INTERAGENCY MONITORING OF PROTECTED VISUAL ENVIRONMENTS

IMPROVE

Summer 2001 The IMPROVE Newsletter Volume 10 / Number 3

Monitoring update

Network operation status

The IMPROVE network operated 107 aerosol samplers, 15 transmissometers, 8 nephelometers, and 4 camera systems during the Summer 2001 monitoring season (June, July, and August 2001).

Preliminary data collection statistics for the Summer 2001 season are:

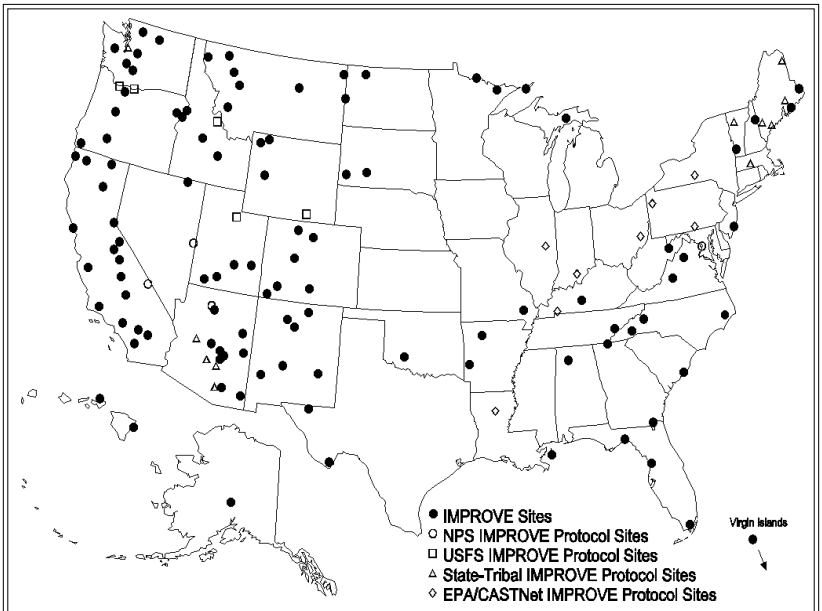
- Aerosol (channel A only) 90% collection
- Aerosol (all modules) 87% completeness
- Optical (transmissometer) 82% collection
- Optical (nephelometer) 97% collection
- Scene (photographic) 94% collection

The following monitoring sites received the Version II IMPROVE aerosol sampler during Summer 2001:

Olympic NP, WA (IMPROVE)
Hoover W, CA (IMPROVE)
Spokane Reservation, WA (IMPROVE Protocol)
Old Town, ME (IMPROVE Protocol)
Seattle, WA (IMPROVE Protocol)

The U.S. Forest Service operates 2 transmissometers, 8 nephelometers, and 6 camera systems in Class I areas in support of the IMPROVE program. The State of Arizona operates 7 nephelometers in Class I areas in support of the IMPROVE program.
Tribal nations that currently operate or will operate IMPROVE aerosol samplers in 2002 include:

Penobscot Tribe (Old Town, ME)
Wampanoags Tribe (Martha's Vineyard, MA)
Micmac Tribe (Presque Isle, ME)
Spokane Tribe (Spokane Reservation, WA)
Omaha Tribe (near Walthill, NE)
Sac and Fox Nation (near White Cloud, KS)
Cherokee Nation (Kay County, OK)
Assiniboine and Sioux Tribes (Fort Peck Reservation, MT)
Northern Cheyenne Tribe (Northern Cheyenne Reserv., MT)
Confederated Salish and Kootenai Tribes of the Flathead Reservation (Flathead Reservation, MT)



IMPROVE and IMPROVE Protocol Sites Summer 2001

Data availability status

Aerosol data for all measurements including carbon are available through February 2000 and optical data are available through November 2000 on the IMPROVE Web site, at http://vista.cira.colostate.edu/improve/Data/data.htm.

Photographic slides and digital images are archived but are not routinely analyzed or reported. Complete photographic archives and slide spectrums (if completed) are available at Air Resource Specialists, Inc.

IMPROVE data are available to interested parties for use in presentations, management plans, and other projects. All data are validated using IMPROVE protocols, which are documented in standard operating procedures. Procedures are written for site selection; instrument installation, operation, and servicing; and data collection, reduction, validation, reporting, and archive. IMPROVE standard operating procedures are available on the IMPROVE Web site at http://vista.cira.colostate.edu/improve/Publications/publications.htm.

Visibility news

STAPPA/ALAPCO assigns new representative to IMPROVE

Dan Ely has resigned his seat on the IMPROVE Steering Committee effective September 2001. For nearly 10 years, Dan has represented STAPPA/ALAPCO (State and Territorial Air Pollution Program Administrators/Association of Local Air Pollution Control Officials) as a member of the committee. He continues his work with the State of Colorado Air Pollution Control Division, but has shifted his focus from visibility monitoring and regional haze issues to smoke management and prescribed fire issues.

Dan has devoted much time to many visibility issues, including the controversy surrounding the Mount Zirkel Wilderness Area, Colorado. The U.S. Forest Service certified visibility impairment in the Wilderness in 1993 and was concerned about acid deposition problems as well. Attention was focused for many years on studying the problems in the Wilderness and working with local existing stationary sources, the Craig and Hayden power stations, suspected of contributing to the problem. Hayden's retrofits for emission controls were complete at the end of 2000. Craig retrofits have just begun and are expected to be complete by the end of 2004.

Ray Bishop has been appointed as Dan's replacement to the IMPROVE Steering Committee. Ray has over 30 years experience in the field of air quality, with a specific focus on ambient monitoring. He currently serves as the manager of the Emissions Inventory Section for the Air Quality Division of the Oklahoma Department of Environmental Quality (DEQ). Prior to that, Ray served as manager of the Air Quality Permits program and the Ambient Air Monitoring Program for the Oklahoma DEQ.

Ray is also an active participant in the Standing Air Monitoring Workgroup, and serves as co-chair for both the Emissions Inventory Improvement Program Area Source Workgroup and the CenRAP Regional Planning Organization Monitoring Workgroup. Ray holds a B.S. degree in biology and an M.S. degree in environmental management.

Ray Bishop may be contacted at his office in Oklahoma. Telephone: 405/720-3162. Fax: 405/720-4101. E-mail: ray.bishop@deq.state.ok.us. Mailing address:

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Scene Monitoring Criteria Document developed for monitoring guidance

A *Scene Monitoring Criteria Document* is available to provide monitoring guidance to individuals who wish to collect visibility-related photographs or digital images according to IMPROVE protocols, for regulatory, research, or planning purposes. The document was prepared by Air Resource Specialists, Inc., in conjunction with the U.S. Fish and Wildlife Service, National Park Service, Bureau of Land Management, and the Environmental Protection Agency.

The document includes considerations and recommendations for implementing effective scene monitoring sites. It addresses siting criteria, monitoring methods, image management, and image applications, and describes current scene monitoring methods and protocols. Individual chapters discuss four types of scene monitoring methods:

- 35mm slide photography
- Still-frame digital photography
- Time-lapse imagery
- Near real-time Internet compatible digital images.

The document will soon be available on the IMPROVE Web site, at http://vista.cira.colostate.edu/improve.

Regional haze video available

Understanding Regional Haze, a 30-minute videotape designed to educate and inform individuals about the issue and problems caused by regional haze, is available to interested parties. The video was produced by the Cooperative Institute for Research in the Atmosphere, in cooperation with EPA's Office of Air Quality Planning and Standards (OAQPS), the National Park Service, the U.S. Forest Service, and the Fish and Wildlife Service.

The video includes two sections; the first section presents and explains visibility concepts and the second section presents regulatory processes and issues. The video is currently being used in EPA regional training workshops as well as in training provided by the NPS to state and regional planning organizations.

A 10-minute version of the tape is also available.

To request the video contact Helene Bennett at CIRA. Telephone: 970/491-8292. E-mail: bennett@cira.colostate.edu.

Visibility news continued on page 5....

Feature article

Environmental Protection Agency prepares draft regional haze guidance documents

The Environmental Protection Agency (EPA) has announced the availability of draft "Tracking Progress" and "Estimating Natural Visibility Conditions" guidance documents in support of the Regional Haze Program. EPA developed this guidance to provide information to EPA Regional, State, and Tribal air quality management authorities and the general public on ways to address program requirements. The documents also explain how EPA intends to exercise its discretion in implementing Clean Air Act (CAA) provisions and EPA regulations concerning the tracking of progress and estimating natural visibility conditions under the Regional Haze Program.

The EPA is interested in receiving public comment on these drafts. All comments will be carefully considered and reflected in later revisions. Although comments are requested on all aspects of these documents, the EPA has the following particular areas of interest.

In the "Tracking Progress" document, the particular areas of interest are:

- Data completeness recommendations for calculating annual visibility values (e.g., minimum number of valid sampling days per calendar quarter, no more than 10 missing sampling days, etc.);
- The use of a minimum of three years from the 2000-2004 baseline period to calculate baseline values;
- The potential use of "worst day data" from incomplete years to calculate baseline values if such data increase values;
- The method for calculating daily light extinction when one or more aerosol components are missing (e.g., suitable use of data substitutions);
- Equation(s) to calculate total light extinction from daily aerosol concentrations;
- The treatment of outliers in the calculation of estimates of baseline and current condition visibility; and
- Appropriate use of data from multiple representative monitoring sites and from new monitoring locations.

For the "Estimating Natural Visibility Conditions" document, the EPA seeks comments on the recommended default approach provided versus the recommended ways States may refine their natural conditions estimates based on additional data and analysis.

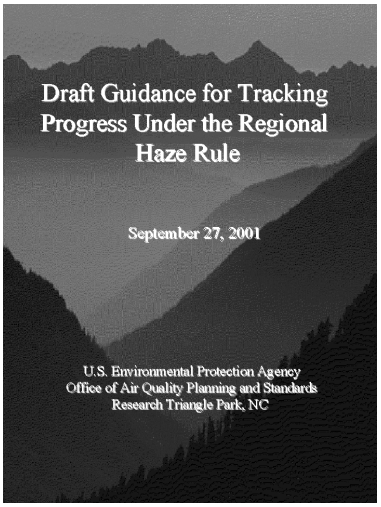
If alternative procedures are proposed for either of these documents, the policy and technical rational and circumstances for their approved use should also be described.

Background

The 1977 Clean Air Act Amendments (CAAA) addressed visibility impairment due to air pollution. The Amendments established a national visibility goal to remedy existing impairment and prevent future impairment in 156 national parks and wilderness areas across the country designated as mandatory federal Class I areas. They also called for EPA to develop regulations requiring State Implementation Plans to address visibility. These plans must include a long-term strategy and Best Available Retrofit Technology (BART) on certain existing sources for making "reasonable progress" toward this goal.

EPA issued initial visibility regulations in 1980 that addressed visibility impairment in mandatory federal Class I areas that is "reasonably attributable" to a single source or small group of sources. EPA subsequently issued regulations to address regional haze (i.e., visibility impairment caused by emissions from numerous sources located over a broad geographic region) in 1999. The regional haze rule requires states with mandatory federal Class I areas to develop State Implementation Plans (SIPs) that include reasonable progress goals for improving visibility in each mandatory federal Class I area, and emission reduction measures to meet those goals.

Tracking Progress Under the Regional Haze Program



The Draft Guidance for Tracking Progress document provides States, Tribes, and other interested parties with a consistent way to evaluate changes in visibility impairment in mandatory federal Class I areas under the Regional Haze Program. The document provides background on the Regional Haze Program and addresses a number of important issues for tracking progress:

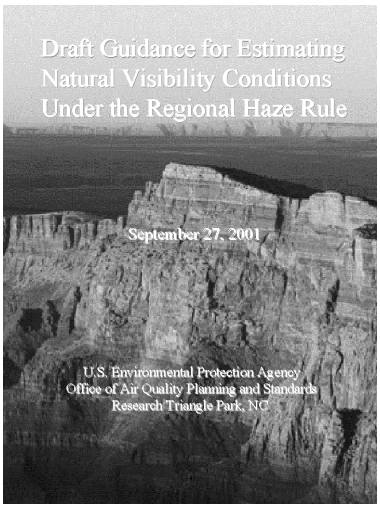
- Methods for calculating light extinction from the data on particulate matter components measured in the IMPROVE ambient monitoring network;
- How to take into account the effect of relative humidity on light extinction calculations;
- What to do when data for a particulate matter component are missing from a specific 24-hour sample;
- Data completeness requirements for calculating annual averages or values for the 20% worst visibility (most visually impaired) or 20% best visibility (least visually impaired) days at a monitoring site;
- Methods for selecting the 20% worst visibility and 20% best visibility days in a year;
- Procedures for calculating baseline values for the 2000-2004 period;
- Procedures for calculating current condition values for future five year periods; and
- Procedures for comparing current conditions to mandatory federal Class I area visibility goals and baseline conditions in order to evaluate progress.

The first step in tracking progress is collecting and analyzing filter samples from IMPROVE network sites. To identify the 20% most impaired and 20% least impaired days in a particular year, a deciview value is determined for each 24-hour sample period, then these values are sorted from highest to lowest. The deciview is a haze index derived from calculated light extinction, such that uniform changes in haziness correspond to uniform incremental changes in perception across the entire range of conditions, from pristine to highly impaired. Averages (in deciviews) for that year are calculated for the days in the 20% most impaired and 20% least impaired "bins."

The average deciview values for the 20% most impaired and 20% least impaired days in each year are then averaged for the five consecutive years 2000-20004 to define baseline conditions. Similarly, when checking mid-course progress (e.g., in 2013), or for calculating current conditions for future SIPs, the annual average values for the 20% most impaired and 20% least impaired days will be averaged for the 5 most recent years of data available, and then those values should be compared to the baseline values for that site. For mandatory federal Class I areas with multiple representative monitors, separate visibility values and progress goals should be established for each site representing the area.

The remainder of the document provides guidance on measuring regional haze and tracking progress toward meeting the national visibility goals. A step-by-step description of recommended calculations for tracking progress in regional haze improvement is provided. Final comparisons used for tracking progress in visibility are also provided. A list of the monthly relative humidity correction factors for each mandatory federal Class I area is also provided. These factors are used for calculating light extinction at each mandatory federal Class I area.

Estimating Natural Visibility Conditions Under the Regional Haze Program



The Draft Guidance for Estimating Natural Visibility Conditions document provides States with suggested methods to estimate natural visibility conditions.

This document describes two approaches for estimating natural visibility conditions. The default approach combines the National Acid Precipitation Assessment Program (NAPAP) estimates for particulate matter (PM) mass components and the IMPROVE methodology for calculating light extinction. Important enhancements incorporated in this approach include the use of 10-year average relative humidity data from more than 300 weather stations, to appropriate relative humidity adjustment factors, and the application of statistical techniques to identify the 20% most impaired and 20% least impaired days. EPA believes that this approach provides an adequate estimate of natural conditions for the purpose of developing initial visibility improvement goals in SIP submissions.

Another approach for estimating natural visibility conditions for each mandatory federal Class I area would allow the States to refine their natural condition estimates based on additional data and analyses. For example, one possible refined approach would involve updating the estimates of natural PM mass concentrations for each PM component, based on recent peer-reviewed literature, rather than using the NAPAP default values. These methods do not represent an exhaustive list and States are free to develop alternative approaches that will provide natural visibility conditions estimates that are technically and scientifically supportable. Any refined approach should be based on accurate and unbiased information and should be scientifically sound.

This document also provides guidance to EPA Regional, State, and Tribal air quality management authorities and the general public on how EPA intends to exercise its discretion in implementing haze-related CAA provisions and EPA regulations. The guidance outlines national policy on haze issues. Sections 169A and 169B of the CAA (42 U.S.C. 7491, 7492) and implementing regulations at 40 CFR 51.308 and 51.309 contain legally binding requirements. This document is not a substitute for those provisions or regulations, nor is it a regulation itself. Thus, it does not impose binding, enforceable requirements on any party, and may not apply to a particular situation based upon the circumstances.

EPA and State decision-makers retain the discretion to adopt approaches on a case-by-case basis that differ from this guidance where appropriate. Any decisions by EPA regarding a particular SIP demonstration will only be made based on the statute and regulations. Therefore, interested parties are free to raise questions and objections about the appropriateness of the application of this guidance to a particular situation. EPA will, and States should, consider whether or not the recommendations in the guidance are appropriate in that situation.

Document Availability

Both the "Tracking Progress" and "Estimating Natural Visibility Conditions" documents are on the Internet at: http://www.battelle.org/projects/epa-environment/default.htm and http://vista.cira.colostate.edu/improve/Publications/GuidanceDocs/Guidancedocs.htm. All comments should be submitted by Friday, November 16, 2001 to: Lara P. Autry, US EPA, MD-14, Research Triangle Park, NC 27711.

Questions or comments about either document should be directed to Lara Autry at US EPA. Telephone: 919/541-5544. E-mail: autry.lara@epa.gov.

Visibility news

continued from page 2 ....

MANE-VU named as new eastern RPO

The Mid-Atlantic/Northeast Visibility Union (MANE-VU) was announced on July 24, 2001, as the regional planning organization (RPO) for the mid-Atlantic and northeast United States. The Ozone Transport Commission (OTC) coordinates the activities of the RPO in partnership with the Mid-Atlantic Regional Air Management Association (MARAMA) and the Northeast States for Coordinated Air Use Management (NESCAUM) (see http://www.sso.org/otc/regional haze/regionalhaze.htm).

The new organization will address the causes of regional haze and ways to reduce related pollutants, as addressed in the regional haze regulations of 1999. Its participants include 11 states: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont; the District of Columbia; 2 Indian tribes: the Penobscot Indian Nation and the St. Regis-Mohawk Tribe; and federal land managers: U.S. EPA, National Park Service, U.S. Fish and Wildlife Service, and the U.S. Forest Service.

MANE-VU has released the following reports:

- *A Basis for Control of BART-Eligible Sources:* identifies sulfur oxides and nitrogen oxides emissions from major sources in the eastern U.S. It recommends integrating BART with existing regulatory programs that control sulfur oxides and nitrogen oxides emissions in order to minimize control costs and reduce administrative complexity for both regulators and affected industry. The report can be found at http://www.nescaum.org/committees/haze.html.
- *Source Apportionment Analysis of IMPROVE and CASTNet Data -- Phase 1A Report:* is the first report of a multi-phase study analyzing data from 16 IMPROVE and CASTNet monitoring sites in the eastern U.S. (see http://www.marama.org/visibility/visibility.html).
- *Work Plan for a Survey to Determine Residential Wood Combustion and Open Burning Activity*: is the first step in improving activity data and emissions estimates for the residential wood combustion and open burning source categories. The work plan contained in the report provides a detailed survey instrument for data collection, and provides a mechanism for inventory development (see http://www.marama.org /visibility/visibility.html).

For more information about MANE-VU contact Jeff Peltola at the Ozone Transport Commission. Telephone: 202/508-3840. E-mail: jpeltola@sso.org. For more information on the reports contact Gary Kleiman at NESCAUM (Telephone: 617/367-8540 or E-mail: gkleiman@nescaum.org) or Tara Koback at MARAMA (Telephone: 410/467-0170 or E-mail: tkoback@marama.org).

WESTAR develops SIP templates

The Western States Air Resources (WESTAR) Council drafted templates to assist states and tribes in developing State Implementation Plans (SIPs), required by the 1999 regional haze regulations. WESTAR formed a work group comprised of state agency SIP planners, federal land managers, the U.S. EPA, and tribal representatives. Over a period of 18 months, the group developed templates for SIP development. In June 2001 the group presented its work to the Western Regional Air Partnership (WRAP), the regional planning organization for western state agencies, land managers, and tribes.

The templates address each section of the regional haze regulations, and include suggested regulatory language for use in the SIP. They identify applicable supporting material and critical planning issues and establish the requirements for various analyses that will ultimately lead to SIP production. Each template section identifies timelines and technical analysis and SIP supporting documents.

The work group also sought to identify and characterize significant western state regional haze SIP issues. Their work is compiled in a report titled *Regional Haze State Implementation Plan Templates*, located on WESTAR's Web site at http://www.westar.org/haze_template.htm.

The templates may also prove useful to federally recognized tribes that choose to adopt Tribal Implementation Plans under the regional haze regulations.

For more information contact Bob Lebens of WESTAR. Telephone: 503/387-1660 ext. 6. Fax: 503/387-1671. E-mail: blebens@westar.org.

CAMNET Web site hit correction

The CAMNET Web site continues to develop with real-time images and data from monitoring sites in the Northeast United States. The July issue of the *IMPROVE Newsletter* reported the site received 22,000 hits the day the *Boston Globe* newspaper published "Haze seen as a lingering problem for region." The actual number of hits the Web site received that day was an astonishing 222,000, or over 10 times the daily average number of hits.

For more information about the CAMNET Web site contact Lee Alter at NESCAUM. Telephone: 617/367-8540. E-mail: lalter@nescaum.org.

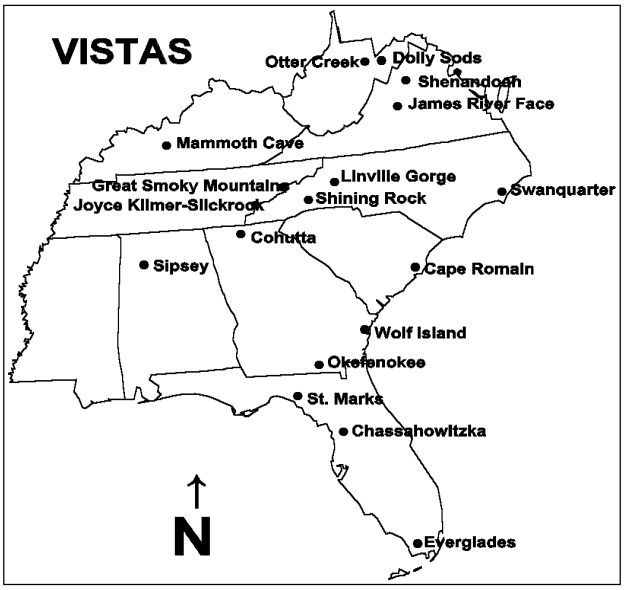
Regional planning organizations Part 3: Visibility Improvement - State and Tribal Association of the Southeast

Overview

In mid-1999, the United States Environmental Protection Agency (EPA) identified Southeast States Air Resource Managers (SESARM) as the organization to coordinate regional haze and visibility issues in the southeast. SESARM is a non-profit organization established by the eight EPA Region 4 States to assess and promote air quality issues in the southeastern region of the United States. Because the federal regional haze planning activities in the southeast extend beyond the eight SESARM States and includes Tribal partners, VISTAS was formed. VISTAS, Visibility Improvement - State and Tribal Association of the Southeast, was established to initiate and coordinate activities associated with the management of regional haze, visibility, and other air quality issues in the southeast.

The purposes of VISTAS are:

- To promote the coordinated efforts of States and Tribes in their efforts to address federal regional haze and visibility requirements;
- To identify regional or common air management issues;
- To conduct research and undertake other activities to provide the membership with scientific and technological information which may be of value in development of air quality strategies; and
- To develop strategies on regional haze and other air quality issues for use by member States and Tribes, where appropriate, in developing their implementation programs, regulations and laws.



Map of the VISTAS region with 18 Class I areas.

The VISTAS region includes 18 federal Class 1 areas, second in number only to the Western Regional Air Partnership (WRAP). These areas are:

Alabama
Sipsey Wilderness

Florida
Chassahowitzka Wilderness
Everglades National Park
St. Marks Wilderness

Georgia
Cohotta Wilderness
Okefenokee Wilderness
Wolf Island Wilderness

Kentucky
Mammoth Cave National Park

North Carolina
Great Smoky Mountains National Park*
Joyce Kilmer-Slickrock Wilderness*
Linville Gorge Wilderness
Shining Rock Wilderness
Swanquarter Wilderness

South Carolina
Cape Romain Wilderness

Tennessee
Great Smoky Mountains National Park*
Joyce Kilmer-Slickrock Wilderness*

Virginia
James River Face Wilderness
Shenandoah National Park

West Virginia
Dolly Sods Wilderness
Otter Creek Wilderness

* North Carolina and Tennessee share these Class 1 areas

Organization

In May 2001, the States of Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia and the Eastern Band of the Cherokee Indians entered into a Memorandum of Understanding and approved bylaws to collaborate on regional haze planning activities. Because the federal regional haze program was established by Congress to be a State and Tribal led effort, States and Tribes are equal members of this collaboration. The Local Air Programs within EPA Region 4 also have representation in VISTAS. These entities are the only voting members of VISTAS. Federal agencies including the U.S. Environmental Protection Agency, the National Park Service, the U.S. Fish and Wildlife Service, and the U.S. Forest Service serve in a non-voting, advisory capacity to the States and Tribes. Public interest groups, including environmental, industries, and other interested parties, though not voting members, have been asked to actively participate at the workgroup level to provide input and feedback into workgroup efforts. VISTAS workgroups are the major tool for participating in the process, reviewing of data, and developing action plans. VISTAS has established three standing workgroups: Data (Monitoring), Technical Analysis (Modeling and Emissions Inventory), and Planning. These workgroups are currently holding monthly conference calls as initial regional haze efforts are planned.

Current Work Efforts

Besides efforts to get organized, initial work on technical issues has begun. A request for proposal has been developed which aims to provide an assessment, based on existing data, of the nature of regional haze in the VISTAS region. While the regional haze and $PM_{2.5}$ levels in the Southeast have not been comprehensively addressed or analyzed, a substantial body of $PM_{2.5}$ and visibility data has been collected in the past five years. In numerous individual efforts, many entities have collected monitoring data related to $PM_{2.5}$ and its constituents and regional haze including individual states, universities, private industry, EPA and Federal Land Managers. The IMPROVE network will be providing valuable information for this effort. Some modeling related to $PM_{2.5}$ and/or regional haze for certain parts of the VISTAS region has also been performed. Three major research efforts in particular, the Southern Oxidants Study (SOS), Southeastern Aerosol Visibility Study (SEAVS) and the Southern Appalachian Mountains Initiative (SAMI), have collected data useful for assessing $PM_{2.5}$ and regional haze. When reviewed in aggregate, the data should provide a more comprehensive picture of the existing regional haze and regional $PM_{2.5}$ situation than presently exists. Equally important, this effort will identify data gaps and shortfalls and make recommendations on needed data collection efforts to remedy them. This is the first major work effort to be undertaken by VISTAS and should be completed by April 2002.

Inter-RPO Collaboration

Early in the regional haze process, SESARM collaborated with the Ozone Transport Commission through a contract with the Mid-Atlantic Regional Air Management Association (MARAMA) on a report titled *The Assessment of Emission Inventory Needs for Regional Haze Plans*. This report reviewed the available information about emissions that may impair visibility and recommended actions to improve the accuracy of this information.

Currently VISTAS is working with other RPOs as it prioritizes the emissions needs for VISTAS so that duplicate efforts are avoided. Collaborative efforts are also underway to establish consistent data and analyses processes as well as reviewing the need for a common data repository for modeling input and output data.

For more information regarding VISTAS see their Web site at http://www.VISTAS-SESARM.org.

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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. Steering Committee representatives are:

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ASSOCIATE MEMBERS

Associate Membership in the IMPROVE Steering Committee is designed to foster additional IMPROVE-comparable visibility 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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Government organizations interested in becoming Associate Members may contact any Steering Committee member for information.

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

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

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IMPROVE Newsletters are also available on the IMPROVE Web site at http://vista.cira.colostate.edu/improve/Publications/publications.htm, and on the National Park Service Web site at: http://www.aqd.nps.gov/ard/impr/index.htm

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