

Course Title	R&R with R&I
OESAC #	
DEQ WW CEUs	0.2
Summary of Lesson Content	This Interactive Poster Session consists of 14 posters covering current projects in the Research and Innovation Department at Clean Water Services. Attendees will interact with the primary investigators one-on one and in small groups. They will learn how the projects relate to, support and benefit plant operations, field operations, district goals and watershed health. The topics to be covered include: Temperature Treatment, PFAS, Biological Phosphorus Removal, eDNA, Remote Sensing Networks, GIS in Stormwater, Method Development in the Research Lab, Metals Inhibition, Anaerobic Digestion Stability, and Data Management.
Training Goal	Attendees will gain knowledge of the goals and outcomes of practical and applicable research conducted by Clean Water Services, and an understanding of how research brings together departments across Clean Water Services for efficient NPDES permit compliance and watershed enhancement and protection.

Subject	Instructor	Outline	Time (Minutes)	
			Min	Max
The Responsibilities and Importance of Interns within Research and Innovations	Asato	Highlighting the various responsibilities of Interns within R&I, and the importance of those responsibilities. Also explaining the benefit of the internship for the intern, and to CWS.		
			9	15
Development of Zinc and Copper Nitrification Inhibition Thresholds for Local Limits Analysis	Barker	Explains biological nitrification process inhibition and how inhibition thresholds are usually selected when deriving local limits for industrial users discharging to a POTW. Discusses how two inhibition tests were developed to identify facility-specific nitrification thresholds for multiple WRRFs, as well as the results and impacts.		
			9	15
IoT & Sensor Networks	Cook	Benefits and limitations of utilizing low powered micro-controllers to manage, record, and transmit data from sensors that can be deployed throughout the collection system and ambient waterways		
			9	15
Using environmental DNA to characterize biological integrity of surface waterways.	Ferguson	Introduction to environmental DNA (eDNA), discussion of study design and preliminary results of spatial and temporal changes in biodiversity, and how eDNA can be used in the context of an NPDES permit.		
			9	15
Virus Detection in Wastewater	Golda	Summary of viral detection methods in wastewater used by Clean Water Services and how we optimized/developed them, introduction to viral dynamics in wastewater, data from full scale viral monitoring at CWS.		
			9	15

Genetic Insights Into Full-Scale Enhanced Biological Phosphorus Removal	Layton	Mining genetic (DNA and RNA) data from aeration basin MLSS samples yields insights into nutrient removal process stability. CWS researchers are seeking bioindicators of EBPR stability, particularly those that may be a leading indicator of an instability event.	9	15
Profiling and Modeling Heat Fluxes through the Water Resource Recovery Facility	Maher	Changes in process water temperature through a WRRF are explained, full scale data is presented, model development is detailed. Results of a shading pilot project are presented. Other potential temperature mitigation strategies are discussed.	9	15
Identifying the Fate of Reuse Water Used to Irrigate Native Wetland Vegetation	Mansell	Monitoring of groundwater and soil moisture with depth are used to track what happens to reuse water applied to native wetland vegetation. Implications of novel beneficial use and 'agronomic' rates are discussed as well as cooperation and partnership with regulating agencies.	9	15
Digital twin to predict flow and nutrient loads	Menniti	The digital twin provides a real-time soft sensor for primary effluent NH4 and PO4, and predicts primary effluent flow, NH4 and PO4 24 hours in the future. The poster will describe the benefit of the digital twin for secondary process control and provide relevant details on the development and deployment of the tool.	9	15
MS4 heatmap for potential sampling locations	Piemonti	Understand what have been considered on the generation of a GIS heatmap representation of locations that have a potential to contribute non-point source pollution to our stormwater conveyance system.	9	15
Microcosms for Nutrient Flux Estimations in the Fernhill Natural Treatment System	Root	Poster illustrating how phosphorus and nitrogen can be released from wetland sediments during drying and re-wetting cycles. A summary of background, methods development, analysis of experimental data, and operational impacts will be presented.	9	15
BPR Stability - From Research to Tool	Schauer	A review of research into biological phosphorus removal carbon storage is presented along with the development and deployment of monitoring tools to assist in operations for improved phosphorus removal.	9	15
Closing the PFAS Mass Balance to WRRFs and the Watershed	Sherman-Bertinetti	PFAS can be tracked through the sewershed, source control can be used to limit PFAS to WRRFs, dominant sources of PFAS (including overlooked source can be analyzed and monitored in WRRFs and in the watershed, tools can be used (mass-balance) to analyze data.	9	15
			9	15

Developing Bench-Scale Methods to Evaluate Anaerobic Digestion Performance

Sosa-Hernandez

The development of two bench-scale methods will be described: (1) a bioassay to monitor digestion health and capacity, and (2) short-term biogas potential test to measure gas yields from co-digestion feedstocks and degradability. The information provided and impacts to full-scale operation will be summarized.

	9	15
Total	1 hour	1 hour
Poster Min/Max	4/7	
Total	2 hours	2 hours
Poster Min/Max	8/14	

Attendance

This is a 2 hour poster session with 14 posters covering different research subjects conducted at Clean Water Services. Attendees are able to earn either 0.1 or 0.2 CEUs. A room monitor from the Public Affairs Department at CWS will sign attendees in and out of the room. Attendees will receive a card upon entry that lists all the posters. As they visit posters the instructor will sign the card. The minimum amount of time spent at a poster is 9 minutes, the maximum amount of time spent at a poster is 15 minutes. To earn 0.1 CEUs the attendee must stay for 1 hour, and visit a minimum of 4 posters and a maximum of 7 posters. To earn 0.2 CEUs the attendee must stay for two hours, and visit a minimum of 8 posters and a maximum of 14 posters. Upon completion the attendee will sign out and the room monitor will record the posters visited, and issue a Certificate of Completion for the correct number of CEUs.