PERMIT-TO-INSTALL APPLICATION
VOLUME III

CLASS I AIR QUALITY MODELING

For:
AMERICAN MUNICIPAL POWER
GENERATING STATION

Submitted By:
AMERICAN MUNICIPAL POWER-OHIO, INC.

May 2006

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PERMIT-TO-INSTALL APPLICATION
VOLUME III

CLASS I AIR QUALITY MODELING REPORT

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The proposed American Municipal Power Generating Station (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 with a nominal net power output of 480 MW each or a maximum heat input capacity of 5,191 MMBtu/hr each. 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, 420,794 meters easting and 4,306,082 meters northing.

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 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 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 if the reviewing agency or Federal Land Manager (FLM) is concerned about potential emission impacts.

Four Class I areas are included in this air quality modeling analysis:

- 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.

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 four Class I areas identified above, which include three areas greater than 200 kilometers from the proposed site, were included in the Class I analysis for the AMPGS as requested by the Ohio Environmental Protection Agency and West Virginia Department of Environmental Protection. Figure 1-1 shows the location of the proposed AMPGS and the distances to the Class I

Areas included in this analysis.

The two boilers for the proposed AMPGS were modeled using the CALPUFF modeling system to predict the maximum impact in the four Class I areas compared to the Class I significance levels and the PSD Increment. The initial modeling for the AMPGS predicted impact above the significance level for the 3-hr and 24-hr SO_2 averaging times. Therefore, an interactive modeling analysis was performed to include other PSD sources in the modeling domain. The maximum concentrations of the interactive modeling predicted results below the Class I PSD Increment and the NAAQS.

In addition, a Class I Air Quality Related Values (AQRVs) Analysis was performed to predict the maximum impact from the AMPGS and compare it to Sulfur (S) and Nitrogen (N) deposition and visibility thresholds established in Federal Land Managers (FLM) guidance.

Table 1-1 summarizes the results of 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	0.042 µg/m^3	0.1 µg/m^3	2
	0.184	24-hour	0.991 µg/m^3	0.2 µg/m^3	5
	0.240	3-hour	4.58 µg/m^3	1.0 µg/m^3	25
PM_{10}	0.036(4)	Annual	0.012 µg/m^3	0.2 µg/m^3	4
	0.036(4)	24-Hour	0.233 µg/m^3	0.3 µg/m^3	8
NO_x	0.08(4)	Annual	0.014 µg/m^3	0.1 µg/m^3	2.5
Visibility	0.184 (SO_2) 0.10 (NO_x) 0.036 (PM_{10})	24-Hour	45.49%	5%	10%
S Deposition	0.15	Annual	0.048 kg/ha/yr	0.01 kg/ha/yr	
N Deposition	0.08	Annual	0.014 kg/ha/yr	0.01 kg/ha/yr	

Notes:

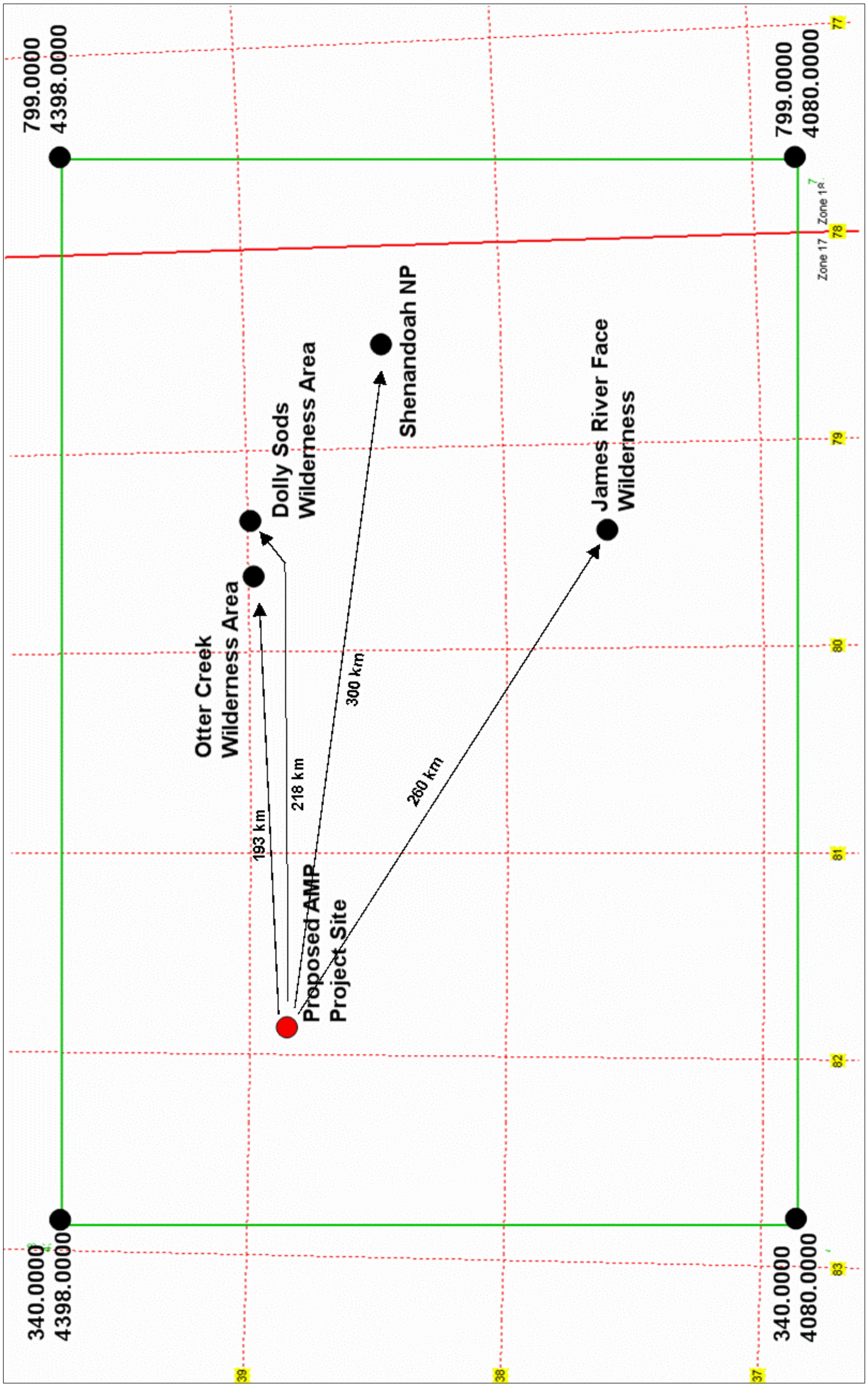
(1) Impacts above the significance levels require an interactive analysis with all other PSD sources that are located within the modeling grid.

(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 emission rates used in this analysis are greater than the emissions rates for PM_{10} and NO_x presented in the permit application submitted for the AMPGS.

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



Models Employed

This analysis was completed with the US EPA approved 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 CALMET, 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.

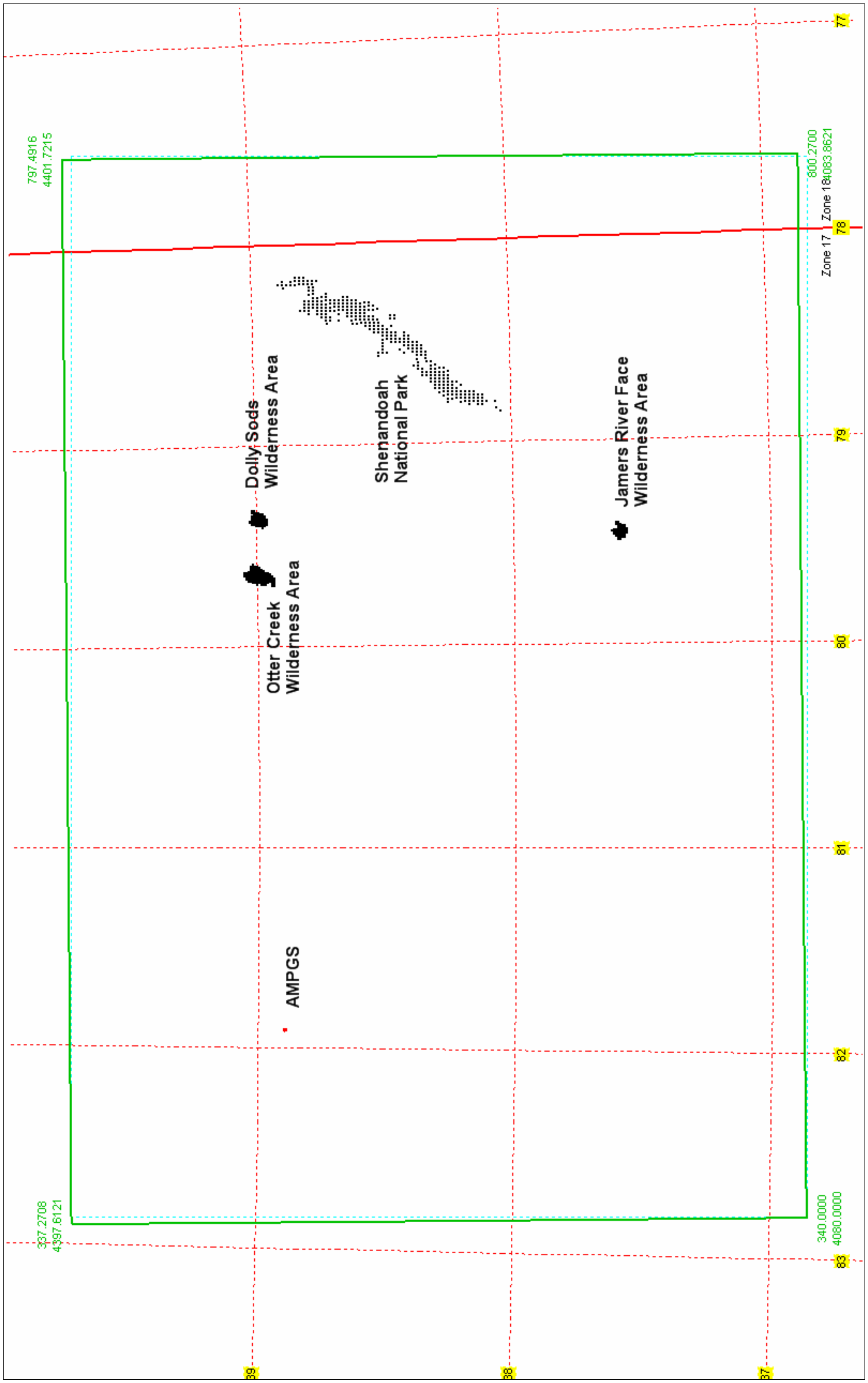
GEOPHYSICAL DATA

Modeling Domain

The southwest corner of the modeling domain is established at 340 kilometers easting and 4,080 kilometers northing (LCC -230.7447, -157.2321). The Grid Cell spacing is 3 kilometers and there are 153 grid cells in the horizontal (easterly) direction and 106 grid cells in the vertical direction (northerly). The modeling grid extends 50 kilometers beyond the proposed facility and Class I areas as suggested in the IWAQM Phase 2 Summary Report. The entire domain covers an area 468 km by 318 km. The CALPUFF computational domain is the same as the CALMET domain.

Due to the size of the modeling domain a Lambert Conformal Conic (LCC) coordinate system was used in this analysis. The LCC projection allows for the curvature of the earth's surface to be accounted for in the coordinate system. The LCC projection in this analysis is based on standard parallels of 36 N and 40 N, an original latitude and longitude of 38.2982^o N and 80.1995^o W and NAD27 datum. Figure 2-1 shows the location of the AMPGS, the modeling domain and the four Class I areas.

Figure 2-1
Modeling Domain with Location of the AMPGS and the Four Class I Areas



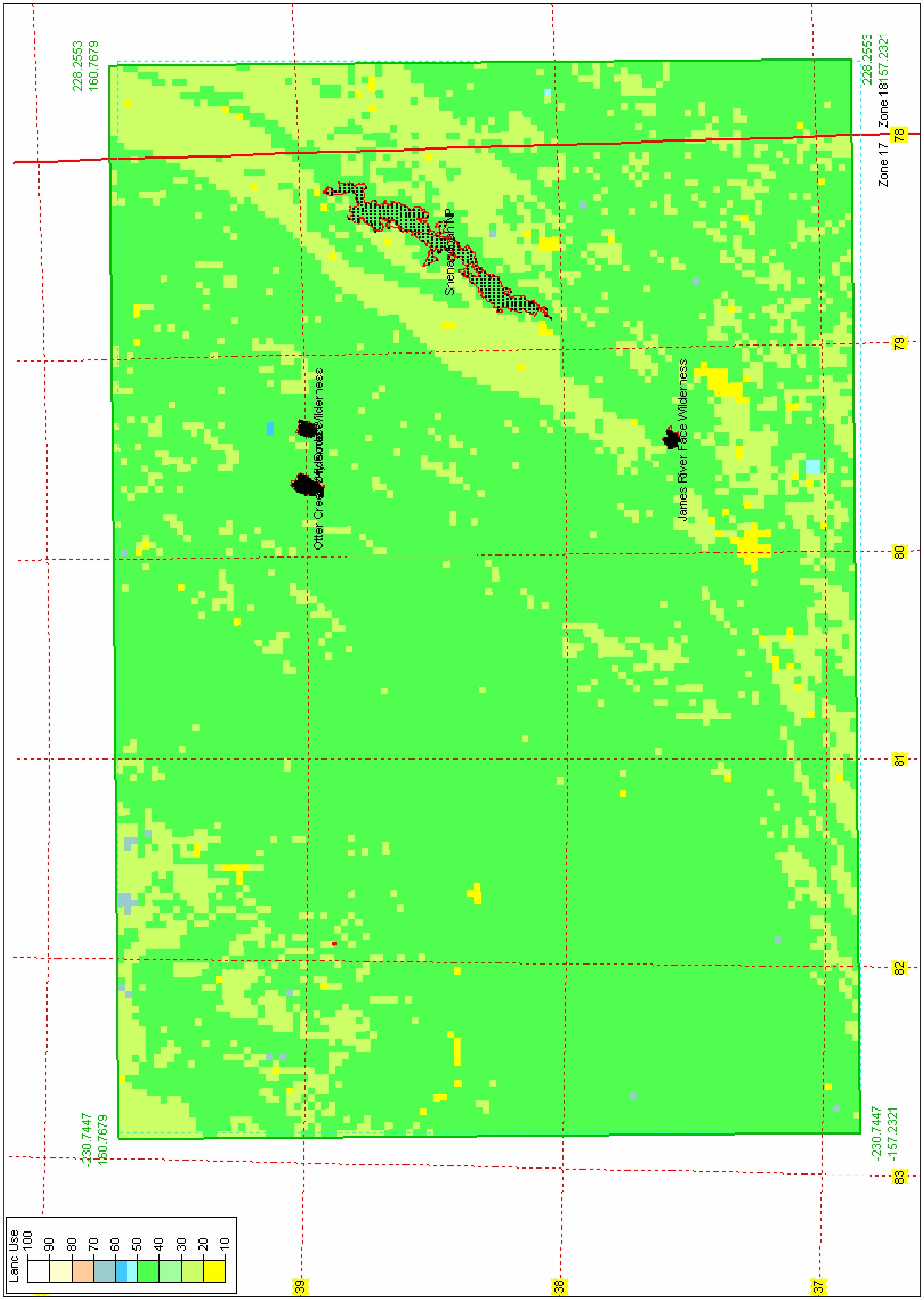
Land Use

Geophysical data is a necessary input to the CALMET portion of the air quality modeling analysis. The United States Geological Survey (USGS) composite theme grid data was processed with the CTGPROC.exe program provided with CALPUFF. This is consistent with the IWAQM guidelines. The geophysical data used in the Class I Analysis are identified in Table 2-1. A 3 km resolution gridded field of the modeling domain land use categories was generated. The terrain height and land use data are required to process the CALMET model. Figure 2-2 presents the land use grid in the Class I modeling domain.

Table 2-1
Geophysical Data

USGS DEM's	**Land Use Data**
Charlottseville-e	Charlottsville.cmp
Charlottesville-w	Cumberland.cmp
Cumberland-e	Charleston.cmp
Cumberland-w	Clarksburg.cmp
Charleston-e	Huntington.cmp
Charleston-w	Columbus.cmp
Clarksburg-e	Norfolk.cmp
Clarksburg-w	Richmond.cmp
Huntington-e	Washington.cmp
Columbus-e	Baltimore.cmp
Norfolk-w	Greensboro.cmp
Richmond-w	Roanoke.cmp
Washington-w	Winston-salem.cmp
Baltimore-w	Bluefield.cmp
Greensboro-e	Johnson_city.cmp
Roanoke-e	Jenkins.cmp
Greensboro-w	
Roanoke-w	
Winston-salem-e	
Bluefield-e	
Winston-salem-w	
Bluefield-w	
Johnson_city-e	
Jenkins-e	

Figure 2-2
Land Use in the Class I Modeling Domain



METEOROLOGICAL DATA

Mesoscale Model Meteorological Data

Mesoscale Model (MM) meteorological data was obtained from the National Park Services for 1990, 1992 and 1996. These data were used to establish the initial guess field for each specific modeling grid cell. The 1990 and 1992 MM4/MM5 data is at 80 km grid spacing and the 1996 MM5 data is at 36 km grid spacing. The initial guess field was then modified using the geophysical data including terrain elevations and land-use data for the specific modeling grid. Final modifications to the wind fields were completed using the National Weather Service (NWS) meteorological station data for both surface and upper air. The MM4 and MM5 data obtained from the National Park Service did not commence on January 1 and terminate on December 31 in each year. Table 2-2 identifies the start and end date/time for each year that an MM4/MM5 data file was built and for which CALMET was processed.

Table 2-2
MM4/MM5 Start and End Dates/Times[1]

	Start			End		
Year	**Month**	**Day**	**Hour**	**Month**	**Day**	**Hour**
1990	1	6	0	12	31	0
1992	1	4	0	12	28	0
1996[2]	1	1	1	8	31	23

Notes:

(1) Eastern Standard Time (Zone +5)

(2) The 1996 MM5 data was available to begin on January 1 (hour 1) and to end on January 30 (hour 18). There was no cloud cover data in the HUSWO surface station data files for September 1 (hour 0) through the end of 1996. The model could not run without the cloud cover data from at least one surface station. Therefore, the last four months of 1996 were excluded from the Class I Modeling Analysis.

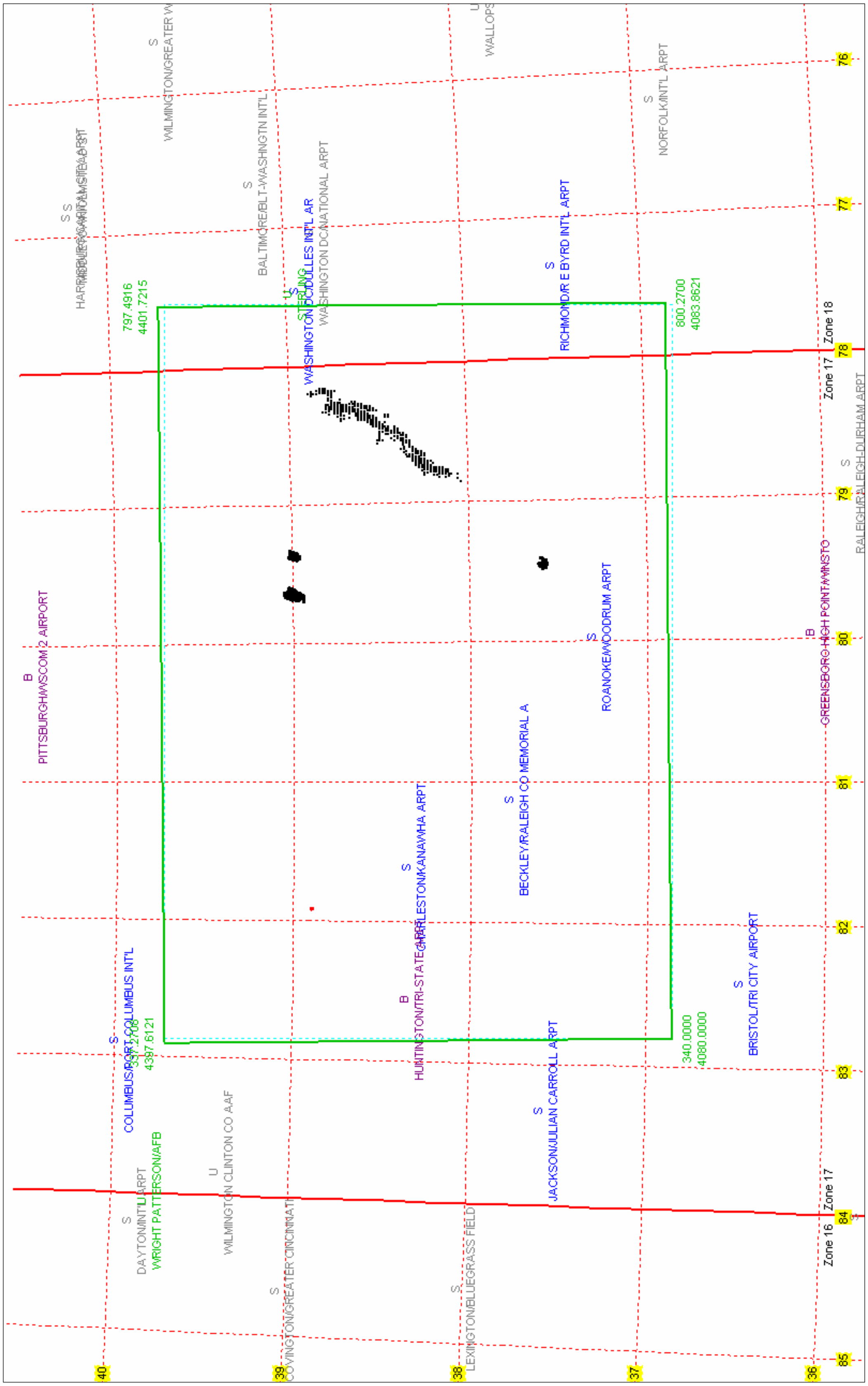
Precipitation Data

Precipitation data from the National Climatic Data Center (NCDC) were used for this analysis. Consistent with the IWAQM Phase 2 Summary report, all precipitation reports for the modeling area will be included. There are 93 precipitation stations located within the modeling grid. The data from these stations were processed using PXTRACT.exe and PMERGE.exe prior to input into CALMET. Precipitation data were not available for some of the stations in 1992 and 1996. A table that identifies the precipitation stations used in the analysis, the station id code and the years that each station was used is included in Appendix A.

Surface Data

The NCDC hourly surface weather observations recommended by the IWAQM Phase 2 Summary Report were used in this analysis. Eleven meteorological stations with surface data are located near the modeling grid and were used in the analysis. The stations are listed in Table 2-3 and shown in Figure 2-3.

Figure 2-3
Upper Air and Surface Meteorological Stations Used in Class I Analysis



Upper Air Data

The NCDC twice daily upper air observations recommended by the IWAQM Phase 2 Summary Report were used in this analysis. Five meteorological stations with upper air data located near the modeling grid were used in the analysis.

The data from these upper air stations was processed with READ62.exe. As described in the IWAQM Phase 2 Summary report, missing meteorological data is expected for each upper air station. Missing data was replaced with the previous reading for the same time period. For example, if data for day 5 hour 0 was missing it was replaced with data from day 4 hour 0. Likewise, if data from day 5 hour 12 was missing it was replaced with data from day 4 hour 12. A complete list of all edits to the upper air data is included in Appendix A. The upper air stations used in the analysis are identified in Appendix A and shown in Figure 2-3. Data were not available for two stations in 1996.

Wind Field Parameters

Table 2-3 lists the wind Field parameters used in the CALMET model.

Table 2-3
Wind Field Parameters

Terrad	15
Rmax 1	15
Rmax 2	50
R1	7
R2	25
Cell Face Heights	0, 20, 40, 80, 160, 320, 1000, 1500, 2200, 3000 meters

AMBIENT BACKGROUND CONCENTRATIONS

Ozone

CALPUFF requires background concentrations of ozone and ammonia. Hourly ozone data was obtained from the U.S. Environmental Protection Agency CASTNET website. Data was available for five stations within the modeling grid. The ozone monitoring stations are identified in Table 2-4. The hourly data was formatted into an “ozone.dat” file as described in the CALPUFF user’s guide.

Table 2-4
Ozone Monitoring Stations

Station	Station ID	State
Parsons	PAR107	WV
Cedar Creek	CDR119	WV
Prince Edward	PED108	VA
Horton Station	VPI120	VA
Shenandoah NP – Big Meadows	SHN418	VA

Ammonia

Background ammonia was determined from the weighted mean background levels from the various land uses in the modeling domain. A background value of 0.5 ppb ammonia was applied to forested land and a value of 10 ppb was applied to agricultural lands. Values were calculated from the landuse.dat file generated from running MAKEGEO.EXE. The landuse.dat file lists the landuse type (by percent) for each grid cell in the modeling domain. The weighted mean of the entire modeling domain resulted in a background ammonia concentration of 2.68 ppb.

STACK 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 PRESENTED 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	415(1)	Maximum annual average emissions rate
NO_X (lb/hr) 24-Hour Average	519	Maximum 24-hour average emissions rate (used for visibility analysis)
PM (lb/hr)	186(2)	Maximum hourly emissions rate
PM (lb/hr) 24-Hour Average	186(2)	Maximum 24-hour average emissions rate (used for visibility analysis)

Notes:

(1) The emission rate for NO_x used in this analysis is greater than the emissions rate presented in the permit application submitted for the AMPGS (i.e., the modeling was performed using conservative data).

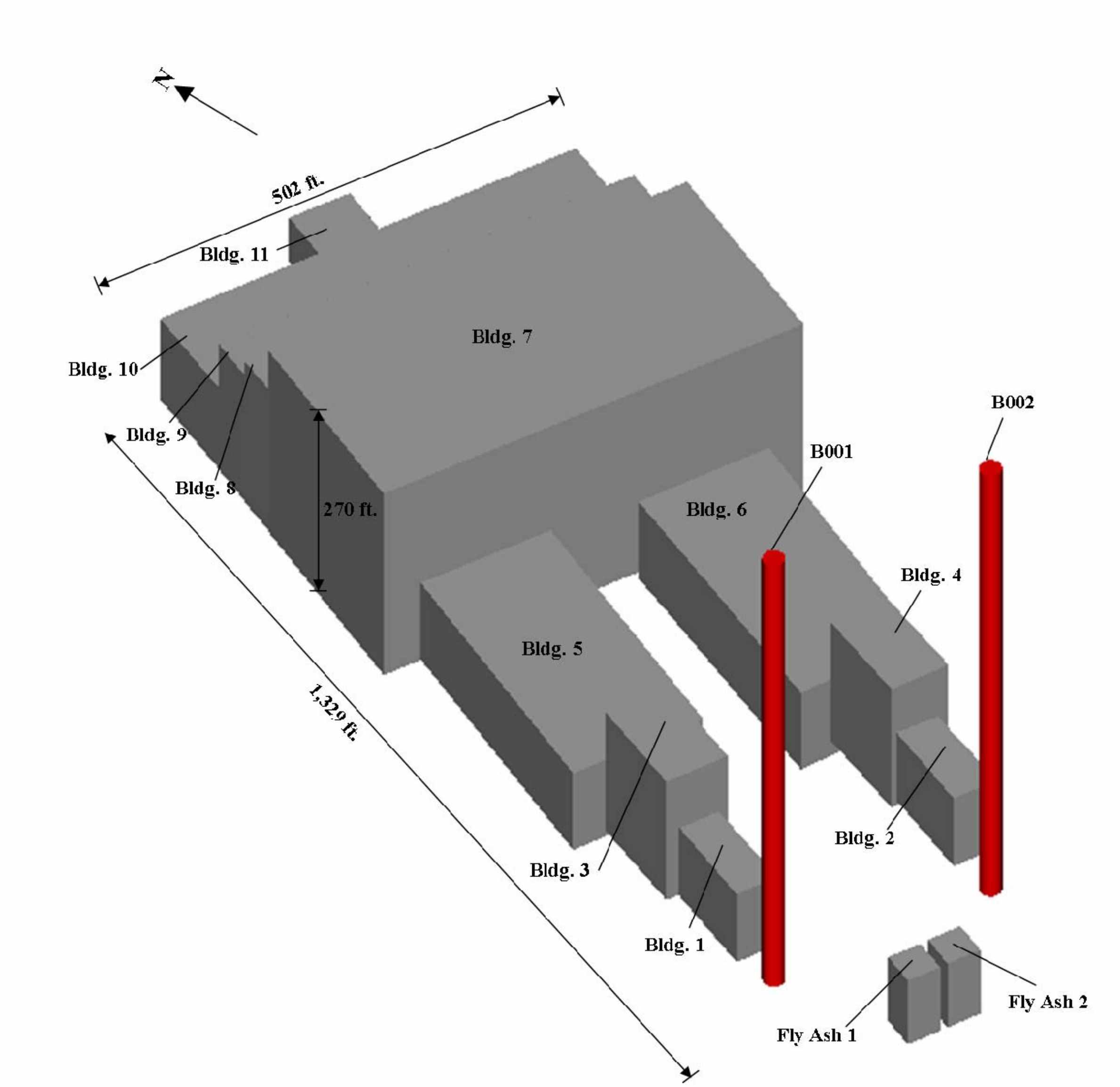
(2) The emission rates for PM_{10} used in this analysis are greater than the emissions rates presented in the permit application submitted for the AMPGS (i.e., the modeling was performed using conservative data).

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 x 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

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 averaging period, 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 4.58 µg/m^3. This concentration was predicted from meteorological data for Julian day 192 in 1992. The location of this peak 3-hour average SO_2 concentration is in the Otter Creek Wilderness Area at receptor number 73.

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

Meteorological Data	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
1990	4.48			34	Otter Creek	077
1992	4.58	1.0	25	73	Otter Creek	192
1996	3.09			312	Shenandoah	037

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 0.99 µg/m^3. This maximum concentration was predicted from meteorological data for Julian day 319 in 1992. The location of this peak 24-hour average SO_2 concentration is in the Shenandoah National Park at receptor number 265.

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

Meteorological Data	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
1990	0.85			325	Shenandoah	344
1992	0.99	0.2	5	265	Shenandoah	319
1996	0.66			477	Shenandoah	031

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 0.042 $\mu g/m^3$. This concentration was predicted from 1992 meteorological data. The location of this peak annual average was in the Otter Creek Wilderness Area at receptor number 1.

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

Meteorological Data	Maximum Predicted Off-Site Impact ($\mu g/m^3$)	Significance Level ($\mu g/m^3$)	Class I PSD Increment ($\mu g/m^3$)	Receptor	Class I Area
1990	0.039	0.1	2	108	Otter Creek
1992	0.042			1	Otter Creek
1996	0.029			1	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 B includes the other PSD sources included in the interactive modeling together with the emission rates and stack parameters used in the analysis. 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 18.16 $\mu g/m^3$. This concentration was predicted from meteorological data for Julian day 202 in 1996. The location of this peak 3-hour average SO_2 concentration is in the Dolly Sods Wilderness Area at receptor number 185. 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 $\mu g/m^3$.

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

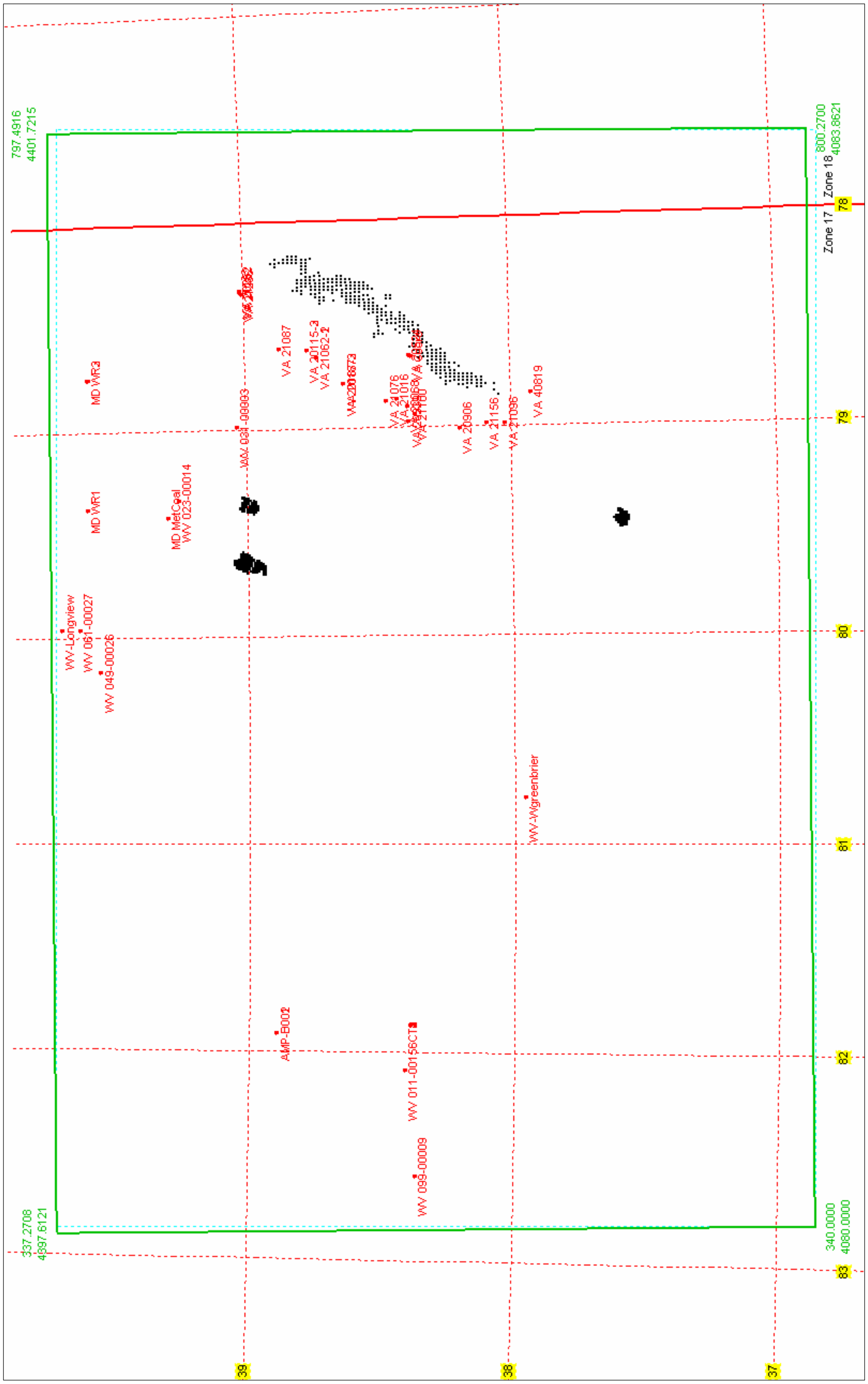


Table 4-4 Interactive SO_2 PSD Class I Increment Analysis 3-Hour Averaging Period					
Meteorological Data	**Maximum Predicted Off-Site Impact ($\mu g/m^3$)**	**Class I PSD Increment ($\mu g/m^3$)**	**Receptor**	**Class I Area**	**Julian Day**
1990	11.84	25	185	Dolly Sods	065
1992	13.26		185	Dolly Sods	348
1996	18.16		185	Dolly Sods	202

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 5.37 $\mu g/m^3$. This concentration was predicted from meteorological data for Julian day 203 in 1996. The location of this peak 24-hour average SO_2 concentration is in the Dolly Sods Wilderness Area at receptor number 185. The contribution of the AMPGS plus the other PSD sources included in this evaluation is slightly greater than the 24-hour Class I PSD increment of 5 $\mu g/m^3$. However, the predicted impact from the AMPGS at receptor 185 on Julian day 203 is 0.0 $\mu g/m^3$. The AMPGS does not contribute significantly to any predicted exceedance of the Class I 24-hour SO_2 PSD Increment.

Table 4-5 Interactive SO_2 PSD Class I Increment Analysis 24-Hour Averaging Period					
Meteorological Data	**Maximum Predicted Off-Site Impact ($\mu g/m^3$)**	**Class I PSD Increment ($\mu g/m^3$)**	**Receptor**	**Class I Area**	**Julian Day**
1990	3.65	5	132	Dolly Sods	112
1992	3.82		185	Dolly Sods	348
1996	5.37		185	Dolly Sods	203

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 0.233 µg/m^3. This maximum concentration was predicted from meteorological data for Julian day 039 in 1992. The location of this peak 24-hour average PM_{10} concentration is in the Shenandoah National Park at receptor number 188.

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

Meteorological Data	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
1990	0.187	0.3	8	325	Shenandoah	344
1992	0.233			188	Shenandoah	039
1996	0.152			477	Shenandoah	031

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 0.012 µg/m^3. This concentration was predicted from 1992 meteorological data. The location of this peak annual average is in the Otter Creek Wilderness Area at receptor number 1.

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

Meteorological Data	Maximum Predicted Off-Site Impact (µg/m^3)	Significance Level (µg/m^3)	Class I PSD Increment (µg/m^3)	Receptor	Class I Area
1990	0.011	0.2	4	108	Otter Creek
1992	0.012			1	Otter Creek
1996	0.008			1	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 0.014 $\mu g/m^3$. This concentration was predicted from 1992 meteorological data. The location of this peak annual average is in the Otter Creek Wilderness Area at receptor number 1.

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

Meteorological Data	Maximum Predicted Off-Site Impact ($\mu g/m^3$)	Significance Level ($\mu g/m^3$)	Class I PSD Increment ($\mu g/m^3$)	Receptor	Class I Area
1990	0.014	0.1	2.5	108	Otter Creek
1992	0.014			1	Otter Creek
1996	0.009			1	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 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

Meteorological Data	Predicted Value (%)	Number of Days >5%	Number of Days >10%	Significance Level (%)	FLM Maximum Threshold (%)
1990	42.62%	39	12	5%	10%
1992	45.49%	49	12		
1996	40.32%	32	13		

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 U.S. 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

Meteorological Data	Predicted Value kg/ha/yr	FLM Maximum Threshold Kg/ha/yr
1990	0.045	0.01
1992	0.048	
1996	0.044	

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 exceed the guidelines established by the FLMs.

Table 8-2
Class I Analysis Nitrogen Deposition

Meteorological Data	Predicted Value kg/ha/yr	FLM Maximum Threshold kg/ha/yr
1990	0.014	0.01
1992	0.014	
1996	0.013	

Based on the results of the Class I sulfur and nitrogen 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 U.S. EPA Region 5.

APPENDIX A

Meteorological Data

Meteorological Data

Precipitation Station Data		
Station	**Station Code**	**Years Processed**
Burdine 2 NE	151120	1990, 1992, 1996
Davella 1 SSW	152053	1990, 1992, 1996
Louisa 2	154946	1990, 1992, 1996
Meta 4 SE	155370	1990, 1992
Pikeville	156355	1990
Staffordsville 2NW	157622	1990, 1992, 1996
Catoctin Mountain Park	181530	1990, 1992
Hancock Fruit Lab	184030	1990, 1992, 1996
McHenry 2 NW	185832	1990, 1992
New Germany 2	186410	1990, 1992
Savage River Dam	188065	1990, 1992, 1996
Athens 2	330282	1990, 1992
Circleville	331592	1990, 1992, 1996
Jackson 2 NW	334004	1990, 1996
Lancaster Water Works	334403	1990, 1992, 1996
Logan	334672	1990, 1992, 1996
McArther	335029	1990, 1992, 1996
McConnelsville Lock 7	335041	1990, 1992, 1996
Portsmouth	336781	1990, 1992, 1996
Tom Jenkins Lake	338378	1990, 1992, 1996
Willow Island Lock and Dam	339197	1990, 1992
Dale Enterprise	339197	1990, 1996
Woodsfield Highway Department	339298	1990, 1992
Altavista	440166	1990, 1992, 1996
Camp Pickett	441322	1990, 1992, 1996
Chatham	441614	1990, 1992, 1996
Covington Filter Plant	442044	1990, 1992, 1996
Culpeper Riverside CG	442159	1990, 1992, 1996
Fredericksburg 2	443200	1990, 1992
Front Royal 1 ESE	443229	1990
Gathright Dam	443310	1990, 1992, 1996
Hot Springs	444128	1990, 1996
Hurley	444180	1990, 1992, 1996
Indian Valley	444246	1990, 1992
John Flannagan Reservoir	444410	1990
Lynchburg WSO Airport	445126	1990, 1992, 1996
Millgap 2 NNW	445595	1990, 1992, 1996
Montebello Fish Nursery	445690	1990, 1992, 1996
Mustoe 4 SSW	445880	1990, 1992, 1996
North Garden	446178	1990, 1992

Meteorological Data

Station	Station Code	Years Processed
Phil Pott Dam 2	446692	1990, 1992, 1996
Piedmont Research Station	446712	1990, 1992, 1996
Pulaski	446955	1990, 1992, 1996
Roanoke WSO Airport	447338	1990, 1992, 1996
Rocky Mount	447338	1990, 1992, 1996
Star Tannery	448046	1990, 1992, 1996
The Plains 2 NNE	448396	1990, 1992, 1996
White Gate	449060	1990, 1992
Williamsville	449159	1990, 1992, 1996
Wise 1 SE	449215	1990, 1992, 1996
Wytheville 1 S	449301	1990, 1992, 1996
Beckley WSO Airport	460582	1990, 1992, 1996
Bemis	460664	1990, 1992
Bluestone Dam	460939	1990
Cacapon State Park	461323	1990, 1992, 1996
Canaan Valley	461393	1990, 1992, 1996
Charleston WSO Airport	461570	1990, 1992, 1996
Clarksburg 1	461667	1990, 1992, 1996
Coopers Rock State Forest	461900	1990, 1992, 1996
Corton	461959	1990, 1992, 1996
Dry Creek	462462	1990, 1992, 1996
Elkins WSO Airport	462718	1990, 1992, 1996
Flat Top	463072	1990, 1992, 1996
Franklin 2 N	463215	1990, 1992
Freemansburg 5 NE	463238	1990, 1992, 1996
Gary	463353	1990
Gassaway	463361	1990, 1992, 1996
Griffithsville	463749	1990, 1992, 1996
Hall 1 WSW	463820	1990, 1992
Hundred	464369	1990, 1992, 1996
Huntington WSOAP	464393	1990, 1992, 1996
Kearneysville 1 NW WBAS	464763	1990, 1992
Lake Lynn	465002	1990, 1992, 1996
Lindside 3 SW	465284	1990, 1992, 1996
Liverpool	465323	1990, 1992, 1996
Lockney	465341	1990, 1992, 1996
Logan	465353	1990, 1992, 1996
Marlinton	465672	1990, 1992, 1996
Mathias	465739	1990, 1992
Moorefield 2 SSE	466163	1990, 1992, 1996
Oak Hill	466591	1990, 1992, 1996

Meteorological Data

Station	Station Code	Years Processed
Romney 1 SW	467730	1990, 1992, 1996
Sheperdstown	468123	1990, 1992, 1996
Smithville	468286	1990, 1992, 1996
Summerville Reservoir	468614	1990
Terra alta 1	468777	1990, 1992, 1996
Tribble	468924	1990, 1992
Tygart Dam	468986	1990, 1992, 1996
Union 3 SSE	469011	1990, 1992, 1996
Valley Head	469086	1990, 1992, 1996
West Union 2	469458	1990, 1992, 1996
Staunton Sewage Plant	488062	1990, 1992, 1996
Bremo Bluff	4440993	1990, 1992, 1996
Surface Station Data		
Huntington/tri-state airport	3860	1990, 1992, 1996
Beckley/Raleigh Co. Memorial	3872	1990, 1992, 1996
Jackson/Julian Carrol Airport	3889	1990, 1992, 1996
Greensboro High Point/Winston-Salem	13723	1990, 1992, 1996
Richmond/RE Byrd International Airport	13740	1990, 1992, 1996
Roanoke/Woodrum Airport	13741	1990, 1992, 1996
Charleston/Kanawha Airport	13866	1990, 1992, 1996
Bristol/Tri-City Airport	13877	1990, 1992, 1996
Columbus/Port Columbus International	14821	1990, 1992, 1996
Washington DC/Dulles International	93738	1990, 1992, 1996
Pittsburgh/WSCOM2 Airport	94823	1990, 1992, 1996
Upper Air Station Data		
Huntington/tri-state airport	3860	1990, 1992, 1996
Greensboro High Point/Winston-Salem	13723	1990, 1992
Wright Patterson Air Force Base	13840	1990, 1992, 1996
Sterling Virginia	93734	1990, 1992
Pittsburgh/WSCOM2 Airport	94823	1990, 1992

AMPGS
Air Quality Modeling
Upper Air Data Revisions

Errors	
1	Missing day(s)
2	Missing/duplicate sounding or time >12 hours
3	Top of sounding is below 500.0-mb level
4	Data at top of sounding is missing
5	Data at bottom of sounding is missing
6	Elevation is decreasing with height
7	Elevation is missing
8	Recorded wrong hour

1990		Missing/Duplicate (Date.Hour)	Replaced (Date.Hour)	Error
03860_90.ua	1	1-12.0	1-11.0	1, 2
		1-12.12	1-11.12	1, 2
		1-13.0	1-11.0	1, 2
		1-13.12	1-11.12	1, 2
	2	5-28.12	5-27.12	3, 4
	3	6-15.12	6-14.12	2
	4	6-16.0	6-15.0	2
	5	6-21.0	6-20.0	6
	6	7-11.12	7-10.12	6
	7	9-10.0	9-9.0	4
	8	12-7.23	12-8.0	2, 8
13723_90.ua	1	1-6.0	1-5.0	6
	2	1-19.12	1-18.12	2
	3	6-20.12	6-19.12	1, 2
		6-21.0	6-20.0	1, 2
		6-21.12	6-19.12	1, 2
		6-22.0	6-20.0	1, 2
	4	11-24.0	11-23.0	1, 2
		11-24.12	11-23.12	1, 2
		11-25.0	11-23.0	1, 2
13840_90.ua	1	1-23.12	1-22.12	2
	2	6-7.0	6-6.0	2
	3	9-18.0	9-17.0	2
	4	10-1.13	10-1.12	2, 8
	5	10-10.0	10-9.0	1, 2
		10-10.12	10-9.12	1, 2
	6	11-27.12	11-26.12	6
	7	12-29.11	12-28.12	3, 4
	8	12-29.12	Deleted	2, 3, 4
93734_90.ua	1	1-10.0	1-9.0	3, 4
	2	1-30.0	1-29.0	2
	3	2-10.12	2-9.12	2
	4	2-13.1	2-13.0	8
	5	2-14.0	2-13.0	3, 4
	6	2-16.12	2-15.12	1, 2
		2-17.0	2-16.0	1, 2
		2-17.12	2-15.12	1, 2
		2-18.0	2-16.0	1, 2
		2-18.12	2-15.12	1, 2
	7	3-14.1	3-14.0	8
	8	4-18.0	4-17.0	2
	9	7-11.12	7-10.12	6
	10	7-25.0	7-24.0	2
	11	8-6.0	8-5.0	1, 2
		8-6.12	8-5.12	1, 2
	12	8-11.12	8-10.12	2
	13	8-15.0	8-14.0	2
	14	10-5.0	10-4.0	2
	15	10-7.12	10-6.12	2
	16	10-25.0	10-24.0	2
	17	11-6.12	11-5.12	2
	18	11-11.12	11-10.12	2
	19	11-12.13	11-12.12	8
	20	11-13.0	11-12.0	1, 2
		11-13.12	11-12.12	1, 2
		11-14.0	11-12.0	1, 2
	21	11-14.13	11-14.12	8
	22	12-7.0	12-6.0	2
	23	12-14.26	12-15.0	8
	24	12-29.1	12-29.0	8
94823_90.ua	1	4-12.12	4-11.12	2
	2	4-29.0	4-28.0	4
	3	7-3.12	7-2.12	2
	4	9-10.12	9-9.12	2
	5	12-6.11	12-6.12	8
	6	12-25.12	12-24.12	2
	7	12-30.12	12-29.12	2

1992		Missing/Duplicate (Date.Hour)	Replaced (Date.Hour)	Error
03860_92.ua	1	1-3.0	1-2.0	1, 2
	2	1-3.12	1-2.12	1, 2
		1-4.12	1-1.12	1, 2
		1-5.0	1-2.0	1, 2
		1-5.12	1-2.12	1, 2
		1-6.0	1-3.0	1, 2
		1-6.12	1-3.12	1, 2
		1-7.0	1-10.0	1, 2
		1-7.12	1-10.12	1, 2
		1-8.0	1-11.0	1, 2
		1-8.12	1-11.12	1, 2
		1-9.0	1-12.0	1, 2
		1-9.12	1-12.12	1, 2
	3	1-29.12	1-28.12	2
	4	2-3.12	2-2.12	2
	5	2-21.0	2-20.0	2
	6	3-8.12	3-7.12	2
	7	4-7.12	4-6.12	3, 4
	8	5-9.12	5-8.12	6
	9	5-16.12	5-15.12	5
	10	6-9.0	6-8.0	2
	11	7-2.0	7-1.0	2
	12	8-21.12	8-20.12	2
	13	8-27.12	8-26.12	2
	14	9-5.0	9-4.0	2
	15	9-7.0	9-6.0	4, 7
	16	9-19.0	9-18.0	2
	17	10-1.0	9-30.0	2
13723_92.ua	1	1-2.12	1-1.12	2
	2	1-5.0	1-4.0	2
	3	1-6.12	1-5.12	3, 4
	4	1-9.0	1-8.0	6
	5	2-19.0	2-18.0	6
	6	3-1.12	2-29.12	2
	7	3-28.0	3-27.0	6
	8	4-20.0	4-19.0	2
	9	4-30.12	4-29.12	4, 7
	10	5-13.12	5-12.12	4, 7
	11	5-17.12	5-14.12	1, 2
		5-18.0	5-15.0	1, 2
		5-18.12	5-15.12	1, 2
		5-19.0	5-16.0	1, 2
		5-19.12	5-16.12	1, 2
	12	7-20.12	7-19.12	2
	13	7-22.0	7-21.0	2
	14	7-24.12	7-23.12	2
	15	8-19.0	8-18.0	2
	16	9-3.0	9-2.0	2
	17	9-20.0	9-19.0	2
	18	9-21.12	9-20.12	2
	19	10-15.0	10-14.0	2
	20	12-24.0	12-17.0	1, 2
		12-24.12	12-17.12	1, 2
		12-25.0	12-18.0	1, 2
		12-25.12	12-18.12	1, 2
		12-26.0	12-19.0	1, 2
		12-26.12	12-19.12	1, 2
		12-27.0	12-20.0	1, 2
		12-27.12	12-20.12	1, 2
		12-28.0	12-21.0	1, 2
		12-28.12	12-21.12	1, 2
		12-29.0	12-22.0	1, 2
		12-29.12	12-22.12	1, 2
	21	12-30.0	12-23.0	4
		12-30.12	12-23.12	4
	22	12-31.12	12-30.12	4
13840_92.ua	1	2-3.0	2-2.0	2
	2	2-8.0	2-7.0	2
	3	3-4.12	3-3.12	4
	4	3-13.12	3-12.12	2
	5	3-29.0	3-28.0	3, 4
	6	5-3.0	5-2.0	6
	7	5-5.0	5-4.0	2
	8	5-6.0	5-5.0	2
	9	5-26.0	5-25.0	6
	10	6-5.12	6-4.12	2
	11	6-9.0	6-8.0	2
	12	6-20.0	6-19.0	2
	13	7-10.0	7-9.0	2
	14	7-26.12	7-25.12	2
	15	8-3.0	8-2.0	2

1996		Missing/Duplicate (Date.Hour)	Replaced (Date.Hour)	Error
13723_96.ua	1	1-6.17	Deleted	6, 7
	2	3-1.12	2-29.12	6, 7
	3	3-19.12	3-18.12	2
	4	4-10.0	4-9.0	2
	5	4-15.0	4-14.0	5
	6	5-20.0	5-19.0	2
	7	5-23.12	5-22.12	5
	8	5-25.0	5-24.0	5
	9	5-28.0	5-27.0	2
	10	6-11.12	6-10.12	5
	11	6-15.0	6-14.0	5
	12	6-16.12	6-15.12	5
	13	6-17.0	6-16.0	5
	14	6-23.0	6-22.0	4, 7
	15	6-24.0	Deleted	2
	16	8-17.12	8-16.12	2
	17	9-4.0	9-3.0	3
	18	9-16.12	9-15.12	2
93734_96.ua	1	1-29.12	1-28.12	4, 6
	2	2-1.0	1-31.0	2
	3	2-1.12	1-31.12	3, 4, 7
	4	2-2.0	Deleted	2
	5	3-15.12	3-14.12	4, 6
	6	4-27.12	4-26.12	2
	7	5-20.12	5-19.12	2
	8	6-12.12	6-11.12	2
	9	6-15.12	6-14.12	2
		6-16.0	6-15.0	2
	10	6-17.0	6-16.0	2
	11	6-20.12	6-18.12	1, 2
		6-21.0	6-19.0	1, 2
		6-21.12	6-19.12	1, 2
	12	6-26.12	6-24.12	1, 2
		6-27.0	6-25.0	1, 2
		6-27.12	6-25.12	1, 2
	13	7-7.12	7-4.12	1, 2
		7-8.0	7-5.0	1, 2
		7-8.12	7-5.12	1, 2
		7-9.0	7-6.0	1, 2
		7-9.12	7-6.12	1, 2
	14	8-8.12	8-7.12	3, 4
	15	8-24.12	8-20.12	1, 2
		8-25.0	8-21.0	1, 2
		8-25.12	8-21.12	1, 2
		8-26.0	8-22.0	1, 2
		8-26.12	8-22.12	1, 2
		8-27.0	8-23.0	1, 2
		8-27.12	8-23.12	1, 2
		8-28.0	8-24.0	1, 2
	16	9-28.12	9-24.12	1, 2
		9-29.0	9-25.0	1, 2
		9-29.12	9-25.12	1, 2
		9-30.0	9-26.0	1, 2
		9-30.12	9-26.12	1, 2
		10-1.0	9-27.0	1, 2
		10-1.12	9-27.12	1, 2
	17	10-5.12	10-4.12	2
	18	10-6.12	10-5.12	2
	19	10-11.0	10-10.0	1, 2
		10-11.12	10-10.12	1, 2
	20	10-13.0	10-12.0	1, 2
		10-13.12	10-12.12	1, 2
	21	10-20.0	10-19.0	2
	22	11-2.0	11-1.0	2
	23	11-17.12	11-16.12	2
	24	11-21.0	11-20.0	2
	25	11-23.0	11-22.0	2
	26	11-27.0	11-26.0	7
	27	12-8.12	12-7.12	5
	28	12-18.0	12-17.0	2
	29	12-18.12	12-17.12	3, 4
	30	12-25.12	12-26.12	3, 4
94823_96.ua	1	1-7.12	1-6.12	4, 6
	2	1-27.0	1-26.0	2
	3	1-28.0	1-27.0	2
	4	3-28.12	3-27.12	2
	5	3-30.12	3-29.12	2
	6	3-31.12	3-30.12	2
	7	4-6.0	4-5.0	2
	8	6-1.12	5-31.12	5
	9	6-4.12	6-3.12	2

	16	8-4.12	8-3.12	2
	17	8-24.12	8-23.12	2
	18	9-12.0	9-11.0	4, 7
	19	11-10.0	11-9.0	1, 2
		11-10.12	11-9.12	1, 2
	20	11-21.0	11-20.0	2
93734_92.ua	1	1-5.12	1-4.12	2
	2	1-16.12	1-15.12	2
	3	1-21.0	1-20.0	2
	4	1-30.12	1-29.12	2
	5	2-7.12	2-6.12	2
	6	2-8.12	2-7.12	2
	7	2-9.12	2-8.12	2
	8	2-11.0	2-10.0	1, 2
		2-11.12	2-10.12	1, 2
	9	2-17.0	2-16.0	2
	10	2-23.0	2-22.0	2
	11	3-1.12	2-29.12	4
	12	3-12.0	3-11.0	2
	13	4-9.0	4-8.0	4
	14	4-11.0	4-10.0	4
	15	4-12.0	4-11.0	4
	16	5-7.12	5-6.12	2
	17	5-9.12	5-8.12	2
	18	5-23.12	5-22.12	2
		5-24.0	5-23.0	2
	19	5-25.0	5-24.0	6
	20	5-25.12	5-24.12	2
	21	6-15.0	6-14.0	2
	22	6-18.0	6-17.0	2
	23	7-15.12	7-14.12	2
	24	7-20.12	7-19.12	2
	25	7-27.0	7-26.0	2
	26	9-2.12	9-1.12	2
	27	9-23.0	9-22.0	2
	28	10-2.12	10-1.12	4
	29	10-4.12	10-3.12	2
	30	10-15.12	10-14.12	2
	31	11-4.0	11-3.0	2
	32	11-14.12	11-13.12	2
	33	11-15.12	11-13.12	1, 2
		11-16.0	11-14.0	1, 2
		11-16.12	11-14.12	1, 2
	34	12-20.12	12-15.12	1, 2
		12-21.0	12-16.0	1, 2
		12-21.12	12-16.12	1, 2
		12-22.0	12-17.0	1, 2
		12-22.12	12-17.12	1, 2
		12-23.0	12-18.0	1, 2
		12-23.12	12-18.12	1, 2
		12-24.0	12-19.0	1, 2
		12-24.12	12-19.12	1, 2
	35	12-27.12	12-26.12	2
94823_92.ua	1	1-11.12	1-9.12	1, 2
		1-12.0	1-10.0	1, 2
		1-12.12	1-10.12	1, 2
	2	1-14.12	1-13.12	4
	3	1-19.12	1-18.12	2
	4	1-21.0	1-20.0	2
	5	1-24.13	1-23.12	2
	6	2-1.12	1-31.12	2
	7	2-3.0	2-2.0	3, 4
	8	2-14.0	2-13.0	5
	9	4-2.0	4-1.0	2
	10	4-10.0	4-9.0	2
	11	4-28.12	4-27.12	2
	12	5-2.0	5-1.0	2
	13	5-30.0	5-29.0	2
	14	6-11.12	6-10.12	2
		6-12.0	6-11.0	2
	15	6-15.12	6-14.12	2
	16	6-17.0	6-16.0	2
	17	7-23.0	7-22.0	2
	18	7-24.0	7-23.0	1, 2
		7-24.12	7-23.12	1, 2
	19	8-23.0	8-22.0	2
	20	8-24.0	8-23.0	1, 2
		8-24.12	8-23.12	1, 2
	21	9-5.0	9-4.0	2
	22	9-20.0	9-19.0	2
	23	9-24.0	9-23.0	1, 2
		9-24.12	9-23.12	1, 2
	24	10-1.12	9-30.12	2
	25	10-3.0	10-2.0	2
	26	10-23.12	10-22.12	2
	27	11-2.12	11-1.12	2
	28	11-13.0	11-12.0	2
	29	12-2.0	12-1.0	2
	30	12-17.12	12-16.12	2

	10	6-14.12	6-13.12	5
	11	6-19.12	6-12.12	1, 2
		6-20.0	6-13.0	1, 2
		6-20.12	6-13.12	1, 2
		6-21.0	6-14.0	1, 2
		6-21.12	6-14.12	1, 2
		6-22.0	6-15.0	1, 2
		6-22.12	6-15.12	1, 2
		6-23.0	6-16.0	1, 2
		6-23.12	6-16.12	1, 2
		6-24.0	6-17.0	1, 2
		6-24.12	6-17.12	1, 2
		6-25.0	6-18.0	1, 2
		6-25.12	6-18.12	1, 2
	12	7-23.12	7-22.12	5
	13	8-4.12	8-3.12	7
	14	8-8.0	8-7.0	2
		8-8.12	8-7.12	2
	15	8-17.12	8-16.12	5
	16	9-6.12	9-5.12	4
	17	9-11.12	9-10.12	5
	18	10-9.0	10-8.0	2
	19	10-15.12	10-14.12	5
	20	11-2.0	11-1.0	2
	21	11-23.12	11-22.12	5
	22	12-3.12	12-2.12	2
	23	12-19.0	12-18.0	3, 4, 7

APPENDIX B

Other Sulfur Dioxide Sources

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 C

CALPOST Output Files
(1990, 1992 and 1996)

APPENDIX D

Class I Modeling Protocol
(January 18, 2006)

AMP-Ohio
Proposed Base Load Generating Facility Development
Air Quality Modeling Protocol
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 will be provided with the permit application.

Following is a preliminary list of the additional emissions units that may be 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.

Although 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 US EPA approved 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.

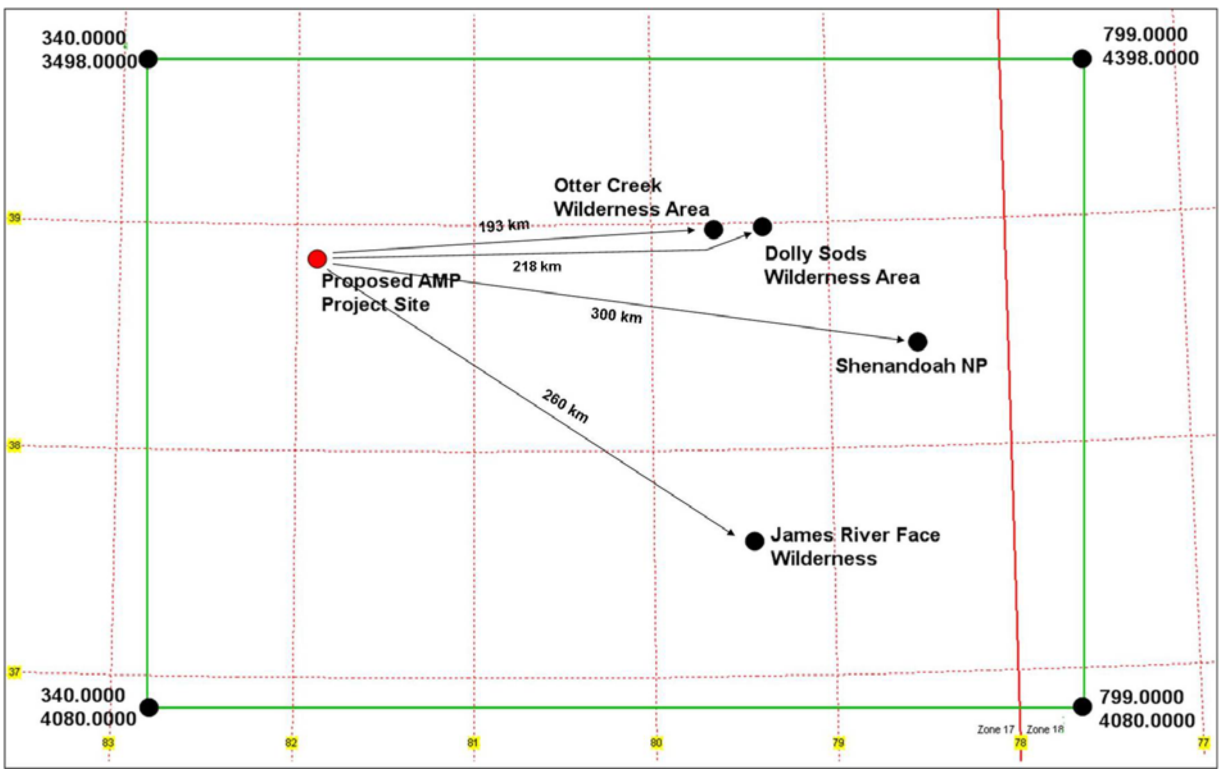
As recommended in the IWAQM Phase 2 Summary Report, the use of the MESOPUFF II chemistry options currently available in CALPUFF will be used to represent the oxidation of SO_2 to sulfate and the nitrate chemistry.

The emission rates for SO_2, NO_x and PM_{10} will be consistent with the emissions rates used in the near field ISC3 air quality analysis for the proposed project

Horizontal Modeling Grid

The proposed modeling grid is consistent with IWAQM Phase 2 Summary Report. The southwest corner of the modeling grid is established at 340 kilometers easting and 4,080 kilometers northing. The Grid Cell spacing is 3 kilometers and there are 153 grid cells in the horizontal direction and 106 grid cells in the vertical direction. The modeling grid extends 50 kilometers beyond the proposed facility and Class I areas as suggested in the IWAQM Phase 2 Summary Report. Figure 1 shows the modeling grid and Class I areas.

Figure 1
Class I Modeling Grid



CALMET

Mesoscale Model (MM) meteorological data from the National Park Services for 1990, 1992 and 1996 will be used to establish the Initial Guess Field for each specific modeling grid. The Initial Guess Field will be modified using the geophysical data including terrain elevations and land-use data for the specific modeling grid. Final modifications to the wind fields will be completed using the national weather service meteorological stations data for both surface and upper air.

Input Options

Table 1 summarizes the CALMET default input parameters as described in the FLAG and IWAQM documents and following recommendations from the CALMET developers (Earthtech).

Table 1 CALMET INPUT PARAMETERS		
Parameter		**Value**
Gridded cloud data options	ICLOUD	0 = not used
Cloud data file format	IFORMC	2 = formatted
Model selection variable	IWFCOD	1 = Diagnostic wind module
Compute froude number adjustment effects	IFRADJ	Yes
Compute kinematic effects	IKINE	No
Use O'Brien procedures for adjustments	IDBR	No
Compute slope flow effects	ISLOPE	Yes
Extrapolate surface wind observations to upper layers	IEXTRP	-4 = Similarity theory layers 1NZ
Extrapolate surface winds even if calm	ICALM	No
Minimum distance from nearest upper air station to surface station for which extrapolation of surface winds at surface stations will be allowed	RMIN2	-1
Timestep (hours) of the prognostic model input data	ISTEPPG	1
Use varying radius of influence	LVARY	False
Minimum radius of influence used in the wind field interpolation (km)	RMIN	0.1
Relative weighing parameter of prognostic wind field data (km)	RPROG	None
Maximum acceptable divergence in the divergence minimization procedure	DIVLIM	5.0E-06
Maximum number of iterations in the divergence min. procedure	NITER	50
Number of passes in the smoothing procedure	NSMTH(N2)	2,4
Maximum number of stations used in each layer for the interpolation of data to a grid point	NINTR2(N2)	99
Critical froude number	CRITFN	1
Empirical factor controlling the influence of kinematic effects	ALPHA	0.1
Multiplicative scaling factor for extrapolation of surface observations to upper layers	FEXTR2(NZ)	0
Number of barriers to interpolation of the wind fields	NBAR	0
Coordinates for beginning of barrier		None
Coordinates for ending of barrier		None
Depth through which the domain-scale lapse rate is computed (m)	ZUPT	200

Table 1 CALMET INPUT PARAMETERS		
Parameter		Value
Upper air station to use for the domain-scale winds	IUPWND	-1
Bottom an top of layer through which the domain-scale winds are computed (m)	ZUPWND	1 - 1,000
Neutral mechanical equation	CONSTB	1.41
Convective mixing height equation	CONSTE	0.15
Stable mixing height equation	CONSTN	2400
Overwater mixing height equation	CONSTW	0.16
Absolute value of Coriolis parameter	FCORIOL	1.0E-04
Conduct spatial averaging	IAVEZI	Yes
Max search radius in averaging process	MINDAV	1
Half-angle of upwind looking cone for averaging	HAFANG	30
Layer of winds used in upwind averaging (from 1 to NZ)	ILEVZI	1
Min potential temperature lapse rate in the stable layer above the current connective	OPTMIN	0.001
Depth of layer above current conv mixing height through which lapse rate is computed	DZZI	200
Minimum overland mixing height (m)	Zmin	50
Maximum overland mixing height (m)	Zmax	3000
Minimum overwater mixing height (m)	Zminw	50
Maximum overwater mixing height (m)	Zmaxw	3000
3D temperatures from observations or from prognostic data	ITPROG	0 = use surface and upper air stations
Interpolation type	IRAD	1-1/R
Radius of influence for temp. interpolation (km)	TRADKM	500
Maximum number f of stations to include in temperature interpolation	NUMT5	5
Conduct special averaging of temperatures	IAVET	Yes
Default temperature gradient below the mixing height over water (K/m)	TGDEFB	-0.0098
Default temperature gradient above the mixing height over water(K/m)	TGDEFA	-0.0045
Beginning and end in land use categories for temperature interpolation over water	JWAT1, JWAT2	55, 55
Method of interpolation	NFLAGP	2-1/R~ 2
Radius of influence (km)	SIGMAP	100
Minimum precip rate cutoff (mm/hr)	CUTP	0.01

Geophysical Data

The geophysical data is a necessary input into the CALMET portion of the air quality modeling analysis. The United States Geological Survey (USGS) composite theme grid data will be processed with the CTGPROC.exe program provided with CALPUFF. This is consistent with the IWAQM guidelines. The land use data includes:

- Charlottsville.cmp
- Cumberland.cmp
- Charleston.cmp
- Clarksburg.cmp
- Huntington.cmp
- Columbus.cmp
- Norfolk.cmp
- Richmond.cmp
- Washington.cmp
- Baltimore.cmp
- Greensboro.cmp
- Roanoke.cmp
- Winston-salem.cmp
- Bluefield.cmp
- Johnson_city.cmp
- Jenkins.cmp

The USGS DEM files will be processed with TERREL.exe to establish the terrain data files. This is consistent with the IWAQM guidelines. The USGS DEMs include:

- Charlottseville-e
- Charlottesville-w
- Cumberland-e
- Cumberland-w
- Charleston-e
- Charleston-w
- Clarksburg-e
- Clarksburg-w
- Huntington-e
- Columbus-e
- Norfolk-w
- Richmond-w
- Washington-w
- Baltimore-w
- Greensboro-e
- Roanoke-e
- Greensboro-w
- Roanoke-w
- Winston-salem-e
- Bluefield-e
- Winston-salem-w
- Bluefield-w
- Johnson_city-e
- Jenkins-e

The land use and terrain files will be processed with MAKEGEO.exe before input into CALMET.

Precipitation Data

Precipitation data from the National Climatic Data Center (NCDC) will be used for this analysis. Consistent with the IWAQM Phase 2 Summary report, all precipitation reports for the modeling area will be included. There are 93 precipitation stations located within the modeling grid. The data from these stations will be processed using PXTRACT.exe and PMERGE.exe prior to input into CALMET. The 45 precipitation stations are:

- Burdine 2 NE (151120)
- Davella 1 SSW (152053)
- Louisa 2 (154946)
- McHenry 2 NW (185832)
- Meta 4 SE (155370)
- New Germany 2 (186410)
- Pikeville (156355)
- Savage River Dam (188065)
- Staffordsville 2NW (157622)
- Athens 2 (330282)
- Catoctin Mountain Park (181530)
- Circleville (331592)
- Hancock Fruit Lab (184030)
- Jackson 2 NW (334004)
- Lancaster Water Works (334403)
- Logan (334672)
- McArther (335029)
- McConnelsville Lock 7 (335041)
- Portsmouth (336781)
- Tom Jenkins Lake (338378)
- Willow Island Lock and Dam (339197)
- Woodsfield Highway Department (339298)
- Altavista (440166)
- Bremo Bluff (440993)

- Camp Pickett (441322)
- Chatham (441614)
- Covington Filter Plant (442044)
- Culpeper Riverside CG (442159)
- Dale Enterprise (339197)
- Fredericksburg 2 (443200)
- Front Royal 1 ESE (443229)
- Gathright Dam (443310)
- Hot Springs (444128)
- Hurley (444180)
- Indian Valley (444246)
- John Flannagan Reservoir (444410)
- Lynchburg WSO Airport (445126)
- Millgap 2 NNW (445595)
- Montebello Fish Nursery (445690)
- Mustoe 4 SSW (445880)
- North Garden (446178)
- Phil Pott Dam 2 (44692)
- Piedmont Research Station (446712)
- Pulaski (446955)
- Roanoke WSO Airport (447338)
- Rocky Mount (447338)
- Star Tannery (448046)
- Staunton Sewage Plant (448062)
- The Plains 2 NNE (448396)
- White Gate (449060)
- Williamsville (449159)
- Wise 1 SE (449215)
- Wytheville 1 S (449301)
- Beckley WSO Airport (460582)
- Bemis (460664)
- Bluestone Dam (460939)
- Cacapon State Park (461323)
- Canaan Valley (461393)
- Charleston WSO Airport (461570)
- Clarksburg 1 (461677)
- Coopers Rock State Forest (461900)
- Corton (461959)
- Dry Creek (462462)
- Elkins WSO Airport (462718)
- Flat Top (463072)
- Franklin 2 N (463215)
- Freemansburg 5 NE (463238)
- Gary (463353)
- Gassaway (463361)
- Griffithsville (463749)
- Hall 1 WSW (463820)
- Hundred (464369)
- Huntington WSOAP (464393)
- Kearneysville 1 NW WBAS (464763)
- Lake Lynn (465002)
- Lindside 3 SW (465284)
- Liverpool (465323)
- Lockney (465341)
- Logan (465353)
- Marlinton (465672)
- Mathias (465739)
- Moorefield 2 SSE (466163)
- Oak Hill (466591)
- Romney 1 SW (467730)
- Sheperdstown (468123)
- Smithville (468286)
- Summerville Reservoir (468614)
- Terra alta 1 (468777)
- Tribble (468924)
- Tygart Dam (468986)
- Union 3 SSE (469011)
- Valley Head (469086)
- West Union 2 (469458)

Surface Data

The NCDC hourly surface weather observations recommended by the IWAQM Phase 2 Summary Report will be used in this analysis. Twelve meteorological stations with surface data are located near the modeling grid. These surface stations are:

- Jackson/Julian Carrol Airport (03889)
- Greensboro High Point/Winston-Salem (13723)
- Pittsburgh/WSCOM2 Airport (94823)
- Bristol/Tri-City Airport (13877)

- Roanoke/Woodrum Airport (13741)
- Washington DC/Dulles International Airport (93738)
- Beckley/Raleigh Co. Memorial (03872)
- Charleston/Kanawha Airport (13866)
- Huntington/tri-state airport (03860)
- Columbus/Port Columbus International Airport (14821)
- Richmond/RE Byrd International Airport (13740)

Surface data from these stations will be processed with SMERGE.exe.

Upper Air Data

The NCDC twice daily upper air observations recommended by the IWAQM Phase 2 Summary Report will be used in this analysis. There are five meteorological stations with upper air data located near the modeling grid. These upper air stations include:

- Huntington/tri-state airport (03860)
- Greensboro High Point/Winston-Salem (13723)
- Wright Patterson Air Force Base (13840)
- Sterling Virginia (93734)
- Pittsburgh/WSCOM2 Airport (94823)

The data from these upper air stations will be processed with READ62.exe. As described in the IWAQM Phase 2 Summary report, missing meteorological data is expected for each upper air station. Missing data will be replaced with the previous reading for the same time period. For example, if data for day 5 hour 0 is missing it will be replaced with data from day 4 hour 0. Likewise, if data from day 5 hour 12 is missing it will be replaced with data from day 4 hour 12. A complete list of all edits to the upper air data will be provided with the final modeling report.

Windfield Parameters

The terrad value will be set at 15 kilometers, 5 times the grid cell spacing of 3. Rmax values will be set at 6 kilometers, 2 times the grid cell spacing of 3. Rmin will be set to the default value of 0.1 kilometer and R_1 and R_2 will be set to 3 kilometers, the grid cell spacing.
The cell face heights will be set at 0, 20, 40, 80, 160, 320, 1000, 1500, 2200 and 3000 meters.

CALMET output will be split bi-monthly to maintain the file size below the 2 kilobyte size limit of CALPUFF.

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
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

Table 2
CALPUFF INPUT PARAMETERS

Parameter		Value
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 Hs < Hb +TBD^HL)	TBD	0.5
Range of landuse categories for which urban dispersion is assumed	IURB1, IURB2	10, 1.9
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

Table 2 CALPUFF INPUT PARAMETERS		
Parameter		**Value**
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
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 will be used to complete the Class I modeling. The maximum air flow rate and corresponding velocity will be used to represent the worst case for the long range CALPUFF analysis. AMP-Ohio 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 PRESENTED FOR EACH STACK)		
Parameter	**Maximum Load**	**Notes**
Stack Height (ft)	625	Less than GEP Stack Height
Stack Diameter (ft)	24.76	NA
Flow Rate (ACFM)	1,738,204	Maximum flow rate, which will cause highest off-site impact
Velocity (fps)	60.2	Maximum flow rate, which will result in maximum velocity
Stack Gas Exit Temperature (F)	135	NA
SO_2 (lb/hr) 3-Hour Average	3,188	Maximum 3-hour average emissions rate
SO_2 (lb/hr) 24-Hour Average	2,169	Maximum 24-hour average emissions rate

Table 3 BOILER STACK PARAMETERS (VALUES PRESENTED FOR EACH STACK)		
Parameter	**Maximum Load**	**Notes**
SO_2 (lb/hr) Annual Average	779	Maximum annual average emissions rate
NO_X (lb/hr)	415	Maximum annual average emissions rate
NO_X (lb/hr) 24-Hour Average	519	Maximum 24-hour average emissions rate (used for visibility analysis)
PM (lb/hr)	78	Maximum hourly emissions rate
PM (lb/hr) 24-Hour Average	78	Maximum 24-hour average emissions rate (used for visibility analysis)

GEP Stack Height

GEP stack height is the optimum stack height for avoiding downwash effects when conducting Class I and Class II air quality modeling and is also the maximum stack height that can be used when conducting Class I and Class II air quality modeling. The GEP stack height was 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 2 depicts the structures on the plant property that will be entered into the Class I and Class II modeling for downwash calculation purposes. Table 4 summarizes the dimensions of each structure identified in Figure 2. Since all of the buildings shown in Figure 2 are connected, all the structures shown are considered to be "nearby" as defined in OAC rule 3745-16-01(G)(1). Since the all of the buildings shown in Figure 2 are "nearby" then the height of the tallest building (Building 8 @ 270 ft) is used to calculate the GEP stack height along with the lesser of the overall width of the entire complex (502 ft) or the height of the tallest building (Building 8 @ 270 ft). The GEP stack height (Hg) is calculated, as follows, according to the equation found in OAC rule 3745-16-01(F)(2)(b):

Hg = H + 1.5 L

Hg = 270 feet (*building 8 height*) + 1.5(270 feet) (*building 8 height is less than the entire structure width (502 feet)*) = 675 feet

Class I Receptors

The receptor network developed by the FLM for Dolly Sods Wilderness Area and Otter Creek Wilderness Area will be 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 ozone data will be obtained from the U.S. Environmental Protection Agency CASTNET website. Data is available for two stations within the modeling grid, Parsons and Cedar Creek. This hourly data will be formatted into an "ozone.dat" file as described in the CALPUFF user's guide.

Figure 2
Building Diagram

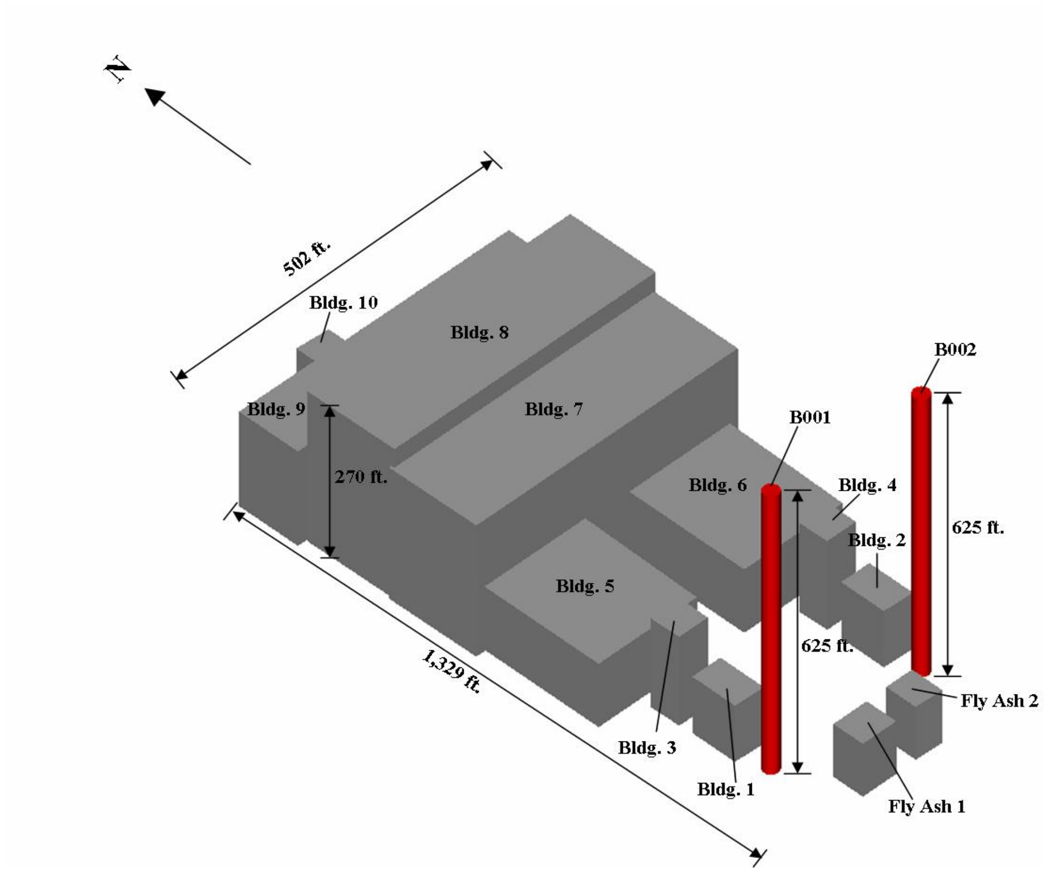


Table 4 BUILDING PARAMETERS			
Building	**Length (ft)**	**Width (ft)**	**Height (ft)**
1	75	49	101
2	75	49	101
3	49	49	160
4	49	49	160
5	200	174	114
6	200	174	114
7	453	148	236
8	453	148	270
9	463	102	170
10	105	52	65
Fly Ash 1	59	52	95
Fly Ash 2	52	46	95

Ammonia Background

The background value that will be 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 and will be used to complete the visibility 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 preliminary PSD increment concentration will be identified for the proposed source. If the proposed source has a significant impact, a cumulative PSD increment consumption analysis will be completed for that specific pollutant. 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 (µg/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 will include PSD increment consuming sources within the modeling grid. A complete inventory will be developed with information provided from West Virginia Department of Environmental Quality and the Ohio Environmental Protection Agency (OEPA).

Visibility

The preliminary visibility analysis will be completed with the proposed project only. The visibility significance level is 5%. A cumulative visibility analysis will be completed if a change in extinction greater than 5% is predicted. A complete inventory will be developed with information provided by the West Virginia Department of Environmental Quality and the Ohio Environmental Protection Agency (OEPA).

S and N Deposition

The total S and N deposition amount, in kg/ha/yr, will be calculated 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