Case Study

Rezatec

# Case Study: City of Spokane

## Leading the charge on building regulatory and investment confidence

**Water SAT – Dam Monitoring**

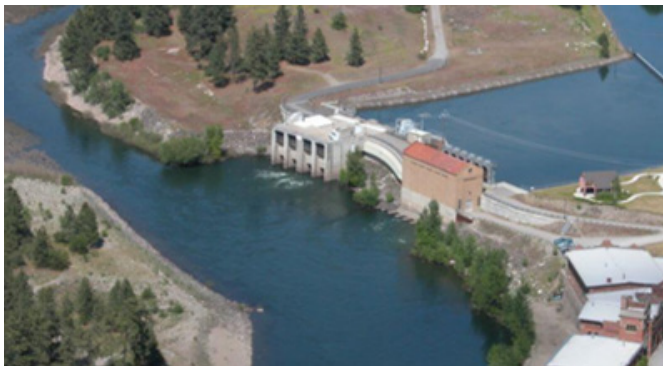
## Overview

Situated in eastern Washington state, the Upriver Hydroelectric Dam on the Spokane River is owned and operated by the City of Spokane's Water Department. The original Upriver Dam was built in 1894 and a new concrete dam replaced the old wooden one in 1936. The dam generates more than 70 million kilowatts of electricity, annually. Power generated at the dam is used to pump water, delivering up to 150 million gallons of clean, safe drinking water per day to more than 280,000 customers. Upriver Dam is a straight, concrete gravity dam. It operates in a 'run-of-the-river' mode, which means there is no water storage provided by the dam. As a result, Upriver Dam is subject to seasonal river flows.

Leading the City's dam safety and maintenance program is Seth McIntosh, Water System and Hydroelectric Plant Manager, and Jeanne Finger, Chief Dam Safety Engineer. Both previously worked on the distribution and transmission side of the City's water department and transferred to the hydro dam in early 2021.

## The Challenges

"It's unusual for a City to own a hydroelectric dam," explains Seth. "It's an important asset for us: our energy costs for pumping are lower because we're producing some of our own electricity, which means our water rates charged to our customers remain competitive. Over the years we evolved to selling our excess power to a local electric utility at a wholesale rate, so it has become a product we can also export."



"The dam hasn't been prioritized for maintenance over a long number of years." continues Seth. "We're fully committed to meeting the FERC's (Federal Energy Regulatory Commission) safety standards so that we can keep our communities safe and the rehabilitation bill is into the millions of dollars."

"Our challenge is to demonstrate to the regulator that we are ahead of any issues that may lead to potential failure, while providing a return on investment to the City and building confidence that there is value in owning this asset."

Having experience with Artificial Intelligence (AI) platforms on other City water department projects, Seth and Jeanne turned to Rezatec's Dam Monitoring geospatial AI product.

## The Solution

**Has the rock moved?**
Initially the team used the insights provided by Rezatec's Dam Monitoring platform to back up inspection reporting to FERC. Jeanne explains, "A predecessor had written in a quarterly inspection report 'looks like the rip rap has settled a bit, rest of dam is safe'. Clearly the regulator's job is to call out anything that looks like it could lead to potential failure and so they were asking us what we were going to do, did we have photographs, were we setting up monitoring? It's tricky to provide evidence of non-movement, trying to figure out the exact location then take photos of the same feature from the same place in the same light in different seasons."

"Because we're a run-of-river dam, our tailrace increases 15 to 20 feet and seasonal run-off is on top of that," adds Seth. "By the time the Spring run-off and debris deposition is complete, the rip rap-covered area looks completely different."

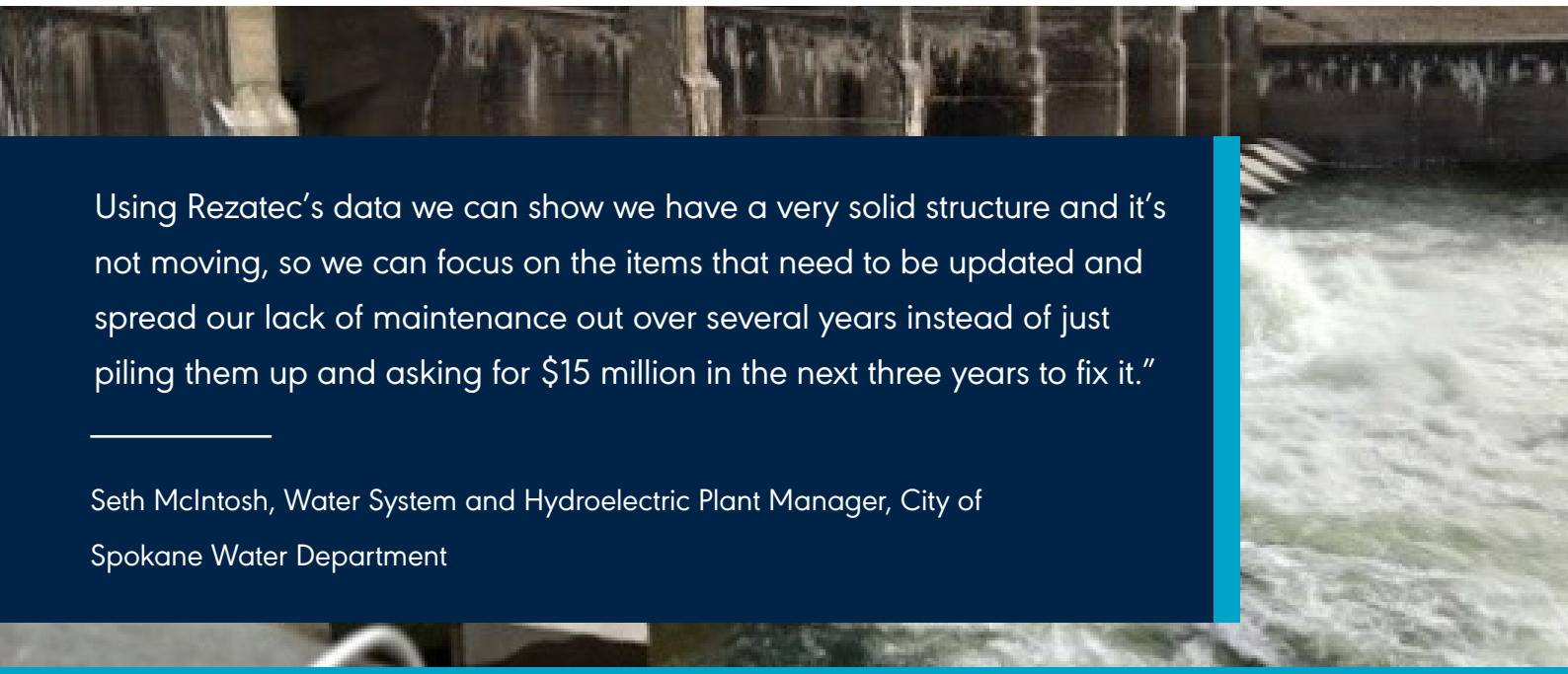
Instead of deploying measuring devices, the team is using geospatial AI data to evidence non-movement on the rip rap and embankments. "Establishing a robust process is important, says Jeanne. "Rezatec's data really fits to solve the puzzles and gives us solid evidence that satisfies FERC's questions."

**Data that's never before been available**
Upriver Dams' control room staff are on site 24 hours a day, 7 days a week. They are required to do two checks per shift, walking the property and reporting anything irregular. Seth and Jeanne then do follow up inspections as needed.

On top of that, the team completes regular physical inspections and has evolved its inspection report to remain in line with FERC guidelines. This involves walking the entire project, inspecting the power houses, surveying all the embankments and the MSE walls, checking for vegetation and checking the power canal. "Anything we see that could potentially be something we want to look at again, we take typically between 60 and 100 photographs every inspection," explains Seth.

"We really value the long-term trending data provided by Rezatec," adds Jeanne. "We rely less on the anomaly data because we have staff on site and we're heavily instrumented. Our control room staff conduct continuous surveillance every day but Rezatec is giving us information we can't get: movement over time that's too fine to detect with the naked eye."

"The other part of it is checking trends to see where we might be starting to go south either with movement or vegetation. We get an early warning of that trend, we investigate and do something about it before it turns into a bigger issue."



Using Rezatec's data we can show we have a very solid structure and it's not moving, so we can focus on the items that need to be updated and spread our lack of maintenance out over several years instead of just piling them up and asking for $15 million in the next three years to fix it."

Seth McIntosh, Water System and Hydroelectric Plant Manager, City of Spokane Water Department

**Focusing maintenance resources**
The team has been working on a rehabilitation project for the auxiliary spillway. One of the agencies hired to establish what is needed for the permitting process asserted that, because of a lack of maintenance, the vegetation in the project area had developed into a wetland and therefore the rehabilitation to ensure safety could not go ahead. "This really was a shock and an eye opener," says Seth. "Vegetation in areas that are critical needs to be maintained to make sure we don't add additional wetlands that will restrict us from doing our dam maintenance."

"Vegetation and moisture data is a really important aspect of what Rezatec provides," adds Jeanne. "We are looking at additional coverage to make sure we're aware of vegetation growth in those critical areas."

"In the FERC inspection this summer, most of the comments had to do with vegetation removal so they really seem to be keen on reminding us to stay on top of that better."

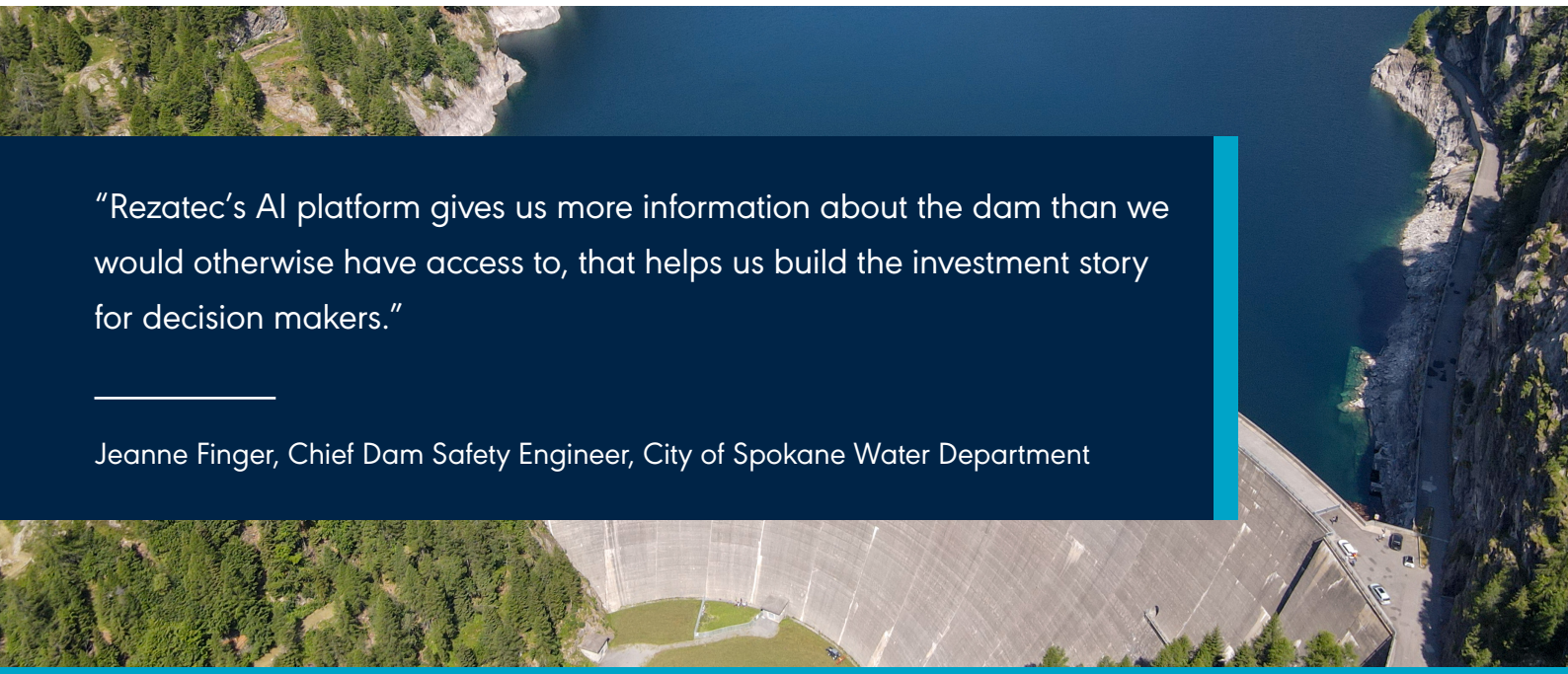
**Building investment confidence.**
After several decades during which the dam underwent light maintenance, the Spokane team is working through an extensive program to update the dam according to the requirements of FERC and other regulatory agencies. "We're catching up on a long period without major upgrades and now we're requesting millions of dollars to update the dam," explains Seth. "As a public entity, we are working hard to justify investments and Rezatec helps us prioritize what needs to be done so that we spread the costs."

## The Results

"Clearly there are obvious things that need to be dealt with such as an out of service gate which fell due to cable failure that resulted in deformation in the support arms. But how much do we really need to spend on the auxiliary spillway rehab and on pier repair?" Seth continues. "Using Rezatec's data we can show we have a very solid structure and it's not moving, so we can focus on the items that need to be updated and spread our lack of maintenance out over several years instead of just piling them up and asking for $15 million in the next three years to fix it."

Jeanne adds: "Rezatec's AI platform gives us more information about the dam than we would otherwise have access to, that helps us build the investment story for decision makers. Our recommendations are based on fact and objective data, which bolsters the case for them."

The upgrade projects should address potential failure modes. "We've built a lot of experience and confidence combining our own inspections with Rezatec's data. When participating in future sessions to identify PFMs, we'll be using this data to establish with a degree of confidence whether a PFM is likely or whether its category would be much lower. We are getting more critical, making sure the projects we plan are doing something to reduce the risk of these potential failure modes," concludes Seth.



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