INTERAGENCY MONITORING OF PROTECTED VISUAL ENVIRONMENTS

IMPROVE

3rd Quarter 2009 | The IMPROVE Newsletter | Volume 18 / Number 3

Monitoring update

Feature Article: Wildfire destroys San Gabriel monitoring stations, 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:

- 61 aerosol samplers
- 32 nephelometers
- 4 transmissometers
- 60 Webcamera systems
- 2 digital camera systems
- 5 interpretive displays

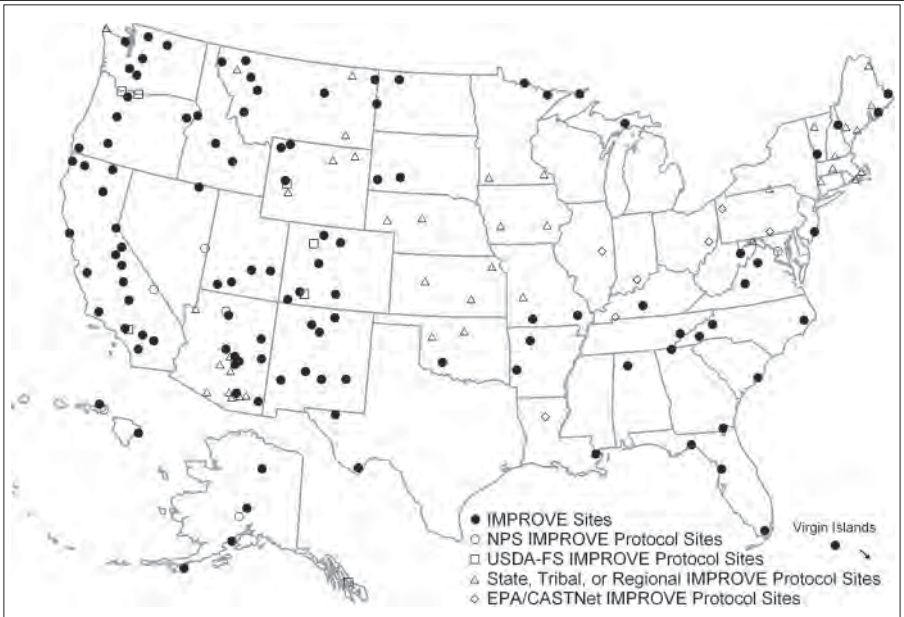
IMPROVE Program participants are listed on page 8. Federal land management agencies, states, tribes, regional air partnerships, and other agencies operate supporting instrumentation at monitoring sites as presented in the map below. Preliminary data collection statistics for the 3rd Quarter 2009 (July, August, and September) are:

- Aerosol (channel A only) 94% collection
- Aerosol (all modules) 92% completeness
- Optical (nephelometer) 97% collection
- Optical (transmissometer) 97% collection

Boulder Lake, WY, is a new protocol site that began operating its four-module sampler in August. It is sponsored by the USDA-Forest Service. The USDA-Forest Service digital camera systems at Mount Zirkel, CO; Shamrock, CO; and Agua Tibia, CA, all ended monitoring in July due to funding issues.

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 December 2008. Nephelometer and transmissometer data are available through June 2009 and December 2008 respectively. Webcamera displays that show near real-time images and data are available on agency-supported Web sites:



IMPROVE and IMPROVE Protocol Sites
3rd Quarter 2009

- National Park Service *http://www.nature.nps.gov/air/WebCams/index.htm*
- USDA-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

IMPROVE calendars expected at year-end

The 2010 IMPROVE calendars are expected to be ready for delivery in late December. Packed full of information about current air quality studies, site operators and stations around the country, and helpful hints about station servicing, these calendars are a hit.

Look for your calendar in early January. If you haven't received one or need an extra, contact us and we'll send one out to you.

To request a calendar, contact Jeff Lemke at CIRA. Telephone: 970/491-2209. E-mail: lemke@cira.colostate.edu.

Steering committee meeting held at Wind Cave National Park

The IMPROVE Steering Committee conducted its annual meeting near Hot Springs, SD, in September. Wind Cave National Park and the National Park Service hosted this year's meeting, which included 27 committee members, network and laboratory contractors, and air quality researchers.

Presentations and discussions included the status of the program, the state of air quality science, and current research being performed to learn more about speciated pollutants and visibility.

Meeting minutes and presentations from this and all past meetings can be found on the IMPROVE Web site, at *http://vista.cira.colostate.edu/improve/Activities/activities.htm*.

IMPROVE meeting attendees inspect the varied instrumentation at the Wind Cave National Park monitoring site.

Networks achieve 90% completeness for calendar year 2008

Aerosol completeness for the IMPROVE and IMPROVE Protocol aerosol networks was 90% for 2008. Data from modules A, B, C, and D must all be present for a sample day to be considered complete. After being collected, data undergo validation using specific criteria stipulated by the Regional Haze Rule. For these data to be used to track progress in improving visibility and be included in preparing state implementation plans, monitoring sites must achieve:

- At least 75% annual completeness.
- At least 50% completeness in each calendar quarter.
- Have no more than 10 consecutive missed samples.

Out of 168 sites in the IMPROVE and IMPROVE Protocol networks, 13 failed to meet these criteria. Generally, sites that failed did so because of unique situations, and most involved the 10 consecutive missed sample stipulation. Additionally, 5 sites, Denali, Egbert, El Dorado Springs, Ike's Backbone, and Trapper Creek, realized an impressive 100% collection for the year! Collection statistics for each site for 2008 are provided in the following listing.

	Percent Valid Data					
Site	% Year	% 1stQtr	% 2ndQtr	% 3rdQtr	% 4thQtr	# Mis.
Acadia	98	94	97	100	100	1
Addison Pinnacle	98	100	100	94	100	1
Agua Tibia	89	90	100	84	80	4
Arendtsville	90	87	100	87	87	4
Badlands	91	81	87	100	97	3
Bandelier	85	90	93	61	97	7
Big Bend	97	94	100	94	100	2
Birmingham	87	87	100	90	70	4
Bliss	91	100	87	81	97	4
Blue Mounds	90	77	90	100	93	4
Bondville	99	100	100	100	97	1
Bosque del Apache	78	84	77	68	83	9
Boundary Waters	95	94	87	100	100	3
Breton	63	55	63	48	87	12
Bridger	93	100	93	87	93	2
Bridgton	98	100	100	97	97	1
Brigantine	48	0	10	90	90	58
Bryce Canyon	86	97	73	84	90	3
Cabinet Mountains	95	90	100	94	97	3
Cadiz	89	90	97	87	83	2

***Networks achieve** continued on page 6....*

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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 advisory released

Under-correction of chloride concentrations for filter blanks

- Affects: Module B - Chloride (Cl^-)
- Sites: All
- Period: 2007-2008

Blank corrections for reported chloride concentrations are based on observed field blank loadings. Before 2005, the median field blank value in each month or quarter was used for the correction. For 2005 and later samples, several months' worth of field blanks were used to determine a common correction for all samples from a given lot of filters. Historical analyses had indicated that blank levels changed when a new filter lot was introduced and then remained stable while that lot was in use, typically a period of about one year.

For historical reasons not yet understood, chloride field blank levels began to depart from their historical pattern in 2007, rising with time during the consumption of a single filter lot. This departure escaped detection until its effects on reported pollutant concentrations were noted by visibility researchers. It is thus necessary to reprocess 2007-2008 chloride data (collected on Module B filters), returning to monthly blank corrections to account for the observed variations within lots. For consistency, all ion data back to 2005 will be reprocessed following the same procedure used prior to that year.

It is recommended that data users postpone analysis pending redelivery of revised 2005-2008 data. A complete discussion of this 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.*

For more information or to submit an advisory, contact Bret Schichtel at CIRA. Telephone: 970/491-8581. Fax: 970/491-8598. E-mail: schichtel@cira.colostate.edu.

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

Operators of distinction

IMPROVE site operator Marc Ohms joined Wind Cave National Park, SD, as Physical Science Technician in 1998. Shortly thereafter the park received an IMPROVE aerosol sampler to begin monitoring, and it is still one of Marc's routine duties.

The large monitoring site includes air monitoring instrumentation sponsored by various groups, including IMPROVE, the Clean Air Status and Trends Network (CASTNet), the National Atmospheric Deposition Program (NADP), the state of South Dakota, and the South Dakota School of Mines. In addition to servicing all the instrumentation, Marc conducts water quality work on park surface and groundwater resources, manages the cave survey project and its data, oversees cave Search and Rescue training and operations, conducts cave restoration work, and assists park biologists in a variety of projects including bison round-up and black-footed ferret surveys. "I do something different every day," said Marc. "My duties are varied and include monitoring the varied resources Wind Cave has both above and below ground."

When one of these other duties takes longer than expected, IMPROVE backup operators Beth Burkhart, Botanist, or Jason Walz, Cave Technician, fill in to perform the weekly servicing. All three operators were on-hand to assist with questions and information from the recent IMPROVE Steering Committee visit to the park (see article and photograph of the monitoring site on page 2).

Marc came to Wind Cave from nearby Jewel Cave National Monument, where he met his wife, Rene (who currently works there). Before that, Marc worked at Mammoth Cave National Park, KY. His career working with the physical sciences began after earning a B.S. degree in physical geography from the University of Wisconsin at Platteville. "I am fortunate to work in an environment where I can experience, care for, and study so many natural resources," said Marc.

In his free time Marc enjoys many pursuits, including caving (spelunking is for amateurs), hunting, fishing, backpacking, and video games. When he is not surveilling the park's landscape for the endangered black-footed ferrets, he cares for his two pet ferrets, Mango and Kona.

WICA1 operator Marc Ohms explains particle collection of the IMPROVE aerosol sampler to monitoring site visitors.

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

Feature article

Wildfire destroys San Gabriel monitoring stations

(by C. McDade, University of California - Davis and Scott Cismoski, Air Resource Specialists, Inc.)

Introduction

The San Gabriel IMPROVE site (SAGA1), located in the mountains above Los Angeles, was destroyed during this summer by a huge wildfire. The Station Fire began on August 26, 2009, and burned throughout September. Burning over 250 square miles, it was the largest wildfire in modern history in Los Angeles County and the tenth largest in California. This destructive fire impacted visibility and aerosol monitoring, yet visibility monitoring during the event proved to be beneficial to USDA-Forest Service staff and tactical fire managers.

Aerosol monitoring station

The last retrievable IMPROVE samples from San Gabriel were collected on August 23, before the fire started. Filters were changed on Tuesday, August 25, the routine IMPROVE sample change day. By the following Tuesday, the fire had passed through the area. Figure 1 shows what remained of the shelter and sampler after the fire had passed through.

Figure 1. The San Gabriel IMPROVE shelter and sampler modules after the fire swept through the monitoring site.

The San Gabriel IMPROVE site was on Vetter Mountain in Angeles National Forest, northeast of Mt. Wilson and its famous observatory (see Figure 2). The site was in the eastern sector of the Station Fire but well within the burned zone.

When Mike McCorison, Air Resource Specialist with the Angeles National Forest, learned that the IMPROVE site had been destroyed, he quickly scouted the area for an alternate location that could supply the needed power and space for a temporary site and could also meet IMPROVE siting criteria for distance from local emissions. He identified a promising spot near Wrightwood, approximately 22 miles to the northeast of the San Gabriel site, and notified UC Davis of both the loss of the sampler and the identification of a new site.

Fortunately, UC Davis had a spare sampler and a sampler rack available for immediate deployment. Kevin Goding and José Mojica of UC Davis loaded a truck and Kevin drove the 400 miles from Davis to Wrightwood. Kevin met Mike at the new site and they installed and calibrated the sampler on Tuesday, September 15. Only seven sample days were lost between August 23 and September 16, despite the total destruction of the site.

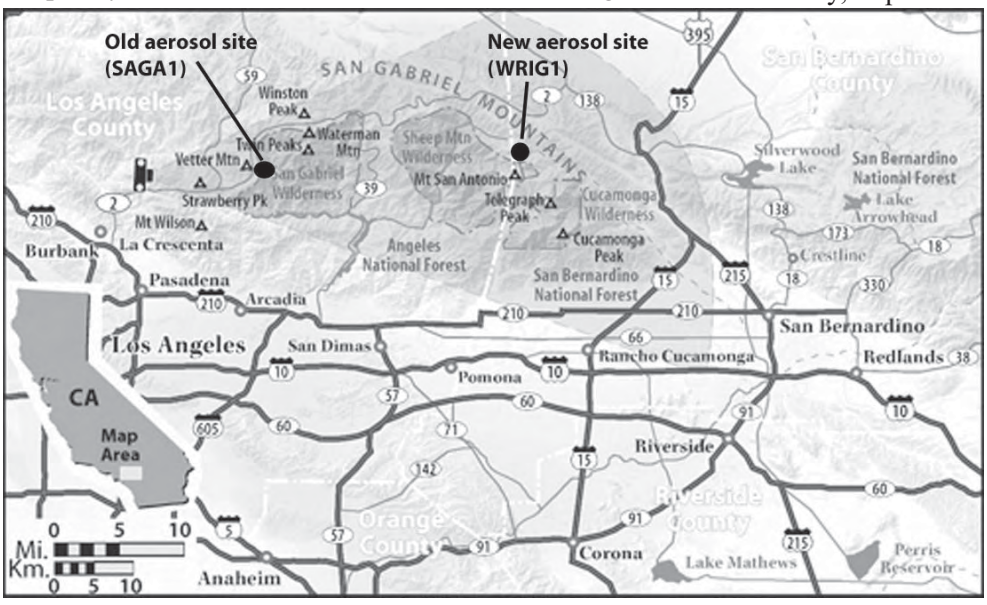

Figure 2. Map of the San Gabriel Wilderness area east of Los Angeles. Vetter Mountain and Mt. Wilson are both annotated. The shaded cone area shows the Webcamera view.

The new site is near the Mountain High Ski Resort, providing more reliable and easier year-round access. While summer site servicing will take a little longer due to the longer drive, winter visits are expected to be shorter as the need for skis and snowshoes will be eliminated. IMPROVE's site naming protocol dictates that a site be renamed if it moves a significant distance, typically more than about a mile. Hence, the new site at Wrightwood was given a new site designation, WRIG1.

The future of this site is not yet clear. Ideally, it will be moved back to its original location and will resume its original name and designation, San Gabriel (SAGA1). Those plans, however, depend upon the availability of power at the original location and upon the Forest Service's overall plans for recovery of the region. It is too early to predict how those plans will unfold. The WRIG1 site will continue to collect samples every three days until permanent plans are established.

Coordination and cooperation between the Forest Service and UC Davis allowed the swift replacement of this sampler. But most important was the attentiveness, dedication, and hard work by individuals involved in both organizations.

Photographic monitoring station

The forest service also operates a high-resolution digital Webcamera system on Josephine Peak, near the original IMPROVE aerosol sampler. The system monitors three views of the wilderness using a pan-tilt unit. Images of one of the views can be found on *http://www.fsvisimages.com*. The other two views are short-term fire vistas, accessible to fire scientists and air quality managers. The general view from the camera looks east, as shown in Figure 2.

McCorison, who operates and maintains the camera system, can remotely control the camera settings including view angle, lens zoom, and timing of images, to focus on the area of interest. High-resolution images from this camera system are typically taken every 15 minutes, 24 hours a day. When short-term fire views are activated, Forest Service managers will often remotely download and distribute the images to others involved in the protection of an area, including air quality managers, tactical firefighters, and wildland managers.

In addition to supporting the regional haze monitoring protocol of the San Gabriel Wilderness, the collected images are used to monitor conditions of a forest airshed or the progression of a wildfire. Along with the camera image, air quality and weather data are also posted on the Web pages. The Air Pollution Control District also uses the images in evaluating open burning requests in the forested areas, at elevations well above monitoring stations in the valley.

Figures 3 and 4 show the two short-term fire views taken by the San Gabriel Webcamera system the day after the fire started. Both views depict heavy smoke and pinpoint specific locations of fire or smoke plume activity. The camera system also was destroyed by this fire two days later. Air Resource Specialists staff shipped a replacement system to McCorison for temporary use and are fabricating an entire new system for ongoing monitoring.

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, or Scott Cismoski at Air Resource Specialists, Inc. Telephone: 970/484-7941. Fax: 970/484-3423. E-mail: scismoski@air-resource.com.

Figure 3. Fire view of August 27, 2009 at 1800 hours. Heavy smoke and visible flame show conditions as well as location of active fire.

Figure 4. Fire view of August 27, 2009 at 1845 hours. Smoke plume shows exact location of fire activity.

Networks achieve *continued from page 2....*

Site	% Year	Percent Valid Data % 1stQtr	% 2ndQtr	% 3rdQtr	% 4thQtr	# Mis.
Caney Creek	89	74	90	94	100	3
Canyonlands	90	94	90	81	97	3
Cape Cod	80	97	50	77	97	8
Cape Romain	92	100	87	100	80	5
Capitol Reef	92	100	93	77	97	3
Casco Bay	94	90	100	94	93	3
Cedar Bluff	93	97	97	94	83	5
Chassahowitzka	95	100	93	87	100	6
Cherokee	95	97	90	97	97	2
Chiricahua	95	94	90	100	97	3
Cloud Peak	87	100	80	77	90	3
Cohutta	74	81	70	48	97	15
Columbia Gorge E.	95	100	100	94	87	3
Columbia Gorge W.	89	100	93	71	90	3
Crater Lake	80	87	83	52	97	5
Craters of Moon	89	97	90	74	97	3
Crescent Lake	96	100	100	100	83	3
Death Valley	98	100	100	100	93	1
Denali	100	100	100	100	100	0
Dolly Sods	97	97	93	100	97	2
Dome Land	84	81	83	81	90	5
Douglas	94	81	100	97	100	3
Egbert	100	100	100	100	100	0
El Dorado Springs	100	100	100	100	100	0
Ellis	94	90	100	97	90	3
Everglades	89	90	83	84	100	2
Flathead	87	87	87	94	80	4
Fort Peck	93	100	87	90	97	4
Fresno	98	100	90	100	100	3
Frostburg Reservoir	98	97	97	100	100	1
Gates of the Mtns.	89	94	80	87	93	3
Gila	83	100	90	58	83	6
Glacier	89	100	87	77	93	5
Grand Canyon	94	90	97	97	93	3
Great Basin	92	84	83	100	100	5
Great Gulf	88	87	100	87	77	3
Great River Bluffs	98	100	100	94	100	2
Great Sand Dunes	95	100	90	100	90	3
Great Smoky Mtns.	98	97	97	100	97	1
Guadalupe Mtns.	98	97	100	100	93	1
Haleakala	94	90	87	100	100	3
Haleakala Crater	98	100	97	100	93	1
Hawaii Volcanoes	93	81	97	97	100	5
Hells Canyon	97	97	100	97	93	2
Hercules-Glades	88	77	90	94	90	3
Hoover	89	74	90	100	90	5
Ike's Backbone	100	100	100	100	100	0
Indian Gardens	96	100	97	90	97	2
Isle Royale	98	100	100	94	97	2
James River	98	100	97	94	100	2
Jarbidge	95	100	97	87	97	4
Joshua Tree	90	100	90	90	80	3
Kaiser	92	81	97	90	100	4
Kalmiopsis	95	97	97	94	93	2
Lake Sugema	94	97	97	100	83	5
Lassen Volcanic	93	84	97	97	93	3
Lava Beds	93	94	93	100	87	2
Linville Gorge	98	97	100	94	100	1
Livonia	98	97	100	97	97	1
Lostwood	81	84	80	84	77	5
Lye Brook	75	39	80	97	87	21
Makah	90	74	100	97	90	7
Mammoth Cave	96	100	100	94	90	3
Martha's Vineyard	98	94	100	97	100	2
Meadview	79	87	67	87	73	7
Medicine Lake	96	100	100	94	90	3
Mesa Verde	94	94	100	94	90	2
Mingo	88	81	87	94	90	3
MK Goddard	98	100	97	97	100	1
Mohawk Mountain	62	100	90	58	0	43
Monture	89	77	100	81	97	3
Moosehorn	96	94	97	97	97	2
Mount Baldy	98	100	100	94	97	1
Mount Hood	96	94	100	100	90	1
Mount Rainier	87	97	70	97	83	7
Mount Zirkel	93	94	97	94	87	4
Nebraska	14	0	0	0	57	100
New York	96	97	97	90	100	2
North Absaroka	87	87	83	87	90	3
North Cascades	89	74	100	90	93	7
Northern Cheyenne	94	100	87	90	100	4
Okefenokee	90	100	97	94	70	10
Olympic	89	74	93	97	93	7
Organ Pipe	96	100	100	84	100	3
Pack Monadnock	94	97	100	94	87	4
Pasayten	92	97	83	87	100	5
Penobscot	97	100	97	97	93	1
Petersburg	81	71	83	97	73	6
Petrified Forest	90	94	100	84	83	3
Phoenix	87	84	77	90	97	4
Pinnacles	96	100	87	97	100	2
Point Reyes	91	100	87	77	100	4
Presque Isle	98	100	100	100	93	2
Proctor Research Ctr.	98	90	100	100	100	3
Puget Sound	98	97	100	100	93	1
Quabbin Reservoir	84	48	93	94	100	13
Quaker City	95	87	97	97	100	3
Queen Valley	89	97	73	97	90	3
Redwood	90	97	93	94	77	7
Rocky Mountain	93	90	100	81	100	3
Sac and Fox	94	94	100	90	93	2
Saguaro	90	87	90	90	93	3
Saguaro West	84	77	97	81	80	5
Salt Creek	99	97	100	100	100	1
San Gabriel	94	90	100	100	87	3
San Gorgonio	93	84	100	100	90	5
San Pedro Parks	90	81	90	100	90	4
San Rafael	93	84	100	97	93	4
Sawtooth	79	55	93	71	97	13
Seney	95	94	100	87	100	4
Sequoia	89	77	90	90	100	4
Shamrock Mines	93	90	83	100	100	5
Shenandoah	99	100	97	100	100	1
Shining Rock	90	77	100	90	93	5
Sierra Ancha	61	61	73	39	73	13
Sikes	80	94	93	65	67	8
Simeonof	82	94	80	68	87	6
Sipsey	90	97	87	90	87	2
Snoqualmie Pass	97	90	100	100	97	2
St. Marks	89	97	83	97	77	3
Starkey	98	97	97	100	100	1
Sula	55	19	23	100	77	47
Swanquarter	43	77	67	0	30	43
Sycamore Canyon	91	94	100	94	77	7
Tallgrass	99	97	100	100	100	1
Theodore Roosevelt	99	100	97	100	100	1
Three Sisters	92	94	100	90	83	5
Thunder Basin	70	65	83	58	77	8
Tonto	89	100	100	90	63	6
Trapper Creek	100	100	100	100	100	0
Trinity	86	61	93	94	97	9
Tuxedni	97	100	100	97	90	2
UL Bend	93	90	93	90	100	2
Upper Buffalo	88	84	90	94	83	5
Viking Lake	98	90	100	100	100	1
Virgin Islands	89	84	97	90	83	5
Voyageurs	88	77	93	87	93	3
Washington DC	91	84	90	100	90	5
Weminuche	90	90	87	84	100	3
Wheeler Peak	78	81	97	48	87	10
White Mountain	95	97	87	97	100	1
White Pass	97	94	97	100	97	1
White River	90	94	97	87	83	4
Wichita Mountains	96	97	100	97	90	2
Wind Cave	87	81	70	100	97	6
Yellowstone	95	87	97	100	97	2
Yosemite	86	90	97	61	97	5
Zion Canyon	94	100	87	100	90	3

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 3rd Quarter 2009 are:

Aerosol (Channel A)

Acadia	Great River Bluffs	Presque Isle
Addison Pinnacle	Great Smoky Mtns.	Puget Sound
Badlands	Haleakala	Quabbin Reservoir
Birmingham	Haleakala Crater	Quaker City
Bliss	Hells Canyon	Rocky Mountain
Bondville	Hercules-Glades	Sac and Fox
Boundary Waters	Hoover	San Gorgonio
Bridgton	Isle Royale	Sequoia
Caney Creek	James River	Shenandoah
Cape Cod	Joshua Tree	Sikes
Cape Romain	Kaiser	Simeonof
Casco Bay	Lassen Volcanic	Snoqualmie Pass
Cedar Bluff	Lava Beds	St. Marks
Chassahowitzka	Lye Brook	Starkey
Cloud Peak	Mammoth Cave	Swanquarter
Columbia Gorge East	Martha's Vineyard	Tallgrass
Crescent Lake	MK Goddard	Theodore Roosevelt
Death Valley	Monture	Three Sisters
Dolly Sods	Moosehorn	Tonto
Douglas	Mount Hood	Trapper Creek-Denali
El Dorado Springs	Mount Zirkel	Viking Lake
Flathead	North Cascades	Weminuche
Frostburg Reservoir	Olympic	Wheeler Peak
Fort Peck	Organ Pipe	White River
Grand Canyon	Pack Monadnock	Wichita Mountains
Great Basin	Point Reyes	Yellowstone

Nephelometer

Children's Park	Ike's Backbone	Queen Valley
Chiricahua	Indian Gardens	Shenandoah
Craycroft	Mammoth Cave	Sierra Ancha
Estrella	Mount Zirkel	Sycamore Canyon
Greer	Petrified Forest	Tucson Mountain
Hance	Phoenix	

Transmissometer

Cloud Peak

Photographic

Gates of the Mountains
Monture

Sites that achieved at least 95% data collection for 3rd Quarter 2009 are:

Aerosol (Channel A)

Brigantine	Kalmiopsis	Shamrock Mines
Chiricahua	Medicine Lake	Tuxedni
Columbia Gorge West	Northern Cheyenne	UL Bend
Fresno	Okefenokee	Upper Buffalo
Gates of the Mtns.	Queen Valley	Voyageurs
Gila	Saguaro	White Pass
Glacier	Saguaro West	Wind Cave
Hawaii Volcanoes	Seney	Yosemite
Ike's Backbone		

Nephelometer

Acadia	Glacier	Organ Pipe
Big Bend	Great Smoky Mtns.	Rocky Mountain
Cloud Peak	Mount Rainier	Vehicle Emissions
Dysart		

Transmissometer

Bridger
Thunder Basin

Photographic

-- none --

Sites that achieved at least 90% data collection for 3rd Quarter 2009 are:

Aerosol (Channel A)

Agua Tibia	Gates of the Arctic	Phoenix
Arendtsville	Guadalupe Mountains	Pinnacles
Bandelier	Lake Sugema	Proctor Research Ctr
Big Bend	Linville Gorge	Redwood
Bryce Canyon	Makah	Salt Creek
Cabinet Mountains	Meadview	Shining Rock
Cadiz	Mesa Verde	Sycamore Canyon
Canyonlands	Mohawk Mountain	Trinity
Craters of the Moon	Mount Rainier	Washington DC
Denali	Nebraska	White Mountain
Dome Land	Penobscot	Zion Canyon
Egbert		

Nephelometer

National Capital	Cape Romain

Transmissometer

San Gorgonio

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)

IMPROVE

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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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