Holland Board of Public Works

PSD Applicability

Table B-1. Netting Demonstration

Pollutant	2-year Past Actual		New CFB Boiler						NSPS		Net Change		Significance Level
	Unit #3		Unit #10										
	tpy	Fugitives (tpy)	$lb/MWhr_{gross}$	lb/MMBTU	lb/hr	lb/yr	tpy	Fugitives (tpy)	$lb/MWhr_{gross}$	lb/MMBTU	tpy	lb/yr	tpy
PM [1]	10.13	2.63		0.011	9.52		41.68	11.08		0.015	40.00		15
$PM_{10}/PM_{2.5}$	10.13	0.74		0.025	21.63		94.72	6.31		0.015	90.16		25
NO_x	425.73		1.00	0.09	78.00		341.64		1.0		-84.09		40
SO_2	531.99		1.40	0.126	109.20		478.30		1.4		-53.69		40
H_2SO_4	32.69			6.10E-03	5.28		23.11				-9.58		7
CO	10.58			0.150	129.75		568.31				557.73		100
VOC	0.0041			0.005	4.33		18.94				18.94		40
HF	4.82			0.0017	1.47		6.44				1.62		3
Lead	0.0088			2.17E-05	0.02		0.08				0.07		0.6
Mercury [2]	0.00093		7.80E-06	7.03E-07	6.08E-04	5.33	2.66E-03				0.002	3.47	

[1] The PM emission factor for Unit #10 is based on the MACT limit using PM as a surrogate for non-mercury metal HAPs.

[2] The mercury emission factor for Unit #10 is based on the MACT limit.

Holland BPW - Coal Handling Operations (Fugitive and Point Source) PM Emissions

Revised November 18, 2008

Table B-9. Post Modification Particulate Emissions Summary - Coal Handling Fugitives and Associated Control Releases

Operation	Annual Average Hourly PM (lb/hr) [1]	PM (tpy)	Annual Average Hourly PM_{10} (lb/hr) [1]	PM_{10} (tpy)
Coal Drop from Barge	0.075	0.03	0.036	0.02
Fugitives from Bulldozer Activity	1.178	5.73	0.257	1.25
Drop Emissions at Underground Hopper	0.030	0.09	0.014	0.04
New Transfer/Crusher House Baghouse	0.343	1.50	0.343	1.50
Unit 10 Storage Silos (3) with Baghouse Control	0.514	2.25	0.514	2.25
Unit 10 Limestone Feed Storage - Bin Filter	0.171	0.7509	0.171	0.7509
New Fly Ash Bin Filter (Unit 10 Only)	0.0377	0.1652	0.038	0.1652
Existing Fly Ash Bin Filter (Units 4 & 5)	0.0005	0.0023	0.001	0.0023
Wind Erosion From Daily Active Pile	0.029	0.13	0.014	0.063
Wind Erosion From Pile After Shipment	0.086	0.3771	0.043	0.189
Wind Erosion From Compacted Pile Area	0.034	0.1509	0.017	0.075
Total Emissions	N/A	**11.18**	N/A	**6.31**

	Tons/year			
Coal Usage (Potential) - Post Modification	503,262	Ratio:	0.354	Pre-Mod / Post Mod
Coal Usage (Past Actual) - Pre Modification	178,263			

Table B-10. Pre Modification Particulate Emissions Summary - Coal Handling Fugitives and Associated Control Releases

Operation	Annual Average Hourly PM (lb/hr) [1]	PM (tpy)	Annual Average Hourly PM_{10} (lb/hr) [1]	PM_{10} (tpy)
Coal Drop from Barge	0.027	0.01	0.0126	0.01
Fugitives from Bulldozer Activity	0.417	2.03	0.091	0.44
Drop Emissions at Underground Hopper	0.011	0.03	0.005	0.01
New Transfer/Crusher House Baghouse				
Unit 10 Storage Silos (3) with Baghouse Control				
Unit 10 Limestone Feed Storage - Bin Filter				
New Fly Ash Bin Filter (Unit 10 Only)				
Existing Fly Ash Bin Filter (Units 4 & 5)	0.0002	0.0008	0.0002	0.0008
Wind Erosion From Daily Active Pile	0.013	0.06	0.006	0.03
Wind Erosion From Pile After Shipment	0.038	0.17	0.019	0.08
Wind Erosion From Compacted Pile Area	0.076	0.33	0.038	0.17
Total Emissions	N/A	**2.63**	N/A	**0.74**

Table B-11. Net Particulate Emissions Summary - Coal Handling Fugitives and Associated Control Releases

Operation	Annual Average Hourly PM (lb/hr) [1]	PM (tpy)	Annual Average Hourly PM_{10} (lb/hr) [1]	PM_{10} (tpy)
Coal Drop from Barge	0.049	0.02	0.023	0.011
Fugitives from Bulldozer Activity	0.761	3.70	0.166	0.81
Drop Emissions at Underground Hopper	0.019	0.06	0.009	0.027
New Transfer/Crusher House Baghouse	0.343	1.50	0.343	1.50
Unit 10 Storage Silos (3) with Baghouse Control	0.514	2.25	0.514	2.25
Unit 10 Limestone Feed Storage - Bin Filter	0.1714	0.7509	0.1714	0.7509
New Fly Ash Bin Filter (Unit 10 Only)	0.0377	0.1652	0.0377	0.1652
Existing Fly Ash Bin Filter (Units 4 & 5)	0.0003	0.0015	0.0003	0.0015
Wind Erosion From Daily Active Pile	0.016	0.07	0.002	0.035
Wind Erosion From Pile After Shipment	0.048	0.21	0.005	0.105
Wind Erosion From Compacted Pile Area	-0.042	-0.18	-0.059	-0.092
Total Emissions	N/A	**8.55**	N/A	**5.56**

Table D-4

PSD Modeling - Fugitive and Coal Handling PM10 Emission Sources

PSD PM Run Description: Final Run - PSD Net Rates
Control Scenarios: 30 mph wind restrictions on After Shipment & Compacted Pile Fugitives

Point Source Release Parameters

Description of Source	X Coordinate (meters)	Y Coordinate (meters)	Elevation (meters)	Emission Rate (g/sec)	Release Ht. (meters)	Temp (K)	Velocity (meter/sec)	Diam (m)	PSD PM Rate (lb/hr)
Unit 10 Coal Storage Silos Baghouse	572496.02	4738251.13	178.3	0.081	49.99	294.26	15.523	0.762	0.643
Unit 10 Limestone Bin Filter	572497.43	4738259.33	178.3	5.93E-05	49.99	294.26	0.018	0.305	4.71E-04
Unit 10 Fly Ash Silo Vent	572516.61	4738221.30	178.3	7.46E-05	24.38	294.26	0.165	0.305	5.92E-04
Existing Fly Ash Silo Vent	572526.06	4738220.62	178.3	0.00E+00	24.38	294.26	0.086	0.203	0.00E+00
Trans/Crush House Baghouse Stk	572500.93	4738060.10	178.3	5.40E-02	15.24	294.26	16.170	0.610	0.429

Area (Polygon) Source Release Parameters

Description of Source	X Coordinate (meters)	Y Coordinate (meters)	Elevation (meters)	Emission Rate (g/sec/m2)	Release Ht. (meters)	X Length (meters)	Y Length (meters)	Angle (degrees)	Plume Ht. (meters)	PSD Emission Rates Hourly (lb/hour)
Active Coal Area			178		7.62	0.00	0.00	0	0	
Coal Drop From Ship				5.555E-08						0.004
Dozer Activity				4.085E-06						0.285
Wind Erosion - Active Pile				2.059E-07						0.014
Wind Erosion - After Shipments				6.176E-07						0.043
Total Emission Rate				**4.964E-06**						0.347
Compacted Coal Area			178	**1.625E-07**	9.14	0.00	0.00	0	0	0.017

Volume Source Release Parameters

Description of Source	X Coordinate (meters)	Y Coordinate (meters)	Elevation (meters)	Emission Rate (g/sec)	Release Ht. (meters)	Init. Lat. (meters)	Init. Vert. (meters)	PSD Emission Rates Hourly (lb/hour)
Drop Emissions at Underground Hopper	572392.98	4738119.64	178.3	1.764E-03	0.00	3.6576	0.5671	0.014

Table D-5

NAAQS PM10 Modeling Emission Rates for Fugitive and Coal Handling Activities

Point Source Release Parameters for Model

Description of Source	X Coordinate (meters)	Y Coordinate (meters)	Elevation (meters)	Emission Rate (g/sec)	Release Ht. (meters)	Temp (K)	Velocity (meter/sec)	Diam (m)	NAAQS PM Rate (lb/hr)
Unit 10 Coal Storage Silos Baghouse	572,496.02	4,738,251.13	178.3	0.081	49.99	294.26	15.523	0.762	0.643
Unit 10 Limestone Bin Filter	572,497.43	4,738,259.33	178.3	5.93E-05	49.99	294.26	0.018	0.305	4.71E-04
Unit 10 Fly Ash Silo Vent	572,516.61	4,738,221.30	178.3	7.46E-05	24.38	294.26	0.165	0.305	5.92E-04
Existing Fly Ash Silo Vent	572,526.06	4,738,220.62	178.3	5.36E-05	24.38	294.26	0.086	0.203	4.25E-04
Trans/Crush House Baghouse Stk	572,500.93	4,738,060.10	178.3	5.40E-02	15.24	294.26	16.170	0.610	0.429

Area Source Release Parameters for Model

Description of Source	X Coordinate (meters)	Y Coordinate (meters)	Elevation (meters)	Emission Rate (g/sec/m2)	Release Ht. (meters)	X Length (meters)	Y Length (meters)	Angle (degrees)	Plume Ht. (meters)	NAAQS Emission Rates Hourly (lb/hour)
Active Coal Area			178.3		10.67			0	0	
Coal Drop From Ship				5.555E-08						0.0039
Dozer Activity				4.085E-06						0.2854
Wind Erosion - Active Pile				2.059E-07						0.0144
Wind Erosion - After Shipments				6.176E-07						0.0432
Total Emission Rate				**4.964E-06**						0.3468
Compacted Coal Area			178.3	**1.625E-07**	10.67			0	0	0.0171

Volume Source Release Parameters

Description of Source	X Coordinate (meters)	Y Coordinate (meters)	Elevation (meters)	Emission Rate (g/sec)	Release Ht. (meters)	Init. Lat. (meters)	Init. Vert. (meters)	NAAQS PM Rate (lb/hr)
Drop Emissions at Underground Hopper	572,392.98	4,738,119.64	178.3	1.764E-03	0.00	0.8506	0.5671	0.014

6.0 AMBIENT IMPACT ANALYSIS

HBPW will be removing existing Unit #3 in order to accommodate the new CFB, a steam turbine, and other associated equipment at the facility. As presented in Section 3.0, a net increase in emissions of PM_{10}, CO, VOC, Pb and Hg is expected as a result of this project. However, only PM_{10} and CO will have a significant net increase and be required to be included in a dispersion modeling analysis to determine ambient impacts. Further, a net decrease in emissions of SO_2 and NO_x from the facility is expected. Per the state air toxics rules, an impact analysis for all expected TACs has been completed. Finally, both Pb and Hg have undergone a Health Risk Assessment utilizing both dispersion and deposition modeling.

The results of the CO, PM_{10}, and TAC modeling are presented in Section 6.7.

Dispersion modeling was conducted for PM_{10} in order to demonstrate compliance with the applicable PSD Class II Increments and National Ambient Air Quality Standards (NAAQS). In addition, modeling has been conducted for PM_{10} to demonstrate compliance with 80% of the applicable PSD Class II Increments per MDEQ-AQD policy that no single facility be allowed to consume more than 80% of the applicable Increment standards, in order to allow future industrial growth. Modeling has also been conducted for CO in order to demonstrate compliance with the applicable NAAQS. CO does not have an established PSD Increment standard.

The ambient impact analysis for criteria pollutants was initially conducted by modeling the emission increases from the affected sources as a result of the proposed modification in order to determine the corresponding impacts. Only those pollutants experiencing a net significant increase were modeled. These impacts were then compared to the appropriate significance impact levels (SIL), per 40 CFR 52.21.

The results of the initial modeling indicate that the increase in CO emissions from the modification will not result in maximum ambient impacts greater than the appropriate SIL, while the increases in PM emissions for the proposed modification will result in maximum ambient impacts that are greater than the appropriate SIL. Therefore, a more detailed modeling analysis has been conducted to demonstrate that the PM_{10} emissions from the proposed modification will not exceed the applicable PSD Class II Increment and NAAQS.

The following sections summarize the modeling methodologies used, discuss sources included in each modeling analysis, pollutant emission rates, exhaust parameters, and present the results of the modeling analysis.

6.1 MODELING BACKGROUND

In promulgating the 1977 Clean Air Act Amendments (CAAA), Congress specified that certain increases, or *increments*, in ambient air quality pollutant concentrations above an air quality baseline concentration level for TSP would constitute significant deterioration. The magnitude of the increment that cannot be exceeded depends on the classification of the area in which a new source (or modification to an existing source) will have an ambient air impact. Three classifications were designated based on criteria established in the CAAA. Initially, Congress promulgated areas as Class I (international parks, national wilderness areas, memorial parks larger than 2,024 hectares [ha] [5,000 acres], and national parks larger than 2,428 ha [6,000 acres]) or Class II (all other areas not designated as Class I). No Class III areas, which would be allowed greater deterioration than Class II areas, were designated. However, the states were given the authority to re-designate any Class II area to Class III status provided certain requirements were met. The U.S. EPA then promulgated, as regulations, the requirements for classifications and area designations.

The approach to these analyses generally begins by determining the impacts of the proposed facility or modification alone. If the impacts of the proposed facility or modification are below specified significance levels, no further study of that pollutant-averaging time combination is needed. These "significant impact levels" or SILs are presented in Table 6-1. If the impacts of the proposed facility or modification are found to be significant (i.e. greater than the SILs), further analysis considering all existing facility sources, other nearby facilities, and natural background concentrations is required for the compliance demonstration.

To accomplish these objectives, air quality impact modeling analyses were conducted for the proposed HBPW modification. All modeling analyses were conducted in a manner consistent with U.S. EPA guidance and standard practices, and guidance contained in EPA manuals and user's guides were followed. For the selected models, this includes the use of regulatory default options as appropriate. Procedures applicable to the AERMOD dispersion and deposition models specified in the U.S. EPA's GAQM were followed in conducting the refined dispersion modeling. The GAQM is codified in Appendix W of Chapter 40, Code of Federal Regulations (C.F.R.) Part 51 (updated as of November 9, 2005 to include the promulgation of AERMOD).

On November 9, 2005, the U.S. Environmental Protection Agency promulgated the use of the AMS/EPA Regulatory Model Improvement Committee (AERMIC) Model (AERMOD Version 07026) for all regulatory applications requiring an ambient impact demonstration. As part of the regulation, the U.S. EPA has granted sources a 12-month grace period to facilitate the transition from the use of ISCST3 to AERMOD. As this grace period will conclude on November 9, 2006, AERMOD has been used to predict environmental impacts of both criteria pollutants and toxic air contaminants (TACs) and to conduct the deposition modeling analyses for lead and mercury.

AERMOD is a steady-state Gaussian model capable of handling multiple source inputs and producing both concentration and deposition impacts from point, area, volume, and open-pit sources. AERMOD is also capable of handling numerous source configurations, building inputs, receptor grids and elevated terrain. It is capable of producing both ambient air concentrations and deposition impacts.

6.2 MODELING METHODOLOGY

The primary objective of any air quality analysis is to demonstrate compliance with all applicable state and federal air quality standards. The federal standards include: (1) The National Ambient Air Quality Standards (NAAQS), and (2) Prevention of Significant Deterioration (PSD) Increments – both of which pertain to criteria pollutant emissions. The MDEQ has further incorporated a policy whereas no single source may consume greater than 80% of any PSD Increment standard applicable to any criteria pollutant. Additionally, the MDEQ has rules pertaining to the impacts of toxic air contaminant (TAC) emissions.

Tables 6-1 through 6-3 list the U.S. EPA's PM_{10} and CO impact standards – Significant Impact Levels, PSD Allowable Increment, and NAAQS, respectively. No analysis was done for Class I areas since the facility is greater than 250 km away from the nearest PSD Class I area (Seney National Wildlife Refuge). Further, there are no Class III areas in the country. The criteria pollutant modeling was conducted in order to demonstrate that the proposed project at the HBPW facility would comply with the allowable ambient impact concentrations listed in Tables 6-1 through 6-3.

Table 6-1. Significant Impact Levels for Criteria Pollutants

Pollutant	Averaging Period	Concentration (μg/m^3)
PM_{10}	Annual	1
	24-Hour	5
CO	8-Hour	500
	1-Hour	2,000

Table 6-2. PSD Allowable Increments (μg/m^3)

Pollutant	Averaging Period	PSD Increment Standards (μg/m^3)		
		Class I	Class II	Class III
PM_{10}	24-Hour [1]	8	30	60
	Annual [2]	4	17	34

[1] High 6th High over a five year period.
[2] Annual arithmetic mean.

Table 6-3. National Ambient Air Quality Standards (NAAQS)

Pollutant	Averaging Period	National Ambient Standards (μg/m^3)	
		Primary	Secondary
PM_{10}	24-Hour [1]	150	150
	Annual [2]	50	50
CO	1-Hour [3]	40,000	n/a
	8-Hour [3]	10,000	n/a

[1] High 6th High over a five year period.
[2] Annual arithmetic mean.
[3] High 2nd High.

6.2.1 Terrain Considerations (AERMAP)

AERMOD requires the use of an elevated terrain data file for use in establishing elevations for all sources, buildings and receptors. The AERMAP pre-processor is used to process digital elevation maps with location points for all sources, structures, and receptors. 7.5-minute digitized topographic files for the area surrounding the facility were used as input to the AERMAP pre-processor to obtain elevations and hill heights, which were then imported into the AERMOD models. The following North American Datum 1927 (NAD27) based Digital Elevation Models (DEMs) were incorporated into the AERMOD model via the AERMAP pre-processor:

- Allendale
- Borculo
- Hamilton East
- Hamilton West
- Holland East
- Holland West
- Hudsonville West
- Port Sheldon
- Saugatuck

Deposition model runs, which required a much larger receptor grid, incorporated all nine DEM files, while the dispersion models only required the use of four DEM files to cover a relatively smaller area. The elevated terrain option was employed for all model runs for this analysis.

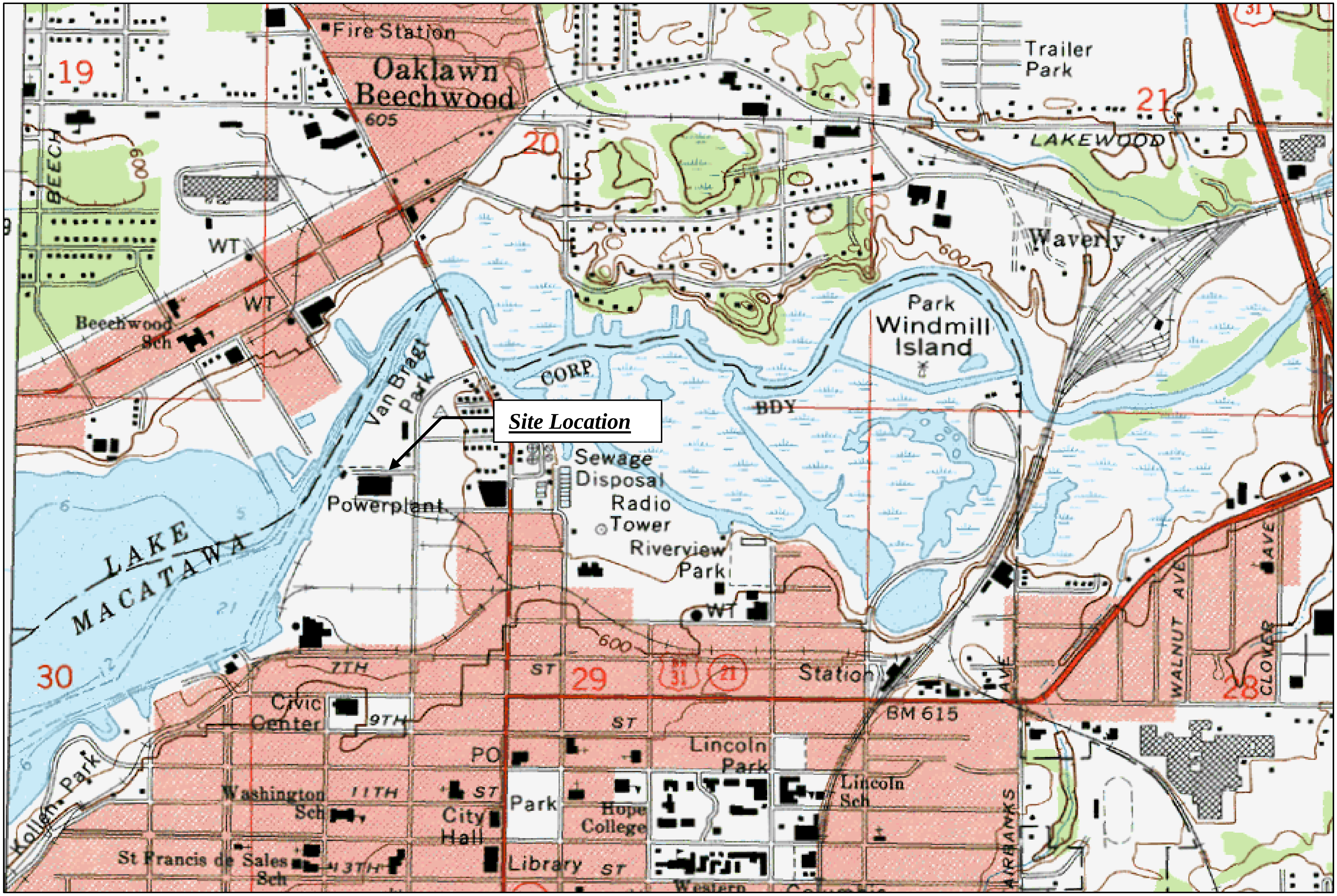

Figure 6-1. Holland BPW Site Location Map (topographic excerpt is from the Holland West 7.5" USGS quadrangle)

6.2.2 Receptor Grid

Receptors were placed at locations considered to be *ambient air*. **Ambient air** is defined as "that portion of the atmosphere, external to buildings, to which the general public has access." A plot plan showing the HBPW facility and fence line is provided in Appendix A. As shown on the site plot plan, the entire perimeter of the facility is surrounded by a fence that restricts public access. Therefore, the nearest location that can be considered ambient air is at the facility's fence line, and no receptors have been placed within the facility's fence line.

Consistent with the GAQM and MDEQ – AQD recommendations, the ambient air impact analyses (criteria pollutant and TAC modeling) utilized the following receptor grid configuration:

- Fence Line Receptors: Receptors were placed on the facility fence line at 25 meter spacing.
- Near-field Cartesian Receptor Grid: Receptors were placed at 50 meter spacing from the fence line outward to 1 km from the center of the facility sources (572,490.92, 4,738,257.70).
- Mid-field Cartesian Receptor Grid: Receptors were placed at 100 meter spacing from the boundary of the Near-field grid out to 3 km from the center point.
- Far-field Cartesian Receptor Grid: Receptors were placed at 250 meter spacing from the boundary of the Mid-field grid outward to 5 km. As a result, the overall grid occupies a 10 km by 10 km area. The southwest corner of the far-field grid in UTMs is (567,490.92 Easting, 4,733,257.70 Northing.

The combination of these receptor grids provides a more dense (50m) grid close to the facility, while expanding the grid out 5 km in each direction from the facility center with wider receptor spacing (up to 250-m spacing). The use of this receptor grid configuration contains a total of 6,032 receptors. A printout of the dispersion modeling receptor grid is provided in Appendix D with the modeling background information.

6.2.3 Meteorological Data

Actual surface meteorological (MET) data is required for use in the AERMOD modeling system. Raw meteorological data obtained in the SAMSON format can be readily obtained from a number of sources. Prior to use with the model, the meteorological data must be processed through the AERMET pre-processor with certain site characteristics, including vegetative cover, friction velocity, etc. In addition, deposition modeling requires that the pre-processed MET data include values for precipitation codes, precipitation rates, relative humidity, surface pressure, and cloud cover, along with the normal parameters required for dispersion modeling.

As part of processing the MET files, the user must specify certain site-specific surface features and characteristics and can, therefore, tailor any MET file to the site-specific conditions at the facility site. The AQD has recently determined representative surface characteristics and has prepared pre-processed "AERMOD-ready" MET data for use in AERMOD modeling.

The AQD prepared and supplied pre-processed, "AERMOD-ready" MET data (i.e. data processed using AERMET) for the Tulip City Airport (Station #12636) in Holland, Michigan, which was required for use in this analysis. The 5-year data set utilized in this modeling analysis will cover the years 2001 through 2005. The upper air station processed with this data is White Lake (Station #94847) for the years 2001-2005.

The full five-year data set (2001-2005) was utilized for criteria pollutant modeling, while only the most recent year of data (2005) was required for the TAC modeling analysis. In addition, as requested by the AQD, the most recent three years of data (2003-2005) were used for the lead and mercury deposition modeling.

6.2.4 Selection of Rural/Urban Dispersion Option

Area characteristics in the vicinity of proposed emission sources are important in determining model selection and use. The first consideration is whether the area is rural or urban as dispersion rates differ between these classifications. In general, urban areas cause greater rates of dispersion because of increased turbulent mixing and buoyancy-induced mixing. This is due to the combination of greater surface roughness from additional buildings and structures and a larger amount of heat released from concrete and similar surfaces.

U.S. EPA guidance provides two procedures to determine whether the character of an area is predominantly urban or rural. The first procedure is based on land-use characteristics and the second is based on population density. Land-use typing utilizes the work of Auer (Auer, 1978) and is preferred by the U.S. EPA because it is meteorologically oriented. The land-use factors employed in making a rural/urban designation are also factors that have a direct effect on atmospheric dispersion of effluent emissions. These factors include building types, extent of vegetated surface area and water surface area, types of industry and commerce, etc. Auer recommends that these land-use factors be considered within 3 km of the source to be modeled to determine urban or rural classification. The Auer land-use typing method was used for the HBPW ambient impact analysis.

The Auer technique recognizes four primary land-use types: industrial (I), commercial (C), residential (R) and agricultural (A). Most industrial and commercial areas come under the heading of urban while the agricultural areas are considered rural. However, those portions of generally industrial and commercial areas that are heavily vegetated can be considered rural in character. In the case of residential areas, delineation between urban and rural is less clear. Auer subdivides residential areas into four groupings based on building structures and associated vegetation. Therefore, accurate classification of residential areas into their proper grouping is important in determining the most appropriate land use classification for the study area.

The 7.5-minute series topographic USGS maps and aerial photography of the area were used to identify the land-use types within a 5 km radius of the HBPW facility. Although there are some areas of fairly dense population within the central Holland area, there is not a significant amount of industrial manufacturing and the population density rapidly decreases outside a 1-2 mile radius of the central city area. Based upon these observations, all modeling analyses have been conducted utilizing the RURAL dispersion option.

6.2.5 Wake and Cavity Effects

The promulgated version of the AERMOD model includes the PRIME downwash algorithms. These enhanced algorithms were incorporated to help address insufficiencies of the ISC model related to calculation of cavity concentrations and the effects of building wake zones on stack plumes in relation to building downwash. As PRIME downwash is included in all modeling runs, the wake zones and cavity affects are addressed in the dispersion and deposition modeling analyses.

Stack Height/Building Wake Effects (GEP)

The CAA Amendments of 1990 require the degree of emission limitation required for control of any pollutant not be affected by a stack height that exceeds good engineering practice (GEP) or any other dispersion technique. On July 8, 1985, EPA promulgated final stack height regulations (40 C.F.R. 51). GEP stack height is defined as the greater of 65 meters, or a height established by applying the formula (known as Equation 1):

Equation 1: $H_g = H + 1.5\, L$

where: H_g = GEP stack height
H = height of the structure or **nearby** structure.
L = lesser dimension (height or projected width) of the **nearby** structure.

Nearby is defined as a distance up to five times the lesser of the height or width dimension of a structure or terrain feature, but not greater than 800 meters. While GEP stack height regulations require that stack heights used in modeling for determining compliance with NAAQS and PSD Increments not exceed the GEP stack height, the actual stack height may be greater. Guidelines for determining GEP stack height have been issued by U.S. EPA (1985).

All existing HBPW stacks considered in the modeling analysis are at or less than the *de minimis* GEP height of 65 meters (213 ft) and, therefore, comply with the U.S. EPA promulgated final stack height regulations (40 C.F.R. 51). However, the stack for the baghouse that controls Unit #10 is greater than 65 meters, and therefore GEP is determined by the use of Equation 1. The tallest influential building (after the proposed building modifications) for the Unit #10 baghouse stack will be the new structure that houses the Unit #10 boiler, which has a height of 46.94 meters and a maximum projected width (L) of 33.89 meters. Therefore, using Equation 1, the GEP stack height for the baghouse stack of Unit #10 will be 97.78. As the stack is being designed to be at a height of 76.20 meters (250 ft), it is less than the GEP stack height, and therefore also complies with the U.S. EPA stack height regulations.

While the GEP stack height rules address the maximum stack height that can be employed in a dispersion modeling analysis, stacks having heights lower than GEP stack height can potentially result in higher downwind concentrations due to building downwash effects. The affects of building downwash on the HBPW boiler stacks have been accounted for by running the U.S. EPA BPIP-PRIME program, based on the various building configurations and stack heights. The various downwash parameters were determined by this program and are assigned to each stack for use within the input file of each modeling run.

When appropriate, downwash was determined for existing stacks based upon the existing building configuration and determined separately for stacks after the proposed modification. Although the stacks for Unit #4 and Unit #5 will not be modified as part of the proposed modification to the facility, a new building structure will be in place for Unit #10, thus creating changes to the downwash on Units #4 and #5. This has been taken into account when performing the deposition modeling by running "before" and "after" modification scenarios in order to determine the "net" deposition. In addition, the pre-modification downwash parameters for Boiler 3 were included in the PM_{10} PSD Increment modeling as this more accurately represents the reductions in ambient impacts as a result of shutting this unit down.

6.3 MODELED EMISSION RATES

The first step in the criteria pollutant modeling analysis was to model the net emissions from the proposed modification for any pollutant for which the net emission rate exceeds the applicable PSD significant emission rate. The impacts resulting from the net emissions are then compared to the Significant Impact Levels (SILs) listed in Table C-4 of the NSR Manual (Table 6-1 of this application support document). Whenever impacts from a new source or modified source exceed the applicable pollutant SILs, emissions from the entire facility must be considered in PSD Increment and NAAQS modeling analyses, along with appropriate off-site sources.

The following subsections will discuss the criteria pollutant emission rates for the proposed project.

6.3.1 Carbon Monoxide (CO)

The emissions of CO associated with the proposed installation of the new CFB boiler (Unit #10) were modeled in a preliminary analysis to determine if additional modeling would be required to demonstrate compliance with the CO NAAQS. Unit #10 is the only source that is considered an "affected source" of CO as proposed in this modification, and it was the only source included in the CO SIL modeling. It should be noted that the CO emission reduction from the shutdown of Unit #3 was not included to offset the CO emissions from Unit #10 in the SIL modeling.

The potential emission rates of CO from the new boiler were discussed in Section 3 related to the various types of fuel used in the boiler. It has been determined that the hourly emission rate of CO would be maximized when the boiler was firing up to 10% (on a heat input basis) sewage sludge as fuel. Table 6-4 presents the emission rate of CO from the new boiler in terms of pound per hour and gram per second.

Table 6-4. Maximum CO Emission Rate from Proposed New CFB Boiler (Unit #10)

Parameter	Value
Max Hourly Emission Rate (lb/hr)	308.3
Modeled Emission Rate (gram/sec)	38.8

6.3.2 Particulate Matter (PM_{10})

The net emissions of PM_{10} resulting from the proposed modification were modeled and the impacts were compared to the applicable SILs for PM_{10}. However, in the case of PM_{10}, the net emissions produce impacts above the SILs, and therefore, a full emission inventory for PM_{10} emission sources at HBPW and for off-site sources was required to be included in a PSD Increment and NAAQS analysis for PM_{10}.

The emissions of PM_{10} associated with the proposed modification were presented in Section 3.1.1 for the new CFB boiler, and in Section 3.2 for coal storage and handling, point and fugitive emission sources. For PSD Increment modeling, past actual emissions were determined because the past actual emissions are considered pre-baseline emissions for PSD purposes. Therefore, only the **net** increases or decreases in emissions should be included in the PSD modeling.

PSD Increment Emission Rates

The PSD baseline date for PM_{10} in the Holland area (Air Quality Control Region 122) is January 31, 1980. Therefore, any sources of PM_{10} installed and operating prior to January 31, 1980 are considered pre-baseline sources and their emissions (at past actual levels) should not be included in PSD modeling analyses. As a result, only the net emissions (related to the increase in coal usage due to the modification) from the coal storage and handling operations should be modeled, along with the increase in emissions from the proposed new boiler and the reduction in emissions from the shutdown of Unit #3 (also a pre-baseline source). The net emissions per source are provided in detail in Table D-4 of Appendix D.

Table 6-5 below summarizes the sources of PM_{10} emissions that have been included in the PSD Increment modeling analysis. The methodologies used to determine the coal handling emission rates were discussed in Section 3.2 and the netting for coal handling sources is provided in more detail in Appendix B. In addition, the emission reduction resulting from the shut down of Unit #3 has been modeled as a negative emission rate, and the rate is based on dividing the past actual annual emission rate used in the netting calculations by 8,760 hours/year.

The PM_{10} emission rates for fugitive sources presented in Table 6-5 represent the worst case daily emission rates averaged over a 24-hour period. This has been done to provide a more conservative estimate of the maximum 24-hour impact that may occur from the fugitive sources that are subject to wind erosion. Annual emissions due to wind erosion are expected to be much less than the maximum daily x 365 days/year, and are based upon the average daily emissions. For purposes of the PM_{10} compliance demonstration, the maximum daily emission rates have been utilized to demonstrate compliance with both the short-term (24-hour) averaging period and the annual averaging period, and this should be considered a conservative approach.

Table 6-5. PM_{10} Emission Rates –Potential Emissions (PSD Increment Analysis)

Point Sources		Emission Rates (lbs/hr)	Modeled Emission Rates (gram/sec)
New CFB Boiler Unit #10 Baghouse		21.625	2.725
Existing Unit #3 (ESP Control) – Shut down		-2.31	-0.29
Transfer/Crusher House Baghouse		0.34	0.043
Unit 10 Coal Storage Silos Baghouse		0.51	0.064
Unit 10 Limestone Bin Filter		0.75	0.095
Unit 10 Fly Ash Silo Vent		0.17	0.021
Cooling Tower		0.22	0.027
Fugitive Area Sources	**Source Area (m^2)**	**Annual Avg. Emission Rate (lbs/hr)**	**Modeled Emission Rates ($gram/sec/m^2$)**
Active Coal Pile [1]	8,803.0	0.347	4.97E-06
Compacted Coal Pile [2]	13,274.0	0.017	1.63E-07
Fugitive Volume Sources		**Net Emission Rate (lbs/hr)**	**Modeled Emission Rate (gram/sec)**
Underground Loading Hopper		0.0092	1.155E-03
Roads		0.326	0.0411

[1] The fugitive emission rate for the active coal pile is the sum of the maximum daily emissions for the coal drop from ship unloading, bull dozer activities, wind erosion on the active pile (normal daily activities) and wind erosion during shipments. The net emission rate represents the increase in daily emissions resulting from the increased coal usage proposed in this modification and takes into account the control strategies that will be implemented.

[2] The fugitive emission rate for the compacted coal pile is the maximum daily emission rate resulting from wind erosion on the compacted area of the coal pile (normal daily activities). The net emission rate represents the decrease in daily emissions that will result from post-modification control strategies that will be implemented.

NAAQS Emission Rates

NAAQS modeling requires all emission sources, regardless of their installation date, to be modeled simultaneously at their potential emission rates. This includes all sources at the facility being installed or modified and all appropriate off-site sources. Table 6-6 summarizes the HBPW emission sources included in the PM_{10} NAAQS modeling, and includes existing Units #4, #5, and the existing fly ash silo that will remain operational for the existing boilers. All HBPW sources have been modeled at their respective maximum potential short term (lb/hour or lb/day) emission rates, as listed in Table 6-6.

Again, the coal handling fugitive (area) source PM_{10} emission rates presented in Table 6-6 represent the worst case daily emission rates averaged over a 24-hour period to provide a more conservative estimate of the maximum 24-hour impact that may occur from the fugitive sources that are subject to wind erosion. As previously stated, annual emissions due to wind erosion are expected to be much less than the maximum daily x 365 days/year and are based upon the average daily emissions. For purposes of the PM_{10} NAAQS compliance demonstration, the maximum daily emission rates have been utilized to demonstrate compliance with both the short-term (24-hour) averaging period and the annual averaging period, and this is again considered a conservative approach.

Table D-5 of Appendix D provides a more detailed breakdown of the sources and their associated emission rates used in the PM_{10} NAAQS modeling.

Table 6-6. PM_{10} Emission Rates – Future Potential Emissions (NAAQS Modeling Analysis)

Point Sources		Potential Emission Rates (lbs/hr)	Modeled Emission Rates (gram/sec)
New CFB Boiler Unit #10 Baghouse		21.63	2.72
Existing Unit #4 (ESP Control) - Based on ROP Limit		75.53	9.517E+00
Existing Unit #5 (ESP Control) - Based on ROP Limit		95.74	1.206E+01
Transfer/Crusher House Baghouse		0.34	0.043
Unit #10 Coal Storage Silos Baghouse		0.51	0.064
Unit #10 Limestone Bin Filter		0.17	0.021
Unit #10 Fly Ash Silo Vent		0.04	0.005
Cooling Tower		0.22	0.004
Roads		0.326	0.041
Unit #4 and #5 Existing Fly Ash Silo Vent		5.17E-04	6.51E-05
Fugitive Area Sources	**Source Area (m^2)**	**Annual Avg. Emission Rates (lbs/hr)**	**Modeled Emission Rates (gram/sec/m^2)**
Active Coal Pile [1]	8,803.0	0.347	4.97E-06
Compacted Coal Pile [2]	13,274.0	0.017	1.63E-07
Fugitive Volume Sources		**Potential Emission Rate (lbs/hr)**	**Modeled Emission Rate (gram/sec)**
Underground Loading Hopper		0.0142	1.785E-03
Roads		0.326	0.0411

[1] The fugitive emission rate for the active coal pile is the sum of the maximum daily emissions for the coal drop from ship unloading, bull dozer activities, wind erosion on the active pile (normal daily activities) and wind erosion during shipments. The potential emission rate represents the maximum daily emissions at the increased coal usage rate proposed in this modification and takes into account the control strategies that will be implemented.

[2] The fugitive emission rate for the compacted coal pile is the maximum potential daily emission rate from wind erosion on the compacted area of the coal pile (normal daily activities). The emission rate represents the maximum daily emissions and takes into account post-modification control strategies that will be implemented.

6.3.3 Toxic Air Contaminants

The emission rates of toxic air contaminants (TACs) are presented in Appendix B for the various fuel scenarios. In order to determine the modeled emission rates, the maximum short term emission rate for each TAC was taken based on the fuel that resulted in the highest emissions on a pound/hour basis. The modeled emission rates (units of gram/second) and results of the TAC analysis are presented in Table D-6 of Appendix D.

6.4 EXHAUST PARAMETERS

Appendix D, Tables D-1 through D-3 present the exhaust parameters and locations for all of the HBPW sources included in the PSD Increment, NAAQS, and TAC modeling analyses. Table D-1 presents the parameters used for the sources modeled as point releases, while Table D-2 and Table D-3 contain the parameters used for the area and volume source releases, respectively. Point sources have been used to represent stack emission points, coal pile and coal handling fugitive emissions were modeled as polygon area sources, and a volume source was used to represent the fugitive release from the underground hopper loading activity.

The area source parameters were determined based on the approximate areas that the various sections of the coal pile will occupy, and were based upon the storage needs of coal that will be held on the facility property. The site map of Appendix A indicates the approximate boundaries of the coal storage pile.

The fugitive emissions from the coal loaded into the underground hopper that feeds the enclosed conveyer system have been represented by a volume source that is released at ground level. The volume source characteristics have been determined by the procedures of Section 1.2.2 of the U.S. EPA's Users Guide for the ISC3 Dispersion Model. In defining the initial lateral (δyo) and vertical (δzo) dimensions of a single, ground level volume source, the U.S. EPA suggests the following methodology (assuming that the release is not adjacent or on top of a building).

$$\delta yo = \text{length of side (m)} \div 4.3$$

$$\delta zo = \text{vertical dimension (m)} \div 2.15$$

The underground hopper loading opening has been approximated as a 12 ft by 12 ft (3.66 m) square, and the vertical dimension of the source was approximated as the middle of the hopper opening above-ground enclosure, at 4 feet (1.22 m). Based on these values, the initial lateral dimension is therefore equal to 0.851 m, and the initial vertical dimension has been assigned a height of 0.567 m.

6.5 ADDITIONAL SOURCE LISTING

An "off-site" or additional source listing was obtained from the MDEQ - AQD for PM_{10}. The sources from this listing that were used in the modeling are summarized in Table 6-7, and the listing as provided by the MDEQ is included in Appendix E.

The PM_{10} modeling analysis has been conducted to demonstrate compliance with the applicable PSD Increments and NAAQS. Therefore, the PSD modeling includes appropriate off-site PSD Increment consuming sources, and the NAAQS modeling analysis includes all sources that the MDEQ-AQD considers to have significant impact areas (SIAs) that interact with the SIAs produced by the HBPW sources.

MDEQ-AQD modeling personnel were consulted to provide a list of appropriate off-site sources for use in the PSD Increment and NAAQS modeling analyses. The off-site inventory was emailed to NTH Consultants on March 6, 2006. Upon receipt of the off-site sources, the listing was examined to determine whether each off-site source consumed PSD Increment. For the PM_{10} listing, it was determined that one source would be considered a pre-baseline source that would not have to be included in the PSD Increment modeling. Specifically, the Consumers Energy J.H. Campbell power plant was determined to be in existence at the time the minor source baseline date was established for PM_{10} (January 31, 1980 in AQCR 122) and therefore does not consume increment (because the major equipment has not been modified after the January 31, 1980 baseline date). Table 6-7 presents the off-site sources included in the PM_{10} PSD Increment and NAAQS modeling analyses. The information in this table includes the source SRN and modeling ID, the company name and source description, whether the emission source consumes increment, the PM_{10} emission rates, and pertinent exhaust characteristics.

TABLE 6-7. List of Off-Site Sources for the Holland Board of Public Works PM_{10} PSD Increment and NAAQS Modeling Analysis (Provided By the MDEQ-AQD)

SRN	Source Name (Modeling ID)	Permit No.	PSD or NAAQS Emission Rate (See Note 1)	Facility/Source Emission Rates			UTM Easting (meters)	UTM Northing (meters)	Source Distance from HBPW (km)	Stack Information [2]				
				(pph)	(g/sec)	(tpy)				Height (ft)	Diameter (inches)	Temp. (deg F)	Flow (ACFM)	Velocity (m/s)
B1982	LOUIS PADNOS IRON & METAL		PSD	0.1	0.0126	0.1	572,500	4,738,000	0.5	***30.0***	***24.0***	***1200.0***	***1250***	***2.0***
B1982	LOUIS PADNOS IRON & METAL CO	182-80B	NAAQS	5.4	0.6804	22.1	572,500	4,738,000	0.5	***30.0***	***24.0***	***1200.0***	***1250***	***2.0***
B1982	LOUIS PADNOS IRON & METAL	700-78A	NAAQS	1.8	0.2268	2.0	572,500	4,738,000	0.5	***30.0***	***24.0***	***1200.0***	***1250***	***2.0***
B2331	PFIZER GLOBAL MANUFACTURING	35-99B	PSD & NAAQS	3.4	0.4284	15.0	572,371	4,738,771	0.3	50.0	36.0	147.0	24476	17.6
B2835	J. H. CAMPBELL PLANT (PRE-BASELINE)		NAAQS	119.0	14.99	492.5	565,180	4,750,810	14.3	520.2	269.3	267.7	2395128	25.3
B7186	HAWORTH INC		PSD	0.1	0.0126	0.2	575,000	4,733,200	5.8	55.0	20.0	70.0	4417	10.3
B7186	HAWORTH, INC.	614-85D	NAAQS	46.0	5.796	140.0	575,000	4,733,500	5.6	55.0	20.0	70.0	4417	10.3

[1] Note 1: Current AQD policy allows the use of actual emissions for PSD Increment compliance demonstrations and requires the use of allowable emission rates in NAAQS compliance demonstrations. Therefore, the AQD supplied both actual and allowable emission rates for off-site sources when the information was available. If only one emission rate was provided, this rate was used for both PSD Increment and NAAQS modeling.

[2] Values presented as ***BOLD ITALICS*** represent default values that have been assumed by the MDEQ AQD and used in the modeling analysis. Essentially, the AQD does not have stack data for these sources.

6.6 BACKGROUND CONCENTRATIONS

To analyze impacts relative to NAAQS, estimates of background pollutant concentrations are needed. Background concentrations are obtained from ambient air quality monitors and include contributions from other sources in the area and may include contributions from natural sources, anthropogenic sources too distant to be included in the modeling inventory, small area sources, and/or other unidentified sources.

For this study, background concentrations for the Grand Rapids, Michigan area were obtained from the MDEQ-AQD via email on June 2, 2006. Table 6-8 summarizes the background concentrations that have been used in the NAAQS compliance analyses for PM_{10}. Monitor selection and background concentrations are presented in Appendix F.

Table 6-8. PM_{10} Background Concentrations for NAAQS

Averaging Period	PM_{10} Concentration ($\mu g/m^3$)
Annual	21.0
24-Hour	51.0

The following section will present the results of the criteria pollutant and TAC dispersion modeling analyses. As the results of the deposition model are used as input information for more detailed analysis in the lead and mercury Human Health Risk Assessment (HHRA), the results are not discussed here. However, Section 7.0 of this document provides some updated information about the deposition specific input parameters that were not discussed in the Modeling Protocol. In addition, the lead and mercury HHRA is being provided as Appendix H of this application document.

6.7 MODELING RESULTS

The results of the CO, PM_{10}, and TAC modeling analyses are contained in the following subsections.

6.7.1 Carbon Monoxide (CO)

A Significant Impact Level (SIL) modeling analysis was performed as a preliminary step to determine whether more refined modeling would be needed to demonstrate compliance with the NAAQS for CO. Only Unit #10 is considered an "affected unit" for the purposes of this modification with respect to CO emissions. Past actual CO emissions from Unit #3 could have been modeled at a negative emission rate to offset the impacts from Unit #10, however ambient concentrations from Unit #10 were low enough that it was not necessary to include Unit #3 in the compliance demonstration.

Table 6-9 presents the results of the modeling analysis conducted using the potential emission rate of the new CFB boiler as proposed in this modification. The emission rate for Unit #10 was presented in Table 6-4.

Table 6-9. Results of the CO SIL Modeling Analysis (03 - 07 BIV MET)

Averaging Period	Maximum Impact [1] ($\mu g/m^3$)	Year of Maximum Impact	Impact UTM Easting (meters)	Impact UTM Northing (meters)	Significant Impact Level ($\mu g/m^3$)	Maximum Impact As % of SIL
1-hour	40.85	2006	571,994.4	4,737,909.0	2000	2.04%
8-hour	25.76	2001	572,994.4	4,738,159.0	500	5.15%

[1] Consistent with how the standards are applied, the maximum 1-hr and 8-hr impacts are based upon the highest of the 2nd high impacts determined using five discrete years of meteorological data (2003 through 2007).

As shown in Table 6-9, the emissions from the proposed new boiler do not result in impacts that are greater than the applicable SILs for CO. The 1-hour CO impact from Unit #10 is only 2.0% of the applicable SIL, while the 8-hour impact is about 5.2% of the 8-hour SIL. Due to the fact that impacts from the proposed equipment are less than the applicable SILs for CO, the impacts are considered insignificant and no further modeling is required to demonstrate compliance with the NAAQS for CO.

6.7.2 Particulate Matter (PM_{10})

Initial modeling results predicted impacts of PM_{10} greater than the SIL. Consequently, both a PSD Increment and NAAQS modeling analysis were performed.

PSD Increment Analysis

The PM_{10} PSD Increment modeling analysis considered all of the HBPW sources that would experience an increase or decrease in PM_{10} emissions as a direct result of the proposed modification (i.e. sources considered "affected sources" for modification purposes). The analysis has a tiered approach for compliance demonstration. The first tier is used to show that the proposed project will not consume more than 80% of the allowed U.S. EPA PSD Increment for each averaging period (i.e., for PM_{10} - annual and 24-hr periods). The second tier is to show that the proposed project and all off-site increment consuming sources, modeled simultaneously, will comply with 100% of the applicable PSD Increment for each averaging period.

Table 6-10 presents the results of the modeling analysis conducted to demonstrate compliance with 80% of the PM_{10} PSD Increments. The HBPW PM_{10} emission sources modeled for the 80% PSD Increment analysis include the all sources for which there will be a net PM_{10} emission increase or decrease as a direct result of the proposed modification, as all other sources not affected by the modification are considered pre-baseline sources (i.e. not installed or modified after January 30, 1980). The HBPW emission sources and PM_{10} emission rates were previously listed in Table 6-5.

Table 6-10. Results of HBPW PM_{10} 80% Increment Modeling (03 - 07 BIV MET)

Averaging Period	Maximum Impact [1] (µg/m^3)	Impact UTM Easting (meters)	Impact UTM Northing (meters)	100% of PSD Class II Increment (µg/m^3)	80% of PSD Class II Increment (µg/m^3)	Maximum HBPW Impact As % of PSD Class II Increment
Annual	3.14	572,605.75	4,738,122.50	17	13.6	23.08%
24-hour	16.93	572,582.12	4,738,050.50	30	24	70.54%

[1] Consistent with how the standards are applied, the maximum annual impact is based upon the highest of the 1st high impacts determined using five discrete years of meteorological data (2003 through 2007), while the 24-hour maximum impacts are based upon the highest of the 2nd high impacts from the same five year set of meteorological data.

As shown in Table 6-10, the PSD Increment consuming PM_{10} emission rates for the proposed project do not result in impacts that are greater than 80% of the applicable PM_{10} PSD Increments. The annual impact is predicted to be less than 25% of the PSD Increment, while the 24-hour impact is about 71% of the PSD Increment.

To demonstrate compliance with 100% of the PSD Increments, the HBPW sources modeled in relation to the 80% PSD Increment analysis were modeled simultaneously with all appropriate off-site sources of PM_{10} emissions that have been determined to consume the PM_{10} Increment. Table 6-7 presented the off-site PSD sources (i.e., those sources listed with PSD emission rates), including the modeled PM_{10} emission rates and the source parameters. The results of the 100% PSD Increment modeling analysis are presented in Table 6-11.

Table 6-11. Results of the HBPW PM_{10} 100% Increment Modeling (03 - 07 BIV Met)

Averaging Period	Maximum Impact [1] ($\mu g/m^3$)	Impact UTM Easting (meters)	Impact UTM Northing (meters)	100% of PSD Class II Increment ($\mu g/m^3$)	Maximum Impact As % of PSD Class II Increment
Annual	3.35	572,605.75	4,738,122.50	17	19.71%
24-hour	13.54	572,605.75	4,738,098.5	30	58.93%

[1] Consistent with how the standards are applied, the maximum annual impact is based upon the highest of the 1st high impacts determined using five discrete years of meteorological data (2003 through 2007), while the 24-hour maximum impact is based upon the highest of the 2nd high impacts from the same five year set of meteorological data.

The results of the 100% PSD Increment modeling analysis for PM_{10} demonstrate compliance with the PM_{10} PSD Class II Increments. As shown in Table 6-11, the annual PM_{10} impact for all HBPW and off-site increment consuming sources is approximately 2.7% of the annual PSD Increment, the 24-hour PM_{10} impact is about 30% of the associated PSD Increment for PM_{10}.

National Ambient Air Quality Standard (NAAQS) Analysis

After having demonstrated compliance with the PSD Class II Increments, the last step in the PM_{10} modeling analysis is a demonstration of compliance with the annual and 24-hour PM_{10} National Ambient Air Quality Standards (NAAQS).

Unlike PSD Increments, which are designed to prevent the air quality in a given region from significantly deteriorating beyond the conditions that existed at a stipulated baseline date, the NAAQS are designed to ensure the protection of human health and the environment. Therefore, the NAAQS modeling analysis includes **all** pertinent sources of emissions near the source of interest, regardless of their installation date. In addition, NAAQS modeling analyses also include a background concentration, which represents the impacts from sources in the area of interest that are not physically included in the modeling analysis (concentrations presented in Table 6-8).

The PM_{10} NAAQS consist of primary and secondary standards. The primary standards have been developed to protect public health, including the health of sensitive portions of the general population (i.e., asthmatics, children, elderly, etc.). The secondary standards are designed to protect public welfare, including decreased visibility in a region and damage to animals, crops, vegetation, and buildings. In the case of PM_{10}, the primary and secondary standards are identical.

Similar to the PSD Increments, the PM_{10} NAAQS are applicable over both annual and 24-hour averaging periods. The NAAQS modeling analysis includes all PM_{10} emission sources – all HBPW PM_{10} emission sources and all off-site PM_{10} emission sources (Table 6-7; sources with rates identified as NAAQS rates) – at their allowable (or proposed allowable) emission rates. In addition, background concentrations were then added to the concentrations predicted by the dispersion model in order to determine the overall maximum concentrations. The results of the initial PM_{10} NAAQS modeling analysis are presented in Table 6-12.

Table 6-12. Results of the HBPW PM_{10} NAAQS Modeling Analysis (03 - 07 BIV MET Data)

Averaging Period	Maximum Impact [1] (μg/m³)	Impact UTM Easting (meters)	Impact UTM Northing (meters)	Primary NAAQS (μg/m³)	Background Concen-tration (μg/m³)	Total NAAQS Impact (μg/m³)	Total Impact As % Of NAAQS
Annual	19.70	575,240.9	4,733,257.5	50	21	40.70	81.40%
24-Hour	98.36	574,740.94	4,733,257.50	150	51 [2]	149.36 [3]	112.32%

[1] Consistent with how the NAAQS are applied, the maximum annual impact is based upon the highest of the 1st High impacts determined using five discrete years of meteorological data (2003 through 2007), while the 24-hour maximum impacts for PM_{10} are based upon the highest 6th high impact from the same five year set of meteorological data.

[2] This background level comes from a Grand Rapids urban site, approximately 30 miles away from the HBPW facility.

[3] A culpability analysis had been conducted previously due to a predicted violation of the standard. Modeling utilizing 2003 through 2007 meteorological data and updated emission estimates for wind erosion from the the coal piles no longer predicts a violation of the NAAQS standard.

As shown in Table 6-12, the initial PM_{10} NAAQS modeling analysis no longer predicts an exceedance of the PM_{10} 24-hour NAAQS when the model predicted maximum impact is added to the background concentration. Therefore, a culpability analysis is no longer necessary.

6.7.3 Toxic Air Contaminants (TAC) Analysis

In addition to the criteria pollutant modeling analyses, a TAC modeling analysis has been conducted to demonstrate that the emissions of TACs from the new CFB boiler (Unit #10) will be in compliance with the Michigan AQD's air toxics regulations. Refined modeling for TACs was performed to determine the ambient, off-property impact from trace metals and organic compounds emitted from the new boiler.

Modeling was performed in accordance with the same methodology used for the criteria pollutant modeling and followed all regulations, guidelines and policies established by U.S. EPA and MDEQ, and again utilized the ISC-AERMOD (PRIME) model Version 07026. Michigan Rule 225 states that emissions from the new or modified source shall not cause a violation of the Initial Threshold Screening Level (ITSL) for non-carcinogens or Initial Risk Screening Level (IRSL) for carcinogens.

The results were determined by scaling the emission rate for each TAC by model predicted impacts based on a 1.0 gram/second model run for the averaging period associated with each TAC's applicable screening. Using this methodology, it is possible to determine the ambient impacts for multiple pollutants based on one model run instead of running a model for each TAC individually. The emission rates and calculated ambient impacts for all TACs (which includes HAPs) are presented in Table D-6 of Appendix D.

Overall, the results presented in Table D-6 show that all TACs will comply with the applicable screening levels at the maximum predicted emission rates and thus comply with the Michigan AQD air toxics rules.

6.8 DISPERSION MODELING FILES

The complete Lakes Environmental project files are being provided in Appendix G on compact disc for the following modeling analysis conducted in ISC AERMOD PRIME.

Table 6-14. Summary of the HBPW Modeling Files

Modeling File Identification	File Description	Meteorological Data
CO_01_R2 through CO_05_R2	CO SIL Models	2003-2007
HBPMr103 through HBPWr107	PM_{10} PSD Increment Models	2003-2007
NAQ03Pr1 through NAQ07Pr1	PM_{10} NAAQS Models	2003-2007
HBPW_GPS	TAC modeling Gram/Second Model	2007