Haul Road Emission Calculations

Vehicle Miles Traveled (VMT) = 2 * Length of Haul Road * Maximum Hourly Amount Hauled
Capacity of Vehicle

Unpaved Haul Road Emissions: From AP-42, Section13.2.2 (12/03)

Emission Factor => E = $\frac{k * (s/12)^a * (W/3)^b}{} \frac{[365 - P]}{365}$

Where

		E = Emission factor (pounds per VMT)	
For PM-10:	1.5	k = constant	Taken from Table 13.2.2-2 in AP-42
	0.9	a = constant	Taken from Table 13.2.2-2 in AP-42
	0.45	b = constant	Taken from Table 13.2.2-2 in AP-42
	8.3	s = surface material silt content (%)	Taken from Table 13.2.2-1 in AP-42
		W = mean vehicle weight (tons)	(Loaded truck weight + Unloaded truck weight)/2
	10	S = Average speed of vehicles (mph)	If average speed is greater than 15 mph, then enter 15
	100	P = Number of days with 0.01" of precipitation	Figure 13.2.2-1

Landfill haul road watering	1	control efficiency
Coal surfactant	0	control efficiency
	1	additional for re-wetting piles
	1	control efficiency for rewetting piles

Paved Haul Road Emission Equations, From AP-42 Section 13.2.1 (12/03)

Emission Factor => E = [k * (sL/2)^0.65 * (W/3)^1.5 -C]* (1 - (1.2*P)/N) =

	Loaded tons	Unloaded tons	Load tons
Truck	40	15	25
Scraper	88.75	51.25	37.5
CAT model 7	76	36	40

Where

	E = Emission factor (pounds per VMT)	
0.016	k = constant	Taken from Table 13.2.1-1 in AP-42
0.00047	C = Emission factor for exhaust, brake wear, and tire wear	Table 13.2.1-2
0.6	sL = Silt loading (g/m2)	Table 13.2.1-3, ubiquitous baseline for <500 trucks per day
	W = mean vehicle weight (tons)	
100	P = Number of days with 0.01" of precipitation	Figure 13.2.1-2
365	N = number of days in averaging period	365 days per year

Calculations

		Vehicle Typ	Paved	Trucks		Length meters	(miles)	Speed mph	Truck Weight Loaded tons	Unloaded tons	Max Hourly tons	Emission Factor lb PM10/VMT
Rock Road Tires	Tires	Truck	yes	1		952.84	0.59	10.00	40	15	27.5	0.14
SUM ROCK ROAD TIRES			yes		RR_T							
Paved Road Tires	Tires	Truck	yes	1		1,060.70	0.66	10.00	40	15	27.5	0.14
SUM PAVED ROAD TIRES			yes		PR_T							
Rock Road All	Limestone	Truck	yes	3		951.66	0.59	10.00	40	15	27.5	0.14
Rock Road All	Bottom Ash Unit 1	Truck	yes	2		951.66	0.59	10.00	40	15	27.5	0.14
Rock Road All	Bottom Ash Unit 2	Truck	yes	1		951.66	0.59	10.00	40	15	27.5	0.14
Rock Road All	Fly Ash Unit 1	Truck	yes	1		951.66	0.59	10.00	40	15	27.5	0.14
Rock Road All	Fly Ash Unit 2	Truck	yes	3		951.66	0.59	10.00	40	15	27.5	0.14
Rock Road All	Gypsum	Truck	yes	5		951.66	0.59	10.00	40	15	27.5	0.14
SUM ROCK ROAD ALL			yes		RR_ALL							
Paved Road All	Limestone	Truck	yes	3		750.00	0.47	10.00	40	15	27.5	0.14
Paved Road All	Bottom Ash Unit 1	Truck	yes	2		750.00	0.47	10.00	40	15	27.5	0.14
Paved Road All	Bottom Ash Unit 2	Truck	yes	1		750.00	0.47	10.00	40	15	27.5	0.14
Paved Road All	Fly Ash Unit 1	Truck	yes	1		750.00	0.47	10.00	40	15	27.5	0.14
Paved Road All	Fly Ash Unit 2	Truck	yes	3		750.00	0.47	10.00	40	15	27.5	0.14
Paved Road All	Gypsum	Truck	yes	5		750.00	0.47	10.00	40	15	27.5	0.14
Paved Road All	Tires	Truck	yes	1		750.00	0.47	10.00	40	15	27.5	0.14
SUM PAVED ROAD ALL			yes		PR_ALL							
Rock Road Gypsum	Gypsum	Truck	yes	5		1,320.59	0.82	10.00	40	15	27.5	0.14
SUM ROCK ROAD GYPSUM			yes		RR_G							
Limestone	Limestone	Truck	yes	3		638.34	0.40	10.00	40	15	27.5	0.14
SUM ROCK ROAD LIMESTONE			yes		RR_L							
Rock Road Bottom Ash	Bottom Ash Unit 2	Truck	yes	1		620.54	0.39	10.00	40	15	27.5	0.14
SUM ROCK ROAD BOTTOM ASH			yes		RR_BA							
Rock Road Existing Bottom A	Bottom Ash Unit 1	Truck	yes	2		198.00	0.12	10.00	40	15	27.5	0.14
SUM RR EXISTING BOTTOM ASH			yes		RR_EBA							
Rock Road Existing Fly Ash	Fly Ash Unit 1	Truck	yes	1		602.86	0.37	10.00	40	15	27.5	0.14
SUM RR EXISTING FLY ASH			yes		RR_EFA							
Rock Road New Fly Ash	Fly Ash Unit 2	Truck	yes	3		565.96	0.35	10.00	40	15	27.5	0.14
SUM RR NEW FLY ASH			yes		RR_NFA							
Rock Road Landfill	All Materials	CAT model	yes	11		2,157.98	1.34	10.00	76	36	56	0.40
SUM RR LANDFILL			yes		RR_LF							

	Vehicle Miles Traveled VMT/hr	Emissions Uncontrolled lb PM10/hr	Controlled lb PM10/hr	Controlled PM10/hr/segm	# segments
Tires	5.92E-01	0.081	0.081	0.0029	28
				0.0029	28
Tires	6.59E-01	0.090	0.090	0.0031	29
				0.0031	29
Limestone	1.94E+00	0.264	0.264	0.0098	27
Bottom Ash Unit 1	1.18E+00	0.161	0.161	0.0060	27
Bottom Ash Unit 2	5.53E-01	0.075	0.075	0.0028	27
Fly Ash Unit 1	6.02E-01	0.082	0.082	0.0030	27
Fly Ash Unit 2	1.67E+00	0.228	0.228	0.0084	27
Gypsum	2.86E+00	0.388	0.388	0.0144	27
				0.0444	27
Limestone	1.53E+00	0.208	0.208	0.0099	21
Bottom Ash Unit 1	9.32E-01	0.127	0.127	0.0060	21
Bottom Ash Unit 2	4.36E-01	0.059	0.059	0.0028	21
Fly Ash Unit 1	4.75E-01	0.065	0.065	0.0031	21
Fly Ash Unit 2	1.32E+00	0.179	0.179	0.0085	21
Gypsum	2.25E+00	0.306	0.306	0.0146	21
Tires	4.66E-01	0.063	0.063	0.0030	21
				0.0480	21
Gypsum	3.96E+00	0.539	0.539	0.0128	42
				0.0128	42
Limestone	1.30E+00	0.177	0.177	0.0071	25
				0.0071	25
Bottom Ash Unit 2	3.60E-01	0.049	0.049	0.0021	23
				0.0021	23
Bottom Ash Unit 1	2.46E-01	0.033	0.033	0.0037	9
				0.0037	9
Fly Ash Unit 1	3.82E-01	0.052	0.052	0.0023	23
				0.0023	23
Fly Ash Unit 2	9.95E-01	0.135	0.135	0.0064	21
				0.0064	21
All Materials	1.48E+01	5.861	5.861	0.0993	59
				0.0993	59

NAAQS Haul Roads

Haul Road Emission Calculations

Vehicle Miles Traveled (VMT) = 2 * Length of Haul Road * Maximum Hourly Amount Hauled
Capacity of Vehicle

Unpaved Haul Road Emissions: From AP-42, Section13.2.2 (12/03)

Emission Factor => E = $\frac{k * (s/12)^a * (W/3)^b}{} \frac{[365 - P]}{365}$

Where

		E = Emission factor (pounds per VMT)	
For PM-10:	1.5	k = constant	Taken from Table 13.2.2-2 in AP-42
	0.9	a = constant	Taken from Table 13.2.2-2 in AP-42
	0.45	b = constant	Taken from Table 13.2.2-2 in AP-42
	8.3	s = surface material silt content (%)	Taken from Table 13.2.2-1 in AP-42
		W = mean vehicle weight (tons)	(Loaded truck weight + Unloaded truck weight)/2
	10	S = Average speed of vehicles (mph)	If average speed is greater than 15 mph, then enter 15
	100	P = Number of days with 0.01" of precipitation	Figure 13.2.2-1

Landfill haul road watering	1	control efficiency
Coal surfactant	0	control efficiency
	1	additional for re-wetting piles
	1	control efficiency for rewetting piles

Paved Haul Road Emission Equations, From AP-42 Section 13.2.1 (12/03)

Emission Factor => E = [k * (sL/2)^0.65 * (W/3)^1.5 -C]* (1 - (1.2*P)/N) =

	Loaded tons	Unloaded tons	Load tons
Truck	40	15	25
Scraper	88.75	51.25	37.5
CAT model 7	76	36	40

Where

	E = Emission factor (pounds per VMT)	
0.016	k = constant	Taken from Table 13.2.1-1 in AP-42
0.000	C = Emission factor for exhaust, brake wear, and tire wear	Table 13.2.1-2
0.600	sL = Silt loading (g/m2)	Table 13.2.1-3, ubiquitous baseline for <500 trucks per day
	W = mean vehicle weight (tons)	
100.000	P = Number of days with 0.01" of precipitation	Figure 13.2.1-2
365.000	N = number of days in averaging period	365 days per year

Calculations

		Vehicle Typ	Paved	Trucks		Length meters	Length (miles)	Speed mph	Truck Weight Loaded tons	Truck Weight Unloaded tons	Max Hourly tons	Emission Factor lb PM10/VMT
Rock Road Tires	Tires	Truck	yes	-		952.840	0.59	10.00	40	15	27.5	0.14
SUM ROCK ROAD TIRES			yes		RR_T							
Paved Road Tires	Tires	Truck	yes	-		1060.704	0.66	10.00	40	15	27.5	0.14
SUM PAVED ROAD TIRES			yes		PR_T							
Rock Road All	Limestone	Truck	yes	2		951.660	0.59	10.00	40	15	27.5	0.14
Rock Road All	Bottom Ash Unit 1	Truck	yes	-		951.660	0.59	10.00	40	15	27.5	0.14
Rock Road All	Bottom Ash Unit 2	Truck	yes	1		951.660	0.59	10.00	40	15	27.5	0.14
Rock Road All	Fly Ash Unit 1	Truck	yes	-		951.660	0.59	10.00	40	15	27.5	0.14
Rock Road All	Fly Ash Unit 2	Truck	yes	3		951.660	0.59	10.00	40	15	27.5	0.14
Rock Road All	Gypsum	Truck	yes	3		951.660	0.59	10.00	40	15	27.5	0.14
SUM ROCK ROAD ALL			yes		RR_ALL							
Paved Road All	Limestone	Truck	yes	2		750.000	0.47	10.00	40	15	27.5	0.14
Paved Road All	Bottom Ash Unit 1	Truck	yes	-		750.000	0.47	10.00	40	15	27.5	0.14
Paved Road All	Bottom Ash Unit 2	Truck	yes	1		750.000	0.47	10.00	40	15	27.5	0.14
Paved Road All	Fly Ash Unit 1	Truck	yes	-		750.000	0.47	10.00	40	15	27.5	0.14
Paved Road All	Fly Ash Unit 2	Truck	yes	3		750.000	0.47	10.00	40	15	27.5	0.14
Paved Road All	Gypsum	Truck	yes	3		750.000	0.47	10.00	40	15	27.5	0.14
Paved Road All	Tires	Truck	yes	-		750.000	0.47	10.00	40	15	27.5	0.14
SUM PAVED ROAD ALL			yes		PR_ALL							
Rock Road Gypsum	Gypsum	Truck	yes	3		1320.590	0.82	10.00	40	15	27.5	0.14
SUM ROCK ROAD GYPSUM			yes		RR_G							
Limestone	Limestone	Truck	yes	2		638.340	0.40	10.00	40	15	27.5	0.14
SUM ROCK ROAD LIMESTONE			yes		RR_L							
Rock Road Bottom Ash	Bottom Ash Unit 2	Truck	yes	1		620.540	0.39	10.00	40	15	27.5	0.14
SUM ROCK ROAD BOTTOM ASH			yes		RR_BA							
Rock Road Existing Bottom A	Bottom Ash Unit 1	Truck	yes	-		198.000	0.12	10.00	40	15	27.5	0.14
SUM RR EXISTING BOTTOM ASH			yes		RR_EBA							
Rock Road Existing Fly Ash	Fly Ash Unit 1	Truck	yes	-		602.860	0.37	10.00	40	15	27.5	0.14
SUM RR EXISTING FLY ASH			yes		RR_EFA							
Rock Road New Fly Ash	Fly Ash Unit 2	Truck	yes	3		565.960	0.35	10.00	40	15	27.5	0.14
SUM RR NEW FLY ASH			yes		RR_NFA							
Rock Road Landfill	All Materials	CAT model	yes	9		2157.984	1.34	10.00	76	36	56	0.40
SUM RR LANDFILL			yes		RR_LF							

Increment Haul Roads

	Vehicle Miles Traveled VMT/hr	Emissions Uncontrolled lb PM10/hr	Controlled lb PM10/hr	Controlled M10/hr/seg	# segments
Tires	0.00E+00	0.000	0.000	-	28
				-	28
Tires	0.00E+00	0.000	0.000	-	29
				-	29
Limestone	1.07E+00	0.145	0.145	0.0054	27
Bottom Ash Unit 1	0.00E+00	0.000	0.000	-	27
Bottom Ash Unit 2	5.53E-01	0.075	0.075	0.0028	27
Fly Ash Unit 1	0.00E+00	0.000	0.000	-	27
Fly Ash Unit 2	1.67E+00	0.228	0.228	0.0084	27
Gypsum	1.57E+00	0.213	0.213	0.0079	27
				0.0245	27
Limestone	8.40E-01	0.114	0.114	0.0054	21
Bottom Ash Unit 1	0.00E+00	0.000	0.000	-	21
Bottom Ash Unit 2	4.36E-01	0.059	0.059	0.0028	21
Fly Ash Unit 1	0.00E+00	0.000	0.000	-	21
Fly Ash Unit 2	1.32E+00	0.179	0.179	0.0085	21
Gypsum	1.24E+00	0.168	0.168	0.0080	21
Tires	0.00E+00	0.000	0.000	-	21
				0.0248	21
Gypsum	2.18E+00	0.296	0.296	0.0071	42
				0.0071	42
Limestone	7.15E-01	0.097	0.097	0.0039	25
				0.0039	25
Bottom Ash Unit 2	3.60E-01	0.049	0.049	0.0021	23
				0.0021	23
Bottom Ash Unit 1	0.00E+00	0.000	0.000	-	9
				-	9
Fly Ash Unit 1	0.00E+00	0.000	0.000	-	23
				-	23
Fly Ash Unit 2	9.95E-01	0.135	0.135	0.0064	21
				0.0064	21
All Materials	1.21E+01	4.775	4.775	0.0809	59
				0.0809	59

Increment Haul Roads

Big Stone II

Emissions Sources

Existing Sources

Point Sources

Area

Volume

Coal Handling System

Emission Points - Daily

Stack ID	Emission Unit	Description	Design Rate Thruput	Design Rate Units	Operation cfm	Stack Diameter feet	Velocity ft/s	Operation hr	Control %	Emissions Factor	Emissions Units	After Control (lb/hr)	After Control (ton/yr)
5	5	Live fuel storage building transfer point	3000.0	tons/hr	8,300	1.67	63.15	8760		0.02	gr/cf	1.42	6.23
6	6	Rotary car dumper conveyor	3000.0	tons/hr	12,000	2.00	63.66	8760		0.02	gr/cf	2.06	9.01
7a	7a	Rotary car dumper building	750.0	tons/hr	30,500	3.17	64.41	8760		0.01	gr/cf	2.61	11.45
7b	7b	Rotary car dumper building	750.0	tons/hr	30,500	3.17	64.41	8760		0.01	gr/cf	2.61	11.45
7c	7c	Rotary car dumper building	750.0	tons/hr	30,500	3.17	64.41	8760		0.01	gr/cf	2.61	11.45
7d	7d	Rotary car dumper building	750.0	tons/hr	30,500	3.17	64.41	8760		0.01	gr/cf	2.61	11.45
8	8	Fuel transfer house	1100.0	tons/hr	15,650	3.62	25.29	8760		0.02	gr/cf	2.68	11.75
9	9	North fuel conveying systems	550.0	tons/hr	14,200	2.26	59.17	8760		0.02	gr/acf	2.43	10.66
10	10	South fuel conveying systems	550.0	tons/hr	16,500	2.82	44.00	8760		0.02	gr/acf	2.83	12.39
13	13	Emergency Reclaim Hopper	375.9	tons/hr	13,500			8760		0.01	gr/scf	1.16	5.07
14	14	New Baghouse for Coal Silos #1, 2, and 3 (Load in)	375.9	tons/hr	36,000			8760		0.01	gr/scf	3.09	13.52
15	15	New Baghouse for Coal Silos #1, 2, and 3 (Load out)	375.9	tons/hr	22,500			8760		0.01	gr/scf	1.93	8.45
18	18	Plant Transfer/Silo Fill System	375.9	tons/hr	71,000			8760		0.01	gr/scf	6.09	26.66
22	22	Transfer from Existing Conveyor 2 to New Silo Feed Conveyor	375.9	tons/hr	9,000			8760		0.01	gr/scf	0.77	3.38
23	23	New Crusher House	375.9	tons/hr	30,000			8760		0.01	gr/scf	2.57	11.26
IAC_WE	IAC_WE	Inactive Coal Pile Wind Erosion						8760				0.71	3.11
IAC_PM	IAC_PM	Inactive Coal Pile Maintenance	0.9	VMT/hr				8760		0.98	lb/VMT	0.87	3.82
IAC_LI	IAC_LI	Inactive Coal Pile Load-in	3600.0	tons/hr				8760	ignore to be co	0.000114	lb/ton	0.41	0.04

Fly Ash Handling System

Emission Points

Stack ID	Emission Unit	Description	Design Rate Thruput	Design Rate Units	Operation cfm	Stack Diameter feet	Velocity ft/s	Operation hr	Control %	Emission Factor	Emission Units	After Control (lb/hr)	After Control (ton/yr)
11	11	Fly ash storage silo	19.0	tons/hr	5,320	1.10	93.83	8760		0.02	gr/acf	0.91	3.99
19	19	Fly ash silo bin vent	27.8	tons/hr	9,000.00			8760		0.01	gr/scf	0.77	3.38
28	28	Unit 2 fly ash loading to trucks (dry)	27.8	tons/hr				8760	90%	0.00833	lb/ton	0.02	0.10

Lime Handling System

Emission Points

Stack ID	Emission Unit	Description	Design Rate Thruput	Design Rate Units	Operation cfm	Stack Diameter feet	Velocity ft/s	Operation hr	Control %	Emission Factor	Emission Units	After Control (lb/hr)	After Control (ton/yr)
12	12	Lime storage silo	15	tons/hr	1,500	0.63	79.37	8760		0.02	gr/cf	0.26	1.13
16	16	Limestone Reclaim Conveyor	10.73	ton/hr	12,000			8760		0.01	gr/scf	1.03	4.51
17	17	Limestone Receiving Hopper	10.73	ton/hr	10,000			8760		0.01	gr/scf	0.86	3.75
20	20	Limestone Day Bin #1	10.73	ton/hr	350			8760		0.01	gr/scf	0.03	0.13
21	21	Limestone Day Bin #2	10.73	ton/hr	350			8760		0.01	gr/scf	0.03	0.13
29	29	Limestone stackout conveyor	10.73	ton/hr	350			8760		0.01	gr/scf	0.03	0.13
LS_WE	LS_WE	Limestone Pile Wind Erosion (cover)						8760	50%			0.02	0.08

Gypsum Handling System

Emission Points

Stack ID	Emission Unit	Description	Design Rate Thruput	Design Rate Units	Emission Factor	Emission Units	Source	Operation hr	Control %	PM10 (lb/hr)	PM10 (ton/yr)
GP_WE	GP_WE	Gypsum Pile Wind Erosion						8760		0.01	0.04
GP_LI	GP_LI	Gypsum Pile Load-in	100	tons/hr	0.0003	lb/ton	drop eqn	8760		0.03	0.15
GP_LO	GP_LO	Gypsum Pile Load-out	82.5	tons/hr	0.0003	lb/ton	drop eqn	8760		0.03	0.12

Landfill System

Emission Points

Stack ID	Emission Unit	Description	Design Rate Thruput	Design Rate Units	Emission Factor	Emission Units	Source	Control %	Operation hr	PM10 (lb/hr)	PM10 (ton/yr)
LF_WE	LF_WE	Landfill Wind Erosion							8760	0.66	2.87
LF_LI	LF_LI	Landfill Load-in	150.00	tph	0.0003	lb/ton	drop eqn	50%	8760	0.02	0.11
LF_PM	LF_PM	Landfill Pile Maintenance	0.89	VMT/hr					8760	0.87	3.82

Drop Equation for load in/load out: From AP-42, Section 13.2.4 (1/95)

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

k =	0.35	
U = mean wind speed (mph)	11.10	
M = material moisture content		
coal		21.42
ash		1.00
gypsum		10.00
landfill		10.00
E (lb PM10/ton)		
coal		1.14E-04
ash		8.33E-03
gypsum		3.32E-04
landfill		3.32E-04

Wind Erosion - See related spreadsheets: From AP-42, Section 13.2.5 (1/95)

		Height ft	Density lb/ft3	Amount tons	Area ft2	Moisture %	Angle of Slope	Threshold Friction	PM10 lb/hr	PM10 tpy	
LS_WE	Limestone Pile Wind Erosion (cover)	53.00	85.00	15,000	20,106	10.00	26.6	0.62	0.04	0.17	Uncontrolled rates
IAC_WE	Inactive Coal Pile Wind Erosion	45.00	45.00	697,000	566,280	21.42	26.6	1.02	0.71	3.11	
GP_WE	Gypsum Pile Wind Erosion	25.00	65.00	9,572	5,000	10.00	26.6	0.62	0.01	0.04	
LF_WE	Landfill Wind Erosion	15.00	65.00	1,300,000	522,720	10.00	26.6	1.02	0.66	2.87	

Pile Maintenance - Unpaved Haul Road Emissions: From AP-42, Section 13.2.2 (2/03)

Emission Factor => E = k(s/12)^a (W/3)^b* ((365-p)/365)

$$\text{Vehicle Miles Traveled (VMT)} = \frac{2 * \text{Length of Landfill Segment} * \text{Maximum Hourly Amount Pushed}}{\text{Weight of Vehicle}}$$

Where:
E = Emission factor (pounds per VMT)

	PM10	
k = constant (PM10)	1.5	Taken from Table 13.2.2-2 in AP-42
a = constant	0.9	Taken from Table 13.2.2-2 in AP-42
b = constant	0.45	Taken from Table 13.2.2-2 in AP-42
s = surface material silt content (%)	2.2	AP-42 table 13.2.4-1, 1/95, coal fired power plant coal as received
W = mean vehicle weight (tons)	51.25	
p = Number of days with 0.01" of precipitation	100	
Maximum hourly amount pushed =	412.50	tons
Capacity of dozer=	25	tons
maximum speed (estimate)	2.50	mph
Length of Road Segment=	0.08	miles

		W tons	VMT/hr	PM10 lb/VMT	PM10 lb/hr	PM10 tpy
IAC_PM	Inactive Coal Pile Maintenance	70.00	0.89	0.98	0.87	3.82
LF_PM	Landfill Pile Maintenance	70.00	0.89	0.98	0.87	3.82

Big Stone II

Emissions Sources

Combustion Sources

			Stack Parameters							
ID	STACKID		Size	Size Units	Height (ft)	Temp. (F)	Velocity (ft/sec)	Diameter (ft)	ACFM	Discharge Type*
1	1	B & W steam generator (old)	5800	mmBtu/hr1	498.00	321	48.09	24.17	1,323,845	V
2	2	1973 combustion steam boiler No. 2 FO	210	mmBtu/hr	85.00	606	21.12	6.50	42,047	V
3	3	1961 Bros steam heating boiler No. 2 FO	98	mmBtu/hr	90.00	525	26.02	4.00	19,620	V
4	4	1974 WPS emergency generator No. 2 FO	1341.022	HP	23.00	880	60.69	1.00	2,860	D
24_100	24_100	Boiler #2 100% load	6,000.00	mmBtu/hr	498.00	131.00	59.26	26.50	1,961,000.00	V
24_75	24_75	Boiler #2 75% load	4,500.00	mmBtu/hr	498.00	131.00	47.05	26.50	1,557,000.00	V
24_50	24_50	Boiler #2 50% load	3,000.00	mmBtu/hr	498.00	131.00	34.45	26.50	1,140,000.00	V
24_25	24_25	Boiler #2 25% load	1,500.00	mmBtu/hr	498.00	131.00	18.43	26.50	610,000.00	V
25	25	New Fire Pump	525.00	HP	25.00	900.00	118.18	0.67	2,500.00	V
26	26	New Diesel Generator	2,220.00	BHP	15.00	900.00	100.44	1.50	10,650.00	V
30	30	Existing Fire Pump	3.24	mmBtu/hr	22.00	900.00	212.21	0.50	2,500.00	V

*Discharge Type- horizontal stack (H), Raincap (C), or Verticle (V)

ID	STACKID	Name	Emissions (lb/hr)					Emissions (tpy)					Hours of
			PM	SO2	CO	NOx	VOC	PM	SO2	CO	NOx	VOC	Operation
1	1	B & W steam generator (old)	1,508.00	6,380.00	458.20	4,988.00	37.12	6,605.04	27,944.40	2,006.92	21,847.44	162.59	8760
2	2	1973 combustion steam boiler No. 2 FO	1.50	11.78	7.50	36.00	0.30	6.57	51.57	32.85	157.68	1.31	8760
3	3	1961 Bros steam heating boiler No. 2 FO	0.70	4.97	3.50	14.00	0.14	3.07	21.77	15.33	61.32	0.61	8760
4	4	1974 WPS emergency generator No. 2 FO	0.94	0.54	7.38	32.18	0.95	4.11	2.38	32.31	140.97	4.14	8760
24_100	24_100	Boiler #2 100% load	180.00	600.00	960.00	420.00	21.60	788.40	2,628.00	4,204.80	1,839.60	94.61	8760
24_75	24_75	Boiler #2 75% load	135.00	450.00	720.00	315.00	16.20	591.30	1,971.00	3,153.60	1,379.70	70.96	8760
24_50	24_50	Boiler #2 50% load	90.00	300.00	480.00	210.00	10.80	394.20	1,314.00	2,102.40	919.80	47.30	8760
24_25	24_25	Boiler #2 25% load	45.00	150.00	240.00	105.00	5.40	197.10	657.00	1,051.20	459.90	23.65	8760
25	25	New Fire Pump	1.16	1.08	3.51	16.28	1.32	0.29	0.27	0.88	4.07	0.33	500
26	26	New Diesel Generator	1.71	4.55	12.73	41.60	2.50	7.50	19.93	55.74	182.21	10.93	8760
30	30	Existing Fire Pump	1.00	0.94	3.08	14.29	1.17	0.25	0.23	0.77	3.57	0.29	500
							TOTAL:	7,415.23	30,668.56	6,349.58	24,236.86	274.82	

			Emission Factors									
ID	STACKID	Name	PM		SO2		CO		NOx		VOC	
1	1	B & W steam generator (old)	0.26	lb/MMBtu	1.10	lb/MMBtu	0.079	lb/MMBtu	0.86	lb/MMBtu	0.0064	lb/MMBtu
2	2	1973 combustion steam boiler No. 2 FO	0.01	lb/MMBtu	0.06	lb/MMBtu	0.04	lb/MMBtu	0.17	lb/MMBtu	1.43E-03	lb/MMBtu
3	3	1961 Bros steam heating boiler No. 2 FO	0.01	lb/MMBtu	0.05	lb/MMBtu	0.04	lb/MMBtu	0.14	lb/MMBtu	1.43E-03	lb/MMBtu
4	4	1974 WPS emergency generator No. 2 FO	0.0007	lb/hp-hr	4.05E-04	lb/hp-hr	5.50E-03	lb/hp-hr	0.024	lb/hp-hr	7.05E-04	lb/hp-hr
24	24	Boiler #2	0.03	lb/MMBtu	0.1	lb/MMBtu	0.16	lb/MMBtu	0.07	lb/MMBtu	0.0036	lb/MMBtu
25	25	New Fire Pump	2.20E-03	lb/hp-hr	2.05E-03	lb/hp-hr	6.68E-03	lb/hp-hr	0.03	lb/hp-hr	0.0025	lb/hp-hr
26	26	New Diesel Generator	0.35	g/bhp-hr	2.05E-03	lb/hp-hr	2.60	g/bhp-hr	8.50	g/bhp-hr	0.51	g/bhp-hr
30	30	Existing Fire Pump	0.31	lb/MMBtu	0.29	lb/MMBtu	0.95	lb/MMBtu	4.41	lb/MMBtu	0.36	lb/MMBtu

Heating Value - Liquid Fuels - Distillate Oil	140,000	Btu/gal
Old Units Fuel Oil - % Sulfur	0.05	% Sulfur
Natural gas heating value	1,020	MMBtu/MMcf

ID	STACKID	Name	PM		SO2		CO		NOx		VOC	
2	2	1973 combustion steam boiler No. 2 FO	1	lb/1000 gal	7.85	lb/1000 gal	5	lb/1000 gal	24	lb/1000 gal	0.2	lb/1000 gal
3	3	1961 Bros steam heating boiler No. 2 FO	1	lb/1000 gal	7.1	lb/1000 gal	5	lb/1000 gal	20	lb/1000 gal	0.2	lb/1000 gal

Cooling Tower

Tower Circulation Rate =	312,540	gallons per minute
Tower Drift Efficiency =	0.0005%	
Water loss due to drift (tower total) =	1.56	gallons per minute
Total Dissolved Solids =	6,000.00	ppm
Water density =	8.34	pounds per gallon
Pounds of water lost due to drift =	13.03	pounds per minute
	0.006	pounds solids per pound water
	0.078	pounds particulate per minute
	4.69	pounds per hour - entire tower
	0.250	lb/MMGal cooled
Cells =	18	

Emission Point	lb/hr/cell	
NewCell1	0.2606584	1
NewCell2	0.2606584	2
NewCell3	0.2606584	3
NewCell4	0.2606584	4
NewCell5	0.2606584	5
NewCell6	0.2606584	6
NewCell7	0.2606584	7
NewCell8	0.2606584	8
NewCell9	0.2606584	9