

MELD Meeting Minutes

2021 NADP Spring Meeting

Virtual

May 10 – May 11, 2021

Co-chair: Richard Haeuber

Co-chair: Colleen Flanagan Pritz

Secretary (unofficial): Katherine Ko/Colleen Flanagan Pritz

Objectives

1. NADP mercury updates
2. Hg litterfall science and sampling protocols
3. Report out on Jan. 2021 Mercury Measurement Workshop
4. Minamata Convention updates
5. Share recent related work

Action Items

- PO and sponsors will discuss potential strategies to pool resources and fill in MDN sites in the West
- Dry Deposition Model: MELD will work with the PO to host a webinar between now and the fall meeting to discuss further. Assemble panel to devise a plan re: how NADP deals with dry dep – then use fall meeting to report out
- Hg Litterfall: Doug will draft a set of concepts about how we proceed; SOP to be discussed at NOS
- Hg Measurement Workgroup to lay out a plan for a co-located field study based on MMET report, then establish a process to advise on network design
- Submit comments on Minamata monitoring guidance by May 21
- (from Joint: follow up on MeHg in rain)

Day 1 Meeting Agenda (May 10, 11am-3pm EST)

11am: Welcome and Introductions

11:15am: Mercury Updates: NADP Program Office

12pm: Litterfall Science – Presentations and Panel

1pm: Litterfall SOP – Proposed changes and Discussion

1:45pm: BREAK

2pm: Mercury Measurement Workgroup – Workshop Report and Next steps

3pm: ADJOURN Day 1

- Meeting commenced at 11am EST
- Attendees introduced themselves
- Rick presented an overview of the agenda and meeting objectives

Mercury Updates from NADP Program Office

David Gay and Mark Olson, WSLH

- Drop in MDN sites since Jan. 2015, especially in the western United States
- 81 MDN sites at current
- Predicted slashing of state budgets has yet to surface
- 13 or 14 AMNet sites at current, similar drop in number around Jan. 2015
- Possible new AMNet monitoring with EPA Region 5 starting June 2021 for ~6 months
- Draft approach to estimate mercury dry deposition using an inferential model with speciated mercury data from AMNet
- 2 authorization bills (1 House, 1 Senate) introduced to establish a comprehensive national mercury monitoring program (Rep. Matt Cartwright and Sen. Susan Collins). HR 2761 and S. 1345. About \$95 mil over first 3 years. [MAZ21437 \(senate.gov\)](https://www.congress.gov/bill/117th-congress/senate-bill/1345), <https://www.congress.gov/bill/117th-congress/house-bill/2761/text>
- 2019 MDN Supervisors Report (wet dep sites) will be sent today or tomorrow to all supers with a download folder – let David know if you want that email.

How Can We “Fill in the Map”?

- 5 sites in the right spots to fill out the gap in the west, from Texas up to Canada
 - Candidates: Umatilla (tribal), CA20 Yurok (tribal, willing), ID03 (NPS), Big Bend, Grand Canyon/Organ Pipe/Chiracahua (NPS), Berkeley, State of Utah Salt Lake
- Working towards future sites with USFWS (Catherine Collins)
- Suggestions: Great Basin? Padre Island?
- Kristi noted to have follow-up, small-group meeting to discuss filler sites

Carbon and Glassware Investigation – *Mark Olson*

- Modified MerPAS Carbon from U Toronto
- Nippon MA 3000 Mercury Analyzer (limited to 500 mg of carbon)
- Effluent and carbon analysis
- Retention time: do slower flowrates increase capture efficiency?
- Tried finely ground carbon = fail
- Tried longer cartridge

MDN Sample Stability Experiment – *Mark Olson*

- Can we collect sample for longer period of time?
- Experiment failed, but it should work, so we will try again

Dry Deposition Model Development – *Muge Yasar*

- Will be available online
- Inferential modeling approach
- Also GEM bidirectional exchange model
- Inputs: Meteorological data from ERA5, LUC and LAI MODIS data, AMNet ambient concentrations data. Run stats in R.
- Some assumptions for meteorological data, AMNet data, and site-specific values

- Future work: sensitivity analysis for dry dep estimations
- Feedback: . Consider characterizing uncertainties in dry deposition estimates, including from using measurements of speciated ambient concentrations. Maybe have working group or NADP Fall Meeting session dedicated to this discussion.

Litterfall Science – Presentations and Panel

Doug Burns, USGS; Dave Krabbenhoft, USGS; Charley Driscoll, Syracuse Univ.; Daniel Obrist, Univ. of Mass., Lowell

Background

- Most litterfall Hg (elemental) originates from atmosphere. Limited uptake from roots and soil water. Canopies are net sink of Hg from atmosphere.
- There have been studies looking into tying Hg litterfall with emissions
- 3-year Pilot Project 2007-2009 (Risch et al. 2012). 23 sites across 15 eastern states.
- 5-year Transition Network began in 2012, same operations model
- NADP Exec Committee voted in 2017 to continue Hg litterfall as Transition Network
- 2018-19: Doug Burns assumed role of Marty Risch, 2019 lab switched to WSLH
- 2020 WSLH assumed full responsibility

Field Sampling Approach

- Sites are generally co-located in a forested plot near an MDN site
- Deploy 4 collectors that are changed once/4 weeks, 2-3 collections/season
- 4 samples are analyzed separately for THg, and MeHg is measured. THg conc is mass-weighted average of all collections at a site.
- SOP manual has been revised over time. Had to arrive at a process for a network. Biggest change was going from 8 to 4 collectors.

Challenges/Discussion Items

- 22 to 27 sites – how to grow? Mostly concentrated in Eastern US, and only deciduous/mixed deciduous sites. Permanent network?
- Little known about litterfall role in grasslands/shrubs/savannah, woody debris fall is not well quantified, does litterfall have a different/larger airshed than other forms of Hg deposition?
- Can we combine wet dep, litterfall, and dry dep estimate from Tekran/model as total atmospheric Hg dep?
- Have discussed wet/dry status of sample in field
- Moisture status of samples is highly variable

Panelists

- Litterfall trend updates from Huntington Site
- Charley has a grad student, Connor Olson, working on manuscript
- Litterfall is best shot at atmospheric archive
- Consider establishment of core deposition sites with additional measures (litterfall, wood uptake/turnover, lichen/moss turnover, throughfall deposition!)

- Foliage litterfall is only part of total plant dep
- Hg(0) represents 76% of total deposition – how to measure?

Litterfall SOP – Proposed Changes and Discussion

Mark Olson, WSLH

- Processing options:
 - Option 1: Composite monthly collections from each site
 - Option 2: Subsample 10% from bulk
 - Option 3: Subsample 10% per retrieval
 - Option 4: Subsample 10% mass grind wet
- Feedback: look at low-temp oven drying?
- Would need ~3-4 advocates at NOS ([NOSAgenda2021spr.pdf \(wisc.edu\)](#)) to suggest making this a permanent network

Mercury Measurement Workgroup – Workshop Report and Next steps

Kristi Morris, NPS and Martin Shafer, WSLH

- Evaluation report available upon request
- Candidate methodologies
 - MerPAS (passive GEM)
 - USGS, Madison (active GEM with isotope options)
 - University of Nevada, Reno (direct GOM and PBM)
 - Japan Gold Amalgamation trap method (manual active GEM)
 - NOAA dual or switching Tekran (RM by difference)
- Evaluation Criteria
 - Suitability in a routine national monitoring network
 - Use of data
- Decision tree = there are pros and cons for each. The recommendation really depends on network design (small vs. large size; temporal resolution, etc.)
- Next steps:
 - Network Design “Workshop”
 - Detailed costing exercise
 - Method intercomparisons?
 - NADP 12-point plan?
 - Have a separate call to see if NADP can do some co-located field testing. Limiting factor is labor/manpower.

Day 2 Meeting Agenda (May 11, 2:30-6pm EST)

- **2:30pm:** Welcome and Day 1 Recap
- **2:45pm:** Minamata Convention on Mercury: Updates
- **3:30pm:** Minamata Discussion
- **4:30pm:** BREAK
- **4:45pm:** Round Robin – recent related work
- **5:45pm:** Wrap Up and Next Steps
- **6:00pm:** ADJOURN

Day 1 Recap

Colleen Flanagan Pritz, NPS

- Discuss more about the Dry Deposition Model and report out at the NADP Fall Meeting (Oct. 2021 in Knoxville, TN).
- Hg Litterfall effort moving forward, headed by Doug Burns, USGS. SOP to be presented at NOS
- Hg Measurement Workgroup to plan co-located field study based on MMET report and flush out network design

Minamata Monitoring Update

Terry Keating, EPA

- Article 22: Effectiveness Evaluation (EE) – first evaluation by 2023
- Article 19: Research, Development, and Monitoring
- TEG recommended framework includes:
 - national reports summary
 - trade/supply/demand report
 - emissions and releases report
 - monitoring assessment
 - modeling assessment
 - effective evaluation committee report
- Monitoring Guidance Timeline
 - Jun-Sep 2020: experts and consultants engaged in draft, including Terry Keating, David Schmeltz, Collin Eagles-Smith, Elsie Sunderland, Lynwill Martin, David Evers, Nil Basu, and Colin Thackray.
 - Apr-May 2021: Party Review of Draft Guidance
 - Jun/Jul 2021: Finalization of Draft Guidance
 - Nov 2021: COP 4.1 Virtual Meeting (Essential Business)
 - Mar 2022: COP 4.2 In-Person Meeting (In-depth discussions)
- Welcome to submit comment on Draft Monitoring Guidance Document (in PDF over Word, if possible) to Terry Keating (keating.terry@epa.gov) by May 21. Keep in mind objectives of document vs objectives of overall monitoring program. On May 31, USG comments submitted to Secretariat.
- Monitoring Guidance Outline:
 1. Acknowledgements
 2. List of abbreviations and glossary

3. Intro and objectives
 4. Use of comparable monitoring data for effectiveness evaluation
 5. Monitoring Hg pollution in air
 6. Biota Hg monitoring
 7. Human biomonitoring
 8. Cross-media data management, modeling, and analysis
 9. References
 - Annex 1: Review of existing monitoring, modeling, and data management activities
 - Annex 2: Gap analysis
 - Annex: Tiered approach to monitoring Hg and Hg compounds in the context of effectiveness eval of the Minamata Convention on Mercury
- Objectives of the Document
 1. Explain role of monitoring in effectiveness eval and set realistic expectations
 2. Provide guidance to parties who are currently monitoring or who wish to develop new monitoring programs
 - Objectives of Monitoring Program
 1. Characterization of representative levels and spatial patterns from local to global scales
 2. Identification of temporal trends
 3. Quantification of key environmental processes to understand cause-effect relationships
 4. Modelling source attribution
 5. Estimation of exposure and adverse impacts
 - Tiered Approach for Investments
 - Tier 1: Entry-Level, Resource Constrained
 - Tier 2: Monitoring for Trend Attribution
 - Tier 3: Research for Process Understanding
 - Some Initial Comments
 - Tiering
 - Site selection strategy
 - Attribution analysis methods
 - Consistency of style and content across chapters

Minamata Discussion

Facilitated by Terry Keating and Rick Haeuber, EPA

- Thus far, emissions reports are not required. There is a gap in emissions inventory, and if we are going to have that repository and data exchange, we need to develop this guidance and agreement.
- M. Shafer: We could use more discussion and recommendations for quality assurance and data repository
- S. Nelson: We should include something about timing/frequency for longer term monitoring (i.e. when and how often to return to sites)
- C. Chen: Is there conversation to coordinate timing and co-located sites between media (e.g. air, biota, human)?
- We encourage modelers to look at Chapter 8 and offer feedback

Round Robin

D. Schmeltz, EPA – Mercury Monitoring Bill and NADP Mercury Monitoring Brochure

- Bill specifies that EPA, USGS, NPS, FWS, and NOAA establish nationwide multi-media mercury monitoring program
- Not much language updated prior to reintroduction of the bill (7th go around)
- Authorizes \$95 mil over three years, but doesn't specify distribution
- NADP is drafting a brochure on "Mercury in the Atmosphere & Effects" – more of an educational pamphlet.
 - Summary
 - Why Hg is a concern
 - What are the effects on fish, wildlife, & humans
 - Where does Hg come from
 - Feature on Hg emissions in U.S.
 - Natural vs re-emitted sources
 - Mercury cycling in the environment
 - Why long-term monitoring is important
 - How NADP measures mercury
- Updates coming in the next couple months, published by end of summer (web content, but hoping for some hard copies as well). Email schmeltz.david@epa.gov if you'd like to get involved.

J. Wathen, EPA – discussed their ongoing effort (since early 2000's) of monitoring methylmercury in fish tissue, links to human health and environmental justice. Collect samples every 5 years from randomly selected sites. Data is up on epa.gov; search "fish advisories" and "monitoring data." Part of National Rivers and Streams Assessment and National Coastal Condition Assessment (Great Lakes). Fish samples are archived in Baltimore; can reach out to Leanne Stahl if curious about analyzing archived samples. Program manager is Leanne Stahl; Shari Barash is also involved.

S. Steffen, Environment Canada – update on global passive air sampling project: they got the samples analyzed and will be looking at the results.

S. Nelson, Appalachian Mountain Club – launching an effort with Dragonfly Mercury Project to investigate mercury in Lowell/Lawrence watershed in the northeastern U.S., link to environmental justice. Collaboration with Appalachian Mountain Club and Dartmouth College (C. Chen)

C. Flanagan Pritz, NPS – Dragonfly Mercury Project has also engaged new partners (USFWS, BLM, and USFS) in recent years to sample dragonfly larvae for mercury analysis. A project prospectus has also recently been finalized.

M. Sather, EPA – planning to run surrogate surface and summer intensive mercury monitoring effort at Carlsbad Caverns. Working with M. Gustin and B. Sive. Maybe have data for a report out at Fall 2023 meeting. Question: possible inclusion of MDN site – TX22 at Guadalupe Mountains?

M. Gustin – for co-located studies, think about conditions (i.e. humidity). Consider Beltsville site? W. Luke concurs.

Wrap Up and Next Steps

- Look forward to NADP fall meeting in late October 2021