

Tennessee Division of Air Pollution Control

New Source Review (NSR) / Prevention of Significant Deterioration (PSD) Dispersion Modeling Protocol Template



Installation Name & Address:

Click here to enter text.

Date:

Click here to enter text.

Prepared by:

Click here to enter text.

Submitted to:

TN Department of Environment & Conservation
Air Pollution Control
Permit Program / Regulatory Development & Planning Program
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Installation Description

1. Installation & Project Description

Information regarding the location and operating status of the facility being modeled should be provided. The installation and project description should include a detailed discussion of the project and how it could impact the existing installation and any adjacent or nearby co-owned installations, if applicable. Please attach a map of the facility and the surrounding area in Appendix A.

2. Installation Locational Data

Include detailed information on the geographic coordinate system that will be used in the air quality analysis including the Universal Transverse Mercator Zone (UTM) coordinates to the nearest 10 meters and UTM grid zone and geodetic reference system, i.e., reference datum.

3. Modeled Emission Rates & Limits

Detailed information on the calculation of the modeled emission rates, including any limits that are proposed for use in the air quality analysis, should be provided. It is important to note that any limits that are noted within the air quality analysis will become a special condition within the construction permit.

4. Source Characterization & Facility Layout

Provide the methodology that will be used to characterize emission releases within the ambient air quality impact analysis based upon source type, i.e., point, line, volume or area. Please provide a facility layout that includes each emission point and structure (with its dimensions) that will be located within the property boundary of the new source or modification in Appendix B (if known). Also, within Appendix C, please include the procedures that will be used in the calculation of each release parameter, i.e., volume source release height, initial lateral and vertical dimension calculations.

Class II Area Analysis

1. Model Selection & Pollutants Under Review

The latest versions of the EPA Preferred/Recommended air quality models or alternative models (in accordance with section 3.2 of the Guideline on Air Quality Models in 40 CFR 51, Appendix W) and the methodology that will be used to demonstrate compliance with the air quality standards for each pollutant under review should be provided. Please note each pollutant that is explicitly being modeled. For modeling assessment for ozone (O₃) and fine particulates (PM_{2.5}) under the PSD program, a recommended TN guidance document, model emissions rates for precursors (MERPs) screening analysis, should be followed for the assessment at the following link:

The November 2019 MERPS guidance can be found at:

https://www.tn.gov/content/dam/tn/environment/air/documents/apc-modeling-page/apc_TN%20Guidance%20on%20the%20Use%20of%20EPAs%20MERPs%20to%20Account%20for%20Secondary%20Formation%20in%20Tennessee_11222019.pdf

Any revisions can also be found at: [Air Quality Modeling \(tn.gov\)](https://www.tn.gov/content/dam/tn/environment/air/documents/apc-modeling-page/apc_TN%20Guidance%20on%20the%20Use%20of%20EPAs%20MERPs%20to%20Account%20for%20Secondary%20Formation%20in%20Tennessee_11222019.pdf).

2. Receptor Grid & Terrain Elevations

*Please describe the receptor grid(s) that will be used to calculate the ambient air quality impacts within the region surrounding the facility. Initial grids normally start with a 50meter resolution around the facility boundary and then extend out at a refined (100-m) resolution, becoming coarser further from the source, and should include any significant impact area. More refined grids may be necessary and included to evaluate hotspots in the initial assessment grid, especially when max impacts fall further from the property line in the coarsely space receptors of the initial grid, and in areas approaching nearby sources whose individual impacts may combine with the project's impacts to significantly impact air quality. In addition, the extraction techniques used to determine terrain elevations should be described in detail. **Appendix D** should contain an overview that includes a visual depiction of the property boundary with fenced areas highlighted.*

3. Meteorological Data & Surface Characteristics

The latest five-year, model ready, National Weather Service (NWS) data set that includes an evaluation of the surface characteristics surrounding the facility site for use in the air quality analysis will be required. An analysis on the selection of the representativeness of the meteorological site will need to be determined and provided by the source in comparison to other nearby sites.

Upon the selection of the representative meteorological data site, the Department will provide the latest five-year, model ready, NWS data upon request. Prospective permittees should consult with the Department modeling staff to pick the most representative source of meteorological data and the site where it was collected. Met data options may include the location of an on-site met monitoring station, or the location of a NWS or FAA location, or within the domain of NWS prognostic met data set. It should be noted that the Department retains the right to require on-site meteorological data collection if it is determined that the facility is located within an area that is comprised of complex terrain or is unduly influenced by nearby obstacles. If on-site data is required, written notification will be provided.

4. Background Concentrations & Interactive Source Inventories

The Department's Air Pollution Control Program will provide background values and interactive source inventories for incorporation into the National Ambient Air Quality and increment standard compliance determinations. It is important to note that inventory development can take up to 30 days to complete.

5. Pre-construction Air Quality Monitoring

Any pollutant that exceeds the Significant Monitoring Concentrations (SCMs) contained within Tennessee Division of Air Pollution Control (TDAPC) regulation 1200-03-09-.01(4) at (<https://publications.tnsosfiles.com/rules/1200/1200-03/1200-03-09.20221228.pdf>) or (40 CFR 52.21) must conduct an ambient air quality analysis addressing existing monitoring concentrations of the source area. The Department may require preconstruction monitoring by the source for up to one year prior to issuance of the construction permit. If the preliminary model results indicate that preconstruction monitoring may be triggered, a summary of each pollutant and its maximum impact area(s) should be provided in Section 5.

Class I Area Analysis

*A diagram of the proposed facility and impacted Class I area locations within 300-km should be provided in **Appendix E**.*

1. Initial Screening Test

The Federal Land Managers (FLMs) 'Air Quality Related Values (AQRVs) Work Group (FLAG) Phase I report (2010) requires all facilities within 100-kilometers of a Class I area to contact the Federal Land Manager (FLM) and develop a modeling protocol that details the modeling methodologies that will be used to determine compliance with the Air Quality Related Values (AQRVs). In addition, any large source located at a distance greater than 100- kilometers must notify the FLM to determine if an air quality analysis will be a required component of the permit application. Currently, the FLM's expect AQRV impacts to be assessed in areas out to 300-kilometers from large, proposed sources but no air quality assessment is required for any Class I area located beyond 300-km from the source. An initial screening test that compares the total annual emissions to the distance from the Class I area in accordance with the FLAG 2010 guidance should be conducted and provided to the FLM and permit granting authority. The Department will notify the FLMs of the received PSD application and conduct all correspondences with the FLMs regarding their recommended modeling analyses (AQRVs) for any impacted Class I area. Class I area resources for permit applicants (such as FLAG Phase I report, AQRV documentation, and Class I area receptors) are provided at the following link: (<https://www.nps.gov/subjects/air/permitresources.htm>).

2. Model Selection & Pollutants Under Review

The air quality model and methodology that will be used to demonstrate compliance with the air quality standards for each pollutant under review should be provided. Please note each pollutant that is explicitly being modeled.

3. Compliance with the PSD Increments

Provide the methodology that will be used to demonstrate compliance with each increment within each Class I area boundary that requires review. Baseline dates are available for each county from the state's dispersion modeling staff.

4. Visibility Assessment

In the 2010 revision to the FLAG Phase I report, the FLMs describe two differing approaches for evaluating visibility impacts within Class I areas based upon the distance of the facility from the area in question. Facilities located within 50-kilometers are considered to have near-field impacts where the plume(s) is compared to a viewing background. Facilities located at a distance in excess of 50-kilometers will undergo a distant/multisource modeling analysis that includes an evaluation of the effects that multiple plumes and plume aggregation will have on the appearance of a scene. Depending on the Class I areas under review, both a near field and a distant/multi-source study may be required. A description of the type of analysis and any critical assumptions that will be used in the visibility assessment should be provided.

5. Nitrogen and Sulfur Deposition

If a Class I assessment is required, the permit applicant is required to calculate the total amount of sulfur and nitrogen deposition that will occur due to the construction of the new source or modification. A description of the type of analysis and any critical assumptions that will be used should be provided.

6. Receptor Grid & Terrain Elevations

*The FLMs maintain a database of receptors for each Class I area located in the United States. The grids developed by the FLM should be used in the Class I area assessment with a visual description provided in **Appendix F**.*

7. Meteorological Data & Surface Characteristics

The applicant is required to develop a modeling domain that is designed to accept prognostic wind data from the Mesoscale Model 5 (MM5) meteorological database or the Weather Research and Forecasting (WRF) model, or any EPA-approved meteorological data for a minimum three-year period. A five-year data period is preferred if it is available. The grid resolution utilized in the development of the prognostic model output for each year considered should be incorporated into the Class I analysis.

The current guidance from the FLM recommends using the Lagrangian California Puff (CALPUFF) model only in a screening mode for Class I area Significant Impact Level (SIL) modeling analyses, i.e., without chemistry involved (turning the chemistry switch to off). The CALMET domain should utilize a UTM coordinate system with ten vertical layers and an initial horizontal array based upon the extent of the domain that is necessary to encompass the source in question and the Class I area being considered. Two-kilometer grid resolution is preferred but can be altered based upon the size and extent of the meteorological domain. Each year modeled should include surface, upper air, and precipitation sites located throughout the modeling domain based upon the default options that have been assigned by the FLM. The FLM refined modeling analysis recommend the usage of the latest version of the Lagrangian Second Order Closure Integrated Puff Model with Chemistry (SCICHEM) model or the latest version of USEPA's recommended Photochemical Grid Models such as the Comprehensive Air Quality Model with Extensions (CAM-x) or the Community Multiscale Air Quality (CMAQ) model.

8. Interactive Source Inventories for Cumulative Impact Assessments

The Department's Air Pollution Control Program will provide background values and interactive source inventories for incorporation into the Class I area Air Quality Related Values assessment. It should be noted that inventory development can take up to 30 days to complete.

Additional Impact Analyses

1. Growth

Please describe the methods that will be used to determine the amount of growth associated with the construction and operation of the new source or modification.

2. Soils and Vegetation Analysis

Please describe the modeling methodology that will be used to determine if an adverse impact on local soils and vegetation will occur. The seven-step process that is described within the Environmental Protection Agency guidance document entitled “A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals, EPA 450/2-81-078, 1980” should provide the basis for this assessment. This document is available for download in addition to other TN modeling guidance documents at the Division air quality modeling website provided at the following link: (<https://www.tn.gov/environment/air/modeling.html>).

3. Class II Visibility Impairment

The methods that will be used to determine if adverse visibility impacts will occur within the region surrounding the new source or modification should be described. Upon request, the Department’s Air Pollution Control Program will provide a list of scenic vistas, airports and other sensitive areas that require evaluation.

Appendices

Appendix A - Map of Facility & Surrounding Area

Appendix B - Facility Layout

Appendix C - Source Characterizations & Release Parameter Assignments (Optional)

Appendix D - Property Boundary & Receptor Grid Overview

Appendix E - Proposed Facility and Class I Area Locations

Appendix F - Class I Area Receptor Grid Overview