COMBUSTION TURBINE

U.S. Navy Public Works Center, PHNC

2 MW Allison Combustion Turbine, model 501-K14C; Bldg. 149

CT Horsepower: 2,680 [hp=kW*1.34]
Maximum Fuel Feed Rate (gal/hr): 235
Maximum Heat Input (MMBTU/hr): 32.67
Operating Hours (hr/yr): 1,187
Operating Hours (hr/day): 24

Type of Diesel Fuel: Diesel #2
Sulfur Content by Weight (%): 0.20%
Fuel Heating Value (BTU/gal): 139,000
Water/Steam Injection (Y/N): N

Max Fuel Consumption (8,760 hr/yr): ####### gal (for one combustion turbine)
Fuel Consumption, Limited Hours: 279,000 gal (combined fuel limit for 2 combustion turbines)

AP-42 Section 3.1, revised 4/00

Pollutant	Emission Factor (lb/MMBtu)	Emissions (lb/hr)	(g/s)	Max (TPY)	Limited (TPY)
SO_2	0.202	6.60	0.83	28.9	3.9
NOx [2]		13.47	1.70	59.0	8.0
CO	0.003	0.11	0.01	0.5	0.1
TOC	0.004	0.13	0.02	0.6	0.1
Lead	0.000	0.00	0.00	0.0	0.0
PM_{10} [1]	0.012	0.39	0.05	1.7	0.2

1 - assumes all PM is PM_{10}
2 - emission rate from 2003 SPT

HAP	Emission Factor (lb/MMBtu)	Emissions (lb/hr)	(g/s)	Max (TPY)	Limited (TPY)
1,3-Butadiene	1.60E-05	5.23E-04	6.59E-05	2.29E-03	3.10E-04
Arsenic	1.10E-05	3.59E-04	4.53E-05	1.57E-03	2.13E-04
Benzene	5.50E-05	1.80E-03	2.26E-04	7.87E-03	1.07E-03
Beryllium	3.10E-07	1.01E-05	1.28E-06	4.44E-05	6.01E-06
Cadmium	4.80E-06	1.57E-04	1.98E-05	6.87E-04	9.31E-05
Chromium	1.10E-05	3.59E-04	4.53E-05	1.57E-03	2.13E-04
Formaldehyde	2.80E-04	9.15E-03	1.15E-03	4.01E-02	5.43E-03
Lead	1.40E-05	4.57E-04	5.76E-05	2.00E-03	2.71E-04
Manganese	7.90E-04	2.58E-02	3.25E-03	1.13E-01	1.53E-02
Mercury	1.20E-06	3.92E-05	4.94E-06	1.72E-04	2.33E-05
Naphthalene	3.50E-05	1.14E-03	1.44E-04	5.01E-03	6.79E-04
Nickel	4.60E-06	1.50E-04	1.89E-05	6.58E-04	8.92E-05
PAH	4.00E-05	1.31E-03	1.65E-04	5.72E-03	7.76E-04
Selenium	2.50E-05	8.17E-04	1.03E-04	3.58E-03	4.85E-04
	TOTAL			**0.18**	**0.02**

Ambient Air concentration: mg/m^3

Pollutant	Averaging Period	Concentration (mg/m^3) Max	Adjusted[1]	Screened[2]	Background	Total	SAAQS	% of SAAQS
SO_2	3 hr	-	-		652	652	1,300	50%
	24hr	-	-		111	111	365	30%
	annual	-	-		6	6	80	8%
NO_x	annual	-	-	-	7	7	70	10%
PM_{10}	24hr	-	-		131	131	150	87%
	annual	-	-		24	24	50	48%
CO	1 hr	-	-		4,778	4,778	10,000	48%
	8 hr	-	-		2,337	2,337	5,000	47%

1. "Adjusted" concentrations are corrected for annual and daily operating hours = "Max" * [Operating Hours/Averaging Period (8,760; 24; 8; or 3)]
2. "Screened" NO2 concentrations adjusted using the multi-tiered screening approach detailed in Supplement C of the Guidelines of Air Quality Models, Appendix W of 40 CFR 51.
3. "OLM" Ozone Limiting Method = 1,096 mg/m^3 * 1.31 g/s * 0.2 (1-hr conversion) = 287 mg/m^3
   assume 10% of 287 mg/m^3 converts to primary NO_2: 287 - 28.7 = 258 mg/m^3
   background ozone = 44 mg/m^3; 44<258, thus ozone limited; (46 g/mole NO)/(48 g/mole O_3) = 0.96
   34 mg/m^3 * 0.96 = 32.6 mg/m^3 secondary NO_2
   OLM = 28.7 (primary) + 32.6 (secondary) = 61.3 mg/m^3

COMBUSTION TURBINE

U.S. Navy Public Works Center, PHNC

2 MW Allison Combustion Turbine, model 501-K14C; Bldg. 177

CT Horsepower: 2,680 [hp=kW*1.34]
Maximum Fuel Feed Rate (gal/hr): 235
Maximum Heat Input (MMBTU/hr): 32.67
Operating Hours (hr/yr): 1,000
Operating Hours (hr/day): 24

Type of Diesel Fuel: Diesel #2
Sulfur Content by Weight (%): 0.20%
Fuel Heating Value (BTU/gal): 139,000
Water/Steam Injection (Y/N): N

Max Fuel Consumption (8,760 hr/yr): ####### gal (for one combustion turbine)
Fuel Consumption, Limited Hours: 235,000 gal (combined fuel limit for 2 combustion turbines)

AP-42 Section 3.1, revised 4/00

Pollutant	Emission Factor (lb/MMBtu)	Emissions (lb/hr)	(g/s)	Max (TPY)	Limited (TPY)
SO_2	0.202	6.60	0.83	28.9	3.3
NOx [2]		13.47	1.70	59.0	6.7
CO	0.003	0.11	0.01	0.5	0.1
TOC	0.004	0.13	0.02	0.6	0.1
Lead	0.000	0.00	0.00	0.0	0.0
PM_{10} [1]	0.012	0.39	0.05	1.7	0.2

1 - assumes all PM is PM_{10}
2 - emission rate from 2003 SPT

HAP	Emission Factor (lb/MMBtu)	Emissions (lb/hr)	(g/s)	Max (TPY)	Limited (TPY)
1,3-Butadiene	1.60E-05	5.23E-04	6.59E-05	2.29E-03	2.61E-04
Arsenic	1.10E-05	3.59E-04	4.53E-05	1.57E-03	1.80E-04
Benzene	5.50E-05	1.80E-03	2.26E-04	7.87E-03	8.98E-04
Beryllium	3.10E-07	1.01E-05	1.28E-06	4.44E-05	5.06E-06
Cadmium	4.80E-06	1.57E-04	1.98E-05	6.87E-04	7.84E-05
Chromium	1.10E-05	3.59E-04	4.53E-05	1.57E-03	1.80E-04
Formaldehyde	2.80E-04	9.15E-03	1.15E-03	4.01E-02	4.57E-03
Lead	1.40E-05	4.57E-04	5.76E-05	2.00E-03	2.29E-04
Manganese	7.90E-04	2.58E-02	3.25E-03	1.13E-01	1.29E-02
Mercury	1.20E-06	3.92E-05	4.94E-06	1.72E-04	1.96E-05
Naphthalene	3.50E-05	1.14E-03	1.44E-04	5.01E-03	5.72E-04
Nickel	4.60E-06	1.50E-04	1.89E-05	6.58E-04	7.51E-05
PAH	4.00E-05	1.31E-03	1.65E-04	5.72E-03	6.53E-04
Selenium	2.50E-05	8.17E-04	1.03E-04	3.58E-03	4.08E-04
	TOTAL			**0.18**	**0.02**

Ambient Air concentration: mg/m^3

Pollutant	Averaging Period	Concentration (mg/m^3) Max	Adjusted[1]	Screened[2]	Background	Total	SAAQS	% of SAAQS
SO_2	3 hr	-	-		652	652	1,300	50%
	24hr	-	-		111	111	365	30%
	annual	-	-		6	6	80	8%
NO_x	annual	-	-	-	7	7	70	10%
PM_{10}	24hr	-	-		131	131	150	87%
	annual	-	-		24	24	50	48%
CO	1 hr	-	-		4,778	4,778	10,000	48%
	8 hr	-	-		2,337	2,337	5,000	47%

1. "Adjusted" concentrations are corrected for annual and daily operating hours = "Max" * [Operating Hours/Averaging Period (8,760; 24; 8; or 3)]
2. "Screened" NO2 concentrations adjusted using the multi-tiered screening approach detailed in Supplement C of the Guidelines of Air Quality Models, Appendix W of 40 CFR 51.
3. "OLM" Ozone Limiting Method = 1,096 mg/m^3 * 1.31 g/s * 0.2 (1-hr conversion) = 287 mg/m^3
   assume 10% of 287 mg/m^3 converts to primary NO_2: 287 - 28.7 = 258 mg/m^3
   background ozone = 44 mg/m^3; 44<258, thus ozone limited; (46 g/mole NO)/(48 g/mole O_3) = 0.96
   34 mg/m^3 * 0.96 = 32.6 mg/m^3 secondary NO_2
   OLM = 28.7 (primary) + 32.6 (secondary) = 61.3 mg/m^3

COMBUSTION TURBINE

U.S. Navy Public Works Center, PHNC

2 MW Allison Combustion Turbine, model 501-K14C; Bldg. K-10

CT Horsepower: 2,680 [hp=kW*1.34]
Maximum Fuel Feed Rate (gal/hr): 235
Maximum Heat Input (MMBTU/hr): 32.67
Operating Hours (hr/yr): 302
Operating Hours (hr/day): 24

Type of Diesel Fuel: Diesel #2
Sulfur Content by Weight (%): 0.20%
Fuel Heating Value (BTU/gal): 139,000
Water/Steam Injection (Y/N): N

Max Fuel Consumption (8,760 hr/yr): ####### gal
Fuel Consumption, Limited Hours: 71,000 gal

AP-42 Section 3.1, revised 4/00

Pollutant	Emission Factor (lb/MMBtu)	Emissions (lb/hr)	(g/s)	Max (TPY)	Limited (TPY)
SO_2	0.202	6.60	0.83	28.9	1.0
NOx [2]		13.47	1.70	59.0	2.0
CO	0.003	0.11	0.01	0.5	0.0
TOC	0.004	0.13	0.02	0.6	0.0
Lead	0.000	0.00	0.00	0.0	0.0
PM_{10} [1]	0.012	0.39	0.05	1.7	0.1

1 - assumes all PM is PM_{10}
2 - emission rate from 2003 SPT

HAP	Emission Factor (lb/MMBtu)	Emissions (lb/hr)	(g/s)	Max (TPY)	Limited (TPY)
1,3-Butadiene	1.60E-05	5.23E-04	6.59E-05	2.29E-03	7.90E-05
Arsenic	1.10E-05	3.59E-04	4.53E-05	1.57E-03	5.43E-05
Benzene	5.50E-05	1.80E-03	2.26E-04	7.87E-03	2.71E-04
Beryllium	3.10E-07	1.01E-05	1.28E-06	4.44E-05	1.53E-06
Cadmium	4.80E-06	1.57E-04	1.98E-05	6.87E-04	2.37E-05
Chromium	1.10E-05	3.59E-04	4.53E-05	1.57E-03	5.43E-05
Formaldehyde	2.80E-04	9.15E-03	1.15E-03	4.01E-02	1.38E-03
Lead	1.40E-05	4.57E-04	5.76E-05	2.00E-03	6.91E-05
Manganese	7.90E-04	2.58E-02	3.25E-03	1.13E-01	3.90E-03
Mercury	1.20E-06	3.92E-05	4.94E-06	1.72E-04	5.92E-06
Naphthalene	3.50E-05	1.14E-03	1.44E-04	5.01E-03	1.73E-04
Nickel	4.60E-06	1.50E-04	1.89E-05	6.58E-04	2.27E-05
PAH	4.00E-05	1.31E-03	1.65E-04	5.72E-03	1.97E-04
Selenium	2.50E-05	8.17E-04	1.03E-04	3.58E-03	1.23E-04
	TOTAL			**0.18**	**0.01**

Ambient Air concentration: mg/m^3

Pollutant	Averaging Period	Concentration (mg/m^3) Max	Adjusted[1]	Screened[2]	Background	Total	SAAQS	% of SAAQS
SO_2	3 hr	-	-		652	652	1,300	50%
	24hr	-	-		111	111	365	30%
	annual	-	-		6	6	80	8%
NO_x	annual	-	-	-	7	7	70	10%
PM_{10}	24hr	-	-		131	131	150	87%
	annual	-	-		24	24	50	48%
CO	1 hr	-	-		4,778	4,778	10,000	48%
	8 hr	-	-		2,337	2,337	5,000	47%

1. "Adjusted" concentrations are corrected for annual and daily operating hours = "Max" * [Operating Hours/Averaging Period (8,760; 24; 8; or 3)]
2. "Screened" NO2 concentrations adjusted using the multi-tiered screening approach detailed in Supplement C of the Guidelines of Air Quality Models, Appendix W of 40 CFR 51.
3. "OLM" Ozone Limiting Method = 1,096 mg/m^3 * 1.31 g/s * 0.2 (1-hr conversion) = 287 mg/m^3
   assume 10% of 287 mg/m^3 converts to primary NO_2: 287 - 28.7 = 258 mg/m^3
   background ozone = 44 mg/m^3; 44<258, thus ozone limited; (46 g/mole NO)/(48 g/mole O_3) = 0.96
   34 mg/m^3 * 0.96 = 32.6 mg/m^3 secondary NO_2
   OLM = 28.7 (primary) + 32.6 (secondary) = 61.3 mg/m^3

BOILERS

U.S. Navy - PWC @ PHNC

12.6 MMBtu/hr Hurst or Superior Boiler Works Portable Boiler

Max Heat Input = 12.60 MMBtu/hr
Fuel Type = diesel no. 2 sulfur content = 0.05%
Fuel Heating Value = 140,000 BTU/gal
Fuel Consumption = 90.0 gal/hr
Operating Hours of Burner = 8,760 hr/yr
Max Fuel Consumption, 8,760 hr = 788,400 gal/ 8,760 hr-yr
Proposed Fuel Consumption = 788,400 gal/ 8,760 hr-yr

Pollutant	Emission Factor (lb/1,000 gal)	Emissions (lb/hr)	(g/s)	Max (T/yr)	Proposed (T/yr)
NO_2	20.00	1.80	0.227	7.9	7.9
CO	5.00	0.45	0.057	2.0	2.0
SO_2	7.10	0.64	0.081	2.8	2.8
PM	2.00	0.18	0.023	0.8	0.8
PM_{10}	1.08	0.10	0.012	0.4	0.4
$PM_{2.5}$	0.83	0.07	0.009	0.3	0.3
TOC	0.56	0.05	0.006	0.2	0.2

Emission factors from AP-42, tables 1.3-1, 3, 6, & 7 dated 9/98

Pollutant	Emission Factor (lb/1,000 gal)	Emissions (lb/hr)	(g/s)	Max (T/yr)	Proposed (T/yr)
1,1,1-Trichloroethane	2.36E-04	2.12E-05	2.68E-06	9.30E-05	9.3E-05
acenaphthene	2.11E-05	1.90E-06	2.39E-07	8.32E-06	8.3E-06
Acenaphthylene	2.53E-07	2.28E-08	2.87E-09	9.97E-08	1E-07
Anthracene	1.22E-06	1.10E-07	1.38E-08	4.81E-07	4.8E-07
Benz(a)anthracene	4.01E-06	3.61E-07	4.55E-08	1.58E-06	1.6E-06
Benzene	2.14E-04	1.93E-05	2.43E-06	8.44E-05	8.4E-05
Benzo(b,k)fluoranther	1.48E-06	1.33E-07	1.68E-08	5.83E-07	5.8E-07
Benzo(g,h)perylene	2.26E-06	2.03E-07	2.56E-08	8.91E-07	8.9E-07
Chrysene	2.38E-06	2.14E-07	2.70E-08	9.38E-07	9.4E-07
Dibenxo(a,h)anthrace	1.67E-06	1.50E-07	1.89E-08	6.58E-07	6.6E-07
Ethylbenzene	6.36E-05	5.72E-06	7.21E-07	2.51E-05	2.5E-05
Fluorene	4.47E-06	4.02E-07	5.07E-08	1.76E-06	1.8E-06
Foluorathene	4.84E-06	4.36E-07	5.49E-08	1.91E-06	1.9E-06
Formaldehyde	3.30E-02	2.97E-03	3.74E-04	1.30E-02	0.01301
Indo(1,2,3-cd)pyrene	2.14E-06	1.93E-07	2.43E-08	8.44E-07	8.4E-07
Lead	9.00E+00	1.13E-04	1.43E-05	4.97E-04	4.97E-04
Naphthalene	1.13E-03	1.02E-04	1.28E-05	4.45E-04	0.00045
OCDD	3.10E-09	2.79E-10	3.52E-11	1.22E-09	1.2E-09
o-Xylene	1.09E-04	9.81E-06	1.24E-06	4.30E-05	4.3E-05
Phenanthrene	1.05E-05	9.45E-07	1.19E-07	4.14E-06	4.1E-06
Pyrene	4.25E-06	3.83E-07	4.82E-08	1.68E-06	1.7E-06
Toluene	6.20E-03	5.58E-04	7.03E-05	2.44E-03	0.00244
			Total	**1.67E-02**	**1.67E-02**

Emission factors from AP-42 table 1.3-9, dated 9/98

Ambient Air concentration: mg/m^3

Pollutant	Averaging Period	Concentration (mg/m^3) Max	Adjusted[1]	Screened[2]	Background	Total	SAAQS	% of SAAQS
SO_2	3 hr	-	-		652	652	1,300	50%
	24hr	-	-		111	111	365	30%
	annual	-	-		6	6	80	8%
NO_x	annual	-	-	-	7	7	70	10%
PM_{10}	24hr	-	-		131	131	150	87%
	annual	-	-		24	24	50	48%
CO	1 hr	-	-		4,778	####	#####	48%
	8 hr	-	-		2,337	####	5,000	47%

1. "Adjusted" concentrations are corrected for annual and daily operating hours = "Max" * [Operating Hours/Averaging Period (8,760; 24; 8; or 3)]
2. "Screened" NO2 concentrations adjusted using the multi-tiered screening approach detailed in Supplement C of the Guidelines of Air Quality Models, Appendix W of 40 CFR 51.
3. "OLM" Ozone Limiting Method = 1,096 mg/m^3 * 1.31 g/s * 0.2 (1-hr conversion) = 287 mg/m^3
   assume 10% of 287 mg/m^3 converts to primary NO_2: 287 - 28.7 = 258 mg/m^3
   background ozone = 44 mg/m^3; 44<258, thus ozone limited; (46 g/mole NO)/(48 g/mole O_3) = 0.96
   34 mg/m^3 * 0.96 = 32.6 mg/m^3 secondary NO_2
   OLM = 28.7 (primary) + 32.6 (secondary) = 61.3 mg/m^3