

## **Water and Wastewater Process Instrumentation Fundamentals**

Charles Aycock<sup>1\*</sup>, Melody White<sup>2</sup>, Tracy Doane-Weideman<sup>3</sup>, Bob Dabkowski<sup>4</sup>, Steve Smith<sup>5</sup>

<sup>1</sup>City of Roseville, 1800 Booth Road, Roseville, CA 95747

-Email: [caycock@roseville.ca.us](mailto:caycock@roseville.ca.us) Phone: 916.746.1887

<sup>2</sup>Hach Company, 5600 Lindbergh Dr., Loveland, CO 80538

-Email: [mwhite@hach.com](mailto:mwhite@hach.com) Phone: 970.619.5134

<sup>3</sup>Endress + Hauser, 2350 Endress Place, Greenwood, IN 46143

-Email: [tracy.doane-weideman@us.endress.com](mailto:tracy.doane-weideman@us.endress.com) Phone: 317.535.1380

<sup>4</sup> Hach Company, 5600 Lindbergh Dr., Loveland, CO 80538

-Email: [bdabkows@hach.com](mailto:bdabkows@hach.com) Phone: 970.980.8810

<sup>5</sup> Endress + Hauser, 2350 Endress Place, Greenwood, IN 46143

-Email: [steve.smith@us.endress.com](mailto:steve.smith@us.endress.com) Phone: 303.656.3266

### **SUBMISSION TYPE**

Hands-On Instrumentation Workshop (5 – 8 hours)

### **KEYWORDS**

Instrumentation, Analyzers, Design, Specifications, Installations, Operations and Maintenance

### **ABSTRACT**

Effective process control extends beyond the addition of analyzers. Other issues that need to be addressed include selecting the optimal measurement locations, developing or adopting appropriate control strategies, and making the commitment to maintain the analyzers. The workshop will be broken up into two blocks; analyzer fundamentals, which will include theory and operation of; ammonia, phosphate and nitrate, pH, ORP, dissolved oxygen, suspended solids, and turbidity analyzers.

The first block of the workshop will provide a review of the technologies and principles used in instrumentation that is available for meeting on-line process analytical needs. The focus is on technologies, and will be presented in a vendor-neutral manner. There will be an interactive demonstration exercise that shows the limits of what some on-line analyzers can and cannot do.

The last block is on how to potentially use analyzers to troubleshoot processes. This will be followed by a presentation that covers the cost-of-ownership as it relates to analyzer installations. Emphasis will be set on the need to maintain analyzers, along with the potential training needs and skill sets required to maintain the analyzers. The final open forum discussion will conclude with a Question & Answer panel wherein the participants may ask the speakers anything they wish about analyzer selection, instrument mounting, maintenance issues, etc.

The proposed workshop team has been presenting on instrumentation at WEFTEC for 10 consecutive years, and is exceptional at maintaining vendor-neutrality in their presentations. The team members were also significant contributing authors to the Instrumentation and Sensors chapters of the WEF MOP-21, Automation of Water Resource Recovery Facilities, 3rd and 4th editions.

**SHORT DESCRIPTION** (75 words or less- for marketing purposes):

Vendor-neutral fundamentals of analyzers will be presented along with how they can be integrated into different strategies for process control. Hands-on exercises will be used to demonstrate analyzer technology limitations, misapplications, and trouble-shooting. Proper instrument placement for different process configurations will also be presented.

**LEARNING OUTCOMES**

- Understand the fundamental measurement principles utilized for ammonia, phosphate and nitrate, pH, ORP, dissolved oxygen, suspended solids, and turbidity analyzers.
- Define the difference between monitoring and control, and which technologies are applicable to each term.
- Recognize technology limitations, and how they can affect measurements.
- Identify potential errors and interferences for the technologies, and how they influence measurements.
- Discover how position of installed instrumentation in process basins affect the measured parameter.

**LEARNING OBJECTIVES**

The objectives are for participants to develop an understanding of the on-line analyzers used in wastewater treatment for nutrient control. This includes; measurement principles, limitations in performance of the various nutrient analyzer technologies, errors and interferences, and installation practices within water resource recovery facilities.

----

**ABOUT THE AUTHORS**

**Charles Aycock:** *Charles has been with the City of Roseville for over 20 years. During this time he has managed numerous capital, development and technology projects for the City's water and wastewater utilities. Charles is a member of AWWA, WEF, ISA, and NFPA, and is a WEF Automation and Information Technology Committee member. Contact: [caycock@roseville.ca.us](mailto:caycock@roseville.ca.us)*

**Melody White:** *Application Development Manager – Hach Company*

**Tracy Doane-Weideman:** *US Marketing Manager,, Analysis Products - Endress + Hauser*

**Bob Dabkowski:** *Application Development Manager – Hach Company*

**Steve Smith:** *Product Marketing Manager – Endress + Hauser*