The Long-Range Transport of Ozone and Its Precursors in the Eastern United States

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EXECUTIVE SUMMARY

Twenty-six years after passage of the Clean Air Act of 1970, ozone pollution continues to be a pervasive health problem throughout much of the eastern United States. Extensive pollution control efforts since 1970 have resulted in significant pollution reductions and improved air quality. Nevertheless, over 70 million people, or almost 30% of the nation's population, currently live in counties that do not meet the existing health-based ozone standard.

A key problem in protecting public health is the interstate transport of ozone and its precursors into areas far downwind of the initial pollution sources. Many of these sources have historically been beyond the control of downwind local and state air quality planners. Progress toward clean air will require further, broad-based pollution reductions aimed at reducing transported ozone and its precursors throughout the eastern United States.

In outlining the scope of the ozone and precursor transport problem, a "weight-of-evidence" approach is used that draws on three main groups of information:

1) pollutant emissions and concentration data along with known weather patterns,
2) analyses of air mass paths associated with "clean" and polluted days in the eastern United States, and
3) computer modeling of the complex photochemistry and meteorology of ozone and precursor transport.

The available "weight-of-evidence" on ozone and precursor transport supports the following:

- Long-range ozone and precursor transport exists. It has been physically documented in the eastern United States.

- Aircraft measurements have recorded elevated concentrations of transported ozone at night above the ground. This ozone-rich layer mixes down to the surface during the day as the sun heats the atmosphere, thus demonstrating transported ozone aloft reaches the ground at later times far downwind of the source regions.

- Wind flow during severe ozone episodes in the northern United States is highly aligned and directional, moving pollution from the nation's Midwest to the Northeast region.

- Oxides of nitrogen (NOx) from power plants, automobiles and other pollution sources are key precursors in producing elevated regional ozone.

- The industrial Midwest is a region of significant power plant NOx emissions relative to the Northeast.

- Reconstructing the paths of air masses associated with elevated ozone concentrations at downwind ozone monitoring sites connects the severest ozone days in the eastern United States to a compact region of NOx emission sources in the industrial Midwest.

- Computer modeling by the Ozone Transport Assessment Group is consistent with the measurement data and air mass path analyses in finding a significant impact from transported ozone out of the industrial Midwest into the Northeast.

- Upwind, cost-effective NOx reductions are readily available throughout the eastern United States, especially in the industrial Midwest, and will be particularly beneficial for the Northeast.

In light of the available weight-of-evidence, strategies that focus on regional NOx reductions and local hydrocarbon controls are needed to reduce elevated ozone levels throughout the eastern United States. This strategy represents a significant departure from the historical focus on local urban areas in air quality planning.

To obtain a copy of the full report, contact the Northeast States for Coordinated Air Use Management, phone: 617-367-8540, fax: 617-742-9162, email: jwilliams@nescaum.org.