August 29, 1997

SCOS97-NARSTO FIELD PROTOCOL

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The intent of this document is to provide a succinct summary of the logistical and measurement plans for the SCOS97-NARSTO field program. It is meant to be a guide to those directly involved, and assumes a basic familiarity with the study. Its purpose is to ensure smooth operations, and to document recent changes to the logistical plans. Those unfamiliar with the study are referred to the Field Study Plan (Fujita *et al.*, 1997) and the Aerosol Program Field Plan (Motallebi *et al.*, 1997) for discussion of the objectives and study design (both available at http://www.arb.ca.gov/scos/scos.htm).

1. Study Dates and Intensive Operational Periods (IOPs)

The study dates are June 16 to October 15, 1997. Fifteen days of intensive operations, grouped in periods of several consecutive days, will be called within this four-month period on a forecast basis. Ideally, IOPs will consist of two or three consecutive days. The maximum number of consecutive days in an IOP is four. An isolated, single IOP day is possible, but not desirable.

Five types of scenarios are targeted for the IOPs. Type 1 refers to a South Coast Air Basin (SoCAB) ozone maximum; Type 2 refers to upper-level transport to San Diego; Type 3 is a secondary SoCAB maximum with transport inland to the Mojave Desert likely; Type 4 is eddy transport to Ventura following a SoCAB maximum; and Type 5 is offshore surface transport to San Diego. The term Type 0 is used for days with predicted ozone below the level of interest.

2. Study Scope

The study domain encompasses the South Coast, San Diego, South Central Coast, Mojave Desert, and Salton Sea Air Basins, and extends to the Tehachapi Mountains to the north, Tijuana and Mexicali, Mexico to the south, San Nicolas Island to the west, and the Arizona and Nevada borders to the east.

The measurements to be made each day throughout the four-month study period include:

- Activity data for freeway traffic, major point sources, commercial and naval ships, commercial aircraft, and wildfires;
- Vertical profiles of winds and temperature from radar wind profilers with radio acoustic sounding systems (RWP/RASS) or SODARs at 32 sites;
- Vertical profiles of winds, temperature, and humidity from rawinsondes 1 or 2 times per day at 4 to 8 sites (depending on the day of the week);
- Speciated volatile organic compound (VOC) sampling every third day (2, 4, or 8 times a day) at 11 sites, and daily analysis 8 times a day at Burbank and Pico Rivera;
- Total reactive nitrogen (NO_y) at 12 sites and nitric acid (by difference) at 10 of those sites;
- Ozone and meteorology at 32 supplemental sites;
- Ozone, total nitrogen oxides (NO_X), and meteorology at 96 existing Air District sites;
- Surface meteorology at over 200 existing sites;
- Specialty radiation at Mt. Wilson and UC Riverside; and
- Total solar radiation at 78 existing sites.

During the month of September, additional continuous measurements include:

- Vertical profiles of ozone, aerosol extinction, temperature, and humidity from a lidar at Hesperia;
- Speciated VOC analysis 24 times a day at Azusa; and

- Hydroxyl and hydroperoxyl radicals, speciated VOC analysis, ozone, NO_X, CO, aerosol size, and ultraviolet radiation at UC Riverside.

Measurements to be made only during IOPs include:
- Vertical profiles of winds, temperature, and humidity from rawinsondes 4 times per day at 11 sites;
- Vertical profiles of ozone and aerosol extinction from a lidar at El Monte Airport;
- Air quality and meteorology aloft from 4 full-time and 2 part-time aircraft;
- Vertical profiles of ozone, temperature, and humidity from ozonesondes 4 times per day at 7 sites;
- Speciated VOC sampling at 25 sites, and aboard 4 aircraft;
- Halocarbons at 6 sites;
- Biogenic hydrocarbon and methylnitronapthalene sampling at 3 sites;
- Specialty nitrogen and VOC at Azusa;
- Peroxyacetyl nitrate (PAN) at 4 sites with peroxypropyl nitrate (PPN) at 2 of the sites; and
- Real-time single particle size and chemical composition at 3 sites.

Three additional studies are being conducted in coordination with the main SCOS97-NARSTO study described above:
- Aerosol program to be conducted between August 16 and September 14. It includes surface street traffic counts at 12 sites, state-of-the-art particle measurements at 3 sites, and a specially instrumented airplane along two separate air trajectories in the SoCAB (see Appendix A for a more complete description).
- Additional specialty radiation measurements at Mt. Wilson and UC Riverside during June 29 to July 5 and the first IOP between September 2 and 12.
- Tracer study with off-shore releases of 5 different perfluorocarbons during four 2-day periods between August 15 and October 15.

3. Field Manager and Field Operations Headquarters

During the field study there will be <u>one</u> on-call field manager and <u>one</u> field operations headquarters. The on-call field manager can be reached via phone, pager, fax, and e-mail (see Table 1) at the field operations headquarters housed at ARB offices in Sacramento. The field manager (rotated between Bart Croes and Leon Dolislager) will be responsible for posting the daily IOP decisions, for confirming notification of each IOP day and the end of an IOP, and for being aware of field readiness status and operational successes and shortfalls. He will be available to help solve field problems and answer questions as they arise. He will also be responsible for compiling a log of activities for each IOP. The on-call field manager will always be available, 24 hours a day, by pager. Additionally, he will be at the headquarters office during the daytime (8 AM to 6 PM) on weekdays and IOPs.

4. IOP Decision Announcements and Communications

IOP decision announcements will be posted daily throughout the study period, as follows:

"**Possible-Go**" (or "No-Go") will be posted by **4 PM** for an IOP start 35 hours later.

"**Definite-Go**" (or "No-Go") will be posted by **11 AM** for an IOP start the next morning at 0300 (midnight for the SCAQMD) for speciated VOC sampling and 0500 for rawinsondes. Under some, hopefully rare, circumstances the "Definite-Go" decision may be postponed until **4 PM** that day, in which case the 11 AM posting will be for a "Possible-Go".

After an IOP has started, the second, third, and fourth days are automatically "Possible-Go". "Definite-Go" or "No-Go" decisions for each successive IOP day will be posted at **11 AM** the day before, with the possibility that the decision will be postponed to **4 PM**.

Once a "No-Go" decision is posted, it will not be changed. A "Definite-Go" decision can only be changed if the predicted meteorological situation totally collapses (such as occurred on July 14). In this case, each measurement group will be notified individually.

The first IOP forecast message will be posted Saturday, June 14 at 4 PM for the field program start on Monday, June 16. The 4th of July Weekend (July 4 to 6) and the Labor Day Weekend (August 30 to September 1) are scheduled "No-Go" days because of atypical emission patterns. If weather conditions are unfavorable for an IOP, "No-Go" decisions will be posted in advance for several consecutive days, so as to provide scheduled down times from field operations.

The daily IOP decision will be sent by e-mail to all the field program participants listed in Appendix B, and will be posted on the IOP update phone at (909) 396-3787. This phone can accommodate 36 incoming calls at a time. For "Possible-Go" and "Definite-Go" decisions that begin an IOP, you will be asked to confirm that you received the message and to state your field readiness status for the following four days. Please confirm by return e-mail to scos-fm@arb.ca.gov or by fax to (916) 322-4357. If you are in the field, or written confirmation is otherwise not possible, you can confirm by voicemail on the IOP update phone. You do not need to confirm that you received a "No-Go" message, unless that decision ends an IOP. If the on-call field manager does not receive confirmation, his task is to call you to ensure that you are aware of the start and end of an IOP.

A list of critical IOP contacts, and the measurements for which they are responsible, is given in the attached field readiness status report. A response from these people, or their designated representative, is essential. IOP contacts responsible for many field personnel are encouraged to set up their own communication network or message machine. Those working with each of these contacts are asked to respond to them directly. This establishes a "chain of command" that will make communications easier for all involved.

For logistical reasons the field manager will immediately telephone the NOAA lidar, STI Aztec, and UCD Cessna contacts when the "Definite-Go" (or corresponding "No-Go") decision has been made for the start of an IOP. These three groups should have someone at their designated phone number awaiting this call between 10:15 and 10:30 AM PDT (and 3:15 and 3:30 PM if the decision is deferred to the afternoon) on the day before a possible IOP start. After an IOP has started, these three groups will be informed by e-mail and the IOP decision phone, the same as everyone else.

5. IOP Measurement Schedules

The field study will operate on the local time, i.e., **Pacific Daylight Time (PDT)**. Table 1 includes local time phone numbers for all the area codes in the study domain. Please synchronize your watches and timers with these exact local times.

Many different groups are involved in launching of rawinsondes and ozonesondes, and in speciated VOC sampling. It is important that these measurements be coordinated. Investigators are asked to follow the schedules given below.

Rawinsondes and Ozonesondes: All rawinsondes are to be launched at 0500, 1100, 1700, and 2300 PDT. All ozonesondes are to be launched at 0800, 1400, 2000, and 0200 PDT. On the last day of an IOP, the 0200 PDT ozonesonde will not be launched. Rawinsonde ascent rates should be between 300 and 600 feet per minute, if feasible. Tracking to 700 mb will be considered successful. Tracking to 500 mb or higher is preferred.

Aircraft: Four to six instrumented aircraft are scheduled to fly on each day of an IOP. Their protocols are summarized here to provide background information. *The San Diego-EOPACE Navajo* is based at Montgomery Field, and will fly the western boundary offshore from San Diego to Point Conception and back twice per IOP day. *The STI Aztec* covers the northern boundary, except if needed to fly the western boundary. On the first day of an IOP, the morning flight departs Camarillo Airport eastward through the Mojave Desert to the Yucca Valley, and ends at Riverside Airport mid-morning. The afternoon flight departs Riverside westward through the San Gabriel Valley and returns to Camarillo. On subsequent days, the flight path is reversed. *The UCD Cessna* flies within the SoCAB, tracing the same flight pattern three times per IOP day to characterize the spatial and temporal development of ozone. This aircraft will fly out of El Monte Airport and collect data in the San Fernando Valley, along the foothills of the San Gabriel Mountains, and in the central basin. *The San Diego-Gibbs Cessna* covers the San Diego Air Basin, departing twice per IOP day out of Montgomery Field and flying over the western third of San Diego County and the southwest portion of Riverside County. *The U.S. Navy Partenavia* will fly out of Oxnard Airport and characterize the spatial extent of polluted layers offshore (west and southwest of Santa Monica Bay). *The CIRPAS Pelican* is a long-endurance aircraft configured to perform atmospheric research and will fly out of El Monte Airport to characterize aerosols within the SoCAB. It will be available August 16 to September 12.

Lidar: Vertical ozone and aerosol extinction profiles will be obtained from the NOAA lidar operated at El Monte Airport for approximately 20 hours per day (generally 0400 to 2400 PDT) during an IOP. The Penn State lidar located at Hesperia will operate at least six hours a day on a regular basis, and up to 24 hours a day during IOPs. On the last day of an IOP, measurements at both lidars can cease at 2100 PDT, one hour after the last ozonesonde release.

Speciated VOC Sampling: Sampling schedules for speciated VOCs are listed in Table 2. Except for the aircraft and background sites, all collections are done over a 3-hour period. All groups in urban areas (except the SCAQMD) will collect 4 samples per day beginning at 0300, 0600, 1300, and 1700 PDT. The SCAQMD will collect 8 samples per day starting at 0000, 0300, 0600, 0900, 1200, 1500, 1800, and 2100 PDT.

6. Quality Assurance Activities

The following audits and measurement intercomparisons will be conducted as part of the SCOS97-NARSTO quality assurance program.

- AVES will perform system and performance audits of the RWP/RASS network in June and early July 1997. All sites will receive a system audit, and performance audits will be conducted at Azusa Foothills, El Monte Airport, Escondido, Los Alamitos, Los Angeles Airport, Oceanside, Ontario Airport, Oxnard Airport, Point Loma, Simi Valley, Temecula, and Van Nuys Airport.

- AVES will perform system and performance audits of surface meteorological measurements at all RWP/RASS sites, and at five other sites to be determined after a review of existing surface meteorological networks by DRI.

- Intercomparisons between the NOAA lidar, UCD Cessna, and CE-CERT ozonesondes were conducted on June 11 at El Monte Airport. The NOAA lidar and UCD Cessna will participate in individual intercomparisons with the other five aircraft, if circumstances permit. The ARB will conduct performance audits of the on-board ozone and NO_y analyzers of all aircraft except the CIRPAS Pelican. The four aircraft with speciated VOC sampling systems will test for contamination by collecting clean air samples well above the inversion layer. During IOPs, the UCD Cessna and CIRPAS Pelican will conduct spirals around the NOAA lidar. The STI Aztec will spiral around both the NOAA and Penn State lidars.

- After a review of statements of qualifications from laboratories conducting VOC analysis, on-site system audits of analytical procedures may be scheduled depending on need and resources.

- Hydrocarbon measurement comparisons consisting of three ambient samples (background, source, downwind) will be conducted during June. Participating laboratories include AAC, ARB, BAAQMD, BRC, DRI, ManTech, SCAQMD, SDAPCD, UCLA, USEPA-ORD, and VCAPCD.

- A carbonyl compound performance audit consisting of a standard mixture of five carbonyl compounds (prepared by DRI) will be conducted over the summer. Participants include AAC, ARB, AtmAA, ManTech, Portland State, SCAQMD, SDAPCD, and VCAPCD. The performance audit will also include aircraft sampling of carbonyl compounds by AtmAA and SDAPCD. A side-by-side field measurement comparison is planned for Azusa during a moderate ozone period (non-IOP day) to examine potential sampling artifacts. To address potential breakthrough on the sampling media, each measurement group will collect a tandem sample at the site and sampling time expected to have the highest carbonyl compound concentrations in their network.

- Comparison of measurements for halogenated hydrocarbons will be conducted in conjunction with the first IOP. Three BRC canister samples from Azusa will be analyzed by BRC and DRI, and compared to corresponding measurements made at Azusa by DGA.

- UCR will compare measurements of biogenic organic compounds from adsorbent-trap samples with corresponding measurements by BRC, DRI, and ManTech from canister samples. Collocated adsorbent and canister samples will be collected by UCR in an oak forest in Ojai for analysis by BRC and DRI.

- CE-CERT will conduct through-to-probe NO_y audits using NO_2, *n*-propylnitrate, and possibly other calibration gases every month.

- During the period between January and March 1997, the ARB audited 36 monitoring stations located in the SCOS97-NARSTO study domain. During the April to June period, the ARB will audit 37 other monitoring stations. In addition, twelve monitoring stations in the SoCAB will be audited during SCOS97-NARSTO. Also during this time, the ARB will audit the five supplemental air monitoring sites operated by AVES.

- System and flowrate performance audits will be performed by DRI for all filter-based sampling equipment used by ADI, ARB, BYU, Caltech, Harvard, and SCAQMD.

- CE-CERT will intercompare ground-based radiation measurement devices with those deployed on the STI Aztec and the CIRPAS Pelican. This will occur at El Monte Airport. After the main study period, CE-CERT will intercompare radiation measurement devices from a subset of all the sites.

7. Principal Investigator Responsibilities

The primary points of contacts listed in the attached field readiness status report are asked to report to the on-call field manager, either via e-mail, fax, phone, or voicemail, as follows:

- Immediately report problems that affect field readiness status or data quality;
- By close of business each Tuesday, report field readiness status (an e-mail or fax is preferred);
- Confirm receipt of "Possible-Go" and "Definite-Go" decisions and give field readiness status;
- Confirm receipt of "No-Go" decisions that end an IOP;
- Each day of an IOP, relay successes and shortfalls directly to the field manager each day;
- After an IOP, send the field manager a written summary of measurements (e-mail preferred); and
- If your responsibility has been handed off to someone else, notify the field manager by e-mail, specify on your voicemail who that person is, and give his or her phone number.

8. Safety

Safety must be the very highest concern for personnel at all levels in this study. We are only collecting data to study air quality and meteorology. Data recovery rates will not recover a human life or raise someone's children. Time and opportunities for adequate rest and nutrition must be included in the work schedules. Driving distances and times must be reasonable. Backup personnel must be made available so that minor illness or fatigue does not become a risk to human life. Fatigue is a concern any time that hours are irregular. Dennis Delaney of the SCAQMD has three rules for field operation safety: (1) Use common sense; (2) Keep your eyes open; and (3) Use the "buddy system" whenever possible. Any policies or procedures that either risk the safety of personnel or indirectly encourage unsafe practices are not acceptable.

9. Site Visits

For security of personnel, instruments, and data and for the safety of visitors, site access requires advance approval from the person responsible for the site lease, and notification of the site operator that a visitor is expected. Any unannounced or unauthorized site visit is considered an act of trespass by an unknown intruder and may result in a “911” call for security purposes. Any site visit must be noted in the log book. Electronic visits (i.e., polling computers) to sites are expressly forbidden unless authorized by the site's principal investigator.

Bart Croes of the ARB is the coordinator for site visits. He will pass requests to the appropriate sponsoring organization. Table 1 contains his phone number.

10. Publicity

Rich Varenchik, the ARB's public information officer in El Monte, is the contact for any inquiries from the public or news organizations. Table 1 contains his phone number.

11. Communication Lists

Appendix B lists many of the personnel participating in the field program.

TABLE 1 — SCOS97-NARSTO PRIMARY POINTS OF CONTACT

Ozone IOP Decisions

Recording/Voicemail:	(909) 396-3787 (can accommodate 36 incoming calls)
Webpage:	http://www.aqmd.gov/scos97/member/decision.html

Aerosol IOP Decisions

Recording/Voicemail:	(909) 396-3786 (can accommodate 36 incoming calls)

On-Call Field Manager

Phone/Voicemail:	(916) 322-3935 (8 AM to 6 PM on weekdays and IOPs)
Pager:	(916) 731-3535 (24 hours a day)
FAX:	(916) 322-4357 (8 AM to 6 PM on weekdays and IOPs)
E-Mail:	scos-fm@arb.ca.gov (8 AM to 6 PM on weekdays and IOPs)

Emergencies When Above Not Immediately Available

Bart Croes	(916) 323-1534
Pager:	(916) 731-9756
FAX:	(916) 322-4357
E-Mail:	bcroes@arb.ca.gov
Dennis Delaney	(909) 396-2316
Pager:	(909) 465-8569

Site Visit Arrangements

Bart Croes (see above)

Public and Press Inquiries

Rich Varenchik	(818) 575-6730
FAX:	(818) 575-6699
E-Mail:	rvarench@arb.ca.gov

Meteorology/Air Quality Forecasts

Webpages:	http://www.aqmd.gov/scos97/member/forecast.html
	http://www.nrlmry.navy.mil/~wakefiel/

Webpages

Field Readiness Status:	http://www.aqmd.gov/scos97/member/ready.html
Overview with Many Links:	http://www.arb.ca.gov/scos/scos.htm
Freeway Traffic (real-time):	http://www.scubed.com/caltrans/
Upper-Air Meteorology (real-time):	http://www4.etl.noaa.gov/scos97.html
Air Quality/Meteorology (real-time):	http://pokey.ecst.csuchico.edu/
Mt. Wilson Camera (real-time):	http://www7.etl.noaa.gov/data/

Numbers for Local Time

(213) 853-1212 Los Angeles
(619) 853-1212 San Diego
(714) 853-1212 Orange County
(760) 853-1212 Mojave Desert

(916) 767-8900 Sacramento

TABLE 2 — SCOS97-NARSTO SPECIATED VOC SAMPLE COLLECTION

AAC (Sucha Parmar)
Canisters (CO, CO_2, CH_4, MTBE, C_2-C_{12} Hydrocarbons) and
DNPH-Impregnated Cartridges (C_1 - Benzaldehyde Carbonyl Compounds)
Twenty-Nine Palms: 3-hour samples at 0300, 0600, 1300, and 1700 PDT for 15 IOP days

ARB (Hieu Le)
Canisters (PAMS Hydrocarbons)
Los Angeles-North Main, San Diego-12th Street: 3-hour samples at 0600 and 1300 PDT every third day (7/3 to 9/28)

CE-CERT (Dennis Fitz) / BRC (Rei Rasmussen) / AtmAA (Kochy Fung)
Canisters (CO, CO_2, CH_4, MTBE, C_2-C_{12} Hydrocarbons, Halocarbons[a]) and
DNPH-Impregnated Cartridges (C_1 - Benzaldehyde Carbonyl Compounds)
STI Aztec[b]: 4 grab samples per morning flight and 2 grab samples per afternoon flight (6 samples daily) for 15 IOP days
UCD Cessna[b]: 2 grab samples per flight (6 samples daily) for 15 IOP days
ARCO Plaza Building, Azusa, Los Angeles-North Main: 3-hour samples at 0300, 0600, 1300, and 1700 PDT for 15 IOP days

DGA (Daniel Grosjean)
GC-ECD (Halocarbons)
Azusa, Simi Valley: 30-minute and 1-hour samples of PAN, PPN, perchloroethylene, and methylchloroform by GC/ECD continuously for 15 IOP days

DRI (Barbara Zielinska)
Canisters (CO, CO_2, CH_4, MTBE, C_2-C_{12} Hydrocarbons, Halocarbons[c]) and
DNPH-Impregnated Cartridges (C_1-Benzaldehyde Carbonyl Compounds)
Anaheim (collected by CE-CERT): 3-hour sample at 0600 PDT for IOP days after 7/15
Burbank (collected by SCAQMD): 3-hour samples at 0600 and 1300 for IOP days after 7/15
Mexicali-ITM (collected by Tracer ES&T): 3-hour samples at 0600 and 1500 PDT for 15 IOP days
Pine Mountain (collected by UCR): 3-hour samples at 0600, 0900, 1300, and 1700 PDT for 15 IOP days
Point Conception (collected by Cal Poly SLO): 12-hour samples at 0600 and 1800 PDT for IOP days after 8/15
San Nicolas Island (collected by CE-CERT): 12-hour samples at 0600 and 1800 PDT for 15 IOP days
Santa Catalina Island-Airport (collected by USC): 12-hour samples at 0600 and 1800 PDT for IOP after 7/15
Tijuana-Rosarito (collected by Tracer ES&T): 3-hour samples at 1000 and 1300 PDT for 15 IOP days

DRI (Dave Schorran)
Canisters (CO, CO_2, CH_4, MTBE, C_2-C_{12} Hydrocarbons), PUF Filters (PAHs)
DNPH-Impregnated Cartridges (C_1 - Benzaldehyde Carbonyl Compounds), and GC-ECD (Halocarbons)
Barstow: 3-hour VOC samples at 0300, 0600, 1300, 1700, 2100 PDT and continuous halocarbons for all type 1 and type 3 IOP days
Lancaster: Continuous halocarbons for type 1 and type 3 IOP days (7/15-10/15)

SCAQMD (Rudy Eden)

Auto-GC (PAMS Hydrocarbons) and DNPH-Impregnated Cartridges (C_1 - Benzaldehyde Carbonyl Compounds)

Burbank: 3-hour samples at 0000, 0300, 0600, 0900, 1200, 1500, 1800, and 2100 PDT daily (7/15 to last IOP day)

Pico Rivera: 3-hour samples at 0000, 0300, 0600, 0900, 1200, 1500, 1800, and 2100 PDT daily (7/6 to last IOP day)

Canister Samples (PAMS Hydrocarbons)

Azusa, Hawthorne: 3-hour samples at 0000, 0300, 0600, 0900, 1200, 1500, 1800, and 2100 PDT every third day (7/6 to 9/28)

Banning, Upland: 3-hour samples at 0000, 0300, 0600, 0900, 1200, 1500, 1800, and 2100 PDT for 15 IOP days and every third day (7/6 to 9/28)

SDAPCD (Mahmood Hossain)

Canisters (PAMS Hydrocarbons) and DNPH-Impregnated Cartridges (C_1-Benzaldehyde Carbonyl Compounds)

San Diego-EOPACE Navajo[b]: 5 grab samples per flight (10 samples daily) for 15 IOP days

San Diego-Gibbs Cessna[b]: 4 grab samples per flight (8 samples daily) for 15 IOP days

Alpine[d], El Cajon, Mount Soledad, Overland: 3-hour samples at 0300, 0600, 1300, and 1700 PDT for 15 IOP days and every third day (7/3 to 9/28)

UCD (Judi Charles)

PFBHA with GC/CI/ITMS (C_1-Benzaldehyde Carbonyl Compounds and Multi-Functional Carbonyl Compounds)

Azusa: sampling times to be determined for September IOPs

UCLA (Suzanne Paulson)

Cold-Trap FID (Total Reactive Carbon and C_2-C_{10} Hydrocarbons)

Azusa: sampling times to be determined for September IOPs

UCR (Janet Arey)

Tenax Cartridges (Biogenic Hydrocarbons and Oxidation Products)

Azusa, Banning, Pine Mountain: 3-hour samples at 0600, 0900, 1300, 1700 PDT, and some evening and early morning for 15 IOP days

PUF Filters (PAHs and Methylnitronapthalenes)

Azusa, Banning, Riverside-Agricultural Operations: Two 12-hour samples for 15 IOP days

USEPA-ORD (Bill McClenney and Chuck Lewis) / ManTech (Hunter Daughtrey)

Auto-GC {PAMS Hydrocarbons, 41 TO-14 Toxic Compounds, Biogenic Hydrocarbons (Isoprene, α- and β-Pinene, MVK, Methacrolein), and Carbonyl Compounds Butanal to Decanal}

Azusa: 1-hour samples continuously from 9/1 to 9/30

Canister Samples (Radiocarbon)

Azusa: 10-12 3-hour samples for IOP days from 9/1 to 9/30 (also for particulate matter)

VCAPCD (Doug Tubbs)

Canisters (PAMS Hydrocarbons) and DNPH-Impregnated Cartridges[e] (C_1-Benzaldehyde Carbonyl Compounds)

El Rio, Ventura-Emma Wood[d], Simi Valley-Cochran: 3-hour samples at 0300, 0600, 1300, and 1700 PDT for 15 IOP days and every third day (6/16 to 10/15, not after IOPs)

[a]Halogenated compounds at Azusa for a few IOP days only.
[b]Samples collected in 50-liter Tedlar bags and extracted onto cartridges.
[c]Halogenated compounds at Mexicali-ITM and Tijuana-Rosarito only.
[d]Hydrocarbons only, no carbonyl compounds.
[e]Cartridges provided by AAC (Sucha Parmar) and returned for analysis.

APPENDIX A — SCOS97-NARSTO AEROSOL PROGRAM FIELD PROTOCOL

Overview

The SCOS97-NARSTO Aerosol Program consists of four concurrent studies: a Trajectory Study, an Aerosol Aircraft Study, a Federal Reference Method (FRM) Nitrate Loss Study, and a Fine Particle Measurement Study. Study sites for the Trajectory Study and the FRM Nitrate Loss Study are Los Angeles-North Main, Azusa, Diamond Bar, Mira Loma, and Riverside-Pierce Hall. The study site for the Fine Particle Measurement Study is the Agricultural Operations station located on the UC Riverside campus, 0.8 miles from Pierce Hall. Study dates are from mid-August to mid-September, with slight differences among the four studies, as described below. The sponsors are the California Air Resources Board (ARB), the Coordinating Research Council, the Electric Power Research Institute, and the U.S. Department of Energy National Renewable Energy Laboratory with in-kind support from ARB and the South Coast Air Quality Management District (SCAQMD).

The *Trajectory Study* will be conducted over four 2-day intensive operational periods (IOPs) between August 18 and September 12, 1997, with simultaneous measurements at three sites. The first two sets of measurements will be made at Los Angeles-North Main, Azusa, and Riverside-Pierce Hall, corresponding to a vehicle-dominated air trajectory. These measurements are planned for the last two weeks of August. The last two sets of measurements will be made at Diamond Bar, Mira Loma, and Riverside-Pierce Hall, corresponding to a nitrate trajectory. These measurements are planned for the first two weeks of September (excluding Labor Day, September 1). UC Riverside (Prather) will measure real-time single particle size and chemical composition by ATOFMS at all three sites. Caltech will measure particle chemistry with 4- to 7-hour resolution by filter-based sampling, size-resolved particle chemistry by MOUDI impactor sampling over one 4-hour period each day, and particle size distribution measurements by optical counters and electrical mobility in real-time. These measurements will be made at all three sites along both trajectories. UC Riverside (CE-CERT) will do the same for continuous NO_y and HNO_3 (by difference) measurements using TECO 42CY and modified TECO 42S monitors. In addition, they will operate a TDLAS (NO_2 and HNO_3) at Azusa and a double diffusion denuder (3-hour average HNO_3 and NH_3) at Azusa (August), Mira Loma (September), and Riverside-Agricultural Operations (both time periods). ADI will make automated nitrate measurements at Riverside-Agricultural Operations in August and at Mira Loma in September. UC Riverside (Tuazon) will make continuous ammonia measurements by FTIR at Mira Loma in September. UC Riverside (Arey) will take PUF filters for PAHs and methylnitronapthalenes at all three sites for the first episode in August only. ARB will take 24-hour PM2.5 samples at Los Angeles-North Main and Azusa in August. In addition to the intensive monitoring, ADI, Caltech (OPC and EAA), and three of the UC Riverside groups (Prather, CE-CERT TECOs, and Tuazon) will operate continuously on days in between IOPs.

The *Aerosol Aircraft Study* is scheduled to begin August 25, and will measure aerosols aloft with the CIRPAS Pelican on the last 6 IOP days of the Trajectory Study. The plane is also equipped to measure ozone and radiation for deployment during any ozone IOPs that occur during this time period. The Pelican will be based at El Monte Airport.

The *FRM Nitrate Loss Study* is being conducted by ADI and SCAQMD in conjunction with the Trajectory Study. Two FRM samplers will be operated side-by-side at each of the three Trajectory Study sites, one with Teflon filters and one with Teflon and nylon filters in series. ADI will operate FRM samplers at Riverside-Pierce Hall, and SCAQMD will operate samplers at the other two sites, namely Los Angeles-North Main and Azusa in August, and Diamond Bar and Mira Loma in September. They will be assisted Caltech for the 0100 PDT sample changes. SCAQMD will pre-weigh the Teflon filters and load all filters into cassettes, and after sampling will post-weigh the Teflon filters and analyze both the nylon and Teflon filters by ion chromatography.

The *Fine Particle Measurement Study* consists of 30 days of measurements beginning August 18, 1997. All measurements will be made at the Riverside-Agricultural Operations site. Harvard University will collect 24-hour samples by HEADS, modified HEADS for inorganic ions, denuded filters for organic and elemental carbon, Harvard impactors for PM10 and PM2.5 mass, and FRM sampler for PM2.5 mass. Brigham Young University will collect 24-hour samples for organic carbon using their BOSS and big-BOSS systems, and for inorganic species using URG annular denuders and the R&P Chemspec automated denuder system. Real time instruments for particle mass include Harvard CAMS, TEOM, and modified "lossless" TEOM for PM2.5. Other real-time instruments are an aethalometer, an ambient temperature nephelometer, an ultraviolet wavelength particle absorption spectrometer, and, for the first two weeks, the ADI automated nitrate system. The same measurements will be made each day, with sample changes at 1000 PDT.

"Go" Decision Protocol and Announcements

The Trajectory Study, Aerosol Aircraft Study, and FRM Nitrate Loss Study will rely on forecasts from the SCAQMD for selecting the best two days of the upcoming week for sampling. Two consecutive days of measurements will be made each week, chosen in consultation between ARB, Caltech, CIRPAS, and UC Riverside (Prather).

- Each day, by 3 PM, the group will make a "No-Go" or "Probable-Go" decision for aerosol measurements commencing in 34 hours. Once a "No-Go" decision is made, it cannot be changed.
- If the following day is a "Probable-Go", the group will make a final "No-Go" or "Definite-Go" decision for aerosol measurements by 3 PM.
- Each day, by 3 PM, the ARB will post the decision on 909-396-3786 and with an e-mail message.
- The earliest possible IOP day is Monday, August 18.
- The 2-day IOPs must be at least 2 days apart.
- The preference is to have at least one 2-day IOP each week.
- All things being equal, non-holiday weekdays will be selected. Intensive sampling periods can occur on a weekend, but the Labor Day Weekend (Friday through Monday) will be avoided unless it is the only time period with high PM.
- Preferably, the move to Diamond Bar and Mira Loma will occur over the Labor Day Weekend.

Sampling Schedules

Trajectory Study

For filter and selected MOUDI sampling:

0100 - 0600 PDT
0620 - 1000 PDT
1020 - 1400 PDT
1420 - 1800 PDT
1820 - 0100 PDT

FRM Nitrate Loss Study

For FRM sampling:

0100 - 0030 PDT the following day

Fine Particle Measurement Study

For filter sampling:

1020 - 1000 PDT the following day

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SCOS97-NARSTO Field Readiness Status - Wednesday, August 27, 1997

Type	Resources	Organization/Contact	Units	Full	Used	Left	Audit Status	Downtime	Status/Problems/Concerns
Emission	**Data collection is in progress. Surface street traffic counts start September 2.**								
Emission	On-Road Motor Vehicles	ARB / Mace	hourly						RSD measurements planned
Emission	On-Road Motor Vehicles	UCD / Niemeier	hourly						Freeways OK; Surface street traffic counts for 2 2-week blocks (12 sites each) start 9/2
Emission	Major Point Sources	Districts / Shah	hourly						All Districts OK
Emission	Commercial Ships	ARB / Shah	daily						Marine Exchange OK; Port of San Diego contacted
Emission	Naval Ships	USN / O'Connell	daily						OK, but may take one year
Emission	Aircraft	ARB / Shah	hourly						Proposal to Flight Vision in preparation; Funding needed
Emission	Wildfires	ARB / Shah	daily						Need report on fires during 4th of July week
Met Aloft	**All 28 RWP/RASS units are operational, but need consistency check. All 6 SODAR units are operational. All 11 rawinsonde sites are ready.**								
Met Aloft	RWP/RASS (2)	ARB / Stroud	hourly				2 audited, "fixed"		El Monte AP, Norton AFB OK
Met Aloft	RWP/RASS (11)	NOAA 1 / King	hourly				11 audited, "fixed"		All 11 OK
Met Aloft	RWP/RASS (2)	NOAA 2 / Weber	hourly				1 audited, "fixed"		Browns Field, El Centro AP OK
Met Aloft	RWP/RASS (5)	Radian / Frederick	hourly				5 audited, "fixed"		Barstow, Hesperia, Riverside, Temecula, Thermal AP OK
Met Aloft	RWP/RASS (2)	SCAQMD / Durkee	hourly				LAX audited, "fixed"		LAX, Ontario AP OK
Met Aloft	RWP/RASS (2)	SDAPCD / Lake	hourly				2 audited		Pt Loma, Valley Center OK
Met Aloft	RWP/RASS (3)	Vandenberg / Crosiar	hourly						Both 915's & sonde OK; 449 < 8000 m
Met Aloft	RWP/RASS (1)	VCAPCD / Tubbs	hourly				1 audited		Simi Valley OK
Met Aloft	SODAR (3)	NOAA 1 / Neff	hourly				3 audited, "fixed"		Azusa, Los Alamitos, Santa Clarita OK
Met Aloft	SODAR (1)	SDAPCD / Lake	hourly				1 audited		Cruz CDF (electrical power?)
Met Aloft	SODAR (2)	USMC / Helgeson	hourly						EAF, Sand Hills OK
Met Aloft	Rawinsonde (1)	ARB / King	days	15	6	9			Bakersfield OK; 10 sondes on hand, but more in mail
Met Aloft	Rawinsonde (2)	CE-CERT / Fitz	days	15	6	9			Pomona, UCLA OK
Met Aloft	Rawinsonde (8)	USN / Helvey	days	15	6	9			All 8 sites OK
Met Aloft	Flux (1)	NOAA 1 / King	hourly						Los Alamitos OK
AQ Aloft	**NOAA ozone lidar is ready. PennSt ozone lidar is operational. All 6 aircraft are ready, but Partenavia and Pelican intercomparisons are needed. All 7 ozonesonde sites are ready.**								
AQ Aloft	Ozone Lidar (1)	NOAA / Marchbanks	hours	350	133	217	6/11, 7/8, 8/24	after 9/27	El Monte AP OK
AQ Aloft	Ozone Lidar (1)	PennSt / Philbrick	hours	180	30	150		after 9/22	Began operating at Hesperia RWP site 8/23; OK but intercomparison needed
AQ Aloft	Aztec (Ozone/NOy)	STI / Anderson	hours	150	46	104	passed audit; intercom 7/8		OK; 50-hr maintenance completed
AQ Aloft	Aztec (VOC)	CE-CERT / Fitz	samples	90	34	56			Background HC/carbonyl samples collected 7/14
AQ Aloft	Cessna (Ozone/NOy)	UCD / Carroll	hours	350	80	270	passed audit; all intercom		OK; Had 100-hr maintenance
AQ Aloft	Cessna (VOC)	CE-CERT / Fitz	samples	90	34	56			Background HC = 17 ppbC; Background carbonyl sample on 7/15
AQ Aloft	Navajo (Ozone/NOy)	SDAPCD / Lake	hours	150	40	110	passed audit; intercom 8/24		OK
AQ Aloft	Navajo (VOC)	SDAPCD / Lake	samples	150	23	127			Background HC & carbonyl samples collected
AQ Aloft	Partenavia (Ozone)	USN / Helvey	hours	90	22	68	passed audit		OK but potential availability conflicts; Intercomparison needed
AQ Aloft	Pelican (PM/Ozone)	Caltech / Seinfeld	hours	100	30	70		after 9/12	OK; Flew to El Monte AP on 8/22; Intercomparison needed
AQ Aloft	SD Cessna (Ozone)	SDAPCD / Lake	hours	135	44	91	passed audit; intercom 8/24		OK
AQ Aloft	SD Cessna (VOC)	SDAPCD / Lake	samples	120	20	100			Background HC & carbonyl samples collected
AQ Aloft	Ozonesonde (6)	CE-CERT / Fitz	days	15	6	9	intercom. 6/11 & 7/8		Anaheim, CSUN, Pomona, Riverside-Ag Ops, USC, Valley Center OK
AQ Aloft	Ozonesonde (1)	USN / Helvey	days	15	7	8			Pt Mugu OK
VOC	**All 25 HC sites and all 6 halocarbon sites are ready. 7 of 8 HC intercomparison results are in. Carbonyl compound audit cylinder in circulation, and intercomparison in September.**								
VOC	Auto-GC (1)	EPA / McClenney	hourly				HC results in	after 9/30	At Azusa 9/1-30; Not ready
VOC	Auto-GC/Carbonyl (2)	SCAQMD / Eden	3-hour				carbonyls tested		Burbank, Pico Rivera OK
VOC	Biogenics (3)	UCR / Arey	days	15	6	9	repeat Ojai test at Rside (8/7)		Azusa, Banning, Pine Mtn OK
VOC	C_1-C_{12}/Carbonyl (1)	AAC / Parmar	samples	60	24	36	HC results in		29 Palms OK
VOC	C_2-C_{10} (2)	ARB / Le	3rd day				HC results in		LA-NMain, SD-12th St OK; Started 7/3
VOC	C_1-C_{12}/Carbonyl (3)	CE-CERT / Fitz	samples	180	68	112	due 7/9!!!		ARCO Plaza, Azusa, LA-NMain OK
VOC	C_1-C_{12}/Carbonyl (1)	DRI / Shorran	samples	60	24	36	HC results in		Barstow OK
VOC	C_1-C_{12}/Carbonyl (8)	DRI / Zielinska	samples	300	66	234	HC results in		Anaheim, Burbank, Catalina, ITM, Pine Mtn, Pt Conception, Rosarito, SNI OK
VOC	C_2-C_{10} (2)	SCAQMD / Eden	IOP + 3rd	15	6	9	HC results in		Banning, Upland OK; Started 7/6
VOC	C_2-C_{10} (2)	SCAQMD / Eden	3rd day				HC results in		Azusa, Hawthorne OK; Started 7/6
VOC	C_2-C_{10} (4)/Carbonyl (3)	SDAPCD / Lake	IOP + 3rd	15	6	9	HC results in; carbonyls tested		Alpine, El Cajon, Mt Soledad, Overland OK; Started 7/3
VOC	C_2-C_{10} (3)/Carbonyl (2)	VCAPCD / Tubbs	IOP + 3rd	15	6	9	HC results in; carbonyl audit 9/2		El Rio, Emma Wood, Simi Valley OK; Started 7/3
VOC	Halocarbons (2)	DGA / Grosjean	days	15	6	9	intercom last IOP		Azusa, Simi Valley OK

VOC	Halocarbons (2)	DRI / Shorran	days	15	6	9	intercom last IOP		Barstow, Lancaster OK
VOC	Halocarbons (2)	DRI / Zielinska	samples	60	24	36	intercom last IOP		ITM, Rosarita OK
VOC	Hydroxycarbonyls (1)	UCD / Charles						after 9/30	Undergoing method development; Plan for week of 9/8 or 9/15
VOC	Organic Carbon (1)	UCLA / Paulson						after 9/30	Undergoing method development
VOC	PAHs (1)	DRI / Shorran	samples	60	24	36			Barstow OK
VOC	PAHs (3)	UCR / Arey	days	15	6	9			Azusa, Banning, Riverside-Ag Ops OK
VOC	Radiocarbons (1)	EPA / Lewis	samples	12	0	12		after 9/30	At Azusa 9/1-30
NOy	**All 14 sites are operational (2 sites are scheduled to be on-line only for September 2-12 aerosol program). Audits needed.**								
NOy	HNO_3/NH_3 by Denuder (1)	CE-CERT / Fitz	days	15	8	7			Azusa/Mira Loma, Riverside-Ag Ops OK
NOy	NO_2/HNO_3 by TDLAS (2)	CE-CERT / Fitz	days	15	8	7			Azusa OK
NOy	PAN/PPN (2)	DGA / Grosjean	days	15	6	9			Azusa, Simi Valley OK
NOy	TECO 42 & LPA-4 (2)	AVES / Pankratz	hourly				NO_X audited		Cajon Pass OK; Calabasas LPA4 down (until ~8/18)
NOy	TECO 42CY (4)	CE-CERT / Fitz	hourly						Azusa, Banning, Riverside-Ag Ops OK; Diamond Bar under repair (9/2)
NOy	TECO 42S (2)	CE-CERT / Fitz	hourly						Mira Loma, SNI OK
NOy	TECO 42 (1)	CE-CERT / Fitz	hourly						LA-NMain OK; Replaced malfunctioning NOy monitor
NOy	TECO 42CY (2)	MDAQMD / Ramirez	hourly						Barstow, 29 Palms OK
NOy	TECO 42CY (2)	SDAPCD / Lake	hourly						Alpine, Mt Soledad OK
NOy	TECO 42CY (1)	VCAPCD / Tubbs	hourly						Simi Valley OK
AQ	**All 32 supplemental ozone sites are operational.**								
AQ	OH, HO_2 (1)	PSU / O'Brien	hourly					after 9/30	At Riverside-Ag Ops; OH, HO_2, O_3, NO_X, CO OK; Auto-GC and PMS not operational
AQ	Ozone (8)	ARB / Fuentes	hourly						Tijuana (4 sites), Mexicali (4 sites) OK
AQ	Ozone (1)	ARB / Stroud	hourly				audited		Mt Baldy OK
AQ	Ozone (5)	AVES / Pankratz	hourly				audited		Calabasas, Cajon Pass, Catalina Isthmus, Catalina AP, Palos Verdes OK
AQ	Ozone (4)	CE-CERT / Fitz	hourly				2 audited		ARCO Plaza, Mt Wilson, SNI, Tehachapi OK
AQ	Ozone (1)	Chevron / Chandler	hourly				audited		Pt Conception OK
AQ	Ozone (1)	MDAQMD / Ramirez	hourly				audited		Upper Cajon Pass OK
AQ	Ozone (2)	SBCAPCD / Murphy	hourly				1 audited		Riviera, Santa Rosa Island OK
AQ	Ozone (1)	SCAQMD / Eden	hourly						Temecula OK
AQ	Ozone (7)	SDAPCD / Lake	hourly				1 audited		Black Mtn, Mt Soledad, San Clemente, San Marcos Peak OK Red Mtn, Valley Center, Warner Springs OK
AQ	Ozone (2)	USN / Helvey	hourly				2 audited		Laguna Peak, Pt Mugu OK
PM	**Aerosol study begins August 16 and ends September 14. LA-Azusa-Riverside trajectory complete. Diamond Bar-Mira Loma-Riverside trajectory starts 9/2.**								
PM	Continuous Nitrate (1)	ADI / Hering	days	30	14	16	passed audit	after 9/12	At Riverside-Ag Ops 8/18-9/1; At Mira Loma 9/2-12
PM	FRM PM2.5 (1)	ADI / Hering	days	8	4	4	passed audit	after 9/12	At Riverside-Pierce 8/18-9/12
PM	FRM PM2.5 (2)	SCAQMD / Eden	days	8	4	4	2 audited, passed	after 9/14	At Azusa, LA-NMain 8/16-28; At Diamond Bar, Mira Loma 9/2-14
PM	CADMP PM2.5 (2)	ARB / Schreiber	days	4	4	4	1 audited	done	At Azusa, LA-NMain 8/18-28
PM	OC/EC (1)	BYU / Eatough	days	30	14	16	audited	after 9/14	At Riverside-Ag Ops 8/18-9/14
PM	Complete Speciation (3)	Caltech / Cass	days	8	4	4	passed audit	after 9/12	At Azusa, LA-NMain 8/18-28; At Diamond Bar, Mira Loma 9/2-12; Riverside-Pierce all
PM	Radiocarbons (1)	EPA / Lewis	samples	12	0	12		after 9/30	At Azusa 9/1-30
PM	HI/HEADS (1)	Harvard / Allen	days	30	14	16	audited	after 9/14	At Riverside-Ag Ops 8/18-9/14
PM	ATOFMS (3)	UCR / Prather	days	45	27	18		after 9/14	Azusa, LA-NMain, Riverside-Pierce OK
PM	NH_3 by FTIR (1)	UCR / Tuazon	days	15	0	15		after 9/14	At Mira Loma 9/2-14
UV	**First ultraviolet radiation intensive (June 29 to July 5) data collection partially successful. Second intensive during first IOP after September 1.**								
UV	Specialty (2)	CE-CERT / Fitz	hourly						Riverside-CECERT radiometers OK; Mt Wilson OK, except for nephelometer
UV	Yankees (2)	ColoradoSt / Janson	hourly						Mt Wilson, Riverside-CECERT OK
UV	Brewers (2)	UGeorgia / Mou	hourly						Mt Wilson, Riverside-CECERT OK
UV	PAMS (6)	SCAQMD / Bermudez	hourly						Radiometers awaiting installation
UV	PAMS (6)	VCAPCD / Field	hourly						All 6 total solar OK; UV radiometer at Simi OK
UV	SCE solar sites (19)	SCE / Severson	hourly						Total solar OK
Tracer	**First offshore test on 8/23-24 used 5 tracers. Three offshore tests left.**								
Tracer	Analysis	BNL / Dietz	tests	4	1	3			OK
Tracer	Release/Sampling	Tracer ES&T / Rappolt	tests	4	1	3			OK