed for their specific gas turbines to comply with the proposed limits in the draft regulation. The cost estimates and other turbine-specific data provided by the facilities indicated that in many cases the proposed standards would be feasible and cost-effective for turbines in the Bay Area, but in other cases, would not be due to the high cost of retrofits and the relatively small emission reduction benefits to be gained.

In addition, the Environmental Protection Agency (EPA) recently published 40 CFR Part 60: Standards of Performance for Stationary Combustion Turbines; Final Rule, dated July 8, 2006. These standards provide the option of meeting an “output based” NOx standard (lbs NOx / MW-hr) in addition to the more typical volumetric based (ppm) standard.

PROPOSED AMENDMENTS:

District staff considered the comments submitted on the first draft amendments, reviewed EPA’s July 2006 Standards of Performance, and continued to research Bay Area gas turbines and available control technology. District staff have revised the initial draft amendments based on these developments. The second draft of the proposed amendments incorporates the following elements:

- **Provide an operating window for turbines of up to 400 hours per year for testing and minor production before any new emission limits are required.** Retrofit is not currently deemed to be cost effective for turbines that are rarely used (e.g., peaking turbines).
- **Raise the threshold for requiring Selective Catalytic Reduction (SCR) or an equivalent retrofit from 10 MW to 40 MW.** The San Joaquin Valley UAPCD recently adopted a gas turbine rule that established a limit of 5 ppm NOx for large turbines over 10 MW. Achieving a 5 ppm NOx limit requires expensive SCR or state-of-the-art Dry Low NOx (DLN) combustion technology. In the Bay Area, requiring SCR or equivalent currently appears to be cost effective only for gas turbines greater than 40 MW. This is because turbines in the 10 MW - 40MW range

account for less overall emissions than larger turbines over 40 MW because of their smaller size, and because many of the turbines in that range already perform much better than current standards. These factors mean that there are fewer emission reduction benefits to be gained in the 10 - 40 MW range from retrofitting with SCR or equivalent technology, making costs of retrofit more difficult to justify. Emission limits for the 19 - 40 MW category are proposed to be reduced to emissions levels that reflect the ability of these turbines to perform below the current limits and require such continued performance. Emission limits for turbines in the 10 - 19 MW category are proposed to remain at current limits.

- **Categorize emission limits by heat input (turbine heat rate) rather than MW output.** NO_x emissions relate directly to fuel consumption. Turbine efficiencies vary, and many are cogeneration units, or combined cycle units. Heat input (turbine heat rate), expressed in terms of million Btu/hr (MM Btu/hr), is a more precise way to categorize turbine size and pollution potential than turbine output.
- **Extend the implementation timetable.** The implementation timetable is proposed to be 18 months for design and application for an Authority to Construct, and 18 months for construction and startup, or at the next scheduled turnaround, whichever is later, but not later than January 1, 2012.
- **Eliminate the thermal efficiency adjustment.** Instead, the proposed amendments provide the option of lbs NO_x / MW-hr “output based” emission limits, consistent with EPA 40 CFR Part 60: Standards of Performance for Stationary Combustion Turbines; Final Rule, dated July 8, 2006. These “output based” emission limits encourage improved energy efficiency, and support reductions in CO₂ emissions and their associated impact on global warming.
- **Include the heating value of steam or direct drive mechanical work in the total useful work component of the MW-hr calculation.**
- **Determine compliance based on 3 hour averaging.** EPA 40 CFR Part 60 and San Joaquin Valley Rule 4703 use a 3-hour average. District staff believes this is the appropriate averaging period to hold operators to the most stringent emission limit.
- **Make minor clarifying changes to the rules such as addition of definitions and deletion of obsolete references.**

The tables on the following pages summarize the current NO_x emission limits in Regulation 9, Rule 9 and proposed NO_x emissions limits. These limits will reduce NO_x emissions by an estimated 0.66 tons per day.

Table 1

NOx Emission Limits for Full Use Turbines

Current NOx limits

Turbine Size		Fuel		
		Natural Gas	Refinery Gas	Liquid Fuel
Less than 0.3 MW		Exempt	Exempt	Exempt
0.3 to 9.9 MW		42	55	65
10 MW or more	without SCR	15	15	42
	with SCR	9	9	25

Proposed Amendments - NOx limits

Turbine Heat Rate	Fuel		
	Natural Gas	Refinery Gas/ Landfill Gas / LPG	Liquid Fuel
< 5 MM Btu/hour	Exempt	Exempt	Exempt
5 – 50 MM Btu/hour - * (0.3 – 3 MW)	2.12 lbs/MW hr or 42 ppm	2.53 lbs/MW hr or 50 ppm	3.28 lbs/MW hr or 65 ppm
> 50 – 140 MM Btu/hour - ** (3 – 10 MW) <ul style="list-style-type: none"> • WI/SI enhancement available • Where DLN technology available 	1.97 lbs/MW hr or 42 ppm 1.64 lbs/MW hr or 35 ppm 1.17 lbs/MW hr or 25 ppm	2.34 lbs/MW hr or 50 ppm	3.04 lbs/MW hr or 65 ppm
> 140 – 250 MM Btu/hour - ** (10 – 19 MW)	0.70 lbs/MW hr or 15 ppm	0.70 lbs/MW hr or 15 ppm	1.97 lbs/MW hr or 42 ppm
> 250 – 500 MM Btu/hour - ** (19 – 40 MW)	0.43 lbs/MW hr or 9 ppm	0.43 lbs/MW hr or 9 ppm	1.17 lbs/MW hr or 25 ppm
> 500 MM Btu/hour - *** (40+ MW)	0.15 lbs/MW hr or 5 ppm	0.26 lbs/MW hr or 9 ppm	0.72 lbs/MW hr or 25 ppm

Legend: Emission limits proposed to be changed are shaded.

* - 25% thermal efficiency basis for small gas turbine output based NOx limits

** - 27% thermal efficiency basis for mid-sized gas turbine output based NOx limits

*** - 44% thermal efficiency basis for large gas turbine output based NOx limits

Operators may choose to comply with the volumetric (ppm) NOx limit or the output based NOx limit.

Table 2
NOx Emission Limits for Limited Use Turbines
(Less than 877 hours per year)

Current NOx limits

Turbine Size	Fuel		
	Natural Gas	Refinery Gas	Liquid Fuel
Less than 4.0 MW	Exempt	Exempt	Exempt
4.1.3 to 9.9 MW	42	N/A	65
10 + MW	42	N/A	65

Proposed Amendments - NOx limits

Turbine Heat Rate	Fuel		
	Natural Gas	Refinery Gas/ Landfill Gas / LPG	Liquid Fuel
< 50 MM Btu/hour - *	Exempt	Exempt	Exempt
50 – 140 MM Btu/hour - ** (3 – 10 MW)	1.97 lbs/MW hr or 42 ppm	N/A	3.04 lbs/MW hr or 65 ppm
> 140 – 250 MM Btu/hour - ** (10 – 19 MW)	1.97 lbs/MW hr or 42 ppm	N/A	3.04 lbs/MW hr or 65 ppm
> 250 – 500 MM Btu/hour - ** (19 – 40 MW)	1.17 lbs/MW hr or 25 ppm	N/A	1.97 lbs/MW hr or 42 ppm
> 500 MM Btu/hour - *** (40+ MW)	0.72 lbs/MW hr or 25 ppm	N/A	1.21 lbs/MW hr or 42 ppm

Legend: Emission limits proposed to be changed are shaded.

* - 25% thermal efficiency basis for small gas turbine output based NOx limits

** - 27% thermal efficiency basis for mid-sized gas turbine output based NOx limits

*** - 44% thermal efficiency basis for large gas turbine output based NOx limits

Operators may choose to comply with the volumetric (ppm) NOx limit or the output based NOx limit.

WORKSHOP DISCUSSION:

This workshop will review the feasibility of the current draft of proposed amendments to Regulation 9, Rule 9. The District invites all interested parties to comment on the proposed amendments. Staff is available to discuss these proposed amendments prior to the workshop, and interested parties are encouraged to contact staff as soon as possible to express concerns or ask questions. **Subsequent to the workshop, staff will accept written comments until Friday, October 20, 2006.**