EXHIBIT A

EMISSION CALCULATIONS

1 Coal Fired Boiler

Basis	Value	Units	Reference
Net Power Rating - Full Load	850	MW	Plant Washington Specification
Maximum Heat Input - Full Load	8300	MMBtu/hr	Plant Washington Specification
Fuel Oil Burner Rating	1300	MMBtu/hr	Plant Washington Specification
Maximum Expected Hours of Operation	8760	hr/yr	Plant Washington Specification
PM Emission Factor - Coal	0.018	lb/MMBtu	BACT
PM_{10} Emission Factor - Coal	0.018	lb/MMBtu	BACT
$PM_{2.5}$ Percentage	57.10%		AP 42, Section 1.1 - Particulate Matter Size Distribution
SO_2 Emission Factor - Coal	0.12	lb/MMBtu	BACT (24 hour and 3 hour averaging periods)
SO_2 Emission Factor - Coal	0.09	lb/MMBtu	BACT (annual averaging period)
NO_X Emission Factor - Coal	0.050	lb/MMBtu	BACT
CO Emission Factor - Coal	0.15	lb/MMBtu	BACT (8-hour averaging period)
CO Emission Factor - Coal	0.30	lb/MMBtu	BACT (1-hour averaging period)
VOC Coal Emission Factor - Coal	0.0034	lb/MMBtu	BACT
H_2SO_4 Emission Factor - Coal	0.0050	lb/MMBtu	BACT
Pb Emission Factor - Coal	1.69E-05	lb/MMBtu	BACT
Hg Emission Factor - Coal	1.50E-05	lb/MW-hr	BACT
HF Emission Factor - Coal	3.00E-04	lb/MMBtu	BACT

PM Emissions - Full Load

8300 MMBtu/hr	*	0.018 lb/MMBtu	/	2,000 lb/ton	*	8,760 hr/yr	=	654 ton/yr

PM_{10} Emissions - Full Load

8300 MMBtu/hr	*	0.018 lb/MMBtu	/	2,000 lb/ton	*	8,760 hr/yr	=	654 ton/yr

$PM_{2.5}$ Emissions - Full Load

654 ton/yr	*	57.10%	=	374 ton/yr

SO_2 Emissions - Full Load (annual averaging periods)

8300 MMBtu/hr	*	0.09 lb/MMBtu	/	2,000 lb/ton	*	8,760 hr/yr	=	3,272 ton/yr

NO_X Emissions - Full Load

8300 MMBtu/hr	*	0.05 lb/MMBtu	/	2,000 lb/ton	*	8,760 hr/yr	=	1,818 ton/yr

CO Emissions - Full Load (1 hr averaging period)

8300 MMBtu/hr	*	0.30 lb/MMBtu	/	2,000 lb/ton	*	8,760 hr/yr	=	10,906 ton/yr

VOC Emissions - Full Load

8300 MMBtu/hr	*	0.00340 lb/MMBtu	/	2,000 lb/ton	*	8,760 hr/yr	=	123.6 ton/yr

H_2SO_4 Emissions - Full Load

8300 MMBtu/hr	*	0.005 lb/MMBtu	/	2,000 lb/ton	*	8,760 hr/yr	=	181.8 ton/yr

HF Emissions - Full Load

8300 MMBtu/hr	*	0.00030 lb/MMBtu	/	2,000 lb/ton	*	8,760 hr/yr	=	10.91 ton/yr

Pb Emissions - Full Load

8300 MMBtu/hr	*	1.69E-05 lb/MMBtu	/	2,000 lb/ton	*	8,760 hr/yr	=	0.61 ton/yr

Hg Emissions - Full Load

850 MW	*	1.50 E-5 lb/MW-hr	/	2,000 lb/ton	*	8,760 hr/yr	=	0.06 ton/yr

2 Auxiliary Boiler

Basis	Value	Units	Reference
Boiler Rating	240	MMBtu/hr	Plant Washington Specification
Maximum Hours of Operation	876	hr/yr	Plant Washington Specification
PM Emission Factor - Fuel Oil	0.02	lb/MMBtu	BACT
PM_{10} Emission Factor - Fuel Oil	0.02	lb/MMBtu	BACT
$PM_{2.5}$ Percentage - Fuel Oil	12.0%		AP-42, Table 1.3-6
SO_2 Emission Factor - Fuel Oil	0.05	lb/MMBtu	BACT
NO_X Emission Factor - Fuel	0.100	lb/MMBtu	BACT
CO Emission Factor - Fuel Oil	0.04	lb/MMBtu	BACT
VOC Coal Emission Factor - Fuel Oil	0.003	lb/MMBtu	BACT
H_2SO_4 Emission Factor - Fuel Oil	6.00E-05	lb/MMBtu	BACT
HF Emission Factor - Fuel Oil	9.31E-06	lb/MMBtu	AP-42 Table 1.3-9
Pb Emission Factor - Fuel Oil	9.00	$lb/10^{12}$ Btu	AP-42, Table 1.3-10
Hg Emission Factor - Fuel Oil	3.00	$lb/10^{12}$ Btu	AP-42, Table 1.3-10

PM Emissions
Fuel Oil

240 MMBtu/hr	*	0.02 lb/MMBtu	*	ton / 2000 lb	*	876 hr / yr	=	2.10 ton/yr

PM_{10} Emissions
Fuel Oil

240 MMBtu/hr	*	0.020 lb/MMBtu	/	2,000 lb/ton	*	876 hr/yr	=	2.10 ton/yr

$PM_{2.5}$ Emissions
Fuel Oil

2.10 ton/yr	*	12.0%	=	0.25 ton/yr

SO_2 Emissions
Fuel Oil

240 MMBtu/hr	*	0.050 lb/MMBtu	/	2,000 lb/ton	*	876 hr/yr	=	5.26 ton/yr

NO_X Emissions
Fuel Oil

240 MMBtu/hr	*	0.10 lb/MMBtu	/	2,000 lb/ton	*	876 hr/yr	=	10.51 ton/yr

CO Emissions
Fuel Oil

240 MMBtu/hr	*	0.04 lb/MMBtu	/	2,000 lb/ton	*	876 hr/yr	=	4.20 ton/yr

VOC Emissions
Fuel Oil

240 MMBtu/hr	*	0.0030 lb/MMBtu	/	2,000 lb/ton	*	876 hr/yr	=	0.32 ton/yr

H_2SO_4 Emissions

Fuel Oil

240 MMBtu/hr	*	6.00E-05 lb/MMBtu	/	2,000 lb/ton	*	876 hr/yr	=	6.31E-03 ton/yr

HF Emissions

Fuel Oil

240 MMBtu/hr	*	9.31E-06 lb/MMBtu	/	2,000 lb/ton	*	876 hr/yr	=	9.79E-04 ton/yr

Pb Emissions

Fuel Oil

240 MMBtu/hr	*	1.00E+06 Btu / 1 MMBtu	*	9.00 1b / 1.00E+12 Btu	/	2,000 lb/ton	*	876 hr/yr	=	9.46E-04 ton/yr

Hg Emissions

Fuel Oil

240 MMBtu/hr	*	1.00E+06 Btu / 1 MMBtu	*	3.00 1b / 1.00E+12 Btu	/	2,000 lb/ton	*	876 hr/yr	=	3.15E-04 ton/yr

3 Diesel Fired Equipment

Basis	Value	Units	Reference
Diesel-Fuel Engine Rating	1500	HP	Plant Washington Specification
Diesel-Fuel Fire Water Pump Rating	350	HP	Plant Washington Specification
Maximum Diesel Engine Hours of Operation	500	hr/yr	Plant Washington Specification
Maximum Fire Water Pump Hours of Operation	500	hr/yr	Plant Washington Specification
Fire Water Pump PM/PM_{10} Emission Factor	2.20E-03	lb/hp-hr	AP-42, Table 3.3-1
Fire Water Pump SO_2 Emission Factor	2.05E-03	lb/hp-hr	AP-42, Table 3.3-1
Fire Water Pump NO_X Emission Factor	0.031	lb/hp-hr	AP-42, Table 3.3-1
Fire Water Pump CO Emission Factor	6.68E-03	lb/hp-hr	AP-42, Table 3.3-1
Fire Water Pump VOC Emission Factor	2.47E-03	lb/hp-hr	AP-42, Table 3.3-1
Diesel Engine PM/PM_{10} Emission Factor	7.00E-04	lb/hp-hr	AP-42, Table 3.4-1
Diesel Engine SO_2 Emission Factor	4.05E-03	lb/hp-hr	AP-42, Table 3.4-1, Assuming Diesel Fuel has 0.5% Sulfur Content
Diesel Engine NO_X Emission Factor	0.013	lb/hp-hr	AP-42, Table 3.4-1, Controlled
Diesel Engine CO Emission Factor	5.50E-03	lb/hp-hr	AP-42, Table 3.4-1
Diesel Engine VOC Emission Factor	7.05E-04	lb/hp-hr	AP-42, Table 3.4-1

PM/PM_{10} Emissions

Diesel Fuel Engine

1500 HP	*	7.00E-04 lb/hp-hr	/	2,000 lb/ton	*	500 hr/yr	=	0.26 ton/yr

Diesel Fuel Fire Water Pump

350 HP	*	2.20E-03 lb/hp-hr	/	2,000 lb/ton	*	500 hr/yr	=	0.193 ton/yr

Total Emissions

0.19 ton/yr	+	0.26 ton/yr	=	0.46 ton/yr

SO_2 Emissions

Diesel Fuel Engine

1500 HP	*	4.05E-03 lb/hp-hr	/	2,000 lb/ton	*	500 hr/yr	=	1.52 ton/yr

Diesel Fuel Fire Water Pump

350 HP	*	2.05E-03 lb/hp-hr	/	2,000 lb/ton	*	500 hr/yr	=	0.18 ton/yr

Total Emissions

1.52 ton/yr	+	0.18 ton/yr	=	1.70 ton/yr

NO_x Emissions

Diesel Fuel Engine

1500 HP	*	1.30E-02 lb/hp-hr	/	2,000 lb/ton	*	500 hr/yr	=	4.88 ton/yr

Diesel Fuel Fire Water Pump

350 HP	*	3.10E-02 lb/hp-hr	/	2,000 lb/ton	*	500 hr/yr	=	2.71 ton/yr

Total Emissions

4.88 ton/yr	+	2.71 ton/yr	=	7.59 ton/yr

CO Emissions

Diesel Fuel Engine

1500 HP	*	5.50E-03 lb/hp-hr	/	2,000 lb/ton	*	500 hr/yr	=	2.06 ton/yr

Diesel Fuel Fire Water Pump

350 HP	*	6.68E-03 lb/hp-hr	/	2,000 lb/ton	*	500 hr/yr	=	0.58 ton/yr

Total Emissions

2.06 ton/yr	+	0.58 ton/yr	=	2.65 ton/yr

VOC Emissions

Diesel Fuel Engine

1500 HP	*	7.05E-04 lb/hp-hr	/	2,000 lb/ton	*	500 hr/yr	=	0.26 ton/yr

Diesel Fuel Fire Water Pump

350 HP	*	2.47E-03 lb/hp-hr	/	2,000 lb/ton	*	500 hr/yr	=	0.22 ton/yr

Total Emissions

0.26 ton/yr	+	0.22 ton/yr	=	0.48 ton/yr

4 Cooling Tower

Basis:	Value	Reference:
Water Flow Rate	450,000 gal/min	Plant Washington Specification
Drift Emission Factor	1.70 lb/10^3 gal	AP-42, Table 13.4-1 Particulate Emissions Factors for Wet Cooling towers - Induced Draft
Operating hours	8,760 hr/yr	Plant Washington Specification
Total Drift %	0.0005%	Plant Washington Specification
Total Dissolved Solids	3300 ppm	Plant Washington Specification
Density of Water	1 g/mL	Constant
PM_{10} Percentage	46.10%	Riesman, Joel and Gordon Frisbie. "Calculating Realistic PM_{10} from Cooling Towers."
$PM_{2.5}$ Percentage	0.20%	Riesman, Joel and Gordon Frisbie. "Calculating Realistic PM_{10} from Cooling Towers."

Total Liquid Drift

$$450{,}000 \text{ gal/min} * 0.0005\% * \frac{3.785 \text{ L}}{\text{gal}} = 8.52 \text{ L/min}$$

PM Emission

$$\frac{3300 \text{ g}}{1000000 \text{ g}} * 1 \text{ g/mL} * \frac{1000 \text{ mL}}{1 \text{ L}} * 8.52 \text{ L/min} * \frac{1 \text{ lb}}{453.59 \text{ g}} = 0.06 \text{ lb/min}$$

$$0.06 \text{ lb/min} * \frac{60 \text{ min}}{\text{hr}} * 8{,}760 \text{ hr/yr} / 2{,}000 \text{ lb/ton} = \boxed{\textbf{16.28 ton/yr}}$$

PM_{10} Emissions

16.28 ton/yr * 46.10% = **7.51 ton/yr**

$PM_{2.5}$ Emissions

16.28 ton/yr * 0.20% = **3.29E-02 ton/yr**

5 Particulate Matter Baghouse Sources

Source	Stack ID	Emission Factor gr/dscf	Air Flowrate (cfm)	PM/PM$_{10}$ Emissions (lb/hr)	PM/PM$_{10}$ Emissions (ton/yr)	PM$_{2.5}$ Emissions (lb/hr)	PM$_{2.5}$ Emissions (ton/yr)
Crusher House Dust Collector	CRUSH	0.005	24,000	1.03	4.51	0.16	0.72
Tripper Decker	TRIP	0.005	18,000	0.77	3.38	0.12	0.54
Limestone Preparation Building	LIMEPR	0.005	5,000	0.21	0.94	5.79E-02	0.25
Fly Ash Mechanical Exhausters	ASHEXH	0.005	2,407	0.10	0.45	0.06	0.26
Fly Ash Silo	FLYASH	0.005	1,500	0.06	0.28	0.04	0.16
Mercury Sorbent Silo	HGSILO	0.005	1,500	1.61E-02	7.04E-02	1.61E-02	7.04E-02
SO_3 Sorbent Silo	SO3SILO	0.005	1,500	1.61E-02	7.04E-02	1.61E-02	7.04E-02
Pre-Treatment Soda Ash Silo	SODAASH	0.005	1,500	8.04E-03	3.52E-02	8.04E-03	3.52E-02
Pre-Treatment Hydrated Lime Silo	LSILO	0.005	1,500	8.04E-03	3.52E-02	2.17E-03	9.50E-03
PRB Stackout	PRBSO	0.005	1,500	0.06	0.28	1.03E-02	4.51E-02
Illinois No. 6 Stackout	IL6SO	0.005	1,500	0.06	0.28	1.03E-02	4.51E-02
Limestone Stackout	LIMESO	0.005	1,500	0.06	0.28	1.74E-02	7.60E-02

* lb/hr emission rate reflects the average hourly emission rate over a 24-hr period (The sorbent silos are expected to vent only 6 hours per day and the soda ash and lime silos will operate only 3 hours per day)

Parameters

Basis	Value	Reference
PM Emission Factor	0.0050 gr/dscf	Vendor Design Basis
Crusher House Dust Collector Operating Hours	8,760 hr/yr	Project Specification
Tripper Deck Operating Hours	8,760 hr/yr	Project Specification
Limestone Preparation Building Operating Hours	8,760 hr/yr	Project Specification
Fly Ash Mechanical Exhausters Operating Hours	8,760 hr/yr	Project Specification
Fly Ash Silo Operating Hours	8,760 hr/yr	Project Specification
Mercury Sorbent Silo Operating Hours	2,190 hr/yr	Project Specification
SO_3 Sorbent Silo Operating Hours	2,190 hr/yr	Project Specification
Pre-Treatment Soda Ash Silo Operating Hours	1,095 hr/yr	Project Specification
Pre-Treatment Hydrated Lime Silo Operating Hours	1,095 hr/yr	Project Specification
Ash $PM_{2.5}$ Percentage	57.10%	AP 42, Section 1.1 - Particulate Matter Size Distribution
Lime $PM_{2.5}$ Percentage	27.00%	AP 42, Table 11.17-7 - PM Size Distribution for Rotary Kiln with Fabric Filter
Coal $PM_{2.5}$ Percentage	16.00%	AP-42, Appendix B.1 (Section 11.10 Coal Cleaning: Dry Process)

Sample Emissions Calculations (Crusher House Dust Collector):

Hourly:

$$0.005 \text{ gr/dscf} * \frac{24{,}000 \text{ dscf}}{\text{min}} * \frac{\text{lb}}{7{,}000 \text{ gr}} * \frac{60 \text{ min}}{\text{hr}} = \frac{1.029 \text{ lb}}{\text{hr}}$$

Yearly:

$$\frac{1.029 \text{ lb}}{\text{hr}} * 8{,}760 \text{ hr/yr} / 2{,}000 \text{ lb/ton} = \frac{4.51 \text{ ton}}{\text{yr}}$$

6 Emission Factors for Material Handling

Emission Description	Pollutant			Units	Reference
	TSP	PM_{10}	$PM_{2.5}$		
Coal Rail Unloading (indoor)	1.44E-05	6.81E-06	1.03E-06	lb/ton	AP-42, 13.2.4.3, Eqn (1)
Transfer Point for PRB Coal (outdoor)	1.16E-04	5.48E-05	8.29E-06	lb/ton	AP-42, 13.2.4.3, Eqn (1)
Transfer Point for Illinois Basin Coal (outdoor)	1.16E-04	5.48E-05	8.29E-06	lb/ton	AP-42, 13.2.4.3, Eqn (1)
Limestone Rail Unloading (indoor)	4.32E-05	2.04E-05	3.09E-06	lb/ton	AP-42, 13.2.4.3, Eqn (1)
Unloading Conveyor to Limestone Stackout (outdoor)	3.47E-04	1.64E-04	2.49E-05	lb/ton	AP-42, 13.2.4.3, Eqn (1)
Bottom Ash Transfer Point to Bottom Ash Bin (outdoor)	1.97E-04	9.31E-05	1.41E-05	lb/ton	AP-42, 13.2.4.3, Eqn (1)
Bottom Ash Transfer Point from Bin to Truck (outdoor)	1.97E-04	9.31E-05	1.41E-05	lb/ton	AP-42, 13.2.4.3, Eqn (1)

Parameter	Value		Reference
Coal Moisture Content	21.91	%	Engineering Estimate based on 50/50 blend of PRB and Illinois #6 Typical Blend from Fluor Specification
Limestone Moisture Content	10	%	Plant Washington Specification
Bottom Ash Moisture Content	15	%	Plant Washington Specification
Gypsum Moisture Content	20	%	Plant Washington Specification
Fly Ash Moisture Content	15	%	Plant Washington Specification
Mercury Sorbent Moisture	12	%	Plant Washington Specification
Hydrated Lime Moisture	1	%	Plant Washington Specification
Soda Ash Moisture	1	%	Plant Washington Specification
SO_3 Sorbent Moisture	10	%	Plant Washington Specification
Wind Speed, Outdoor	6.46 mph		Based on average wind speed of 2.89 m/s for Macon, GA (1987-1991)
Wind Speed, Indoor	1.3 mph		Lower bound for emission equation AP-42, 13.2.4(1)
Percent of the time wind is greater than 12 mph	6	%	Based on Macon/Centerville Weather Data 1987-1991

Notes:

Material Handling Emission Factor — AP-42 Section 13.2.4.3, Equation (1)

$E = k\ (0.0032)\ ((U/5)^{1.3}/\ (M/2)^{1.4})$

Where:
E = Emissions in lb/tons
k = Particle Size Multiplier
U = Mean Wind Speed (mph)
M = Material Moisture Content (%)

Aerodynamic Particle Species	k
Total Suspended Particle (TSP)	0.74
PM_{10}	0.35
$PM_{2.5}$	0.053

Sample Calculations (TSP for Rail Unloading):

$$0.74 * 0.0032 * \left(\frac{1.3\ \text{mph}}{5}\right)^{1.3} / \left(\frac{21.91\%}{2}\right)^{1.4} = 1.44\text{E-}05\ \text{lb/ton}$$

7 Particulate Matter Drop Point Emissions

Emission Description	Pollutant			Units
	TSP	PM_{10}	$PM_{2.5}$	
Rail Unloading	2.72E-02	1.29E-02	1.95E-03	ton/yr
Transfer Point for PRB Coal	0.11	5.17E-02	7.83E-03	ton/yr
Transfer Point for Illinois Basin Coal	0.11	5.17E-02	7.83E-03	ton/yr
Limestone Unloading	4.39E-03	2.08E-03	3.15E-04	ton/yr
Unloading Conveyor to Limestone Stackout	3.53E-02	1.67E-02	2.53E-03	ton/yr
Fly Ash Mechanical Exhausters	3.46E-03	1.64E-03	2.48E-04	ton/yr
Bottom Ash Transfer Point to Bottom Ash Bin	2.78E-02	1.32E-02	1.99E-03	ton/yr
Bottom Ash Transfer Point from Bin to Truck	2.78E-02	1.32E-02	1.99E-03	ton/yr

Material Throughput

Parameter	**Value**	**Reference**
Powder River Basin Coal Throughput	1,887,931 ton/yr	Typical 50/50 Blend - Plant Washington Specification
Illinois No. 6 Coal Throughput	1,887,931 ton/yr	Typical 50/50 Blend - Plant Washington Specification
Limestone Throughput	203,458 ton/yr	Plant Washington Specification
Ash Throughput	282,812 ton/yr	Typical 50/50 Blend - Plant Washington Specification
Amount of SO_2 Reacted		

Sample Emission Calculations (TSP for Rail Unloading):

$$3{,}775{,}862 \text{ ton/yr} * 1.44\text{E-}05 \text{ lb/ton} * \frac{1 \text{ ton}}{2000 \text{ lb}} = 2.72\text{E-}02 \text{ ton/yr}$$

8 Solid Material Handiling Fugitive Emissions

Emissions form Earth Moving Operations-Ash

Basis	Value	Units	Reference
PM_{10} Scaling Factor, k	0.75		AP-42, Table 11.9-1 Bulldozing (Overburden)
$PM_{2.5}$ Scaling Factor, k	0.105		AP-42, Table 11.9-1 Bulldozing (Overburden)
Silt Content	6.9	%	AP-42, Table 11.9-3 Bulldozers (Overburden)
Moisture Content	7.9	%	AP-42, Table 11.9-3 Bulldozers (Overburden)
Control Efficiency	90	%	Plant Washington Specification
Solid Material Handling Area	118	acres	Plant Washington Specification
Acre to m^2 Conversion	4046.86	m^2/Acre	Conversion Factor

PM Emissions

$$5.7 * \left(6.9 \text{ ^ } 1.2\right) / \left(7.9 \text{ ^ } 1.3\right) = 3.94 \text{ lb/hr}$$

$$3.94 \text{ lb/hr} * \frac{1 \text{ ton}}{2000 \text{ lb}} * 8{,}760 \text{ hr/yr} * \frac{(100\%-90\%)}{100\%} = 1.73 \text{ ton/yr}$$

PM_{10} Emission Rate

$$0.75 * 1 * \left(6.9 \text{ ^ } 1.5\right) / \left(7.9 \text{ ^ } 1.4\right) = 0.75 \text{ lb/hr}$$

$$0.75 \text{ lb/hr} * \frac{1 \text{ ton}}{2000 \text{ lb}} * 8{,}760 \text{ hr/yr} * \frac{(100\%-90\%)}{100\%} = 0.33 \text{ ton/yr}$$

Area Emission Rate

$$0.33 \text{ ton/yr} * \frac{2000 \text{ lb}}{1 \text{ ton}} / 8{,}760 \text{ hr/yr} * \frac{1 \text{ hr}}{3600 \text{ s}} * \frac{453.5 \text{ g}}{1 \text{ lb}} = 0.01 \text{ g/s}$$

$$\frac{0.01 \text{ g/s}}{118 \text{ acre}} / \frac{4.05E+03 \text{ m^2}}{\text{acre}} = 1.99E-08 \text{ g/(s-m^2)}$$

$PM_{2.5}$ Emission Rate

$$0.105 * 5.7 * \left(6.9 \text{ ^ } 1.2\right) / \left(7.9 \text{ ^ } 1.3\right) = 0.41 \text{ lb/hr}$$

$$0.41 \text{ lb/hr} * \frac{1 \text{ ton}}{2000 \text{ lb}} * 8{,}760 \text{ hr/yr} * \frac{(100\%-90\%)}{100\%} = 0.18 \text{ ton/yr}$$

Area Emission Rate

$$0.18 \text{ ton/yr} * \frac{2000 \text{ lb}}{1 \text{ ton}} / 8{,}760 \text{ hr/yr} * \frac{1 \text{ hr}}{3600 \text{ s}} * \frac{453.5 \text{ g}}{1 \text{ lb}} = 5.21E-03 \text{ g/s}$$

$$\frac{5.21E-03 \text{ g/s}}{118 \text{ acre}} / \frac{4.05E+03 \text{ m^2}}{\text{acre}} = 1.09E-08 \text{ g/(s-m^2)}$$

Emissions form Earth Moving Operations-Gypsum

Basis	**Value**	**Units**	**Reference**
PM_{10} Scaling Factor, k	0.75		AP-42, Table 11.9-1 Bulldozing (Overburden)
$PM_{2.5}$ Scaling Factor, k	0.105		AP-42, Table 11.9-1 Bulldozing (Overburden)
Silt Content	6.9	%	AP-42, Table 11.9-3 Bulldozers (Overburden)
Moisture Content	7.9	%	AP-42, Table 11.9-3 Bulldozers (Overburden)
Control Efficiency	90	%	Plant Washington Specification
Solid Material Handling Area	267	acres	Plant Washington Specification
Acre to m^2 Conversion	4046.86	m^2/Acre	Conversion Factor

PM Emissions

$$5.7 * \left(6.9 \wedge 1.2\right) / \left(7.9 \wedge 1.3\right) = 3.94 \text{ lb/hr}$$

$$3.94 \text{ lb/hr} * \frac{1 \text{ ton}}{2000 \text{ lb}} * 8{,}760 \text{ hr/yr} * \frac{(100\%-90\%)}{100\%} = 1.73 \text{ ton/yr}$$

PM_{10} Emission Rate

$$0.75 * 1 * \left(6.9 \wedge 1.5\right) / \left(7.9 \wedge 1.4\right) = 0.75 \text{ lb/hr}$$

$$0.75 \text{ lb/hr} * \frac{1 \text{ ton}}{2000 \text{ lb}} * 8{,}760 \text{ hr/yr} * \frac{(100\%-90\%)}{100\%} = 0.33 \text{ ton/yr}$$

Area Emission Rate

$$0.33 \text{ ton/yr} * \frac{2000 \text{ lb}}{1 \text{ ton}} / 8{,}760 \text{ hr/yr} * \frac{1 \text{ hr}}{3600 \text{ s}} * \frac{453.5 \text{ g}}{1 \text{ lb}} = 0.01 \text{ g/s}$$

$$\frac{0.01 \text{ g/s}}{267 \text{ acre}} / \frac{4.05E+03 \text{ m}\wedge2}{\text{acre}} = 8.78E-09 \text{ g/(s-m}\wedge2)$$

$PM_{2.5}$ Emission Rate

$$0.105 * 5.7 * \left(6.9 \wedge 1.2\right) / \left(7.9 \wedge 1.3\right) = 0.41 \text{ lb/hr}$$

$$0.41 \text{ lb/hr} * \frac{1 \text{ ton}}{2000 \text{ lb}} * 8{,}760 \text{ hr/yr} * \frac{(100\%-90\%)}{100\%} = 0.18 \text{ ton/yr}$$

Area Emission Rate

$$0.18 \text{ ton/yr} * \frac{2000 \text{ lb}}{1 \text{ ton}} / 8{,}760 \text{ hr/yr} * \frac{1 \text{ hr}}{3600 \text{ s}} * \frac{453.5 \text{ g}}{1 \text{ lb}} = 5.21E-03 \text{ g/s}$$

$$\frac{5.21E-03 \text{ g/s}}{267 \text{ acre}} / \frac{4.05E+03 \text{ m}\wedge2}{\text{acre}} = 4.82E-09 \text{ g/(s-m}\wedge2)$$

9 Inactive PRB and Illinois No. 6 Coal Piles - Bulldozing Emissions Only
Note: The assumption is made that sufficient crusting will occur to prevent wind erosion

Basis	Value	Units	Reference
PM_{10} Scaling Factor, k	0.75		AP-42, Table 11.9-1 Bulldozing (Coal)
$PM_{2.5}$ Scaling Factor, k	0.022		AP-42, Table 11.9-1 Bulldozing (Coal)
Silt Content	8.6	%	AP-42, Table 11.9-3 Bulldozers (Coal)
Moisture Content	21.91	%	Coal Specification (typical 50/50 blend)
PM Emission Rate	$18.6*s^{1.5}/M^{1.4}$	lb/hr	AP-42, Table 11.9-1
Control Efficiency	90	%	Plant Washington Specification

PM Emissions

$$78.4 * \left(8.6 \wedge 1.2\right) / \left(21.91 \wedge 1.3\right) = 18.74 \text{ lb/hr}$$

$$18.74 \text{ lb/hr} * \frac{1 \text{ ton}}{2000 \text{ lb}} * 8{,}760 \text{ hr/yr} * \frac{(100\%-90\%)}{100\%} = 8.21 \text{ ton/yr}$$

PM_{10} Emission Rate

$$0.75 * 18.6 * \left(8.6 \wedge 1.5\right) / \left(21.91 \wedge 1.4\right) = 4.67 \text{ lb/hr}$$

$$4.67 \text{ lb/hr} * \frac{1 \text{ ton}}{2000 \text{ lb}} * 8{,}760 \text{ hr/yr} * \frac{(100\%-90\%)}{100\%} = 2.05 \text{ ton/yr}$$

$PM_{2.5}$ Emission Rate

$$0.022 * 78.4 * \left(8.6 \wedge 1.2\right) / \left(21.91 \wedge 1.3\right) = 0.41 \text{ lb/hr}$$

$$0.41 \text{ lb/hr} * \frac{1 \text{ ton}}{2000 \text{ lb}} * 8{,}760 \text{ hr/yr} * \frac{(100\%-90\%)}{100\%} = 1.81\text{E-}01 \text{ ton/yr}$$

10 Active PRB Coal Storage Pile Emission Calculations

Basis	Value		Reference
Pile Volume	2,137,605	ft^3	Plant Washington Specification
Pile Diameter	286	feet	Plant Washington Specification
Threshold Velocity	1.12	m/s	Table 13.2.5-2 AP-42 for wind erosion from piles

Pile Dimension Calculations

Assume pyramid shape V=1/3*h*Area of base
Surface Area = 1/2*(perimeter of base* slant height)
slant height = $SQRT(h^2+(L/2)^2)$

Area of Base: π * 286 ft ^ 2 / 4 = 64,242 ft^2

Height: 3 * 2,137,605 ft^3 / 64,242 ft^2 = 100 ft

Slant Height: $SQRT\left(143\ ft^{2} + 100\ ft^{2} \right) = 174\ ft$

Surface Area: $\left(\left(\pi * 286\ ft \right) * 174\ ft \right) * 0.5 = 78{,}346\ ft^2 \quad 7{,}278\ m^2$

Pile B2 from Fig 13..2.5-2 is the selected Pile Configuration for wind contours because the prevailing wind is WNW. According to the figure, the maximum shear velocity is 1.1 times ten percent of the prevailing wind; therefore, wind erosion occurs whenever the fastest 2 minute wind exceeds the following value:

$$V = \frac{1.12}{0.11} = 10.2\ m/s = 22.78\ mph$$

Sample Calculation:
Erosion Potentials were calculated for the dates where the normalized wind surface wind speeds exceeded the threshold velocity for uncrusted coal piles (1.12 m/s)
Erosion Potential ((AP-42, 13.2.5-3, Equation 3)
$P=58(u^*-u^*_t)^2+25(u^*-u^*_t)\ g/m^2$
where:
P = Erosion Potential
u^* = Friction velocity = 0.1 u
u^*_t = Threshold Friction Velocity
u_s = Surface Wind Speed
u_r = Approach Wind Speed
December 1, 2006 - 1.1 Wind Contour

P = 58 * $(1.13 - 1.12)^2$ + 25 * (1.13 - 1.12) = 0.28 g/m^2

Emissions are computed by multiplying the Erosion Potential by the surface area of the pile, the Aerodynamic Particle Size Multiplier to speciate the PM size, and the fraction of the pile subarea that is subject to a specified wind contour. Emissions from the pile are controlled to 90% by dust suppressant

Emission rates multiplied by k = 0.5 to reduce emissions to just PM_{10} and k = 0.075 to $PM_{2.5}$ (AP-42, 13.2.5-3)
Fraction of Pile Subarea Subject to 0.9 Contour of Normalized Surface Wind Speed = 0.17
Fraction of Pile Subarea Subject to 1.1 Contour of Normalized Surface Wind Speed = 0.024
December 1, 2006 - PM10 Emissions for 1.1 Wind Contour

$$0.28\ g/m^2 * 7{,}278\ m^2 * 0.5 * 0.024 * \frac{(100\%-90\%)}{100\%} = 2.45\ g/d$$

Daily records of fastest mile from 12/1/06 through 11/30/07 and it exceeded the calculated threshold on the following dates:(10 m anemometer)

	Wind Speed	Wind Speed	Normalized Surface Wind Speeds				Erosion Potential $P=58(u^*-u^*_t)^2+25(u^*-u^*_t)$ g/m^2 (AP-42, 13.2.5-3, Equation 3)		Daily PM_{10} Erosion Potential		Daily PM_{10} Erosion Potential Summation	Daily $PM_{2.5}$ Erosion Potential		Daily $PM_{2.5}$ Erosion Potential Summation
Date	mph	m/s	$u_s/u_r = 0.2$	$u_s/u_r = 0.6$	$u_s/u_r = 0.9$	$u_s/u_r = 1.1$	P(0.9)	P(1.1)	P(0.9)	P(1.1)		P(0.9)	P(1.1)	
20061201	23	10.28	0.21	0.62	0.93	1.13		0.28		2.45	2.45		0.37	0.37
20061207	24	10.73	0.21	0.64	0.97	1.18		1.71		15	15		2.24	2.24
20061225	26	11.62	0.23	0.70	1.05	1.28		5.42		47	47		7.10	7.10
20061226	23	10.28	0.21	0.62	0.93	1.13		0.28		2.45	2.45		0.37	0.37
20061231	24	10.73	0.21	0.64	0.97	1.18		1.71		15	15		2.24	2.24
20070108	23	10.28	0.21	0.62	0.93	1.13		0.28		2	2		0.37	0.37
20070109	28	12.52	0.25	0.75	1.13	1.38	0.16	10.25	10.18	89	100	1.53	13.42	15
20070128	24	10.73	0.21	0.64	0.97	1.18		1.71		15	15		2.24	2.24
20070213	31	13.86	0.28	0.83	1.25	1.52	4.12	19.59	255	171	426	38	25.7	64
20070218	23	10.28	0.21	0.62	0.93	1.13		0.28		2.45	2.45		0.37	0.37
20070301	32	14.30	0.29	0.86	1.29	1.57	5.81	23.27	359	203	563	54	30.5	84
20070302	30	13.41	0.27	0.80	1.21	1.48	2.61	16.20	162	141	303	24	21.2	45
20070316	29	12.96	0.26	0.78	1.17	1.43	1.29	13.08	80	114	194	12	17.1	29
20070404	33	14.75	0.30	0.89	1.33	1.62	7.69	27.22	476	238	714	71	35.7	107
20070415	32	14.30	0.29	0.86	1.29	1.57	5.81	23.27	359	203	563	54	30.5	84
20070416	28	12.52	0.25	0.75	1.13	1.38	0.16	10.25	10.18	89	100	1.53	13.42	14.95
20070508	23	10.28	0.21	0.62	0.93	1.13		0.28		2.45	2.45		0.37	0.37
20070603	23	10.28	0.21	0.62	0.93	1.13		0.28		2.45	2.45		0.37	0.37
20070629	32	14.30	0.29	0.86	1.29	1.57	5.81	23.27	359	203	563	54	30.5	84
20070701	28	12.52	0.25	0.75	1.13	1.38	0.16	10.25	10.18	89	100	1.53	13.42	15
20070711	25	11.18	0.22	0.67	1.01	1.23		3.43		30	30		4.49	4.49
20070720	38	16.99	0.34	1.02	1.53	1.87	19.91	51.21	1,232	447	1,679	185	67.1	252
20070806	23	10.28	0.21	0.62	0.93	1.13		0.28		2	2		0.37	0.37
20070816	25	11.18	0.22	0.67	1.01	1.23		3.43		30	30		4.49	4.49
20070817	41	18.33	0.37	1.10	1.65	2.02	29.50	68.97	1,825	602	2,427	274	90.4	364
20070824	26	11.62	0.23	0.70	1.05	1.28		5.42		47	47		7.10	7.10
20071115	25	11.18	0.22	0.67	1.01	1.23		3.43		30	30		4.49	4.49
							Subtotal		5,138	2,839 g/yr	2,427 g/d	771 g/yr	426 g/yr	364 g/d
							Annual Emission Rate			7,977 g/yr 8.79E-03 ton/yr	**Annual Emission Rate**		1,196 g/yr 1.32E-03 ton/yr	
							24 Hour Emission Rate			2,427 g/d 0.98 ton/yr	**24 Hour Emission Rate**		364 g/d 1.46E-01 ton/yr	

11 Active Illinois No. 6 Coal Storage Pile Emission Calculations

Basis	Value		Reference
Pile Volume	2,137,605	ft^3	Plant Washington Specification
Pile Diameter	286	feet	Plant Washington Specification
Threshold Velocity	1.12	m/s	Table 13.2.5-2 AP-42 for wind erosion from piles
N	365	days	Daily fresh coal applied to the Main Inactive pile

Pile Dimension Calculations

Assume pyramid shape V=1/3*h*Area of base

Surface Area = 1/2*(perimeter of base* slant height)

slant height = $SQRT(h^2+(L/2)^2)$

Area of Base: π * 286 ft ^ 2 / 4 = 64,242 ft^2

Height: 3 * 2,137,605 ft^3 / 64,242 ft^2 = 100 ft

Slant Height: SQRT (143 ft ^ 2 + 100 ft ^ 2) = 174 ft

Surface Area: ((π * 286 ft) * 174 ft) * 0.5 = 78,346 ft^2 7,278 m^2

Pile B2 from Fig 13..2.5-2 is the selected Pile Configuration for wind contours because the prevailing wind is WNW. According to the figure, the maximum shear velocity is 1.1 times ten percent of the prevailing wind; therefore, wind erosion occurs whenever the fastest 2 minute wind exceeds the following value:

$$V = \frac{1.12}{0.11} = 10.2 \text{ m/s} = 22.78 \text{ mph}$$

Sample Calculation:

Erosion Potentials were calculated for the dates where the normalized wind surface wind speeds exceeded the threshold velocity for uncrusted coal piles (1.12 m/s)

Erosion Potential ((AP-42, 13.2.5-3, Equation 3)

$P=58(u^*-u^*_t)^2+25(u^*-u^*_t)$ g/m^2

where:

P = Erosion Potential

u^* = Friction velocity = 0.1 u

u^*_t = Threshold Friction Velocity

u_s = Surface Wind Speed

u_r = Approach Wind Speed

December 1, 2006 - 1.1 Wind Contour

P = 58 * $(1.13 - 1.12)^2$ + 25 * (1.13 - 1.12) = 0.28 g/m^2

Emissions are computed by multiplying the Erosion Potential by the surface area of the pile, the Aerodynamic Particle Size Multiplier to speciate the PM size, and the fraction of the pile subarea that is subject to a specified wind contour. Emissions from the pile are controlled to 90% by dust suppressant

Emission rates multiplied by k = 0.5 to reduce emissions to just PM_{10} and k = 0.075 to $PM_{2.5}$ (AP-42, 13.2.5-3)

Fraction of Pile Subarea Subject to 0.9 Contour of Normalized Surface Wind Speed = 0.17

Fraction of Pile Subarea Subject to 1.1 Contour of Normalized Surface Wind Speed = 0.024

December 1, 2006 - PM10 Emissions for 1.1 Wind Contour

$$0.28 \text{ g/m}^2 * 7{,}278 \text{ m}^2 * 0.5 * 0.024 * \frac{(100\%-90\%)}{100\%} = 2.45 \text{ g/d}$$

Daily records of fastest mile from 12/1/06 through 11/30/07 and it exceeded the calculated threshold on the following dates:(10 m anemometer)

	Wind Speed	Wind Speed	Normalized Surface Wind Speeds				Erosion Potential $P=58(u^*-u^*_t)^2+25(u^*-u^*_t)$ g/m^2 (AP-42, 13.2.5-3, Equation 3)		Daily PM_{10} Erosion Potential		Daily PM_{10} Erosion Potential Summation	Daily $PM_{2.5}$ Erosion Potential		Daily $PM_{2.5}$ Erosion Potential Summation
Date	mph	m/s	$u_s/u_r = 0.2$	$u_s/u_r = 0.6$	$u_s/u_r = 0.9$	$u_s/u_r = 1.1$	P(0.9)	P(1.1)	P(0.9)	P(1.1)		P(0.9)	P(1.1)	
20061201	23	10.28	0.21	0.62	0.93	1.13		0.28		2.45	2.45		0.37	0.37
20061207	24	10.73	0.21	0.64	0.97	1.18		1.71		15	15		2.24	2.24
20061225	26	11.62	0.23	0.70	1.05	1.28		5.42		47	47		7.10	7.10
20061226	23	10.28	0.21	0.62	0.93	1.13		0.28		2.45	2.45		0.37	0.37
20061231	24	10.73	0.21	0.64	0.97	1.18		1.71		15	15		2.24	2.24
20070108	23	10.28	0.21	0.62	0.93	1.13		0.28		2	2		0.37	0.37
20070109	28	12.52	0.25	0.75	1.13	1.38	0.16	10.25	10.18	89	100	1.53	13.42	15
20070128	24	10.73	0.21	0.64	0.97	1.18		1.71		15	15		2.24	2.24
20070213	31	13.86	0.28	0.83	1.25	1.52	4.12	19.59	255	171	426	38	25.7	64
20070218	23	10.28	0.21	0.62	0.93	1.13		0.28		2.45	2.45		0.37	0.37
20070301	32	14.30	0.29	0.86	1.29	1.57	5.81	23.27	359	203	563	54	30.5	84
20070302	30	13.41	0.27	0.80	1.21	1.48	2.61	16.20	162	141	303	24	21.2	45
20070316	29	12.96	0.26	0.78	1.17	1.43	1.29	13.08	80	114	194	12	17.1	29
20070404	33	14.75	0.30	0.89	1.33	1.62	7.69	27.22	476	238	714	71	35.7	107
20070415	32	14.30	0.29	0.86	1.29	1.57	5.81	23.27	359	203	563	54	30.5	84
20070416	28	12.52	0.25	0.75	1.13	1.38	0.16	10.25	10.18	89	100	1.53	13.42	14.95
20070508	23	10.28	0.21	0.62	0.93	1.13		0.28		2.45	2.45		0.37	0.37
20070603	23	10.28	0.21	0.62	0.93	1.13		0.28		2.45	2.45		0.37	0.37
20070629	32	14.30	0.29	0.86	1.29	1.57	5.81	23.27	359	203	563	54	30.5	84
20070701	28	12.52	0.25	0.75	1.13	1.38	0.16	10.25	10.18	89	100	1.53	13.42	15
20070711	25	11.18	0.22	0.67	1.01	1.23		3.43		30	30		4.49	4.49
20070720	38	16.99	0.34	1.02	1.53	1.87	19.91	51.21	1,232	447	1,679	185	67.1	252
20070806	23	10.28	0.21	0.62	0.93	1.13		0.28		2	2		0.37	0.37
20070816	25	11.18	0.22	0.67	1.01	1.23		3.43		30	30		4.49	4.49
20070817	41	18.33	0.37	1.10	1.65	2.02	29.50	68.97	1,825	602	2,427	274	90.4	364
20070824	26	11.62	0.23	0.70	1.05	1.28		5.42		47	47		7.10	7.10
20071115	25	11.18	0.22	0.67	1.01	1.23		3.43		30	30		4.49	4.49
							Subtotal		5,138 g/yr	2,839 g/yr	2,427 g/d	771 g/yr	426 g/yr	364 g/d
							Annual Emission Rate			7,977 g/yr	**Annual Emission Rate**		1,196 g/yr	
										8.79E-03 ton/yr			1.32E-03 ton/yr	
							24 Hour Emission Rate			2,427 g/d	**24 Hour Emission Rate**		364 g/d	
										0.98 ton/yr			1.46E-01 ton/yr	

12 Limestone Storage Pile Emission Calculations

Basis	Value		Reference
Pile Volume	461,723	ft^3	Plant Washington Specification
Pile Dimensions	378	feet	Plant Washington Specification
	195	feet	Plant Washington Specification
Threshold Velocity	1.33	m/s	Table 13.2.5-2 AP-42 for wind erosion from piles

Pile Dimension Calculations

Assume pyramid shape V=1/3*h*Area of base

Surface Area = 1/2*(perimeter of base* slant height)

slant height = $SQRT(h^2+(L/2)^2)$

Area of Base= 195 ft * 378 ft = 73,710 ft^2

height= 3 * 461,723 ft^3 / 73,710 ft^2 = 19 ft

Slant Height(1) $SQRT\left(189\text{ ft}^2 + 19\text{ ft}^2 \right)$ = 190 ft

Slant Height(2) $SQRT\left(98\text{ ft}^2 + 19\text{ ft}^2 \right)$ = 99 ft

Average Slant Height $\left(190\text{ ft} + 99\text{ ft}\right) / 2$ = 145 ft

Surface Area $\left(\left(378\text{ ft} + 195\text{ ft} \right) * 2 * 145\text{ ft} \right) * 0.5$ = 82,863 ft^2 = 7,698 m^2

Pile B2 from Fig 13..2.5-2 is the selected Pile Configuration for wind contours because the prevailing wind is WNW. According to the figure, the maximum shear velocity is 1.1 times ten percent of the prevailing wind; therefore, wind erosion occurs whenever the fastest 2 minute wind exceeds the following value:

$$V = \frac{1.33}{0.11} = 12.1 \text{ m/s} = 27.05 \text{ mph}$$

Sample Calculation:

Erosion Potentials were calculated for the dates where the normalized wind surface wind speeds exceeded the threshold velocity for a limestone pile (1.33 m/s)

Erosion Potential ((AP-42, 13.2.5-3, Equation 3)

$P=58(u^*-u^*_t)^2+25(u^*-u^*_t)$ g/m^2

where:

P = Erosion Potential

u^* = Friction velocity = 0.1 u

u^*_t = Threshold Friction Velocity

u_s = Surface Wind Speed

u_r = Approach Wind Speed

January 9, 2007 - 1.1 Wind Contour

P = 58 * $(1.38 - 1.33)^2$ + 25 * (1.38 - 1.33) = 1.30 g/m^2

Emissions are computed by multiplying the Erosion Potential by the surface area of the pile, the Aerodynamic Particle Size Multiplier to speciate the PM size, and the fraction of the pile subarea that is subject to a specified wind contour. Emissions from the pile are controlled to 90% by dust suppressant

Emission rates multiplied by k = 0.5 to reduce emissions to just PM_{10} and k = 0.075 to $PM_{2.5}$ (AP-42, 13.2.5-3)

Fraction of Pile Subarea Subject to 0.9 Contour of Normalized Surface Wind Speed = 0.17

Fraction of Pile Subarea Subject to 1.1 Contour of Normalized Surface Wind Speed = 0.024

January 9, 2007 - PM10 Emissions for 1.1 Wind Contour

$$1.30 \text{ g/m}^2 * 7{,}698 \text{ m}^2 * 0.5 * 0.024 * \frac{(100\%-90\%)}{100\%} = 12 \text{ g/d}$$

Daily records of fastest mile from 12/1/06 through 11/30/07 and it exceeded the calculated threshold on the following dates:(10 m anemometer)

	Wind Speed	Wind Speed	Normalized Surface Wind Speeds				Erosion Potential $P=58(u^*-u^*_t)^2+25(u^*-u^*_t)$ g/m^2 (AP-42, 13.2.5-3, Equation 3)		Daily PM_{10} Erosion Potential		Daily PM_{10} Erosion Potential Summation	Daily $PM_{2.5}$ Erosion Potential		Daily $PM_{2.5}$ Erosion Potential Summation
Date	mph	m/s	u_s/u_r = 0.2	u_s/u_r = 0.6	u_s/u_r = 0.9	u_s/u_r = 1.1	P(0.9)	P(1.1)	P(0.9)	P(1.1)		P(0.9)	P(1.1)	
20061201	23	10.28	0.21	0.62	0.93	1.13								
20061207	24	10.73	0.21	0.64	0.97	1.18								
20061225	26	11.62	0.23	0.70	1.05	1.28								
20061226	23	10.28	0.21	0.62	0.93	1.13								
20061231	24	10.73	0.21	0.64	0.97	1.18								
20070108	23	10.28	0.21	0.62	0.93	1.13								
20070109	28	12.52	0.25	0.75	1.13	1.38		1.30		12	12		1.70	1.70
20070128	24	10.73	0.21	0.64	0.97	1.18								
20070213	31	13.86	0.28	0.83	1.25	1.52		7.05		65	65		9.23	9.23
20070218	23	10.28	0.21	0.62	0.93	1.13								
20070301	32	14.30	0.29	0.86	1.29	1.57		9.53		88	88		12.48	12.48
20070302	30	13.41	0.27	0.80	1.21	1.48		4.85		45	45		6.36	6.36
20070316	29	12.96	0.26	0.78	1.17	1.43		2.93		27	27		3.84	3.84
20070404	33	14.75	0.30	0.89	1.33	1.62		12.29		113	113		16.09	16.09
20070415	32	14.30	0.29	0.86	1.29	1.57		9.53		88	88		12.48	12.48
20070416	28	12.52	0.25	0.75	1.13	1.38		1.30		12	12		1.70	1.70
20070508	23	10.28	0.21	0.62	0.93	1.13								
20070603	23	10.28	0.21	0.62	0.93	1.13								
20070629	32	14.30	0.29	0.86	1.29	1.57		9.53		88	88		12.48	12.48
20070701	28	12.52	0.25	0.75	1.13	1.38		1.30		12	12		1.70	1.70
20070711	25	11.18	0.22	0.67	1.01	1.23								
20070720	38	16.99	0.34	1.02	1.53	1.87	7.26	30.28	475	280	755	67	40	107
20070806	23	10.28	0.21	0.62	0.93	1.13								
20070816	25	11.18	0.22	0.67	1.01	1.23								
20070817	41	18.33	0.37	1.10	1.65	2.02	13.91	44.45	910	411	1,321	129	58	187
20070824	26	11.62	0.23	0.70	1.05	1.28								
20071115	25	11.18	0.22	0.67	1.01	1.23								
							Subtotal		1,385 g/yr	1,241 g/yr	1,321 g/d	196 g/yr	176 g/yr	187 g/d
							Annual Emission Rate			2,626 g/yr	**Annual Emission Rate**		372 g/yr	
										2.89E-03 ton/yr			4.11E-04 ton/yr	
							24 Hour Emission Rate			1,321 g/d	**24 Hour Emission Rate**		187 g/d	
										0.53 ton/yr			7.54E-02 ton/yr	

13 Total Vehicle Miles Traveled

Basis	Value	Units	Reference
Daily Number of Trucks	126	Trucks	Plant Washington Specification
Length of Paved Road	0.380	Miles	Plant Washington Specification
Number of Trips on Road	2		Accounts for Distance to and from Land Fill

Total Vehicle Miles Traveled to and from Land Fill

126 Trucks/day * 0.380 Miles/Truck * 2 = 95.73 miles/day

95.73 miles/day * 365 days/year = 34,943 miles/year

14 Fugitive Emission Calculations for Paved Road

Basis	Value	Units	Reference
Road Surface Silt Loading (sL)	8.2	g/m^2	EPD specifications
Mean Vehicle Weight (W)	12.5	tons	Average Weight of vehicles
k (empircal constant) - PM_{10}	0.016	lb/VMT	AP-42 constant for paved road
k (empircal constant) - $PM_{2.5}$	0.0024	lb/VMT	AP-42 constant for paved road
Number of wet days in a year (P)	120	days/year	AP-42 table (number of days in a year with at least 0.01 inch of precipitation)
Total Miles traveled on a road segment	34,943 miles/year		Based on Segment Distance and Number of Trips
Control Efficiency	90	%	Projected Control Efficiency
Number of Days in Averaging Period	365	days	Number of Days in Averaging Period

PM_{10} Emission Factor (E)

$$k * \left(\frac{sL}{2}\right)^{0.65} * \left(\frac{W}{3}\right)^{1.5}$$

$$0.016 * \left(\frac{8.2}{2}\right)^{0.65} * \left(\frac{12.5}{3}\right)^{1.5} = 0.34 \text{ lb/VMT}$$

PM_{10} Emissions

$$0.34 \text{ lb/VMT} * 34{,}943 \text{ miles/year} * \frac{1 \text{ ton}}{2000 \text{ lb}} * (1-120/(4*365)) * \frac{(100\%-90\%)}{100\%} = 0.55 \text{ ton/yr}$$

$PM_{2.5}$ Emission Factor (E)

$$k * \left(\frac{sL}{2}\right)^{0.65} * \left(\frac{W}{3}\right)^{1.5}$$

$$0.0024 * \left(\frac{8.2}{2}\right)^{0.65} * \left(\frac{12.5}{3}\right)^{1.5} = 0.05 \text{ lb/VMT}$$

$PM_{2.5}$ Emissions

$$0.05 \text{ lb/VMT} * 34{,}943 \text{ miles/year} * \frac{1 \text{ ton}}{2000 \text{ lb}} * (1-120/(4*365)) * \frac{(100\%-90\%)}{100\%} = 8.19 \text{ E-02 ton/yr}$$