MID-ATLANTIC/NORTHEAST VISIBILITY UNION (MANE-VU) REGIONAL HAZE PLANNING -- YEAR 3

February 1, 2002 – January 31, 2003

NESCAUM Final Report
March 31, 2003

The U.S. Environmental Protection Agency (EPA) awarded a grant to the Ozone Transport Commission (OTC) to continue the process of assessing regional haze in the Mid-Atlantic and Northeast region and planning for the submission of implementation plans by MANE-VU members to comply with the regional haze rule. In the grant application, the Northeast States for Coordinated Air Use Management (NESCAUM) was identified to continue to perform a significant part of this work in cooperation with OTC and the Mid-Atlantic Regional Air Management Association (MARAMA) on behalf of MANE-VU. A Memorandum of Agreement (MOA) was signed in February 2002 documenting NESCAUM's responsibilities, which included the year 3 work plan from the grant application as an attachment. This report is organized consistent with the outline of the work plan.

A.1 NESCAUM Monitoring and Assessment

A.1.1 Visibility Database

A.1.1.1 Update and Maintain The Class I / IMPROVE Database

The VIEWS data repository, query and analysis system remains under development, but has been established through the contributions of all RPOs to support a national contract serviced by the Cooperative Institute for Research of the Atmosphere (CIRA) at Colorado State University. The current contract covers the period August 1, 2002 to July 31, 2003 with a price of $250,000, whose cost is equally distributed among the five RPOs. MANE-VU's portion of funding for the first year contract has been paid through the year 3 haze grant and we anticipate that future year contributions will be paid directly through EPA using funds withheld prior to awarding annual RPO grants.

NESCAUM staff continue to review and provide feedback on the performance of work products as they become available on the VIEWS website. NESCAUM also remains active on inter-RPO workgroups to provide direction and guidance on the future development of the site to ensure that it will meet state and tribal needs.

A.1.1.2 Review Urban Visibility Data

NESCAUM has conducted a comparison of IMPROVE data and speciated PM data collected at Speciation Trends Network (STN) sites which are located in urban environments throughout the MANE-VU Region. This survey makes a preliminary attempt to integrate data from these two distinct networks to yield composite maps of aerosol extinction across the region. This investigation has shown significant differences between the networks, but shows promise for

eventually resolving differences and developing a more complete picture of fine particle pollution and its impact on visibility and public health.

Complete results are available in Technical Memorandum #7, Review of Speciation Trends Network and IMPROVE Chemically Speciated Data found at:
http://64.2.134.196/regionalhaze/memoranda/Memo7-IMPROVE_STN.pdf

A.1.2 Maintain CAMNET

CAMNET consists of automated digital cameras that record the visual quality of a fixed scene every fifteen minutes. Most sites have related air pollution and weather data associated with the visibility pictures. Photographs are posted to the CAMNET web site and are archived for later use to document unusual fine particle pollution events such as the July 2002 Quebec forest fires and the mid-August 2002 regional haze episode. An example of the forest fires is shown below as Figure 1; note the striking difference between Acadia National Park, ME and Burlington VT.

Ongoing NESCAUM CAMNET tasks include coordination with the web site contractor (Air Resource Specialists Inc.), troubleshooting web site problems (both site specific and more general issues), and operation of the Boston CAMNET site. Particular attention is being paid to increase the data capture rate by identifying causes of chronic failures and implementing changes where possible.

CAMNET is presently running with six sites and continues to gain momentum. A Baltimore CAMNET site will be added within months and additional sites are being proposed for Moosehorn (Class I area), Maine, Blue Hill, Massachusetts, Presque Isle, Maine, Frostburg, Maryland within the next year. There is potential interest in additional sites located on Martha's Vinyard, Massachusetts, Pac Monadnock, New Hampshire and a Mohawk Mountain site is likely given Connecticut DEP's commitment to deploy a visibility supersite at that location. Given this rapid rate of growth proposed over the next 1 to 2 years, additional operation and maintenance costs may be needed to support the network in future years.

CAMNET can be found online at:
http://www.hazecam.net/

A.1.3 Field Campaign

A.1.3.1 Aircraft Studies

A $100,000 contract for aircraft measurements in the MANE-VU domain during summer 2002 haze events was awarded to Bruce Doddridge at the University of Maryland (UMD) for 48 flight hours and related data processing efforts. An additional $10,000 was spent on two MetOne optical particle size instruments for use on the UMD aircraft, and for conference call charges associated with flight planning. NESCAUM arranged for the no-cost loan of a portable total particle count instrument (CPC) for the second half of the summer measurement period to complement the MetOne particle measurements.

NESCAUM staff led approximately 30 haze-flight forecast calls between June 3 and August 19, 2002. A total of 56 MANE-VU related flight hours were flown covering 4 days in July and 4 days in August 2002. The eight additional flight hours beyond those originally budgeted for were used

to characterize the unusual mid-August event in northern New England; these costs were covered by the Maryland Department of Environment. Although the UMD work is fully funded out of the year-three MANE-VU grant, the data deliverables will not be completely finalized until spring 2003. Details on specific flights and available data to date are at: http://www.atmos.umd.edu/~umdair/rf2002.html

A.1.3.2 Enhancements to Ground-Based Monitoring

Profiler network coordination

In addition to several NOAA-run profilers in the Northeast US during this period as part of the AIRMAP program, there are 3 systems run on an ongoing basis by state agencies in the MANE-VU domain:

- Stow MA: Massachusetts Dept. of Environmental Protection
- New Brunswick, NJ: Rutgers University and the New Jersey Dept. of Environmental Protection
- Ft. Mead MD: Maryland Department of the Environment

NESCAUM contracted with Sonoma Technologies Inc. (STI) to perform an on-site review of these three upper air profiler sites, and to perform level 0.5 (automated screening) data validation on the NJ and MA sites. A limited amount of level 1.0 (manual) screening is also being performed.

The STI site review was of critical value to the documented quality of profiler data; all sites had notable performance related problems; two of the three sites had substantial errors with the wind direction data. Appendix A is the STI report on the MANE-VU funded site reviews.

Real-time and archived profiler data for the MANE-VU sites are available at: http://sonomatech.com/NESCAUMradarops/

Data from these and other profilers are available at: http://profiler.noaa.gov/jsp/profiler.jsp

Mount Washington Continuous Sulfate measurements

NESCAUM built and deployed a continuous sulfate monitor on the summit of Mt. Washington NH (elevation: 6300 feet) during the summer of 2002 on a pilot basis to compliment the trace gas measurements and daily aerosol chemistry measurements being done at that site by AIRMAP. Sulfate is the key aerosol species for haze in the Northeast US, and highly time-resolved sulfate data is a useful measurement for haze attribution and control.

The method used was recently developed by a NESCAUM staff member while working at the Harvard School of Public Health, and is not yet commercially available. NESCAUM built the sulfate to SO2 conversion module, and the NY-DEC loaned a trace-level SO2 analyzer for use as the detector. AIRMAP and the Mt. Washington Observatory supported the field operations of this instrument.

Figure 3 is an example of hourly Mt. Washington sulfate data from the mid-August haze event. It shows a substantial degree of sub-daily variation in sulfate concentrations that are obscured by a single daily average measurement. Of special interest is the rapid onset of the multi-day event on August 11 at mid-day; this was concurrent with an increase in SO2 and O3 at that site, but not CO or NOx.

Figure 1: The CAMNET “All sites” page during the peak of the Quebec forest fires in July 2002.

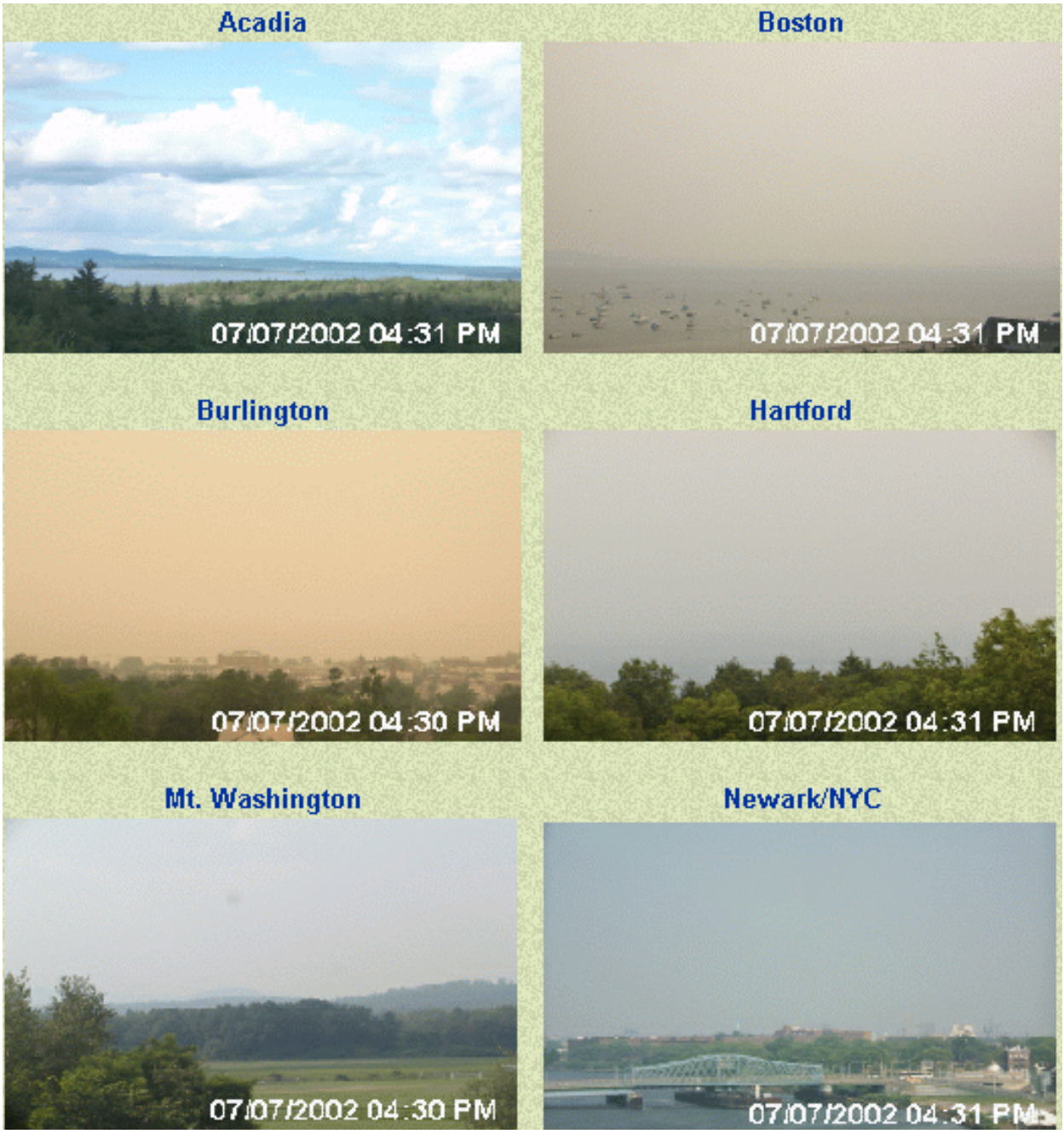


Figure 2: MANE-VU Haze Aircraft flights and PM2.5 at Rutland VT and Boston MA

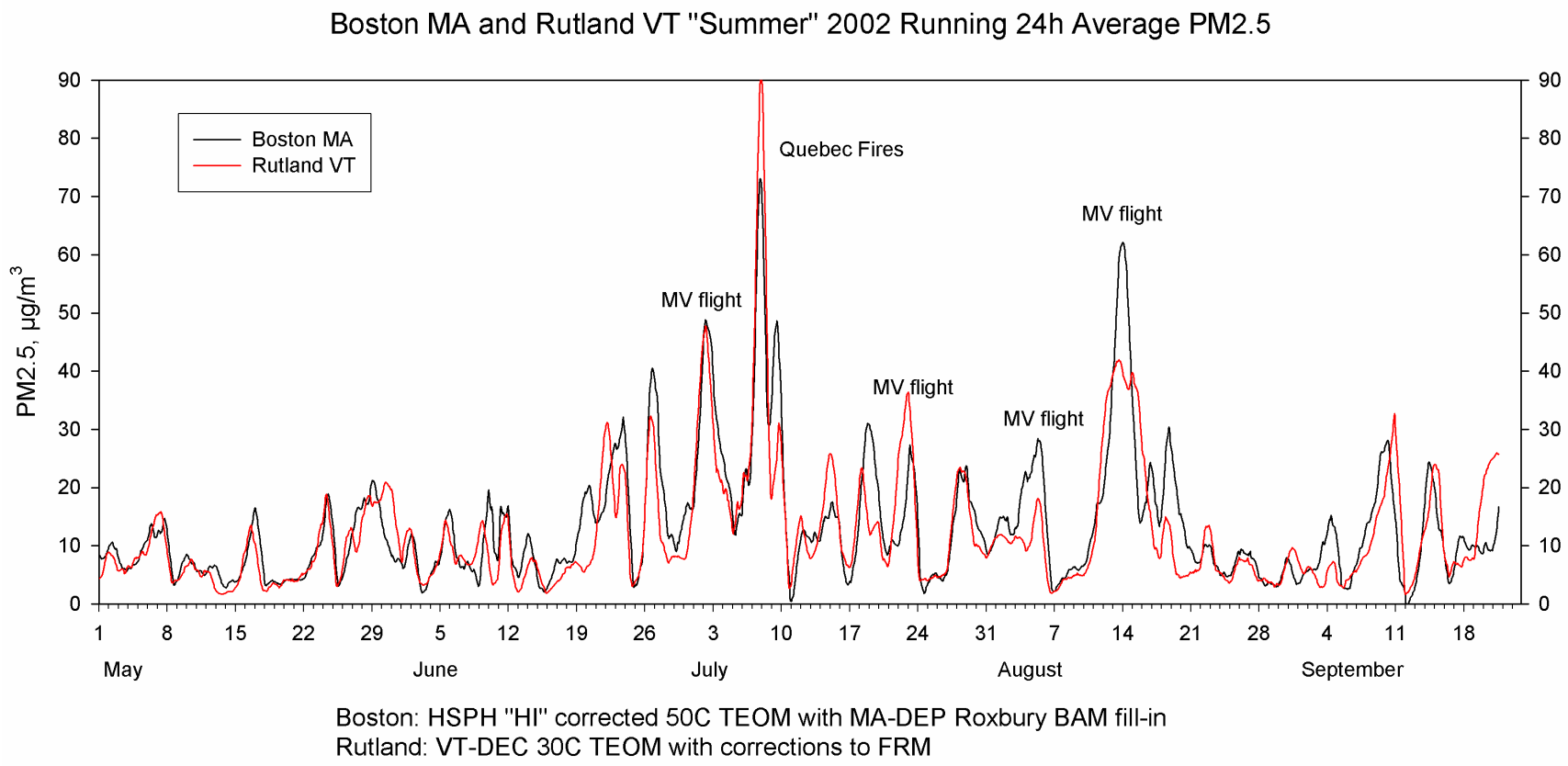
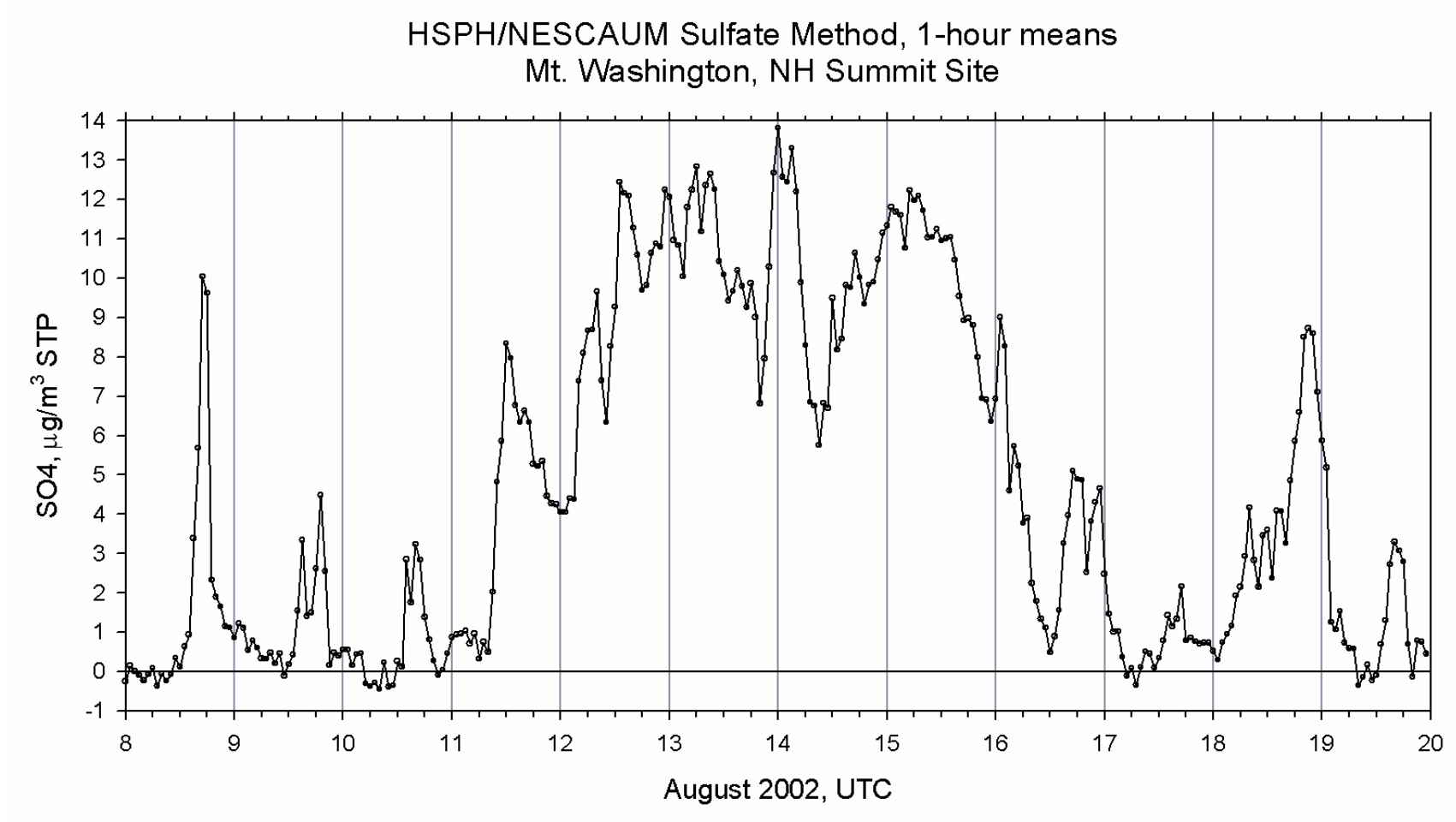


Figure 3: Hourly Mt. Washington sulfate data from the mid-August haze event.



B.1 NESCAUM Modeling

B.1.1 REMSAD

NESCAUM has performed several platform intercomparison experiments to identify potential differences between installations of REMSAD version 6.3 on a DEC Alpha (located at SAI offices), a Linux workstation and PC running Windows NT(NESCAUM) and a Sun workstation (NYDEC). The results of these exercises showed few differences in particulate phase species greater than a threshold of 1 ng/m3 (roughly 10,000 times smaller than the PM2.5 standard) suggesting sufficient stability for modeling PM species on any of these platforms subject to qualifications described in a technical memorandum documenting these studies.

The full text of this memorandum can be found in Technical Memorandum #5, REMSAD Platform Intercomparison Experiments at:
http://64.2.134.196/regionalhaze/memoranda/Memo5-Intercomparison.pdf

NESCAUM and the University of Maryland have performed a platform intercomparison experiment designed to compare the performance of REMSAD and CMAQ. Meteorological inputs have been developed for July 5-17, 1997 as part of the OTC ozone workplan effort. Emissions inventories inputs are being developed based on the 1996 NET inventory as this was determined to be the most direct way of incorporating the PM relevant haze precursor species (primarily SO2, Ammonia, and primary PM). Results of these simulations have been compared with each other and with observations from the IMPROVE network to demonstrate important differences between the models which will be the focus of continued testing in Year 4.

B.1.2 Modeling Coordination

Under model coordination efforts, NESCAUM had initially planned to develop a modeling workplan to outline all of the tasks associated with future modeling efforts for regional haze SIP compliance. After receiving input from the participants in the *MANE-VU modeling and data analysis workshop* in Portland, Maine in September, the MANE-VU modeling workplan was expanded to encompass other technical areas important for the haze planning process. This comprehensive workplan includes all technical activities to be coordinated for MANE-VU over the next three years. Workshop participants reviewed elements in the plan and further defined each subsection of the plan to ensure the proper elements were included. NESCAUM has worked with regional contacts to the document which is available online at:
http://www.nescaum.org/committees/haze/TWPtext.pdf

C.2 NESCAUM Emissions Inventory

C.2.1 Develop a Regional List of BART-Eligible Sources for Non-Utility Sectors

NESCAUM has been able to make substantial progress in developing a comprehensive list of non-EGU BART-eligible sources in the region ahead of schedule. While we had anticipated only beginning this process during Year 3, the use of interns and a shift in funding from other MANE-VU activities has allowed NESCAUM to develop a complete list of potentially BART-eligible sources for Connecticut, Delaware, Maine, Maryland,

Massachusetts, New Hampshire, New Jersey, New York, and Rhode Island. A determination has been made that there are no BART sources in Vermont or the District of Columbia. Additionally, Pennsylvania, Philadelphia County, and Allegheny County have declined NESCAUM's assistance for this effort.

The list of sources that has been developed is qualified as *potentially* BART-Eligible Sources because some sources could not be definitively identified as BART-Eligible without additional information that was not available in state permit files. Such information includes installation dates, total potential emissions or complete listings of all units at a facility. State staff will have to obtain necessary information from these sources in order to develop a final list of BART-Eligible sources.

A complete description of the process that was followed in order to develop this list is contained in a technical memorandum along with summary information on the number and type of sources that have been identified through this process. This document, Technical Memorandum #6, Development of a list of BART-Eligible Sources in the MANE-VU Region can be found online at:
http://64.2.134.196/regionalhaze/memoranda/Memo6-BART.pdf

This document complements the BART-Eligible source list for fossil-fuel fired steam electric plants (EGUs) that NESCAUM developed under the MANE-VU Year 2 grant which can be found online at:
http://64.2.134.196/regionalhaze/basis.pdf

E.3 NESCAUM RPO Facilitation and Planning

NESCAUM staff have continued in their coordinating roles on the monitoring and data analysis, modeling and communications workgroups at both the intra- and inter-RPO level requiring the participation in numerous conference calls, meeting and workshops.

G.2 NESCAUM Outreach and Communication Scoping Study

NESCAUM has completed a communications scoping study. The core components of this study include: a detailed communications and outreach plan, a media audit assessing haze press coverage, a researched listing of potential third-party partners with specific communications opportunities, and results of interviews with the MANE-VU states regarding preferences for outreach and communications materials. The scoping study has been revised after incorporation of comments from the review process and the final document is available online at:
http://64.2.134.196/regionalhaze/communications/Memo1-commscoping.pdf