METEC TESTING RESULTS AUGUST 2021

Abstract

Project Canary recently completed the second round of field testing at Colorado State University's Methane Emissions Technology Evaluation Center (METEC) using Project Canary's CanaryX methane sensors and quantification analytics. Project Canary integrates sensor data and cloud analytics to offer a complete IoT solution for oil and gas customers to detect and quantify methane emissions. Results show ~100% leak detection success and an error of 6% for overall leak volumes in controlled test conditions in a real-world environment. This demonstrates the success of Project Canary's continuous monitoring at detecting and quantifying methane emissions.

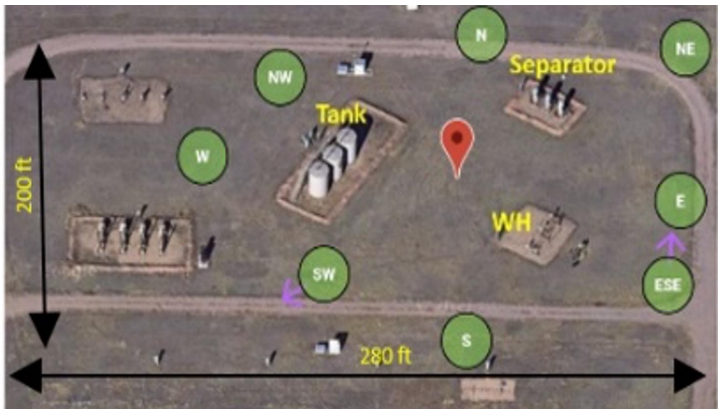

Figure 1.METEC Test Site Configuration

The field-testing campaign includes 44 experimental conditions of methane releases from leak sources surrounded by methane sensors as shown in **Figure 1.** Each experiment lasted 60 minutes and was repeated three times for reproducibility of results. The controlled methane releases ranged from 0.05 g/s (~10 scfh) to 0.84 g/s (~160 scfh) which represents an average well pad emission.

The Canary X includes the sensor package, computing system, communications system, power system, enclosure, and mounting system. The Canary sensor package includes a methane sensor, ultrasonic wind sensor, GPS sensor as shown in **Figure 2.** Using this sensor, we can observe small methane gas fluctuations as low as 250 ppb. Detector to source distance ranging from 69 to 230 ft. Advanced filtering techniques improve the fidelity of the sensor data and enhance the accuracy of the quantification model through inputting the model with the most relevant information.

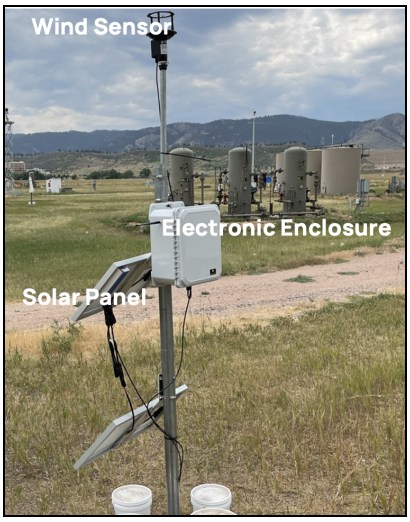

Figure 2. CanaryX Methane Sensor

Figure 3. Project Canary Dashboard

The Project Canary dashboard in **Figure 3** visualizes the data required for the quantification and localization of methane leaks. This includes site layout, methane sensor, and wind data. Project Canary leverages plume dispersion models which calculate flux based on knowledge of the emissions characteristics, terrain, and atmospheric stability. The model is based on the forward and inverse solution of the advection-diffusion of a gas dispersion from a point source as shown in **Figure 4.**

Project Canary demonstrated it can quantify **total site methane emissions with a ~100% leak detection rate** and a cumulative calculation error of 6% as shown in **Figure 5**. Future work is being planned for longer duration testing at METEC in order to optimize emissions calculations.

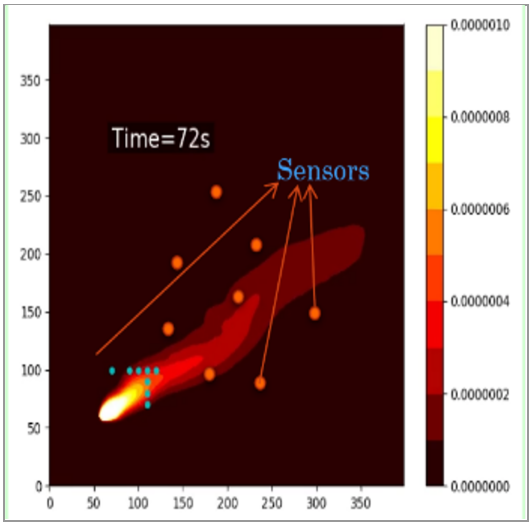

Figure 4. Plume Dispersion Model

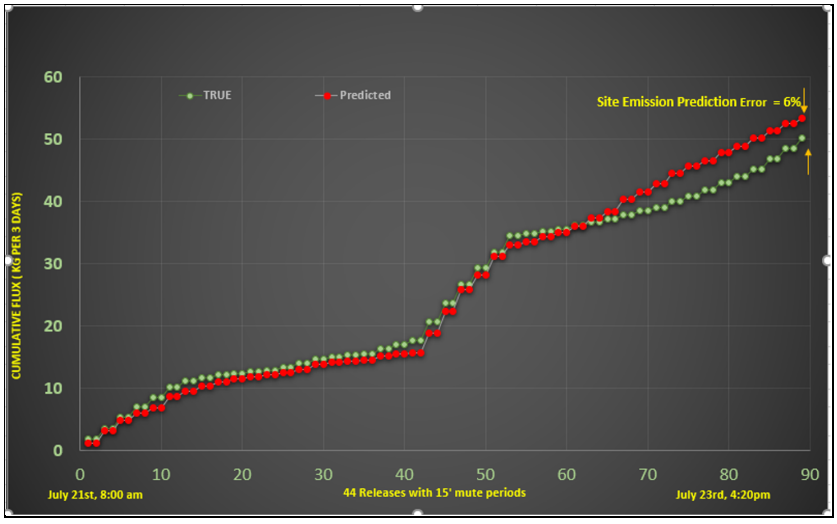

Figure 5. Quantification Model Prediction Results