CHESTER WILLCOX & SAXBE LLP
Attorneys and Counselors at Law

October 20, 2006

Via Hand Delivery

William Spires
Air Quality Assessment Unit
Division of Air Pollution Control
Ohio Environmental Protection Agency
122 South Front Street
Columbus, OH 43216

RE: American Municipal Power Generating Station: Class I and II Air Quality Modeling Supplements

Dear Bill:

On behalf of American Municipal Power-Ohio, Inc. ("AMP-Ohio"), attached, please find the following electronic files:

- 1 External Hard Drive containing Supplemental Class I Air Quality Modeling;
- 1 CD containing Supplemental Class II Air Quality Modeling.

These electronic files are being submitted to supplement AMP-Ohio's May 15, 2006 PSD air permit application and modeling and August 16, 2006 Class I and Class II Modeling data (submitted in paper copy form) for the proposed American Municipal Power Generating Station located in Meigs County, Ohio. This additional modeling was performed at Ohio EPA's request and includes modeling data not yet available at the time AMP-Ohio submitted its air permit application in May.

Please do not hesitate to contact Randy Meyer, AMP-Ohio's Director of Environmental Affairs, or Chuck Taylor, GT Environmental, if you have any questions.

Respectfully,

April R. Bott

Attachments (2)
cc: Randy Meyer
Scott Kiesewetter
Chuck Taylor

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AMP OHIO
American Municipal Power-Ohio, Inc.

August 31, 2006

Via Hand Delivery

William Spires
Air Quality Assessment Unit
Division of Air Pollution Control
Ohio Environmental Protection Agency
122 South Front Street
Columbus, OH 43216

and

Dean Ponchak
Division of Air Pollution
Ohio EPA-SEDO
2195 Front Street
Logan, OH 43138

**RE: American Municipal Power Generating Station:
Class I and II Air Quality Modeling Supplements**

Dear Bill and Dean:

On behalf of American Municipal Power-Ohio, Inc. ("AMP-Ohio"), enclosed, please find the following volumes:

- Volume III-A: Supplemental Class I Air Quality Modeling
- Volume IV-A: Supplemental Class II Air Quality Modeling and Additional Impacts Analysis

These volumes contain modeling to supplement AMP-Ohio's May 15, 2006 PSD air permit application and modeling for the proposed American Municipal Power Generating Station located in Meigs County, Ohio. This additional modeling was performed at Ohio EPA's request.

Volume III-A contains VISTAS Met data and background ozone air quality data for calendar years 2001, 2002 and 2003. The VISTAS CAL met data was supplied to AMP-Ohio by West Virginia DEP. The VISTAS ozone data was supplied to AMP-Ohio by BEE-Line Software. This data was not yet available at the time AMP-Ohio submitted its air permit application in May. Volume IV-A reflects Ohio EPA's requested background concentrations for sulfur dioxide.

AMP-Ohio 2600 Airport Drive Columbus, Ohio 43219 • **Phone:** 614/337-6222 • **Fax:** 614/337-6220 • www.amp-ohio.org

Please do not hesitate to contact Randy Meyer, AMP-Ohio's Director of Environmental Affairs, or Chuck Taylor, GT Environmental, if you have any questions.

Respectfully,

Marc Gerken
President, AMP-Ohio, Inc.

Enclosures
cc: Randy Meyer
Scott Kiesewetter SWK
Chuck Taylor
April Bott

PERMIT-TO-INSTALL APPLICATION
VOLUME IIIA

SUPPLEMENTAL
CLASS I AIR QUALITY MODELING

For:
AMERICAN MUNICIPAL POWER
GENERATING STATION

Submitted By:
AMERICAN MUNICIPAL POWER-OHIO, INC.

August 2006

GT
Environmental, Inc.

635 Park Meadow Road, Suite 112
Westerville, Ohio 43081
(614) 794-3570

PERMIT-TO-INSTALL APPLICATION
VOLUME IIIA

SUPPLEMENTAL
CLASS I AIR QUALITY MODELING REPORT

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SECTION 1 INTRODUCTION AND SUMMARY

This Supplemental Class I Air Quality Modeling report was prepared to respond to a request from the Ohio Environmental Protection Agency (Ohio EPA) for an additional Class I impact analysis for the proposed American Municipal Power Generating Station (AMPGS) project based on the latest meteorological data compiled by the Visibility Improvement State and Tribal Association of the Southeast (VISTAS). Volume III of the technical support for the permit application submitted for the AMPGS in May 2006 included a Class I PSD air quality impact assessment performed using meteorological data provided by the National Park Service for calendar years 1990, 1992 and 1996. Since that submittal, the meteorologically data developed by VISTAS for calendar years 2001, 2002 and 2003 became commercially available. While AMPGS was not obligated to perform additional modeling based on data that were not available at the time the permit application was submitted, AMPGS agreed to perform the additional modeling to respond to Ohio EPA's request.

The proposed AMPGS project is the development of a new pulverized coal-fired electric generating facility. The facility will consist of two steam generators designed for base load operation. Each of the steam generators will have a nominal net power output of 480 MW and a maximum heat input capacity of 5,191 MMBtu/hr. The units will burn a blend of Ohio, Central Appalachian and/or Powder River Basin coals. The proposed project is located in Meigs County (Ohio) in UTM Zone 17 at 420,794 meters easting and 4,306,082 meters northing.

PSD emissions from the AMPGS will be controlled using best available control technology (BACT) and all non-PSD emissions will be controlled using Best Available Technology (BAT) as required by Ohio EPA rules. The proposed BACT will be low NO_x burners, overfire air (OFA) and selective catalytic reduction (SCR) for NO_x control, a baghouse for PM/PM_{10} control, a wet flue gas desulfurization (FGD) system for SO_2 control and a wet-ESP for control of sulfuric acid (H_2SO_4) and other condensable emissions. A complete BACT/BAT analysis is provided in Volume II of the permit application.

The New Source Review Workshop Manual Prevention of Significant Deterioration and Non Attainment Area Permitting Guideline (Draft October 1990) describes EPA policy to evaluate the impact of all major sources or major modifications on Class I areas located within 100 kilometers of a proposed project site (page E-16). This is also referenced in the Federal Land Managers' Air Quality Related Values Workgroup (FLAG) Phase 1 Report (page 9). The FLAG document indicates that a Class I impact analysis may be required if a major source proposes to locate at a distance greater than 100 kilometers from a Class I area if the reviewing agency or Federal Land Manager (FLM) is concerned about potential emission impacts. The Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts cautions that the CALPUFF air modeling system approved for long range transport *should not be used* for distances greater than 200 kilometers.

The Ohio EPA and the West Virginia Department of Environmental Protection requested that four Class I areas be included in the analysis for the AMPGS, including three areas greater than 200 kilometers from the proposed site. Figure 1-1 shows the location of the proposed AMPGS and the distance to each Class I area. The four Class I areas evaluated are:

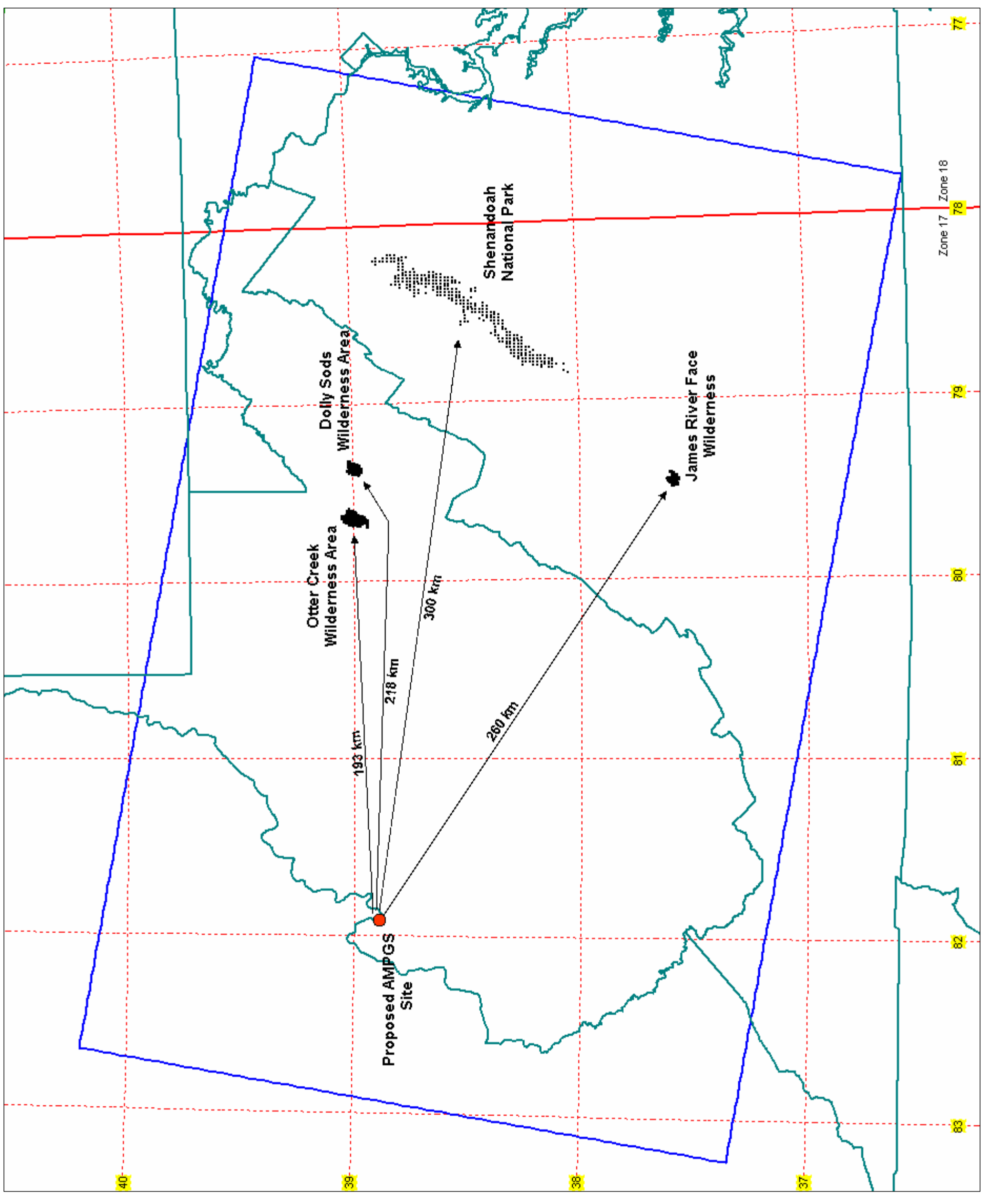
- The Otter Creek Wilderness Area in West Virginia (approximately 193 kilometers northeast of the proposed site);

- The Dolly Sods Wilderness Area in West Virginia (approximately 218 kilometers northeast of the proposed site);

- Shenandoah National Park in Virginia (approximately 300 kilometers southeast of the proposed project); and

- The James River Face Wilderness Area in Virginia (approximately 260 kilometers southeast of the proposed site.

Figure 1-1
Location of AMPGS in Relationship to Class I Areas



The two boilers for the proposed AMPGS were modeled using the CALPUFF modeling system to predict the maximum impact at the four Class I areas compared to the PSD Class I significance levels and the PSD increments. The modeling for the AMPGS predicted impact below the significance levels for PM/PM_{10} and NO_x but above the significance levels for the 3-hr and 24-hr SO_2 averaging times. As a result, an interactive analysis was performed for SO_2 that included the AMPGS plus the other PSD sources in the modeling domain. The maximum concentrations predicted by the interactive SO_2 modeling are below the Class I PSD increments.

The CALPUFF modeling system was also used to perform a Class I Air Quality Related Values (AQRVs) Analysis to predict the maximum impact from the AMPGS and compare it to the Sulfur (S) deposition, Nitrogen (N) deposition and visibility thresholds established in the FLM guidance.

Table 1-1 summarizes the results of the supplemental AMPGS Class I Air Quality Impact Analysis.

Table 1-1
Class I Modeling Summary

Pollutant/ Criterion	Emission Rate (lb/mmBtu)	Averaging Period	Predicted Value	Significance Level(1)	Class I PSD Increment(2) or FLM Maximum Threshold(3)
SO_2	0.150	Annual	0.026 μg/m^3	0.1 μg/m^3	2
	0.184	24-hour	0.79 μg/m^3	0.2 μg/m^3	5
	0.240	3-hour	3.96 μg/m^3	1.0 μg/m^3	25
PM_{10}	0.025(4)	Annual	0.005 μg/m^3	0.2 μg/m^3	4
	0.025(4)	24-Hour	0.116 μg/m^3	0.3 μg/m^3	8
NO_x	0.07	Annual	0.008 μg/m^3	0.1 μg/m^3	2.5
Visibility	0.184 (SO_2) 0.10 (NO_x) 0.025 (PM_{10})	24-Hour	36.96%	5%	10%
S Deposition	0.15	Annual	0.031 kg/ha/yr	0.01 kg/ha/yr	
N Deposition	0.07	Annual	0.008 kg/ha/yr	0.01 kg/ha/yr	

Notes:

(1) Impacts above the significance levels require an interactive analysis with all other PSD sources that are located within the modeling grid.

(2) The Class I PSD increments for SO_2, PM_{10} and NO_2 are regulatory requirements.

(3) The visibility, S deposition and N deposition thresholds are guidelines established by the Federal Land Managers to reflect impacts that are acceptable (these relate to the regulatory requirement that the applicant provide an additional impact "analysis of the impairment to visibility, soils and vegetation that would occur" as a result of the installation and operation of the source as well as other authority identified in Appendix B of the FLAG Document).

(4) The PM_{10} emission rate is for total PM_{10} emissions (filterable + condensable).

MODELS EMPLOYED

This analysis was completed with the Version 6 CALPUFF modeling system including CALMET, CALPUFF and CALPOST. The Federal Land Managers' Air Quality Related Values Workgroup (FLAG) Phase I Report (USFS, December 2000) and the Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Report (U.S. EPA, December 1998) were followed for this analysis except where specifically indicated. The specific CALPUFF and CALPOST input parameters for this Class I modeling analysis are identified in the Class I Modeling Protocol (January 18, 2006) included as Appendix D.

AIR CONTAMINANTS MODELED

This project involves "major" emissions for PM_{10}, SO_2, NO_x and CO. Class I PSD increments have been established for PM_{10}, SO_2, NO_2. The air quality modeling in this analysis was performed to determine the impact of PM_{10}, SO_2 and NO_x emissions from the AMPGS on the Class I PSD Increments. The impact of visibility and the annual total deposition of Sulfur (S) and Nitrogen (N) were also evaluated. The emission rates for SO_2, NO_x and PM_{10} are consistent with the emissions rates used in the near field AERMOD air quality analysis for the proposed project and can been found in Table 1-1.

As recommended in the IWAQM Phase 2 Summary Report, the MESOPUFF II chemistry options currently available in CALPUFF were used to represent the oxidation of SO_2 to sulfate and the nitrate chemistry.

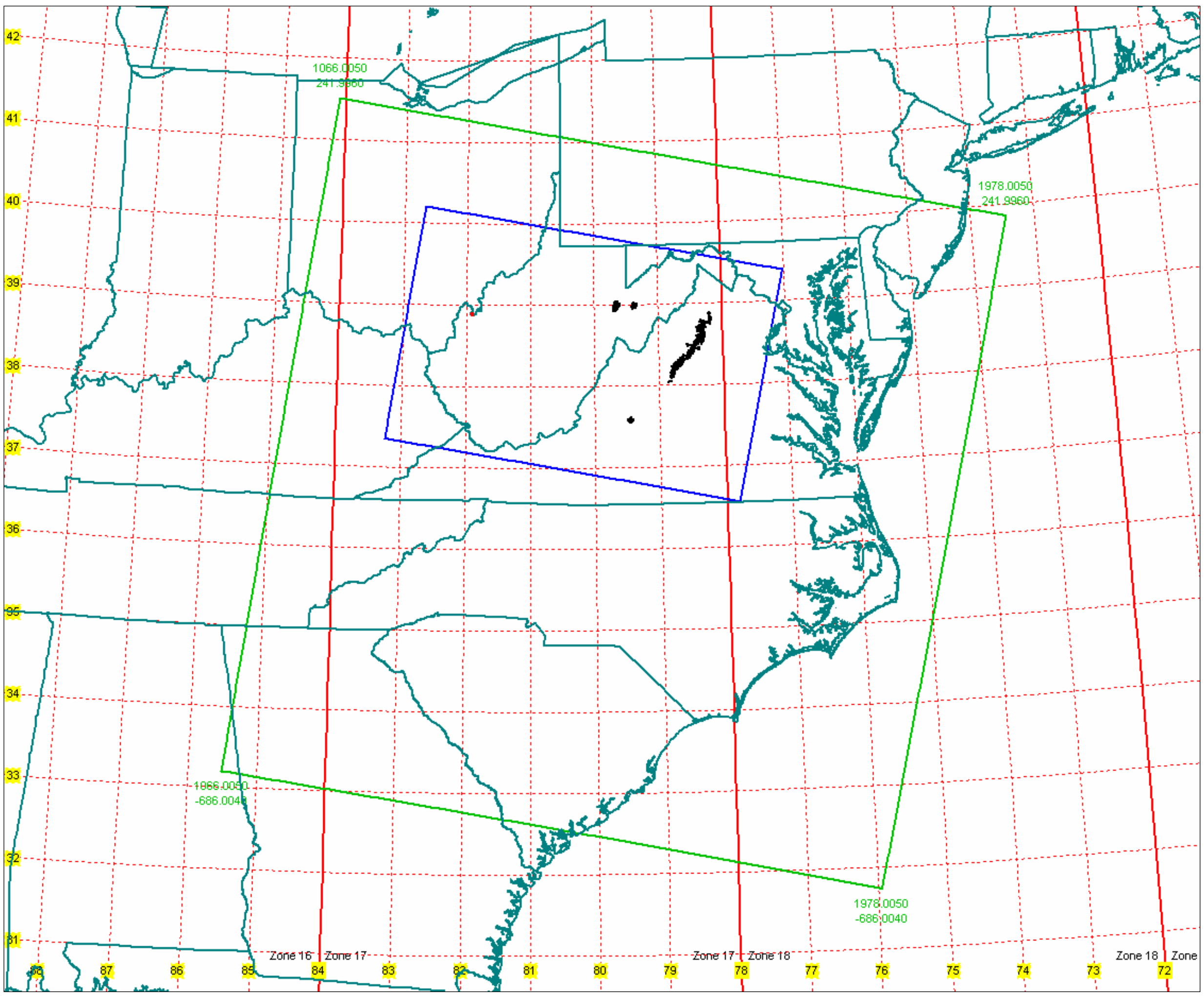
VISTAS CALMET DATA

Visibility Improvement State and Tribal Association of the Southeast (VISTAS) data were used for this Class I Analysis. Region 5 VISTAS CALMET.DAT files were obtained from the West Virginia Division of Environmental Protection (WVDEP). The files obtained for this analysis are for calendar years 2001, 2002 and 2003. Earth Tech/TRC prepared the calmet files using available surface and upper air observations in addition to MM5 data. The files have 4-km grid spacing. The Lambert Conic Conformal (LCC) coordinates for the corners of the CALMET.DAT files obtained from WVDEP are identified in Table 2-1. The CALMET.DAT files obtained from WVDEP were directly input to CALPUFF.

The Region 5 VISTAS CALMET.DAT grid has 228 cells in the easterly direction and 232 cells in the northerly direction (4-km grid spacing). The easterly AMPGS computational domain was established beginning in column 36 and ending in column 157 of Region 5 VISTAS grid. The northerly AMPGS computational domain begins in row 122 and ends in row 201. The LCC coordinates of the AMPGS computational grid are listed in Table 2-1. Figure 2-1 shows the VISTAS Region 5 domain, the AMPGS Class I Analysis computational domain and the four Class I areas located within the AMPGS computational domain.

Table 2-1 Location of the VISTAS Region 5 and AMPGS Computational Domain		
Corner of Domain	**Region 5 Modeling Domain (LCC)**	**AMPGS Computational Domain (LCC)**
southwest	1066, -686	1206, -202
northwest	1066, 242	1206, 118
northeast	1978, 242	1694, 118
southeast	1978, -686	1694, -202

Figure 2-1
VISTAS Region 5 and AMPGS Computational Domain



AMBIENT BACKGROUND CONCENTRATIONS

Ozone

CALPUFF requires background concentrations of ozone and ammonia. Hourly VISTAS ozone data for the years 2001, 2002 and 2003 were obtained from the Bee-Line Software website. These extracted OZONE.DAT files include 687 ozone stations for 2001, 682 stations for 2002 and 687 stations for 2003. All representative ozone stations located within the AMPGS Class I Analysis computational domain were used for this analysis.

Ammonia

The AMPGS Class I Analysis assumes a background ammonia concentration of 0.5 ppb as recommended by the IWAQM document for forested Class I areas.

SECTION 3 SOURCE PARAMETERS

Table 3-1 presents the source parameters and emission rates that were used to complete the Class I modeling analysis. The AMPGS will be constructed with 625 ft stacks that do not exceed the Good Engineering Practice (GEP) stack height specifications in OAC rule 3745-16-02. The GEP stack height was determined to be 675 ft.

Table 3-1
Boiler Stack Parameters
(Values for Each Stack))

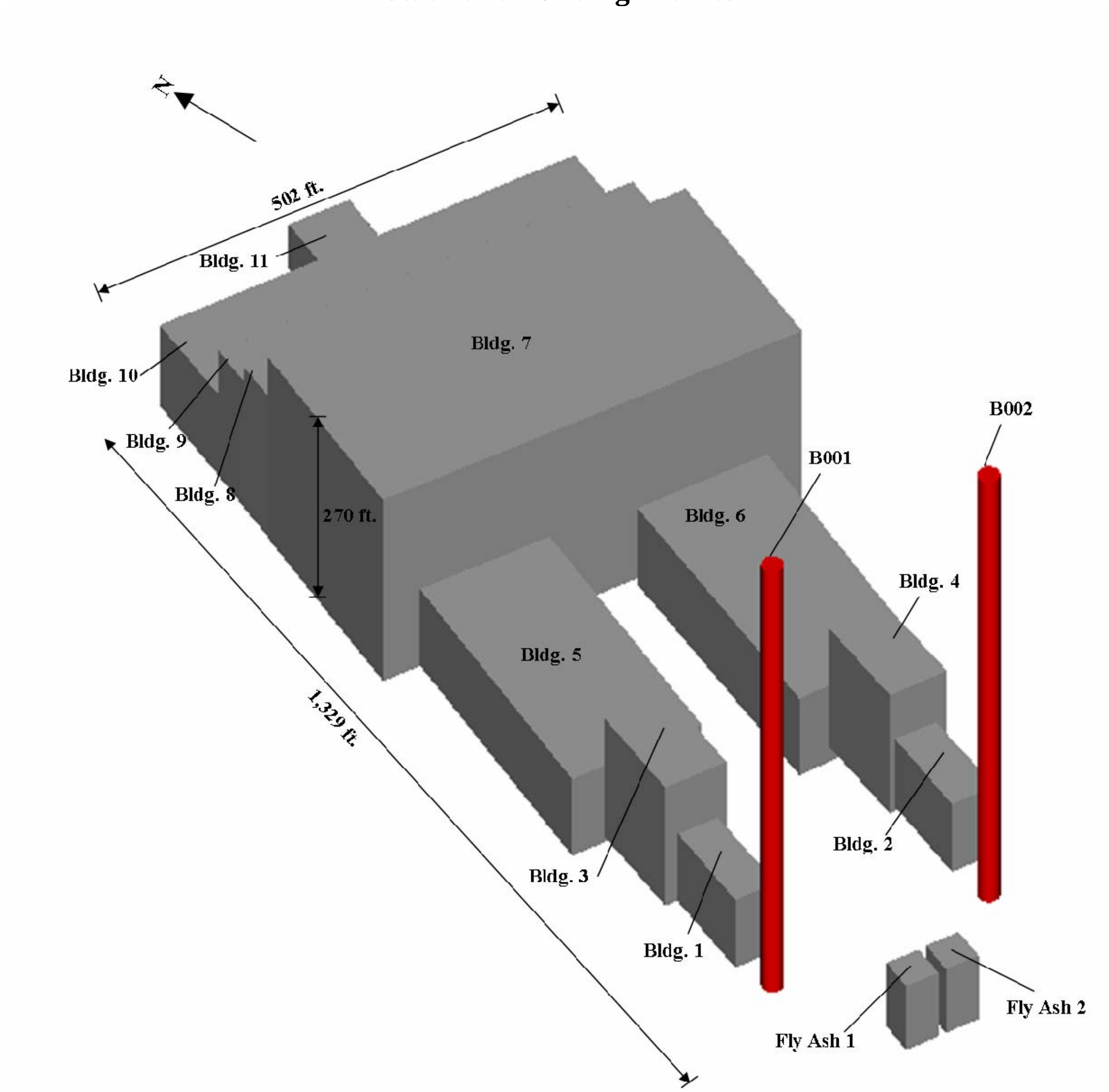
Parameter	Value	Notes
Stack Height	625 feet	Less than GEP Stack Height
Stack Diameter	24.76 feet	None
Velocity	60.2 fps	Based on the maximum flow rate (resulting in maximum velocity)
Stack Gas Exit Temperature	135 ^{o}F	None
SO_2 3-Hour Average	1,246 lb/hr	Maximum 3-hour average emissions rate
SO_2 24-Hour Average	955 lb/hr	Maximum 24-hour average emissions rate
SO_2 Annual Average	779 lb/hr	Maximum annual average emissions rate
NO_X Annual Average	363 lb/hr	Maximum annual average emissions rate
NO_X 24-Hour Average	519 lb/hr	Maximum 24-hour average emissions rate (used for visibility analysis)
PM/PM_{10}	129 lb/hr	Maximum hourly total emissions rate (filterable + condensable)
PM/PM_{10} 24-Hour Average	129 lb/hr	Maximum 24-hour average emissions rate (used for visibility analysis)

GEP STACK HEIGHT

The GEP stack height is the optimum stack height for avoiding downwash effects and is the maximum stack height that can be used when conducting Class I and Class II air quality modeling. The GEP stack heights for the AMPGS were calculated based on the requirements of OAC rule 3745-16-02 and guidance provided in the "Guideline for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations) (Revised)" (US EPA June 1985).

Figure 3-1 depicts the structures on the plant property that were entered into the Class I modeling for downwash calculation purposes. Table 3-2 summarizes the dimensions of each structure identified in Figure 3-1. Since all of the buildings shown in Figure 3-1 are connected, all the structures shown are considered to be "nearby" as defined in OAC rule 3745-16-01(G)(1). Since all of the buildings shown in Figure 3-1 are "nearby", the height of the tallest building (Building 7 at 270 ft) is used to calculate the GEP stack height with the lesser of: (a) the overall width of the entire complex (502 ft); or (b) the height of the tallest building (Building 7 at 270 ft).

Figure 3-1
Stack and Building Profiles



The GEP stack height is calculated in accordance with the equation found in OAC rule 3745-16-01(F)(2)(b) as follows:

GEP Height = H + 1.5 x L

Height = 270 feet (*Building 7 height*) + 1.5 x (270 feet) = 675 feet

Note: *The height of Building 7 (270 ft) is less than the entire structure width (502 feet)*

Table 3-2 BUILDING PARAMETERS			
Building	**Length (ft)**	**Width (ft)**	**Height (ft)**
1	75	50	101
2	75	50	101
3	70	70	160
4	70	70	160
5	200	160	114
6	200	160	114
7	502	160	270
8	502	120	210
9	502	64	187
10	502	120	120
11	104	71	65
Fly Ash 1	40	40	95
Fly Ash 2	40	40	95

The CALPUFF modeling system was used to determine the maximum off-site impact from the AMPGS at designated receptors in each of the four Class I areas on an annual average, a 24-hour averaging period and a 3-hour averaging period. The maximum SO_2 concentrations for these averaging periods were evaluated to determine if any predicted concentration exceeded the significance level or the Class I PSD Increment.

RESULTS

As indicated in Table 4-1, the maximum predicted 3-hour average off-site concentration that results from the proposed maximum 3-hour SO_2 emissions requested by the AMPGS is 3.96 µg/m^3. This concentration was predicted from meteorological data for Julian day 225 in 2001. The location of this peak 3-hour average SO_2 concentration is in the Otter Creek Wilderness Area at receptor number 108.

Table 4-1
SO_2 PSD Class I Increment Analysis
3-Hour Averaging Period

Year	Maximum Predicted Off-Site Impact (µg/m^3)	Significance Level (µg/m^3)	Class I PSD Increment (µg/m^3)	Receptor	Class I Area	Julian Day
2001	3.96	1.0	25	108	Otter Creek	225
2002	3.73			263	Shenandoah	362
2003	3.67			508	James River	014

As indicated in Table 4-2, the maximum predicted 24-hour average off-site concentration that results from the proposed maximum 24-hour SO_2 emissions requested by the AMPGS is 0.79 µg/m^3. This maximum concentration was predicted from meteorological data for Julian day 006 in 2003. The location of this peak 24-hour average SO_2 concentration is in the Shenandoah National Park at receptor number 434.

Table 4-2
SO_2 PSD Class I Increment Analysis
24-Hour Averaging Period

Year	Maximum Predicted Off-Site Impact (µg/m^3)	Significance Level (µg/m^3)	Class I PSD Increment (µg/m^3)	Receptor	ClassI Area	Julian Day
2001	0.68	0.2	5	188	Shenandoah	016
2002	0.72			1	Otter Creek	058
2003	0.79			434	Shenandoah	006

As indicated in Table 4-3, the maximum predicted off-site concentration on an annual averaging period that results from the proposed annual SO_2 emissions requested by the AMPGS is 0.026 µg/m³. This concentration was predicted from 2001 meteorological data. The location of this peak annual average was in the Otter Creek Wilderness Area at receptor number 115.

Table 4-3
SO_2 PSD Class I Increment Analysis
Annual Averaging Period

Year	Maximum Predicted Off-Site Impact (µg/m³)	Significance Level (µg/m³)	Class I PSD Increment (µg/m³)	Receptor	Class I Area
2001	0.026	0.1	2	115	Otter Creek
2002	0.025			1	Otter Creek
2003	0.025			120	Otter Creek

CONCLUSIONS

The maximum SO_2 emissions from the AMPGS result in predicted maximum concentrations that are less than the PSD increments at all of the receptors in the four Class I areas. In addition, the maximum impact for the annual averaging time is less than the PSD significance level. As a result, interactive modeling with other PSD sources is not required for the annual averaging time. The predicted maximum impact for both the 3-hour and 24-hour averaging times exceeds the PSD significance levels and, as a result, interactive modeling is required for both of these averaging times.

INTERACTIVE SO_2 MODELING

Interactive modeling was required for the 3-hour and the 24-hour averaging periods because the impact from the AMPGS exceeded the significance level for these averaging periods. Appendix A includes the other PSD sources included in the interactive modeling together with the emission rates and stack parameters used in the analysis. The data for the other PSD sources were provided by the WVDEP and are the same as previously used in the modeling presented in Volume III. Figure 4-1 identifies the location of the AMPGS and the other PSD sources that are included in the interactive analysis.

Table 4-4 summarizes the results of the interactive analysis for the 3-hour averaging time. The maximum cumulative 3-hour impact from all of the PSD sources including the AMPGS is 18.43 µg/m³. This concentration was predicted from meteorological data for Julian day 077 in 2001. The location of this peak 3-hour average SO_2 concentration is in the Dolly Sods Wilderness Area at receptor number 133. The contribution of the AMPGS plus the other PSD sources included in this evaluation is less than the 3-hour Class I PSD increment of 25 µg/m³.

Figure 4-1
Sources Included in Interactive PSD Increment Consumption Analysis

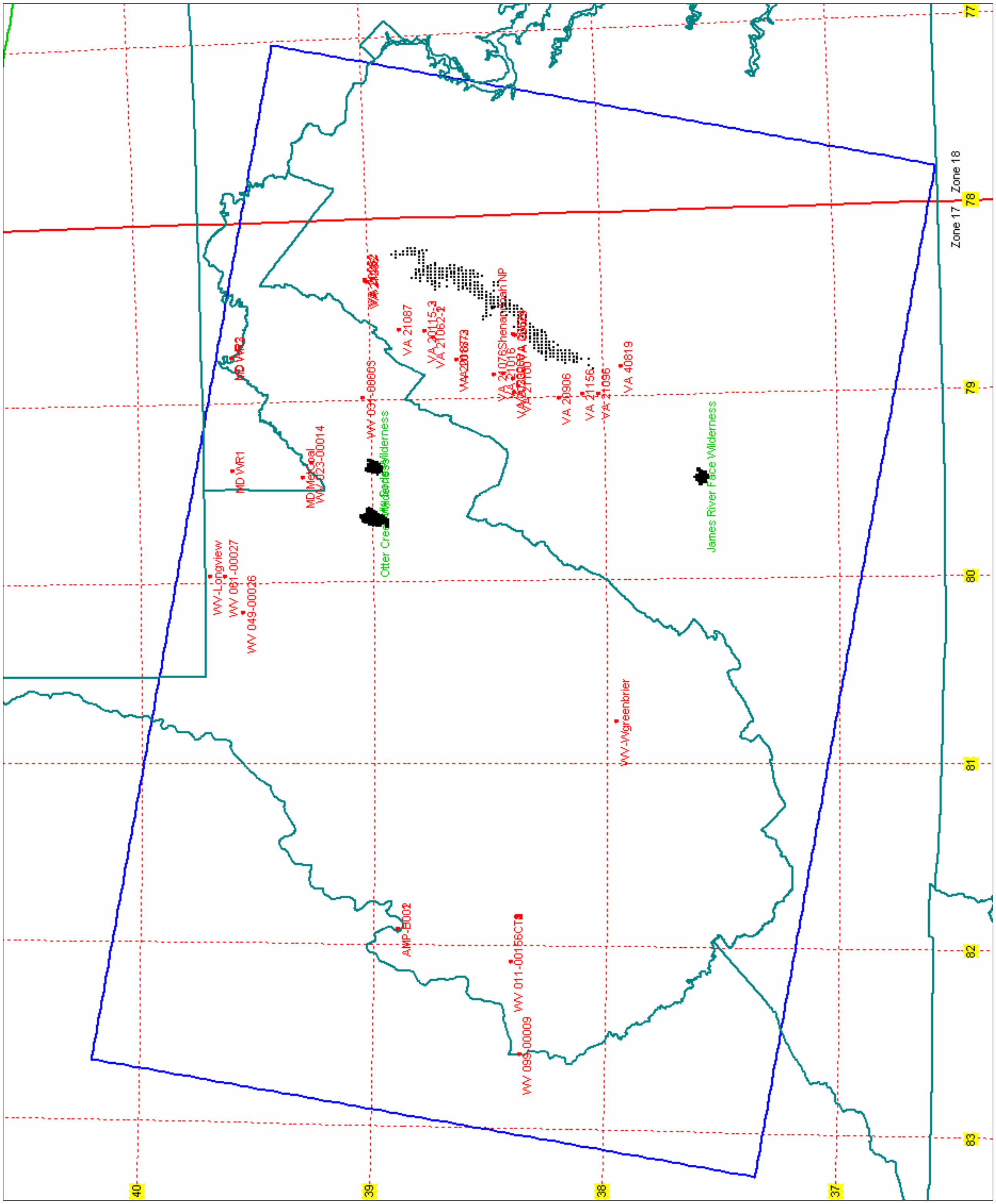


Table 4-4 **Interactive SO_2 PSD Class I Increment Analysis** **3-Hour Averaging Period**					
Year	**Maximum Predicted Off-Site Impact ($\mu g/m^3$)**	**Class I PSD Increment ($\mu g/m^3$)**	**Receptor**	**Class I Area**	**Julian Day**
2001	18.43	25	133	Dolly Sods	077
2002	14.39		159	Dolly Sods	003
2003	13.79		293	Shenandoah	145

Table 4-5 summarizes the results of the interactive analysis for the 24-hour averaging time. The maximum cumulative 24-hour impact from all of the PSD sources including the AMPGS is 4.53 $\mu g/m^3$. This concentration was predicted from meteorological data for Julian day 003 in 2002. The location of this peak 24-hour average SO_2 concentration is in the Dolly Sods Wilderness Area at receptor number 159. The contribution of the AMPGS plus the other PSD sources included in this evaluation is less than the 24-hour Class I PSD increment of 5 $\mu g/m^3$.

Table 4-5 **Interactive SO_2 PSD Class I Increment Analysis** **24-Hour Averaging Period**					
Year	**Maximum Predicted Off-Site Impact ($\mu g/m^3$)**	**Class I PSD Increment ($\mu g/m^3$)**	**Receptor**	**Class I Area**	**Julian Day**
2001	3.59	5	284	Shenandoah	135
2002	4.53		159	Dolly Sods	003
2003	3.05		284	Shenandoah	272

The CALPUFF modeling system was used to determine the maximum off-site impact from the AMPGS at designated receptors in each of the four Class I areas on a 24-hour averaging period and an annual averaging period. The maximum PM_{10} concentrations for these averaging periods were evaluated to determine if any predicted concentration exceeded the significance level or the Class I PSD Increment.

RESULTS

As indicated in Table 5-1, the maximum predicted 24-hour average off-site concentration that results from the proposed maximum 24-hour PM_{10} emissions requested by the AMPGS is 0.116 µg/m^3. This maximum concentration was predicted from meteorological data for Julian day 014 in 2003. The location of this peak 24-hour average PM_{10} concentration is in the James River Face Wilderness Area at receptor number 508.

Table 5-1
PM_{10} PSD Class I Increment Analysis
24-Hour Averaging Period

Year	Maximum Predicted Off-Site Impact (µg/m^3)	Significance Level (µg/m^3)	Class I PSD Increment (µg/m^3)	Receptor	Class I Area	Julian Day
2001	0.109	0.3	8	188	Shenandoah	016
2002	0.111			532	James River Face	296
2003	0.116			508	James River Face	014

As indicated in Table 5-2, the maximum predicted off-site concentration on an annual averaging period that results from the proposed annual PM_{10} emissions requested by the AMPGS is 0.005 µg/m^3. This concentration was predicted from 2001 meteorological data. The location of this peak annual average is in the Otter Creek Wilderness Area at receptor number 115.

Table 5-2
PM_{10} PSD Class I Increment Analysis
Annual Averaging Period

Year	Maximum Predicted Off-Site Impact (µg/m^3)	Significance Level (µg/m^3)	Class I PSD Increment (µg/m^3)	Receptor	Class I Area
2001	0.0054	0.2	4	115	Otter Creek
2002	0.0049			1	Otter Creek
2003	0.0050			115	Otter Creek

CONCLUSIONS

The maximum PM_{10} emissions from the AMPGS result in predicted maximum concentrations that are less than the PSD increments at all of the receptors in the four Class I areas. In addition, the maximum impact is less than the PSD significance level for both the 24-hour and annual averaging periods. As a result, interactive modeling with other PSD sources is not required for PM_{10}.

The CALPUFF modeling system was used to determine the maximum off-site NO_x impact from the AMPGS at designated receptors in each of the four Class I areas on an annual averaging period. The maximum NO_x concentrations for this averaging period were evaluated to determine if any predicted concentration exceeded the significance level or the Class I PSD Increment.

RESULTS

As indicated in Table 6-1, the maximum predicted annual average off-site concentration that results from the proposed maximum annual NO_x emissions requested by the AMPGS is 0.008 µg/m^3. This concentration was predicted from 2003 meteorological data. The location of this peak annual average is in the Otter Creek Wilderness Area at receptor number 120.

Table 6-1
NO_x PSD Class I Increment Analysis
Annual Averaging Period

Year	Maximum Predicted Off-Site Impact (µg/m^3)	Significance Level (µg/m^3)	Class I PSD Increment (µg/m^3)	Receptor	Class I Area
2001	0.0076	0.1	2.5	1	Otter Creek
2002	0.0080			1	Otter Creek
2003	0.0082			120	Otter Creek

CONCLUSIONS

The maximum NO_x emissions from the AMPGS result in predicted maximum concentrations that are less than the PSD increments at all of the receptors in the four Class I areas. In addition, the maximum impact is less than the PSD significance level for the annual averaging period. As a result, interactive modeling with other PSD sources is not required for NO_x.

The Federal Land Managers (FLMs) have established a threshold to use as a guideline for assessing 24-hour average visibility impacts from sources that are subject to PSD. The visibility threshold relates to the regulatory requirement that the applicant provide an additional impact "analysis of the impairment to visibility, soils and vegetation that would occur" as a result of the installation and operation of the source. The regulatory basis for the use of the visibility threshold by the FLMs is further reviewed in Appendix B of the FLAG Document.

This visibility analysis was conducted with the following model parameters:

- Rayleigh scattering = 10;
- Relative humidity = 98%;
- Natural background concentrations of aerosols from Table 2.B-2 of the FLAG document.

RESULTS AND CONCLUSIONS

Table 7-1 summarizes the results of the visibility impact analysis for maximum 24-hour emission rates of SO_2, NO_x and total PM/PM_{10} from the AMPGS. As indicated in this table, the predicted maximum visibility impact from the AMPGS exceeds the guidelines established by the FLMs.

Table 7-1
Class I Visibility Analysis

Year	24-Hr Extinction Change		Receptor	Class I Area	Number of Days >5%	Number of Days >10%	FLM Significance Level (%)	FLM Maximum Threshold (%)
2001	1st	13.14%	108	Otter Creek	28	4	5%	10%
	2nd	12.19%	115	Otter Creek				
	3rd	11.60%	86	Otter Creek				
2002	1st	31.24%	188	Shenandoah	15	5		
	2nd	30.01%	246	Shenandoah				
	3rd	16.75%	188	Shenandoah				
2003	1st	36.96%	467	Shenandoah	26	3		
	2nd	18.51%	439	Shenandoah				
	3rd	11.50%	177	Dolly Sods				

There are a number of factors that contribute to predicted visibility impact. While the emission rates for the source(s) being evaluated are important, it is likewise important to note that other factors that impact visibility predictions relate to naturally occurring conditions (e.g., humidity, precipitation and vegetation).

Based on the results of the Class I visibility analysis for the AMPGS, AMP-Ohio will work with Ohio EPA and the FLM to develop additional analyses and/or mitigation measures as needed. Given the stringency of the FLM criteria, it is not uncommon for large sources to cause predicted impacts that exceed the FLM guidelines. That said, compliance with CAIR and other regulatory programs can be used to offset the predicted exceedances of the FLM guidelines for visibility and deposition in a manner that is satisfactory to Ohio EPA and the FLMs. This approach has been utilized successfully for other recent power plant projects in US EPA Region 5.

The Federal Land Managers (FLMs) have established thresholds to use as a guideline for assessing annual sulfur and nitrogen deposition impacts from sources that are subject to PSD. These thresholds relate to the regulatory requirement that the applicant provide an additional impact "analysis of the impairment to visibility, soils and vegetation that would occur" as a result of the installation and operation of the source. The regulatory basis for the use of the sulfur and nitrogen deposition thresholds by the FLMs is further reviewed in Appendix B of the FLAG Document.

RESULTS AND CONCLUSIONS

Table 8-1 summarizes the results of the annual sulfur deposition impact analysis for maximum emissions of SO_2 from the AMPGS. As indicated in this table, the predicted maximum sulfur deposition impacts from the AMPGS exceed the guidelines established by the FLMs.

Table 8-1
Class I Analysis Sulfur Deposition

Year	Predicted Value kg/ha/yr	FLM Maximum Threshold Kg/ha/yr	Receptor	Class I Area
2001	0.031	0.01	115	Otter Creek
2002	0.027		108	Otter Creek
2003	0.029		120	Otter Creek

Table 8-2 summarizes the results of the annual nitrogen deposition impact analysis for maximum emissions of NO_x from the AMPGS. As indicated in this table, the predicted maximum nitrogen deposition impacts from the AMPGS are less than the guidelines established by the FLMs. The maximum predicted off-site impact that results from the proposed emissions requested by the AMPGS is 0.0084 kg/ha/yr. This concentration was predicted from 2001 meteorological data. The location of this peak annual average is in the Otter Creek Wilderness Area at receptor number 115.

Table 8-2
Class I Analysis Nitrogen Deposition

Year	Predicted Value kg/ha/yr	FLM Maximum Threshold kg/ha/yr	Receptor	Class I Area
2001	0.0084	0.01	115	Otter Creek
2002	0.0072		63	Otter Creek
2003	0.0082		120	Otter Creek

Based on the results of the Class I sulfur deposition analyses for the AMPGS, AMP-Ohio will work with Ohio EPA and the FLM to develop additional analyses and/or mitigation measures as needed. Given the stringency of the FLM criteria, it is not uncommon for large sources to cause predicted impacts that exceed the FLM guidelines. That said, compliance with CAIR and other regulatory programs can be used to offset the predicted exceedances of the FLM guidelines for visibility and deposition in a manner that is satisfactory to Ohio EPA and the FLMs. This approach has been utilized successfully for other recent power plant projects in US EPA Region 5.

APPENDIX A

Sulfur Dioxide Sources Included in Cumulative PSD Class I Increment Analysis

AMPGS
Sources Included in the Interactive Class I PSD Increment Consumption Analysis

State	Source Name	Source ID	Source ID	UTM Easting (X) (km)	UTM Northing (Y) (km)	Zone	Stack Height (m)	Base Elevation (m)	Stack Diameter (m)	Exit Velocity (m/s)	Exit Temp. (K)	Init Sigma y	Init Sigma Z	Momentum Flux	SO_2 gm/s
OH	AMPGS[(1)]	B001	AMP-B001	420.863	4305.750	17	190.5	184.5	7.5468	18.349	330.3822	0	0	1	120.328
OH	AMPGS[(1)]	B002	AMP-B002	420.940	4305.729	17	190.5	185.8	7.5468	18.349	330.3822	0	0	1	120.328
WV	American Woodwork	14-0002	WV 031-00003	674.500	4322.600	17	9.75	293.6	0.46	15.24	478	0	0	1	1.084
WV	Virginia Electric and Power Company	14-0004	WV 023-00014	643.500	4346.850	17	109.12	929.3	3.96	16.55	458	0	0	1	102.06
WV	American Bituminous Power Partners	14-00005	WV 049-00026	571.848	4379.442	17	99.67	376.4	3.51	23.48	436	0	0	1	115.396
WV	Morgantown Energy Associates	14-0007	WV 061-00027	589.200	4388.100	17	103.02	249.9	2.44	24.08	442	0	0	1	35.91
WV	Ashland Chemical Company	14-0008	WV 099-00009	360.930	4248.160	17	24.38	173.7	2.59	8.95	644	0	0	1	0.691
WV	Panda Culloden Power, L.P.	14-0018	WV 011-00156CT1	405.249	4252.278	17	53.34	208.8	5.79	10.7	344	0	0	1	0.844
WV	Panda Culloden Power, L.P.	14-0018	WV 011-00156CT2	405.243	4252.238	17	53.34	208.8	5.79	10.7	344	0	0	1	0.844
WV	Panda Culloden Power, L.P.	14-0018	WV 011-00156CT3	405.233	4252.169	17	53.34	208.8	5.79	10.7	344	0	0	1	0.844
WV	Panda Culloden Power, L.P.	14-0018	WV 011-00156CT4	405.227	4252.130	17	53.34	208.8	5.79	10.7	344	0	0	1	0.844
WV	Gen-Power - Longview Plant	14-0024	WV-Longview	589.232	4395.635	17	169	341.4	5.94	26.2	330	0	0	1	92.44
WV	Western Greenbrier Co-Gen	14-0025?	WV-Wgreenbrier	519.877	4201.599	17	85.34	737.6	3.65	18.89	339	0	0	1	19.53
VA	VA Coors		VA Coors	704.456	4249.987	17	144.7	396.2	3.4	12	358	0	0	1	13.29
VA	VA 20339		VA 20339	677.200	4250.700	17	12.19	362.7	0.55	11.99	510.9	0	0	1	0.44
VA	VA 21076		VA 21076	685.700	4260.000	17	6.1	420.6	0.52	7.3	494.3	0	0	1	1.03
VA	VA 20187		VA 20187	692.800	4278.000	17	13.72	310.9	0.61	18.9	477.6	0	0	1	3.75
VA	VA 40819		VA 40819	689.900	4199.700	17	3.66	182.9	0.05	6.35	310.9	0	0	1	3.09
VA	VA 21156		VA 21156	676.500	4218.100	17	42.67	413.3	0.91	5.67	505.4	0	0	1	2.7
VA	VA 21096		VA 21096	676.700	4210.300	17	9.14	424.6	0.61	6.1	463.7	0	0	1	4.39
VA	VA 20906		VA 20906	674.500	4229.300	17	10.97	393.2	0.61	7.62	505.4	0	0	1	1
VA	VA 21016		VA 21016	686.500	4255.800	17	15.24	432.8	1.07	15.24	449.8	0	0	1	5.67
VA	VA 20524		VA 20524	705.100	4250.900	17	3.05	304.8	0.2	61.78	699.8	0	0	1	0.59
VA	VA 21100		VA 21100	680.100	4248.300	17	9.45	365.8	0.61	12.25	499.8	0	0	1	2.75
VA	VA 20068		VA 20068	683.600	4251.200	17	9.75	365.8	0.61	13.73	494.3	0	0	1	1
VA	VA 20187-2		VA 20187-2	692.800	4278.000	17	9.14	310.9	0.61	16.03	566.5	0	0	1	1.88
VA	VA 20187-3		VA 20187-3	692.800	4278.000	17	8.53	310.9	0.61	16	566.5	0	0	1	1.88
VA	VA 20115-2		VA 20115-2	706.600	4293.400	17	10.67	274.3	0.7	9.33	505.4	0	0	1	1.65
VA	VA 20115-3		VA 20115-3	706.600	4293.400	17	27.43	274.3	1.37	14.94	463.7	0	0	1	2.1
VA	VA 20252		VA 20252	731.300	4321.800	17	24.08	198.1	1.22	40.63	519.3	0	0	1	0.52
VA	VA 21062-1		VA 21062-1	703.700	4289.200	17	12.19	283.5	0.76	16.95	477.6	0	0	1	0.03
VA	VA 21062-2		VA 21062-2	703.700	4289.200	17	12.19	283.5	0.7	9.14	435.9	0	0	1	0.64
VA	VA 21087		VA 21087	707.200	4305.200	17	12.19	323.1	0.64	16.67	476.5	0	0	1	2.93
VA	VA 21182		VA 21182	730.800	4321.500	17	12.5	201.2	1.37	23.16	405.4	0	0	1	5.52
VA	VA 21286		VA 21286	730.000	4320.900	17	12.5	207.3	1.71	29.97	755.9	0	0	1	1.26
MD	MD 9 9 Mettiki Coal		MD MetCoal	636.500	4351.300	17	42.67	731.5	2.6	13.5	333	0	0	1	9.89
MD	MD 3 127 Warrior Run 1		MD WR1	639.583	4384.965	17	81.69	196.6	3.75	23.62	398.2	0	0	1	54.77
MD	MD 6 243 Warrior Run 2		MD WR2	693.550	4385.189	17	15.24	198.1	0.61	27	355.4	0	0	1	0.39
MD	MD 9 136 Warrior Run 3		MD WR3	693.549	4385.009	17	9.14	196.6	0.3	15.89	533.2	0	0	1	0.05

Notes:

[(1)] The SO2 emissions rates modeled for each boiler at the AMPGS are: 1,246 lb/hr (3-hr average); 955 lb/hr (24-hr average) and 779 lb/hr (annual average).

APPENDIX B

CALPOST Output Files
(2001, 2002 and 2003)

AMPGS Class I Analysis
3-hr Avg. Period
SO2 Concentration

2001 SUMMARY SECTION

SO2 1

(ug/m**3)

RECEPTOR	COORDINATES (km)		TYPE	PEAK (YEAR,DAY,START TIME)		FOR RANK	FOR AVERAGE PERIOD
108	1479.259	35.042	DISCRETE	**3.9611E+00**	(2001,225,0700)	RANK 1	3 HOUR
192	1571.904	-50.884	DISCRETE	2.6002E+00	(2001,016,0400)	RANK 2	3 HOUR

2002 SUMMARY SECTION

SO2 1

(ug/m**3)

RECEPTOR	COORDINATES (km)		TYPE	PEAK (YEAR,DAY,START TIME)		FOR RANK	FOR AVERAGE PERIOD
263	1584.880	-27.546	DISCRETE	**3.7268E+00**	(2002,362,0400)	RANK 1	3 HOUR
1	1479.243	23.778	DISCRETE	2.6136E+00	(2002,345,1900)	RANK 2	3 HOUR

2003 SUMMARY SECTION

SO2 1

(ug/m**3)

RECEPTOR	COORDINATES (km)		TYPE	PEAK (YEAR,DAY,START TIME)		FOR RANK	FOR AVERAGE PERIOD
508	1527.574	-118.913	DISCRETE	**3.6721E+00**	(2003,014,2200)	RANK 1	3 HOUR
119	1482.597	36.625	DISCRETE	2.6734E+00	(2003,156,0100)	RANK 2	3 HOUR

AMPGS Class I Analysis
24-hr Avg. Period
SO2 Concentration

2001 SUMMARY SECTION

SO2 1

(ug/m**3)

RECEPTOR	COORDINATES (km)		TYPE	PEAK (YEAR,DAY,START TIME)	FOR RANK	FOR AVERAGE PERIOD
188	1570.525	-58.686	DISCRETE	**6.7871E-01** (2001,016,0100)	RANK 1	24 HOUR
192	1571.904	-50.884	DISCRETE	5.1351E-01 (2001,016,0100)	RANK 2	24 HOUR

2002 SUMMARY SECTION

SO2 1

(ug/m**3)

RECEPTOR	COORDINATES (km)		TYPE	PEAK (YEAR,DAY,START TIME)	FOR RANK	FOR AVERAGE PERIOD
1	1479.243	23.778	DISCRETE	**7.2442E-01** (2002,058,0100)	RANK 1	24 HOUR
26	1479.249	27.533	DISCRETE	4.8808E-01 (2002,363,0100)	RANK 2	24 HOUR

2003 SUMMARY SECTION

SO2 1

(ug/m**3)

RECEPTOR	COORDINATES (km)		TYPE	PEAK (YEAR,DAY,START TIME)	FOR RANK	FOR AVERAGE PERIOD
434	1599.185	24.340	DISCRETE	**7.9187E-01** (2003,006,0100)	RANK 1	24 HOUR
387	1597.587	10.832	DISCRETE	5.4091E-01 (2003,319,0100)	RANK 2	24 HOUR

AMPGS Class I Analysis
Annual Avg. Period
SO2 Concentration

2001 SUMMARY SECTION

SO2 1

(ug/m**3)

RECEPTOR	COORDINATES (km)		TYPE	PEAK (YEAR,DAY,START TIME)	FOR RANK	FOR AVERAGE PERIOD
115	1479.787	36.082	DISCRETE	**2.6144E-02**	RANK 1	8758 HOUR

2002 SUMMARY SECTION

SO2 1

(ug/m**3)

RECEPTOR	COORDINATES (km)		TYPE	PEAK (YEAR,DAY,START TIME)	FOR RANK	FOR AVERAGE PERIOD
1	1479.243	23.778	DISCRETE	**2.4671E-02**	RANK 1	8758 HOUR

2003 SUMMARY SECTION

SO2 1

(ug/m**3)

RECEPTOR	COORDINATES (km)		TYPE	PEAK (YEAR,DAY,START TIME)	FOR RANK	FOR AVERAGE PERIOD
120	1481.017	37.258	DISCRETE	**2.5242E-02**	RANK 1	8734 HOUR

AMPGS Class I Analysis
24-hr Avg. Period
PM10 Concentration

2001 SUMMARY SECTION

PM10 1

(ug/m**3)

RECEPTOR	COORDINATES (km)		TYPE	PEAK (YEAR,DAY,START TIME)	FOR RANK	FOR AVERAGE PERIOD
188	1570.525	-58.686	DISCRETE	**1.0935E-01** (2001,016,0100)	RANK 1	24 HOUR
192	1571.904	-50.884	DISCRETE	8.2605E-02 (2001,016,0100)	RANK 2	24 HOUR

2002 SUMMARY SECTION

PM10 1

(ug/m**3)

RECEPTOR	COORDINATES (km)		TYPE	PEAK (YEAR,DAY,START TIME)	FOR RANK	FOR AVERAGE PERIOD
532	1532.237	-116.122	DISCRETE	**1.1104E-01** (2002,296,0100)	RANK 1	24 HOUR
34	1479.075	28.438	DISCRETE	7.1904E-02 (2002,363,0100)	RANK 2	24 HOUR

2003 SUMMARY SECTION

PM10 1

(ug/m**3)

RECEPTOR	COORDINATES (km)		TYPE	PEAK (YEAR,DAY,START TIME)	FOR RANK	FOR AVERAGE PERIOD
508	1527.574	-118.913	DISCRETE	**1.1578E-01** (2003,014,0100)	RANK 1	24 HOUR
387	1597.587	10.832	DISCRETE	8.3234E-02 (2003,319,0100)	RANK 2	24 HOUR

AMPGS Class I Analysis
Annual Avg. Period
PM10 Concentration

2001 SUMMARY SECTION

PM10 1

(ug/m**3)

RECEPTOR COORDINATES (km) TYPE PEAK (YEAR,DAY,START TIME) FOR RANK FOR AVERAGE PERIOD

115 1479.787 36.082 DISCRETE **5.3912E-03** RANK 1 8758 HOUR

2002 SUMMARY SECTION

PM10 1

(ug/m**3)

RECEPTOR COORDINATES (km) TYPE PEAK (YEAR,DAY,START TIME) FOR RANK FOR AVERAGE PERIOD

1 1479.243 23.778 DISCRETE **4.9089E-03** RANK 1 8758 HOUR

2003 SUMMARY SECTION

PM10 1

(ug/m**3)

RECEPTOR COORDINATES (km) TYPE PEAK (YEAR,DAY,START TIME) FOR RANK FOR AVERAGE PERIOD

115 1479.787 36.082 DISCRETE **4.9552E-03** RANK 1 8734 HOUR

AMPGS Class I Analysis
Annual Avg. Period
NOx Concentration

2001 SUMMARY SECTION

NOX 1

(ug/m**3)

RECEPTOR COORDINATES (km) TYPE PEAK (YEAR,DAY,START TIME) FOR RANK FOR AVERAGE PERIOD

1 1479.243 23.778 DISCRETE **7.6443E-03** RANK 1 8758 HOUR

2002 SUMMARY SECTION

NOX 1

(ug/m**3)

RECEPTOR COORDINATES (km) TYPE PEAK (YEAR,DAY,START TIME) FOR RANK FOR AVERAGE PERIOD

1 1479.243 23.778 DISCRETE **8.0486E-03** RANK 1 8758 HOUR

2003 SUMMARY SECTION

NOX 1

(ug/m**3)

RECEPTOR COORDINATES (km) TYPE PEAK (YEAR,DAY,START TIME) FOR RANK FOR AVERAGE PERIOD

120 1481.017 37.258 DISCRETE **8.2044E-03** RANK 1 8734 HOUR

AMPGS Class I Analysis
24 hour Avg. Period
Visibility

2001--- Ranked Daily Visibility Change ---
Modeled Extinction by Species

YEAR	DAY	HR	RECEPTOR	COORDINATES (km)		TYPE	BEXT(Model)	BEXT(BKG)	BEXT(Total)	%CHANGE	F(RH)	bxSO4	bxNO3	bxOC	bxEC	bxPMC	bxPMF
2001 1	225	1	108	1479.259	35.042	D	3.175	24.162	27.337	**13.14**	6.291	2.473	0.659	0.000	0.000	0.043	0.000
2001 2	264	1	115	1479.787	36.082	D	3.178	26.080	29.258	12.19	8.423	1.374	1.784	0.000	0.000	0.020	0.000
2001 3	261	1	86	1478.905	33.097	D	3.122	26.929	30.052	11.60	9.366	2.290	0.814	0.000	0.000	0.018	0.000
2001 4	332	1	483	1607.035	42.927	D	2.814	27.174	29.988	10.36	9.638	0.923	1.870	0.000	0.000	0.022	0.000
2001 5	54	1	347	1593.816	0.639	D	2.171	21.967	24.138	9.88	3.852	0.719	1.411	0.000	0.000	0.041	0.000
2001 6	44	1	257	1576.378	-29.285	D	2.168	25.550	27.719	8.49	7.833	1.044	1.102	0.000	0.000	0.022	0.000

--- Number of days with Extinction Change => 5.0 % : 28
--- Number of days with Extinction Change => 10.0 % : 4
--- Largest Extinction Change = **13.14%**

2002--- Ranked Daily Visibility Change ---
Modeled Extinction by Species

YEAR	DAY	HR	RECEPTOR	COORDINATES (km)		TYPE	BEXT(Model)	BEXT(BKG)	BEXT(Total)	%CHANGE	F(RH)	bxSO4	bxNO3	bxOC	bxEC	bxPMC	bxPMF
2002 1	296	1	188	1570.525	-58.686	D	7.646	24.479	32.125	**31.24**	6.643	4.442	3.161	0.000	0.000	0.044	0.000
2002 2	362	1	246	1582.786	-31.738	D	6.598	21.984	28.582	30.01	3.872	2.290	4.252	0.000	0.000	0.056	0.000
2002 3	73	1	188	1570.525	-58.686	D	4.108	24.528	28.636	16.75	6.698	1.909	2.172	0.000	0.000	0.027	0.000
2002 4	91	1	216	1575.750	-40.699	D	3.125	23.096	26.221	13.53	5.107	0.980	2.125	0.000	0.000	0.020	0.000
2002 5	295	1	1	1479.243	23.778	D	3.039	23.802	26.840	12.77	5.891	1.772	1.243	0.000	0.000	0.023	0.000
2002 6	361	1	215	1574.330	-40.988	D	2.003	21.658	23.661	9.25	3.509	0.816	1.154	0.000	0.000	0.033	0.000

--- Number of days with Extinction Change => 5.0 % : 15
--- Number of days with Extinction Change => 10.0 % : 5
--- Largest Extinction Change = **31.24%**

2003--- Ranked Daily Visibility Change ---
Modeled Extinction by Species

	YEAR	DAY	HR	RECEPTOR	COORDINATES (km)		TYPE	BEXT(Model)	BEXT(BKG)	BEXT(Total)	%CHANGE	F(RH)	bxSO4	bxNO3	bxOC	bxEC	bxPMC	bxPMF
1	2003	6	1	467	1600.493	32.143	D	9.491	25.680	35.172	**36.96**	7.978	3.543	5.888	0.000	0.000	0.060	0.000
2	2003	156	1	439	1597.402	25.851	D	4.398	23.759	28.158	18.51	5.844	1.956	2.403	0.000	0.000	0.039	0.000
3	2003	279	1	177	1509.296	38.084	D	3.168	27.554	30.722	11.50	10.060	1.884	1.268	0.000	0.000	0.016	0.000
4	2003	213	1	187	1504.726	39.063	D	2.834	28.683	31.517	9.88	11.315	2.418	0.401	0.000	0.000	0.015	0.000
5	2003	129	1	482	1605.631	42.632	D	2.649	29.262	31.912	9.05	11.958	1.640	1.001	0.000	0.000	0.009	0.000
6	2003	228	1	1	1479.243	23.778	D	2.309	26.304	28.613	8.78	8.671	1.404	0.892	0.000	0.000	0.013	0.000

--- Number of days with Extinction Change => 5.0 % : 26
--- Number of days with Extinction Change => 10.0 % : 3
--- Largest Extinction Change = **36.96%**

AMPGS Class I Analysis
Annual Avg. Period
S Deposition

2001 SUMMARY SECTION

S TF

(ug/m**2/s)

RECEPTOR COORDINATES (km) TYPE PEAK (YEAR,DAY,START TIME) FOR RANK FOR AVERAGE PERIOD

115 1479.787 36.082 DISCRETE **9.9117E-05** RANK 1
8758 HOUR

2002 SUMMARY SECTION

S TF

(ug/m**2/s)

RECEPTOR COORDINATES (km) TYPE PEAK (YEAR,DAY,START TIME) FOR RANK FOR AVERAGE PERIOD

108 1479.259 35.042 DISCRETE **8.5352E-05** RANK 1
8758 HOUR

2003 SUMMARY SECTION

S TF

(ug/m**2/s)

RECEPTOR COORDINATES (km) TYPE PEAK (YEAR,DAY,START TIME) FOR RANK FOR AVERAGE PERIOD

120 1481.017 37.258 DISCRETE **9.2582E-05** RANK 1
8734 HOUR

AMPGS Class I Analysis
Annual Avg. Period
N Deposition

2001 SUMMARY SECTION

N TF

(ug/m**2/s)

RECEPTOR COORDINATES (km) TYPE PEAK (YEAR,DAY,START TIME) FOR RANK FOR
AVERAGE PERIOD

115 1479.787 36.082 DISCRETE **2.6693E-05** RANK 1
8758 HOUR

2002 SUMMARY SECTION

N TF

(ug/m**2/s)

RECEPTOR COORDINATES (km) TYPE PEAK (YEAR,DAY,START TIME) FOR RANK FOR
AVERAGE PERIOD

63 1478.551 31.152 DISCRETE **2.2818E-05** RANK 1
8758 HOUR

2003 SUMMARY SECTION

N TF

(ug/m**2/s)

RECEPTOR COORDINATES (km) TYPE PEAK (YEAR,DAY,START TIME) FOR RANK FOR
AVERAGE PERIOD

120 1481.017 37.258 DISCRETE **2.5917E-05** RANK 1
8734 HOUR

APPENDIX C

Class I Modeling Protocol
(August 2006)

AMP-Ohio
Proposed Base Load Generating Facility Development
Air Quality Modeling Protocol
Supplemental Class I Air Quality Modeling Analysis

General Plant Description

The proposed project involves the development of a new pulverized coal-fired electric generating facility. The facility will consist of two steam generators designed for base load operation with a nominal net power output of 480 MW each or a maximum heat input capacity of 5,191 MMBtu/hr each. The steam generators will burn a blend of Ohio, Central Appalachian and/or Powder River Basin bituminous coals.

All PSD emissions will be controlled using best available control technology (BACT) and all non-PSD emissions will be controlled using Best Available Technology (BAT) as required by Ohio EPA rules. The proposed BACT will be low NO_x burners, overfire air (OFA) and selective catalytic reduction (SCR) for NO_x control, a fabric filter for PM/PM_{10} control, wet flue gas desulfurization (FGD) system for SO_2 control and a wet-ESP for control of other condensable emissions. A complete BACT/BAT analysis was submitted with the permit application.

Following is a preliminary list of the additional emissions units included in the overall facility permit application:

1. Natural gas fired auxiliary boiler;
2. Diesel fired emergency generator;
3. Diesel fired fire pump;
4. Cooling towers;
5. Residual solid waste landfill (dumping, spreading, haul roads, etc.);
6. Plant haul roads and parking lots;
7. Coal handling, crushing and storage;
8. Limestone handling, crushing and storage;
9. Gypsum handling and storage;
10. Maintenance shop;
11. Fly ash handling and storage;
12. 19% Aqueous ammonia tanks;
13. Gasoline tanks;
14. H_2SO_4 tanks;
15. NaOH tanks; and
16. Turbine oil tanks.

Location of the Proposed Source

The proposed project is located in Meigs County (Ohio) in UTM Zone 17, 420,794 meters easting and 4,306,082 meters northing.

Class I Areas Impacted

The New Source Review Workshop Manual Prevention of Significant Deterioration and Non Attainment Area Permitting Guideline (Draft October 1990) describes EPA policy to evaluate the impact of all major sources or major modifications on Class I areas located within 100 kilometers of the proposed project site (page E-16). This is also referenced in the Federal Land Managers' Air Quality Related Values Workgroup (FLAG) Phase 1 Report (page 9). A Class I impact analysis may be required if a major source proposes to locate at a distance greater than 100 kilometers from a Class I area and it is of such a large size that the reviewing agency or Federal Land Manager (FLM) is concerned about potential emission impacts. Although the proposed project site is more than 100 kilometers from all Class I areas, it is a large source.

Four Class I areas are included in this air quality modeling analysis. The Otter Creek Wilderness Area in West Virginia is approximately 193 kilometers northeast of the proposed site. The Dolly Sods Wilderness Area in West Virginia is approximately 218 kilometers northeast of the proposed site. Shenandoah National Park in Virginia is approximately 300 kilometers southeast of the proposed project. The James River Face Wilderness Area in Virginia is approximately 260 kilometers southeast from the proposed site.

The Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts cautions that the CALPUFF air modeling system approved for long range transport *should not be used* for distances greater than 200 kilometers. These four class I areas, including three areas greater than 200 kilometers from the proposed site are included as requested by the Ohio Environmental Protection Agency and West Virginia Environmental Protection Agency.

Models to be Employed

The analysis will be completed with the Version 6 CALPUFF modeling system including CALMET, CALPUFF and CALPOST. The Federal Land Managers' Air Quality Related Values Workgroup (FLAG) Phase I Report (December 2000) was followed for this analysis except where specifically indicated in this modeling protocol.

Air Contaminants to be Modeled

This project will involve "major" emissions for PM_{10}, SO_2, NO_x and CO. Class I PSD increments have been established for Sulfur Dioxide, Particulate Matter and Nitrogen Dioxide. The air quality modeling will be performed to determine the impact of PM_{10}, SO_2 and NO_x on the Class I PSD Increment. The impact of visibility will be evaluated and the annual total deposition of Sulfur (S) and Nitrogen (N) will be evaluated.

As recommended in the IWAQM Phase 2 Summary Report, the use of the MESOPUFF II chemistry options currently available in CALPUFF will be used to represent the oxidation of SO_2 to sulfate and the nitrate chemistry.

The emission rates for SO_2, NO_x and PM_{10} are consistent with the emissions rates presented in the permit application and the near field (Class II) AERMOD air quality analysis for the proposed project.

VISTAS CALMET Data

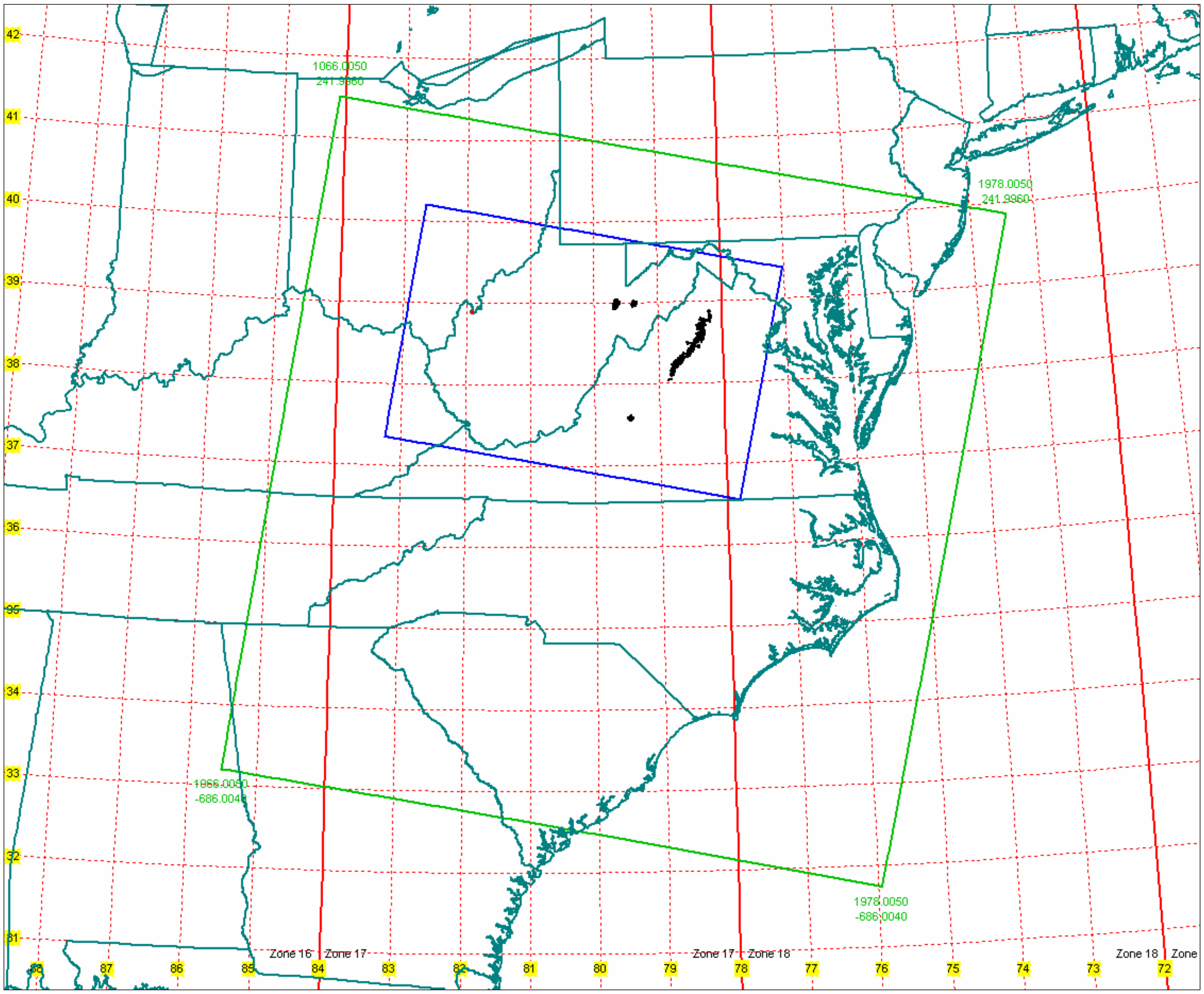
Visibility Improvement State and Tribal Association of the Southeast (VISTAS) data were used for the Class I Analysis. Region 5 VISTAS CALMET.DAT files were obtained from the West Virginia Division of Environmental Protection (WVDEP). The files obtained for this analysis are for the calendar years 2001, 2002, 2003. Earth Tech/TRC prepared the CALMET.DAT files using available surface and upper air observations in addition to MM5 data. The files have 4-km grid spacing. The Lambert Conic Conformal (LCC) coordinates for the corners of the CALMET.DAT files obtained from WVDEP are listed in Table 1. The CALMET.DAT files obtained from WVDEP were directly input to CALPUFF.

The Region 5 VISTAS CALMET.DAT grid has 228 cells in the easterly direction and 232 cells in the northerly direction (4-km grid spacing). The easterly AMPGS computational domain was established beginning in column 36 and ending in column 157 of Region 5 VISTAS grid. The northerly AMPGS computational domain begins in row 122 and ends in row 201. The LCC coordinates of the AMPGS computational grid are listed in Table 1. Figure 1 shows the VISTAS Region 5 domain, the AMPGS Class I Analysis computational domain and the four Class I areas located within the AMPGS computational domain.

Table 1
Location of the Region 5 VISTAS and AMPGS Computational Domains

Corner of Domain	Region 5 Modeling Domain (LCC)	AMPGS Computational Domain (LCC)
southwest	1066, -686	1206, -202
northwest	1066, 242	1206, 118
northeast	1978, 242	1694, 118
southeast	1978, -686	1694, -202

Figure 1
Class I Modeling Grid



CALPUFF

Input Options

Table 2 summarizes the CALPUFF default input parameters as described in the FLAG and IWAQM documents and following recommendations from the CALPUFF developers (Earthtech).

Table 2 CALPUFF INPUT PARAMETERS		
Parameter		**Value**
Averaging Time (minutes)	AVET	60
PG Averaging Time (minutes)	PGTIME	60
Vertical distribution used in the near field	MGAUSS	1 = Gaussian
Terrain adjustment method	MCTADJ	3 = partial plume path adjustment

Table 2 **CALPUFF INPUT PARAMETERS**		
Parameter		**Value**
Subgrid-scale complex terrain modeled	MMCTSG	No
Near-field puffs modeled as elongated slugs	MSLUG	No
Transitional plume rise modeled	MTRANS	Yes
Stack tip downwash	MTIP	Yes
Vertical wind shear modeled above stack top	MSHEAR	No
Puff splitting allowed	MSPLIT	Yes
Aqueous phase transformation modeled	MAQCHEM	No
Wet removal modeled	MWET	Yes
Dry deposition modeled	MDRY	Yes
Method used to compute dispersion Coefficients	MDISP	2 = internally calculated (AERMOD)
PG sigma-y, z adj for roughness	MROUGH	No
Partial plume penetration of inversion	MPARTL	Yes
PDF used for dispersion under convective conditions (AERMOD)	MDF	Yes
Sub-Grid TIBL module used for share line	MSGTIBL	No
Nesting factor of the sampling	MESHDN	1
Reference cuticle resistance	RCUTR	30
Reference ground resistance	RGR	10
Reference pollutant reactivity	REACTR	8.0
Number of particle-size intervals used to evaluate effective particle deposition velocity	NINTR	9
Vegetation state in unirrigated areas	IVEG	1 = active and unstressed vegetation
Nighttime SO_2 loss rate (%hr)	RNITE1	0.2
Nighttime NO_X loss rate (%hr)	RNITE2	2.0
Nighttime HNO3 formation rate (%hr)	RNITE3	2.0
Horizontal size of pull (m) beyond which time-dependant dispersion equation (Hefter) are used to determine sigma-y and sigma –z)	SYTDEP	5.5E02
Switch for using Hefter equation for sigma z as above	MHFTSZ	No
Stability class used to determine plume growth rates for puffs above the boundary layer	JSUP	5
Vertical dispersion constant for stable conditions (K1 in eqn. 2.7-3)	CONK1	0.01
Vertical dispersion constant for neutral/unstable conditions (K2 in Eqn. 2.7-4)	CONK2	0.1
Factor determining Transition-point from Schulman-Scire to Huber-Snyder Building downwash scheme)SS used for	TBD	0.5

Table 2 CALPUFF INPUT PARAMETERS		
Parameter		**Value**
Hs < Hb +TBD^HL)		
Range of landuse categories for which urban dispersion is assumed	IURB1, IURB2	10, 19
Maximum length of sug (met, grid units)	XMLEN	1.0
Maximum travel distance of a puff/slug grid units during one sampling step	XSAMLEN	1
Maximum number of slug/puffs release from one source during one time step	MXNEW	99
Maximum number of sampling steps for one puff/slug during one time step	MXSAM	99
Number of iterations used when computing the transport wind for a sampling step that includes gradual rise	NCOUNT	2
Minimum sigma y for new puff/slug	SYMIN	1
Minimum sigma z for a new puff/slug	SZMIN	1
Default minimum turbulence velocities sigma-v for each stability class	SVMIN	0.50, 0.50, 0.50, 0.50, 0.50, 0.50
Default minimum turbulence velocities sigma-w for each stability class	SVMIN	0.20, 0.12, 0.08, 0.06, 0.03, 001
Divergence criterion for dw/dz across puff used to initiate adjustment for horizontal convergence partial adjustment starts at CDIV(1) and full adjustment is reached at CDV(2) (1/s)	CDIV	0, 0
Minimum wind speed (m/s) allowed for non-calm conditions	WSCALM	0.5
Maximum mixing height	XMAXZI	3000
Minimum mixing height	XMINZI	50.0
Default wind speed classes 5 upper bounds (m/s)	WSCAT	1.54, 3.09, 5.14, 8.23, 10.8
Default wind speed profile power-law exponents for stabilities 1-5	PLXO	0.07, 0.07, 0.10, 0.15, 0.35, 0.55
Default potential temperature gradient for stable classes E, F (deg K/m)	PTGO	0.020, 0.035
Default plume path coefficients for each stability class (used when MCTADJ =3)	PPC	0.50, 0.50, 0.50, 0.50, 0.35, 0.35
Slug to puff transition criterion factor equal to sigma y length of slug	SL2PF	10
Number of puffs that result every time a puff is split	NSPLIT	3
Time(s) of a day when split puffs are eligible to be split once again	IRSPLIT	17
Split is allowed only if last hour's mixing height (m) exceeds a minimum value	ZISPLIT	100
Split is allowed only if ratio of last hour's mixing ht to the maximum mixing ht experienced by the puff is less than a minimum vale	ROLDMAX	0.25

Table 2 CALPUFF INPUT PARAMETERS		
Parameter		**Value**
Number of puffs that result every time a puff is split	NSPLITH	5
Minimum sigma-y (grid cell units) of puff before it may be split	SYSPLITH	1.0
Minimum puff elongation rate(SYSPLITH/hr) due to wind sheer, before it may be split	SHSPLITH	2.0
Minimum concentration (g/m^3) of each species in puff before it may be split	CNCPLITH	1.0E-07
Fractional convergence criterion for numerical SLUG sampling integration	EPSSLUG	1.0E-04
Fractional convergence criterion for numerical AREA source integration	EPSAREA	1.0E-06
Trajectory step-length (m) used for numerical rise integration	DSRISE	1.0

Source Parameters

Table 3 summarizes the source parameters and emission rates that were used to complete the Class I modeling. The maximum air flow rate and corresponding velocity were used to represent the worst case for the long range CALPUFF analysis. AMPGS plans to install a 625 ft stack that is less than the Good Engineering Practice (GEP) stack height requirements in OAC rule 3745-16-02 allow. The GEP stack height was determined to be 675 ft.

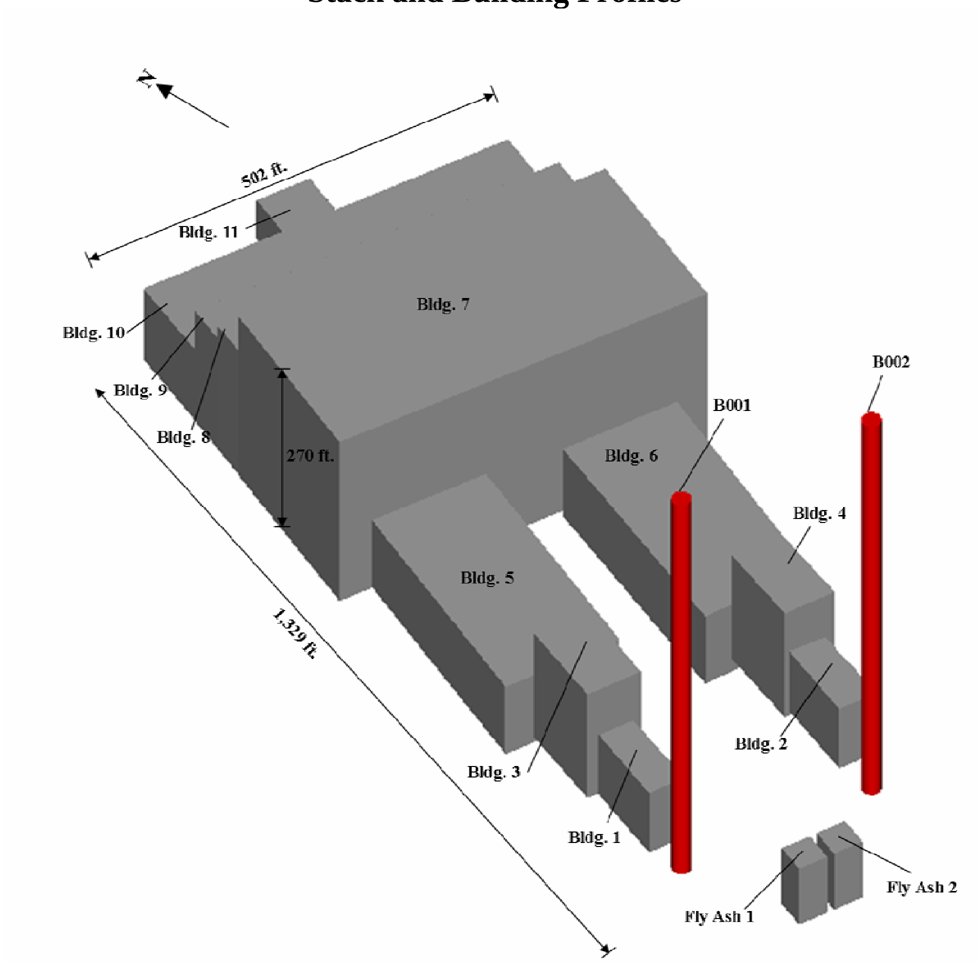
Table 3 Boiler Stack Parameters (Values for Each Stack))		
Parameter	**Maximum Load**	**Notes**
Stack Height (ft)	625	Less than GEP Stack Height
Stack Diameter (ft)	24.76	None
Velocity (fps)	60.2	Based on the maximum flow rate (resulting in maximum velocity)
Stack Gas Exit Temperature (F)	135	None
SO_2 (lb/hr) 3-Hour Average	1,246	Maximum 3-hour average emissions rate
SO_2 (lb/hr) 24-Hour Average	955	Maximum 24-hour average emissions rate
SO_2 (lb/hr) Annual Average	779	Maximum annual average emissions rate
NO_X (lb/hr) Annual Average	363	Maximum annual average emissions rate
NO_X (lb/hr) 24-Hour Average	519	Maximum 24-hour average emissions rate (used for visibility analysis)
PM/PM_{10} (lb/hr)	129	Maximum hourly emissions rate
PM/PM_{10} (lb/hr) 24-Hour Average	129	Maximum 24-hour average emissions rate (used for visibility analysis)

GEP Stack Height

The GEP stack height is the optimum stack height for avoiding downwash effects when conducting Class I and Class II air quality modeling. It is also the maximum stack height that can be used when conducting Class I and Class II air quality modeling. The GEP stack heights for the AMPGS were calculated based on the requirements of OAC rule 3745-16-02 and guidance provided in the "Guideline for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations) (Revised)" (US EPA June 1985).

Figure 3-1 depicts the structures on the plant property that were entered into the Class I modeling for downwash calculation purposes. Table 3-2 summarizes the dimensions of each structure identified in Figure 3-1. Since all of the buildings shown in Figure 3-1 are connected, all the structures shown are considered to be "nearby" as defined in OAC rule 3745-16-01(G)(1). Since all of the buildings shown in Figure 3-1 are "nearby", the height of the tallest building (Building 7 at 270 ft) is used to calculate the GEP stack height together with the lesser of: (a) the overall width of the entire complex (502 ft); or (b) the height of the tallest building (Building 7 at 270 ft).

Figure 3-1
Stack and Building Profiles



The GEP stack height is calculated in accordance with the equation found in OAC rule 3745-16-01(F)(2)(b) as follows:

$$GEP\ Height = H + 1.5 \times L$$

Hg = 270 feet (*Building 7 height*) + 1.5 x (270 feet) = 675 feet

Note: *The height of Building 7 (270 ft) is less than the entire structure width (502 feet)*

Table 3-2
BUILDING PARAMETERS

Building	Length (ft)	Width (ft)	Height (ft)
1	75	50	101
2	75	50	101
3	70	70	160
4	70	70	160
5	200	160	114
6	200	160	114
7	502	160	270
8	502	120	210
9	502	64	187
10	502	120	120
11	104	71	65
Fly Ash 1	40	40	95
Fly Ash 2	40	40	95

Class I Receptors

The receptor network developed by the FLM for Dolly Sods Wilderness Area, Otter Creek Wilderness Area, Shenandoah National Park and James River Face Wilderness Area are included in this analysis. The receptor network includes 65 receptors in the Dolly Sods Wilderness Area, 122 receptors in the Otter Creek Wilderness Area, 298 receptors in Shenandoah National Park and 52 receptors at James River Face Wilderness Area.

Ozone Background

Hourly VISTAS ozone data were obtained from the Bee-Line Software webpage and were input to CALPUFF.

Ammonia Background

The background value used for ammonia is 0.5 parts per billion. The ammonia background concentration value is from the IWAQM Phase 2 Summary Report and represents forested areas.

CALPOST

CALPOST is the final phase of the CALPUFF modeling system. CALPOST was used to complete the visibility, deposition and concentration calculations. Table 5 summarizes the CALPOST input parameters.

Table 5
CALPOST INPUT PARAMETERS

Parameter		Value
Modeled PM Course	EEPMC	0.6
Modeled PM Fine	EEPMF	1.0
Background PM Course	EEPMCBK	0.6
Ammonium Sulfate	EESO4	3
Ammonium Nitrate	EENO3	3
Organic Carbon	EEOC	4
Soil	EESOIL	1
Elemental Carbon	EEEC	10
Background light extinction	BEXTBK	None
Percentage of particles affected by relative humidity	RHFRAC	None

Concentrations

The PSD increment concentration was identified for the proposed source. A cumulative PSD increment consumption analysis was performed for SO_2 because the predicted maximum impact from the proposed AMPGS was significant. The PSD Class I significance levels are included in Table 6. The significance levels evaluated represent the values proposed by USEPA and currently acceptable by the Federal Land Managers and the West Virginia Department of Environmental Quality.

Table 6
PSD CLASS I SIGNIFICANCE LEVELS

Pollutant	Averaging Period	PSD Significance Level ($\mu g/m^3$)
SO_2	Annual	0.1
	24-Hour	0.2
	3-Hour	1.0
PM_{10}	Annual	0.2
	24-Hour	0.3
NO_2	Annual	0.1

The cumulative analysis included PSD increment consuming sources within the modeling grid. A complete inventory was developed with information provided from West Virginia Department of Environmental Quality and the Ohio Environmental Protection Agency (OEPA).

Visibility

The visibility analysis was completed with the proposed project only. The visibility significance level is 5%.

S and N Deposition

The total S and N deposition amount, in kg/ha/yr, were estimated by the CALPUFF modeling system and compared with the National Park Service deposition analysis thresholds (DATs) for eastern Class I areas as identified in Table 7.

Table 7
FEDERAL LAND MANAGERS MAXIMUM THRESHOLDS FOR SULFUR AND NITROGEN DEPOSITION

Pollutant	Averaging Period	FLM Maximum Threshold
S Deposition	Annual	0.010 kg/ha/yr
N Deposition	Annual	0.0096 kg/ha/yr