

## **IMPROVE STEERING COMMITTEE 2014 ANNUAL MEETING**

**Date:** October 15-16, 2014  
**Location:** Cape Romain National Wildlife Refuge, South Carolina  
The Sewee Visitor Center, 5821 Highway 17 North, Awendaw, SC

**Time:** 10/15: 8:00am – 5:30pm  
10/16: 8:00am – 11:30am

### **IMPROVE Steering Committee members present:**

|                        |               |  |
|------------------------|---------------|--|
| Scott Copeland (Chair) | CIRA/USFS     | <a href="mailto:scott.copeland@colostate.edu">scott.copeland@colostate.edu</a>       |
| Bob Lebens             | WESTAR        | <a href="mailto:blebens@westar.org">blebens@westar.org</a>                           |
| Dave Maxwell           | BLM           | <a href="mailto:dmaxwell@blm.gov">dmaxwell@blm.gov</a>                               |
| Gordon Pierce          | CDPHE/NACAA   | <a href="mailto:gordon.pierce@state.co.us">gordon.pierce@state.co.us</a>             |
| Rich Poirot            | VTDEC/NESCAUM | <a href="mailto:rich.poirot@state.vt.us">rich.poirot@state.vt.us</a>                 |
| Rick Saylor            | NOAA          | <a href="mailto:rick.saylor@noaa.gov">rick.saylor@noaa.gov</a>                       |
| Bret Schichtel         | NPS ARD       | <a href="mailto:bret.schichtel@colostate.edu">bret.schichtel@colostate.edu</a>       |
| Charles Turner         | VDEQ/MARAMA   | <a href="mailto:charles.turner@deq.virginia.gov">charles.turner@deq.virginia.gov</a> |
| Jill Webster           | USFWS         | <a href="mailto:jill_webster@fws.gov">jill_webster@fws.gov</a>                       |

### **IMPROVE Steering Committee members not present:**

|            |     |  |
|------------|-----|--|
| Neil Frank | EPA | <a href="mailto:frank.neil@epa.gov">frank.neil@epa.gov</a> |
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### **Additional IMPROVE stakeholders present:**

|                   |                    |  |
|-------------------|--------------------|--|
| Cassie Archuleta  | ARS                | <a href="mailto:carchuleta@air-resource.com">carchuleta@air-resource.com</a> |
| Eric Boswell      | EPA                | <a href="mailto:boswell.eric@epa.gov">boswell.eric@epa.gov</a>               |
| Judy Chow         | DRI                | <a href="mailto:Judy.Chow@dri.edu">Judy.Chow@dri.edu</a>                     |
| Scott Cismoski    | ARS                | <a href="mailto:scismoski@air-resource.com">scismoski@air-resource.com</a>   |
| Dennis Crumpler,  | EPA                | <a href="mailto:Crumpler.Dennis@epa.gov">Crumpler.Dennis@epa.gov</a>         |
| Ann Dillner       | UC-Davis           | <a href="mailto:amdillner@ucdavis.edu">amdillner@ucdavis.edu</a>             |
| Tracy Dombek      | RTI                | <a href="mailto:tdombek@rti.org">tdombek@rti.org</a>                         |
| Jenny Hand        | CSU/CIRA           | <a href="mailto:jlhand@colostate.edu">jlhand@colostate.edu</a>               |
| Nicole Hyslop     | UC-Davis           | <a href="mailto:nmhyslop@ucdavis.edu">nmhyslop@ucdavis.edu</a>               |
| Donna Kenski      | LADCO              | <a href="mailto:kenski@ladco.org">kenski@ladco.org</a>                       |
| William Malm      | CSU/CIRA           | <a href="mailto:wcmalm@colostate.edu">wcmalm@colostate.edu</a>               |
| John Molenaar     | ARS                | <a href="mailto:jmolenaar@air-resource.com">jmolenaar@air-resource.com</a>   |
| Marc Pitchford    | DRI                | <a href="mailto:marcp@dri.edu">marcp@dri.edu</a>                             |
| Tony Prenni       | NPS                | <a href="mailto:anthony_prenni@nps.gov">anthony_prenni@nps.gov</a>           |
| Joann Rice        | EPA                | <a href="mailto:Rice.Joann@epa.gov">Rice.Joann@epa.gov</a>                   |
| Laurie Trinca     | EPA                | <a href="mailto:Trinca.Laurie@epa.gov">Trinca.Laurie@epa.gov</a>             |
| John Vimont       | NPS                | <a href="mailto:john_vimont@nps.gov">john_vimont@nps.gov</a>                 |
| Roxanne Vingarzan | Environment Canada | <a href="mailto:Roxanne.Vingarzan@ec.gc.ca">Roxanne.Vingarzan@ec.gc.ca</a>   |
| John Watson       | DRI                | <a href="mailto:john.watson@dri.edu">john.watson@dri.edu</a>                 |
| Anthony Wexler    | UC-Davis           | <a href="mailto:aswexler@ucdavis.edu">aswexler@ucdavis.edu</a>               |
| Warren White      | UC-Davis           | <a href="mailto:whwhite@ucdavis.edu">whwhite@ucdavis.edu</a>                 |

## DAY 1: OCTOBER 15, 2014

### WELCOME AND AGENDA REVIEW

Scott Copeland opened with welcoming comments and introductions.

### NETWORK REVIEW

#### Optical, Scene, Night Sky

John Molenaar presented *Optical and Scene Networks* (see Molenaar\_OpticalScene\_2014.pptx). In Summary:

- 17 nephelometers operated in 2013 (11 remote, 6 urban nephelometers) and 4 transmissometers (1 remote, 3 urban).
  - ARS contract was renewed with significant cost savings measures including reductions in on-site nephelometer servicing (only service sites collocated with gas monitors, others will be supported remotely), and no funding for R&D, special studies or data analysis.
  - Some background information on the NPS night sky program was presented. Related to this program, images from the Bryce Canyon night sky camera system continue to be captured and archived to record night sky light intensity related to the Alton Coal Mine.
- *Bill Malm commented that the NPS night sky program is exclusively focused on light intensity, and does not consider particle/haze effects on light.*
  - *Marc Pitchford asked if aerosol haze effects on light could be modeled.*
  - *John Molenaar commented that there is not currently funding available to do this*
  - *Bill Malm commented that there are a number of existing models available, but these incorporate lots of assumptions and model accuracy is questionable.*

#### Quality Assurance – Field Audits

Nicole Hyslop presented *IMPROVE Particle Monitoring Network: Quality Assurance – Field Audits* (see Hyslop\_ISCFlowAudits\_2014.pptx). In Summary:

- Thirty two (32) independent field audits were performed in 2013.
  - Four (4) sites had issues with flow rate measurements and three (3) sites had issues with nominal flow differences.
  - In a review of all audited sites, a positive bias was noted in EPA flow measurements.
- *Bret Schichtel asked if this bias had been seen in previous years, and what the uncertainty in flow measurements is.*
  - *Nicole indicated she thought it had been evident in previous years, and that UC-Davis uncertainty is about 3%, but she didn't know what EPA uncertainty might be.*

- After discussions at the 2013 Steering Committee Meeting, new audit responses were adopted in 2014. To date in 2014, there have been 13 audits with 2 failures. In cases where audits failed, UC-Davis has followed up with auditor. In one follow-up test, audit results were confirmed, and a module was replaced. In the other case, results were not confirmed, and UC-Davis is in communication with EPA auditor to resolve the differences.
- UC-Davis plans to send their Field Manager to an EPA hosted auditor training meeting the week on 10/20. Biases and discrepancies noted in previous audits will be discussed.
- *Scott Copeland asked if the Steering Committee could find out about any conclusions regarding the audit bias and discrepancies before the next annual meeting.*

***Action Item: Nicole indicated that she will forward to group any conclusions reached during the auditor training meeting.***

- *Dennis indicated that all trainees would bring their own audit instruments to the training which will allow for some inter-comparisons.*
- *Gordon Pierce commented that temperature fluctuations may contribute to differences.*
- *Dennis responded that, in the flow equation, the error due to temperature variations is small.*
- *Tony Wexler indicated that the current UC-Davis QAPP indicates flow is measured at standard temperature, but local pressure.*

***Action Item: Nicole indicated that she will look into the temperature/pressure standard/local conditions inconsistency in the recently revised UC-Davis QAPP.***

### **Aerosol Monitoring Network Status**

Nicole Hyslop presented *UC Davis Status Report to IMPROVE Steering Committee* (see Hyslop\_ISCOperationsUpdate\_2014.pptx). In summary:

- A map of all current IMPROVE sites was shown, and the only change in 2013 was the addition of a Lake Tahoe Community College site (LTCC) which is independently funded by the Tahoe Regional Planning Agency (TRPA).
- Data are currently submitted through December 2013.
- A resubmittal of 2005-2009 data is planned for November 2013 to make sure data for the years 2005-present use consistent formulations, including changes in OC artifact correction. Data advisories will be submitted for some of the items related to data updates.
- *Marc Pitchford commented that any data processing changes important enough to require a data resubmittal should be documented in a data advisory.*
- *Warren White indicated that data re-submittals are often documented in grey papers.*

- *Bret Schichtel suggested that one data advisory be submitted regarding all of the changes, and a grey paper be used to document the data resubmittal, with references to the data advisory.*
- *Rich Poirot asked if the RHR metrics are automatically recalculated when IMPROVE data are resubmitted.*
- *Scott Copeland indicated that the 2005-2009 5-year progress period metrics would remain “frozen”, as these have already been referenced in a number of RHR progress reports. Previous feedback from States indicated that they prefer the metrics not change, so they don’t have to redo anything they have already done.*
- *Marc Pitchford commented that changes in data are generally not enough to affect the SIPs.*
- *Donna Kenski indicated that she would prefer to use the most updated data in her RHR analysis for the LADCO states.*
- *Marc Pitchford suggested that Scott do some data analysis regarding the differences in the RHR metrics, and that the Steering Committee should make a recommendation to the EPA.*
- *Cassie Archuleta noted that new EPA guidance (April, 2013) suggested use of rolling 5-year averages to determine RHR progress, which adds more implications regarding which data metrics should be “frozen”.*

***Action Item: Scott Copeland agreed to perform analysis regarding changes in RHR metrics due to data resubmittals. The Steering Committee will follow up with a recommendation.***

- *Donna Kenski indicated that some States are still performing data substitutions for incomplete data.*
- *Scott Copeland commented that the need for consistent data substitution methods was discussed at the 2013 Steering Committee meeting, but time and resources have not been available to address this.*
- *Average sample recovery was 91% in 2013. Most data collection issues were due to operator no-shows (24%), equipment problems (19%), power outages (19%) and the 2013 government shutdown (16%).*
- *Five (5) sites did not meet RHR data completeness requirements in 2013, which is the best record in recent history (UC-Davis had a party!). Goal is <5 in 2014.*
- *Dennis asked if operator no-shows are related to fire activity.*
- *Nicole responded that some sites are operated by firefighters, and fires and other issues may affect their availability.*
- *Bret asked if operator issues at sites were recurring.*
- *Nicole responded that some had been recurring in the past, but the lab has recently been more proactive in addressing issues.*
- *Marc mentioned that there used to be a protocol regarding when to contact federal agencies regarding operator issues.*

- *Nicole mentioned that no issues have been reported this year as of October 2014, and lab changes have involved contacting people faster, sending quarterly status reports, and providing additional training information.*
- The NOAB1 site had two (2) lightning hits this year, and is slated to receive a lightning mitigation retrofit.
- For the SAWT1 site, the operator went above and beyond expectations, staying until 10:30pm on a Friday to troubleshoot issues. UC-Davis invested in a small gift for this operator.
- *Bill Malm noted that the NADP network invests in site operator appreciation, including 15 and 20-year pins and other awards.*
- *Warren White noted that a lot of the NADP site operators attend the annual meetings.*
- *Marc Pitchford added that the calendar and newsletter used to provide some operator appreciation and outreach.*
- *Scott Copeland suggested that operator appreciation and outreach funds could be discussed later in the meeting during the budget discussions.*
- Quarterly status reports now are emailed to >300 recipients, and have prompted lots of positive feedback and proactive responses from operators.
- UC-Davis is currently redesigning sampler electronics (e-boxes) as current systems are 15 years old, with some parts being discontinued. Upgrades will also include better GUI and troubleshooting capability, and eliminate the need for on-site calibrations. First prototype boards have been developed and field testing is expected to commence in 2014, with replacement occurring through 2015 & 2016.
- New flow controls (critical orifices rather than needle valves) have been installed at half of the sites.
- The lab has begun using new lab management software that includes additional functionality to better track operator interactions, and better manage filters shipments and archiving.
- The lab QAPP was revised in 2014. New QAPP is streamlined, with more references to SOPs.
- Manufacturer has changed filter resin for Pall PTFE filters. Lab has old filters to last through mid-2016. Lab is conducting tests and working with Pall to get new filters that meet their specifications.

## **LABORATORY REVIEW & METHODS DEVELOPMENT**

### **Status of IMPROVE Carbon Analysis**

Judy Chow (DRI) presented *IMPROVE Carbon Analysis* (see Chowetal\_IMPROVECarbonAnalysis\_2014.pptx). In summary:

- The lab received ~1690 samples per month on average between 7/2013 and 6/2014.

- Sample analysis and reporting time has decreased from an average of ~300 days (4/2011) to ~120 days (6/2014).
- Recent lab improvements include use of NIST certified sucrose calibration standards and design of a new, more stable, laser housing unit.
- In 2013 and 2014, DRI authored/co-authored 31 IMPROVE-related reports and publications.

### Equivalence in OC and EC between Single- and Multi-wavelength Carbon Analyzer

Judy Chow (DRI) presented *Equivalence in OC and EC between Single and Multi-Wavelength Carbon Analyzers* (see Chowetal\_IMPROVECarbonComparison\_2014.pptx). In summary:

- The DRI model 2015 Thermal/Optical Carbon Analyzer is being phased in to replace the 2001 model, which is becoming obsolete.
- New model replaces single- $\lambda$  system with 7- $\lambda$  system, and adds other improvements to increase stability, reliability, efficiency and cost. A prototype has been tested, and a new system is currently under construction.
- Comparisons indicate good correlation between Model 2001 633nm and Model 2015 635nm diode measurements for TC, OC and EC.
- Existing Model 2001 analyzers are also being retro-fit with 7 $\lambda$  diodes before full implementation of 2015 models. The lab expects to begin reporting 7 $\lambda$  data for IMPROVE samples in 2015.

### Optical Characteristics of Multi-Wavelength Carbon Analyzer

John Watson presented *Multi-Wavelength Calibration of Thermal/Optical Analyzer and Potential Applications* (see Watsonetal\_IMPROVECarbonWavelengths\_2014). In summary:

- Light source/detector combinations can yield different results within or between instruments. More accurate  $b_{\text{abs}}$  for multi-wavelength system requires consistency in light intensity measurements. DRI is using a well characterized range of real-world samples (2003 Fresno Supersite filters) to calibrate reflectance and transmittance measurements.
- Preliminary results were shown using multi-wavelength to decouple Black Carbon (BC) and Brown Carbon (BrC) measurements.

### Ion Analysis

Tracy Dombek presented *Ion Analysis* (see Dombek\_RTIfinal\_2014.pptx). In summary:

- RTI is evaluating two new ion chromatographs (MetroLIM and ThermoCap IC systems), as the old instruments are no longer supported. The ThermoCap is emerging as the preference, as it runs continuously with auto-reagent preparation.
- Results were shown for S/SO<sub>4</sub> ratios, indicating species were highly correlated, with slightly higher ratios during summer months.

- 115 samples where <80% of sulfur was attributed to sulfate were re-analyzed without an oxidation step. Only samples from AK showed some recoverable sulfate.
- *Bret Schichtel asked what kinds of filters are being used.*
- *Tracy responded that S was measured via XRF on Teflon filters and SO<sub>4</sub> via IC on nylon filters.*

### Laboratory Inter-Comparisons and Issues

Eric Boswell presented *Experimental Inter-Comparisons of the Chemical Speciation Laboratories* (see Boswell\_LabIntercomparisons\_2014.ppt). In summary:

- Collocated MetOne SuperSASS instruments were used to generate reference samples.
- Teflon filters and metallic weights were sent to seven (7) labs, including DRI, RTI and UC-Davis, with NAREL as the reference lab.
- Most comparison results were well under advisory level differences.
- The NAREL reference standards showed more variation than the audited external lab results for nylon filter analysis of sodium and potassium.
- XRF analysis results were shown for replicates from several labs, with 3 $\sigma$  uncertainties indicated on the plots.
- *Bret Schichtel asked what the reported uncertainties are based on.*
- *Eric responded that a source of uncertainty might be the reporting units from the individual labs, as some labs report  $\mu\text{g}/\text{cm}^2$  and some report  $\mu\text{g}/\text{filter}$ . EPA references for deposit area for the MetOne SuperSASS are used by NAREL when conversions are necessary.*
- *John Watson noted that the filter holder defines the deposit area, rather than the instrument. John also noted that precision rather than uncertainty might be a better term to characterize the results, but it is important to know how the reported uncertainties were calculated.*
- *Eric commented that the EPA distributes a questionnaire to find out how each lab calculates uncertainty.*
- *Cassie asked if it would be better for EPA to issues guidelines on how uncertainty should be calculated, rather than asking how it is calculated.*
- *Eric responded that the variations in analysis and reporting methods add a lot of variables, so it would be difficult to prescribe uncertainty calculation methods.*

### Teflon filter orientation

Nicole Hyslop (UC-Davis) presented *Multi-Element Reference Materials for XRF (and Filter Orientation)* (see Hyslop\_ISCFilterOrientation\_2014.pptx). In summary:

- XRF standards available on the market are limited, so the lab has worked to develop multi element reference standards using aerosolized deposits of standard solutions on filters.
  - Samples were distributed to eight labs, including New Zealand and UK. Ratios to potassium (K) were evaluated. Results were generally good, with some noted biases from specific labs.
  - Filter deposit areas were also investigated, as filter deposit area is used for conversions between g/filter and g/cm<sup>2</sup>.
  - Inconsistencies were noted, as a Pall 47mm PTFE filter internal diameter measures ~38mm (11.34 cm<sup>2</sup>), while EPA uses 11.86 cm<sup>2</sup> for MTL filters.
- *Joann noted that EPA offers instrument specific filter areas, along with a +/- range, which are based on the FRM design specifications as reported by a manufacturer. These areas are not measured or built from filter exposer, which would depend on the filter holder.*
- Filters are also designed with a raised ring, and some analysis was performed with the raised ring up vs. raised ring down. The potential impacts of differences in filter orientation are still being assessed.

### Multi-wavelength HIPS (“BITS”)

Tony Wexler presented *Broadband Integrating Transmittance/Reflectance Spectrometer (BITS)* (see Wexler\_BITS\_2014.ppt). In summary:

- The lab has done some testing and calibration of a HeNe laser with an integrating sphere with wavelengths ranging between 190 and 1700nm. Schematic of new system was shown.
  - Successful calibration was achieved using neutral density filters, but application of the calibration to PTFE filters gave noisy results. Calibration tests were performed using successive stacks of PTFE filters to retain diffusion properties of filters.
  - Upcoming development work will include additional calibration work, assembly of a complete system, and tests on IMPROVE archive samples for comparisons to HIPS.
- *Marc Pitchford asked how long it would be before results on IMPROVE samples are available.*
- *John Watson replied that results would hopefully be available prior to the next meeting.*

### Predicting TOR OC and EC with FTIR

Ann Dillner (UC-Davis) presented *Predicting TOR OC and EC from FT-IR Spectra of IMPROVE Samples* (see Dillner\_PredictingTOR\_OCandEC\_2014.pptx). In summary:



- The IMPROVE heating process is destructive to filter samples. As an alternative, non-destructive FTIR spectrums were used to determine OC and EC concentrations from module A Teflon filters.
  - Tests included 794 samples collected in 2011 from 7 sites. About 2/3 of the samples were used along with TOR OC and EC data to create a calibration, and remaining 1/3 of samples were used to test calibration. Different calibration optimization methods were evaluated.
  - For OC and EC, preliminary results show FTIR method can be optimized to have similar prediction errors and MDL as TOR methods. For OC, differences in organic composition increased error (e.g. ammonium absorbs in the same spectrum as organics).
  - Next steps include additional analysis and calibration work leading to development of a calibration model for the entire IMPROVE network.
- *Marc Pitchford asked if results suggested you could use the FTIR spectrums to predict NH<sub>4</sub>.*
  - *Ann responded that yes, it could be used, but volatilization would affect the sample results.*
  - *Judy Chow indicated that the FTIR spectrum of a blank Teflon filter can vary a lot, and that this should be factored in with a pre- and post- test.*
  - *Nicole responded that pre- analysis is not available for archived filters. She also added that the Teflon filters are subject to effects from stretching and rotation, which may affect results.*
  - *Judy added that maybe the filters could be “marked” to show filter orientation during installation.*
  - *Marc Pitchford asked if the more assuring statistics might be guided by functional groups.*
  - *Ann responded that the lab has started to look at what function groups cause variations.*
  - *Bill Malm asked how well high concentration data points are predicted, and added that results may be affected by differences in filter handling.*
  - *Marc Pitchford added that characterizing high concentration data points, such as high smoke days, might be informative.*
  - *Tony Prenni asked if functional groups on the surface of the EC might affect the spectrum.*
  - *Bill Malm responded that EC is a mis-nomer, it is actually a different molecule.*
  - *Jenny Hand indicated that a recent paper supported the continued use of “EC” as an operational definition (e.g. if you call it EC, you know it is TOR).*

### Identifying smoke in IMPROVE Samples using FT-IR

Ann Dillner and Sean Raffuse (by phone) presented *Identifying Smoke Impacts in IMPROVE Samples* (see Dillner\_IdentifyingSmokeImpacts\_2014.pptx). In summary:

- FT-IR spectra results were combined with fire assessment results to develop a “proof of concept” algorithm designed to determine if smoke impacts are evident in an IMPROVE sample.
  - Fire events in 2013 were analyzed, including the Rim Fire in Yosemite (for YOSE, HOOV and BLIS sites) and prescribed fires in the southeastern US (for ROMA, SAMA and OKEF sites).
  - Simple “Yes/No” models agreed most of the time for “probable” fires, and less for “maybe” fires. Models did better for wild fires than prescribed burns.
  - Additional development of both the qualitative methods and the FT-IR calibration methods are planned.
- *Rich Poirot asked if relative abundance of compounds was considered.*
  - *Ann responded that relative area in the FT-IR spectra was used, not mass.*
  - *Eric Boswell asked if impacts related to the altitude of the plume were considered.*
  - *Sean answered that some plume heights are resolved in some of the fire data available, but not all.*
  - *Marc Pitchford suggested looking at non-soil K as part of the detection criteria, as these data are ready available from IMPROVE samples.*

## **DATA PROCESSING, DISTRIBUTION AND QUALITY**

### **Data analysis and uncertainty**

Warren White (UC-Davis) presented *Data Analysis and Uncertainty* (see White\_DataUncertainty\_2014). In summary:

- A data advisory was released indicating probable contamination of Cr and Ni data at the NOAB site between 2008 and 2012. Contamination appears to have begun with installation of a new shed, but it is unknown what happened in August 2012 when the issue appeared to become resolved in data.
  - A data advisory was released for the CORI site, indicating contamination of Zn and MF. This appears to be related to site operator use of caulking near the sample inlets.
  - Advisories were also released for  $F_{\text{abs}}$  after 2003 due to revised calibrations.
- *Mark Pitchford asked if these data should be taken out of the IMPROVE data set.*
  - *Warren responded that the data are not removed from the dataset, but the advisory recommends that the data are not used for analysis.*
- Data regarding regional transport of chemically distinctive dust were also presented for the Bosque del Apache, White Mountain and Salt Creek sites. Specific characteristics of soil composition at these sites were discussed.

- *Bret Schichtel noted that gypsum concentrations shown for the White Mountain site peaked in the Spring, which corresponds to Spring peaks that have been seen in sulfate throughout the US.*
- *Warren indicated that the high gypsum peaks only show up at a few sites, including White Mountain and Salt Creek.*
- *Marc Pitchford noted that most evaporated carbonate does not contain sulfur.*

### **IMPROVE and FED websites**

Bret Schichtel presented *Current and Future State of the IMPROVE Website* (see Schichtel\_IMPROVEwebsite.pptx). In summary:

- In 2000, the original objectives for the IMPROVE website included serving as a mechanism to distribute data, graphs and program transparency through data advisories. The current VIEWS website is getting old, and it is becoming necessary to re-think the purpose and structure.

***Action Item: Bret suggested that a committee be formed to help guide the development of a new website.***

- *Bret indicated that Rodger Ames (CIRA) may be available part-time for website work this winter, and noted that funding questions will require a consortium of FLMs, EPA and States.*
- The FED (Federal Land Manager Database) website was also discussed. This website took over from VIEWS, and was primarily designed to meet reporting needs of the NPS and FS.
- *Bret suggested that any redevelopment of the IMPROVE website should use the FED air quality databases.*
- *Warren asked if a new IMPROVE website could be part of FED.*
- *Marc asked if the IMPROVE website could just house data advisories and other IMPROVE network content, but not data. The FED site could be used to serve up data.*
- *Jill Webster indicated that she would like the new website to offer interpolated data for sites without monitors (per NPS policy).*
- *John Vimont indicated that similar data interpolation could be done for other Refuges.*
- *Tony Prenni asked how much money might be required for development of a new website.*
- *Bret indicated that upfront development costs would be necessary, plus funding to maintain the site. He indicated that he would have to work out the details.*
- *Bret indicated that the WRAP TSS site was used to provide a number of States with information for SIPS, and many inserted TSS graphics directly into their SIPS.*
- *Cassie Archuleta noted that the WRAP TSS also has aging infrastructure, and is in need of updates.*

## DATA ANALYSIS

### Image contrast as a measure of visual air quality

Bill Malm presented *Uses of Webcam Images* (see Malm\_UsesOfWebcamImages\_2014). In summary:

- Historically, camera and webcam images have been used along with measurements of optical properties and particles to qualitatively determine the effect of haze on scenic landscape features.
  - Recent work explored use of different quantitative metrics calculated from webcam images to determine haze effects.
  - Results were shown comparing the log of average contrast ( $\ln(C_T)$ ) to hourly nephelometer light scattering ( $b_{\text{scat}}$ ) measurements. Comparisons between the means of contrast distributions and scattering measurements showed good correlation between images and measurements for Grand Canyon and Great Smoky.
- *Marc noted that uses like this might help make a case for continued operation of the nephelometer network.*
- *John Watson asked if this would require a nephelometer at each camera site.*
- *Bill suggested that nephelometers could cycle through sties.*

### Trends in haze and its constituents

Jenny Hand presented *Trends in Haze* (1990-2013) (see Hand\_Trends\_2014.pptx). In summary:

- Their regression statistics were used to determine trends and significance in IMPROVE data for the 1990-2013 and 2000-2013 periods.
  - Maps showing trends for total extinction, and trends for specific aerosol species were shown for the 20% worst days.
  - Ammonium sulfate is generally decreasing, most significantly in the East. Ammonium nitrate is also generally decreasing, but sulfate reductions in the east have increased the percent contribution of species such as POM and AN to total extinction on the worst days.
  - Soil and CM show increasing trends across the West in Spring, and in central US in summer and fall.
- *Tony Wexlar asked about natural background.*
- *Bill Malm indicated that CAMX modeling for ROMO in 2009 showed Asian sulfate contributing to about 30% of sulfate. He indicated that these boundary conditions are something that States should be concerned about.*

## DAY 2: OCTOBER 16, 2014

### OTHER TOPICS

#### IMPROVE Steering Committee Business

Scott Copeland led a discussion regarding IMPROVE business updates.

- Scott indicated that he was available to continue as chair of the committee.

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| <b>A motion was made to retain Scott Copeland as chair of the Steering Committee. The motion was seconded and unanimously approved.</b> |
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- Discussion was opened regarding the location of next year's meeting location.
  - *Marc noted that historically, meetings occur in mid-Spring or Fall, when off-season weather for a particular location is expected to be nice.*
  - *Laurie Trinca indicated that the EPA would not be able to attend another meeting in FY15 due to travel limitations.*
  - *Roxanne Vingarzen extended an open invitation to Vancouver.*
  - *Scott Copeland offered options including Upper Buffalo, Grand Canyon (Albright Lodge) and Northern Washington.*
  - *Marc Pitchford indicated that Grand Canyon had been used previously, and offered Zion, as it is a short trip from Las Vegas.*
  - *Tony Prenni indicated a preference for Lassen.*
  - *John Molenaar followed up after the meeting by email indicating that Grand Canyon had only been used once for an IMPROVE meeting in 1985. Also he noted that next year is the 30<sup>th</sup> anniversary of the network.*
  - *Bill Malm added by email that concerns for the Grand Canyon was really the genesis of IMPROVE.*
- Discussion was opened regarding requests for use of archived IMPROVE filters. Scott indicated that he and Bret regularly receive requests. There are no formal protocols, and they generally follow up on requests by asking for a plan.
  - *Warren indicated that it would be necessary to request information regarding proposed constructive vs destructive analysis.*
- Discussion was opened regarding the IMPROVE calendar, which was cut from funding in 2014, but funded independently through Warren White.
  - *Warren suggested that a charitable pot should be established to facilitate contributions from people who support the calendar. He indicated that this could be run through the National Park Foundation.*

- *Scott indicated that, at the very least, a bare-bones sample days calendar should be made available.*

**Action Item: Cassie Archuleta offered to send a 1-page sampling calendar to Nicole for distribution.**

- Discussion was opened regarding the movement of two IMPROVE sites (SYCA1 and TUXE1). Both sites currently have operator access issues. Scott noted that there are no formal protocols for site movement.
- *Cassie indicated that, in the past (e.g. HALE1 and ZION1), overlap between old and new sites allowed for data adjustments using correlations, as site movement affects calculation of RHR 5-year tracking metrics. She asked some overlap could occur for the old and potential new locations.*
- *Scott indicated that overlap would probably not be possible.*
- *Jill Webster indicated that it is likely that TUXE1 will continue operation through the end of the calendar year.*
- *John Vimont added the TUXE1 operator has gone above and beyond normal operator expectations. The operator has flown to the site every Tuesday, and the site has never had an incomplete year.*

## **BUDGET**

### **Budget Analysis**

Tony Prenni (NPS) presented **IMPROVE Budget Summary** (see Prenni\_IMPROVEBudgetSummary\_2014). In summary:

- The current year (April 2014-March 2015) is expected to remain on budget.
- Assuming no funding increases from EPA, and increases in projected expenses, a budget shortfall of ~119K is expected for April 2015-March 2016.
- Options to account for a shortfall might include shutting down sites (6?), shutting down the whole network for 2 weeks, or shifting the timing of some payment allocations for the next contract period (would only buy time in first year).
- *Bret noted that the December shut down did not occur as planned in 2013 because UC-Davis donated services.*
- *Laurie Trinca noted that flat funding is a realistic expectation for EPA funds.*
- *Marc noted that there has not been an increase in EPA funding since the 1999-2002 network expansion.*
- *Scott indicated that the CSN network recently went through some budget cuts, and that JoAnne Rice had been invited to discuss their process.*

JoAnne Rice (EPA) presented **CSN Network Assessment** (see Rice\_CSNAssessment\_2014.pptx). In summary:

- The CSN network was implemented in 1997 to support NAAQS. Recently, CSN faced a 20% budget shortfall and had to implement cost saving strategies.
- An “objectives scoring” based approach was developed to prioritize site operation in relation to network objectives. Each site was “scored” to prioritize defunding of sites.
- Additional cost savings measures were recommended, including elimination of CSN total mass measurements where FRM mass is available, reduction of sampling frequency at some sites, and reduction of carbon blanks and ice packs.
- Assessment and implementation included a “CSN assessment team” and coordinated communication with stakeholders.

➤ *Jenny Hand asked if a list of sites to be defunded could be provided by site ID.*

**Action Item: JoAnne will follow up with group with a list of site IDs for defunded sites.**

- *Marc Pitchford asked what would happen if costs ended up lower than projected.*
- *JoAnne answered that any additional funds would add to re-investment costs.*
- *Bret suggested that States/Agencies may be able to fill the IMPROVE budget gap.*
- *Joanne pointed out that for CSN, the EPA strictly pays lab costs. States already pay for the samplers and upkeep.*

Scott Copeland presented ***IMPROVE Cost Savings in a Flat Funded World*** (see Copeland\_IMPROVECostSavingsScenarios\_2014.pptx). Previous discussions and actions for budget shortfalls were summarized, including:

- In 2006, expected budget cuts prompted a process to rank sites by priority of possible defunding, and comments from States and FLMs were compiled.
  - In 2012, a series of budget workgroup calls were conducted to identify cost savings measures, and some of these were implemented.
  - In 2013, budget analysis was conducted, and no measures were implemented as the steering committee did not come to a consensus on options of site removal vs. reducing sample frequency.
- *Bret indicated that a shift in funding allocation, as Tony Prenni presented, might buy time needed to develop a new process, and allow time for stakeholders to react and offer feedback.*
  - *Scott indicated that the process could be expedited.*
  - *Laurie Trinca asked if each agency could scrape together \$50K.*
  - *Scott responded that FS can ask, but funds availability is severely limited.*
  - *Chuck suggested that a proposal should be released, reaction could be gauged, and a budget plan could be created based on reaction.*

- *Bill Malm suggested removing December and January samples.*
- *Scott responded that removing specific months biases results, and random sample removals might be better.*
- *Marc suggested that sample analysis exclusion decisions could be based on gravimetric analysis results.*
  
- *Rich Poirot suggested that a letter be drafted to the EPA acknowledging the fact that budget shortfalls will slowly lead to losing the ability to effectively implement the RHR.*
- *Bill Malm and John Watson agreed that a letter could put political pressure on the process.*
- *Bret Schichtel indicated that more than 6 sites should be listed as potential candidate sites for defunding. More sites will elicit more responses from particular states which might be affected.*
  
- *Nicole mentioned that cutting back-up carbon filters has been discussed previously, but not yet implemented.*

***Motion: Bret motioned that, in the absence of objections from John or Judy, analysis of back-up carbon filters should be cut. This motion was seconded, and unanimously approved.***

***Action item: Scott will follow up with John and Judy to determine if there are any objections to cutting collection and analysis of back-up carbon filters.***

- Nicole mentioned that analysis of incomplete samples (e.g. just A module missing) could be cut as a cost savings measure. This might represent 2 to 3% of samples in a year.

***Action item: Nicole offered to prepare for the group a cost assessment identifying potential savings by eliminating analysis of incomplete samples.***

***Action item: Scott Copeland will draft a letter from the Steering Committee to IMPROVE stakeholders, including FLMs, States and the EPA. Considerations discussed include:***

- *A long list of sites identified in order of priority for cuts, noting that these are recommendations only, based on efforts to determine the least impact to the network.*
- *References to analysis justifying assessments will be included.*
- *It will be noted that, given current projections, it is possible for up to 6 sites to be cut the first year, with additional thereafter.*
- *It will also be noted that additional cost-savings measures will be explored (potential additional measures will not be specifically stated).*

The meeting was adjourned. Some participants reconvened at the ROMA1 IMPROVE site for a site tour and a ferry ride to Bull's Island.