

OPERATORS JOIN THE DIALOGUE ON ADVANCED WATER TREATMENT CERTIFICATION

By Penelope Grenoble
SOURCE Editor

WITH INCREASED INTEREST IN ALTERNATIVE water supplies, advanced water treatment (AWT) has become a hot topic in the regional water industry. In SOURCE Fall 2016 we featured two articles, one a report on a workshop of industry professionals that explored advanced water treatment operator training and certification, the other a discussion of a WaterReuse Research Foundation report undertaken in support of the California State Water Resources Control Board's (SWRCB) expert panel on direct potable reuse. Since both discussions took as their starting point the importance of well-trained and experienced operators, we thought it was time to hear from operators themselves. One important takeaway from the conversation was the need for better communication between the people in the plants and the policy makers and regulators who to varying degrees define their jobs.

Tyson Neely is operations manager for the Orange County Water District's (OCWD) Groundwater Replenishment System (GWRS), the largest groundwater replenishment system in the world and its Green Acres Project (GAP). Jon Bradley is chief plant operator at Orange County Sanitation District (OCSD) Plant 1, which supplies 140 million gallons a day (MGD) of secondary treated Spec water to OCWD. Neely has 30 years experience in collection systems management and wastewater treatment including over 15 years of AWT operation specific to indirect potable reuse (IPR). He joined OCWD a year before GWRS came on line in 2008. Previously, he worked at the IPR reverse osmosis (RO) facility operated by the City of Chandler, AZ. He holds SWRCB Treatment Plant Operator Grade 5 and Drinking Water Treatment Operator Grade 3 and Drinking Water Distribution Operator Grade 2 certifications. Bradley has worked in wastewater for 12 years, 10 of them at OCSD. He holds SWRCB Wastewater Treatment Plant Operator Grade 5 certification and has a bachelor's degree in business administration.

SOURCE: Where do GWRS advanced water treatment operators come from?

Tyson: Our operators have come predominantly out of wastewater. Recently we've hired some drinking water certified operators because SWRCB's Recycled Water regulations accept water operator certification as the same as wastewater operator



THE SOURCE

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*Operations Manager
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certification. However, for operators to progress internally, they have to advance through the higher levels of wastewater treatment operator certification.

We recently hired two new operators who had only water treatment certifications, but one of them came with substantial microfiltration (MF) experience and the other came with RO and ultraviolet (UV) experience. Many certified operators we interview come with experience in conventional processes that employ few, if any advanced processes even though AWT technologies such as ultrafiltration (UF), MF, membrane bioreactor (MBR) and UV disinfection systems exist in both conventional water and wastewater treatment.

In general, operators with experience know what a log book is and its purpose, they understand operational trends, hydraulics, much of the biology and chemistry, and the chemical systems and industrial safety practices. All these are part of our daily lives no matter what type of treatment plant we're working in. Ultimately, however, operators with only conventional treatment experience require more training to learn the proper operation of interrelated AWT processes and their extensive support and management systems.

SOURCE: One assumption seems to be that current certifications don't reflect what an advanced treat-



INTERVIEW

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ment operator needs to know. What does this say about existing GWRS operators?

Tyson: There's a lot of concern. We've got one operator who's been at OCWD 40 years and has been doing AWT since the 70s. Is he going to be required to take a whole new test to prove he's a proficient AWT operator? If existing operators are going to be grandfathered in, will an operator carrying a Grade 5 keep his existing Wastewater Treatment Plant Operator (WWTP) certification and be grandfathered at the same level of AWT certification without having to take an exam? Or if he has to take the exam and doesn't pass the first time, will this mean more training? Another test? And who will pay for it?

The GWRS is classified as a wastewater treatment plant, but there are few questions on the existing WWTP certification exams specific to AWT processes. To validate that our operators have the knowledge and skills specific to our processes and because traditional wastewater operator exams cover only conventional processes generally not found in AWT, we have developed our own internal testing program for an operator to progress from an Operator I to Operator II and so on.

SOURCE: What about the idea currently being discussed of adding an AWT module to existing water and wastewater certifications?

Tyson: I don't agree that it should be a module expanding existing wastewater or water certifications. A new AWT certification should be a separate and standalone certification program specific to IPR-DPR treatment operators only. A water plant using UF membranes shouldn't be required to have an AWT IPR/DPR certificate to comply with federal or state water quality regulations. Likewise, I don't believe a wastewater plant operator using an advanced technology MBR system should be required to have an AWT IPR/DPR certificate. However, existing water and wastewater tests need to be revised and expanded to include more questions based on the advanced technologies being used in conventional treatment facilities such as MBR and UV for wastewater and MF and UF for water.

Remember, the idea of developing a new AWT certification program was based upon the needs of potable reuse facilities and their specialized non-conventional operations. That's where the focus needs to stay.

SOURCE: In potable reuse two different water treatment trains are involved. How much should wastewater treatment plant operators know about advanced water treatment and vice-versa?

Jon: I am a firm believer in being a specialist in your line of work. In plants the size OCSD and OCWD operate, it would be extremely difficult to master both wastewater and advance treatment thoroughly. I don't expect Tyson to know my process in detail and he doesn't expect me to know his process in detail. But we both have a general knowledge of each other's operations. I would think there is an opportunity to add more generalized questions about advanced water treatment to the wastewater certifications testing to aid in increasing awareness of potable reuse operations. As wastewater operators, it's important to be aware of current trends and new technologies and where things are going on a general level in the wastewater and water worlds. On the other hand, it makes sense that AWT operators tied to a wastewater plant should have a general overall awareness of the wastewater plant and its process, although not to the degree where they're considered to be expert.

Tyson: I agree. There is an expectation that our operators know more than a little about how a WWTP works, which is an advantage of their being required to maintain wastewater treatment operator licenses. These general types of knowledge points could be easily applied on a new AWT IPR/DPR certification exam. These are very large plants and have very unique operational characteristics and sizable staffs. It's hard to imagine one utility managing the scope of this joint OCSD/OCWD project, but if I were managing both a wastewater treatment and AWT IPR/DPR plant under one utility, I would want to utilize operational staff to its fullest potential and have operators rotate through WWTP and AWT operational assignments. In that case it would make sense for all the operators to have both wastewater and AWT IPR/DPR certification.

SOURCE: Who should take the lead in developing AWT certification and training?

Tyson: The current strategy seems to be to turn this over to AWWA and CWEA (California Water Environment Association)

with SWRCB providing oversight. What the process needs is folks who have diverse overall knowledge of how these AWT IPR/DPR plants operate such as the state inspectors who inspect the plants and the people who run them. Our state inspector knows OCWD's wastewater treatment process, OCSD's source control, the GWRS advanced treatment processes, our recharge facilities, and our spreading basins. Practical knowledge of this scope is important.

I was recently involved in an AWT workshop organized by CA-NV AWWA and CWEA. An observer from the SWRCB and one from the wastewater board monitored the nine of us splitting hairs trying to figure out the domains and subdomains for a future AWT certification test and what we would expect from a Grade 3 versus a Grade 4 versus a Grade 5. The process could have been much more productive if each participant had been asked to develop 50 questions and bring them to the workshop, 50 for a Grade 3, 50 for a Grade 4 and 50 for Grade 5.

I felt comfortable with concerns regarding technology, public health, and other issues identified by engineers and AWT, water, and wastewater plant operators during the workshop. However, it's time to turn the page and have the people who do the AWT IPR work every day and manage the processes become a more integral part of developing a certification and training framework. Every treatment plant is different in one or more ways. The best way to encompass these differences in knowledge-based exams would be having the managers, regulators, and even highly experienced operators of these AWT IPR-DPR facilities lead the development process moving forward.

Jon: To say that a wastewater treatment plant like ours now needs some kind of a validation stamp for advanced water treatment doesn't make sense. I agree that it might if the wastewater and advanced water treatment plants are owned and operated by the same agency and there is a potential for cross training in the different fields of work. To me, a certification for AWT operators should be on a case by case basis. It shouldn't be a one size fits all.

The size and capacity of our two plants, for example, creates a particular dynamic. In our plant, operators operate and we are specialists. We monitor our processes and equipment, facilitate large shutdowns and tie-ins for construction projects and ensure the integrity of our permit; we have the knowledge, skills, and experience to respond to the various emergencies that can arise. We handle the required reporting and logs and we understand and know how to operate the various treatment units throughout our plant. We are not maintenance technicians. We have a general understanding of maintenance work, but we are not electricians or instrumentation technicians. We have people dedicated to that. As operators, we are dedicated to operating the treatment plant and having a thorough understanding of it. If you go to a smaller plant, however, an operator is likely to be a jack of all trades. That's one reason why one size doesn't fit all.

SOURCE: Should advanced water treatment certification follow the grades currently used in water and wastewater?

Jon: If you have a Drinking Water Treatment Level 1 or 2 or Wastewater Water Treatment Operator 1 and 2 and you want to pick up this new industry, starting at AWT grade 3, 4, 5 makes a lot of sense.

Tyson: In the workshop there was discussion about following the existing water and wastewater programs with AWT operator Grades 1-5. The other thought, which I support, was to eliminate AWT grades 1 and 2, based on the presumption that an operator who has a Grade 1 or 2 in water or wastewater has enough knowledge base to begin the AWT certification process as a Grade 3. Given that treatment plants are classified by their flow capacity and the technologies they employ, it's going to be tough to find someone in an AWT plant at a Grade 3 or less. Most AWT IPR/DPR plants are going to be classified at 4 or 5 due to the technologies, even smaller plants.

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TYSON NEELY

SOURCE: What about knowledge and proficiency requirements identified in the WateReuse Research Foundation project?

Tyson: AWT operators need to be well versed and very knowledgeable on the barriers in advanced water treatment. Critical Control Points (CCPs), which are continuously monitored by our SCADA (supervisory control and data acquisition) operating systems are a key to our continued success at GWRS. Our processes have operational standards that are constantly being evaluated to ensure operational integrity throughout the plant. Specific alarm set points are managed so that if a critical parameter is exceeded, the operations department is immediately notified, investigates, and takes any necessary corrective actions. Regarding operational integration and reporting and operational response procedures, we have five operators assigned to each of our four shift rotations with an internal mandate of having no less than three on duty at all times. We have one operator assigned to the control room to monitor the process control system and maintain an open line of communication with everyone who needs to discuss details regarding every aspect of plant operations. Two

to four operators are constantly in the field manipulating and adjusting equipment, collecting localized data and process compliance samples, performing housekeeping and special projects such as membrane cleaning and testing, as well as assisting peer work groups such as maintenance, electricians, technicians, distribution, etc. Operators are very in touch and in tune with the local processes and operational requirements. We've got to know what's going on out there. No way do you ever just depend on your SCADA.

SOURCE: What about the operational interfaces between source water, wastewater, and advance treatment called out in the WateReuse Research Foundation Report?

Jon: Since GWRS went into operation, we have perfected what each of our operations should know about the other and how we should communicate. It's a continuing process. This is another area where the operators who do this work could provide knowledge and information to developing a certification and training framework.

Tyson: With our recent GWRS expansion there was a lot more to be learned such as incorporation of our new flow equalization process. We have also developed new ways to optimize our chloramine program and post treatment processes. These areas are purely plant optimization efforts that have helped improve our operational efficiencies. Our finished product has essentially remained unchanged since we went online January 2008, which gives us confidence in the continued mitigation of public health concerns related to our operations.

Our two operations are in continuous communications 24/7, which is paramount to our ability to determine how a process in one plant may affect the other plant. Our plants operate in very stable patterns so even subtle changes are noticed and discussed. Sometimes this can result in OCSD making corrective measures or explaining its plant processes to help OCWD operators better understand expected effects or be prepared to incorporate response procedures based upon prescribed CCP response plans. Take for example GWRS microfiltration feed water turbidity NTU (nephelometric turbidity unit) limits. If we see the NTU climbing about four or five NTU, we'll call OCSD to see if they can provide any details or corrective actions. If the feed water exceeds 20 NTU for four hours we must shutdown; if the feed water NTU exceeds 50 NTU at any time, we must shutdown. The feed water we receive from OCSD maintains a very stable 2-4 NTU so something would have to be seriously wrong next door to hit those CCP feed water NTU limits.

Jon: The true success of our facilities is that the training and coordination is so strong in our partnership. We're physically right next door to each other and we have a flexible and informed working relationship. And our service areas are very, very similar so we're able to operate for the good of the service area. Not for the good of either organization independently.

SOURCE: You're suggesting that not only are you two personally talking with each other but that operators at various levels are also talking. What about plants that aren't linked operationally as yours are? Will there be a need for extensive training and employee development?

Tyson: Training in this arena needs to stress the importance of being informed about the other agency's specific concerns and realizing the importance of communicating any issues as they arise. We have developed training materials for MF, RO, UV/AOP (advanced oxidation process) and post treatment stabilization, much of which was developed by the initial GWRS design and construction. Membrane consultants and vendors also provide training. Our operations department has also developed various training materials on a lessons-

learned/need-to-know basis. Training materials specific to advanced treatment processes are more readily available from manufacturers of the components, and traditional water and wastewater study courses are still coming up to speed in offering detailed materials specific to AWT IPR/DPR. Having the proper training materials available for future AWT IPR/DPR exams is an important piece to this puzzle. The challenge is exploiting these new technologies to the level they need to be for training purposes.

Jon: In the 90s there were a lot of training opportunities such as internships, college courses, and work/trade programs that trained the previous generation who went into water and wastewater jobs. With most of the vacancies filled and not much turnover, the need for these programs fell off. Several years ago here at OCSD, we started looking into what we could do to prepare for the upcoming "retirement wave." Our decision was to develop a working relationship with Rancho Santiago College, which has a comprehensive internship program. We work the

students through operations, maintenance, electrical, instrumentation, and collections, the whole gamut. They get education and hands-on training that is very valuable and is difficult to find.

SOURCE: What would you tell CA-NV AWWA, government agencies and other professionals about the kind of training AWT operators need?

Tyson: Focus new training materials on technologies specific to IPR/DPR AWT facilities. That means knowledge of low- and high-pressure membrane systems, biological, fouling and scaling control of membrane systems; disinfection and advanced oxidation systems; pump, hydraulic, and valve control. Chemical applications. Post treatment. And all the terminologies—EC (electrical conductivity) TDS (total dissolved solids), log removal, PDT/MIT (pressure decay test/ membrane integrity test), TMP (transmembrane pressure), TOC (total organic carbon), pH, etc. I'm in favor of the SCWCB coordinating and offering future AWT IPR/DPR exams and

certifications as they do now in water and wastewater. Existing or new training entities should begin offering materials and classes on the newer technologies. These might include CA-NV AWWA, California State University at Fresno, OpStar, etc.

Jon: When an agency develops a training or testing program, it is important to thoroughly understand the topic. In this case, if you want a program that covers the various types of AWT process units and integration of processes, it is important to survey several plants that operate these types of facilities and gather their feedback. In general, certification programs are designed to assess an operator's general knowledge of industry practices. For example, in wastewater we learn about ponds, but at OCSD we don't use ponds to treat our wastewater. It's still important to learn about ponds, however, because some wastewater plants in California could include them as part of their treatment process. Training programs should match industry practices and cover variations likely to exist in different kinds of facilities. 💧

