



19th Annual EPA Drinking Water Workshop: Small Systems Challenges and Solutions

August 29 – September 1, 2022

Workshop Bios and Summaries by Session

SESSION 1 – OPENING PLENARY	2
SESSION 2A – BREAKOUT FOCUS GROUP DISCUSSION: CORROSION	4
SESSION 2B – BREAKOUT FOCUS GROUP DISCUSSION: CLIMATE CHANGE	5
SESSION 2C – BREAKOUT FOCUS GROUP DISCUSSION: PATHOGENS AND DBPs	6
SESSION 2D – BREAKOUT FOCUS GROUP DISCUSSION: TMF CAPACITY	7
SESSION 2E – BREAKOUT FOCUS GROUP DISCUSSION: PFAS	8
SESSION 2F – BREAKOUT FOCUS GROUP DISCUSSION: CYBERSECURITY	9
SESSION 3A – BIPARTISAN INFRASTRUCTURE LAW (BIL)	10
SESSION 3B – METHODS AND ANALYTICS	12
SESSION 4A – EQUITY AND ENVIRONMENTAL JUSTICE	14
SESSION 4B – CONTAMINANTS OF EMERGING CONCERN (CECs)	16
SESSION 5A – WATER QUALITY	18
SESSION 5B – PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) I	20
SESSION 6A – PATHOGENS	22
SESSION 6B – PFAS II	24
SESSION 7A – LEAD AND COPPER	26
SESSION 7B – RESILIENCE	28
SESSION 8 – ASK THE EXPERTS, POSTERS, AND MODELS AND TOOLS DEMONSTRATIONS	30
SESSION 9 – HIGHLIGHTS AND CLOSING REMARKS PLENARY	37
SESSION 10A – IN-DEPTH TRAINING: CORROSION	38
SESSION 10B – IN-DEPTH TRAINING: DRINKING WATER MICROBIOLOGY	40
SESSION 10C – IN-DEPTH TRAINING: SANITARY SURVEYS	41

SESSION 1 – OPENING PLENARY

Welcome and Opening Remarks: Gregory Sayles, Director of the Center for Environmental Solutions and Emergency Response, EPA-ORD

Keynote Speakers: c Frey, Assistant Administrator, EPA-ORD and Karen Dettmer, Managing Director for Infrastructure Implementation, EPA-OW

A Tribal Perspective of Nibi (Water): Allison Smart, Little River Band of Ottawa Indians Natural Resources Department
Agenda Review and Logistics: Sandhya Parshionikar, Thomas Speth, and Michelle Latham, EPA-ORD

Gregory Sayles, EPA-ORD

Bio: Gregory Sayles, Ph.D. is the director of the U.S. EPA's Center for Environmental Solutions and Emergency Response (CESER), one of four research centers in EPA's Office of Research and Development. CESER research helps develop solutions to challenges around the built environment, including water infrastructure. He has conducted and led research programs for EPA for over 30 years. Greg holds a B.S., an M.S., and a Ph.D. in chemical engineering.

Christopher Frey, EPA-ORD

Bio: Christopher Frey, Ph.D. is the Assistant Administrator for the Office of Research and Development of the U.S. EPA, effective May 2022. He also serves as the Agency Science Advisor. Before his confirmation, he served ORD as the Deputy Assistant Administrator for Science Policy. Prior to joining EPA, Dr. Frey was the Glenn E. and Phyllis J. Futrell Distinguished University Professor at North Carolina State University, where he served on the faculty since 1994. His research has focused on modeling and measurement of emission sources and air pollution exposure, and on quantification of uncertainty, variability, and sensitivity in modeling. Dr. Frey was an AAAS/EPA Environmental Science and Engineering Fellow in 1992. He served as exposure modeling advisor in ORD's National Exposure Research Laboratory from 2006 to 2007. He was a member of the EPA FIFRA Scientific Advisory Panel (2004 to 2006), a member of the EPA Clean Air Scientific Advisory Committee (CASAC) (2008 to 2012), chair of CASAC (2012 to 2015), and a member of the EPA Science Advisory Board (2012 to 2018). He has also served on committees and expert groups of the National Academies of Science, Intergovernmental Panel on Climate Change, and World Health Organization. Chris holds a B.S. in mechanical engineering from the University of Virginia, and a M.E. in mechanical engineering and a Ph.D. in engineering and public policy from Carnegie Mellon University.

Karen Dettmer, EPA-OW

Bio: Karen Dettmer is Managing Director for Infrastructure Implementation for the U.S. EPA's Office of Water. The Office of Water works to ensure that drinking water is safe, wastewater is safely returned to the environment, and surface waters are properly managed and protected. Prior to joining EPA, Karen served as the Commissioner of Public Works for the City of Milwaukee and as Superintendent of Milwaukee Water Works in Wisconsin. In these roles she has developed and managed large capital projects, and her leadership has been recognized for advancing racial equity. Karen is a licensed Professional Engineer in the state of Wisconsin, and she holds a B.S. in architectural engineering and an M.S. in environmental engineering from Milwaukee School of Engineering.

Allison Smart, Little River Band of Ottawa Indians Natural Resources Department

Bio: Allison Smart is the Environmental Division Manager for the Little River Band of Ottawa Indians (LRBOI) located in Manistee, MI. Allison started working for LRBOI full time in February of 2012, as an Aquatic Biologist with a focus on surface water quality monitoring, wild rice, and inland fisheries assessments. In December of 2015, Allison moved into the Environmental Division Manager role. In this role she currently leads a team of five full time employees and oversees the Tribe's water quality (CWA 106/319), brownfields (CERCLA 128a), wetlands, air quality (CAA 103), IGAP, and LAMP programs. Allison is also currently the Regional Tribal Caucus Co-chair on the Region 5 Tribal Operations Committee. She holds a B.A. in Biology and Anthropology from Albion College (Albion, MI; land ceded 1821 Treaty of Chicago) and M.S. in Conservation Biology from Central Michigan University (Mt. Pleasant, MI; land ceded 1819 Treaty of Saginaw/Isabella Indian Reservation). Allison is a proud enrolled member of the Sault Ste Marie Tribe of Chippewa Indians and has spent most of her life living within the 1836 Ceded Territory.

Sandhya Parshionikar, EPA-ORD

Bio: Sandhya Parshionikar, Ph.D. is a Senior Advisor in U.S. EPA's Office of Research and Development, Center for Environmental Solutions and Emergency Response in Cincinnati, OH. She has a Master's degree in Biochemistry and a Ph.D. in Microbiology from the University of Mumbai. Her research interest included bacteriology as well as molecular virology related to drinking water contamination. She also has 18 years of experience in drinking water policy and managing research and technical support related to drinking water contaminants (chemical and microbial) and treatment. She is the elected Vice-Chair of AWWA's Organisms in Water Committee.

Thomas Speth, EPA-ORD

Bio: Thomas Speth, P.E., Ph.D. is the associate director for science in the U.S. EPA's Center for Environmental Solutions and Emergency Response, one of four research centers in EPA's Office of Research and Development, where he is leading efforts on PFAS, lead, and small water systems. He is a professional engineer who has worked in the field of water-treatment research at EPA since 1986. Over his career, Tom has been active in numerous organizations, such as the American Water Works Association and the Water Research Foundation, where he has served as Trustee, Chair, and EPA Liaison on numerous divisions, committees, and advisory boards.

Michelle Latham, EPA-ORD

Bio: Michelle Latham is a biologist with EPA's Office of Research and Development, Immediate Office of the Assistant Administrator, where she has led the outreach and stakeholder engagement support for the cross-cutting national research programs since 2019. Prior to her current position, she served as the technical communications and outreach lead for ORD's Safe and Sustainable Water Resources Research Program from 2014-2019 and as the technical communications lead for the Water Supply and Water Resources Division of ORD's National Risk Management Research Laboratory from 2008-2014. A large portion of Michelle's efforts at EPA focus on drinking water, particularly small systems. Michelle holds an M.Ed., a B.S. in Biology, and a B.L.A. with a biology minor from Xavier University; an A.A.S. from Shoreline Community College; and a C.G. in Advanced Medical Laboratory Technology from the Naval School of Health Sciences.

SESSION 2A – BREAKOUT FOCUS GROUP DISCUSSION: CORROSION

Facilitator: Darren Lytle, EPA-ORD

Description: What are the most pressing corrosion issues and how are they being addressed?

Training Hours: 1.0

Darren A. Lytle, EPA-ORD

Bio: Darren A. Lytle, Ph.D., P.E. is an environmental engineer with U.S. EPA's Office of Research and Development, Center for Environmental Solutions and Emergency Response in Cincinnati, Ohio. Since beginning work at EPA in 1991, Darren's primary goal has been to research the quality of drinking water. Over the years, he has investigated and published works on drinking water systems, including work on distribution system corrosion control and water quality (e.g., red water control, lead and copper corrosion control); filtration (emphasis on removal of particles, and microbial contaminants and pathogens from water); biological water treatment; and iron and arsenic removal. Darren holds a B.S. in civil engineering from the University of Akron (1990), an M.S. in environmental engineering from the University of Cincinnati (1991), and a Ph.D. in environmental engineering from the University of Illinois (2005).

SESSION 2B – BREAKOUT FOCUS GROUP DISCUSSION: CLIMATE CHANGE

Presenters: Allison Smart, Emily Frary, and Kevin Letterly

Description: This breakout will discuss how primacy agencies and water systems are being impacted by climate change and any strategies they are using to mitigate negative impacts. This breakout session will also explore how EPA and ASDWA can assist primacy agencies with climate change mitigation – what hurdles is your agency experiencing that is preventing or slowing climate change mitigation practices, what information or projects can be shared or developed to better assist primacy agencies or water systems?

Training Hours: 1.0

Allison Smart, Little River Band of Ottawa Indians Natural Resources Department

Bio: Allison Smart is the Environmental Division Manager for the Little River Band of Ottawa Indians (LRBOI) located in Manistee, MI. Allison started working for LRBOI full time in February of 2012, as an Aquatic Biologist with a focus on surface water quality monitoring, wild rice, and inland fisheries assessments. In December of 2015, Allison moved into the Environmental Division Manager role. In this role she currently leads a team of five full time employees and oversees the Tribe's water quality (CWA 106/319), brownfields (CERCLA 128a), wetlands, air quality (CAA 103), IGAP, and LAMP programs. Allison is also currently the Regional Tribal Caucus Co-chair on the Region 5 Tribal Operations Committee. She holds a B.A. in Biology and Anthropology from Albion College (Albion, MI; land ceded 1821 Treaty of Chicago) and M.S. in Conservation Biology from Central Michigan University (Mt. Pleasant, MI; land ceded 1819 Treaty of Saginaw/Isabella Indian Reservation). Allison is a proud enrolled member of the Sault Ste Marie Tribe of Chippewa Indians and has spent most of her life living within the 1836 Ceded Territory.

Emily Frary, Utah Department of Environmental Quality

Bio: Emily Frary is an environmental scientist with Utah's Division of Drinking Water and has been there for 8 years. She currently manages the Nitrate, Arsenic, Radionuclide and Chemical Contaminant Rules. Emily also has experience managing Utah's Lead and Copper Rule and implementing the first Lead Testing in Schools Initiative in Utah. Emily has a B.S. in Chemistry and Materials Science, and an M.S. in Environmental Science from the University of Utah.

Kevin Letterly, ASDWA

Bio: Kevin Letterly is a Senior Policy Analyst with the Association of State Drinking Water Administrator and has been with ASDWA for four years. Some of his areas of focus include: AWOP, drinking water security issues, climate change, and lead testing in schools.

SESSION 2C – BREAKOUT FOCUS GROUP DISCUSSION: PATHOGENS AND DBPs

Facilitator: Laura Boczek and Jennifer Best

Description: This session will discuss pathogens of concern in drinking water distribution as well as premise plumbing. EPA is currently in the process of revising the microbial and disinfection byproducts (MDBP) rule and this session will discuss this process and areas of concern relating to the rule revision.

Training Hours: 1.0

Laura Boczek, EPA-ORD

Bio: Laura Boczek is a research microbiologist for the U.S. EPA's ORD, CESER. Her research areas have focused on disinfection efficacy of various microorganisms in drinking water, including the study of premise plumbing pathogens with an emphasis on *Legionella*; specifically, the ecology of these organisms, understanding how they persist, and what steps can be taken to mitigate the risk of infection to insure public health protection. She has also been involved with antibiotic resistance studies in various environmental matrixes and with pathogens and method development in biosolids. Laura holds a B.S. in biological science from Northern Kentucky University and an M.S. in biological science from the University of Cincinnati.

Jennifer Best, EPA-OW

Bio: Jennifer Best is a microbiologist with EPA's Office of Ground Water and Drinking Water, Technical Support Branch in Cincinnati Ohio. Jennifer provides microbiological technical support for regulatory and programmatic activities. Jennifer has been with the Agency since 2001.

SESSION 2D – BREAKOUT FOCUS GROUP DISCUSSION: TMF CAPACITY

Presenters: Ashley Voskuhl and Tanushree Courlas

Description: This breakout discussion will focus on challenges and solutions to achieving sufficient technical, managerial, and financial (TMF) capacity at water systems. Attendees will discuss the most pressing issues around achieving technical, managerial, and financial capacity and discuss how states can work to ensure water systems have effective asset management. Participants will also discuss strategies that states or water systems have employed to overcome these challenges.

Training Hours: 1.0

Ashley Voskuhl, ASDWA

Bio: Ashley is a Senior Policy Analyst with ASDWA focusing primarily on the lead and copper rule, regulatory implementation, engineering and standards, and compliance and enforcement. Prior to joining ASDWA in January 2022, Ashley spent 5 years as an environmental specialist with Ohio EPA's Division of Drinking and Ground Waters, working on regulatory development and implementation with a specific focus on the lead and copper rule, unregulated contaminants, and engineering standards. She previously worked at U.S. EPA's Office of Research and Development researching impacts of corrosion on lead in drinking water. Ashley received her B.S. in Chemical Engineering from The Ohio State University.

Tanushree Courlas, Ohio EPA

Bio: Tanushree began her work with the Agency in 2006 in the Division of Surface Water (DSW) in Northwest District Office. In this role, she inspected various wastewater treatment facilities and reviewed detail plans and NPDES discharge permits. Tanushree transferred to DDAGW in Central Office in 2008 to the Compliance Assurance Section drafting enforcement actions. In 2011, she transferred to Division of Financial Assistance (DEFA) as a project engineer and was responsible for WPCLF projects from planning to construction. She transferred to DSW in 2013 to be the Permit-to-Install contact, Household Sewage Treatment System permit reviewer and the DSW Operator Certification contact. In 2015, she went back to DDAGW as supervisor in the Operator Certification Unit and later, in 2019, in the Engineering and Infrastructure section. In 2021, she took the role as the Manager of the Engineering and Infrastructure which included responsibilities for DDAGW engineering review, Asset Management, and Infrastructure Funding. In February, she became the second Assistant Chief for the DDAGW overseeing infrastructure, funding, asset management and engineering. Before coming to Ohio EPA, Tanushree worked at a private environmental laboratory in Columbus where she supervised a team of 12 for the analysis of water and wastewater samples. Tanushree earned a B.S. in Chemical Engineering from The Ohio State University and has held a Professional Engineer's license since 2014.

SESSION 2E – BREAKOUT FOCUS GROUP DISCUSSION: PFAS

Facilitator: Thomas Speth and Brandon Kernen

Description: How are primacy agencies and water systems addressing treatment, health effects, analytical methods, and funding?

Training Hours: 1.0

Thomas Speth, EPA-ORD

Bio: Thomas Speth, P.E., Ph.D. is the associate director for science in the U.S. EPA's Center for Environmental Solutions and Emergency Response, one of four research centers in EPA's Office of Research and Development, where he is leading efforts on PFAS, lead, and small water systems. He is a professional engineer who has worked in the field of water-treatment research at EPA since 1986. Over his career, Tom has been active in numerous organizations, such as the American Water Works Association and the Water Research Foundation, where he has served as Trustee, Chair, and EPA Liaison on numerous divisions, committees, and advisory boards.

Brandon Kernen, New Hampshire Department of Environmental Services

Bio: Brandon Kernen is the Administrator of the Drinking Water and Groundwater Bureau at the New Hampshire Department of Environmental Services. He has over 30 years of professional experience and a graduate degree in Civil and Environmental Engineering from Tufts University and an undergraduate degree in Hydrology and Water Resources from the University of Arizona. He is a licensed Professional Geologist.

SESSION 2F – BREAKOUT FOCUS GROUP DISCUSSION: CYBERSECURITY

Presenters: Michael Finn and Anthony DeRosa

Description: What strategies and resources are primacy agencies using to address cyber attacks experienced by water systems and what best practices can water systems use to build resilience?

Training Hours: 1.0

Michael Finn, EPA-OW

Bio: Michael Finn, P.E. is an environmental engineer with U.S. EPA's Office of Groundwater and Drinking Water, Drinking Water Protection Branch. He is currently working with states and public water systems on the implementation of the Surface Water Treatment Rules, the Disinfection Byproducts Rules, the Groundwater Rule, and the Lead and Copper Rule, as well as microbial and other contaminant treatment issues, alternative treatment technologies, and potable water reuse. Mike has 26 years of experience in public water supplies and drinking water treatment and serves as a national subject matter expert in the areas of disinfection and microbial treatment of drinking water. He is a licensed professional engineer in California and Maryland and a certified water treatment operator.

Anthony DeRosa, ASDWA

Bio: Anthony R. DeRosa is the Information Technology and Special Projects Manager at ASDWA. Anthony has over 20 years of experience working with state primacy agencies, EPA, and partner organizations in the drinking water community; delivering complex projects to success in support of ASDWA's mission of protecting public health. Anthony is primarily responsible for implementation activities of the Data Management program, including support for the SDWIS Modernization initiative, and leads the Association's efforts to advance Cybersecurity resiliency and promote Innovative Technology adoption within the sector. Anthony is the lead facilitator for ASDWA's workgroups on Data, Cybersecurity, and Sanitary Surveys, and currently serves as the project manager on a 3-year ORD-funded project – Innovation Applied – that seeks to lower barriers to innovative technology approvals. He holds a B.A. in Political Science from the American University in Washington, D.C.

SESSION 3A – BIPARTISAN INFRASTRUCTURE LAW (BIL)

Moderator: Kevin Letterly

Presenters: Dallas Shattuck, Stephanie Schlea, and Michael Grange

Training Hours: 1.75

Kevin Letterly, ASDWA

Bio: Kevin Letterly is a Senior Policy Analyst with the Association of State Drinking Water Administrator and has been with ASDWA for four years. Some of his areas of focus include: AWOP, drinking water security issues, climate change, and lead testing in schools.

Myth-Busting the Drinking Water State Revolving Fund Program

Dallas Shattuck, EPA-OW

Summary: Water infrastructure funding is a top priority for drinking water systems. One of the largest sources of federal funding for water infrastructure is the Drinking Water State Revolving Fund (DWSRF). Furthermore, the recently passed Bipartisan Infrastructure Law (BIL) provides over \$30 billion to the DWSRF over the next five years. This presentation will provide an overview of the DWSRF, discuss the benefits available to drinking water systems by using the DWSRF, additional opportunities under the BIL, and “myth-busting” common misconceptions about the DWSRF program as they relate to small water systems.

Bio: Dallas Shattuck serves as a Physical Scientist in the Office of Ground Water and Drinking Water at the U.S. EPA in Washington, D.C. She is part of the DWSRF Team, where she helps with program implementation, technical assistance, training, and oversight. Previously, Dallas worked with the EPA’s DWSRF team as an ORISE Research Participant. Dallas has an M.A. in Environmental Resource Policy from the George Washington University in Washington, D.C. and B.S. degrees in Chemistry and Criminal Justice from Saint Francis University in Pennsylvania.

National Perspectives on the BIL

Stephanie Schlea, ASDWA

Summary: The Bipartisan Infrastructure Bill marked a historic investment of over \$50 billion dollars in federal funding for drinking water and wastewater systems. Among other initiatives, the BIL provides significant investments to address lead service lines and emerging contaminants, specifically per- and polyfluoroalkyl substances (PFAS). In this session, Stephanie will discuss the specific details of the BIL, how these components are impacting the drinking water sector, the challenges and successes we have seen thus far, and what lies ahead.

Bio: Stephanie Schlea is the Senior Water Policy Advisor for ASDWA. ASDWA's members are the drinking water program administrators in the 50 states, the five territories, the Navajo Nation, and the District of Columbia. Stephanie has more than six years of experience in water policy and regulation and leads ASDWA’s work on PFAS, environmental justice, and infrastructure. Prior to coming to ASDWA, Stephanie worked for the Association of Metropolitan Water Agencies (AMWA), which represents large public drinking water systems, as the Director of Regulatory and Scientific Affairs. Before AMWA, Stephanie oversaw the Commonwealth of Kentucky’s 401 Water Quality Certification program, as well as the state’s wetlands program. Stephanie has a B.S. in biology from Northern Kentucky University, an M.Sc. in forestry from Southern Illinois University and is currently pursuing a DrPH from the Johns Hopkins Bloomberg School of Public Health.

BIL Challenges and Opportunities

Michael Grange, Utah Department of Environmental Quality, Division of Drinking Water

Summary: States have been given a unique opportunity under the BIL to invest over \$50 billion in their water infrastructure nationwide. What challenges exist in getting these funds out the door and how can primacy agencies use this money to help the communities who need it most?

Bio: Michael joined the Division of Drinking Water in October 2006 and was promoted to Section Manager in October 2011. As the Technical Assistance Section Manager, he oversees the Operator Certification Program, the Backflow Technician Certification Program, and the Drinking Water State Revolving Fund Financial Assistance Programs offered by

the Division. Michael earned degrees in Chemical Engineering and Business Administration from the University of Utah. Prior to his work with DDW, Michael spent 15 years in the private sector as a laboratory technician, process engineer, and consulting engineer focusing on water and wastewater treatment and environmental assessment and remediation.

SESSION 3B – METHODS AND ANALYTICS

Moderator: Dan Hautman

Presenters: Hunter Adams; Matthew Alexander and Laura Meteer; and Linda Weavers

Training Hours: 1.75

Dan Hautman, EPA-OW

Bio: Dan serves as the Branch Supervisor for the Technical Support Branch (TSB) in the U.S. EPA, Office of Ground Water and Drinking Water, Standards and Risk Management Division. He has held a management position within the SRMD Cincinnati office since 2010. Prior to accepting this position, he served as the TSC Team Leader and senior chemist managing the direct federal implementation of the Unregulated Contaminant Monitoring Regulation (UCMR). He graduated with a B.S. in Chemistry from the University of Cincinnati in 1988 and has worked for the past 34 years on numerous EPA projects involving both organic and inorganic methods development, validation, environmental research initiatives and national contaminant occurrence studies. He is the author/co-author of over 15 technical manuscripts and 5 U.S. EPA drinking water analytical methods.

The Achilles' Heel of Water Quality Data: Sample Collection QA/QC

Hunter Adams, City of Wichita Falls (Texas)

Summary: Sample collection QA/QC is often viewed as being of little importance in the grand scheme of what we do in the water industry. However, poor sample collection QA/QC procedures can cause a chain reaction of issues in the life cycle of data. Water quality data integrity begins with sample collection, and it is important that operators and lab staff are trained properly to ensure that human error is minimized and data is reliable, defensible, and high quality.

Bio: Hunter is the Laboratory Supervisor, Deputy Quality Control Manager, and Technical Manager of Microbiology and Inorganic Chemistry for the Cypress Environmental Laboratory – City of Wichita Falls, TX. He holds a B.S. in Biology and an M.S. in Biology from Midwestern State University. He is a licensed Double A Water Operator and Wastewater Treatment Operator by the Texas Commission on Environmental Quality. He is also a Certified Water Professional and certified in Infrastructure Protection and Infrastructure Disaster Management by the Texas A&M Engineering Extension Service of Texas A&M University. He has worked in the planning and implementation of microbiological and analytical testing for Direct Potable Reuse and Indirect Potable Reuse systems for the City of Wichita Falls, TX. He has also successfully implemented a HAB and Taste and Odor Monitoring Program that has completely eliminated customer complaints for over 5 years. Hunter received the WEF Laboratory Analyst Excellence Award in 2020. He has authored and contributed to Journal AWWA, Opflow, AWWA Water Science, AWWA manuals, Bridges, Lab Matters, LCGC North America, and WE&T. Hunter serves as a TNI Microbiology Expert Committee Member, an APHL Environmental Laboratory Sciences Committee Member, and on several committees with AWWA and WEF.

Manganese Interference with Chlorine Methods

Matthew Alexander, EPA-OW and Laura Meteer, Queens University

Summary: This presentation will provide a summary of manganese occurrence in public water systems and describe its potential interference with commonly used methods to measure disinfectant residual. Case studies will be shared to demonstrate this issue. A flow chart to diagnose manganese interference will be introduced to help identify approaches to minimize manganese interference with commonly used methods, including sample pre-treatment, sample filtration, and alternative methods.

Bio: Matthew Alexander, P.E. is an engineer in the U.S. EPA's Office of Groundwater and Drinking Water in Cincinnati, Ohio. As a member of the Agency's Area-Wide Optimization Program (AWOP), he supports the development and demonstration of various optimization approaches and provides technical assistance related to disinfection and distribution system water quality, with particular emphasis on maintaining disinfectant residual, reducing DBP formation, and storage tank operations. Matthew holds a B.S. in civil engineering and an M.S. in environmental engineering from the University of Cincinnati. He is also a registered professional engineer in Ohio, has over 13 years of experience in drinking water, and is a member of the American Water Works Association.

Bio: After 21 years in the water industry, Laura has returned to school to pursue her Master's degree with the Drinking Water Quality Group and Queen's University. Her research focus areas are biostability, distribution system water quality, chlorine and chloramines residuals and operational monitoring. Laura is an active member of various AWWA committees and is currently volunteering on two manual revisions. Locally, she is a member of the OWWA Distribution Committee and the governmental Ontario Drinking Water Advisory Council.

Developing an Ozone Design Standard for Ohio Public Water Systems: Lowering Plan Approval Barriers for Small and Medium PWS

Linda Weavers, The Ohio State University/Ohio Water Resources Center

Summary: Small and medium sized PWSs in Ohio currently face time and financial barriers for implementing ozonation facilities to treat health relevant issues such as disinfection byproducts (DBPs). While ozone has been implemented for decades in the United States, it is considered an "emerging technology" in the State of Ohio due to the lack of extensive design criteria in the Ten State Standards (TSS). At present, prior to installation, a costly pilot-scale demonstration is required during Ohio EPA's Plan Approval process. To lower the regulatory requirements, cost, and time for Plan Approval, the Ohio Water Resources Center (Ohio WRC) at The Ohio State University has partnered with Ohio EPA and two project committees to develop an ozone design standard for Ohio PWSs. The standard aims to allow future ozone design using ozone bench-scale demonstration rather than pilot-scale for small to medium sized PWSs targeting organic contaminants. After review, Ohio EPA plans to adopt the standard as a supplement to the TSS.

This presentation will discuss the development of the standard, the established design criteria for future ozone facilities, and the creation of a filter TOC reduction model that will support future design targeting DBP precursors. The model has been created with extensive data analysis from a collection of pilot and full-scale ozone-BAF studies from facilities across the U.S. With the collaboration of Ohio WRC, Ohio EPA, design professionals, and public utilities, the ozone design standard will enable impactful improvements to finished drinking water quality in Ohio and potentially beyond.

Bio: Linda Weavers holds the John C. Geupel Endowed Chair and is Professor in the Department of Civil, Environmental and Geodetic Engineering at The Ohio State University. In addition, Dr. Weavers is co-Director of the Ohio Water Resources Center, the federally authorized and state-designated Water Resources Research Institute for the State of Ohio. Dr. Weavers' research is multi-pronged with expertise in developing water and hazardous waste treatment technologies, promoting innovation in the water industry and determining fate of emerging contaminants in water systems. She is a fellow and past-president of the Association of Environmental Engineering and Science Professors (AEESP).

SESSION 4A – EQUITY AND ENVIRONMENTAL JUSTICE

Moderator: Ashley Voskuhl

Presenters: Allison Smart, Larry Taylor, and Leslie Moening

Training Hours: 1.75

Ashley Voskuhl, ASDWA

Bio: Ashley is a Senior Policy Analyst with the Association of State Drinking Water Administrators (ASDWA) focusing primarily on the lead and copper rule, regulatory implementation, engineering and standards, and compliance and enforcement. Prior to joining ASDWA in January 2022, Ashley spent 5 years as an environmental specialist with Ohio EPA's Division of Drinking and Ground Waters, working on regulatory development and implementation with a specific focus on the lead and copper rule, unregulated contaminants, and engineering standards. She previously worked at U.S. EPA's Office of Research and Development researching impacts of corrosion on lead in drinking water. Ashley received her B.S. in Chemical Engineering from The Ohio State University.

[State \(KY\) Perspective on Environmental Justice](#)

Larry Taylor, Kentucky Energy and Environment Cabinet

Summary: The Kentucky Energy and Environment will discuss the role that community demographics play in environmental decision-making and the processes of the regulatory agency. The cabinet has focused on incorporating the principles of Executive Order 12898 and subsequent federal actions to consider equity and environmental justice. Community demographics can influence methods of communication and early action to engage communities.

Bio: Larry Taylor is the Executive Advisor in the Energy and Environment Cabinet's Office of Legislative and Intergovernmental Affairs and assists with legislative, policy, and technical issues for the cabinet. Mr. Taylor has served in several roles in the cabinet including human health and ecological risk assessor, Director of the Division of Compliance Assistance, and as science and policy advisor to the Commissioner and the Department for Environmental Protection on high profile, multimedia, or cross-program projects that often involve multiple divisions. Larry has served as Toxic Release Inventory (TRI) coordinator, environmental justice coordinator, Quality Assurance Manager, departmental legislative contact, worked on public health outreach and nutrient reduction, and has represented the department or cabinet on various committees, task forces, and work groups to advance environmental protection in the Commonwealth. He also represents the cabinet on the Kentucky Emergency Response Commission and the Kentucky Pollution Prevention Center Board of Directors. His education is from the University of Kentucky with a B.S. in Biology and an M.S. in Biology with emphasis in toxicology and ecology.

[Artificial Intelligence Reduces Lead Exposure and Promotes Environmental Justice in Toledo, Ohio](#)

Mark Riley, City of Toledo

Summary: The continued presence of lead service lines highlights the large environmental justice impact of this problem: many older cities have not kept up with modernizing their infrastructure in older areas of the city, which are often where many low-income families and minority populations live, as is the case in Toledo. Thirteen zip codes within two miles of the downtown area have been categorized as high-risk for lead poisoning, with the result that children living in these zip code areas receive blood lead screenings. Toledo recently received a U.S. EPA grant to use machine learning to more effectively carry out a Lead Service Line (LSL) replacement program and education program to reduce lead exposure. This presentation will show how the statistical model is created and "This data-driven approach will prioritize the needs of citizens at highest risk of lead exposure."

Bio: Mark is the City of Toledo, Ohio, Administrator for the Department of Public Utilities, Division of Water Distribution. He oversees the City's Advanced Metering Infrastructure (AMI) projects and the LSL Replacement Program. The city has developed a multi-year, entire lead service replacement program, which consists of a series of actions that Toledo is undertaking to reduce or eliminate lead in drinking water at the customer's tap. In addition, this program aims to educate customers and residents with lead lines. Toledo has used Blue Conduit's Artificial Intelligence program for lead service line predictions to prioritize service line replacement based on risk in Toledo. Building on the inventory, the city has committed to replacing all of the lead service lines in the city, both public and private-side, free of cost to residents.

Mark received his B.A. in Business Administration and M.B.A. from Mount Vernon Nazarene University and completed the Ohio Certified Public Manager Program at The Ohio State University, School of John Glenn.

[Equitable Program for Lead Service Line Replacement: A Local Perspective](#)

Leslie Moening, Greater Cincinnati Water Works

Summary: The Flint crisis brought the lead in water hazard into the national spotlight. The Flint situation made Greater Cincinnati Water Works (GCWW) evaluate their current lead program and how the program could be improved. One early objective was how to create a lead service line replacement program and make it equitable and affordable for all people within the GCWW Service Area. This presentation will explain how the GCWW Enhanced Lead Program was created and how it included programs to assist the disadvantaged communities within Greater Cincinnati in replacing lead service lines.

Bio: Leslie Moening serves as the Lead Program Manager for Greater Cincinnati Water Works. She is responsible for overseeing the Enhanced Lead Service Line Replacement Program which proactively removes the lead in water hazard in Cincinnati. She manages a team of professionals and communication specialists who coordinate the replacements between the customers and contractors, do community outreach, oversee annual budgets and capital planning all to ensure future regulatory compliance. Previously she has held engineering positions at utilities in Ohio and Colorado managing capital water infrastructure projects from design through construction. She is a licensed professional engineer in Ohio and Colorado with over 24 years' experience in the water industry. She holds a Bachelor's in Civil Engineering from the University of Cincinnati. She has served in leadership positions within the Ohio American Water Works Association from the local level to the State Board of Directors.

SESSION 4B – CONTAMINANTS OF EMERGING CONCERN (CECs)

Moderator: Regan Murray

Presenters: Brenda Bowden; Phil Brandhuber; and Tom Waters and Nicholas Dugan

Training Hours: 1.75

Regan Murray, EPA-ORD

Bio: Regan Murray, Ph.D. is the director of the Water Infrastructure Division within the Center for Environmental Solutions and Emergency Response in EPA's Office of Research and Development. This division is made up of more than 70 engineers, chemists, biologists, and physical scientists who collaborate every day to solve problems associated with our nation's drinking water, stormwater, wastewater, and water reuse infrastructure. She has been with the EPA since 2003 as a researcher in the areas of drinking water security, sustainability, and resilience. Regan holds a Ph.D. in applied mathematics with a minor in hydrology and water resources.

Preparing For the Fifth Unregulated Contaminant Monitoring Rule (UCMR 5)

Brenda Bowden, EPA-OW

Summary: The U.S. EPA's Unregulated Contaminant Monitoring Rule (UCMR) provides national occurrence data for unregulated contaminants in drinking water to protect public health and support future regulatory decisions. The fifth UCMR cycle ("UCMR 5") requires monitoring for 30 chemical contaminants between January 2023 and December 2025. This presentation provides: an overview of the UCMR 5 program, a summary of public water systems (PWSs) subject to the rule requirements, the analytes to be monitored (29 per- and polyfluoroalkyl substances [PFAS] and lithium), monitoring locations and frequency, reporting requirements, the Safe Drinking Water Accession and Review System (SDWARS), and a preview of the draft sampling instructions. It is important that small PWSs and States/Tribes/Territories learn about the UCMR 5 requirements now to properly prepare for monitoring.

Bio: Brenda Bowden has worked as an environmental scientist with EPA's Office of Water, Office of Groundwater and Drinking Water in Cincinnati, Ohio for more than 15 years. She began her research on the first Unregulated Contaminant Monitoring Rule (UCMR 1) as an Oak Ridge Institute for Science and Education (ORISE) research fellow and has held various roles throughout every round of UCMR monitoring. She is currently the UCMR rule manager. Brenda holds a B.S. in Environmental Science and Toxicology from Ashland University and a M.En. in Environmental Science concentrated on Hazardous Waste and Toxicology from Miami University.

What Utilities and Regulators Should Know About Manganese

Phil Brandhuber, Brandhuber Water Quality & Treatment LLC

Summary: Manganese has long been known to discolor water and stain surfaces, reducing consumer confidence in the safety of their water. But recent research into the adverse health effects of manganese exposure on children and the detrimental role of manganese on distribution system water quality shines a new light on the management of manganese in drinking water. This presentation is intended to summarize key points utilities and regulators should know about manganese, so they can better assess how the changing manganese picture could affect them in the future.

Bio: Phil Brandhuber, Ph.D. specializes in drinking water quality and treatment, focusing on the behavior of inorganic contaminants in drinking water. He has more than 20 years of experience as a consultant, working for McGuire Environmental and HDR Engineering. Currently he is the owner of his own firm, Brandhuber Water Quality & Treatment LLC. Phil is the chair of the American Water Works Association Manganese Subcommittee and has been the principal or co-principal investigator for ten drinking water related research projects sponsored by the Water Research Foundation (WRF) and other agencies. He was the principal investigator for the WRF projects, Guidance for the Treatment of Manganese and Legacy of Manganese Accumulation in Water Systems. Phil holds a Bachelor's in Mechanical Engineering from the University of Dayton as well as a Master's and Doctorate degrees in Environmental Engineering from the University of Colorado Boulder.

HABs/Cyanotoxins Treatment

Tom Waters, EPA-OW and Nicholas Dugan, EPA-ORD

Summary: This presentation will discuss the basics of cyanobacterial photosynthesis, removal of cyanobacterial cells through conventional treatment processes, adsorption of cyanobacterial toxins by activated carbon, and removal of toxins by oxidation.

Bio: Thomas Waters, P.E. is an environmental engineer with the U.S. EPA Office of Ground Water and Drinking Water, Technical Support Branch in Cincinnati, OH. He works on EPA's drinking water optimization program, providing technical assistance to primacy agencies and water systems, with a particular focus on water treatment for cyanobacteria and their associated cyanotoxins, membrane treatment, and distribution system optimization. Tom is a licensed professional engineer in Ohio with 14 years of experience in drinking water treatment and distribution.

Bio: Nicholas Dugan, P.E. is an environmental engineer in the U.S. EPA's Office of Research and Development, Center for Environmental Solutions and Emergency Response in Cincinnati, Ohio. He conducts bench- and pilot-scale treatment studies to evaluate the removals of cyanobacteria, cyanobacterial toxins, nitrate, perchlorate, pesticides, and *cryptosporidium*. Nick is licensed as a Professional Engineer in Ohio and is a member of American Water Works Association.

SESSION 5A – WATER QUALITY

Moderator: Michael Finn

Presenters: April Byrne; Michael Mercado and Oluwaseun Ogbeni; and Daniel Ma

Training Hours: 1.75

Michael Finn, EPA-OW

Bio: Michael Finn, P.E. is an environmental engineer with U.S. EPA's Office of Groundwater and Drinking Water, Drinking Water Protection Branch. He is currently working with states and public water systems on the implementation of the Surface Water Treatment Rules, the Disinfection Byproducts Rules, the Groundwater Rule, and the Lead and Copper Rule, as well as microbial and other contaminant treatment issues, alternative treatment technologies, and potable water reuse. Mike has 26 years of experience in public water supplies and drinking water treatment and serves as a national subject matter expert in the areas of disinfection and microbial treatment of drinking water. He is a licensed professional engineer in California and Maryland and a certified water treatment operator.

Funding Integration Tool for Source Water: Build a Funding Plan That Fits Your Source Water Needs!

April Byrne, EPA-OW

Summary: Protecting sources of drinking water is the first step in a multi-barrier approach to providing safe drinking water. Preventing source water contamination helps reduce treatment costs and may avoid or defer the need for complex treatment. There are multiple sources of federal funding to assist communities to develop and implement source water protection plans. The Funding Integration Tool for Source Water (FITS) is a tool that helps users integrate various federal funding sources, including the Drinking Water and Clean Water State Revolving Funds (SRFs), to support activities that protect sources of drinking water. Users may navigate between source water protection funding sources, planning and funding coordination information, and examples of funding sources in action. A live demo will include a mock drinking water challenge in which participants learn how to develop a source water protection funding plan using FITS. The goal is to assist drinking water stakeholders to 1) plan for the long-term improvement and/or protection of drinking water, 2) identify potential funding sources, 3) build or strengthen partnerships, and 4) understand the SRFs' roles in protecting drinking water sources.

Bio: April Byrne joined the Source Water Protection program at EPA HQ as a Physical Scientist in 2022 after a yearlong ORISE Internship on the Source Water Protection team. Her main duties include building collaborative partnerships with other EPA programs and federal agencies, like National Resource Conservation Service, U.S. Forest Service, and more. She also performs data analysis on federally funded source water protection efforts and serves on the Drinking Water Mapping Application to Protect Source Water (DWMAPS) team. She has a B.A. and B.S.W. from University of Georgia and an M.S. in Environmental Science and M.P.A. from Indiana University.

Taking Control of the Lead: A Case Study of the Los Angeles Department of Water and Power's Control Gorge Power Plant

Michael Mercado and Oluwaseun Ogbeni, Los Angeles Department of Water and Power

Summary: Historical Lead and Copper Rule data at Los Angeles Department of Water and Power's (LADWP's) Control Gorge Power Plant water system had been widely variable and exceedances in the action level for lead had attracted the attention of the regulatory agency. This session will discuss the actions implemented by LADWP to mitigate the elevated levels of lead in this small water system using established and cost-effective methods.

Bio: Michael Mercado is an Environmental Supervisor at LADWP and has nine years' experience in public drinking water supply and distribution and oversees regulatory compliance for LADWP-owned and operated small water systems. His responsibilities include regulatory compliance, coordination of operations and treatment activities, and responding to water quality incidents and emergencies. He has participated in scientific advisory groups and provided input on several proposed rules, including the EPA's Lead and Copper Rule Revision. Mike has a B.S. in Biology and maintains a water distribution operator certification.

Bio: Oluwaseun Ogbeni is an Environmental Specialist at the LADWP where he uses his ten-year background and licensing in, wastewater and water distribution to assist with maintaining regulatory compliance for the nation's largest

municipal utility, with its environmental regulators. As a subject matter expert, Oluwaseun has led and coordinated various regulatory compliance activities including the annual Lead and Copper Rule technical reports for LADWP's water systems. He was one of LADWP's main contributors to the EPA proposed revisions to the Lead and Copper Rule where he reviewed and submitted recommendations to the EPA on the regulation. Oluwaseun holds Master's degrees in both Environmental Management and Public Administration.

Measuring and Modeling Systems Factors That Impact Tap Water Quality and Public Perceptions of Drinking Water Systems: Pilot Study in Scioto County, Ohio

Daniel Ma, The Ohio State University

Summary: This session will provide an overview of a study performed in Scioto County, OH to investigate quality and customer perception of tap water in rural water distribution systems. Through this project, our aim was to gain an understanding of systemic factors that impact tap water quality. We developed an approach that utilities can use to partner with researchers and local stakeholders to develop relationships with their communities and evaluate customers' perceptions of tap water quality. The presentation will highlight results from the analysis of 24 water samples and interviews, next research steps, and findings for utilities.

Bio: Daniel Ma is an Environmental Engineering Ph.D. student working under Dr. Natalie Hull at The Ohio State University. He holds a B.S. in Civil and Environmental Engineering from Messiah College and an M.S. in Civil Engineering from The Ohio State University. Prior to joining the Hull Lab, Daniel focused on international development work designing drinking water solutions for small communities and testing the performance of point-of-use water treatment devices. His current work includes quantitative microbial risk assessment, bench-scale UV disinfection experiments, wastewater surveillance of SARS-CoV-2, and community engagement and education in water quality in rural water systems. In all of his work, Daniel's focus has been on the design and evaluation of treatment technologies for controlling microbial contaminants and impacts of water systems on communities.

SESSION 5B – PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) I

Moderator: Thomas Speth

Presenters: Steve Wendelken, Will Adams, and Dan Tettenhorst; Adam Cadwallader; and Ashley Voskuhl

Training Hours: 1.75

Thomas Speth, EPA-ORD

Bio: Thomas Speth, P.E., Ph.D. is the associate director for science in the U.S. EPA's Center for Environmental Solutions and Emergency Response, one of four research centers in EPA's Office of Research and Development, where he is leading efforts on PFAS, lead, and small water systems. He is a professional engineer who has worked in the field of water-treatment research at EPA since 1986. Over his career, Tom has been active in numerous organizations, such as the American Water Works Association and the Water Research Foundation, where he has served as Trustee, Chair, and EPA Liaison on numerous divisions, committees, and advisory boards.

PFAS Drinking Water Methods: Past, Present, and Future

Steve Wendelken and Will Adams, EPA-OW and Dan Tettenhorst, EPA-ORD

Summary: This presentation will outline the history of drinking water PFAS method development by EPA and explore current efforts that are underway to address the challenges of PFAS analysis.

Bio: Steve Wendelken, Ph.D. is currently serving as the senior analytical chemist for the U.S. EPA Technical Support Center. Additionally, he is the project officer for the Analytical Laboratory Support contract at EPA's research facility in Cincinnati, Ohio. He has over 24 years of method development experience with the last nineteen years being spent at the OGWDW Laboratory. During this time, he has worked as a senior analytical chemist and principal investigator on multiple EPA drinking water methods. His background encompasses a broad number of analytical techniques including GC, GC/MS, GC/AED, LC, LC/MS/MS, CE, UV-Vis, SPE and electrochromatography.

Bio: Dr. Adams is a Chemist with the U.S. EPA, Office of Ground Water and Drinking Water, Technical Support Branch in Cincinnati, OH, where he is involved with drinking water method development and support for regulated and unregulated contaminants, the Drinking Water Alternate Test Procedure (ATP) Program evaluating new and updated drinking water methods for regulatory compliance monitoring, and the UCMR program as a technical and analytical method resource. He has 15 years of research experience in U.S. EPA analytical method development for drinking water contaminants with a focus on LC-MS/MS. He received a B.S. in Chemistry in 2001 and a Ph.D. in analytical chemistry in 2006 from The University of Alabama.

Bio: Mr. Tettenhorst is a Chemist with the U.S. EPA, Office of Research and Development, Water Infrastructure Division, Chemical Methods and Treatment Branch in Cincinnati, OH, where he is involved with the development of standardized analytical methods for organic chemicals in drinking water and ambient water. He provides technical expertise regarding analytical methods to support the CCL and UCMR programs. He has 12 years of research experience in U.S. EPA analytical method development for drinking water contaminants using solid phase extraction (SPE) and liquid chromatography/tandem mass spectrometry (LC/MS/MS). He is co-author on four published drinking water methods specifically for PFAS, harmful algal toxins, and various pesticides and pesticide degradates. Prior to his career at the EPA, he was a Laboratory Technical Manager for commercial environmental laboratories. He received a B.S. in Chemistry in 1998 from the University of Cincinnati.

Predicting Occurrence Based on State Data and the Third Unregulated Contaminant Monitoring Rule (UCMR 3)

Adam Cadwallader, EPA-OW

Summary: Per- and polyfluoroalkyl substances (PFAS) in drinking water are currently a key focus area of public health concern in the United States. While occurrence data have been and continue to be collected, the limited number of detections above the reporting limit in nationally representative datasets leaves considerable uncertainty in estimates of national exposure. This presentation describes the development of a Bayesian hierarchical model for estimating national occurrence of four PFAS (PFOS, PFOA, PFHxS, and PFHpA) that were monitored during the third cycle of U.S. EPA's Unregulated Contaminant Monitoring Rule (UCMR 3) between 2013 and 2015. The structure of the model allows for the incorporation of additional state data that have been collected since UCMR 3 with improved analytical methods. The

result is a model that balances a nationally representative structure with the ability to estimate occurrence at levels below UCMR 3 reporting limits.

Bio: Dr. Adam Cadwallader is a general engineer in the Risk Reduction Branch of the Standards and Risk Management Division within the Office of Ground Water and Drinking Water, where his work focuses primarily on PFAS and disinfection byproducts. Adam has 9 years of experience in the drinking water field across his Ph.D. and time at EPA. He came to EPA in 2018 as a postdoctoral ORISE fellow and transferred to an employee in 2019. Adam holds a B.S. in environmental engineering from Worcester Polytechnic Institute and an M.S. and Ph.D. in civil and environmental engineering from Carnegie Mellon University.

Current Status of PFAS Regulations and Advisories

Ashley Voskuhl, ASDWA

Summary: Challenges faced by states in the promulgation of state-specific regulations, as well as solutions and lessons learned, will be a critical source of information in the upcoming implementation of PFAS regulations at the national scale. This presentation will outline a variety of approaches taken by states to address PFAS in drinking water and will include a discussion of the many considerations that drove different states' approaches. The presentation will cover how those approaches relate to the newly released final and interim health advisories released by U.S. EPA, as well as the anticipated National Primary Drinking Water Regulations for PFAS.

Bio: Ashley is a Senior Policy Analyst with ASDWA focusing primarily on the lead and copper rule, regulatory implementation, engineering and standards, and compliance and enforcement. Prior to joining ASDWA in January 2022, Ashley spent 5 years as an environmental specialist with Ohio EPA's Division of Drinking and Ground Waters, working on regulatory development and implementation with a specific focus on the lead and copper rule, unregulated contaminants, and engineering standards. She previously worked at U.S. EPA's Office of Research and Development researching impacts of corrosion on lead in drinking water. Ashley received her B.S. in Chemical Engineering from The Ohio State University.

SESSION 6A – PATHOGENS

Moderator: Sandhya Parshionikar

Presenters: Vicente Gomez-Alvarez, Kirsten Studer, and Joe Uliasz

Training Hours: 1.75

Sandhya Parshionikar, EPA-ORD

Bio: Sandhya Parshionikar is a Senior Advisor in U.S. EPA's Office of Research and Development, Center for Environmental Solutions and Emergency Response in Cincinnati, OH. She has a Master's degree in Biochemistry and a Ph.D. in Microbiology from the University of Mumbai. Her research interest included bacteriology as well as molecular virology related to drinking water contamination. She also has 18 years of experience in drinking water policy and managing research and technical support related to drinking water contaminants (chemical and microbial) and treatment. She is the elected Vice-Chair of AWWA's Organisms in Water Committee.

Challenges and Perspectives of Studying Water Storage Tank Ecosystems in Distribution Systems

Vicente Gomez-Alvarez, EPA-ORD

Summary: Finished water storage facilities are tanks or reservoirs used to store water that will undergo no further treatment. Storage tanks are vulnerable to contamination, and excess water retention time may cause depletion of disinfectant residual which creates an environment favorable for microbial contamination. The current presentation evaluated the use of a field-based sampling and a pilot-scale experimental approach to understand the ecosystem of water storage tanks. An integrative approach was utilized to characterize the storage tank ecosystem and their microbiome. Adaptive traits that allow microbes to persist and respond to environmental changes, virulence and antimicrobial-associated genes are encoded at a genetic level. It is important to understand the biotic and abiotic characteristics of these systems which amplify the potential public health risk relative to the distribution system.

Bio: Vicente Gomez-Alvarez is a microbiologist at U.S. EPA-Cincinnati in the Water Systems Division with 20 years of experience in planning and executing a diverse and intensive research project to study the microbiome in built and natural environments. His research focuses on microbial ecology, including the application of genomic technologies and the use of computational and bioinformatics workflow platforms for the characterization of microbial communities. He has led research projects on technological solutions for economic and environmental sustainability. Vicente has a Ph.D. in microbiology from the University of Massachusetts-Amherst and a B.S. in industrial microbiology and an M.S. in biology from the University of Puerto Rico.

Microbial and Disinfection Byproducts (MDBP) Rules Revision Update

Kirsten Studer, EPA-OW

Summary: EPA is seeking input and information to inform potential regulatory revisions of eight National Primary Drinking Water Regulations (NPDWRs) included in five Microbial and Disinfection Byproducts (MDBP) rules following the third Six-Year Review. EPA hosted an initial virtual public meeting in October 2020 to solicit input on further improving public health protection from MDBPs in drinking water. Throughout 2021, EPA sought input relevant to any potential rule revisions through additional public meetings focusing on topics identified through public comments and information. EPA has requested the National Drinking Water Advisory Council (NDWAC or Council), a Federal Advisory Committee (FAC) established under the Safe Drinking Water Act (SDWA) of 1974, to provide the agency with advice and recommendations on potential revisions to the MDBP Rules. In addition, to support the work of the Council, EPA asked the NDWAC to form a working group to explore specific issues and identify potential MDBP rule revision options for the Council to consider in making recommendations to EPA. This presentation will provide an overview of the regulatory process, summary of public engagements, topics under consideration, and timeline with next steps.

Bio: Kirsten Studer is a Physical Scientist with the Office of Ground Water and Drinking Water Risk Reduction Branch in Washington, D.C. She joined EPA after receiving her doctorate from the University of North Carolina at Chapel Hill in 2020. She also received her M.S. in environmental engineering from the University of Massachusetts at Amherst.

Optimization Techniques to Improve MDBP Control

Joe Uliasz, Kentucky Energy and Environment Cabinet

Summary: This session will look at Kentucky's disinfection byproduct (DBP) compliance and how public water systems in the Commonwealth achieved an 86% reduction in DBP health-based violations. The presentation will outline Kentucky's implementation of the Area Wide Optimization Program (AWOP) and how its tools laid a path to improved compliance with DBPs as well as maintaining simultaneous compliance.

Bio: Mr. Uliasz studied electrical engineering and environmental science, which lead to a career in drinking water operations. Mr. Uliasz became a Class B certified drinking water operator in Florida and operated a 16 MGD treatment plant. His family later relocated to Kentucky where he received his certifications for Class IVA water treatment plant operator as well as Class IIID water distribution operator. He served as a water plant operator at Georgetown Municipal Water and then took a position as the manager for the Beech Fork Water Commission in Clay City, Kentucky. Subsequent to his employment as a water plant operator, he has worked for and owned companies that sold, installed and trained operators on equipment used for the treatment of both drinking water and wastewater. In all of these positions, Mr. Uliasz gained a great deal of experience in plant operations, chemical treatment, water distribution, and employee/operator training and customer service. Mr. Uliasz is also a U.S. Army veteran. He is now the Supervisor of the Technical Assistance Section for the Drinking Water Branch within the Division of Water.

SESSION 6B – PFAS II

Moderator: Jonathan Pressman

Presenters: Amy Klei; Brandon Kernen; and Jonathan Burkhardt and Levi Hauptert

Training Hours: 1.75

Jonathan Pressman, EPA-ORD

Bio: Jonathan Pressman, P.E., Ph.D. is the branch chief of the Drinking Water Management Branch of U.S. EPA, ORD, CESER's Water Infrastructure Division. Since joining EPA in 2005, his research has focused on process engineering for improving disinfection, reducing disinfection byproducts, characterizing NOM and most recently PFAS removal. Jonathan holds a B.S. in civil engineering from Cornell University and an M.S. and a Ph.D. in civil engineering from The University of Texas at Austin. He is a registered professional engineer in Ohio and Texas.

Occurrence of PFAS in Ohio

Amy Klei, Ohio Environmental Protection Agency

Summary: Ohio is one of a small number of states to conduct statewide sampling of all community and non-transient public water systems that produce drinking water. This ambitious effort resulted in sampling over 1550 public water systems serving over 90% of Ohio's population during a 10-month period. All samples were analyzed for 6 PFAS (PFOA, PFOS, PFNA, PFBS, PFHxS and GenX) and if PFAS was detected in finished water Ohio EPA completed three additional quarters of monitoring. While PFAS was detected in finished water at 82 public water systems, the overwhelming majority (94.5%) of systems did not have any PFAS detections.

Bio: Amy has served as Chief of Ohio EPA's Division of Drinking and Ground Waters since 2018 and has been with the agency for over 24 years. She is responsible for oversight of the Division programs characterizing and protecting Ohio's ground water resources and ensuring Ohio's citizens have access to adequate supplies of safe drinking water. Previous positions at the agency include Manager of the Harmful Algal Bloom section, Lake Erie Coordinator, Environmental Specialist and geologist positions in Source Water Protection, SDWA-CWA Coordination, and Underground Injection Control programs. Amy started her career at Ohio EPA in 1998 and has a B.S. in Geology from Denison University and a Master of Environmental Management in Water Resources from Duke University.

The Implementation of State PFAS Maximum Contaminant Levels (MCLs) in New Hampshire

Brandon Kernen, New Hampshire Department of Environmental Services

Summary: The drinking water in New Hampshire is substantially impacted by the occurrence of per- and polyfluoroalkyl substances (PFAS). PFAS have been emitted to the air over the last few decades and has contaminated the surface water and groundwater that is used for drinking water in the southern part of the state which is New Hampshire's population center. Additionally, local sources of PFAS contamination have been found at hundreds of sites throughout the state. New Hampshire has completed the testing of 1456 sources of drinking water for 1200 public water systems for PFAS. The session will present New Hampshire's PFAS regulatory program and actions taken to date to identify and reduce exposure to PFAS in drinking water.

Bio: Brandon Kernen is the Administrator of the Drinking Water and Groundwater Bureau at the New Hampshire Department of Environmental Services. He has over 30 years of professional experience and a graduate degree in Civil and Environmental Engineering from Tufts University and an undergraduate degree in Hydrology and Water Resources from the University of Arizona. He is a licensed Professional Geologist.

PFAS Treatment

Jonathan Burkhardt and Levi Hauptert, EPA-ORD

Summary: This talk discusses research and information associated with treatment of PFAS in drinking water. The presentation includes an overview of associated topics, specifics about current research, and a summary of how modeling can be used to estimate performance and cost of PFAS treatment using granular activated carbon and anion exchange resins.

Bio: Jonathan Burkhardt, Ph.D. is an environmental engineer with U.S. EPA's Office of Research and Development, Center for Environmental Solutions and Emergency Response. He began working with EPA in 2013 as an ORISE postdoctoral fellow and then joined EPA in 2015. His research at EPA has focused on modeling contaminant fate and transport in water distribution systems, premise plumbing systems, and modeling water treatment with granular activated carbon and ion exchange. Jon has supported Water Treatment Models, ETDOT, EPANET, EPANET-MSX, WNTR and PPMtools development to support research related to these systems. Jon holds a B.S., an M.S., and a Ph.D. in chemical engineering from the University of Cincinnati.

Bio: Dr. Hauptert earned his Ph. D. in chemistry from Purdue University where he studied nonlinear optical properties of crystals. He started working with EPA as an ORISE fellow in 2016 before joining the agency in 2019. His current research interests include modeling ion exchange filter performance and studying transport of contaminants in polymers.

SESSION 7A – LEAD AND COPPER

Moderator: Darren Lytle

Presenters: Hannah Holsinger, Christina Devine, and Patrick Smart

Training Hours: 1.75

Darren Lytle, EPA-ORD

Bio: Darren A. Lytle, Ph.D., P.E. is an environmental engineer with U.S. EPA's Office of Research and Development, Center for Environmental Solutions and Emergency Response in Cincinnati, Ohio. Since beginning work at EPA in 1991, Darren's primary goal has been to research the quality of drinking water. Over the years, he has investigated and published works on drinking water systems, including work on distribution system corrosion control and water quality (e.g., red water control, lead and copper corrosion control); filtration (emphasis on removal of particles, and microbial contaminants and pathogens from water); biological water treatment; and iron and arsenic removal. Darren holds a B.S. in civil engineering from the University of Akron (1990), an M.S. in environmental engineering from the University of Cincinnati (1991), and a Ph.D. in environmental engineering from the University of Illinois (2005).

EPA's Lead Service Line Inventory Guidance

Hannah Holsinger, EPA-OW

Summary: This presentation will provide an overview of EPA's Guidance for Developing and Maintaining a Service Line Inventory. The guidance was developed to assist water systems in developing and maintaining service line inventories and to provide states with needed information for oversight and reporting to EPA. The guidance provides best practices for inventory development and communicating information to the public; includes a template for water systems, states, and Tribes to use or adapt to create their own inventory; contains case studies on developing, reviewing, and communicating about inventories; and highlights the importance of prioritizing inventory development in disadvantaged communities and where children live and play.

Bio: Hannah Holsinger is the chief of the Regulatory Assessment and Development Branch in EPA's Office Ground Water and Drinking Water (OGWDW). Her branch is responsible for the development of the Lead and Copper Rule Improvements. She started in OGWDW as a public health fellow in 2009 and has had multiple roles including two details as acting associate branch chief for two branches in OGWDW's former Drinking Water Protection Division. She has previously worked on a wide range of drinking water projects including PFAS, harmful algal blooms and cyanotoxins, the Contaminant Candidate List, the Endocrine Disruptor Screening Program, and on emerging contaminants such as *Legionella*. Hannah has a B.S. in Biological Sciences with a second major in Food Science and Technology from Virginia Tech and a Master of Public Health, focusing on environmental health, from the University of Kentucky. She is currently a doctoral candidate at Johns Hopkins University focusing on environmental health and engineering.

Corrosion Test Methods: Review of Bench Top and Pilot Lead Corrosion Assessment Studies

Christina Devine, EPA-ORD

Summary: Bench top and pilot lead corrosion studies are gaining more interest, considering revisions and upcoming improvements to the Lead and Copper Rule. This presentation will review studies ranging from simpler month(s)-long bench top dump-and-fill stagnant water tests to more complicated year(s)-long intermittent flow pilot studies. With increasing complexity in design and operation, studies more closely approximated real plumbing conditions at increased cost, footprint, and duration. Comparison of bench top and pilot designs (in terms of lead test piece age/dimensions/configuration/replicates, study duration, sample collection, and other factors) can assist in the selection of a design that matches the needs and constraints of the study.

Bio: Christina Devine is an Oak Ridge Institute of Science and Education (ORISE) post-doctoral fellow at the U.S. EPA's Office of Research and Development, Center for Environmental Solutions and Emergency Response, in Cincinnati, Ohio. As a part of the Water Infrastructure Division her research is focused on lead in drinking water. Christina holds a B.S. in engineering science and mechanics and both an M.S. and Ph.D. in environmental engineering from Virginia Tech.

Case Study on Lead Service Line (LSL) Removal Approaches and Associated Costs

Patrick Smart, MSK Engineers

Summary: In 2017, Bennington, VT initiated a project to replace all the LSLs that included a rigorous LSL identification assessment program. This program includes a stepwise approach of records reviews, visual observation, fully flushed and sequential profile water sampling, and test excavations. This approach was applied to 159 “control” homes (99 LSL and 60 non-lead LSL sites). This presentation will focus on discussion of performance of each of these methods, selection of stepwise approach to SL IDENTIFICATION, and project costs.

Bio: Patrick Smart is an environmental engineer with MSK Engineers in Montpelier, Vermont. Mr. Smart has 16 years of professional experience where he has focused on environmental site remediation, inorganic water chemistry, and public drinking water regulations. Since joining MSK in 2020, he has managed the lead service line identification and replacement project for the Town of Bennington, VT. Previously, he supervised the State of Vermont’s Public Drinking Water Program’s engineering and sanitary survey sections. Pat has an M.S. in Environmental Engineering from the Colorado School of Mines in Golden, Colorado, and a B.S. in Environmental Engineering from the University of New Hampshire in Durham, NH.

SESSION 7B – RESILIENCE

Moderator: Sarah Bradbury

Presenters: Matt Umberg, Donna McNeil, and Emily Frary

Training Hours: 1.75

Sarah Bradbury, EPA-OW

Bio: Sarah Bradbury is a physical scientist with EPA's Drinking Water Protection Division in the Office of Water (OW), Office of Ground Water and Drinking Water (OGWDW) in Washington, D.C. She is currently working on implementation of the Consumer Confidence Rule, the Public Notice Rule, and is the project lead for the Consumer Confidence Report Rule revisions. In her 10+ years of experience, Sarah has had the opportunity to work on a variety of water resource topics, including total maximum daily loads, water quality sampling, and source water protection. Sarah holds a B.S. in oceanography from the University of Michigan and an M.S.E.S. in water resources and an M.P.A. in environmental policy and natural resource management from Indiana University's School of Public and Environmental Affairs.

How to Prepare for and Respond to Supply Chain Disruptions

Matt Umberg, EPA-OW

Summary: There have been a number of disruptions in the supply of chemicals the water and wastewater system sector uses for treatment, beginning in early 2020 and continuing through present day. There is also growing concern over availability of other products needed for the sector to conduct essential operations (e.g., pipe, fittings, pumps, motors). This presentation will highlight guidance and resources that EPA's Water Infrastructure and Cyber Resilience Division has developed to help utilities prepare for, and respond to, future supply chain disruptions, including the Supply Chain Resilience Guide, Chemical Suppliers and Manufacturers Locator Tool, EPA website with supply chain updates, EPA-hosted information sharing platform, and EPA technical assistance.

The applicability of authorities granted under SDWA Section 1441 and the Defense Production Act to supply chain disruptions will also be addressed.

Bio: Matt Umberg is an environmental engineer with U.S. EPA's Office of Ground Water and Drinking Water, Water Infrastructure and Cyber Resilience Division. Since joining EPA in 2010, Matt has supported the water and wastewater system sector in its response to supply chain issues and its implementation of online water quality monitoring programs. The supply chain support has consisted of direct technical assistance to water and wastewater systems as well as sharing of information related to ongoing disruptions with the sector. Matt holds a B.S. in civil/environmental engineering and a Master of Engineering degree in environmental engineering from the University of Cincinnati.

An Evaluation of Kentucky's Operator Workforce Survey and Small Systems Issues in Appalachia

Donna McNeil, University of Kentucky–Kentucky Water Resource Research Institute

Summary: The Appalachian Community Technical Assistance and Training (ACTAT) Program aids small water utilities in the Appalachian with a variety of free outreach, technical assistance, and training. The ACTAT's primary goal is to provide resources, tools, and assistance to support small utility efforts to provide safe and dependable water service while strengthening operations to become sustainable and improving economic development. Over the last six years utilities continue to struggle with key management areas such as financial viability, operational resiliency, customer communications, and recruiting and retaining operators. Working with the Kentucky Department for Environmental Protection, as well as industry stakeholders, the Kentucky Water Resources Research Institute at the University of Kentucky developed and implemented two online surveys to assess Kentucky's water utility workforce. The surveys were designed to identify the challenges and barriers that utilities face in recruiting and retaining drinking water and clean water operators. The presentation will summarize the results of the Kentucky Workforce Survey focusing on small drinking water systems and discuss the ACTAT program strategies to address the challenges of utilities in Appalachia, such as, developing utility improvement plans, developing computer models for distribution systems, and implementing AWWA's M36 water audit protocols to reduce water loss.

Bio: Donna McNeil is a Research Engineer with the Kentucky Water Resources Research Institute (KWRRRI) at the University of Kentucky. Prior to joining KWRRRI, Donna served as the Executive Director of the Kentucky Infrastructure

Authority, during which she served on two Legislative Task Forces focused on public water and wastewater infrastructure and small private wastewater systems. Additionally she was a former co-chair for the States/U.S. EPA State Revolving Fund Workgroup. Her experience includes working as a compliance specialist with the Kentucky Rural Water Association and as the manager of Kentucky's drinking water program within the Kentucky Division of Water. Donna has over 30 years of service helping drinking water and wastewater utilities staff, decision-makers, and consultants. Donna received a B.S. in Civil Engineering from the University of Kentucky.

Drought Resilience

Emily Frary, Utah Department of Environmental Quality

Summary: Utah has faced the worst droughts on record resulting in challenges for drinking water systems with both water supply and degraded water quality. Utah also has one of the highest population growth rates in the nation which puts additional strain on water sources. The session will cover Utah's drought resiliency initiatives and highlight examples of how water systems have dealt with drought through education, conservation, interconnections, water hauling, increased water monitoring and long-term water planning.

Bio: Emily Frary is an environmental scientist with Utah's Division of Drinking Water and has been there for 8 years. She currently manages the Nitrate, Arsenic, Radionuclide and Chemical Contaminant Rules. Emily also has experience managing Utah's Lead and Copper Rule and implementing the first Lead Testing in Schools Initiative in Utah. Emily has a B.S. in Chemistry and Materials Science, and an M.S. in Environmental Science from the University of Utah.

SESSION 8 – ASK THE EXPERTS, POSTERS, AND MODELS AND TOOLS DEMONSTRATIONS

Experts: Christopher Frey, Jonathan Pressman, Thomas Speth, Stephanie Schlea, Jennifer Best, Melissa Simic, Dan Tettenhorst, Laura Boczek, Hodon Ryu, Vicente Gomez-Alvarez, Darren Lytle, Simoni Triantafyllidou, Hannah Holsinger, Sarah Bradbury, Michael Finn

Posters: Corinne Wiesner-Friedman, Morgan McNeely, Riley Achtemeier, Matthew Pinelli, Megan Urbanic, Evan Crockett, Alexander Paul, Peyton Woodruff, Michelle Latham

Models and Tools Demonstrators: Jonathan Burkhardt, Feng Shang, Dave Wahman, Page Jordan

Training Hours: 1.0

Ask the Experts

Christopher Frey, EPA-ORD

Bio: Christopher Frey, Ph.D. is the Assistant Administrator for the Office of Research and Development of the U.S. EPA, effective May 2022. He also serves as the Agency Science Advisor. Before his confirmation, he served ORD as the Deputy Assistant Administrator for Science Policy. Prior to joining EPA, Dr. Frey was the Glenn E. and Phyllis J. Futrell Distinguished University Professor at North Carolina State University, where he served on the faculty since 1994. His research has focused on modeling and measurement of emission sources and air pollution exposure, and on quantification of uncertainty, variability, and sensitivity in modeling. Dr. Frey was an AAAS/EPA Environmental Science and Engineering Fellow in 1992. He served as exposure modeling advisor in ORD's National Exposure Research Laboratory from 2006 to 2007. He was a member of the EPA FIFRA Scientific Advisory Panel (2004 to 2006), a member of the EPA Clean Air Scientific Advisory Committee (CASAC) (2008 to 2012), chair of CASAC (2012 to 2015), and a member of the EPA Science Advisory Board (2012 to 2018). He has also served on committees and expert groups of the National Academies of Science, Intergovernmental Panel on Climate Change, and World Health Organization. Chris holds a B.S. in mechanical engineering from the University of Virginia, and a M.E. in mechanical engineering and a Ph.D. in engineering and public policy from Carnegie Mellon University.

Jonathan Pressman, EPA-ORD

Bio: Jonathan Pressman, P.E., Ph.D. is the branch chief of the Drinking Water Management Branch of U.S. EPA, ORD, CESER's Water Infrastructure Division. Since joining EPA in 2005, his research has focused on process engineering for improving disinfection, reducing disinfection byproducts, characterizing NOM and most recently PFAS removal. Jonathan holds a B.S. in civil engineering from Cornell University and an M.S. and a Ph.D. in civil engineering from The University of Texas at Austin. He is a registered professional engineer in Ohio and Texas.

Thomas Speth, EPA-ORD

Bio: Thomas Speth, P.E., Ph.D. is the associate director for science in the U.S. EPA's Center for Environmental Solutions and Emergency Response, one of four research centers in EPA's Office of Research and Development, where he is leading efforts on PFAS, lead, and small water systems. He is a professional engineer who has worked in the field of water-treatment research at EPA since 1986. Over his career, Tom has been active in numerous organizations, such as the American Water Works Association and the Water Research Foundation, where he has served as Trustee, Chair, and EPA Liaison on numerous divisions, committees, and advisory boards.

Stephanie Schlea, ASDWA

Bio: Stephanie Schlea is the Senior Water Policy Advisor for ASDWA. ASDWA's members are the drinking water program administrators in the 50 states, the five territories, the Navajo Nation, and the District of Columbia. Stephanie has more than six years of experience in water policy and regulation and leads ASDWA's work on PFAS, environmental justice, and infrastructure. Prior to coming to ASDWA, Stephanie worked for the Association of Metropolitan Water Agencies (AMWA), which represents large public drinking water systems, as the Director of Regulatory and Scientific Affairs. Before AMWA, Stephanie oversaw the Commonwealth of Kentucky's 401 Water Quality Certification program, as well as the state's wetlands program. Stephanie has a B.S. in biology from Northern Kentucky University, an M.Sc. in forestry

from Southern Illinois University and is currently pursuing a DrPH from the Johns Hopkins Bloomberg School of Public Health.

Jennifer Best, EPA-OW

Bio: Jennifer Best is a microbiologist with EPA's Office of Ground Water and Drinking Water, Technical Support Branch in Cincinnati Ohio. Jennifer provides microbiological technical support for regulatory and programmatic activities. Jennifer has been with the Agency since 2001.

Melissa Simic, EPA-OW

Bio: Melissa Simic has been a physical scientist with U.S. EPA for 13 years. She is currently working in OGWDW's TSC as the implementation team leader for the Unregulated Contaminant Monitoring Rule (UCMR). Melissa holds a B.S. in cell and molecular biology from Oklahoma State University and an M.S. in environmental epidemiology, exposure, and risk from Harvard University.

Dan Tettenhorst, EPA-ORD

Bio: Mr. Tettenhorst is a Chemist with the U.S. EPA, Office of Research and Development, Water Infrastructure Division, Chemical Methods and Treatment Branch in Cincinnati, OH, where he is involved with the development of standardized analytical methods for organic chemicals in drinking water and ambient water. He provides technical expertise regarding analytical methods to support the CCL and UCMR programs. He has 12 years of research experience in U.S. EPA analytical method development for drinking water contaminants using solid phase extraction (SPE) and liquid chromatography/tandem mass spectrometry (LC/MS/MS). He is co-author on four published drinking water methods specifically for PFAS, harmful algal toxins, and various pesticides and pesticide degradates. Prior to his career at the EPA, he was a Laboratory Technical Manager for commercial environmental laboratories. He received a B.S. in Chemistry in 1998 from the University of Cincinnati.

Laura Boczek, EPA-ORD

Bio: Laura Boczek is a research microbiologist for the U.S. EPA's ORD, CESER. Her research areas have focused on disinfection efficacy of various microorganisms in drinking water, including the study of premise plumbing pathogens with an emphasis on *Legionella*; specifically, the ecology of these organisms, understanding how they persist, and what steps can be taken to mitigate the risk of infection to insure public health protection. She has also been involved with antibiotic resistance studies in various environmental matrixes and with pathogens and method development in biosolids. Laura holds a B.S. in biological science from Northern Kentucky University and an M.S. in biological science from the University of Cincinnati.

Hodon Ryu, EPA-ORD

Bio: Hodon Ryu, Ph.D. is a chemical engineer/microbiologist in the U.S. EPA's, ORD, CESER in Cincinnati, Ohio and has been with EPA since 2009. His main research interests lie in health-related environmental microbiology and biotechnology, particularly focusing on interdisciplinary research (i.e., hybrid engineering and microbiology studies). More recently, he has conducted a study on inactivation efficacy of waterborne pathogens using germicidal multiple-wavelength UV-LEDs. He is a member of EPA's Pathogen Equivalency Committee and CCL5 Microbial Workgroup. Also, he is a recipient of the EPA 2018 Trudy A. Speciner Award for advancing environmental protection. Hodon has served on the international editorial board of Journal of Water and Health and Journal Water. He has published more than 90 papers in peer-reviewed journals and presented over 100 abstracts in international and domestic conferences. Hodon received his doctoral degree from Arizona State University.

Vicente Gomez-Alvarez, EPA-ORD

Bio: Vicente Gomez-Alvarez is a microbiologist at U.S. EPA-Cincinnati in the Water Systems Division with 20 years of experience in planning and executing a diverse and intensive research project to study the microbiome in built and natural environments. His research focuses on microbial ecology, including the application of genomic technologies and the use of computational and bioinformatics workflow platforms for the characterization of microbial communities. He

has led research projects on technological solutions for economic and environmental sustainability. Vicente has a Ph.D. in microbiology from the University of Massachusetts-Amherst and a B.S. in industrial microbiology and an M.S. in biology from the University of Puerto Rico.

Darren Lytle, EPA-ORD

Bio: Darren A. Lytle, Ph.D., P.E. is an environmental engineer with U.S. EPA's Office of Research and Development, Center for Environmental Solutions and Emergency Response in Cincinnati, Ohio. Since beginning work at EPA in 1991, Darren's primary goal has been to research the quality of drinking water. Over the years, he has investigated and published works on drinking water systems, including work on distribution system corrosion control and water quality (e.g., red water control, lead and copper corrosion control); filtration (emphasis on removal of particles, and microbial contaminants and pathogens from water); biological water treatment; and iron and arsenic removal. Darren holds a B.S. in civil engineering from the University of Akron (1990), an M.S. in environmental engineering from the University of Cincinnati (1991), and a Ph.D. in environmental engineering from the University of Illinois (2005).

Simoni Triantafyllidou, EPA-ORD

Bio: Simoni Triantafyllidou, Ph.D. is an environmental engineer with U.S. EPA's Office of Research and Development, Center for Environmental Solutions and Emergency Response in Cincinnati, OH. Her research interests include aquatic chemistry, corrosion science, drinking water quality/treatment, sustainable drinking water infrastructure (premise plumbing/distribution systems) and public health. She has authored/co-authored more than 30 publications on various scientific aspects of these research areas. At EPA, Simoni is primarily conducting research on metallic corrosion and inorganic contaminants in drinking water. She holds both an M.S. and a Ph.D. in environmental engineering from Virginia Tech and is the recipient of First Place M.S., Thesis Awards by the Association of Environmental Engineering and Science Professors (AEESP) and by the American Water Works Association (AWWA), an Outstanding Ph.D. Dissertation Award by AEESP, and Best Paper Awards from the journals Environmental Science and Technology, Journal AWWA and AWWA's Opflow Periodical. She is the Chair of AWWA's Committee, Premise Plumbing: Beyond the Meter.

Hannah Holsinger, EPA-OW

Bio: Hannah Holsinger is the chief of the Regulatory Assessment and Development Branch in EPA's Office Ground Water and Drinking Water (OGWDW). Her branch is responsible for the development of the Lead and Copper Rule Improvements. She started in OGWDW as a public health fellow in 2009 and has had multiple roles including two details as acting associate branch chief for two branches in OGWDW's former Drinking Water Protection Division. She has previously worked on a wide range of drinking water projects including PFAS, harmful algal blooms and cyanotoxins, the Contaminant Candidate List, the Endocrine Disruptor Screening Program, and on emerging contaminants such as *Legionella*. Hannah has a B.S. in Biological Sciences with a second major in Food Science and Technology from Virginia Tech and a Master of Public Health, focusing on environmental health, from the University of Kentucky. She is currently a doctoral candidate at Johns Hopkins University focusing on environmental health and engineering.

Sarah Bradbury, EPA-OW

Bio: Sarah Bradbury is a physical scientist with EPA's Drinking Water Protection Division in the Office of Water (OW), Office of Ground Water and Drinking Water (OGWDW) in Washington, D.C. She is currently working on implementation of the Consumer Confidence Rule, the Public Notice Rule, and is the project lead for the Consumer Confidence Report Rule revisions. In her 10+ years of experience, Sarah has had the opportunity to work on a variety of water resource topics, including total maximum daily loads, water quality sampling, and source water protection. Sarah holds a B.S. in oceanography from the University of Michigan and an M.S.E.S. in water resources and an M.P.A. in environmental policy and natural resource management from Indiana University's School of Public and Environmental Affairs.

Michael Finn, EPA-OW

Bio: Michael Finn, P.E. is an environmental engineer with U.S. EPA's Office of Groundwater and Drinking Water, Drinking Water Protection Branch. He is currently working with states and public water systems on the implementation of the Surface Water Treatment Rules, the Disinfection Byproducts Rules, the Groundwater Rule, and the Lead and Copper

Rule, as well as microbial and other contaminant treatment issues, alternative treatment technologies, and potable water reuse. Mike has 26 years of experience in public water supplies and drinking water treatment and serves as a national subject matter expert in the areas of disinfection and microbial treatment of drinking water. He is a licensed professional engineer in California and Maryland and a certified water treatment operator.

Posters

Quantifying microbial impacts from spatially distributed sources with network-based land-use regression: implications to drinking water sources

Summary: This poster presents land-use regression approaches that can be helpful to characterizing transport stochastically and identifying the impacts of spatially distributed sources on microbial contamination to potential drinking water sources. Two examples of the application of these approaches are provided: 1) a series of river networks that are tributaries to the Great Lakes, a major drinking water source and 2) in sewer networks, which may be important to understanding impact of leaky sewer on microbial risks in drinking water distribution systems.

Corinne Wiesner-Friedman, EPA-ORD

Bio: Corinne Wiesner-Friedman is a postdoctoral ORISE fellow at the U.S. EPA Office of Research and Development in Cincinnati, OH. She received her Ph.D. in Environmental Sciences and Engineering in the Gillings School of Global Public Health from UNC-Chapel Hill in 2021 where she developed network-based, land-use regression approaches to understand the impacts of spatial and temporal factors on microbial contamination in water, on surfaces, and in the air. Her current projects include evaluating spatial and temporal variation of microbial responses in sewer networks with applications to wastewater-based surveillance and assessing factors contributing to microbial stormwater and floodwater quality.

Characterization of Microbial Water Quality Using Molecular Technology in Model Home Plumbing System

Summary: Opportunistic premise plumbing pathogens (OPPPs) can be difficult to remove via conventional water treatment methods. When testing the efficiency of different treatment methods, it is important to have a reliable way to identify and quantify these OPPPs. This poster demonstrates how qPCR and DNA sequencing can be used as effect methods to monitor microbial populations.

Morgan McNeely, EPA-ORD

Bio: Morgan McNeely is a biologist with the U.S. EPA's Office of Research and Development, Center for Environmental Solutions and Emergency Response in Cincinnati, Ohio. Since joining the agency, she has aided in various studies relating to water quality issues including work with home plumbing systems, biosolids, and harmful algal blooms. In addition, she has worked in quality assurance and metrology. Morgan has a B.S. in biology from Thomas More University with a concentration in ecology.

Full-Scale Home Plumbing System Pilot Plant

Summary: In 2012, a full-scale home plumbing system (HPS) simulating water usage by a family of four people was constructed at EPA's research facility in Cincinnati, OH. HPS aims to help with understanding chemical and microbiological impacts on home plumbing systems and how prolonged stagnation, HPS modifications, and yearly degradation due to normal water usage affects residents water quality.

Riley Achtemeier, EPA-ORD

Bio: Riley Achtemeier is an ORISE Participant at the U.S. EPA Office of Research and Development in Cincinnati, OH. She received her B.S. in Environmental Science from University of Wisconsin-Madison in May of 2021. Her research focus includes lead removal from point of use filters, *legionella* mitigation within home plumbing, and lead service line identification. In addition to research, Riley maps treatment plant data to help inform state and local governments, assists in water quality emergency response, and supports her mentor in technical assistance.

Lead Exposure Assessment Device

Summary: When a water system needs to replace lead service lines, multiple different water sampling methods are employed to identify which service lines contain lead and which do not prior to excavation. This poster discusses the

process and potential benefits of a new method currently in development; loading and extracting lead from point-of-use filters to obtain samples and identify lead service lines.

Matthew Pinelli, EPA-ORD

Bio: Matthew Pinelli is an ORAU participant with U.S. EPA's Office of Research and Development, Center for Environmental Solutions and Emergency Response. His research mainly involves particulate and soluble lead behavior, often associated with filtration effectiveness. His other work includes organizing and analyzing field data, maintaining EPA's home plumbing system and associated database, and 3D printing experimental apparatus and patent models. He obtained a B.S. in chemical engineering and a minor in chemistry from the University of Toledo.

Evaluating Targeted Monitoring Approaches for Drinking Water Lead Sampling

Summary: This poster discusses several different types of drinking water lead sampling, including First Draw, Random Daytime, Sequential, and Manual Composite Sampling in detail through visual aids and sampling comparison data. There is no universal lead sampling approach for drinking water. It is important to understand the objectives of the sampling event to properly choose the sampling approach to be used, including regulatory and compliance sampling, sampling for lead source assessment/lead service line (LSL) identification, and exposure-assessment sampling.

Megan Urbanic, EPA-ORD

Bio: Megan Urbanic is an ORISE Participant at the U.S. EPA Office of Research and Development, Center for Environmental Solutions and Emergency Response in Cincinnati, OH. She received her B.S. in Biological Sciences, with a minor in Chemistry, from the University of Cincinnati in May of 2020. She works under mentors Dr. Darren Lytle, Laura Boczek, and Daniel Williams. Her research is primarily focused in microbiology, but she has also shown interest and done work on various lead sampling and monitoring studies. Her work at the EPA has included a *legionella* mitigation study within a simulated home plumbing system, an HPC method comparison, a lead service line identification study using multiple lead sampling approaches, a full-scale water treatment plant monitoring study, and she plans on helping with a *legionella* disinfection study later this year. In addition to research, Megan has assisted in data collection, management, and producing various data outputs for high-technical summaries, reports, and presentations.

Accumulation and Release of Contaminants from Old Cast Iron Pipe Section

Summary: This poster presents data on the accumulation and release of contaminants from cast iron under differing experimental water chemistry conditions on a laboratory recirculating pipe system.

Evan Crockett, EPA-ORD

Bio: Evan Crockett is an ORAU contractor who has been working with EPA's Office of Research and Development at the AWBERC center in Cincinnati, Ohio since 2019. Evan works with his mentor Darren Lytle on analyzing iron pipe corrosion scale and the effects of water conditions on the pipe scale. Evan holds a B.S. in Chemical Engineering and in Chemistry from Ohio University.

Summary of Current Research in the Effect of Phosphates on Lead Particles in Water

Summary: Lead particles are an area of focus as particle formation and release is not fully understood. This poster presents research focused on the interactions of orthophosphate and polyphosphate and their effects on particles properties.

Alexander Paul, EPA-ORD

Bio: Alexander Paul is a ORAU Drinking Water Researcher at the U.S. EPA Office of Research and Development in Cincinnati, OH. He received his B.S. in Environmental and Ecological Engineering with a minor in Environmental Policy from Purdue University in May 2021. His research focus is on lead particles and studying how different water chemistry and conditions affect formation, properties, and filterability. He also researches lead removal from point of use filters and lead service line identification. In addition to research, he assists in analyzing water samples and provides technical assistance for communities and his mentor.

Comparing Nitrate Removal Efficiency Between Gravel and PVC Biocarriers

Summary: This poster illustrates the comparison of nitrate removal in anaerobic biological contactors with two different biocarriers. The biocarriers used in this project were gravel, which is a cheaper material, and PVC, a comparatively more expensive material with a higher surface area.

Peyton Woodruff, EPA-ORD

Bio: Peyton Woodruff is an ORISE Research Participant with U.S. EPA's Office of Research and Development, Center for Environmental Solutions and Emergency Response in Cincinnati, Ohio. Her research interests include drinking water quality, environmental justice, and microbial contaminants. She graduated from Xavier University with a B.S. in Environmental Science in 2017. Since graduating, Peyton has worked in professional laboratories, in various science fields, and co-authored papers focused on microbiology, agronomy, and molecular sciences.

Small Drinking Water Systems: Engaging Stakeholders Through Targeted Outreach

Summary: This poster highlights EPA's outreach efforts, including training and workgroup opportunities.

Michelle Latham, EPA-ORD

Bio: Michelle Latham is a biologist with EPA's Office of Research and Development, Immediate Office of the Assistant Administrator, where she has led the outreach and stakeholder engagement support for the cross-cutting national research programs since 2019. Prior to her current position, she served as the technical communications and outreach lead for ORD's Safe and Sustainable Water Resources Research Program from 2014-2019 and as the technical communications lead for the Water Supply and Water Resources Division of ORD's National Risk Management Research Laboratory from 2008-2014. A large portion of Michelle's efforts at EPA focus on drinking water, particularly small systems. Michelle holds an M.Ed., a B.S. in Biology, and a B.L.A. with a biology minor from Xavier University; an A.A.S. from Shoreline Community College; and a C.G. in Advanced Medical Laboratory Technology from the Naval School of Health Sciences.

How Many Small Systems are in Your State/Territory and Region?

Summary: This poster displays the number of active small drinking water systems in the United States per state/territory and EPA Region as of Quarter 2 of Fiscal Year 2019. Systems are broken out by medium, small, and very small

Michelle Latham, EPA-ORD

Bio: Michelle Latham is a biologist with EPA's Office of Research and Development, Immediate Office of the Assistant Administrator, where she has led the outreach and stakeholder engagement support for the cross-cutting national research programs since 2019. Prior to her current position, she served as the technical communications and outreach lead for ORD's Safe and Sustainable Water Resources Research Program from 2014-2019 and as the technical communications lead for the Water Supply and Water Resources Division of ORD's National Risk Management Research Laboratory from 2008-2014. A large portion of Michelle's efforts at EPA focus on drinking water, particularly small systems. Michelle holds an M.Ed., a B.S. in Biology, and a B.L.A. with a biology minor from Xavier University; an A.A.S. from Shoreline Community College; and a C.G. in Advanced Medical Laboratory Technology from the Naval School of Health Sciences.

Models and Tools Demos

Environmental Technologies Design Option Tool (ETDOT)

Summary: The Environmental Technologies Design Option Tool (ETDOT) is a software application used to model various drinking water treatment processes. It was developed by Michigan Technological University and given to EPA to distribute. AdDesignS is a module that models granular activated carbon (GAC) adsorption. AdDesignS is being used to model PFAS removal from drinking water. It can be used to support decision making about media selection, system sizing and design, and operations. It can be used to model a range of adsorbable species in addition to PFAS. Both GAC and ion exchange modeling tools housed in Water Treatment Models can also be discussed.

Jonathan Burkhardt, EPA-ORD

Bio: Jonathan Burkhardt, Ph.D. is an environmental engineer with U.S. EPA's Office of Research and Development, Center for Environmental Solutions and Emergency Response. He began working with EPA in 2013 as an ORISE postdoctoral fellow and then joined EPA in 2015. His research at EPA has focused on modeling contaminant fate and transport in water distribution systems, premise plumbing systems, and modeling water treatment with granular

activated carbon and ion exchange. Jon has supported Water Treatment Models, ETDOT, EPANET, EPANET-MSX, WNTR and PPMtools development to support research related to these systems. Jon holds a B.S., an M.S., and a Ph.D. in chemical engineering from the University of Cincinnati.

EPANET

Summary: EPANET is a software application used throughout the world to model water distribution systems. It was developed as a tool for understanding the movement and fate of drinking water constituents within distribution systems and can be used for many different types of applications in distribution systems analysis. Today, engineers and consultants use EPANET to design and size new water infrastructure, retrofit existing aging infrastructure, optimize operations of tanks and pumps, reduce energy usage, investigate water quality problems, and prepare for emergencies. It can also be used to model contamination threats and evaluate resilience to security threats or natural disasters.

Feng Shang, EPA-ORD

Bio: Feng Shang received his bachelor's and master's degrees in environmental engineering from Tsinghua University in China. He completed his Ph.D. at the University of Cincinnati in the Environmental Engineering program. After getting his Ph.D. degree, he worked briefly as an ORISE postdoc for the EPA, during which time he wrote the initial code for the multiple species extension to EPANET (EPANET-MSX). He joined the engineering software company Innovyze in 2008 and worked there as a principal software engineer until 2019. He joined EPA's Water Infrastructure Division as an environmental engineer in April, 2019. His research at EPA has been focused on the hydraulic and water quality modeling of drinking water distribution systems.

Theoretical Equilibrium Lead Solubility Simulator (TELSS) Demonstration

Summary: Theoretical Equilibrium Lead Solubility Simulator (TELSS) Demonstration is open-source R code that allows simulation of theoretical equilibrium total soluble Pb(II) (TOTSOLPb) concentrations under a variety of user-defined conditions (e.g., DIC, phosphate, sulfate, and chloride concentrations; pH; ionic strength; and various combinations of Pb(II) containing solids controlling solubility). The TELSS code provides a standardized and accessible model to verify model implementations in additional environments, may be expanded and updated by the end-user to meet their specific needs, and provides an example of how to generally create a theoretical solubility model in an open source format that could be applied to other scenarios of interest in drinking water or other disciplines (e.g., copper (II) solubility model).

Dave Wahman, EPA-ORD

Bio: David G. Wahman is currently a Research Environmental Engineer in the USEPA Office of Research and Development located in Cincinnati, Ohio. He is a registered Professional Engineer with over 25 years of experience. He received his B.S. in Civil Engineering from Rose-Hulman Institute of Technology and an M.S.E. in Environmental and Water Resources Engineering and Ph.D. in Civil Engineering from The University of Texas at Austin. Following graduation, he conducted a Post-Doctoral fellowship at the USEPA before accepting a permanent position. His research interests include disinfectant chemistry, disinfectant biofilm penetration, and distribution system water quality issues, including nitrification.

Drinking Water Treatability Database (TDB)

Summary: The Drinking Water Treatability Database (TDB) is an easy to use tool that provides referenced information on the control of contaminants in drinking water. It was designed for use by utilities, first responders to spills or emergencies, consultants, treatment process designers, and researchers. Information in the TDB is gathered from thousands of literature sources and is available for over 140 regulated and unregulated contaminants and more than 30 treatment processes.

Page Jordan, EPA-ORD

Bio: Page Jordan received her Master's in Environmental Science from Miami University in Oxford, Ohio. Page has over five years of experience with EPA and water quality research. Her research focus is on drinking water treatment technologies and their efficacy to remove contaminants of emerging concern such as per- and polyfluoroalkyl substances (PFAS). Her research interests are in equitable green infrastructure placement to manage stormwater and evaluating and monitoring system performance.

SESSION 9 – HIGHLIGHTS AND CLOSING REMARKS PLENARY

Moderator: Michelle Latham, EPA-ORD

Report-Outs From Breakout Focus Groups: Facilitators from Session 2

Closing Remarks: EPA and ASDWA

Michelle Latham, EPA-ORD

Bio: Michelle Latham is a biologist with EPA’s Office of Research and Development, Immediate Office of the Assistant Administrator, where she has led the outreach and stakeholder engagement support for the cross-cutting national research programs since 2019. Prior to her current position, she served as the technical communications and outreach lead for ORD’s Safe and Sustainable Water Resources Research Program from 2014-2019 and as the technical communications lead for the Water Supply and Water Resources Division of ORD’s National Risk Management Research Laboratory from 2008-2014. A large portion of Michelle’s efforts at EPA focus on drinking water, particularly small systems. Michelle holds an M.Ed., a B.S. in Biology, and a B.L.A. with a biology minor from Xavier University; an A.A.S. from Shoreline Community College; and a C.G. in Advanced Medical Laboratory Technology from the Naval School of Health Sciences.

SESSION 10A – IN-DEPTH TRAINING: CORROSION

Trainers: Darren Lytle, Simoni Triantafyllidou, Michael Schock, Mike DeSantis, Jennifer Tully, and Stephen Harmon

Description: This session will cover the fundamentals of lead and copper release including corrosion, the role of particles, and metal solubility relationships in drinking water. Distribution system assessment approaches, including water sampling strategies and pipe scale analyses, will also be addressed. Lastly, corrosion control strategies and corrosion control assessment tools will be presented. Case study data will be used to illustrate important messages where appropriate.

Training Hours: 4

Darren Lytle, EPA-ORD

Bio: Darren A. Lytle, Ph.D., P.E. is an environmental engineer with U.S. EPA's Office of Research and Development, Center for Environmental Solutions and Emergency Response in Cincinnati, Ohio. Since beginning work at EPA in 1991, Darren's primary goal has been to research the quality of drinking water. Over the years, he has investigated and published works on drinking water systems, including work on distribution system corrosion control and water quality (e.g., red water control, lead and copper corrosion control); filtration (emphasis on removal of particles, and microbial contaminants and pathogens from water); biological water treatment; and iron and arsenic removal. Darren holds a B.S. in civil engineering from the University of Akron (1990), an M.S. in environmental engineering from the University of Cincinnati (1991), and a Ph.D. in environmental engineering from the University of Illinois (2005).

Simoni Triantafyllidou, EPA-ORD

Bio: Simoni Triantafyllidou, Ph.D. is an environmental engineer with U.S. EPA's Office of Research and Development, Center for Environmental Solutions and Emergency Response in Cincinnati, OH. Her research interests include aquatic chemistry, corrosion science, drinking water quality/treatment, sustainable drinking water infrastructure (premise plumbing/distribution systems) and public health. She has authored/co-authored more than 30 publications on various scientific aspects of these research areas. At EPA, Simoni is primarily conducting research on metallic corrosion and inorganic contaminants in drinking water. She holds both an M.S. and a Ph.D. in environmental engineering from Virginia Tech and is the recipient of First Place M.S., Thesis Awards by the Association of Environmental Engineering and Science Professors (AEESP) and by the American Water Works Association (AWWA), an Outstanding Ph.D. Dissertation Award by AEESP, and Best Paper Awards from the journals Environmental Science and Technology, Journal AWWA and AWWA's Opflow Periodical. She is the Chair of AWWA's Committee, Premise Plumbing: Beyond the Meter.

Michael Schock, EPA-ORD

Bio: Michael Schock is a chemist with U.S. EPA's Office of Research and Development, Center for Environmental Solutions and Emergency Response. He has spent 35 years of his 43-year professional environmental science career with the drinking water research program of the EPA in Cincinnati. In his capacity with the EPA, Mr. Schock has conducted both in-house and field research into drinking water treatment with emphasis on metal release mechanisms and predictive modeling, corrosion control, pipe scale/sediment and inorganic water analysis, contaminant accumulation and water quality in domestic plumbing and municipal distribution systems, and development of sampling strategies for metal contamination in building and premise plumbing. Mike has provided technical consultation and served on numerous advisory committees to other EPA Offices, State agencies, standards organizations, engineering consultants, and directly to water systems. Since 1981, he has received more than 22 publication, research, and technical support awards from EPA, New England Water Works Association (NEWWA) and the American Water Works Association (AWWA), including the A.P. Black lifetime achievement award in 2011.

Mike DeSantis, EPA-ORD

Bio: Mike DeSantis, Ph.D. is a physical scientist with U.S. EPA's Office of Research and Development, Center for Environmental Solutions and Emergency Response, in Cincinnati, Ohio. He has 16 years of experience on the characterization of corrosion solids and their effects on drinking water quality in lead, copper, and iron drinking water

pipng. Mike has a Ph.D. in geology from the University of Cincinnati, an M.S. in geology from the University of Idaho, and a B.A. in biology with specialization in marine science from Boston University.

Jennifer Tully, EPA-ORD

Bio: Jennifer Tully is a physical scientist with EPA's ORD in Cincinnati, Ohio. She works in CESER's Water Infrastructure Division, Drinking Water Management Branch. Jennifer has spent the past 6 years examining drinking water pipe corrosion scales and deposits and developing sampling plans to investigate the occurrence of lead in drinking water. Prior to her work in ORD she spent three years with EPA's Office of Water as an ORISE participant and assisted in the implementation of the third unregulated contaminant monitoring rule (UCMR 3) and the rule development process for UCMR 4. Jennifer has an M.S. in geology and a B.S. in geology with a minor in biology.

Stephen Harmon, EPA-ORD

Bio: Stephen Harmon is a physical scientist with U.S. EPA's Office of Research and Development, Center for Environmental Solutions and Emergency Response. He has been involved in the analysis of drinking water, pipe scale and particulate materials at EPA for over 30 years. Major analytical areas of interest include powder X-ray diffraction, scanning electron microscopy with energy dispersive spectroscopy (EDS), transmission electron microscopy with EDS, and wavelength dispersive X-ray fluorescence.

SESSION 10B – IN-DEPTH TRAINING: DRINKING WATER MICROBIOLOGY

Trainers: Laura Boczek and Jennifer Best

Description: This session will introduce the audience to general drinking water microbiology, as well as the EPA's drinking water regulations with respect to disinfection of microbes and providing safe water to consumers. Attendees will be able to see drinking water microbial methods performed as well as conduct the methods and tests at the workshop. This workshop will give an appreciation for the complex nature of microbial sampling and testing, and a better understanding behind the regulatory process with respect to microbiology.

Training Hours: 4

Laura Boczek, EPA-ORD

Bio: Laura Boczek is a research microbiologist for the U.S. EPA's ORD, CESER. Her research areas have focused on disinfection efficacy of various microorganisms in drinking water, including the study of premise plumbing pathogens with an emphasis on *Legionella*; specifically, the ecology of these organisms, understanding how they persist, and what steps can be taken to mitigate the risk of infection to insure public health protection. She has also been involved with antibiotic resistance studies in various environmental matrixes and with pathogens and method development in biosolids. Laura holds a B.S. in biological science from Northern Kentucky University and an M.S. in biological science from the University of Cincinnati.

Jennifer Best, EPA-OW

Bio: Jennifer Best is a microbiologist with EPA's Office of Ground Water and Drinking Water, Technical Support Branch in Cincinnati Ohio. Jennifer provides microbiological technical support for regulatory and programmatic activities. Jennifer has been with the Agency since 2001.

SESSION 10C – IN-DEPTH TRAINING: SANITARY SURVEYS

Trainers: Michael Finn and Derek Losh

Description: This session will provide information for state and federal public water system oversight personnel on evaluating water treatment processes as part of sanitary surveys or technical assistance for public water systems. Presenters will be experienced field staff from multiple agencies.

Training Hours: 4

Michael Finn, EPA-OW

Bio: Michael Finn, P.E. is an environmental engineer with U.S. EPA's Office of Groundwater and Drinking Water, Drinking Water Protection Branch. He is currently working with states and public water systems on the implementation of the Surface Water Treatment Rules, the Disinfection Byproducts Rules, the Groundwater Rule, and the Lead and Copper Rule, as well as microbial and other contaminant treatment issues, alternative treatment technologies, and potable water reuse. Mike has 26 years of experience in public water supplies and drinking water treatment and serves as a national subject matter expert in the areas of disinfection and microbial treatment of drinking water. He is a licensed professional engineer in California and Maryland and a certified water treatment operator.

Derek Losh, EPA-OW

Bio: Derek has been an environmental engineer with the U.S. EPA's Office of Ground Water and Drinking Water since 2004. His initial experience was in developing regulatory determinations for drinking water contaminants. Upon transferring to Cincinnati, he spent several years working in drinking water treatment optimization and now works mostly on implementation of EPA's Unregulated Contaminants Monitoring Rule (UCMR). His efforts to support state review of UV treatment resulted from his involvement in EPA's Environmental Technology Innovation Clusters Program. He holds a B.S. in civil engineering from the University of Akron (1999), an M.S. in environmental engineering from the University of Texas at Austin (2001), and became a licensed professional engineer in 2003.