

## **NOS Meeting Minutes – 2023 Fall NADP Meeting, Madison, WI, October 23, 2023**

### **Agenda**

- 2:00 PM Welcome, Logistics, Introductions (Tim Sharac)
- 2:10 PM Sample and Data Updates (Zac Najacht)
- 2:30 PM Field Operations & NED Updates (Dana Grabowski)
- 2:40 PM Network Analytical and QA Reports
- 2:40 PM AMNet Update (Vid Grande )
- 2:50 PM QAAG (Martin Shafer/Nicole Miller)
- 3:00 PM QA Report (Nicole Miller)
- 3:10 PM MDN Bag Update (David Gay)
- 3:20 PM Mercury Bottle Material Test Update (Christa Dahman/Chris Lepley )
- 3:30 PM Site Liaison (Richard Tanabe)
- 3:35 PM Break
- 3:50 PM USGS External QA Project Update (Noel Deyette)
- 4:10 PM Update to NADP Audit Database (Mike Butler)
- 4:20 PM CASTNET Update (Melissa Puchalski)
- 4:35 PM NPS Update (Kristi Morris)
- 4:45 PM PFAS Update (Martin Shafer/John Offenberg)
- 5:00 PM Nomination of NOS Secretary (Tim Sharac)
- 5:05 PM Final Discussion/Questions/Wrap-up (Tim Sharac)

### **Two motions were passed in NOS:**

#### **Approval of NOS Minutes from Spring meeting, 2023**

**Mike McHale moved to nominate Noel Deyette (USGS) for NOS Secretary, Winston Luke second. Motion approved.**

### **Sample and Data Updates (Zac Najacht)**

- **Supply & Sample Processing (Overview)**
  - Receive/Clean/Ship sampling SUPPLIES for all networks and collect supply QC
  - Receive/Login/Data Entry; SAMPLES for all networks (NTN, AMoN, MDN, MLN)
  - Contamination coding of NTN samples (no longer perform pH/Cond/filter at Henry Mall)
  - Store sample ARCHIVE, process and ship special studies samples
  - Staff:
    - Colin Kelly – Lab Technician (supplies & shipping)
    - Cami Ritonia – Lab Technician (site operator communication, PFAs/NADP coordination)
    - Anita Peterson – Lab Technician (site supply logistics, ordering & conference planning)
    - Maya Giordano – Lab Technician (joined us in July 2023)
    - Students (Ella Braun, Lilly Mager)
  - Work more closely with Field Operations (NED/Site Support)
- **Staffing Updates**

- Supervisory Changes:
  - Amy Mager, Director of NADP, Soils Lab & PFAs (Sept 2022)
  - Zac Najacht, Sample & Data Supervisor (Feb 2023)
  - Dana Grabowski, Field Operations Supervisor (Feb 2023)
- Additions
  - Maya Giordano – Lab Tech
  - Fiona O’Connell & Ella Wickstrom - APHL Interns (summer 2023)
  - APHL Fellow – joining us late 2023/early 2024; 1-2 year commitment
- Current Focus
  - Supply & Sample Process improvements/efficiencies
  - Utilize Receiving staff for preliminary data review steps
- Supply & Shipping Updates
  - NTN Supply Survey
    - Conserves supply stock at lab & avoids build up of too many supplies at sites
    - Built in an extra 2 weeks of supplies to each site,
    - Keeps supplies from getting too low at sites
    - Allows room for delays, mistakes, lost shipments, etc.
  - General Items
    - Supply Chain - things have continued to improve since the Fall 2022 meeting
    - Streamlining supplies/inventory tracking, ordering and shipping
    - Still ordering more in bulk vs. standing orders
  - Shipping
    - Change over from UPS to FedEx for supply & sample shipping – July 2023
    - Better rates & working with FedEx to improve efficiencies
    - Still using UPS for some special situations & working with FedEx Express for future use
- Connection between Sample Receiving and Field Operations
  - Site Support Hub
    - Tracking equipment issues, equipment/supply requests, operator communications; built in automation
    - Trouble Ticket button in data entry (login step) now links directly to Site Support Hub
  - pH/Conductivity/Filtering (NTN samples)
    - Moved these processes to Ag Drive lab (Katie’s group), June 2023
    - These are the first steps in the analytical process – better fit in analytical group
    - Henry Mall – focus on receiving/supplies/shipping/data review
  - Supplies/Shipping & Receiving Team
    - Continue to evaluate how these teams work together & look for improvements
    - Site communications, supply ordering/inventory, preliminary data review steps
- NADP Data Overview
  - Precipitation Data Review
    - Precipitation data including precip totals, collector exposure, optical sensor activity and gage voltage processed and reviewed weekly. (Dana)
    - Zac gave a demonstration of data correction/removal of false precip values
  - Network Preliminary Data Review - NTN, MDN, AMoN, AMNet, MLN (Litterfall)
    - AMoN data review
    - MLN data reviewed manually
    - AMNet data reviewed independently
  - NTN & MDN - reviewed precip data brought into Data Review program
    - Field/analytical data reviewed by monthly sets (all samples rec’d in a specific month)
    - Automated error flags, notes codes

Manual notes codes/lab qualifiers added\*

Quality Rating (QR) Code (A, B or C)

Final visual checks

Reports are generated and sent

- Zac presented an example of data review for an MDN sample

Field form info entered manually into data review program

Precipitation, analyte concentration info imported automatically

Site History summary table (last 6 months) also available

- Data Review Flags/Comments

Network specific document/SOP appendix

By category for cross reference

Fewer mouse clicks & manual copy/paste

Reduces time spent per sample

- Data published from labs to Program Office, then to NADP Website (Mark)

### ● Network Sites and Sample Load

- Monthly datasets (samples received during specific month, regardless of sampling dates);

~ 1,650 physical samples received per month; ~ 3,000 records for review per month

NTN - 261 sites, ~1075 samples/month

MDN - 85 sites, ~340 per month

MLN - 23 sites, seasonal/variable # samples per month

AMoN - 116 sites, ~ 230 samples/month

AMNet - 10 sites, ~8640 5-min data points/month

PRECIP ~1200 samples/data per month

- Active sites per year (2018-2023) – from start of UW’s assumption of program

NTN sites per year stable ~260

AMoN ~105 to ~115 in 2021, stable thereafter

MDN sites on the uptick (from 80 in 2021-2022)

AMNet declining from 18 in 2020 to 10 now\

### ● Data Review and Report Turnaround Time (90 day goal)

NTN - 202 days (171 in 2020, 88 in 2021, 139 in 2022)

AMoN - 202 days (123 in 2020, 95 in 2021, 117 in 2022)

MDN - 201 days (117 in 2020, 76 in 2021, 105 in 2022)

- What impacts data review & reporting?

Site additions, changes or closures

Network acquisitions (MDN, MLN, PFAs)

Shifting personnel & roles (NADP staff, site operators, funding sources)

Program development (deploy/hold times, lab qualifiers, monthly precip loading)

Other circumstances (COVID, fed gov’t shutdown)

- What have we learned?

Further experience in above impacts

Focus on what we can control

Better prepared for what is out of our control

Improve data review programs, processes & roles

### ● Data Review Updates – Moving Forward

- Roles & Responsibilities

Now working more closely with sample receiving team, supplies/shipping, and data team

Dana now working with site support team & involved in data streamlining

Data streamline meetings - ONGOING

program development

- determining roles & timelines
- Weekly Data/Ops Meetings (data, program development, site support & QA) – ONGOING  
Amy, Casey, Dana, Jason, Mark, Nichole, Richard, Zac
- Data Management Advisory Group (DMAG) – ONGOING  
Added new member (Jayde Alderman - WSP)  
Met this Fall - Mark & Zac continuing as co-chairs  
Improving data stream from preliminary lab data review to final data processing to website  
Shifting data focus from 2022 annual summaries/maps to data review streamlining  
Continue making improvements and evaluating processes to increase efficiencies
- Improvements/upgrades made to data review programs & processes – ONGOING  
Adjust preliminary data review processes, roles & timelines  
Processes (what) & roles (who)  
Data streamline meetings
- Continuous upgrades to sample processing & data review programs  
Increasing automation, reducing mouse clicks, less copy & paste  
Lab qualifiers program implemented (automated comments & notes codes)  
Precip management program upgrade – precip data in preliminary review process
- NADP Site Support Hub (track communications, site issues, actions, timelines)  
Better communication = better site operation = better data
- Developing strategies to prescreen data sets – ADVANCING  
Identify initial steps for preparing data sets for these “prescreens”  
Assign initial steps to multiple personnel for branched approach  
Main Goal - filter out samples that are definitely valid (QR=A) or invalid (QR=C)  
Focus critical review on middle range (QR=B)
- Branched preliminary data review approach – ADVANCING  
Incorporating more staff into prelim data review (Supply/Shipping, Rec Team, APHL)  
Identify initial steps for preparing data sets for prescreening:  
Data Streamlining:  
Sampling period gaps/overlaps  
Missing precip/monthly precip data loading (automation in progress)  
Bulk/undefined samples  
Analytical data/missing chemistry data  
Lab qualifiers (automated)  
Other protocol errors/manual flags  
Develop & Implement monthly data set “prescreen”  
Refine data set for critical review  
Final Preliminary Review & Reporting  
Last look before passing on to PO
- Moving from linear data entry and review to branched/simultaneous data screening  
Parcel tasks among Lab and Sample Receiving staff

### **Discussion**

No questions

### **Field Operations/NED Update (Dana Grabowski)**

- NED Staff

Mike Randall, Instrumentation Tech  
Jason Worden, Site Ops Support Specialist  
Jaden Anderson, APHL Intern  
Jehona Zeneli, UW Student Employee

● Inventory/Equipment Shipped Breakdown

- Built up inventory on Aerochem(ACM) sensors and motorboxes  
40 ACM Motorboxes, 27 ACM NTN Sensors, 18 ACM MDN Sensors
- Items shipped per year since 2019:
  - ~ 50-65 NTN ACM Motorboxes,
  - ~ 20 MDN ACM Motorboxes
  - ~ 3-6 NCON
  - ~ 30-50 NTN ACM Sensors
  - ~20-20 MDN ACM Sensors
  - ~ 5-10 Thies Sensors

● Equipment/NED Improvements

- CAD designs for ACM motorbox clutch and ACM sensor parts (Mike Randall)
  - Will allow for manufacturing uniform parts
  - Easier maintenance
  - More consistent operations
- Developing and improving SOPs (Mike Randall and students/interns)
- Parts organization system
- New vendors for manufacturing old ACM parts
  - UW Madison Physics Lab
  - Savannah Precision Machining
- Improved ACM sensors to eliminate possible failure spots
- Prototype ACM motorbox clutch torque adjuster
  - Uniform parts
  - Streamlined torque adjustment
  - Will allow for easier adjustment of torque in NED and field by EEMS
- Improved ACM motorbox power supply
  - New digital power supply
  - Less bulky, Inexpensive
  - Operating temp -40°C to 85°C
  - Self protected from voltage overload
  - Makes motorbox repairs and maintenance much easier
  - Monitoring these motorboxes in the field through the use of a unique serial number
- Aerochem Motorbox Clutch Design (CAD)
  - Uniform parts, cleaner design
  - Streamlined torque adjustment
  - Will allow for easier adjustment of torque in NED and field by EEMS (nut driver)

● Aerochem Sensors

- Weak Points
  - Sensor plate rusting due to use of mild steel
  - No negative effect on sensor performance
  - All new sensor plates are made with stainless steel
  - Sensor thermistor not making contact with plate
  - Can lead to slow heater response time
  - Inconsistent heater plate temperature when temps are below freezing
- Thermistor Failure Example

Collector opens late and closes early based on exposure plot  
Sample depth 0.03, total precip 0.28 and collection efficiency 11%  
Likely due to poor contact of thermistor with sensor plate

- Improvements to thermistor contact
  - Use of epoxy to install sensor thermistor
  - Extensive testing done in lab with calibration and cold tests
  - More secure and reliable design
  - Does not change performance of sensor - only difference is the way the thermistor is attached
- Site Support Hub – One Year Later
  - Improvements – More Functionality
    - Added in additional queries
    - Internal trouble tickets
    - EEMS trouble tickets
    - External partner trouble tickets
    - Sample Lag Report
    - Gage full query
    - Automated emails for full gage and gage missing data
  - Field Operations and Future Improvements
    - Since Spring meeting resolved 24 more sites with missing Event Recorder signal
    - Largest increase of equipment issues was with raingage load cell noise, mostly ETI
    - Currently working to resolve some telemetry issues at sites and gain better understanding of GOES telemetry and data processing
    - Continue to utilize and improve on SSH with more added functionality and automated troubleshooting guides
    - Working towards more standardized datalogger programming at sites and better metadata management related to site programs, firmware, OS, datalogger clock times...

### Discussion

Greg Wetherbee - To whom do the automated emails (missing data) go?

Dana Grabowski - I believe to site operators only

GW - Can they be sent to site sponsors as well?

DG - I believe so, will look into it

GW - If the emails go to site sponsors or supervisors, we can be a resource to reach out to them so the PO doesn't have to.

Mike McHale - Nice work!

### **AMNet Update (Vid Grande)**

- Site Updates
  - Currently 10 active sites -AK95, MC03, MD08, MD99, NJ30, NJ54, NY20, NY98, OH52, TW01
  - HI00 paused by summit eruption of the Mauna Loa volcano
  - OH02 is currently purchasing equipment, will start this winter
  - Mexico City site (MC03) started in June
  - MD08 future uncertain beyond end of next year... (Mark Castro retiring)?
- Data Review
  - 2023 data received for most sites through at least August
  - MC03 using DropBox®

NY98 using TeamViewer  
NJ sites weekly submissions

- 2022 data review complete: somewhat problematic - many sites had long-standing, unresolved issues & invalid data

● Site Audits

- Audits at MD99, MD08, NJ30, NJ54, NY20, NY98 and OH52
- Many sites have new operators who are unfamiliar with Tekran functioning
- Site setup and training at OH02 to be scheduled
- Hopefully network is in better overall shape

● Moving Forward

- Equipment – trying to repair to get a few systems to deploy
- Training Jason Worden
- Improving Data Program – move program to a more modern programming language?

Discussion

Winston Luke – Is the trouble with MD08 due to funding issues, or is it strictly a manpower issue?

Vid Grande – My impression is that he is retiring and will walk away from site operation – I am uncertain about funding status.

**QAAG Update (Nichole Miller/Martin Shafer)**

● Wind Rose Plots (for Collector Orientation)

- Continued discussion on allowing collector reorientation based on predominant wind directions
- Survey among QAAG for 15 sites – majority of sites had agreement as to whether reorientation would be allowed (a few were split)
- Next steps
  - Tim may rework the plots based on precipitation volume and type
  - Hold a smaller meeting if these plots change and to discuss the few sites with split votes
  - Draft a letter to send to sites to let them know of this option to reorient their collector

● Total N/Total P

- Last update was figuring out pH issue/over acidifying low volume samples
- There has been continued interest to start collecting samples next year
- Will put this initiative back on the forefront

● New/Backup Instrumentation

- Plan to load method onto PerkinElmer ICP as backup option if our instrument is down for an extended period of time
- Our two Hach Lachat Quickchem FIAs have been discontinued and will stop being supported in 2025 – looking into the FIALab instrument
- Plan to make a purchase in the next fiscal year

● Audits

- Finalizing the internal systems and methods audit for 2023
- There will be an external audit for the PO and NAL in 2025

● MDN Bottle Contamination

- Majority of the data from this issue has been processed
- Adjustments made to mapping criteria to not have invalidated samples counted against a site
- For the 2022 data set:
  - 136 of 473 Wet samples invalidated (29%)

14 of 30 DF/DK samples invalidated (47%)  
114 Dry samples

### **Discussion**

Kristi Morris – So the current MDN map has 30% fewer sites?

Nichole Miller – There is a completeness criterion that limits the number of invalidated samples before a site is not used in the map summary. We altered the criterion so that bottle contamination did not count against a site's completeness

Mark Kuether – Only one site was affected by this criterion change

MK – What was the objective of the wind rose analysis? To reduce splash?

NM – Yes, to improve capture

Tim Sharac – Yes, reducing splash and improving capture are the main goals. The SOP assumes a dominant wind direction from the west – in most of the country it is true, in other parts it is not – we looked at wind rose plots over 30 years at sites during periods of precip > 0.01 inches. At a handful of sites the winds are not from the West and a waiver of the siting criteria or reorientation of the collector may be needed.

NM – The letter that will go to the sites will notify them that we will not count these collector orientation issues against them.

David Gay – It's re-examining an assumption made 40 years ago that at most/all sites the predominant wind direction is from the west.

### **Quality Assurance Updates (Nichole Miller)**

#### ● Occurrences

- Samples not associated with passing batch QC uploaded to LIMS
  - Two NTN samples in a batch with a failed Mg duplicate – suspected carryover; qualified
- ICP down for repair
  - Delayed repair (Agilent staffing issues) caused risk of exceeding hold times of NTN samples
- Analyst's DOC not current for THg – MDN
  - Exceeded expiration of DOC by two months – there are multiple spikes created by the analyst for each batch on this platform and they were all sufficient during this time
- Failing PO4 and NH4 QCs
  - Consistent QC failures for 3 months; abundant troubleshooting; some NH4 data uploaded to meet holding times
- AMoN hood filters passed change date
  - Filters due to be changed on 12/23/2022; ordering issues; hood blank QC failures; changed on 5/18/2023. It should be noted that all other QC samples during these weeks (sonicator, prep, and jar blanks) were well within criteria. Samplers themselves were not affected.
- Tekran CVAFS instrument carryover issues
  - Consistent and significant carryover from samples and standards greater than 20 ppt since April 2023 – issue has been resolved

#### ● Major Changes

- Changed the value of the FL standard on the ICs from 0.025 mg/L to 0.050 mg/L to better match the concentrations of this solution on other platforms
- Changed the vendor of our FLP solution from Reagecon to SUEZ for cost savings (shipping) and reducing waste (stock volume)
- Changed the extraction solution for methylmercury distillation of litterfall from dilute HCl to KCl/H2SO4/CuSO4 – this is the procedure that USGS used for litterfall



- Data review flag comments are no longer copied and pasted into the review box during the data review process – utilizing the “NTN Data Review Flags Table” for cross referencing
- Changed use of AMoN bodies back to a maximum of 5 uses before removing from use – seeing if this will decrease the influx of broken samplers at sites
- PT Samples – USGS SRS
  - We analyze a precip sample, nutrient sample and a mercury sample in Spring and Fall. –
  - Recoveries generally good
- PT Samples – ECCC
  - We have finished Spring set for NTN and MDN. Fall set were just ordered. Acceptable recoveries with a few exceptions
- PT Samples – WMO
  - We have run one set (Spring) this year – 3 samples. Good recoveries
- Interlab study with USGS
  - 4 samples/month. Quarterly for MDN
- Analytical QC
  - NTN analytes
  - Duplicates are run per batch of 10 samples
  - Field Blanks
  - FM (mid point concentration)
  - FL (low point concentration)
  - FR50 (historical 50th percentile concentration of each analyte)
- Good results – but 14 duplicate failures for pH (carryover issues – corrected now), 42 FM failures for PO4
- QA Documents
  - 2021 QAR was approved and will be available on the web
  - 2022 QAR is currently going through internal reviews
  - QAP was updated in 2022
  - Internal systems and methods audits are being completed

### Discussion

Greg Wetherbee – You mentioned DF/DKs for MDN were invalidated due to contaminated bottles?

We (USGS) want all the samples, A, B, or C coded, so can we get the invalidated samples?

Mark Keuther/Nichole Miller – Yes, they are on the web but C coded data are not sequestered

Noel Deyette - Do you change the FR50 over time?

NM – Yes the FR50 expires 3 months so we make new samples every three months

ND – For every analyte?

NM – Yes

### **MDN Bag Update (David Gay)**

- Motivation
  - Goal is to replace the glass sample train of MDN with a clean bag
  - Current sample train is expensive to purchase, ship, clean, etc.
- Current sample train is expensive to purchase, ship, clean, etc.
  - Preparation/Cleaning

Funnel  
Thistle tube  
Used to clean capture bottle – now PET/PETG

- Shipping  
We ship a very large cooler, to protect the glassware from breaking.  
Cost ~\$22 one way if ship in a box (\$1), otherwise more expensive
- Breakage  
We break a lot of thistle tubes (~\$20 each)
- Nasty procedures  
We use acid to clean and soak this equipment (costly, nasty)  
We use lots of very clean water to rinse out the acid (costly, sustainability)  
All work is done in a very expensive hood, using lots of power & cleaning filters

● Using principle of the NTN bag, conduct mercury measurement in a bag

- Bag made from PET
- Must be clean (all analytes plus Hg)
- Should be inexpensive and easy to use

● Richard Tanabe has been diligent in working on this

- Working on more versions of the bag  
Richard was able to make new models - thanks to ECCC and their bag sealer  
New version fabricates a sealed seam to induce an incline in the bag to collect small rain events in the lower corner of the bag, as will Cl<sup>-</sup> ions from the precharge
- Richard thinks he has a good fit on the collector  
Opening size for a round fit  
A bit of a deeper funnel (snow)
- He also has an idea for keeping the bag tight to the sample inlet using a simple band

● Discussions with Degage Corp. (Terrell, TX) to fabricate prototypes

- Degage is willing to make the bag out of PET to NADP specs
- Estimated cost ~\$5 (rough estimate)
- NADP will pay Degage for setup and manufacture ~100 bags for testing

● Continued Lab Work

- With Christa Dahman and Chris Lepley  
How easy is the bag to use?
- Current design:  
Tear away top (bags will arrive sealed from Degage), for cleanliness and ease of use  
“Ziplock” seal in throat; seal bag to return sample, also allows lab to open/close sample  
Two holes to hang bag & sample in lab  
Keeps sample upright  
Allows lab to open & close as needed  
Won’t spill  
Hopefully chemical addition and sample extraction is easy
- Design changes as necessary  
In very light rain (~0.5 mls), the bag throat doesn’t open  
We are continuing to think about this...

● Shipping Ideas

- Ship in a reusable plastic box, large enough for 2-4 samples  
This will allow the site to store and ship in bulk  
Saves shipping costs directly to the sites
- Lab would run 2-4 samples from each site together

- Staggered shipping from sites for efficient work flow
  - Sites 1-30 ship at beginning of month
  - Sites 31-60 ship ~ 10th of month
  - Sites 61-85 ship ~ 20th of month

- Next Steps

- Order test bags
  - Work with the lab to improve the design (bag handling)
- Figure out how to manufacture and send to sites
  - 10 bags “bagged” together?
  - 4 bags “bagged” together?
  - Multiple weeks shipped to site at once?
- Find the right shipping box
- Lab will do some basic blank tests for Hg
- Field Test
  - Solid acid addition (KCl pill) rather than HCl
  - Should yield same results as acid charge?

- David passed around a demo bag, sealed to a chimney

### Discussion

David Gay – Successfully implementing this strategy will save a significant amount of money, reducing expenses for the lab as well as site sponsors.

Mark Olson – Is the ultimate goal to brominate the sample in the bag?

Christa Dahman and others – We have to.

MO - Do you need an acidic environment to collect the sample? We proved that methyl mercury sticks to the walls of PETG and you need to brominate it to take it off.

CD - EPA Method 1631 allows a 28-day interval between sample collection and preservation if you brominate in the sample container.

DG – So, do you mean that if we get the MDN sample back within 28 days we don’t have to add chloride at all?

CD – 1631 applies to surface waters, where you collect at one time rather than over a week, but it’s a thought and we are testing.

MO – But you’ve proven that mercury sticks to the bottle walls so you need to brominate to extract it.

DG – Have we proven that it all sticks to the bottle walls?

CD – No it doesn’t.

Martin - We have significant testing ahead.

Mike McHale – Using the solid salt, will the water (sample) and salt mix well? That would be a concern?

DG – We want to get away from HCl from a shipping perspective and its my understanding that the chloride does the trick, not the H<sup>+</sup>, hence a salt instead of a liquid

MO – I thought that the acidity of the sample also contributes?

DG – It’s possible. We can still ship with HCl if need be. It’s my understanding that you have to flood the sample with chloride to make mercury chloride to stay in solution. To be determined. We can still go back to liquid HCl. We will still save money – we need to do this.

### **PET – PETG Study Summary; Presented to QAAG 10/11/23 (Christa Dahman)**

- Material Comparison for NADP MDN Sample Collection

- Background

- Polyethylene terephthalate glycol (PETG) have been in use for MDN since 2018.

- During 2021, PETG bottles became more difficult to procure reliably so polyethylene terephthalate (PET) was adopted for use while additional testing was performed.
- The two materials are expected to behave similarly for mercury analysis:
  - Fadini, Pedro S. and Jardim, Wilson F. ‘Storage of natural water samples for total and reactive mercury analysis in PET bottles’. Analyst, 2000, Vol. 125, 549–551
  - Copeland, D. D., Facer, M., Newton, R., and Walker, P. J. ‘Use of Poly(ethylene terephthalate) Plastic Bottles for the Sampling, Transportation and Storage of Potable Water Prior to Mercury Determination’. Analyst, February 1996, Vol. 121, 173-176
  - Hall, Gwendy E. M., Pelchat, J. C., Pelchat, Pierre, and Vaive, Judy E. ‘Sample collection, filtration and preservation protocols for the determination of ‘total dissolved’ mercury in waters’. Analyst, 2002, Vol. 127, 674–680
- PET has been used by the USGS’s Mercury Research Laboratory for several years. For these reasons, the testing plan at WSLH was limited in scale and scope. A first attempt at this study in 2022 revealed an intermittent box-specific contamination issue with a previously approved lot of PET bottles.

● Study Conditions Summary

- 60 total samples including:
  - 7 blanks for each plastic
  - 7 spikes for each plastic
  - 5 natural (NTN) samples in duplicate in each plastic
  - 2 additional natural sample replicates prepared directly in analysis vial for “true value” estimation.
- Bottles held with standard precharge 1% HCl for 1 week before use
- Samples stored in bottles for 1 week before BrCl oxidation for analysis
- Samples reanalyzed at 4 weeks

● Performance Criteria – Based on Limits from EPA Method 1631

- Blank results meet bottle lot testing criteria at initial and secondary testing: mean concentration below the MDL of 0.2 ng/L and no individual result above (10/3 MDL), 0.667 ng/L.
- Individual spiked results are recovered at  $\pm 15\%$  of the calculated target concentration at both initial and secondary analyses for each material: PET, PETG, and vial. (6.8 – 9.2 ng/L)
- A two sample t-test will be used to compare the concentrations in each sample type between bottle materials. The null hypothesis is that both bottle types will yield the same mean result for each sample type ( $p > 0.05$ ), particularly in the spiked and natural samples. If there is a significant difference in the blank levels of the bottle types, other results may need to be blank-corrected before continuing the assessment.
- Due to the low number of replicates of natural samples, an additional evaluation will be made. The RPD between the means for each sample in each material type must be less than 25%, and the RSD of all results for a sample must be less than 15% (limits taken from EPA 1631 for replicates and calibration factors).
- Each individual spiked reagent sample must have a relative percent difference (RPD) of  $\leq 25\%$  between initial and secondary analyses.
- Individual precipitation results have RPD  $\leq 25\%$  between the material types at both initial and secondary analysis.

● Results

- Failed criteria on reanalysis (first and second analyses) of blanks in PETG bottles
- Clear bias between natural samples in vials versus those in PET and PETG bottles

- Clear increase in blanks after sitting with BrCl for three weeks – does not reflect normal analysis conditions, only samples which must be reanalyzed
- Blank results meet bottle lot testing criteria at initial and secondary testing: mean concentration below the MDL of 0.2 ng/L and no individual result above (10/3 MDL), 0.667 ng/L
- Increasing blank levels due to capture of mercury in air due to the BrCl charge?
- Individual spiked results are recovered at  $\pm 15\%$  of the calculated target concentration at both initial and secondary analyses for each material: PET, PETG, and vial. (6.8 – 9.2 ng/L)

#### ● T-tests

- A two sample t-test will be used to compare the concentrations in each sample type between bottle materials. The null hypothesis is that both bottle types will yield the same mean result for each sample type ( $p > 0.05$ ), particularly in the spiked and natural samples. If there is a significant difference in the blank levels of the bottle types, other results may need to be blank-corrected before continuing the assessment.
- Null hypothesis was rejected frequently in both blank and spiked samples

#### ● Precision Evaluations

- Due to the low number of replicates of natural samples, an additional evaluation will be made. The RPD between the means for each sample in each material type must be less than 25%, and the RSD of all results for a sample must be less than 15% (limits taken from EPA 1631 for replicates and calibration factors).
- Each individual spiked reagent sample must have a relative percent difference (RPD) of  $\leq 25\%$  between initial and secondary analyses.
- Individual precipitation results have RPD  $\leq 25\%$  between the material types at both initial and secondary analysis

#### ● Conclusions

- Most of the predefined data evaluation criteria were met, failures were associated with increasing blank levels
- Both materials suffered increasing blank after ~3 weeks of storage with BrCl. PET performed better than PETG.
- PET provided noticeably better stability/precision over the study period.
- PET should be officially accepted as an alternative to PETG, as long as the lot is consistently clean

### Discussion

Christa Dahman – Do we need to vote?

David Gay – Should PET be preferred to PETG, in your professional opinion?

CD – Possibly. I think it makes sense based on cost and performance. We had run into a separate issue with Corning PET bottles, where the openings were a little bit different but we don't have to use Corning.

Do we have to have one preferred material? Can we say that either may be used?

DG – No, we don't. If you had to choose, which one?

CD - Probably PET unless the PETG is on sale.

Amy Mager – I think we already voted to allow PET bottles at least as an interim solution.

CD – I'm not sure that was a permanent allowance to use PET.

Richard Tanabe – I don't think we set an end date to that original motion.

Noel Deyette – For the MDN interlaboratory comparison next year I just bought all PETG bottles. I just want that noted.

CD – No problem, I think the two perform similarly. I don't think the differences would be significant for MDN samples.

AM – We’re working on a year’s worth of PETG bottles as well. PET used to be significantly cheaper, but now the PET price is creeping up. Mark Olson just reminded me that PET is recyclable but PETG is not, so that may be something to think about as well.

CD – The reason we can’t reuse the bottles is that BrCl degrades them. We can talk to the recycler near the lab and see if he cares, but in general PET is accepted by the recycling company in Madison - but they don’t like to take items from a lab, anyway, due to possible contamination (material is hand sorted).

### **NADP Site Liaison Report (Richard Tanabe)**

Richard noted that this is not a traditional Site Liaison report – he had been working on the site photo issues and wanted to provide an update.

- Site photos now on the website!
  - Available for each site through the network interactive maps or data access tables.
  - Users can scroll through the photos, and can download them.
  - All active NTN, MDN, and AMoN sites have photos based on EEMS pictures. If there are no photos from EEMS for a given site they will not be available on the web.
  - Need to talk with Eric Hebert for issues going forward. Navigating the EPA drive (where photos are resident) is difficult.
- New Idea for Operator Training, from NOS Operator Workgroup
  - Virtual training module
  - Utilize Qualtrics survey framework
  - Prepare short survey with slides, training video, etc
  - Record score and participant name, Site ID, email address
  - Track progress, earn credits, award incentives with more modules watched.
  - Operator would view a training module and answer questions based on content – if answers are wrong we would correct them and tell them the right answer.

### **Discussion**

Richard Tanabe - Is this worth pursuing? What topics should be covered? PowerPoint slides vs. training videos? We would have to edit the videos we have. What would get people more engaged?

Tim Sharac - We could provide photos of site problems and ask operators to identify them.

RT - We can use some of EEMS site photos for this.

Eric Hebert - What if the operators don’t participate/complete training?

RT - People who will do it are the same ones who come to the training sessions.

EH - We will still have to figure out how to train people.

David Gay - We could report to the site funder who took the training and who didn’t.

RT - That might not solve the problem either.

DG - If the funder sends email to operators stating their expectation that operators take the training, maybe that would work.

RT - That’s why offering incentives will also help.

EH - Some of the site operators who are struggling with doing the work will also struggle finding time for training.

Kristi Morris - Do you have videos that address trouble shooting different issues?

RT –No, we have pdf troubleshooting guides that are sent automatically to sites that need them, but not videos yet. It has been on my list to put together videos – e.g., how to assemble and disassemble an ETI rain gauge.

KM - Or a video for new and backup operators – what needs to be done this week/site visit?

RT - This was brought up at the Spring meeting but if it is not useful long term, is it worth pursuing? We could make one module/video, send it out, and decide from there.

Cari Furiness - I really like this idea – anything that helps the operators troubleshoot, help backup operators to increase their confidence, and provide a point of contact to solve problems is helpful. Piloting a program is a good idea – we can send to specific site operators for feedback.

RT - I will put something together, gather input, get it out in the new year and report back at the Spring meeting.

Mike McHale – Are you talking about reinforcing basic skills, or fixing specific problems?

RT - Those are two different things. We need to decide on the best policy. Is it rain gauge maintenance? Maybe in September-October before the gauges are winterized, we send out specific content?

MM - I think if in terms of troubleshooting, just target the most common problems for troubleshooting. You might get a better response than a refresher on bag change-out and basic information.

TS - With the EEMS annual report, we can identify most-frequently observed findings, so when EEMS goes out the following year, they are not encountering the same problems over and over again. Identify problems with a photo so EEMS doesn't see them so often. Bring it to the attention of the operator. It may be more engaging.

EH - I get Mike's point about fixing specific problems, but you often have new site operators who weren't trained correctly in the basic procedures, who may have learned from previous operator who were also trained incorrectly.

MM - Yes, I wasn't making a recommendation, just suggesting that we look at the biggest need – basic training or instrument repairs?

## **USGS External QA Project Fall 2023 Update (Greg Wetherbee, Noel Deyette)**

### ● PCQA Core Programs 2024

#### - Interlaboratory Comparisons

NTN – 11 labs, 4 samples/month

MDN – 9 labs for most of the year, one lab that will reapply, not sure about their status. ,  
6 samples/quarterly

#### - NTN Field Audit

USGS implementation from Troy, NY

~ 100 sites once a year – all 1L now

21 surveys received; 19 samples processed

#### - MDN System Blank

NAL implementation from Madison, WI

All sites once a year – PETG bottles

28 surveys received; 24 samples processed

#### - Co-located sites at 20NY and 99NY ending 6/1/24

Future of the Co-located Sampler Program is uncertain (budget constraints)

Co-located samplers in virtually every state

Highest number in CO and NY/New England

Would like to look at wind rose diagrams and pick sites with and without snow

Precipitation; leave one collector oriented to the west, orient the co-located sampler according to the prevailing wind rose

### ● PCQA Information Products

- 2019-2020 External QA Report is published.

- 2021-2022 External QA data release is published.

- 2021-2022 SIR in review. Likely publication in spring 2024.

- No new QA reports to prepare in FY24.

- Greg's FY24 goal is to revamp the PCQA website, but Noel might have other plans.
- USGS Proceeding with adding Telemetry at their sites
  - Program office working on Telemetry issues (GOES system)
  - Working with EPA to expand and piggyback on their telemetry systems
  - Our goal is to ensure that all USGS stations have telemetry
- USGS Transition Planning for FY24
  - Noel Deyette
    - PCQA half-time Project Chief in FY24
    - Greg continues to train Noel.
    - She is capable of fully taking over at any time.
  - Greg Wetherbee
    - Help train new USGS NADP Coordinator
    - USGS NADP operations and research
    - Telemetry expansion
    - Site moves, new operators
    - QAAG, NOS, EC?, etc.
  - Mike McHale will remain in NOS, EC, etc.
  - Doug Burns will train new USGS NADP Coordinator when hired and retire in April 2024

### **Discussion**

Mike McHale – Just 2-3 years ago we had only 8 sites with telemetry, we now have 30-31?

Greg Wetherbee - Yes, We are chipping away at this, we have ~40 sites to go. I should mention that, according to Campbell Scientific, the Campbell data loggers (CR800 and CR1000) are not compatible with GOES TX325 transmitter. This is not really true because we have one working at MN23, and will hopefully add others. Campbell will try to sell you new data loggers, so if you want to introduce telemetry at your site, make sure that the data logger you have is compatible, in their eyes, with the transmitter you intend to use.

### **Update to NADP Audit Database (Mike Butler)**

- Mike has been working on replacing current audit database with a new web-based system– should improve operations
- Mike logged in to the EEMS Audit database to demonstrate – a calendar will be accessible to inform users of EEMS travel schedule
- Information is displayed for each site – type of equipment, points of contact, etc.
- Goal is to contact operator a site to be visited to get current data to assist in the audit
- List of equipment at each site tells EEMS what they need to inspect and troubleshoot if necessary – dictates what questions are asked of the operator (network- and equipment-specific)
- Once done with the audit, EEMS will answer form questions about condition and functionality of equipment

### **Discussion**

Richard Tanabe - So as far as reporting back to sites, it's similar to what you do now, with a new question format?

Mike Butler - Yes, new question format, Spot reports, site photos. I would like to automatically send info to the Program Office also.

Tim Sharac - Will there be extra fields for siting criteria violations and questions?

MB - All the questions are dynamically created as you go.

RT - Will the questions be in layman's terms?

Eric Hebert - We need to work with you in defining questions.



RT - Whose input will be needed? Tim's?

TS - We're asking EEMS to resolve the contorted nature of the questions. In addition, the wording and appropriate responses differed in different sections of the report, so we want to fix that.

RT - What we report back to the site operators can be 4-5 pages long, and operators don't want that - maybe provide a summary report that links to the full report?

EH: We can filter the questions that can be on the spot report.

## **Clean Air Status and Trends Network (CASTNET): EPA Program Update (Melissa Puchalski)**

### ● Network Status

- Since May 2023, operations have been sustained across most of the network
  - EPA is supporting 55 CASTNET sites, including 8 tribal sites
  - 26 NTN sites, but NY52 will transfer to NYSERDA on January 1st
  - 50 AMoN sites
  - Most sites that were suspended in May 2022 remain closed due to resource constraints
  - Continuing to support independent audits (CASTNET) and site survey program (NADP)
- Operations at the Kickapoo site (KIC003/KS97) were suspended from March – June and again in July 2023
  - Impacts to CASTNET, NTN, AMoN data completeness in addition to PFAS wet deposition and organic nitrogen studies
- Woodstock (WST109, NH) will resume sampling in November (ozone) and January 2024 (filterpack)
  - Operations transferred from CIES to USFS
  - Hoping to use MOU as a template to engage with other Agencies
  - AMoN will not resume at this time
- Santee Sioux (SAN189/NE98) site will move ~10km away to the environmental offices to improve site access and security
  - Site will have a new ID starting in November 2023
- NPS discontinued SO<sub>2</sub> measurements at their sites in August 2023
  - Impacts to maps and total deposition products
  - New bias adjustments use multiple years to allow for the handling of missing data (e.g., mothballed sites and/or discontinued measurements)

### ● Scientific Program Review

- EPA's Science Advisory Board (SAB) accepted the Program's request to convene a panel of experts that would advise the Agency on how to transform the network to ensure it continues to provide value to the data users
  - SAB Panel formed – EPA prepared background material and charge questions – Feb. '23
  - Panel convened at in-person meeting, May '23
  - Draft report posed to the SAB website – August '23
  - Virtual Meeting to finalize draft recommendations and letter to the Administrator - Oct. '23
  - Draft Final Report will be submitted to the Chartered SAB for Quality Review – Nov. '23
  - Chartered SAB will accept/reject report with recommendations – Dec. '23
  - Report will be submitted to EPA Administrator – Jan. '24

### ● SAB Draft Report

- Panelists included representatives from diverse backgrounds
  - State, Federal, Tribal Agencies
  - NGOs
  - Universities

## Industry

- Input from public comments also considered in the recommendations
- Six charge questions (summarized)
  1. How well have past and future objectives been met?
  2. Do the proposed approaches meet the goals of EPA's Strategic Plan?
  3. Detailed review of proposed network configurations to reduce annual operating costs.
  4. Comment on what new data products would be the most valuable.
  5. Advise on new measurements or products that should be considered to enhance the value of the program.
  6. What additional analyses would improve the Agency's ability to communicate air quality impacts in communities served by CASTNET?

## ● High-Level Summary of SAB Draft Report

- Current network provides national-scale coverage, consistent measurements, and long-term multipollutant (gases, particles) and any changes should prioritize the unique value of the existing program
- Data are used to provide accountability for regulatory programs and NAAQS compliance
- Pollutant transport across political boundaries with consistent, comparable measurements
- Model development and validation to support future air quality assessments
- 30+ year data record is unique in that it provides a transparent and consistent dataset to understand climate impacts on air quality and step function changes from extreme events
- Recommendations were tiered within the draft report (I, II, III) but some inconsistencies within responses for different charge questions
- Tier 1 example recommendations from the draft:
  - Use matrix provided to inform decisions about reducing network costs (closing sites, discontinuing measurements)
  - Continue to measure SO<sub>4</sub>, NH<sub>4</sub>, NO<sub>3</sub>, SO<sub>2</sub>, HNO<sub>3</sub>, NH<sub>3</sub> and O<sub>3</sub> in rural areas, consider reducing the frequency of the filters at a select number of sites
  - Maintain filter pack sampling while evaluating new methodologies (e.g., online instrumentation to replace manual methods where technology is available, for example the Aerosol Chemical Speciation Monitor), continue to archive filters/extracts for researchers
  - Expand tribal monitoring in the Northern Plains/Central US to build monitoring capacity and fill spatial gaps in the network
  - Deploy PM<sub>2.5</sub> continuous sensors and develop complementary air quality visualization and communication tools
  - Support contaminants of concern (e.g., passive Hg sampler, PFAS in precipitation) on tribal lands and within disadvantaged communities

## ● Method Evaluations and Updates

- Testing new regulatory ozone analyzers
- Deployed APS pollen sensor
- Evaluating PM<sub>2.5</sub> sensors
- Prioritizing infrastructure repairs
- Developing method for measuring black carbon using existing filter media
- Developing scoring for sites and measurements based on matrix provided by the panel and input from internal (OAQPS, ORD) and external stakeholders
  - Which sites are the most important when considering Agency and scientific priorities?
- Addressing recommendations from panel discussion:
  - DOI for data
  - Reporting concentrations in ppb
  - Report filter pack concentration data to AQS?

Evaluating air sheds represented by CASTNET to characterize how changes in rural air quality impact populations (collaboration between EPA and CDC)

- Enhanced Air and Deposition Monitoring (John Walker, Ryan Fulgham, Luke Valin, John Offenberg)
  - Collaboration with EPA/ORD for method evaluations, model development, and addressing persistent air quality issues
  - Continued operation of “nitrotrain” at Duke Forest, NC hardwood tower
    - Hourly concentrations of NO, NO<sub>2</sub>, NO<sub>y</sub>, NH<sub>x</sub>, HNO<sub>3</sub>
  - Water soluble organic nitrogen (WSON) measurements
  - 1 year of organic nitrogen measurements from 27 CASTNET sites
  - Particle bound organic N contributes 10-15% to total particle N concentrations across the sites
  - Ozone precursor measurements in the Midwest
  - Wildfire impacts on air quality (black carbon and existing measurements)
  - Coordination across PFAS wet deposition monitoring sites
    - Expanded to western sites
    - Tribal support (Umatilla, Kickapoo, Choctaw, Grand Portage)
- Improved Website
  - @EPAairmarkets – Monitoring Mondays; promote specific sites every week
  - New map website includes concentrations 1989-2021 and TDEP (dry, wet, total deposition) including GIF movies 2000-2021
    - <https://www.epa.gov/castnet/maps-charts>
  - New Qlk query tool to download CASTNET data (filter pack, ozone, trace gas and quality control check results)
    - <https://www.epa.gov/castnet/download-data>
    - Prepackaged data files are still available on the ftp and can be accessed through the “Help” tab on the data download page
    - Feedback requested
  - New site pages
  - Melissa demonstrated website features – see trends in N & S deposition, O<sub>3</sub> concentrations, etc.
- 2021 Annual Report available

## Discussion

Kristi Morris – Melissa, I didn’t hear much about cost reduction strategies except for a longer filter pack duration? Were there more suggestions?

Melissa Puchalski - Yes, the panel focused more on the value of the program and on a one-time increase in funding. Their recommendation was to use the matrix at the end of the report to evaluate the sites.

KM - So, fewer sites?

MP- Yes.

David Schmeltz - I agree – the panel was not charged to look at cost savings, and they didn’t have the data to evaluate that. The matrix in the appendix will provide some ways to prioritize sites, and we will work through that in the next several months.

KM - Remind me, are we doing a filter pack duration study?

MP - No, we have talked about doing it. We didn’t give the panel a budget to look at and did not have a budget to work with.

John Offenberg - Can you read into the tea leaves about PM<sub>2.5</sub> sensors vs. regulatory measures, what that means for the guidance?

MP – For which guidance?

JO - For the matrix going forward, there was mention of continuous PM<sub>2.5</sub> sensors, but not equivalency methods.

MP - Our internal thinking is that we deploy sensors, see what the concentrations are, see what the 2023 PM2.5 standards are, and what the levels are across the network, and work with states, tribes, and local agencies about monitor placement - like a survey, first.

Greg Wetherbee - Melissa, did you say you had 25 NTN sites mothballed?

MP - I did not. For NTN, on the order of 7 sites.

GW - How many MDN sites do you sponsor?

MP - Zero – we were supporting Ann Arbor but LADCO took over when we mothballed it.

### **NPS Update (Kristi Morris)**

- NPS is facing declining budgets.
- Conducted evaluations looking at each of the monitoring networks NPS participates in
- This summer we were facing the prospect of either shutting down several ozone monitoring sites or discontinuing SO<sub>2</sub> measurements.
- In consultation with EPA, NPS decided to discontinue SO<sub>2</sub> measurements at about 20 NPS CASTNET Sites.
- These are types of decisions agencies have to make – we hated to lose the long-term SO<sub>2</sub> record, but felt that SO<sub>2</sub> concentrations the parks are low and near detection levels (in the West). So, we prioritized the ozone measurements.
- The SAB guidance was to continue all the measurements were doing, but we made the best decision Possible.
- Another 5% cut to NADP budget from NPS, in the coming year. We will close the Petrified Forest site - An archeological find was made at the site. Due to distance considerations, a new site would have to be established, incurring large costs and eliminating the historical record at PF. The decision was made to close the site instead.
- NPS is finding other partners to take over some sites. In the coming year NPS will look at identifying another NTN and MDN site to discontinue.
- This is why efforts to save money with passive mercury samplers and implementing MDN bag collection, etc., are so important. We hate to see networks shrink along with the loss of long term records. The more cost effective we can be will help us keep sites open.

### **Discussion**

David Schmeltz - Has there been any public reaction to the discontinuation of SO<sub>2</sub> measurements?

Kristi Morris - We heard from Shenandoah (National Park), but their concern was whether other parks were being cut, too. We explained the situation to them. There really wasn't much opposition.

Greg Wetherbee - You didn't talk about Lochvale?

KM: Lochvale is running now, Jill Behren's (sp?) group at USGS supports the analysis and the site operations there. The former operator, Tim Wineman, moved on to the State of Colorado, and a site operator (Derek Day) will serve the site. We will also be looking for long term funding for the site, especially for site operations.

Doug Burns - It will be interesting to see – the NO<sub>x</sub>/SO<sub>x</sub> CASAC recommended that the secondary (NAAQS) SO<sub>2</sub> standard be lowered from 500 to 10-15 ppb. A lot of sites would be in exceedance. If that happened, how could that be implemented as a rule?

KM - I don't know.

DB - I don't know what will happen, but the panel felt that was a justifiable standard.

KM – There will be a real disconnect between policy and monitoring budgets if that's the case.

## PFAS Update (Martin Shafer/John Offenberg)

- PFAS Concentrations and deposition in precipitation: An intensive 5-month study at National Atmospheric Deposition Program – National trend sites (NADP-NTN) across Wisconsin, USA
  - Pfothenhauer et al., Atmos. Env. 2022 – doi.org/10.1016/j.atmosenv.2022.119368
  - Found PFAS in precipitation at 8 NTN sites
  - 33 PFAS compound method
  - Two studies: 91 Wet-Deposition samples
    - Spring/Summer 2020 - Background study at 7 sites (14 weeks)
    - Fall 2020 - Source study at 2 sites
      - Marinette - temporary installation
      - Trout Lake - permanent site
  - PFAS compounds detected at ng/L concentrations at 8 NTN sites in WI
  - Evidence of seasonal pattern in concentrations
- PFAS In Precipitation: EPA-ORD Pilot Program
  - “Long-term” Monitoring for PFAS at NADP-NTN sites
  - John Offenberg, John Walker, Melissa Puchalski, Doug Burns, Andy Johnson, Martin Shafer
  - Expand “synoptic” sampling using NADP infrastructure
  - 2<sup>nd</sup> and 3<sup>rd</sup> Phase Sampling Initiated – continuing until July 2024
  - 2nd phase sites: KS97 (Kickapoo Tribe), NY06 (Bronx, NY), WI93 (Arboretum), WI31 (Devil’s Lake)
  - Three sites added in 3<sup>rd</sup> Phase: WY94 (Grand Tetons), AK03 (Denali), WA04 (Umatilla Tribes)
- Status of EPA-ORD/NADP PFAS in Precipitation Initiative: Sample Collection/Processing
  - 834 precipitation samples have been collected & processed as of September 2023. Average field sample yield = 64.1%
  - Reasons for <100% PFAS Sample Yield
    - Dry weeks
    - Insufficient volume/pooled weeks
    - Debris contamination
  - Moving to a method requiring smaller volumes, so yield should increase
  - Most extensive study of its type in scale and scope ever conducted.
- PFAS ANNUAL Wet-Deposition Fluxes
  - Sum of 33 PFAS Compounds
  - Study period = Sept. 2020 – Sept. 2021 for EPA Pilot Sites, 192 Samples
  - Study period = April-August (Nov.) 2020 for Wisconsin Sites, 91 Samples
  - Calculated annual fluxes (~0.9-3.6 micrograms m<sup>-2</sup>) are very significant for many environments e.g. large lakes with long residence times and terrestrial environments with few point sources
  - Writing a manuscript describing annual fluxes for 2021 for these sites
- A deep dive into QA of the approach for incorporation into a 8- or 12- point plan
  - Lab and field studies, document robust protocols
  - Quarterly field and trip blanks, field spikes. Also co-located sites (3 at Duke Forest – unique)
  - 249 QA Samples (30% of total samples)
  - Synthesize data into a QA summary of the performance of an NADP-driven NTN PFAS sampling network
  - Documentation and validation of the program are two important products as an outcome
- Co-Located Sampler Precision
  - NC Duke Forest, 2020-2021
  - Triplicate NCON Samplers: NC30, NC96, NC97
  - For the 8 Most Frequently Detected PFAS Compounds, unless at very low concentrations:

For most typical concentrations (>2 ng/L or so), 5-10% RSD for complete overall system RSD

Puts us in a good spot for looking at trends

● EPA-ORD Network Updates

- EPA-ORD Pilot Program

Complete 2020-2021 dataset submitted to EPA last year. External data quality audit completed. Next step - manuscripts (in-progress).

Complete 2022 dataset submitted to EPA (and external auditor) – currently in review

- Expansions

Two NTN sites in New Mexico (NM07, NM08). Collaboration with USGS. Started summer 2023. Multiple years.

Major New Jersey DEP effort.

Three existing NTN and one new NTN site. Two year precipitation program.

Two additional sites TBD. 1 year.

Air (aerosol, vapor) monitoring at two sites for 1 year.

Passive air samplers at several sites.

Started early summer 2023.

Choctaw Nation – Negotiations in-progress

● PFAS in Tree Canopy Throughfall

- Two Ongoing Studies

Duke Forest (North Carolina), March 2022 - Current

Thain Family Forest (Bronx, NY), April 2023 – Current

- Throughfall (surrogate for dry deposition) is nearly 11 times wet deposition

● PFAS in Cloud Water – Whiteface Mountain, NY

- First of its kind evaluation of PFAS in Cloud Water

● Quantifying multi-media loadings of PFAS in the Great Lakes basin using targeted and non-targeted Analyses

- 3-yr Study, January 2022-December 2024

- Use multiple techniques to quantify PFAS in tributaries, precipitation, open water, sediments to:

Estimate partitioning within the water column

Provide point-in-time loading estimates, and

Perform source fingerprinting.

● Tracing Atmospherically Deposited PFAS from Source to Sediment in the Great Lakes Region

- 3-yr Study, January 2023-December 2025

● PFAS Wet-Deposition NADP-NTN Sampling Sites: USGS-Funded Projects

- PFAS analysis of NTN samples from a number of sites in MN, WI, MI

- Also looking at PFAS fluxes in 25 tributaries on event basis and base flow conditions

- Status (Sample Collection/Processing)

345 precipitation samples have been collected & processed as of September 2023

Average field sample yield = 61.8%

At least 2 full years of collections from these 13 Great Lakes sites

● Gas and Aerosol-phase PFAS Measurements at Selected NADP Sites in Parallel with Precipitation Collection

- Funded by EPA/ORD 2022-2023

At Eagle Heights and Devil's Lake

Triplicate Co-located Hi-Vols: Vapor and Aerosol Phase PFAS

Duplicate Co-located N-CONS: Wet-Deposition (PFAS Dedicated)

E-Raingage  
One-Year Intensive  
Evaluate Sampling Variables (flow, time, XAD mass)

● PFAS in Air

- At both Eagle Heights & Devils Lake
  - 36 co-located (duplicate) sample sets
  - Primary and co-located Hi-Vols
  - 20 “special” samples (3rd Hi-Vol)
  - 8 field blanks
  - 4 field target compound spikes
- 184 Total Sample Sets
- 24 Total QC Samples
- Aerosol and Vapor

● Atmospheric Deposition Receptors Study

- Measurements focused on receptors (soil, sediments) in systems where atmospheric deposition is the primary source of PFAS to that environment:
  - Seepage Lakes with small watersheds
  - Soil systems that have seen very little but atmospheric precipitation over past decades
  - Collect sediment cores Devil’s Lake and Hope Lake (near Madison)
  - Collect water column samples from Devil’s Lake
  - Collect Soil cores at Devil’s Lake and UW-Arboretum (Curtis Prairie)
- Sediment Cores
  - Cores sectioned at 1cm intervals.
  - 25 sections Devil’s Lake, 40 sections Hope Lake. Approx. 1920 at base.
  - Will date cores using 210Pb, 137Cs and 40K.
  - Organic carbon, elements.
  - Very few published dated PFAS lake sediment cores.

Discussion

Greg Wetherbee - I have a question related to the analytical capability of the WSLH regarding PFAS measurements. There is a USGS study in New Mexico that has used the (Wisconsin) state lab, as well as other projects. I’m not speaking for USGS, but there may be interest within USGS for expanding analytical resources for PFAS. So what kind of capability or capacity does WSLH have for doing outside analytical work for PFAS?

Martin Shafer - We are kind of at capacity at the moment. If we want to expand, we would need to have some commitment to that and bring in the appropriate tools and people to make that happen. We’d have to talk to Jamie and see what we’d like to work out. The work is scalable, but we can’t commit to anything now. We have a lot of samples to get through, but we’d like to work with you on that. When that Arizona and New Mexico group talked to us, we compared methods from the USGS lab and our lab and they decided to use WSLH for a variety of reasons – analytical reasons, and perhaps cost issues. We also hope to advance the methods and not keep them static but we can have those discussions.

**Approval of NOS Minutes from Spring meeting, 2023 (Tim Sharac)**

- We did not approve the NOS minutes from the Spring meeting. Is there a motion to approve? Moved by Greg Wetherbee. Melissa Puchalski second. **Motion approved.**

**Nomination of NOS Secretary (Tim Sharac)**

Mike McHale moved to nominate Noel Deyette (USGS) for NOS Secretary, Winston Luke second.

**Motion approved.**

**Motion to Adjourn the NOS meeting moved by Mike McHale, Winston Luke second. Motion approved.**

| <u>Remote Participants</u> | <u>email</u>   |
|----------------------------|--|
| Gary Yip                   | <a href="mailto:gary.yip@ec.gc.ca">gary.yip@ec.gc.ca</a>                             |
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