



EARTHVIEW

100 Meter Detection

02 June 2025

Introduction

Earthview's platform can detect emissions from significant distances. However, the ability to detect an emissions event is not primarily a function of distance, it is a function of the sensor's concentration resolution. In practical terms, this means that a small leak at close range can result in the same concentration change as a large leak from farther away.

This relationship is especially important when interpreting sensor data and estimating emission rates using dispersion models. The following table illustrates this effect using a forward Gaussian plume model under stable atmospheric conditions with **1.5 m/s** wind speeds, a **1 ppm** increase above background concentrations, and varying distances from the source.

Table 1: Distance to source and forward gaussian plume model results for emission rate (kg/hr) in stable atmospheric conditions, **1.5 m/s** wind speeds, and **1 ppm** observed methane concentration at the point sensor.

Distance to Source (m)	Emission Rate (kg/hr)
200	16
100	4
50	1.2
25	0.3

Put another way the same emissions rate from different distances will yield much different observed concentrations at the source. For example consider a **10 kg/hr** leak in stable conditions and **1.5 m/s** wind speeds as detailed in **Table 2**.

Table 2: Distance to source and gaussian plume model concentrations for **10 kg/hr** emission rate in stable atmospheric conditions, **1.5 m/s** wind speeds.

Distance to Source (m)	Observed Concentration (ppm)
200	0.62
100	2.37
50	8.7
25	26.8

With a very conservative methane concentration detection sensitivity of **0.5 ppm** Earthview could observe a **10 kg/hr** emission rate from **200 meters** away.

METEC Demonstration of Observed Emissions Over 100m

In 2024, Earthview participated in the METEC ADED single-blind testing campaign. The METEC facility spans approximately 140 meters by 70 meters, as illustrated in **Figure 1**, with each grid square representing 10 meters by 10 meters. Equipment labels by METEC are given in **Figure 2**.



Figure 1: METEC ADED site from 2024 where single-blind testing was performed. The site is 140 meters across in the east-west direction and 70 meters across in the north-south direction. Each square in the grid is 10mx10m

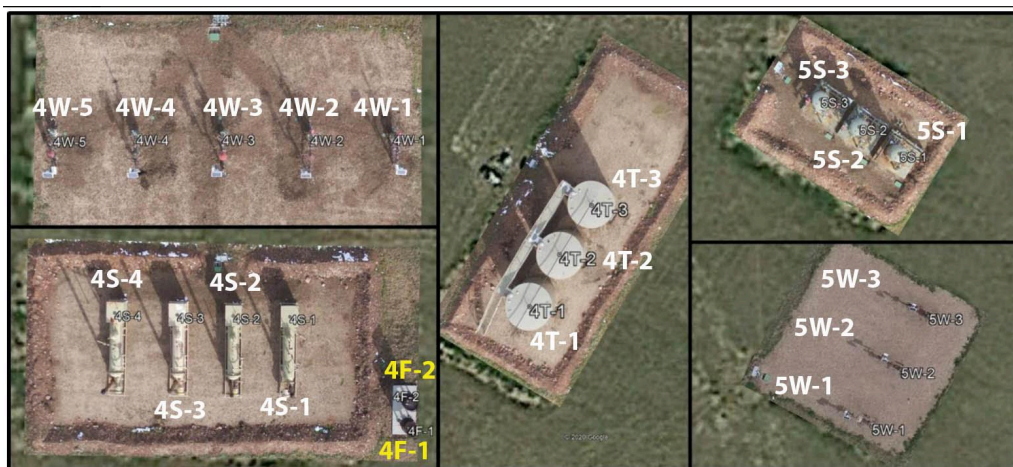


Figure 2: Equipment groups and labels provided by METEC. 4W are the wellheads on the north west side of the facility, 4S are the separators on the south west side of the facility, 4F is the equipment south west of the pad that is not the separators, 4T are the central tanks, 5S are the north east separators, and 5W are the south east wellheads.

The position of devices as set up on the METEC facility in 2024 are given in **Figure 3**. Devices are labeled as “MT 1-12” around the facility.



Figure 3: Earthview IoT device placement at the METEC ADED Facility in 2024 testing. Devices are labeled “MT 1-12”.

The 2024 METEC campaign spanned approximately three months, during which Earthview devices successfully detected several controlled releases from distances exceeding 100 meters. For the purposes of this paper, the analysis will focus exclusively on single-release experiments, as multiple simultaneous releases introduce ambiguity in determining which node detected which event. The specific examples selected for further analysis are summarized in **Table 3**.

Table 3: Detected METEC Experiments from over 100 meters away.

Experiment Number	Experiment Start Time (UTC)	Experiment End Time (UTC)	Emission Rate (kg/hr)	Emission Source	Device Detected	Distance from Source (meters)
1	2024-02-07 08:00:33	2024-02-07 08:30:33	1.528	4W-3	MT: 6	101
2	2024-02-08 08:00:58	2024-02-08 08:30:57	0.635	4W-3	MT: 5	105

Experiment 1

Experiment 1 was a **1.5 kg/hr** event from the **4W-3** wellhead detected by the node labeled **MT: 6** as displayed in **Figure 4**. The distance between the emission and the source is displayed in **Figure 5**. The time series of the device labeled MT:6 during this experiment is displayed in **Figure 6**.

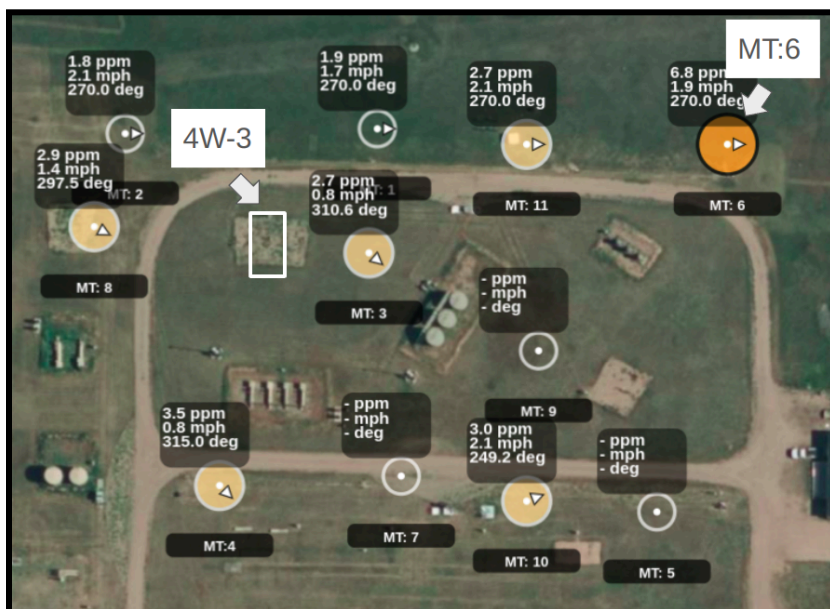


Figure 4: Experiment 1 detection results from a **1.5 kg/hr** leak from **4W-3** wellhead detected by **MT: 6** device at a distance of **101m**.



Figure 5: Experiment 1 detection results from a **1.5 kg/hr** leak from **4W-3** wellhead detected by **MT: 6** device at a distance of **101m**.

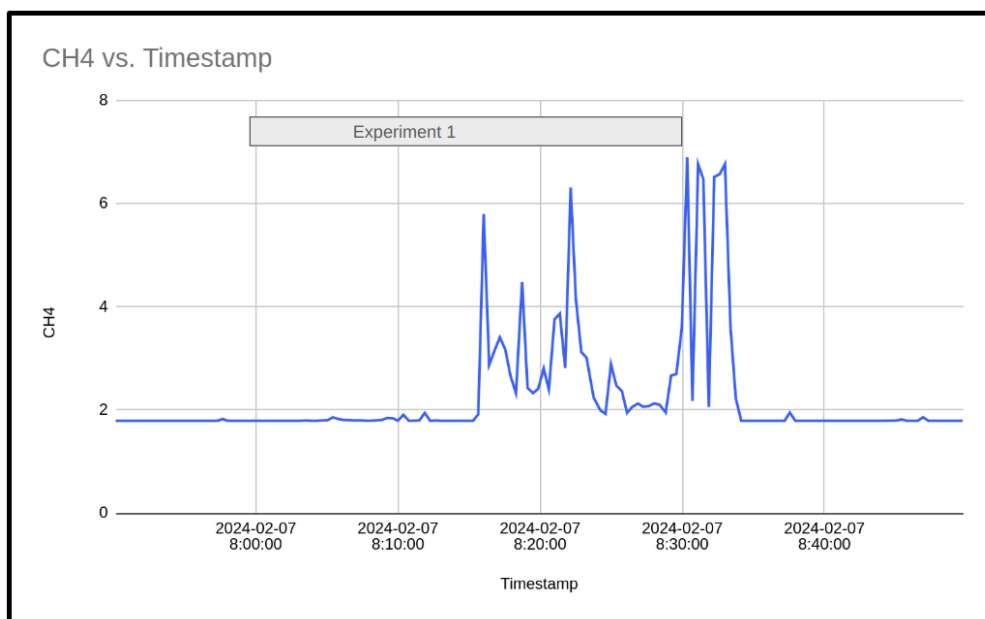


Figure 6: Time series concentration readings from the device **MT: 6** during Experiment 1. The experiment was from **2024-02-07 08:00:33 - 2024-02-07 08:30:33**. Residual gas on the facility after emission ended for about 5 minutes is expected. Methane from an experiment will not always be blowing directly onto a sensor.

Experiment 2

Experiment 2 was a **0.63 kg/hr** event from the **4W-3** wellhead detected by the node labeled **MT: 5** as displayed in **Figure 7**. The distance between the emission and the source is displayed in **Figure 8**. The time series of the device labeled MT:6 during this experiment is displayed in **Figure 9**.

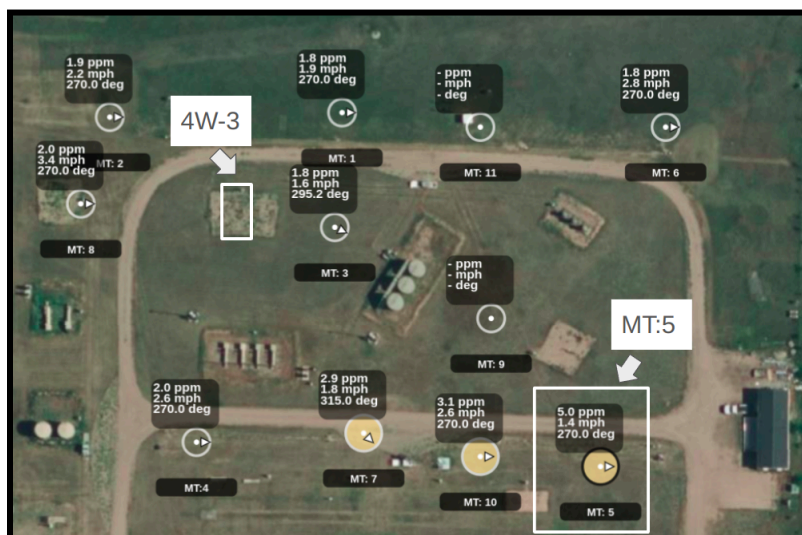


Figure 7: Experiment 2 detection results from a **0.63 kg/hr** leak from **4W-3** wellhead detected by **MT: 5** device at a distance of **105m**.



Figure 8: Experiment 2 detection results from a **0.63 kg/hr** leak from **4W-3** wellhead detected by **MT: 5** device at a distance of **105m**.

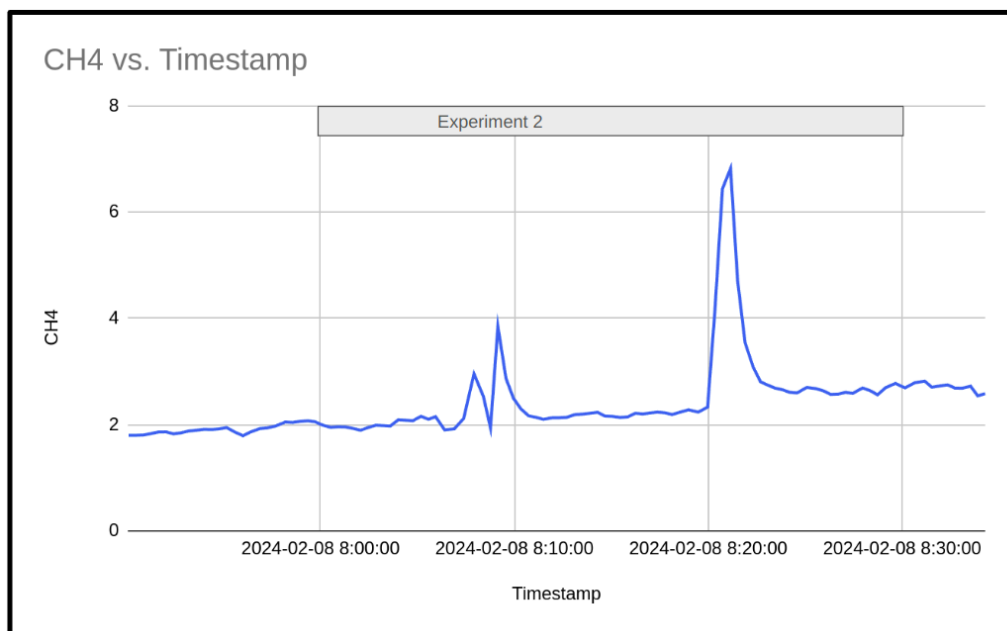


Figure 9: Time series concentration readings from the device **MT: 5** during Experiment 1. The experiment was from **2024-02-08 08:00:58 - 2024-02-08 08:30:57**. Residual gas on the facility after emission ended for about 5 minutes is expected. Methane from an experiment will not always be blowing directly onto a sensor.

While there are several additional METEC experiments that could be analyzed, the size of the facility limits the number of cases in which a device located over 100 meters away successfully detected an emission event during a single controlled release. However, the two examples highlighted above clearly demonstrate Earthview's ability to detect relatively small emissions from distances greater than 100 meters. This capability is primarily a function of the device's methane concentration sensitivity, rather than proximity alone.

Field Demonstration of Observed Emissions Over 100m

While METEC ADED provides an ideal environment for controlled, single-blind testing, real-world performance is ultimately what determines the value of these detections for customers. The example below illustrates a field detection of an estimated **2 kg/hr** methane leak from a West Texas operator in February 2025. During this event, an Earthview emissions technician was present in the area and was alerted by the Earthview Continuous Monitoring System. The system identified the likely source of the emission as the tank battery, as shown in **Figure 10**.

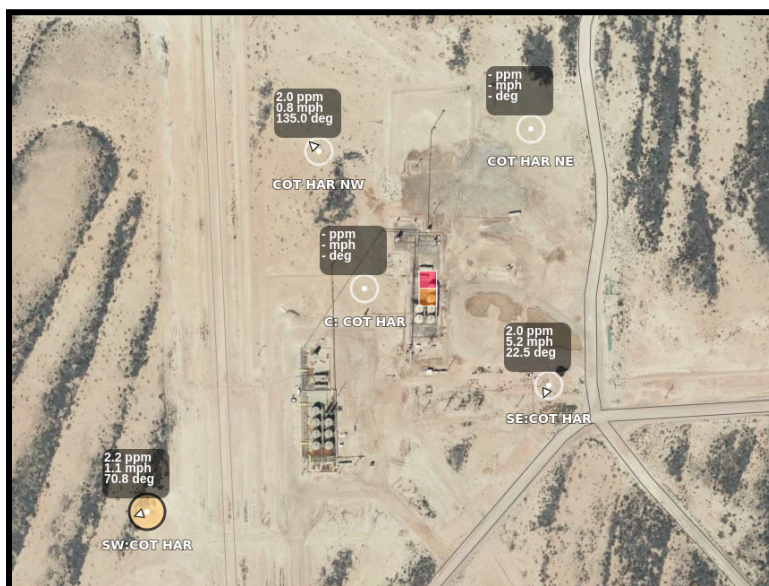


Figure 10: Earthview continuous monitoring event detected in February 2025, where the device labeled “SW: COT HAR” detected the increased concentration of methane and localized the source to the Tank Battery. The red square is the primary suspected emission source and the orange square is the secondary suspected emission source.

With an Earthview emissions technician on site, we were able to verify the leak source using a handheld detection device. The source was identified as an enardo valve blowing off the top of the tanks, as shown in **Figure 11**. The confirmed emission point is marked with a red dot in the figure.

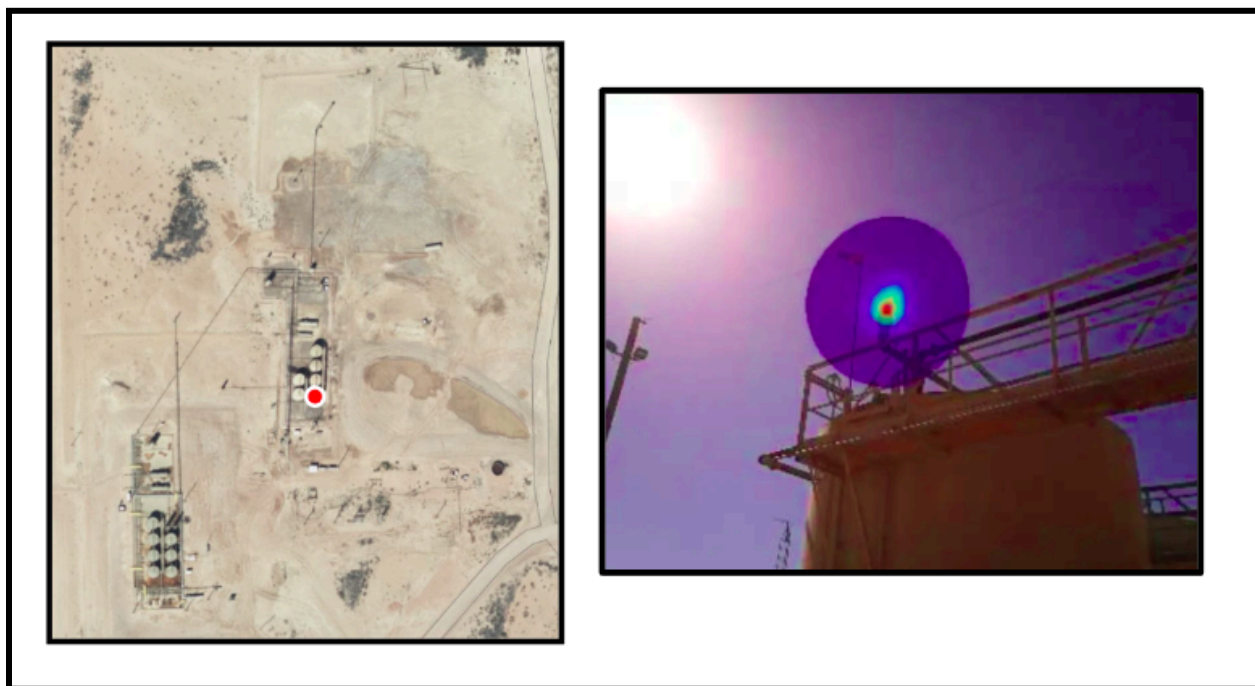


Figure 11: (Left) actual location of leak as verified by field technician from overhead view. (Right) field confirmed image of leaking emissions source.

The distance between the actual source of the emissions event and the distance of the node is displayed in **Figure 12**.

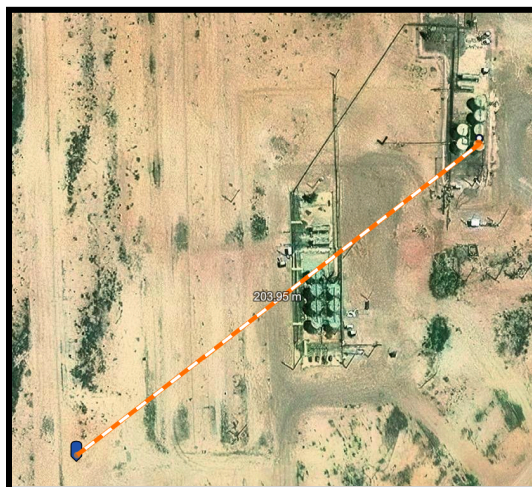


Figure 12: 204 meter distance between the source and the device that detected the event.

As shown in **Figure 12**, a device located over **200 meters** from the verified emission source was able to detect an emissions event. While a direct comparison to a reference-grade instrument is not available to confirm the exact emission rate, this example demonstrates the device's capability to identify emissions from a significant distance with meaningful sensitivity.

Figure 13 displays the methane sensitivity of the device over the length of the event. The signal will not be as high due to the distance between the source and the device. Dates have been removed for anonymity.

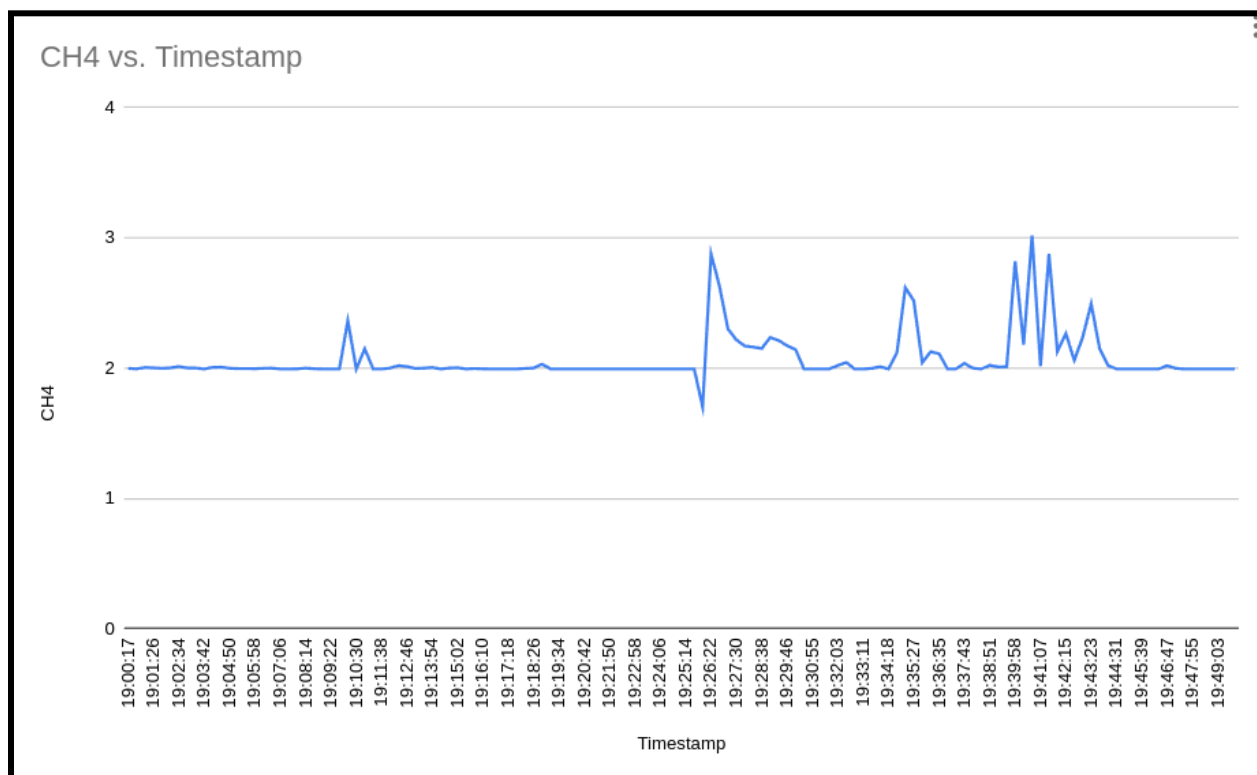


Figure 13: Field methane concentrations for device over 200 meters away from source.