



PROFESSOR DAVID JENKINS TECHNICAL SERIES

RELATING FUNDAMENTALS OF BIOLOGICAL NITROGEN REMOVAL TO RETROFIT ACTIVATED SLUDGE PLANTS



Workshop #1
August 29, 2024
SF Bay Regional Water Quality Control Board
1515 Clay Street, Oakland, CA

AUGUST 29, 2024

WORKSHOP BOOKLET

THIS WORKSHOP WILL PROVIDE THE TECHNICAL KNOWLEDGE TO RETROFIT CONVENTIONAL
WASTEWATER TREATMENT PLANTS TO ACCOMPLISH NITROGEN REMOVAL GOALS



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Learning Objectives

To familiarize the audience with:

- Nutrient regulations and impacts in the SF Bay
- SF Bay case studies for developing a nutrient strategy
- Fundamentals of nitrogen characteristics and forms in wastewater
- Nitrogen removal by activated sludge in BOD removal only plants
- Ammonia removal by nitrification
- Nitrogen removal by denitrification
- Nitrogen removal effects on sludge production
- Nitrogen removal effects on recycle streams
- Aeration and energy considerations in nitrogen removal



Ground Rules

1. Punctuality: We have a lot of information to cover and a lot of learning to do together. We will start and stop on time for all breaks to ensure you get your full worth!

2. No Disturbances: Smart phones will actually play a role in this training but should be turned to vibrate so as to not disturb others during the workshop.

3. Participation: This is NOT intended be one-way communication to audience. To get the most from this workshop, you will need to be an involved and engaged participant in each module.

4. Ask Questions: If you do have a question you don't want to ask in front of others, ask it privately during a break. Please do not think any question you have is unimportant.



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AGENDA

8:30 am - 9:00 am

Registration and Coffee

9:00 am - 9:10 am

Introduction and Learning Goals



Krishna Pagilla, PhD, PE, BCEE

Professor, University of Nevada, Reno
Director, Nevada Water Innovation Institute
Pagilla@unr.edu

9:10 am - 9:30 am

Nutrient Overview in SF Bay Area



Lorien Fono, PhD

Executive Director
BACWA
lfono@bacwa.org

9:30 am - 10:15 am

Developing a Nutrient Management Strategy or Roadmap

- Mainstream Activated Sludge Upgrades
- Intensification
- Sidestream Treatment
- Multi-Benefit and Regional Solutions



J.B. Neethling, PhD, PE

Wastewater Treatment and
Effluent Management Director
HDR, Inc.
JB.Neethling@hdrinc.com

Dr. Neethling is the Technical Director for Wastewater with HDR Engineering. JB has worked on many nutrient removal projects since 1976 – and still learns new approaches to nutrient removal! He has designed advanced treatment processes, including a WRRFs to meet very low effluent limits - 0.05 mg/L TP and 2 mg/L TIN. JB was the technical lead for the BACWA Nutrient Removal Optimization and Upgrade Study (2018) that lead to the current nutrient reduction efforts. JB has a Bachelor's Degree from the University of Stellenbosch (South Africa) and MS and PhD degrees from University of California, Berkeley. David Jenkins was his advisor, mentor, and friend.



**Leon S. Downing,
PhD, PE**

Global Practice and Technology
Leader, Nutrient Removal &
Recovery
Director of Innovation Platform |
Treatment Solutions
Black & Veatch

10:15 am - 10:30 am

1:30 am - 11:15 am

Dr. Leon Downing is the Global Practice and Technology Leader for Nutrient Removal and Recovery for Black & Veatch from Madison, Wisconsin. Leon also serves as the Director of Innovation for Treatment Solutions where he provides leadership across all of Black & Veatch’s applied research investments. Dr. Downing has led many innovations in the industry, including some of the first implementations of AGS, MABR, low DO, densification, deammonification and nutrient harvesting in North America. He has contributed to ten Water Research Foundation projects and served as a principal investigator on three of those projects. In addition to his role at Black & Veatch, Dr. Downing serves as an adjunct professor at the University of Wisconsin.

Break

Nitrogen Removal Fundamentals

- Wastewater N Concentrations and Trends
- Ammonia Removal – Nitrification
- Nitrogen Removal – Denitrification
- N Removal Effects and Impacts on Sludge Production
- Nitrogen Removal Effects and Impacts on Bulking and Foaming
- Nitrogen Removal Effects on Aeration and Energy Consumption
- Sidestream and Emerging Processes



**Krishna Pagilla, PhD,
PE, BCEE**

Professor, University of
Nevada, Reno
Director, Nevada Water
Innovation Institute
Pagilla@unr.edu

Dr. Krishna Pagilla is the Ralph E. and Rose A. Hoeper Engineering Professor in the Civil and Environmental Engineering Department at the University of Nevada, Reno. He is also the Director of Nevada Water Innovation Institute, a university-utility partnership to meet water technology and development needs, and to drive leading edge research and innovation in the water sector. Dr. Pagilla’s expertise is on water resource recovery, nutrient pollution control, water reuse, and decarbonization. He is a Fellow of WEF, IWA, and ASCE. He served as process expert for various water resource recovery facilities for planning, design, and implementation.



**Robert Sharp, PhD,
PE, F.WEF**

Vice President
Hazen and Sawyer
RSharp@hazenandsawyer.com

Rob Sharp has over 25 years of experience in wastewater process design. He spent the first 25 years of his career as a Professor at Manhattan College conducting research and teaching courses in wastewater treatment, water reuse and resource recovery. He has worked part-time for Hazen for the past 18 years and recently joined the firm full-time. He specializes in advanced wastewater process planning and design, anaerobic digestion/co-digestion and resource recovery.

11:15 am - 11:30 am

Q&A or Panel Discussion

11:30 am - 12:15 am

Lunch Break (Lunch Provided)

12:15 pm - 1:15 pm



Jamie Pigott, PE
Design Manager / Associate
Carollo Engineers
jpigott@carollo.com



Irene W. Chu, PE
Senior Associate
Hazen and Sawyer
lchu@hazenandsawyer.com



David Donovan
WPCF Manager, City of Hayward
David.Donovan@hayward-ca.gov



Linda Sawyer, PhD, PE
Wastewater Process Engineer
Brown and Caldwell
LSawyer@BrwnCald.com

1:15 pm - 2:15 pm



Francesca Cecconi, PhD
Process Engineering, Water
Black & Veatch Corporation
CecconiF@BV.com

Mainstream Activated Sludge Case Studies

Sunnyvale

Jamie Pigott is a design manager and process mechanical engineer with Carollo in Walnut Creek. He has 10 years of experience in the industry, all spent in the San Francisco Bay Area. Jamie has helped agencies plan for, design, and construct secondary treatment and nutrient removal projects. He's here today to talk about the City of Sunnyvale's new BNR facility currently in construction.

USD

Irene Chu is a Senior Associate at Hazen and Sawyer with 15 years of experience specializing in wastewater process design and optimization. She has worked on several nutrient removal projects in the Bay Area and New York, including Union Sanitary District ETSU program and NYC's Advanced Wastewater Treatment program. Prior to Hazen and Sawyer Irene worked at SFPUC's Southeast and Oceanside Plants.

Hayward

David Donovan is the Water Resource Recovery Facility Manager for the City of Hayward. He has been with the City of Hayward since 2015.

Hayward

Dr. Linda Sawyer has over 30 years of experience in wastewater process engineering and currently leads Brown and Caldwell's wastewater process engineering team in California, Arizona, and Nevada. Over the last decade, Linda has worked on nutrient removal evaluations and designs with San Francisco Bay area agencies including Palo Alto, San José, Hayward, and Silicon Valley Clean Water. Linda has a PhD from the University of California at Berkeley, where David Jenkins was a member of her committee.

Intensification Case Studies

Windsor MABR

Francesca is a process engineer with 7 years of experience in wastewater treatment research and consulting. She achieved her bachelor's and master's degree in environmental engineering from the University of Florence, Italy. She has achieved her PhD in Civil and Environmental Engineering from the University of California, Irvine. She has joined Black & Veatch in 2020 where she has focused on innovative treatment processes and technologies at large to small-scale facilities for biological nutrient removal. Innovative treatment processes and technologies she has evaluated and researched include Aerated Granular Sludge (AGS), RAS fermentation, Membrane Aerated Biofilm Reactor (MABR), bioelectrode sensors for anaerobic digestion monitoring and machine learning tools for biological processes sensors application.



Michael Walkowiak, PE
 Managing Principal
 Brown and Caldwell
 mwalkowiak@brwnncald.com



Seppi Henneman, PE
 Managing Principal
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Rion Merlo, PhD, PE, PMP
 Associate Vice President &
 West Region Wastewater
 Practice Leader
 Hazen and Sawyer
 rmerlo@hazenandsawyer.com

2:15 pm - 2:30 pm

2:30 pm - 3:10 pm



Cory Lancaster
 Senior Technologist,
 Buildings, Infrastructure,
 and Advanced Facilities
 Jacobs
 cory.lancaster@jacobs.com



John Witter, PE
 Senior Engineer
 Carollo Engineers
 jwitter@carollo.com

Palo Alto MABR

Mike’s experience covers all aspects of wastewater infrastructure and treatment projects –from initial planning, permitting, and pilot testing through design, construction commissioning, and optimization. He manages large multidisciplinary teams on high-profile and award-winning water resource recovery, biosolids, and recycled water projects. Mike earned an MS in environmental engineering from UC Berkeley and a BS in civil engineering from San Diego State University. Mike holds professional registrations in both civil and mechanical engineering.

Palo Alto MABR

Seppi Henneman is a managing engineer for Brown and Caldwell in Walnut Creek. He has spent most of his career helping clients plan for and implement nutrient removal upgrades. More recently, he has been managing teams of engineers to implement nutrient removal design work. He was the Project Engineer for the Palo Alto project which is the topic of today’s discussion.

Municipal Airport AGS

Rion is Hazen's West Region Wastewater Practice Leader and has been working in the San Francisco Bay Area for over 20 years. He is a graduate of U.C. Berkeley where he studied under Professor David Jenkins. Rion has worked on several nutrient removal projects across California at the planning and design stages. He has expertise in pilot testing, process modeling and biological process design.

Break

Sidestream Case Studies

Sunnyvale – Demon

Cory is a senior technologist with Jacobs in San Francisco. He specializes in process modeling, design, and optimization of wastewater treatment processes focusing on nutrient removal. Recent projects include sidestream nitrogen removal for Alex Renew, in Alexandria, VA and Sunnyvale WPCP in Sunnyvale, CA. Cory has helped develop proprietary wastewater treatment applications, conducted laboratory-scale and pilot-scale treatment studies, has been awarded three patents in the fields of wastewater treatment and algal production, and was the PI on a California Energy Commission research grant investigating a novel carbon diversion technology. Cory has also contributed to national guidance documents on biological wastewater treatment, process modeling, and nutrient removal.

Fresno – Anita Mox

John Witter has over 8 years of experience working in Fresno, CA at Carollo Engineers. He has experience in master planning, process evaluation, biological modeling, piloting, and design for wastewater treatment facilities in the central valley and northern California.

3:10 pm - 3:50 pm



Aaron Winer
Director of Water Quality and
Resource Recovery
West County Wastewater
awiner@wcwd.org

Multi-Benefit and Regional Case Studies

West County Wastewater

Aaron's career spans nearly 30 years in wastewater operations. That experience includes work with elected bodies, communicating with regulators and stakeholders, leading safety programs, developing and collaborating with staff. His work in water quality programs includes the past fourteen years in Richmond, the first nine years with Veolia Water (managing wastewater operations for Richmond) and the past five years as a Department Director with West County Wastewater. Aaron holds certifications in wastewater operations (CA Grade IV), CWEA Environmental Compliance Inspector, Laboratory Technician, Industrial Waste Treatment Operator and Workplace Safety. He earned a Master of Public Administration from USC in 2006.



Andre Gharagozian, PE
Northern CA Wastewater
Process Lead
Carollo Engineers
AGharagozian@carollo.com

West County Wastewater

Andre Gharagozian is an Associate Vice President at Carollo and serves as the regional process lead for wastewater in northern California. He has over 25 years of experience and is a seasoned process engineer with a wide range of experience from facility and master planning, process analysis and design, troubleshooting, operational assistance, and training. Andre's expertise is in process modeling and nitrogen removal with an emphasis on activated sludge, hybrid systems, and sidestream treatment. Andre has worked with many Bay Area agencies and has collaborated with Professor David Jenkins on some of those efforts.



Mallika Ramanathan, PE
Wastewater Market Sector Lead |
Vice President
HDR
Mallika.Ramanathan@hdrinc.com

Central San

Mallika Ramanathan has been working in the Bay Area for over 25 years on nutrient removal and recycled water projects. She has experience in planning, design, and construction of wastewater treatment and recycled water treatment facilities. Mallika's experience includes developing synergies between nutrient removal and water reuse in municipal and industrial applications. Mallika holds a B.S. from Cornell University and a M.S. in Environmental Engineering from the University of North Carolina – Chapel Hill.

3:50 pm - 4:05 pm

Q&A and Panel Discussion



Sara Sadreddini, M.A.Sc., M.Eng., P.E.
Wastewater Process Engineer
Black & Veatch
SadreddiniS@bv.com

Sara is a Wastewater Process Engineer with over 10 years of experience in the industry and holds master's degrees from University of Toronto and the Nanyang Technological University in Singapore in wastewater treatment. She has worked on BNR projects globally and across Northern California, specializing in wastewater treatment planning, design, process modelling, and capacity evaluation. Her expertise also includes project management and engineering services during construction. Passionate about advancing nutrient reduction strategies in the Bay Area, Sara is committed to developing innovative solutions to complex environmental challenges.

4:05 pm - 4:15 pm

Wrap-up and Next Topics

Krishna Pagilla, University of Nevada, Reno

4:15 pm

Adjourn

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We extend our deepest gratitude to all the sponsors who have generously supported the David Jenkins Nutrient Removal Seminar. Your contributions have been instrumental in making this event possible, allowing us to gather, learn, and advance our shared mission of promoting knowledge and innovation in the field. Your commitment to excellence and collaboration is truly inspiring, and we are honored to have you as partners in this endeavor. We would like to offer special recognition to our Platinum, Gold, Silver, and Bronze sponsors whose logos are proudly displayed. Thank you for your unwavering support and dedication.

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PROFESSOR DAVID JENKINS OPERATOR SCHOLARSHIP

ABOUT THE SCHOLARSHIP

Professor David Jenkins has left a distinguished and influential legacy in education, research, and scientific advances in the water sector. Throughout his nearly 60-year career, he actively engaged operators both as Professor and later as Professor Emeritus at the University of California, Berkeley.

The Professor David Jenkins Operator Scholarship is being established in honor of his contributions and legacy to the wastewater operator community. This scholarship will provide up to \$10,000 to a wastewater operator to pursue a college education to further their career in the water sector. The Water Environment Federation (WEF) is building an endowment that will generate the annual funds to offer the scholarship each year in perpetuity.



How to Contribute

Donations can be made to the endowment fund online by visiting:

<https://www.wef.org/Jenkins-Scholarship>



Or by mailing your donation to:

Water Environment Federation
Professor David Jenkins
Endowment Fund
601 Wythe Street
Alexandria, VA 22314

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