

## Monitoring update

### Network operation status

The IMPROVE (Interagency Monitoring of Protected Visual Environments) Program consists of 110 aerosol visibility monitoring sites selected to provide regionally representative coverage and data for 155 Class I federally protected areas. Additional instrumentation that operates according to IMPROVE protocols in support of the program includes:

- 58 aerosol samplers
- 6 transmissometers
- 34 nephelometers
- 8 digital or film camera systems
- 57 Webcam systems
- 5 interpretive displays

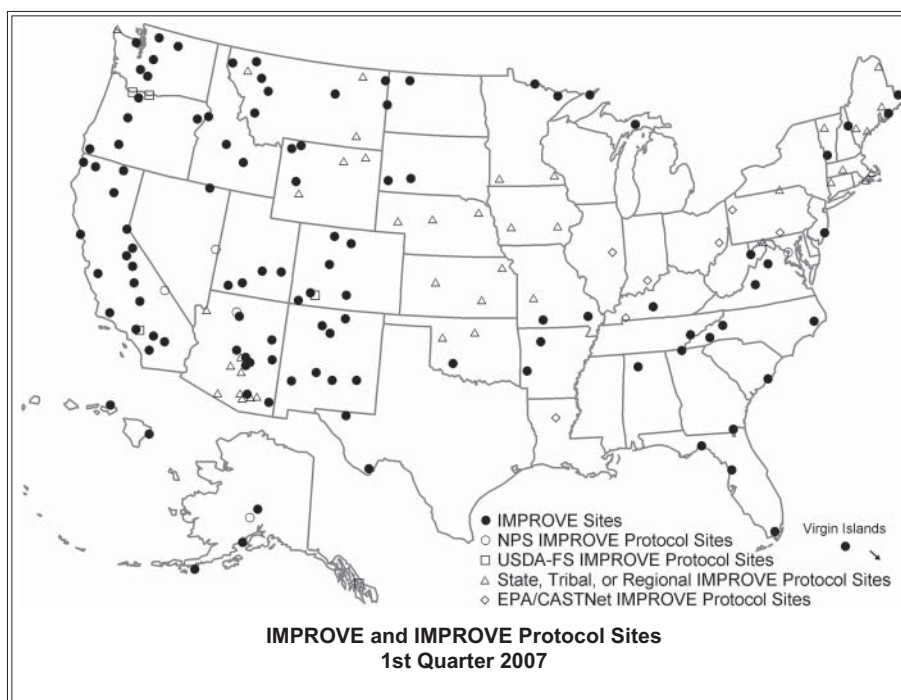
IMPROVE Program participants are listed on page 8. Federal land management agencies, states, tribes, regional air partnerships, and other agencies operate supporting instrumentation at monitoring sites as presented in the map below. Preliminary data collection statistics for the 1<sup>st</sup> Quarter 2007 (January, February, and March) are:

- |                             |                  |
|-----------------------------|------------------|
| ➤ Aerosol (channel A only)  | 94% collection   |
| ➤ Aerosol (all modules)     | 92% completeness |
| ➤ Optical (transmissometer) | 99% collection   |
| ➤ Optical (nephelometer)    | 94% collection   |
| ➤ Scene (photographic)      | 78% collection   |
| (does not include Webcams)  |                  |

An aerosol sampler was installed at Haleakala Crater, HI, this quarter. The original Haleakala IMPROVE site, located at a lower elevation, will remain in operation. The Baltimore, MD, site was discontinued due to funding limitations.

The San Geronio Wilderness, CA, transmissometer obtained additional funding from the USDA-Forest Service and resumed operation in March. IMPROVE Protocol sites operating nephelometers discontinued monitoring at Mayville, WI, and at Cohutta Wilderness, GA, this quarter.

Two high-resolution Webcams began collecting 15-minute images and Web postings this quarter: South Pass, WY (sponsored by the state of Wyoming), and Sault Ste. Marie, MI (sponsored by the Lake Michigan Air Director's Consortium).



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### Data availability status

Data are available on the IMPROVE Web site, at <http://vista.cira.colostate.edu/improve/Data/data.htm>. IMPROVE and other haze-related data are also available on the VIEWS Web site, at <http://vista.cira.colostate.edu/views>.

Aerosol data are available through February 2006. Transmissometer and nephelometer data are available through December 2005 and December 2006 respectively.

Photographic slide spectrums are also available on the IMPROVE Web site, under *Data*. Real-time Webcam displays are available on a variety of agency-supported Web sites.

*Monitoring update continued on page 3...*

## Visibility news

### IMPROVE aerosol network changes to local standard time

During 2007, all samplers in the IMPROVE network will begin operating on local standard time year-round. There is currently a mixture of protocols in the network, with many sites operating on local time (daylight or standard) and other sites always operating on standard time. Using standard time exclusively will unify the network and avoid misunderstandings.

Upgrades to the sampler's operating software are to be installed throughout the network during 2007. Each site will convert to standard time when it receives its replacement controller with the new software installed. Technical staff from UC-Davis will work with each site operator to make the transition as seamless as possible.

*For more information contact Chuck McDade at the University of California-Davis. Telephone: 530/752-7119. Fax: 530/752-4107. E-mail: [mcdade@crocker.ucdavis.edu](mailto:mcdade@crocker.ucdavis.edu).*

### Steering committee to meet in Durango

The IMPROVE Steering Committee is planning its annual program status and planning meeting September 5-6, 2007, in Durango, Colorado, to be hosted by the USDA-Forest Service. Also, September 7 is being scheduled for a tour of some of the energy development in the region, as well as a site visit to the local IMPROVE protocol monitoring site at Shamrock Mine, sponsored by the USDA-Forest Service.

A more extensive tour is also being considered following the meeting, including a visit to the Navajo Generating Station in Page, AZ. This Four Corners area of the country is experiencing growth in the electricity, oil, and gas industries, and is drawing concerns regarding the development's impact on air quality in the region.

The meeting's agenda and final scheduling will be available and distributed to IMPROVE Steering Committee members and other interested parties later this summer.

*For more information contact Marc Pitchford at the National Oceanic and Atmospheric Administration. Telephone: 702/862-5432. Fax: 702/862-5507. E-mail: [marc.pitchford@noaa.gov](mailto:marc.pitchford@noaa.gov).*

### NACAA sees change in representative

Ray Bishop, the National Association of Clean Air Agencies (NACAA) representative to the IMPROVE Steering Committee, has served on the committee since 2001, and has retired as of March 31, 2007. Ray had nearly 40 years experience in the field of air quality monitoring. During his tenure at the Oklahoma Department of Environmental Quality, he managed the Air Quality Division's Emissions Inventory Section, the Air Quality Permits Program, and the Ambient Air Monitoring Program. He also was co-chair for both the Emissions Inventory Improvement Program Area Source Workgroup and the Central Regional Planning Organization's Monitoring Workgroup.

Ray's replacement as the NACAA representative to the IMPROVE Steering Committee is Terry Rowles, of the Missouri Department of Natural Resources (MDNR), Air Pollution Control Program. Mr. Rowles is an Environmental Specialist and has worked with the MDNR for 25 years; 2 years as an air inspector, 1 year in emission inventory, and 22 years in air monitoring. He currently supervises the Air Monitoring Unit.

The IMPROVE Steering Committee welcomes Terry as the NACAA representative.

*To contact Terry Rowles, see address information on page 8. Telephone: 573/751-4817. E-mail: [terry.rowles@dnr.mo.gov](mailto:terry.rowles@dnr.mo.gov).*

### EPA IMPROVE 2008 budget projection

The Environmental Protection Agency's (EPA's) fiscal year 2007 funding contribution to IMPROVE has not been reduced by 15% as called for in budget projections last year. This means all of the 110 monitoring sites that are representative of the visibility-protected federal Class I areas will be continued.

However, next year's EPA budget projection again includes a reduction for IMPROVE funding, which if realized, would result in decommissioning as many as 30 of the 110 monitoring sites starting in July 2008.

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## Aerosol sites to receive new inlet screen this summer

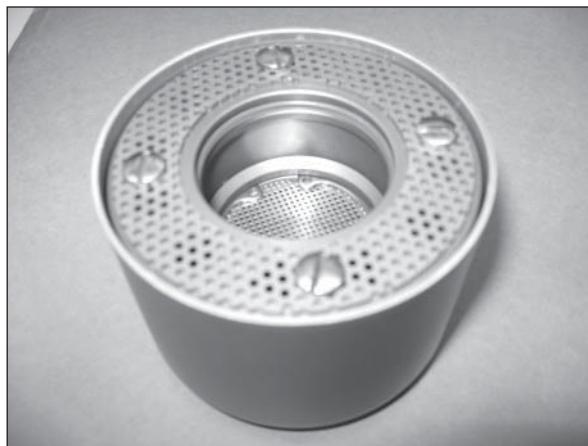
In 2005 the PM<sub>2.5</sub> sampler inlets at several sites were found to be blocked by mud and webs deposited by insects and spiders. At three of these sites, all in the southeastern United States, the blockage was sufficient to reduce the sampled particulate matter by a significant amount. Although the blockage was enough to reduce the measured concentrations, it did not alter the flowrates. Thus, the problem was not apparent from routine flowrate checks and could be discerned only by removing and examining the inlets.

To reduce the occurrence of blocked inlets, the inlet design is being retrofitted to include a fine mesh wire screen. This screen will act much as a window screen does, allowing air to flow but keeping out all but the smallest of insects and spiders. The screen covers the entire inlet face, as shown in the photograph at right. The new inlet screens will be placed at each site by UC-Davis field staff during their annual maintenance visits.

The new screen design has been tested extensively by UC-Davis scientists, both at a test facility in Davis and at

selected field sites. These tests have demonstrated that adding the screen causes no discernible changes to the sampled aerosol.

*For more information contact Chuck McDade at the University of California-Davis. Telephone: 530/752-7119. Fax: 530/752-4107. E-mail: mcdade@crocker.ucdavis.edu.*



IMPROVE PM<sub>2.5</sub> sampler inlet with new screen attached.

*Visibility news continued on page 6...*

## Monitoring update *continued from page 1 ....*

### Operators of distinction

Never say never. When Russell Paulk retired from the state of Georgia's public health division a few years ago, he never thought he'd re-enter the full-time job market again. Now, however, Russell is a ranger and air quality technician at Great Smoky Mountains National Park, TN, and spends the majority of his time outdoors en route to or from an air quality site. The park has five such sites run by the National Park Service that require weekly servicing.

Russell joined the park's workforce less than one year ago. "You can only do so much fishing in retirement," said Russell, "and my 'honey-do' list was never ending." So Russell reapplied himself, finding his productivity level still good enough for some serious work. During his tenure in Georgia, Russell was an environmentalist and moved up to deputy director of the district and programs manager. He holds a BS degree in biology and an MS degree in environmental pollution control from Penn State University.

Servicing the IMPROVE sampler and a wide range of other air quality instrumentation suits Russell just fine. Collecting samples, performing instrument maintenance, and completing some paperwork are his only tasks. "It is a relaxing job," said Russell, "I'm outside almost all the time, and our Cove Mountain site is an 8-mile hike round trip. It provides built-in exercise, which I consider a perk of the job."

Although being relatively new to air quality site servicing, Russell enjoys his work and advises laboratory staff of any sampling service problems.

In his free time, Russell can still be found outdoors, volunteering to maintain his church's lawn and flower gardens, tying flies and fly fishing, or drawing and painting. He also spends time with his brand-new granddaughter, his first grandchild. Russell, his wife, and two daughters currently all live in the Gatlinburg area. Retirement will just have to wait.



Ranger Russell Paulk, maintains up to five air monitoring sites in Great Smoky Mountains National Park, TN. The servicing takes up most of his time, which is just fine by him.

*Monitoring update continued on page 7...*



## Feature article

### Four Corners Air Quality Task Force Studies Oil and Gas Development in the Region

#### Overview

A few years ago, local USDI-Bureau of Land Management (BLM) offices identified a potential, significant visibility impact to two Class I areas in the Four Corners region of the United States (Utah, Colorado, New Mexico, and Arizona). The two areas, Mesa Verde National Park and Weminuche Wilderness Area, were identified as potentially impacted using IMPROVE data and reconstructed extinction methodologies. Growth of the oil and gas industry in the region has caused concern over degraded visibility, which led BLM to require lower oxides of nitrogen emissions from small well-head engines, and was the impetus for the formation of the Four Corners Air Quality Task Force.

The states of New Mexico and Colorado convened the Task Force in November 2005, and will oversee its work through its completion in December 2007. The interagency collaborative effort is now shared by federal, tribal, state, and local air and land management agencies in the Four Corners states, including the Navajo Nation Environmental Protection Agency; the Southern Ute Indian Tribe's Air Quality Department; the U.S. Environmental Protection Agency; the U.S. Department of the Interior, Bureau of Land Management and National Park Service; the U.S. Department of Agriculture, Forest Service; the U.S. Department of Energy; and the state of Utah. Additional members include community members, interest groups, and local industry. The Task Force welcomes any interested party to join.

#### Purpose

Increased energy development, including new power plants and oil and gas wells, and population growth are all contributing to current and future air quality concerns. Ozone levels in the region are close to exceeding the health-based national air quality standards for outdoor air, and many local residents are also concerned about health and ecosystem impacts from other pollutants. Haze that impairs visibility is often seen overlying the landscape.

Because of these varied concerns, the Task Force has been developing a comprehensive list of options for improving air quality in the area, that will aid regulatory agencies in developing plans for managing air quality and visibility goals. These options will need to consider and accommodate the expansion of oil and gas exploration and production, the proposed growth, coal-fired power production, and related economic development in the region. A draft report

containing these options has been released and is available on the Task Force's Web site (<http://www.nmenv.state.nm.us/aqb/4C/index.html>).

In addition to ongoing input, a public review process will take place for three weeks in June and July 2007. This review will be Web-based, allowing anyone with Internet access to review and comment on the draft Task Force report.

The Task Force meets quarterly in the Four Corners area (usually Farmington, NM, or Durango, CO) in the months of February, May, August, and November. All meeting information is available on the Task Force's Web site on the Meetings page.

#### Task Force work groups

In addition to welcoming anyone to join the Task Force, anyone is welcome to participate in any of its five work groups. Local residents and private citizens find this an opportunity to work alongside government representatives toward a common goal. Most work groups have monthly conference calls and meet face-to-face at the quarterly Task Force meetings.

##### Power Plants / Oil and Gas / Other Sources

The purpose of three "source" work groups, Power Plants, Oil and Gas, and Other Sources, is to provide education, discuss mitigation options, receive input, and coordinate the development of the mitigation options for input into the draft and final reports relating to those source sectors.

##### Cumulative Effects / Monitoring

The purpose of the Cumulative Effects and Monitoring work groups is to coordinate existing data and analyses, as well as identify additional air quality analyses and monitoring that many be helpful in forming mitigation options. These options may be implemented to develop air quality management plans and will be discussed in the draft and final reports.

##### Inventory and modeling project

In addition to developing air quality mitigation options, the Task Force is also working on an inventory and modeling project for the Four Corners area. Prior to convening the Task Force, the agencies involved identified the need for a more site-specific emissions inventory of the area as well as more robust modeling of mitigation scenarios. The Cumulative Effects work group created an inventory and modeling project (from an ad hoc committee made of interested

stakeholders). Results of the project will be used by the regulatory agencies to identify the most effective mitigation strategies for implementation in the Four Corners area.

The work group relies generally on existing emission inventory information for their work, specifically the emissions inventory commissioned by the Western Regional Air Partnership (WRAP), the San Juan and Rio Arriba Counties inventories commissioned by the State of New Mexico, and the Southern Ute emission inventory. Results of the inventory and modeling project will be used by the agencies after the Task Force Report is complete and will not be a part of the final Task Force Report.

The data center initiated to support the Task Force work is the Four Corners Aerometric and Hydrometric Monitoring Networks - GIS Mapping, Data Access, and Analysis Web site. This Web site can be found at (<https://web.ead.anl.gov/fourcorners/index.cfm>). One of its key functions is to provide a centralized monitoring data center accessing measurement data and to view spatial locations of individual monitors and related monitoring networks. An example mapping screen showing air monitoring locations is shown as Figure 1 below.

## Final report

The Four Corners Air Quality Task Force will work for a two-year period, making its final report available by December 2007. From then on, it will convene periodically to receive progress updates and provide additional input as necessary.

The final report will be available on the Task Force's Web site and include all of the potential mitigation options developed by its members. This document will serve as a resource and guide to the regulatory agencies responsible for the region, in developing air quality management plans. These plans may include development of new regulations or revising existing regulations, supporting new legislation, developing new outreach and information programs, and developing and/or expanding voluntary programs for emission reduction. A draft report is currently available on the Web site (<http://www.nmenv.state.nm.us/aqb/4C/>).

For more information contact Scott Archer at the Bureau of Land Management. Telephone: 303/236-6400. Fax: 303/236-3508. E-mail: [scott\\_archer@blm.gov](mailto:scott_archer@blm.gov).

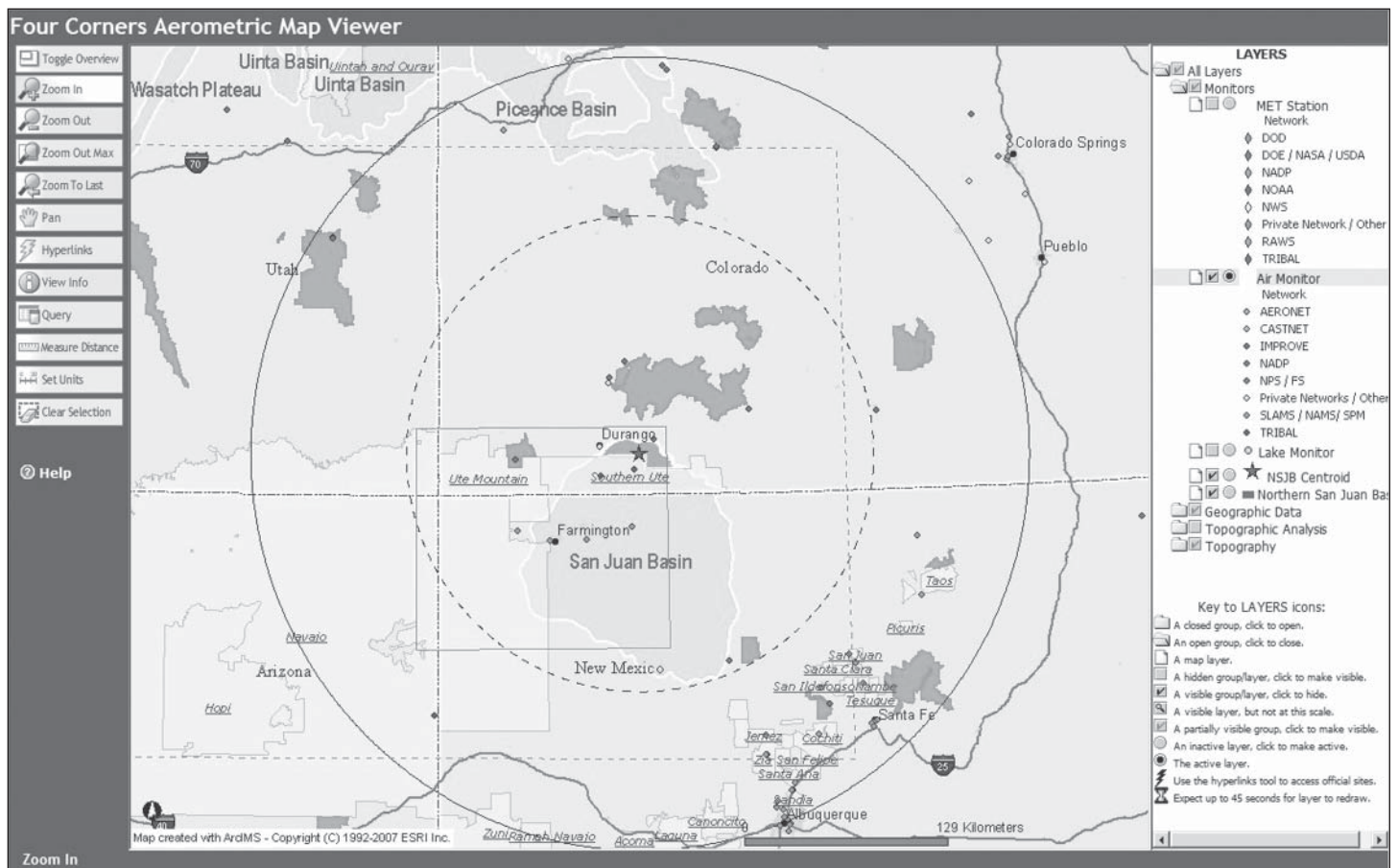


Figure 1. Four Corners Aerometric Map Viewer displaying a map of the region with locations of air monitors defined by operating agency.

## Visibility news *continued from page 3 ....*

### New data advisories for IMPROVE

Three new data advisories have been posted on the IMPROVE Web site this quarter:

#### Varying bias of XRF sulfur relative to IC sulfate

- Affects: Module A, Sulfur
- Period: 2003-2004, maybe earlier years

Most fine particle sulfur is present as sulfate. Measured concentrations are therefore expected to exhibit a fixed ratio of sulfur to sulfate, but reported concentrations in IMPROVE data often depart from this ratio by more than their reported uncertainties. During the years 2003 and 2004, evidence points to X-Ray Fluorescence (XRF) measurement bias as the source of most of the observed variation. Samples beginning in 2005 are being analyzed with a new and more stable copper-anode XRF system, and calibrations are now more frequently verified against certified elemental references. These improvements appear to have stabilized the sulfur measurement. Scientists recommend data analysts use sulfate in preference to sulfur for trend analysis.

#### Introduction of a second copper-anode XRF system

- Affects: Module A, Species Na, Mg, Al, Si, P, S, Cl, K, Ca, Ti, V, Cr, Mn, and Fe
- Period: Beginning October 2005

Light-element concentrations are determined by XRF analysis using a copper anode tube as the source. A second system, with the same design as the first, was recently placed into service. Samples collected in October 2005 were the first to be analyzed using the second system. The two copper anode systems are designed to be equivalent and are calibrated against the same reference foils. They report concentrations for the single-element calibration foils that agree within prescribed tolerances. However, the two systems do exhibit some detectable differences for actual samples. Data from samples collected after October 1, 2005, will be reported with an added indicator of the copper anode XRF system used in analysis.

#### Diminished wintertime nitrate concentrations in late 1990s

- Affects: Module B, Nitrate
- Period: Wintertime, 1996-1997 through 1999-2000

Wintertime nitrate concentrations at many IMPROVE sites were below historical levels for about four years, from 1996-1997 to 1999-2000. Wintertime nitrate concentrations have been at consistent levels since 2000-2001, and these levels are comparable to those observed prior to 1996-1997. Recent testing did not identify any methodological cause

for the below-normal winter nitrate concentrations, although these tests were limited because filters were not available for tests of the filter lots used in the 1990s. Scientists recommend treating wintertime nitrate data from 1996 to 2000 with caution.

Complete discussions of these and all other data advisories can be found on the IMPROVE Web site at [http://vista.cira.colostate.edu/improve/Data/QA\\_QC/Advisory.htm](http://vista.cira.colostate.edu/improve/Data/QA_QC/Advisory.htm).

*For more information or to submit an advisory, contact Bret Schichtel at CIRA. Telephone: 970/491-8581. Fax: 970/491-8598.*

### Visibility specialty conference scheduled

The visibility specialty conference, *Aerosols & Atmospheric Optics*, is being scheduled during April 28 - May 3, 2008, in Moab, UT. The conference is co-sponsored by the Air & Waste Management Association (A&WMA) and the American Association for Aerosol Research (AAAR). Conference chairpersons have formed a list of proposed presentation topics listed below. They are currently seeking additional topics and anyone interested in volunteering to chair sessions.

Proposed science topics currently include:

- Remote sensing of air pollution concentrations
- New techniques in monitoring of particulate matter and optical properties
- Air quality modeling, including deterministic receptor and hybrid techniques
- Results from field studies, including routine monitoring networks and special studies
- International transport of air pollutants
- Characteristics of smoke
- Determination of natural background
- Innovative uses of digital cameras
- Single particle characteristics
- Global radiation budget (radiative forcing of aerosols)

Proposed policy topics currently include:

- State implementation plans - plans for tracking progress
- Implications of recent federal legislation

*For more information or to submit a topic or volunteer, contact Kristi Gebhart at the National Park Service. Telephone: 970/491-3684. Fax: 970/491-8598. E-mail: [Gebhart@cira.colostate.edu](mailto:Gebhart@cira.colostate.edu).*



## Monitoring update *continued from page 3 ....*

### Outstanding sites

Data collection begins with those who operate, service, and maintain monitoring instrumentation. IMPROVE managers and contractors thank all site operators for their efforts in caring for IMPROVE and IMPROVE Protocol networks. Sites that achieved 100% data collection for 1<sup>st</sup> Quarter 2007 are:



#### Aerosol (Channel A)

Addison Pinnacle	Great Gulf	Omaha
Arendtsville	Great Sand Dunes	Pasayten
Badlands	Great Smoky Mountains	Penobscot
Bandelier	Haleakala	Presque Isle
Birmingham	Hawaii Volcanoes	Quabbin Reservoir
Blue Mounds	Hells Canyon	Quaker City
Bridgton	Hercules-Glades	Queen Valley
Brigantine	Hoover	Saguaro West
Bryce Canyon	James River	San Gorgonio
Canyonlands	Kalmiopsis	San Pedro Parks
Cape Romain	Lassen Volcanic	Sawtooth
Casco Bay	Livonia	Seney
Chassahowitzka	Mammoth Cave	Sequoia
Cherokee	Martha's Vineyard	Shamrock Mine
Columbia Gorge East	Meadview	Shenandoah
Columbia Gorge West	Medicine Lake	Shining Rock
Crater Lake	M.K. Goddard	Three Sisters
Death Valley	Mohawk Mountain	Trapper Creek-Denali
Dolly Sods	Mount Hood	UL Bend
Douglas	Mount Rainier	Voyageurs
Egbert	New York	Weminuche
Everglades	Okefenokee	Yellowstone
Gates of the Mountains	Olympic	Yosemite
Glacier		

#### Transmissometer

Cloud Peak	Grand Canyon (In Canyon)
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#### Nephelometer

Estrella  
Mammoth Cave  
National Capital  
Phoenix

#### Photographic

Agua Tibia  
Gates of the Mountains  
Grand Canyon  
Monture

Sites that achieved at least 95% data collection for 1<sup>st</sup> Quarter 2007 are:

#### Aerosol (Channel A)

Bondville	Kaiser	Redwood
Bridger	Lake Sugema	Sac and Fox
Cape Cod	Lostwood	Simeonof
Craters of the Moon	Lye Brook	Sipsey
Crescent Lake	Mesa Verde	Snoqualmie Pass
El Dorado Springs	Monture	Starkey
Ellis	Moosehorn	Tonto
Frostburg Reservoir	Mount Baldy	Upper Buffalo
Grand Canyon	Organ Pipe	Washington DC
Great River Bluffs	Pinnacles	White Pass
Indian Gardens	Proctor Research Center	White River
Joshua Tree	Puget Sound	

#### Transmissometer

Bridger	San Gorgonio	Thunder Basin
Grand Canyon (S Rim)		

#### Nephelometer

Acadia	Dysart	Shenandoah
Big Bend	Grand Canyon (Hance)	Sierra Ancha
Children's Park	Great Smoky Mountains	Sycamore Canyon
Chiricahua	Greer	Thunder Basin
Cloud Peak	Mount Rainier	Tucson Central
Cohutta	Organ Pipe	Vehicle Emissions
Craycroft	Petrified Forest	

#### Photographic

-- none --

Sites that achieved at least 90% data collection for 1<sup>st</sup> Quarter 2007 are:

#### Aerosol (Channel A)

Acadia	Fort Peck	Rocky Mountain
Agua Tibia	Gila	Saguaro
Big Bend	Ike's Backbone	San Gabriel
Bliss	Jarbridge	San Rafael
Cabinet Mountains	Lava Beds	Sikes
Capitol Reef	Makah	St. Marks

Cedar Bluff	Mingo	Sula
Chiricahua	Mount Zirkel	Swanquarter
Cloud Peak	Nebraska	Trinity
Denali	Petersburg	Tuxedni
Dome Land	Point Reyes	Wichita Mountain
Flathead		

#### Transmissometer

--none--

#### Nephelometer

Grand Canyon (Indian Gardens)	Ike's Backbone Mount Zirkel	Queen Valley Tucson Mountain
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#### Photographic

--none--

### Monitoring Site Assistance:

Aerosol sites: contact University of California-Davis  
telephone: 530/752-7119 (Pacific time)

Optical/Scene sites: contact Air Resource Specialists, Inc.  
telephone: 970/484-7941 (Mountain time)



## The IMPROVE Newsletter

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**TO:**

First Class Mail

### IMPROVE STEERING COMMITTEE

IMPROVE Steering Committee members represent their respective agencies and meet periodically to establish and evaluate program goals and actions. IMPROVE-related questions within agencies should be directed to the agency's Steering Committee representative.

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\* Steering Committee chair

#### **ASSOCIATE MEMBERS**

Associate Membership in the IMPROVE Steering Committee is designed to foster additional comparable monitoring that will aid in understanding Class I area visibility, without upsetting the balance of organizational interests obtained by the steering committee participants. Associate Member representatives are:

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