

Monitoring update**Network operation status**

The IMPROVE network operated 101 aerosol samplers, 17 transmissometers, 8 nephelometers, and 5 camera systems during the Fall 2000 monitoring season (September, October, and November 2000).

Preliminary data collection statistics for the Fall 2000 season are:

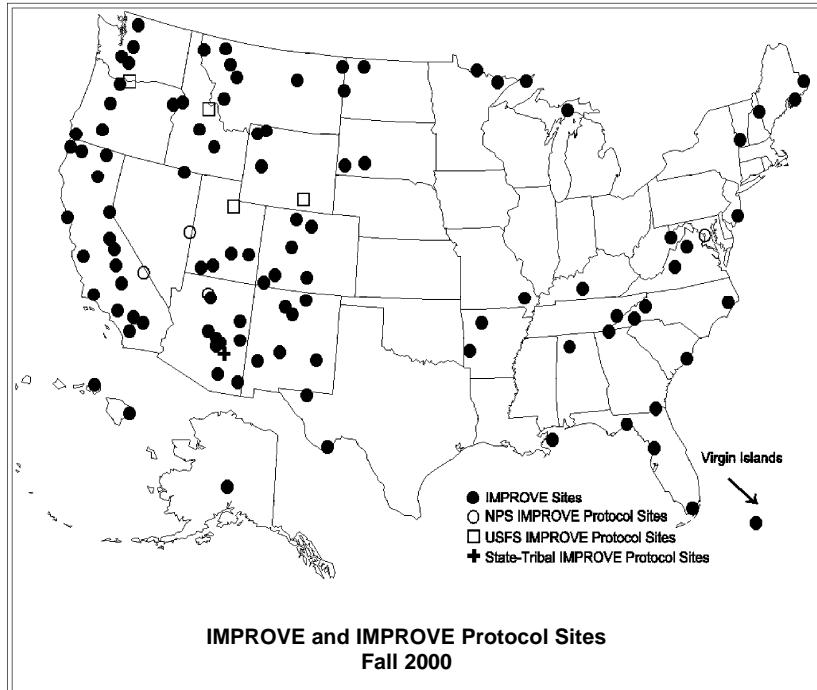
- Aerosol (channel A only) 93% collection
- Aerosol (all modules) 91% completeness
- Optical (transmissometer) 92% collection
- Optical (nephelometer) 94% collection
- Scene (photographic) 86% collection

The following monitoring sites received the Version II IMPROVE aerosol sampler during Fall 2000:

Agua Tibia W	San Gabriel W
Haleakala NP	Sawtooth W
Hawaii Volcanoes NP	Washington, DC
Queen Valley, AZ	

The following IMPROVE and IMPROVE Protocol (Pro) aerosol sites are scheduled to receive a Version II sampler:

Addison-Pinnacle, NY (Pro)	Old Town, ME (Pro)
Arendtsville, PA (Pro)	Olympic NP
Bondville, IL (Pro)	Organ Pipe, AZ (Pro)
Bridgton, ME (Pro)	Pasayten W
Cadiz, KY (Pro)	Presque Isle, ME (Pro)
Cape Cod NS, MA (Pro)	Proctor Research Ctr, VT (Pro)
Casco Bay, ME (Pro)	Quabbin Reservoir, MA (Pro)
Connecticut Hill, NY (Pro)	Quaker City, OH (Pro)
Denali - Trapper Creek (Pro)	Saguaro NP
Hercules-Glades W	Saguaro West, AZ (Pro)
Hillside, AZ (Pro)	Sikes, LA (Pro)
Hoover W	Simeonof NWR
Livonia, IN (Pro)	Spokane Reservation, WA (Pro)
Martha's Vineyard, MA (Pro)	Tuxedni NWR
Meadview, AZ (Pro)	White Mountain W
MK Goddard, PA (Pro)	Wichita Mountains
Mohawk Mountain, CT (Pro)	

**Data availability status**

Aerosol data for all measurements including carbon are available through February 2000 on the UC-Davis FTP site, at <http://improve.cnl.ucdavis.edu>. Seasonal summaries beginning with 1998 are also available on the site.

From June 1999 through October 2000, IMPROVE transmissometers were retrofitted with a redesigned transmitter feedback block (see *IMPROVE Newsletter*, Volume 8, No. 4 (Fall 1999)) and phased into the network during annual servicing. Transmissometer data through November 2000 (instruments operating with the original feedback block design) are available on the Cooperative Institute for Research in the Atmosphere (CIRA) FTP site, at ftp://alta_vista.cira.colostate.edu. Data through November 2000 (after the feedback block retrofit) will be available in late February. Nephelometer processing algorithms are currently being reevaluated. Once the algorithms are finalized, all historical nephelometer data will be reprocessed.

Photographic slides are archived but are not routinely analyzed or reported. Complete photographic archives and slide spectrums are available from Air Resource Specialists, Inc.

Visibility news

National Park Service considers air quality in snowmobiles and winter use decision

The National Park Service announced in November its decision regarding use of snowmobiles in Yellowstone and Grand Teton National Parks. The decision calls for a phase-out of snowmobile use in the parks over three years and encouragement of snowcoach use to transport groups of park visitors. The decision came after concerns surfaced over whether snowmobile use adversely affects or impairs park resources, including air quality, wildlife, natural soundscapes, and visitor safety and enjoyment.

The decision was selected from a number of alternatives created in response to studies performed for an Environmental Impact Statement. Studies conducted in the two parks suggest that snowmobiles could harm wildlife, air quality, and the natural sounds of the parks. The air quality study is summarized in a report released by the National Park Service, *Air Quality Concerns Related to Snowmobile Usage in National Parks*. The report was first issued in October 1999 and was updated in February 2000.

According to the report, 63,000 snowmobiles carried tourists in Yellowstone National Park during the 1998-1999 winter season. This is among the highest use in more than 40 parks that allow snowmobile use.

Most snowmobiles operate with two-stroke engines, which emit substantial amounts of air pollutants. The report states that snowmobiles emit far more air pollutants than other motorized vehicles, and are responsible for 68% to 90% of all hydrocarbons and 35% to 68% of all carbon monoxide emissions in Yellowstone.

In addition, measurements during Winter 1999 at Yellowstone National Park indicated that pollutants from snowmobile emissions, including cancer-causing compounds such as benzene, can be high enough to threaten human health. Exposure to these pollutants can cause respiratory and neurological effects, including cancer.

Air pollution sources situated within national parks must adhere to federal, state, and local regulations. Under federal law, the National Park Service has a responsibility to protect park resources, including air quality.

The National Park Service decision, which applies only to Yellowstone and Grand Teton National Parks, calls for the following proposed regulations, which will be subject to public comment:

- Winter 2000-2001: no change from current regulations.
- Winter 2001-2002: allow snowmobile use at current levels, but prevent daily use from exceeding a 7-year average for peak days. Encourage snowcoach operators to increase their fleet size and snowmobile dealers to increase their snowcoaches and decrease their snowmobile stock.
- Winter 2002-2003: set daily snowmobile numbers at levels approximately one-half of current numbers at Yellowstone's south and west entrances, allow no snowmobiles in Grand Teton National Park except on the Continental Divide Snowmobile Trail and access roads to private or adjacent forest lands, and require snowmobile users to travel with a permitted guide in limited groups.
- Winter 2003-2004: most oversnow motorized visitor travel would be allowed only by National Park Service-managed snowcoach.

For more information the Record of Decision for Yellowstone and Grand Teton National Parks is available at <http://www.nps.gov/planning>. The report, Air Quality Concerns Related to Snowmobile Usage in National Parks, is available at http://www2.nature.nps.gov/ard/pubs/snowmobile_report.htm.

Call for papers: Regional haze and global radiation conference

The Air & Waste Management Association has issued a call for papers for its conference, *Regional Haze and Global Radiation Balance - Aerosols, Measurements and Models: Closure, Reconciliation and Evaluation*. The conference will be held in Bend, Oregon, October 2-5, 2001. Abstracts must be received for review before April 2, 2001.

The conference will address sources, chemical and physical characteristics of aerosols; measurement methodologies; predictive modeling techniques; and air quality management implications. A visibility-related professional development course, designed to provide both a technical foundation and a timely refresher, will be offered on-site prior to the conference.

For more information, visit <http://www.awma.org>, or contact Scott Archer, Technical Program Chair. Telephone: 303/236-6400. Fax: 303/236-3508. E-mail: scott_archer@blm.gov.

Visibility news continued on page 7....

Feature article

IMPROVE and WRAP Web sites launched to provide comprehensive data and information

Introduction

Two recent visibility developments suggest that new approaches for disseminating IMPROVE information are appropriate. First, the implementation of the regional haze rule has expanded the focus of IMPROVE from largely a research program to a regulatory program. To support the regional haze rule, the IMPROVE monitoring network needs to have openly documented quality assurance/quality control procedures and results, and the data need to be as widely and easily available as other regulatory programs. In addition, states and tribes new to regional haze need background information about visibility science, history, and regulations. The second development is that in the western United States, the Western Regional Air Partnership (WRAP) has determined that there is a need for air quality and meteorology data, as well as related air quality information, to be made readily available to all their partners through a Web-based, interactive database.

To support these needs, two new Web sites are under development by CIRA (Cooperative Institute for Research in the Atmosphere). The IMPROVE Web site is focused on delivering IMPROVE data and general information about visibility science and regulations. The

WRAP Web site, being developed for WRAP's Ambient Monitoring and Reporting Forum, is focused on providing visibility, air quality, and meteorological data to WRAP partners in an on-line database. The IMPROVE data are central to both Web sites. Therefore, the co-development of the Web sites is mutually beneficial with WRAP benefiting from the database development for the delivery of the IMPROVE data, and the IMPROVE Web site benefiting from the integrated WRAP database and data visualization tools to be developed.

Both sites are in development and, as such, are not complete. However, CIRA feels that they contain sufficient content to open them up to interested users. All users are encouraged to provide comment and feedback concerning these sites.

- The IMPROVE site can be accessed at <http://vista.cira.colostate.edu/improve/>
- The WRAP/AMRF site can be accessed at <http://vista.cira.colostate.edu/wrap/>

IMPROVE Web Site

The primary objective of the IMPROVE Web site is to provide federal, state, and local air quality regulatory agencies and the general public access to IMPROVE data, data products, and metadata fully describing the IMPROVE database, including characteristics and history of all network sites. Secondary objectives include providing:

- Access to data analysis tools and algorithms to facilitate analysis of IMPROVE data;
- Access to educational material on visibility issues, science, and regulations;
- A user supported discussion forum;
- Feedback mechanisms for users to report quality assurance/quality control issues.

To accomplish these objectives, the IMPROVE Web site is implemented through a hierarchical structure with five main sections: Data, Tools, Publications, Studies, and Education/Regulation (Figure 1). Other features of the Web site include a user supported discussion forum and separate sections presenting an overview of the Web site, information on IMPROVE activities, and related Web links.

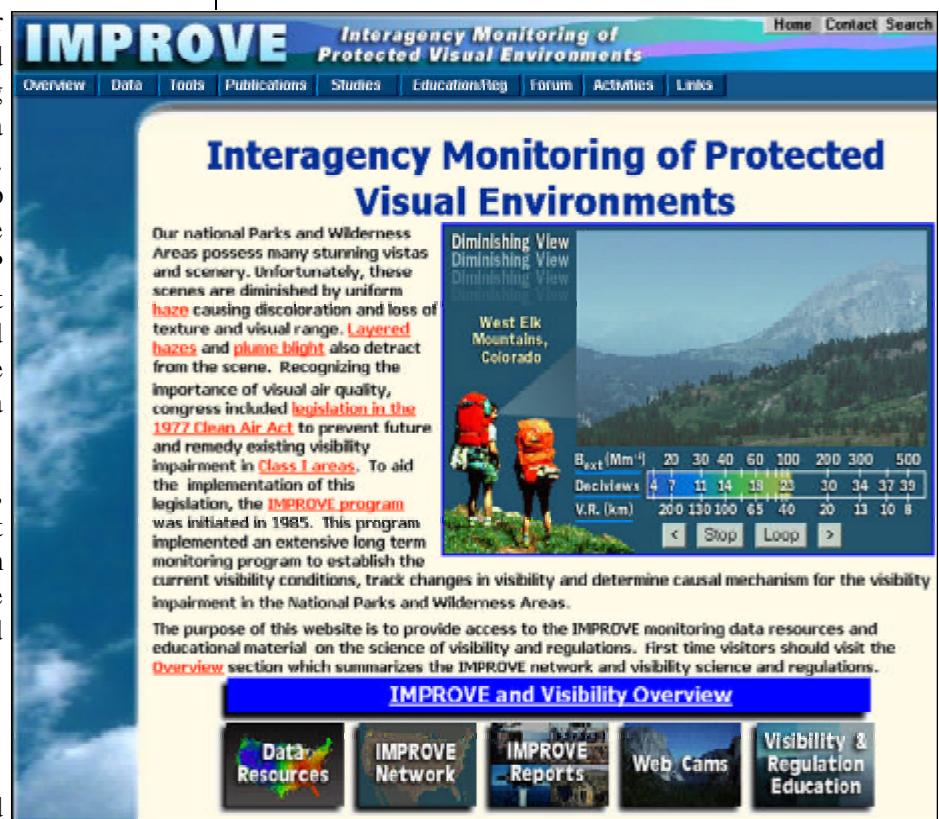


Figure 1. The IMPROVE home page includes an animated visibility graphic.

Data Section. The central part of the Web site includes readily available IMPROVE data, its metadata, and high quality processed data products. A number of tools have been created, enabling a user to browse and access these data resources. The exploration of the content of the IMPROVE aerosol, optical, and scene data sets is accomplished via the metadata browser (Figure 2). This is an interactive tool allowing the retrieval of detailed information about all IMPROVE monitoring sites. This information includes the monitoring site's location, topography, the air quality species measured, changes over time to the sampling and filter analyses, and pictures of the site and surroundings.

will be provided. This will be based on IMPROVE slide spectrum CD's and associated Web browser compiled by Air Resource Specialists, Inc.

The National Park Service (NPS)/CIRA group produces routine and novel data analyses of the IMPROVE datasets including spatial and temporal patterns of major aerosol types and reconstructed visibility. These analyses are summarized every three years in IMPROVE reports. To make these results more accessible, an interactive graphic viewer has been constructed. This viewer consists of a series of linked views allowing the browsing of the spatial patterns of the data in a Map View, temporal cycles including diurnal, seasonal, and

long term trends in a Time View, and the frequency distributions of the data (Figure 3). In addition, the data used to generate these plots are available as ASCII data files and the algorithms used to process the raw IMPROVE data are also available. At this time, these plots were created using IMPROVE algorithms. It is anticipated that the EPA methodologies associated with the regional haze rule will be different and these figures will be updated after the EPA methods are finalized.

Tools Section. A goal of the Web site is to empower data analysts with tools to examine the IMPROVE database and perform routine analyses required for the regional haze regulations. To accomplish this, a tools section has been created. The section contains standard algorithms for aggregating and deriving new variables, such as aerosol types and reconstructed light extinction from IMPROVE specified aerosol data. In addition, other tools are available such as

WinHaze for estimating air quality levels on the visual environment.

In the future, tools will be added to allow on-line analytical processing enabling users to perform tasks such as calculating reconstructed extinction for selected monitoring sites and time periods. Also, simple visualization tools for plotting data, such as time series and scatter plots will be added. These tools will be linked directly to the IMPROVE air quality database.

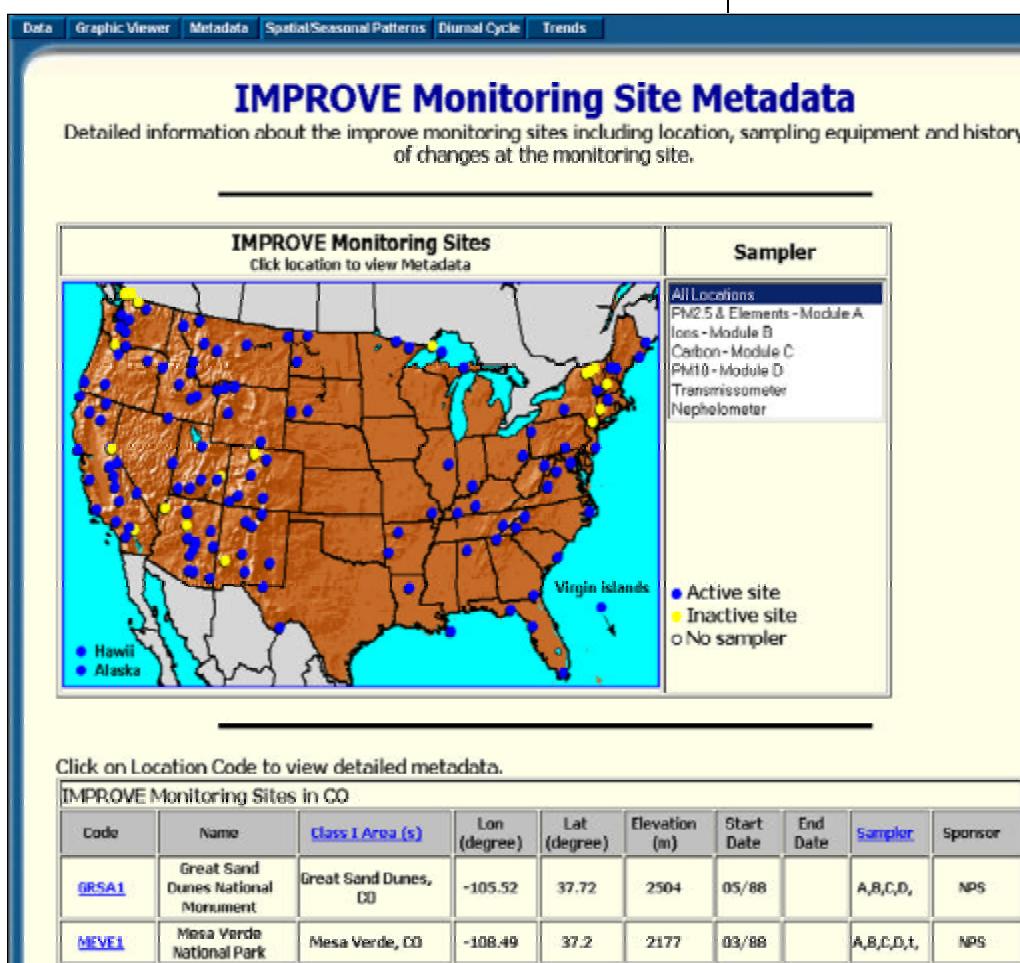


Figure 2. The IMPROVE metadata graphic browser contains site information for all sites.

The raw aerosol and optical data are currently accessible as ASCII files for each site as well as the entire database. In addition, location and variable tables are provided that fully describe the monitoring site locations and species sampled. In the coming months, tools will be implemented to allow ad-hoc queries of the data based upon the location, variable, and time range. Also, photographs documenting the spectrum of visibility conditions at each IMPROVE monitoring site

Publications Section. The Publication section is where all documents important to the IMPROVE Program and products of the IMPROVE Program are made available. This includes IMPROVE reports, network standard operating procedures, and IMPROVE Newsletters. In addition, principle visibility documents such as the National Acid Precipitation Assessment Program (NAPAP) State of the Science report are provided. A searchable reference database is also included containing all articles and abstracts from the NPS/CIRA reference database. The documents are a basic resource of the Web site containing detailed information on the IMPROVE network and visibility science. Context-sensitive links are provided throughout the Web site to the detailed information contained in this section.

Studies. As part of the IMPROVE Program, special monitoring studies are periodically conducted that are often associated with sources or source areas that may contribute to visual impairment at a Class I area. These studies are designed to obtain the necessary air quality, meteorological, and emission data to investigate source contributions to impaired visibility.

The Studies section is meant to provide background information and findings from these studies, and includes measured aerosol, optical, and meteorological data, data reports and papers, and links to related Web sites.

Education/Regulation Section. The Education/Regulation section will guide people through the basic visibility science and regulatory information at their own pace. Currently it is under development and contains only links to several basic visibility documents such as "Introduction to Visibility," a glossary, and EPA documents on the regional haze rule. However, a multi-media presentation is under development that will use animations, voice, and still images to convey the basic concepts of visibility science, air quality data analysis, and haze regulations. The presentation will draw extensively on the "Introduction to Visibility" report and the new video on regional haze and regulations being produced by CIRA.

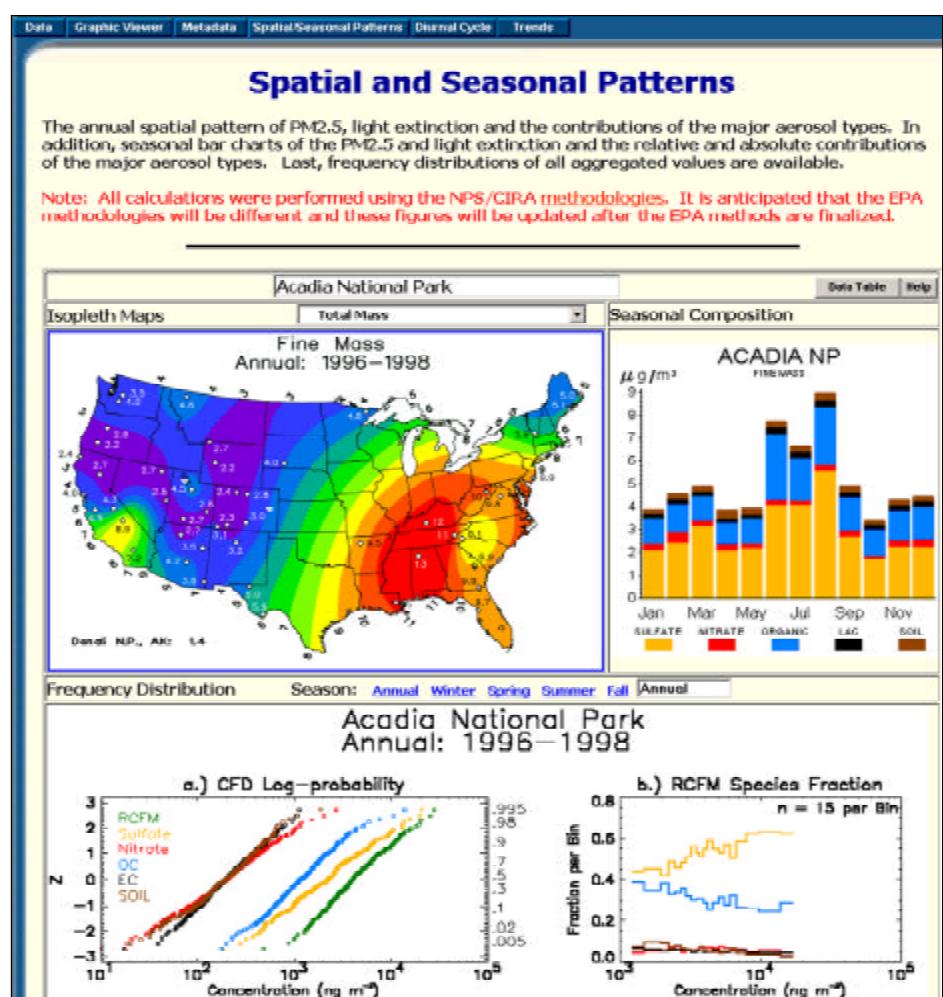


Figure 3. The IMPROVE data graphic browser contains a variety of graphic types.

WRAP Web Site

The primary objective of the WRAP Ambient Monitoring & Reporting Forum (AMRF) Web site is to provide WRAP partners (western state and local air agencies, western Indian tribes, and federal land managers) with data and information resources to help identify common regional air management issues; develop and implement strategies to address these common regional issues, and formulate and advance western regional policy positions on air quality. WRAP activities are especially focused on implementing recommendations from the Grand Canyon Visibility Transport Commission and the Regional Haze Regulations. The WRAP AMRF Web site is designed to:

- Create a living inventory of distributed air quality, meteorological, and emission data resources for the Western U.S.;
- Provide a uniform interface to these organized and described data resources, and;
- Enable searching, querying, analyzing, and visualizing a subset of the datasets.

The WRAP Web site (Figure 4) is an integrated data resource tool consisting of an integrated database of raw air quality and meteorological data and data products from multiple networks as well as catalogs of other on-line air quality data resources. All catalog entries have a description of the data resource, a list of keywords to facilitate searching with future tools and links to its metadata description file. These on-line data resources include links to measured and modeled air quality, meteorological, and emission datasets as well as satellite imagery. The decision of which data sets to include in the WRAP database is guided by the philosophy that, whenever possible, the data remain with the data producer or official custodians and that the WRAP site should not duplicate capability that exist elsewhere.

providing it meets posted metadata standards and other criteria. New graphics will be created from these additional data resources and will be added to the graphic viewer. The WRAP Web site will also have additional data analysis tools, most of which will be subsequently applied to the IMPROVE Web site. Some of these tools will include integration of meteorological and air quality data (e.g., trajectory analysis), and calculations of extinction from aerosol speciation data using the EPA-approved approach and other selected methods. The WRAP database Web site is likely to be the principal means for publishing and distributing WRAP annual data reports.

Implementation

Both Web sites are being developed in tandem following a three-tier process. The first tier release represents the current capability of both Web sites. The second tier release, within the next six months, will include IMPROVE data added to a multi-dimensional database allowing ad-hoc queries of the database and some simple data aggregation and manipulation tools. The design of this database and the metadata, to describe the data, will follow the recent developments of EPA's Supersite Data Management workgroup that is creating a metadata standard for describing all data collected by the Supersite program. The final tier release for the Web sites, anticipated within the year, will enhance the on-line querying and manipulation tools and add some on-line data visualization tools.

Over the course of the next year data will continually be added. It is anticipated that the IMPROVE optical and photographic data will be added by May 2001. The call to states, tribes, and others who may have optical data to submit to the WRAP Web site will be issued by

March 2001. These data will be added as it becomes available during the summer and fall of 2001. The airmass history database and access and visualization tools will be included by the winter of 2001.

Details of the data included and the state of completion of the Web site are best determined by visiting the site. We invite you to browse and welcome your feedback on the site.

For more information contact Bret Schichtel or Doug Fox at CIRA. Telephone: 970/491-8581 (Schichtel), 970/491-3983 (Fox). Fax: 970/491-8598. E-mail: schichtel@cira.colostate.edu, or dfox@cira.colostate.edu.



Figure 4. The Western Regional Air Partnership (WRAP) home page.

Currently, the WRAP Web site contains the same data and data products, such as the graphic viewer, as the IMPROVE Web site. In addition, entries will be added to on-line resources in the data catalogs, such as to EPA's AIRS database and the RAWS data archive at Desert Research Institute's Western Regional Climate Center. Catalog entries will be continually added as new resources are found.

In the future the WRAP Web site will distinguish itself from the IMPROVE Web site by including additional aerosol, optical, and meteorological data. The site will invite public and private data sources to submit data to be included,

Visibility news *continued from page 2*

FLAG releases Phase I report

The Federal Land Managers' Air Quality Related Values Work Group (FLAG) was formed to develop a more consistent approach to evaluate air pollution effects in areas that the federal land managers are responsible for. The group has worked to provide consistent policies and processes for identifying air quality related values (AQRVs) and evaluating the effects of air pollution on AQRVs, primarily in Class I areas.

The *FLAG Phase I Report*, released in December 2000, contains technical and policy analyses, recommendations for evaluating AQRVs, and guidelines for completing and evaluating New Source Review permit applications. Phase II of FLAG's work will address unresolved issues including those that require research and collection of new data.

To provide information for the federal land manager's assessment of adverse impacts on AQRVs, the permit applicant should identify the potential impacts of the source on all applicable AQRVs of that area. The primary areas of concern to the federal land managers with respect to air pollution emissions are visibility impairment, ozone effects on vegetation, and effects of pollutant deposition on soils and surface waters.

Visibility Impacts

The visibility guidance recommendations address assessments of sources proposed for locations near (generally within 50 km) and at large distances (greater than 50 km) from Class I areas. FLAG recommends that an applicant:

- Consult with the appropriate regulatory agency and the federal land manager of the affected area, for confirmation of preferred procedures and whether a cumulative analysis is needed.
- Obtain the federal land manager's recommendation for the specified reference levels (estimate of natural conditions) and, if applicable, recommended plume/observer geometries and model receptor location(s).
- Apply the applicable EPA guidelines and steady-state models for regions within areas that are affected by plumes or layers that are viewed against a background.
- For regions where visibility impairment from the source would cause a general alteration of the appearance of the scene, apply a non-steady-state air quality model with chemical transformation capabilities, which yields ambient concentrations of visibility-impairing pollutants.

Ozone Impacts

Federal land manager actions or specific requests on permit applications will be based on the existing air pollution situation at the area they manage. These conditions include whether or not actual ozone damage has occurred in the area, and whether or not ozone exposure levels occurring in the area are high enough to cause damage to vegetation. Applicants should be aware that:

- Oxidant stipple necrosis on plant foliage and ozone-induced senescence infer adverse physiological or ecological effects, and are considered to be damaging if they have a negative impact on aesthetic value.
- The W126 ozone metric is recommended to describe ozone exposure.
- Nitrogen oxides and volatile organic compounds are of concern because they are precursors of ozone. Current information indicates most federal land manager areas are nitrogen oxide-limited. Until the volatile organic compounds or nitrogen oxide status of each area is determined, nitrogen oxide emission sources will be the focus of control.

Deposition Impacts

The permit applicant should consult with the appropriate regulatory agency and federal land manager for the affected area to determine if a deposition impact analysis should be performed. If an analysis is advised, the permit applicant should obtain available information on Class I AQRVs, critical loads, and concern thresholds from the federal land manager. Recommendations for evaluating deposition impacts are to:

- Estimate the current deposition rate to the area.
- Estimate the future deposition rate by adding the existing rate, the new emission's contribution to deposition, and the contribution of sources permitted but not yet operating.
- Compare the future deposition rate with the recommended screening criteria for the affected area.

The final Phase I report, as well as a response to comments document, can be found on the Internet at <http://www.aqd.nps.gov/ard/flagfree/>.

For more information, contact John Bunyak of the National Park Service. Telephone: 303/969-2818. Fax: 303/969-2822. E-mail: John_Bunyak@nps.gov.

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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.aqd.nps.gov/ard/impr/index.htm>

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