

QUARTERLY PROGRESS REPORT

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Title: The Pittsburgh PM Supersite Program: A Multidisciplinary Consortium for Atmospheric Aerosol Research

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Institution: Carnegie Mellon University

Project Period: February 15, 2000 – May 15, 2001

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Objectives: Characterization of the atmospheric aerosol in the Pittsburgh region. Development and evaluation current and next generation atmospheric aerosol monitoring techniques. Quantification of the impact of the various sources to the PM concentrations in the area. Elucidation of the links between PM characteristics and their health impacts. Study of the responses of the PM characteristics to changes in emissions.

Work Status: The construction of the new CMU air quality laboratory was completed in the end of April. The new space will be used for the analysis of the aerosol samples and VOCs collected during the Supersite operations. The various groups coming to Carnegie Mellon will also use it for the setting-up and troubleshooting of their equipment. The central sampling site was also completed in the beginning of May. It was connected to the power grid during the second week of May and installation of the CMU equipment started right away.

Instruments installed at the site in the middle of May included the FRM and Dichotomous samplers, TEOM (operating at 30°C), two MOUDI impactors, the CMU sampler for OC and EC,

the continuous nitrate monitor, nephelometer, meteorological station, and gas monitors (O_3 , NO_x , CO and SO_2). The remaining CMU baseline instruments will be installed during the last two weeks of May. They include the CMU inorganic sampler, the particle sizing instruments (nano-SMPS, SMPS and APS), and the CMU steam sampler.

The outside collaborators are expected to arrive and install their equipment in the last week of May and first two weeks of June. The Baltensperger group (Paul Scherrer Institute, Switzerland) will install one of their nephelometers at their central site. A second one will be installed later in one of the satellite sites. The site will be selected after the analysis of the results of the July 2001 intensive. The ADI group instruments (continuous sulfate and carbon) have already arrived at CMU and are waiting for the arrival of the ADI team. The BYU group has installed their PC-BOSS sampler at the site. The sampler will be operated during the intensive.

The Rutgers group (B. Turpin) will be installing their semi-continuous OC/EC monitor in the beginning of June. The same group will also be running a low-pressure impactor (LPI) with ZnSe impaction plates for the FTIR analysis of the organic aerosol components. The team will also run a hivol sampler at the site for the analysis of the polar and non-polar organic aerosol fractions. This last measurement has been added to the PAQS program to support the health-related work. The same sampler will be used by the University of Colorado group (Hernandez) for the collection of their bio-aerosol samples. The samples will be frozen and mailed to Denver for analysis.

The Colorado State group (Collett) will install their hydrogen and organic peroxide monitors at the central site in the middle of June. Their fog water collector will also be added to the suite of instruments in the central site. A second cloud water collector will be installed in the early fall at the top of the Cathedral of Learning for sampling of low level clouds.

The installation of the semi-continuous metals sampler (SEAS) of the University of Maryland has been delayed for a few weeks because of problems with its data acquisition and control system. The system will be installed in the central site in the end of June.

The CMU team together with Prof. Rogge is building an additional sampler for organic aerosol speciation. The sampler will have a high flow rate and the quartz filter will be followed by a PUF as a back-up filter. The samples will be frozen and mailed to Florida International University for speciation by the Rogge group. The sampler will be ready by the end of June and it will be used during the July intensive.

A denuder-based organic sampler is constructed and will be used together with the regular CMU OC/EC sampler. The latter is using two lines, one with two quartz filters and the second with a Teflon filter followed by a quartz filter. The denuder-based sampler will use a honeycomb carbon denuder followed by a quartz filter and a carbon-impregnated filter (CIF) as a back-up. These samplers together with the PC-BOSS, the MOUDI impactor, the semi-continuous Rutgers OC/EC monitor and the continuous ADI Carbon monitor will provide a unique combination of organic aerosol measurements.

The UC Davis/U. Delaware groups are facing some difficulties with their construction of their single particle mass spectrometer. One of their suppliers has informed them that he will not be able to deliver their custom-made power supply until the end of June. The single particle instrument is expected to be deployed at the site in the beginning of July. The use of the instrument for more than a year at the site should compensate for the lack of measurements during June.

The Supersite team had a coordination meeting with the Allegheny County Health Department, the Pennsylvania DEP, and the DOE/NETL personnel and their subcontractors. CMU will operate four speciation sites in and around Pittsburgh. The County and the State have ordered two Met-One speciation samplers for each of the site to facilitate the every-day sampling. Arrangements have been made with RTI for the mailing of the coolers and filter-packs between Pittsburgh and North Carolina. DOE/NETL and its subcontractors (ATS, CONSOL, and Ohio University) will operate four more satellite sites (Athens Ohio, Steubenville, Holbrook, and the

NETL site) during the July intensive. We expect that all the sites will be ready on time, and will be provide daily aerosol speciation measurements during July.

Changes in Key Personnel Involved in the Project: Dr. Bruce Doddridge and his group from the University of Maryland have joined the Pittsburgh Air Quality Study (PAQS) team. They will use their airplane to characterize the vertical concentration profiles of aerosols and ozone upwind and downwind of the Pittsburgh Supersite.

Expenditures to Date: During the first fifteen months of the project the Supersite team has used approximately all the budget for the corresponding period.

Quality Assurance Requirements: The Quality Assurance/Quality Control plans for the project are coordinated with the other six Supersites and EPA. Dr. Beth Wittig will be the QA manager for the Supersite. The QAPP has been sent to EPA and the comments have been received. The QAPP will be revised and will be submitted in its final form before the beginning of the intensive July period.

Planned Activity for the Subsequent Reporting Period: Major activities planned for the sixth quarter of the project include:

- Installation of the remaining baseline instruments
- Beginning of all the baseline measurements
- Completion of the construction of the single particle mass spectrometer by the Wexler group, the SEAS metal analyzer and the LIBS instrument by the University of Maryland
- Revision of the QAPP and submission to EPA
- Performance of intensive measurements during July

Supplemental Key Words: Airborne particulate matter, aerosol, size distribution, ultrafine, fine and coarse particles, atmospheric chemistry, source-receptor, measurement error, study design, epidemiology, regional modeling, source/receptor analysis, Pittsburgh, Ohio River Valley, Western Pennsylvania, photochemistry, meteorology, trajectory modeling, peroxides.

Relevant Web Sites: homer.cheme.cmu.edu