Date of Report: April 15, 2003
EPA Agreement Number: R82806001-0
Title: PM2.5 Technology Assessment and Characterization Study in New York State (PMTACS-NY)
Investigators: Kenneth L. Demerjian, PI, with G. Lala, J. Schwab, V. Mohnen, and U. Roychowdhury, ASRC, University at Albany; P. Galvin, R. Gibbs, D. Felton and T. Lanni, New York State Department of Environmental Conservation; C. Kolb, M. Zahniser, and D. Worsnop, Aerodyne Research, Inc.; S. Herring, Aerosol Dynamics, Inc.; L. Newman, Brookhaven National Laboratories; P, Hopke, Clarkson University; W. Brune, Penn State University; L. Husain, N. Kim, X. Zhou, NYS Department of Health; J. Zamurs, NYS Department of Transportation; H. Patashnick, Rupprecht and Patashnick Co., Inc.
Institution: Atmospheric Sciences Research Center, University at Albany
Cost Sharing Partners: New York State Energy Research and Development Authority (NYSERDA) and New York State Department of Environmental Conservation (NYSDEC)
Research Category: Particulate Matter EPA "Supersites" Program
Sorting Code: 99-NCERQA-X1
Project Period: January – March 2003

Objective of Research:

As a result of recent clinical and epidemiological studies (NRC, 1998) associating adverse health effects in humans and fine particle mass, a new National Ambient Air Quality Standard for $PM_{2.5}$ mass (15 $\mu g/m^3$ annual and 65 $\mu g/m^3$ 24-hr average) has been promulgated in the United States (Federal Register, 1997). Significant scientific and technical issues surrounding the mitigation of the warm season PM2.5 /co-pollutant complex and its interdependence with O_3 air quality through coupled photochemical pathways, common precursors, and similar dependencies upon meteorology must be addressed if effective control strategies are to be implemented.

The long-term monitoring of the PM2.5/co-pollutant complex and its precursors at urban and regional representative sites provides the opportunity to track the impact of emission controls and their effectiveness on air quality. These data can to be used to verify that implemented PM2.5 primary and secondary precursor (including ozone precursor) emission controls are performing according to specifications and verify that PM2.5 and ozone air quality has responded to the emission changes achieved as expected. Without adequate monitoring systems to track the progress and effectiveness of implemented control programs, the air quality management approach remains unaccountable.

The PMTACS-NY Supersite program provides a unique and unparalleled opportunity to enhance our understanding of ozone/$PM_{2.5}$-precursor relationships and track progress in current precursor emission control programs and assess their effectiveness in achieving expected air quality responses. The impact of this research is highly significant, providing a sound scientific basis for informed effective decisions in the management of air quality in New York and will benefit its citizens both environmentally and economically.

The PMTACS-NY is designed around three major objectives and addresses a series of science policy relevant questions related to hypotheses to be tested using measurement data collected under the program. The subject quarterly reports provide highlights on the overall program status, the progress made in the context of the specific tasks associated with the three program objectives, identification of outstanding issues, project schedule and completion status by task, and a budget analysis.

Progress Summary/Accomplishments:

Data reduction from the summer 2002 field intensive measurement campaign at Whiteface Mountain is nearing completion. The data workshop and review meeting for this campaign has been scheduled for June 10, 2003 in Albany. The workshop is later than originally planned (February/March timeframe), but several other Supersite obligations made it necessary to postpone to the June date. During this quarter our research team helped organize and participated in the PI's Supersite meeting in Atlanta, GA, January 22-23, 2003 and AAAR Conference on Particulate Matter: Atmospheric Sciences, Exposure and the Fourth Colloquium on PM and Human Health, March 31 – April 4, 2003, Pittsburgh, PA. Details of the latter can be found in Appendix A.

Objective I. Measure the temporal and spatial distribution of the PM2.5/co-Pollutant complex including: SO_2, CO, VOCs/Air Toxics, NO, NO_2, O_3, NOy, H_2CO, HNO_3, HONO, PM2.5 (mass, $SO4^{=}$, NO_3^-, OC, EC, Trace Elements), single particle aerosol composition, CN, OH and HO_2 to support regulatory requirements to develop cost effective mitigation strategies PM2.5 and its co-pollutants and to establish trends in the relevant precursor concentrations to assess the impact of recent and future emission reductions in terms of emission control effectiveness and air quality response.

Measurements at our two rural sites Whiteface Mountain and Pinnacle State Park and at our two urban sites IS 52 in the South Bronx and PS219 in Queens operated during this quarter as outlined in Table 1 of the QAPP.

Objective II. Monitor the effectiveness of new emission control technologies [i.e. Compressed Natural Gas (CNG) bus deployment and Continuously Regenerating Technology (CRT)] introduced in New York City and its impact on ambient air quality, thorough remote open path roadside, mobile platform, and fixed site measurements of CO_2, CO, NO, H_2CO, HONO, CN and aerosol chemical composition.

A manuscript, entitled "Mobile Particulate Emission Studies of in-use New York City Vehicles", was submitted to Aerosol Science and Technology reporting on PM emissions from CNG, diesel and CRT-diesel vehicles using an innovative mobile platform that chases vehicles and reports on their in-use emissions.

There were no further measurements planned or performed with this technology during this quarter.

Objective III. Test and evaluate new measurement technologies and provide tech-transfer of demonstrated operationally robust technologies for network operation in support of the development of process science and observation based analysis tools and health based exposure assessments.

Additional testing, evaluation and comparisons of semi-continuous PM sulfate and nitrate instrumentation operated during the Summer 2001 field intensive in Queens, NY and the Summer 2002 at Whiteface Mountain were presented at the 2003 PI's Supersite meeting in Atlanta, GA, January 22-23, 2003 and in poster sessions at the AAAR Conference on Particulate Matter: Atmospheric Sciences, Exposure and the Fourth Colloquium on PM and Human Health, March 31 – April 4, 2003, Pittsburgh, PA. In addition, presentations on the status of the PMTACS-NY were made to the New York State Energy Research and Development Authority (NYSERDA) at its EMEP Program Advisors and Science Advisors meeting on March 18-19, 2003. NYSERDA is a co-sponsor of the PMTACS-NY.

Titles and authors of Posters/Presentations for the AAAR Pittsburgh, PA conference from the PAMTACS-NY research team are attached as Appendix A:

Following papers have been accepted for publication:

Development and Operation of an Aerosol Generation, Calibration and Research Facility
Olga Hogrefe, G. Garland Lala, James J. Schwab, Frank Drewnick and Kenneth L. Demerjian
Atmospheric Sciences Research Center, University at Albany, State University of New York,
251 Fuller Road, Albany, NY 12203, Aerosol Science and Technology

Measurement of Ambient Aerosol Composition during the PMTACS-NY 2001 using an Aerosol Mass Spectrometer - Part I: Mass Concentrations
Frank Drewnick, James J. Schwab, John T. Jayne, Manjula Canagaratna, Douglas R. Worsnop, Kenneth L. Demerjian**;** Atmospheric Sciences Research Center, State University of New York, 251 Fuller Road, Albany, NY 12203, USA (F.D., J.J.S., K.L.D.); Center for Aerosol and Cloud Chemistry, Aerodyne Research Inc, 45 Manning Road, Billerica, MA 01821-3976 (J.T.J., M.C., D.R.W.), **Aerosol Science and Technology**

Measurement of Ambient Aerosol Composition during the PMTACS-NY 2001 using an Aerosol Mass Spectrometer - Part II: Chemically Speciated Mass Distributions
Frank Drewnick, John T. Jayne, Manjula Canagaratna, Douglas R. Worsnop, Kenneth L. Demerjian**;**Atmospheric Sciences Research Center, State University of New York, 251 Fuller Road, Albany, NY 12203, USA (F.D., K.L.D.); Center for Aerosol and Cloud Chemistry, Aerodyne Research Inc, 45 Manning Road, Billerica, MA 01821-3976, USA (J.T.J., M.C., D.R.W.), **Aerosol Science and Technology**

Intercomparison and Evaluation of Four Semi-continuous PM-2.5 Sulfate Instruments
F. Drewnick, J. J. Schwab, O. Hogrefe, S. Peters, L. Husain[1], D. Diamond[2], R. Weber[2] and K. L. Demerjian; Atmospheric Sciences Research Center, University at Albany, State University of New York, 251 Fuller Road, Albany, NY, [1]NYS Department of Health, Wadsworth Center, Albany, NY, [2]School of Earth and Atmospheric Sciences, Georgia Institute of Technology, Atlanta, GA ,
Atmospheric Environment

Future Activities and Outstanding Issues: During the next quarter planned activities include: 1) convening on June 10, the data workshop and review meeting on the Whiteface Mountain Summer 2002 Field Intensive data set; 2) participation in the NOAA 2002 New England Air Quality Study Data Workshop Meeting Date: 28-30 May 2003; and 3) preparation and submission of draft manuscripts for the 2nd Supersite Special Issues in Aerosol Science and Technology and the 1st Supersite Special Issue in Journal of Geophysical Research.

Finally, uncertainties still remain with respect to New York City winter field intensive campaign. We have decided to postpone this intensive until January 15 – February 15, 2003), but timing for the construction of the NYS DEC's Queens College permanent monitoring facility, which was to host the intensive study remains uncertain. We have scheduled meetings with NYS DEC upper level management to discuss this issue. Unfortunately, state budget cuts and the current deadlock in the passage of the NYS 2004 budget is delaying and may impact capital expenditure decisions at DEC. If this issue is not resolved by the end of June, we will have to develop an alternate field implementation plan for the winter campaign, which may take us to another monitoring location.

Supplemental Keywords: ambient air, atmospheric aerosols, ozone, particulate matter, metals, nitrogen oxides, sulfates, organics, atmospheric chemistry, monitoring, measurement methods, northeast air quality.

Relevant Web Sites: http://www.asrc.cestm.albany.edu/pmtacsny/

Appendix A. AAAR Conference on Particulate Matter: Atmospheric Sciences, Exposure and the Fourth Colloquium on PM and Human Health, March 31 – April 4, 2003, Pittsburgh, PA.

1. **[P07-22] INTECOMPARISON OF SEMI-CONTINUOUS PARTICULATE SULFATE AND NITRATE MEASUREMENT TECHNOLOGIES AT A NEW YORK STATE URBAN AND RURAL LOCATION.** ***Authors:*** Olga Hogrefe, Drewnick Frank, James J. Schwab, Kevin Rhoads, Sarah Peters, Kenneth L. Demerjian ***Date/Time:*** Thursday, April 2, 2003 - ***Session Info:*** Poster Session 3: Workshop 7: Semi-Continuous Methods for Measuring PM (8:30 PM-9:30 PM)
2. **[P07-21] SEMI-CONTINUOUS PM2.5 SULFATE AND NITRATE MEASUREMENTS IN NEW YORK CITY.** ***Authors:*** Oliver V Rattigan, Dirk Felton, James J Schwab, Kenneth L Demerjian ***Date/Time:*** Thursday, April 2, 2003 - ***Session Info:*** Poster Session 3: Workshop 7: Semi-Continuous Methods for Measuring PM (8:30 PM-9:30 PM)
3. **[P04-59] URBAN AND RURAL CHEMICAL COMPOSITION OF FINE PARTICULATE MATTER IN NEW YORK STATE.** ***Authors:*** James J Schwab, H D Felton, Kevin Civerolo, Liaquat Husain, Kenneth L Demerjian ***Date/Time:*** Thursday, April 2, 2003 - ***Session Info:*** Poster Session 1: Workshop 4d: Sampling and Analyzing PM - Spatial and Temporal Variation for PM and Precursors (11:00 AM-12:00 PM)
4. **[P04-36] MEASUREMENT UNCERTAINTY IN THE DETERMINATION OF FINE PARTICLE MASS AND MASS CONCENTRATIONS OF SULFATE AND TRANSITION METALS.** ***Authors:*** James J Schwab, H D Felton, Liaquat Husain, Kenneth L Demerjian ***Date/Time:*** Thursday, April 2, 2003 - ***Session Info:*** Poster Session 1: Workshop 4b: Sampling and Analyzing PM - Sampling and Analysis Networks and Methods (11:00 AM-12:00 PM)
5. **[P04-08] SOURCE RESOLUTION OF SULFATE AND TRACE ELEMENTS IN PM2.5 IN NEW YORK, NEW YORK.** ***Authors:*** Sumizah Qureshi, Vincent A. Dutkiewicz, Utpal K. Roychowdhury, James J. Schwab, Kenneth L. Demerjian, Liaquat Husain ***Date/Time:*** Thursday, April 2, 2003 - ***Session Info:*** Poster Session 1: Workshop 4a: Sampling and Analyzing PM - Source Characterization and Attribution (11:00 AM-12:00 PM)
6. **[P10-09] AEROSOL SIZE DISTRIBUTIONS: A COMPARISON OF MEASUREMENTS FROM URBAN AND RURAL SITES.** ***Authors:*** G. Garland Lala, Olga Hogrefe, Kenneth L. Demerjian ***Date/Time:*** Thursday, April 3, 2003 - ***Session Info:*** Poster Session 4: Workshop 10: Measurement of Particle Size (Ultrafine, Fine, and Coarse) (8:00 AM-9:00 AM)
7. **[P07-27] CORRELATION OF VISIBILITY AND PM2.5 MASS CONCENTRATION AND RELATED PRECURSORS IN THE ADIRONDACK REGION OF UPSTATE NEW YORK DURING THE PMTACS-NY SUMMER INTENSIVE OF 2002.** ***Authors:*** Utpal K. Roychowdhury, Richard A. Lamica, Henry D. Felton, Phil Galvin, James J. Schwab, Kenneth L. Demerjian ***Date/Time:*** Thursday, April 3, 2003 - ***Session Info:*** Poster Session 6: Workshop 7: Semi-Continuous Methods for Measuring PM (4:00 PM-5:00 PM)
8. **[P07-22] INTECOMPARISON OF SEMI-CONTINUOUS PARTICULATE SULFATE AND NITRATE MEASUREMENT TECHNOLOGIES AT A NEW YORK STATE URBAN AND RURAL LOCATION.** ***Authors:*** Olga Hogrefe, Drewnick Frank, James J. Schwab, Kevin Rhoads, Sarah Peters, Kenneth L. Demerjian ***Date/Time:*** Thursday, April 3, 2003 - ***Session Info:*** Poster Session 6: Workshop 7: Semi-Continuous Methods for Measuring PM (4:00 PM-5:00 PM)
9. **[P07-21] SEMI-CONTINUOUS PM2.5 SULFATE AND NITRATE MEASUREMENTS IN NEW YORK CITY.** ***Authors:*** Oliver V Rattigan, Dirk Felton, James J Schwab, Kenneth L Demerjian ***Date/Time:*** Thursday, April 3, 2003 - ***Session Info:*** Poster Session 6: Workshop 7: Semi-Continuous Methods for Measuring PM (4:00 PM-5:00 PM)

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