SENSING EXCELLENCE

Multisensor

CASE STUDY

Monitoring Spring Water in the Alps following a Diesel Spill from a Pump

Application Dossier: No. XXI

Application

Monitoring Spring Water for Diesel Contamination Following Pump Breakdown

Product

MS1200 standard version with 4-20 mA output, installed in an insulated cabinet

MS1200
Oil in Water Monitor

Application

Monitoring a mountain spring in the Swiss Alps for VOCs and diesel contamination following an accident.

Customer

Municipal Water Company, Switzerland.

Problem

A diesel pump located near a spring that feeds the local water treatment plant (WTP) suffered a breakdown, resulting in a significant diesel spill. The contamination posed a serious threat to the water supply.

Product

MS1200 standard version with 4-20 mA output, installed in an insulated cabinet.

Installation Facts

In late 2022, Multisensor Systems was approached by a leading RO membrane manufacturer supplying filtration systems to the local municipal WTP.

The WTP expressed grave concerns about the potential contamination of their water source—a spring located at an altitude of 1,500 metres—due to the diesel spill. Ensuring water quality was paramount, as the local population relied heavily on tap water and trusted its safety.

Swift detection of diesel at the water intake was critical, even though the RO filters were expected to remove any contaminants. The challenging location, accessible only by helicopter or snowbike, made it essential to choose a low-maintenance oil in water monitoring system.

To address the harsh environmental conditions, including freezing temperatures and condensation, the MS1200 was installed inside an insulated cabinet for additional protection as shown in the pictures below.

MS1200 installed into a cabinet with internal insulation; the insulation was the best way to ensure that the instrument was protected

Another key consideration for the end user was ensuring that the monitor provided reliable and accurate measurements.

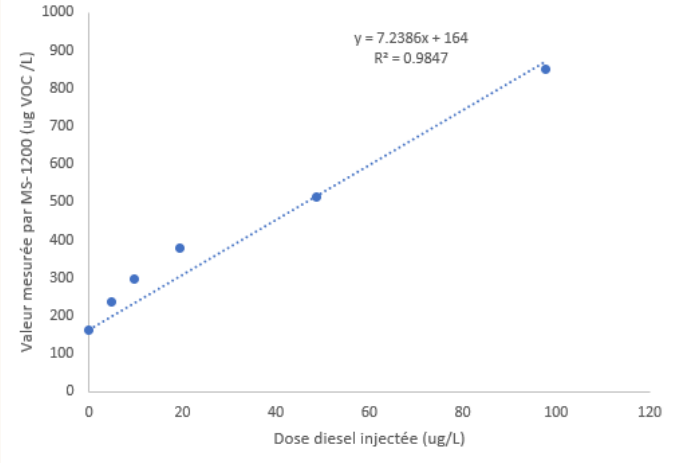
The water is taken directly from the main line using the existing pressure and goes back into the spring from a return pipe.

To achieve the high level of confidence required by both the customer and the application, significant effort was invested in training the local technician in proper validation techniques.

Validation of the MS1200 oil-in-water monitor is typically performed using a known concentration of toluene (200 ppb for the MS1200) introduced to the analyser via the Multisensor Systems Validation Kit.

Once the customer became proficient in the validation process with the 200 ppb toluene standard provided by Multisensor Systems, they conducted additional testing using the specific diesel spilled during the accident.

The results of these tests are shown in the accompanying graph, where the calculated correlation coefficient (r-value) for diesel was an impressive 0.98. For reference, the original data is included in the table below for completeness.



A linear regression was calculated using the reported Total VOC value by the MS1200 and the diesel concentration used for testing.

Concentration diesel (µg/L)	Signal MS1200
0	164
4.9	237
9.8	297
19.5	380
48.8	513
97.6	850

After completing these validation procedures, tests, and correlation analyses in early 2023, the customer expressed full satisfaction with the instrument. Since then, they have been validating the system every six months and successfully using it to detect potential contamination at their water intake.

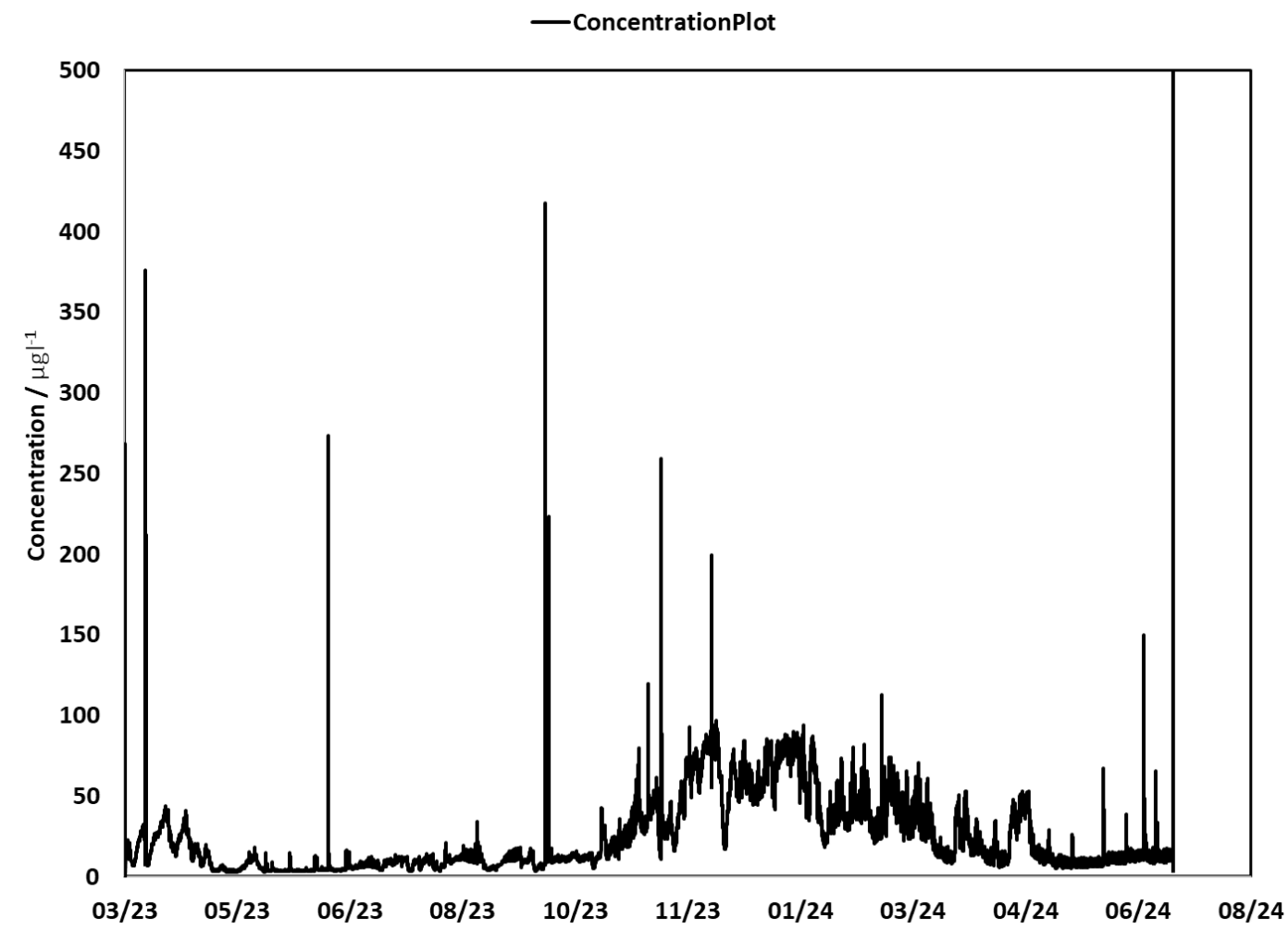
The graph on the next page shows several significant peaks (many from validations) as well as a prolonged period of elevated values, reflecting VOC level at the water intake.

Did you know?

Diesel is not a single, uniform substance but rather a broad category of fuel with varying chemical compositions. Different types of diesel—such as standard road diesel, marine diesel, and off-road diesel—are formulated to meet specific performance, environmental, and regulatory requirements. These variations can result in significant differences in their VOC (volatile organic compound) content, which directly influences their behavior in the environment and how they are detected by monitoring systems.

The VOC content in diesel depends on factors like its source (e.g., crude oil, biodiesel blends), refining processes, and any additives used. For example, biodiesel blends may contain fewer VOCs than traditional petroleum-based diesel, while high-performance diesel fuels can include more volatile additives. As a result, monitoring systems must account for these differences when calibrating and validating instruments to ensure reliable detection, particularly in sensitive applications such as water quality monitoring.

Typical VOCs in diesel include alkanes, aromatics (such as benzene, toluene, and xylene), and small amounts of other hydrocarbons like alkenes and naphthalenes.



Plot showing the reported concentration of Total VOCs from March 2023 to June 2024; it can be noted how some peaks are around the 200 ppb mark (validations) but some others are more protracted showinng likely VOC contamination.

Why Multisensor?

Given the remote location, the customer was looking for a low maintenance instrument

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For more information

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Front Image Credit: Robert J Heath, Bettmeralp region, Switzerland

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Multisensor Systems is a developer and supplier of Water and Gas Analysers specialising in oil in water and hydrocarbon analysers, oil in water detectors, VOC monitors and THM analysers based in the United Kingdom.

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CHANGELOG

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