Mirant Potomac River, LLC
Alexandria, VA

Update 2 to:

A Dispersion Modeling Analysis of Downwash from Mirant's Potomac River Power Plant

Modeling Unit 1 Emissions at Maximum and Minimum Loads

ENSR Corporation
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1.0 INTRODUCTION

This report describes AERMOD modeling results performed for Unit 1 at Mirant's Potomac River Generating Station. The purpose of these runs was to demonstrate that operation of Unit 1 for 24 hours a day at loads from 35 MW to 88 MW with the use of trona to reduce SO_2 emissions will not cause or contribute to modeled exceedances of the National Ambient Air Quality Standards (NAAQS). Mirant proposes to use trona on an as needed basis to limit SO_2 emissions to less than 0.89 lb/MMBtu and 14,800 lb/day, whichever is more stringent.

Section 2 of this report presents the stack and emission parameters included in the modeling. Section 3 presents modeling results and conclusions.

2.0 MODEL INPUTS

The current modeling presented in this report is based on So2 emissions from Unit 1 at maximum output (88 MW) of 616.7 lb/hr. This emission rate is based on the Update # 1 emission cap of 14,800 lb/day (14,800 lb/day x 1 day/24 hr = 616.7 lb/hr). The current coal averages 1.2 lb/MMBtu while the current permit limit is 1.52 lb SO_2/MMBtu. Compliance with the emission cap at maximum output will be achieved by using trona injection. If the Unit 1 is operated at full load for 24 hours, Mirant would comply with an emission cap of 14,800 lb/day resulting in SO_2 emissions at or below 0.586 lb/MMBtu.

Mirant is proposing to limit SO_2 emissions to 0.89 lb/MMBtu or 14,800 lb/day, whichever is more stringent. At the minimum load of 35 MW, 0.89 lb/MMBtu is the more stringent limit. At 35 MW, the heat rate is 14,000 Btu/kWh. Therefore, the modeled SO_2 emission rate at minimum load is 436.2 lb/hr (35 MW x 1,000 kW/MW x 14,000 Btu/kWh x 1 MMBtu/1,000,000 Btu x 0.890 lb/MMBtu= 436.2 b/hr). Compliance will be achieved by using trona injection.

Based on recent EPA Method 201A/202 Unit 1 stack testing, PM_{10} emissions are higher than the maximum load rates used in the September 2005 Update #1 report. Those emissions, which were 63.18 lb/hr, were based on 0.06 lb/MMBtu. The latest stack testing indicates a PM_{10} emissions rate of 0.12 lb/MMBtu (filterable plus condensible particulate). However, to be conservative, a slightly higher emission rate of 0.13 lb/MMBtu was used in the modeling. This emission rate is equivalent to 136.89 lb/hr. Fugitive emission sources are identical to the Update #1 report, which were set to 20% of what they are when the plant is operating at maximum output. Fugitive PM_{10} emissions from the coal pile were not reduced.

NOx emissions are identical to the maximum load rates used in the original August 2005 report, which were 473.9 lb/hr at a rate of 0.45 lb/MMBtu.

Table 2-1 and Table 2-2 shows the stack and flue gas exit parameters used in modeling Unit 1 stack emissions and fugitive sources.

Table 2-1 - Stack and Emission Parameters Used in the Modeling

Point Source	Height (m)	Diameter (m)	Temp (K)		Exit Velocity (m/s)		Emissions (g/sec)			
							SO_2		PM_{10}	NOx
			35 MW	*88 MW*	*35 MW*	*88 MW*	*35 MW*	*88MW*	*88MW*	*88MW*
Boiler 1/Stack 1	48.2	2.6	442.6	444.3	19.0	35.7	54.96	77.7	17.2	59.7
Fly Ash Silo	33.6	1.0	293.0		0.1		0.0		0.017	0.0
Fly Ash Silo	33.6	1.0	293.0		0.1		0.0		0.017	0.0
Bottom Ash Silo	31.0	1.0	293.0		0.1		0.0		0.023	0.0

Table 2-2 - Mirant Potomac: Fugitive Sources

Area Sources	Size	Height	PM_{10} Existing Emissions			
	m^2	m	lb/hr	tpy	g/sec	g/sec-m^2
Ash Loader Upgrade	546	2.0	0.01	0.01	0.001	2.36E-06
Coal Pile Wind Erosion and Dust Suppression	17,679	4.6	0.93	1.12	0.118	6.66E-06
Coal Stackout Conveyor Dust Suppression	263	9.1	0.01	0.04	0.001	4.38E-06
Coal Railcar Unloading Dust Suppression	288	1.0	0.02	0.01	0.003	1.08E-05
Ash trucks on Paved Roads	5,886	1.0	0.12	0.24	0.015	2.57E-06

Notes:
Coal Pile = 4 acres = 17,679 m^2
Modeled height of coal pile = one half of average pile height = 30 feet x 0.5 = 15 feet (4.6 meters)
Modeled height stackout conveyor dust supression = average height of coal pile (9.1 meters)
Resuspended roadway dust from paved roads: area = 2 x 0.3 miles x 20 feet wide = 5,886 square meters

3.0 MODELING RESULTS

3.1 Sulfur Dioxide (SO_2) Modeling Results

Table 3-1 and Table 3-2 presents the results of modeling SO_2 emissions from Potomac River Unit 1 at maximum output (88 MW) and minimum output (35MW), respectively. Highest second highest 3-hour and 24-hour impacts and highest annual average impacts for each year are presented in the tables. The modeled impacts are added to a monitored background value of 51 $\mu g/m^3$, as used in the September 2005 Update #1 report.

Maximum Load Results

As shown in Table 3-1, the highest second highest 3-hour average SO_2 concentration is 784.1 $\mu g/m^3$. This concentration is below the 1,300 $\mu g/m^3$ 3-hour NAAQS standard. The highest second highest 24-hour average concentration is 269.0 $\mu g/m^3$. This concentration is below the 365 $\mu g/m^3$ 24-hour NAAQS standard. The highest annual average SO_2 concentration is 41.7 $\mu g/m^3$, which is also below the 80 $\mu g/m^3$ annual NAAQS.

Minimum Load Results

As shown in Table 3-2, the highest second highest 3-hour average SO_2 concentration is 814.0 $\mu g/m^3$. This concentration is below the 1,300 $\mu g/m^3$ 3-hour NAAQS standard. The highest second highest 24-hour average concentration is 364.1 $\mu g/m^3$. This concentration is below the 365 $\mu g/m^3$ 24-hour NAAQS standard. The highest annual average SO_2 concentration is 64.3 $\mu g/m^3$, which is also below the 80 $\mu g/m^3$ annual NAAQS.

3.2 PM_{10} Results

Table 3-3 presents the results of modeling PM_{10} emissions from Unit 1 stack plus all other non-combustion sources at the Potomac River Generating Station. The highest second highest 24-hour average concentration is 100.4 $\mu g/m^3$, which is below the 150 $\mu g/m^3$ 24-hour NAAQS standard. The highest annual average concentration of 35.7 $\mu g/m^3$ is below the 50 $\mu g/m^3$ annual NAAQS.

3.3 Nitrogen Oxides (as NO_2) Results

Table 3-4 presents the results of modeling Unit 1 NOx emissions at maximum output. The highest predicted annual NO_2 concentration of 63.8 µg/$m^3$is below the 100 µg/m^3 annual NAAQS standard.

3.4 Conclusions

The AERMOD modeling results demonstrate that operation of Unit 1 at loads from 35 MW to 88 MW on a continuous basis with SO_2 emissions limited to 14,800 lb/day or 0.89 lb/MMBtu, whichever is more stringent, will not cause or contribute to modeled exceedances of the National Ambient Air Quality Standards (NAAQS) for SO_2, PM_{10}, and NO_2.

Update #1 showed that Unit 1 could be operated on a cycling basis at an SO_2 emission rate of 1.20 lb/MMBtu without causing or contributing to modeled exceedances of the NAAQS. For SO_2, PM_{10} and NO_2. Therefore, Update # 1 also demonstrates that Unit #1 can be operated on a cycling or intermittent basis at 0.89 lb/MMBtu, without causing or contributing to modeled exceedances of the NAAQS for SO_2, PM_{10} and NO_2.

The net result of Update 1 and Update 2 demonstrate that Unit 1 can be operated at continuous or intermittent loads in the 35 MW to 88 MW range with SO_2 emissions limited to no more than 0.89 lb/MMBtu and 14,800 lb/day without causing or contributing to modeled exceedances of the NAAQS for SO_2, PM_{10} and NO_2.

PM_{10} stack emissions in Update #1 were modeled at 0.06 lb/MMBtu and NAAQS compliance was demonstrated with a maximum 24-hour PM_{10} impact of 100.2 µg/m^3. The higher PM_{10} emissions modeled in Update #2 (0.13 lb/MMBtu) produced almost identical PM10 impacts (100.4 µg/m^3). This is because, with only one unit operating, maximum PM_{10} impacts are dominated by low level fugitive (non combustion) PM_{10} sources. Therefore, the PM_{10} results presented in Update #1 remain valid.

Table 3-1 AERMOD Modeling Results for SO_2 – Maximum Load
Unit 1 at 100% Load, SO_2 Emission Rate = 14,800 lb/day (0.586 lb/MMBtu)

Year	Pollutant	Averaging Period	AERMOD-PRIME	Monitored Background	AERMOD-PRIME + Background *	NAAQS	Impact Location		Distance	Direction	Ground Elevation	Flagpole Elevation
			Concentrations ($\mu g/m^3$)				X (m)	Y (m)	m	deg	m	m
2000	SO_2	3-hour	438.0	238.4	676.4	1300	322700.9	4298819.5	232.2	333	10.3	39.6
		24-hour	208.3	51.0	259.3	365	322770.8	4298791.5	182.7	349	6.1	39.6
		Annual	26.0	15.7	41.7	80	322880.8	4298542.5	102.7	133	6.7	0.0
2001	SO_2	3-hour	506.3	238.4	744.7	1300	322763.3	4298799.5	192.1	347	6.5	39.6
		24-hour	218.0	51.0	269.0	365	322755.8	4298806.0	200.1	346	6.5	39.6
		Annual	24.2	15.7	39.9	80	322880.8	4298542.5	102.7	133	6.7	0.0
2002	SO_2	3-hour	545.7	238.4	784.1	1300	322700.9	4298819.5	232.2	333	10.3	39.6
		24-hour	205.0	51.0	256.0	365	322770.8	4298791.5	182.7	349	6.1	39.6
		Annual	20.7	15.7	36.4	80	322880.8	4298542.5	102.7	133	6.7	0.0
2003	SO_2	3-hour	361.9	238.4	600.3	1300	322858.6	4298648.5	64.6	56	4.1	0.0
		24-hour	155.1	51.0	206.1	365	322880.8	4298542.5	102.7	133	6.7	0.0
		Annual	15.7	15.7	31.4	80	322919.7	4298385.0	254.3	153	8.9	0.0
2004	SO_2	3-hour	407.2	238.4	645.6	1300	322700.9	4298819.5	232.2	333	10.3	39.6
		24-hour	197.1	51.0	248.1	365	322880.8	4298542.5	102.7	133	6.7	0.0
		Annual	18.0	15.7	33.7	80	322880.8	4298542.5	102.7	133	6.7	0.0

* SO_2 background concentrations for 24-hour averaging period are less than 51 $\mu g/m^3$ during periods when the highest impacts from Unit 1 are predicted.

Table 3-2 AERMOD Modeling Results for SO_2 – Minimum Load
Unit 1 at 35% Load, SO_2 Emission Rate = 0.89 lb/MMBtu

Year	Pollutant	Averaging Period	AERMOD-PRIME	Monitored Background	AERMOD-PRIME + Background *	NAAQS	Impact Location		Distance	Direction	Ground Elevation	Flagpole Elevation
			Concentrations ($\mu g/m^3$)				X (m)	Y (m)	m	deg	m	m
2000	SO_2	3-hour	539.5	238.4	777.9	1300	322770.8	4298791.5	182.7	349	6.1	39.6
		24-hour	311.8	51.0	362.8	365	322770.8	4298791.5	182.7	349	6.1	39.6
		Annual	42.1	15.7	57.8	80	322787.7	4298786.0	174.8	354	6.1	39.6
2001	SO_2	3-hour	565.4	238.4	803.8	1300	322858.6	4298648.5	64.6	56	4.1	0.0
		24-hour	313.1	51.0	364.1	365	322849.3	4298677.0	78.4	34	6.1	0.0
		Annual	48.6	15.7	64.3	80	322770.8	4298791.5	182.7	349	6.1	39.6
2002	SO_2	3-hour	557.0	238.4	795.4	1300	322858.6	4298648.5	64.6	56	4.1	0.0
		24-hour	311.1	51.0	362.1	365	322787.7	4298786.0	174.8	354	4.6	39.6
		Annual	40.4	15.7	56.1	80	322787.7	4298786.0	174.8	354	4.6	39.6
2003	SO_2	3-hour	548.4	238.4	786.8	1300	322858.6	4298648.5	64.6	56	4.1	0.0
		24-hour	249.9	51.0	300.9	365	322854.0	4298627.0	51.0	73	5.0	0.0
		Annual	30.9	15.7	46.6	80	322854.0	4298627.0	51.0	73	5.0	0.0
2004	SO_2	3-hour	575.6	238.4	814.0	1300	322858.6	4298648.5	64.6	56	4.1	0.0
		24-hour	269.2	51.0	320.2	365	322858.6	4298648.5	64.6	56	4.1	0.0
		Annual	36.2	15.7	51.9	80	322854.0	4298627.0	51.0	73	5.0	0.0

* SO_2 background concentrations for 24-hour averaging period are less than 51 $\mu g/m^3$ during periods when the highest impacts from Unit 1 are predicted.

.Table 3-3 AERMOD Modeling Results for PM_{10}
Unit 1 at 100% Load, Fugitive Dust Sources Reduced to 20% except Coal Pile
PM_{10} Emission Rate = 0.13 lb/MMBtu

Year	Pollutant	Averaging Period	*AERMOD-PRIME*	*Monitored Background*	*AERMOD-PRIME + Background* *	*NAAQS*	Impact Location		Distance	Direction	Ground Elevation	Flagpole Elevation
			Concentrations ($\mu g/m^3$)				X (m)	Y (m)	m	deg	m	m
2000	PM10	24-hour	48.6	45	93.6	150	322810.6	4298329.0	283.1	179	10.6	0.0
		Annual	13.5	21	34.5	50	322910.1	4298434.0	206.7	150	7.7	0.0
2001	PM10	24-hour	55.4	45	100.4	150	322810.6	4298329.0	283.1	179	10.6	0.0
		Annual	14.7	21	35.7	50	322904.4	4298462.5	179.5	146	8.3	0.0
2002	PM10	24-hour	48.3	45	93.3	150	322810.6	4298329.0	283.1	179	10.6	0.0
		Annual	13.2	21	34.2	50	322904.4	4298462.5	179.5	146	8.3	0.0
2003	PM10	24-hour	42.3	45	87.3	150	322810.6	4298329.0	283.1	179	10.6	0.0
		Annual	12.2	21	33.2	50	322810.6	4298329.0	283.1	179	10.6	0.0
2004	PM10	24-hour	47.2	45	92.2	150	322810.6	4298329.0	283.1	179	10.6	0.0
		Annual	12.3	21	33.3	50	322810.6	4298329.0	283.1	179	10.6	0.0

* The highest PM_{10} background air quality concentrations over the past three years (2001-2003) were obtained from the monitors located at 2675 Sherwood Hall Lane or Cob Run, Lee Road. Both monitors are in Fairfax County.

Table 3-4 AERMOD Modeling Results for NOx
Unit 1 at 100% Load, NOx Emission Rate = 0.45 lb/MMBtu

Year	Pollutant	Averaging Period	AERMOD-PRIME	Monitored Background	AERMOD-PRIME + Background *	NAAQS	Impact Location		Distance	Direction	Ground Elevation	Flagpole Elevation
			Concentrations ($\mu g/m^3$)				X (m)	Y (m)	M	deg	m	m
2000	NO_2	Annual	14.9	48.9	63.8	100	322880.8	4298542.5	102.7	133	6.7	0.0
2001	NO_2	Annual	13.9	48.9	62.8	100	322880.8	4298542.5	102.7	133	6.7	0.0
2002	NO_2	Annual	11.9	48.9	60.8	100	322880.8	4298542.5	102.7	133	6.7	0.0
2003	NO_2	Annual	9.0	48.9	57.9	100	322919.7	4298385.0	254.3	153	8.9	0.0
2004	NO_2	Annual	10.3	48.9	59.2	100	322880.8	4298542.5	102.7	133	6.7	0.0

* NOx concentrations were multiplied by 0.75 to obtain NO2 estimates in accordance with USEPA guidelines.