INTERAGENCY MONITORING OF PROTECTED VISUAL ENVIRONMENTS

IMPROVE

Fall 1999 The IMPROVE Newsletter Volume 8 / Number 4

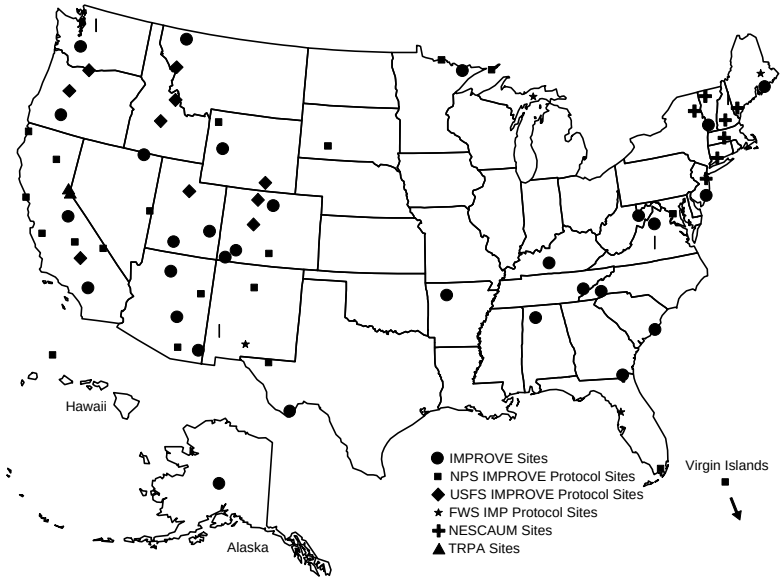
Monitoring update

Preliminary data collection statistics for the Fall 1999 monitoring season (September, October, and November) are:

- Aerosol 91% collection
- Optical (transmissometer) 96% collection
- Optical (nephelometer) 96% collection
- Scene (photographic) 86% collection

Particulate data have been submitted through August 1999 for all measurements including carbon. All data are available electronically on the UC-Davis or CIRA FTP sites. The seasonal summaries beginning with 1998 are available on http://improve.cnl.ucdavis.edu.

Optical data have been submitted through August 1998 and are available on the CIRA FTP site, at ftp://alta_vista.cira.colostate.edu. Scene data are archived but are no longer routinely reported.



IMPROVE and IMPROVE Protocol Sites
Fall 1999

Visibility news

IMPROVE Newsletter receives new look

The new year brings, among other things, a new millennium and a new look for the IMPROVE Newsletter. The quarterly newsletter, which debuted in March 1992, delivers news and events pertinent to the IMPROVE Program and related air quality issues.

Beginning with this issue, the IMPROVE Newsletter will bring a splash of color and a format change for a refreshed, new look. It will continue to bring the same news and updates related to the IMPROVE Program, special studies involving IMPROVE monitoring methods, and feature articles of interest.

Individuals wishing to contribute articles related to air quality and IMPROVE Program issues are welcome.

For more information contact Gloria Mercer at Air Resource Specialists, Inc. Telephone: 970/484-7941. E-mail: gmercer@air-resource.com

IMPROVE committee meeting scheduled

The IMPROVE Steering Committee has scheduled a meeting February 8-9, 2000, to discuss the monitoring network and status of the current program. Agenda items will include:

- Progress of the aerosol network expansion
- Methods to improve program accountability
- Data processing standardization issues
- Technical presentations

The meeting will be held at the Desert Research Institute in Las Vegas, Nevada.

For more information contact Marc Pitchford at the U.S. EPA. Telephone: 702/895-0432. E-mail: marcp@snsc.dri.edu

***Visibility news** continued on page 3*

Feature article

The new IMPROVE aerosol sampler, Version II, redesigned and ready for monitoring

The Version I aerosol samplers currently used in the IMPROVE Program have been operating since 1988. These instruments are aging, components are no longer available, and they cannot accommodate the new one-day-in-three sampling schedule. Consequently, the IMPROVE aerosol sampler Version II will be taking over.

Continuity

The Version II sampler involves no change in basic sampling methodology over Version I, but the new design promotes easier maintenance and servicing. Version II still has four independent filter modules connected to a common controller module (Figure 1) and the particle collection and flow rate measurement components have not changed. The filter modules have separate air streams, sizing devices, critical orifice flow controllers, and pumps, and the solenoids can expose up to four filters between changes. A new steel enclosure makes the new sampler one-half the volume of the older samplers (Figure 2). Collocated tests have shown no differences in measured particulate concentrations.

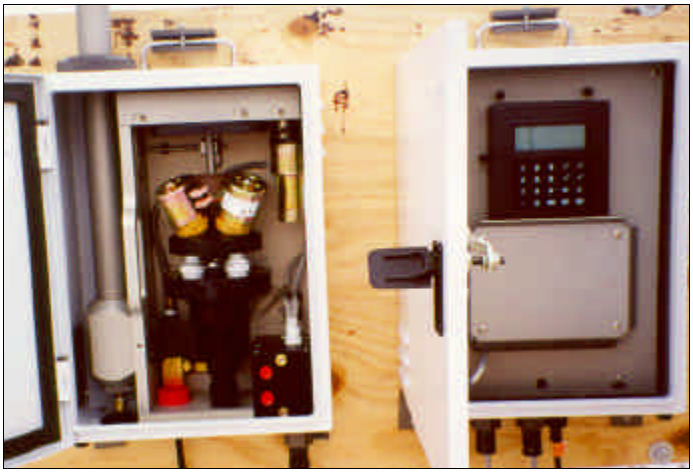


Figure 1. Version II IMPROVE aerosol sampler module and controller. Up to four filter modules may be controlled by one controller module.

Controller

Version II has a significantly changed controller from the Version I instruments. Instead of a programmable timer, Version II uses a microprocessor with screen and keypad. In operating mode, the screen shows the status of past or current sampling. In menu mode, the screen leads the operator in sample changing steps and displays information to be recorded on log sheets. The microprocessor monitors flow rate and temperature every minute and logs this information on a removable magnetic card. The operator removes this card and transports it with the filter cassettes.

Figure 2. Version II IMPROVE aerosol sampler modules mounted for the BRAVO study in Big Bend National Park, Texas. The steel enclosures are one-half the volume of the older samplers.

Filter Cassettes and Cartridges

Filter cassettes for the Version II sampler are easier to change than before. The new cassettes have the same dimensions as the old, but have a superior design. Cassettes are held together by O-rings to eliminate leaks, and built-in stainless steel screens produce a more uniform particle distribution. Cassettes are pre-installed in a cartridge at UC-Davis; each cartridge holds up to four cassettes. The site operator will exchange the entire cartridge, and guide pins ensure that the cassettes are correctly oriented. A manifold drops onto the cassettes to also eliminate leaks.

Tuesday Sample Changes

The network will continue to operate on a Wednesday-Saturday schedule until early spring. It will then shift to a one-day-in-three protocol, with sample changing always on Tuesdays. The Version II sampler can easily accommodate this change.

Installation

The new samplers will be installed in 110 monitoring clusters, which represent all 156 mandatory Class I areas except the Bering Sea National Wildlife Refuge in Alaska. (See *IMPROVE Newsletter*, Volume 8, Number 2 (Spring 1999) for discussion on expansion of the aerosol monitoring network). Operators at IMPROVE sites may expect to receive a Version II sampler before March, and operators at IMPROVE Protocol sites may expect one before June.

For more information contact Bob Eldred at the Crocker Nuclear Laboratory at the University of California-Davis. Telephone 530/752-1124 or E-mail eldred@crocker.ucdavis.edu

Visibility news continued from page 1....

Optec redesigns LPV-2 transmissometer light detector module

The LPV-2 long-range transmissometer, operational in the IMPROVE network since 1988, is receiving a transmitter upgrade that is intended to reduce polarization effects on transmissometer data due to lamp aging.

The transmissometer transmitter projects a light beam to a receiver where the intensity of the light received is measured and converted to b_{ext}, the atmospheric extinction coefficient. The feedback block in the transmitter controls the intensity of the light emitted by the lamp (Figure 1).

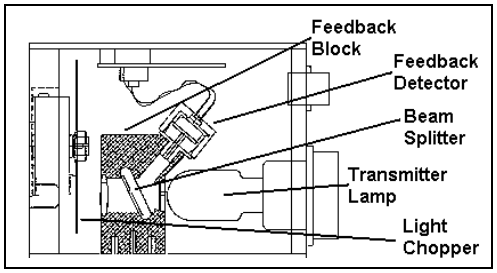


Figure 1. Diagram of the Optec, Inc. LPV-2 transmissometer transmitter, with new feedback block designed to minimize polarization.

The feedback block consists of a feedback detector, a beam splitter, a condensing lens, and a flat lens. The beam splitter reflects a small sample of the emitted light to the detector. A circuit connected to this detector then adjusts the lamp voltage as required to maintain a constant level of brightness. Because the light reflected to the detector includes a small amount of polarized light, the accuracy of the detector's circuitry to control the lamp voltage may vary. The new feedback block design changes the orientation of the beam splitter and feedback detector relative to the emitted light beam. The reduced reflection angle between the emitted light and feedback detector minimizes the effects of the polarized light.

For more information contact Jim Wagner at Air Resource Specialists, Inc. Telephone: 970/484-7941. E-mail: jwagner@air-resource.com

NPS hosts air quality summit in Colorado

National Park Service representatives from park and regional offices around the country met in Estes Park, Colorado, November 16-18, 1999, to discuss current programs and future plans for improving air quality in parks. Resource managers, monitoring technicians, and park rangers shared information about air quality issues in parks and programs being implemented to reduce pollution. Discussion also included an update on national regulations and policies affecting air quality in parks and a summary of monitoring and research status and needs.

For more information contact Chris Shaver at the NPS. Telephone: 303/969-2074. E-mail: chris_shaver@nps.gov

New plume model nearing completion

The National Park Service and the Visibility Research Group at the Cooperative Institute for Research in the Atmosphere (CIRA) are nearing completion of a new plume simulation model called VisualPlume. It simulates plumes and predicts the contrast, apparent visual shape, blue-red ratio, reduction in visual range, Delta E, probability of visual detection, and other optical properties of plumes in the atmosphere. Users will be able to model changes in source parameters, meteorology, and chemical and physical properties of particles in the plume and background.

An integral part of VisualPlume is a new Windows-based user interface for the PLUVUE II model. Users may input a plume from PLUVUE or select their own concentrations, and generate output from either PLUVUE or the more sophisticated Backward photon trajectory, multiple scattering, Monte Carlo model (BMC) Model. It will also compare results from the two models.

For more information contact Yahya Golestani at CIRA. Telephone: 970/491-8692 E-mail: golestani@cira.colostate.edu

Special studies

California launches regional particulate air quality study (CRPAQS)

California began a two-year air quality study, the California Regional $PM_{10}/PM_{2.5}$ Air Quality Study (CRPAQS) in December. The comprehensive study aims to provide an improved understanding of emissions and dynamic atmospheric processes that influence particle formation and distribution; develop and demonstrate methods useful to decision-makers in formulating and comparing candidate control strategies for attaining the federal and state $PM_{10}/PM_{2.5}$ standards in central California; and provide reliable means for estimating the impacts of control strategy options developed for $PM_{10}/PM_{2.5}$ on visibility, air toxics, and acidic aerosols and on attainment strategies for other regulated pollutants.

Three field campaigns are planned for a large portion of central California: a long-term program (December 1999 - January 2001), a fall episodic program (September-October 2000), and a winter episodic program (December 2000-January 2001). The long-term campaign, which began December 1, 1999, will characterize annual average concentrations and their causes.

For more information contact Karen Magliano at the California Air Resources Board. Telephone: 916/322-7137. E-mail: kmaglian@arb.ca.gov

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Government organizations interested in becoming Associate Members may contact any Steering Committee member for information.

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The IMPROVE Program was designed in response to the visibility provisions of the Clean Air Act of 1977, which affords visibility protection to 156 federal Class I areas. The program objectives are to provide data needed to: assess the impacts of new emission sources, identify existing human-made visibility impairments, and assess progress toward the national visibility goals as established by Congress.

To submit an article, to receive the IMPROVE Newsletter, or for address corrections, contact:

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IMPROVE Newsletters are also available on the National Park Service Web site at: http://www.nature.nps.gov/ard/impr/index.htm

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