EPA VIRTUAL NATIONAL BIOSOLIDS MEETING 2020

December 8-10, 2020

Welcome to the EPA National Biosolids Meeting

Elizabeth Resek,
EPA Biosolids Lead

Deborah Nagle, Office Director, EPA Office of Science and Technology

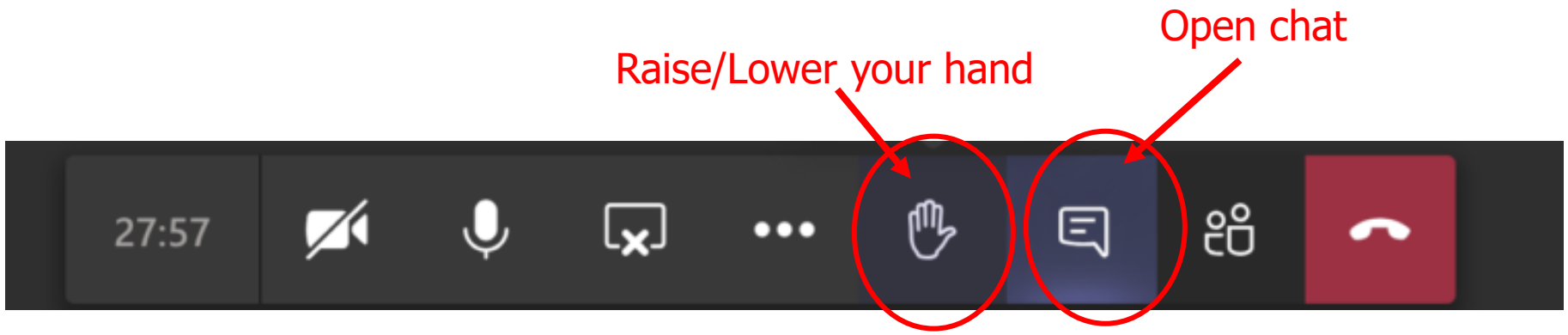
Betsy Behl,
Division Director, EPA Health and Ecological Criteria Division

Participating Effectively via Teams

- To reduce background noise, please be on mute unless speaking
- If you would like to jump into the conversation, please let us know by "raising your hand" or submitting a chat
- Please show your video when you are speaking

Before We Get Started…

- Please submit into the chat the name of the organization you are representing
- If you have never used MS Teams, please practice 'raising your hand' when you are done



Participating Effectively via Teams

- Once the meeting has ended, the chat log will remain in your MS Teams interface. We will not be revisiting chat for follow-up questions.
- Please email any questions following the meeting to: **resek.elizabeth@epa.gov**
- This meeting will not be recorded

How many years have you worked in the biosolids field?

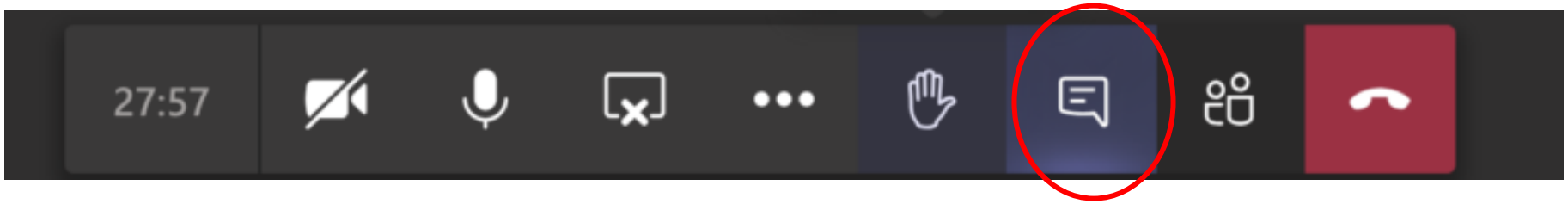
- Less than 5 years
- 5 to 10 years
- 10 to 20 years
- 20 to 30 years
- More than 30 years

Looking at the participant list, how many names do you recognize?

- Less than 5
- 5 to 10
- 10 to 20
- 20 to 30
- More than 30

What are you hoping to learn/hear/get from this meeting?

Please enter your response via chat



Important Logistics for the 3 days of meetings

- 3 half day meetings with break. The first and third days will be plenary. Day 2 will be all in breakout sessions.
- You should have received a calendar invite from Heather Christopher from Ross Strategic. In the body of that email are the logistics for the meeting.
- You can always find the logistics for the meeting at: http://www.rossstrategic.com/nationalbiosolidsmeeting
- You will receive an email from me every evening with the link and the plan for the following day.
- Plan for today . . .

EPA BIOSOLIDS PROGRAM OVERVIEW

ELIZABETH RESEK, US EPA
TESS RICHMAN, US EPA

U.S. Environmental Protection Agency Biosolids Program

Elizabeth Resek, Biosolids Lead

Office of Water, Office of Science and Technology

Health and Ecological Criteria Division

resek.elizabeth@epa.gov

Meeting CWA Requirements

Section 405(d) of the Clean Water Act (CWA) requires EPA to:

Establish numeric limits and management practices that protect public health and the environment from the reasonably anticipated adverse effects of chemical and microbial pollutants during the use or disposal of sewage sludge.

Review biosolids (sewage sludge) regulations every two years to identify additional toxic pollutants that occur in biosolids (i.e., biennial reviews) and set regulations for those pollutants if sufficient scientific evidence shows they may harm human health or the environment.

Meeting CWA Requirements

Biennial Reviews

- Review publicly available information on occurrence, fate and transport in the environment, human health and ecological effects, and other relevant information for pollutants found in biosolids.

- Data may be used to conduct risk screens and refined risk assessments for pollutants found in biosolids.

- Biosolids Biennial Report No.8 (reporting period 2018-2019) anticipated release end of 2020. https://www.epa.gov/biosolids/biennial-reviews-sewage-sludge-standards

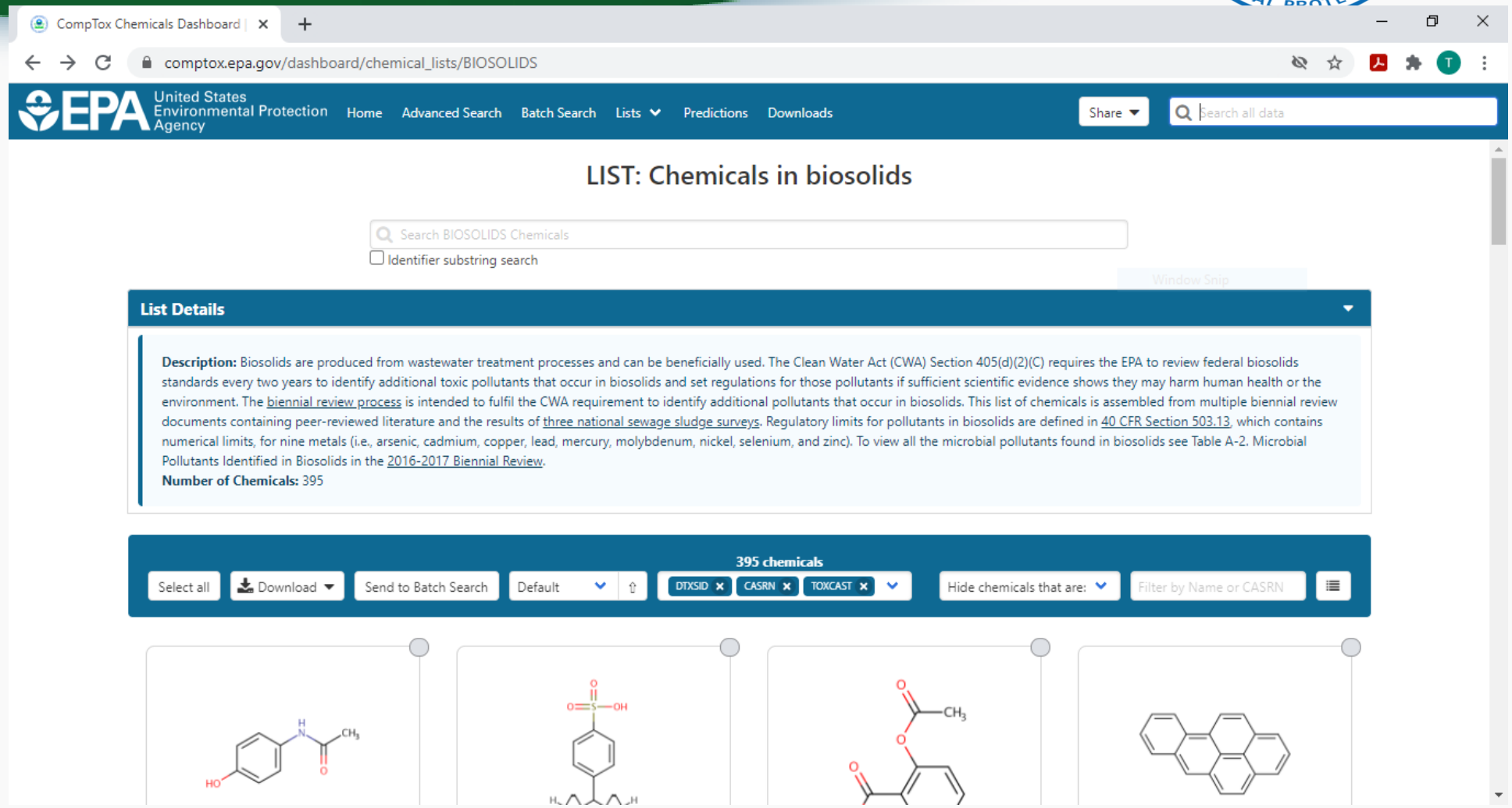
Meeting CWA Requirements

Biosolids List in EPA's CompTox Chemicals Dashboard

- Biosolids List in EPA's publicly available **CompTox Chemicals Dashboard** was curated from past biennial reviews and sewage sludge surveys representing the Agency's understanding of chemicals found in biosolids. https://comptox.epa.gov/dashboard/chemical_lists/BIOSOLIDS

- CompTox Chemicals Dashboard primer videos: https://www.epa.gov/chemical-research/comptox-chemicals-dashboard-primer-videos

Meeting CWA Requirements



Stakeholder Engagement

Biosolids Webinar Series

- Kicked-off in Fall 2019.
- Register for future webinars on EPA's biosolids website: https://www.epa.gov/biosolids

EPA Biosolids Website

- Completely overhauled and launched in July 2020.

EPA Commitment to Continued Engagement

- Participation in stakeholder-led meetings and calls.
- Follow-up to December 2020 meeting.

Additional Activities

National Defense Authorization Act Interim Guidance on Destruction and Disposal of PFAS and PFAS-Containing Materials

- EPA Biosolids Team participated on Agency-wide workgroup.
- Effort led by EPA Office of Land and Emergency Management.
- Due January 2021.

Resource Recovery

- A consistent process for evaluating products derived from sewage sludge that are intended for land application is needed.
- 40 CFR Part 503 does not consider or anticipate current and future innovative resource recovery technologies and products.
- Work in this area is ongoing.

COVID

EPA Statement on Biosolids Land Application (Spring 2020)

Existing requirements and guidance help ensure that biosolids are processed, handled, and land-applied in a manner than minimizes the risk of exposure to pathogens, including viruses. We have no evidence that biosolids contain infectious SARS-CoV-2 virus when requirements under 40 CFR part 503 are met for Class A biosolids. Generally, pathogens may exist when requirements are met under 40 CFR part 503 for Class B biosolids, which is why EPA's site restrictions that allow time for pathogen degredation should be followed for harvesting crops and turf, for grazing of animals, and public contact. All requirements under 40 CFR part 503 should continue to be met. Additionally, per CDC's Guidance for Controlling Potential Risks to Workers Exposed to Class B Biosolids, employers should prevent work-related illness by providing proper personal protective equipment (PPE) and supporting other health and safety practices for persons hauling and land applying biosolids. While no additional COVID-19–specific protections are recommended for the land application of biosolids, consider checking for advisories from your local health department.

Thank You!

Biosolids Team

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Tess Richman, ORISE Fellow richman.tess@epa.gov

Lauren Questell, ORISE Fellow questell.lauren@epa.gov

UPCOMING RESEARCH SNAPSHOTS

Placeholder for instruction slides/session framing

Upcoming Research Snapshots

- **EPA Office of Research and Development** (Christopher Impellitteri, EPA ORD)
- **Water Research Foundation** (Ashwin Dhanasekar, WRF)
- **NEBRA** (Janine Burke-Wells, NEBRA)
- **W4170** (Maria Lucia Silveira, UFL & Nicholas Basta, OSU)

EPA

Office of Research and Development

EPA-OST Virtual
Biosolids Workshop
December 8, 2020

SAFE AND SUSTAINABLE WATER RESOURCES RESEARCH PROGRAM

Biosolids Research Overview

Christopher A. Impellitteri, EPA-ORD

Biosolids Research Projects

Pathogen and Vector Attraction Reduction	Inform the update to the *"Environmental Regulations and Technology: Control of Pathogens and Vector Attraction in Sewage Sludge"* report (EPA/625/R-92/013).
ARBs and ARGs	Evaluate types and prevalence of antibiotic resistant bacteria (ARB) and antibiotic resistance genes (ARGs) in biosolids to inform management strategies.
Emerging Contaminants (CECs)	Application of non-targeted analysis to municipal wastewater and residuals and method development and evaluation of CECs in wastewater and biosolids.

Biosolids Research Projects

PFAS Analytical Methods	**Development and validation of a PFAS isotope dilution method for biosolids.** • Collaboration with DoD • 40 different PFAS • Single validation data collection is complete
PFAS Prevalence and Pretreatment	**Research on the occurrence, fate, and transport of PFAS in wastewater treatment plants and biosolids. Identify sources and evaluate pretreatment strategies.**
Treatment Strategies	**Treatment strategies for biosolids, including incineration and pyrolysis.**

Biosolids Research Projects

Risk Assessments

Provide OW-OST with information to support the development of chemical risk assessments.

- Computational toxicology
- Evaluate chemicals in biosolids for risk assessment prioritization

Contaminants and Land Application

Characterize contaminants in land applied biosolids.

- Liquid and solid forms
- Metals and coliforms
- Emerging contaminants (alkylphenol ethoxylates, PFAS)
- Leaching test methods

Contaminants and Soils

Characterization of soils by evaluating contaminants (PFAS, PAH, metals) as a function of loading and soil depth.

Biosolids-Related Research Grants

- **Open National Priorities RFA (Closes January 5, 2021):** Evaluation of Pollutants in Biosolids
- **Awarded Grants:** Practical Methods to Analyze and Treat Emerging Contaminants (PFAS) in Solid Waste, Landfills, Wastewater/Leachates, Soils, and Groundwater to Protect Human Health and the Environment
- **Awarded National Priorities Grants:** Research on PFAS Impacts in Rural Communities and Agricultural Operations

Research Gaps

- Based on future occurrence evaluations, assess the fate and transport of emerging contaminants (including PFAS) in land-applied biosolids.
- Examine the destruction of emerging contaminants in alternative biosolids management processes (e.g., thermal treatment).
- Develop frameworks for emerging contaminant risk management in agriculture (e.g., reducing plant uptake).
- Characterize biochar derived from the pyrolysis of biosolids and develop frameworks for beneficial use.
- Compare/contrast pyrolysis and alternative technologies (e.g., E-Beam) with existing management strategies using lifecycle assessment approaches.
- Assess microbial contamination of surface and groundwater after land application of biosolids.

Contact

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Safe and Sustainable Water Resources Research Program
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The views expressed in this presentation are those of the individual author and do not necessarily reflect the views and policies of the US EPA.

THE Water Research FOUNDATION

Biosolids: Upcoming Research Snapshot

Ashwin Dhanasekar

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ABOUT

MISSION

Advancing the science of water to improve the quality of life

VISION

To create the definitive research organization to advance the science of all things water to better meet the evolving needs of subscribers and the water sector

VALUES

Integrity • Leadership • Respect
Innovation • Collaboration

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One Water

WRFs research benefits all areas of the water sector, as well as agriculture, energy, watershed management, and other commercial industries.

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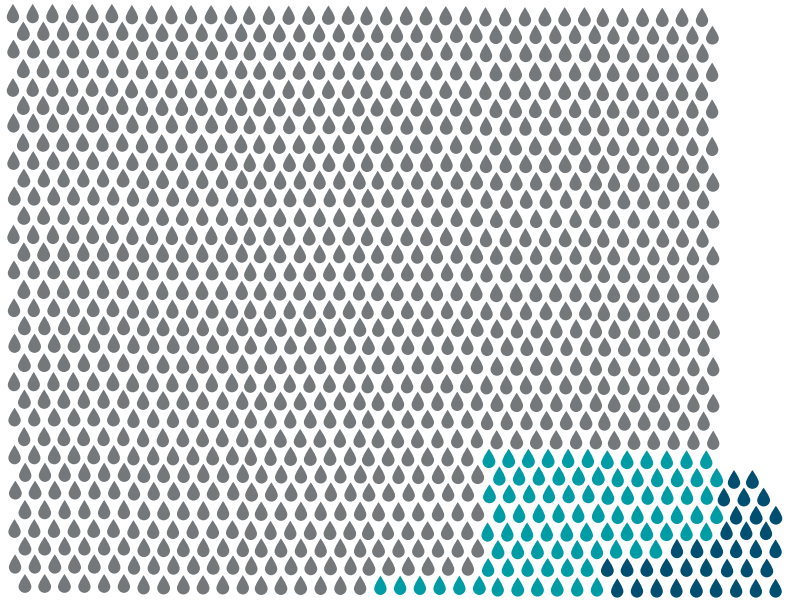
WRF AT A GLANCE



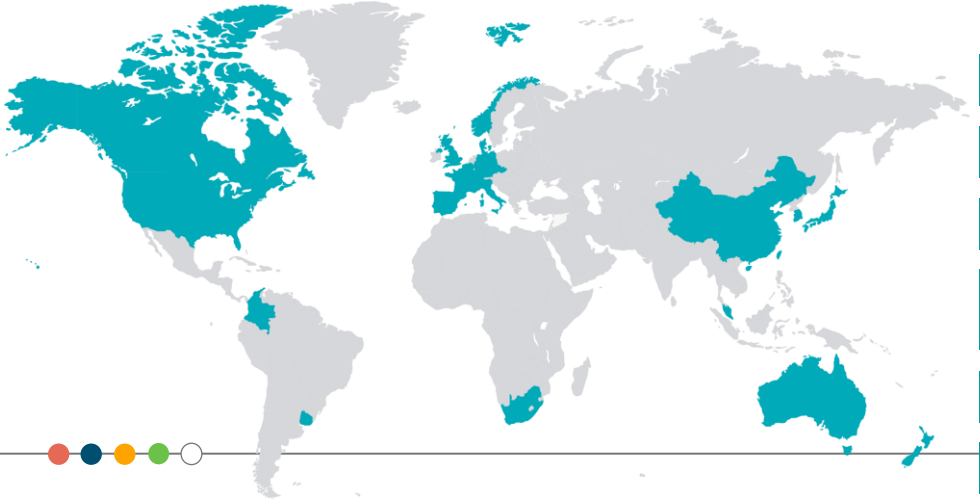
SUBSCRIBERS

1034 UTILITIES

39 MANUFACTURERS

89 CONSULTANTS

The Water Research Foundation operates and affects change on **6 continents**



PROGRAMS

- Research Priority
- Tailored Collaboration
- Emerging Opportunities
- Unsolicited Research
- Grants/Awards
- Facilitated Research
- Paul L. Busch Award

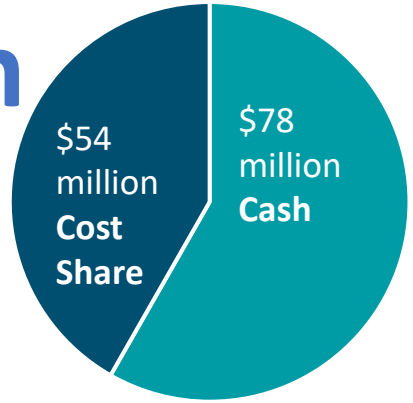
RESEARCH PRIORITIES

- PFAS & Constituents of Emerging Concern
- Lead & Copper
- Harmful Algal Blooms (HABs)
- Resiliency
- Infrastructure
- Integrated Water Management
- Energy Efficiency
- Nutrients

FUNDED RESEARCH

$132 Million

Contractually Funded Research



RESEARCH PORTFOLIO

1 Federal Contracts

4 Federal/ State Grants

323 Active Projects

172 Co-funders IN **291** Co-funded projects

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WRF Research Programs

At-a-Glance: Distinguishing Features of WRF Research Programs

Research Program & Description	% Annual Research Budget	Project Approval	Anticipated Schedule
Research Priority A strategic research program broadly relevant to the water sector	60	WRF Board-appointed Research Advisory Council (RAC)	April/March
Tailored Collaboration A matching program designed to support utility-specific/regional issues	20	WRF Board-appointed Tailored Collaboration Review Committee	Pre-proposal & proposal period starts 2 QTR project selection 3 QTR
Emerging Opportunities A program to address emerging and time critical issues; additionally, supports partnering opportunities and add-ons to current projects	10	WRF Board Executive Committee	Rolling
Unsolicited Research A program that focuses on novel, transformative research	10†	WRF Board-appointed RAC	Opening in 2020
Facilitated Research A program that is fully funded by the project team	0	WRF CEO and leadership team	Rolling

†While research budget is allocated to this program annually, research-project funds are released every other year, starting in 2020.

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Background

- The last Biosolids Research Summit was in 2003.
- There are tons of new advances in the world of Biosolids since then.
- EPA submitted a report in 2019 claiming a need for risk assessment on 352 constituents.
- This is/was impacting utilities and how they can use their biosolids.
- WRF has had bits and pieces of research covering Biosolids.
- WRF stepped up to hold a focused research summit to identify key research needs.

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Goals of the Summit

- Develop a long term 5-year research plan
- Prioritize research needs and develop project concepts
- Identify research partners to provide in-kind support and/or funding
- Identify volunteers to serve on the WRF Research Advisory Committee
- Conclude with clear next steps

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WRF Biosolids Research Summit

- 45 Attendees
- Academics, Utility Representatives, Social Scientists, Non-Profits, Consultants
- Co-Sponsored by WEF & NYCDEP
- Support from SFPUC & DC Water
- 11 Project Concepts

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Research Needs

Contaminants	Benefits	Utility Needs
Presence	Crop yield	Product Development
Fate and Transport	Water holding capacity	Communication
Risk Assessments	Fire ravaged lands	
Pathways	Brown fields	
Relative concentrations	Mine reclamation	
Plant uptake	Soil remediation	
Nutrient run-off	Carbon sequestration	
Microplastics		

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Key Takeaways from Research Summit

Share the Knowledge

Better pooling of research to combat misinformation

Share, condense and disseminate

Keep the conversation going

Localize Research

Local research, outreach and support local gatekeepers

Buy-in and encourage staff pride for Biosolids products

Address CECs as a whole

Develop protocols/tools to address emerging contaminants as a whole

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Objectives

To improve the economic value and sustainability of products that represent 95% of our mass and a third of our cost for our community's water and wastewater services.

Summarize known benefits and long-term successful reuse enterprises as case studies.

Quantify factors of interest that are currently lacking data (soil health, risk assessment of contaminants, customer demands/expectations).

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Next Steps

- The AC will keep prepping the Research Area for a 2021 launch.
- The project concepts will get ranked and prioritized based on current developments.
- Till the RAC approves the AC, staff will be pursuing other opportunities, if any, to continue research.

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Advisory Committee

- John Willis *Brown & Caldwell* (RAC Liaison)
- Karri Ving *SFPUC*
- Nick Basta *OSU*
- Patrick Dube *WEF*
- Matt Seib *MMSD*
- Joshua Cheng *CUNY*
- Greg Kester *CASA*
- Erica McKenzie *Temple U*
- Maile Lono-Batura *NW Biosolids*

WRF Staff

- Stephanie Fevig, Research Program Manager
- Ashwin Dhanasekar, Research Program Manager

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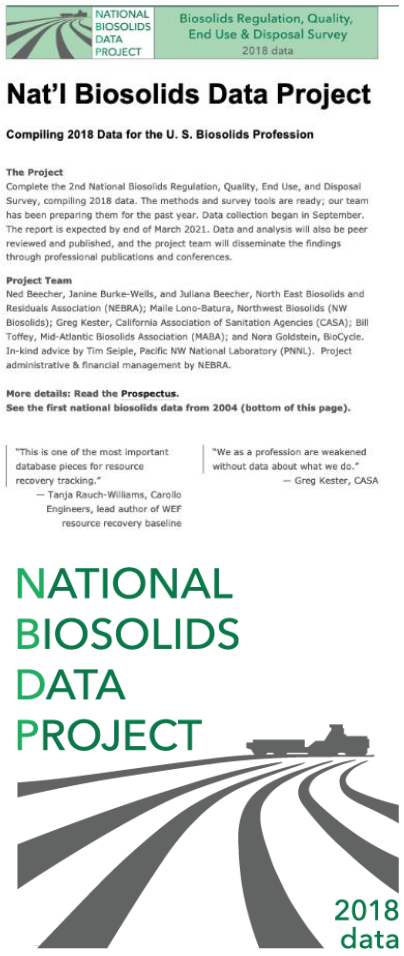
Research Snapshots

North East Biosolids & Residuals Association

- Small non-profit created in 1997 with mission to cooperatively promote the environmentally sound recycling or beneficial use of water, wastewater, and other residuals in the Northeast, New England and eastern Canada
- Other regional associations/collaborators include Northwest Biosolids Association, Mid-Atlantic Biosolids Association, Virginia Biosolids Council and the newest South East Biosolids Association; California Association of Sanitation Agencies
- Research Committees – NWBA's is the best! https://nwbiosolids.org/whats-happening/resource-library
- NEBRA can be nimble! https://www.nebiosolids.org/why-biosolids-organizations-are-needed

The National Biosolids Data Project 2018 data



- The 2nd compilation of biosolids nationwide & by states; first compilation published in 2007 reporting 2004 data
- Team includes NEBRA, CASA, NW Biosolids, BioCycle, MABA
- Literature review & methods completed in spring, thanks to a cooperative agreement with EPA Region 4
- Funding for current project from diverse organizations nationwide
- Final report planned for end of March 2021; peer-review publication to follow
- 2 separate surveys: State Coordinators & WRRFs
- The State Survey is here: https://www.surveymonkey.com/r/NBDPStateSurvey7Oct2020

The NBDP Webpage: https://www.nebiosolids.org/national-biosolids-survey-2018-data

The National Biosolids Data Project 2018 data

We need state coordinators help to provide whatever info you have!

PROGRESS:

- 14 state coordinators have started survey… Well done!
- DE, IN, MO, NJ, OR, and TX have completed their spreadsheet & survey and had phone interviews with us. Superb! Thank you.
  "It was kind of fun,…" we heard one say.
- The separate survey of WRRFs ("WWTP Survey") is going out very soon. We are hoping for thousands of responses. Please spread the word - and the email invitation.
- Please start your state's survey ASAP.
- We are here to help with questions, filling in the survey, talking through it on the phone – whatever you need!
- We know this is a big request; thank you for your time and effort.

NATIONAL BIOSOLIDS DATA PROJECT 2018 data

Support from biosolids leaders nationwide

NACWA

CASA carollo loop

Water Environment Federation
the water quality people

Virginia Biosolids Council SYNAGRO

Denali Water Solutions Hazen

RENDA Environmental CDM Smith WM

NATIONAL BIOSOLIDS DATA PROJECT

2018 data

dc water is life CHARLOTTE WATER Mid-Atlantic Biosolids Association

San Francisco Water Power Sewer

SLOW-RELEASE Milorganite NITROGEN FERTILIZER

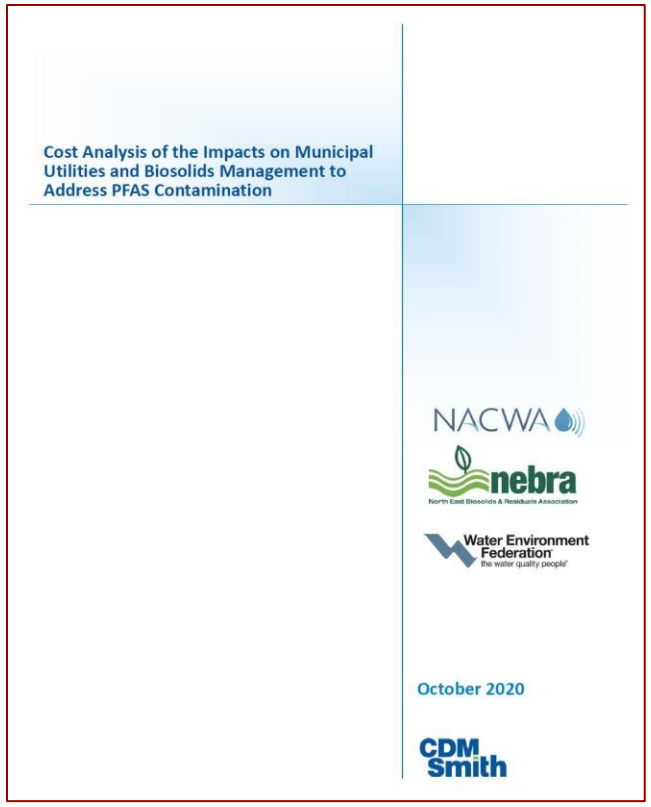
Jacobs Illinois Association of Wastewater Agencies NEFCO

MERRELL BROS.

METRO WASTEWATER RECLAMATION DISTRICT

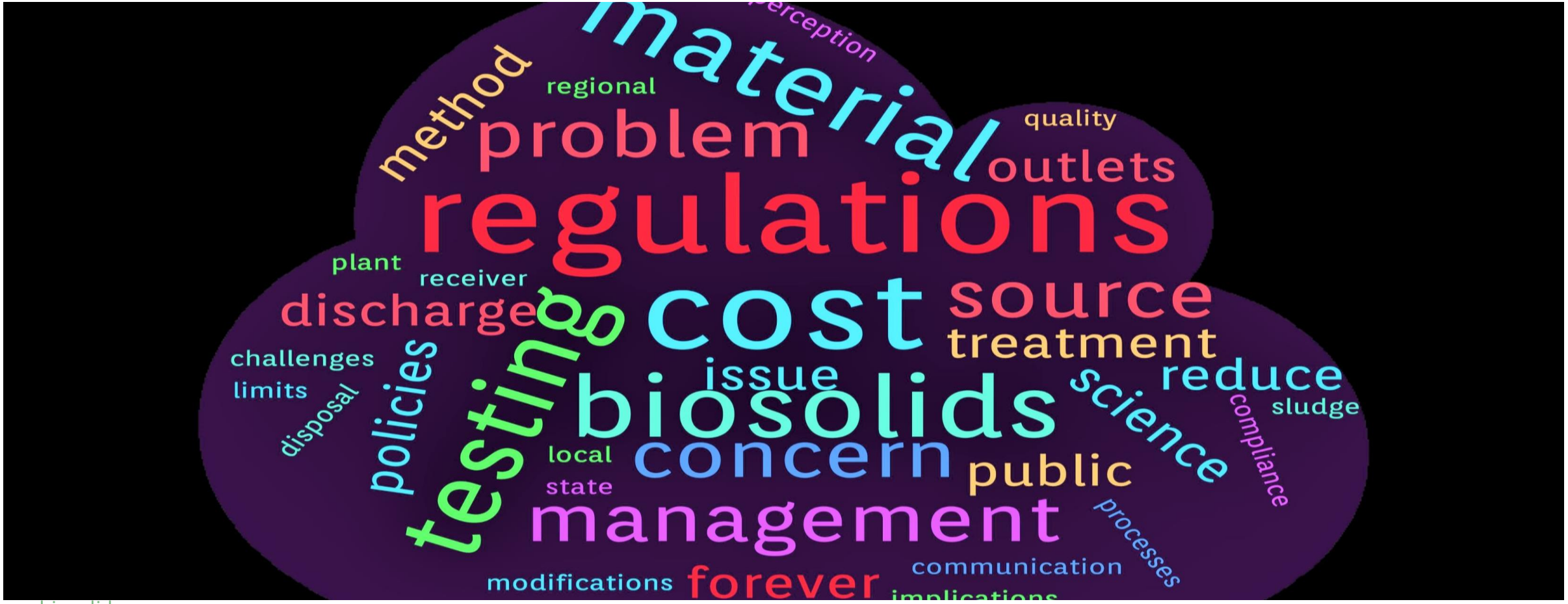
Brown AND Caldwell

PFAS Cost Impacts on Utilities and Biosolids Management



- Average biosolids management cost increased by 37%
- Beneficial reuse programs experience the most significant cost impacts due to PFAS
- 29 entities surveyed; 9 detailed case studies
- Chapter on emerging technologies
- Available on WEF, NACWA, and NEBRA websites https://www.nebiosolids.org/pfas-biosolids

Cost Study
Qualitative Results on PFAS Challenges

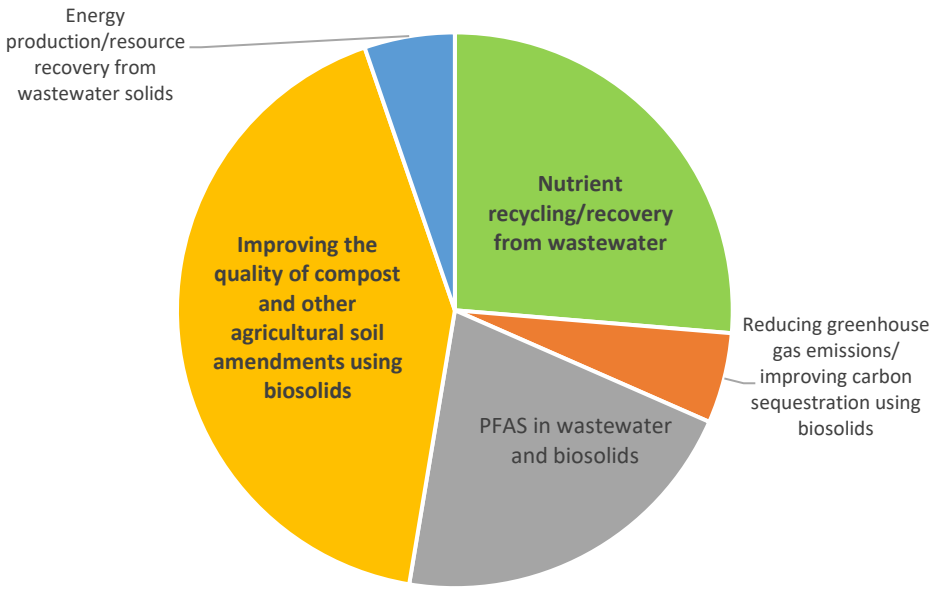


Member Research Interests and Other Initiatives

- PFAS fate & transport modeling for Maine soils (Stone Environmental)
- Webinars on innovative solids handling solutions for PFAS
- NW Biosolids: GHG Calculator https://bggc.nwbiosolids.org/
- CASA: restoring fire-ravaged land with biosolids https://casaweb.org/renewable-resources/biosolids/
- Carbon sequestration in soils with biosolids

Research Topic of Most Interest to NEBRA Members

10/29/20 survey



Thank You for your Attention!

Questions?

Contact:
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http://www.nebiosolids.org

USDA NIFA Multistate Research Project
W4170- Beneficial Use of Residuals to Improve Soil Health and Protect Public, and Ecosystem Health

EPA Virtual Biosolids Meeting
December 8, 2020

Maria Silveira –Professor of Soil and Water Science, Univ. of Florida
Nicholas Basta – Professor of Soil and Environmental Science, Ohio State Univ.

Multistate Research Project

The Land-Grant universities were established with passage of the Morrill Act in 1862

Research focus on agricultural and mechanical research but land-grant institutions now address many academic fields (aquatic, urban, space, and sustainable energy research)

The Hatch Act of 1887 – Multistate Research Fund - provided the framework for funding agricultural research at land-grant institutions. Led to establishment of State Agricultural Experiment Stations (SAES) associated with 1862 Institutions

- Research focuses on a specific and important problem of concern to **more than one state**
- Collaborative **team effort** in which the scientists are mutually responsible for designing and conducting the research, and accomplishing the objectives
- **Multiple disciplines** participate in the research

W170 Regional Project Contribution to Biosolids Research

Timeline:

- **Early 1970's**: a biosolids project started in the North Central Region (NC-118 "Utilization and disposal of municipal, industrial and agricultural processing wastes) to evaluate the agronomic impacts of land applying biosolids

- **1972**: Western Region Project W-124 "Soil as a waste treatment system" focused on similar objectives

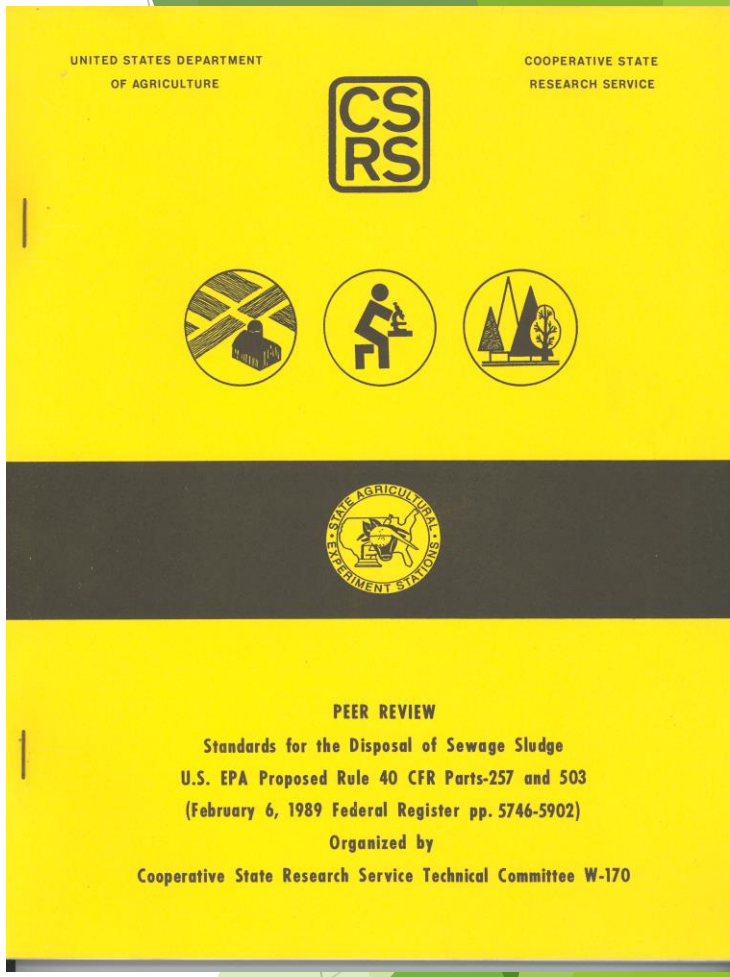
- **1977**: the NC-118 and W-124 projects reorganized as W-124 "Optimum utilization of sewage sludge on land"

- **1985**: the project it was renewed as W-170 "Chemistry and bioavailability of waste constituents in soils"

  - A key study by this group was the regional experiment with Chicago biosolids that was replicated at several locations in the U.S.
  - **W170 provided research data and risk assessment support to develop risk based guidelines (Tables 2, 3, 4) in Part 503 1993 rule**

W-170 Peer Review of the 503 Risk Assessment and Draft Rules

- A group of EPA, W-170 scientists, and other specialists engaged in revision of the technical basis for the 503 rule
- The focus of the review was the data sets and mathematical models used to evaluate exposure pathways, most exposed individuals, and health and environmental effects
- The revised numbers were then submitted to the rule writers for their consideration
- The final rule was published on February 19, 1993



W170 Regional Project Contribution to Biosolids Research

Timeline:

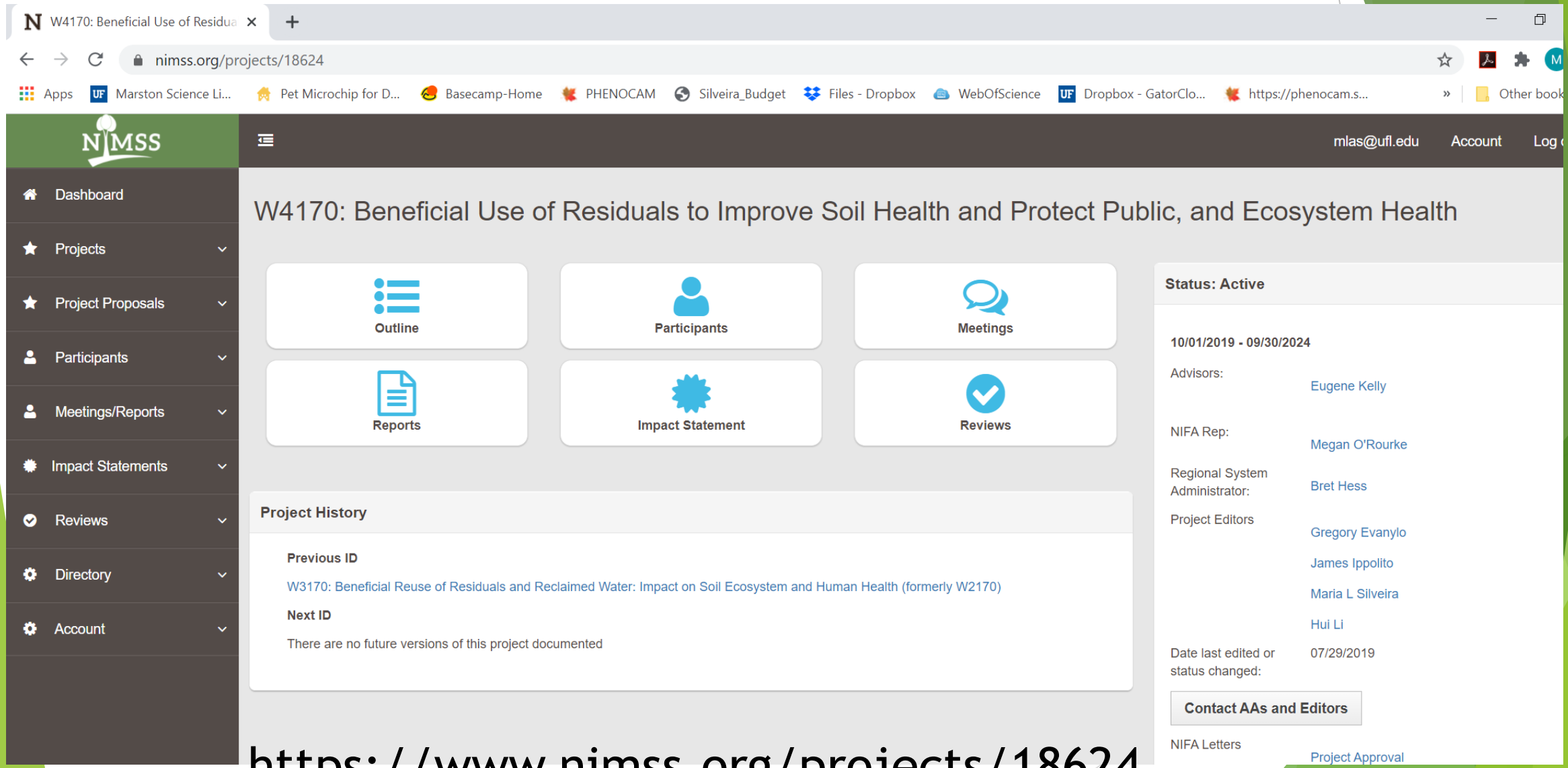
- **1985-1999**: W-170 “Chemistry and bioavailability of waste constituents in soils”. Renamed in 2004 (W-1170 “Chemistry, bioavailability, and toxicity of constituents in residuals and residual-treated soils”
- **2009**: W-2170 “Soil-based use of residuals, wastewater and reclaimed water”
- **2014**: W-3170 “Beneficial reuse of residuals and reclaimed water: Impact on soil ecosystem and human health”
- **2019**: **W-4170 “Beneficial Use of Residuals to Improve Soil Health and Protect Public, and Ecosystem Health”**

W4170 Beneficial Use of Residuals to Improve Soil Health and Protect Public, and Ecosystem Health

- 50+ scientists from 30 states with extensive history on biosolids research
- USEPA Office of Water, Office of Research and Development
- USDA, ARS
- Biosolids Regional Groups (NW, NEBRA, CASA, MWRD, Mid Atlantic)
- Other biosolids stakeholders, industry representatives
- Research and extension activities to scientific community, **federal, state, regional, and local agencies, community and stakeholders**

Diverse expertise with national and international recognition

W4170 Beneficial Use of Residuals to Improve Soil Health and Protect Public, and Ecosystem Health



https://www.nimss.org/projects/18624

Participant	Instituition	Participant	Instituition
Badgley, Brian D	Virginia Tech Univ.	Kumar, Kuldip	MWRD-Chicago
Basta, Nicholas T.	Ohio State Univ	Kuo-Dahab, Camilla	University of Massachusetts
Batjiiaka, Ryan	San Francisco Public Utilities Commission	Lee, Linda	Indiana - Purdue University
Borch, Thomas	Colorado State University	Li, Hui	Michigan State University
Brose, Dominic	Metropolitan Water Reclamation District of Greater Chicago	McLain, Jean	Univ. of Arizona
Brown, Sally	University of Washington	McPhillips, Lauren	Pennsylvania State Univ.
D'Angelo, Elisa M	University of Kentucky	Meregillano, Tom	Orange County Sanitation District
Daniels, W. Lee	Virginia Tech Univ.	Moss, Lynne	Black & Veatch Inc.
Dunbar, James	Lystek International Limited USA Operations	Murphy, Cheryl	Michigan State University
Elliottt, Herschel	Pennsylvania State Univ.	Norton, Urszula	University of Wyoming
Evanylo, Gregory	Virginia Tech Univ.	Pepper, Ian	University of Arizona
Gan, Jay	University of California, Riverside	Preisendanz, Heather	Pennsylvania State Univ.
Gentry, Terry	Texas AgriLife Research	Raj, Cibin	Pennsylvania State Univ.
Gerba, Chuck	Arizona - University of Arizona	Rock, Channah	University of Arizona
Gray, Andrew	California -Riverside : University of California, Riverside	Roseberg, Richard	Oregon State University
Hawkins, Shawn	University of Tennessee	Rosen, Carl	University of Minnesota
Hettiarachchi, Gang	Kansas State University	Seyfferth, Angelia L	University of Delaware
Huang, Qingguo	University of Georgia	Shannon, Robert	Pennsylvania State Univ.
Hue, N.V.	University of Hawaii	Silveira, Maria L	Univ. of Florida
Ippolito, James	Colorado State University	Watson, John E	Pennsylvania State Univ.
Iqbal, Javed	Univ. of Nebraska	Xia, Kang	Virginia Tech Univ.
Judy, Jonathan	Univ. of Florida	Xing, baoshan	University of Massachusetts
Kaiser, Michael	Univ. of Nebraska	Ying, Samantha C	University of California, Riverside
Kester, Greg	California Association of Sanitation Agencies	Zhang, Hailin	Oklahoma State University

W4170 Research Focus

Objective 1. Evaluate the short- and long-term chemistry and bioavailability of **emerging contaminants** (PFAS, microplastics, etc), pharmaceuticals and personal care products (PPCPs), persistent organic contaminants, and pathogens in residuals, reclaimed water, and amended soils in order to assess the environmental and human health risk-based effects of their application at a watershed scale.

- Chemistry, bioavailability, fate, and transport of CECs/PPCPs: carbamazepine, estrogens, sulfamethoxazole, trimethoprim, ofloxacin, ciprofloxacin and azithromycin, caffeine, etc
- Antibiotic resistant microorganisms
- Perfluorochemicals (PFAS)
- Engineered nano-particles (ENP)

Research for this objective was conducted by members from PA, WA, IN, MA, FL, VA, GA, MI, and KY

W4170 Research Focus

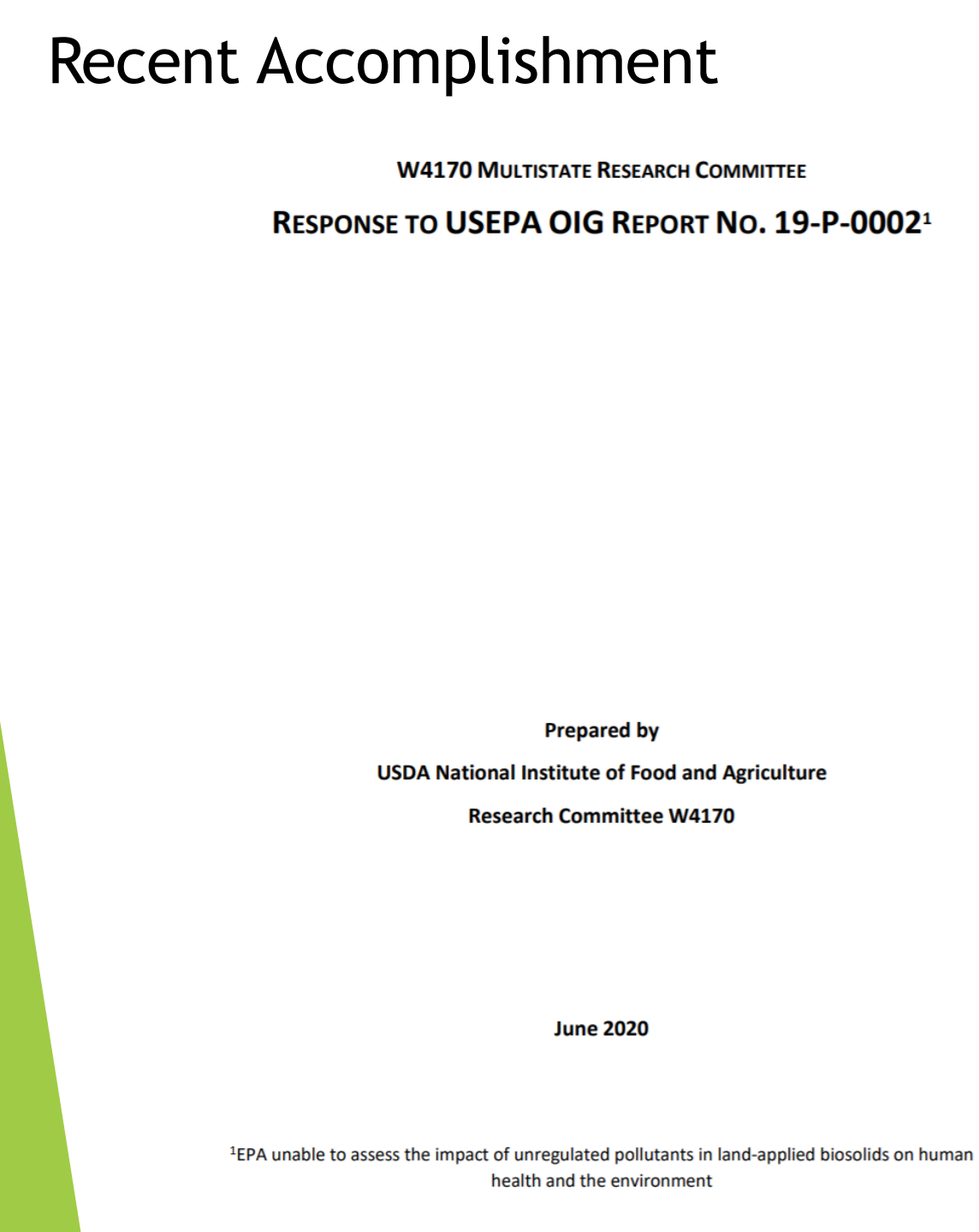
Objective 2. Evaluate the uses and associated **environmental benefits** for residuals and wastewaters in various ecosystems (e.g., agricultural, urban, recreational, forest, rangeland, mine-impacted, disturbed, degraded) with respect to changes in soil physical, chemical, biological, nutrient, and trace/heavy metals with respect to soil quality/soil health

- Assessment of benefits in agriculture and urban: food production, soil health, etc
- Greenhouse gas balance, soil carbon
- Impacts on water quality
- Mined and disturbed lands mitigation

Research on this topic was conducted by members from PA, HA, CO, OH, WA, FL, MN, VA, GA, NE and KS

Recent Accomplishment

On November 15, 2018 the USEPA Office of Inspector General (OIG) published "EPA Unable to Assess the Impact of Hundreds of Unregulated Pollutants in Land-Applied Biosolids on Human Health and the Environment," Report No. 19-P-0002 (USEPA, 2018). The OIG report alleged that "…[EPA] lacked the data or risk assessment tools needed to make a determination on the safety of 352 pollutants found in biosolids…[including] 61 designated as acutely hazardous, hazardous or priority pollutants in other programs."



W4170 MULTISTATE RESEARCH COMMITTEE

RESPONSE TO USEPA OIG REPORT NO. 19-P-0002[1]

Prepared by

USDA National Institute of Food and Agriculture

Research Committee W4170

June 2020

[1]EPA unable to assess the impact of unregulated pollutants in land-applied biosolids on human health and the environment

AUTHORS

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https://www.nimss.org/system/ProjectAttachment/files/000/000/502/original/W4170%20Response%20to%20OIG%20Report%20July%2023%202020%20final.pdf

Response to OIG Report

The response from USEPA Office of Water, which has regulatory oversight of the national biosolids program, in Appendix D stated "We are concerned about how the science is presented in the OIG report. It is biased and raises alarm...and is taken out of context"

Concern from USEPA Office of Water and widespread concern from practitioners led to the creation of this review and response

The objective was to provide a science-based review of chemicals of concern highlighted in the OIG report

- Document shows that the OIG report did not consider the concentration of chemicals found in the biosolids. Often, the bulk of human exposure to these chemicals is from domestic use of consumer goods and **only trace amounts are found in biosolids**

- **"Sufficient data and research are available to conclude that current biosolids regulations are protective of human health and the environment**. Of course, as with any regulation intended to protect public health and the environment, they must always be dynamic and evolve with updated science. That fact does not imply that they are not protective while research is ongoing."

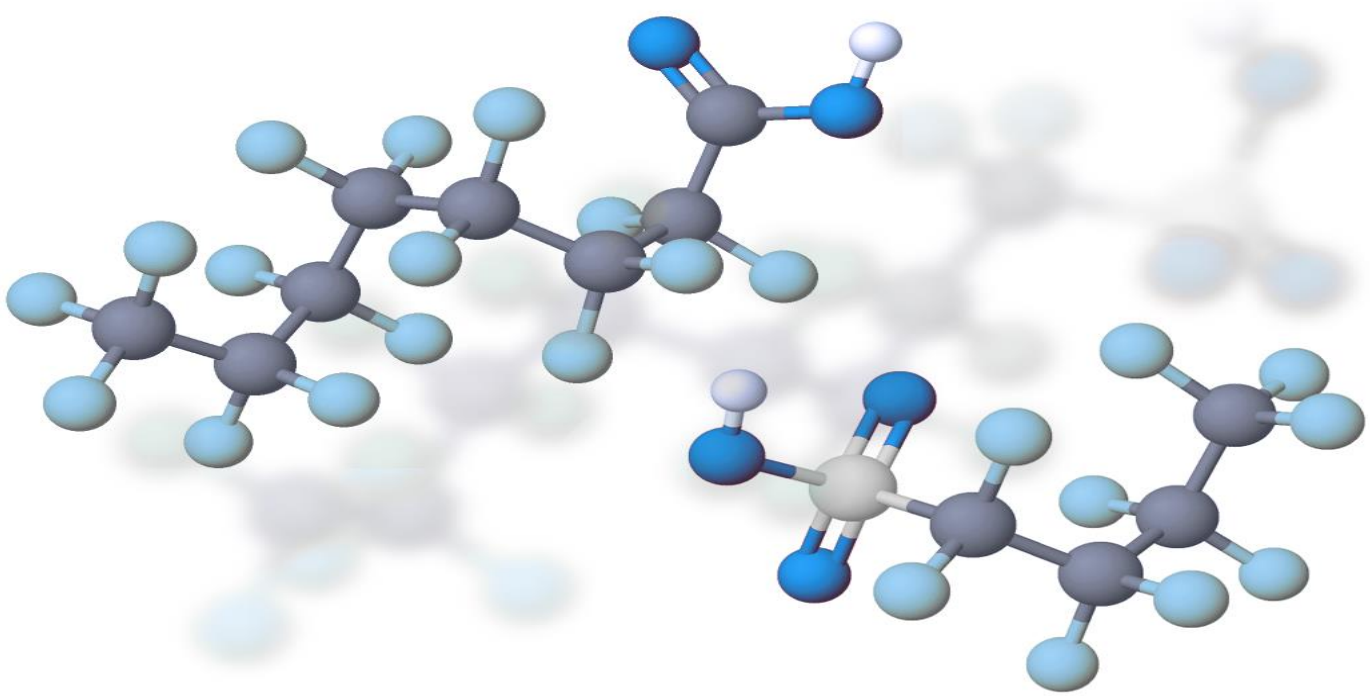
THANK YOU!

Maria Silveira
Email: mlas@ufl.edu

BREAK

MEETING RESUMES AT: 2:30 PM

EPA's PFOA & PFOS Biosolids Risk Assessment



EPA National Biosolids Meeting 2020

Elyssa Arnold
Biosolids Program
U.S. EPA Office of Water

Outline

- What is Risk Assessment?
- Why do we do Risk Assessment for Biosolids?
- EPA's PFOA & PFOS Biosolids Risk Assessment
    - Summary of the November Problem Formulation Meetings
    - Next Steps

WHAT IS RISK ASSESSMENT?

What is Risk?

- EPA Definition: **Risk** is the chance of harmful effects to human health or to ecological systems resulting from exposure to an environmental stressor.

- A **stressor** is any physical, chemical, or biological entity that can induce an adverse response. Stressors may adversely affect specific natural resources or entire ecosystems, including plants and animals, as well as the environment with which they interact.

What is Risk Assessment?

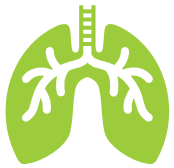
- Risk Assessment is a scientific process.
- EPA uses risk assessment to characterize the nature and magnitude of health risks to humans and ecological receptors from chemical contaminants and other stressors that may be present in the environment.
- At EPA, risk assessment typically falls into one of two areas:
    - Human health risk assessment
    - Ecological risk assessment

What is Risk Assessment?

- Risk depends on the following 3 primary factors:
  - How much of a chemical is present in an environmental medium (*e.g.*, biosolids, soil, water, air).
  - How much contact a person or ecological receptor (*e.g.*, fish, bird) has with the contaminated environmental medium.
  - The inherent toxicity of the chemical (hazard).

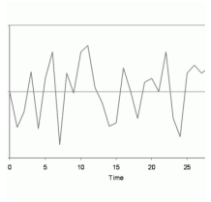
Risk = Exposure * Toxicity

Risk Assessment Terminology



Risk

The chance of harmful effects to human health or to ecological systems.



Variability

The range of toxic response or exposure.

Uncertainty

Our inability to know for sure, often due to incomplete data.

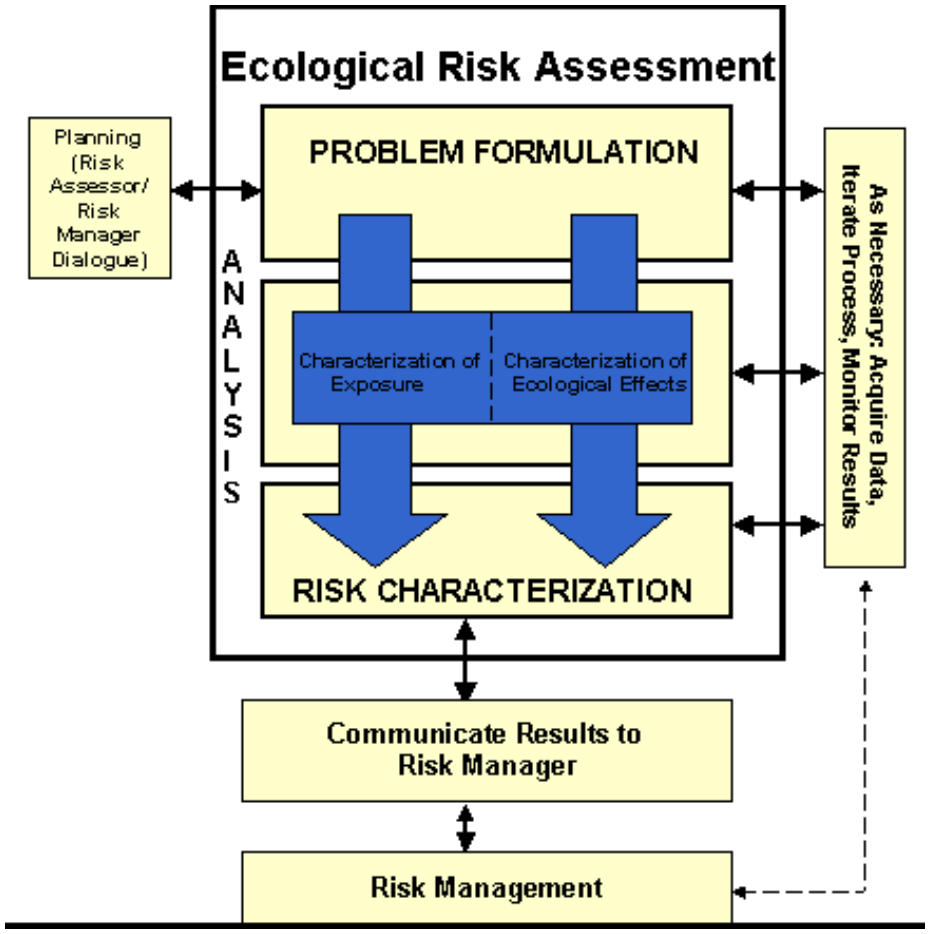
Types of Risk Assessment

- **Deterministic** risk assessment
  - A technique that uses point values and simple models to produce a point estimate of exposure (either high-end or typical exposure). Deterministic assessments are simple to carry out, often use readily available data, and produce results that are straightforward to interpret.
- **Probabilistic** risk assessment
  - A technique that utilizes the entire range of input data to develop a probability distribution of exposure or risk rather than a single point value. The input data can be measured values and/or estimated distributions.

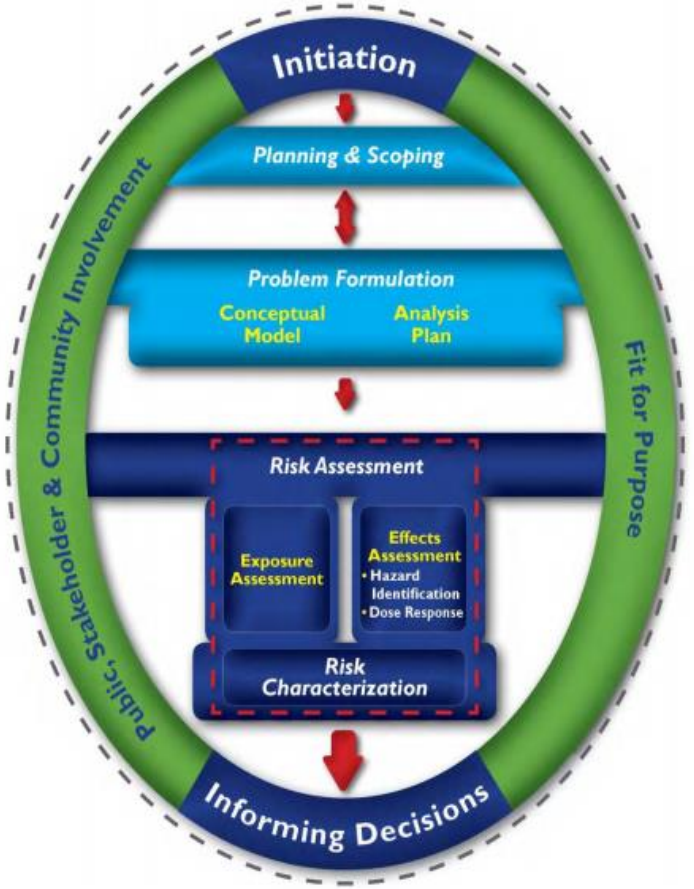
Risk Assessment Framework

- Problem Formulation / Scoping
- Exposure
- Effects / Toxicity
- Risk Characterization
- Risk Management and Communication

Risk Assessment Framework



Human Health Risk Assessment



WHY WE DO RISK ASSESSMENT FOR BIOSOLIDS

Why do Risk Assessment for Biosolids?

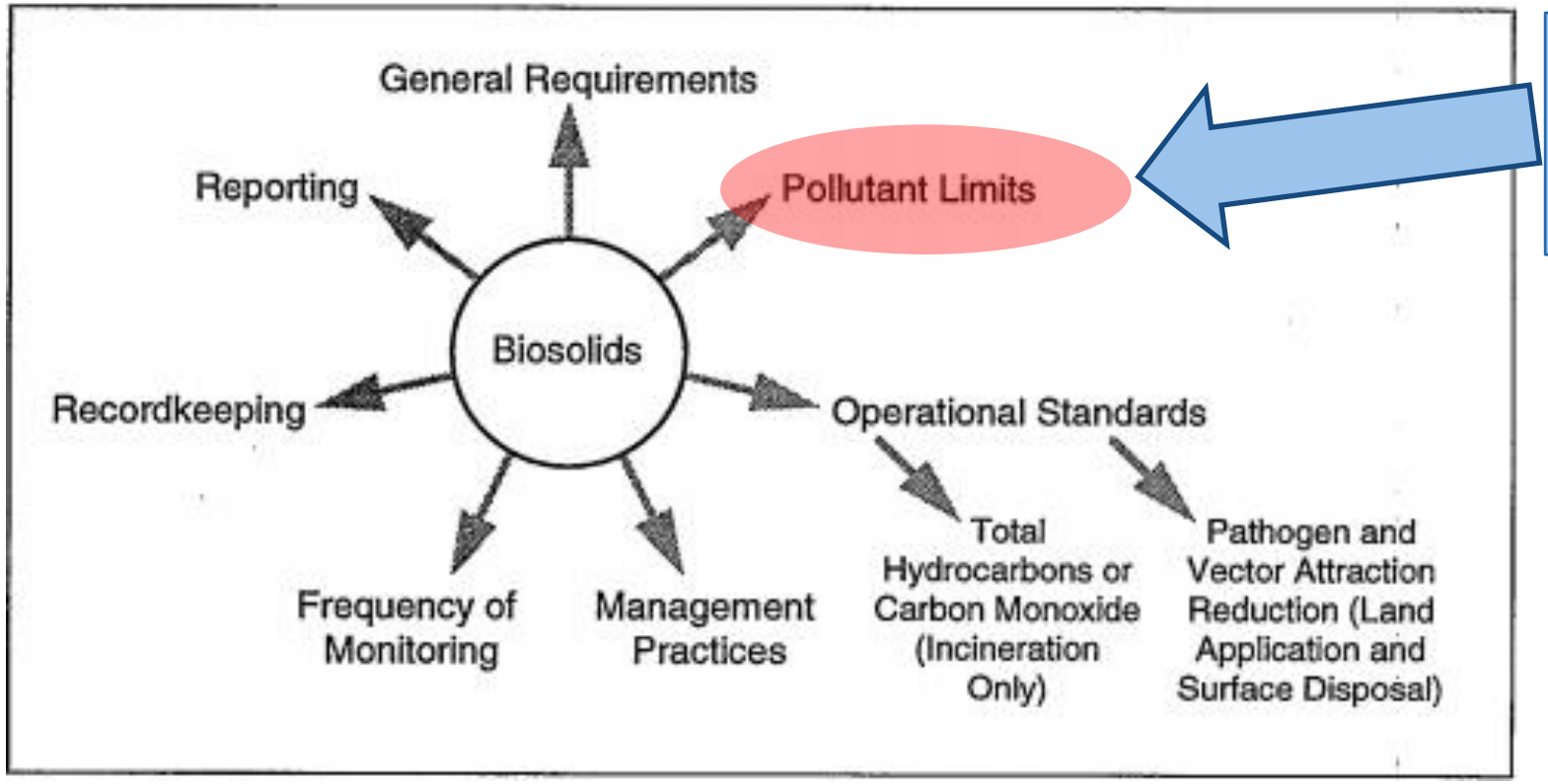
Clean Water Act, Section 405 requires EPA:

- To establish numeric limits and management practices that protect public health and the environment from the effects of chemical and microbial pollutants during the use or disposal of sewage sludge.
- To review biosolids (sewage sludge) regulations every two years to identify additional toxic pollutants that occur in sewage sludge and set regulations for those pollutants if sufficient scientific evidence shows that they may harm human health or the environment.

The Biosolids Rule: 40 CFR Part 503

- Rule published in 1993 to protect human health and the environment from reasonably anticipated adverse effects of pollutants that may be present in biosolids that are used or disposed.
- Based on the results of risk assessments that were conducted to identify risks associated with the use or disposal of biosolids (land application, surface disposal or incineration).
- Informed by National Academy of Sciences 1983 procedures for risk assessment in the federal government.
- Analyzed risks to human, animals, plants, and soil organisms from exposure to pollutants in biosolids through 14 different exposure pathways.

40 CFR Part 503



Pollutant limits in 40 CFR part 503 are supported by risk assessment

EPA'S PFOA & PFOS BIOSOLIDS RISK ASSESSMENT

Biosolids Risk Assessment in the PFAS Action Plan

- Activity: Scoping biosolids risk assessment for PFOA/PFOS
- Purpose: EPA is in the early scoping stages of risk assessment for PFOA and PFOS in biosolids to better understand the implications of PFOA and PFOS in biosolids to determine if there are any potential risks.
- Timeframe: 2020

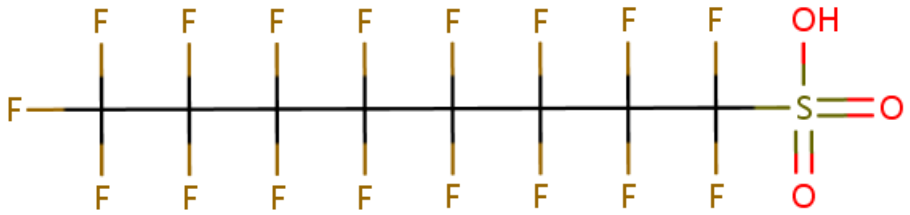
https://www.epa.gov/pfas/epas-pfas-action-plan

Problem Formulation

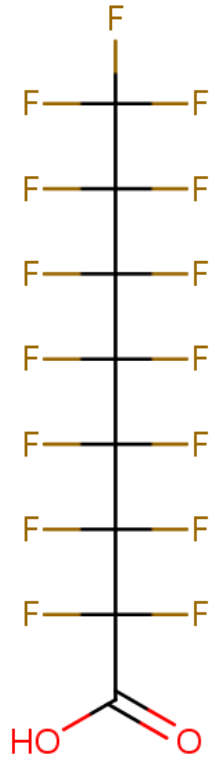
Problem Formulation is the part of the risk assessment that:

- Articulates the purpose for the assessment
- Defines the problem
    - Chemical sources and occurrence
    - Fate and transport in the environment
    - Toxicity endpoints
- Determines the conceptual models (sources and routes of exposure) for assessing adverse effects to human health and ecological receptors (*e.g.*, birds, fish)
- Describes the analysis plan, documenting the approach for acquiring reliable data and the models and tools to be used in the analysis
- **Includes engagement with states and tribes, risk managers, scientists, and members of the biosolids community to discuss foreseeable science and implementation issues.**

PFOS and PFOA



Perfluorooctanesulfonic Acid (PFOS)
$C_8HF_{17}O_3S$
CASRN: 1763-23-1



Perfluorooctanoic Acid (PFOA)
$C_8HF_{15}O_2$
CASRN: 335-67-1

PFOS and PFOA Sources and Environmental Fate

- PFOS and PFOA are part of a larger group of chemicals called per- and polyfluoroalkyl substances (PFAS).
- PFAS are highly fluorinated aliphatic molecules that have been released to the environment through industrial manufacturing and through use and disposal of PFAS-containing products.
- While many PFASs have been found in biosolids, PFOS and PFOA are among the most abundant and have the largest data sets to support risk assessment.
- PFOS and PFOA do not readily degrade via aerobic or anaerobic processes.
- While PFOS and PFOA have largely been phased out of production in the United States, their resistance to environmental degradation causes a lingering concern for exposure. They can also be formed from precursors in the environment.

Concentrations of PFOA and PFOS in Biosolids

Year Sampled	PFOA (ng/g dry wt)	PFOS (ng/g dry wt)	Reference
2001	12 - 70	308 - 618	Venkatesan, 2013
2004-2007	8 - 68	80 - 219	Sepulvado, 2011
2005	8.3 - 219	8.2 - 110	Loganathan 2007
2005	18 - 241	<10 - 65	Sinclair, 2006
2006	--	81 - 160	Schultz, 2006
2006-2007	18 - 69	31 - 702	Yu, 2009
2007	20 -128	32 - 418	Yoo, 2009
2011	1 - 14	4 - 84	Navarro, 2016
2014	10 - 60	30 - 102	Mills, Dasu (in prep)
2018	1-11	2 – 1,100	EGLE, 2020

Toxicity Endpoints

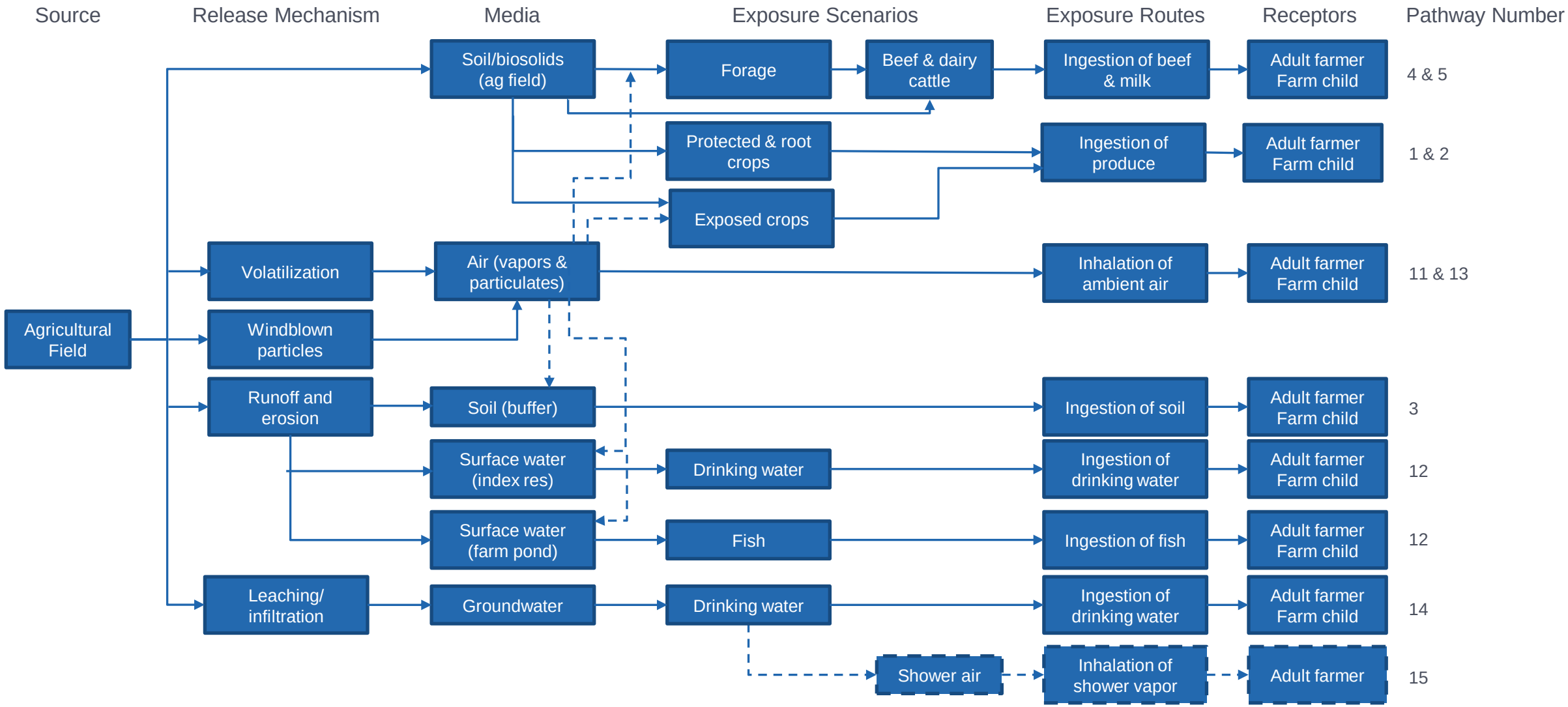
- Human Health - Reference Dose (RfD) and Cancer Slope Factor (CSF)
  - Human health effects data support both ambient water criteria for human health and Safe Drinking Water Act regulatory determinations.
  - Health Effects Support Documents (HESDs) for PFOA and PFOS Health Advisories were published in 2016.
  - Ongoing work to evaluate newer published literature.
- Ecological – survival, growth, and reproduction
  - Relevant toxicity studies from peer-reviewed literature were identified through ECOTOX searches (https://cfpub.epa.gov/ecotox/) and reviewed for data quality.
  - Aquatic life and aquatic-dependent wildlife effects data support ambient water criteria for aquatic life and aquatic-dependent wildlife
  - Toxicity endpoints for non-aquatic dependent birds, mammals, terrestrial invertebrates, and terrestrial plants are currently being evaluated by the Biosolids Program

Biosolids Use and Disposal Pathways

1. Land Application
2. Surface Disposal
3. Incineration

40 CFR Part 503.1: *"(a) Purpose. (1) This part establishes standards, which consist of general requirements, pollutant limits, management practices, and operational standards, for the final use or disposal of sewage sludge generated during the treatment of domestic sewage in a treatment works. Standards are included in this part for sewage sludge applied to the land, placed on a surface disposal site, or fired in a sewage sludge incinerator."*

Conceptual Model for the Agricultural Land Application Scenario: Human Exposures



Dashed arrows and box outlines indicate a pathway or route that has been added since 1993.

Modeling Approach

- Currently under development for presentation to the Science Advisory Board in 2021
    - Biosolids Screening Tool for deterministic, screening-level assessment
    - Probabilistic Risk Assessment framework for chemicals that fail at the screening level
- Modeling for biosolids will be based on publicly available, previously peer-reviewed models for leaching, runoff, erosion, air dispersal, and plant uptake to the greatest extent possible
- Approach for PFAS will be consistent, to the extent appropriate, with all other chemical risk assessment for biosolids

November PF Meeting Input

- Data sharing – thank you!
- Methods – cost and availability
- Conceptual models
- Occupational exposure
- Precursors
- Big picture:
    - Impacts on biosolids management
    - Pre-treatment/source reduction
    - Risks from biosolids relative to other exposure sources (*e.g.*, household)

Next Steps

- Problem Formulation
    - Meetings completed December 2020
    - Draft document Spring 2021
- Science Advisory Board review of modeling approach – Spring 2021
- Risk Assessment – estimated completion in 2022 for internal review, followed by public comment
- If EPA determines that PFOA or PFOS in biosolids may adversely affect public health or the environment, risk managers will consider options for numerical limitations and best management practices for these compounds (as there are with current Part 503 pollutant limits).
- If regulatory limits are advised, they will go through a standard regulatory process including inter-Agency and OMB review as well as public comment.

Thank you

Elyssa Arnold

Risk Assessment Lead, EPA Biosolids Program

arnold.elyssa@epa.gov

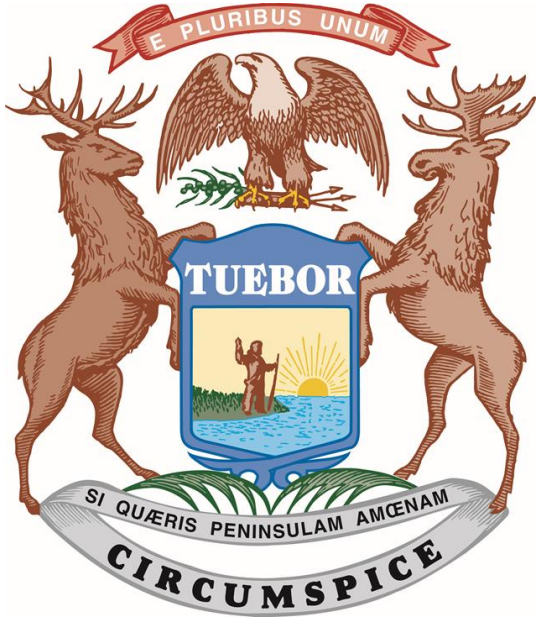
202-566-1189

MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY

Michigan PFAS & Biosolids Update
State Perspectives

Mike Person
Michigan Biosolids Program
personm@michigan.gov
989-297-0779

Michigan PFAS Action Response Team (MPART)



- Unique multi-agency approach
- Leads coordination and cooperation among all levels of government
- Directs implementation of state's action strategy
- WRD -Member of Great Lakes PFAS Task Force

Biosolids

Plans to amend the biosolids workgroup to include other beneficial use programs

MPART Biosolids Workgroup

EGLE WRD, RRD, MDARD, DHHS

- **Mission:**
  - *Expand knowledge of PFAS and biosolids within wastewater collection and treatment systems to develop guidance to municipal Wastewater Treatment Plants (WWTPs), land application contractors, and farmers/landowners regarding land application of biosolids containing PFAS.*
  - *Establish a durable process to evaluate biosolids land application sites.*
  - *In conjunction with Industrial Pretreatment Program (IPP) Initiative efforts, reach equilibrium in program status that allows the majority of WWTPs to maintain the option to safely land apply biosolids. This is contingent on identifying and controlling sources within wastewater collection systems and on ability to develop guidance above.*

IPP PFAS Initiative

- February 2018 – 95 WWTPs required to screen Industrial Users
  - Evaluate Industrial Users as potential sources of PFAS
  - Sample effluent if sources above screening criteria (12 ppt PFOS)
  - Sample biosolids if PFOS > 50 ppt in effluent
  - Source control/elimination of PFOS from sources
  - Ongoing monitoring of sources & POTW effluent
  - Status reports submitted to EGLE

Additional information on IPP PFAS Initiative:
https://www.michigan.gov/pfasresponse/0,9038,7-365-86510---,00.html

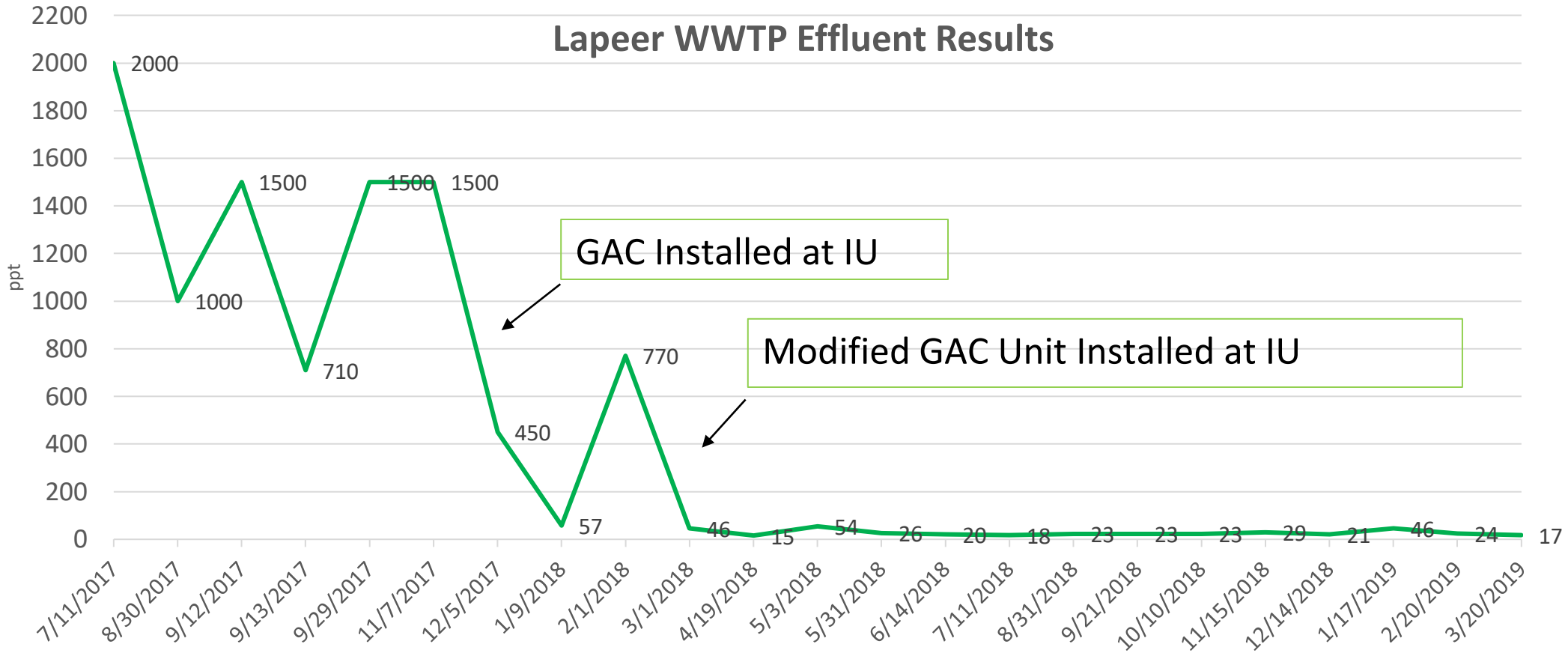
Substantial Reductions in PFOS Concentrations at WWTPs

Municipal WWTP	PFOS, Effluent (ppt, most recent**)	PFOS Reduction in Effluent (highest to most recent)	Actions Taken to Reduce PFOS
Lapeer	17*	99%	Treatment (GAC) at source (1)
Wixom	16*	99%	Treatment (GAC) at source (1)
Ionia	<8.49	98%	Treatment (GAC) at source (1)
Port Huron	18*	99%	Elimination of source PFOS (2)
Howell	5.2	96%	Treatment (GAC/resin) at source (1)
Bronson	10	96%	Treatment (GAC) at source (1)
Kalamazoo	3.09	92%	Treatment (GAC) at sources (2), change water supply
K I Sawyer	9.3	96%	Eliminate leak AFFF, some cleaning
GLWA (Detroit)	9.8	74%	Treatment (GAC) at sources (17)
Belding	9.4	32%	Restricted landfill leachate quantity accepted

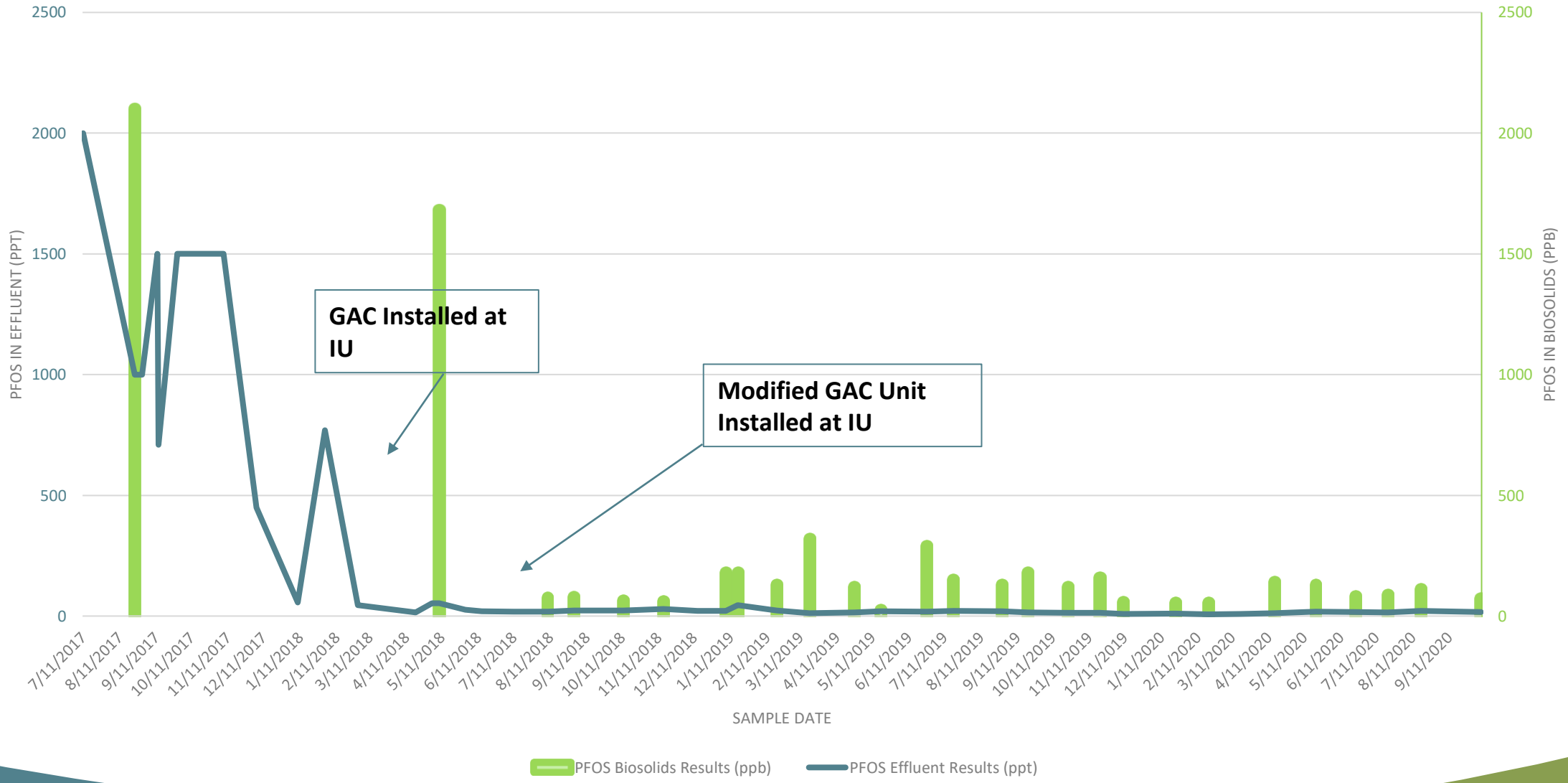
*Greater than Water Quality Standards

**Data received as of November 27, 2020

PFOS Reduction After IU Pretreatment



PFOS Reduction After IU Pretreatment



Source Document

Evaluation and Identification of significant sources of PFOS to WWTPS in Michigan.

www.Michigan.gov/PfasResponse

Expanding upon the IPP initiative

- Non-IPP WWTPs: Landfill Leachate/Septage/ High Strength Waste
- Compliance Strategy Developed:
  - Industrial Direct Discharges
  - Industrial Stormwater Discharges

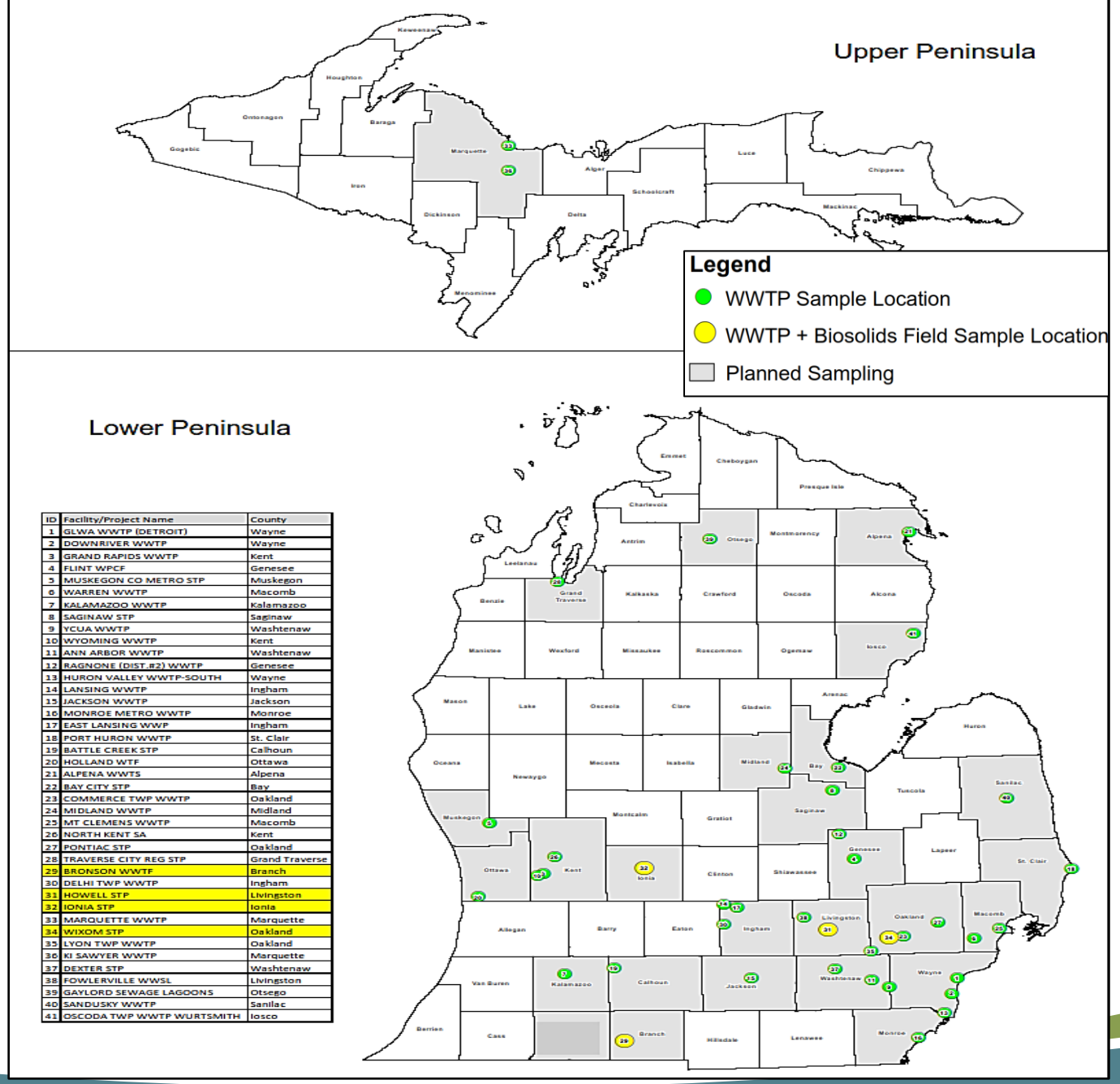
https://www.michigan.gov/documents/pfasresponse/Compliance_Strategy_for_Addressing_PFAS_PFOS-PFOA_from_Industrial_Direct_Discharges_and_Industrial_Storm_Water_Discharges_698878_7.pdf

- Municipal Groundwater Discharges

Statewide Biosolids Study

- Selected /sampled Effluent, Influent, & Biosolids from 42 WWTPs
  - 20 Largest
  - Various treatment processes
  - Some with no industrial users
- Conduct Site Investigations (soil, gw, sw) of Biosolids Land Application Sites
- Evaluate various fate and transport modeling techniques

Statewide Biosolids Study Locations

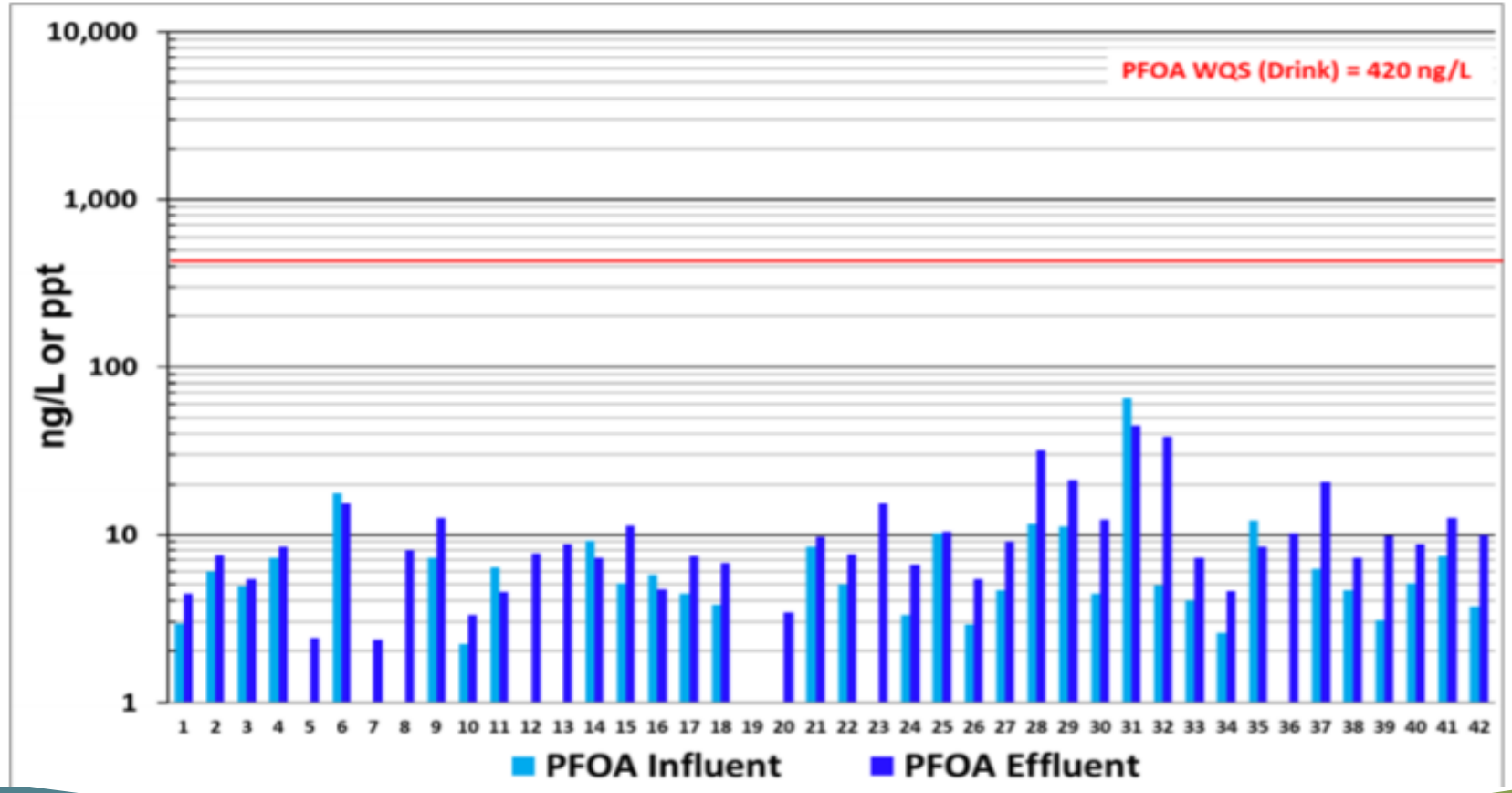


ID	Facility/Project Name	County
1	GLWA WWTP (DETROIT)	Wayne
2	DOWNRIVER WWTP	Wayne
3	GRAND RAPIDS WWTP	Kent
4	FLINT WPCF	Genesee
5	MUSKEGON CO METRO STP	Muskegon
6	WARREN WWTP	Macomb
7	KALAMAZOO WWTP	Kalamazoo
8	SAGINAW STP	Saginaw
9	YCUA WWTP	Washtenaw
10	WYOMING WWTP	Kent
11	ANN ARBOR WWTP	Washtenaw
12	RAGNONE (DIST.#2) WWTP	Genesee
13	HURON VALLEY WWTP-SOUTH	Wayne
14	LANSING WWTP	Ingham
15	JACKSON WWTP	Jackson
16	MONROE METRO WWTP	Monroe
17	EAST LANSING WWP	Ingham
18	PORT HURON WWTP	St. Clair
19	BATTLE CREEK STP	Calhoun
20	HOLLAND WTF	Ottawa
21	ALPENA WWTS	Alpena
22	BAY CITY STP	Bay
23	COMMERCE TWP WWTP	Oakland
24	MIDLAND WWTP	Midland
25	MT CLEMENS WWTP	Macomb
26	NORTH KENT SA	Kent
27	PONTIAC STP	Oakland
28	TRAVERSE CITY REG STP	Grand Traverse
29	BRONSON WWTF	Branch
30	DELHI TWP WWTP	Ingham
31	HOWELL STP	Livingston
32	IONIA STP	Ionia
33	MARQUETTE WWTP	Marquette
34	WIXOM STP	Oakland
35	LYON TWP WWTP	Oakland
36	KI SAWYER WWTP	Marquette
37	DEXTER STP	Washtenaw
38	FOWLERVILLE WWSL	Livingston
39	GAYLORD SEWAGE LAGOONS	Otsego
40	SANDUSKY WWTP	Sanilac
41	OSCODA TWP WWTP WURTSMITH	Iosco

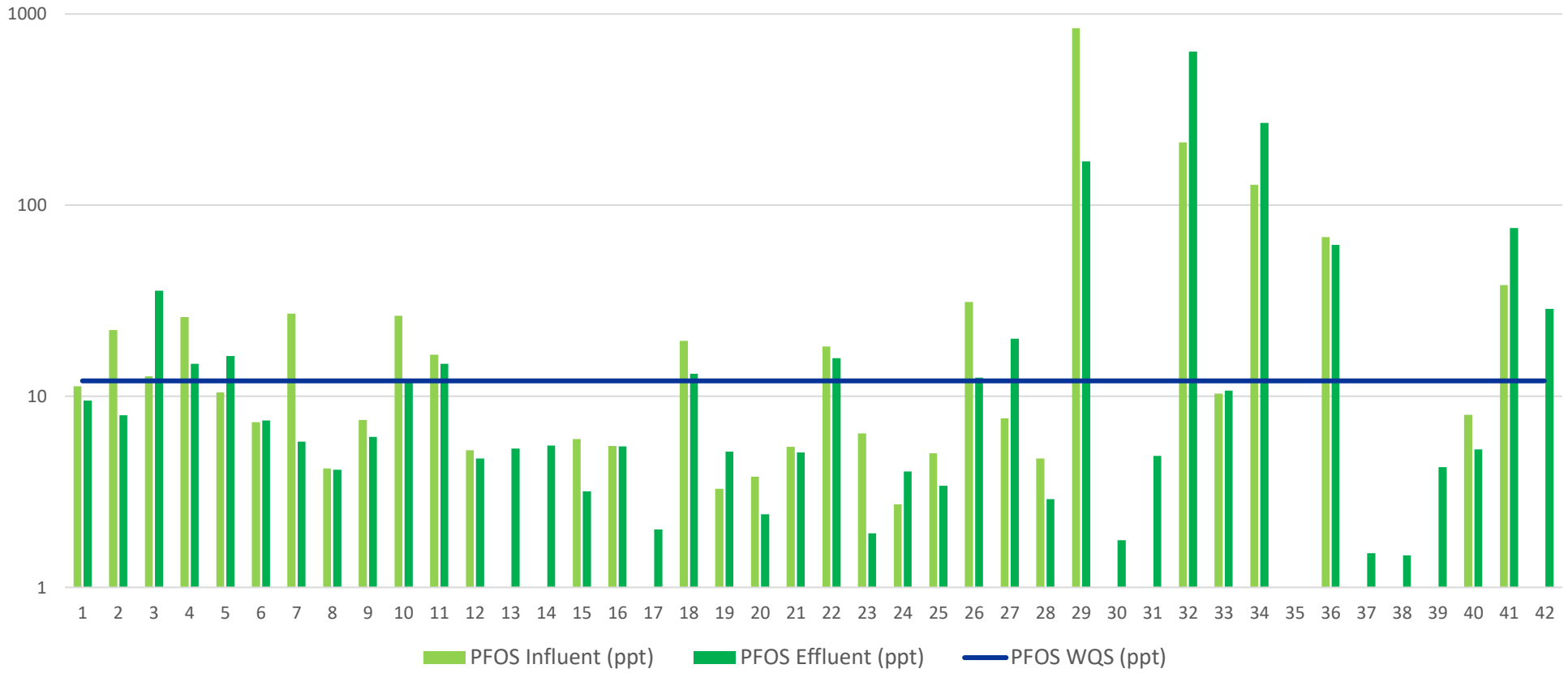
2018 Statewide Study
WWTP PFOA Influent and Effluent Data

Figure 5. PFOA Influent and Effluent Concentrations in WWTPs*

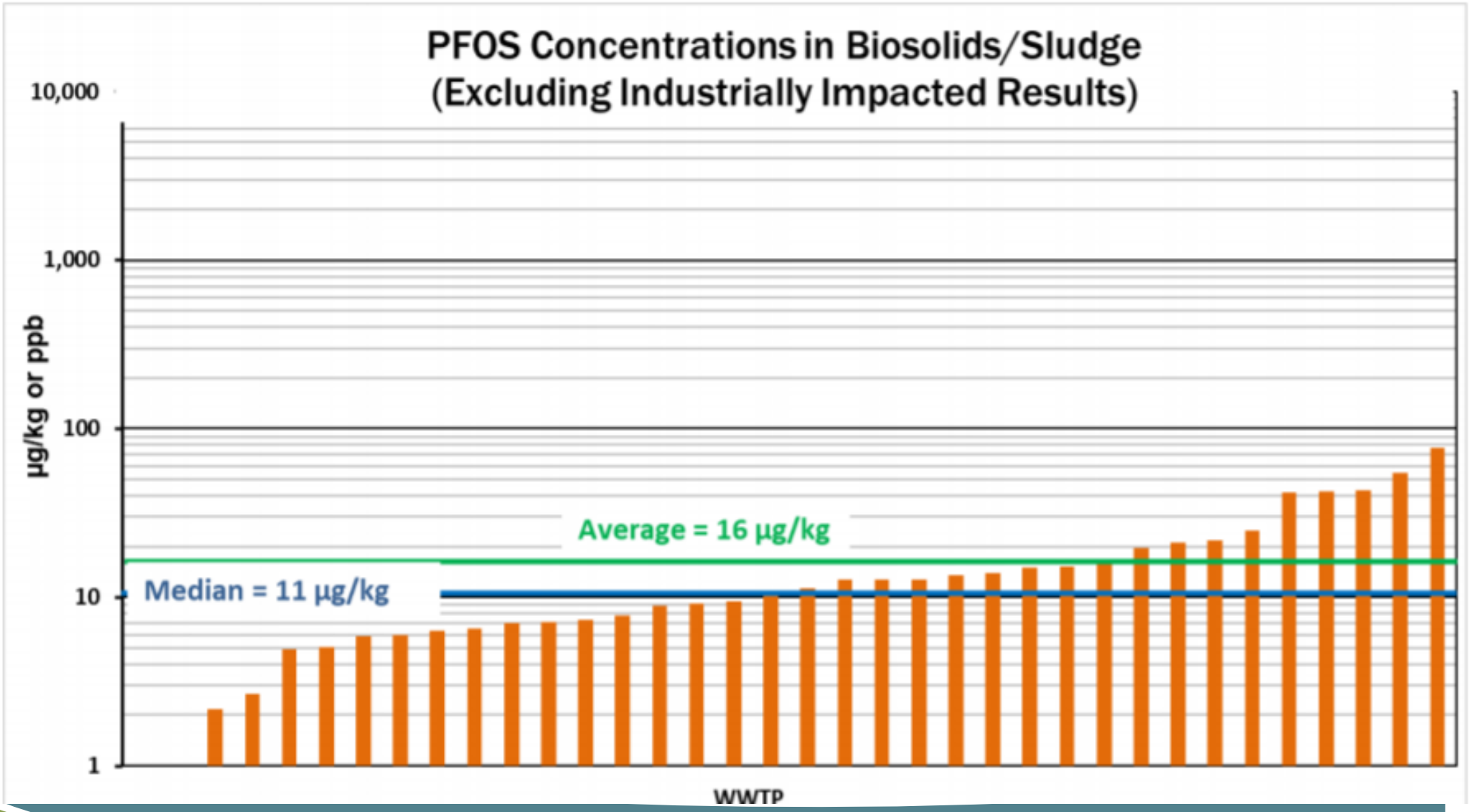
NOTE: The PFOA water quality value depicted in the chart is the most conservative value and only applies to surface waters used as a drinking water source. The PFOA water quality value for surface water not used as a drinking water source is 12,000 ng/L.



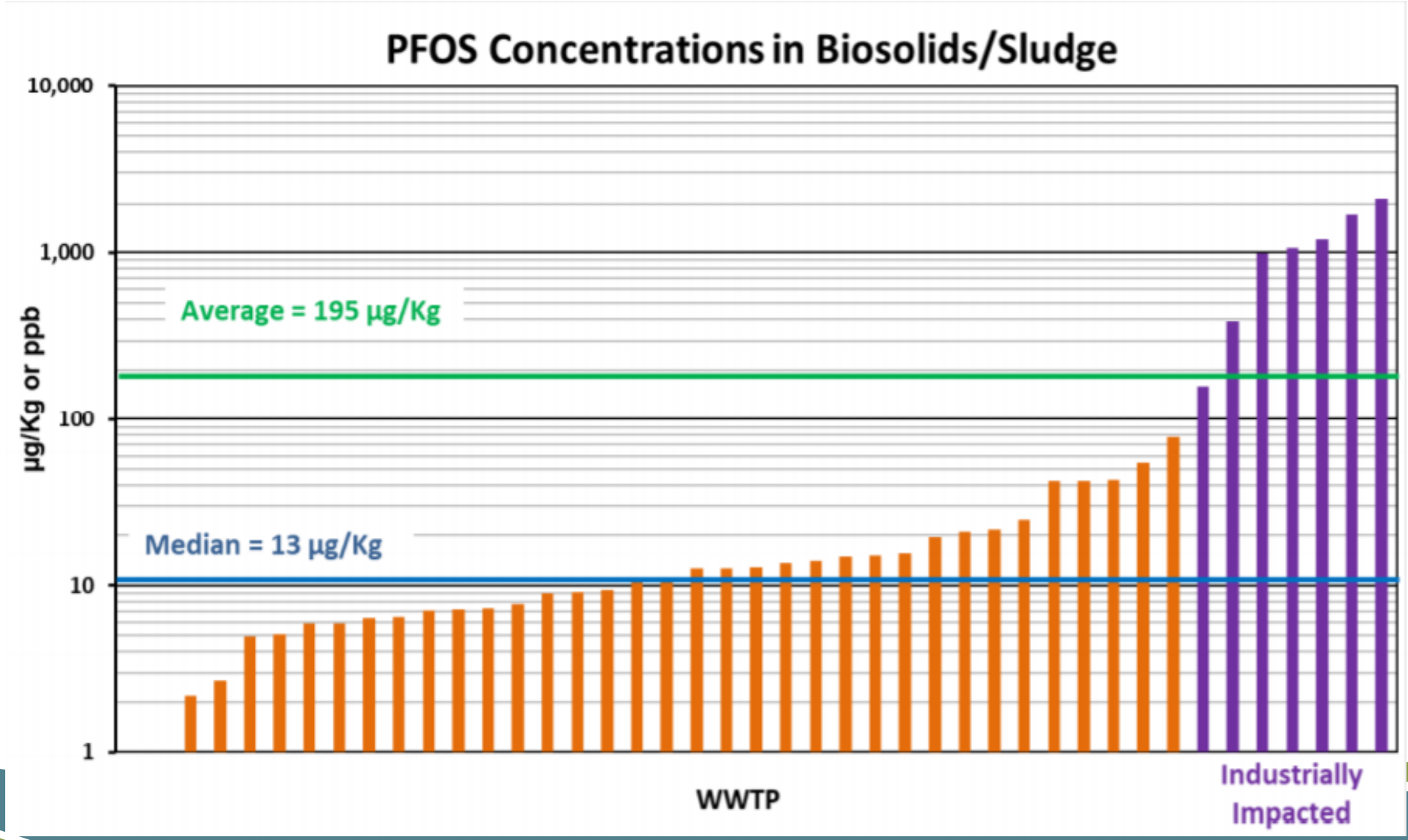
2018 Statewide Study
WWTP PFOS Influent and Effluent Data



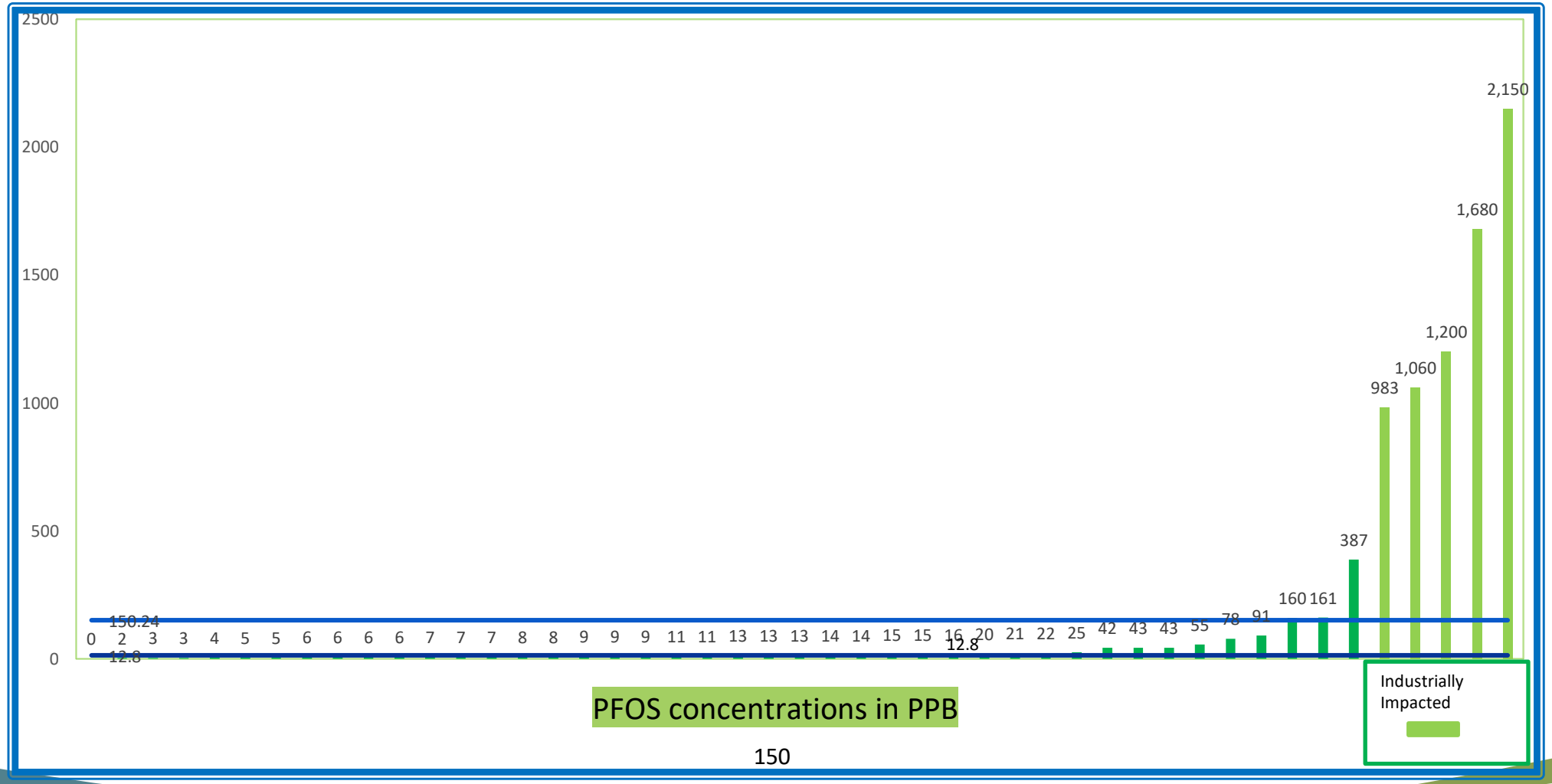
Statewide Study - Sludge/Biosolids PFOS Results



Statewide Study - WWTP Stabilized Sludge/Biosolids PFOS Results



Statewide Study - WWTP Stabilized Sludge/Biosolids PFOS Results



PFAS in Sludge /Biosolids - When is it considered industrially impacted?

No Regulatory Limit - Looking to EPA to lead

- Threshold level of 150 ppb is being used at the point at which biosolids is considered industrially impacted.

- Determination of "industrially impacted" is based on a number of factors including
  - Review of literature and land application studies with high PFAS concentrations (Decatur, Alabama)
  - Results of Statewide Biosolids Study
  - Results of soil /gw sampling of land application sites in Michigan
  - Natural Break Point in results

***This is not a risk-based number. As more information about fate and transport of these chemicals becomes available, including the field study results, this level will be reevaluated as necessary*

EGLE

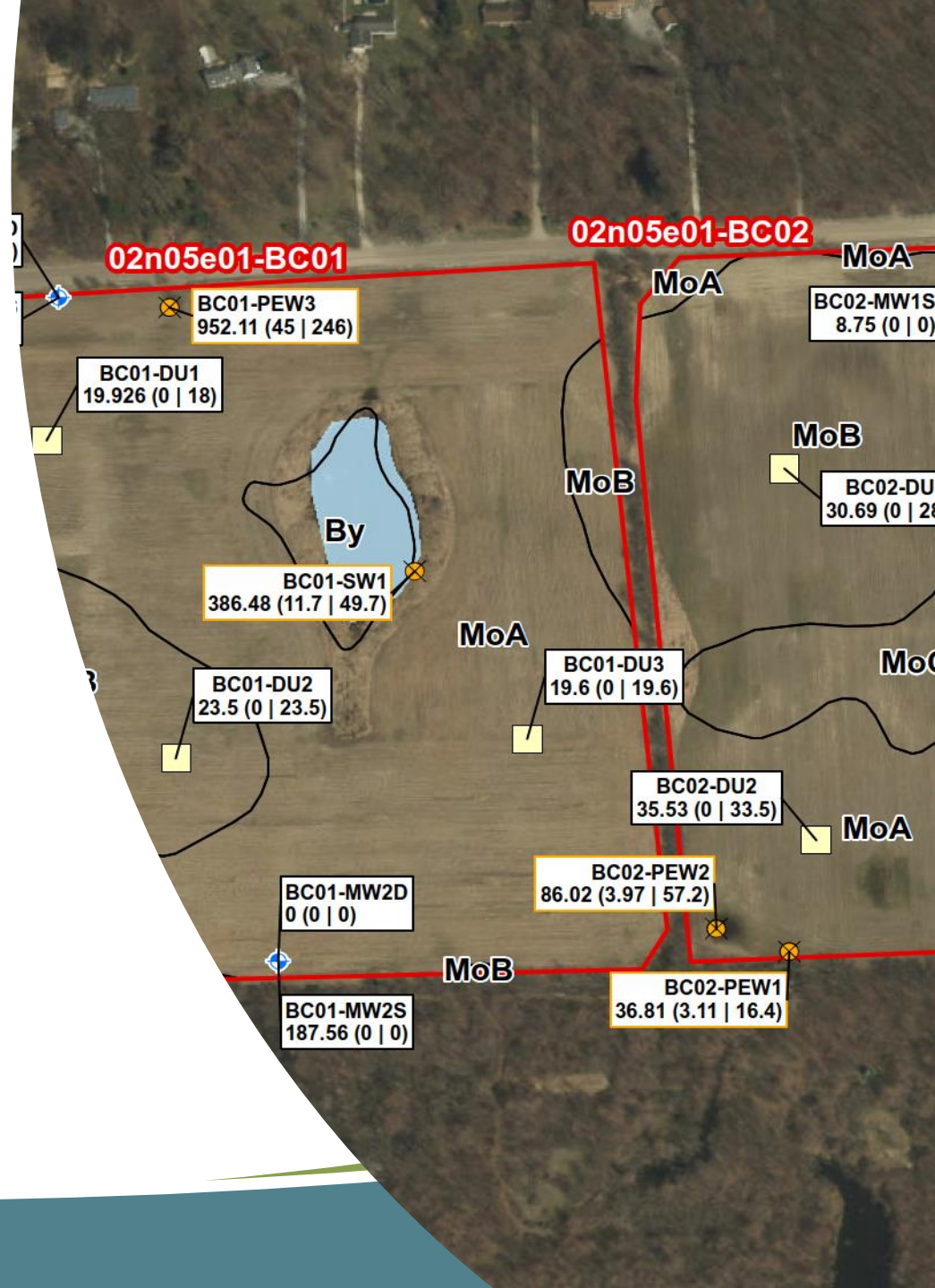
Statewide Biosolids Study

Land Application Field Screening

22 Fields Screened from 8 WWTPS

- 3 WWTPs w/ PFOS > 1000 ppb
- 5 WWTPs w/ PFOS < 100 ppb

- **Sampled: Soils, groundwater, tile drains, swales, ponding/perched waters and surface waters**
- Developed field prioritization process to screen "worst case scenarios" for each facility
- Lapeer reports posted on MPART website
- Reports pending for remaining fields



Summary Report Document

**Detailed Report expected late 2020*

EGLE MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

SUMMARY REPORT:

Initiatives to Evaluate the Presence of PFAS in Municipal Wastewater and Associated Residuals (Sludge/Biosolids) in Michigan

June 2020

WATER RESOURCES DIVISION
800-662-9278 | Michigan.gov/EGLE

EGLE

Strategy - Land Application of Biosolids Containing PFAS

- *Strategy to assist with biosolids management decisions*
  - Draft Strategy Document expected January with implement for spring 2021.
  - Present Study results and strategy at the next stakeholders meeting.
  - Strategy will need to go through MPART review
  - Webinar for WWTPs/ Contractors upon implementation

Strategy Components - Land Application of Biosolids Containing PFAS

Source Reduction - Continue aggressively identifying and reducing significant sources of PFAS in wastewater and biosolids.

Research –Continuing efforts with evaluation and study of PFAS in biosolids and land application sites.

- Continue supporting EPAs efforts to develop a biosolids standard for PFAS

Prevention - While continuing to drive PFAS biosolids concentrations lower through aggressive source reduction efforts work to identify /prevent industrially impacted biosolids from being land applied.

Sampling - Additional monitoring for PFAS of land applied biosolids.

EGLE

Strategy Components - Land Application of Biosolids Containing PFAS

Communication / Transparency - Open dialogue between WWTPS / Contractors and landowners /farmers on PFAS in biosolids

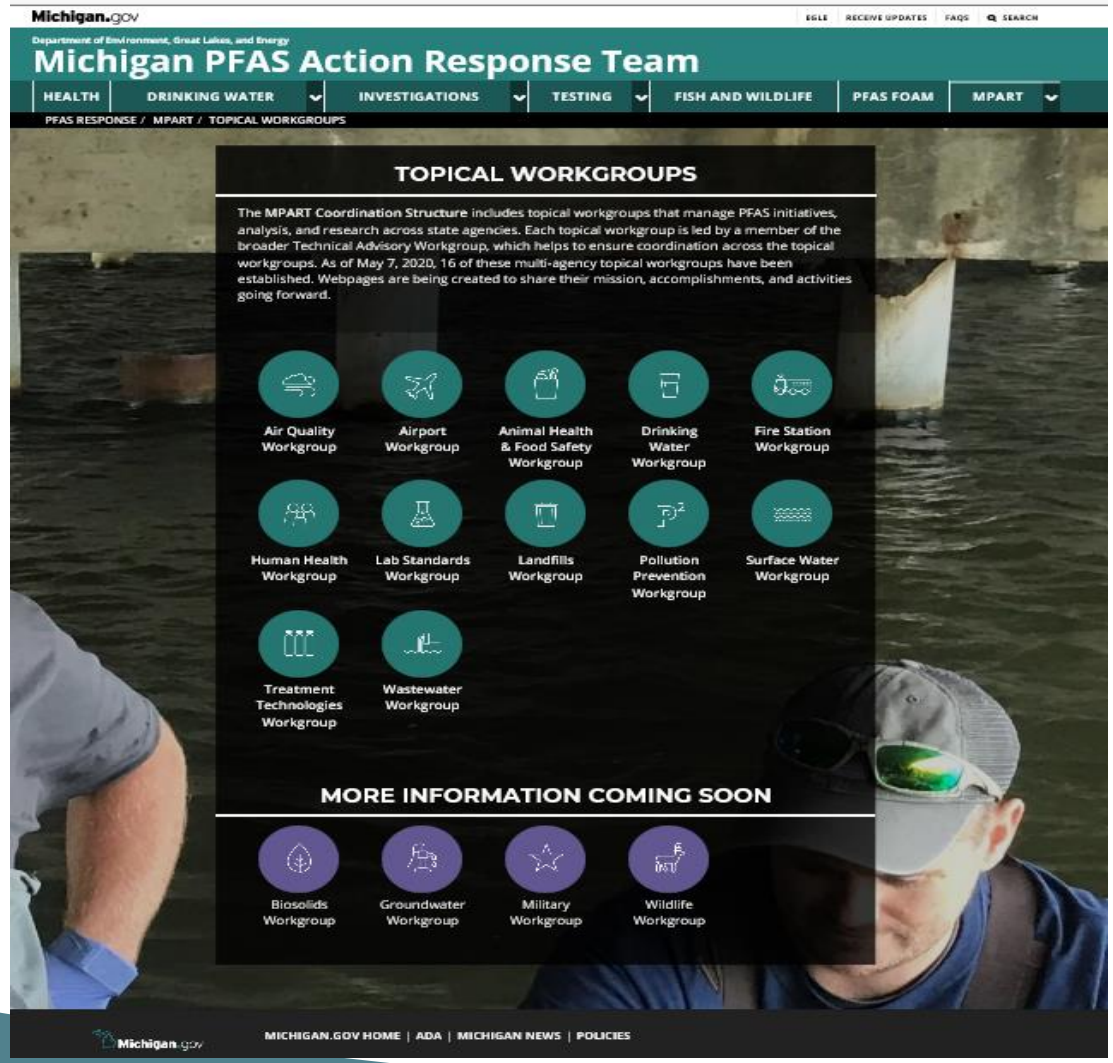
Provide tools for disseminating information /analytical on PFAS in biosolids.

MWEA BS Committee -

- The PFAS and Biosolids Quick Facts for Landowners document

- Best Management Practices Document

Visit the MPART Biosolids Workgroup



www.Michigan.gov/PfasResponse

or search

MPART Biosolids Workgroup

Biosolids Workgroup

MISSION:

- Expand knowledge of PFAS and biosolids within wastewater collection and treatment systems to develop guidance to municipal Wastewater Treatment Plants (WWTPs), land application contractors, and farmers/landowners regarding land application of biosolids containing PFAS.
- Establish a durable process to evaluate biosolids land application sites.
- In conjunction with Industrial Pretreatment Program (IPP) Initiative efforts, reach equilibrium in program status that allows the majority of WWTPs to maintain the option to safely land apply biosolids. This is contingent on identifying and controlling sources within wastewater collection systems and on ability to develop guidance above.

This workgroup is led by the Department of Environment, Great Lakes, and Energy (EGLE) and consists of representatives from Michigan Department of Agriculture and Rural Development (MDARD) and Michigan Department of Health and Human Services (MDHHS).

What are Biosolids?
Recent Accomplishments | Next Steps | Research/Studies and Reports | Timeline of Accomplishments
Contact Information

WHAT ARE BIOSOLIDS?

Biosolids are the nutrient-rich organic materials resulting from the treatment of domestic sewage in a wastewater treatment plant (WWTP) (visit our FAQ). Biosolids contain essential plant nutrient and organic matter. When treated and processed, biosolids can be recycled and applied to crops as fertilizer to improve and maintain productive soils and stimulate plant growth. For more information on biosolids, go to EGLE's Water Resources Division (WRD) Biosolids Program Web Page: Michigan.gov/Biosolids.

For more information on PFAS and biosolids see MPART's Frequently Asked Questions document.

RECENT ACCOMPLISHMENTS:

After the Lapeer WWTP was found to be a significant source of PFAS contamination to the Flint River, tests revealed that Lapeer's sludge contained high levels of PFOS. In response, EGLE prohibited the sludge from being spread on land. MPART hired AECOM Technical Services Inc. to investigate PFAS issues related to Lapeer's Biosolids in late 2017/early 2018.

Reports from the Lapeer Biosolids PFAS Investigation were finalized and posted on the MPART website in late 2018. Following this investigation and the Michigan IPP PFAS Initiative, the Biosolids Workgroup conducted a review of available research to better understand how common PFAS might be in biosolids.

Following are highlights of the Biosolids Workgroup efforts over the past year:

- The Biosolids Workgroup expanded the Lapeer Biosolids PFAS Investigation to a Statewide Biosolids and WWTP PFAS Study to further our knowledge on the prevalence of PFAS in municipal WWTP effluents (the outflow of treated water) in Michigan and to evaluate what happens to PFAS in biosolids that are spread on land (a final report is anticipated in the Summer of 2020).
  - The Statewide Biosolids and WWTP PFAS Study achieved the following:
    - Developed a detailed sampling work plan to identify and prioritize facilities to be investigated, which included surveying each facility on treatment process and selecting sample locations.
    - Collected samples of effluent, influent, and biosolids/sludge from the high priority WWTPs across Michigan and gathered detailed wastewater treatment process information from each WWTP based on the work plan.
    - Developed the EGLE Biosolids Site Selection Procedure to prioritize sites and identify those most in need of further investigation.
    - Collected samples of soil, surface water, tile drain water, and groundwater from agricultural fields that received biosolids from high priority WWTPs, which were WWTPs known to have industrially impacted biosolids with high concentrations of PFAS.
    - Collected soil and surface water samples from agricultural fields that were expected to have a "typical" amount of PFAS in the biosolids. These fields served as a comparison group for the highly impacted biosolids at other fields.
    - Collected crop samples from the Lapeer field that received biosolids impacted by PFAS.
    - Re-sampled permanent monitoring wells installed at the Lapeer field the previous spring.
    - Evaluated and selected a PFAS fate and transport model based on Michigan data and conditions. See Report – Review of Available Software for PFAS Modeling Within the Vadose Zone.
    - Conducted the modeling to evaluate the potential for PFOS/PFOA migration from Michigan biosolids land application sites. Numerical Modeling of PFOS and PFOA Migration Through the Vadose Zone Following Land Application of Municipal Biosolids. Expected release in 2020.
- The Biosolids Workgroup also completed the following activities:
  - Completed the Biosolids FAQ document.
  - Completed the Biosolids and Sludge PFAS Sampling Guidance. The guidance was developed by EGLE based on information gained during the Statewide Biosolids and Municipal WWTP PFAS Study (Summary Report).
  - Refined procedures and processes developed under the Lapeer investigation and included lessons learned from planning the Statewide Biosolids and Municipal WWTP PFAS Study.
  - Developed partnerships between EGLE, MDHHS, MDARD, and the agricultural community that allowed work on this issue to continue in a systematic and scientifically based way. Hosted stakeholder meetings attended by a cross section of the agricultural and wastewater treatment communities involved in biosolids land application.
  - Integrated Biosolids Workgroup efforts with those of the Wastewater, Surface Water, and Treatment Technology Workgroups while continuing involvement with groups such as the Michigan Water Environment Association – Biosolids and PFAS Committees, Michigan Rural Water Association, Michigan Waste and Recycling Association, Farm Bureau, and the North East Biosolids & Residuals Association.
  - Conducted residential well sampling around biosolids land application sites in the Palo area in Ionia County and held public meetings on the situation.
  - Participated in discussions with United States Environmental Protection Agency (USEPA) staff and various State of Michigan Departments and Divisions about investigating non-biosolid sludge applied to land.

Michigan Department of
Environment, Great Lakes, and Energy

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Impact of Past Biosolids Land Application on One Maine Farming Community

Carla Hopkins, ESIV

Residuals Management Unit

Background – Farm in Southern Maine

- December 2016 elevated PFOS in milk from farm in southern Maine
- Farm had accepted Class B biosolids and paper mill residuals from 1980s to early 2000s
- PFOS in soil made its way into groundwater and then dairy cows

Background – Rulemaking

- In 2018, Maine adopted screening concentrations for residuals, including biosolids, for three PFAS compounds:
  - PFBS: 1,900 ng/g
  - PFOA: 2.5 ng/g
  - PFOS: 5.2 ng/g
- Based on leaching to groundwater modeling with 200 ng/L as endpoint

Background – Testing Requirements

- In March 2019, began requiring facilities that land-apply biosolids and biosolids-derived products to test for PFBS, PFOA and PFOS
  - Class B programs
  - Class A pellet programs
  - Class A composters (includes WWTP sludge and dewatered septage)
- Ongoing testing required for these facilities February 2020

Background – PFAS Task Force

- In March 2019, Governor forms PFAS task force to study the threats of PFAS contamination to public health and the environment
- Public health experts, DHHS, DEP, DACF, MEMA, industry experts, drinking water sector, environmental groups
- Final Report issued January 2020
- Two key recommendations relating to biosolids:
  - Prioritize locations for sampling where biosolids were spread on fields that produce crops for human consumption or feed
  - Greatly expand testing of agricultural produce and products grown and/or raised in soils where biosolids have been agronomically utilized

Background – Central Maine Farm

- Maine Department of Agriculture, Conservation and Forestry (DACF) off-the-shelf milk testing program in 2019 and 2020
- Sample over the detection limit prompted further testing
- June 2020 tested milk at contributing farms
- Results of 12,700 ppt, 14,400 ppt, 14,900 ppt and 32,200 ppt PFOS in milk
- Farm had accepted Class B biosolids ~1980-2003 (WWTP with significant contribution from industry) and Class A sludge-derived liming product ~2006-2015 and spread own manure
- DEP initiated an investigation in July 2020

Sampling Activity

- Matrices sampled June 2020 to present:

- Milk
- Dairy Cow Manure
- Beef Cow Manure
- Hog Manure
- Surface Water
- Soil
- Animal Drinking Water Source
- Beef
- Residential Drinking Water Wells
- Spring (used as drinking water)
- Eggs
- Hay
- Haylage
- Corn Silage
- Fish Byproduct (used as feed)
- “Green Chop”
- Grass
- Purchased Feed
- Class A Liming Product
- Produce (grown with farm manure)
- Groundwater

Farm Fields - Overview

Milk and Beef Results

Milk

Sample ID	Sample Date	PFOS (ng/L)	Validation Qual	PFOA (ng/L)	Validation Qual
Milk Tank	6/24/20	12,700		31.9	
Milk Tank (re-test)	6/24/20	14,400		38.5	
Milk Tank (re-test)	6/24/20	14,900		52.9	J
Milk Tank	7/13/2020	32,200		46.5	J

Beef

Sample ID	Sample Date	PFOS (ng/g Dry)	Validation Qual	PFOA (ng/g Dry)	Validation Qual
COW-GROUND BEEF	7/13/2020	20.9		ND	

"J" indicates an estimated value. This is commonly applied to values that are either very low or very high compared to the calibration range of a test.
"ND" indicates that compound not detected in the sample.

Manure Results

Manure					
Sample ID	Sample Date	PFOS (ng/g Dry)	Validation Qual	PFOA (ng/g Dry)	Validation Qual
BEEF MANURE PAD	7/31/2020	113	J	22.1	J
DAIRY MANURE PIT	7/31/2020	35.1	J	4.48	J
HOG MANURE STACK	7/31/2020	39.9	J	5.81	J

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"ND" indicates that compound not detected in the sample.

Water and Other Results

Surface Water and Animal Drinking Water Source

Sample ID	Sample Date	PFOS (ng/L)	Validation Qual	PFOA (ng/L)	Validation Qual
DAIRY BARN TROUGH	7/13/2020	4.52		2.44	
SW-101 (by home fields)	7/28/2020	127.8		266.5	
SW-103 (pond-201 fields)	7/31/2020	6,390		1,920	
SW-104 (pond-201 fields)	7/31/2020	7,330		3,340	

Other

Sample ID	Sample Date	PFOS (ng/g Dry)	Validation Qual	PFOA (ng/g Dry)	Validation Qual
Class A Liming Product	7/9/2020	30.9		54.7	

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"ND" indicates that compound not detected in the sample.

Feed Results

Feed					
Sample ID	Sample Date	PFOS (ng/g Dry)	Validation Qual	PFOA (ng/g Dry)	Validation Qual
GRASS-201-5	7/31/2020	352.90		49.96	
GREEN CHOP	7/8/2020	31.43		1.58	J
HAY SILOED 2019	7/8/2020	0.44	J	ND	
HAY-1 (haybale)	7/8/2020	50.61		7.64	
GRASS-RIDGE-1	7/31/2020	399.10		39.82	
GRASS-RIDGE-3	7/31/2020	396.07		86.06	
SILAGE-2019	7/8/2020	ND		ND	
BYPRODUCT-1	7/13/2020	13.61		2.30	
GRAIN-071320	7/13/2020	ND		ND	

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Soil Results

Soil					
Sample ID	Sample Date	PFOS (ng/g Dry)	Validation Qual	PFOA (ng/g Dry)	Validation Qual
CS-BARN-1	7/24/2020	23.29		1.94	J
CS-BARN-2	7/24/2020	4.33		0.44	J
FIELD 1	7/28/2020	15.58		3.86	
FIELD 2	7/28/2020	45.62		48.75	
NO SPREAD 1	7/28/2020	27.22		3.18	
P2	7/28/2020	150.3		22.85	
201-1	7/31/2020	294	J	11.7	
201-2	7/31/2020	479		31.3	
201-3	7/31/2020	283		18.4	
201-4	7/31/2020	544		16.8	
201-5	7/31/2020	422		16.4	
201-6	7/31/2020	571		20.2	
RIDGE-1	7/31/2020	579		21.4	
RIDGE-2	7/31/2020	792		30.3	
RIDGE-3	7/31/2020	981		38.7	
RIDGE-4	7/31/2020	1,080		49.6	
RIDGE-5	7/31/2020	1,010	J	42.5	
RIDGE-6	7/31/2020	553		30.6	

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"ND" indicates that compound not detected in the sample.

Soil and Associated Grass Results

Soil and Associated Grass					
Sample ID	Sample Date	PFOS (ng/g Dry)	Validation Qual	PFOA (ng/g Dry)	Validation Qual
201-5 Soil	7/31/2020	422		16.4	
201-5 Grass	7/31/2020	352.90		49.96	
RIDGE-1 Soil	7/31/2020	579		21.4	
RIDGE-1 Grass	7/31/2020	399.10		39.82	
RIDGE-3 Soil	7/31/2020	981		38.7	
RIDGE-3 Grass	7/31/2020	396.07		86.06	

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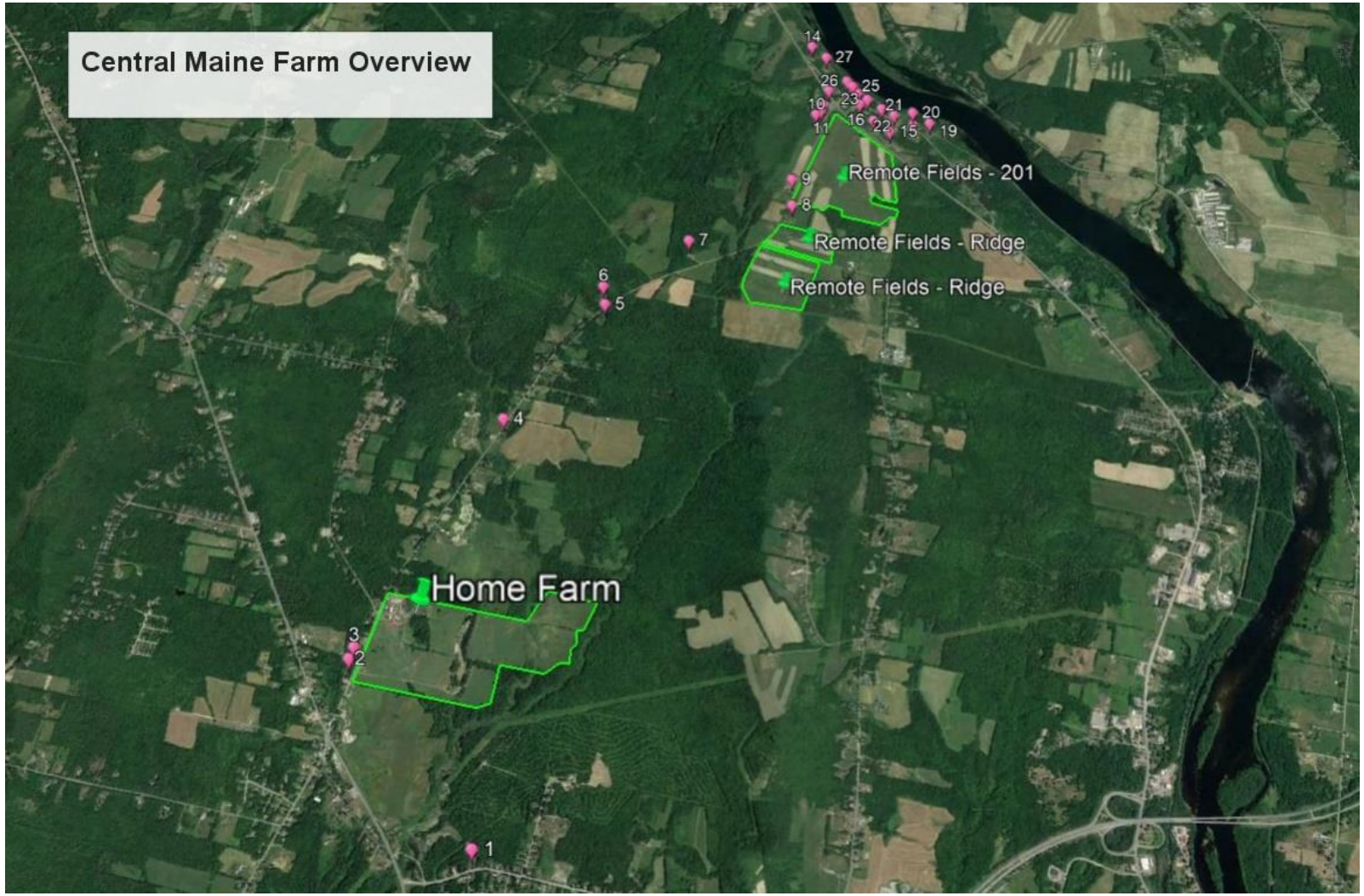
Sample Locations - Overview



Residential Drinking Water Results

Residential Drinking Water					
Sample ID	Sample Date	PFOS (ng/L)	Validation Qual	PFOA (ng/L)	Validation Qual
1	11/03/2020	ND		ND	
2	11/03/2020	ND		0.49	J
3	11/03/2020	0.734	J	0.222	J
4	11/03/2020	ND		11.4	
5	11/03/2020	ND		0.818	J
6	10/29/2020	ND		5.25	
7	8/28/2020	1.12	J	23.92	
8	8/28/2020	60.36		50.02	
9	9/18/2020	ND		1.08	

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"ND" indicates that compound not detected in the sample.

Residential Drinking Water Results

Residential Drinking Water

Sample ID	Sample Date	PFOS (ng/L)	Validation Qual	PFOA (ng/L)	Validation Qual
10	9/18/2020	2,680		898	
11	9/18/2020	2,150		784	
12	9/18/2020	170		394	
13	11/03/2020	641		278	
14	10/22/2020	ND		0.25	
15	10/22/2020	58.4		1,910	
16	9/18/2020	12,000		3,800	
17	10/22/2020	189		424	
18	10/22/2020	ND		ND	

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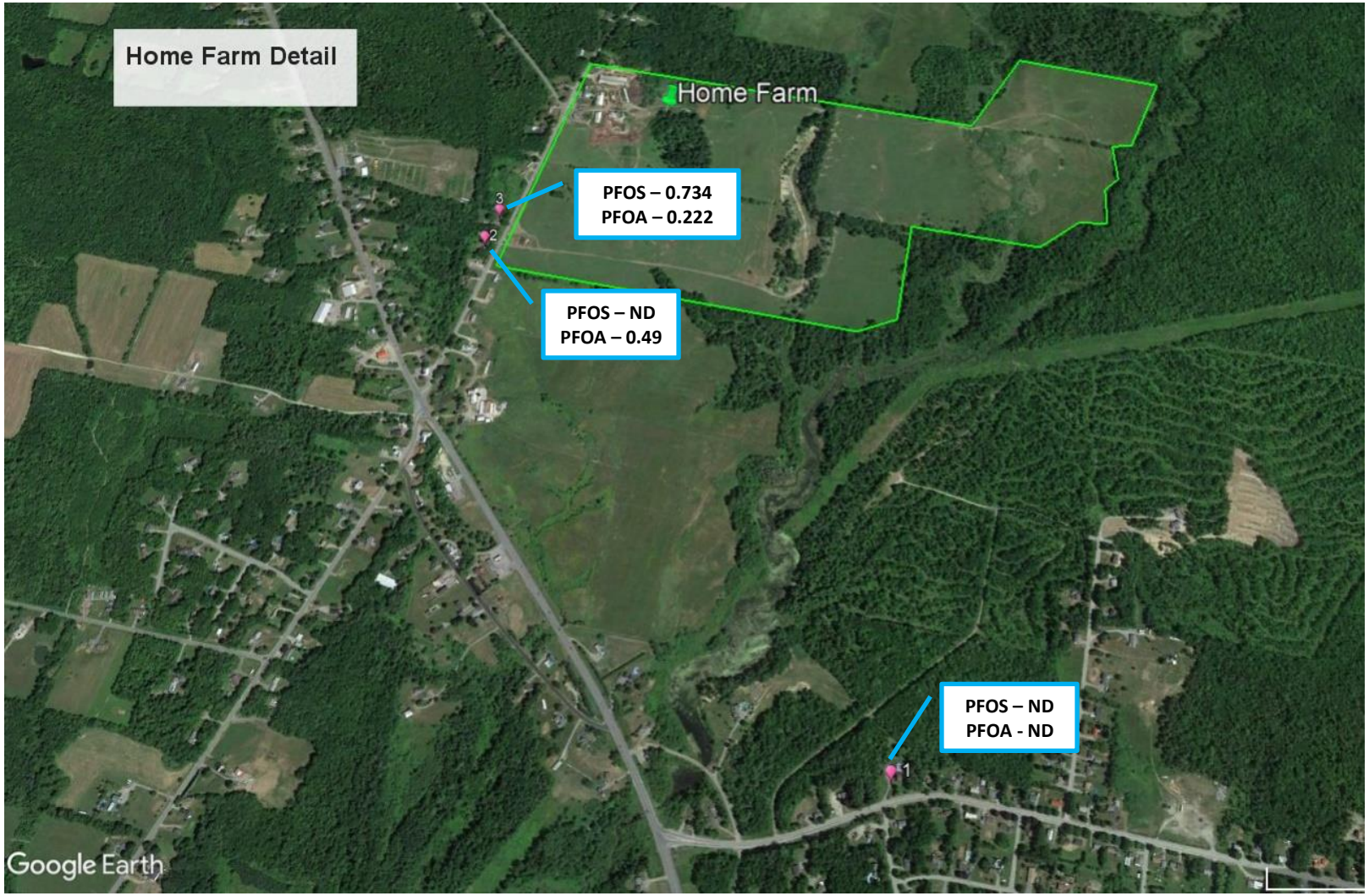
"ND" indicates that compound not detected in the sample.

Residential Drinking Water Results

Residential Drinking Water					
Sample ID	Sample Date	PFOS (ng/L)	Validation Qual	PFOA (ng/L)	Validation Qual
19	10/22/2020	ND		216	
20	11/03/2020	26		96.1	
21	10/22/2020	59.7		288	
22	10/22/2020	3,170		3,520	
23	10/22/2020	243		220	
24	10/22/2020	511		1,400	
24-1	10/22/2020	2,920		3,070	
25	11/03/2020	3,190		3,140	
26	11/04/2020	414	J	1,130	J
27	10/22/2020	25.4		108	

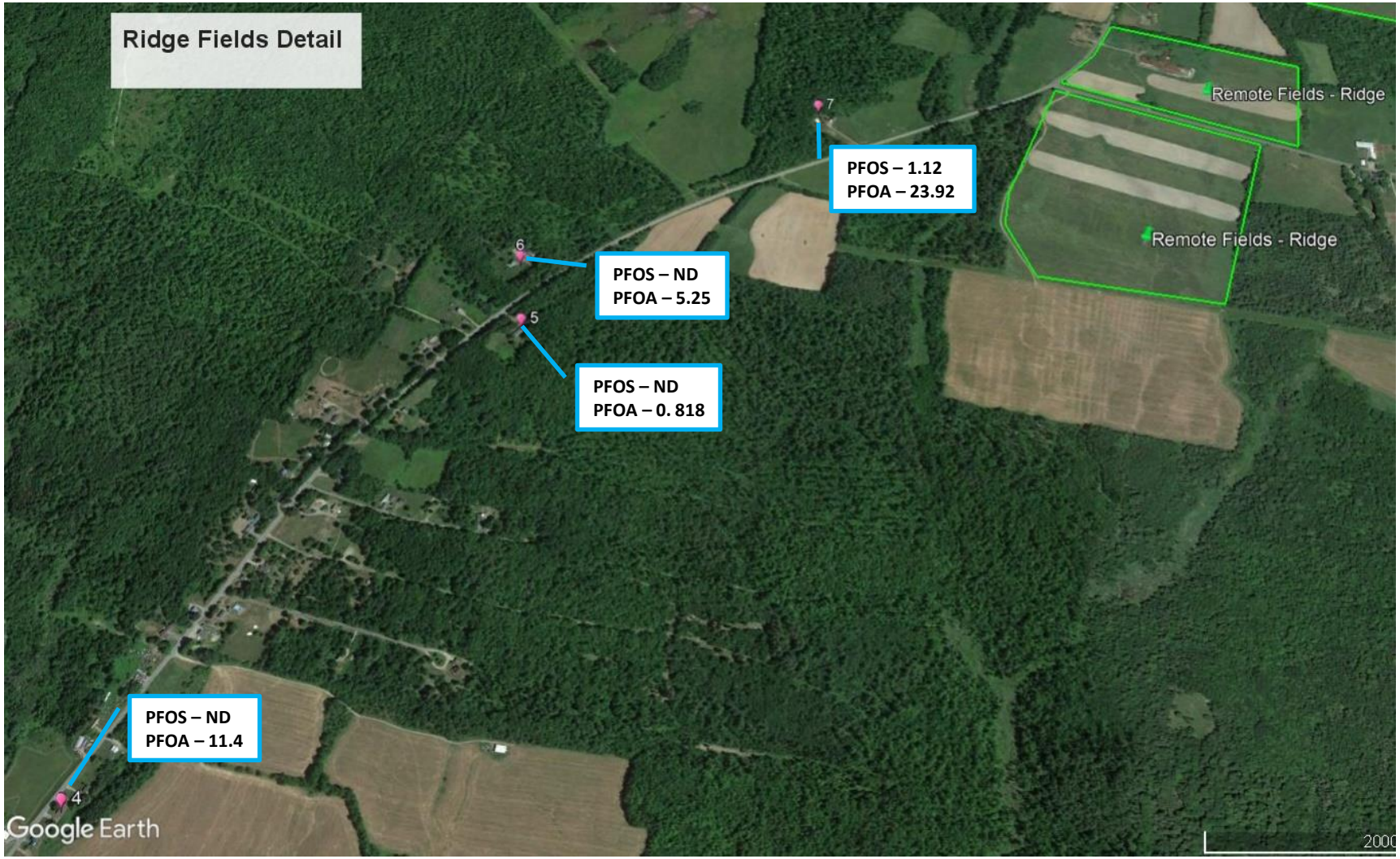
"J" indicates an estimated value. This is commonly applied to values that are either very low or very high compared to the calibration range of a test.
"ND" indicates that compound not detected in the sample.

Sample Locations – Home Farm Detail



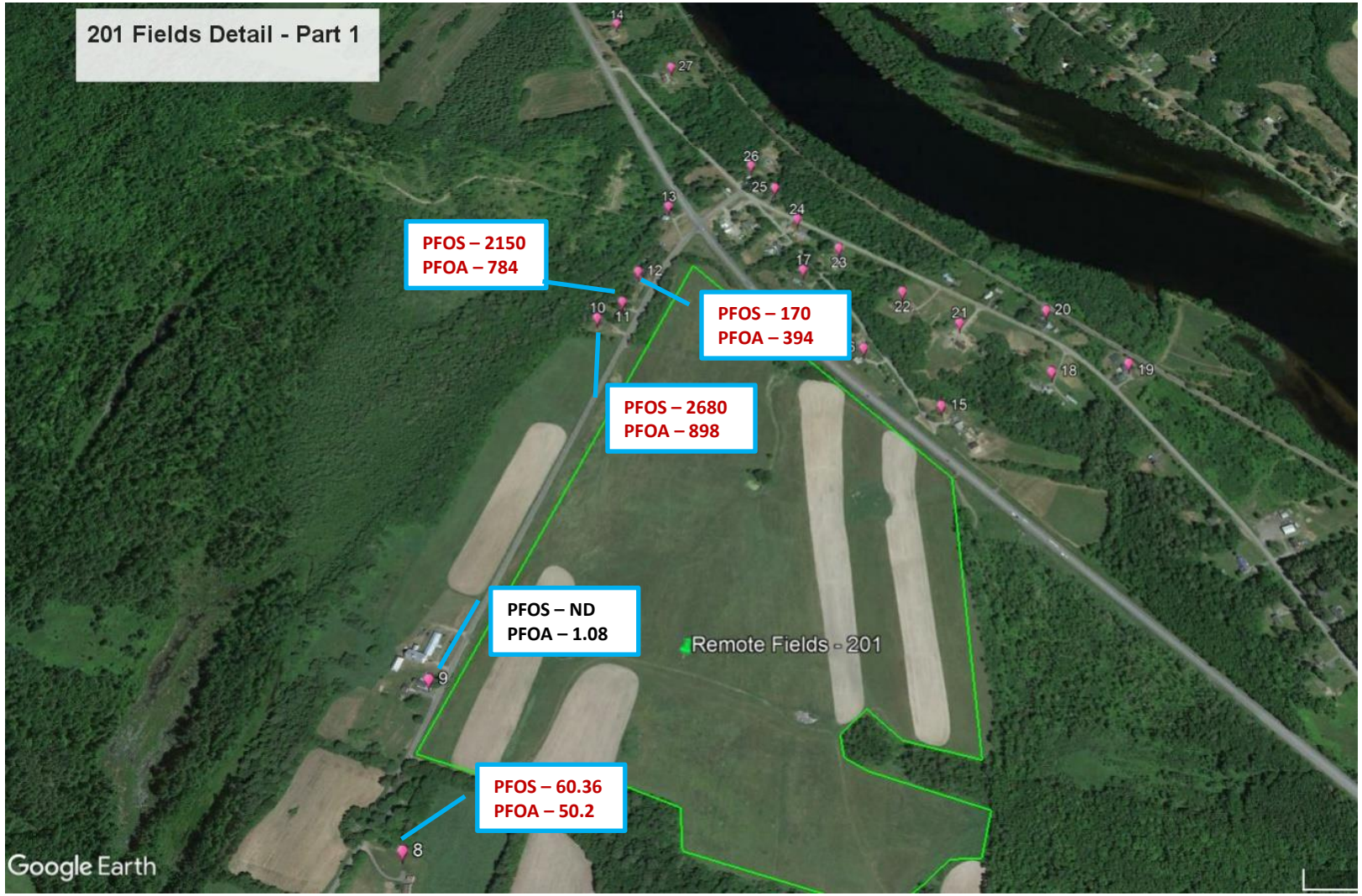
*All Results in ng/L (parts per trillion)

Sample Locations – Ridge Fields Detail



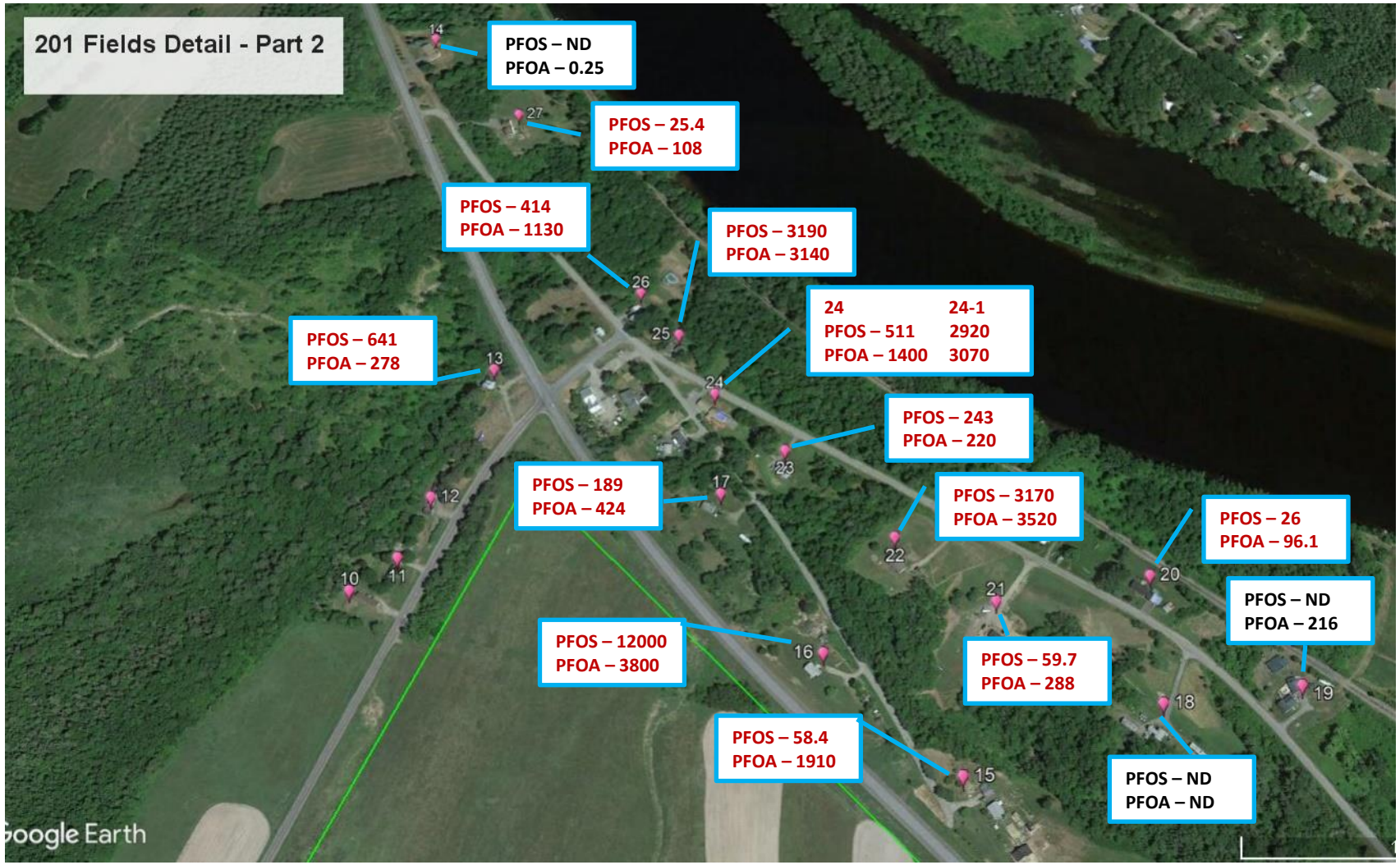
*All Results in ng/L (parts per trillion)

Sample Locations – 201 Fields Detail



*All Results in ng/L (parts per trillion)

Sample Locations – 201 Fields Detail

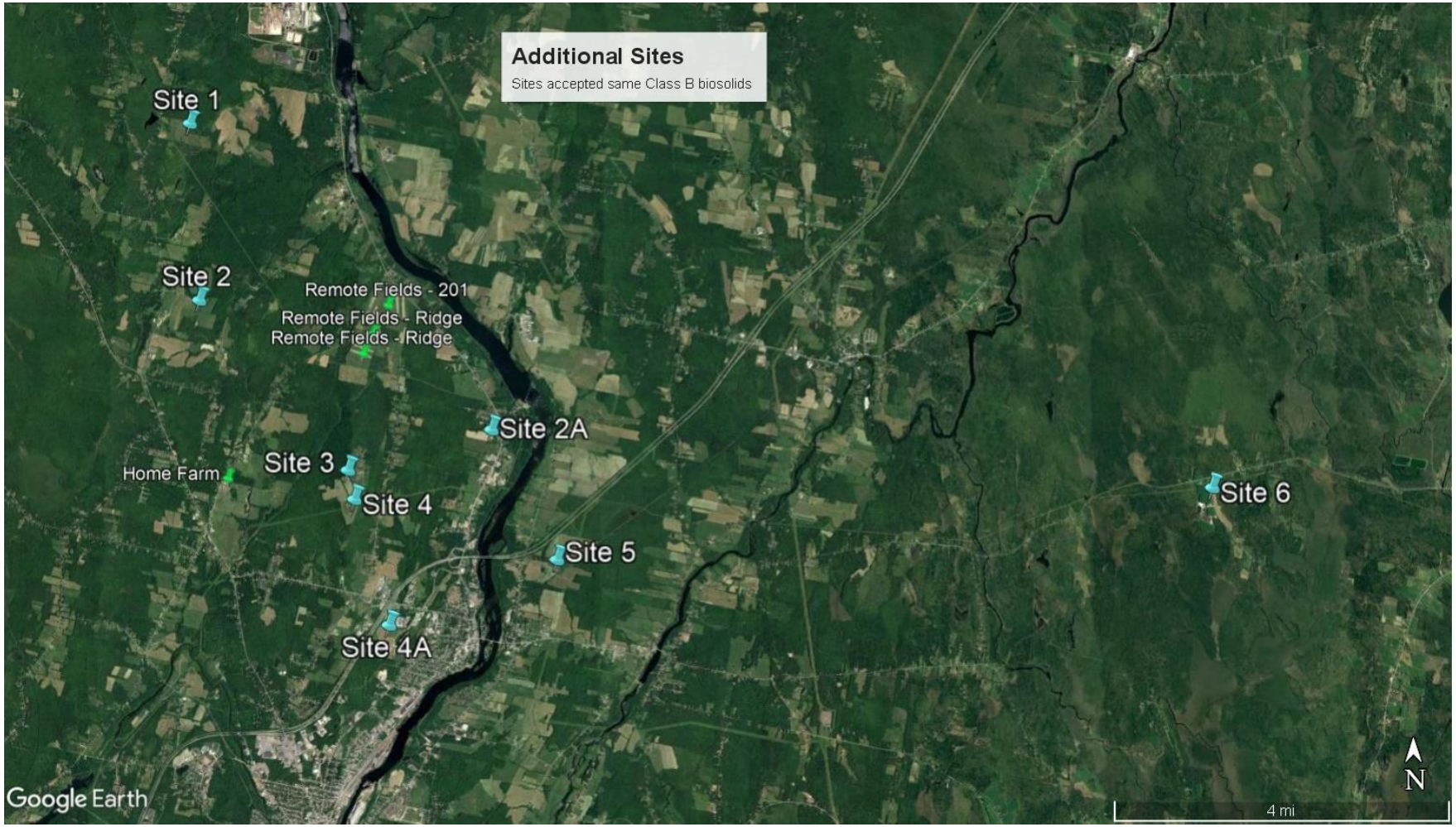


*All Results in ng/L (parts per trillion)

Current Work

- Expanding private drinking water well testing based on results
- Reviewing data for soils that received only manure from farm – no Class A or Class B biosolids
- Reviewing data for soils that received only Class A sludge-derived liming product – no Class B biosolids
- Reviewing data from other sites that received the same Class B biosolids during the same timeframe as this farm

Additional Sites



Additional Sites – Soil Results

Soil					
Sample ID	Sample Date	PFOS (ng/g Dry)	Validation Qual	PFOA (ng/g Dry)	Validation Qual
Site 1 (3)	10/29/2020	328		31	
Site 1 (F2-1)	10/29/2020	60		58.4	
Site 2 (P-1)	10/29/2020	83.9		7.21	
Site 2 (5-1/5-2)	10/29/2020	220		12.3	
Site 2A	No Data	No Data		No Data	
Site 3 (A1)	10/29/2020	157		6.27	
Site 3 (B1)	10/29/2020	239		9.07	
Site 4 (2A)	10/29/2020	298		13.3	
Site 4 (2C)	10/29/2020	409		11.4	
Site 4A	No Data	No Data		No Data	
Site 5	No Data	No Data		No Data	
Site 6 (G4)	10/29/2020	403		26.1	
Site 6 (G5)	10/29/2020	208		34.1	

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Additional Sites – Water Results

Water					
Sample ID	Sample Date	PFOS (ng/L)	Validation Qual	PFOA (ng/L)	Validation Qual
Site 1 – 1	10/29/2020	4.99		1.6	J
Site 1 – 2	10/29/2020	4.54		16.8	
Site 1 – 3	10/29/2020	0.573	J	1.32	J
Site 2 – 1	10/29/2020	25.7		22.1	
Site 2 – 2	10/29/2020	3.26		15.4	
Site 2A	No Data	No Data		No Data	
Site 3	10/29/2020	No Data		No Data	
Site 4 – 1	10/29/2020	9,360		2,720	
Site 4A	No Data	No Data		No Data	
Site 5	10/29/2020	No Data		No Data	
Site 6 – 1	10/29/2020	37,400		18,200	
Site 6 – 2	10/29/2020	552		1,740	
Site 6 – 3	10/29/2020	60,700		19,200	

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"ND" indicates that compound not detected in the sample.

Additional Sites – Milk Results

Milk					
Sample ID	Sample Date	PFOS (ng/L)	Validation Qual	PFOA (ng/L)	Validation Qual
Site 2 (Milk Tank)	10/26/2020	863		-	
Site 2 (Milk Tank)	11/17/2020	620		4.07	

"J" indicates an estimated value. This is commonly applied to values that are either very low or very high compared to the calibration range of a test.
"ND" indicates that compound not detected in the sample.

Next Steps

- Coordinating treatment systems for those impacted above the EPA Health Advisory
- Continue expanding private drinking water well testing based on results, if necessary
- Review information for other sites that received Class B biosolids from same generator as sites discussed earlier and sample as appropriate
- Expand testing to sites that received other Class B biosolids

Contact:
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DAY 3: EPA NATIONAL VIRTUAL BIOSOLIDS MEETING

Reflections and Insights from Experienced Biosolids Practitioners

Speakers will each have 10-minutes:

- Kyle Dorsey, Washington Department of Ecology
- Lauren Fondahl, US EPA
- Greg Kester, California Association of Sanitation Agencies
- Cynthia Sans, US EPA
- Frederick J. Hegeman, Wisconsin Department of Natural Resources
- John Dunn, US EPA
- Bob Bastian, Retired EPA Senior Environmental Scientist

Questions for Speakers:

- What advice would you give your younger self?
- In biosolids, what has been the most impactful development or achievement you have witnessed or been a part of and why was it so impactful?

BREAK

MEETING RESUMES AT: 2:35 PM

Breakout Sessions

- Breakout 1: Chemical and Microbial Methods for Meeting Part 503 Requirements
- Breakout 2: Considerations for Resource Recovery
- Breakout 3: Experiences in Risk Communications
- Breakout 4: Thermal Technologies: Incineration, Pyrolysis and Gasification
- Breakout 5: Surface Disposal and Storage Approaches, Planning and Challenges
- Breakout 6: Continuity and Institutional Knowledge Transfer within Biosolids Programs
- Breakout 7: (Non-PFAS!) Current Challenges for State and Tribal Biosolids Programs

Presentation Format

For each breakout session the 'report out' will follow this format:

1. Opportunity/Challenge Statement (<1 min)
2. Key Observations, Obstacles, & Actions (<2 mins)
3. Full Group Reflection via chat/hand raise (5 mins)
    1. For those who participated in the breakout any points you wish to amplify, amend, or share?
    2. For those who did not participate in the breakout session – what jumps out at you? Were there any surprises and why is it a surprise?

8-12 minutes per breakout session

1. CHEMICAL AND MICROBIAL METHODS FOR MEETING PART 503 REQUIREMENTS

Breakout Group Topic Opportunities and Challenges

- 40 CFR Part 503 identifies allowable methods to be used for four pathogens, inorganic pollutants, and some physical and aggregate biosolids properties. This session explores the use of existing methods and potential need for new methods.
    - The focus of this session is not PFAS methods.
    - Website reference to the methods: https://www.epa.gov/biosolids/biosolids-analytical-methods-and-sampling-procedures

Key Observations, Obstacles, & Actions

EPA as an Information Resource

- More information from EPA on preferred or recommended methods would be helpful (beyond what's reflected in EPA table – even if just anecdotal information) – providing contextual text or references to understand what might be more desirable or appropriate under certain circumstances when choosing a method – e.g., clarity regarding holding times for different pollutants.
    - One thing missing on EPA methods chart is test methods for nutrients (especially in land application) – requires us to typically rely on wastewater methods but when reviewing out of state products, many different methods are used.
    - Is there additional resource or guidance EPA can provide regarding sampling? e.g., authoritative structure that identifies what constitutes truly representative sample.
- Sometimes site-specific issues and dependent on where they are in process – would be helpful for consultants or cities to have place they can go to, to know what they should be thinking about and what method is appropriate (e.g., what do you need to think about in early-stage vs mid or later stage)
- Would be helpful to let EPA know what particular aspect of language in rule that is not clear, so they can more effectively fix it.

Changes and Availability of Methods

- Would like more options or alternative approach from EPA to provide support for additional method(s) for vector attraction reduction and stability (e.g., Solvita for respiration).
- For fecal coliform analysis, IDEXX method not listed as allowed under 503 (though this wasn't developed for use on solids, originally designed for drinking water analysis; may not have received favorable results in comparison to EPA method).
- 200.7 (1994) for metals is in 40 CFR Part 136, but it does not have a biosolids section. 200.7 (2001) has a biosolids section but is not in 40 CFR Part 136. If you want to play it safe, you stick with the methods listed in Part 503.
- Would like EPA to revisit 6-hour holding time for fecal coliform – 1680 or 1681.

Breakout Reflections

Full Group Reflection via chat/hand raise:

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2. CONSIDERATIONS FOR RESOURCE RECOVERY

Breakout Group Topic Opportunities and Challenges

- EPA is aware of new approaches to make and sell products recovered from sewage sludge waste streams regulated under Part 503. In some cases, Part 503 may create regulatory hurdles to the development of these products, which EPA did not envision when it promulgated Part 503 in 1993.

Key Observations, Obstacles, & Actions

- Succinct list generated of the current primary products/efforts.

Opportunities/Actions

- Development of user standards, e.g., characterizing the odor intensity. (This augments 503's focus on health/safety).
- Need to help utilities in understanding lifecycle costs/benefits of the products/options so a utility can best select among the options to match with the community's needs. This includes information on financing option pros/cons and the economics of keeping the programs going (staffing, qualified operators etc.)
- Coordinated effort to address limitations to biosolids use in global markets and certified organics program.
- Easier certification for beneficial reuse.
- Leverage common causes – Climate Change, Healthy Soils, Urban Agriculture, NetZero.
- EPA should enhance partnership among the federal family: EPA and USDA (organics), USGS (soil conservation), USFS (reclamation).
- Enhance reclamation use of biosolids.

Breakout Reflections

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3. EXPERIENCES IN RISK COMMUNICATIONS

Breakout Group Topic Opportunities and Challenges

- Communicating risk uncertainties from pollutants in biosolids is challenging. Concerns over biosolids containing high levels of PFAS chemicals are presenting challenges for land application. This session explores biosolids risk communication strategies, tools and messaging.

Key Observations, Obstacles, & Actions

- Great opportunity to learn from one another's successes and failures. Great brainstorming in the notes including some lessons learned, best practices, formats, routes, etc.
- Some targeted communications resources exist, e.g., PFOS NH, ITRC.
- Convergence around most common challenges
    - Trust issues stem from misperceptions/sensationalism, legacy issue/sites, distrust of messengers.
    - Reactive Cycle and disincentive to be proactive
    - PFOA/PFOS/CECs
    - Predicable 'triggers', e.g., odor

Opportunities and Actions

- Leverage EPA's expertise and credibility
    - Finishing the risk assessment work for PFOS and PFOA ASAP would help states. Create flyers/graphics that explains risk comms for PFOS/PFOA specific to biosolids. (Applies to CECs generally).
    - Webinars on 'hot topics' and areas where EPA has deep experience, e.g., crisis communication from large events.
    - Tools like model MOU from EPA would help lend credibility.
    - Dedicated, knowledgeable spokesperson at EPA – to deliver message at a national level proactively…and answer some of the questions that are difficult to answer.
    - Message around source reduction work as other strategies are developed. Legacy issues – connected to trust.

Breakout Reflections

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4. THERMAL TECHNOLOGIES: INCINERATION, PYROLYSIS, AND GASIFICATION

Breakout Group Topic - Opportunities and Challenges

This session explores the use of **incineration**, **pyrolysis** and **gasification** as options for biosolids management. While EPA continues to support the land application of biosolids, additional management options are needed, particularly for biosolids that are highly contaminated with PFAS.

Key Observations, Obstacles, & Actions

- Impressive brainstorm on why/why not different technologies are being used and what is working well and not working well.
- Obstacles/Opportunities (See next slide)
- Targeted brainstorm on Permitting Issues/Challenges and Ash Reuse

What obstacles exist for implementing thermal technologies? How can some of the obstacles be addressed?

Connections btwn CAA and CWA

Better coordination/communication and education btwn OW, OAR with support from Biosolids office

(+3) Lingering questions about PFAS

Comes up in industrially impacted sludge from PFAS w/ land application and landfills (nervous) taken off table

Political issues w/ moving this material (GB as an example from MI) – liability issue

Better understand the fate and transport

(+1) Do other technologies better handle PFAS? Understanding what options are available to deal with this contaminant?

Prefer to be in incineration vs. land application

Risk to invest in new technologies

For Pyr and Gasif – would be helpful to see scaled-up pilots to prove technology. With help from Fed/State funding to support.

NJ (Linden) – Gasification facility under construction (by 2022) (sharing lessons learned, etc.). Same company may have a facility under construction in CA (Aries)

Third party review/federal review/reporting to provide information not just from company

How are pyro/gasif regulated under CAA

Provide more certainty on how these types of facilities are permitted (pyro/gasif)

(+1) Local rules impact ability to find sites to build - would benefit from state support to advocate for policies that allow for permits.

(+1) how to regulate solids that come out of pyr/gas would be helpful

Breakout Reflections

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5. SURFACE DISPOSAL AND STORAGE APPROACHES, PLANNING, AND CHALLENGES

Breakout Group Topic Opportunities and Challenges

- This session explores surface disposal and storage approaches, planning, and challenges.

Key Observations, Obstacles, & Actions

- Impressive brainstorm on experiences with surface disposal and storage planning.
- Peer to Peer direct support during the breakout session ☺!

Explored challenges and opportunities in both planning and surface disposal

- Big constellation of "Small Town" challenges. Big opportunity area for EPA to provide some support?
    - Funding
    - Expertise and Capacity
    - Lack of storage or land disposal sites
    - Lack of planning
- Conflicting and/or inconsistent regulations (topic and geographic) Example: Biosolid Storage Regulations.
- Local zoning – cannot build additional storage sites due to restrictions.
- Sampling analysis/approach and analytic methods.
- Alternative methods for analysis for compliance.

Breakout Reflections

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6. CONTINUITY AND INSTITUTIONAL KNOWLEDGE TRANSFER ACROSS THE BIOSOLIDS COMMUNITY

Breakout Group Topic Opportunities and Challenges

- Biosolids co-regulators and management professionals experience a turnover in personnel. This session explores ways in which to **create and maintain continuity and institutional knowledge transfer across the biosolids community.**

Key Observations, Obstacles, & Actions

- White house manual; SOPs, compliance plans, sampling plan; written procedures; fact sheets; listservs; regional/national meetings; through regional organizations; and conferences are the primary tools for knowledge and information transfer.
- Key takeaway: Clear need and demand to ramp up opportunities for institutional transfer of knowledge (like this conference!)

Obstacles and Opportunities

- Reliance on paper copies and/or much of the information is 'trapped' in documents and slowly getting out of date. Opportunity to improve ability to find/access right technical/background material. Specific suggestions to update topic specific guidance docs from EPA e.g., the plain English guide, domestic septage guidance, manual of good practices, white house document, storage document
- Resources and staffing – having the right amount of people to commit to a biosolids program.
    - Retirements are challenging capacity and existing knowledge. Younger generation less enthusiastic about biosolids and stay in positions for only a few years.
    - In several states, not allowed to fill position until it's empty. As a result, can't get anyone up to speed until that seat is empty. Would like ability to hire on to have that interchange/overlap.
    - Opportunity to create "biosolids for beginners, for inspectors, permitters," etc. Documents to have people to refer people to. Need to have clear resources to start with when new to the field.
    - Accept delegation, give grant money to hire more staff – tying delegation to grants or funding is a potential EPA strategy.
- Situations that don't fit neatly into existing rules or legislation. When situations happen that aren't covered specifically – people who have been in field for long time have more knowledge to handle it. Opportunity to better use networks/conferences to support this.
- Working with small facilities who don't receive outreach/help. Need outreach to small facilities. New staff don't understand 503, etc.

Breakout Reflections

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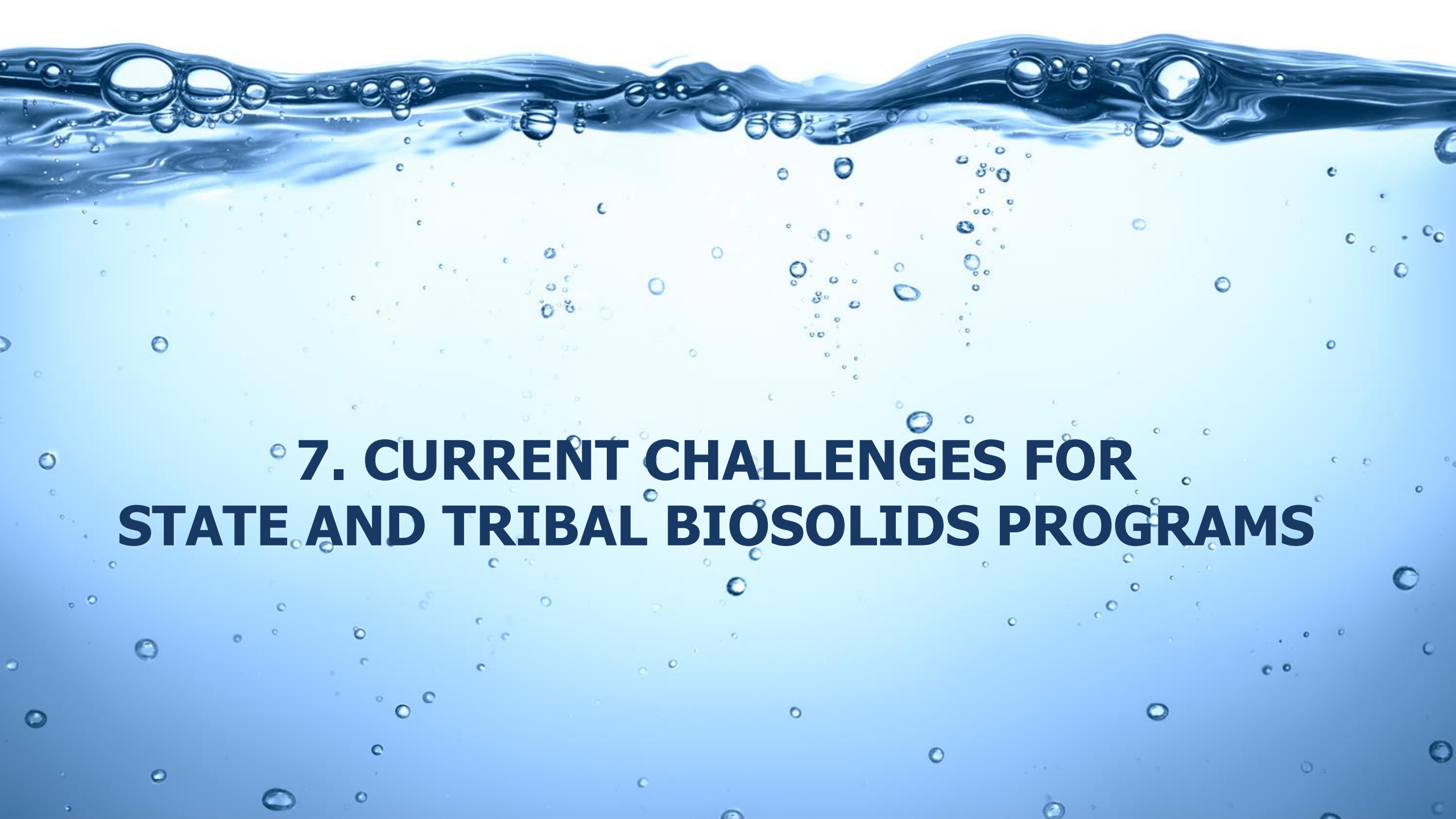

7. CURRENT CHALLENGES FOR STATE AND TRIBAL BIOSOLIDS PROGRAMS

Breakout Group Topic Opportunities and Challenges

- While PFAS is a major issue for biosolids programs today, this session explores non-PFAS challenges that state and tribal programs currently face and what possible solutions exist.

Brainstormed List of Challenges Facing Biosolids Program (non PFAS!)

- Gaps in current science and access to emerging science (e.g., on phosphorous) This is exacerbated by internal challenges in dealing with own scientists.
- Understanding emerging technologies including cost and capability of technologies.
- Lack of science and communications about the benefits of biosolids. Need funds for research to document benefits. Most funds are going toward CECs.
- Inter-state transfers of biosolids. Need ways to regulate transport between states and track the treatment processes, compliance etc.
- Working in and communicating with remote areas.
- Running out of capacity for disposal, application sites, etc. Exacerbated by impacts from climate change.
- Changing climate is influencing land application opportunities, timing, storage needs, etc.
- Time and capacity to do this work; response time—e.g. 8 people for 300+ facilities; working on new permit approach; statewide general permit; identifying facilities without active biosolids programs—automatically covered under the general permit.
- Lack of clarity around regulatory jurisdiction. E.g., tribal program bringing biosolids into state; subject to regulations; also, federal facilities. Movements in and out of jurisdictions.
- Regulate struvite; ammonia removal from biosolids; how rule applies to products "derived from" biosolids; secondary products from WW treatment plants. Importance of EPA's position on 503 rule; helpful for regulators; provide consistency for industry.
- Challenge navigating the benefits of land application and uncertainties.
- Administration of biosolids program. 8 states with delegated authority, others not delegated. No EPA funding; limited FTE. Lack of funding and support. Have a coordinators network (list serv) for asking questions, etc.; EPA website. Would like to be able to do more—e.g., permitting. Not enough to ensure compliance.
- In remote areas of the state, we have tribal lands. Holding times for samples that are shipped to labs. Microbial methods.
- New fields, whether will become part of regulatory frameworks. Antibiotic resistance.
- Phosphorous. Basin plan, TMDL. How can you permit new land application?
- E-reporting

Opportunities and Actions for EPA to consider

- Excited about EPA re-engaging in biosolids!
- Supporting end uses and analysis of benefits. Anything EPA can do. Support for science on contaminants—but also on benefits of biosolids as a resource for land application. Organics rule is a big opportunity/need.
- Emerging science and new technologies
    - Wastewater resource recovery. Research and science re: potential to contain pathogens. Suggest EPA develop science to support decision-making.
    - New technologies. E.g., facility testing infra-red to reduce pathogens; microwave technologies. State regulators, don't have the experience. Where get more information to understand technologies? Often pick up the phone to EPA Region or ORD.
    - On research, EPA is reinvesting in biosolids program. Concerns re: microplastics and other emerging contaminants. Small states don't have the capacity to do more research. Need information to support land application (where appropriate).
    - Rely on EPA for science and supporting science-based decision-making. Appreciated how EPA responded to language/issues raised in the OIG report.
- EPA convene a sharing group for new practitioners.
- Co-digestion and pyrolysis (hydro char). New treatment methods.

Breakout Reflections

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