Chesapeake Bay Program's
Toxic Contaminants Workgroup
Meeting Minutes
Wednesday, August 9th, 2023
1:00 - 3:00 PM
August Meeting Materials

Chesapeake Bay Program
A Watershed Partnership

Summary of Actions and Decisions

There were no actions and decisions for this meeting.

Meeting Minutes

1. **Introduction and Announcements:**
   - i. *Upcoming CBP Budget and Finance Workgroup (BFWG) meeting on August 16th featuring USACE funding programs for SDCs that support pollution control in stormwater and source water.*
     - BFWG Meeting Calendar Page
     - USACE Pilot Program Factsheet
   - ii. *Development and Validation of EPA Method 1633 for PFAS (DoD SERDP/ESTCP)*
     - Method 1633 Page
2. **Technical Presentations: PFAS in Land-Applied Biosolids**
   - a. Lee Blaney, UMBC – PFAS and Precursor Analysis in Biosolids: Current Knowledge and Ongoing Challenges
     - i. **Summary**: Lee gave an overview of PFAS and their precursors, methods of analysis, relevant studies, and ongoing work by his team.
     - ii. **Discussion:**

Ping Wang: I have a question about the concentration in biosolids from the same facility; why are they looking so different? Is the explanation seasonal, or source material change?
Lee Blaney: [Referring to slide with results from Helmer *et al., Water Res.*, 2022] This isn't our study, so I can't fully answer the question, but it really depends on inputs changing. I don't know anything about these facilities so I'm speaking speculatively, but if we think about traditional sources, i.e., landfill leachate, landfill leachate tends to get sent to wastewater treatment plants. If that leachate is being introduced with a pattern, and that goes up, the PFAS levels in the biosolids could go up. If there's diurnal patterns to PFAS loading that might also have an impact. I don't know that we've looked at that for our Chesapeake Bay data in enough depth yet, but our samples do involve some repeat

sampling. I don't know that we saw as much variation as the Michigan study in terms of total PFAS concentration or composition but there is some variability.

James Fotouhi (in chat): Why did your 1633 table only include 36 analytes, when the EPA method has 40? I didn't see FTCA, is that because those analytes were of trivial concentrations in the sample?

Lee Blaney: A lot of the PFAS work we've been doing is on the experimental side, and we're trying to balance the line between pushing the experimental research forward and doing some of the monitoring work to get preliminary data which can inform what questions we ask on the research side. One thing we find ourselves thinking about frequently is what kind of PFAS can we buy in bulk quantities that we can use for experimental purposes. Analytical standards are very expensive so we can't use them for experimental purposes unless we get a lot more money. So, our list is more limited because of that. We may see if we can modify our assays for TOP in particular or for biosolids extractions. I.e., how well do they perform when we know the inputs versus applying them to unknown samples. You're correct there are a few analytes here that aren't in our list, but we're also focusing a lot more on short and ultra short PFAS (C2, C3, C4 molecules, with different chemistries). Those are ones that you wouldn't expect to find in biosolids, but they are present in wastewater, and they seem to be increasingly important to toxicologists. In terms of biosolids application, those are also the ones that are more likely to get into plant species. Those aren't in 1633 and so we're pushing that forward on our side.

Greg Allen (in chat): In the Michigan study [they] may be referring to service areas, which might involve multiple plants.

b. Linda Lee, Purdue – State of the Science on PFAS Occurrence in Land Applied Biosolids and Potential Impacts to Groundwater and Surface Water

i. **Summary:** Linda gave an overview of PFAS related research efforts by her team at Purdue, specifically relating to land applied biosolids. This included work at both the lab scale and field scale sampling efforts at sites like Hampton Roads.

ii. **Discussion:**

Bradley Baker (in chat): I might have missed it, but did you look at concentrations at different soil depths? Soil column gradient. [At disposal sites]

Linda Lee: We were not able to get soil cores due to unusually heavy rainfall and so we are coring this month, as part of the next round of surface soil composites. We will be doing soil coring at all our sites; we just haven't got all the data analyzed.

Bill Kramer (in chat): Is there a correlation between the amount of biosolids applied over time and PFAS levels?

Greg Allen: You had indicated that future work at the disposal site involved planting plants on the material.

Linda Lee: We're not planning on that. At the same site, the whole site is over 100 acres, and this was just 9 acres for the dedicated land disposal. The sanitation district that I'm working with has installed 10 more monitoring wells so that we can do a brand new, never been applied biosolids application on 60 or 70 acres, and there's another 20 acres where they've been doing wastewater effluent irrigation for decades on crops that are harvested. I will be doing a one time

snapshot of cores, surface soils and plants at that irrigated site as a comparison. Plus, I know that it could be impacting groundwater monitoring well data across the whole site.

Greg Allen: Are you aware of studies that help us understand how efficient the uptake is in crops from soils that have PFAS in them? Is it highly efficient or just partial?

Linda Lee: Bioavailability from the biosolids is not instant. This is why I say to be careful when looking at certain types of data, at 15 centimeters, lysimeters, because it's not instant. Even in irrigated sites, like the Penn State Living Filter that's part of one of our EPA projects, uptake was little. You don't see a lot in the corn, which is why Maine recommends to their dairy farmers to increase the amount of corn silage and decrease grasses. That's the opposite of what they would do for nutrition, but it does help them manage PFAS. We know PFAS are taken up more in the grasses than they are in corn, and obviously different levels of uptake. I have two other grants that will look at whether we can mitigate PFAS update into crops by mixing in environmentally sorbents, and there's lots of different options including mulch. In the Bay, you're dealing with runoff, so I wanted to highlight that. Because of what we've seen at the Hampton Roads site we're now adding runoff samplers to our other sites. 80% of the chemical load in the stream network was from intense rain events that also caused runoff and there's very few BMPs that can be done to minimize that. That's for manure but I won't be surprised if we see similar things with PFAS, although they have higher sorption and absorb at the air-water interface. I didn't get to show this, but how we apply the biosolids is another management strategy we can exploit, by mixing it in and doing deep tilling. How can we manage continuing to use them but minimize their unintended consequences.

c. David Tobias, EPA – Chemical Risk Assessment for PFOA and PFOS in Biosolids

i. **Summary:** David provided an update on the EPA's Biosolids program. He reviewed the process and framework used for risk assessment and detailed ongoing work.

ii. **Discussion:**

Michelle Young (in chat): 1633 has not been approved for biosolids yet. Expected ETA?

David Tobias: It depends on what you mean by approved. There were a small number of labs that developed method 1633 including the part for biosolids and there's a multi lab validation that was completed and they're in the final stages of creating the reports. Soon an updated multi lab validated method for the method 1633 analytes in biosolids will be released based on that, and they've already been released for some media other than biosolids. Approved can mean different things to different people. In general, what you need to do for finalization is to promulgate [the method] into a rule, which could take quite a while to do. We think the multi lab validation final report should come out this year, but I don't know when the final regulatory step will take place. In the past, I think that once you have a multi lab validated method that's available, a lot of states have viewed that as usable, but it could vary.

Linda Lee (in chat): In response to the question about 1633 availability – what is most important with doing PFAS analysis in biosolids (or any media) is that QAQC samples were included and data provided.

Doug Myers (in chat): [The] risk assessment assumption that farmers eat their own food is very outdated. Most modern agriculture ships grain to a centralized facility where it is mixed with other grain and then fed to animals somewhere.
Guillaume Boivin (in chat): Concerning soil ingestion, probably by the farm family infant eating a certain amount of soil. What is the risk assessment for everything applied in a field compared to PFAS presence? I mean there will be pesticides, chemical fertilizer, manure…. I'm guessing that PFAS won't be the most "dangerous" contaminant there.
David Tobias: In terms of soil ingestion and in terms of the model in general, when you start running the model, you're going to focus on what came from the POTW. After you do that risk assessment and before you move to risk management, when you're coming up with a criteria level, you think about how that compares to other sources of PFAS that may apply to the field and what other levels you might find. It's then a policy decision about how you want to regulate the part of the exposure that comes from biosolids. If you look at what happens in different parts of the EPA or in the past, just think about what came from biosolids. When people do a drinking water assessment, they use something called a relative source contribution and say the goal is to keep the 'risk cup from overflowing'. You want to make sure that people recognize they have a diversity of exposures and that you're not pushing them above an acceptable level of risk for the chemical that you're assessing. When you're saying that there could be other things in the soil that people will also face harm from, I agree with you, there could be, but we can't do an everything assessment. You have to do the best to protect people from the contaminants as you're able to evaluate them. I don't think that we're assuming across the entire country that farmers diets are focused solely on the food they're growing. What we're doing is looking at what do the regulations allow and what do you find in terms of people's diets? Starting with how protective do you need to be for your risk assessment, to later when you think about what the impact of population is, when people think about risk management, they'll consider those factors in deciding what the policy should be. As you may know, a lot of this started from the concerns that came out of Maine. What they found in Maine were fields impacted both by solids from paper mills but also biosolids that have been contaminated from the waste from manufacturers creating food contact materials. When you look at those situations, unfortunately within that sample set, they did find farmers who were ingesting a fairly significant amount of what they produced and farmers who faced fairly significant exposures from their groundwater and/or milk. It's a set of very high end exposures, and an unfortunate situation that those materials were land applied. The reality is that we need to be able to communicate to farmers that we have confidence that their use of biosolids is not presenting them with unacceptable risk levels. When we start to do that, we consider both what the spectrum of observed behaviors are but also what does the regulation allow. That's consistent in a lot of different regulatory frameworks.
Salil Kharkar (in chat): Some papers at WEFTEC have indicated mass load is higher from domestic wastewater than point industrial sources.
James Fotouhi (in chat): If a source control study is completed, and no significant point sources are identified, what does EPA expect WWTPs to do?

Mo Abu-Orf (in chat): If a portion of TOP from biosolids transfer to terminal products after land application, how is EPA planning on regulating terminal products at the start of land application?

3. **Work Session: Improving our understanding of land-applied biosolids and their potential impacts in the Chesapeake Bay Watershed**
   i. Brooke Kline, USGS C-StREAM intern – Calculated Biosolids Application estimates in the Chesapeake Bay Watershed
      - **Summary:** Brooke presented on her project on spatial mapping of biosolid applications over time.
      - **Discussion:**

        Lisa Challenger (in chat): Where did the data for Pennsylvania biosolids land application quantities come from?
        Emily Majcher (in chat): Lisa: for the watershed, all biosolids estimates were from NBiosolids in CAST, calculated with a generalized estimate for available N in biosolids.
        Linda Lee: Does CAST just say where biosolids were actually applied or just permitted for application?
        Brooke Kline: It was where they're applied, but it only tells us what county they were applied in.
        Linda Lee: So it's definitely application not permitted for application. Does it tell you how often they're applied?
        Emily Majcher: It does not.
        Greg Allen: Annual data flows that come into CAST where the states report some of these pieces of information related to mostly nitrogen management, so it's an annual reporting cycle that feeds CAST.
        Emily Majcher: I would couch that with, this was really a starting point for the spatial distribution and with an understanding that this was just an estimate and could be improved as we have additional data sources moving forward. In that context

   ii. Discussion of ongoing efforts to improve our understanding
      - **Summary:** The group discussed, through a Jamboard, ongoing efforts and gaps and needs relating to land-applied biosolids and their potential impacts.

Participants

Al Razik, MES
Amy Laliberte, MDE
Andrew Horwath, Civil & Environmental Consultants, Inc.
Andy James
April Thompson
Ashley Geiger
Ata Adeel, MWCOG
August Goldfischer, CRC
Becky Renner, PA DEP
Bel Martinez da Matta
Bill Kramer, Kershner Environmental Technologies
Bill Toffey, MABA/Effluential Synergies
Bob Buglass
Bradley Baker, MDE
Bret Kline
Briaunna Makar, PA DEP
Brian Churchill, DE DNREC
Brooke Kline, USGS
Bryan Cauthorn, VA DEQ
Bryce Meeker
Camille Liebnitzky
Carlington Wallace

Caroline Nguyen
Chris Clark, PG County DoE
Chris Curran, AECOM
Chris Murphy, Anne Arundel DPW
Christopher Curran
Chuck Hegberg, RES, LLC
Cindy Driscoll, MD DNR
Connor Robinson, SYLVIS Environmental
Corey Bjornberg
Dave Whitall
David Tobias, EPA
Doug Austin
Doug Myers, CBF
Dustin Bilhimer, WA Dept. of Ecology
Ed Wirth, NOAA
Elijah Stuber
Emily Majcher, USGS
Erik Johnson, WLSSD (Duluth, MN)
Faith Kibuye, Penn State
George Onyullo, DC DOEE
Glenn Dowling
Greg Allen, EPA
Guillaume Boivin
Heather Preisendanz, Penn State
Jacob Carnes, WA Dept. of Ecology
James Fotouhi, DC Water
James Howard
Janine Burke-Wells, NEBRA
Yen-Der Cheng
JB Neethling, HDR Inc.
Jeff Seltzer
Jenna Dodson
Jennifer Guziak
Joel Caudill
John Cargill, DNREC
John Thompson
Jon Brindle, Stafford County Utilities
Kate Guth, ICS Group
Ken Pantuck, EPA
Kevin McLeary
Kim Smith
KOFI Asante-Duah, DC DOEE
Lauren Miller, Denali Water
Lee Blaney, UMBC
Lee Lundberg
Lexi Myers, Alliance for the Chesapeake Bay
Linda Lee, Purdue
Lisa Challenger
Lisa Ochsenhirt
Lisa Reynolds
Lisa Williams
Lorie Baker
Lorna Shea, ALCOSAN
Lucretia Brown, DOEE
Maia Tatinclaux
Marielle Larson, University of Washington
Puget Sound Institute
Mark Gunderson
Mark Mank, MDE
Mark Richards, VA DEQ
Martin Griffin
Michelle Lorah
Michelle Young, Carollo Engineers
Mi-Ling Li, University of Delaware
Mohammed Abu-Orf, Hazen
N Shulterbrandt, DC DOEE
Nasser Kamazani
Nicki Bellezza, Fairfax Water
Nomble Lee, AECOM
Odette Mina, Penn State
Patrick McNamara
Pete Key
Ping Wang, DE DNREC
Richard Jack, King County Water and Land
Robert Peoples, MDE
Salil Kharkar
Shirish Agarwal, Brown and Caldwell
Sidney Kline
Steve Bieber, MWCOG
Susan Lamb, USDA
Sushanth Gupta, CRC
Theresa Johnston
Tim Evans, Ohio Public Utilities
Tom Parham, MD DNR
Vicki Blaze, USGS

Acronym List

BFWG: Budget and Finance Workgroup
BMP: Best Management Practice
CAST: Chesapeake Assessment Scenario Tool
CBF: Chesapeake Bay Foundation
CRC: Chesapeake Research Consortium
DNREC: [DE] Department of Natural Resources and Environmental Control
DOEE: [DC] Department of Energy and the Environment
EPA: [US] Environmental Protection Agency
MDE: Maryland Department of the Environment
MES: Maryland Environmental Service
MWCOG: Metropolitan Washington Council of Governments

NEBRA: North East Biosolids and Residuals Association
PFAS: Per- and Polyfluoroalkyl Substances
PFOS: Perfluorooctanesulfonic Acid
POTW: Publicly Owned Treatment Works
SDC: Small and Disadvantaged Communities
TOP: Total Oxidizable Precursor
UMBC: University of Maryland, Baltimore County
USACE: US Army Corps of Engineers
USDA: United States Department of Agriculture
USGS: United States Geological Survey
WEFTEC: Water Environment Federation's Technical Exhibition and Conference