Utility leaders from around the globe joined professional services firm CH2M in a forum to discuss current challenges, lessons learned, and innovations and trends in potable reuse at the International Water Association’s (IWA) International Conference on Water Reclamation & Reuse. CH2M’s global drinking water and reuse practice team, which has and continues to partner with each of the participating utilities, hosted the event.

“Populations continue to grow, regulations are changing, infrastructure is aging, and there’s a greater need for increased security,” says Russell Ford, CH2M global drinking water and reuse practice director, commenting on factors that are affecting utility leaders’ decision-making. “There’s a constant push to find more innovative and cost-effective solutions to these issues – and the worldwide leaders at this forum are driving these advancements every day,” he adds.

Prior to the forum, CH2M asked five utilities to share their key areas of interest. Topics included technology innovations, source control, regulatory considerations, online monitoring, and direct potable reuse.

The leading utilities included:
- Singapore Public Utilities Board, which began piloting its NEWater Initiative in 2001 and now operates five NEWater factories, treats more than 379 million liters per day (mld) to ensure that every drop of water is used to meet growing supply demands.
- Hampton Roads Sanitation District in the US state of Virginia, shared its plans to add advanced treatment capabilities to multiple wastewater treatment plants and inject more than 379 mld of purified reclaimed water into the Potomac Aquifer to alleviate depleted groundwater levels.
- Upper Occoquan Service Authority, located in northern Virginia, owns and operates a regional advanced water reclamation facility that consolidated and replaced 11 small plants in the 1970s. It is one of the largest and first planned and recognized surface water augmentation type potable reuse plants in the world, with a capacity of 204 mld.
- Metropolitan Water District of Southern California is a regional wholesaler that supplies water to 19 million people in southern California. MWD detailed plans for a proposed 568-mld regional groundwater recharge project and 1.9-mld advanced water treatment demonstration facility, currently undergoing design and construction.
- Orange County Water District, in Southern California, operates the world’s largest ground water replenishment system for indirect potable reuse – producing 379 mld of high-quality water for nearly 850,000 residents.

**Challenges and lessons learned**

Regardless of the type of reuse program used, sampling and monitoring to measure and record treatment process effectiveness are critical to meeting regulations and program goals, the utilities agreed. Several utilities highlighted best practices in the area, including online monitoring for critical control points. At Upper Occoquan Service Authority (UOSA) in Virginia, online monitoring is especially important to advanced water treatment plant efforts, said Bob Angelotti, UOSA’s deputy executive director for technical services. Angelotti explained that online instruments are being used at various locations throughout the advanced water treatment plant to quickly alert operators to analyze and respond to online monitoring in conjunction with other triage information collected early on in troubleshooting an event –
Source control
Source control was a major topic of the forum as the different agencies discussed challenges and best practices. At Hampton Roads Sanitation District (HRSD), detailed sampling was conducted at all landfills in the system to look for the mass contribution of the 1-4 dioxane coming from the landfill leachate to the plants, said Tyler Nading, CH2M project engineer for HRSD’s Sustainable Water Initiative for Tomorrow (SWIFT) program.

“We were at least interested in doing something to understand if there was some small segment of industries or an industry that was contributing substantially to, say, 1-4 dioxane – and there are,” says Hampton Roads Sanitation District Water Technology and Research Specialist Chris Wilson.

“Source control is interesting because we do have a well-defined pollution prevention and control program, but it’s very uniform across the district, and the way the industries are distributed is not,” says Wilson of HRSD’s approach. “And the way the industries are impacting us is not really uniform either, so we had to figure out how to make that program stay uniform but still address contaminant control. That’s something we’re still making peace with – that maybe there’s a more uniform way we need to apply limits rather than targeting a specific thing, on a compound by compound basis,” he adds.

Angelotti echoed the importance of source control for UOSA, which uses a multi-pronged approach. “We’re not only interested in protecting public health but also the aquatic ecosystem, our biological treatment processes, and beneficial use of biosolids or reclaimed water, so anytime there’s an industry or other contributor in our sewershed that may increase risks to one of those, it’s important to us,” he says.

OCWD’s successful approach to source control – open communication with everyone involved – is based on close coordination with its upstream sanitation district, Orange County Sanitation District (OCSD), and remains close to the same as when it brought its Groundwater Replenishment System online a decade ago.

OCWD communicated clear limits to Orange County Sanitation District based on findings from extensive pilot testing that established expected removal, and also helped OCSD find alternative chemicals to use in its onsite processes, said Patel.

“We found that you have to give your partner agencies some kind of target so that they can support your goal limits with their sewer discharge programs,” says Patel. OCSD is also a joint partner on the Groundwater Replenishment System, he added.

In OCWD’s experience, partnership on the reuse project strengthened its relationship with OCSD, which in turn became committed to the program’s success since it is tied directly to OCSD’s own sewer discharge programs and importantly reduced ocean wastewater discharge, key economic drivers for sanitation districts.

Metropolitan Water District of Southern California Water Treatment Manager Heather Collins echoed the sentiment of forming close, integrated partnerships with the Sanitation Districts of Los Angeles County (LACSD). She says, “Over the years, with the benefit of others in the region implementing potable reuse, there has been greater focus on source control, and LACSD has increased the robustness of its source control program. We see that LACSD is invested in enhancing its wastewater treatment systems to ensure the plants continue to protect public health and the environment as the ocean discharge transitions to reclamation.”

Perspectives on the future of potable reuse
All utilities agreed that the continued outlook ahead for reuse advancements is promising. OCWD Director of Research Megan Plumlee shared enthusiasm for the reuse industry’s continued innovations. “What’s exciting for us about the direct potable reuse effort is that the work being done advances industry knowledge for other reuse categories, like our indirect reuse project. As a result, considerations for source control and online monitoring are talked about more frequently, as is benefits reuse in general,” she says.

“Direct potable reuse kind of drives what our R&D [research and development] does now,” says Patel. “When before we had more leeway to look into a wide variety of things, now we’re trying to consider the R&D on the specific topics inspired by direct reuse because these issues are starting to hit us from multiple angles.”

At HRSD, working first with a pilot-scale led to selection of the best treatment train to meet discharge requirements, Wilson said. The district is also optimistic about the benefits of reuse programs in areas severely affected by climate variability.

In the last century, for example, groundwater levels in the Potomac Aquifer have rapidly depleted – dropping 61 meters, Nading explained. The SWIFT program is the answer to provide a more resilient water supply to meet current and future needs in the region, an area that is second to risk at climate variability in the nation, he said.

And even at UOSA, which has experienced decades of success, with its potable reuse system that supplements the drinking water supply for approximately 1.5 million people, there’s still work to do. Angelotti adds, “We’re always interested in improvements that come with technology innovations.”

The engaging conversation on reuse is set to continue, with CH2M leading the development of a white paper that will discuss the challenges and practices covered during the forum and the future innovations, which will give more people access to safe and abundant water supplies.

Author’s Note
CH2M Communications Strategist Kathryn Weast wrote this article with contributions from CH2M Water Reuse Technologists Jason Assouline and Tyler Nading and CH2M Global Technology Leader for Water reuse, Larry Schimmoller. The company is headquartered in Englewood, Colorado, United States.