DEQ   **Michigan Department of Environmental Quality - Air Quality Division**
Guidelines for Dispersion Modeling

Dispersion modeling is a tool for predicting source impacts through computer simulations. Use of air dispersion modeling is sometimes required to demonstrate compliance with various state and federal ambient air quality standards.

A new major source or a major modification at an existing major source, located in an attainment area and emitting criteria pollutants (NO_2, SO_2, CO, PM, PM_{10}, VOC, lead, mercury, and beryllium), is subject to the federal Prevention of Significant Deterioration (PSD) regulations. Applicants for a PSD permit <u>are required</u> to demonstrate that proposed emissions, in combination with applicable emissions from existing sources, will not contribute to the deterioration of air quality <u>and</u> will not violate any National Ambient Air Quality Standards (NAAQS). Therefore, all applications for major sources or major modifications in an attainment area <u>must</u> submit PSD increment modeling for PM_{10}, SO_2 and NO_2 along with NAAQS modeling for PM_{10}, SO_2, NO_2, CO, and lead (Pb). The PSD modeling analysis is required to use five years of the most recent and representative meteorological (met) data unless one year of on-site data is available and approved by the AQD.

PSD increments and the NAAQS are federal air quality standards which apply to all sources, regardless of size. Therefore, PSD increment and NAAQS modeling is required for sources not subject to PSD but emitting criteria pollutants in significant amounts. The applicant can elect to have the AQD perform the modeling if the necessary information requested below on pages 2 and 3 is included with the application. Criteria pollutant modeling for sources not subject to PSD can use only one year of the most recent and representative met data; however, the applicant has the option of using five years of met data.

Dispersion modeling may also be required to demonstrate compliance with the health based screening level requirements of Rule 225 for emissions of toxic air contaminants (TACs). Refer to the guidance document "Toxic Air Contaminants - Demonstrating Compliance with Rule 225" for information on how to comply with Rule 225. The applicant has the option of performing the modeling or submitting the necessary information requested below on pages 2 and 3 to allow the AQD to conduct the modeling. Modeling of TAC emissions requires the use of one year of the most recent met data.

The AQD is updating the "Air Dispersion Modeling Guidance Document (DEQ)" to assist with required modeling. The document will provide useful information for dispersion modeling which includes approved regulatory models, modeling protocols, meteorological (met) data, modeling data elements, stack designs, and suggested modeling methods. The link to this document become available when the updates are complete.

Modeling information such as Ambient Backgrounds; Rules & Guidance Documents; Meteorological Data and Prevention of Significant Deterioration Baseline Dates can be found on the AQD "Modeling and Meteorology" webpage. Some of the information that can be found on the website is listed in the table below. To obtain nearby facility source data which includes criteria pollutant emission rates and stack parameters of nearby facilities necessary to conduct a PSD and NAAQS dispersion modeling analysis, or for questions regarding modeling, contact Jim Haywood at 517-284-6745 (HaywoodJ@michigan.gov).

MODELING GUIDANCE AND INFORMATION

Item	Description
Air Dispersion Modeling Guidance Document (DEQ) – under review	AQD guidance document detailing PSD, NAAQS and Toxics modeling protocol
AERMAP, AERMET, AERMOD & AERSURFACE Users Guides	EPA guidance documents for AERMOD modeling system
Meteorological Data	Weather data used in conjunction with dispersion models
PSD Baseline Dates	Major and minor source baseline dates throughout Michigan which determine whether emissions from a facility consume increment
New Source Review (NSR) Workshop Manual	EPA manual focusing on the PSD portion of the NSR program found in 40 CFR 52.21
Background Values	EPA criteria pollutant monitoring data for Michigan and surrounding states (https://www3.epa.gov/airdata/)
Human Health Risk Assessment Protocol – Chapter 3	EPA air dispersion and deposition modeling guidance for evaluating risk from both direct and indirect pathways

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Information Required For Dispersion Modeling

Please provide the following information, including units, for each pollutant (criteria and toxic air contaminant) emitted from each stack. This information is required whether the applicant or AQD is performing the modeling. For multiple pollutants emitted from multiple stacks, the information may be submitted in a spreadsheet format.

STACK INFORMATION

1.   Name of stack or stack identifier
2.   Height of stack from ground level (feet or meters)
3.   Exit temperature of exhaust gas (°F or °C)
4.   Inside diameter or length and width of stack (ft or m)
5.   Exit velocity of exhaust gas (ft/s or m/s) OR:
        Volumetric flow rate (acfm, m^3/s)
6.   Stack location (UTMs or Local)*
7.   Stack Orientation (i.e., vertical, horizontal, gooseneck)
8.   Stack Obstructions (rain caps, other)
9.   Emission Rate of each pollutant from this stack (lbs/hr or g/s)
10.   For FLARES the heat content (Btu/ft^3) and flow rate of the gas should be provided

* For UTM coordinates please indicate which North American Datum System was used i.e.,   NAD 1927 or NAD 1983.

VOLUME SOURCE INFORMATION (if applicable)

1.   Name of volume identifier
2.   Release height (center of volume) (feet or meters)
3.   Initial lateral dimension of the volume (meters)
4.   Initial vertical dimension of the volume (meters)
5.   Center of volume location (UTMs or Local)*
6.   Emission Rate of each pollutant from this volume (lbs/hr or g/s)

*Provide North American Datum System used (i.e., NAD 1927 or NAD 1983) or Local origin.   If local coordinates are used, provide a UTM coordinate for the (0,0) location.

AREA SOURCE INFORMATION (if applicable)

1.   Name of area identifier
2.   Release height above ground (feet or meters)
3.   Length of X side (in east-west direction if angle is 0)
4.   Length of Y side (in north-south direction if angle is 0)
5.   Area rectangle orientation angle from north (degrees)
5.   Southwest corner of area source (UTMs or Local)*
6.   Emission Rate of each pollutant from this area ($g/(s\text{-}m^2)$)

*Provide North American Datum System used (i.e., NAD 1927 or NAD 1983) or Local origin.   If local coordinates are used, provide a UTM coordinate for the (0,0) location.

BUILDING INFORMATION

1.   Peak roof height from ground level
2.   Heights of any higher sections (tiers) on main roof
3.   Building Dimensions, length and width
4.   Building Location via Local or UTM coordinates or Plot Plan

Please provide the above information for all buildings/structures within a distance of five (5) times the height of that building/structure to any stack

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SITE INFORMATION
Please provide a plot plan which includes all of the following:

1.   North arrow
2.   Distance scale
3.   Location of all stacks, volumes, and areas being modeled
4.   All buildings/structures located within a distance of 5 times its height to any stack being modeled
5.   All property lines
6.   Any fence lines, berms, other public access barriers.

ELECTRONIC DATA FILES - CD OR FLOPPY DISK

1.   Copy of the modeling input files (*.inp, *.dat, *.dta, *.api)
2.   For AERMOD a copy of the Stage 1 and 3 AERMET input files (*.in1, *.in3)
3.   For AERMOD a copy of the AERMAP output file (*.rou)
4.   Copy of the building profile input (bpip) file (*.bpi)
5.   Copy of the modeling output files (not as important as the two first items, but helpful)
6.   Toxic Air Contaminant lists/spreadsheets including emission rates, screening levels, and impacts.