National Atmospheric Deposition Program

Network Operations Subcommittee Minutes

Submitted by Mike McHale NOS Secretary
Spring Meeting 2022
Wednesday April 20, 2022

Agenda

13:00 Welcome (Ryan McCammon)
13:05 Modification of NOS meeting format (Tim Sharac)
13:15 Network Analytical and QA Reports
13:15 NTN (Katie Blaydes)
13:30 AMoN (Camille Danielson)
13:45 MDN (Christa Dahman)
14:00 Methylmercury and Aliquoting (Christa Dahman)
14:10 MLN (Christa Dahman)
14:15 AMNet (Richard Tanabe)
14:20 Break
14:30 Sample, Supply and Data Processing Report (Amy Mager)
14:50 USGS External QA Report (Greg Wetherbee)
15:05 Site Liaison/NED Report (Richard Tanabe)
15:20 EEMS Site Survey Report (Eric Hebert)
15:40 Break
15:50 New ACM Sensor Evaluation (Greg Wetherbee)
16:00 Event Recorders, Dry Exposure, and QR coding (Discussion - Greg Wetherbee, Bob Larson, Zac Najacht)
16:10 MDN multi-week comparison study - II? (Discussion - Greg Wetherbee, Christa Dahman)
16:20 Siting Criteria Workgroup (Tim Sharac)
16:35 Wrap up (Ryan McCammon)

Summary of Adopted Motions:

1) **Motion:** The NADP shall discontinue analysis of MeHg as an optional analyses for the MDN on May 1, 2022. Participating sites shall be informed immediately.

2) **Motion:** The NADP shall accept PET bottles as a conditionally acceptable sampling container for MDN. NADP shall conduct QA/QC comparisons to further validate the acceptability for adding PET by the Fall Meeting 2022.

3) **Motion:** Greg Wetherbee, Wyatt Sherlock and Richard Tanabe will make a plan to test the variability between old and new ACM sensors.
   Mike McHale made the motion
   Second: Dana Grabowski

The meeting was called to order at 13:00 by chairman Ryan McCammon

Modification of NOS Meeting format

Tim Sherac Vice-Chair suggested staying with the NOS schedule and putting stuff in a "parking lot" to revisit on the following Monday

Discussion: Kristi asked are we going to do this every time? And if so could it not be that Monday? How about the following Wednesday. There was general agreement. Ultimately it was decided that we would hold a NOS "overflow session" later in the week on Thursday afternoon.

13:15 Analytical and QA Reports

NTN: Katie Blaydes – NTN, She is now lab supervisor (in December 2021), they hired a new chemist (Chris Bauknecht, from within the state lab, Proficiency testing Dept.). Chris Worley retired in March 2022, They have a vacancy out for a lab chemist (Marie Assem left), Mike Randall is the new instrument technologist (started in April 2022).

A new filter apparatus began being used in October 2021 for NTN, reduced the contamination issues they had been seeing. In January they changed their field and lab hold deployment times for most of the networks.

Supply QC – mostly looks good, they always have some contamination from the lids (Ca and Cl) and the NTN syringe filters also cause some contaminations (Cl, Ca, and K).

Lab QC from March 2021 to March 2022: They have had very few analytical QC exceedances.

They participate in 4 different sample exchange programs (proficiency test programs), Environment and Climate Change Canada, USGS SRS, WMO and USGS intercomparison study. The ECCC results were satisfactory, except for the NH4 which was analyzed a month later than it should have been. The USGS SRS samples are done 2 times per year, the results were satisfactory, except for low recovery of SO4. They looked into this in some detail, they were not able to determine the problem but seem to have ruled out a problem with the instrument and are currently thinking it is a problem with the matrix. They had one exceeding the warning limit on Mg on WMO samples, they think that it might be caused by the analyst implementing a nitric acid rinse, they have since stopped using the acid rinse. The USGS intercomparison consists of 24 samples per year, there was a slight positive bias for NO3. More information will be presented later on that issue.

2022 Method Detection Limits (MDLs), all MDLs were verified, one change to note the Mg MDL was decreased from 6 ppb to 4 ppb. All MDLs are below the 10th percentile for analytes except for orthophosphate (which is really low anyway).

<u>Major Occurrences</u>:

1. The 10-use limit on the 1 L samples bottles has been temporarily suspended because of supply chain issues.
2. They had a delay in processing low volume samples due to a supply chain issue.
3. They had some ongoing supply QC failures related to the filtering apparatus discussed earlier, the replacement of the filtering apparatus seems to have resolved that issue.
4. They had some issues with faulty standards and a faulty reagent which caused them to purchase a new lot of the standard.

5. The ongoing low recovery for SO4 discussed earlier.
6. ICP trend for Mg and Ca for the check standards, this issue is unresolved.

Research for total N and total P, out of 43 samples collected 23 were analyzed, all others were too low in sample volume. Currently they have 2 locations collecting SNIPIT samples (Arboretum in Madison and Duke Forest). This is the second set of samples for the SNIPITS. There was quite good reproducibility for the 6 pairs of co-located samples. However, they are still seeing negative organic fractions for total N and total P. Out of the 23 samples analyzed, 7 had positive organic fractions for N. Katie's theory is that the samples are being over acidified causing issues with the color development on the FIA method. This is caused by low volume samples, the acid amount is calculated based on a 250 ml volume. Katie has an idea of how to test this theory.

Questions and Answers:
Doug Burns: he has seen issues with negative organic N in clear mountain streams and suggested that they may never fully solve this problem.

John Walker: Was the NH4 from the unacidified bucket sample rather than the bucket sample
Answer: from the bucket.
John commented that they have not seen negative organic values when samples are not acidified.

Greg Wetherbee: Which analytes were you seeing contamination for from the sampling apparatus?
Answer: Na, Cl, Ca – quite low contamination and in nothing else.

Mike McHale: In terms of the acid rinsing issue, would you consider adding the acid rinse a change to the SOP and if so how was that done? Are changes in SOPs required to be approved before they are implemented by an analyst?
Answer: Yes, it was a change in the SOP that was not approved.
Mike: Maybe this is a time to reiterate that analysts are not supposed to make changes to SOPs without approval.
Answer: Agreed, we have had a lot of turn-over in staff and we have made it clear that analysts do not have the authority to make change to SOPs without approval.

AMoN: Camille Danielson, Quality Assurance Manager for the NADP labs and QAAG co-chair

Current QC update:

- 3 travel blanks and 3 duplicates per year.
- AMoN sample bodies get 8 uses before being replaced.
- Reagent expiration after 4 weeks.

Camille pointed out that they document any method changes.

QC Blank Summary

- Hood blanks – no exceedances in 2021
- Core Blanks – no exceedances in 2021
- Prep Blanks – no exceedances in 2021

- Room Blanks – no exceedances in 2021, they have discontinued room blanks, but reserve running them as a corrective action if necessary.
- Extraction water is tested daily
- There were 22 Jar Blank exceedances in 2021 – not particularly high, but a concern. They have taken several corrective actions and have had no exceedances in 2022 although they never tracked down the exact problem.

Field QC:

They did 553 travel blanks in 2021, only 1 travel blank was over the criteria in 2021
They do 3 travel blanks per site per year
They had 11 invalid travel blanks which usually means it was one that was deployed by mistake
Duplicates – 378 sets in 2021, 85% were less than 10% relative percent difference and 94% were less than 20% relative percent difference, the other 6% were quite high, but they do not know why, it's difficult to track down.

Analytical QC:

They do a lot of analytical QC, they review all QC charts for bias and trending issues and none were found. Only a couple exceedances for the year

Method Detection Limits:

They verify the MDLs every year. They only make changes if there is a large change.
The lab MDL is used analytically for criteria for the lab and supplies and it is also used to flag the travel blank identity, it is currently 0.01 and will remain that for 2022.

The network MDL is used to flag the actual deployed samplers and is calculated based on travel blanks, it went up slightly to 0.08 this year.

Studies:

1. Tom Butler Watershed Study
   They have a watershed with 9 AMoN sites, the study started in May and concentrations decreased through time, those near Ag were higher than forested regions.
2. Blue Body Study
   Originally the Wisconsin Lab chose to use 5 deployments for the sample bodies. Illinois was using 10. They deployed a series of bodies with various lengths of previous deployments with the same lots of cores. No significant difference in concentrations was found so they decided to switch to 8 deployments for each body since they are having supply chain issues in getting new bodies. They plan to study this further; they need another site with more wind or sand.

   Camille also talked about studying changes in deployment time and also how long they can store prepared samplers. She also suggested looking at temperature effects on ammonia. Camille also suggested the possibility of tracking the core lots automatically to each sampler which would allow a blank core correction if people wanted the ability to do that.

Questions and Answers:
Amanda Cole: Is there a reason you are only suggesting a core blank correction, why not a travel blank correction as well?
Answer: Because we would have to send travel blanks to every site which would be prohibitively expensive, although Camille did say that would be ideal.
Martin Shafer comments that there are other networks that apply a running travel blank correction network wide, Camille thought that was a good idea.

MDN, MLN, Methylmercury and Aliquoting: Christa Dahman (supervises the trace element clean lab where all of the mercury analyses take place)

Mark Olson left at the end of 2021. He has not been replaced instead his duties have been dispersed. There are 3 other people who work in the trace element clean lab, they all left in July and August 2021. They have had a nearly complete staff turnover in the last year.

They started reusing the vials for the CVAFS analyses, they are cleaned and stored with a small amount of dilute HCL.

In June 2021 they started looking at individual collections of methyl mercury instead of compositing. They also started their first season of litterfall. They also changed the one parameter for hold time, the time from bromination to analysis.

They had one supply QC issue with their bottles – some 2 L bottles had a mean concentration of the lot above the MDL, but did not exceed the secondary criteria of a single bottle being above 3 times the MDL. So they accepted the bottles because of the bottle supply chain issues.

Glass ware cleaning procedures look great, lab water looks great, acid preservative looks great.
They had one incident of a CCV failure which affect 10 samples which get flagged, which was quite small.

Laboratory reagent blanks all look good.

They completed a new MDL study for MeHg this year after the spike issue was resolved which resulted in a new MDL (0.03) which is slightly lower. No changes to the total Hg MDL

Major Occurrences:

1. MethylMercury – the ongoing precision and recovery of the instrument checks look excellent. In the fall of 2021 they had an issue which affected their spike recoveries (which were high). It turned out to be a problem with the Madison water supply which had high CO2. This caused them to stop analyzing MeHg for quite some time to allow them to trouble shoot. The calibration was being suppressed. However, the reagent blanks all still looked good. The solution is to distill all of the reagent water.

2. They had GC oven failures starting in the spring of 2021, it took a long time to figure out why because they had a previous GC oven failure so were assuming it was being caused by the same problem which was not the case. It was an easy resolution, but took a long time to figure out.

3. They had a lot of variability for the USGS sample exchanges prepared by Greg Wetherbee that they think is related to aliquoting and after a discussion at the 2021 Fall meeting they have fixed the issue.

Litterfall Network

Sample collection started in 2020 for analysis at the Wisconsin Lab, they took it over fully in 2021. The report will not be sent out for a while yet. They are behind due mainly to staffing shortages, but hope to be caught up by the end of the summer.

MeHg Aliquoting Problem

They have been wondering about the acid concentration in MDN samples for some time. They pre-charge with 1% HCl.

Mark did a study of a spike in reagent water and HCl, put it outside for a month and every week took 30 ml for analysis. Almost immediately they could not recover the spike. They were only getting about 30% recovery which only got worse over time. This did not bode well for the stability of Hg in samples, but where was the Hg going? They added more acid to the bottles to try to get Hg off of the bottle walls if that was the issue, which did not really help. They then added bromine monochloride which they use to oxidize all of the Hg and all of the Hg came out.

When they looked for the same issue on real samples they saw the same issue. The same loss of Hg to the bottle walls. As a result, aliquoting presents a problem for full recovery of the sample. Christa went into a lot of detail about the issues with aliquoting and the other potential factors affecting MeHg concentrations especially sample contamination which appears to be under reported. In addition, with sample compositing if one sample is not contaminated, but another in the composite is then the whole sample becomes contaminated. They have done a lot of testing related to these issues including temporarily stopping sample compositing MeHg samples to look at individual sample concentrations. All of the 35 MeHg concentrations above the Limit of Quantification (LOQ) were contaminated.

Christa ended by saying that she does not think this is a trend (an analyte) that we can easily monitor. The data come with a lot of nuance that is hard to communicate through a data file downloaded from the website. She thinks it's possible to continue as a special project but should not continue as a network analyte.

Motion:

The NADP shall discontinue analysis of MeHg as an optional analyses for the MDN on May 1, 2022. Participating sites shall be informed immediately.

Motion Made by Greg Wetherbee
Seconded by: Christa Dahman
Motion Passed
In room 19 yays no nays
9 yays on the chat no nays.

AMNet: Richard

With the departure of Mark Olson the role of AMNet Site support liaison needed to be filled. Wyatt Sherlock is the new AMNet Site Support liaison, he is learning the data review process.

No site audits have been performed since December 2019 due to COVID, EEMS will start performing site audits again in 2022, they have 4 scheduled in 2022.

All data for 2021 have been received except for 1 site. All data have been processed through the data review program. Final data review is currently in process.

They are working to improve the timeliness of data received from the sites by sending out quarterly reminders.

They are planning an AMNet site operator Zoom training session.

Questions and Answers:
What is the status of all of the equipment that has been acquired over the years?
Answer: It is all stored in the Henry Mall building and can be used for new sites. The equipment needs to be evaluated in the future, there is not staff to do that now.

Sample and supply data processing report: Amy Mager
Given by Amy Mager – NADP Sample and Data Processing Manager

They receive, log in and do data entry on all of the samples for all networks NTN, AMoN, MDN and the newest network, the mercury litterfall network. They receive, clean and ship sampling supplies for all networks. We collect all necessary supply quality control; they do the contamination coding, the pH and conductivity, and filtering for the NTN samples. They store the sample archive and process and ship out any special study samples that are going on.

<u>2021 Stats</u>
Received 13,000 NTN samples.
3,100 AMoN samples
4,000 MDN samples
280 MLN (mercury litterfall network) samples
That amounts to about 1,600 samples per month from all of the networks
Site numbers:
NTN 263 sites
MDN 81 sites
AMoN 115 sites
Mercury Litterfall 23 sites

NTN bag sampling:
The network is one year into the NTN bag sampling by May of 2021 99% of the sites were converted to bag sampling. We are officially one year into bag sampling, and it was a smooth transition overall. They conducted several operator training sessions related to the bag transition. Those training session were helpful as have all of the online training implemented during COVID.

They also have switched to a proactive supply shipping method, all of the sites are on a schedule, and they ship new supply box to the sites every 8 weeks. They've also implemented a supply survey related to this, so the week before a box is going out to a site they send a survey, asking them to update us with what they have on hand and the supply boxes are adjusted based on the answers. It's helped us conserve our supply inventory and has helped avoid a buildup of supply supplies at sites which has been a problem in the past.

Amy spent some time discussing the issue of the bags being difficult to get into the bucket as well as some of the other bags considered. They are exploring options for bags with their supplier.

Supply shortage issues
MDN Sample Bottles - They cannot get the PETG bottles for MDN. As a result, they are using Corning PET bottles temporarily. They also have a supplier for Fisher PET bottles they have enough to get through the 2022 calendar year. David Gay has some literature that says these bottles are good to use. The PET bottles cost less and are recyclable, it amounts to a cost savings of about $30,000 per year. They want to make the change permanent.

NTN Sample Bottles 1L HDPE Bottles –
They have temporarily stopped discarding these bottles after 10 uses because they cannot get any more for the time being. They have a potential alternative from Corning that they are currently testing.

They are trying to get ahead of supply issues by ordering ahead of time and keeping in contact with suppliers.

Mercury Litterfall
2019-20 USGS in NY processed samples and sent them to Wisconsin for analyses, for the 2020-21 and 2021-22 seasons. It became an official network in spring 2021. There were 23 sites in 2021-22 and they received 70 sample sets about 280 individual samples. They now have a LIMs module for logging in the samples. Reporting is currently a manual process, 2019 is done, 2020 is in process, 2021 the samples are just starting to be processed. Equipment prep is about to begin for the current year.

System Blank Field Audit Program
Greg Wetherbee has been in charge of this – NADP staff will now prep and ship the control solutions and materials beginning in 2022. The system blank applies to the MDN network, the field audit sample is for the NTN network. Greg will still review and report the data. The material prep is underway.

Sample Archive
NADP keeps 5 years of samples that had enough volume to archive. They are refrigerated at Henry Mall. All samples get archived at forever sites, one sample per month are archived for fixed sites – these all get frozen. Researchers reach out with requests for the samples at an average of 1 request per month. Amy said that they may need to assess how many samples get archived, the archive is getting quite large.

Data Reviewing and Reporting
The process includes review of precipitation field and analytical data. Precipitation data is reviewed weekly, about 300 records per week. Sample field and analytical data are reviewed bi-monthly.

The goal for turning around monthly data sets is 90 days which they met for 2021; they did not meet that goal in 2020, but they were adding the new Mercury Litterfall network and dealing with COVID restrictions. They are currently reviewed and reported through December 2021 for all networks.

Hold Times and Notes Codes update:
This is something that was introduced and approved at the fall 2021 meeting. They discovered that there were inconsistencies across the networks for notes codes and the resulting QR codes related to time categories. They have standardized the codes across the networks and automated the process to improve consistency. They also created codes for the Litterfall network which has never had notes codes. These are currently manually entered but will be automated in the future. These changes will be implemented for review of the 2022 data.

Here is an example for lab hold times - from date received to date analyzed.
We had always held a standard for ourselves in the lab if we went over that in this case 30 days that would be a manual code that we would have to add manually and adjust the QR code that way. But now this is an automated code. That will now get an "H" notes code or an H. qualifier automatically and the QR code will go to B.

Another good example of this is that for AMoN. Previously, there were no field time criteria so that has been as well as some automated coding and that process is now automated which is more consistent with the other networks. A related note is that since the Mercury Litterfall Network is a new network there were really no notes codes associated with MLN in the past as far as the reporting would go, a manual report was created but no qualifiers of any kind that we know of were associated with those data. So we've also developed some notes codes for the MLN network. Some basic notes codes will be added manually, as needed, when reports are created and eventually we're hoping to have this automated.

For instance if there is a field protocol error or some sort of serious problem in the field that compromises sample integrity such as a low mass sample or laboratory error, or a minor quality control issue, we now have a way to note these things and qualify the sample if needed.

Questions and Answers:
Ryan McCammon – you said something about a motion, when is that going to come up?
Answer – We can talk about it now.

Motion:
The NADP shall add PET bottles as a conditionally acceptable sampling container for MDN. NADP shall conduct QA/QC comparisons to further validate the acceptability for adding PET by the Fall Meeting 2022.
Made by Amy Mager
Second Christa Dahman
24 yays 1 abstention
I don't know how many in the online (at least 20)

USGS External Quality Assurance: Greg Wetherbee

Greg presented the annual USGS precipitation chemistry QA report for 2021

Recap of the USGS Quality Assurance Programs

There are 5 programs

- An interlaboratory comparison for NTN that includes most of the major precipitation monitoring networks in the northern hemisphere.
- An interlaboratory comparison for MDN that includes as many laboratory networks as possible throughout the world.
- The field audit and system blank programs to assess sample contamination and stability.
- The co-located study in which 2 collectors are put at the same location for a year to look at variability.

Highlights

- There is a negative analytical bias for the HAL for most of 2021, that appears to have been corrected in November.
- The HAL variability was high, about twice that for all the participating labs in the interlaboratory comparison.
- The combination of bias and variability is not consistent with previous HAL performance, but it looks like they have addressed the concerns.
- The mercury network maximum contamination is about 0.09 nanograms per sample
- For NTN there was a positive statistically significant analytical bias for hydrogen ion and for nitrate.
- For 2021 the CAL variability is lower than the overall period for calcium, sodium, potassium, ammonium, sulfate and specific conductance.
- CAL variability is higher than overall for magnesium, chloride, nitrate, and pH.
- The field audit shows decreasing contamination for everything except calcium, magnesium which is consistent with an increase in hydrogen ion loss.
- Preliminary results for the collocated sampler sites indicate less than 10% variability for all analytes with about half the data collected. We do not do co-located sites for MDN because the cost is prohibitive.

Greg then went on to discuss the results in some detail.

Publications:
The 2019-2020 QA Report is being drafted for directive's approval
Greg is making a USGS Scientific investigations Map on Rocky Flats nitrogen deposition.
The 2019-2020 QA data release is on ScienceBase now.
All of Greg's NUANCE data is on ScienceBase as well.
A new publication was just accepted, "Elevated nitrogen deposition a fire prone forest adjacent to urban and agricultural areas" that was developed using the NUANCE data.
Dave Felix at Texas A & M is writing a stable isotope paper using data we collected at some NADP sites.
Greg also wrote a paper on estimating urban air pollution contribution to South River nitrogen using NADP data

Greg also said that he is planning to bring on a new person to take over the QA duties with his guidance, possibly transitioning the work to Wisconsin.

Richard – Site Liaison NED report

Staffing updates: Mike Randall is the new instrumentation technologist

He has over 20 years of interactive science education and outreach program experience.
This summer they will have Alex Tanner work full-time in the NED this summer. Alex is a mechanical engineering student.

They have converted the 1 800 number to a "hunt" group. In the past the site operators calling the 1 800 number and either they got Richard or they got voicemail. Now it is set up to ring 3 to 4 times to Richard's desk then it switches to Wyatt, then goes to voicemail and emails Richard and Wyatt
But there's been some growing pains because now some thing's fall through the cracks.
They have a new email address for the NED (ned@slh.wisc.edu).

EEMS and the program office have continued to do monthly meetings which include USGS (Greg Wetherbee) and Wood (Chris Rogers).

Virtual training sessions:
They began these to improve operator engagement and have continued into 2022.
They consist of a brief presentation followed a Q&A session.
The sessions are recorded and made available on the website as soon as possible.

Operator turnover is still a challenge, there was a site in South Dakota where they discovered there's a new operator who started in 2020 and the program office did not know.

They've been talking about improving operator troubleshooting documentation. There isn't a lot available.

They are still working with students to develop a linear actuator for the NTN Aerochem, they've made a lot of progress this year.

Richard has created new list servs for AMNet, Litterfall and DMAG.

NED Priorities:

- Clear the backlog of Aerochem motor boxes needing repair
- Continue refurbishing and upgrading Aerochem sensors.
- Test and repair Theis sensors
- We need to adapt the Aerochem collectors for the SNIPIT sampler.
- Reorganize the NED space
- Integrate Mike into site troubleshooting with the operators.

Site Audit Issues: Eric Hebert
EEMS is contracted to do the site visits.
They visit about the same ratio of MDN to NTN sites every year. In 2017, they switched to visiting sites every 4 years rather than every 3 years based on their EPA funding.
Eric discussed the site visit schedule, and they are mostly caught up with site visits and are on track to visit all sites every 4 years.

Eric reported that the rain gauges perform well in his evaluations
They also test the actuators and replace those that are not operating properly.

They check lid arms and tighten them if necessary
They check whether siting criteria are being violated
They update datalogger operating systems, change the internal batteries and convert the sites to Androids if needed.

Siting Criteria Work Group: Timothy Sharac

Tim presented an in-depth analysis of the siting criteria and the effect on data invalidation

There are 22 siting criteria for NTN – each time EEMS does a siting report roughly 75% of sites fail the siting criteria; the question is are siting violations impacting the quality of data ?

Topics from the Fall Meeting:
Doing a Chi-squared or contingency table evaluating criteria and impacts to data completeness.
The topic of siting criteria impacts on chemistry has not been addressed yet.
Ultimately, they want to know what to do with sites that do not meet siting criteria, how do we explain that to users.

The analyses:
They began by binning the sites by NOAA climate regions, but that resulted in the sample sizes being too small to conduct statistical analyses.
About 90% of invalid samples have debris in them and about 12.5% of the 100,000 are contaminated or invalidated due to c and d note coded data.
About 39% of invalid data have other code types
The challenge is that there are many more sites that pass for each given siting criteria than those that fail. As a result, it becomes difficult to determine whether there is a statistically significant difference in the data. The variability for the sites that pass is typically greater because there are so many more sites in that group.

They adjusted the datafilters for determining which sites to include using best professional judgement and ended up with about 60,000 records and made sure the sample sizes were comparable and then ran summary statistics, Chi-square and Fisher t-tests for 12 siting criteria.

With this routine they found episodically statistically significant differences for 3 siting criteria: Road Rules, 45-degree rule (no obstructions within a 45° cone of the collector top), and the collector orifice position rule (the collector must be within 5-30 meters of the rain gauge or 0.3 meters vertically).

Their results did not agree with some of the previous studies on this topic.
Their conclusion is that the 3 criteria that they found statistically significant certainly do affect data completeness, but it is not clear that all of the siting criteria affect data completeness.

Next Steps:
Compare NADP sample chemistry with another wet deposition network if it's co-located.
Explore how sites may benefit from windshields on the collector (this was suggested back in 1990).
Should we consider changing or dropping siting criteria violations that do not change sample data completeness?

Questions and Answers:
Winston: Should we take a more holistic approach at the sites and try to evaluate the way equipment condition and cleanliness contribute to invalidating data.
Answer: Yes, a short discussion followed about this issue. Tim ended by supporting the idea of doing virtual audits for the sites since the budget will not support more frequent on-site audits.

Motion to adjourn: Greg Wetherbee
Seconded: Winston Luke

Post-NOS Thursday April 21, 2022

Topics

- New ACM Sensor Evaluation (Greg Wetherbee)
- Event Recorders, Dry Exposure, and QR coding (Discussion - Greg Wetherbee, Bob Larson, Zac Najacht)
- MDN Aliquoting Implications
- MDN multi-week comparison study - II? (Discussion - Greg Wetherbee, Christa Dahman)

ACM Sensor Evaluation
Greg W presented a quick and dirty examination of data from 5 stations. He showed a change in the relation between Precip depth and Wet Exposure Time (new sensor opens later).

Wyatt Sherlock said the only difference between the old and new sensors is the circuit board, made with solid state components and uses more robust connectors. During periods when it's less than freezing the grid sensor heats to about 10 deg C in the inactive state. In the active state the new sensors heat to 65 deg C the old sensors heated to above 50 deg C, but it was quite variable so there is a difference. So, the inactive temperature is pretty much the same it's the active temperature that's heating differently.

This would perhaps create less dry exposure – which could potentially change the chem, but a lot less than opening early and would probably be more accurate. Greg's main concern is that we do not know how the new sensors will affect the chemistry. He suggests we test the new sensors against the old sensors so we can quantify the differences between the sensors.

Richard Tanabe: We can't just compare one old sensor to one new sensor because the operation of the old sensors is so variable. We would need to compare several old sensors to several new sensors.
There followed a long discussion about the sensors and the ways that we could go about comparing the old sensors and the new sensors. Greg Wetherbee agreed to send Eric the list of sites that had new sensors installed so that Eric could look at the inactive temperature record for those sites.

There was agreement that we would test several old sensors and 1 new sensor at Eagle Heights.

Motion: Greg, Wyatt, and Richard will make a plan to test the variability between old and new ACM sensors.
Made by: Mike McHale
Second: Dana Grabowski

9 yays in the room and majority in the chat
Motion Passed

Event Recorder

Amy Mager introduced the topic by saying that there are times when they do not have any event recorder information, however they do have precipitation data and a good samples depth which match. Currently, that sample would go through as valid, however since the event recorder data are not available, they do not know if the sampler was open for an extended period of time. The question is how should that situation be represented in terms of a notes code and QR code. They do not want to invalidate those samples because it is such a large amount of data. Currently 40 sites have no event recorder data. About 15% of all data would be invalidated. Dana observed that sites with new sensors tend not to wire up the event recorders properly. A discussion then occurred about how to fix this situation including emailing site operators directly and providing a document that details how to fix the event recorder.

A decision was made to try to get all of the events recorders fixed between now and the 2022 Fall meeting.

MDN 1 week vs 2-week sampling

The idea here is to determine whether we can collect MDN samples every 2 weeks instead of every week. Greg Wetherbee suggested using 1 or 2 dual chimney samplers at Eagle Heights to pull 1 week and 2-week samples for some period of time.

Christa suggested using spike samples and doing a much shorter time period for example 20 bottles, 1 baseline measurement and then every 2 weeks they take 1 or 2 in and analyze them. This would be a lot faster and produce more data. Greg said that is okay with him using a natural matrix, no aliquoting. We will evaluate the results when the work is complete.

MDN Aliquoting Implications

Camille

The aliquots taken from MDN samples that have MeHg on their plan, their total Hg may have been affected causing a high-bias of about 10% on samples from the HAL. Camille asked whether we do anything about this either the MeHg data or the total Hg data? There was a short discussion to clarify the actual problem and then Amy Mager suggested we put a message on the website and Mike McHale suggested that if someone queries NADP about using the data they can contact Christa and she can work with them and help them deal with the concentrations. Wisconsin took over the Hg analyses in 2019. Kristi asked that an actual correction be made for the Great Smoky Mountains.
Motion to adjourn: Greg Wetherbee
Seconded: Mike McHale