



WEBINAR FOR GROUNDWATER PROFESSIONALS AND WATER MANAGERS

# MICROPLASTICS IN GROUNDWATER

“A RAPIDLY DEVELOPING WATER QUALITY ISSUE”  
(An American Ground Water Trust Webinar Program)



**WEBINAR - TUESDAY, JUNE 20, 2023**

- 8:00am – 11am (Pacific time)
- 9:00am – 12:00pm (Mountain time)
- 10:00am – 1:00pm (Central time)
- 11:00am – 2:00pm (Eastern time)
- 6:00pm – 9:00pm (Greenwich Mean Time (GMT))

## BACKGROUND

The topic of **microplastics in groundwater** is “new” for most practicing hydrogeologists and water supply professionals. This information-exchange webinar is an opportunity to learn about microplastics in groundwater by a team of experts in the industry for an update on:

- Latest research findings on microplastics (MPs) in groundwater
- Role played by MPs in aquifer contamination
- Implications of MPs for groundwater management and drinking water supply safety
- Reducing the volume of MPs entering groundwater and treating MPs contaminated water

Plastics have been around since “Parkesine” was invented in 1862\*. The 1909 patent of “Bakelite” and early 20th century development of chemical products such as Perspex, nylon and Teflon heralded the plastic age that today accounts for millions of tons of annual plastic production. Where does it go?

When released in the environment, plastics degrade and breakdown as macroplastics (> 5mm), microplastics (1nm – 5mm) and nanoplastics (<1nm). Macroplastic contamination of surface water and marine environments is well known, but it is only recently that there is growing awareness of microplastic contamination of groundwater. There has been a rapid rise in international scientific journals describing MP in groundwater. Microplastics and nanoplastics can enter pore spaces in soil and rocks and have been found in groundwater at depths of over 100 meters. These tiny plastic fragments may themselves contain contaminants and can also adsorb and release other pollutants. MP contamination can have a destructive effect on groundwater microorganisms and may suppress the natural attenuation of toxicity of other contaminants.

\*<https://www.sciencemuseum.org.uk/objects-and-stories/chemistry/age-plastic-parkesine-pollution>

**The principal target audience for this webinar is groundwater professionals and water managers.**

Certificate of Attendance available for self-reporting professions upon completion of CE Form.

There will be an opportunity for Q & A discussion among webinar participants.

## WEBINAR SPONSORS AND AMERICAN GROUND WATER TRUST PRINCIPAL CORPORATE SUPPORTERS:



The American Ground Water Trust thanks Jon Rohrer for assistance in developing this webinar.

# MICROPLASTICS IN GROUNDWATER WEBINAR PROGRAM

(Times listed are USA Eastern time zone. Zoom login information will be emailed on June 19<sup>th</sup>)

11:00am

## WELCOME AND INTRODUCTION TO THE WEBINAR AND OBJECTIVES

Sara Chudnoff, PG, Hydrogeologist, American Ground Water Trust, Pinetop, AZ

11:05am

## MICROPLASTICS (MP) IN THE ENVIRONMENT IS NOT JUST A SURFACE WATER/OCEAN ISSUE

Scott Coffin, PhD, Research Scientist, California State Water Resources Control Board, Sacramento, CA

- What are microplastics?
- The timeline of awareness of occurrence and environmental consequences
- Actions taken by California and ongoing MP research

11:45am

## HUMAN HEALTH EFFECTS OF MP AND POTENTIAL STATE/FEDERAL DRINKING-WATER ACTIONS

Catherine Boston, MPH, DABT, Principal Scientist, Risk Assessor, Roux, Burlington, MA

- Current human health impact research
- Regulatory awareness and actions

12:00pm

## FATE AND TRANSPORT OF MP IN THE SUBSURFACE AND GROUNDWATER

Melissa Lenczewski, PhD, Professor, Dept. of Earth Atmosphere & Environment, Northern Illinois University, DeKalb, IL

- Sources of MP and transport into groundwater
- Properties of MP (Size, shape, type) that impact transport
- Case Studies of MP in groundwater

12:25pm

## MICROPLASTICS CONTAMINATION OF URBAN AQUIFERS

Stefano Viaroli, PhD, Assistant Professor, Earth Sciences Department, University of Pisa, Pisa, Italy

- Definition of MP contamination in urban aquifers
- The potential role of the "sponge city" concept in relation to mitigating MP loading to aquifers
- Relationship between surface and groundwater contamination

12:40pm

## ROLE OF MP IN TRANSPORTING CONTAMINANTS INTO AND WITHIN AQUIFERS

Yasemin Kunukcu, PhD, PE, Technical Director, Roux, Somerset, NJ

- Role of MP as carrier of contaminants
- Factors influencing the transport of contaminants by MP
- Effect of physico-chemical properties of MP on their contaminant transport capacity in drinking water matrices

1:10pm

## WATER UTILITY PERSPECTIVES ON MICROPLASTICS IN DRINKING WATER

Terri Slifko, PhD, Water Quality Manager: Chemistry, Metropolitan Water District of So. California, Los Angeles, CA

- Lessons learned from other emerging contaminants and the California experience
- Near-term microplastics challenges for purveyors (sampling, analysis, results communication and costs)
- Preliminary treatment information and possibilities.

1:30pm

## MODERATED DISCUSSION AND Q & A

Moderator: Jon Rohrer, PG, CHG, Principal Hydrogeologist, Roux, Long Beach, CA

Talking Points:

- Not all groundwater sources are at equal risk of experiencing microplastics impacts
- How can existing Source Water Assessments/well information and basin activities be evaluated to preliminarily evaluate vulnerability of sources to microplastics?
- What can groundwater managers do right now to prepare for potential microplastics water regulation?
- What are the long-term implications for managed aquifer recharge efficiency and water quality that could result from aquifer recharge water sources that contain microplastics?
- Have recent graduates entering the hydrogeological/water management workforce received adequate coursework background on microplastics?
- From a hydrogeological perspective, what are the microplastics research priorities?

2:00pm **WEBINAR ENDS**

## PROFESSIONAL BACKGROUND OF THE WEBINAR PRESENTERS

### **Sara Chudnoff, PG, Hydrogeologist, American Ground Water Trust, Pinetop, AZ**



Sara recently joined the American Ground Water Trust. She has been working in the water resources and environmental field in New Mexico since the early 2000s. As a consulting scientist, she worked on projects from methane monitoring and reporting to hydrogeologic investigations and well design. In 2009, Sara left her regulatory role with the State and started working with Bernalillo County. In this position, she worked with hundreds of residents monitoring water levels and promoting outreach and education. At the New Mexico Bureau of Geology, she took this model to work on a State-Wide Groundwater Level Monitoring Network. Sara facilitates educational outreach for watershed health with the local school district and provides water resource consulting in New Mexico. She has a B.S. in Geology from New Mexico Tech and a M.S. in Water Resources from the University of New Mexico.

### **Scott Coffin, PhD, Research Scientist, California State Water Resources Control Board, Sacramento, CA**



Scott has been researching microplastics' effects on aquatic organisms and humans since 2014. He is the subject-matter expert for microplastics at the California State Water Resources Control Board. He leads the agency's efforts to monitor and manage microplastics pollution in drinking water and the environment. He recently led several international working groups to standardize monitoring methodologies for microplastics and develop and apply risk-based thresholds for humans and aquatic ecosystems. Scott is a review editor for several microplastics-related research topics dealing with human health and alternatives to petroleum-based plastics for the *Frontiers in Water* journal. He serves as co-chair of the Society of Toxicology and Chemistry's global microplastics interest group's committee to plan a Pellston workshop to develop a science-based framework to assess the full life-cycle impacts of consumer products with the goal of informing policy-makers on the environmental and public health sustainability of plastics and their alternatives. His PhD in Environmental Toxicology is from the University of California, Riverside.

### **Catherine Boston, MPH, DABT, Principal Scientist, Risk Assessor, Roux, Burlington, MA**



Ms. Boston is a board-certified toxicologist with over twelve years of experience. She combines her background in geology with her human health risk assessment and statistical expertise to provide multi-disciplinary support for remedial investigations and in environmental litigation. She holds a B.A. from Colgate University, and a Master of Public Health (MPH) degree from Boston University with a focus on Environmental Risk Assessment and Toxicology, where her research has revolved around per- and polyfluoroalkyl substances (PFAS). Ms. Boston's areas of expertise include emerging contaminants, quantitative risk assessment, exposure assessments, and general causation assessments. Ms. Boston conducts quantitative human health risk assessments and negotiates with regulatory agencies in support of remedial investigations and remediation at contaminated properties across the United States for industry, developers, and municipalities.

### **Melissa Lenczewski, PhD, Professor, Department of Earth Atmosphere and Environment, Northern Illinois University, DeKalb, IL**



Professor Melissa Lenczewski is a contaminant hydrogeologist at Northern Illinois University in the Department of Earth, Atmosphere and Environment. She is jointly appointed in the Institute for the Study of the Environment, Sustainability, and Energy. As IESE director, she spearheaded development of NIU's undergraduate program in environmental studies and leads faculty from five colleges in tackling interdisciplinary issues related to the environment, sustainability and alternative energy. Her research, teaching and engagement focuses on water quality and contaminant hydrogeology. For more than a decade, she has collaborated with Mexico's Yucatan Scientific Research Center, providing students from both institutions with water-quality research opportunities in the karst terrain of the Yucatan. Melissa has a PhD from the University of Tennessee and an MS from the University of Arizona.

### **Stefano Viaroli, PhD, Assistant Professor, Earth Sciences Department, University of Pisa, Pisa, Italy**



Dr. Viaroli graduated in Geology in 2010 and PhD in 2014 at the Roma Tre University (Italy). Currently, Marie Skłodowska-Curie postdoctoral fellow at University of Pisa (Italy) and visiting researcher at Southern University of Science and Technology - SUSTech (Shenzhen, China). The title of the project funded by the European Commission (MSCA-IF-2020-GF-101028018) is "Surface runoff as source of microplastics and emerging contaminants in megacities aquifers – SPONGE". The project aims at defining the groundwater pollution of microplastics and emerging contaminants in megacity aquifers and to explore the possible use of surface runoff as unconventional recharge via Sponge City facilities. Former research activities during the post doc at Roma Tre University mainly dealt with regional hydrogeology and the study of volcanic aquifers in Central Italy (Sabatini, Vulsini and Roccamonfina) both through groundwater budget calculations and through the use of numerical models for the validation of hydrogeological conceptual models. Co – Chair of the Italian committee of young hydrogeologists (ECHN-Italy), he held the keynote lesson entitled "The Good, the Bad and the Bottled: considerations of the effects of our habits on the water and environment protection" at 46th IAH international congress in Malaga in 2019.

### **Yasemin Kunukcu, PhD, PE, Technical Director, Roux, Somerset, NJ**



Yasemin has more than 18 years of environmental consulting experience focusing on design, implementation, and management of site-specific in situ soil and groundwater remediation technologies, including Enhanced In Situ Bioremediation (EISB), In Situ Chemical Reduction (ISCR), In Situ Chemical Oxidation (ISCO), In Situ Thermal Treatment (ISTT), biosparging, bioslurping, and bioventing for numerous multi-faceted environmental remediation projects with a wide range of contaminants, including chlorinated solvents, chromium, petroleum hydrocarbons, emerging contaminants (PFAS, 1,4-Dioxane, etc.). She participated extensively in the Interstate Technology and Regulatory Council (ITRC) Optimizing Injection Strategies and In Situ Remediation, PFAS, and Microplastics teams, and the Natural Groundwater Association (NGWA) PFAS team during the development of the guidance documents as a co-leader/writer. She is currently serving on the ITRC PFAS and Microplastics teams. Yasemin holds a Ph.D. in Chemical Engineering and is a registered P.E. in New York.

**Terri Slifko, PhD, Water Quality Manager: Chemistry, Metropolitan Water District of Southern California, Los Angeles, CA**



Dr. Theresa Slifko manages the Chemistry Unit in the Drinking Water Quality Laboratory at Metropolitan Water District of Southern California. She has been a leader in the water community for over 26 years, providing technical guidance and expertise in the field of water quality, regulations, legislation, and water quality compliance within the areas of drinking water, recreational water, recycled water, and potable reuse water. Currently, Dr. Slifko oversees compliance chemistry, chemistry research, taste and odor testing and analysis, drinking water treatment plant operations support, data evaluation, compliance monitoring and reporting, and other water quality support activities at Metropolitan's six Water Quality Laboratories. Current research efforts within Dr. Slifko's Unit are focused on the development and optimization of cyanotoxin detection methods, development of bioassessment tools for detecting toxicity of non-targeted compounds, development and testing microplastics enumeration methods, and monitoring and evaluating occurrence of per- and polyfluoroalkyl substances. Terri's PhD is from the University of South Florida.

**Jon Rohrer, PG, CHg, Principal Hydrogeologist, Roux, Long Beach, CA**



Jon is a Principal Hydrogeologist with over 25 years of experience and is a Professional Geologist and Certified Hydrogeologist. He has a M.S. in Subsurface Hydrology from the University of Arizona (1996) and a B.S. in Geological Sciences from Lehigh University (1993). Mr. Rohrer has provided State and Federal expert testimony on a number of technical topics, including historical operations and chemical usage relating to spills and/or releases to the subsurface; responsible party evaluations; fate and transport of contaminants in soil, soil vapor, and groundwater; the extent, severity, and longevity of groundwater impacts in relation to damage assertions; and technical aspects underlying cost allocation approaches. His clients include small businesses and property owners up through Fortune 500 companies. Mr. Rohrer has extensive experience with a range of contaminants, regulatory settings, and geological environments, including perchlorate, 1,4-dioxane, PFAS, microplastics and other emerging contaminants.

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