SOUTHERN OXIDANTS STUDY

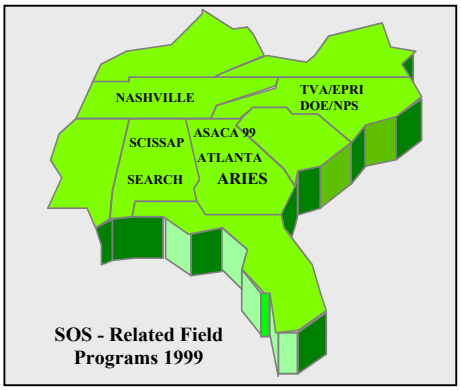
Summer 1999 Field Campaign Newsletter No. 1 – January 1999

Jim Meagher NOAA Aeronomy Laboratory

The intent of this Newsletter is to better inform those participating in this summer's SOS Field Campaign, and other interested parties, of the activities that are planned. The complex array of measurements and multiple intensives that are planned necessitate a somewhat dispersed planning process that makes it difficult for most participants to "see" the whole picture. This Newsletter, and subsequent issues, will attempt to describe the elements of the Field Campaign in sufficient detail that each of us can see how our research contributes to a greater whole.

The Big Picture – A Tale of Two Cities

"It was the best of times, it was the worst of times …"[1]



The SOS is in for a very busy year! The SOS, in collaboration with other organizations and programs, will conduct a major Field Campaign during the summer of 1999. We will be investigating the processes responsible for the formation of oxidants and fine particulate matter (PM) and their interactions. The Field Campaign will have two components: the major component centered in Nashville during June/July will include extensive airborne measurements, and a smaller component in Atlanta during August will have surface-based measurements at one or two sites focussing on measurements of the physical and chemical characteristics of PM and an intercomparison of continuous and semi-continuous methods for PM speciation. Truly, a tale of two cities. In addition, several major SOS-related measurement programs will be operational during the summer of 1999.

The SOS leadership is working to integrate these disparate programs into a cohesive whole. The combined activities provide an unparalleled opportunity to describe the production and distribution of ozone and PM throughout the Southeast with a level of detail that has hitherto not been possible. The new science and improved insights that will result are expected to translate directly into better management strategies for these two pollutants.

The focus on Nashville and Atlanta provides context and contrast for our measurements. These two southern cities, while seemingly very different (Atlanta is much larger with a population of almost 4 million as compared to Nashville with a population of about 500 thousand), are in fact, similar in many respects. Both cities experience similar climates, are transportation and petroleum distribution centers, and thus, have a similar distribution of precursor emissions, although total emissions scale with population. Both are island cities, surrounded by rural areas with abundant vegetation with significant biogenic VOC emissions.

[1] Charles Dickens "A Tale of Two Cities"

By exploiting these similarities and differences, we hope to maximize the value of our findings, providing information on the degree to which the results obtained in one city are generally applicable and transferable to another.

These two urban-based field campaigns are being conducted against a backdrop of enhanced regional monitoring by SOS collaborators that extends the intensive efforts while providing temporal and spatial context. When taken as a coordinated effort, these studies provide a regional perspective for the atmospheric process studies and are expected to produce a rich database for the evaluation and improvement of predictive air quality models.

A brief description of each of these programs is presented below to give the reader a broad-brush view of the planned activities and to provide some context for the more detailed description of the Nashville Field Intensive that follows.

Nashville Field Intensive

The Nashville Field Intensive is scheduled to run from June 15 through July 15, 1999. Measurements will focus on obtaining an improved understanding of the processes that control the formation and distribution of fine particles and ozone. Three study themes are identified in the Science Plan:

1. Local vs. regional – regional contrasts
2. Ozone and PM formation in plumes
3. Diurnal cycle in chemistry and meteorology

These themes will be addressed through a series of coordinated measurements involving instrumented aircraft and a ground-based network of chemistry and meteorological measurements. The following instrumented aircraft will participate:

1. NOAA WP-3D – 4-engine turboprop *in situ* measurements of chemistry and meteorology
2. DOE G-1 – 2-engine turboprop *in situ* measurements of chemistry
3. TVA Bell 205 – helicopter *in situ* measurements of chemistry and meteorology
4. NOAA CASA 212 – 2-engine turboprop airborne remote sensing of ozone and aerosol-backscatter using lidar

Three new ground-based chemistry monitoring sites will be operational during the study:

- Dickson – 53 km WNW of Nashville, upwind, rural site
- Polk Building – Downtown Nashville, 5-m tower on the roof of the building, source signature
- Cornelia Fort Airport – 8km NE of Nashville, downwind, urban site.

More detail on the operational aspects of the Nashville Intensive is provided in this newsletter.

The Science Plan for this field campaign can be found on the NOAA Aeronomy Laboratory web site at (http://www.al.noaa.gov/WWWHD/Pubdocs/SOS/SOS99.html) Contact: Jim Meagher NOAA, Aeronomy Lab Phone: 303-497-3605
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Atlanta "PM Supersite"

Recently, U.S. EPA's Office of Air Quality Planning and Standards (OAQPS) and Office of Research and Development (ORD) have invited SOS to submit a proposal for additional funds (on the order of $1 million) to implement a "PM Supersite" in Atlanta during calendar year 1999. EPA's Draft Conceptual Plan for the supersite program can be found at (http://www.epa.gov/ttnamti1/supsites.html). Additional information on the planning for the supersite program is contained in the Report of the PM Measurements Workshop (http://www.al.noaa.gov).

As part of this implementation, we will be expanding the scope of the Atlanta portion of the Field Campaign. The objectives of this expanded experiment will be to:

1. Test and characterize the performance of emerging and/or state-of-the-science "PM Measurements."

(We use the term "PM Measurements" to mean technologies, instruments, and methods used to characterize the physical and chemical characteristics and health impacts of PM, as well as their precursors and related parameters);
2. Intercompare for accuracy and consistency of similar and dissimilar PM measurements;
3. Evaluate the scientific information that can be gained by combining various independent and complementary PM measurements at a single or at multiple sampling sites, and the information potentially lost by using only a small subset of the available PM measurements;
4. Evaluate the precision, accuracy, and completeness of the information that will likely be gained from the mass and chemical composition PM networks currently being implemented by the U.S. EPA and State and local agencies; and
5. Use the gathered and quality assured data to address various relevant scientific issues.

The Atlanta supersite will build on the extensive PM measurement program that already exists in Atlanta as a result of the ARIES, SCISSAP, and ASACA programs (for more information, see below). A proposal is in preparation.
Contact: William Chameides, Georgia Institute of Technology
Phone: 404-894-1749
Email: (wcham@eas.gatech.edu)

Aerosol Research and Inhalation Epidemiology Study (ARIES)

In anticipation of the EPA's implementation of the newly-promulgated $PM_{2.5}$ monitoring program, EPRI, Southern Company and their collaborators launched a detailed monitoring and speciation study, which exceeds the EPA's expectation of a "supersite." At its core, the ARIES entails 18 months of intensive monitoring at the Atlanta, GA, SEARCH site. ARIES is a multi-faceted study in which the disciplines of monitoring, epidemiology, exposure assessment, and modeling are combined in the study design. The state-of-the-art ambient monitoring component of the program will provide to the epidemiological component a characterization of aerosol (gas and particle) physical, chemical and biological (aeroallergens) properties that has not been available to epidemiologists before. There are four components of ARIES:

- *Air Quality Characterization:* $PM_{2.5}$ mass concentration and composition as well as related gas-phase and particle-phase pollutants will be monitored for 18 months. The air quality field measurements also include SO_2, CO, NO, NO_2, NO_y, O_3, HNO_3, NH_3, and VOCs in the gas phase; major ions including acidity, elements, water-soluble metals, and carbon in the particle phase; pollen and mold; and particle number and size distribution from nm to μm size range.
- *Air Pollution Mortality:* daily mortality data will be collected and analyzed in a multi-pollutant ecological time-series study.
- *Air Pollution Morbidity:* daily data on emergency room admissions will be collected from all the large hospitals in the Atlanta area. The focus will be on admission for coronary and respiratory symptoms. A subset of these patients will subsequently participate in a panel study in which the association between their activities, reported symptoms, medication use, and personal exposure may be examined.
- *Exposure Assessment:* a personal/indoor/outdoor exposure assessment study is planned to aid the epidemiologists in assessing exposure misclassification associated with use of regional monitors as surrogates for personal exposure. This information can then be used to validate personal exposure models.

EPRI contact: Tina Bahadori (tbahadori@epri.com).
Southern Company contact: John Jansen (John.J.Jansen@scsnet.com).

The Assessment of Spatial Aerosol Composition in Atlanta, 1999 (ASACA '99)

Atlanta is one of the fastest growing urban areas in the country and is currently categorized as "serious" nonattainment for ozone (O_3). A major contributor to Atlanta's ozone problem is automobile exhaust (Atlanta has more total daily vehicle miles traveled, VMT, than any other city in the country). Coincidentally, automobile exhaust also plays a significant role in $PM_{2.5}$ production. As a result, there are indications that Atlanta will experience difficulty meeting the new NAAQS for $PM_{2.5}$. In an effort to

study the problem in Atlanta and gain some insight, a system of particulate matter monitors, including continuous mass monitors and speciated particle composition monitors, are being deployed throughout Atlanta beginning in the summer of 1998.

The data obtained from this research study will include both mass measurements and chemical speciation. The continuous mass measurements (taken at three sites) will be used to identify NAAQS attainment and to determine diurnal and/or seasonal patterns in spatial variability of $PM_{2.5}$, while the speciated data (taken at four sites) will be used to understand aerosol dynamics in the Atlanta area, and to help form a basis for developing automobile emission control strategies to reduce ambient particle levels. Taken together, these data support better air quality management decisions, and there is an urgent need to collect and analyze data as quickly as practical.

The overall goal of this research is to fully characterize $PM_{2.5}$ in Atlanta using field measurements (continuous mass and integrated speciation) and modeling during the period 1/1/99 through 12/31/99. The specific objectives of the project are as follows:

- Measure $PM_{2.5}$ daily from 1/1/99 to 12/31/99 using USEPA equivalent methods and speciation monitors, and correlate these data to other ambient monitoring data.
- Use expanded field monitoring data from 1999 to estimate the spatial distribution of $PM_{2.5}$ in Atlanta.
- Develop statistical "back-casting" models for estimating daily $PM_{2.5}$ levels; use source-based modeling to identify primary contributors of $PM_{2.5}$.

Research Methods

I. Particle Composition Measurements and Analyses

A manual, filter-based particle composition monitor will be operated on a daily schedule to meet the research objectives as listed above. It is a 4-channel system, based on the ARA design, to collect 24-hour integrated samples for analysis of major ions, trace metals, organic and elemental carbon and semi-volatile organic species in the $PM_{2.5}$ size range. The monitor is controlled by a data acquisition system, which activates sampling, sequences filters and controls sample flow. Four such monitors will be deployed in the Atlanta area (NE - Tucker, GA; SE - South Dekalb College; SW - Fort McPherson Army Installation; NW - Southern Polytechnic State University).

Ambient air is drawn through each channel of the monitor using a size-selective cyclone, which passes only those particles with aerodynamic diameters less than 10 μm. The air then flows through annular denuders (for selective removal of reactive gases), a WINS impactor (providing a 2.5-μm size cut) and finally, the sampling media.

II. Continuous Mass Measurements

Continuous $PM_{2.5}$ monitors provide mass information at approximately 2-minute intervals, thus significantly reducing the inherent labor intensity of the reference systems. In addition, continuous monitors provide the short-duration, high-frequency data required to increase the power of epidemiologic studies. One of the two continuous monitors that have attained USEPA equivalent status, an R&P TEOM (tapered element oscillating microbalance), will be used in this study.

III. Statistical back-casting and source-based modeling

The speciated and continuous data will be used to develop a statistical model that will be used to provide information on $PM_{2.5}$ levels in years prior to those in which measurements are made. This model will be based on correlations between the $PM_{2.5}$ data collected, other routinely monitored pollutants (PM_{10}, ozone, SO_2, NO_x) and meteorological data. Particular attention will be paid to quantifying uncertainty in the predicted levels.

A source-based model for ozone and secondary PM will be used in addition to the statistical model to identify source-impact associations for ozone and $PM_{2.5}$. This photochemical model includes the secondary formation of sulfate, nitrate, ammonium, and organic aerosol, as well as the dynamics of primary emissions. The model will provide a separate estimate of $PM_{2.5}$ levels, an account of how emissions have changed over time, and compositional information.

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SEARCH

The SouthEastern Aerosol Research and CHaracterization SEARCH study is led by Southern Company, EPRI and a consortium of other electric utilities. Its objectives are 1) to establish a long-term, quality-assured data set of speciated $PM_{2.5}$; 2) investigate sources of error and uncertainty related to the federal reference method (FRM) for $PM_{2.5}$, 3) develop, adopt and modify, as needed, improved (e.g., continuous) methods for physically and chemically characterizing $PM_{2.5}$; 4) collaborate with state/local agencies and research universities to establish high quality data sets for the cities of Birmingham, AL and Atlanta, GA; and 5) provide data and information to the research and regulatory communities, including modelers, epidemiologists and others who may require such information for hypothesis testing. As a basis for attaining these objectives, gaseous and particle-characterization and meteorological measurements are made at eight stations in four urban-rural site pairs in GA, FL, AL, and MS. SEARCH is an outgrowth of the SCION component of SOS and is planned to continue through mid 2001. Southern Company contact: John Jansen (John.J.Jansen@scsnet.com). EPRI contact: Alan Hansen (ahansen@epri.com)

SCISSAP

The long-term mission of the Southern Center for the Integrated Study of Secondary Air Pollutants (SCISSAP) is:

The development of the scientific understanding and analytical tools that underpin the design and implementation of an effective and integrated control strategy for secondary air pollutants, using the atmosphere of the southern United States as a natural laboratory.

This mission is based on the premises that a basic understanding of the chemistry and physics of the atmosphere are a prerequisite for designing effective control strategies for secondary air pollutants; and that the concentrations of secondary air pollutants in the atmosphere are often codependent because of interacting chemical reactions.

Over a three-year period beginning on April 1, 1998, SCISSAP has chosen to focus on an integrated study of ground-level ozone (O_3) and particulate matter with diameters less than 2.5 μm ($PM_{2.5}$) in the South. The central scientific objectives of this focus will be to provide a better understanding of:

(i) The sources and dynamics of O_3 and $PM_{2.5}$ in the southern United States;
(ii) The physical and chemical processes, and emissions that couple O_3 and $PM_{2.5}$; and
(iii) The combined effects of various emissions control strategies on O_3 and $PM_{2.5}$.

When fully implemented and integrated with existing federal and state agency $PM_{2.5}$ sites, the Urban/Rural Monitoring Network will consist of three types of monitoring sites:
Level 0 sites with Federal Reference Method for $PM_{2.5}$ and largely consisting of state-operated NAMS/SLAMS sites;
Level 1 sites with measurement of particle composition for $PM_{2.5}$ and ozone and consisting of state-operated sites, IMPROVE sites operated by the National Parks Service and the U.S. EPA, sites operated by SC/ARA and TVA; and
Level 2 sites with measurements of particle composition, ozone, and gaseous precursors (VOC, NO, NO_y, NH_3, SO_2) and consisting of sites operated by SCISSAP, SCS/ARA/, and TVA.

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TVA/EPRI/DOE/NPS Collaboration in GSMNP

The Tennessee Valley Authority is working with EPRI, the DOE's Federal Environmental Technology Center, and the National Park Service to develop fully equipped monitoring sites in or near the largest Class I area in the Southeast, the Great Smokey Mountains National Park (GSMNP). These sites are located within the sphere of influence of several large urban

areas and major point sources of sulfur and nitrogen oxides and will provide unique opportunities for methods testing and special purpose monitoring of the physical and chemical properties of fine particles.

Two existing monitoring sites located on the western boundary of GSMNP will be augmented as part of this program.

- Look Rock – This site, located on the Foothills Parkway along Chilhowee Mountain just outside the Park boundary, is part of the Interagency Monitoring of Protected Visual Environments (IMPROVE) network, and data on ozone concentrations, ambient light scattering, and basic meteorological conditions are collected year-round.
- Cove Mountain – This site is located 28 km to the NE and 1500 ft higher than the Look Rock site. This site is just within the Park boundary and will serve as a secondary monitoring site.

The development of the Look Rock monitoring station is proceeding as planned, and operation of the TVA prevention-of-significant-deterioration monitoring package (including SO_2, CO, O_3, NO/NO_x, $PM_{2.5}$, PM_{10}, WS, WD, T, RH, Solar Radiation) is scheduled to commence during the first two weeks of January 1999. Deployment of additional research instrumentation (including a $PM_{2.5}$ TEOM, PC-Boss, revised IMPROVE sampler) will occur in early spring (March-April).

Planning for the Field Campaign

"…it was the age of wisdom, it was the age of foolishness…"[1]

A Science Plan has been developed for the Nashville Intensive and a proposal for the Atlanta "supersite" program is in development. The Nashville Science Plan was reviewed at a planning meeting held in Nashville October 20-21, 1998. A similar meeting, to review the Atlanta proposal, is planned for February 1999. The rest of this newsletter will be dedicated to providing an update to the Nashville Science Plan and the discussions at the October meeting. We will provide more details on the Atlanta Intensive in subsequent editions of the Field Campaign Newsletter.

The principal task before the collaborators in the Nashville Intensive is to convert the broad scientific objectives and plans described in the Science Plan into an Operational Plan. This is being accomplished through a series of planning teams that are focused on specific issues. A status report on the teams and their activities is provided below.

Aircraft Coordination Team

This team is made up of representatives from each of the four groups with instrumented aircraft that will participate in the Nashville Intensive. The team is discussing coordinated flight plans for the following airborne experiments:

- Measurement Intercomparisons
- Diurnal Studies
- Plume Studies – Urban and Power Plant
- Regional Studies

To date, discussions have focused on plans for the measurement intercomparisons. The intercomparison will involve three activities: 1) circulation of standards prior to the intensive, 2) circulation of standards during the intensive, and 3) the side-by-side intercomparison flights that are planned for the very beginning of the intensive. The data will be reduced and evaluated by a QA team within a few days to allow time for any adjustments that may be necessary.

In order to maximize the probability of a successful intercomparison, three special-topic groups were created to deal with specific topics associated with the intercomparison of airborne measurements. Tom Ryerson of NOAA is organizing a group to review measurement methodologies for nitrogen oxides. Roger Tanner of TVA is heading a group that will recommend procedures for the intercomparison of aerosol measurement instruments on the aircraft. Jim Meagher of NOAA is working with representatives from the various instrumented aircraft to identify and address data management issues.

VOC Measurement Team

This group is composed of researchers responsible for the quantification of speciated VOCs during the Nashville Intensive and interested bystanders. The measurement of VOCs has been a particularly difficult and contentious part of previous SOS field studies. Therefore, it was felt that this activity was deserving of special attention if we were to insure that the compatibility of the VOC data reported by the participating groups. Jack Calvert and Eric Apel of NCAR have agreed to organize and oversee the VOC measurement intercomparison.

VOC measurements will be performed by the following groups:
Elliot Atlas, NCAR – canisters, NOAA WP-3
Eric Apel, NCAR* – *in situ*, Dickson
Paul Doskey, Argonne N L – canisters, Polk Building
Paul Goldan, NOAA – *in situ*, NOAA WP-3
Bill Lonneman, EPA – canisters, TVA Bell 205, DOE G-1, source characterization
William McClenny, EPA – *in situ*, Cornelia Fort
Valerie Young, Ohio Univ.* – *in situ*, Cornelia Fort
Chuck Lewis, EPA – canisters, Dickson and Cornelia Fort

* Contingent upon funding

The VOC measurement intercomparison will be conducted in three phases. During phase 1, each group will be sent a prepared standard mixture to insure consistent peak identification and comparability of standards. During phase 2, each group will receive a Nashville whole-air sample to check on any analytical problems with the analysis of "real world" samples and to evaluate comparability. The last phase will take place in Nashville at the Cornelia Fort site. A side-by-side intercomparison will be conducted during the week immediately preceeding the Intensive.

The VOC Measurement Team has developed a list of "target" compounds to be quantified during the Nashville Intensive. This list provides an important focal point for the VOC measurement program. In this list, we have identified those compounds whose measurement would contribute most to the analysis of the Nashville data set. These compounds are important, either as a consequence of their contribution to overall VOC reactivity, or as tracers for the various emission sources in the region. The ability of the individual systems to quantify these VOCs will form the basis of the intercomparison.

Alkanes:
ethane, propane, n-butane, i-butane, n-pentane, i-pentane
Alkenes:
ethene, propene, 1-butene, 2-butene (cis and trans), 2-pentene (cis and trans), 1,3 butadiene, isoprene, alpha pinene
Alkynes:
acetylene
Aromatics:
benzene, toluene, o-, m-, p-xylene, ethylbenzene tri-methyl-benzene (3 isomeres)
Oxygenates:
acetaldehyde, propanal, MTBE, methanol, ethanol
Others:
tetrachloroethylene

We are asking each VOC analysis group to identify the compounds on this list that they will be able to quantify. During the study, each researcher will review their measurements of these specific compounds in each chromatogram to verify that compound identification, lack of peak overlap, peak integration, etc. have all been properly done. For each chromatogram, each compound should be reported with different flags for below detection limit or measurement problem, etc., as necessary. This procedure should allow us to generate a comprehensive and compact data set that will facilitate data analysis.

PBL Dynamics Team

This team is working on the detailed planning for the PBL dynamics experiments to be conducted as part of the Nashville Intensive. The following topics are currently under discussion:
Siting of the wind profiler network: Sites have been selected at Dickson, Cornelia Fort and Gallatin. Two additional sites remain to be selected: 1) a site south of the city to complete the triangular array, and 2) a additional site west of Nashville to improve coverage near Cumberland and Johnsonville power plants.

Siting of the flux network: Tilden Meyers, NOAA is seeking to locate surface energy and chemical (CO_2 and O_3) flux sites in representative land-use classifications (forest, cropland, and pastureland) in the region around Nashville.

Air Quality Modeling Team

The development of this team serves two main objectives. First, the team will review the measurement plans for the Nashville Intensive and will make recommendations for changes that would benefit the application of the data collected for model evaluation and improvement. This is our response to the recommendation voiced at the October meeting for a role for the modeling community in the planning process. Second, the team will provide a mechanism for collaboration among those groups that are utilizing the Nashville 95 data set or are planning to use the 99 data set in modeling studies. This group will also work with SOS-funded emissions inventory efforts to maximize the benefits of those activities.

Dick McNider of UAH is organizing this team and is planning a workshop for January of 1999 to review ongoing modeling research and develop plans for future collaborations.

Nashville Ground-Based Network

"…it was the epoch of belief, it was the epoch of incredulity, it was the season of Light, it was the season of Darkness, it was the spring of hope, it was the winter of despair…"[1]

Dickson Site

Preparation for measurements at the Dickson site should be complete by the end of March. Other than securing and extending the rights to use the site and completing the existing power hook-up, little will remain to be done at that time. Some measurements will likely start by the end of March with the installation of the Tennessee Valley Authority sampling trailer that houses the Level II instruments. The sampling towers and one or two rental trailers will be set up in late May for additional measurements. Sampling is scheduled to coincide with the Nashville intensive: 15 June through 15 July.

As of this writing, the following measurements will be made at Dickson.

Measurement	PI/Affiliation
NO, NO_2, NO_y, O_3, CO, SO_2, Met.	K. Olszyna/TVA
PANs, alkyl nitrates	*S. Bertman/W. Mich. U.
Isoprene and oxidation products	*P. Shepson/Purdue U.
C_2-C_{12} VOC	**E. Apel/NCAR
Aerosol: chemical and physical	K. Baumann/GIT
915 MHz wind profiler	W. Neff/NOAA ETL
Surface energy balance/fluxes	W. Neff/NOAA ETL
Above-canopy energy balance/fluxes	T. Meyers/NOAA ARL
Gas-phase and aerosol VOC for isotopic analysis	C. Lewis/EPA

*Contingent upon NOAA funding
**Contingent upon SOS/EPA funding

Cornelia Fort Airport Site

Planning for the intensive photochemical measurements program at the Nashville downwind urban site is reaching the mature phase. Acquisition of rights to use the site at the Cornelia Fort airport (CFA - across the river from Opryland) has tentatively been obtained. Installation of power and communication lines is the next step. The schedule for sampling is still firm: 15 June through 15 July, 1998. However, an additional activity has been scheduled to occur from 1 June to 15 June: an informal comparison of the instruments used to measure VOCs will be staged. The comparison will consist of 2 weeks of common space/time sampling at the CFA site in order to assess the differences, if any, among the measurement techniques used to sample these important compounds. This will require that infrastructure at the site (power, communication, towers and some trailers) be in place prior to the intensive proper. We will attempt to have all rental trailers set-up and powered prior to the VOC comparison in order to minimize any disruptions toward the end of this study. Current plans call for two *in-situ* sampling towers with three trailers surrounding each tower. Remote sensing and long-path instruments will be placed in separate locations. As soon as the complete suite of measurements is confirmed, site sketches will be drawn up and submitted to all PIs for

comments.

As of this writing, the following measurements will be conducted at the CFA site.

Measurement	PI/Affiliation
NO, NO_2, NO_y	E. Williams/NOAA AL
PANs, alkyl nitrates	J. Roberts/NOAA AL
HNO_3, NO^{-3}, NH_4^+, SO_4^{-2}	R. Norton/NOAA AL
O_3 (UV and chemiluminescence)	E. Williams/NOAA AL
CO, SO_2	E. Williams/NOAA AL
surface meteorological data	E. Williams/NOAA AL
photolysis rates	*R. Shetter/NCAR
C_2-C_8 VOC	*V. Young/Ohio University
C_2-C_{12} VOC	W. McClenny/EPA
OH, HO_2	*W. Brune/Penn State U.
RO_2	***R. Tanner/TVA
HONO, NO_3 (radical), aromatics	U. Platt/Univ. of Heidelberg
CH_2O, methylglyoxal	Y.-N. Lee/Brookhaven NL
C_2-C_3 aldehydes, alcohols	C. Stroud/NOAA/AL
aerosol: physical/chemical	L. Stockburger/EPA
continuous SO_4^{-2}, NO^{-3}	**S. Hering/Aerosol Dynamics, Inc.
O_3 and aerosol LIDAR	M. Hardesty/NOAA ETL
doppler winds, water vapor	M. Hardesty/NOAA ETL
S-band RADAR	W. Neff/NOAA ETL
SODAR Array	W. Neff/NOAA ETL
surface flux measurements	W. Neff/NOAA ETL
915 MHz wind profiler	W. Angevine/NOAA AL

*Contingent upon NOAA funding
**Contingent upon SOS/EPA funding
***Contingent upon EPA funding

Aerial View of Cornelia Fort Airport

Polk Building Site

Bill Parkhurst of TVA, working with the folks from the State of Tennessee, has secured permission for SOS to use the roof of the Polk Building in downtown Nashville as a sampling site during the summer intensive. Bill is arranging to have a 5-meter tower erected on the roof of this building. This will place the sampling inlet approximately 110 meters above street level. We will be using the same instrument enclosure, located in the "penthouse", that was used in 1995.

This site proved particularly valuable in the 1995 SOS Field Study by providing a semi-continuous measure of the urban source signature. This site also recorded the highest ozone concentrations measured at any of the ground sites in 1995.

The following measurements are anticipated for this site in 1999.

Measurement	PI/Affiliation
NO, NO_2, NO_y, O_3, CO, SO_2, Met.	K. Olszyna/TVA
C_2-C_{10} VOCs	P. Doskey, Argonne NL

Nashville 1999 Logistics

Lodging

SOS has reserved a block of 50 rooms at the Homestead Village (727 McGavock Pike; Nashville TN 37214; phone: 615 316-9020, fax: 9772) for our collective use during the 1999 Field Study. Depending on the length of stay, the room rates range from $35 to $45 per night. Federal Tax waivers are accepted and should be used. Each of us is responsible for securing his or her own room reservations. When making your reservation you should speak with Mindy A. Hobbs and preface your request with the fact that you are a member of the SOS/TVA Field Study and that you would like one of the 50 rooms reserved for that purpose. The rooms will be distributed on a first come-first serve basis and so we urge each of you to make your reservations as soon as practical. Remember that Nashville Fan Fair 1999 overlaps with the timing of the study and rooms in Nashville will be at a premium.

Gasaway Building

The Gasaway Building is a two-story office building located at the Nashville International Airport. Currently, only a portion of the ground floor is occupied. The airport has agreed to allow us to use most of the second floor as office space during the Nashville portion of the Field Campaign if no paying customer shows up before March 1, 1999. We will provide office furniture and network/internet connections. Please provide Bill Parkhurst of TVA (Phone: 256-386-2793, Email: (wjparkhurst@tva.gov)) an estimate of number of scientists from each organization who will need office space in this building as well as an indication of any special requirements.

Kudos

Many thanks to those who provided information for this issue of the Field Campaign Newsletter including: Bill Chameides, Chuck Dickens, Alan Hansen, Bill Parkhurst, Ted Russell, and Eric Williams.

"It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness, it was the epoch of belief, it was the epoch of incredulity, it was the season of Light, it was the season of Darkness, it was the spring of hope, it was the winter of despair, we had everything before us, we had nothing before us, we were all going direct to Heaven, we were all going direct the other way--in short, the period was so far like the present period, that some of its noisiest authorities insisted on its being received, for good or for evil, in the superlative degree of comparison only."[1]