

IMPROVE Steering Committee Meeting Summary June 3 - 4, 1993

Introduction

Marc Pitchford, IMPROVE Steering Committee chair, opened the meeting and those present introduced themselves (see attached list). The agenda was reviewed and approved (attached).

Visibility Issues and Activities of Concern

US Forest Service (Rich Fisher)

Monitoring Strategy: Rich informed the committee that the USFS recently had a national meeting to strategize on visibility -- comprehensive and agency wide. USFS drafted a 5-year draft monitoring strategy and is now implementing the first year. The USFS overall visibility policy is still alive – not yet formally approved by the Chief. The new monitoring strategy is a statement about the importance of visibility and it is making changes in the USFS. This year alone installing:

<u>Site*</u>	<u>Neph</u>	<u>Aerosol</u>
Mt. Zirkel (CO)	xxxx	xxxxxxx
Gila (NM)	xxxx	xxxxxxx
Lone Peak (UT)	xxxx	xxxxxxx
Alpine Lakes (WA)	xxxx	xxxxxxx
3-Sisters (OR)	xxxx	xxxxxxx
Columbia Gorge (WA)	xxxx	xxxxxxx
Great Gulf (NH)		xxxxxxx
Shining Rock (NC)		xxxxxxx

*All sites will have cameras for view documentation.

All sites will be IMPROVE Protocol sites. Next year the plan is to add four more sites. No new sites are envisioned in the last three years of the five year plan and there will be a stable budget. USFS spending \$400-500K for monitoring this year. The USFS has sent money to IMPROVE (\$20K). Rich stated that USFS wants good data products in the hands of its managers. This is a top priority. He is hopeful the money can contribute toward the data products.

Rich is also recommending to forests to retire camera sites after 5 years' of quantitative densitometry data. Air Resource Specialists (ARS) will qualitatively review slides after that, they will not be scanned. USFS wants to use cameras to ID problems, like at Mt. Zirkel – if see something then step-up monitoring. The visibility monitoring strategy will be summarized later this summer.

John Core (Western States Air Resources Council WESTAR) and Rich discussed the need for states to buy-into the sites or the data won't be used in regulatory situations. John suggested a meeting with WESTAR representatives.

Site Recommendation: Rich Fisher recommended to the Steering Committee that Shining Rock replace Linville Gorge as an IMPROVE site. The site is USFS funded and no IMPROVE dollars go into the site except that data analysis is folded in. Linville Gorge was #9 on IMPROVE's original site priority ranking for the east, but only 8 were funded by IMPROVE. Shining Rick and Linville Gorge are geographically close to each other. The advantages of the move were discussed.

The IMPROVE Steering Committee unanimously endorsed that Linville Gorge be replaced by Shining Rock on the IMPROVE ranking of sites and endorsed the move.

US Fish & Wildlife Service (Sandra Silva)

Sandra Silva reported that USF&WS is beginning its own plans for air quality monitoring. An air quality monitoring strategy has been developed for Class I areas and includes a visibility component. The strategy calls for IMPROVE Protocol sites in all 21 USF&WS areas that are not now monitored. Will likely be getting some money in FY 94 but probably won't know until January. Several sites have been prioritized as high risk: Cape Romain, Moosehorn, Breton Island, Wolf Island, and Lostwood. The newest site is in Chassahowitzka, Florida. USF&WS turned over some resources to NPS.

US Environmental Protection Agency (Joe Elkins and Marc Pitchford)

Joe Elkins talked to management about using NPS for providing further resources to do more data presentation.

The Clean Air Status and Trends Network, headed by Gardiner Evans (EPA), is now down to 8 sites, operational by end of summer. Originally there were to be a total of 32 sites, however, 8 is all they can support. The implementation has been very different from the plan that many people present helped develop. Two other sites, sponsored by the state of New York, may turn their transmissometers over to the network. Four NGN2 nephelometers have been purchased. However, the particle samplers are not IMPROVE samplers. As it has turned out, CASTNET is not as large, not as compatible, and may not be as long-term as originally planned.

National Park Service (Bill Malm)

NPS has a draft visibility monitoring strategy that was handed out to Steering Committee members. Comments were requested with two weeks. Monitoring protocols are also presented for both routine and special studies. NPS has IMPROVE long-term trend sites, IMPROVE look-alike sites, and special study sites. The document comes to grips with which sites would be kept if budgets continue to be cut. Data show that some sites are similar and often representative of a region. So some sites in that same region may be able to be cut with some loss of spatial information. Table 7-2 presents Minimum NPS Trend Sites By Region. For example, Canyonlands still there but Arches is out – they are very close in proximity. NPS document prepared independent of IMPROVE but issues overlap. The minimum NPS trend sites by region are 10 sites that would be monitored “forever.” All 10 are IMPROVE now except Great Basin, Can have other sites for better spatial data but these 10 are recommended to hand onto at all cost. Some reconfiguration also.

There are a number of transmissometers and nephelometers across the country. In the recent data analysis it is clear we still don't understand what is going on with carbon. Need total extinction, scattering and b_{abs} at same sites. Therefore, at some sites the transmissometers are being pulled and at others nephelometers are being added so that at the regional sites there will be both transmissometers and nephelometers. May have been underestimating absorbing material by about one-half. If b_{abs} is a good measurement (seems like it is) then Elemental Carbon by Thermal Optical Reflectance is not so good. Need this differencing method between instruments (transmissometer – nephelometer) to accurately measure absorbance.

To meet budget constraints this year, independent of overall reconfiguration, NPS is going to have to pull transmissometers from Yellowstone, Mesa Verde, Pinnacles, and Tonto. For each site that a transmissometer is being pulled, there are technical and representativeness justifications.

The group discussed why monitoring was started at Great Basin. It is not Class I and IMPROVE was established for congressionally protected sites. However, Great Basin represents a big data hole in a “clean air corridor.” Jarbidge in a transition area. Great Basin is much cleaner. Discussion was had about USFS sites and how they may compliment NPS sites. The big picture needs to be considered in the reconfiguration. Nevertheless, NPS must pull four sites and agrees that reconfiguration involves other considerations including regional representativeness. The Steering Committee agreed that due to lack of resources transmissometer monitoring should be discontinued at two IMPROVE sites (Mesa Verde and Pinnacles). The other two sites that would be affected are not IMPROVE sites.

Another presently unknown factor with respect to network resources is the particle contract which is out for bid right now. If it comes back with significantly higher prices the network may have to cut back more.

Bureau of Land Management (Scott Archer)

BLM has no Class I areas and has reduced its camera/densitometry monitoring from 4 sites to 2 sites. BLM provides \$5K/year to IMPROVE (NPS). The camera sites are paid for separately by the BLM.

Scott Archer suggested that some of the earlier discussion about IMPROVE and IMPROVE Protocol sites reflected ambiguities that could be solved by developing bylaws or interagency agreements. It may be time to again bring up the issue of formalizing IMPROVE. An MOU could handle it as no money would be transferred. Marc Pitchford suggested that this issue be the last item on the agenda for tomorrow with the federal visibility technical center.

WESTAR (John Core)

WESTAR is concerned about the IMPROVE funding issue. (See discussion of funding below).

WESTAR is helping Wyoming with a visibility problem in the Green River Basin. Apparently no Class I issues involved, seems to be a layered haze problem. WESTAR writing scoping document.

In the Blue Mountains of NE Oregon there is a forest health problem due to drought, bugs, and changing land management philosophies that adds up to 4M acres of dead and dying trees. It is on the forefront of the forest health issue that extends elsewhere throughout the west. The USFS is trying to find ways to get rid of this fuel. They estimate that in the Blue Mountains a 3-5 fold increase in emissions is likely during next few years and that alone would double prescribed emissions in OR. This brings up PM₁₀, air toxics, and regional haze issues. Same issues around Boise. Eventually the issue will spread all over the west. How to balance smoke risks from wildfire vs. prescribed fire? OAQPS has asked WESTAR to write PM₁₀ initiative about this issue.

WESTAR has also been asked to work on a multi-state issue regarding wind blown dust and fugitive soil.

In general, IMPROVE is not a hot topic with states at the moment given everything else they are dealing with.

STAPPA/ALAPCO (Dan Ely)

The IMPROVE funding issue is important for STAPPA/ALAPCO. (See discussion below).

Speaking for the State of Colorado, Dan reported on the Mt. Zirkel Wilderness Area – a situation that is developing into a reasonable attribution study. Certification of impairment should occur within a month or so.

NESCAUM (Rich Poirot)

NESCAUM operates 7 aerosol only sites and is nearing the end of the 5th full year of operation. Have added a duplicate precision sampler at one site. This will contribute to overall QA of the IMPROVE particle sampler. The majority of the analytical costs had been carried by the IMPROVE Program. However, due to budget constraints, that has ended (see discussion below). Recently had a meeting of NESCAUM's monitoring group to look at funding future. The CASTNET program in their original plan was going to take over operation of the NESCAUM sites. Since this will not happen, NESCAUM may be looking at vastly reduced operation of the sites. NESCAUM has looked at various funding options.

Once the data are received from University of California at Davis, Rich puts the data into Voyager and in ASCII formats. Nearing completion of a tool to extract AIRS workfiles and output them into Voyager. Also now have Voyager files that combine NESCAUM and IMPROVE data.

Two temporary sites have been funded through the Lake Champlain initiative. This is EPA money for 1 year to provide better spatial resolution. One of them is collocated with New York's dichotomous samplers, metals by NAA. They run every day.

Just completing a draft report that is statistical research project using IMPROVE type data and looking at indices of central tendency, precision limits, and detection errors. will send report to Steering Committee. The same investigators have gotten a grant from the Office of Exploratory Research. This is an opportunity to feed back to them questions IMPROVE wants answered. Marc suggested that one area would be that the older systems had poorer detection limits – could values below MDL be filled-in in some way?

What is an IMPROVE site? During the course of the discussions by the various representatives the question came up, What makes a visibility monitoring site an "IMPROVE" site? Making it IMPROVE implies that any additions, deletions, or other changes are brought to the Steering Committee. While IMPROVE has no additional monetary resources to contribute to new sites at this time, the sponsoring agency would have to give up some control. What do they get in return? Building an image that IMPROVE sites are ones that should be there forever, as long as there are Class I visibility protection regulations and requirements for visibility monitoring, If an entity is just monitoring for a few years and then changes priorities, they probably don't want it in IMPROVE. If it is adopted into IMPROVE, and the sponsoring entity is short money one year IMPROVE could help. Some degree of mutual commitment.

Discussion about money for data presentation. Bill Malm (NPS) pointed out that all the IMPROVE money is used in monitoring and data analysis/reporting. Need to do better in the area of data presentation and products. This takes dollars. Marc Pitchford added that this could be a difference between an IMPROVE and a non-IMPROVE site. If full IMPROVE, then one needs to support the overhead. Willing to share methodologies for IMPROVE look-alike or partial IMPROVE look-alike sites and report data.

Network Status

Optical parameters, Air Resource Specialists (Dave Dietrich)

Dave provided a handout (attached) that is a table updating the Committee on the optical and scene components of the network.

Very pleased with the operation of NGN-2 nephelometers. Crater Lake remains to be installed. Not sure if Lye Brook will go in – funding issue. NGN-2s have been installed in the network over the last 4 months.

The operation is hourly averages based on twelve 2-minute samples (2 minutes on, 3 minutes off), serial and analog data, collected and reviewed daily, auto clean air and zero every 30 hours, SUVA 134a span gas every 2 weeks, bulb replacement about every 2 months. Want to let them burn out to get an operational history with the bulbs, seem to last about 2 ½ months. Very pleased with the operational experience. Of 1370 days of onsite operation the data collection efficiency at IMPROVE sites is 98%. Major causes of data loss: moisture in light traps (a design issue), line power outages, and also lose data when it's raining or snowing and when the lamp burns out.

Daily plot of the data are made to check operations in the field. Now using telephone modems and this has really enhanced operation since one can now “talk” to instrument and figure out what the problem is. Can usually tell operator exactly how to fix it. Much easier to install than the transmissometer and routine servicing is about 30 minutes.

Steering Committee will be visiting the test site and ARS’ office. ARS operationally verifies each instrument at the test site before they go out. This is a 2-week process involving side-by-side comparisons as well.

Continuing to tack down precision, deal with the light trap design changes to alleviate water pooling problems, want to develop auto span gas calibrations instead of manually done every two weeks but SUVA is reactive with some materials so need to test all the materials in the valves and lines etc., and looking at ways to improve the software and firmware. Dave showed a number of plots illustrating the water pooling problem, daily plots of raw data in visual basic, and draft precision data.

Four transmissometer monitoring sites are proposed to be pulled out primarily for financial reasons: Yellowstone, Tonto, Pinnacles, Mesa Verde. Need decisions from committee-IMPROVE sites are Tonto and Mesa Verde.

Transmissometers in general are operating very well. Have developed good knowledge of the instrument so most operational problem are known. Recently had a filter degradation problem and may lose some data while replacing all filters. The site at Bridger has had power problems which are now solved. Shelters need to be replaced this summer at Canyonlands and Petrified Forest. Have also put into practice a new “burn in” procedure for bulbs.

ARS operates 44 scene (color photography) monitoring sites: 29 IMPROVE, 14 NPS IMPROVE Protocol, and 2 BLM. Over the years the 35 mm archives have grown into literally tons of slides. Slide media does degrade over time. Technology is developing so that one can easily digitize any slide. Need to consider archiving selected slides. Can use photo-CD or comparable technology.

A transmissometer data report is nearing completion. Now have a revised lamp drift correction factor. ARS has re-evaluated all data to reestablish the curve, from 1987 to 1993. Report due soon and does not change past data much. Somewhat behind schedule due to redoing all the data. Will then be back on the usual 3-month schedule. Dave presented example data in the familiar seasonal summary. In the new report will have a haziness scale in deciview. Committee also wanted to keep SVR. All data will be redone.

Particle parameters, University of California at Davis (Bob Eldred and Tom Cahill)

Bob Eldred reported that they now have a way to measure many variables redundantly and intercompare for QA. They have never lost data by losing samples in the mail. Running at about 95% data capture. Flow rates good. Have been doing PIXE reanalysis a month later for sulfur. Precision 3%, for example at Shenandoah. PESA reanalysis showing 2%, with r^2 of 0.997. Also doing similar comparisons for other methods in other labs. Random reanalysis. Evaluated every quarter.

Recently added XRF. PIXE and XRF now have higher sensitivity for elements heavier than iron. Better detection limits. For example, 0.02 ng/m^3 for Se. Combination of methods provide some overlap. For example, get zinc from both PIXE and XRF. Started summer 1992.

QA comparison between different filters – for example, sulfur on teflon and sulfate on nylon. If find the slope of a regression line is not 1.0 or there are outliers the data are further examined. Do organics on quartz and on teflon. No organic artifact on teflon filters was found in last summers data. Compare reconstructed mass (RM) to measured fine mass (MFM). Getting around 84% agreement between RM and MFM. Do these plots all the time now before data goes into database. Looking at intercepts and zeros. QA on Project Mohave. Did side by side comparisons – 16 in one situation. In all cases measured precision for sulfur and it was within about 5% of the calculated precision. Somewhat poorer for soils which are near the cut point. Even co-located samplers get different amounts of soil.

The World Meteorological Organization (WMO) has adopted IMPROVE protocols. The concept of integral redundancy built into the system and the checks on precision and accuracy impressed WMO. Thirteen countries across the world are collecting IMPROVE comparable samples on Wednesdays and Saturdays. 150 sites around world using IMPROVE. World Bank has also backed this packaged set of measurements.

Teflon filters are showing a loss of over half of the nitrate. Want to better understand this. Have investigated whether integrating plate for babs match with integrating sphere technique. They do compare very well. Again two independent analyses. Annual reports are late. They will contain lots of dull QA and complete sets of maps.

Graphs of sulfate isopleths seem to show regionally valid, redundant measures of aerosol. Lots of same values in same region. Trends in time with 10 years of data. To get this length of record had to include the older SFU sampler with the IMPROVE sampler data. It was a major effort to compare the two systems. However, the cut point measurements are virtually identical and so earlier data should just splice on. If it would not work, the soil would stand out since it is near the cut point. Tom showed a plot indicating there is a “tad” more soil measured on IMPROVE. However, sulfur is the same. They have confidence that use of the two samplers data in trends analysis is valid. Tom showed plots that summarized all sites for 10 years. A few sites do have trends: Mesa Verde, Chiricahua, Glacier, Smokies, and Shenandoah. Shenandoah and Smokies

show a steady rise in sulfate over the last decade – about 4% per year. At Chiricahua and Mesa Verde sulfate decreases. Can see when Nacozari smelter went on line, when the Douglas smelter shut down and when Four Corners scrubbed its stacks. Glacier shows a slight rise. Most trends are zero. Network is capable of giving trends.

Exploratory work at Shenandoah. Emissions and ambient SO₂ versus sulfate at Shenandoah. Emissions constant, ambient SO₂ down and sulfate up. Size resolved sulfate work at Shenandoah. Some periods show plumes of almost pure sulfuric acid crossing Shenandoah during the special study in Sept 91. Discussion about trends data. Joe Elkins and EPA very much want to get trends data into their data reports.

For very remote particle sampler operations UCD recommends that IMPROVE channel A (solar or hard wired) should be the base unit. The SMART Sampler (low power consumption rotating drum impactor) can be co-located or go into the field in one day for emergencies, like forest fires. The SMART Sampler is a research and not a routine monitoring instrument.

Database Access and Reports

Spatial and temporal trends report

Bill Malm reported that the spatial and temporal patterns report has been out for awhile now. There will be updates each year. Updates will focus on data of other kinds as well as other things that are being learned as the data are explored. Idea is not to redo the same report each year – probably a 5-year cycle on topics. Each year it will look at different things.

Discussion of organic artifact and QA/QC

IMPROVE has been criticized by some people for having poor QA. They use the organic artifact on the teflon filters identified in IMPROVE reports as their principal example. The point that people often miss is that other programs would not have caught the organic artifact problem without the integral redundancy built into IMPROVE. Also lose sight of fact that it affected only 7% of fine particle mass data from one year. Hear rumors that IMPROVE's QA is poor. In actuality the QA procedures of IMPROVE are very good with lots of redundancy, etc. The problem may be communicating this effectively. Tom Cahill noted that the QA documents are available and are 3" thick. Usually cannot get QA related articles into peer reviewed journals (can get them in AWMA proceedings). Tom Cahill agreed to work to get more about IMPROVE's QA out to the visibility/aerosol community.

Marc related that because of Project MOHAVE, a large amount of independent QA was done – lab audits and system audits. IMPROVE has the opportunity to do an inexpensive, external QA audit by adding onto what was already done – same equipment and procedures – and produce an IMPROVE QA report and/or journal article. The credibility of the program was called into question by the National Academy of Science haze report, though word is that they were just trying to spur the feds into putting more resources into this IMPROVE by pointing to a potential deficiency. Possible \$15K or so would allow the QA work done in Project MOHAVE to be expanded and converted into a full IMPROVE QA report; if IMPROVE waits until the Project MOHAVE data is too old to use, it could cost \$50K - \$7K to start from scratch. Marc recommended taking advantage of timing of the Mohave external audit – to be discussed further tomorrow.

Access to database

UCDavis is using a new dial-in at modem, all menu-driven to give access to the IMPROVE data. Procedure is that request goes to NPS and Bill Malm gives authorization code good for one month. Will be a short article in newsletter about data access and information about how to get data in every issue. Diskettes with optical data are also available.

British Columbia Visibility Program (Peter Reid)

Peter thanked those who came to Harrison Hot springs in BC. The BC Visibility Task Force will be making recommendations on how to address visibility issues in the area. Also starting studies, buying equipment.

This year they will be studying lower the Fraser Valley, which has a photochemical oxidant problem from July 15-Aug 15, 1993. About one-third of valley is in the US. Typically have one good 50-100 ppb ozone episode/summer. REVEAL is a regional visibility experiment in lower Fraser valley. BC Environment doing visibility portions, the visibility part of the study is tacked onto the ozone study sponsored by Environment Canada. They will be leasing nephelometers, aerosols sampler modules, and transmissometers. It is a learning exercise with a transfer of technology from IMPROVE.

They will likely end up with several long-term monitoring sites in BC. Also want to continue liaison with IMPROVE Steering Committee members for review of plans, draft reports, etc. Marc asked that materials be sent to him and he will distribute as appropriate.

Peter stated that they have a clean slate in terms of laws and regulations – could start off saying they want to protect lots of different areas. Prescribed and wildfire smoke are the main problem outside Fraser Valley. Smoke management program seems to be working – the worst days have been eliminated.

Funding

Joe Elkins started the discussion by indicating that there is usually \$1M/year from EPA to NPS, however this year is only \$900K. In Feb 93 the amount was scheduled to be cut 20%, but Joe battled to restore \$100K for a total of \$900 in FY93. Due to Title V of the Clean Air Act, the way 105 money is distributed is going to change in the future. Joe has received assurances that for FY94 the full \$1M will be back in the IMPROVE budget. In FY95, there should also be \$1M. However, Title V begins to become important in 1996. That is the most likely year of change for how IMPROVE is funded. By spring 1994 should have enough of an understanding to estimate impact on 105 funds. IMPROVE is a national program and will have to compete from a diminishing national pot of funds. Likely that decision will begin to be made in 1994. IMPROVE will need to be proactive. This may mean moving the money to regions.

Marc Pitchford relayed thoughts from a conversation with Bruce Polkowsky (EPA). That if the 105 resources are no longer going to be available, other funding sources may be possible, For example, we could try to get IMPROVE categorized as NAMS monitoring. Joe replied that there are apparently shortfalls in the millions of dollars for ozone monitoring and that it is a bad time to ask for additional money for other things – the priority is on ozone.

Scott Archer proposed that if EPA believes IMPROVE is an important operational program then it should be funded as a line item off the top from EPA. Scott would lobby through his agency for EPA to do this if it was the will of the Committee. Would states and state organizations be willing to lobby hard for this?

John Core stated that EPA should take an active role in funding this through other than 105 funds but it was his opinion that if had not been funded through 105, IMPROVE would not now exist. It is not a high enough priority currently for EPA or states to make this commitment. It is still in existence because it is funded through 105. Dan Ely and John Core continued that it is clear that STAPPA's intent is to reduce off-the-top allocations – to cap them to around \$10M. The amount and the percentage have been growing each year and STAPPA/ALAPCO folks are agitated – they want more control over money that is to be allocated to state air programs. Don't want EPA taking more and more of their money off the top. John expressed an interest in finding ways to lobby for other sources.

A reality is that if there was no monitoring program like IMPROVE, EPA would have to provide guidance to states and if that guidance was to do something like IMPROVE it could be very expensive for most states. Possible that it is a legal requirement at this point for visibility monitoring to continue, since IMPROVE was starting as part of a court order settlement. One alternative would be for states to pick up those costs for sites in their jurisdiction. They could get their 105 allotment increased to fund these directly. Makes sense to keep a good, cost/effective program going instead of reinventing it. One route to keep it going is to have a joint decision between DOI, DOA, and EPA, for the first two to fund it with EPA coordination.

Marc asked whether IMPROVE should try to plan for a program with level funds or an eroding base? Bill Malm wondered that since FS was going to pick up monitoring at a time when NPS may be backing out some, the FS may be able to cover the basics. Next two years probably nothing drastic. The big question will be in 1996. May need to rethink IMPROVE by then.

Dan Ely again mentioned the concerns of STAPPA and getting IMPROVE's role better understood by STAPPA. Rich Poirot made a presentation about IMPROVE to SAMWG last fall which was received well at the time, but later they think about how they need the money for other state programs. Bill Laxton was a big IMPROVE advocate and believed it was a good quality program for the money. More targeting is needed of information to STAPPA/ALAPCO people. John thought the problem was compounded by the states being hammered to meet deadlines in meeting after meeting – they never hear about visibility anymore – just CAAA requirements. States want every dime they can find to get the work done. Rich Poirot added that the Photochemically Active Monitoring program, PAMS (56 precursors for ozone production) is at the top of state monitoring people's list. It is a requirement to do this if an area is ozone nonattainment.

Scott Archer noted that only 11 states apparently have no sites, and that number may be reduced if camera-only sites are counted. Fact is that lots of states have some monitoring. IMPROVE is directly doing something for many states – they don't have to worry about it, IMPROVE takes care of this responsibility.

EPA may reopen regulations and put in requirements for visibility monitoring. Monitoring guidance could be in updated 40 CFR part 58, methodology for monitoring for 6 criteria pollutants. Visibility protection is a required program and for \$30K or so written guidance can be

developed, however, one would have to assemble a package of evidence to see this approach. May not be able to require monitoring but could require doing it in a certain way. The demise of airport visibility monitoring and cutbacks of CASTNET help IMPROVE – its the only thing left. Need to get word out on IMPROVE, distribute information.

Marc wondered if there was any way to redeem the two IMPROVE sites that transmissometers were recommended be cut? Bill replied that the shortfall is about \$24K per site and won't know the status of particle monitoring until bids come in. At this point is just the transmissometers that are being recommended for cuts. The budget on the optical side is over by a total of 4 sites.

Discussion turned to what actions to take. People want reports and newsletters. Need to blanket and target better. Put things on AMTIC bulletin board. Seasonal summaries of optical data are on the bulletin board and the particle data is available through a dial-in modem – there is good access to the data. Use the bulletin board, newsletter and call up data lines to advertise each other. Could format AMTIC to get visibility on there as separate part. Committee felt that it needed a more concrete idea as to what to do. The Committee appointed an Information Transfer Subcommittee to take the lead in targeting different audiences and developing products. Necessary to focus and prioritize. Dan Ely (lead), Joe Elkins, Julie Winchester, Marc Pitchford, Scott Archer, Rich Poirot, and John Core. Subcommittee meeting scheduled after IMPROVE Steering Committee meeting over.

Monitoring Configuration and Protocols

NPS' proposed strategy is to reduce to as few as 10 regionally representative but completely instrumented sites and to have aerosol-only sites (no optical or scene monitoring) to maintain the desired geographic coverage of the NPS network. Marc wondered if IMPROVE can validly claim to be a Class I area visibility monitoring network if there are just 10 sites (out of 156 Class I areas) that measure visibility. Presently 18 sites have transmissometers, and 8 eastern sites have nephelometers. The latter would not change under the worst case scenario with the NPS strategy.

Originally the idea was that visibility monitoring IMPROVE-style involved three components: scene, optical, particle. IMPROVE monitoring would have all three of these. The proposal is a fundamental redefinition of the IMPROVE strategy. the best that aerosol-only sites can do is to use relationship between aerosols component concentrations and visibility developed at complete sites to estimate an extinction budget. Much poorer aerosol time resolution and uncertainty in the relationship make this an inferior approach to estimating visibility at a site compared to directly monitoring with a transmissometer or nephelometer. Bill Malm asserted that enough is simply not known yet to say whether this is a credible approach – may be underestimating b_{abs} , may be underestimating organics to overall visibility, but we may need to change our monitoring approach in order to move ahead and learn.

IMPROVE is primarily a routine monitoring program but also includes research. Can't dispense with research because we need to ensure that our data is what it reports to be, but if we de-emphasize routine monitoring, then could lose program altogether. If IMPROVE adopts a strategy consistent with that drafted by the NPS then the idea would be that IMPROVE is making a change because the IMPROVE Steering Committee feels it does well with aerosol in terms of reconstructing extinction as long as there is a place nearby where regional visibility is fully optically measured. It is in line with the basic approach of redundancy. If we buy into this then we need to review sites to determine which sites can represent a region for optical and aerosol and where the relationships are different. Need to develop a new IMPROVE routine monitoring plan if

changes are to be made. It was proposed that Marc rewrite IMPROVE" basic plan. Current operation is inconsistent at a couple of sites (where there is no optical monitoring) with old version of plan. The Steering Committee will review the plan and its implications at the next meeting.

Rich Fisher pushed for the need to work together since the FS monitoring strategy builds on what is already there. If NPS and IMPROVE change then FS needs to work around it. Any new IMPROVE strategy and other FLM programs should be complimentary. IMPROVE ought to look at all sites and prioritize them. Need to coordinate a new IMPROVE strategy with the federal land managers. At this point the NPS and FS strategies are different: Bill's approach says, if money continues to erode here is what we would want to save; while Rich's approach is if everything stayed the same, here is what we should do in addition. Marc and Bill are working on a plan of what is technically justifiable. The Steering Committee also charged them to work on coordination and planning of sites: Technical Strategy Committee. Rich Fisher, Bill Malm, Marc Pitchford (lead).

Scott asked what EPA might think of these changes since IMPROVE was created in response to a settlement agreement? Joe replied that the Steering Committee needs to agree. The 8 eastern sites need to stay for a variety of reasons. Other sites are ok to change within Steering Committee process as long as we stick to the decision making process. There is no fat in the budget. Have to cut sites and parameters. Marc concluded the discussion by stating that a draft would be out in a couple of months and then the Steering Committee will meet again.

Other Agenda Items

QA audit

Marc revisited the QA opportunity for an external audit which is estimated to cost about \$15K. IMPROVE is short \$100K from EPA and the NPS visibility monitoring program is also short. ENSR did the QA audit for Project MOHAVE recently. Ask them to modest additional work and report on it in the context of IMPROVE network. Using the same techniques as were used in Mohave. Make maximum use of the Mohave audit. NAS report said little about IMPROVE except external QA audit needed. The perceptions fostered that there is poor QA is just not the case, but IMPROVE can put \$15K into an audit to shore up the credibility of an investment of millions. People outside of IMPROVE want to see an external program to put a blessing on IMPROVE. Perceptions are very important. Hope of NAS committee was that EPA would direct more money into the program for auditing. Also need to discuss procedures in peer reviewed journals, mention them in results papers, put in methodology sections, etc. People don't know what is being done. An external audit would say, Here is our response to the Haze Committee. If we wait we could might have to do a full QA audit. Motion that Marc form QA committee to develop QA proposal to address by time of next meeting. Motion was 2nd and carried unanimously. Contractors will serve committee. Joe Elkins, Marc Pitchford (lead), Rich Fisher, John Core. Could have workshop and bring in critics. Largely endorsed.

Optical monitoring cut at two IMPROVE sites

Marc moved the Committee accept the NPS proposal to discontinue transmissometer measurements at two IMPROVE monitoring sites. Carried unanimously.

NESCAUM network

Issue of IMPROVE covering the analysis cost at 7 NESCAUM sites was raised for consideration. Resources are not available to continue analysis. CASTNET originally planned to pick up the cost of these sites. They won't now. Seven sites have Channel A and two of the 7 also have Channel C. Channel A cost per site for one year are about \$10K. Cost about \$70K for the 7 sites. However, only \$1K/year/site just to buy filters and measure fine particle mass. Within NPS and IMPROVE money is not there for even this. Rich Poirot related that NESCAUM has discussed what should go – carbon analysis, sampling frequency, number of sites? Basic situation then is that if things don't change the analysis will remain unfunded and the likelihood of things changing in a favorable way is low. In addition, this is not the highest priority of IMPROVE since these sites are not Class I Areas. The Committee hoped that the NESCAUM states could come up with \$7K to bridge this time while there is so much uncertainty.

Tour

Committee toured the NPS facilities and saw a demonstration of their computer haze imaging system. The Committee also toured the ARS facilities nearby and viewed two videos produced by the NPS concerning visibility.

Adjourned

The chair, Marc Pitchford, adjourned the meeting at noon.

--end --

IMPROVE Steering Committee Meeting Agenda

Dates: June 3 & 4, 1993
Location: Colorado State University, Atmospheric Science Center conference room
Foothills Campus, Ft. Collins, CO

June 3

9:00 am	Introductions, agenda review & approval, etc.	Marc Pitchford
9:30 am	Visibility issues and activities of concern to: FS (monitoring strategy) FWS (new sites) BLM (?) NPS (monitoring strategy) EPA (CASTNet) WESTAR (?) STAPPA (data availability, Mt. Zirkel) NESCAUM (particle sampling)	Rich Fisher Sandra Silva Scott Archer Bill Malm Marc Pitchford John Core Dan Ely Rich Poirot
11:00 am	Network operations status report Aerosol monitoring and analysis Optical and photographic	Bob Eldred John Molenaar
12:00 pm	Lunch	
1:30 pm	Data reporting and analysis Database access & report on 1 st 3 years Quarterly newsletter & other publications	Bill Malm Dave Dietrich
2:00 pm	Funding for 1993 and beyond EPA (FY93, state grant changes) NPS (FY93) Other federal agencies Possible future state resources	Joe Elkins Bill Malm Rich Fisher, etc. John Core, etc.
2:30 pm	Possible relationship with the British Columbia Visibility Program	Peter Reid
3:00 pm	Tour computer imaging system for haze simulations	Bill Malm
3:45 pm	Tour ARS facilities	John Molenaar
5:00 pm	Adjourn for the day	

June 4

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|----------|---|----------------|
| 9:00 am | Future changes in network operations
Utility of particle monitoring only sites
New nephelometer versus transmissometer
Light absorption versus light absorbing carbon
Quality assurance audit
Monitoring priorities: what's the first to go
in a budget squeeze or the first to be added
with spare dollars? | Marc Pitchford |
| 10:30 am | Break | |
| 10:45 am | Future changes in data & analysis availability
Protocol for obtaining data
Training for data users (workshops or pamphlets)
Anticipated publications | Bill Malm |
| 11:15 am | Possibility of a federal visibility center and its
relationship to IMPROVE | Marc Pitchford |
| 12:00 pm | Adjourn | |

IMPROVE Steering Committee Meeting Participants
June 3 & 4, 1993

<u>Name</u>	<u>Organization</u>	<u>Phone</u>
Marc Pitchford	NOAA/EPA	702 895-0432
John Core	WESTAR	503 220-1660
Scott Archer	USDI-BLM	303 236-6400
Mark Green	Desert Research Institute	702 895-0445
Rich Fisher	USDA-FS	303 498-1232
Brian Mitchell	NPS	303 969-2071
Rich Poirot	VT DEQ/NESCAUM	803 244-8731
Bill Malm	NPS	303 491-8292
David Dietrich	Air Resource Specialists, Inc.	303 484-7941
Dan Ely	CO Dept. of Health/STAPPA	303 629-3228
Bob Eldred	University of California, Davis	916 752-1124
Tom Cahill	University of California, Davis	916 752-1120
Pete Lahm	USDA-FS	602 207-2356
Mark Scruggs	NPS	303 969-2077
Peter Reid	BC Environment	604 371-6296
Joe Elkins	US-EPA	919 541-5653
Sandra Silva	USDI-FWS	303 969-2814
Ellen Porter	USDI-FWS	303 969-2814

IMPROVE Monitoring Network Configuration
Optical and Scene Components
June 8, 1993

Location	Trans.	Neph.	Camera	AT/RH	Notes
<u>IMPROVE</u>					
Acadia	-	1	1	1	Remove transmissometer. Install Optec nephelometer (6/8/93).
Big Bend	1	-	1	1	
Boundary Waters	-	1	1	1	
Bryce Canyon	-	-	1	-	
Bridger	1	-	1	1	
Canyonlands	1	-	1	1	
Cape Romain	-	-	-	-	
Chiricahua	1	-	1	1	
Crater Lake	-	1	1	1	Install Optec nephelometer (7/93).
Denali	-	-	1	-	
Dolly Sods	-	1	1	1	
Edwin B. Forsythe	-	1	1	1	
Glacier	1	-	1	1	
Grand Canyon	2	-	2	2	
Great Smoky Mtns.	-	1	1	1	
Jarbridge	-	1	1	1	
Linville Gorge	-	-	-	-	
Lyebrook	-	-	1	1	Optec nephelometer; installation decision required.
Mammoth Cave	-	1	1	1	
Mesa Verde	1	-	1	1	Funding (remove transmissometer?)
Mt. Rainier	-	1	1	1	
Okefenokee	-	1	-	1	Camera stolen; new location being investigated.
Rocky Mt.	1	-	1	1	
San Geronio	1	-	1	1	
Shenandoah	1	-	1	1	
Sipsey	-	-	1	-	
Tonto	1	-	1	1	Funding (transmissometer reinstallation on hold).
Upper Buffalo	-	1	1	1	
Weminuche	-	-	1	-	
Yosemite	1	-	1	1	
<u>IMPROVE PROTOCOL</u>					
Badlands	1	-	1	1	
Bandelier	1	-	1	1	
Great Basin	1	-	1	1	
Great Sand Dunes	-	-	1	-	
Guadalupe	1	-	1	1	
Haleakala	-	-	1	-	
Hawaii Volcanoes	-	-	1	-	
Lassen Volcanic	-	-	1	-	
National Capital	-	-	1	-	
Petrified Forest	1	-	1	1	
Pinnacles	1	-	1	1	Funding (remove transmissometer?)
Point Reyes	-	-	1	-	
Redwood	-	-	1	-	
Yellowstone	1	-	1	1	Funding (remove transmissometer?)
<u>BLM SITES</u>					
Black Canyon	-	-	1	-	
Craig	-	-	1	-	
TOTALS	20	11	44	32	