Field Demo: Refined Hydrocarbons

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On August 19th, 2015 a ZAPS Technologies representative was onsite to perform preventative maintenance on a LiquID™ station.   Prior to the representative's arrival it had been arranged for them to also perform a demonstration of the LiquID station's response to the presence of refined hydrocarbons, in this instance diesel fuel. This document summarizes the results of this demonstration.

Demonstration Protocol

The demonstration was designed to recirculate 10 liters of source water acquired from the inlet to the LiquID station just prior to the start of the demo. This source water was then adulterated with diesel fuel to simulate the response of the LiquID station to a similar event on the river. The setup included a bucket, a recirculating pump on a closed loop between the station inlet and drain return to the bucket and an impeller used to enhance dispersion of the diesel fuel as evenly as possible through the volume of water.

Demonstration Results

The results of the demonstration can be best seen in the following screenshot from the LiquID Web User Interface (WUI). Highlights of the demonstration have been labelled on the chart and described below.
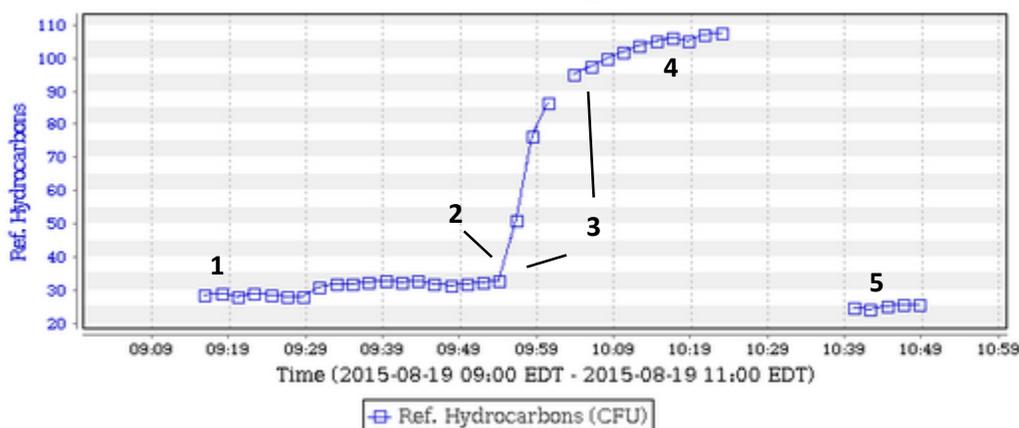

- **Label 1:** The demonstration was set up and initial measurements on source water began at approximately 09:15.
- **Label 2:** The source water was allowed to recirculate for approximately 40 minutes prior to the introduction of 0.5 ml of diesel fuel at approximately 09:55.
- **Label 3:** Immediately after the addition of diesel fuel an increasing response was observed for approximately 10 minutes as the fuel was dispersed through the recirculating volume.
- **Label 4:** Following the 10 minute rise the signal leveled off, stabilized at approximately 10:05 and was allowed to run at this plateau for approximately 15 minutes.
- **Label 5:** Finally, the instrument was returned to normal supply and operation, returning the Refined Hydrocarbon parameter to pre-demonstration levels.

Additional Discussion

One of the challenges of these sorts of demos is equating them to the types of events in nature that they are attempting to mimic. Using recent stream flow data available from the USGS for the local creek and river systems and the 1:20,000 dilution used, Table 1 summarizes our estimated magnitude of the event being replicated by this demo.

River Name	Discharge Rate (ft³/sec)	Discharge (gallons/4 hours)	Fuel spill (gallons in 4 hours)
Local Creek	196	21,111,550	1,050
Local River	1,090	117,406,100	5,900

The estimates in Table 1 are admittedly simple and assume both a constant spill rate and complete homogenization throughout the full volume of water discharged over a 4 hour period prior to arrival at the intake. Nevertheless, this provides at least a rough estimate of the magnitude of an event being mimicked during the demo. The volumes of spilled fuel calculated in Table 1 are roughly equivalent to the volume transported by a medium sized tanker truck.

Lastly, the diagram below summarizes the response observed by the LiquID station relative to watch values from which alarms are currently being generated (Upper limit 75 CFUs and Critical limit 100 CFUs).
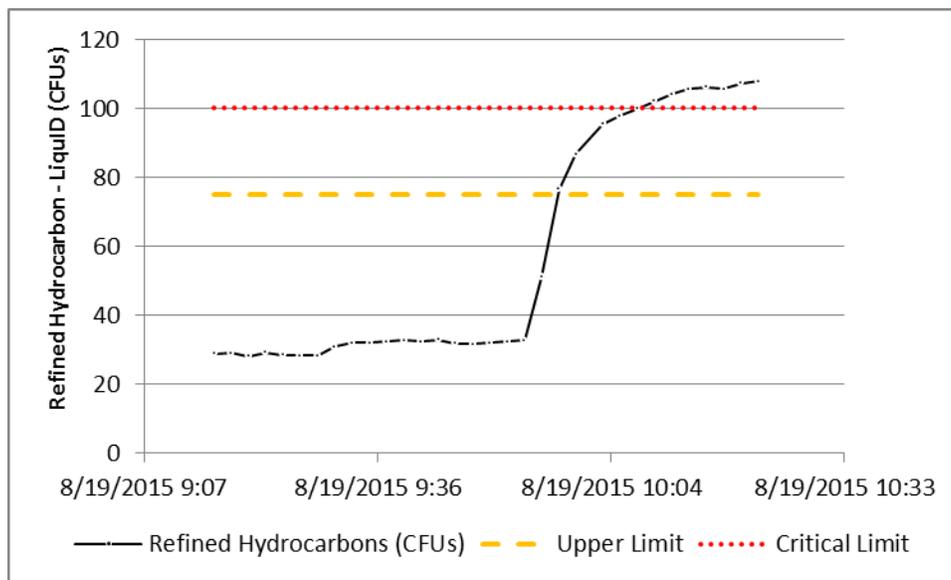
We hope that this demonstration and subsequent analysis is useful in your operations and event monitoring. As always, please feel free to contact us with any questions.