

## Title V Permit Evaluation

**Site Number:** A0621

**Site Name:** City of Santa Clara, Electric Department

**Site Address:** 524 Robert Avenue, Santa Clara, CA

**Application Number:** 18321

**Reviewing Engineer:** RTH

### EMISSION LIMITS AND MONITORING REQUIREMENTS:

#### Particulate Sources

S# & Description	Emission Limit Citation	Federally Enforceable Emission Limit	Monitoring
<b>GAS TURBINES W/WATER INJECTION: S1, S2</b>	BAAQMD Regulation 6-301	Ringelmann 1.0	None
	BAAQMD Regulation 6-310	0.15 gr/dscf @ 6% O <sub>2</sub>	None
<b>DUCT BURNERS: S3, S4</b>	BAAQMD Regulation 6-301	Ringelmann 1.0	None
	BAAQMD Regulation 6-310	0.15 gr/dscf @ 6% O <sub>2</sub>	None

### PM Discussion:

#### **S1, S2: Gas Turbines; 55.1 MMBTU/hr, Natural Gas Fired**

The Gas Turbines S1 and S2 are required by a federally enforceable permit condition to fire only natural gas except during periods of PG&E curtailment. Because visible emissions are not normally associated with proper natural gas combustion, periodic monitoring for Ringelmann limits would not be appropriate for the turbines.

BAAQMD Regulation 6-310.3 limits PM emissions from “heat transfer operations” to 0.15 gr/dscf @ 6% O<sub>2</sub>. This compares to a PM10 factor of 0.042 lb/MMBTU from AP-42 Table 3.1-2 “Emission Factors For Large Uncontrolled Gas Turbines”. For a typical natural gas fuel with a gross heating value of 1000 BTU/scf, 0.15 gr/dscf @ 6% O<sub>2</sub> can be converted to lb/MMscf (natural gas fired) as follows:

From 40 CFR 60, Appendix A, Method 19, the stoichiometric dry natural gas combustion factor of 8.710 dscf (combustion products)/scf (natural gas) can be derived from Table 19-1. At 6% excess O<sub>2</sub>, this factor becomes:

$$8.710 \times [21\% / (21\% - 6\%)] = 12.194 \text{ dscf (c.p.) / scf (n.g.)}$$

Therefore, the conversion of 0.15 gr/dscf @ 6% O<sub>2</sub> to lb/MMscf (n.g.) is:

$$(12.194 \text{ dscf/scf-ng}) \times (0.15 \text{ gr/dscf}) \times (\text{lb}/7000 \text{ gr}) \times (1,000,000 \text{ scf-ng/MMscf-ng})$$

$$= 261.3 \text{ lb/MMscf natural gas (0.261 lb/MMBTU)}$$

Since this factor is so far above the AP-42 factor of 0.042 lb/MMBTU, the addition of periodic monitoring to demonstrate compliance with this limit would not be appropriate.

**S3, S4: Duct Burners; 20 MMBTU/hr, Natural Gas Fired**

The case for not monitoring particulate emissions from the duct burners is the same as discussed for the Gas Turbines; natural gas combustion does not produce visible emissions, and the AP-42 emission factor is far below the Regulation 6-310.3 standard. EPA AP-42 Table 1.4-1 “Emission Factors For Particulate Matter (PM) From Natural Gas Combustion” lists a PM factor of 6.2 lb/MMscf (natural gas) for small industrial boilers (analogous to duct burners). This is well below the converted Regulation 6-310.3 standard of 261.3 lb/MMscf (natural gas).

**NOx Sources**

<b>S# &amp; Description</b>	<b>Emission Limit Citation</b>	<b>Federally Enforceable Emission Limit</b>	<b>Monitoring</b>
<b>GAS TURBINES W/WATER INJECTION: S1, S2</b>	BAAQMD 9-9-301.1	42 ppmv @15% O <sub>2</sub> (dry)	Annual Source Test
	NSPS Subpart GG 60.332 (a)(2)	141 ppmv @15% O <sub>2</sub> (dry)	Water-to-fuel ratio
	Condition #14194, part 4	42 ppmv @15% O <sub>2</sub> (dry), each turbine (except during startup and shutdown)	Annual Source Test
	Condition #14194, part 5	42 ppmv @15% O <sub>2</sub> (dry), each turbine/supplemental burner combination	Annual Source Test
<b>DUCT BURNERS: S3, S4</b>	Condition #14194, part 5	42 ppmv @15% O <sub>2</sub> (dry), each turbine/supplemental burner combination	Annual Source Test

**NOx Discussion:**

Existing monitoring is sufficient to periodically demonstrate compliance with NOx limits.

**SO2 Sources**

<b>S# &amp; Description</b>	<b>Emission Limit Citation</b>	<b>Federally Enforceable Emission Limit</b>	<b>Monitoring</b>
<b>GAS TURBINES W/WATER INJECTION: S1, S2</b>	BAAQMD 9-1-301	Ground level concentrations: 0.5 ppm for 3 consecutive minutes, 0.25 ppm averaged over 60 consecutive minutes, 0.05 ppm averaged over 24 hours	None
	BAAQMD 9-1-302	300 ppm (dry) general emission limitation	None
	40 CFR 60 Subpart GG 60.333 (b)	0.8% (wt) fuel sulfur content	None
<b>DUCT BURNERS: S3, S4</b>	BAAQMD Regulation 9-1-301	Ground level concentrations: 0.5 ppm for 3 consecutive minutes, 0.25 ppm averaged over 60 consecutive minutes, 0.05 ppm averaged over 24 hours	None
	BAAQMD Regulation 9-1-302	300 ppm (dry) general emission limitation	None

**SO2 Discussion:**

Fuel sulfur monitoring required by 40 CFR 60 Subpart GG, 60.333 (b) has been subsumed by BAAQMD Condition #14194, part 1. This condition requires PUC grade natural gas to be used at all combustion sources at the facility. PUC standard natural gas can have no more than 5 grains total sulfur per 100 standard cubic feet (170 ppm, 0.017% by weight). Therefore, the exclusive use of PUC standard gas will eliminate the need to monitor fuel sulfur content.

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**PERMIT SHIELD:**

The City of Santa Clara Electric Department requested that the following requirements be subsumed by a federally enforceable requirement to combust only natural gas that meets the PUC quality standard

- 40 CFR 60.334(b)(2): Fuel sulfur and nitrogen content monitoring
- 40 CFR 60.334(c)(2): Fuel sulfur exceedance report

The District recommends that the Gas Turbines S1, S2 and Duct Burners S3, S4 be excluded from these requirements.

**ALTERNATE OPERATING SCENARIO:**

No alternate operating scenario was requested.

**COMPLIANCE STATUS:**

All sources at this facility are currently in compliance with all applicable requirements.