Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection
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MODELING GUIDANCE FOR SIGNIFICANT STATIONARY SOURCES OF AIR POLLUTION
MassDEP Bureau of Waste Prevention

1. BACKGROUND

MassDEP will not approve the construction and operation of a new or modified facility if emissions from the facility will cause or contribute to an exceedance of National Ambient Air Quality Standards (NAAQS). In 1996, MassDEP issued modeling guidance for demonstrating compliance with NAAQS using Environmental Protection Agency (EPA) approved air quality dispersion models. The 1996 guidance has now been updated to reflect current EPA regulations and guidance for Prevention of Significant Deterioration (PSD). The MassDEP modeling guidance will be modified as needed when amended PSD regulations and guidance have been promulgated or, in the case of guidance, published, from time to time by EPA.

The following guidance applies to proposed new and increased emissions that equal or exceed significant rates. For modeling guidance for new emissions or increased emissions below EPA significant emission rates, please contact MassDEP Boston BWP Air Planning and Evaluation Branch (617-292-5607).

2. SIGNIFICANT EMISSION RATES

Annual emission rates at or above the following emission rates for the following pollutants are considered by MassDEP and EPA to be significant.

Pollutant	**Significant emission rate (tons per year)**
carbon monoxide (CO)	100
oxides of nitrogen (NO_x)	40
Sulfur dioxide (SO_2)	40
particulate matter with an aerodynamic particle diameter of less than or equal to 10 micrometers (PM10)	15
particulate matter with an aerodynamic particle diameter of less than or equal to 2.5 micrometers (PM2.5)	10

3. SIGNIFICANT IMPACT LEVELS (SILs)

Under the provisions of the EPA's PSD regulations, Massachusetts is classified as a Class II area. EPA SILs for Class II areas are listed below. All SILs are in units of ug/m3.

	Annual	24-hour	8-hour	3-hour	1-hour
SO_2	1	5	-	25	7.8 [3 ppb]
PM10	1	5	-	-	-
PM2.5	0.3	1.2	-	-	-
NO_2	1	-	-	-	7.5 [4 ppb]
CO	-	-	500	-	2000

Please note that the 1-hour SO_2 and NO_2 SILs are based on interim EPA guidance.

4. MODELING REQUIREMENTS

If proposed annual emissions from a new facility or proposed annual emission increases from an existing facility are at or above the significant emission rate for a pollutant listed above, a modeling protocol and a refined air quality impact analysis that demonstrates compliance with applicable NAAQS is required. Estimates of ambient air quality concentrations shall be based on air quality models, data bases, and other requirements specified in Environmental Protection Agency, 40 CFR Part 51, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions [Appendix W], Federal Register / Vol. 70, No. 216 / Wednesday, November 9, 2005.

EPA's TTN website - http://www.epa.gov/ttn/scram/ - is a good resource for model codes, user guides and EPA modeling guidance. Prior to performing the air quality analysis, a modeling protocol shall be submitted to MassDEP for review and approval. Required contents of the modeling protocol are described in Section 6**.** Applicants are strongly advised to contact the MassDEP Boston BWP Air Planning and Evaluation Branch (617-292-5607) for guidance early in the process of preparing a modeling protocol (the Regional office should be contacted for guidance early in the process of preparing the application for a plan approval). Use of modeling platforms other than AERMOD must be approved by MassDEP and EPA Region I.

5. NAAQS COMPLIANCE DEMONSTRATION

Maximum predicted impacts associated with proposed emissions from a new facility or proposed emission increases from an existing facility should be compared to applicable SILs listed in Section 3, above, to determine what is required to demonstrate compliance with applicable NAAQS and PSD requirements.

New Facility

1. If maximum predicted impacts of a pollutant proposed to be emitted from a new facility are below all applicable SILs, the new facility's proposed emissions are considered to be in compliance with NAAQS for that pollutant.

2. If maximum predicted impacts of a pollutant proposed to be emitted are at or above applicable SILs and there are no nearby sources of that pollutant that could significantly interact with those of the proposed facility, the predicted air quality impacts from the new facility should be added to representative background levels and compared to applicable NAAQS. If the results are below applicable NAAQS, the facility's proposed emissions are considered to be in compliance with NAAQS for that pollutant.

3. If maximum predicted impacts of a pollutant proposed to be emitted are at or above applicable SILs and there are nearby sources of emissions of that pollutant that could significantly interact with the proposed facility, the predicted air quality impacts from the new facility, along with predicted air quality impacts from nearby significantly interacting sources, should be added to representative background levels and compared to applicable NAAQS. If the results are below applicable NAAQS, the facility's proposed emissions are considered to be in compliance with NAAQS for that pollutant.

Existing Facility

1. If maximum predicted impacts of a pollutant due to proposed emission increases from the existing facility are below applicable SILs, the predicted emissions from the proposed modification are considered to be in compliance with NAAQS for that pollutant. However, a compliance demonstration may be required to ensure that the combined emissions from the existing facility and the proposed modification will not cause or contribute to a NAAQS violation for that pollutant.

2. If maximum predicted impacts of a pollutant due to proposed emission increases from the existing facility are at or above applicable SILs and there are no nearby sources of that pollutant that could significantly interact with the proposed facility, the predicted air quality impacts from the existing facility as proposed to be modified should be added to representative background levels and compared to applicable NAAQS. If the results are below applicable NAAQS, the facility, as proposed to be modified, is considered to be in compliance with NAAQS for that pollutant.

3. If maximum predicted impacts of a pollutant due to proposed emission increases from the existing facility are at or above applicable SILs and there are nearby sources of that pollutant that could significantly interact with emissions from the facility's proposed modification, the predicted air quality impacts from the existing facility as modified, along with predicted air quality impacts from nearby significantly interacting sources, should be added to representative background levels and compared to applicable NAAQS. If the results are below applicable NAAQS, the facility, as proposed to be modified, is considered to be in compliance with NAAQS for that pollutant.

6. MODELING PROTOCOL

If proposed annual emissions from a new facility or proposed allowable emission increases at an existing facility are significant, a modeling protocol is required to be submitted to MassDEP for review and approval. Recommended contents of a modeling protocol are listed below. Contact the MassDEP BWP Air Planning and Evaluation Branch (617-292-5607) for guidance on recommended models and modeling procedures.

Model(s): A description of the dispersion model(s) employed for the air quality impact analysis should be provided. MassDEP recommends using EPA's AERMOD modeling platform for most refined modeling analyses in Massachusetts. Use of alternative modeling platforms must be approved by MassDEP and EPA Region I.

Facility Description: A description of the facility under review should be provided, including site plans (with scale shown) and appropriate topographic maps.

Land Use: A description of land use within 3 kilometers of the proposed site should be provided along with a rural or urban dispersion designation.

Stack Parameters: Maximum proposed emissions in pounds per hour and tons per year for each pollutant of concern must be provided. Stack parameters for 50%, 75% and 100% load conditions, or 100% load conditions and such other load conditions which represent normal facility operation for the proposal under review, should be provided.

Nearby Sources: If proposed allowable emissions from a new facility or proposed allowable emission increases from an existing facility are at or above significant emission rates, nearby sources (of that pollutant) that could significantly interact with the source under review should be determined. Sources within 10 kilometers that emit significant emission rates for that pollutant (actual emissions) are typically considered to be nearby sources that may significantly interact with a new or modified facility. Emergency generators shall not be included in any source interaction because of their limited operating periods (300 hours/year).

Stack parameters (at maximum permitted hourly operating rate) for nearby interacting sources should be provided. The appropriate MassDEP Regional Office should be contacted to help identify nearby interacting sources and confirm their emission rates and operating conditions. In particular, PM emission data for existing sources should be characterized as to particle size fraction and inclusion or omission of condensibles.

GEP Stack Height: A Good Engineering Practice stack height determination shall be prepared for the proposed facility or proposed modification at an existing facility. Plot and building plans drawn to scale should be provided indicating elevations and building dimensions of structure(s) with the potential to cause building downwash.

Wind Direction-Specific Dimensions: Wind direction-specific building dimensions for all stacks below GEP shall be determined following EPA guidance. EPA's Building Profile Input program (BPIP), or equivalent software is recommended for wind direction-specific calculations.

Meteorological Data: A description and justification of the selected surface and upper air meteorological data used by EPA's AERMOD meteorological preprocessor (AERMET) to prepare hourly input files should be provided. EPA's AERSURFACE model is recommended for estimating albedo, Bowen ratio and surface roughness in the vicinity of the surface meteorological station.

MassDEP recommends consulting with the Boston BWP Air Planning and Evaluation Branch (617-292-5607) before selecting or purchasing meteorological data.

Receptor Network: A rationale for the receptor network should be provided. The principal purpose of receptor placement is to ensure that maximum air quality concentrations are not over-looked. A listing of areas of concern where additional receptors should be located (i.e. property line, schools, hospitals, PSD Class I areas, closest state borders) should be presented. A description of the terrain data used for generating terrain elevations with the EPA's AERMOD terrain preprocessor should also be provided.

Existing Air Quality Data: A technical justification for the background air quality concentrations should be provided. Background concentrations are ambient pollutant levels attributable to upwind sources including major and minor sources, natural sources and long-range transport.

Contact the MassDEP Boston BWP Air Planning and Evaluation Branch (617-292-5607) for guidance on estimating background concentrations.

Prevention of Significant Deterioration (PSD): If a PSD permit is required, contact the MassDEP Boston BWP Air Planning and Evaluation Branch for information on PSD baseline areas and guidance for estimating PSD increment consumption for applicable pollutants.

7. AIR QUALITY ANALYSIS REPORT

After all necessary air quality modeling has been performed, modeling results shall be presented and discussed in an air quality impact analysis report. The recommended contents of the air quality impact analysis report are listed below.

1. Source Description

2. GEP Calculations

3. Land Use Determination

4. Worst-Case Load Conditions

5. Refined Air Quality Analysis

    Air quality models 1
    Stack parameters (facility under review, as proposed)
    Stack parameters (nearby existing sources)
    GEP Analysis and Building Profile Input Program (BPIP) results
    Meteorological data
    Receptor network
    Background concentrations
    Maximum impacts and locations for each averaging time and pollutant of concern
    Maps with 1 ug/m3 annual average isopleths for SO2/PM10/PM2.5/NO2 (to help identify Section 107 areas where minor source baseline would be triggered)

6. Compliance Demonstration with NAAQS

7. Compliance demonstration with applicable PSD increments

8. Compliance with applicable MassDEP guidelines

9. Compact Disks containing all model input and output files

8. Reference Documents

Contact the MassDEP Boston BWP Air Planning and Evaluation Branch (617-292-5607) for guidance or questions about preparing air quality impact analysis reports.