

DRAFT
ENGINEERING EVALUATION REPORT
PHILIP BURTON FEDERAL BUILDING
PLANT NUMBER 15645
APPLICATION NUMBER 19504

BACKGROUND

On behalf of Philip Burton Federal Building, Enovity, Inc. has applied to obtain an Authority to Construct and a Permit to Operate an Ingersoll-Rand MT250SM **MicroTurbine**. The turbine will be used to generate electricity. The application covers the following source:

S-5 Microturbine, Ingersoll-Rand, MT250SM, 250 kw, 3.16 MMBTU/hr

EMISSION CALCULATIONS

Emission Factor Derivations:

Nitrogen Oxides (NO_x)

Per Air Resources Board Executive Order DG-009, the Ingersoll-Rand MT250SM MicroTurbine has been certified to meet a nitrogen oxides emission standard of 0.07 pounds per MW-hr. Based upon the maximum rated net output of 250 KW, the corresponding mass emission rate is calculated as follows.

$$\begin{aligned} \text{NO}_x &= (0.07 \text{ lb/MW-hr})(250 \text{ KW})(8760 \text{ hrs/yr}) \\ &= 153.3 \text{ lb/yr} \\ &= 0.077 \text{ tpy} \end{aligned}$$

Carbon Monoxide (CO)

Per Air Resources Board Executive Order DG-009, the Ingersoll-Rand MT250SM MicroTurbine has been certified to meet a carbon monoxide emission standard of 0.1 pounds per MW-hr. Based upon the maximum rated net output of 250 KW, the corresponding mass emission rate is calculated as follows.

$$\begin{aligned} \text{CO} &= (0.1 \text{ lb/MW-hr})(250 \text{ KW})(8760 \text{ hrs/yr}) \\ &= 219 \text{ lb/yr} \\ &= 0.11 \text{ tpy} \end{aligned}$$

Sulfur Dioxide (SO₂)

The SO₂ emission factor is based upon the PG&E natural gas specifications, which give a maximum sulfur content of 1 gr/100 scf of natural gas.

$$\begin{aligned} \text{SO}_2 &= (3,160,000 \text{ BTU/hr})(1 \text{ scf}/1020 \text{ BTU})(1 \text{ gr S}/100 \text{ scf})(\text{lb}/7000 \text{ gr})(2 \text{ g SO}_2/1 \text{ g S})(8760 \text{ hrs/yr}) \\ &= 77.54 \text{ lb/yr} \\ &= 0.039 \text{ tpy} \end{aligned}$$

Precursor Organic Compounds (POC)

Per Air Resources Board Executive Order DG-009, the Ingersoll-Rand MT250SM MicroTurbine has been certified to meet a volatile organic compound emission standard of 0.02 pound per MW-hr. Based upon the maximum rated net output of 250 KW, the corresponding mass emission rate is calculated as follows.

$$\begin{aligned} \text{POC} &= (0.02 \text{ lb POC/MW-hr})(250 \text{ KW})(8760 \text{ hrs/yr}) \\ &= 21.9 \text{ lb/yr} \\ &= 0.011 \text{ tpy} \end{aligned}$$

Particulate Matter with an aerodynamic diameter of less than 10 microns (PM₁₀)

Per Air Resources Board Executive Order DG-009, the Ingersoll-Rand MT250SM MicroTurbine has been certified to meet a particulate matter emission standard corresponding to a natural gas with a fuel sulfur content of no more than 1.0 gr/100 scf. Assuming that all of the sulfur in the fuel is converted to ammonium sulfate particulate, the corresponding mass PM₁₀ emission rate is calculated as follows.

$$\begin{aligned} \text{PM}_{10} &= (3,160,000 \text{ BTU/hr})(1 \text{ scf}/1020 \text{ BTU})(1 \text{ gr S}/100 \text{ scf})(\text{lb}/7000 \text{ gr})(132.1 \text{ g H}_8\text{N}_2\text{O}_4\text{S}/16 \text{ g S})(8760 \text{ hrs/yr}) \\ &= 320.1 \text{ lb/yr} \\ &= 0.16 \text{ tpy} \end{aligned}$$

Daily Maximum Emissions:

$$\begin{aligned} \text{NO}_x &= 0.4 \text{ lb/day} \\ \text{CO} &= 0.59 \text{ lb/day} \\ \text{SO}_2 &= 0.21 \text{ lb/day} \\ \text{POC} &= 0.06 \text{ lb/day} \\ \text{PM}_{10} &= 0.86 \text{ lb/day} \end{aligned}$$

CRITERIA-POLLUTANT EMISSION SUMMARY

Annual Average Project Emissions Increase:

Pollutant	lb/day	ton/yr
POC	0.06	0.011
NO _x	0.4	0.077
SO ₂	0.21	0.039
CO	0.59	0.11
PM ₁₀	0.86	0.16
NPOC	0	0

Toxic Air Contaminant Emissions:

The following emission rates are based upon 24 hr/day, 365 day/year of the turbine operation at the maximum firing rate of 3,160,000 BTU/hour.

Compound	Emission Factor ¹ (lb/MM BTU)	Annual Emission Rate For The Turbine (lb/yr)
1,3-butadiene	4.30E-07	0.012
acetaldehyde	4.00E-05	1.1
acrolein	6.40E-06	0.177
benzene	1.20E-05	0.33
ethylbenzene	3.20E-05	0.88
formaldehyde	7.10E-04	19.65
naphthalene	1.30E-06	0.036
PAHs	2.20E-06	0.061
propylene oxide	2.90E-05	0.798
toluene	1.30E-04	3.6
Xylenes	6.40E-05	1.76

¹AP-42, Table 3.1-3, "Emission Factors for Hazardous Air Pollutants from Natural Gas-Fired Stationary Gas Turbines", 4/00

PLANT CUMULATIVE INCREASE

POC = 0.011 tpy
 NOx = 0.077 tpy
 SOx = 0.039 tpy
 CO = 0.11 tpy
 PM10 = 0.16 tpy

TOXIC RISK SCREENING ANALYSIS

Compound	Annual Emission Rate ¹ (lb/yr)	Risk Screening Trigger Level (lb/yr)
1,3-butadiene	0.012	1.1
acetaldehyde	1.1	64
acrolein	0.177	2.3
benzene	0.33	6.4
ethylbenzene	0.88	77000
formaldehyde	19.65	30
naphthalene	0.036	5.3
PAHs	0.061	0.011
propylene oxide	0.798	49
toluene	3.6	12000
xylenes	1.76	27000

¹based upon annual firing rate of (24 hr/day)(365 day/yr)(3,160,000 BTU/hr) = 27,681 MM BTU/yr

Pursuant to the District Regulation 2-5, a health risk screening analysis is required since PAHs listed above are emitted at rates in excess of the risk screening trigger level given in the Table 2-5-1. A health risk screening analysis was performed, and the results indicate that the maximum cancer risk is 0.82 in a million (interoffice memo dated 6/1/09). In accordance with the District Regulation 2-5, this risk level is considered acceptable.

BACT ANALYSIS

Based upon 24-hr per day operation at the maximum firing rate, the proposed Microturbine does not have the potential to emit 10 pounds or more per highest day of precursor organic compounds (POC), non-precursor organic compounds (NPOC), nitrogen oxides (NO_x), sulfur dioxide (SO₂), PM₁₀ or carbon monoxide (CO). Therefore, the BACT requirement of NSR (Regulation 2-2-301.1) does not apply.

OFFSET ANALYSIS

Because the facility POC and NO_x emissions (including proposed microturbine emission increases) will not exceed 10 tons per year, the offset provision of NSR for those pollutants (Regulation 2-2-302) does not apply.

Because the facility is not a major facility for SO₂ or PM₁₀, the offset provision of NSR for those pollutants (Regulation 2-2-303) does not apply.

STATEMENT OF COMPLIANCE

Ingersoll-Rand MicroTurbine is not subject to the requirements of Regulation 9, Rule 9 ("NO_x From Stationary Gas Turbines") because the turbine has a power output rating of less than 0.3 MW. The turbine is not subject to any other District prohibitory rule.

This project is **categorically exempt** from District CEQA Regulation 2-1-311 pursuant to Regulation 2-1-312.11 (Permit applications for a new/modified source(s) or for process changes which will satisfy the "No Net Emission Increase" provisions of Regulation 2, Rule 2, and for which there is no possibility that the project may have any significant environmental effect in connection with any environmental media or resources other than air quality) and therefore is not subject to CEQA review. A completed Appendix H form is provided by the applicant.

The project is within 1000 feet of a K-12 school, Tenderloin Community School and within ¼ mile of Civic Center Secondary School and Sacred Heart Cathedral Preparatory School, and is therefore subject to the public notification requirements of Reg. 2-1-412. A public notice was distributed on _____ to the parents and guardians of the school identified above and all addresses within 1000 feet of the source. The comment period ended _____ and comments were received. The comments and District responses are summarized below:

A Toxics Risk Screening Analysis is required due to the emission of the toxic air contaminants at the rates above toxic trigger levels given in the Table 2-5-1 of Regulation 2-5. Risk analysis is discussed in toxic risk screening analysis section of this report. TBACT does not apply to this project.

BACT, Offsets, PSD, NSPS, and NESHAPS do not apply to this project.

PERMIT CONDITIONS:

None

RECOMMENDATION

Issue an **Authority to Construct** for the microturbine described in the background section of this report.:

BY: _____
Dharam Singh, Air Quality Engineer II
Date: 6/9/09