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Ms. Mary Ann Dolehanty
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Michigan Department of Natural Resources & Environment
Air Quality Division
P.O. Box 30473
Lansing, MI 48909

May 21, 2010
NTH Project No. 16-060556

**RE: Response to Request for Information**
**Holland Board of Public Works**
**Application 25-07**

Dear Ms. Dolehanty:

In response to your letter dated March 10, 2010 and as a result of comments received during the open public comment period, the Holland Board of Public Works (HBPW) has requested that NTH Consultants, Ltd. (NTH) perform an ambient impact analysis demonstrating that the proposed project will meet the national ambient air quality standard (NAAQS) for emissions of $PM_{2.5}$. On May 7, 2010 NTH submitted a modeling protocol outlining the methodology to be used in the analysis that included a summary of emission estimates for sources of $PM_{2.5}$.

Enclosed is the ambient impact analysis demonstrating that impact of the emissions of $PM_{2.5}$ from the proposed project will be less than the most stringent significant impact level of 1.2 $ug/m^3$ proposed by U.S. EPA in the $PM_{2.5}$ implementation rule. Additionally, because some changes to stack heights have occurred, we have updated the $PM_{10}$ ambient impact analysis as well.

If you have any further questions, please feel free to contact us at (517) 484-6900.

Sincerely,

NTH Consultants, Ltd.

Jeffrey P. Jaros
Project Manager

Delbert Rector/mj

Delbert Rector, P.E.
Senior Vice President

Enclosure

cc: Mr. Vrajesh Patel, Michigan Department of Environmental Quality
Mr. David Koster, Holland Board of Public Works
Charles Denton, Esquire, Barnes & Thornburg LLP
Mr. Daniel Mitas, HDR|CB

JPJ/DR/mjb

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# ATTACHMENT A

## AMBIENT IMPACT ANALYSIS FOR $PM_{10}$ and $PM_{2.5}$

In response to comments received on draft permit number 25-07 and the March 10, 2010 letter from the Michigan Department of Natural Resources and Environment (MDNRE), HBPW has completed an ambient impact analysis for emissions of $PM_{2.5}$ from the proposed project. The dispersion modeling was conducted according to the methodology outlined in the Modeling Protocol submitted to MDNRE on May 7, 2010. On May 18, 2010 MDNRE provided four (4) comments on the Modeling Protocol, which have been addressed in performing the dispersion modeling analysis.

## 1.0 SUMMARY OF PROPOSED PROJECT

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 previously in the application and supporting documentation, a net increase in emissions of $PM_{10}$, $PM_{2.5}$, CO, VOC, Pb and Hg is expected as a result of this project. However, only $PM_{10}$, $PM_{2.5}$, 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. An ambient impact analysis for CO and $PM_{10}$ has previously been completed. However, due to changes in certain stack heights for material handling sources, the ambient impact analysis has been re-done to show that these changes do not adversely affect the impacts of $PM_{10}$. Per the state air toxics rules, an impact analysis for all expected TACs has been previously completed and is not included. Finally, both Pb and Hg have undergone a Health Risk Assessment utilizing both dispersion and deposition modeling, which has been previously submitted.

The ambient impact analysis for both $PM_{2.5}$ and $PM_{10}$ 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 $PM_{2.5}$ emissions from the modification will not result in maximum ambient impacts greater than the most stringent SILs proposed by U.S. EPA, while the increases in $PM_{10}$ 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 and present the results of the modeling analysis.

The results of the $PM_{10}$ and $PM_{2.5}$ modeling are presented in below.

## 2.0 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 2-1. 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 concluded on November 9, 2006, AERMOD has been used to predict environmental impacts of both $PM_{2.5}$ and $PM_{10}$.

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.

## 2.1 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 2-1 through 2-3 list the U.S. EPA's $PM_{10}$ and $PM_{2.5}$ 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 dispersion 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 2-1 through 2-3.

**Table 2-1. Significant Impact Levels for $PM_{10}$ and Proposed for $PM_{2.5}$**

| Pollutant | Averaging Period | Concentration ($\mu g/m^3$) |
|---|---|---|
| **$PM_{10}$** | Annual | *RESCINDED* |
| | 24-Hour | 5 |
| **$PM_{2.5}$** | Annual | 1.0 |
| | | 0.8 |
| | | 0.3 |
| | 24-Hour | 5.0 |
| | | 4.0 |
| | | 1.2 |

**Table 2-2. 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 | N/A | N/A | N/A |
| **$PM_{2.5}$** | 24-Hour | 2 | 9 | 18 |
| | Annual [2] | 1 | 4 | 8 |
| | | 1 | 5 | 10 |

[1] High 2nd High over a five year period.

[2] U.S. EPA has proposed two Increments for annual $PM_{2.5}$ standard.

**Table 2-3. 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 | N/A | N/A |
| **$PM_{2.5}$** | 24-Hour [2] | 35 | 35 |
| | Annual [3] | 15 | 15 |

[1] High 6th High over a five year period.

[2] 98th Percentile over a five year period.

[3] Three year average of the weighted annual mean.

### 2.1.1 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

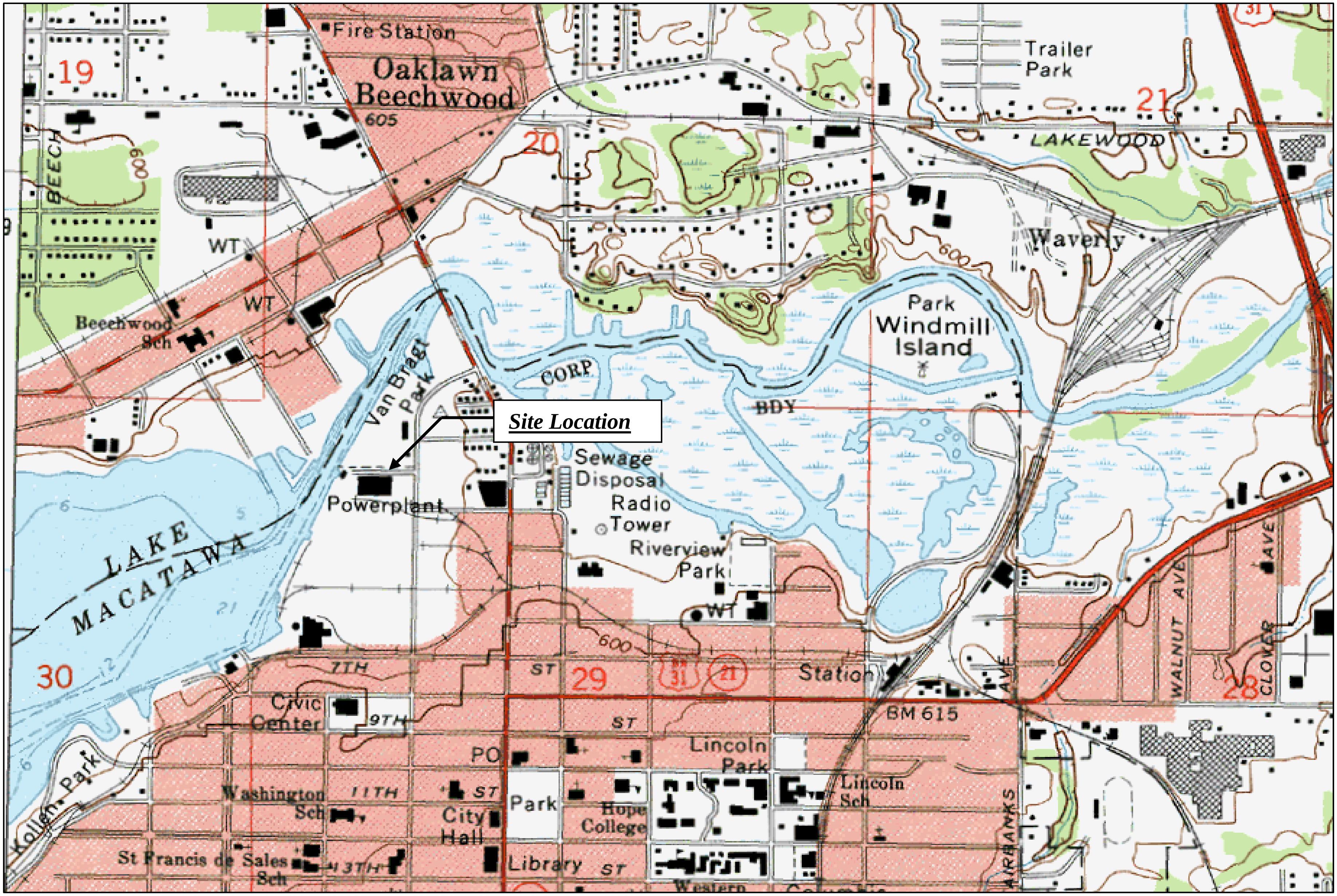

Figure 1-1. Holland BPW Site Location Map (topographic excerpt is from the Holland West 7.5" USGS quadrangle)

### 2.1.2 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.

### 2.1.3 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 2003 through 2007. The upper air station processed with this data is White Lake (Station #94847) for the years 2003-2007.

The full five-year data set (2003-2007) was utilized for the $PM_{2.5}$ and $PM_{10}$ pollutant modeling, consistent with all previous analyses.

### 2.1.4 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.

### 2.1.5 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.

# ATTACHMENT A

***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.

### 2.2 Additional Source Listing

An "off-site" or additional source listing was obtained from the MDNRE for $PM_{10}$. The sources from this listing that were used in the modeling are summarized in Table 2-4. As noted in Table 2-4, MDNRE updated the $PM_{10}$ emission rate for Haworth, Inc. on November 24, 2008 based upon more accurate data reflected in the facility’s ROP.

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.

MDNRE 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 November 24, 2008. 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.

Updated November 24, 2008

**TABLE 2-4. 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. [3] | 614-85D | NAAQS | 5.71 | 0.7182 | 25.0 | 575,000 | 4,733,500 | 5.6 | 55.0 | 20.0 | 70.0 | 4417 | 10.3 |

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[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.

[3] Emission rate for Haworth, Inc. (B7186) revised on November 24, 2008 in an e-mail from David Mason, MDEQ-AQD. New emission rate reflects permit rate in facility's ROP.

## 2.3 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 MDNRE via email on November 7, 2008. Table 2-5 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 2-5. $PM_{10}$ 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 $PM_{2.5}$ and $PM_{10}$ dispersion modeling analyses.

## 2.4 MODELING RESULTS

The results of the $PM_{2.5}$ and $PM_{10}$ modeling analyses are contained in the following subsections.

### 2.4.1 Particulate Matter ($PM_{2.5}$)

The PSD Increment and NAAQS modeling analysis are discussed below.

***Significant Impact Analysis***

The $PM_{2.5}$ SIL modeling analysis considered all of the HBPW sources associated with the proposed project that would experience an emissions increase. Because the footprint of the coal piles will not change and HBPW will be implementing additional fugitive dust controls not currently being applied at the site, the projected emissions for these area sources will decrease. Therefore, these sources have not been included in the analysis. The detailed emissions calculations have previously been provided to MDNRE with the Modeling Protocol. In addition, HBPW has determined that routing the emissions from the limestone silo and new fly ash silo to the baghouse servicing the Unit 10 boiler provides better engineering design. Because the air flow from these two silos is minimal and intermittent, it does not affect the design of the Unit 10 baghouse or flow rate.

Table 2-6 presents the results of the $PM_{2.5}$ modeling analysis conducted to demonstrate compliance with the most restrictive SIL proposed by U.S. EPA.

**Table 2-6. Results of HBPW $PM_{2.5}$ SIL Modeling (03 - 07 BIV MET)**

| Averaging Period | Maximum Impact [1] ($\mu g/m^3$) | Impact UTM Easting (meters) | Impact UTM Northing (meters) | Significant Impact Level ($\mu g/m^3$) | Maximum HBPW Impact As % of SIL |
|---|---|---|---|---|---|
| Annual | 0.16 | 572,605.74 | 4,738,170.81 | 0.3 | 53% |
| 24-hour | 1.15 | 572,840.94 | 4,738,707.5 | 1.2 | 96% |

[1] The maximum impact is the maximum impact from all receptors and days.

As shown in Table 2-6, the proposed project impacts of $PM_{2.5}$ are below the most restrictive of the SILs proposed by U.S. EPA. Because the impacts are below the SILs, no further modeling for emissions of $PM_{2.5}$ is required.

### 2.4.1 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 2-7 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).

**Table 2-7. Results of HBPW $PM_{10}$ 80% Increment Modeling (03 - 07 BIV MET)**

| Averaging Period | Maximum Impact (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 |
|---|---|---|---|---|---|---|
| 24-hour | 8.14 | 572,558.39 | 4,738,050.39 | 30 | 24 | 34% |

As shown in Table 2-7, the PSD Increment consuming $PM_{10}$ emission rates for the proposed project do not result in impacts that are greater than 80% of the 24-hour $PM_{10}$ PSD Increment.

To demonstrate compliance with 100% of the PSD Increment, 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 2-4 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 2-8.

Table 2-8. Results of the HBPW $PM_{10}$ 100% Increment Modeling (03 - 07 BIV Met)

| Averaging Period | Maximum Impact (μg/m$^3$ ) | Impact UTM Easting (meters) | Impact UTM Northing (meters) | 100% of PSD Class II Increment (μg/m$^3$ ) | Maximum Impact As % of PSD Class II Increment |
|---|---|---|---|---|---|
| 24-hour | 9.13 | 572,490.94 | 4,738,957.50 | 30 | 30% |

The results of the 100% PSD Increment modeling analysis for $PM_{10}$ demonstrate compliance with the 24-hour $PM_{10}$ PSD Class II Increments.

***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 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 2-5).

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 for only the 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 2-4; 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 $PM_{10}$ NAAQS modeling analysis are presented in Table 2-9.

**Table 2-9. Results of the HBPW $PM_{10}$ NAAQS Modeling Analysis (03 - 07 BIV MET Data)**

| Averaging Period | Maximum Impact [1] (µg/m$^3$ ) | Impact UTM Easting (meters) | Impact UTM Northing (meters) | Primary NAAQS (µg/m$^3$ ) | Background Concentration (µg/m$^3$ ) | Total NAAQS Impact (µg/m$^3$ ) | Total Impact As % Of NAAQS |
|---|---|---|---|---|---|---|---|
| 24-Hour | 91.69 | 572,590.94 | 4,738,007.50 | 150 | 51 [2] | 142.69 | 95% |

[1] Consistent with how the NAAQS are applied, 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.

## 6.8 DISPERSION MODELING FILES

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

**Table 6-14. Summary of the HBPW Modeling Files**

| Modeling File Identification | File Description | Meteorological Data |
|---|---|---|
| PSD03r4 through PSD07r4 | $PM_{10}$ PSD Increment Models | 2003 – 2007 |
| NAQ03Pr5 through NAQ07Pr5 | $PM_{10}$ NAAQS Models | 2003 – 2007 |
| PM25 | PM2.5 Model | 2003 – 2007 |