

SF Public Utilities Commission

Water Management

Case Study

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Overview

The San Francisco Public Utilities Commission (SFPUC) oversees the collection, treatment, transmission, and distribution of the San Francisco water supply.

The SFPUC provides water to 2.4 million people including 29 suburban water agencies. Collection of the water begins in the Hetch Hetchy watershed located in Yosemite National Park. The water then flows by gravity, down the Hetch Hetchy aqueduct for approximately 160 miles. This water makes up about 85% of the water supplied by the SFPUC and is one of the largest non-filtered water supplies on the West Coast. Two water treatment plants make up the balance by treating local sources. They are the Sunol Valley Water Treatment Plant in the East Bay and Harry Tracy Water Treatment Plant in the West Bay.

The Water Quality Bureau (WQB), which operates under the SFPUC, is responsible for ensuring that regulatory compliance is met during all phases of collection, treatment, transmission, and distribution. This requires monthly reporting of water quality data collected at numerous points along the aqueduct as well as at the treatment plants, and throughout the distribution system. The WQB also provides operational support to various divisions in making treatment decisions that ensure the highest quality water is delivered up and down the San Francisco peninsula.

Need for Implementation

The SFPUC monitors numerous points for turbidity, pH, disinfectant residual, and conductivity through its SCADA system. Water Quality regulations set forth by the California Department of Health Services require monthly reporting of several water quality parameters. Turbidity and disinfectant residual must be recorded every four hours as well as daily minimums, maximums, and averages at several locations throughout the water system. This information, while available electronically, was not in a reportable format. Data was recorded on circular charts and then evaluated and entered manually into Excel spreadsheets. This method proved to be tedious and time consuming. Additionally, spreadsheets are required that calculate contact time based on various water quality parameters as well as system conditions such as flow. Again, all of this data was available electronically but was still being manually entered into spreadsheets. A solution was needed that would allow the WQB to mine and utilize data in an easy, user-friendly fashion.

Real-Time Performance Management

- # Monitor Status of Incoming Water Supply
- # Analyze Data in Real-Time for Real-Time Decisions
- # Archive Data Long-Term for Historical Information
- # Consolidate Data from Multiple Sources in a Unified Repository
- # WEB Enabled
- # Features Include:
 - # Advanced Trending
 - # Graphical Display
 - # Calculation Engine
 - # Excel Add-In
 - # Alarm Capabilities
 - # Notification Services
 - # Reporting
 - # Open API

The need for long-term archiving of data is necessary for the WQB in terms of regulatory compliance and research. While there is no regulation yet that states the length of time all electronic data must be stored, the regulations do state that specific treatment plant data must be stored for at least two years. Aside from its regulatory role, the WQB frequently participates in industry studies to develop improved treatment methods. This often requires data that has been collected over several years. Requests for this data often resulted in time-consuming searches through filing cabinets and network searches for old reports. Locating data for in-house studies and trending also proved difficult.

Solution

The path around the data roadblock that WQB was experiencing was found in InStep Software's eDNA software and support. eDNA is a real-time monitoring package that is ideal for distribution of current and historical information throughout large enterprises. eDNA was selected based on its speed of data collection, ability to interface with existing instrumentation and its cost

effective licensing structure. A standard eDNA installation was conducted throughout SFPUC, interfacing eDNA to the process/control system. The information collected from the process/control system was then available to anyone in the enterprise. As the project developed, more users in the government infrastructure discovered how easy it was to get data from eDNA and the number of desktops plugged into eDNA increased dramatically. Although eDNA was already used by other departments within the SFPUC, a customized solution for the WQB was needed.

A phone call to an InStep representative proved to be an encouraging first step. After discussing the unique needs of the WQB, an InStep technician worked on site to install a set of eDNA clients, including a Calculation Service (CalcServ), on a local server separate from the existing SFPUC system. This local installation was the key to effective use of data for the WQB.

Next, InStep worked with WQB staff to automate several of the spreadsheets included in the monthly report to state regulators. Initial reports were produced on site. However, subsequent reports were the result of collaboration through email. This proved to be big cost savings. InStep's training has allowed for in-house creation of these automated reports, which has resulted in even larger cost savings to the SFPUC.

HETCH HETCHY WATER AND POWER											
MONTHLY SUMMARY OF RAW WATER TURBIDITY AND pH											
System Name: SFPWD Raw System No.: 38-001 County: Stanislaus					Name of Water Supply: Hetch Hetchy Aqueduct Sample Location: Albers Rd. Valve House						
For: 4/30/02 to 5/9/02					<input type="button" value="Run Report"/>		<input type="button" value="Edit Notes"/>		<input type="button" value="Clear No Data"/> <input type="button" value="Save Snapshot"/>		
Date	Daily Max NTU	Four Hour Raw Water Turbidities (NTU)						Average	Daily pH 0800	Pipeline Monitored	
		4:00	8:00	12:00	16:00	20:00	24:00				
4/30/2002									6.20		
5/1/2002	5.62							0.44	0.44	6.20	2
5/2/2002	6.01	0.56	0.61	0.20	0.38			0.44	0.44	6.20	2
5/3/2002											
5/4/2002											
5/5/2002											
5/6/2002	5.99						0.64	0.17	0.41	6.20	3
5/7/2002	329.55	0.41	0.06	0.24	0.63		0.63	0.04	0.34	7.14	2
5/8/2002	10.97	0.11	0.16	0.39	0.57		0.67	0.06	0.33	7.19	3
5/9/2002										7.15	
Report Period Averages:								0.39		6.61	
Incidents of Turbidity Greater Than 1.00 NTU											
Date of NTU Incident:	1-May-02	2-May-02	6-May-02	7-May-02	8-May-02						
Maximum NTU on Date:	5.62	6.01	5.99	329.55	10.97						
Total Duration on Date:	00h 00m 40s	00h 05m 31s	00h 02m 30s	00h 13m 10s	00h 14m 11s						
# Occurances on Date:	4	33	15	79	85						
Turbidity Limit: 5.00 NTU											
Total No. of days where turbidity is > 1.00 NTU: <u> 5 </u> , > 5.00 NTU: <u> 5 </u>											
Name: _____					Date: _____						
Notes: <div style="border: 1px solid black; height: 40px; width: 100%;"></div>											

Sample Report: Monthly Summary of Rawwater Turbidity and pH

The solutions provided by InStep have resulted in significant savings to the SFPUC in terms of time and money. The automation of monthly report submittals has resulted in a savings of approximately 40-48 man-hours per month. Automation has also allowed for more accurate reporting in that it eliminates human error and subjectivity encountered when circular charts were being translated.

eDNA has provided SFPUC with advanced data mining capabilities. SFPUC's CalcServ allows for configuration of data points that can be archived for up to 9999 days, which exceeds any regulatory requirements. Data points can also include calculations thus eliminating the need to download raw data and perform calculations by hand or in Excel, resulting in huge time savings.

eDNA Trend has made it possible to trend large amounts of data in seconds. Additionally, the auto-update function allows for trending of conditions occurring at several locations in the system in real-time. This allows for very accurate slug tracing, which in turn allows WQB to correct potential problems occurring in the system before water reaches customers.

Another result of using eDNA has been the positive inter-departmental relationships that have been built by sharing this technology. For example, through the use of eDNA View, the WQB has been able to design screens for various departments in the SFPUC that allow staff to view and trend data that is tailored to their specific needs. This technology sharing between departments has not only given staff an opportunity to see the larger picture of how the SFPUC functions as a whole, it has also provided staff, who may not have otherwise known that these tools were available, to do their jobs more effectively.

Sheila Garret, a Water Quality Technician at SFPUC, calls attention to an additional benefit. "The building of morale that occurs when departments cease to be isolated from one another and realize that everyone is working for the common goal of providing a high quality product is a value that cannot be quantified."

Conclusion

InStep and the WQB continue to enjoy a great relationship. The original scope of the SFPUC project involved one application of eDNA; however, the benefits of extending eDNA throughout the enterprise quickly became apparent.

Several hundred users, including managers, engineers, and technicians have access to information about their facilities' performance. The information is available regardless of their location within the enterprise due to eDNA's distributed architecture. Some even have access to the information from home. For all users, eDNA serves as a

multifunction tool providing enterprise system control, fast analysis, and historian services.

“The support site on the web has been very responsive when issues have arisen and each new release of eDNA software continues to improve,” Garrett says. “Additionally, InStep has been very responsive in accepting suggestions for improvements in new software releases.” SFPUC looks forward to enhancing its data utilization capabilities as eDNA applications continue to evolve.

