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Via Overnight Mail

June 15, 2007

Mr. John Vial
Air Quality Division
Michigan Department of Environmental Quality
525 West Allegan Street
Lansing, Michigan 48909

Subject: Dispersion Modeling Protocol
Letter No: MME-MDEQ-002

Dear Mr. Vial:

Mid-Michigan Energy, LLC (MME) is proposing construction of a new coal-fired electric generating facility in Midland, Michigan. The forthcoming application for a Permit to Install (PTI) will require a dispersion modeling analysis pursuant to 40 CFR §52.21, and Michigan Rule 240. The Michigan Department of Environmental Quality (MDEQ) *PSD Workbook – A Practical Guide to Prevention of Significant Deterioration* dated October 2003 advises Prevention of Significant Deterioration (PSD) applicants to provide a modeling protocol for MDEQ review prior to commencing any extensive modeling analysis.

Please find enclosed for your review and comment two (2) copies of the Mid-Michigan Energy Station – Dispersion Modeling Protocol.

Should you have any questions or need additional information, please contact me at 636-532-2200 or via email at dmulvey@lspower.com.

Sincerely,

Douglas Mulvey

Douglas Mulvey, P.E.
Environmental Engineer

Cc: Jaime Boothby, Vision Environmental

Mid-Michigan Energy Station

Dispersion Modeling Protocol

June 2007

Prepared for:

MID-MICHIGAN ENERGY

Prepared by:

VISION ENVIRONMENTAL, INC.

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1.0 INTRODUCTION

Mid-Michigan Energy, LLC (MME) is proposing construction of a new coal-fired electric generating facility in Midland, Michigan (the "Facility"). The Facility will be a nominal 750 megawatt power generation facility that will utilize a pulverized coal (PC) boiler, and various emissions control equipment including selective catalytic reduction (SCR), flue gas desulphurization (FGD), activated carbon injection (ACI), and high efficiency fabric filters. The Facility will be located on S. Saginaw Road, as shown on the attached plot plan, Figure 1.

In addition to the coal fired boiler, the Facility will consist of other sources of emissions including coal, lime, carbon, and ash material handling and storage; paved roads; auxiliary boiler(s); emergency diesel engines; and fuel storage tanks.

2.0 DISPERSION MODELING PROTOCOL

Based on current estimates, the Facility will be a major source with respect to federal New Source Review. The area (Midland County) where the Facility is proposed to be located is currently designated as an unclassifiable / attainment area with respect to all criteria pollutants. Accordingly, the forthcoming Permit to Install (PTI) application will require a dispersion modeling analysis to demonstrate compliance with Prevention of Significant Deterioration (PSD) increments as well as an analysis to demonstrate that emissions from the Facility will result in predicted impacts in compliance with the National Ambient Air Quality Standards (NAAQS).

State of Michigan Public Act 451, Rule 336.1225 states that new or modified sources of toxic air contaminants (TACs) which are subject to the requirements to obtain a PTI *shall not cause or allow the emission of the toxic air contaminant from the proposed new or modified emission unit or units in excess of the maximum allowable emission rate which results in a predicted maximum ambient impact that is more than the initial threshold screening level (ITSL) or initial risk screening level (IRSL) or both.* Therefore, the PTI application will also include a dispersion modeling analysis to demonstrate compliance with the applicable health based screening levels.

2.1 PSD Class I Modeling

As indicated previously, the Facility will be located in Midland, Michigan. The nearest Class I PSD area to the Facility is the Seney National Wildlife Refuge which is located approximately 332 kilometers (km) from the proposed location in Michigan's Upper Peninsula. Due to the distance between the Facility location and the Seney National Wildlife Refuge, a Class I modeling analysis will not be necessary as part of the PSD air permit application.

2.2 PSD Class II Modeling

Effective December 9, 2005, the recommended dispersion model in the USEPA's "Guideline on Air Quality Models" is AERMOD, the dispersion modeling program developed by the American Meteorological Society/Environmental Protection Agency Regulatory Model Improvement Committee (AERMIC). Therefore, AERMOD version 07026 will be used to demonstrate that the impacts from the Facility will comply with the NAAQS and available PSD increments.

2.2.1 Stack Height and Building Downwash Consideration

The AERMOD dispersion model considers the influence of building structures on exhaust stack plumes. These conditions may occur when the height of an exhaust stack is less than its Good Engineering Practice (GEP) stack height (generally 2.5 times the height of the influencing structure). A building may have an influence on an exhaust plume if the distance between the building and the stack is less than five times the height or width (whichever is smaller) of the building.

The location of the influencing structures at the Facility relative to the exhaust stack will be entered in the USEPA BPIP-PRIME program. The BPIP-PRIME program calculates the projected influence of building widths and heights depending upon wind direction for use in the building downwash algorithms of the AERMOD model.

2.2.2 Meteorological Data

The most recent five years of available surface and upper air meteorological data (2002-2006) recorded at the nearest National Weather Service Station will be used to determine impact concentrations. The meteorological data proposed for use was recorded at the Tri-Cities Airport in Freeland, Michigan (station no. 14845). The meteorological data files will be provided by the MDEQ.

2.2.3 Dispersion Coefficients

The AERMOD model uses data that represent the dispersion of pollutants in rural or urban areas. The land use procedures outlined in the *Guideline on Air Quality Models* (Appendix W, 40CFR51) indicates that the area surrounding the Facility is classified as rural respective to dispersion modeling. Therefore, the rural dispersion coefficients will be used in the air pollution modeling analysis.

2.2.4 Receptors

Receptor positions (i.e., locations where pollutant impact concentrations are determined) will be established based on the USEPA definition of ambient air, that is, "that portion of the atmosphere, external to buildings, to which the general public has access." It is the USEPA's policy that the exemption from ambient air is available only for the atmosphere over land owned

or controlled by the source, and to which public access is prohibited, by a fence or other physical barriers. The Facility will utilize a fence or other physical barriers. Therefore, based on the definition of ambient air, a receptor grid with 25 meter (m) spacing along and extending 50 m beyond the fence line of the facility will be utilized. Additional receptor grids with increasing spacing extending to 50 km from the Facility will be used to ensure that the locations of the maximum ambient air impact concentrations are identified. The additional grids will start with 100 m spacing to 3000 km, 1000 m spacing to 10 km, 2500 m spacing to 20 km, and 5000 m spacing to 50 km. The proposed grids will be adjusted as necessary based upon the locations of maximum impact concentrations and the area of significant impact concentrations.

2.2.5 Off-Site Sources

For those criteria pollutants whose emissions from the Facility result in impacts above USEPA designated significance thresholds, the impacts of criteria pollutants from other facilities must be added to demonstrate compliance with the available PSD increment and the NAAQS. The MDEQ will provide the necessary information to incorporate into the model for the off-site sources whose emissions result in significant impact levels which overlap the Facility's area of significant impact. Included in this information will be the required emission rates, physical exhaust stack parameters, and whether the applicable off-site sources consume PSD increment, or are only for inclusion in demonstrating compliance with the NAAQS.

In addition to the off-site sources, background concentrations of applicable criteria pollutants will be included to demonstrate compliance with the NAAQS. The background concentrations will be obtained from the appropriate federally mandated, and/or state and local air monitoring sites, and will be determined pursuant to MDEQ-AQD policy.

2.2.6 Terrain Considerations

The AERMOD dispersion model is capable of accounting for terrain elevation when calculating impact concentrations. Due to the relatively minor changes in elevation (i.e., flat terrain) within the area of impacts from typical sources in Michigan, terrain elevations often have very little effect on the resultant maximum impact concentrations. Therefore, terrain elevations are not normally considered in dispersion modeling analyses submitted to the MDEQ.

However, to ensure that the results of the analysis for the Facility are as accurate as possible, terrain elevations *will* be included in this modeling analysis. The elevations will be based upon Digital Elevation Model (DEM) terrain data gathered by the United States Geological Survey (USGS). The DEM data will be obtained from WebGIS.com, a source approved by the MDEQ.

2.2.7 Emission Rates

The impact concentrations determined by AERMOD are directly proportional to the emission rate used in the model. Therefore, where appropriate, to predict impact concentrations of several pollutants with only one dispersion model, the model will be run using a total non-pollutant

specific emission rate of 1 lb/hr. The impact concentrations calculated using the 1 lb/hr emission rate will then be scaled based on the maximum potential emissions of individual pollutants. When this is not appropriate due to specifics regarding the emission configuration, individual dispersion models which include pollutant specific emission rates will be utilized.

In order to ensure that the worst case conditions are accounted for, in addition to modeling to determine maximum impact concentrations at full load, the modeling analysis will include emissions and exhaust parameters representative of 25%, 50%, and 75% load. The analysis will also include modeling of pollutants with short term impact thresholds (e.g., SO_2) that are affected by start-up conditions.

Based on discussions with the MDEQ-AQD, emission parameters for the worst case hourly emissions during start up conditions will be utilized to determine the maximum 3 hour average impact of SO_2. The 24 hour impact will be based on the maximum average 24 hour emissions rate of SO_2 and conservatively, the hourly exhaust parameters which result in the least amount of dispersion (i.e., lowest flow rate, lowest exhaust temperature). Should the conservative exhaust parameters result in unacceptable impact concentrations, as directed by the MDEQ-AQD, exhaust parameters based on the weighted average of the 24 hours with the maximum emission rate will be utilized.

It should be noted that ozone, while a criteria pollutant, will not be included in the pollutants modeled as there is no model to accurately predict the impact concentrations of the formation of low level ozone from oxides of nitrogen and volatile organic compounds in the presence of sunlight. Additionally, compliance with $PM_{2.5}$ standards will be demonstrated via compliance with PM_{10} standards (or thresholds).

2.2.8 Additional Impact Analyses

In addition to the quantitative analysis of criteria pollutant impact concentrations resulting from the Facility, PSD permit applications require additional impact analysis for each pollutant subject to PSD. The additional analysis considers the impacts to the air, soil, and vegetation from the potential emissions of the proposed source, and is divided into three parts; growth analysis, soils and vegetation analysis, and visibility analysis.

The growth analysis will estimate the emissions of air pollutants generated by projected industrial, commercial and residential growth in the area that may come about due to the installation of the Facility.

Analyses on the impacts to soils and vegetation are based on an inventory of the soil and vegetation types in the area impacted by the PSD subject pollutants. Based upon MDEQ guidance, the agency "finds sufficient the secondary standard for NAAQS as an adequate demonstration for protection of vegetation and soils." Therefore, the modeling analysis will demonstrate compliance with the secondary standards for NAAQS.

If required, at the request of the MDEQ-AQD, supplemental analysis will be performed to demonstrate that emissions from the Facility will result in no adverse effects to soils and vegetation.

A visibility analysis commonly includes an assessment of the visual quality of the area and a review of proposed sources of emissions to consider the possibility of visual impairment. Based on guidance, the MDEQ generally requires assessments for visibility impacts only for Class I areas. As indicated Section 2.1, the distance to the nearest Class I area is such that modeling is not proposed based on previous federal land manager (FLM) guidance of a 300 kilometer threshold for modeling. Visibility analysis on surrounding Class II areas will be discussed with MDEQ-AQD after review of preliminary modeling data.

2.3 Toxic Air Contaminant Modeling

As with the dispersion modeling of criteria pollutants, AREMOD will be used to predict the maximum impact concentrations of toxic air contaminants (TACs). With the following exceptions, the modeling of TACs will follow the same protocol as presented in this document for criteria pollutants.

2.3.1 Meteorological Data

Compliance with the health based screening does not require 5 years of meteorological data to be evaluated, and is typically completed using only the most recent year of available meteorological data. However, as a conservative measure, to complete the dispersion modeling for TACs from the Facility, the same 5 years (2002-2006) of available meteorological data from the Tri-Cities Airport utilized in the dispersion modeling for criteria pollutants will be used for TACs.

2.3.2 Receptors

In addition to receptors along the boundary of the Facility and the ambient air (e.g., fence line) and additional receptor grids extending further from the Facility used to ensure that the location of the maximum ambient air impact concentrations of TACs are determined, supplementary receptor grids will be utilized as needed to determine the maximum impact concentrations of mercury (Hg) on certain bodies of water as requested by the MDEQ-AQD. These bodies of water include Sanford Lake, located approximately 11 miles (17.6 kilometers) northwest of the Facility, Kiwassee Lake, located approximately 3 miles (4.7 kilometers) north-northeast of the Facility, and a small pond located approximately 3.5 miles (5.5 kilometers) east of the facility, north of Hotchkiss Road, and west of 11 Mile Road.

The Facility will be located within the Tittabawassee river watershed. The boundaries of the watershed, as determined by the USGS Hydrological Unit Code (HUC) system, have also been incorporated into the model, in order to determine the maximum impact concentration of Hg within that region.

2.3.3 Off-Site Sources

Dispersion modeling analyses utilized to determine compliance with the health based screening levels pursuant to Michigan Rule 225 do not require that off-site sources of pollutants be addressed. Therefore, only emissions from the proposed Facility will be accounted for in the TAC dispersion modeling analysis.

2.3.4 Pollutants

In addition to comparing impacts of TACs to published health based screening levels (ITSLs and IRSLs) including tetrachlorodibenzo(p)dioxin, the dispersion model will be used to determine the maximum annual impact concentration of lead from the proposed facility. Additionally, as part of this analysis, the maximum annual impact of mercury on the Tittabawassee river watershed and other bodies of water indicated in Section 2.3.2 will be evaluated.

Figure 1

Site Plan – Proposed Electric Generating Facility