

Pioneering Direct Potable Reuse in Utah: The City of South Jordan's Pure SoJo Direct Potable Reuse Demonstration Facility



Step 1 of the Pure SoJo treatment train is ozone and biologically active filtration, or biofiltration.



Steps 2 and 3 of the Pure SoJo treatment train are ultrafiltration and granular activated carbon.

The City of South Jordan is pioneering direct potable reuse (DPR) in the state of Utah. With the help of Carollo Engineers and other partners, it has developed the Pure SoJo direct potable reuse demonstration facility and has successfully demonstrated that wastewater can be treated to drinking water standards. More than that, it is also showing that DPR can win vital public acceptance. In the following discussion, representatives from the City of South Jordan and Carollo tell us more about how they are developing a new source of water in the arid West.

Municipal Water Leader: Would each of you please tell us about your background and how you came to be in your current position?

Stetson Bassett: I've been with Carollo for almost 7 years. I am the project manager for the Pure SoJo project. I got involved in this project for two reasons. First, I'm a local: I live in Salt Lake City, Utah, near South Jordan. Second, though not focused on potable reuse, I have spent most of my career in the drinking water field, specializing in biofiltration and piloting, which are integral parts of this project.

Eva Steinle-Darling: I direct the water reuse practice at Carollo and oversee the project team and technical aspects of pioneering projects such as Pure SoJo. I've been working in advanced treatment for potable reuse applications since my PhD studies, during which I studied the removal of organic chemicals of emerging concern using high-pressure membranes. I've broadened my capabilities since then to a wide range of unit processes and the public health, regulatory, and technical aspects of these projects.

Raymond Garrison: I am the director of the South Jordan public works department. I've been with the city for

24 years. Over the past few decades, our system's needs have grown exponentially, and a couple of colleagues and I have chased the reuse idea for a number of years. We're pleased to finally come up with a treatment train that works for us.

Municipal Water Leader: Would you introduce Carollo Engineers and the South Jordan public works department?

Stetson Bassett: Carollo Engineers is an environmental engineering firm that specializes in the planning, design, and construction of water and wastewater facilities. For over 90 years, water has been our sole focus and our passion. We have approximately 1,500 employees in over 50 offices throughout North America.

Raymond Garrison: The rapidly growing city of South Jordan, Utah, has a population of around 90,000 and is located in the Salt Lake Valley. The city has about 500 employees, including the employees of the police force, the fire department, the public works department, the courts, and more. Public works has about 120 employees, with a water division of 26 employees. The city's water system has approximately 24,000 water connections.

Municipal Water Leader: Please tell us about the Pure SoJo direct potable reuse demonstration facility.

Raymond Garrison: South Jordan currently imports all its water from a regional water supply agency and has no other drinking water source. The previous city manager, the prior public works director, and I were tasked with finding an additional water source for South Jordan. We built a task force, and our mayor championed the idea of water reuse.

Our treatment facility is a pilot plant of about 10 gallons per minute and has been in operation for a few years now.

It's been challenging, but we're hitting major milestones with the project.

Municipal Water Leader: This facility uses a carbon-based ozone biofiltration process. Would you explain how this process works and why this process was favored over reverse osmosis (RO)?

Stetson Bassett: RO uses high pressure to push water through a membrane that excludes contaminants and salt, resulting in clean water. This process is energy intensive, and its byproduct is a concentrated brine solution that needs to be disposed of.

When South Jordan was looking for sustainable water, it investigated DPR. It wanted to avoid the cost of RO and the complexities associated with brine disposal. South Jordan found a DPR demonstration pilot that Carollo was working on in Altamonte Springs, Florida, that doesn't use RO.

Carollo helped South Jordan develop a similar, non-RO-based treatment approach called carbon-based advanced treatment. Pure SoJo's treatment train has several steps. The first is ozone and biologically active filtration, or biofiltration. This step disinfects the water and breaks down and removes contaminants and other chemicals in the water, including organics and turbidity.

The next step is ultrafiltration. This removes microbes and turbidity.

The third step is granular activated carbon (GAC). This is the polishing step. It absorbs all the trace contaminants of emerging concern, such as per- and polyfluoroalkyl substances (PFAS), often referred to as *forever chemicals*.

The last step is disinfection: UV disinfection, which inactivates pathogens and destroys the remaining chemicals and other contaminants, followed by chlorine disinfection, which provides final disinfection for the treated water.

This treatment train meets all treatment objectives. It produces safe, clean water and avoids the costs and complexities associated with RO.

Municipal Water Leader: Would you explain what makes PFAS difficult to filter? How does Pure SoJo remove PFAS?

Eva Steinle-Darling: I've been working on PFAS since graduate school. They don't biodegrade. They are not destroyed chemically by typical treatment processes. They're dissolved and are relevant at very low concentrations. That makes them difficult to remove through physical methods. They've recently been regulated in drinking water. In fact, they're the first new contaminants to be regulated in the United States in over 20 years.

One proven method for PFAS removal is the GAC process that Stetson mentioned. That's built right into Pure SoJo's advanced purification train. This is the polishing step that occurs once almost all the other contaminants have

already been removed or destroyed by other methods. It's a lot more efficient to do it in a polishing step at the end.

The PFAS are sequestered on the GAC media. At some point, the column of GAC gets saturated with PFAS, and you must remove the media and replace it with fresh media. We're not fully destroying PFAS, but we're removing them from the water. The hope is that in the future, there will be a reasonable, cost-effective means of fully destroying the PFAS in the solids removed from this plant.

Municipal Water Leader: Would you tell us about the partnerships involved in the Pure SoJo project?

Raymond Garrison: This project wouldn't be where it is without Carollo. We had the idea, but we needed its expertise. There are many experts at Carollo familiar with this water reuse technology. Our other great partners include the Utah Division of Drinking Water (DDW). It has supported the idea of DPR in the state and believes this is a good source of water for the state of Utah. Another is the Jordan Basin Improvement District, which owns and operates the Jordan Basin Water Reclamation Facility and hosts the Pure SoJo facility within an existing building on site. We engaged with the University of Utah to help us with this project, too. I don't believe we'd be where we are now without these partners. It's been a great team to work with.

Municipal Water Leader: The city offers tours of Pure SoJo to the public. Why is it important that residents see the facility?

Raymond Garrison: Water reuse is a very sensitive topic right now. It is often misrepresented. The general public doesn't know about the technology, the safe barriers, the sampling, and all the things that go into a project like this. This tour helps us explain all that.

We initially had some negative media attention on this project. I took a lot of calls from people who were concerned that we were putting wastewater into the drinking water system. When I explained what we were doing, had them tour the plant, and walked them through all the safety barriers, they were more accepting. Having previously said they would never drink the water, they ended up tasting it. Offering tours is an effective educational tool that helps get people to buy in and understand what's happening.

Municipal Water Leader: How will this project be regulated to ensure that the drinking water remains safe?

Stetson Bassett: There currently are no regulations for DPR in Utah. We've been working closely with the Utah DDW to help formulate regulations. It is monitoring the data with us and making sure that this water is 100 percent safe for our public.

Eva Steinle-Darling: We've developed the treatment goals and the monitoring and reporting requirements for this project together with the Utah DDW to provide full transparency. The project, even though it's not technically required, is currently operating under a special permit from the DDW. We requested regulatory oversight to bring the regulators along on this process of introducing DPR to Utah.

Municipal Water Leader: This project was recognized at the 2024 American Council of Engineering Companies' Engineering Excellence Awards Gala. Please tell us about the importance of this recognition.

Eva Steinle-Darling: Water infrastructure projects are not as visible as bridges, buildings, and transit centers. To be recognized among these more visible projects is gratifying. It means we're doing something that has an effect.

Beyond that, elevating the profile of potable reuse is hugely important. It's essential for potable reuse nationwide. The engineering community at the awards gala is our target audience: engineers and the utilities that might pursue these projects in the future.

It's important to recognize South Jordan as the leader in bringing DPR to Utah. It has learned not just water treatment but ultra water treatment from scratch. It is doing this not only to serve itself but to serve the entire state.

Municipal Water Leader: What are the prospects for the use of DPR in other communities in Utah and across the United States?

Raymond Garrison: Educating people and developing regulations can help others who are facing water scarcity and extreme growth. I hope other communities can develop this alternate source of water to help supplement their needs. This project has already spurred a lot of other communities to look at reuse. We would love to help our surrounding communities if something like this would work for them.

Eva Steinle-Darling: There's a general trend toward more reuse in the arid Southwest. We've also seen potable reuse projects on the East Coast that have been pursued for various reasons, with water supply and discharge avoidance being the main drivers. If potable reuse becomes accepted in a headwaters state like Utah, that means a lot. When you think about the water available to folks in Southern California, many supplies are already impaired, and people know that. In a desert community such as El Paso, it's obvious that there's not a lot of water available. That community has been vocal about needing to be innovative with new sources of water supply. It may come as a surprise to those who live among snowcapped mountains that water is a challenge here, too. This project takes us to the next frontier. This is a solution not just for a desert community, it's a solution for any community that needs water.

Municipal Water Leader: Is there anything you would like to add?


Stetson Bassett: DPR still faces several challenges: There are few full-scale operating facilities, and currently there are no federal regulations and few state-specific regulations. The public perception can be negative, and acceptance can be undermined by a lack of understanding.

South Jordan is a fairly small city, but its vision and long-term goals are huge. It's having a significant effect on DPR in Utah by helping educate the public and regulators. It's moving other utilities and cities toward potable reuse. It has an influence on the United States as a whole as well. This project, though it's a small, 10-gallon-per-minute demonstration pilot, has an outsized effect. I think it's remarkable.

Raymond Garrison: We've reached many milestones, but we still have a long road ahead. One challenge is dealing with water rights. Even though we're at the pilot-plant and taste-testing stage, before we can actually get to full DPR, we've got to continue educating the public and gathering data.

Municipal Water Leader: What is your vision for the future?

Raymond Garrison: In the coming years, I'd like to see DPR regulations be developed and DPR become an option. I'd like people to understand that the technology exists and the water is clean, safe, and potable. That's my vision.

Stetson Bassett: My vision for DPR in Utah in particular is that it won't be polarizing and will become commonplace. Hopefully, it will continue to spread throughout Utah and the United States. 



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