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REGION 5

SUBJECT: Regulatory Application of Northshore Model/Monitor Evaluation Results

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Background

A model evaluation study has been conducted for the Northshore Taconite Facility, located at Silver Bay, Minnesota. The primary objective was to select the most appropriate dispersion model to be used for regulatory assessment of SO2 and NOx. The SO2 comes almost entirely from two power plants. The NOx comes primarily from gas-fired pelletizer furnaces. The study compared ambient monitoring data with predicted concentrations from a reference model and a candidate model. The reference model is ISC2, the candidate model has been revised throughout the study. The initial candidate model was ISC2 without terrain and without building downwash. The initial study resulted in the candidate model outperforming the reference model for NOx but not for SO2. A subsequent study was performed with a new set of meteorological and monitoring data. This new study examined the reference model with ISC2 without terrain but with downwash. The study showed that the new model outperformed the reference model in assessing SO2 concentrations. In summary, the studies supported modeling NOx emissions from Northshore with ISC2 without terrain and without building downwash, and modeling SO2 without terrain but with building downwash. As explained below, the difference between SO2 and NOx dispersion has since been shown to be the result of different stack heights (i.e., taller stacks emitting SO2, shorter stacks emitting NOx.)

Although the candidate models for NOx and SO2 were approved for regulatory use by EPA Region 5, the Minnesota Pollution Control Agency and Region 5 felt that a better technical model could be developed. After analyzing stack-by-stack contributions from the two studies, an evaluation was conducted that applied building downwash to "Huber-Snyder" stacks but not to "Schulman-Scire" stacks. This new model outperformed the reference model and when ultimately approved, could be used to model SO2 and NOx from the facility.

Issue

The Northshore evaluation has resulted in a model which can be

used for future regulatory modeling of SO2 and NOx at the facility sources. The question of whether the new model is appropriate for particulate matter (PM) emissions has arisen. Assuming that the particulate matter is expected to disperse as gaseous emissions, it seems reasonable that the results from the Northshore study could be applied to particulate matter emissions emitted from the sources which were tested in the model/monitor study.

A complicating factor in applying the new model to Northshore particulate matter emissions is that the new model underpredicted for SO2 and NOx. Underprediction factors have been calculated and would be applied as follows:

Pollutant	1-hour	3-hour	24-hour
SO2	1.7	1.7	1.2
NOx	1.8	NA	1.0

In addition, a 10 percent regulatory safety factor will be applied.

These underprediction factors were developed from 2nd high predicted and monitored data collected during the study time period. Information to develop a particulate matter underprediction factor in the same manner is not available. An option that is being considered is to apply the higher of the underprediction factors for the 24-hour averaging period, plus the 10 percent regulatory safety factor, to the particulate matter concentrations predicted by the new Northshore model. As mentioned before, only emissions from the sources evaluated in the study would be modeled using the new model. Other facility particulate matter sources would be required to use the current regulatory version of ISC. This option seems consistent with the idea that the model/monitor study is designed to evaluate source-receptor relationships and not dispersion based on different pollutants. The similarity in underprediction factors for the 1-hour and 24-hour averaging times for the two pollutants indicates that the model is performing about the same regardless of the pollutant being emitted, and this performance should translate to PM emissions as well.

Potential Recommendation

A possible recommendation for resolution of this issue is to allow the new Northshore model to be applied to particulate emissions from the sources at the facility which were included in the model/monitor study. An underprediction factor of 1.2 plus a 10% regulatory safety factor, would be applied to the predicted results. Other particulate matter sources at the facility must be modeled using the current regulatory model.