A01-T14 - Turbine Natural Gas Fired All Sizes with Water Injection-SCR-Oxidation Catalyst

CALCULATION METHODS
Ea = Ua x EF (lbs/mmft3)
Eh = Uh (scfm) x (60/1000000) x EF (lbs/mmft3)

NOTES:
- SCR can achieve efficiencies as high as 90% in reducing of NOx.

- Catalytic oxidation can achieve efficiencies of approximately 90% in reducing of CO, ROG, TOG, and AB2588 toxic organic compounds.

- Emission factors are based on a natural gas BTU content of 1020 BTU/scf.

- Trace organic emissions are based on detected AB 2588 compounds listed in Table 3.1-3.

- Propylene Oxide and Lead factors are not used since they were not detected.

- A USEPA memo (8/21/01) titled "Hazardous Air Pollutant (HAP) Emission Control Technology for New Stationary Combustion Turbines" lists emission factors for Acetaldehyde, Benzene, and Formaldehyde that are not significantly different from AP-42.

- Ammonia factor must be entered with site specific data from ammonia slip test results.

- SCR controls create ammonia / ammonium hydroxide emissions which are considered PM10 by the District's definition. The PM factors below do NOT include ammonia slip. Site specific emission estimates should be quantified as ammonium hydroxide and added to the PM default PM factors where TSP and PM10 (filterable and condensible) data does not exist.

- For natural gas fired turbines, formaldehyde accounts for about two-thirds of the total HAP emissions. Polycyclic aromatic hydrocarbons (PAH), benzene, toluene, xylenes, and others account for the remaining one-third of HAP emissions.

- The formation of carbon monoxide during the combustion process is a good indication of the expected levels of HAP emissions. Similar to CO emissions, HAP emissions increase with reduced operating loads. Typically, combustion turbines operate under full loads for greater fuel efficiency, thereby minimizing the amount of CO and HAP emissions.

Pollutant	District Emission Factor (lbs/million ft3 fuel burned)	EPA Reference Document	EPA Factor	Units	Comments
NOx	32.64	AP-42, Sect 3.1, 4/00, Table 3.1-1	3.20E-02	lbs/MMBTU	Assumes 90% control efficiency. AP-42 Sec 3.1.4.3
CO	8.36	AP-42, Sect 3.1, 4/00, Table 3.1-1	8.20E-03	lbs/MMBTU	Assumes 90% control efficiency. AP-42 Sec 3.1.4.3
SOx	0.60	AP-42, Sect 3.1, 4/00, Table 3.1-2a	4.70E-04	lbs/MMBTU	Assumes an average sulfur content of 2000 grains MM ft3 natural gas
TOG	1.12	AP-42, Sect 3.1, 4/00, Table 3.1-2a	1.10E-03	lbs/MMBTU	Assumes 90% control efficiency. AP-42 Sec 3.1.4.3
ROG	0.21	AP-42, Sect 3.1, 4/00, Table 3.1-2a	6.40E-05	lbs/MMBTU	Assumes 90% control efficiency. AP-42 Sec 3.1.4.3
TSP	6.73	AP-42, Sect 3.1, 4/00, Table 3.1-2a	6.60E-03	lbs/MMBTU	TSP includes filterable (1.9 E-03) and condensable (4.7 E-03) PM
PM10	6.73	AP-42, Sect 3.1, 4/00, Table 3.1-2a	6.60E-03	lbs/MMBTU	PM10 includes filterable (1.9 E-03) and condensable (4.7 E-03) PM
1,3-Butadiene	0.00004	AP-42, Sect 3.1, 4/00, Table 3.1-3	4.30E-08	lbs/MMBTU	Based on half the detection limit as recommended by AP-42. Assumes 90% control efficiency. AP-42 Secs 3.1.3.5 & 3.1.4.3
Acetaldehyde	0.004	AP-42, Sect 3.1, 4/00, Table 3.1-3	4.00E-05	lbs/MMBTU	Assumes 90% control efficiency. AP-42 Secs 3.1.3.5 & 3.1.4.3
Ammonia	0.00000			lbs/MMBTU	Use site specific ammonia slip test results to estimate these emissions.
Acrolein	0.0007	AP-42, Sect 3.1, 4/00, Table 3.1-3	6.40E-07	lbs/MMBTU	Assumes 90% control efficiency. AP-42 Secs 3.1.3.5 & 3.1.4.3
Benzene	0.001	AP-42, Sect 3.1, 4/00, Table 3.1-3	1.20E-06	lbs/MMBTU	Assumes 90% control efficiency. AP-42 Secs 3.1.3.5 & 3.1.4.3
Ethylbenzene	0.003	AP-42, Sect 3.1, 4/00, Table 3.1-3	3.20E-06	lbs/MMBTU	Assumes 90% control efficiency. AP-42 Secs 3.1.3.5 & 3.1.4.3
Formaldehyde	0.07	AP-42, Sect 3.1, 4/00, Table 3.1-3	7.10E-05	lbs/MMBTU	Assumes 90% control efficiency. AP-42 Secs 3.1.3.5 & 3.1.4.3
Methane	0.88	AP-42, Sect 3.1, 4/00, Table 3.1-2a	8.60E-04	lbs/MMBTU	Assumes 90% control efficiency. AP-42 Sec 3.1.4.3
Naphthalene	0.0001	AP-42, Sect 3.1, 4/00, Table 3.1-3	1.30E-07	lbs/MMBTU	Assumes 90% control efficiency. AP-42 Secs 3.1.3.5 & 3.1.4.3
PAH	0.0002	AP-42, Sect 3.1, 4/00, Table 3.1-3	2.20E-07	lbs/MMBTU	Assumes 90% control efficiency. AP-42 Secs 3.1.3.5 & 3.1.4.3
Toluene	0.013	AP-42, Sect 3.1, 4/00, Table 3.1-3	1.30E-05	lbs/MMBTU	Assumes 90% control efficiency. AP-42 Secs 3.1.3.5 & 3.1.4.3
Xylenes (Mixed)	0.0065	AP-42, Sect 3.1, 4/00, Table 3.1-3	6.40E-06	lbs/MMBTU	Assumes 90% control efficiency. AP-42 Secs 3.1.3.5 & 3.1.4.3

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