



AQUARIUS Surface Water Monitoring Case Study: Wyoming State Engineer's Offices' State-Wide Implementation of AQUARIUS Rating Curves



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Loren Smith, Wyoming State Engineer's Office

Solution Highlights

- ▶ Wyoming's water data aligns with USGS water data, and is more accurate
- ▶ Office efficiency has increased by more than 25%
- ▶ AQUARIUS is more flexible, easier and faster to use
- ▶ Central server-based system provides statewide consistency of datasets and processes

Solution Summary

- ▶ **Client:** Wyoming State Engineer's Office
- ▶ **Application:** Hydrology
- ▶ **AQUARIUS packages:**
 - AQUARIUS Hydrologic Workstation (all toolkits)
 - AQUARIUS Server
 - AQUARIUS Web Portal



Background

Since 1890, the Wyoming State Engineer's Office has been responsible for the management and administration of water rights throughout the state. "We are in charge of any consumptive use non-consumptive use that the state's water is put to, any use that needs a permit," explains Loren Smith, the Superintendent of Water Division III. "We have hydrographers and other field staff, commissioners, superintendents and assistants in a number of offices across the state. They monitor reservoir water and ground water as well as surface water flows. Agricultural, municipalities, industrial and commercial users and manufacturing uses all fall under our responsibility."

The Engineer's Office monitors continuous recording devices in 252 streams and canals, and operates another 53 continuous recording stations in co-operation with the USGS. In addition, there are recording stations run in co-operation with the National Weather Service and other agencies, and non-continuous recording stations. All water data is collected, reduced and compiled by the Engineer's Office.

AQUARIUS Allows Resultant Data to be in Compliance with Usgs Standards

For over a year, the State of Wyoming has relied on AQUARIUS software to import, process, visualize and manage their water data. The AQUARIUS system replaced a water data analysis system that had been in place for many years, but which did not always produce results to the USGS standard, according to Smith. "We were running into differences—sometimes small, sometimes significant—between our final numbers and what the USGS was coming up with on the same dataset." The Engineer's Office evaluated a number of vendors, seeking a software package that would provide the accuracy of the USGS ADAPS system, and bring new features and flexibility as well.

AQUARIUS Ratings Package is Intuitive and Flexible

They were immediately impressed by the ease and flexibility of rating curve development in AQUARIUS. "The Ratings Package stands out. It's a tool that we've wanted forever, and we've finally found something that really does what we had in mind." Compared to the competition, he says, "AQUARIUS is more intuitive. It's easy for anyone to grasp how a rating curve is developed and why it's developed the way it is." He adds. "It's flexible—you just grab a line and adjust which curve you're using, and how that curve is related to the measurements or the actual skeletal points. That wasn't possible before."

Rapid and Effective Digitization of Chart Data from Older Sensors

The Engineer's Office had some specific demands for the AQUARIUS system. They required a way to integrate their historical data into a complete searchable database of current and historical data. In addition, they wanted to quickly and accurately digitize the paper chart data, produced by hundreds of older water level recorders that are still in use.

Aquatic Informatics worked closely with them to meet their needs. "Aquatic Informatics designed a toolbox for us that digitizes the paper chart data and creates a digital



record,” says Smith. “The customer service we’ve received has been better than we expected. They’ve been very willing to work with us in developing the solutions to fit our needs, and helping get us to where we are.”

Accurate and Archiveable Water Data

In its first year of use, AQUARIUS has increased the Engineer’s Office’s efficiency by more than 25%. However, Smith is clear that the system’s primary benefits are its accuracy and its audit trail. “We have improved the accuracy of our record, which is critical. Creating a reproducible, archiveable, dependable record—and being able to publish that record to USGS standards, which is the national standard for us—that’s the big plus.”

The Wyoming State Engineer’s Office implementation of the AQUARIUS system runs through Citrix servers to provide high-performance remote access to AQUARIUS toolboxes and datasets. Smith feels there is tremendous value in centralized data management. “Things we used to do with paper documentation are now automated. We’re bringing all the paper files from our dozen field offices into one centralized database. The data is secure, and it’s not spread all over the state.”

The AQUARIUS system continually saves and archives Wyoming’s water data and the processes that are applied to it. Says Smith, “We archive the original data along with the whiteboard schematics and any corrections that have been applied. Anybody can come back at a later date and see how a record was computed, and reconstruct the computation of that record.”

Archiving the complete record is critical, because the department can’t predict what their historical data might be used for. “Our water data is frequently used in lawsuits and cases, from the State Board of Control to the Wyoming Supreme Court and even in the U.S. Supreme Court,” he says. When a water-use conflict arises it may be essential to go back and re-evaluate a dataset from an entirely different perspective. If the original, uncorrected data were lost, a re-examination may not be possible. “In a litigation situation, we know we can call upon the correction history and audit trail that’s saved in AQUARIUS.”

Making Data Accessible and Relevant for Public Distribution

Every year, each division of the Wyoming State Engineer’s Office produces an Annual Report. This is the first year for which all water data, and the associated charts and visualizations, will be produced entirely from the AQUARIUS system.

Looking to the future, the Engineer’s Office will soon begin implementing the AQUARIUS Web Portal, a map-based web browser user interface. The Annual Report data will be published to the Web, as well as live near real time data from water monitoring sites across the state.

Aquatic Informatics Inc.
Business Development
1100 – 570 Granville St.
Vancouver, B.C. V6C 3P1
tf: 1.877.870.AQUA (2782)
p: +1.604.873.AQUA (2782)

info@aquaticinformatics.com
www.aquaticinformatics.com