INTERAGENCY MONITORING OF PROTECTED VISUAL ENVIRONMENTS

IMPROVE

2nd Quarter 2010 | The IMPROVE Newsletter | Volume 19 / Number 2

Monitoring update

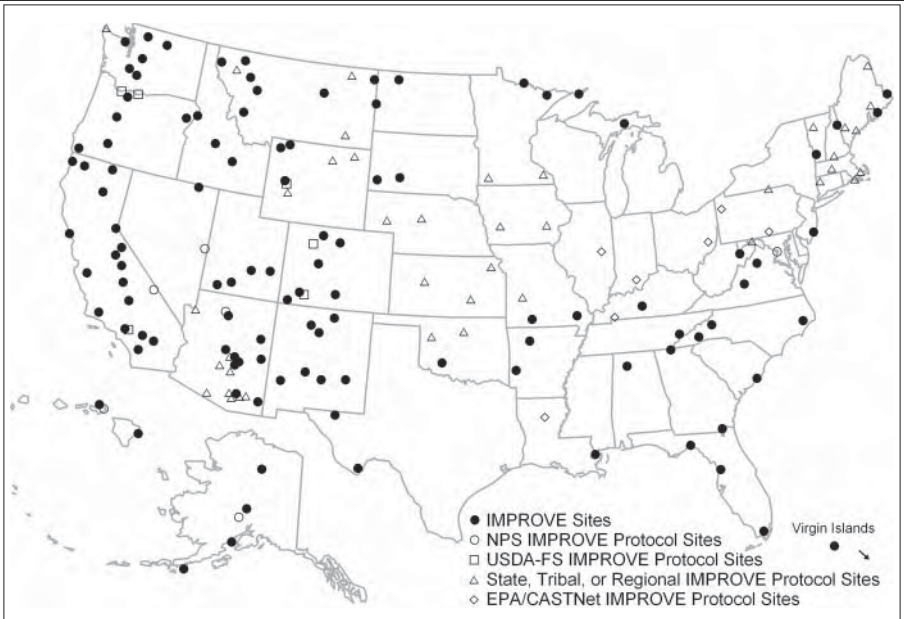
Feature Article: Status report -- WRAP decision and data support systems, Page 4

Network operation status

The IMPROVE (**I**nteragency **M**onitoring of **Pro**tected **V**isual **E**nvironments) 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:

- 59 aerosol samplers
- 20 nephelometers
- 2 transmissometers
- 71 Webcamera systems
- 2 digital camera 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 2nd Quarter 2010 (April, May, June) are:



IMPROVE and IMPROVE Protocol Sites
2nd Quarter 2010

- Aerosol (channel A only) 95% collection
- Aerosol (all modules) 94% completeness
- Optical (nephelometer) 95% collection
- Optical (transmissometer) 95% collection

Budget cuts forced 9 of the Arizona Department of Environmental Quality's 14 nephelometers to end monitoring in May. The systems operated at: Chiricahua, Greer, Ike's Backbone, Organ Pipe, Petrified Forest, Queen Valley, Sierra Ancha, Sycamore Canyon, and Tucson Mountain.

Data availability status

Data and photographic spectrums are available on the IMPROVE Web site at *http://vista.cira.colostate.edu/improve/Data/data.htm* and on the VIEWS Web site at *http://vista.cira.colostate.edu/views*. Aerosol data are available through September 2009. Nephelometer and transmissometer data are available through March 2010 and December 2009, respectively. Webcamera real-time images and data are available on agency-supported Web sites:

- National Park Service *http://www.nature.nps.gov/air/WebCams/index.htm*
- US-Forest Service *http://www.fsvisimages.com*
- CAMNET (Northeast Camera Network) *http://www.hazecam.net*
- Midwest Haze Camera Network *http://www.mwhazecam.net*
- Wyoming Visibility Network *http://www.wyvisnet.com*
- Phoenix, AZ, Visibility Network *http://www.phoenixvis.net*

The EPA AIRNow Web site *http://airnow.gov* includes many of these as well as additional visibility-related Webcameras. Click on View Other Visibility Webcams.

***Monitoring update** continued on page 3....*

Visibility news

EPA performs intercomparison of speciation analysis laboratories

The U.S. Environmental Protection Agency (EPA) Office of Radiation and Indoor Air (ORIA) manages a comprehensive environmental laboratory [the National Air and Radiation Environmental Laboratory (NAREL)] in Montgomery, AL, whose staff perform annual studies of speciation analysis laboratories. The IMPROVE Program currently utilizes three such laboratories for analysis of its filters; the University of California-Davis (UCD), Desert Research Institute (DRI), and Research Triangle Institute (RTI) routinely participate in these studies as a quality assurance measure.

Results from the 2009 study to evaluate laboratory performance at these and three other laboratories that routinely analyze chemical speciation samples are now available at *http://www.epa.gov/ttn/amtic/pmspec.html*. For this study, NAREL scientists delivered to each laboratory a similar set of filters, including hidden replicates and blanks, for comparison. Analysis methods studied include:

- Gravimetric mass analysis
- Ion chromatography (IC) analysis
- Carbon by thermal optical analysis (TOA)
- Elemental analysis by X-Ray Fluorescence (XRF)

Each gravimetric lab was challenged with a set of ten filters and two metallic samples that were weighed using a microbalance. Test lab results were compared to expected values determined at NAREL, and all of the labs reported mass values within the EPA advisory limits.

RTI and DRI were among six labs that reported IC results, and both labs fared well in comparison. RTI normally performs the IC analysis for IMPROVE filters.

Five labs analyzed a set of quartz filters using at least one TOA method and more than one analysis instrument. Values for the IMPROVE_A method were in agreement with others and were within reported uncertainties.

***Laboratories** continued on page 6....*

National Park Service camera monitoring network receives new Web site design

The National Park Service Air Resources Division (NPS ARD) in Denver, CO, maintains a Digital Webcamera Network with Web sites that provide real-time photographic images and current air quality and weather information. The ARD recently redesigned the 16 Web sites to engage virtual visitors in learning more about air quality and its impacts on national parks as they admire the parks' spectacular scenery.

Each month over 450,000 visitors view the NPS Webcamera sites. The Web pages also display current visual range, levels of gaseous pollutants known to affect human health and natural resources (ozone, particulate matter, or sulfur dioxide), and weather conditions. The images are updated every 15 minutes and air quality data are updated hourly.

The redesign incorporates new navigation bars and tabs for easier access to a variety of air quality information. It will also help to make parks more accessible to a wider audience, while increasing public awareness and understanding of air quality conditions in parks. To access the Digital Webcamera Network and Web sites visit *http://www.nature.nps.gov/air/WebCams/index.cfm.*

For more information contact Dee Morse at the National Park Service. Telephone: 303/969-2817. Fax: 303/969-2822. E-mail: dee_morse@nps.gov.

Newly redesigned National Park Service Air Quality Webcam site depicting Mount McKinley at Denali National Park & Preserve.

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IMPROVE Newsletters are also available on the IMPROVE Web site at *http://vista.cira.colostate.edu/improve/Publications/news_letters.htm.*

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Data availability near the Gulf Oil Spill

The Deepwater Horizon oil spill in the Gulf of Mexico is among the largest oil spills in history. Efforts are underway to assess the extent of environmental damage resulting from the spill. Scientists from the U.S. Environmental Protection Agency are studying the air quality effects of the spill, and have contacted IMPROVE scientists to gain early access to the carbonaceous aerosol data from the Gulf region. Laboratory staff at the University of California-Davis and at the Desert Research Institute have been expediting the shipment and analysis of filters from several IMPROVE sites along the Gulf Coast.

The Breton Island monitoring site is located 120 miles north of the Deepwater Horizon Well. The site is, on occasion, inaccessible as roads become submerged during high tides and storm surges. Daily patrols of air, boat, and ground traffic are part of the spill cleanup efforts in the area. Tar balls have also been recovered near the monitoring site.

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.

Steering committee sets fall meeting

The US-Forest Service will host an IMPROVE steering committee meeting this fall in Stevenson, WA, in the Columbia River Gorge National Scenic Area.

The annual meeting of federal land managers, regional planning organizations, and air quality managers of interested state agencies will include discussions of the status of monitoring throughout the program and future needs and planning. Researchers and scientists will also present related topics of interest such as the latest scientific findings associated with visibility or data analysis methods.

A meeting agenda will be available later this summer. The two-day meeting is open to all interested parties.

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.

***Visibility news** continued on page 6....*

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

Operators of distinction

Site operator Keith Felts has spent his career in the environmental discipline. Although now retired, he continues that same discipline as operator of the Frostburg Reservoir IMPROVE Protocol site in western Maryland.

Keith has operated the Frostburg site since 2005. Complete site servicing takes one to two full days, as in addition to the IMPROVE aerosol sampler, the site is also home to Maryland Department of the Environment's rural NCore station, and has numerous gaseous samplers, acoustic sounders, and meteorological sensors. Keith considers it "his site" and if something goes awry, he steps in to correct it. "If it's broke you try and fix it," said Keith. "I am responsible for getting it working and keeping it working." Servicing can be difficult at times, especially during the winter months. Last winter the area experienced 23 feet of snow, necessitating the use of snow shoes and/or cross country skis to get to the monitoring shelters. "It seems every other year is a bad one," said Keith.

He holds an Associate's degree in pollution abatement technology and his professional career has included environmental consulting, stack emissions testing, and working in the environmental department of a local power company. "I've always been interested in environmental concerns," said Keith. "I like to be aware of what's going on and want to stay involved." When a friend told him about the job opening for an air quality site operator in 2005, Keith readily applied for it.

Keith was born in and has spent much of his life in and near Washington, D.C. He served in the U.S. Air Force for four years and has also lived in Tennessee and Virginia. He currently lives in a cabin in the quiet woodlands of western Maryland, and spends his free time enjoying the outdoors doing what he pleases, including fishing, bird hunting, camping, hiking, and other similar pleasures.

Keith Felts, IMPROVE site operator at Frostburg Reservoir (FRRE1) enjoys protecting the environment and experiencing it outdoors.

***Monitoring update** continued on page 7....*

Feature article

Status report -- WRAP technical decision and data support systems

Background

The Western Regional Air Partnership (WRAP) region includes 118 Class I federal areas, about 75% of the 156 areas protected under the Clean Air Act. WRAP (*http://www.wrapair2.org*) has supported technical and policy analyses for state planning to improve visibility in these areas under the EPA Regional Haze Rule (RHR). The implementation of emissions controls and tracking of reasonable progress efforts to improve visibility is to occur under the RHR for the period 2004 - 2064, with periodic analysis and planning update cycles in that 60-year period.

Technical data and analysis results from the WRAP regional analyses for the 2000-2009 current analysis period and the 2018 projections milestone are delivered for RHR planning and implementation through connected Web data systems for the WRAP region, including a decision support system (TSS, *http://vista.cira.colostate.edu/tss/*), as well as data support systems for monitoring (VIEWS, *http://views.cira.colostate.edu/web/*), emission inventories (EDMS, *http://www.wrapedms.org*), and fire tracking and emissions inventories (FETS, *http://www.wrapfets.org/*). This article summarizes the current functions and status of the WRAP Web systems.

Current functions

- TSS: Decision support for regional haze planning and implementation
  - Key summary analytical results in standard graphic formats for preparing implementation plans.
  - Comprehensive summary documentation for regional haze analysis work in the WRAP region.
  - Integration of key monitoring, emissions, modeling, and source apportionment results from WRAP regional analyses and data systems (VIEWS, EDMS, FETS).

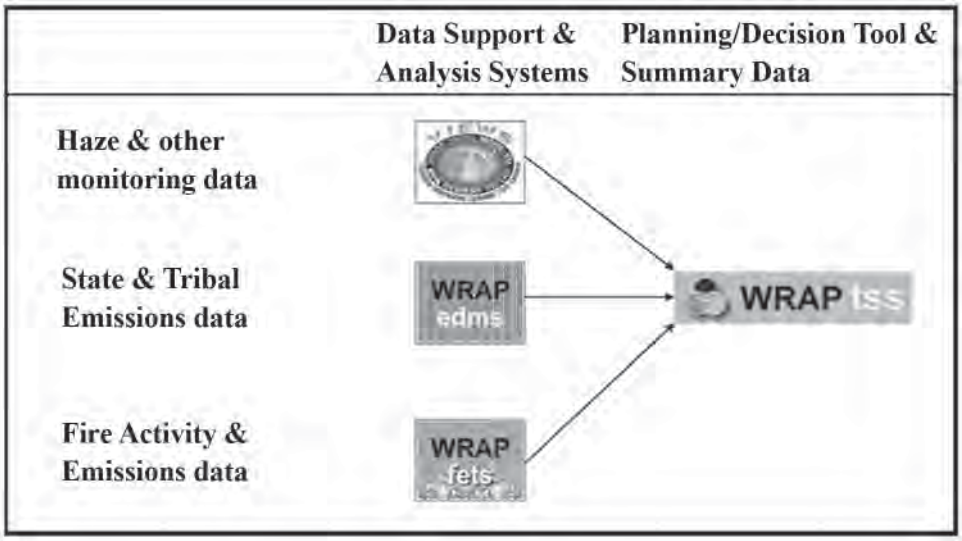
- VIEWS: Monitoring data
  - Easy online access to a wide variety of air quality data.
  - User-friendly tools for exploring, visualizing, and analyzing data.
  - Primary source for IMPROVE Regional Haze Rule data.
  - Developed for and used by states, tribes, federal land managers, EPA, and local air agencies.
  - Critical documentation and metadata.

- EDMS: Emission inventory data
  - Emissions inventory data for all WRAP region states and tribes (all source types and for multiple years).
  - Summary data via Standard Reports and an Ad Hoc Query tool. Data are presented at the county, facility, or tribal level by SCC and pollutant.
  - Spatial tool provides geographic/tabular data for a selected area.

- FETS: Fire emissions tracking and inventory data
  - Stable storage repository for activity data for all fire types within the WRAP region.
  - Data available in near real-time to be used for regional coordination by agencies making burn/no-burn decisions.
  - Quality assurance/quality control (QA/QC) checks using automated routines and by allowing for manual inspection, review, and altering of data.
  - Report QA/QC results to build and use comprehensive, QC'd inventories of fire activity and emissions.
  - Web-based map tool displaying locations, emissions, fire type, and activity date(s) for planned and accomplished fire events and locations of satellite fire detections.
  - Pop-up table showing the current status of fire data submittals to the FETS.
  - Critical documentation and metadata.

Users and types of use

	Users	Types of Use
TSS	• State haze and air quality planners and analysts • Federal Land Managers (FLMs) • Environmental Protection Agency (EPA)	• Emissions, monitoring, modeling, and source apportionment results' analysis • Air quality analysis & planning • Plan review • Plan review and implementation
VIEWS	• State haze and air quality planners and analysts • FLMs • EPA	• Analysis for haze planning • Haze and air quality planning • Tracking progress in reducing haze-causing emissions • Data for permit modeling and analysis
EDMS	• State and federal air quality planners and analysts • Consultants	• Quality assurance/quality control of emissions inventories • Haze and air quality planning • Tracking progress in reducing haze-causing emissions • Data for permit modeling and analysis
FETS	• State and tribal Smoke Management Program staff • State and federal air quality planners and analysts • State and federal land managers	• Regional Coordination; Burn decisions and burn planning • Fire activity and emissions inventories • Air quality planning • Air quality episode analysis



datasets will provide a more complete picture of the aerosol concentrations and sources over the U.S. in conjunction with ground-based network data currently available in VIEWS. Through a small, separately funded effort by the EPA, ozone and nitrogen dioxide gas concentration data across the U.S. have also been added. All data and documentation on VIEWS will continue to be available. VIEWS is suitable as a template for a future data support system for the Ozone and/or other National Ambient Air Quality Standard and other air pollution indicators, but this capability of VIEWS will be in hibernation mode until those needs are identified.

Status

The regional haze planning process to complete the foundational baseline emissions control plans and identify 2018 reasonable progress visibility improvement targets for each Class I federal area is nearing completion. The TSS, VIEWS, EDMS, and FETS Web systems are in a stable condition to support the states' adoption of their regional haze plans and review of those plans by federal land managers and EPA. The individual systems have received different levels of effort to continue to improve and further develop them over the past two years.

The TSS contains all the regional analyses and associated documentation for the data used in those scenarios to support the foundational haze plans for the WRAP states. IMPROVE regional haze progress tracking data will be updated through 2009 by the end of 2010. Calculations of the 2005-2009 five-year averages of the worst and best visibility days will be made and added to the TSS display tools. All data and documentation on the TSS will continue to be available. The TSS is suitable as a template for a future decision support system for the Ozone and/or other National Ambient Air Quality Standard and other air pollution indicators, but will be in hibernation mode until those needs are identified.

VIEWS contains current and historic air quality data and associated documentation, with an emphasis on the IMPROVE haze tracking data. IMPROVE data will be updated through 2009 by the end of 2010. Calculations of the 2005-2009 five-year averages of the worst and best visibility days will be made and added to the VIEWS data display tools. Through a separate NASA-funded demonstration project, VIEWS is adding existing NASA satellite data such as: 1) aerosol optical depth products, 2) imagery from the Terra/Aqua (MODIS, AIRS) and Aura (OMI) satellites, 3) CALIPSO LIDAR, and 4) fire activity data from the NOAA GOES satellite. These

EDMS contains WRAP region emissions inventories for 2002 and 2005 actual reported, 2000-2004 regional haze planning, and 2018 projections for all source types. Significant work on quality control and assurance has been completed, as well as improving map displays of the emissions data. Additional standard reports for various source categories and scenarios were added. Actual emissions data for 2008 are in the process of being added, continuing to completion in 2011. All data and documentation on EDMS will continue to be available, even as EDMS is operated at a lower level of effort. EDMS is suitable as a template for a future data support system of actual and planning emissions data for the regional analysis of Ozone and/or other National Ambient Air Quality Standard and other air pollution indicators; the exact form of those needs remain to be identified.

The FETS came online in 2007 and fills a unique activity and emissions tracking role for highly-variable and episodic emissions sources, wildland, and agricultural fire. FETS contains 2007-present fire activity and emissions data for the WRAP region. Significant work to add data providers and standardize and document emissions estimation methods was completed, as well as improving map displays of fire data. The EPA has separately funded a project to compare their default fire emissions estimates for the 2008 National Emissions Inventory to the tracking data in the FETS. All data and documentation on FETS will continue to be available, even as FETS is operated at a lower level of effort. FETS fills a unique need as a data support system of fire emissions data for the regional analysis of Ozone and/or other National Ambient Air Quality Standard and other air pollution indicators; the exact form of those needs remain to be identified.

For more information contact Tom Moore, WRAP Air Quality Program Manager. Telephone: 970/491-8837. E-mail: mooret@cira.colostate.edu.

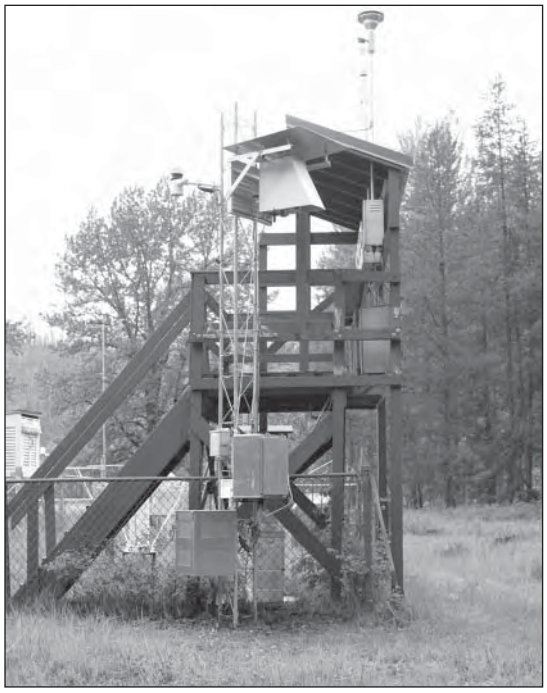
Visibility news continued from page 3 ....

Glacier National Park nephelometer relocated with new communication system

The Glacier National Park nephelometer was moved from its location at the air quality monitoring shelter to the IMPROVE sampler platform in June. Other instrumentation at the air quality shelter was reconfigured at that time, which made servicing access to the nephelometer difficult. The park safety officer disapproved of the situation and the National Park Service and Glacier National Park management asked Air Resource Specialists, Inc. (ARS) for a solution that provided safer instrument servicing.

ARS field specialists worked with park officials to move the nephelometer 100 feet to near the IMPROVE monitoring platform, which would allow the operator safe access to the nephelometer while standing on the platform. The nephelometer now collects and transmits data through a wireless serial connection between the modem in the air quality shelter and the datalogger on the nephelometer tower at the IMPROVE platform. Park staff obtained the necessary permits, and a dedicated electrical circuit was installed to operate the nephelometer system.

For more information contact Mark Tigges at Air Resource Specialists, Inc. Telephone: 970/484-7941. Fax: 970/484-3423. E-mail: mtigges@air-resource.com.



The nephelometer system in Glacier National Park, MT, was moved to the IMPROVE monitoring platform. The system transmits data via a wireless radio link back to the air quality shelter, where it can be relayed to data analysts through telephone modem.

Laboratories continued from page 2....

Reasonably good precision was obtained within the same method for the major carbon fractions, organic carbon, and elemental carbon, regardless of which instrument performed the analysis.

Three XRF labs participated in the study using 25mm filters. A variety of instruments were used to produce the XRF results, and all three labs were in reasonably good agreement, especially for the more abundant elements. One of the more significant results is shown below in Figure 1. The figure shows XRF analysis values for all three IMPROVE labs and for eight elements. UCD (dark gray) was the reference lab, and DRI and RTI performed two analyses each against the reference lab.

UCD participated only in XRF analysis as its lab was undergoing an equipment change on other analytical instrumentation at the time of this study. The EPA appreciates the exceptional contributions from DRI, RTI, and UCD, all of whom gave extra effort in reporting their results from both routine and non-routine filter media.

For more information contact Jewell Smiley at NAREL. Telephone: 334/270-7073. Fax: 334/270-3454. E-mail: smiley.jewell@epa.gov.

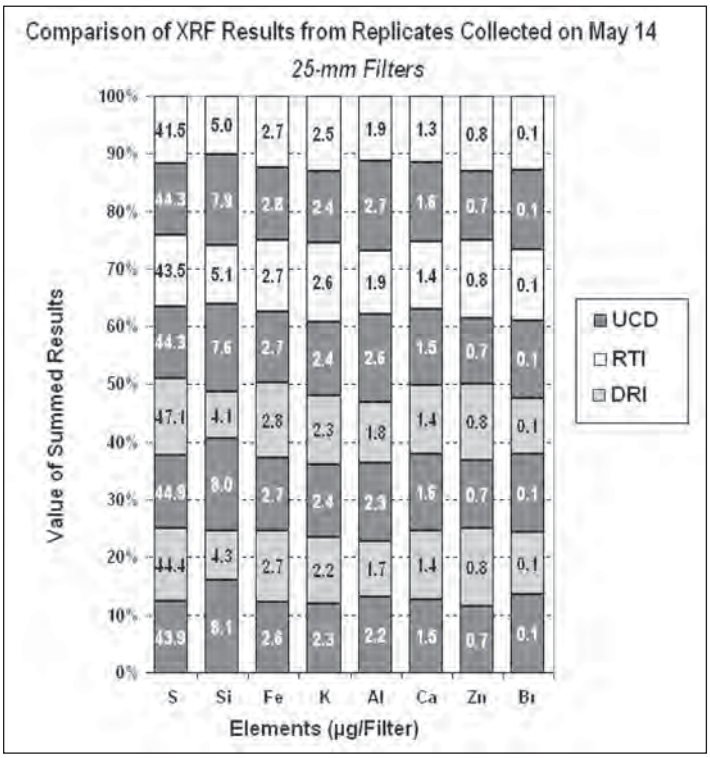


Figure 1. Stacked bar graph detailing XRF analysis results from UCD, RTI, and DRI for eight elements. As can be seen, all results are in good agreement with each other.

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 2nd Quarter 2010 are:

Aerosol (Channel A) - 53% of all sites

Acadia	Great Smoky Mtns.	Presque Isle
Addison Pinnacle	Guadalupe Mountains	Puget Sound
Arendtsville	Haleakala	Quabbin Reservoir
Badlands	Haleakala Crater	Quaker City
Bliss	Hawaii Volcanoes	Queen Valley
Bondville	Indian Gardens	Redwood
Boundary Waters	James River	Rocky Mountain
Bridgton	Jarbidge	Saguaro
Brigantine	Lake Sugema	San Gorgonio
Cadiz	Lassen Volcanic	Seney
Caney Creek	Linville Gorge	Sequoia
Cape Cod	Livonia	Shamrock Mine
Cape Romain	Lostwood	Shenandoah
Cedar Bluff	Makah	Snoqualmie Pass
Columbia Gorge East	Martha's Vineyard	Starkey
Columbia Gorge West	Meadview	Sycamore Canyon
Craters of the Moon	Medicine Lake	Tallgrass
Crescent Lake	Mesa Verde	Theodore Roosevelt
Death Valley	Monture	Three Sisters
Denali	Moosehorn	Thunder Basin
Dolly Sods	Mount Hood	Trapper Creek-Denali
Douglas	Mount Rainier	Tuxedni
Egbert	North Cascades	UL Bend
Ellis	Olympic	Virgin Islands
Everglades	Organ Pipe	Voyageurs
Flathead	Pack Monadnock	Weminuche
Fresno	Penobscot	White River
Frostburg Reservoir	Petrified Forest	Yosemite
Grand Canyon	Phoenix	Zion Canyon
Great Basin	Point Reyes	

Nephelometer - 30% of all sites

Children's Park	Estrella	National Capital
Craycroft	Indian Gardens	Vehicle Emissions

Transmissometer - 0% of all sites

-- none --

Sites that achieved at least 95% data collection for 2nd Quarter 2010 are:

Aerosol (Channel A) - 9% of all sites

Cabinet Mountains	Hells Canyon	Tonto
Canyonlands	Hercules-Glades	White Pass
Chassahowitzka	MK Goddard	Wichita Mountain
Cherokee	Salt Creek	Wrightwood
Cloud Peak	Swanquarter	Yellowstone
Crater Lake		

Nephelometer - 30% of all sites

Acadia	Great Smoky Mtns.	Mount Rainier
Dysart	Mammoth Cave	Shenandoah

Transmissometer - 50% of all sites

San Gorgonio

Sites that achieved at least 90% data collection for 2nd Quarter 2010 are:

Aerosol (Channel A) - 22% of all sites

Bandelier	Great Sand Dunes	Pinnacles
Bosque del Apache	Isle Royale	Proctor Research Ctr.
Boulder Lake	Joshua Tree	Sac and Fox
Breton	Kaiser	Saguaro West
Bryce Canyon	Lava Beds	San Pedro Parks
Capitol Reef	Mingo	San Rafael
Casco Bay	Mohawk Mountain	Sawtooth
Chiricahua	Mount Baldy	Simeonof
Cohutta	Mount Zirkel	Sipsey
Dome Land	Nebraska	St. Marks
El Dorado Springs	North Absaroka	Sula
Glacier	Northern Cheyenne	Trinity
Great River Bluffs	Okefenokee	

Nephelometer - 25% of all sites

Cape Romain	Great Basin	Rocky Mountain
Glacier	Hance	

Transmissometer - 50% of all sites

Bridger

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)

IMPROVE

The IMPROVE Newsletter

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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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BLM

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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:

STATE OF ARIZONA

Currently vacant