CAT deployment report for Platte River Biogas on October 30, 2024

The CDPHE APCD Community Air Toxics (CAT) mobile laboratory was deployed to Platte River Biogas (19179 Co Rd 49, La Salle, CO 80645) on October 30, 2024 at the request of the CDPHE APCD Compliance Monitoring Unit III Supervisor. Prior to the deployment, the CAT received permission from the Sr. Director of Asset Management at BerQ RNG to drive onto Platte River Biogas facility property. The CAT was operated by two scientists from the CDPHE APCD Air Toxics & Ozone Precursor (ATOPs) program.

The CAT arrived at Platte River Biogas at approximately 11:19 a.m. MDT. The CAT continuously measured at Platte River Biogas until approximately 2:52 p.m. MDT. The complete CAT drive path is shown in Figure 1.

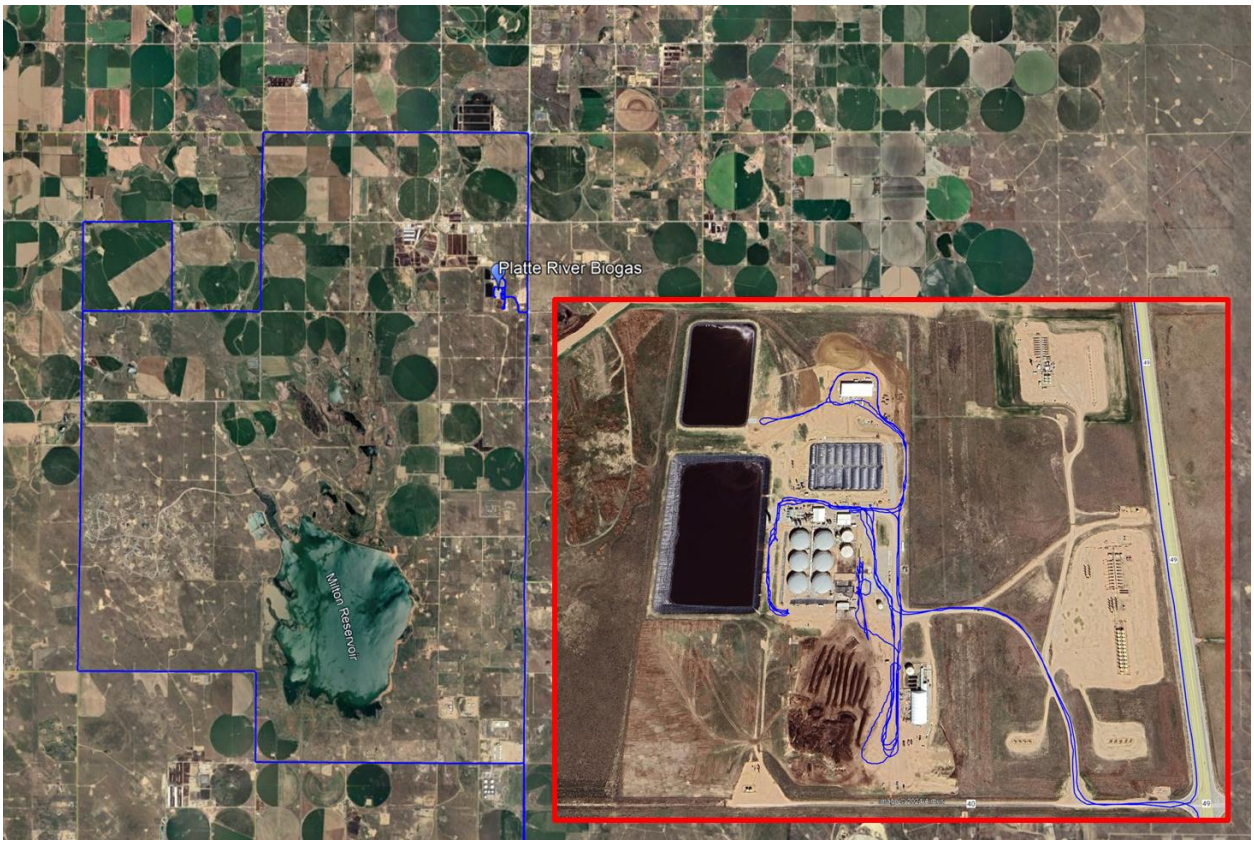

Figure 1. A map of the CAT drive path for the deployment to Platte River Biogas on October 30, 2024. The CAT drive path is shown as a blue line. The location of Platte River Biogas is denoted by a blue pin marker. The red inset shows the CAT drive path inside the Platte River Biogas facility.

The CAT is equipped with four instruments used for sampling ambient air toxics: a Tofwerk Vocus Eiger Proton-Transfer-Reaction Time-of-Flight Mass Spectrometer (PTR-ToF-MS), a Tofwerk Vocus B AIM Chemical Ionization Mass Spectrometer (CIMS), a Picarro Cavity Ring-Down Spectroscopy (CRDS) instrument, and a Gill Instruments MaxiMet meteorological station. All four of these instruments were fully operational for the duration of the deployment at

Platte River Biogas. The chemical compounds and parameters measured by these four instruments are summarized in Table 1.

Table 1. CAT instrumentation summary

Manufacturer	Instrument	Measured parameters
Tofwerk	Vocus Eiger Proton-Transfer-Reaction Time-of-Flight Mass Spectrometer (PTR-ToF-MS)	Benzene, toluene, xylene, methanethiol, acetone, acetonitrile, acetaldehyde, butadiene, methyl ethyl ketone, hexene, tetrachloroethylene, trimethylbenzene
Tofwerk	Vocus B AIM Chemical Ionization Mass Spectrometer (CIMS)	Hydrogen cyanide, toluene
Picarro	Cavity Ring-Down Spectroscopy (CRDS) instrument	Hydrogen sulfide, methane, water vapor
Gill Instruments	Maximet GMX500	Pressure, temperature, relative humidity, wind speed & direction, GPS location, speed, heading

While at Platte River Biogas, the CAT intermittently but consistently measured elevated concentrations of hydrogen sulfide (H_2S), methanethiol (CH_3SH), methane (CH_4), and benzene (C_6H_6). The observed elevations in H_2S, CH_3SH, and CH_4 were strongly correlated with each other, indicating that the three compounds were likely co-emitted. A time series of the concentrations of these three chemicals, along with air temperature, are provided in Figure 2. A map of the CAT drive path, color-coded by H_2S concentration, is provided in Figure 3.

The highest concentrations of H_2S were observed while the CAT was parked immediately next to two open-air pits. The CAT was parked next to these pits from approximately 1:40 p.m. MDT to 2:30 p.m. MDT. During this time, the observed two-second H_2S concentration regularly reached above 1 ppmv, with the maximum observed concentration being 3 ppmv. Detailed statistics for these measurements are provided in Table 2.

It should be noted that the day of deployment was relatively cold, with air temperatures ranging from 4 to 9°C or 39.2 to 48.2 °F (see Figure 2). It should also be noted that the CAT operators were informed by the plant manager that the facility was actively ramping down operations in preparation for the winter. For both of these reasons, the conditions during the CAT deployment may not necessarily reflect standard operating conditions, especially during the summer months.

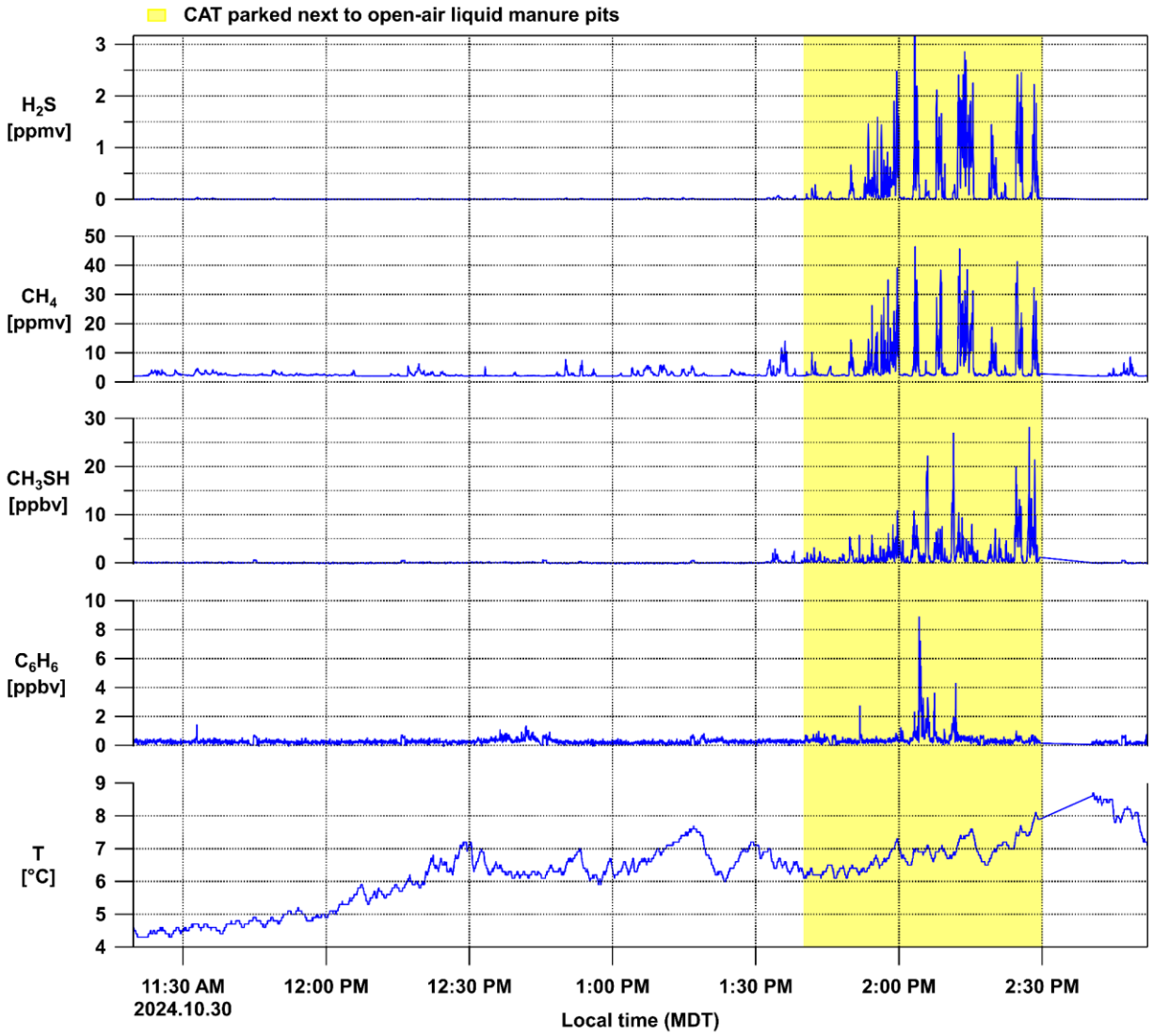

Figure 2. Time series of hydrogen sulfide, methanethiol, methane, benzene, and temperature as measured by the CAT at Platte River Biogas on October 30, 2024.

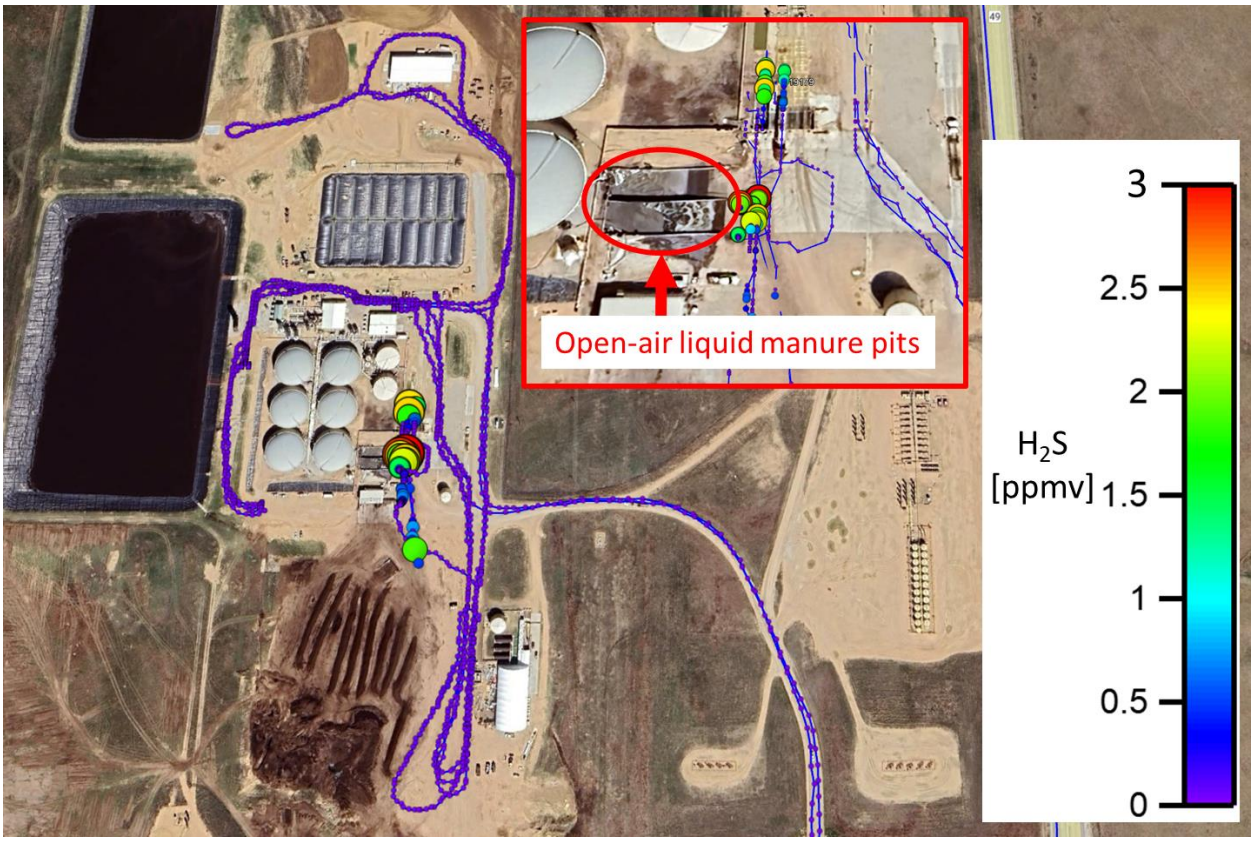

Figure 3. Map of ambient H_2S measurements at Platte River Biogas on October 30, 2024. The circular marker size and color indicates the ambient two-second H_2S concentration. The red inset shows the location of the open-air liquid manure pits where the highest ambient H_2S concentrations were observed.

Table 2. Measurement statistics at Platte River Biogas on October 30, 2024 from 1:40 p.m. MDT to 2:30 p.m. MDT, while the CAT was parked next to the open-air liquid manure pits

Parameter	Average	Standard deviation	Minimum	Maximum
H_2S	0.287 ppmv	0.534 ppmv	< 0.006 ppmv	3.170 ppmv
CH_4	6.162 ppmv	7.452 ppmv	2.041 ppmv	46.421 ppmv
CH_3SH	2.0 ppbv	3.3 ppbv	< 0.2 ppbv	28.2 ppbv
C_6H_6	0.5 ppbv	0.6 ppbv	< 0.3 ppbv	8.9 ppbv
Air temperature	6.8°C	0.4°C	6.1°C	8.1°C