

Manufacturer's Emission Estimates - GE 7FA													
Air Emissions Summary (1)(2)													
CASE		1AA	1AB	1AC	1BA	1BB	1BC	1CA	1CB	1CC	2x1 600 7A	2x1 600 7B	2x1 600 7C
Ambient Temp.	Deg F.	5	50	85	5	50	85	5	50	85	5	50	85
Ambient Relative Humid.	%	80	65	45	80	65	45	80	65	45	80	80	80
Gas Turbine Load	Percent	100	100	100	75	75	75	50	50	50	100	100	100
Turbine Fuel	Type	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG
Duct Burner Fuel	Type	-	-	-	-	-	-	-	-	-	NG	NG	NG
GAS TURBINE INPUT (Per Turbine)													
Fuel (7)	Type	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG
Fuel Sulfur - Annual Average	ppmv	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5
Fuel Sulfur - Annual Average	grains/100 scf	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
SO2 Emission factor - Annual Average (LHV)	lb/MM Btu	0.00240	0.00240	0.00240	0.00240	0.00240	0.00240	0.00240	0.00240	0.00240	0.00240	0.00240	0.00240
Fuel Sulfur - Short Term Average	ppmv	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1
Fuel Sulfur - Short Term Average	grains/100 scf	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
SO2 Emission factor - Short Term Average	lb/MM Btu	0.00480	0.00480	0.00480	0.00480	0.00480	0.00480	0.00480	0.00480	0.00480	0.00480	0.00480	0.00480
Fuel Heating Value (LHV)	Btu/lb	21,325	21,325	21,325	21,325	21,325	21,325	21,325	21,325	21,325	21,325	21,325	21,325
Fuel Heating Value (LHV)	Btu/scf	952	952	952	952	952	952	952	952	952	952	952	952
Fuel Temperature	Deg F	365	365	365	365	365	365	365	365	365	365	365	365
Turbine Output (Gross @ Generator Terminals)	kW	188,300	172,500	152,700	141,200	129,400	114,600	94,200	86,200	76,400	188,300	172,500	152,700
Heat Rate (LHV)	Btu/kWh	9,195	9,355	9,680	9,930	10,120	10,620	11,810	12,140	12,680	9,195	9,355	9,680
Heat Consumption (LHV)	MM Btu/h	1,731.4	1,613.7	1,478.1	1,402.1	1,309.5	1,217.1	1,112.5	1,046.5	968.8	1,731.4	1,613.7	1,478.1
GAS TURBINE EMISSIONS (Per Turbine) - Uncontrolled													
Exhaust Flow	lb/h	3,953,000	3,660,000	3,362,000	3,069,000	2,905,000	2,755,000	2,485,000	2,402,000	2,314,000	3,953,000	3,660,000	3,362,000
Exhaust Pressure	inches Water	22.0	19.3	16.5	13.7	12.4	11.3	9.2	8.6	8.0	22.0	19.3	16.5
Exhaust Temp.	Deg F.	1059	1109	1150	1129	1159	1187	1182	1200	1200	1059	1109	1150
NOx	ppmvd @ 15% O2	9	9	9	9	9	9	9	9	9	9	9	9
NOx as NO2	lb/h	63	59	54	51	47	44	40	38	35	63	59	54
SO2 - Annual Average	ppmvd @ 15% O2	0.27	0.27	0.27	0.27	0.27	0.27	0.28	0.28	0.28	0.27	0.27	0.27
SO2 - Annual Average	lb/h	4.2	3.9	3.5	3.4	3.1	2.9	2.7	2.5	2.3	4.2	3.9	3.5
SO2 - Short Term Average	ppmvd @ 15% O2	0.54	0.54	0.54	0.54	0.54	0.54	0.56	0.56	0.56	0.54	0.54	0.54
SO2 - Short Term Average	lb/h	8.3	7.7	7.1	6.7	6.3	5.8	5.3	5.0	4.7	8.3	7.7	7.1
CO	ppmvd	9	9	9	9	9	9	9	9	9	9	9	9
CO	lb/h	32	30	27	25	24	22	20	20	19	32	30	27
VOC	ppmwv	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
VOC as CH4	lb/h	3.1	2.9	2.7	2.4	2.3	2.2	2.0	1.9	1.8	3.1	2.9	2.7
Particulates (PM10 front- and back-half)	lb/h	17	17	17	17	17	17	17	17	17	17	17	17
Argon	% VOL	39.95	0.90	0.89	0.88	0.91	0.90	0.88	0.89	0.90	0.90	0.89	0.88
Nitrogen	% VOL	28	75.17	74.67	73.90	75.08	74.63	73.92	75.17	74.75	74.08	75.17	74.67
Oxygen	% VOL	32	12.87	12.70	12.54	12.61	12.61	12.59	12.86	12.95	13.07	12.87	12.70
Carbon Dioxide	% VOL	44	3.71	3.73	3.70	3.83	3.77	3.68	3.72	3.61	3.46	3.71	3.73
Water	% VOL	18	7.35	8.01	8.98	7.58	8.10	8.93	7.36	7.80	8.50	7.35	8.01
Exhaust MW		28.48	28.41	28.30	28.47	28.41	28.30	28.48	28.43	28.34	28.48	28.41	28.30
DUCT BURNER INPUT (Per HRSG) (2)(3) - Uncontrolled													
Fuel (4)	Type	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG
Fuel Heating Value (LHV)	Btu/lb	21,325	21,325	21,325	21,325	21,325	21,325	21,325	21,325	21,325	21,325	21,325	21,325
Heat Consumption (LHV)	MM Btu/h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	600.0	600.0	600.0
Heat Consumption (HHV)	MM Btu/h												
NOx	lb/hr	0.08									52.8	52.8	52.8
SO2	lb/hr										1.44	1.44	1.44
CO	lb/hr	0.08									52.8	52.8	52.8
VOC	lb/hr	0.01									6.6	6.6	6.6
PM10	lb/hr	0.015									9.90	9.90	9.90
Addition to Exhaust Flow	lb/hr										28,136.0	28,136.0	28,136.0
COMBINED GAS TURBINE AND DUCT BURNER EMISSIONS (Per Turbine/HRSG) - Uncontrolled													
Exhaust Flow	lb/h	3,953,000	3,660,000	3,362,000	3,069,000	2,905,000	2,755,000	2,485,000	2,402,000	2,314,000	3,981,136	3,688,136	3,390,136
NOx	ppmvd @ 15% O2	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	12.2	12.4	12.6
NOx - AirPermits calculated	ppmvd @ 15% O2	8.9	9.0	9.0	8.9	8.8	8.9	8.8	8.9	8.9	115.8	111.8	106.8
NOx AS NO2	lb/h	63.0	59.0	54.0	51.0	47.0	44.0	40.0	38.0	35.0	115.8	111.8	106.8
SO2 - Annual Average	ppmvd @ 15% O2	0.27	0.27	0.27	0.27	0.27	0.27	0.28	0.28	0.28	5.6	5.3	5.0
SO2 - Annual Average	lb/h	4.2	3.9	3.5	3.4	3.1	2.9	2.7	2.5	2.3	5.6	5.3	5.0

SO2 - Short Term Average	ppmvd @ 15% O2		0.54	0.54	0.54	0.54	0.54	0.54	0.56	0.56	0.56			
SO2 - Short Term Average	lb/h		8.3	7.7	7.1	6.7	6.3	5.8	5.3	5.0	4.7	11.2	10.6	10.0
CO	ppmvd		9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0			
CO - AirPermits calculated	ppmvd		10.1	10.4	10.4	10.1	10.4	10.3	9.9	10.4	10.5	26.6	28.3	30.1
CO - AirPermits calculated	ppmvd @ 15% O2		7.5	7.5	7.4	7.2	7.4	7.3	7.2	7.7	7.9	14.7	15.1	15.5
CO	lb/h		32.0	30.0	27.0	25.0	24.0	22.0	20.0	20.0	19.0	84.8	82.8	79.8
VOC	ppmvw		1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	4.3	4.5	4.8
VOC as CH4	lb/h		3.1	2.9	2.7	2.4	2.3	2.2	2.0	1.9	1.8	9.7	9.5	9.3
Particulates (PM10 front- and back-half)	lb/h		17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	26.9	26.9	26.9
Argon	% VOL	39.95	0.90	0.89	0.88	0.91	0.90	0.88	0.89	0.90	0.90	0.89	0.88	0.87
Nitrogen	% VOL	28	75.17	74.67	73.90	75.08	74.63	73.92	75.17	74.75	74.08	74.23	73.66	72.82
Oxygen	% VOL	32	12.87	12.70	12.54	12.61	12.61	12.59	12.86	12.95	13.07	10.21	9.84	9.44
Carbon Dioxide	% VOL	44	3.71	3.73	3.70	3.83	3.77	3.68	3.72	3.61	3.46	4.91	5.03	5.10
Water	% VOL	18	7.35	8.01	8.98	7.58	8.10	8.93	7.36	7.80	8.50	9.76	10.60	11.77
Exhaust MW			28.48	28.41	28.30	28.47	28.41	28.30	28.48	28.43	28.34	28.32	28.24	28.12
Exhaust MW dry			27.05	26.86	26.58	27.00	26.84	26.59	27.05	26.91	26.70	26.46	26.23	25.90
STACK EMISSIONS (Per Turbine/HRSG)														
Stack Flow	lb/h		3,953,000	3,660,000	3,362,000	3,069,000	2,905,000	2,755,000	2,485,000	2,402,000	2,314,000	3,981,136	3,688,136	3,390,136
Stack Temp.	Deg F.		195	195	195	190	190	190	180	180	180	180	180	180
Stack Flow	acfm		1,109,118	1,029,463	949,296	854,903	811,008	771,866	681,285	659,851	637,675	1,145,741	1,064,491	982,715
Stck Velocity	ft/s											67.4	62.6	57.8
Stck Flow	scfm		723,725	660,543	593,457	567,697	530,204	491,606	464,447	441,839	415,302	731,809	671,565	608,643
Stack Flow	scfm @ 15% O2		985,002	918,042	840,899	797,662	744,981	692,414	632,907	595,359	551,155	1,326,345	1,259,385	1,182,242
NOx	ppmvd @ 15% O2		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
NOx Emission Control Efficiency	%		72.0%	72.1%	72.1%	72.0%	71.6%	71.8%	71.7%	71.9%	71.8%	79.5%	79.8%	80.2%
NOx AS NO2	lb/h		17.5	16.3	15	14.1	13.1	12.2	11.0	10.4	9.6	23.8	22.6	21.2
SO2 - Annual Average	ppmvd @ 15% O2		0.27	0.27	0.27	0.27	0.27	0.27	0.28	0.28	0.28			
SO2 - Annual Average	lb/h		4.2	3.9	3.5	3.4	3.1	2.9	2.7	2.5	2.3	5.6	5.3	5.0
SO2 - Short Term Average	ppmvd @ 15% O2		0.54	0.54	0.54	0.54	0.54	0.54	0.56	0.56	0.56			
SO2 - Short Term Average	lb/h		8.3	7.7	7.1	6.7	6.3	5.8	5.3	5.0	4.7	11.2	10.6	10.0
CO annual average	ppmvd @ 15% O2		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
CO Emission Control Efficiency	%		73.2%	73.3%	72.8%	72.2%	72.9%	72.6%	72.4%	74.0%	74.7%	86.4%	86.7%	87.1%
CO annual average	lb/h		8.5	8.0	7.3	6.8	6.4	5.9	5.4	5.1	4.7	11.6	11.0	10.3
CO 1-hr average (not in permit)	ppmvd @ 15% O2		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
CO 1-hr average (not in permit)	lb/h		21.3	20.0	18.3	17.0	16.0	14.8	13.5	12.8	11.8	28.9	27.5	25.8
VOC	ppmvd @ 15% O2	30%	0.8	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	1.8	1.8	1.9
VOC as CH4	lb/h	30%	2.2	2.0	1.9	1.7	1.6	1.5	1.4	1.3	1.3	6.8	6.6	6.5
Particulates (PM10 front- and back-half)	lb/h		18.7	18.6	18.5	18.4	18.3	18.2	18.1	18.0	18.0	29.2	29.1	29.0
Particulates minus sulfates	lb/h		17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	26.9	26.9	26.9
Argon	% VOL	39.95	0.90	0.89	0.88	0.91	0.90	0.88	0.89	0.90	0.90	0.89	0.88	0.87
Nitrogen	% VOL	28	75.17	74.67	73.90	75.08	74.63	73.92	75.17	74.75	74.08	74.23	73.66	72.82
Oxygen	% VOL	32	12.87	12.70	12.54	12.61	12.61	12.59	12.86	12.95	13.07	10.21	9.84	9.44
Carbon Dioxide	% VOL	44	3.71	3.73	3.70	3.83	3.77	3.68	3.72	3.61	3.46	4.91	5.03	5.10
Water	% VOL	18	7.35	8.01	8.98	7.58	8.10	8.93	7.36	7.80	8.50	9.76	10.60	11.77
Exhaust MW			28.48	28.41	28.30	28.47	28.41	28.30	28.48	28.43	28.34	28.32	28.24	28.12
Exhaust MW dry			27.05	26.86	26.58	27.00	26.84	26.59	27.05	26.91	26.70	26.46	26.23	25.90
Ammonia Slip	ppmvd		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Ammonia Slip	lb/h		13.2	12.3	11.4	10.2	9.7	9.3	8.3	8.0	7.8	13.5	12.7	11.8
Sulfate Conversion (Atmospheric)	%		20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
Sulfate Particulates (Atmospheric)	lb/hr		1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.0	1.0	2.31	2.19	2.06
Sulfate Conversion (In-stack)	%		5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Sulfate Conversion (In-Stack)	lb/hr		0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.6	0.5	0.5

SITE CONDITIONS														
Elevation	ft.		115	115	115	115	115	115	115	115	115	115	115	115
Stack Height	ft.		150	150	150	150	150	150	150	150	150	150	150	150
Stack Diameter	ft.		19	19	19	19	19	19	19	19	19	19	19	19
Site Pressure	psia		14.64	14.64	14.64	14.64	14.64	14.64	14.64	14.64	14.64	14.64	14.64	14.64

- Gas turbine performance and emission estimates are based on GE PG7241 (FA) turbine with dry low-NOx burners.
- Duct burner emission estimates are based on the following emission factors.
NOx 0.080 lb/MM Btu (HHV)
CO 0.080 lb/MM Btu (HHV)
VOC 0.010 lb/MM Btu (HHV)
PM10 (front & back half) 0.015 lb/MM Btu (HHV)
- Case 2 is the firing rate that produces a temperature of 1600 F downstream of the duct burner. This firing rate corresponds to maximum firing rate for conventional HRSG design.
- Emission estimates are based on the following gas compositions and properties.

Constituent Percent Composition

H2	0.0	C3H8	0.5	MW, lb/lbmole	16.64
N2	0.3	C4H8	0.0	Btu/scf (LHV)	952
CO2	0.0	IC4H10	0.1	Btu/scf (HHV)	1,047
CH4	96.9	NC4H10	0.1		
C2H4	0.0	IC5H12	0.0		
C2H6	2.0	NC5H12	0.0		
C3H6	0.0	C5+	<u>0.1</u>		
		Total	99.2		