Table B-3: Reciprocating Gas Engine Emissions
Wolf 1 CHP Data Center
Newark, Delaware

Unit Type		Reciprocating Engine	
Equipment Model		18V50SG	
Manufacturer		Wartsila	
Rated Capacity		18.759	MW
Exhaust Flow per RGE	*Summer*	236,511	lb/hr
	Winter	251,590	lb/hr
Heat Input Rate per RGE, H_{in}	*Summer*	128.8	MMBtu/hr (LHV)
	Winter	**138.3**	MMBtu/hr (LHV)
Exhaust Flow Rate per RGE, Q	*Summer*	66,233	dscfm
	Winter	71,119	dscfm
Heat Input (3) 18V50SG	*Winter case x 8,850 hrs/yr*	3,559,842	MMBTU/yr

Unit Emissions		
Pollutant	***18V50SG***	
	Wartsila @ 100% load	
	Emission Factor	Units
NO_x^{+}	0.132	lb/MWh
CO^{+}	0.286	lb/MWh
VOC^{+}	0.286	lb/MWh
SO_2^{++}	0.000588	lb/MMBTU
PM_{10}^{++}	0.0099	lb/MMBTU
$PM_{2.5}^{++}$	0.0099	lb/MMBTU
PM_{Total}^{++}	0.0099	lb/MMBTU
$H_2SO_4^{1}$	0.0011	lb/MMBTU
Ammonia*	7	ppmv d
	0.0096	lb/MMBtu
Green House Gases		
CO_2^{+}	1,067	lb/MWh
$CH_4^{\S}$	0.001	kg/MMBTU
$N_2O^{\S}$	0.0001	kg/MMBTU
Calculated Hourly Emissions Potential to Emit - PER UNIT		
NO_x	2.48	lb/hr
CO	5.37	lb/hr
VOC	5.4	lb/hr
SO_2	0.08	lb/hr
PM_{10}	1.37	lb/hr
$PM_{2.5}$	1.37	lb/hr
PM_{Total}	1.37	lb/hr
H_2SO_4	0.147	lb/hr
Ammonia	1.3	lb/hr
Green House Gases		
CO_2	20,016	lb/hr
$CH4^{\S}$	0.304	lb/hr
$N_2O^{\S}$	0.030	lb/hr
Gross Annual Potential to Emit - PER UNIT		
NO_x	10.6	tons/year
CO	23.0	tons/year
VOC	23.0	tons/year
SO_2	0.35	tons/year
PM_{10}	5.9	tons/year
$PM_{2.5}$	5.9	tons/year
PM_{Total}	5.9	tons/year
H_2SO_4	0.6	tons/year
Ammonia	5.7	tons/year
Green House Gases		
CO_2	85,868	tons/year
CH_4	1.3	tons/year
N_2O	0.131	tons/year

Actual Emissions for 3 engines @ 100% load	
Hourly Actual Emissions (lb/hr)	
NO_x	7.43
CO	16.10
VOC	16.10
SO_2	0.24
PM_{10}	4.11
$PM_{2.5}$	4.11
PM_{Total}	4.11
H_2SO_4	0.44
Ammonia	3.98
Greenhouse Gases	
CO_2	60,048
CH_4	0.91
N_2O	0.09
Hourly Yearly Emissions (tons/year)	
NO_x	31.87
CO	69.05
VOC	69.05
SO_2	1.05
PM_{10}	17.62
$PM_{2.5}$	17.62
PM_{Total}	17.62
H_2SO_4	1.89
Ammonia	17.07
Greenhouse Gases	
CO_2	257,604
CH_4	3.92
N_2O	0.39

Emission Factor Source:

[1] H_2SO_4 calculated assuming a conservative estimate of 0.5 grains of Sulfur per 100 standard cubic foot (scf); natural gas heating value of 1027BTU/scf; 50% of Sulfur becomes SO_3 and 100% of SO_3 becomes H_2SO_4.

** Emission factor based on BACT/LAER assessment*

+ Emission Factors obtained via the manufacturer specifications

++ Emission Factors obtained via Table 3.2-2 of the EPA AP-42 (7/2000)

§ Emission Factor obtained from Table C-2 to Subpart C of Part 98 - Default CH4 and N2O Emission Factors for Various Types of Fuel - of the United States Federal Register Volume 74, No. 209