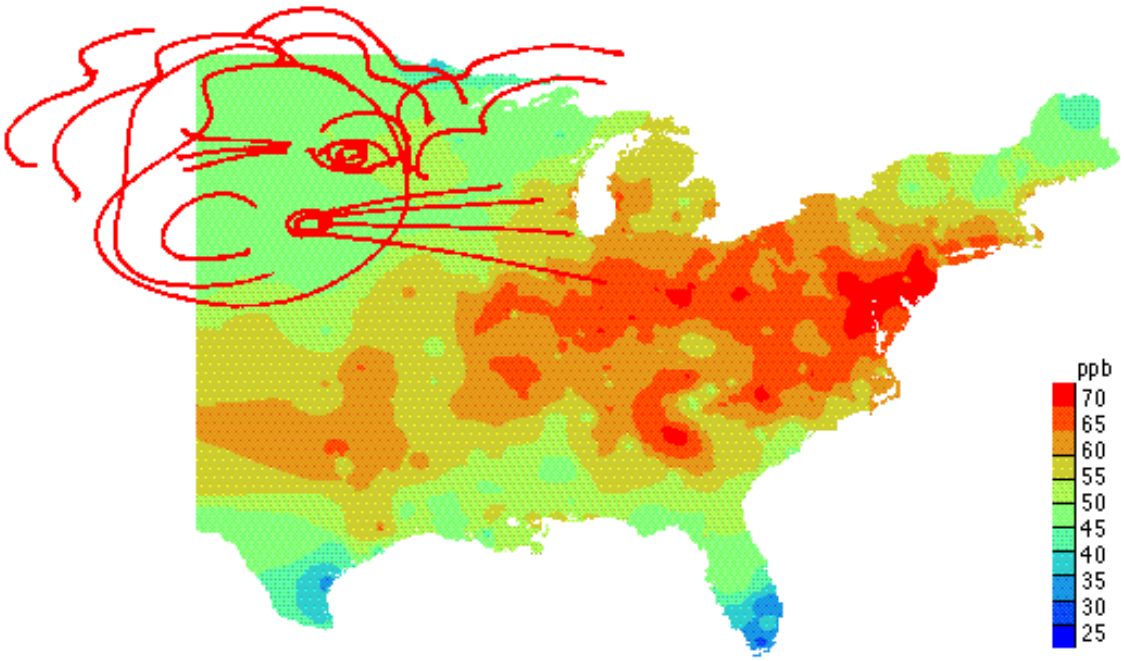
# The Costs of Ozone Transport: Achieving Clean Air in the East




*Average Daily Maximum Ozone during June, July, and August 1991-1995*

NESCAUM

**Northeast States for Coordinated Air Use Management**

**July 1998**

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## Executive Summary

Physical measurements of transported ozone pollution collected since the 1970s show a significant contribution of ozone in the Northeast originating from pollution sources outside the region. Transported ozone entering into the Northeast Corridor has been measured at levels exceeding 80% of the federal one-hour standard, and over 100% of the new eight-hour ozone standard.[1]

The transport of ozone and its precursors from upwind sources significantly contributes to the level of ozone in the Northeast – making it even more difficult for the Northeast to achieve attainment of the ozone standards. The U.S. Environmental Protection Agency (EPA) acknowledges the problem created by the transport of ozone, and has proposed a "$NO_X$ SIP call" requiring regional reductions of oxides of nitrogen ($NO_X$) by 2003. Efforts are underway, however, to weaken the proposed extent of $NO_X$ reductions from upwind sources. Weakening of the upwind $NO_X$ reduction requirements would require the Northeast to compensate, if feasible, for the unmitigated ozone transport burden by imposing additional measures beyond those necessary to reduce the Northeast's own ozone contribution.

With this in mind, the Northeast States for Coordinated Air Use Management (NESCAUM) sponsored a cost analysis to investigate the economic impact that would result if the Administration delays or weakens EPA's $NO_X$ SIP call proposal. The analysis is presented here in two parts. The first part describes what is known about the transport of ozone and its precursors into the Northeast. It establishes a range of 20-45% contribution to ozone levels above the 1-hour standard in the Northeast from upwind sources. The second part of the study applies this transport impact to determine the financial costs to the Northeast if the full extent of EPA's $NO_X$ SIP call is not applied to regions outside the Northeast.

The analysis finds that if only Clean Air Act Title IV (Acid Rain Program) $NO_X$ controls are implemented in six upwind states (IN, KY, MI, OH, VA, WV), Northeast states will likely incur between $1.4 to $3.9 billion in additional costs associated with local control measures to offset transported ozone. This cost range does not include additional control costs in the Northeast needed to reach attainment after compensating for transported ozone.

An important realization from this analysis is that reaching ozone attainment in the Northeast is unlikely if the Northeast must first compensate for significant ozone transport from outside the region. Simply stated, there are not enough feasible reductions left in the Northeast to reach ozone attainment after compensating for transport. Therefore, it is not a choice between reductions from upwind sources or additional reductions from sources within the Northeast. Both are needed.

While the cost per ton of additional Northeast reductions beyond the EPA $NO_X$ SIP call are substantially greater than the control costs that upwind sources must bear to achieve the $NO_X$ SIP call reductions, this study identifies additional measures within the Northeast, such as heavy duty diesel controls, that can provide cost-effective reductions beyond the EPA $NO_X$ SIP call. These measures, combined with NOx reductions in the proposed SIP call, will be necessary to achieve

[1] For example, beginning on the night of July 12, 1997 just prior to a severe ozone episode in the Northeast, an upwind ozone monitor in Shenandoah National Park, VA recorded a rolling eight hour average ozone concentration above the federal eight-hour standard that lasted for 28 consecutive hours (Source: USEPA AIRS database).

attainment of the new eight-hour ozone standard throughout the eastern United States. If these remaining cost-effective options are instead used to offset the impact of transported ozone, then significantly more expensive options will have to be implemented within the Northeast (if available at all) to make progress towards air quality goals.

The rationale for requiring upwind sources to meet the EPA's proposed budgets is supported by the fact that there are significantly more low-cost opportunities for reducing $NO_X$ emissions in upwind regions than in the Northeast. The cost analysis estimates that power plants in the states of Indiana, Kentucky, Michigan, Ohio, Virginia, and West Virginia can meet the $NO_X$ emission budgets required in the EPA SIP call at an average cost of $662/ton. The Northeast power plants, while among the least expensive control options available in the Northeast, will spend an average of roughly $1,031/ton to meet the EPA budgets – roughly fifty percent higher than the average cost to the upwind sources.

It is important to recognize that even if all states were to meet the EPA SIP call $NO_X$ budgets, upwind sources will continue to emit relatively large volumes of $NO_X$ that will contribute to ozone in the Northeast. The analysis estimates that even after the upwind sources reduce $NO_X$ emissions from the electricity sector down to the levels implied by the EPA's SIP call budgets, the economic impact on the Northeast would remain as high as $1.1 billion each year.

The study suggests that the overall costs of controlling $NO_X$ emissions could be reduced if the EPA adopts some form of $NO_X$ credit trading system to allow Northeast sources to purchase some of the relatively low-cost $NO_X$ reductions available from upwind sources. A $NO_X$ credit trading system will help mitigate the burden on the Northeast sources in reaching attainment of the ozone standard, and will also mitigate the net costs to the upwind sources in meeting the EPA SIP call budgets.

The public health and ecological impacts of the ozone transported into the Northeast are not considered in this report. Hence, the total health and economic costs of transported ozone are substantially greater than the costs presented in this analysis.