

IMPROVE Steering Committee Meeting Summary August 7-8, 1991

A meeting of the IMPROVE Steering Committee was held in Luray, VA on August 7 & 8, 1991. The primary objectives of the meeting were:

1. to review the status of the deployment of the new monitoring sites,
2. to review and consider changes to network operations including field activities and data processing,
3. to discuss the status and develop future policy for data and information dissemination, and
4. to visit the Shenandoah field experiment site.

In addition to these topics, a number of other issues were discussed including status of the Grand Canyon Regional Haze Transport Commission, CASTNET, Project MOHAVE, and a Regional Haze Workshop in the planning stages. A copy of the meeting agenda and a list of participants are attached.

New Monitoring Sites

The Steering Committee at the last meeting agreed to accept responsibility to operate additional eastern sites selected by EPA for additional resources. For more information refer to the summary for the November 1990 meeting. At the time, it was thought that 10 sites could be operated for the \$500,000 per year that was available. A subsequent analysis indicates that 8 to 10 sites can be operated at that resource level. A decision was made to start by deploying 8 sites, then to reanalyze resources capabilities for an additional 1 or 2 sites before deploying them. The priority list of eastern candidate sites was consulted to identify the following 8 sites for the first round of deployment: Lye Brook W., Brigantine W., Okefenokee W., Upper Buffalo W., Dolly Sods or Otter Creek W., Mammoth Cave NP., Boundary Waters Canoe Area W., and Sipsey W.; and to postpone a decision on deployment at Linville Gorge W., and Cape Romain W. until the costs are more certain.

One of the most important factors that will affect the cost to deploy and operate sites is the viability of operating a nephelometer in place of a transmissometer at the field sites. The nephelometer, which is presently undergoing field evaluations, is expected to be less costly to deploy, operate, and maintain. However, field experience with that system is necessary before a firm estimate of the cost to operate will be available.

The 8 new sites will be operational for particle monitoring by the end of August and have camera systems by mid-fall. Next summer the optical equipment (expected to be nephelometers) will be deployed at 4 sites, with the remaining 4 sites receiving them after new fiscal year resources are available.

Network Status

In general, the network is operating well at all sites. Presentations were made on the optical and photographic monitoring by John Molenaar, and on the aerosol sampling and analysis by Thomas Cahill. Both presentations also addressed the status of data processing and other topics related to monitoring.

A computer screening algorithm was developed for flagging transmissometer data influenced by fog and precipitation in the sight path. The reason for wanting to identify and flag meteorological influences in the optical data is so that relationships between pollution levels and visibility can be developed with the data that excludes meteorological influences, and so that visibility levels can be characterized (e.g., seasonal and annual medians) both with and without meteorological visibility influences. The computer approach and its affect on the data were presented and discussed. All IMPROVE transmissometer data has now been processed through this algorithm and is available for dissemination.

Aerosol sampling is proceeding well, however, there is a recently discovered problem with the thermal analysis for carbon. Data in the last batch from the carbon analysis contractor is significantly different from all earlier batches. The difference was noticed as part of routinely conducted intercomparisons of independent but related aerosol parameters (e.g., ratios of organic carbon to fine mass, and to fine hydrogen). Apparently the analysis laboratory made a change in procedures designed to improve the analysis. They have been notified and are investigating to determine whether the data is correctable or must be re-analyzed. In any case, since the data validation procedures for the aerosol monitoring require intercomparisons with the carbon data, this delay is holding up dissemination of all of the last 9+ months of IMPROVE aerosol data.

Blank subtraction for organic analysis was also discussed. Field blanks and backup filter blanks are substantial compared with the values on the fine particle filters. This is true not only for the IMPROVE Program, but for all aerosol monitoring programs that analyze for organic species. The question of how best to subtract a blank value is at issue. Several reasonable approaches are available. The steering committee suggested that whatever approach is employed, the database should include the organic values measured on the backup and field blanks, plus a description of the approach employed on the ambient data. This would allow future data users to use blank corrected data using our approach or, by an additional effort on their part, to employ whatever blank correction approach they desire.

A concern was raised by a recent AWMA Annual Meeting paper by Delbert Eatough that indicated that particulate sulfate measurements could have a large and variable artifact caused by conversion of SO₂ to sulfate by alkaline soil particles. Thomas Cahill and staff at UC-Davis have been investigating this claim, since if true it would have a profound effect on the utility of IMPROVE sulfate data (as well as the vast majority of all sulfate data collected anywhere in the world). Comparisons of measurements of sulfur collected on IMPROVE channel A (our primary source of particle composition data) with sulfate measured on denuded channel B of the sampler (the denuder is used to eliminate a nitrate artifact caused by nitric acid vapor) compare very well. Since the nitric acid denuder would also eliminate SO₂ gas from the sample stream, there should be no artifact on that channel. In addition, a factor of 10 error was found in the Eatough paper. The matter is still being investigated, though at this time it seems much less of a serious threat to data quality.

The CASTNET program will be deploying visibility monitoring sites with the purpose to provide the supplemental spatial coverage required to allow national trends analysis. CASTNET management wants to use the same procedures and equipment as IMPROVE to the greatest extent possible. They have questioned whether our particle sampling schedule with Wednesday and Saturday sample periods is biasing our data. They point out that a every 3rd day sampling schedule would eliminate any bias, would result in nearly the same number of samples (122 vs 104 per year), and could be selected to coincide with the every 6th day sampling of the national PM₁₀ network.

IMPROVE evaluated and rejected the every 3rd day schedule during its design phase. This was due primarily to the practical and logistical difficulty that an every 3rd day schedule was thought to represent for our part-time field operators who would have a different day of the week to remember and arrange to service the sampler every week. Since we have very high data recovery (better than 90% overall), we are not inclined to change to a sampling schedule which could jeopardize this performance. Thus far, efforts to identify a weekend/weekday bias indicate very little bias to exist in a few sites/parameters, and no bias in the majority of site/parameters. Evaluation of this issue will continue and be expanded to include the optical data which is collected everyday on an hourly basis.

It was pointed out in the committee discussion on aerosol sampling that the IMPROVE system does not monitor SO₂. This could be added to the particle sampler for \$4k to \$5k per site year and would be valuable for tracking the emission changes mandated by the Clean Air Act Amendments. The original decision not to monitor SO₂ was because as a gas, it does not impair visibility directly. Only after it converts to sulfate is it important to visibility. No resolution to add this to the program was made.

In another discussion concerning monitoring capabilities, it was pointed out that the IMPROVE particle monitoring system does not have sufficient sensitivity to identify the great number of trace elements that would be required to conduct extensive regional-scale source apportionment using receptor modeling. It should be pointed out that no routinely operated particle monitoring system has greater sensitivity for trace elements. It was also pointed out that there is value in a simple to operate, cost-effective system that could be adopted by other programs; and that IMPROVE should not sacrifice those qualities to achieve greater source apportionment capabilities. Since no specific technical proposal was made at the meeting concerning how to obtain better trace elements sensitivity, the subject was not pursued further.

Data Dissemination

A substantial amount of IMPROVE data is now readily available. It has been presented and interpreted to some extent in a few documents. However, it has not been systematically disseminated and conveniently available to all interested parties. At present, data is documented at three levels of detail: complete, validated data on 9-track tape; optical and separate aerosol seasonal data summaries by site; and a few reports, papers, etc. which summarize and characterize regional or national visibility using IMPROVE along with other data sources. William Malm sent all steering committee representatives a draft of an extensive visibility report, "Characteristics and Origins of Haze in the Continental United States," that he prepared using IMPROVE data. At the meeting he presented a short (10-minute) video on visibility which is designed as an orientation/training film for NPS staff but could be adapted for the more general use of IMPROVE participant organizations' staff. Rich Poirot distributed a report prepared using

NESCAUM and pre-IMPROVE NPS data as another example of the kind of analysis that can be performed using IMPROVE network data.

The steering committee discussed approaches to disseminate IMPROVE data. In the short-term, the EPA AIRS data system will not serve the needs of the data users, since it appears unlikely that AIRS will be in a position to accept IMPROVE data for a year or more. This is caused by the need to develop new AIRS software to accept the IMPROVE data. Basically, two alternative approaches were discussed for data dissemination: steering committee member organizations could service their constituents' data requirements, or a centralized data distribution system could be established. At present, the NPS is serving as the centralized data archive with the capability to distribute 9-track data tapes of all of the data, and site-specific seasonal data summaries for optical and for aerosol data. The suggestion was made to develop and maintain a centralized mailing list for the seasonal summaries. Data tapes are only sent to those requesting them. Steering Committee representatives were asked to poll their constituents concerning the best approach for data dissemination, and to communicate that advise directly to the IMPROVE Steering Committee Chairman as soon as possible.

Also discussed was the more general question of how to provide broad information about the status and plans of the IMPROVE Program to those who are involved or have an interest. An IMPROVE Newsletter to be prepared twice yearly (e.g., September and March) was suggested and approved by the committee. Sandra Silva, FWS representative, offered to edit the newsletter which would be limited to two or four pages with segments contributed by other committee members and IMPROVE contractors. A standard feature of the newsletter would be a section on data availability. Other sections would include network status reports, descriptions of IMPROVE-related special studies (i.e., the present Shenandoah study), lists of publications that used IMPROVE data, and certain non-IMPROVE visibility-related news of general interest.

In a related idea developed subsequent to the committee meeting, Marc Pitchford is attempting to obtain access for the IMPROVE program to the electronic bulletin board developed and maintained by OAQPS. This would allow all of the IMPROVE participants, and others interested in IMPROVE, to have on-line computer access to the latest information about IMPROVE. This could be used to distribute WordPerfect files with the newsletter; meeting notices, agendas, and summaries; lists of sites; availability of data, etc.,

Shenandoah Field Site Visit

A large number of experiments were in progress at nearby Shenandoah National Park during the committee meeting. Among these were tests of transmissometer window soiling effects, numerous intercomparisons of variations of particle samplers with and without denuders and of nephelometers operating at ambient and non-ambient relative humidities, test of a new nephelometer and an aethalometer (continuous particle absorption instrument), and experiments involving tracking the weight changes of particle samples as a function of time after removal from the sampler.

Some of the multiple objectives of the study include: evaluation of approaches to determine the aerosol acidity with modest low-cost changes to the IMPROVE particle sampling procedures and equipment; tests of the new algorithm for flagging fog and precipitation influence on transmissometer data; and to determine the importance of water growth in the East, and as a result of the extent to which historic eastern nephelometer data should be believed. Preliminary analysis of the data collected thus far indicates that the Shenandoah data will be a gold mine of information.

Other Issues

The World Meteorological Organization (WMO) is interested in adopting the IMPROVE particle sampling protocol and equipment for use in its monitoring programs. A meeting between UC-Davis and WMO official to discuss this is scheduled for early September. The broad acceptance of the IMPROVE sampler and procedures is demonstrated by its use in 13 foreign countries. This is being managed with informal agreements between the foreign agencies and UC-Davis for quality control, laboratory intercomparisons, and data sharing. As indicated above the CASTNET program is also planning to use IMPROVE protocols and instrumentation for visibility and aerosol sampling in order to minimize data intercomparison difficulties. The objective of CASTNET is to track changes in air quality related to emission controls mandated by the 1990 Clean Air Act Amendments. The program is presently in the process of establishing contracts for network operations, with the monitoring sites expected to be deployed in one to two years.

Project MOHAVE is a congressionally mandated EPA tracer study of the visibility effects of the Mohave Power Plant (at the southern tip of Nevada) at Grand Canyon National Park and other local Class I Areas. The study is beginning in September, and consists of a year-long period of additional monitoring (local IMPROVE monitoring sites are being augmented and new sites added). Two intensive periods of monitoring (January 1992 and July/August 1992) will involve stack release of an artificial tracer; air quality, visibility, and tracer monitoring at over 30 locations; upper air meteorological monitoring with radar wind profilers at 4 locations, and application of a deterministic wind field model.

The Clean Air Act Amendments required the establishment of the Grand Canyon Visibility Transport Commission. This commission, to be composed of representatives from the affected states, the Federal Land Managers, and EPA (the federal participants are non-voting members) is charged with making recommendations to EPA concerning approaches to control regional haze at the Grand Canyon after four years of investigating the subject. The first organizational meeting to establish the commission is scheduled for Phoenix, AZ for mid-August.

The interest in a technically sound approach to controlling regional haze has been growing rapidly since the first of the year. One outfall of this interest is the planning of a Regional Haze Workshop for the fall of this year. The workshop is in the initial phase of planning, but will apparently involve representatives from government, industry, and environmental conservation organizations gathered to identify broad approaches for policy development and the technical information requirements associated with those approaches. Undoubtedly more specific information will be available concerning the workshop in the next month or two.

Action Items

<u>Activity</u>	<u>Responsible Person</u>	<u>Date</u>
Initiate an IMPROVE Newsletter	Sandra Silva with assistance from Marc Pitchford	9/91
Explore access to the OAQPS electronic bulletin board	Marc Pitchford & Neil Berg	9/91
Continue to develop information on Wed/Sat vs every 3 rd day	Thomas Cahill & John Molenar	10/91
Explore and document the issue of sulfate artifact	Thomas Cahill	10/91
Develop an IMPROVE video	William Malm & Donna Lamb	12/91
Design and implement a data dissemination system and seasonal summary mailing list	William Malm & Marc Pitchford with input from all	12/91

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IMPROVE Steering Committee Meeting Agenda

Dates: August 7 & 8, 1991

Location: Luray Inn and Convention Center, VA

August 7

8:30 am	Introductions and welcome	Marc Pitchford
8:45 am	Review and revision of agenda	Marc Pitchford
9:00 am	Deployment of new sites	William Malm
9:15 am	CASTNET update and coordination	Bruce Polkowsky
9:30 am	Status of the network and data processing	John Molenaar & Thomas Cahill
10:00 am	Break	
10:30 am	Continued status of network and data	
11:00 am	Status of data entry into AIRS	Neil Berg
11:15 am	Data analysis and dissemination plans	William Malm
12 noon	Lunch	
1:30 pm	Drive to Shenandoah National Park to see special studies	William Malm
5:00 pm	Adjourn for the day	

August 8

8:30 am	Technical issues concerning the network (possible sulfate artifact, carbon analysis uncertainty, new nephelometer, aethelometer, etc.)	Thomas Cahill & John Molenaar
10:00 am	Open discussion of future directions and remaining issues	Marc Pitchford
12 noon	Lunch	1:30 pm Adjourn

**IMPROVE Steering Committee Meeting Participants
August 7 & 8, 1991**

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Brian Mitchell	NPS – Air Quality Div. Denver	303 969-2071
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Ken O'Dell	Air Resource Specialists, Inc.	602 774-4367
Bruce Polkowsky	EPA – Office of Air Quality Planning and Standards	FTS 629-5532
Marc Pitchford	EPA – Environmental Monitoring Systems Laboratory, Las Vegas	FTS 545-2363 702 798-2363
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