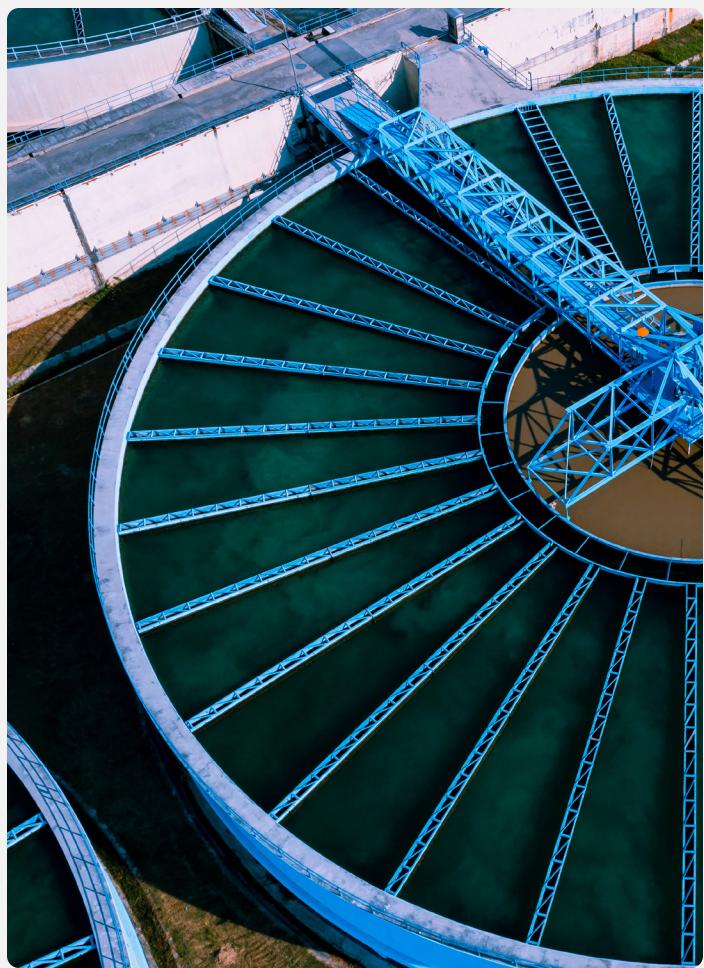# Usalco

From good to great:

How a strong operations team can take their treatment game to the next level with AI-based decision support tools.

Excellent raw water quality does not mean that water treatment are easy.

> **GREG VENETTE**
> Changing both alum and ACH simultaneously made us a bit nervous at first … but in water, EVERYTHING is changing all the time, so operators need to be more dynamic in their thinking.

Excellent raw water quality does not mean that water treatment operations are easy or straightforward. The operations team at Louisville, Colorado knew this firsthand when they began exploring digital tools to assist them in providing the highest quality drinking water possible for their community.

Situated between Denver and Boulder on the Front Range of the Colorado Rockies, Louisville has benefitted from some natural advantages in water supply. Sourced from either South Boulder Creek or the Colorado River, Louisville benefits from the "snowcap-to-tap" water systems that supply many of the communities along the Front Range. While life next to the mountains presents its own watershed risks (wildfires devastated the community in 2021, destroying more than 500 homes) so Utilities

Director Greg Venette and his team have always maintained a policy of excellent operations and data-driven decisions. While Louisville's raw water was naturally low in organics. Greg and the team knew that optimizing coagulant dosing and allowing filters to run for as long as possible between backwashes would save water and money in the long run.

INNOVATION FLOWS HERE

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A member of the utility's IT team had a background in data science and built a regression analysis tool based on historic data that the operations team utilized to dial in coagulation. "Our source water is really good, so in order to achieve better performance, you need real accuracy in your data and your model," notes Venette.

Unfortunately, the in-house model was complex to utilize and hard to update, so they began searching for additional options, seeking a digital tool that would be usable by the entire team and easy to maintain and sustain as new team members joined the utility. The IT department was also wary of software that was directly connected to SCADA. "SCADA is sacred", notes Venette, "you really have to be careful about cybersecurity." Having a cloud-hosted option that was disconnected to SCADA seemed like the best approach.

Louisville learned about Virtual Jar® in April 2023. Virtual Jar® is a cloud-hosted software system that enables operators to accurately model the treatment processes in in their plant and perform thousands of "virtual jar tests" to explore the broadest range of treatment chemical combinations. Venette and his team liked what they saw and asked for a demo in August, and kicked off use of the software in October.

The Louisville team knew that operators needed to embrace the tool if it was ever going to be adopted successfully, so they assigned two up-and-coming operators to work directly with the team from Fontus Blue to get the model built and perform the first simulations. They then were assigned the job of training the rest of the operation steam. "If you get the champions online early, everyone else comes along sooner," notes Venette.

The operations team started off by replicating current plant operations in the Virtual Jar®. "There's no 'breaking it' because it's a computer model; you just play and play. It's really a collaborative tool," notes Venette. Rather than dictating specific recommendations to the operations team, Virtual Jar® invited the operators to explore combinations of chemicals and dosage ratios that were outside their normal operations.

Senior operators often have decades of experience with a specific treatment plant, but also favor treatment combinations they have experience with. "'That's the way we've always done it' is actually NOT OK," notes Venette. It helps operators to be able to see not only what they've done in the past but also what the future could look like with different treatment strategies.
"Organics treatment was a big mindset change for us," notes Venette. The team had historically prioritized turbidity reduction because organic levels were generally low in their raw water. But certain turbidity reduction strategies ALSO help reduce organic levels, and the

Louisville team soon found that different ratios of alum and ACH produced better results for both treatment objectives. Virtual Jar® also helped the team appreciate how mixed coagulants needed to be adjusted for temperature: for colder water, higher ratios of ACH produced the best results whereas when water temperatures were warmer, higher fractions of alum produced better results.

"I have always been cautious in my approach to treatment changes," explained Venette, "changing only one variable at a time and evaluating the results." But with software that can accurately predict plant performance over a wide range of conditions and chemical combinations the operations team were able to evaluate simultaneous changes in multiple chemicals – discovering some "hidden islands" of optimal performance. "Changing both alum and ACH simultaneously made us a bit nervous at first", notes Venete, "but in water, EVERYTHING is changing all the time, so operators need to be more dynamic in their thinking." The software tool also able to reveal the exact cost of each treatment strategy, allowing the operations team to choose the best treatment scenario for a given cost objective.

"Our utility isn't small, but it isn't medium: it's 'smedium'," notes Venette. "We have resources and a strong drive to produce optimal quality water, but we sometimes don't have all the people. Virtual Jar® helps level the playing field."

CHEMICAL DOSE COMPARISON: 2021-2023
AVERAGE VS. 2024 (MG/L)

■ 2021 - 2023 AVERAGE
■ 2024 AVERAGE

	ALUM	ACH	CAUSTIC
2021 - 2023 Average	33	04	13
2024 Average	30	02	10