Rapid Response Water Analysis with AROMA-VOC

AROMA Application Note

The recent acceleration and magnification of wildfire events in the western United States over the past several years has led to an alarming increase in loss of life and property damages, with many models predicting that this trend will continue in the near future. Among the hazards left in the wake of these large wildfires is the introduction of toxic volatile organic compounds (VOCs), such as benzene, into the residential drinking water systems. One of the first major examples of this risk was the 2017 Tubbs Fire, which led to concentrations greater than 900 µg/L of benzene in drinking water in a residential area near Santa Rosa, CA.

While the presence of VOCs in drinking water occurs primarily in areas where destruction is coincident with depressurization of water systems, this is not uniquely the case. Rapid, widespread testing is critical to determine the extent and scale of contamination. Only once this has been determined can district operators take immediate steps to minimize the long-term impact of any VOC contamination and restore the system to nominal operation. Delaying the response can have significant long-term, detrimental effects on restoring operations, as VOCs have been shown to sorb into polymer piping. This uptake leads to persistent sources of VOC contamination that may require full replacement of piping systems that were undamaged by the fire event itself. These piping systems, in many cases, could have been

Entanglement Technologies Mobile Lab investigating the Carr Fire (2018)

salvaged or even saved by rapid testing and flushing of the impacted systems.

To help communities address this risk, Entanglement Technologies has developed the AROMA chemical analysis system. The AROMA instruments provide laboratory-quality, speciated VOC analysis in the field and in minutes, with typical detection limits in the ng/L range for most compounds. This allows water districts to rapidly assess multiple points in a drinking water network to determine if hazardous levels of chemicals are present and to take immediate remedial actions, including health-protective orders, flushing, and diversion.

In one such response action, an AROMA-VOC instrument was deployed to sample the water system in areas impacted by the Carr Fire in and

around Redding, CA. The Entanglement team tested multiple wells in multiple water districts most heavily impacted by the fire, with detection limits below 50 ng/L for benzene and other VOCs. Rapid response deployment gave water districts confidence that water quality was not degraded by VOC contamination in the immediate aftermath of the fire, allowing resources to be focused on the critical rebuilding and repair of infrastructure instead of mitigating serious chemical exposure hazards.

Rapid response, and high-quality data is critical to underpinning the decision-making abilities of local municipalities. Unlike most field-analysis capabilities, including GC-PID and GC-FID, AROMA provides positive compound identification with multiple lines of evidence. This creates a robust platform for enabling rapid decision-making based on actionable and defensible data when combined with the analyzer's high levels of precision, accuracy, and its typical limits of detection below 50 ng/L.

AROMA-VOC helps reduce the uncertainty in the often-chaotic aftermath of a destructive wildfire event, enabling the acceleration of rebuilding efforts. Entanglement Technologies is proud to support first responders and municipal officials working hard to protect these communities impacted by wildfires.

Contact us to learn more about how you can leverage AROMA technology to rapidly monitor your water system at info@entanglementtech.com.
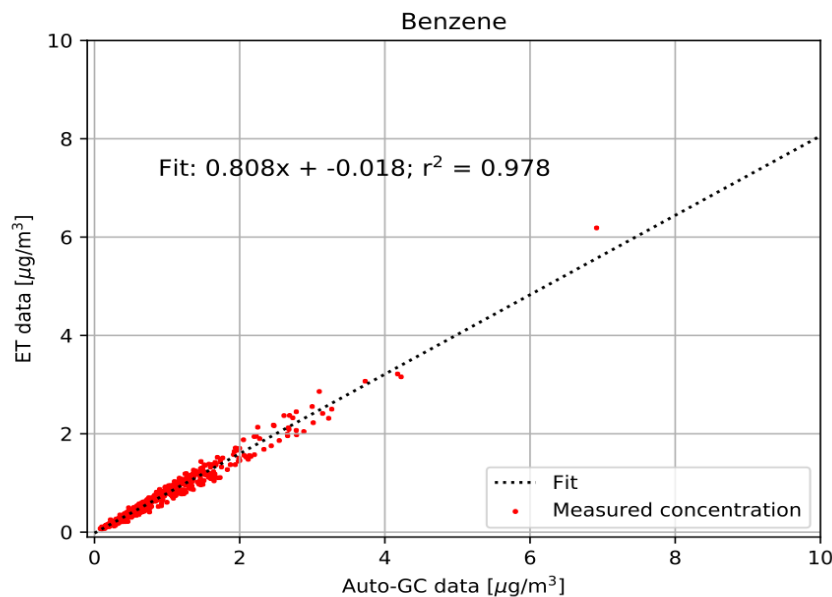

Figure 1. AROMA-VOC Benzene Performance in 30-day, unattended side-by-side vs. Auto-GC

Fit: $0.808x + -0.018$; $r^2 = 0.978$