



PROJECT REPORT
The Procter & Gamble Paper Products Company

CONSTRUCTION AND OPERATING PERMIT APPLICATION
ALBANY NEW BOILER PROJECT

Toxic Air Pollutant Modeling Analysis

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1.1. INTRODUCTION

Sterling Energy Assets (Sterling) plans to construct a Biomass Cogeneration Boiler at the Procter and Gamble Paper Products Company (P&GPP), located in Albany, Georgia. The cogeneration plant will be considered part of the existing P&GPP site under the Prevention of Significant Deterioration (PSD) and Title V programs by virtue of being on contiguous property, under common control, and assuming the first two digits of the SIC code for P&GPP's manufacturing operations by virtue of its support to P&GPP operations.

The P&GPP Albany facility is an existing PSD Major Source, currently operating under Title V permit number 2676-095-0071-V-02-1. Approximately half of the steam to be produced by Sterling's 1,037 MMBtu/hr circulating fluid bed (CFB) boiler will be used to generate power for the electrical grid. The remainder of the steam will be supplied to the adjacent P&GPP operations to replace steam currently produced by an existing permitted 216 MMBtu/hr heat input biomass boiler (ID No. B002), that will be decommissioned following the shakedown period associated with the cogeneration plant and will also be used to replace process heat generated from natural gas combustion in existing permitting duct burners. There will be no physical changes to the production equipment that can increase production capacity or utilization and the use of steam for heating will only maintain existing production capacity. P&GPP will continue to maintain the capacity to use the natural gas duct burners and backup natural gas boiler for process heating during periods of downtime of the Biomass Cogeneration Boiler.

The proposed project will require a Prevention of Significant Deterioration (PSD) permit. The existing P&GPP facility is a major stationary source with respect to Title V and emissions increases from the proposed project will exceed the respective PSD significant emission rates thresholds for carbon monoxide (CO), sulfur dioxide (SO₂), oxides of nitrogen (NO_x), particulate matter with an aerodynamic diameter of 10 microns (PM₁₀), and PM with an aerodynamic diameter of 2.5 microns (PM_{2.5}).

Following EPD policy, Trinity Consultants (Trinity), on behalf of P&GPP, prepared and submitted a dispersion modeling protocol on May 3, 2013 which was subsequently approved on May 17, 2013. The PSD portion of the modeling report was included as Volume II of the permit application submitted to EPD on June 12, 2013.¹ This report documents the Georgia state toxic air pollutant (TAP) analysis that was also performed as part of the project. The TAP modeling was performed for the pollutants of concern identified by EPD at the May 7, 2013 PSD pre-application meeting.² The modeled TAP are also emitted from existing P&GPP combustion sources and as such, additional sources beyond those included in the PSD modeling were included in this analysis. The same modeling methodology and data resources utilized in the PSD modeling analyses were also used in this toxics demonstration and are in accordance with Georgia EPD Toxics modeling guidelines (*Guidelines*).³

¹ *Volume II – Dispersion Modeling Analysis Application* submitted by P&GPP to Georgia EPD on June 12, 2013.

² <http://www.georgiaair.org/airpermit/html/permits/psd/dockets/greenenergy/facilitydocs.htm>

³ Georgia EPD, *Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions*, June 1998.

1.2. REPORT ORGANIZATION

The remainder of this report is organized as follows:

- > Section 2 provides the source description and layout,
- > Section 3 presents the toxics modeling results,
- > Appendix A contains the TAP emissions summary, and
- > Appendix B contains the electronic modeling files.

2. EMISSION SOURCE DESCRIPTION

This section contains the description and layout of all sources included in the facility-wide toxics modeling.

2.1. MODELED SOURCES

In addition to the new biomass boiler (B004), P&GPP has 6 papermaking lines (1-6) which consist of forming stacks, process stacks and dry end stacks. The process stacks are the only sources of TAP emissions, due to the combustion of natural gas in the Predryer and Yankee burners. Lines 1-3 have individual stacks for each burner while lines 4-6 have both burners ducting through a single process stack. As previously discussed, the existing biomass boiler (B002) will be shutdown as part of this project and is not included in the analysis. There are two other existing boilers at the Albany site: B001 (permitted to fire fuel oil or natural gas), and B003 (permitted to fire natural gas or propane). Those boilers were included in this modeling demonstration. Tables 2-1 and 2-2 present the modeled source locations and stack parameters, respectively.

Table 2-1. Modeled Source Locations

Model ID	Description	UTM-E (m)	UTM-N (m)	Elevation (m)
B004	New Biomass Boiler	774,682.4	3,494,652.0	57.6
1PR1	1A Predryer Stack	774,358.0	3,494,266.5	56.5
1PR2	1A Yankee Dryer Stack	774,359.1	3,494,257.8	56.3
2PR1	2A Predryer Stack	774,385.4	3,494,255.2	56.0
2PR2	2A Yankee Dryer Stack	774,397.5	3,494,257.9	56.0
3PR1	3A Predryer Stack	774,571.6	3,494,262.0	58.4
3PR2	3A Yankee Dryer Stack	774,595.8	3,494,222.7	56.9
4APR	4A Predryer/Yankee Stack	774,606.3	3,494,261.7	57.7
5APR	5A Predryer/Yankee Stack	774,708.9	3,494,263.1	54.8
6APR	6A Predryer/Yankee Stack	774,778.3	3,494,272.8	54.7
B001	Existing Boiler 001	774,380.8	3,494,359.1	57.8
B003	Existing Boiler 003	774,386.3	3,494,365.8	57.9

Table 2-1. Modeled Source Parameters

Source ID	Stack Height (m)	Stack Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)
B004	65.00	435.93	18.35	3.66
1PR1	28.65	303.71	7.25	4.05
1PR2	24.08	308.15	9.36	2.65
2PR1	23.47	398.15	16.18	2.44
2PR2	21.34	367.04	12.86	2.65
3PR1	35.36	370.93	24.35	2.44
3PR2	19.51	302.59	32.98	1.19
4APR	35.36	365.37	25.94	2.44
5APR	30.18	377.59	22.49	2.59
6APR	30.18	363.71	26.40	2.59
B001	49.07	422.04	6.89	2.13
B003	31.70	433.15	16.64	1.37

2.2. MODELED EMISSION RATES

Detailed TAP emission calculations are included in Appendix A to this report. Table 2-3 presents the rates that were modeled for each source and pollutant.

Table 2-3. Modeled TAP Emission Rates

Model ID	Modeled Emission Rates (g/s)																							
	CO	LEAD	ACETAL	ACETOP	ACROLEIN	AMMONIA	ANTIMONY	ARSENIC	BENZENE	BERYL	CADMIUM	CHROMIUM	COBALT	FORM	HXCLPDX	HCL	HF	MANGNSE	MERCURY	NICKEL	PHOS	SELENIUM	SILVER	STYRENE
B004	1.31E+01	6.27E-03	1.08E-01	4.18E-07	5.23E-01	2.73E+00	1.03E-03	2.88E-03	5.49E-01	1.44E-04	5.36E-04	4.57E-04	8.49E-04	5.75E-01	2.09E-04	2.61E+00	1.16E+01	2.09E-01	1.05E-04	4.31E-03	3.53E-03	3.66E-04	1.31E-03	2.48E-01
1PR1	1.56E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.71E-06	3.89E-05	2.22E-07	2.04E-05	0.00E+00	1.56E-06	1.39E-03	0.00E+00	0.00E+00	0.00E+00	7.04E-06	7.04E-06	3.89E-05	0.00E+00	4.45E-07	0.00E+00	0.00E+00
1PR2	9.86E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.35E-06	2.46E-05	1.41E-07	1.29E-05	0.00E+00	9.86E-07	8.80E-04	0.00E+00	0.00E+00	0.00E+00	4.46E-06	4.46E-06	2.46E-05	0.00E+00	2.82E-07	0.00E+00	0.00E+00
2PR1	1.56E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.71E-06	3.89E-05	2.22E-07	2.04E-05	0.00E+00	1.56E-06	1.39E-03	0.00E+00	0.00E+00	0.00E+00	7.04E-06	7.04E-06	3.89E-05	0.00E+00	4.45E-07	0.00E+00	0.00E+00
2PR2	9.86E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.35E-06	2.46E-05	1.41E-07	1.29E-05	0.00E+00	9.86E-07	8.80E-04	0.00E+00	0.00E+00	0.00E+00	4.46E-06	4.46E-06	2.46E-05	0.00E+00	2.82E-07	0.00E+00	0.00E+00
3PR1	1.56E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.71E-06	3.89E-05	2.22E-07	2.04E-05	0.00E+00	1.56E-06	1.39E-03	0.00E+00	0.00E+00	0.00E+00	7.04E-06	7.04E-06	3.89E-05	0.00E+00	4.45E-07	0.00E+00	0.00E+00
3PR2	9.86E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.35E-06	2.46E-05	1.41E-07	1.29E-05	0.00E+00	9.86E-07	8.80E-04	0.00E+00	0.00E+00	0.00E+00	4.46E-06	4.46E-06	2.46E-05	0.00E+00	2.82E-07	0.00E+00	0.00E+00
4APR	2.54E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.05E-06	6.36E-05	3.63E-07	3.33E-05	0.00E+00	2.54E-06	2.27E-03	0.00E+00	0.00E+00	0.00E+00	1.15E-05	1.15E-05	6.36E-05	0.00E+00	7.26E-07	0.00E+00	0.00E+00
5APR	2.08E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.94E-06	5.19E-05	2.97E-07	2.72E-05	0.00E+00	2.08E-06	1.85E-03	0.00E+00	0.00E+00	0.00E+00	9.39E-06	9.39E-06	5.19E-05	0.00E+00	5.93E-07	0.00E+00	0.00E+00
6APR	2.08E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.94E-06	5.19E-05	2.97E-07	2.72E-05	0.00E+00	2.08E-06	1.85E-03	0.00E+00	0.00E+00	0.00E+00	9.39E-06	9.39E-06	5.19E-05	0.00E+00	5.93E-07	0.00E+00	0.00E+00
B001	1.94E+00	2.54E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.84E-04	2.22E-04	4.85E-05	4.68E-06	6.70E-05	4.17E-05	1.01E-03	5.55E-03	0.00E+00	0.00E+00	0.00E+00	5.05E-04	1.90E-05	1.42E-02	1.59E-03	1.15E-04	0.00E+00	0.00E+00
B003	1.82E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.32E-06	4.54E-05	2.59E-07	2.38E-05	0.00E+00	1.82E-06	1.62E-03	0.00E+00	0.00E+00	0.00E+00	8.22E-06	8.22E-06	4.54E-05	0.00E+00	5.19E-07	0.00E+00	0.00E+00

Figures 2-1 and 2-2 present the overall Albany site layouts. Figure 2-1 presents the overall site plan showing the locations of the new sources.

Figure 2-1. P&GPP Albany Overall Site Layout

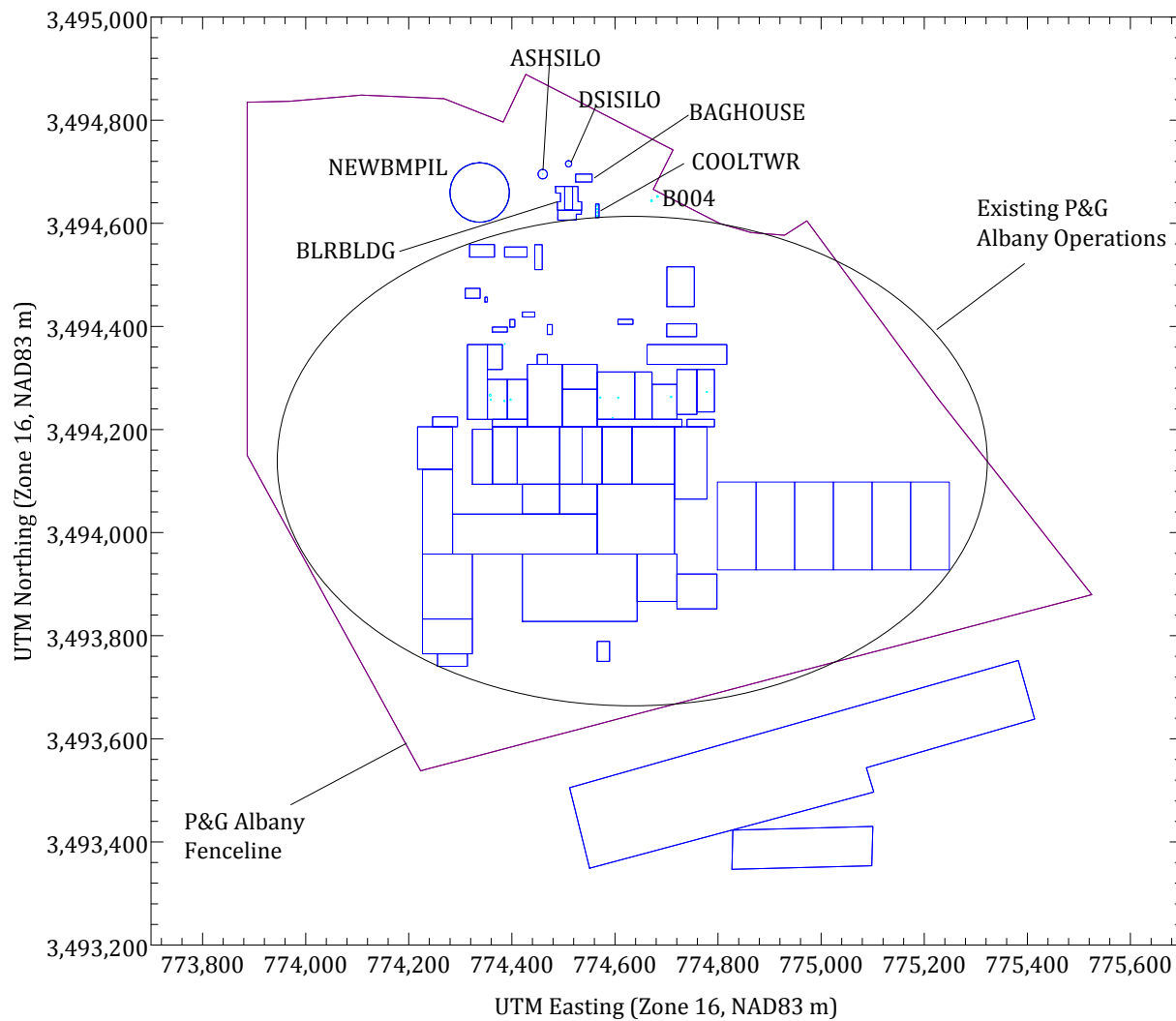
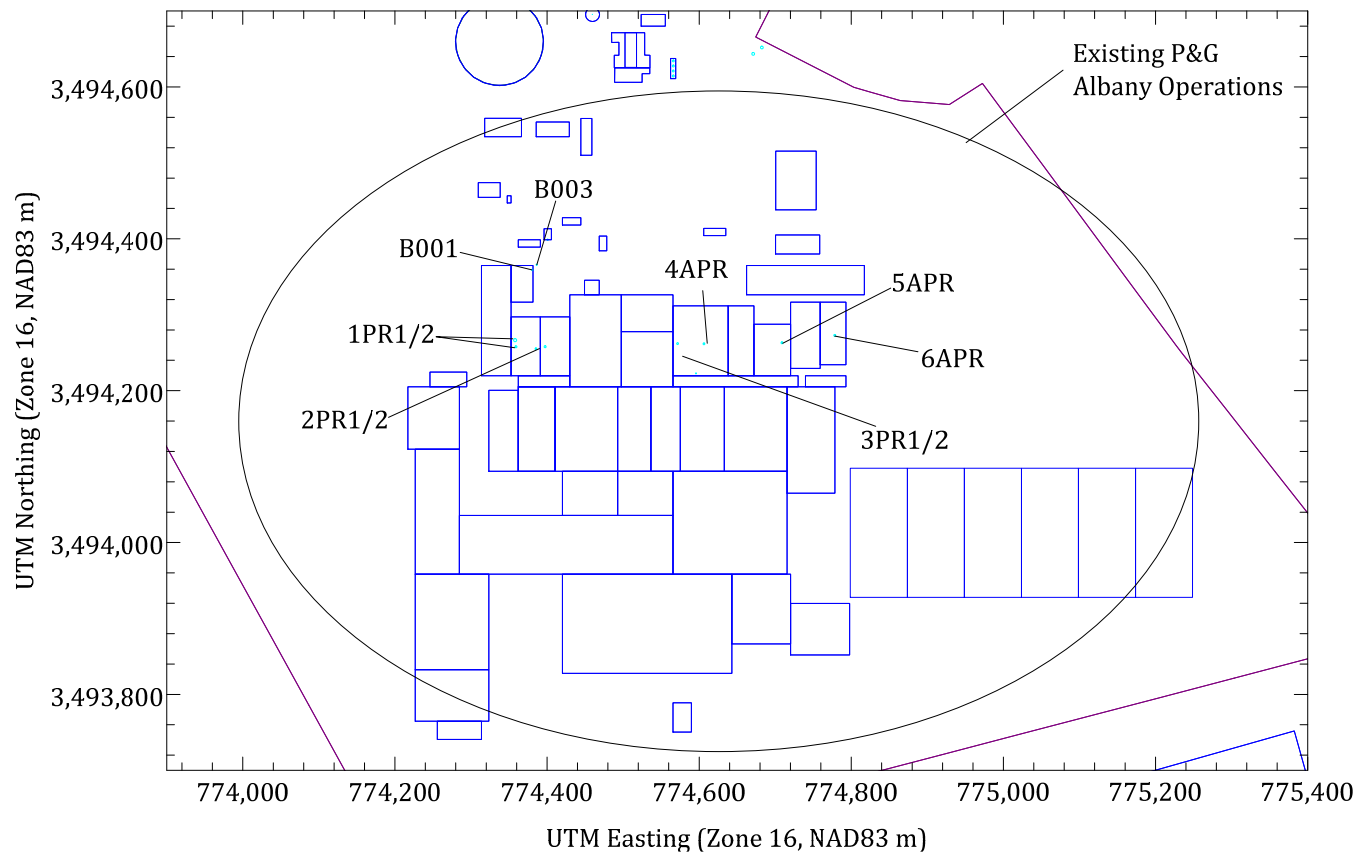


Figure 2-2 focuses on the current P&GPP facility area to better illustrate the location of the existing P&GPP sources.

Figure 2-2. P&GPP Albany Existing Source Layout



3. TAP MODELING RESULTS

This section presents the modeling results for the TAP analysis conducted for the proposed project. As shown all modeled impacts are below their respective acceptable ambient concentrations (AAC). The electronic input and output files used in the AERMOD analyses are included on the CD-ROM in Appendix B. The *Guidelines* include the following hierarchy to be used in order to determine the appropriate AAC and averaging period(s) of concern for TAP:

- > U.S. EPA Integrated Risk Information System (IRIS) reference concentration (RfC) or unit risk;
- > Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PEL);
- > American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV);
- > National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Limits (REL); and
- > Lethal Dose – 50% (LD50) Standards.

The applicable reference concentrations and calculated AAC are included in the results table below.

3.1. TAP MODELING RESULTS

Table 3-1 presents the results of the TAP dispersion modeling and demonstrates that all modeled pollutant impacts are below their AAC. As such, the proposed new boiler project will not result in any TAP impacts above any thresholds of concern.

Table 3-1. TAP Modeling Results

	B			C		D			E				F		
Compound Name & CAS No.	RfC	"C" or STEL	TWA	Safety Factor		AAC, µg/m³			AERMOD Modeling Results, µg/m³				Acceptability of the Predicted Ambient Impact		
	mg/m3	mg/m3	mg/m3	STEL/"C"	TWA	15 Minutes	24 Hours	Annual	1 hour	15 minutes	24 Hours	Annual	15-minute Impact	24-hour Impact	Annual Impact
Hydrogen Chloride HCl (7647-01-0)	0.02	7.00	7.00	10.00	100	7.00E+02	1.67E+01	2.00E+01	4.08E+00	5.38E+00	7.10E-01	8.83E-02	Acceptable	Acceptable	Acceptable
Hydrogen Fluoride (7664-39-3)	na	1.64	2.45	10.00	100	1.64E+02	5.83E+00	na	1.82E+01	2.40E+01	3.16E+00	na	Acceptable	Acceptable	na
Mercury (7439-97-6)	3.00E-04	0.10	0.10	10.00	100	1.00E+01	2.38E-01	3.00E-01	9.50E-04	1.25E-03	3.50E-04	4.00E-05	Acceptable	Acceptable	Acceptable
Arsenic (7440-38-2)	2.00E-07	0.002	0.10	10.00	300	2.00E-01	7.94E-02	2.00E-04	5.03E-03	6.64E-03	9.00E-04	1.30E-04	Acceptable	Acceptable	Acceptable
Formaldehyde (50-00-0)	8.00E-04	2.46	0.92	10.00	100	2.46E+02	2.20E+00	8.00E-01	9.33E-01	1.23E+00	1.60E-01	2.35E-02	Acceptable	Acceptable	Acceptable
Ammonia (7664-41-7)*	0.10	27.00	35.00	10.00	100	2.70E+03	8.33E+01	1.00E+02	4.25E+00	5.62E+00	7.41E-01	9.21E-02	Acceptable	Acceptable	Acceptable
Carbon Monoxide (630-08-0)*	na	229.00	55.00	10.00	100	2.29E+04	1.31E+02	na	2.11E+02	2.78E+02	7.59E+01	na	Acceptable	Acceptable	na
Benzene (71-43-2)	1.30E-04	15.95	3.19	10.00	300	1.60E+03	2.53E+00	1.30E-01	8.57E-01	1.13E+00	1.49E-01	1.87E-02	Acceptable	Acceptable	Acceptable
Acrolein (107-02-8)	2.00E-05	0.80	0.25	10.00	100	8.00E+01	5.95E-01	2.00E-02	8.16E-01	1.08E+00	1.42E-01	1.77E-02	Acceptable	Acceptable	Acceptable
Beryllium (7440-41-7)	4.00E-06	0.005	0.002	10.00	300	5.00E-01	1.59E-03	4.00E-03	2.40E-04	3.17E-04	4.00E-05	1.00E-05	Acceptable	Acceptable	Acceptable
Cadmium (7440-43-9)	6.00E-06	na	0.005	10.00	300	na	3.97E-03	6.00E-03	2.76E-03	na	1.03E-03	1.20E-04	na	Acceptable	Acceptable
Lead (7439-92-1)	na	na	0.05	10.00	100	na	1.19E-01	na	1.03E-02	na	1.79E-03	na	na	Acceptable	na
Manganese (7439-96-5)	5.00E-05	5.00	0.10	10.00	100	5.00E+02	2.38E-01	5.00E-02	3.28E-01	4.32E-01	5.70E-02	7.13E-03	Acceptable	Acceptable	Acceptable
Nickel (7440-02-0)	na	na	1.00	10.00	300	na	7.94E-01	na	1.06E-01	na	1.92E-02	na	na	Acceptable	na
Selenium (7782-49-2)	na	na	0.20	10.00	100	na	4.76E-01	na	9.00E-04	na	2.00E-04	na	na	Acceptable	na
Acetaldehyde (75-07-0)	0.01	na	360.00	10.00	100	na	8.57E+02	9.00E+00	1.69E-01	na	2.95E-02	3.66E-03	na	Acceptable	Acceptable
Acetophenone (98-86-2) ¹	na	na	na	10.00	na	na	na	na	4.90E-06	na	na	na	na	na	na
Antimony (7440-36-0)	na	0.50	0.50	10.00	100	5.00E+01	1.19E+00	na	6.44E-03	8.50E-03	1.15E-03	na	Acceptable	Acceptable	na
Cobalt	na	na	na	10.00	100	na	na	na	7.46E-03	na	na	na	na	na	na
Phosphorus (7723-14-0)	na	0.10	0.10	10.00	100	1.00E+01	2.38E-01	na	1.16E-02	1.53E-02	2.37E-03	na	Acceptable	Acceptable	na
Styrene (100-42-5)	1.00	425.00	425.00	10.00	100	4.25E+04	1.01E+03	1.00E+03	3.88E-01	5.12E-01	6.75E-02	8.39E-03	Acceptable	Acceptable	Acceptable
Silver (7440-22-4)*	na	na	0.01	10.00	100	na	2.38E-02	na	2.05E-03	na	3.60E-04	na	na	Acceptable	na
Chromium (18540-29-9)	8.00E-08	na	0.0025	10.00	300	na	1.98E-03	8.00E-05	8.00E-04	na	1.40E-04	2.00E-05	na	Acceptable	Acceptable
Hexachlorodibenzo-p-dioxins (57653-85-5)	2.00E-05	na	na	10.00	100	na	na	2.00E-02	3.30E-04	na	na	1.00E-05	na	na	Acceptable

¹ Model Results were less than the reportable value in AERMOD (0.0E-05), as such, the result was conservatively assumed to be 4.9E-06.

APPENDIX A - TAP EMISSION CALCULATIONS

SUPPORTING TOXICS MODELING CALCULATIONS
COGENERATION BIOMASS BOILER

Heat Input (MMBtu/hr)	1,037.00
Operating Schedule (hrs/yr)	8760
Heat Input (MMBtu/yr)	9,084,120
Biomass Feed (Heat Input Basis) (%)	100.00%
Biomass Usage (tons/yr) =	983,130
Biomass Heating Value (BTU/lb) =	4,620 from Sterling Plant Emission calcs

Natural Gas Burner Heat Input (MMBtu/hr)	200.00	
Hours to Startup =	8.00	hrs
No. of Startups per year =	3	
Max Hours of Startup per year =	24.00	
Natural Gas Usage (scf/yr)=	4,705,882	196,078.43
Natural Gas Heating Value (BTU/scf)=	1,020	

Pollutant	Pollutant Type	Emission Factors							Emissions				Worst Case Emission Factor	Total Uncontrolled Total			Maximum Controlled Total ⁷		
		Biomass				Natural Gas Startup			Biomass Combustion Emissions		Natural Gas Startup Emissions			lb/hr	lb/yr	tpy	lb/hr	lb/yr	tpy
		lb/MMBtu Uncontrolled	% Efficiency	lb/MMBtu Controlled	Ref.	lb/10 ⁶ scf Uncontrolled	lb/MMBtu Uncontrolled	Ref.	Uncontrolled	Controlled	Uncontrolled	Controlled							
PSD-Regulated Pollutants																			
Filterable Particulate Matter (PM)	PSD	1.280	99.2%	0.0098	5			2	1.33E+03	1.02E+01				1,327.36	11,627,673.60	5813.8	10.16	89,024.38	44.51
Filterable Particulate Matter<10 microns (PM ₁₀)	PSD	0.528	98.3%	0.0098	5			2	5.48E+02	1.02E+01				547.54	4,796,415.36	2398.2	10.16	89,024.38	44.51
Filterable Particulate Matter<2.5 microns (PM _{2.5})	PSD	0.184	95.1%	0.0098	5			2	1.91E+02	1.02E+01				190.81	1,671,478.08	835.7	10.16	89,024.38	44.51
Condensable Particulate Matter (PM _{Cond})	PSD	0.0162		0.0162	5			2	1.68E+01	1.68E+01				16.80	147,162.74	73.58	16.80	147,162.74	73.58
Total Particulate Matter (PM)	PSD	1.296	99.4%	0.0260	3.5	7.600	7.45E-03	3	1.34E+03	2.70E+01	1.49E+00	1.49E+00	Biomass	1,344.16	11,774,836.34	5887.4	26.96	236,187	118.09
Total Particulate Matter<10 microns (PM ₁₀)	PSD	0.544	98.3%	0.0260	3.5	7.600	7.45E-03	3	5.64E+02	2.70E+01	1.49E+00	1.49E+00	Biomass	564.34	4,943,578.10	2471.8	26.96	236,187	118.09
Total Particulate Matter<2.5 microns (PM _{2.5})	PSD	0.200	95.1%	0.0260	3.5	7.600	7.45E-03	3	2.08E+02	2.70E+01	1.49E+00	1.49E+00	Biomass	207.61	1,818,640.82	909.3	26.96	236,187	118.09
Sulfur Dioxide (SO ₂)	PSD	0.260	92.3%	0.0200	5	6.00E-01	5.88E-04	2	2.70E+02	2.08E+01	1.18E-01	1.18E-01	Biomass	269.62	2,361,871.20	1180.94	20.76	181,864	90.93
Nitrogen Oxides (NO _x)	PSD	0.200	62.5%	0.075	5		1.00E-01	5	2.07E+02	7.78E+01	2.00E+01	2.00E+01	Biomass	207.40	1,816,824.00	908.4	77.78	681,309	340.7
Carbon Monoxide (CO)	PSD/ TAP	0.100		0.100	5		1.20E-01	5	1.04E+02	1.04E+02	2.40E+01	2.40E+01	Biomass	103.70	908,412.00	454.2	103.70	908,412	454.2
Volatile Organic Compounds (VOC)	PSD	0.007		0.007	5	5.5	5.39E-03	2	7.26E+00	7.26E+00	1.08E+00	1.08E+00	Biomass	7.26	63,588.84	31.79	7.26	63,589	31.79
Lead	PSD/TAP	4.80E-05		4.80E-05	1	0.0005	4.90E-07		4.98E-02	4.98E-02	9.80E-05	9.80E-05	Biomass	4.98E-02	436.04	0.22	0.05	436	0.22
GHG																			
Carbon Dioxide (CO2)		195.00		1.95E+02	1		116.89	2	2.02E+05	2.02E+05	2.34E+04	2.34E+04	Biomass	2.02E+05	1,771,964,468	885,982	2.02E+05	1,771,964,468	885,982
Methane (CH4)		0.021		2.10E-02	1		0.0022	2	2.18E+01	2.18E+01	4.41E-01	4.41E-01	Biomass	2.18E+01	190,777	95.39	2.18E+01	190,777	95.39
Nitrous Oxide (N2O)		0.013		1.30E-02	1		0.00022	2	1.35E+01	1.35E+01	4.41E-02	4.41E-02	Biomass	1.35E+01	118,095	59.05	1.35E+01	118,095	59.05
CO2e				199.47	4		117.004		2.07E+05	2.07E+05	2.34E+04	2.34E+04	Biomass	2.07E+05	1,812,580,118	906,290	2.07E+05	1,812,580,118	906,290
CO2e biomass deferral				4.47	4		117.0037		4.64E+03	4.64E+03	2.34E+04	2.34E+04	Nat Gas	2.34E+04	41,176,718	20,588	2.34E+04	41,176,718	20,588
Hazardous Air Pollutants																			
Acetaldehyde	HAP/TAP	8.30E-04		8.30E-04	1				8.61E-01	8.61E-01				8.61E-01	7,539.82	3.77E+00	8.61E-01	7,539.82	3.77E+00
Acetophenone	HAP/TAP	3.20E-09		3.20E-09	1				3.32E-06	3.32E-06				3.32E-06	0.03	1.45E-05	3.32E-06	0.03	1.45E-05
Acenaphthene	HAP			0.00E+00		1.80E-06	1.76E-09	2			3.53E-07	3.53E-07	Nat Gas	3.53E-07	0.00	1.55E-06	3.53E-07	0.00	1.55E-06
Acenaphthylene	HAP			0.00E+00		1.80E-06	1.76E-09	2			3.53E-07	3.53E-07	Nat Gas	3.53E-07	0.00	1.55E-06	3.53E-07	0.00	1.55E-06
Acrolein	HAP/TAP	4.00E-03		4.00E-03	1				4.15E+00	4.15E+00			Biomass	4.15E+00	36,336.48	1.82E+01	4.15E+00	36,336.48	1.82E+01
Ammonia	TAP				7				2.16E+01	2.16E+01			Biomass	2.16E+01	189,500.80	9.48E+01	2.16E+01	189,500.80	9.48E+01
Antimony & Compounds	HAP/TAP	7.90E-06		7.90E-06	1				8.19E-03	8.19E-03			Biomass	8.19E-03	71.76	3.59E-02	8.19E-03	71.76	3.59E-02
Arsenic & Compounds	HAP/TAP	2.20E-05		2.20E-05	1	1.96E-07	1.92E-10	2	2.28E-02	2.28E-02	3.84E-08	3.84E-08	Biomass	2.28E-02	199.85	9.99E-02	2.28E-02	199.85	9.99E-02
Benzene	HAP/TAP	4.20E-03		4.20E-03	1	2.06E-06	2.02E-09	2	4.36E+00	4.36E+00	4.04E-07	4.04E-07	Biomass	4.36E+00	38,153.30	1.91E+01	4.36E+00	38,153.30	1.91E+01
Benzo(b,k)fluoranthene	HAP					1.76E-09	1.73E-12	2			3.46E-10	3.46E-10	Nat Gas	3.46E-10	0.00	1.52E-09	3.46E-10	0.00	1.52E-09
Benzo(g,h,i)perylene	HAP					1.18E-09	1.15E-12	2			2.31E-10	2.31E-10	Nat Gas	2.31E-10	0.00	1.01E-09	2.31E-10	0.00	1.01E-09
Benzo(a)pyrene	HAP	2.60E-06		2.60E-06	1				2.70E-03	2.70E-03			Biomass	2.70E-03	23.62	1.18E-02	2.70E-03	23.62	1.18E-02
Beryllium metal	HAP/TAP	1.10E-06		1.10E-06	1	1.18E-08	1.15E-11	2	1.14E-03	1.14E-03	2.31E-09	2.31E-09	Biomass	1.14E-03	9.99	5.00E-03	1.14E-03	9.99	5.00E-03
Cadmium Metal	HAP/TAP	4.10E-06		4.10E-06	1	1.08E-06	1.06E-09	2	4.25E-03	4.25E-03	2.11E-07	2.11E-07	Biomass	4.25E-03	37.24	1.86E-02	4.25E-03	37.24	1.86E-02
Carbon tetrachloride	HAP	4.50E-05		4.50E-05	1				4.67E-02	4.67E-02			Biomass	4.67E-02	408.79	2.04E-01	4.67E-02	408.79	2.04E-01
Chlorine	HAP	7.90E-04		7.90E-04	1				8.19E-01	8.19E-01			Biomass	8.19E-01	7,176.45	3.59E+00	8.19E-01	7,176.45	3.59E+00
Chlorobenzene	HAP	3.30E-05		3.30E-05	1				3.42E-02	3.42E-02			Biomass	3.42E-02	299.78	1.50E-01	3.42E-02	299.78	1.50E-01
Chloroform	HAP	2.80E-05		2.80E-05	1				2.90E-02	2.90E-02			Biomass	2.90E-02	254.36	1.27E-01	2.90E-02	254.36	1.27E-01
Chromium—Other compds	HAP/TAP	2.10E-05		2.10E-05	1				2.18E-02	2.18E-02			Biomass	2.18E-02	190.77	9.54E-02	2.18E-02	190.77	9.54E-02
Chromium VI	HAP/TAP	3.50E-06		3.50E-06	1				3.63E-03	3.63E-03			Biomass	3.63E-03	31.79	1.59E-02	3.63E-03	31.79	1.59E-02
Chrysene	HAP			0.00E+00		1.76E-09	1.73E-12	2			3.46E-10	3.46E-10	Nat Gas	3.46E-10	0.00	1.52E-09	3.46E-10	0.00	1.52E-09
Cobalt compounds	HAP/TAP	6.50E-06		6.50E-06	1	8.24E-08	8.07E-11	2	6.74E-03	6.74E-03	1.61E-08	1.61E-08	Biomass	6.74E-03	59.05	2.95E-02	6.74E-03	59.05	2.95E-02
Dibenzo(a,h)anthracene	HAP					1.18E-09	1.15E-12	2			2.31E-10	2.31E-10	Nat Gas	2.31E-10	0.00	1.01E-09	2.31E-10	0.00	1.01E-09
Dinitrophenol, 2,4-	HAP	1.80E-07		1.80E-07	1				1.87E-04	1.87E-04			Biomass	1.87E-04	1.64	8.18E-04	1.87E-04	1.64	8.18E-04
Di(2-ethylhexyl)phthalate (DEHP)	HAP	4.70E-08		4.70E-08	1				4.87E-05	4.87E-05			Biomass	4.87E-05	0.43	2.13E-04	4.87E-05	0.43	2.13E-04
Ethyl benzene	HAP	3.10E-05		3.10E-05	1				3.21E-02	3.21E-02			Biomass	3.21E-02	281.61	1.41E-01	3.21E-02	281.61	1.41E-01
Ethylene dichloride (1,2-dichloroethane)	HAP	2.90E-05		2.90E-05	1				3.01E-02	3.01E-02			Biomass	3.01E-02	263.44	1.32E-01	3.01E-02	263.44	1.32E-01
Fluoroanthene	HAP			0.00E+00		2.94E-09	2.88E-12	2			5.77E-10	5.77E-10	Nat Gas	5.77E-10	0.00	2.53E-09	5.77E-10	0.00	2.53E-09
Fluorene	HAP			0.00E+00		2.75E-09	2.69E-12	2			5.38E-10	5.38E-10	Nat Gas	5.38E-10	0.00	2.36E-09	5.38E-10	0.00	2.36E-09
Formaldehyde	HAP/TAP	4.40E-03		4.40E-03	1	7.35E-05	7.21E-08	2	4.56E+00	4.56E+00	1.44E-05	1.44E-05	Biomass	4.56E+00	39,970.13	2.00E+01	4.56E+00	39,970.13	2.00E+01
Hexachlorodibenzo-p-dioxin 1,2,3,6,7,8	TAP	1.60E-06		1.60E-06	1				1.66E-03	1.66E-03			Biomass	1.66E-03	14.53	7.27E-03	1.66E-03	14.53	7.27E-03
Hydrogen chloride (hydrochloric acid)	HAP/TAP	1.78E-01	88.8%	2.00E-02	5				1.85E+02	2.07E+01			Biomass	1.85E+02	1,616,973.36	8.08E+02	2.07E+01	181,586.11	9.08E+01
Hydrogen fluoride	HAP/TAP	8.90E-02		8.90E-02	6				9.23E+01	9.23E+01			Biomass	9.23E+01	808,486.68	4.04E+02	9.23E+01	808,486.68	4.04E+02
Indo(1,2,3-cd)pyrene	HAP					1.76E-09	1.73E-12	2			3.46E-10	3.46E-10	Nat Gas	3.46E-10	0.00	1.52E-09	3.46E-10	0.00	1.52E-09
Lead and Lead compounds	HAP	4.80E-05		4.80E-05	1				4.98E-02	4.98E-02			Biomass						

Pollutant	Pollutant Type	Emission Factors							Emissions				Worst Case Emission Factor	Total Uncontrolled Total			Maximum Controlled Total ⁷		
		Biomass				Natural Gas Startup			Biomass Combustion Emissions		Natural Gas Startup Emissions			lb/hr	lb/yr	tpy	lb/hr	lb/yr	tpy
		lb/MMBtu Uncontrolled	% Efficiency	lb/MMBtu Controlled	Ref.	lb/10 ⁶ scf Uncontrolled	lb/MMBtu Uncontrolled	Ref.	lb/hr Uncontrolled	lb/hr Controlled	lb/hr Uncontrolled	lb/hr Controlled							
Mercury, vapor (Include in Mercury & Compds)	HAP/TAP	1.10E-05	92.7%	8.00E-07	5	3.73E-07	3.65E-10	2	1.14E-02	8.30E-04	7.30E-08	7.30E-08	Biomass	1.14E-02	99.93	5.00E-02	8.30E-04	7.27	3.63E-03
Methyl bromide (bromomethane)	HAP	1.50E-05		1.50E-05	1				1.56E-02	1.56E-02			Biomass	1.56E-02	136.26	6.81E-02	1.56E-02	136.26	6.81E-02
Methyl chloride (chloromethane)	HAP	2.30E-05		2.30E-05	1				2.39E-02	2.39E-02			Biomass	2.39E-02	208.93	1.04E-01	2.39E-02	208.93	1.04E-01
Methyl chloroform (1,1,1 trichloroethane)	HAP	3.10E-05		3.10E-05	1				3.21E-02	3.21E-02			Biomass	3.21E-02	281.61	1.41E-01	3.21E-02	281.61	1.41E-01
Methyl ethyl ketone	HAP	5.40E-06		5.40E-06	1				5.60E-03	5.60E-03			Biomass	5.60E-03	49.05	2.45E-02	5.60E-03	49.05	2.45E-02
Methylene chloride (dichloromethane)	HAP	2.90E-04		2.90E-04	1				3.01E-01	3.01E-01			Biomass	3.01E-01	2,634.39	1.32E+00	3.01E-01	2,634.39	1.32E+00
Naphthalene	HAP	9.70E-05		9.70E-05	1	5.98E-07	5.86E-10	2	1.01E-01	1.01E-01	1.17E-07	1.17E-07	Biomass	1.01E-01	881.16	4.41E-01	1.01E-01	881.16	4.41E-01
Nickel metal (Component of Nickel & Compounds)	HAP/TAP	3.30E-05		3.30E-05	1				3.42E-02	3.42E-02			Biomass	3.42E-02	299.78	1.50E-01	3.42E-02	299.78	1.50E-01
Nitrophenol, 4-	HAP	1.10E-07		1.10E-07	1				1.14E-04	1.14E-04			Biomass	1.14E-04	1.00	5.00E-04	1.14E-04	1.00	5.00E-04
Pentachlorophenol	HAP	5.10E-08		5.10E-08	1				5.29E-05	5.29E-05			Biomass	5.29E-05	0.46	2.32E-04	5.29E-05	0.46	2.32E-04
Perchloroethylene (tetrachloroethylene)	HAP	3.80E-05		3.80E-05	1				3.94E-02	3.94E-02			Biomass	3.94E-02	345.20	1.73E-01	3.94E-02	345.20	1.73E-01
Phenanthrene	HAP					1.67E-08	1.63E-11	2			3.27E-09	3.27E-09	Nat Gas	3.27E-09	0.00	1.43E-08	3.27E-09	0.00	1.43E-08
Phenol	HAP	5.10E-05		5.10E-05	1				5.29E-02	5.29E-02			Biomass	5.29E-02	463.29	2.32E-01	5.29E-02	463.29	2.32E-01
Phosphorus Metal, Yellow or White	HAP/TAP	2.70E-05		2.70E-05	1				2.80E-02	2.80E-02			Biomass	2.80E-02	245.27	1.23E-01	2.80E-02	245.27	1.23E-01
Polychlorinated biphenyls	HAP	8.15E-09		8.15E-09	1				8.45E-06	8.45E-06			Biomass	8.45E-06	0.07	3.70E-05	8.45E-06	0.07	3.70E-05
Polycyclic Organic Matter	HAP	1.25E-04		1.25E-04	1				1.30E-01	1.30E-01			Biomass	1.30E-01	1,135.52	5.68E-01	1.30E-01	1,135.52	5.68E-01
Propionaldehyde	HAP	6.10E-05		6.10E-05	1				6.33E-02	6.33E-02			Biomass	6.33E-02	554.13	2.77E-01	6.33E-02	554.13	2.77E-01
Propylene dichloride (1,2 dichloropropane)	HAP	3.30E-05		3.30E-05	1				3.42E-02	3.42E-02			Biomass	3.42E-02	299.78	1.50E-01	3.42E-02	299.78	1.50E-01
Pyrene	HAP					4.90E-09	4.81E-12	2			9.61E-10	9.61E-10	Nat Gas	9.61E-10	0.00	4.21E-09	9.61E-10	0.00	4.21E-09
Selenium compounds	HAP/TAP	2.80E-06		2.80E-06	1	2.35E-08	2.31E-11	2	2.90E-03	2.90E-03	4.61E-09	4.61E-09	Biomass	2.90E-03	25.44	1.27E-02	2.90E-03	25.44	1.27E-02
Silver	TAP	1.70E-03	99.4%	1.00E-05	1				1.76E+00	1.04E-02			Biomass	1.76E+00	15,443.00	7.72E+00	1.04E-02	91.11	4.56E-02
Styrene	HAP/TAP	1.90E-03		1.90E-03	1				1.97E+00	1.97E+00			Biomass	1.97E+00	17,259.83	8.63E+00	1.97E+00	17,259.83	8.63E+00
Tetrachlorodibenzo-p-dioxin, 2,3,7,8-	HAP	8.60E-12		8.60E-12	1				8.92E-09	8.92E-09			Biomass	8.92E-09	0.00008	3.91E-08	8.92E-09	0.00	3.91E-08
Toluene	HAP	9.20E-04		9.20E-04	1	3.33E-06	3.27E-09	2	9.54E-01	9.54E-01	6.54E-07	6.54E-07	Biomass	9.54E-01	8,357.39	4.18E+00	9.54E-01	8,357.39	4.18E+00
Trichloroethylene	HAP	3.00E-05		3.00E-05	1				3.11E-02	3.11E-02			Biomass	3.11E-02	272.52	1.36E-01	3.11E-02	272.52	1.36E-01
Trichlorofluoromethane (CFC 111)	HAP	4.10E-05		4.10E-05	1				4.25E-02	4.25E-02			Biomass	4.25E-02	372.45	1.86E-01	4.25E-02	372.45	1.86E-01
Trichlorophenol, 2,4,6-	HAP	2.20E-08		2.20E-08	1				2.28E-05	2.28E-05			Biomass	2.28E-05	0.20	9.99E-05	2.28E-05	0.20	9.99E-05
Vinyl chloride	HAP	1.80E-05		1.80E-05	1				1.87E-02	1.87E-02			Biomass	1.87E-02	163.51	8.18E-02	1.87E-02	163.51	8.18E-02
Xylene, o-	HAP	2.50E-05		2.50E-05	1				2.59E-02	2.59E-02			Biomass	2.59E-02	227.10	1.14E-01	2.59E-02	227.10	1.14E-01
* Highest HAP														1.85E+02	1,616,973.36	808.5	9.23E+01	808,486.68	404.2
* Total HAPs														2.97E+02	2,605,633.77	1302.8	1.34E+02	1,170,153.86	585.1

¹ Uncontrolled emission factors (criteria and HAP/TAP) for wood combustion from AP-42; Compilation of Air Pollutant Emission Factors Vol. 1 - Stationary Sources USEPA, 5th ed. Section 1.6, 9/03

² Uncontrolled and controlled emission factors (criteria and HAP/TAP) for natural gas combustion from Per AP-42, Section 1.4, 9/98.

³ Controlled PM emission factor is Boiler MACT Emission limit for biomas fluid bed boilers of 0.0098 + Condensible PM portion of 0.0162 lb/MMBtu which is 95% of the AP-42 condensable factor. PM=PM10+PM2.5 for conservatism and since speciation for biomass is unknown.

⁴ CO2e does not have an emission factor. CO2e is the sum of Carbon Dioxide, Methane, and Nitrous Oxide.

⁵ Provided from ESI Inc of Tennessee.

⁶ Hydrogen fluoride emissions are assumed to be 50% of the Hydrogen chloride emissions.

⁷ Ammonia emissions are calculated from the ammonia slip calculation in a separate spreadsheet provided later in this appendix.

⁸ All Metal compounds are assumed to be uncontrolled except for silver which will be controlled by the bagfilter with a 99.41% efficiency as provided by the vendor to achieve compliance with the Boiler NESHAP standard for particulate matter.

SUPPORTING TOXICS MODELING CALCULATIONS
P&GPP EXISTING COMBUSTION SOURCES

Emission Sources & Control Device(s):

Source Description	Rating	Units	Max Fuel Use (scf/hr)	Fuel Types
Boiler No. 1	187	MMBtu/hr	183333.3	Gas/Oil
Boiler No. 3	175	MMBtu/hr	171568.6	Gas/LPG
1AMP (150 MMBTU/hr burner, 95 MMBtu/hr yankeeburner)	245	MMBtu/hr	240196.1	Gas/LPG
2AMP (150 MMBTU/hr burner, 95 MMBtu/hr yankee burner)	245	MMBtu/hr	240196.1	Gas/LPG
3AMP (150 MMBTU/hr burner, 95 MMBtu/hr yankee burner)	245	MMBtu/hr	240196.1	Gas/LPG
4AMP (150 MMBTU/hr burner, 95 MMBtu/hr yankee burner)	245	MMBtu/hr	240196.1	Gas/LPG
5AMP (90 MMBTU/hr burner,100 MMBtu/hr yankee burner)	200	MMBtu/hr	196078.4	Gas/LPG
6AMP (90 MMBTU/hr burner, 110MMBtu/hr yankee burner)	200	MMBtu/hr	196078.4	Gas/LPG

Basis:

Heating Value for Propane =	92 MMBtu/10 ³ gal	Per AP-42, Section 1.3, 9/98
Heating Value for No. 2 Fuel Oil =	140 MMBtu/10 ³ gal	Per AP-42, Section 1.3, 9/98
Heating Value for Natural Gas =	1020 Btu/scf	Per AP-42, Section 1.4, 9/98
Potential Hours of Operation =	8760 hrs/yr	
Sulfur Content in No. 2 Fuel Oil =	0.05 %	

Potential Emissions:

Pollutant	No. 2 Uncontrolled Emission Factor (lb/10 ³ gal) ⁴	No. 2 Uncontrolled Emission Factor (lb/MMBtu) ¹	Propane Emission Factor (lb/10 ³ gal)	Propane Emission Factor (lb/MMBtu) ²	Natural Gas Uncontrolled Emission Factor (lb/MMBtu) ³	Worst Case Emission Factor For Boiler No. 1 (lb/MMBtu)	Worst Case Emission Factor for Boiler No. 1	Worst Case Emission Factor For Boiler No. 3 and Papermaking (lb/MMBtu)	Worst Case Emission Factor for Boiler No. 3 and Papermaking	Boiler No. 1 (lb/hr)	Boiler No. 1 (tpy)	Boiler No. 3 (lb/hr)	Boiler No.3 (tpy)
VOCs	2.52E-01	1.80E-03	1.00E+00	1.09E-02	5.39E-03	5.39E-03	Natural Gas	1.09E-02	Propane	1.01	4.42	0.94	4.13
Carbon Monoxide (CO)	5.00E+00	3.57E-02	7.50E+00	8.20E-02	8.24E-02	8.24E-02	Natural Gas	8.24E-02	Natural Gas	15.40	67.45	14.41	63.12
Acenaphthene	2.11E-05	1.51E-07			1.76E-09	1.51E-07	Diesel	1.76E-09	Natural Gas	2.82E-05	1.23E-04	3.09E-07	1.35E-06
Acenaphthylene	2.53E-07	1.81E-09			1.76E-09	1.81E-09	Diesel	1.76E-09	Natural Gas	3.38E-07	1.48E-06	3.09E-07	1.35E-06
Antimony & Compounds	5.25E-03	3.75E-05				3.75E-05	Diesel	0.00E+00	Natural Gas	7.01E-03	3.07E-02	0.00E+00	0.00E+00
Arsenic & Compounds	1.32E-03	9.43E-06			1.96E-07	9.43E-06	Diesel	1.96E-07	Natural Gas	1.76E-03	7.72E-03	3.43E-05	1.50E-04
Barium	2.57E-03	1.84E-05			4.31E-06	1.84E-05	Diesel	4.31E-06	Natural Gas	3.43E-03	1.50E-02	7.55E-04	3.31E-03
Benzene	2.14E-04	1.53E-06			2.06E-06	2.06E-06	Natural Gas	2.06E-06	Natural Gas	3.85E-04	1.69E-03	3.60E-04	1.58E-03
Benzo(a)anthracene	4.01E-06	2.86E-08			2.86E-08	2.86E-08	Diesel	0.00E+00	Natural Gas	5.36E-06	2.35E-05	0.00E+00	0.00E+00
Benzo(k,h)fluoranthene	1.48E-06	1.06E-08			1.76E-09	1.06E-08	Diesel	1.76E-09	Natural Gas	1.98E-06	8.66E-06	3.09E-07	1.35E-06
Benzo(g,h,i)perylene	2.26E-06	1.61E-08			1.18E-09	1.61E-08	Diesel	1.18E-09	Natural Gas	3.02E-06	1.32E-05	2.06E-07	9.02E-07
Butane		0.00E+00			2.06E-03	2.06E-03	Natural Gas	2.06E-03	Natural Gas	3.85E-01	1.69E+00	3.60E-01	1.58E+00
Beryllium metal	2.78E-05	1.99E-07			1.18E-08	1.99E-07	Diesel	1.18E-08	Natural Gas	3.71E-05	1.63E-04	2.06E-06	9.02E-06
Cadmium Metal	3.98E-04	2.84E-06			1.08E-06	2.84E-06	Diesel	1.08E-06	Natural Gas	5.32E-04	2.33E-03	1.89E-04	8.27E-04
Chloride	3.47E-01	2.48E-03				2.48E-03	Diesel	0.00E+00	Natural Gas	4.63E-01	2.03E+00	0.00E+00	0.00E+00
Chrysene	2.38E-06	1.70E-08			1.76E-09	1.70E-08	Diesel	1.76E-09	Natural Gas	3.18E-06	1.39E-05	3.09E-07	1.35E-06
Chromium VI	2.48E-04	1.77E-06				1.77E-06	Diesel	0.00E+00	Natural Gas	3.31E-04	1.45E-03	0.00E+00	0.00E+00
Chromium-Other compds	8.45E-04	6.04E-06				6.04E-06	Diesel	0.00E+00	Natural Gas	1.13E-03	4.94E-03	0.00E+00	0.00E+00
Cobalt compounds	6.02E-03	4.30E-05			8.24E-08	4.30E-05	Diesel	8.24E-08	Natural Gas	8.04E-03	3.52E-02	1.44E-05	6.31E-05
Copper	1.76E-03	1.26E-05			8.33E-07	1.26E-05	Diesel	8.33E-07	Natural Gas	2.35E-03	1.03E-02	1.46E-04	6.39E-04
Dibenzo(a,h)anthracene	1.67E-06	1.19E-08			1.18E-09	1.19E-08	Diesel	1.18E-09	Natural Gas	2.23E-06	9.77E-06	2.06E-07	9.02E-07
Ethylbenzene	6.36E-05	4.54E-07				4.54E-07	Diesel	0.00E+00	Natural Gas	8.50E-05	3.72E-04	0.00E+00	0.00E+00
Fluoranthene	4.84E-06	3.46E-08			2.94E-09	3.46E-08	Diesel	2.94E-09	Natural Gas	6.46E-06	2.83E-05	5.15E-07	2.25E-06
Fluorene	4.47E-06	3.19E-08			2.75E-09	3.19E-08	Diesel	2.75E-09	Natural Gas	5.97E-06	2.62E-05	4.80E-07	2.10E-06
Fluoride	3.73E-02	2.66E-04				2.66E-04	Diesel	0.00E+00	Natural Gas	4.98E-02	2.18E-01	0.00E+00	0.00E+00
Formaldehyde	3.30E-02	2.36E-04			7.35E-05	2.36E-04	Diesel	7.35E-05	Natural Gas	4.41E-02	1.93E-01	1.29E-02	5.64E-02
Indo(1,2,3-cd)pyrene	2.14E-06	1.53E-08			1.76E-09	1.53E-08	Diesel	1.76E-09	Natural Gas	2.86E-06	1.25E-05	3.09E-07	1.35E-06
Lead	1.51E-03	1.08E-05				1.08E-05	Diesel	0.00E+00	Natural Gas	2.02E-03	8.83E-03	0.00E+00	0.00E+00
Manganese & compounds	3.00E-03	2.14E-05			3.73E-07	2.14E-05	Diesel	3.73E-07	Natural Gas	4.01E-03	1.76E-02	6.52E-05	2.86E-04
Mercury, vapor (Include in Mercury & Compds)	1.13E-04	8.07E-07			3.73E-07	8.07E-07	Diesel	3.73E-07	Natural Gas	1.51E-04	6.61E-04	6.52E-05	2.86E-04
Methane	1.00E+00	7.14E-03			2.25E-03	7.14E-03	Diesel	2.25E-03	Natural Gas	1.34E+00	5.85E+00	3.95E-01	1.75E+00
Molybdenum	7.87E-04	5.62E-06			1.08E-06	5.62E-06	Diesel	1.08E-06	Natural Gas	1.05E-03	4.60E-03	1.89E-04	8.27E-04
N2O	5.30E-01	3.79E-03				3.79E-03	Diesel	0.00E+00	Natural Gas	7.08E-01	3.10E+00	0.00E+00	0.00E+00
Naphthalene	1.13E-03	8.07E-06			5.98E-07	8.07E-06	Diesel	5.98E-07	Natural Gas	1.51E-03	6.61E-03	1.05E-04	4.58E-04
Nickel metal (Component of Nickel & Compounds)	8.45E-02	6.04E-04			2.06E-06	6.04E-04	Diesel	2.06E-06	Natural Gas	1.13E-01	4.94E-01	3.60E-04	1.58E-03
OCDD	3.10E-09	2.21E-11				2.21E-11	Diesel	0.00E+00	Natural Gas	4.14E-09	1.81E-08	0.00E+00	0.00E+00
Phenathrene	1.05E-05	7.50E-08			1.67E-08	7.50E-08	Diesel	1.67E-08	Natural Gas	1.40E-05	6.14E-05	2.92E-06	1.28E-05
Phosphorus Metal, Yellow or White	9.46E-03	6.76E-05				6.76E-05	Diesel	0.00E+00	Natural Gas	1.26E-02	5.53E-02	0.00E+00	0.00E+00
POM	1.30E-03	9.29E-06				9.29E-06	Diesel	0.00E+00	Natural Gas	1.74E-03	7.61E-03	0.00E+00	0.00E+00
Propane		0.00E+00			1.57E-03	1.57E-03	Natural Gas	1.57E-03	Natural Gas	2.93E-01	1.28E+00	2.75E-01	1.20E+00
Pyrene	4.25E-06	3.04E-08			4.90E-09	3.04E-08	Diesel	4.90E-09	Natural Gas	5.68E-06	2.49E-05	8.58E-07	3.76E-06
Selenium compounds	6.83E-04	4.88E-06			2.35E-08	4.88E-06	Diesel	2.35E-08	Natural Gas	9.12E-04	4.00E-03	4.12E-06	1.80E-05
SO3	2.22E-05	1.59E-07				1.59E-07	Diesel	0.00E+00	Natural Gas	2.97E-05	1.30E-04	0.00E+00	0.00E+00
TOC	1.28E+00	9.14E-03				9.14E-03	Diesel	0.00E+00	Natural Gas	1.71E+00	7.49E+00	0.00E+00	0.00E+00
TOC (non-methane)	2.80E-01	2.00E-03				2.00E-03	Diesel	0.00E+00	Natural Gas	3.74E-01	1.64E+00	0.00E+00	0.00E+00
Toluene	6.20E-03	4.43E-05			3.33E-06	4.43E-05	Diesel	3.33E-06	Natural Gas	8.28E-03	3.63E-02	5.83E-04	2.56E-03
Trichloroethane, 111-	2.36E-04	1.69E-06				1.69E-06	Diesel	0.00E+00	Natural Gas	3.15E-04	1.38E-03	0.00E+00	0.00E+00
Vanadium	3.18E-02	2.27E-04			2.25E-06	2.27E-04	Diesel	2.25E-06	Natural Gas	4.25E-02	1.86E-01	3.95E-04	1.73E-03
Xylenes, o-	1.09E-04	7.79E-07				7.79E-07	Diesel	0.00E+00	Natural Gas	1.46E-04	6.38E-04	0.00E+00	0.00E+00
Zinc	2.91E-02	2.08E-04			2.84E-05	2.08E-04	Diesel	2.84E-05	Natural Gas	3.89E-02	1.70E-01	4.98E-03	2.18E-02

¹ - AP-42; Compilation of Air Pollutant Emission Factors Vol. 1 - Stationary Sources USEPA, 5th ed. Section 1.3, 9/98

² - AP-42; Compilation of Air Pollutant Emission Factors Vol. 1 - Stationary Sources USEPA, 5th ed. Section 1.5, 9/98

³ - AP-42; Compilation of Air Pollutant Emission Factors Vol. 1 - Stationary Sources USEPA, 5th ed. Section 1.4, 9/98

⁴ - Potential Emissions (lb/hr) =

Heat Input Rating (MMBtu/hr) * Max Emission Factor Heat Input Rating (MMBtu/hr) * Max Emis Heat Input Rating (MMBtu/hr) * Max Emission Factor between Natural Gas and No. 6 Fuel Oil (lb/MMBtu)

⁵ - Potential Emissions (lb/yr) =

Potential Emissions (lb/hr) * 8760 (hrs/yr)

Potential Emissions (lb/hr) * 8760 (hrs/yr)

Potential Emissions (lb/hr) * 8760 (hrs/yr)

SUPPORTING TOXICS MODELING CALCULATIONS
P&GPP EXISTING COMBUSTION SOURCES

Emission Sources & Control
Device(s):

Source Description	Rating	Units	Max Fuel Use (scf/hr)	Fuel Types
Boiler No. 1	187	MMBtu/hr	183333.3	Gas/Oil
Boiler No. 3	175	MMBtu/hr	171568.6	Gas/LPG
1AMP (150 MMBTU/hr burner, 95 MMBtu/hr yankeeburner)	245	MMBtu/hr	240196.1	Gas/LPG
2AMP (150 MMBTU/hr burner, 95 MMBtu/hr yankee burner)	245	MMBtu/hr	240196.1	Gas/LPG
3AMP (150 MMBTU/hr burner, 95 MMBtu/hr yankee burner)	245	MMBtu/hr	240196.1	Gas/LPG
4AMP (150 MMBTU/hr burner, 95 MMBtu/hr yankee burner)	245	MMBtu/hr	240196.1	Gas/LPG
5AMP (90 MMBTU/hr burner,100 MMBtu/hr yankee burner)	200	MMBtu/hr	196078.4	Gas/LPG
6AMP (90 MMBTU/hr burner, 110MMBtu/hr yankee burner)	200	MMBtu/hr	196078.4	Gas/LPG

Basis:

Heating Value for Propane =	92 MMBtu/10 ³ gal	Per AP-42, Section 1.3, 9/98
Heating Value for No. 2 Fuel Oil =	140 MMBtu/10 ³ gal	Per AP-42, Section 1.3, 9/98
Heating Value for Natural Gas =	1020 Btu/scf	Per AP-42, Section 1.4, 9/98
Potential Hours of Operation =	8760 hrs/yr	
Sulfur Content in No. 2 Fuel Oil =	0.05 %	

Emissions Per Papermaking Machine per Burner								Emissions Per Papermaking Machine				TOTAL EMISSIONS	
Emissions for 150 MMBtu/hr Predryer Burner (1AMP - 4AMP) (lb/hr)	Emissions for 150 MMBtu/hr Predryer Burner (1AMP - 4AMP) (tpy)	Emissions for 95 MMBtu/hr Yankee Burner (1AMP - 4AMP) (lb/hr)	Emissions for 95 MMBtu/hr Yankee Burner (1AMP - 4AMP) (tpy)	Emissions for 90 MMBtu/hr Predryer Burner (5AMP and 6AMP) (lb/hr)	Emissions for 90 MMBtu/hr Predryer Burner (5AMP and 6AMP) (tpy)	Emissions for 110 MMBtu/hr Yankee Burner (5AMP and 6AMP) (lb/hr)	Emissions for 110 MMBtu/hr Yankee Burner (5AMP and 6AMP) (tpy)	1AMP through 4AMP PaperMachine Emissions per machine (lb/hr)	1AMP through 4AMP PaperMachine Emissions per machine (tpy)	5AMP and 6AMP PaperMachine Emissions per machine (lb/hr)	5AMP and 6AMP PaperMachine Emissions per machine (tpy)	TOTAL (lb/hr)	TOTAL (tpy)
1.64	7.18	1.04E+00	4.55	0.98	4.31	1.20E+00	5.27	2.68	11.73	2.19	9.57	15.08	66.06
12.35	54.11	7.82	34.27	7.41	32.46	9.06	39.68	20.18	88.37	16.47	72.14	113.65	497.77
2.65E-07	1.16E-06	1.68E-07	7.34E-07	1.59E-07	6.96E-07	1.94E-07	8.50E-07	4.32E-07	1.89E-06	3.53E-07	1.55E-06	2.44E-06	1.07E-05
2.65E-07	1.16E-06	1.68E-07	7.34E-07	1.59E-07	6.96E-07	1.94E-07	8.50E-07	4.32E-07	1.89E-06	3.53E-07	1.55E-06	2.44E-06	1.07E-05
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.94E-05	1.29E-04	1.86E-05	8.16E-05	1.76E-05	7.73E-05	2.16E-05	9.45E-05	4.80E-05	2.10E-04	3.92E-05	1.72E-04	2.71E-04	1.19E-03
6.47E-04	2.83E-03	4.10E-04	1.79E-03	3.88E-04	1.70E-03	4.75E-04	2.08E-03	1.06E-03	4.63E-03	8.63E-04	3.78E-03	5.95E-03	2.61E-02
3.09E-04	1.35E-03	1.96E-04	8.57E-04	1.85E-04	8.12E-04	2.26E-04	9.92E-04	5.04E-04	2.21E+00	4.12E-04	1.80E-03	2.84E-03	1.24E-02
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.65E-07	1.16E-06	1.68E-07	7.34E-07	1.59E-07	6.96E-07	1.94E-07	8.50E-07	4.32E-07	1.89E-06	3.53E-07	1.55E-06	2.44E-06	1.07E-05
1.76E-07	7.73E-07	1.12E-07	4.90E-07	1.06E-07	4.64E-07	1.29E-07	5.67E-07	2.88E-07	1.26E-06	2.35E-07	1.03E-06	1.62E-06	7.11E-06
3.09E-01	1.35E+00	1.96E-01	8.57E-01	1.85E-01	8.12E-01	2.26E-01	9.92E-01	5.04E-01	2.21E+00	4.12E-01	1.80E+00	2.84E+00	1.24E+01
1.76E-06	7.73E-06	1.12E-06	4.90E-06	1.06E-06	4.64E-06	1.29E-06	5.67E-06	2.88E-06	1.26E-05	2.35E-06	1.03E-05	1.62E-05	7.11E-05
1.62E-04	7.09E-04	1.02E-04	4.49E-04	9.71E-05	4.25E-04	1.19E-04	5.20E-04	2.64E-04	1.16E-03	2.16E-04	9.45E-04	1.49E-03	6.52E-03
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.65E-07	1.16E-06	1.68E-07	7.34E-07	1.59E-07	6.96E-07	1.94E-07	8.50E-07	4.32E-07	1.89E-06	3.53E-07	1.55E-06	2.44E-06	1.07E-05
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.24E-05	5.41E-05	7.82E-06	3.43E-05	7.41E-06	3.25E-05	9.06E-06	3.97E-05	2.02E-05	8.84E-05	1.65E-05	7.21E-05	1.14E-04	4.98E-04
1.25E-04	5.48E-04	7.92E-05	3.47E-04	7.50E-05	3.29E-04	9.17E-05	4.02E-04	2.04E-04	8.94E-04	1.67E-04	7.30E-04	1.15E-03	5.04E-03
1.76E-07	7.73E-07	1.12E-07	4.90E-07	1.06E-07	4.64E-07	1.29E-07	5.67E-07	2.88E-07	1.26E-06	2.35E-07	1.03E-06	1.62E-06	7.11E-06
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4.41E-07	1.93E-06	2.79E-07	1.22E-06	2.65E-07	1.16E-06	3.24E-07	1.42E-06	7.21E-07	3.16E-06	5.88E-07	2.58E-06	4.06E-06	1.78E-05
4.12E-07	1.80E-06	2.61E-07	1.14E-06	2.47E-07	1.08E-06	3.02E-07	1.32E-06	6.73E-07	2.95E-06	5.49E-07	2.40E-06	3.79E-06	1.66E-05
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.10E-02	4.83E-02	6.99E-03	3.06E-02	6.62E-03	2.90E-02	8.09E-03	3.54E-02	1.80E-02	7.89E-02	1.47E-02	6.44E-02	1.01E-01	4.44E-01
2.65E-07	1.16E-06	1.68E-07	7.34E-07	1.59E-07	6.96E-07	1.94E-07	8.50E-07	4.32E-07	1.89E-06	3.53E-07	1.55E-06	2.44E-06	1.07E-05
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5.59E-05	2.45E-04	3.54E-05	1.55E-04	3.35E-05	1.47E-04	4.10E-05	1.79E-04	9.13E-05	4.00E-04	7.45E-05	3.26E-04	5.14E-04	2.25E-03
5.59E-05	2.45E-04	3.54E-05	1.55E-04	3.35E-05	1.47E-04	4.10E-05	1.79E-04	9.13E-05	4.00E-04	7.45E-05	3.26E-04	5.14E-04	2.25E-03
3.38E-01	1.48E+00	2.14E-01	9.38E-01	2.03E-01	8.89E-01	2.48E-01	1.09E+00	5.52E-01	2.42E+00	4.51E-01	1.98E+00	3.11E+00	1.36E+01
1.62E-04	7.09E-04	1.02E-04	4.49E-04	9.71E-05	4.25E-04	1.19E-04	5.20E-04	2.64E-04	1.16E-03	2.16E-04	9.45E-04	1.49E-03	6.52E-03
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8.97E-05	3.93E-04	5.68E-05	2.49E-04	5.38E-05	2.36E-04	6.58E-05	2.88E-04	1.47E-04	6.42E-04	1.20E-04	5.24E-04	8.25E-04	3.61E-03
3.09E-04	1.35E-03	1.96E-04	8.57E-04	1.85E-04	8.12E-04	2.26E-04	9.92E-04	5.04E-04	2.21E+03	4.12E-04	1.80E-03	2.84E-03	1.24E-02
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.50E-06	1.10E-05	1.58E-06	6.94E-06	1.50E-06	6.57E-06	1.83E-06	8.03E-06	4.08E-06	1.79E-05	3.33E-06	1.46E-05	2.30E-05	1.01E-04
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.35E-01	1.03E+00	1.49E-01	6.53E-01	1.41E-01	6.18E-01	1.73E-01	7.56E-01	3.84E-01	1.68E+00	3.14E-01	1.37E+00	2.16E+00	9.48E+00
7.35E-07	3.22E-06	4.66E-07	2.04E-06	4.41E-07	1.93E-06	5.39E-07	2.36E-06	1.20E-06	5.26E-06	9.80E-07	4.29E-06	6.76E-06	2.96E-05
3.53E-06	1.55E-05	2.24E-06	9.79E-06	2.12E-06	9.28E-06	2.59E-06	1.13E-05	5.76E-06	2.52E-05	4.71E-06	2.06E-05	3.25E-05	1.42E-04
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5.00E-04	2.19E-03	3.17E-04	1.39E-03	3.00E-04	1.31E-03	3.67E-04	1.61E-03	8.17E-04	3.58E-03	6.67E-04	2.92E-03	4.60E-03	2.01E-02
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3.38E-04	1.48E-03	2.14E-04	9.38E-04	2.03E-04	8.89E-04	2.48E-04	1.09E-03	5.52E-04	2.42E-03	4.51E-04	1.98E-03	3.11E-03	1.36E-02
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4.26E-03	1.87E-02	2.70E-03	1.18E-02	2.56E-03	1.12E-02	3.13E-03	1.37E-02	6.97E-03	3.05E-02	5.69E-03	2.49E-02	3.92E-02	1.72E-01

¹ - AP-42; Compilation of Air Pollutant Emission Factors Vol. 1 - Stationary Sources USEPA, 5th ed. Section 1.3, 9/98

² - AP-42; Compilation of Air Pollutant Emission Factors Vol. 1 - Stationary Sources USEPA, 5th ed. Section 1.5, 9/98

³ - AP-42; Compilation of Air Pollutant Emission Factors Vol. 1 - Stationary Sources USEPA, 5th ed. Section 1.4, 9/98

⁴ - Potential Emissions (lb/hr) =

⁵ - Potential Emissions (lb/yr) =

APPENDIX B - ELECTRONIC MODELING FILES
