Overview
Until recently, the Minnesota Pollution Control Agency (MPCA) did not have a consistent means of meeting the “equivalent or better dispersion” (EBD) demonstration as provided in numerous air quality permits. This memorandum describes the approach that the agency will take in meeting this requirement using primarily existing modeling files and related data. The purpose of this memorandum and attachments is to document the practice and inform the Air Quality Permits Section of these procedures.

Need for a Specific Modeling Practice
The MPCA has issued numerous permits that include a specific provision for an EBD demonstration in situations where a permit amendment is required. The intent of the EBD approach was to offer a more flexible means of demonstrating ongoing compliance with the applicable National Ambient Air Quality Standards (NAAQS) in situations where a “small” change or changes are proposed at a facility that had previously demonstrated modeled compliance with a specific NAAQS. Please note that the modeling approach described in this memorandum is not available for an increment evaluation under the Prevention of Significant Deterioration (PSD) program.

The EBD approach covers various changes. For stack and vent sources, this includes the source emission rate(s) (e.g., including emission rate scalars by hour of day, week, month, etc.), location, height, diameter, exit velocity, exit temperature, discharge direction, use of rain caps or rain hats, and, if applicable, locations and dimensions of nearby buildings. For non-stack/vent sources, this includes the source emission rate(s), location, size and shape, release height, and, if applicable, any emission rates scalars, and the initial lateral dimensions and initial vertical dimensions and adjacent building heights.

Conditions where an EBD Demonstration Applies
The EBD approach is limited to situations where a permit provision provides for this level of analysis. In addition, the following conditions apply:

- Must have had a previous modeling demonstration for the permit.
- Older model files (including Industrial Source Complex [ISC]) must be updated to the most current version of AMS/EPA Regulatory Model (AERMOD).
• Changes involving less than 15 emission sources are considered reasonable for an EBD demonstration based on MPCA resource constraints. For projects with more than 15 emission source changes, arrangements should be made to consult with MPCA modeling staff to determine if refined modeling is more appropriate for the project.
• No limit on changes to buildings or roads (e.g., fugitive sources).
• EBD demonstration is specific to the results that prompted the language in the permit – i.e., pollutant and averaging time specific.
• At this time, applicability to PSD permitting is made on a case-by-case basis in consultation with U.S. Environmental Protection Agency (EPA).
• Consecutive EBD analyses are cumulative, meaning that each consecutive analysis will include the previous EBD changes. No more than three consecutive EBD demonstrations may be submitted without an MPCA determination on the need for refined modeling.
• EBD is not available for environmental review-related projects.

Under certain circumstances, older ISC dispersion model files may not easily convert to an AERMOD format without substantial revision. In this situation, new input files may be required to meet the needs of the EBD using AERMOD. In most situations where an EBD analysis is employed, changes to the facility may include only a few emission sources. If a facility is entertaining changes to 15 or more emission sources, a refined modeling demonstration may be more time and cost effective. Lastly, the use of EBD in environmental review is inconsistent with the need to evaluate potential cumulative effects as this approach does not require consideration of other sources (e.g., ambient background concentration values or the explicit modeling of nearby sources). For PSD-related projects, EBD may not appropriate in light of the expectations of PSD regulations and the PSD increment analysis. MPCA staff will consult with EPA Region 5 staff to determine if an EBD demonstration may be used for a PSD-related project.

Equivalent or Better Dispersion Modeling Approach
This EBD approach offers a method that considers an evaluation of dispersion based on changes to an existing facility. The changes can include either stack vent sources or non-stack/vent sources. Under this approach, EBD considers different emissions, stack locations, changes in stack parameters, new building characteristics resulting in modified downwash, and new hours of operation, through an adaptation of PSD increment evaluation concepts and the Preliminary Analysis. In this way, the EBD analysis uses positive allowable emission rates for the “new” case, and negative allowable emission rates for the “old” case. Likewise, a similar approach is used for changes in buildings and related structures or changes in roads (e.g., road length or changes in road surface). This EBD approach differs from the approach used in a PSD increment analysis where positive allowable emission rates are used for the “new” case and negative past actual emission rates for the “old” case.

An underlying assumption in any EBD demonstration is that a facility is in compliance with the applicable NAAQS based on the previous modeling demonstration. In essence, the EBD is a means to evaluate whether the previously modeled compliance condition would be altered as a result of the proposed changes at the facility. Interpreting the output of an EBD analysis is based on the net change in predicted concentrations due to proposed “small” changes at the facility.

Interpreting the Results
In situations where a proposed change(s) enhances or improves dispersion, the modeled output will be zero, rather than a negative value as AERMOD is not capable of presenting a negative output value. This also means that this approach is not able to quantify “better” dispersion of the proposed changes. In situations where dispersion is not improved, the AERMOD output will generate a positive value. Theoretically the modeled output should be “zero” if indeed there is equivalent dispersion as a result of the facility modification.
MPCA modeling staff evaluated several cases and found that projects that present “equivalent” dispersion often result in a non-zero output. This means that in situations where the proposed changes are minimal, the modeled output was greater than zero by as much as two decimal places, however, most evaluations that presented output values greater than zero were close to 0.005 µg/m³. As a confirmation, additional MPCA evaluations found that in a situation where no changes were modeled the predicted output was still greater than zero to five significant figures. This work identified a functional distribution of predicted outputs that can be used in interpreting the results.

Typically, based on preliminary MPCA evaluations, dispersion is considered impaired when modeled output is greater than 0.00 µg/m³ (i.e., rounded values greater than 0.005 µg/m³). In these situations, the EBD results will be referred to the MPCA program managers and/or supervisors for further discussion to determine if a refined modeling demonstration is warranted. Factors that will be considered include the ambient air quality standard and how much of the standard was consumed based on previous modeling; density of nearby sources; background concentrations; number of receptors in the modeling domain that are greater than zero; and, any specific permit conditions that may affect the final decision on refined modeling.

**Administrative Process and Forms**

To facilitate this approach, the MPCA has developed a specific form that addresses the EBD demonstration. A copy of the form is included as an attachment to this memorandum. As the EBD analysis is much less complex than refined dispersion modeling, the review and approval of an EBD proposal is conducted using a single form that combines the protocol and report into one document. The form becomes part of the permit amendment submittal if required by a permit, or as a separate, stand-alone submittal as required to fulfill a permit condition. An MPCA permit engineer would become involved with this process when changes to emission rates occur.

**Review of the Practice and Integration into Modeling Guidance**

This memorandum is intended to provide guidance on the practice of conducting an EBD demonstration. Ultimately, this practice will be included in the MPCA Modeling Guidance. Procedurally, this memorandum will operate as the MPCA guidance document on this subject until the next 2014 revision of the MPCA Modeling Guidance is completed. During this period the memorandum is in effect, the MPCA will review the performance of this approach and discuss the application of the analysis with project proposer that have employed this practice to determine if further refinements are needed prior to integrating it into the next 2014 Modeling Guidance revision.

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Attachments