

# Acuvate Enhances Water Quality Monitoring for Urban Water Supply Department with Advanced Anomaly Detection

# **ABOUT THE CLIENT**

The Urban Water Supply Department, in collaboration with the Department of Information Technology, embarked on a vital initiative to elevate drinking water quality across a major metropolitan region. Tasked with managing a large-scale water supply network, the Department oversees nearly 80 databases and 90 applications. These systems track essential water quality indicators—including temperature, turbidity, dissolved oxygen, pH levels, and chlorine—through a combination of advanced instrumentation and manual lab testing.

#### **BUSINESS CHALLENGES**

Before partnering with Acuvate, the Department primarily relied on manual workflows—especially Excel-based files for managing water quality data. Water Chief officials adopted a similar approach, working with static datasets aggregated from multiple disconnected sources. However, this manual methodology significantly limited scalability, accuracy, and real-time responsiveness.

Through a structured assessment, Acuvate identified several key challenges:

#### Fragmented Data Sources

Sensor anomalies—such as data spikes—were often misattributed to environmental conditions or sensor faults.

#### Manual Processing Bottlenecks

Dependence on Excel-driven reports slowed decision-making and hindered the ability to scale operations efficiently.

#### Data Integrity Issues

While core datasets remained intact, peripheral data inconsistencies such as corrupted or outdated entries—negatively influenced analytical outcomes and water treatment strategies.

#### Delayed, Reactive Decisions

The absence of automation limited proactive water quality management, introducing potential regulatory and compliance risks.

Improving data quality to ensure accuracy, consistency, and reliability became a critical priority.

## SOLUTION

Acuvate stepped in to streamline data management, enhance data quality, and implement advanced anomaly detection mechanisms, ensuring an accurate and reliable water quality monitoring system. Acuvate enabled the identification and resolution of sensor anomalies, ensuring sensors operated correctly and provided accurate readings. It replaced manual processes and equipped the department with actionable insights through intuitive dashboards and real-time data intelligence.



# **KEY HIGHLIGHTS**



#### **Centralized Database**

Manual workflows have been eliminated with the implementation of a centralized database. Water Chief officials can now access updated, reliable data in a single location, enabling seamless sharing and automated alerts. This allows them to prioritize data analysis over routine manual tasks.



# Real-Time Data Streaming

Continuous ingestion of real-time sensor data enables faster identification and resolution of issues, supporting timely corrective actions.



#### Automated Alerts

Anomaly detection mechanisms automatically trigger email alerts upon detecting deviations, ensuring immediate attention and action.



#### **Digital Twin Integration Recommendation**

Acuvate recommended integrating Digital Twin technology to simulate water infrastructure performance, detect potential blockages, and further enhance overall water quality.

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### SOLUTION DETAILS

#### **Addressing Top-Level Water Data**

Acuvate deployed an advanced anomaly detection framework that monitored real-time surface-level sensor data for key water parameters like temperature, turbidity, pH levels, and chlorine concentration. The model differentiated between actual environmental changes and sensor faults, triggering alerts and deactivating faulty sensors for timely repairs.

#### Managing Water Data at Different Depths

To ensure quality throughout the water column, Acuvate extended anomaly detection to multi-depth sampling. Data from three or more layers was analyzed for consistency, improving treatment decision accuracy.

#### **Holistic Data Quality Assurance**

Machine learning models cross-validated top-level and depth-specific datasets, proactively identifying irregularities and ensuring consistent, clean data across all measurement levels. By ensuring data reliability, the department could proactively address issues, leading to better water management.

#### **Transforming Data Accessibility**

Acuvate centralized access to critical data—ranging from surface and depth sensor readings to lab-based enzyme and chemical treatment data, and hydrological system inputs. This included:



Automated delivery treatment adjustments (DTA)

Historical comparisons for compliance and calibration

This consolidation enabled faster retrieval, real-time insights, and automated alerts when parameters exceeded safety thresholds.

#### **ML-Powered Data Integrity Framework**

Acuvate's machine learning-powered data quality framework continuously scanned incoming data streams for anomalies, ensuring:



Early detection of sensor drift or malfunction



Alignment across datasets from various sources



Trusted data for treatment planning and decision-making

By enhancing data quality, the Department optimized treatment processes and ensured regulatory standards were consistently met.

#### High-Performance Azure-Based Infrastructure

#### The team migrated the data infrastructure to Azure, enhancing:



With an optimized cloud-based infrastructure, the Department could process data quickly, generate reports accurately, and respond proactively to water quality issues

#### **Proactive Monitoring and Anomaly Detection**

Using predictive analytics, the system identified irregularities before they became operational issues. Whether due to contamination risks or sensor failures, the system triggered alerts for immediate response, vastly improving public water safety

Acuvate transformed the Department's ability to monitor, analyze, and maintain water quality with greater accuracy and efficiency. This collaboration set a new benchmark for data-driven decision-making in urban water management, ensuring a safer and more reliable drinking water supply for millions.

#### Have A Question? Connect With Us Now

# **BUSINESS OUTCOMES**

#### **Return on Investment (ROI)**

The implemented solution delivers substantial **Direct Savings** by eliminating manual processes. Additionally, the automated anomaly detection system enabled faster and more informed decisions for water treatment, facilitating **Indirect Savings**. These combined efficiencies resulted in measurable cost savings and enhanced service delivery.

#### **Proactive Risk Management**

Real-time alerts enabled immediate intervention and preventive measures.

#### **Operational Efficiency**

Streamlined data handling and automation improved team productivity and response time.

#### **Enhanced Public Trust**

Consistently high-water quality reinforced the Department's commitment to public health and regulatory compliance

#### **About Acuvate**

With over 18+ years of experience in digital solutions, accelerating enterprise-wide digital transformation with our AI accelerators, we provide solutions and services that modernize, automate and support organizations. We help our customers transform their conventional processes to match the next-generation technological trend. We have a strong presence in the US, Europe, and the Middle East, where we serve multiple Fortune 500 companies. We specialize in New-age AI solutions, Migration & Modernization, and Digital Workplace Solutions. With our multi-skilled experts and packaged AI accelerators, we deliver unparalleled efficiencies and accelerate time-to-value for our customers

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