National Atmospheric Deposition Program Joint Subcommittees Minutes

2016 Spring NADP Meeting, Madison, WI

April 26-27th, 2016

Tuesday April 26th

NOS Chair, Richard Tanabe called the meeting to order at 13:06, Tuesday, April 26.

13:10 Introductions around the room

13:13 Approval of Fall 2015 Joint minutes (Rochester, NY) – Richard Tanabe

M. Rhodes motioned to approve the minutes, G. Wetherbee seconded. Unanimously approved.

13:14 State of the NADP - David Gay, NADP Coordinator

David opened with a video clip from a speech by President Obama on the history of air pollution control.

SC17 operations have paused, but are expected to restart. State Ag Experiment Station closing at IL18. Otherwise, status quo for NTN with healthy stability. David praised CAL for keeping NTN in good shape. AIRMoN – nothing new to report. Over the last 12 months, MDN lost 12 sites and added 4. MDN Lost: NV-2 sites, IL-2 sites. New AMoN sites: 7 sites added, and 1 site lost. AMNet, 2 sites lost, 1 site added, 23 sites currently. Program Office has more spare equipment for AMNet. PO purchased 4 x Tekran 2437A analyzers from Eric Edgerton/Southern Company. Tekran donated a 2537X analyzer.

Sites in jeopardy: MO03, MO46, IL18NTN, IL63, MI26, WI07, WI99, VT99AMNet, WA98NTN, GA40, GA22.

Acid Rain 2015 was a tremendous success with 339 attending, including good attendance from Europe and Asia, plus other continents. NADP ended up in the black! [Note: The Executive Committee will discuss how the proceeds of Acid Rain 2015 will be spent. See Executive Committee minutes.] There were 103 presentations that will remain live on website for 5 years. Special edition of Atmospheric Environment planned. 36 papers, expected to be open access. Atmospheric Environment is taking more control of acceptance process than anticipated. The issue might be published in Sept./Oct. 2016.

Testing new conference phone system for meetings. 4 phones tied together that work as 1 unit. Being used in CLAD and TDEP. Some issues. 4 units together work best. Cost: $1850. Recommended by Acid Rain 2015 AV contractor.

NED Equipment: ACM motor box repairs decreasing in frequency. Thies, 11-grid, and 7-grid sensor repairs are flat. Belfort repairs are almost non-existent as there are 25 gages left in networks. Changes to e-gages are having the desired effects. However, Thies sensor covers are cracking. Thies has a redesign with 2 models. Plan to eliminate most of the remaining Belforts to be presented in Executive Committee.

Data: All 2014 data are released. About 75% 2015 data on web. In good shape. MeHg data now downloadable from web. Format change for NTN and AIRMoN – Data status: 1= Lab delivered, 2= Preliminary on Web, 3=Final. Br^- data, QR Codes for NTN and AIRMoN will be available soon.

New Impact Statement from SAES/USDA in February, and on web site. Nice publication produced by State Ag. Experiment stations.

Journal Article Count = 2,750 for 2015.

Site News: Craters of the Moon had an eagle hit by car, and they used NTN shipping box to contain him.

Retirements: OR10, Jon Moreau, 35 years! Ray Knighton, USDA, retired Jan. 7. Ali Mohamed is representing USDA temporarily.

Talks/Travel: AGU Meeting in Montreal, May 3-7. Hg meeting in Jeju, South Korea, June 14-22, Japan Society of Env. Chemists, Sapporo. Sent Van Bowersox to Japan to give talk on behalf of WMO this week to encourage them to share data. National Env. Monitoring Conference, Chicago, Aug. 2015. LADCO Network Meeting, Aug. 19-20, Indy, Budget Committee in August;

Meetings coming up in 2016/17: Mercury 2017 coming up! Next week, NWQ Monitoring Conference, Tampa, FL. Association of Science Limnology and Oceanography, Tribal Air Monitoring Support, Mercury 2017 Planning Meeting, Asia Pacific Hg Monitoring Meeting, National Ambient Air Monitoring Conference (Aug 8-12, 2016), Atmospheric Sciences Current Scene (UNAM, Mexico City), August 2016.

13:45 CAL Report – Chris Lehmann, CAL Director

2015 sample tally: 17,136 samples analyzed by CAL, the busiest year ever! 10,000th AMoN sample since 2007 was collected.

7 new NTN sites, 5 sites closed, 41 Sites with issues: Power (15), Egage (27), Winter (4), Other (2).

AIRMoN: Bag sampling. Bag failure rate of 1.5%.

AMoN: 7 new sites, 1 site closed, 4 sites with protocol issues.

Data Completeness: NTN 87%, AIRMoN 99%, AMoN 98.7%. NTN completeness is up last 2 years!

AMoN Travel Blanks: Doing very well. No values above target limit in 2016 so far. Travel blank NH_3 concentrations are trending lower. New lab washer for AMoN jars. New AMoN sampler body labels are silicon based and custom made.

Revised sample processing for low volume samples. New prioritization FIA>IC>ICP>pH&Cond. Formerly, running only pH and conductivity, now we have a full complete suite of analyses. Consistent coding of lab sample types now improved as well.

Bottle leaks: 2 series (green dot/squishy) and old bottles. Stats show that about 10 uses is optimal for all bottles.

pH and Conductivity automated instrument. Lee and Nina working are with Angela in the lab, and data will be shown in NOS.

QA Documents: QA Report for 2015 in preparation. 2014 QA plan published. 53 SOPs available online.

IDLs have dropped, except for NH_4^+ for AIRMoN (0.019 mg/L).

Data deliverables: NTN 44 days, AIRMoN 39 days, AMoN 43 days.

Ella Ashford (8th grader from Port Townsend, WA) sent thank you note to Chris for support of her air quality/asthma project. She won first place in her division for science fair/competition.

14:03 QA Report – Mark Rhodes, PO QA Manager

Highlights from QAAG conference call April 21.

Site surveys on schedule. Upgrade of single-chimney N-CON MDN collectors continues.

Dual Chimney N-CON axles have problems due to coupling used. Now, N-CON using single piece axle. Axles being replaced as they break.

Some ACM collectors now in the field 35+ years, and some are in bad shape. Upgrades needed at many sites.

QA Reports:

2014 – All posted

2015 – Field Survey in external editing, should be published shortly after meeting. HAL, CAL, AMNet QA reports still pending.

QA Documents

1 new SOP and 5 updated documents approved by QAAG.

Guidelines for Evaluation and Approval of Equipment for Use in AMoN and AMNet are needed.

Other items: HAL is revising QAP for 2016, and it should be final next week.

AMoN: Quantification of uncertainty to be presented in NOS.

Approval of Tekran 2537X instrument is needed.

USGS collocated equipment program at SD08 discussed. Site went dark for 6 weeks. NADP and CAL now have updated processes to identify and address this problem sooner.

Debris in wet-deposition samples at SC03 is a mystery. Not sure what is going on. SC03 says samples are clean, but lab sees debris. Possibly humic material.

PO 2016 Review Team for this summer: Rich Grant (Purdue), Mark Nilles (USGS), Tim Sharac (EPA), Andy Johnson (ME DEQ).

DQO study is ongoing. Need to focus on this in 2016.

14:15 Training – Richard Tanabe led an open discussion.

How should we do training in the future? Webinars, onsite, at meetings? Ideas?

CAPMoN: Goes to each site 2 times per year to observe and provide hands-on, onsite training. Techniques have to be approved by observers/trainers. AMEC goes to each CASTNET site once every 6

months. Some training / follow-up done on as-needed basis. EEMS goes to each CASTNET site once per year and does training. Rhodes: Webinar attendance is 20-30 people, including several PO/lab staff.

D. Gay: Suggestion – Site operators watch video, and then site liaison calls them to ask questions about it. Nilles: operator turnover is high, and commuting to a site 52 times per year is a lot to ask an operator. So, there are substitutes that operate the site infrequently. Therefore, trying to reach all of them is difficult. CAPMoN operators are paid, whereas lots of NADP sites are run by volunteers, which makes a big difference. Many ideas were shared by various committee members. No resolution was reached.

14:30 Overview of Agendas for Subcommittees - Chairs

EROS Agenda – Pam Padgett

N in Rain brochure out of date and needs update.

Data citation and licensing

Site operator engagement (training)

Outreach for K-12 projects

CLAD definitions project

Quarterly newsletter items

Remote Access progress

Creating a Wikipedia page for NADP

NOS – Richard Tanabe

AMNet Update – Mark Olson

AMoN Update and Uncertainty - Melissa Puchalski

Equipment Testing Update (Belfort, sensor study, modified Thies sensor) – Mark Rhodes

USGS Hg Isotope Study Update - Marty Risch

Site Survey Report - Eric Hebert

NOS Governance – Richard Tanabe

Proposed Studies – Mark Rhodes

Automated pH/Conductivity at CAL – Nina Gartman and Lee Green

Pollen Network – Chris Lehmann and Andy Johnson

Leaking bottles and bags – Chris Lehmann

USGS QA Update – Greg Wetherbee

N-CON Collector Bias – Greg Wetherbee

CAPMoN Update – Richard Tanabe

CLAD – Claire O'Dea

Critical Loads uncertainty

Critical Loads definitions and webinars

General wrap-up

The meeting went into recess at 14:45.

Wednesday, April 27th

Meeting resumed at 13:30 with Science and Subcommittee Reports

CLAD – Claire O'Dea

Created working groups: systems, uncertainty. Definition of terms.

TDEP - Kristi Morris

Met on Monday and Tuesday. Update from Gary Lear and Donna Schwede on mapping. Working on getting wet-deposition correct. Outreach: meetings, conferences, webinar, getting word out. Creating a TDEP map summary similar to the NADP annual report – more at fall meeting. Discussed Hg TDEP. Bringing experts to fall meeting to carry Hg further. Requesting renewal of TDEP as a Science Committee. Prioritized research needs. Kristi is going on 5 years as TDEP Chair, but Gary stepped down as Vice Chair. Chris Rogers stepped up to Vice Chair. Two-year terms for Chairs decided.

EROS – Pam Padgett

Update N brochure. Revising brochure. Ali Mohamed suggested adding an economic perspective to NADP description.

Data licensing discussed. Downloading large datasets into fixed file with a DOI assigned to that file. This would be faster and supplies a reference citation.

Education K-12 Outreach: D. Gay suggested short videos to describe data and effects. Video room will be set up at fall meeting, and volunteers will give short briefing on their projects / interests. The vignettes will be edited into a video.

CLAD and TDEP description document will be created and posted with citation. Newsletter has been a success. Outline for a Wiki page was developed. A Wikipedia page will be set up by Bob Larson, and EROS volunteers will populate the page with information.

NOS – Richard Tanabe

Site Survey report, AMNet update, AMoN update

Motion for calculation of the AMoN uncertainty as the 2-sigma of trip blank values for quartiles of data was approved.

Motion to stop Belfort e-gage testing was approved.

Accepted modified Thies sensor report. Accepted OR09 modified Thies sensor and data collected by OR09.

Greg Wetherbee gave the USGS External QA Report.

Nina Gartman and Lee Green reported on new, automated pH/Conductivity instrument.

Chris reported on leaking bottles and bags for bag sampling.

Mark Olson – Tekran users group meeting briefing.

Greg Wetherbee – N-CON collector bias. There is a bias, but depending on DQOs, might be important, might not.

Lehmann – Proposed Pollen Network

Richard – CAPMoN update.

Richard – NOS governance / selection of officers discussed.

13:50 HAL Report - Bob Brunette

Ryan Nelson is new Lab Manager.

EPA Hg Air Toxics Standards update provided. April 14, 2016 EPA confirmed that it is appropriate and necessary to regulate air toxics, including Hg, from power plants.

Global Hg Treaty – Minamata Convention: More countries getting involved in Hg control.

Bob presented a time series of maps from 1999 to date on expansion of the MDN. 95,000 historical samples collected by MDN for wet deposition of Hg. Sites lost: NV02, NV09, AK04, AK98, AK00, 4 LADCO sites. Potential New: 4 LADCO, Kodiak AK, AK00, SK27. Jeopardy: WA03, but saved by NPS. LSU Ag stations want to keep LA stations running.

Pacific NW high altitude Hg deposition estimated by annual map using PRISM data, but more sites needed to verify.

Equipment modernization: down to less than 10% MDN using Belfort raingages. 59 modified ACM, and 59 N-CONs.

Site Liaisson Activity: 168 Journal Tracking Entries, 79 emails, 89 phone calls. No issues with new instruments, but a few ACM repairs.

2015 Review: 14 Specific Recognition, 47 recommendations, and 19 findings. HAL's written response was submitted November 30, 2015.

Database conversion – SQLServe Progress: Since last fall, many upgrades have automated reporting processes. Goal for switch over is June 2016. Meeting on Monday was held between HAL, db contractor, and QA Manager to discuss progress and plans.

QR Codes: 2016 distributions of A, B, and C codes are very similar to 2014. 94% data completeness with 4-6 percent C-coded samples.

Data delivery schedule: On track. Goal is to shorten time between site operator review and delivery to PO.

Draft MDN QA Report for 2015 is scheduled for delivery to Mark Rhodes by June 2016.

Reporting limits: Update to 2015 QA Report will include matrix duplicates.

Staff changes: Gerard Van der Jagt left HAL in November 2015.

Doug Disney is MDN Site Liaison again. Ryan is new Lab Manager taking over Gerard's position.

Trace Metals Initiative: Documentation in place. Good feedback from advocates and comments were well received. Current sponsors cannot share data. Trace Metals only collocated study at WA18. Decision to move to a Pilot Network; working with G. Wetherbee and M. Rhodes. Sites for Pilot: WA18, OH02, Environment Canada site, IL11, PA Site, AL/MS (in discussion). Draft plan will show where pilot network sites will be located.

Planning electronic outreach letter to Regulated Community.

EPA National Coastal Condition Assessment for Hg in fish selected Eurofins Frontier Global Sciences as lab to run samples for collaborative survey. Understanding that Hg is coming from atmospheric deposition

Assisting USGS with Hg isotope study at WA18.

EPA Reg. 6: 2016-18 Post MATS Total Hg Deposition will use same sites as 2010-12.

Possible Phosphorous monitoring at MDN/NTN collocated sites being studied.

PETG bottles being evaluated for use in MDN. Bottles will be single use. Percent differences between PETG and glass is about 1-3 percent. Collocated glass/PETG bottle study planned.

Jamie Shanley published paper on Puerto Rico Hg wet deposition.

International Joint Commission recommends US to support 21 MDN and AMNET sites and fund at $250K/year to measure Hg deposition to Great Lakes. Suggested convening a discussion group between HAL, PO, and Environment Canada.

HAL attending National Env. Monitoring Counsel meeting.

14:15 Update on the Asia Pacific Mercury Monitoring Network- David Schmeltz

An emerging network, a group of countries, agencies, academics and monitoring groups making Hg measurements in wet deposition and in gaseous and particle-bound phases. Striving for consistent equipment and protocols and data sharing.

Policy Driver is Minamata Convention: 128 signatories, 25 ratifications; controls lifecycle stages of Hg covered by different articles of convention; monitoring provisions and planning activities for effectiveness evaluation. 7th session on Intergovernmental Negotiating Committee on Hg – Dave's goal is to have NADP represented on that committee.

Global Emissions: 40% from East Asia, and 75% of that is from China. 5-40% of Hg deposited in US comes from Asia. Atmospheric Hg monitoring is well covered by NADP in USA, EMEP in Europe, but few sites in SE Asia where largest sources are located. No long-term measurement sites in SE Asia. Opportunities to improve monitoring coordination and assist countries with limited experience and capabilities (capacity building).

Partnership: Taiwan leadership. Sites in Indonesia, Japan, Korea, Philippines, Taiwan, Thailand, and Vietnam. Taiwan launching technology center and expanding lab. Support from NADP, USEPA, and Environment Canada. There are pending sites in Philippines, Sri Lanka, Vietnam, Thailand, and Indonesia. Interest from Mongolia and Malaysia. Program operating in Japan, Taiwan, and Korea already. Expansion to 25 – 30 sites, including India and Australia, others

Priorities: Taiwan to procure and deploy 15 new collectors, Sri Lanka and Philippines are next, EPA to support additional collector in Vietnam. Training and organizational development in July 2016 in Bangkok. Launch APMMN (PO) in June at NCU-Taiwan. Workshop in Japan in the fall. Data acquisition, management, and distribution work on database coming soon.

News article: Vietnam justifying more monitoring based on Hg in rain in Hanoi.

14:30 Expansion of NADP to Cuba and Mexico – Greg Wetherbee

Greg presented an unsolicited proposal to expand the NTN into the nations of Cuba and Mexico, with 2 sites in Mexico and 3 in Cuba. The sites were selected in coordination with the UNAM in Mexico City and the CEAC in Cienfuegos. NADP's objective is to create a transect of NTN sites through the Caribbean at about 22° North latitude. The data will be used to evaluate reactive nitrogen deposition to the Gulf of Mexico and Caribbean. In addition, the impact on the Cuban landscape due to increased development will be evaluated. NADP personnel involved in the project include Greg Wetherbee, David Gay, Chris Lehmann, Mark Nilles, and David Schmeltz.

14:45 Mercury Litterfall Status – Marty Risch

Litterfall useful for comparison with MDN and AMNet data. Network will achieve 5 years of operation in Autumn 2016 following NADP 12-point plan. Site sponsor pays $2600/year. There are 8 passive collectors operating August through end of litterfall drop. Samples are dried and weighed (catch), analyzed for Hg and MeHg and deposition is calculated.

20 sites will operate in autumn 2015 – includes 6 new sites and a 3rd year in Puerto Rico. Initial study in 2007-09 plus data from initiative 2012-14 are ready for analysis. All told, there were 27 NADP sites in

deciduous and mixed forests in 16 states in eastern USA. Data summary: Median 11.6 μg/m^2/yr, Range: 2.2-23.4 μg/m^2/yr.

Median concentration: 41.9 ng/g, range 21.4-67.8 ng/g.

Median wet deposition: 9.2 μg/m^2/yr, range 4.5 – 19.7 μg/m^2/yr.

PR20 monthly data for 2014 with annual litterfall Hg dep. 37.9 μg/m^2/yr. Mean litterfall Hg concentration 45 ng/g. Litterfall catch 869 g. MeHg deposition 0.3% of total.

Marty is conducting an evaluation of temporal and spatial variability of Hg in deciduous forest study plot at Indiana Dunes. USGS supported IN34 site. Median Total Hg and sample dry weight are correlated. Mean weekly concentration 36.2 ng/g with 9.6% RSD. Rain on collector material did not seem to have a profound effect.

Samples are archived for 7 years, freeze dried and available for additional research. Journal article forthcoming later this year. NADP data archive planned.

15:20 SCUAM (Subcommittee on Urban Atmospheric Monitoring) update - Pam Templer/Tom Whitlow

Pam started out with an update on monitoring in Boston and NYC. Goal is to have 19 sites by 2025. Currently there are 4 urban NADP sites. In urban areas, scale is important. Hot spots and hot moments influence data. Siting criteria is always challenging, but achievable. 15 Sites in Boston. N inputs 4 times higher than rural areas and vary 3-4 fold in Boston.

Drivers of deposition rates: Variability driven by 1) distance to urban core, and 2) NOx emissions.

Sites in Boston set up for bulk deposition on roofs of buildings. Looking at both organic and inorganic forms of nitrogen.

Tom showed rooftop farm at Brooklyn Grange / Brooklyn Navy Yard. Issue was where to place collector(s). Bulk samplers located in middle of garden plots. Raised roof samples from 0.5-2.5m above roof surface also installed. Natural gas fired power plant is very close to rooftop garden creates “hot events”.

There is both seasonal and small scale spatial variation. There are differences between raised roof samplers and samplers in plots. Generally higher concentrations in the lower samplers compared to raised roof samplers. Unfiltered N concentrations slightly higher than filtered.

Soil moisture sampling collecting leachate samples to “close the balance”. More variation during growing season. Bulk deposition samples indicate more N leaching off of Grange surface compared to atmospheric deposition.

Pam Padgett asked about expansion of sample collection. Pam Templer indicated that they are at the maximum extent of their resources, but they could expand with other partner cities, and that they are willing to help other people get set up for monitoring.

Emily Elliot suggested making the Siting Criteria available more broadly to help people get set up.

N deposition model performance and implications for CLAD, TDEP and NOS - Jason Williams

TDEP, CMAQ, NTN MAPS, AND CMAQ (WSU), GEOS-Chem, CAMx – Which models do you use? What should the protocol be to select a model?

CL Exceedance = N deposition – Critical Load (CL)

Typically, Ndep estimated using gridded output, equation applied to each grid cell, deterministic models assume no uncertainty in Ndep and CL.

Large Ndep bias could cause false positive or negative deterministic excedance. So, Jason quantified bias for available deposition models.

CMAQ at NTN uses N bias of CL values for lichens and diatoms.

Paradise Bulk Deposition Monitoring by NPS/SWU 30 km east of WA99 modeling used CMAQ, TDEP, PRISMxNTN. Model wet compared to bulk for different models. When PRISMxNTN used, the relation to measured bulk at Paradise were better than TDEP. Ndep bias can exceed 100% of CL values in the Pacific NW. The bias quantified is likely a minimum estimate.

Recommendation for CLAD: Require modelers to provide a file w/paired modeled and observed annual deposition values along with deposition GIS grids. Use performance information to inform model selection for CLs and CL exceedance calculations. Define adequate performance for your specific application. Use performance information to inform interpretation of CLs and CL exceedances.

Recommendation for TDEP/NOS: Discuss how NADP completeness criteria should be applied for NTN/TDEP maps. At Tahoma Woods, Criteria 1 and 3 most frequently not met. Used censored data, and results come out close to TDEP model.

A lively discussion between Jason, Donna Schwede, Rick Artz, Gary Lear, and others ensued and continued after adjournment of the session.

16:25 Annual Variations in Wet-deposition Chemistry Related to Changes in Climate - Greg Wetherbee

Greg presented his paper that was recently published online in Climate Dynamics. Greg's analysis shows how NADP precipitation-type data indicate that the snow season is shortening along with a trend toward increasing air temperature. Moreover, the timings of wet-deposition chemical maxima are shifting in a consistent latitudinal pattern with snow-season duration shortening. Longitudinal patterns are more varied with different patterns observed in high-altitude regions. The implications for theses shifts in wet-deposition timing are unclear. However, Greg speculated about how shifts in the growing season may or may not coincide with the observed shifts in wet deposition chemistry, which could cause more nutrients to wash off the landscape in surface water.

16:45 Spring 2017 Meeting - Greg Wetherbee

The spring 2017 meeting will be held at The Brown Hotel in Louisville, Kentucky.

16:50 Fall 2016 NADP Meeting and Scientific Symposium – Donna Schwede

The 2016 Fall Meeting and Scientific Symposium will be held at the La Fonda Hotel in Santa Fe, New Mexico.

Adjourn

16:46 The meeting adjourned with a motion by Pam Padgett that was seconded by Mark Nilles.