PNWS-AWWA Water Treatment Committee Fall Workshop

Disinfection

Wednesday, October 8th, 2025

Workshop Schedule

Time	Presentation	Speaker
8:30-9:00 AM	Introduction to the Workshop	Tessora Young, EIT, PhD Sanyukta Gokhale, PE
9:00-9:30 AM	UV 101: Basic of UV Disinfection for Water and Wastewater Treatment	Mark Heath, PE
9:30-10:00 AM	UV Disinfection at Cedar Water Treatment Facility	Tessora Young, EIT, PhD
15-minute break		
10:15-10:45 AM	Introduction to Ozone Disinfection	Bryan Black, PE
10:45-11:15 AM	Intermediate Treatment with Ozone: 20 Years and Beyond	Kim Reid
11:15 AM-12:15 PM	Chlorine Disinfection Fundamentals: Principles, Practices, and Public Health Protection	Amy (Qiao) Gao, PE
1-hour lunch		
1:15-1:45 PM	A Multi-Faceted Chlorine-Based Disinfection Approach at Judy Reservoir WTP	Julia Cummings, EIT Gary Tollefson
1:45-2:15 PM	Switching the Disinfection Method to On-Site Sodium Hypochlorite Generation	Patrick Craney, PE
15-minute break		
2:30-3:30 PM	Chlorine Residual Testing Skills	Jolyn Leslie, PE Laura McLaughlin, PE

Anticipated Learning Outcome

Participants in this course will learn about the different approaches to disinfection used in the Pacific Northwest. Introductory sessions will provide an overview of the disinfection approach and case studies will follow to see how these approaches are used throughout the region to treat water and wastewater in the Northwest. The workshop will focus on the following drinking water and wastewater treatment technologies: ultraviolet light, ozone, chlorine gas, chlorine dioxide, 12.5% sodium hypochlorite, and on-site-generated 0.8% sodium hypochlorite.

Speaker and Presentation Info

- Mark Heath – PE, Manager of Carollo Engineers' Portland UV Disinfection Validation Facility
    - Presentation Title:
        - UV 101: Basics of UV Disinfection for Water and Wastewater Treatment
    - Presentation Abstract:
        - This presentation will present the basics of UV disinfection including basic terminology, including UV dose and transmittance, as well as dose distribution. It will provide a summary of the methods of application of UV light into water and wastewater streams. It will discuss factors affecting the efficiency of UV disinfection. It will also provide an overview of the UV validation process and how UV disinfection is regulated.
    - Professional Qualification:
        - BS in Industrial Engineering from University of Illinois – Urbana, MS in Environmental Engineering from University of Illinois - Urbana
    - Background:
        - Since 2006, Mr. Heath has been the manager and lead validation engineer for Carollo's Portland UV Disinfection Validation Facility in Portland OR. During that time, he has conducted over 90 validations of drinking water UV reactors according to the USEPA-UVDGM requirements, dozens of UV reactor validations for wastewater and potable and non-potable reuse, as well as testing for UV advanced oxidation applications. He has developed bench and pilot scale devices for evaluating UV system performance. He has been involved in Water Research Foundation studies that have been instrumental in guiding the regulation of application of UV technologies worldwide.
    - Contact Information:
        - Phone – (503)544-1872
        - Email – mheath@carollo.com
- Tessora Young – PhD, EIT, Water Treatment Engineer, Jacobs
    - Presentation Title:
        - UV Disinfection at Cedar Water Treatment Facility
    - Presentation Abstract:
        - Ultraviolet (UV) treatment is one technology available to surface water treatment plants to comply with cryptosporidium oocyst inactivation requirements from the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWR), established in 2006. Cedar Water Treatment Facility (Seattle, WA) utilizes UV disinfection in a suite of disinfectants to avoid filtration following Washington State Department of Health requirements, which will be compared to the UV Disinfection Guidance Manual from the US EPA. This presentation will

share key evaluation criteria for operating UV reactor system at Cedar Water Treatment Facility as it passes its twenty-first year of continuous operation.

- Professional Qualification:
  - BS in Chemical Engineering from University of Utah, PhD in Civil and Environmental Engineering from University of Washington
- Background:
  - Tessora Young is a process engineer for Jacobs in Bellevue, WA with 4 years' working experience on drinking water and wastewater projects. Tess was previously employed (2020-2021) at Kubota Membrane as an Application Engineer designing Membrane Bioreactors. Tess also graduated with a PhD at the University of Washington in 2019 focused on bench scale drinking water treatment, including: chlorine photolysis, ozone, and advanced oxidation processes.
- Contact Information:
  - Phone – (541)706-1920
  - Email – Tessora.young@jacobs.com

- Bryan Black – PE, Regional Practice Leader for Water at Stantec
  - Presentation Title:
    - Introduction to Ozone Disinfection
  - Presentation Abstract:
    - This presentation will provide and introduction to ozone use for disinfection. It includes information on chemistry, water quality benefits of ozonation, ozone generation, alternative ozone contacting methods, and the PNW regulatory environment for ozonation.
  - Professional Qualification:
    - MS Environmental Engineering University of North Carolina – Chapel Hill; BS Civil Engineering University of Texas at Austin; Registered Engineer Oregon, Washington, Idaho.
  - Bio:
    - Bryan has been working on water treatment plant designs in the Pacific Northwest for the last 25 years. He has completed water treatment plant design throughout the PNW including full-scale ozone projects.
  - Contact Information:
    - Phone – (503)902-2041
    - Email – Bryan.Black@stantec.com

- Kim Reid – OR WTO 4, Willamette River Water Treatment Plant Manager
  - Presentation Title:
    - Intermediate Treatment with Ozone: 20 Years and Beyond
  - Presentation Abstract:

        - Veolia has operated and maintained the Willamette River Water Treatment Plant in Wilsonville, Oregon since start-up in April 2002. The plant was designed with ozone treatment before filtration in order to reduce taste and odor compounds, but ozone also improves filtration and provides disinfection. We will cover ozone generation and application system basics, costs to run the system, regulatory implications, and contrast the new with the old.
    - Professional Qualification:
        - MS Environmental Engineering from Georgia Institute of Technology, BS in Biology/Chemistry from Carroll University
    - Bio:
        - Kim has spent 8 years at the Willamette River Water Treatment Plan serving as engineer, asset manager, maintenance coordinator, and, now, the DRC.
    - Contact Information:
        - Phone – (503)826-2633
        - Email – kimberleigh.reid@jacobs.com

- Amy (Qiao) Gao – PE, Water Engineer at Jacobs
    - Presentation Title:
        - Chlorine Disinfection Fundamentals: Principles, Practices, and Public Health Protection
    - Presentation Abstract:
        - This presentation explores the principles of chlorine disinfection in water treatment, including chemical behavior, dosage control, and pathogen inactivation. It will cover practical fundamentals such as contact time, residual monitoring, and regulatory compliance. Attendees will gain a deeper understanding of how chlorine functions as a disinfectant and how to optimize its use for safety and effectiveness.
    - Professional Qualification:
        - M.S. in Environmental Engineering from The University of Texas at Austin, B.S. in Earth and Environmental Engineering from Columbia University
    - Bio:
        - Amy Gao is a licensed professional engineer in the state of WA, NV, and NY. Amy has about 15 years of experience in drinking water from planning and piloting to design and commissioning. Her experience covers design of PFAS treatment systems, ozone, floc/sed, filtration, UV, and advanced oxidation.
    - Contact Information:
        - Phone – (917)216-9135
        - Email – amy.gao@jacobs.com

- Julia Cummings – EIT, Staff Professional at Carollo Engineers
    - Presentation Title:
        - One Chemical, Many Roles: Chlorine Use at Judy Reservoir Water Treatment Plant
    - Presentation Abstract:
        - At Judy Reservoir Water Treatment Plant, chlorine is relied upon for multiple critical functions—primary disinfection, residual maintenance in the distribution system, and control of taste, odor, and biological growth. Each application requires careful balance to meet CT targets, manage disinfection by-product formation, and ensure reliable delivery to customers. Operators have to be familiar with the maintenance and process control for chlorine gas, chlorine dioxide, and sodium hypochlorite at Judy Reservoir WTP. This presentation will highlight how operators adjust chlorine use across treatment and distribution, emphasizing the practical strategies and tradeoffs involved in applying one chemical to serve many purposes.
    - Professional Qualification:
        - M.S. in Civil and Environmental Engineering from University of Washington, B.S. in Molecular Toxicology from University of California - Berkeley
    - Bio:
        - Julia is an engineer-in-training and staff professional at Carollo Engineers in Seattle, WA. She focused her past three years on water treatment process design and has experience working with utilities in the western United States.
    - Contact Information:
        - Phone – (510)501-1204
        - Email – jcummings@carollo.com

- Patrick Craney – PE, Water Resources Engineer for City of Vancouver
    - Presentation Title:
        - Switching the Disinfection Method to On-Site Sodium Hypochlorite Generation
    - Presentation Abstract:
        - On-site Sodium Hypochlorite Generation is not a plug-and-play technology. There are steps and precautions that a utility can take to ensure the disinfection system stays operational. This presentation shares those insights gained as a utility replaces the tried-and-true chlorine gas systems at eight (8) separate water source production sites.

- Professional Qualification:
  - BS in Civil Engineering from Oklahoma State University, MS in Water Resources Engineering from Texas A&M University
- Bio:
  - Patrick carries his professional engineering license in California and Washington. He has been working in water, wastewater, and solid waste engineering for over 30 years.
- Contact Information:
  - Phone – (503)231-9458
  - Email – Patrick.craney@cityofvancouver.us

- Laura McLaughlin – PE, Washington State Department of Health; Jolyn Leslie – PE, Washington State Department of Health
  - Presentation Title:
    - Chlorine Residual Testing Skills
  - Presentation Abstract:
    - This workshop will present drinking water system operators with training and hands-on experience measuring chlorine levels in drinking water. Chlorine level is important because it keeps disinfected drinking water safe from contamination by bacteria and viruses. This course will teach the theory of residual analysis, exploring the chemistry of different measurement techniques. This will distinguish between free chlorine residual from total chloramine residual and the different techniques. Next it will cover calibration of instruments against known standards. Finally it will include testing techniques where attendees will get to use industry equipment for hands-on experience measuring residual in real samples. Attendees will compare results to understand variability and learn how to understand if data is meaningful. Attendees will be better prepared to evaluate chlorine residual in drinking water systems and protect public health.
  - Professional Qualification:
    - BS in Civil and Environmental Engineering from University of California – Berkeley, MS in Environmental Engineering/Environmental Health from University of Washington
  - Bio:
    - Laura is a professional engineer at the Washington State Dept. of Health's Office of Drinking Water. She currently serves as the Regional Engineer for Whatcom County. She has over a decade of experience researching, developing products, and implementing chlorine and water treatment projects in the US and abroad.

        - Jolyn is a professional engineer with 21 years' experience with the Washington State drinking water program. She has served as regional engineer for Island, Snohomish, Whatcom, and San Juan counties. In that role she reviews project reports, construction documents, and water system plans; performs sanitary surveys; provides technical assistance to water system operators, owners, purveyors, boards. She is the surface water team lead for the Northwest Regional office.
    - Contact Information:
        - Phone – (206)945-6927
        - Email – jolyn.leslie@doh.wa.gov
        - Phone – (564)669-0753
        - Email – laura.mclaughlin@doh.wa.gov