IMPROVE Steering Committee Meeting Summary
June 2 & 3, 2004
Glacier National Park Community Building; West Glacier, MT
06/9/04 Draft by Gloria Mercer

Overview

The steering committee met at the Community Building in Glacier National Park, MT, on June 2 and 3, 2004. A copy of the agenda and meeting participants is attached.

Major discussion topics included:

- Aerosol denuder tests
- Nitrate and ammonium ion studies
- Biogenic smoke studies
- New XRF system
- Old vs. new carbon analyzers
- Fine particle data at the detection limit
- Relocated sites and data comparisons
- Transmissometer tests
- Nephelometer comparisons tests
- IMPROVE Web site update
- Sampler auditing and QA/QC

The following summarizes the meeting discussions in greater detail as shown in the agenda.

Welcome and Introductions

Leo Marnell, chief of Glacier National Park's science division, welcomed the group. Attendees introduced themselves and most acknowledged this is their first time visiting Glacier NP. As requested presentations made during the meeting will be posted on the IMPROVE Web site. A representative from Environment Canada stated that Canada is interested in having an IMPROVE Protocol site collocated with the Environment Canada network to allow for cross-comparison with the IMPROVE Network.

Aerosol Monitoring

Network Operations:

Sample Recovery. Year 2003 sample recovery statistics are completed. Recovery for the year is 95% (channel A only). Recovery for each quarter during 2003 (1st, 2nd, 3rd, and 4th) is: 96%, 94%, 94%, and 96%. Data losses were due to several factors including operator no-shows, incorrect filter installation, power outages, damaged filters, equipment malfunctions, or clogged filters (common during fires). Regional Haze Rule requirements state that sites must achieve at least 75% annual completeness, achieve at least 50% completeness in each calendar quarter, and have no more than 10 consecutive missed samples. Sites failing Regional Haze Rule requirements in 2003 were: Cohutta, Death Valley, Glacier, Guadalupe Mountains, Hells Canyon, Indian Gardens, Point Reyes, and Sequoia. UC-Davis will strive to improve recovery by:

stressing the 10 consecutive missed sample limit, shipping replacement equipment to the site immediately instead of attempting on-site repairs, and sending field staff to the site if other remedies have failed.

Data Delivery. To facilitate state-review of IMPROVE data, CIRA post new data in a review section on the IMPROVE web site for a 1-month period prior to including it with the rest of the data in the database. September, October, and November data are currently being processed at UCD for delivery to CIRA. For the September and October data, the sulfate/sulfur ratio was found to be uniformly lower than historical values. UC Davis has been investigating possible reasons for this difference. *[Subsequent to the steering committee meeting, UCD resolved the issue when they discovered the use of an incorrect XRF factor in the calculation of sulfur concentrations. The corrected data will be available on the IMPROVE web site shortly].*

New Sites. By summer 2004 there will be 176 full IMPROVE and IMPROVE Protocol aerosol monitoring sites. New sites include: Ambler, AK; Frostburg, MD; Petersburg, AK; and Shamrock Mines, CO.

Additional Networks. The Speciation Trends Network (STN) has had collocated sites with the IMPROVE Network since 2001 at Puget Sound, WA; Mount Rainier, WA; Washington, DC; Dolly Sods, WV; Phoenix, AZ; and Tonto, AZ. Further comparison of STN vs. IMPROVE networks at additional urban sites has begun this year in New York City, Pittsburgh, Chicago, Atlanta, Birmingham, Houston, and Detroit. Additional urban comparison sites are planned in California at Fresno and Rubidoux once siting logistics have been arranged. In the 2001-2002 data, $PM_{2.5}$ and chemical species compare well between both networks, but iron, silicon, and calcium don't compare well. The differences apparent at the lower detection limits are not unexpected.

UC Davis has been investigating data analysis approaches for paired samplers that are not overly influenced by outlier data points. One favorable approach involves comparing the actual observed differences between data from collocated sites to the expected differences generated from known measurement uncertainties. The ideal percent of observed error within the estimated error is 68%, based on one standard deviation. Flagging of internally inconsistent data, such as discrepant sulfur and sulfate concentrations, was discussed; opinions differed on the need for this.

There will be 24 collocated quality assurance modules (A, B, C, and D) in the IMPROVE QA Network by the end of summer. These QA modules will operate indefinitely to provide a measure of the data precision for the network. Data from the collocated modules will undergo the same quality control checks as will data from the primary sampler, but they will not be used to correct or adjust the primary data.

Investigations & Special Studies:

Technical Investigations. IMPROVE Network field denuder tests were performed for one-month periods during 2003 at Hance, Brigantine, and San Gorgonio. The objectives were to assess any differences in nitric acid denuding efficiency due to different denuder configurations, and to examine the influence that denuder configuration may

have had on measured concentrations, if any. The tests included five denuder configurations: 1) no denuder, 2) a newly coated denuder (IMPROVE standard), 3) an uncoated denuder, 4) a coated denuder with no glycerol, and 5) a used denuder (i.e. used for one year at Joshua Tree monitoring site). All test results demonstrated that the five configurations agreed within measurement uncertainty. Laboratory denuder tests are just beginning at Colorado State University by Jeff Collett's group. The tests involve measuring known nitric acid (HNO_3) concentrations with assorted denuders at varied temperature/relative humidity to simulate field conditions.

Hi-vol collection of samples for carbon-14 analysis is being performed at six sites. Six-day integrated samples will be collected during the periods June-July-August and December-January-February. Analysis will be performed at Lawrence Livermore National Laboratories by accelerator mass spectrometry. Carbon 14 hi-vol collection will also be performed next year at different sites.

Davis Test Site. The new test site at UC-Davis is on the roof of the Engineering Building, next to Crocker Nuclear Lab. The site currently has two sampler shelters, and one additional shelter is planned. Examples of experiments that may be performed include routine diagnostics, tests of sampling changes (e.g., new cassettes, filter lots), and special investigations (e.g., nylon filter characteristics, sampler port dependence, Version I vs. Version II samplers).

PM10 speciation. PM_{10} speciation research is being performed at nine sites. Sampling is conducted using Teflon, nylon, and quartz on $PM_{2.5}$ modules and Teflon, nylon, and quartz on PM_{10} modules.

GRSM 2004. A study will occur in mid-July to mid-August to characterize ion concentrations and measurement methods in a humid, acidic, summer environment. UC-Davis (UCD), Colorado State University (CSU), and the Tennessee Valley Authority (TVA) will participate. UCD will perform ammonia contamination tests and collect daily speciation samples using $PM_{2.5}$ and PM_{10} IMPROVE modules. CSU will use URG filter pack/denuders for ammonium ion (NH_4^-) loss, water extraction efficiency, and aerosol acidity; MOUDI for ion size distributions; and PILS for $PM_{2.5}$ ions with 15-minute resolutions. TVA will study continuous ammonia and continuous sulfate analyses.

Ion Studies. An IMPROVE ion/nitrate study was performed earlier this year at Big Bend, Yosemite, San Gorgonio, and Grand Canyon to determine the characteristics of ionic aerosol present at IMPROVE sites. The study shows that nitrate may be present in fine or coarse modes. Instrumentation included a Particle Into Liquid Sampler (PILS), a Micro Orifice Uniform Deposit Impactor (MOUDI), and a URG $PM_{2.5}$ cyclone/annular denuder/filter pack sampler that operated for one month at each site. Study results indicate that high $PM_{2.5}$ nitrates in Big Bend are probably associated with Gulf flow, and the nitrate replaces chloride in sea salt aerosols (the reaction with sea salt results in coarse mode nitrate). Results at Yosemite show carbon-dominated aerosol and $(NH_4)_2SO_4$. Results at San Gorgonio show a large diurnal variability and nitrates are primarily ammonium nitrate, and at Grand Canyon, nitrates appear in coarse mode, which appear to be associated with the sodium ion (Na^-) and calcium ion (Ca_2^-).

Nitrate ion (NO_3^-) extraction efficiency on nylon filters by water as employed by IMPROVE is the topic of tests being conducted as part of the special studies. High efficiency was found in the first three studies. The San Gorgonio experiment had lower efficiency and will be repeated this summer. Ammonia loss on the nylon filter was significant. Nylon recaptures volatilized NO_3^-, but 10% - 40% of the ammonium ion is lost. Only a few IMPROVE sites include ammonium ion measurements. Data form these should probably be not be use in light of such significant biases.

Biogenic Smoke. Currently there are no methods to routinely differentiate anthropogenic organics from natural smoke. While sulfates concentrations are generally decreasing across the country, organics are staying the same or increasing. Comparisons of wild fire emissions and ambient carbon concentrations imply that the fraction of organic carbon attributed to fire in the northwest and small areas of the southwest during 2000 is quite high, while in the southeast it is generally small. To better understand smoke impacts, a biogenic smoke study was performed at the Turtleback Dome Sampling Site in Yosemite (July-September 2003), and wood smoke source sampling was conducted at the USDA-Forest Service Fire Science Laboratory in Missoula, MT (November 19-26, 2003). There is evidence that the light scattering contribution of smoke is being underestimated. Organics are also probably weakly hygroscopic. Organic carbon is often highly correlated with water-soluble potassium suggesting smoke.

Aerosol Analytical Methods:

New XRF. A new XRF vacuum system is under development and evaluation at UC Davis. XRF analysis in vacuum is more consistent than the current system that uses helium (He) flow, and it avoids He degradation of the beryllium detector window. A thorough comparison of the old and new systems will be made before the changeover. Replication analysis is continuing on archived filters, with interlaboratory comparison planned by Research Triangle Institute (RTI) and others. Ultimately four vacuum systems will be constructed to minimize backlogs during periods of high use.

Mercury Measurement. Particulate Mercury (Hg) is not routinely reported to the IMPROVE database, though it is available from the XRF analysis. Mercury appears in the atmosphere in 3 forms: 1) elemental mercury vapor (from coal-burning and volcanic eruptions), 2) reactive gas-phase Hg, and 3) particle bound Hg. IMPROVE XRF analysis measures principally only the particle bound Hg (with minimum detection limit of 0.05 ng/m^3), but is incapable of measuring the majority of the atmospheric mercury which resides in the other two forms and is not captured during the filtration sampling process.

Carbon Analysis. An evaluation was performed of the equivalence of carbon concentrations from the thermal-optical analyzer used since 1985 and the new Model 2001 analyzer. The currently used analyzers need to be replaced at some point because it's getting to be harder to keep these 15 year old instruments going. Organic carbon (OC) and elemental carbon (EC) appear to be the same on the original and the

Model 2001, but are not the same for the individual organic and elemental carbon fractions when using nominally the same operational programs (i.e. temperatures and carrier gases) for each analyzer. A detailed study of the temperatures and oxidation environments for samples in the two versions of the carbon analyzers identified a number of reasons for the differing carbon fraction results and a way to adjust the operating characteristics of the new analyzer to match the actual operating conditions of the older analyzers. A summary of the various differences among the thermal/optical analysis configurations and parameters was presented. The Model 2001 analyzer attains more precise temperature control than the original analyzer. The original analyzers permitted small amounts of oxygen to be included with the helium during the OC analysis phase. This is reduced in the newer analyzer. Additional steps to be done include: documenting the precision of the Model 2001; modifying procedures to include performance tests of temperature, oxygen content, and optical calibration; devising a transition protocol and documenting the results; and obtaining approval for the instrument change. In another study, IMPROVE-TOR and STN-TOR analysis were compared. The transmittance method yields a larger value than the reflectance method for the optical correction of the charring of vapor deposited carbon. Also by splitting the filters and separately analyzing the front and back half of a filter another study showed that much of low temperature OC is adsorbed organic vapor.

Aerosol Data Interpretation:
Trends. Long-term trends in IMPROVE sulfate, IMPROVE sulfur, and CASTNet sulfate were compared to determine the temporal stability of the respective measurements. Inter-method biases were observed to vary somewhat from year to year.

MDLs. Behavior of fine particle elemental data near the detection limit is being studied using the results of hundreds of reanalysis of the same filter to produce the measured concentration distributions for each element. IMPROVE XRF elemental analysis routinely reports three values, the concentration, the uncertainty, and the detection limit. Each of these numbers is independent of the other two. This work demonstrates that the uncertainty and detection limit estimates that are routinely reported are generally quite accurate. The work also clearly demonstrates the problems of using data that is near the detection limit because of large uncertainties for these low values.

Site Comparisons. When a site is to be relocated for whatever reason, an assessment of data from concurrent measurements made at the old and new locations are performed, if possible. Three IMPROVE sites have been relocated during the past year: San Gorgonio, August 2003; Mount Rainier, November 2003; and Zion, January 2004. San Gorgonio had tree growth that resulted in a violation of sampler siting criteria at the monitoring site. The site was relocated and both sites operated concurrently for 3-4 months. The new site has a different sampler height, but measurements seem to agree well, with a difference in calculated light extinction of less than 1 dv. The Mount Rainier site was relocated a short distance due to construction by the National Park Service. The construction precluded any opportunity for collocated sampling.

The Zion site, though within the class I area boundary, was in close proximity to an Interstate highway (I-15), so the site was moved several miles away to a location much

nearer to the main entrance to Zion Canyon on the southeaster boundary to the park and about 1000 feet lower in elevation than the original site. The relocated site was different enough that it was given a new site ID (ZICA) to distinguish it from the old side ID (ZION) in the database. The sampler at the old site was in a shelter and at the new site it is in a standard wooden structure. The data between sites show some variability; the new site generally has more total mass but sulfate values are similar. Measurement differences from the two sites are slightly more than 1 dv. The measurements usually track well, but higher EC is recorded at the old site, perhaps reflecting influence of vehicle emissions. The two Zion sites will be collocated for one year.

The State of South Dakota raised concerns about a paved road and a campground near the Badlands site. A test site, 23 km west of the monitoring site, was installed to evaluate these concerns. The two sites operated concurrently from July-October 2003. Calculated light extinction values agree at both Badlands sites, with differences of <1 dv. Somewhat more EC is recorded at the Badlands IMPROVE site (maybe from diesel buses) but more OC is recorded at the Badlands test site. Sulfate values agree extremely well. It was concluded that the two sites are sufficiently similar in concentrations that moving the site would not be warranted.

As part of the Badlands investigation it was noted that the existing site is in an air-conditioned shelter but the test site was on an outdoor stand. IMPROVE protocols call for near-ambient temperature sampling to avoid alteration of the ambient aerosol. UC Davis plans to determine the number of network sites that are air conditioned and to propose an approach to remedy this situation. UCD will also assess sampling bias that may result from sampling in shelters without air conditioning, as these shelters tend to be warmer than ambient.

IMP/STN Comparison. (see earlier presentation). Collocated carbon measurements from the two systems agree pretty well when the STN OC data was blank-corrected. EC is within 10%, which is very good agreement and contrary to expectations based on previous laboratory comparisons in the literature.

Mass Balance Carbon. This presentation describes a new approach for improving our understanding the components of FRM mass collected on Teflon filters. This was tested using data for six FRM sites (Mayville, Chicago, Indianapolis, Cleveland, Birmingham, and the Bronx). The approach begins by determining the amount of ammonium nitrate retained in on FRM filter. A model uses sampling temperature and relative humidity to determine how much nitrate is retained on the Teflon filter. The next step was to calculate the water associated with the sulfates and nitrates on the filter during the gravimetric weighing of the filter. Finally the carbonaceous mass is estimated by subtracting the mass of the non-carbonaceous components (e.g. nitrates, sulfates, water, and ammonium) from the gravimetric mass. The uncertainties in this approach may be no worse than the uncertainties inherent in determining carbonaceous mass from TOR analysis of OC which needs to be blank corrected and multiplied by a factor to convert OC to organic compound mass.

Optical & Scene Monitoring

Optical Network Status

The network currently consists of 44 nephelometers and 23 transmissometers. Agencies participating in the network include: Arizona; USDA-Forest Service; Wyoming; Wisconsin; Tahoe Regional Planning Agency (TRPA); Lake Michigan Air Director's Consortium (LADCO); Visibility Improvement State and Tribal Association of the Southeast (VISTAS); Colorado Department of Public Health & Environment; and Clark County, NV. Fully instrumented sites are Grand Canyon, Big Bend, Petrified Forest, Cloud Peak (WY), and Thunder Basin (WY). Fully instrumented urban sites are in Fort Collins, CO; Denver, CO; Phoenix, AZ; and Tucson, AZ. Nephelometer data are submitted 90 days after the end of a quarter, and transmissometer data are submitted annually. ARS attempts to submit the data six months after the end of the year of record.

Transmissometer Calibration Tests

Tests are being performed to reconcile issues with the instrument. A transmissometer measures transmittance and uncertainty results from a bias in extinction from the transmittance measurement. Several variables are involved in the transmittance measurement, and are included in calibration calculations. The instruments are calibrated on a 300 m path. Beam uniformity tests were performed on 200, 300, 500, and 800 m path lengths using the LPV-2 and the receiver was aligned on 13 points. Test results indicate that the 200 m path was very uniform, the 300 m path was good, and the 500 m path was the most uniform. The 800 m path was also good, but it had some interference from surface reflections. A lamp burn-in time test was also performed using the LPV-2, with 8 lamps (4 operating continuously and 4 operating in a cycled mode) on the 300 m path. Calibration was performed using lamps that were burned-in at 0, 24, 30, 3,7, 49, and 61 hours. The current standard operating procedure calls for 36 hours of burn-in before operational use. Results of the test show monitoring feedback voltage for corrected lamps had a very small standard deviation change.

Nephelometer Comparison Tests

Ecotech is a new nephelometer manufacturer based in Australia. Comparison tests are currently being run at Air Resource Specialists (ARS), and include 2 Ecotech M903s, 2 Optec NGN-2s, 1 Optec NGN-3 size-cut, and 2 Radiance Research nephelometers. Meteorological sensors are also included in the tests. The Ecotech M903 uses an LED light source instead of a light bulb the other manufacturers use. Nine LEDs are arranged in a 160-degree array, which run cooler than the light bulbs. NOAA has one of these instruments and it is generally known as a good instrument. In the test, the M903s are size-cut to $PM_{2.5}$. It became apparent that black tubing must be used with the M903s; white tubing was initially configured but the tubing was allowing light to enter the instrument chamber. An engineer from Ecotech is visiting ARS in two weeks. Preliminary data indicate that all instruments track well. The Optec NGN instruments are capable of 1 Mm^{-1} resolution and are much more stable to calibrations than the other instruments. The Ecotech instruments can obtain a better resolution and can also use different calibration gases. The Ecotech instruments result in about 0.5-degrees of heating while other instruments can see up to 15-degrees of heating. Costs for the

Ecotech M903 are rising; it currently costs about $15,000, compared to $30,000 for TSI instruments.

Optical Monitoring Open Discussion
An ongoing study is trying to determine why, on clean days, measured scattering is lower than reconstructed aerosol scattering, and why the reverse is true on dirty days. Ecotech will be at the visibility conference in October and display their new nephelometer. Contact ARS if you are interested in this instrument. Four Phoenix-area nephelometers report to AirNow as $PM_{2.5}$ equivalents.

IMPROVE Web Site Update
The IMPROVE Web site currently posts IMPROVE data and metadata, various graphics, analytical tools, a forum, and more. A complete overhaul of the database is being completed, much of which will be invisible to the user. Aerosol data are updated monthly, nephelometer data are updated quarterly, and transmissometer data are updated annually. The site also includes special studies data as well as various publications (annual aerosol reports, IMPROVE meeting presentations, operating procedures, newsletters, meeting minutes, photographs, and gray literature). Aerosol data are posted on a preliminary page and states have 30 days for review before data are added to the database. Very little feedback is received from the states; perhaps they are not aware of this 30-day review option. We will get an email list of the appropriate contact persons in each state from STAPPA so we can routinely notify them via email of the availability of the data that can be reviewed each month. The Web site receives about 1,000 different visitors every month, from 87 countries. Future additions to the Web site are planned, including QA/QC tools, VIEWS analysis, data display tools, an expanded education section, and an email notification system on the availability of IMPROVE data. These additions will hopefully be added this year. The education section will include an interactive page of photographs, examples of haze, types of impairment, the science of visibility, and a map and video representation of plume dispersion from power plants. The VIEWS Web site has an improved metadata browser with GIS capability so that users can add roads, parks, urban areas, etc. to a site maps.

Data Quality Assurance
Lindsey DeBell is the new Quality Assurance (QA) Coordinator at CIRA. She will be responsible for updating site metadata, performing Web page and database QA, and implementing and reporting CIRA's QA procedures. Database review is performed quarterly and annually. Validation levels 0, 1, 2, and 3 for aerosol monitoring were defined, and a nomenclature change may be made in the future. A QA report will be developed, summarizing the findings of the QA process and providing examples of identified problems. The reporting process is yet to be determined. Discussion followed, during which it was agreed that the data processing procedures need to be consistent with the QAPP.

Quarterly Newsletter
About 500 individuals are on the distribution list. Meeting attendees feel the newsletter is very well done. The upcoming Web site improvements would be a good article in the

next issue. Few ideas are received from IMPROVE members for articles. Operators chosen for the site operator feature are generally very excited to be selected.

Particle Analysis Contract Update
UC-Davis won the bid for the next Aerosol Coordination and Elemental Analysis contract. The 1-year contract with options for four 1-year renewals is will be signed shortly. The new contract include annual performance reviews.

Budget Review
The 2005 budget (for aerosol only) includes the period 7/1/04 to 6/30/05, coinciding with the dates of the new UC-Davis contract. Of the budget, 66% goes toward elemental analysis and particle coordination, 12% to CSU/CIRA, 13% to carbon analyses, 6% to ion analyses and other miscellaneous components, 1% to other studies, and 2% to preparing the newsletter and coordinating meetings. DRI and RTI contracts expire 9/30/05. The program has a cooperative agreement with CSU and CIRA. Costs to start an IMPROVE aerosol site are about $22.5k with about $17k for the sampler purchase and the remainder for installation materials, labor, and travel. Costs this year to maintain an ongoing site is about $33k per year, which is unchanged from previous years because of efficiencies of scale and practice, but is expected to increase in future years due to inflation of labor and material cost. The NPS is responsible for fiscal performance of the project.

EPA's Audit Program; and States and WESTAR Concerns

The EPA budget for conducting independent field audits of IMPROVE and STN sites has shrunk to the point where few audits are being conducted by EPA. To mitigate this situation, they have instituted a training program for the states/tribes who wish to perform independent audits. Some states seem to perceive this to be an unfunded mandate. The IMPROVE Quality Management Plan (QMP) calls for a certain number of external audits per year for the IMPROVE aerosol network. The suggestion was made that we should re-evaluate the audit requirement and that we should do whatever is necessary to ensure that we meet them. Various options for conducting additional audits were discussed.

States need to feel confident about data and quality assurance (QA) methods. WESTAR requests IMPROVE to help with this issue. If a QA requirement is needed for the aerosol program, we must find a way to implement it. EPA Region 10 has indicated to WESTAR that it has no funds to do IMPROVE QA audits. Currently, only about five audits per year are performed; this means that a long time passes before all monitors get audited. It is in the best interest of states to have good, quality data. UC-Davis is comfortable with the EPA auditor training provided to states and tribes. Perhaps another agency can perform the audits (e.g., ARS, CASTNet contractors). States should also be encouraged to come to the IMPROVE meetings, to build trust and confidence in the program and the federal land managers.

A subcommittee was established to consider what is needed and how best to accomplish it. Darcy Anderson would lead the subcommittee which would include Marc

Pitchford, Ray Bishop, Bob Lebens, Dennis Mikel, Jeff Lantz, Nicole Hyslop, and others who may be interested (contact Darcy if you are interested). The EPA would consider paying expenses associate with required audits after a plan is prepared and reviewed. EPA currently funds a Performance Evaluation Program (PEP) for the FRM network, perhaps this could be extended to the IMPROVE program.

Sampler Quality Control

UC-Davis feels it is not necessary to perform independent flow rate audits at all sites. The routine quality assurance system is designed to identify flow deviations, as noted by the operator, or during annual site maintenance visits. Immediate resolution of unusual flow rates is performed using the following steps: 1) the operator calls and notifies UCD of a non-standard flow rate, 2) the field log is reviewed, 3) the data storage flashcard on the controller that logs the flow rate is compared to the field log, 4) corrections are made, and 5) the incident is documented. Audit differences are resolved by comparing the flow rate audit to the prior calibration, searching for a cause, backdating the audit calibration (if necessary), and documenting the findings. Most flow rate issues are found and corrected within days or weeks. UC-Davis continues to examine routine review and audit procedures to find and resolve flow rate differences more quickly. The state of Arizona requested a hardcopy report documenting each audit performed.

Field Site Tour

After the meeting adjourned, the group traveled to the IMPROVE aerosol and the transmissometer monitoring sites with the site operators.

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IMPROVE Steering Committee Meeting Agenda
June 2 & 3, 2004
Glacier National Park Community Building; West Glacier, MT

Wednesday, June 2

Time	Topic	Discussion Leader
8:00am	Welcome	Park official
8:10am	Introductions and agenda review	Marc Pitchford
	Aerosol Monitoring	
8:30am	Network Operations: • Sample recovery • Data delivery • New sites • Additional networks	UCD team
9:30am	Investigations & Special Studies: • Technical investigations • Davis test site • PM_{10} speciation • GRSM 2004	UCD team
10:30am	Break	
10:45am	• Ion studies (30 min)	Bill Malm
	• Biogenic smoke (60 min)	Bill Malm
12:15am	Lunch	
1:30pm	Aerosol Analytical Methods	
	• New XRF (15 min)	Chuck McDade
	• Particulate mercury (15 min)	Nicole Hyslop
	• Carbon analysis (30 min)	John Watson
2:30pm	Aerosol Data Interpretation	
	• Trends (15 min)	Warren White
	• MDLs (15 min)	Warren White
	• Site comparisons (30 min)	Nicole Hyslop
3:30pm	Break	
3:45pm	• IMP/STN comparison (15 min)	Neil Frank
	• Mass balance carbon (30 min)	Neil Frank
4:30pm	Aerosol monitoring open discussion	Marc Pitchford
5:30pm	Adjourn for the day	

Thursday, June 3

Time	Topic	Discussion Leader
	Optical & Scene Monitoring	
8:00am	Optical network status	John Molenar
8:20am	Transmissometer calibration tests	John Molenar
8:40am	Nephelometer comparison tests	John Molenar
9:00am	Optical monitoring open discussion	Marc Pitchford
9:15am	Break	
	Data & Information Distribution	
9:30am	IMPROVE Web site update	Bret Schichtel
10:00am	Data quality assurance	Linsey DeBell
10:15am	Quarterly Newsletter	Gloria Mercer
	Financial Administration	
10:45am	Particle analysis contract update	David Maxwell
11:00am	Budget review	David Maxwell
11:15am	Open discussion of financial admin.	Marc Pitchford
11:30am	Lunch	
	Independent Field Audit Program	
1:00pm	EPA's audit program	Neil Frank
1:15pm	States and WESTAR concerns	Bob Lebens
1:30pm	Sampler quality control	Chuck McDade
1:45pm	Open discussion of audit program	Marc Pitchford
2:45pm	Adjourn Steering Committee Meeting	
3:00pm	Assemble at IMPROVE monitoring site	
4:30pm	Field site tour completed	

IMPROVE Steering Committee Meeting Participants
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