

IMPROVE STEERING COMMITTEE 2015 ANNUAL MEETING

Date: November 3-4, 2015
Location: Grand Canyon National Park, Arizona
Horace Albright Training Center
1 Albright Ave., Grand Canyon Village, AZ

Time: 11/3: 8:30am – 6:00pm
11/4: 8:00am – 10:00am

IMPROVE Steering Committee members present:

Scott Copeland (Chair)	CIRA/USFS	scott.copeland@colostate.edu
Neil Frank	EPA	frank.neil@epa.gov
Bob Lebens	WESTAR	blebens@westar.org
Tom Coulter	BLM	ccoulter@blm.gov
Gordon Pierce	CDPHE/NACAA	gordon.pierce@state.co.us
Rick Saylor	NOAA	rick.saylor@noaa.gov
Bret Schichtel	NPS ARD	bret.schichtel@colostate.edu
Charles Turner	VDEQ/MARAMA	charles.turner@deq.virginia.gov
Jill Webster	USFWS	jill_webster@fws.gov

IMPROVE Steering Committee members not present:

Vacant	NESCAUM
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Additional IMPROVE stakeholders present:

Ann Dillner	UC-Davis	amdillner@ucdavis.edu
Anthony Wexler	UC-Davis	aswexler@ucdavis.edu
Brett Gantt	EPA	Gantt.Brett@epa.gov
Bruce Polkowsky		bvpolk@gmail.com
Cassie Archuleta	ARS	carchuleta@air-resource.com
Chuck McDade	UC-Davis	mcdade@crocker.ucdavis.edu
Craig Pearson	AZ DEQ	Pearson.Craig@azdeq.gov
Daniel Murphy	NOAA	Daniel.M.Murphy@NOAA.gov
Donna Kenski	LADCO	kenski@ladco.org
Jenny Hand	CSU/CIRA	Jenny.Hand@colostate.edu
Joann Rice	EPA	Rice.Joann@epa.gov
Joe Adlhoch	ARS	jadlhoch@air-resource.com
John Vimont	NPS	john_vimont@nps.gov
John Watson	DRI	johnw@dri.edu
Judy Chow	DRI	Judy.Chow@dri.edu
Keith Jones	EC	keith.jones@ec.gc.ca
Laurie Trinca	EPA	Trinca.Laurie@epa.gov
Marc Pitchford	DRI	marc.pitchford@dri.edu
Mark Tigges	ARS	mtigges@air-resource.com
Melinda Beaver	EPA	Beaver.Melinda@epa.gov

Additional IMPROVE stakeholders present (continued):

Nicole Hyslop	UC-Davis	hyslop@crocker.ucdavis.edu
Prakash Doraiswamy	RTI	pdoraiswamy@rti.org
Scott Cismoski	ARS	scismoski@air-resource.com
Sean Raffuse	UC-Davis	sraffuse@ucdavis.edu
Tony Prenni	NPS	anthony_prenni@nps.gov
Tracy Dombek	RTI	tdombek@rti.org
Warren White	UC-Davis	whwhite@ucdavis.edu
William Malm	CSU/CIRA	wcmalm@colostate.edu

DAY 1: NOVEMBER 3, 2015

WELCOME AND AGENDA REVIEW

Jane Rodgers, Deputy Chief of Science and Resource Management at Grand Canyon National Park, presented some background information about air quality in the park. In summary:

- Long-term, consistent monitoring continues to be important at the park.
- The IMPROVE site operator position has been vacant since February.
- The HANC and Abyss air quality sites continue to operate, but the Indian Gardens and Phantom Ranch sites are no longer in operation.

Scott Copeland opened with welcoming comments and introductions. Notably:

- Rich Poirot has retired, and NESAUM did not have funds to send an alternate Steering Committee representative.

NETWORK REVIEW

Optical and Scene Monitoring

Mark Tigges and Scott Cismoski (Air Resource Specialists, Inc.) presented *Optical and Scene Networks* (see TiggesCismoski_OpticalScene_2015.pdf). In Summary:

- Twelve (12) nephelometers currently operate in the network.
 - As a cost savings measure, 5 sites are serviced by operators, and remaining sites are serviced by ARS every other year.
 - Currently, ARS is negotiating with ADEQ to obtain surplus nephelometers and support system equipment to replace aging infrastructure in NPS visibility program.
 - Twenty (20) webcams currently operate in nineteen (19) parks.
 - A new NPS website was launched 10/30/2015, featuring responsive design for mobile device viewing.
- *Bret Schichtel asked if a recent image browser will be available on the website.*

- *Scott Copeland commented that the FS website hosts daily time-lapse tools*
- *Scott Cismoski commented that there is more flexibility with the FS website, as it is hosted at ARS and not through NPS. There may be technical issues making time-lapse video and image archive tools on the NPS site, but some features might be feasible.*

Quality Assurance – Field Audits

Nicole Hyslop (UC-Davis) presented ***IMPROVE Particle Monitoring Network: Quality Assurance – Field Audits*** (see Hyslop_ISCFieldAudits_2015.pdf). In Summary:

- UC-Davis attended an EPA auditor training event in October 2014 and noted a concern about limited “hands-on” time for auditors.
 - Twenty four (24) independent field audits were performed in 2014.
 - Six (6) sites had issues with flow rate measurements and four (4) sites had issues with nominal flow differences. It was noted that this is a worse failure rate than past years, which may be related to reduced maintenance frequency recently implemented as a cost savings measure.
 - At the 2014 IMPROVE Steering Committee meeting, it was noted that there was a positive bias in EPA flow measurements during audits. UC-Davis methods were reviewed and it was determined that flow check device calibration method was introducing a bias. Methods were modified April, 2015. Only one (1) site has failed EPA audits so far in 2015.
- *John Vimont asked what effect the 3% bias might have on reported aerosol concentrations.*
 - *Nicole responded that it would affect concentrations, but it was unknown how far back.*

Action Item: Nicole indicated that UC-Davis would draft a data advisory related to the flow bias introduced by calibration methods.

- *Bret Schichtel asked if IMPROVE protocols could be modified to change the set point.*
- *Scott Copeland added that the previous calibration methods had been in place as far back as 1987.*

Aerosol Monitoring Network Status

Nicole Hyslop (UC Davis) and Sean Raffuse (UC Davis) presented ***UC Davis Status Report to IMPROVE Steering Committee*** (see HyslopRaffuse_ISC_OperationsUpdate_2015.pdf). In summary:

- Changes in 2014 and 2015 included shut down of WASH1 (5/2015), CLPE (7/2015), ELLI1 (10/2015) and DOUG1 (10/2015), and movement of SYCA1 (10/2015) to SYCA2 and TUXE1 (to Kenai Peninsula Borough (KPBO1), 8/2015).
- Data are currently submitted through March 2015.

- Related to a 2005-2013 data re-submittal (discussed at 2014 IMPROVE Committee Meeting), data in the EPA Air Quality System (AQS) database are updated back to 2007. Prior to 2007, AQS configurations and submittals were performed by CIRA, and differences in configurations are requiring some troubleshooting for the pre-2007 uploads.
 - It was noted that in recent data corrections and advisories, updates to PM₁₀ uncertainties were overlooked.
 - Average sample recovery was 94% in 2014. Most data collection issues were due to operator no-shows (2.3%), equipment problems (1%) and power outages (1.1%).
 - NOAB1 had 3 lightning damage incidents in 2015 (18 since 2007). Plans are to move forward with a lightning mitigation retrofit.
 - Four (4) sites did not meet data completeness criteria in 2014 (best in recent history), but five (5) sites have already not met criteria in 2015.
 - For HAVO1, a question regarding PM₁₀ data validity was posed. The site received a new PM₁₀ stack in May 2014, which was not installed correctly resulting in a leak that was discovered at a site visit in 2015. Nicole asked how much effort should be expended in adjusting/validating these data.
- *No resolution regarding the HAVO1 validity was reached.*
 - *Bret Schichtel suggested that UC-Davis track all maintenance issues related to the reduction of site maintenance visits.*
- UC-Davis has brought on new engineers for the ongoing redesign of sampler electronics. A field ready prototype is expected by the end of 2015, and the first systems are expected to be installed in the field in the Spring of 2016.
 - Sean Raffuse (formerly of STI) has joined UC-Davis to help facilitate a data management transition, including development of new validation and visualization tools.

LABORATORY REVIEW & METHODS DEVELOPMENT

Update on IMPROVE Carbon Analysis

Judy Chow (DRI) presented *IMPROVE Carbon Analysis* (see Chowetal_IMPROVECarbonAnalysis_2015.pdf). In summary:

- A DRI model 2015 carbon analyzer has been designed, tested and commercialized. New model has lower MDLs and a 7λ system.
- Preliminary work shows 7λ system provides separation of Brown Carbon (BrC) and Black Carbon (BC).
- DRI is working with UC-Davis to begin 7λ reporting in 2016.

Temperature Calibration of Thermal/Optical Carbon Analyzer

John Watson (DRI) presented *Temperature Calibration of Thermal/Optical Carbon Analyzer* (see Watsonetal_IMPROVETempCalibrationMethod_2015). In summary:

- Current temperature calibration methods with Tempilaq (quick-drying temperature indicator liquids) were reviewed, and a new calibration method using infrared emission spectroscopy was discussed.
- New methods may be less cumbersome, but equipment is costly. More tests are proposed with less costly equipment.

Ion Analysis

Tracy Dombek (RTI) presented *Ion Analysis* (see Dombek_SCMeetingIons_2015.pdf). In summary:

- Dave and Eva Hardison have retired from RTI. Tracy took over in February.
- Unfavorable sulfate results were produced during a recent PE evaluation by EPA. Organic acids may have caused a bias in sulfate data (~10% increase in S).

Service Award

Chuck McDade (UC-Davis) was presented a trophy for 13 years of service to the IMPROVE program. Chuck has postponed retirement, but will be moving off of the IMPROVE program to the STN program.

Laboratory Inter-Comparisons and Issues

Joanne Rice (EPA) talked briefly about laboratory inter-comparisons and issues. In summary:

- Jewell Smiley has retired from EPA
- The lab inter-comparison program is moving back to OAQPS, with lab work at RTP.

F_{abs} Data

Nicole Hyslop (UC-Davis) deferred time on agenda for “Trend Analysis” to Warren White (UC-Davis) for additional time related to F_{abs} Data. Warren presented *HIPS data are now reported with consistent calibration (2003-present)* (see White_Fabs_2015.pdf). In summary:

- Measurements show that light absorption by aerosols on PTFE filters (F_{abs}) correlates well with EC.
- Some scatter in the F_{abs}/EC correlations is due to other light absorbing species such as Iron Oxide.
- Regressions do not yield stable mass coefficients for EC over time, indicating that the composition of the carbonaceous haze fraction may be evolving as concentrations of EC decrease.

FT-IR Measurements of OC and EC

Ann Dillner (UC-Davis) presented *OC, EC, OM and functional group measurements for IMPROVE and STN using FT-IR* (see Dillner_FTIRmeasurements_2015.pdf). In summary:

- UC-Davis is continuing to evaluate the use of Fourier Transform Infrared (FT-IR) spectroscopy to determine OC and EC concentrations from module A Teflon filters.
 - 2011 and 2013 data have been tested for several sites. Measurements correlate well using a single calibration curve for all but the Fresno and N. Korea sites. Future work will involve development of calibrations for groups of sites with similar characteristics.
 - FT-IR absorbance also corresponds to organic function groups, which can be related to source information (e.g., biogenic, agriculture-related, and anthropogenic SOA).
- *John Vimont asked if archived filters could be analyzed using FT-IR.*
- *Ann responded that the IMPROVE filters are not stored cold, so organic species would not have been well preserved.*

DATA ANALYSIS

Trends

Jenny Hand (CIRA) presented *Temporal Trends in Mineral Dust Concentrations at IMPROVE Sites Across the Southwest* (see Hand_Trends_2015.pdf). In summary:

- Trend statistics indicate large increases in seasonal mean dust for a number of areas in the US. Trends also indicate an earlier onset for the Spring dust season (i.e., increasing March trends).
- Trends indicate that reconstructed fine mass (RCFM) has decreased at a faster rate than fine mass (FM). Data prior to 2005 indicated that RCFM was over-predicting PM, while recent trends indicate that RCFM is under-predicting FM.

Integrated Assessment

Bret Schichtel (NPS) presented *Framework for Visibility Secondary PM NAAQS, Implications from 2015 Integrated Science Assessment (ISA)* (see Schichtel_Framework_Vis_Standard_2015.pdf). In summary:

- In 2012, following an EPA policy assessment, it was determined that the primary health based PM_{2.5} standard was adequate to protect visibility.
- Bret's review of visibility studies showed that "unacceptable" visual range is related to the most prominent landscape feature.
- A GIS assessment of the most prominent landscape features across the US showed that the current standard is not protective enough for most areas of the US.

Comparisons of IMPROVE data to aircraft overpasses

Daniel Murphy (NOAA) presented *DC3 and SEAC4RS comparisons to IMPROVE data* (see [Murphy_AircraftComparisons_2015](#)). In summary:

- NASA DC8 aircraft data were compared to IMPROVE data for 35 to 40 chance encounters near IMPROVE sites.
 - Correlations of total mass, dust and sulfate were reasonable. Comparisons of organic measurements were poor, and may have implications for better calibration of aircraft equipment.
- *Dan Murphy indicated that fly-over times for comparisons to IMPROVE data were about 5-minutes.*
- *Scott Copeland indicated that Sulfate correlations to 24-hour IMPROVE data may be better as there is not generally a big diurnal variation in sulfate.*
- *Marc Pitchford asked why aircraft instrumentation was not located on the ground for comparisons.*
- *Dan replied that the aircraft instruments were not designed for ground comparisons.*

DATA PROCESSING, DISTRIBUTION AND QUALITY

FED and NPS AQC&T websites

Bret Schichtel (NPS) presented a few slides related to the IMPROVE websites (see [Schichtel_IMPROVE_Website_2015.pdf](#)). In summary:

- The IMPROVE website (<http://vista.cira.colostate.edu/IMPROVE>) is aging and in need of overhaul.
- The FED website (<http://views.cira.colostate.edu/fed/>) underwent reorganization last Spring to better facilitate the visualization of data.

Ion QA

Tracy Dombek presented *Improve Quality Assurance for IMPROVE* (see [Dombeck_IonQA_2015.pdf](#)). In summary:

- RTI has been looking at adding an additional QC standard to calibration process that is similar to measured concentrations at sites.
 - RTI is also beginning to look at historic values at sites to flag potential outlier data.
- *Bret Shichtel asked if collocated IMPROVE/STN comparisons have been used as a QA check.*
- *Prakesh noted that these can be investigated if there is an issue, but it is not routine.*

Beyond Level 2 QA

Scott Copeland presented *Beyond Level 2 QA* (see Copeland_QAforRHR_2015.pdf). In summary:

- Scott posed a question about treatment of suspect data in the validated data submittals and presented an example of organic extinction compared gravimetric fine mass at SAWT1 in 2010, showing what appears to be anomalous organic mass measurements.
- Historically, if suspect data are identified, UC-Davis is notified and they investigate. Following investigation, data are re-flagged and re-submitted at UC-Davis' discretion. In the case of the SAWT1 example, UC-Davis determined they did not have enough evidence substantiating a change.
- Scott suggested a process where recommendations regarding data use, which are contrary to UC-Davis validity determinations, are made to State, FLMs and EPA. If all parties agree on a data determination, this would be followed by either changing of the data validity at UC-Davis, or the addition of a flag at CIRA.
 - *Marc Pitchford asked if UC-Davis had a flag that indicated fine mass does not equal reconstructed fine mass.*
 - *Neil Frank suggested an additional flag that identifies data as suspect but not invalid.*
 - *Chuck McDade indicated a preference that all flags be applied by UC-Davis, to help ensure dissemination of consistent data sets.*

TEE UP WEDNESDAY WORKING GROUP SESSION

IMPROVE Tracking Progress Method Development

Brett Gantt (EPA) presented *Tracking Visibility Progress in the Regional Haze Rule* (see Gantt_RegionalHazeIMPROVE_2015.pdf). In summary:

- EPA is looking at methods to modify the RHR tracking metrics to better treat the variability of extreme events such as wildfires and dust storms.
- Methods explored involve splitting natural conditions into “routine” natural (based on default NCII conditions) and “episodic” natural (based on a site’s lowest 95th percentile dust and carbon measurements between 2000-2014).
- The “routine”+“episodic” natural conditions are then subtracted from current conditions and a new distribution of “most impaired days” is determined based on only the remaining aerosol contribution.
- A public comment period for any new draft guidance will likely occur in 2016, with SIP submissions expected in the 2018-2021 timeframe.
- Further discussion on the progress tracking metrics is scheduled to take place at the RHR Working Group Session, following the IMPROVE business meeting on Wednesday, November 4.

- *Marc Pitchord suggested that the EPA use the RPO process to review the new guidance.*
- *Brett Gantt indicated that they were already engaging the individual States.*
- *Scott Copeland indicated that the split using the NCII conditions was a default split that should be refined.*

Mystery Topic

Special guest Bruce Polkowsky presented *Old and New, Visibility Protection 2.0* (see Polkowsky_Visibility_2015.pdf). In summary:

- A brief history of the IMPROVE monitoring network and the RHR was presented, which included an initial Steering Committee meetings at the Albright Training Center in 1985.
- Key issues for ongoing RHR efforts were highlighted, including natural conditions refinements and support for the next SIP modeling platform.

DAY 2: NOVEMBER 4, 2015

BUDGET

Budget Analysis

Tony Prenni (NPS) presented *IMPROVE Operations Funding, April 1, 2015 – March 31, 2016* (see Prenni_IMPROVEBudgetSummary_2015). In summary:

- The current year (April 2014-March 2015) is expected to have a deficit of ~\$119K, and a deficit of ~\$130K is projected for the next year.
 - EPA is closing IMPROVE protocol sites, which will help with this year's deficit.
 - Potential additional costs not accounted for include updates to the IMPROVE website, which may start early in 2016.
 - There could also be potential cost savings in eliminating analysis for the first two samples of 2016 (week after Christmas).
- *Scott Copeland indicated that additional cost savings measures are needed.*
- *John Vimont suggested that the cost savings reductions for the eliminated IMPROVE protocol sites be determined to better assess the current shortfall.*
- *Per the question about the holiday samples, Warren White indicated that potential RHR re-writes should be considered, especially the possibility of determining completeness based on scheduled samples rather than possible samples.*
- *Nicole indicated that UC-Davis collected the holiday samples last year (the first year this cost savings measure was implemented), but did not analyze the samples. She indicated that filter costs are small compared to analysis costs. Nicole asked about instead not analyzing December 26 and 29 of 2015, rather than losing the first two samples of 2016.*

The Committee agreed that the 12/26/15 and 12/29/15 filters would be sent and sampled, but not analyzed unless necessary for data completeness requirements at a specific site.

- *Neil Frank asked if the filters could be analyzed at a later date, and Nicole deferred the question to Judy Chow, asking if Carbon analysis would be valid.*
- *Judy Chow indicated that the analysis should be OK, and suggested samples be sent to her.*

IMPROVE Protocol Site Assessment

JoAnne Rice (EPA) presented *IMPROVE Protocol Assessment* (see Rice_IMPROVEProtocolAssessment_2015.pdf). In summary:

- In 2014, a CSN assessment resulted in the defunding of 38 sites

- In 2015, a similar assessment was performed on 38 IMPROVE Protocol sites. From this assessment, 9 sites are scheduled for defunding (sampling will run through the end of calendar year 2015).

QAPP

Scott Copeland presented **IMPROVE QAPP** (see Copeland_QAPP_2015.pdf). In summary:

- The IMPROVE network Quality Assurance Project Plan (QAPP) is due for updates.
- For the updated QAPP, a new Data Quality Objective (DQO) was proposed, including a reference to determining a 4% decrease in light extinction for the “most impaired days.”
 - *Bret Schichtel asked if the 4% objective might cause problems in the future.*
 - *Warren White indicated that this is the first time a statistically meaningful objective has been proposed for the network.*
 - *Scott indicated that the next steps will involve gathering comments from “key officials”.*

Tony Prenni continued the QAPP discussion (see Prenni_IMPROVEQAPP_2015.pdf). In summary:

- Regarding the “Assessment and Oversight” section of the updated QAPP, it is proposed that IMPROVE Steering Committee workgroups be organized to meet every 5 years for discussion of organization/management, documentation, QA/QC measures and network reviews.
- Related to Technical System Audits, a new QC position is open at CIRA, with the goal of auditing a subset of the IMPROVE sites annually.
 - *Gordon Pierce commented that the new CIRA auditor should coordinate with the States, as some States already audit their IMPROVE equipment.*

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.

Hearing none opposed, Scott Copeland was retained as Chair of the IMPROVE Steering Committee.

- Discussion was opened regarding the location of next year’s meeting location.
 - *Scott indicated that the NADP Steering Committee is interested in again holding a joint conference with the IMPROVE Steering Committee. Next year’s NADP meeting is scheduled to take place the 1st week of November, 2016 in Santa Fe, NM.*

Hearing none opposed, Scott Copeland will coordinate with NADP representatives regarding a possible joint meeting in 2016.

The IMPROVE business meeting was adjourned. Some participants visited the GRCA2 IMPROVE site, and some re-convened after the meeting to participate in a RHR working group session regarding RHR tracking metrics.