2024 Q4 SENSOR REPORT
COMMERCE CITY NORTH DENVER COMMUNITY AIR MONITORING NETWORK
COMMERCE CITY, COLORADO

Prepared For:

Suncor Energy (U.S.A.) Inc.
5801 Brighton Boulevard
Commerce City, CO 80022

Prepared By:

Montrose Air Quality Services, LLC
6270 Joyce Dr., Unit B
Arvada, CO 80403

CTEH, LLC
350 Indiana St.
Golden, CO 80401

Document Number: **317AA-032669-RT-774**
Report Period: **October 1 – December 30, 2024**
Submittal Date: **August 18, 2025**

MONTROSE
AIR QUALITY SERVICES

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF TABLES

LIST OF FIGURES

Executive Summary

In response to feedback received by Suncor Energy (U.S.A.) Inc. (Suncor) through community engagement conducted in the fall of 2020, Suncor voluntarily committed to developing a continuous, near real-time air monitoring program to gain insight into air quality for neighborhoods in the vicinity of the Suncor refinery in Commerce City, Colorado. Montrose Environmental Group - Air Quality Services, LLC (Montrose) was contracted by Suncor to deploy, operate, and maintain the network in the Commerce City and North Denver (CCND) neighborhoods. Air monitoring was accomplished through three separate technical approaches: (1) continuous, near real-time monitoring for the following analytes[1]: carbon monoxide (CO), sulfur dioxide (SO_2), hydrogen sulfide (H_2S), nitrogen dioxide (NO_2), particulate matter ($PM_{2.5}$), and total volatile organic compounds (VOCs); (2) periodic collection and laboratory analysis for the presence of specific VOCs from 6-liter evacuated stainless steel ("Summa") canisters; and (3) periodic real-time air monitoring throughout neighborhoods using a mobile monitoring van to detect the presence of specific VOCs. This report details approach number one, continuous near real-time air monitoring and a screening health risk analysis. Periodic collection and analysis of Summa canister air samples and mobile monitoring van data are presented in separate reports.

Continuous air monitoring sensors were operating at 10 locations across the CCND neighborhoods. The fourth quarter of 2024 air monitoring preliminary data was made available in near real-time at ccnd-air.com from October 1 – December 31, 2024, and final data is presented in this report. The sensors used in this program integrate different technologies including a photoionization detector for VOCs; an electrochemical sensor for CO, NO_2, H_2S, and SO_2; laser scattering for $PM_{2.5}$; and a sonic anemometer for wind speed and direction. All sensor monitoring was conducted in accordance with the Quality Assurance Project Plan (QAPP) available at ccnd-air.com/documents.

Health scientists from CTEH, LLC (CTEH®) evaluated the air monitoring data and compared them to air quality standards and health-based reference values to determine if the measured air quality may have the potential for adverse effects on community health. The results of this assessment indicate that 1-hour rolling averages for all analytes at all locations were below their respective acute health-based reference levels compared in this report, if available.

[1] An "analyte" is a material that a measuring device is designed to detect and measure. It may be a chemical gas, an airborne particle, or other type of material.

1.0 INTRODUCTION

In response to feedback received by Suncor Energy (U.S.A.) Inc. (Suncor) through community engagement conducted in the fall of 2020, Suncor voluntarily committed to developing a continuous, near real-time air monitoring program to gain insight into air quality for neighborhoods in the vicinity of the Suncor refinery in Commerce City, Colorado. Montrose Environmental Group-Air Quality Services, LLC (Montrose) was contracted by Suncor to deploy, operate, and maintain the network in the Commerce City and North Denver (CCND) neighborhoods.

Air monitoring was accomplished through three separate technical approaches:

(1) Continuous, near real-time monitoring for the following analytes: carbon monoxide (CO), sulfur dioxide (SO_2), hydrogen sulfide (H_2S), nitrogen dioxide (NO_2), particulate matter ($PM_{2.5}$), and total volatile organic compounds (VOCs)

(2) Periodic (planned and triggered) collection and laboratory analysis for the presence of 59 VOCs from Summa canisters

(3) Periodic real-time air monitoring throughout neighborhoods using a mobile monitoring van to detect presence of 65 volatile compounds.

An “analyte” is a material that a measuring device is designed to detect and measure. It may be a chemical gas, an airborne particle, or other type of material. This report details approach number one, the continuous, near real-time monitoring for the analytes listed. The Summa canister sampling and mobile monitoring van data are presented in separate reports. Air monitoring, sampling, and analysis from approaches (1) and (2) were conducted in accordance with the Quality Assurance Project Plan (QAPP) that can be found online at https://www.ccnd-air.com/Documents/.

1.1 Air Monitoring Site Description

Continuous air monitoring sensors were installed at ten locations across CCND neighborhoods within a three-mile radius of refinery operations in July 2021 (CM1-CM8). Two additional monitoring sensors were installed in December 2021 (CM9) and March 2022 (CM10). The monitor locations are shown in Figure 1-1 and described in Table 1-1; and were selected based on the following criteria:

- Historical wind pattern data
- Proximity to the refinery and non-refinery sources
- Existing infrastructure, as well as site access and safety
- Community feedback

FIGURE 1-1
MAP OF 10 CCND MONITOR LOCATIONS

TABLE 1-1
CCND MONITORS AND SUMMA CANISTER SAMPLING LOCATIONS

Location ID	Secondary ID	GPS Coordinates	Distance from Refinery Center (miles)	Cross Streets
CM1	Rose Hill Elementary School	39.80164, -104.90882	2.0	E. 58th Ave. & Oneida St., Commerce City
CM2	Suncor Refinery Business Center	39.79630, -104.95727	0.70	Brighton Blvd. & York St., Commerce City
CM3	Adams City High School	39.82736, -104.90193	2.9	E. 72nd Ave. & Quebec Pkwy, Commerce City
CM4	Adams City Middle School	39.82893, -104.93499	1.9	Birch St. & E. 72nd Ave., Commerce City
CM5	Central Elementary School	39.81365, -104.92191	1.7	Holly St. & E. 64th Ave., Commerce City
CM6	Focus Points Family Resource Center	39.78436, -104.95663	1.4	Columbine St. & 48th Ave., Denver
CM7	Kearney Middle School	39.80888, -104.91545	1.7	E 62nd Ave. & Kearney St., Commerce City
CM8	Monroe	39.81560, -104.94503	0.85	Monroe St. & E 64th Ave., Denver
CM9	48th and Race	39.78455, -104.96264	1.7	East 48th Ave. & Race St., Denver
CM10	Alsup Elementary School	39.820268, -104.936616	1.2	East 68th Ave. & Birch St., Commerce City

2.0 METHODS

2.1 Continuous Monitoring

The sensors used in the ten CCND network sites were manufactured by SensIT, an Indiana-based company. The near-Federal Equivalent Method (FEM) AQM65 monitors used for quality assurance purposes only of the network at three of the ten sites (CM2, CM6, CM7) were manufactured by Aeroqual, a New Zealand-based company. Each sensor is solar powered and transmits data to the data platform via Long Term Evolution (LTE) cell technology. The monitoring in the community is performed using a variety of technologies, as described in Table 1-2.

TABLE 1-2
CCND MONITORING TECHNOLOGY

Air Pollutant/Parameter Category	Principle of Operation	Sensor Manufacturer
Total VOC	Photoionization Detector	SensIT
SO_2	Electrochemical Sensor	SensIT
CO	Electrochemical Sensor	SensIT
NO_2	Electrochemical Sensor	SensIT
H_2S	Electrochemical Sensor	SensIT
$PM_{2.5}$	Laser Scattering	SensIT
Wind Speed, Wind Direction	Sonic Anemometer	SensIT
Temperature, Relative Humidity, Barometric Pressure	Solid State	SensIT

The SensIT Remote Air Quality Monitoring Platform (RAMP) instruments, monitor the ambient air by allowing it to passively enter each sensor's exterior housing via small holes and pass over the surface of the sensor as described in Table 1-2. The AQM65 monitors the ambient air via a pump that pulls the sample into the individual analyte-specific gas modules for analysis.

The Photoionization Detector (PID) sensors used to measure total VOCs contain a lamp that produces photons that carry enough energy to break molecules into ions. The PID responds to molecules that have an ionization energy at or below the energy of the lamp; the PID used on this project employs a 10.6 electron-volt lamp. The produced ions then generate an electrical current that is measured as the output of the detector. PIDs are known to drift with ambient temperature and humidity variation. The PIDs used in this program mitigate the humidity issue by having a hydrophobic filter installed between the lamp and the ambient air. This deters water molecules from entering the ion-producing chamber and absorbing radiation. The PIDs are also heated slightly above ambient temperature to improve the stability of the detector.

Electrochemical sensors measure the concentration of a specific gas (SO_2, CO, NO_2, and H_2S) within an external circuit via oxidation or reduction reactions. These reactions generate the positive or negative current flow through the external circuit. An electrochemical sensor is made up of a working, counter, and reference electrode. All these components sit inside of a sensor housing along with a liquid electrolyte that is specific to the compound of interest. Temperature and relative humidity are known to affect the electrochemical sensors being used and could influence data quality. SensIT RAMP devices collect temperature and ambient relative humidity data along with an active sampling and heating mechanism to mitigate the impact of these interferences. SensIT RAMP non-zero readings that are below the instrument's detection limit may be artifacts of the manufacturer's algorithm. Extreme temperature and humidity conditions can cause the liquid electrolyte to dry up and cause erratic readings on the monitors.

Additionally, electrochemical sensors have known cross-sensitivity to other compounds. For example, ozone causes a response in the NO_2 sensor. This issue is mitigated by using an ozone filter on the face of the NO_2 sensor used to collect the data in this report. Similarly, the SO_2 sensor can have a response caused by the presence of H_2S, and has a built-in filter to mitigate the H_2S interference. The SO_2 sensor has additional interference from NO_2.

For measuring $PM_{2.5}$, the sampled particles in air are measured by the physical principle of light scattering. Each single particle is illuminated by a defined laser light and each scattering signal is detected at an angle of 90° by a photo diode. In accordance with the Mie theory, each measured pulse height is directly proportional to the particle size whereas each pulse is classified in an electronic register of 32 different size channels.

The data are intended to be used for informational purposes only and cannot be used for official compliance determinations. The accuracy of sensors used in the program are not as high as certified ambient air monitoring equipment used by federal and local officials for National Ambient Air Quality Standards (NAAQS) compliance monitoring. The sensors' detection limits and accuracy can be found in the QAPP online at https://www.ccnd-air.com/Documents/. State regulatory compliance air quality data can be found on the CDPHE air quality website at https://www.colorado.gov/airquality .

Sensor-based monitoring equipment like the SensIT RAMP are also known to produce data that is noisier (lower signal-to-noise ratio) than traditional regulatory reference method quality ambient

air monitoring equipment. To mitigate this issue, the data were averaged at one or 24-hours to improve the signal-to-noise of the instrument readings.

All sampling and quality assurance procedures were performed by Montrose.

2.2 Assessment of Community Health Implications

Health scientists from CTEH evaluated the air monitoring data collected by Montrose from October 1, 2024, through December 31, 2024. The air concentrations were averaged over 1-hour and 24-hour periods to compare to various ambient air standards and health-based reference levels.

The analytes CO, NO_2, SO_2, and $PM_{2.5}$ are all listed by the United States Environmental Protection Agency (USEPA) as criteria air pollutants. These criteria air pollutants are emitted by many different sources and are commonly found in the air across the U.S. The USEPA regulates these compounds differently and has developed national standards (NAAQS) for these pollutants. The NAAQS are enforceable under the Clean Air Act. As such, USEPA has specific, state compliance requirements for instrumentation that must be used to determine compliance with the NAAQS. This CCND sensor program provides general air quality information and is not intended to meet compliance requirements for measuring criteria air pollutants comparable to the national ambient air quality standards.

The determination that a criteria pollutant is at a level legally required to be mitigated comes from evaluation of one year (CO) to three years (NO_2, SO_2, and $PM_{2.5}$) of air monitoring data[2] collected by regulatory-grade instrumentation. The sensors in this program are not regulatory grade and therefore, the results are not official compliance determinations. These data, however, provide general trends in air quality in the CCND area. If the maximum or average analyte levels in this report are higher than their respective NAAQS, it does not indicate that adverse health effects are likely. Any measurement of a criteria air pollutant over its respective NAAQS concentration must be evaluated in the context of one to three years of data previously collected. For example, to be determined as above the NAAQS, NO_2 concentration must be measured by a regulatory grade instrument for a minimum of three consecutive years and the 98th percentile of the distribution of daily maximum 1-hour averages for each year averaged together for three years must be above 100 ppb.The NAAQS values are presented in Table 1-4 for reference, but are not intended to be compared as the equipment used to collect these measurements and the time they were collected is not appropriate for a direct comparison to the standards.

H_2S is not a criteria air pollutant, but was selected to be monitored because of presence in some grades of crude oil and its refined products. The health reference values for H_2S were developed by the Agency for Toxic Substances and Disease Registry (ATSDR)[3]. The ATSDR acute health-based reference levels (which represents one day to two weeks of continuous exposure) is a health reference value below which continuous exposure is likely to be without risk of developing adverse health effects, even in sensitive sub-populations. Maximum one-hour rolling average H_2S levels recorded in each CCND neighborhood were compared to an ATSDR acute-health-based reference level.

[2] USEPA NAAQS Table, available online at https://www.epa.gov/criteria-air-pollutants/naaqs-table
[3] ATSDR MRL List available online at https://wwwn.cdc.gov/TSP/MRLS/mrlsListing.aspx

Finally, the USEPA has established values for use in emergency situations, termed Acute Exposure Guideline Levels (AEGLs). Unlike health-based reference levels that can be thousands of times below exposure levels where adverse effects are observed, AEGL values are levels at which different acute adverse health effects may be anticipated to occur. According to USEPA, "AEGL-1 represent exposure levels that could produce mild and progressively increasing but transient and non-disabling odor, taste, and sensory irritation or certain asymptomatic, non-sensory effects. With increasing airborne concentration above each AEGL, there is a progressive increase in the likelihood of occurrence and the severity of effects described for each corresponding AEGL [i.e., AEGL-2 or AEGL-3]." The AEGL-1 60-minute value, if available for the applicable compound, was also used for comparison purposes because it is more precautionary (than AEGL-2 or AEGL-3) as the AEGL-1 level reflects potential health impacts that are reversible upon cessation of exposure. The AEGL-1 60-minute values for H_2S (510 ppb), NO_2 (500 ppb), and SO_2 (200 ppb) were also listed for comparison purposes. The USEPA did not derive an AEGL-1 value for CO, therefore an AEGL-2 (83 ppm) was selected.

2.3 Summary of Downtime or Equipment Malfunction

Data recovery is a percentage of the number of data points collected divided by the expected number of data points. For example, if a data point is expected every five minutes, 12 data points would be expected over a one-hour period. If only 11 data points were received, the data recovery for that hour would be 92%. The data recoveries during the reporting period did not meet the QAPP targets of >95% during this quarter (Table 1-3).

TABLE 1-3
CCND MONITORING DATA RECOVERY

Location ID	SensIT RAMP Percent Data Recovery (includes periods of adverse atmospheric conditions)
CM1	87.9%
CM2	88%
CM3	86.1%
CM4	90.9%
CM5	86.9% (does not include CO data)
CM6	98.1%
CM7	90.9%
CM8	91.6%
CM9	87.9%
CM10	90.3%

During the month of December, all the SENSIT RAMP went through maintenance service and their gas sensing parts were replaced, as they had reached their expiration date. The upgraded sensors were allowed to equilibrate in ambient conditions for 48 hours. Following the QAPP 2024, after the calibration of the upgraded sensors a collocation study took place to evaluate their performance. The collocation study took place at the Focus Point CM6 monitoring location. The study started on December 20, 2025, and was completed on December 30, 2025. During the collocation study, the normal operation of the CCND sensor network had been interrupted, and this resulted in a lower data recovery. In addition, the data recovery is below the QAPP target of 95% for several reasons, including instrument malfunction, communication issues, downtime when performing quality assurance procedures, theft, etc. In alignment with the QAPP, data recovery does not include downtime when adverse atmospheric conditions, such as extreme humidity, extreme temperature, and other conditions which can affect a monitor's ability to provide reliable data. The CM5 SENSIT instrument had a malfunction of the CO sensor, resulting in a lower data recovery percentage, 0.5%. The system was able to measure the rest of the air pollutants (H_2S, NO_2, $PM_{2.5}$, SO_2, TVOC) with a data recovery of more than 86.9%. The CO, H_2S, SO_2 and NO_2 sensors were replaced with new ones during the end of December 2024. Prior to their installation to the CCND network, all the new sensors were calibrated and collocated with the CCND near-FEM and FEM instruments for a short period of 48 hours, following the CCND QAPP.

3.0 RESULTS

3.1 Results Summary

The one-hour rolling average results for CO, NO_2, H_2S, SO_2, and total VOCs during this reporting period can be found in Table 1-4, Figures 1-2 through 1-5A and Figure 1-7. The gaseous (CO, NO_2, H_2S, SO_2, and total VOC) concentrations are reported on a one-hour rolling average updated every five minutes. The $PM_{2.5}$ data presented on the website is in one-hour averages to align with the other $PM_{2.5}$ sensor-based monitoring programs around the local community; these readings are shown in Figure 1-6A. The 24-hour averages for $PM_{2.5}$ and rolling averages for H_2S are also reported and can be found in Table 1-4, and Figure 1-6B, and Figure 1-5B. Values reported as zero do not necessarily mean that the analyte is not present, but instead indicates that the analytes' concentration, if present, was below the detectable level of the instrument. For the purposes of this report, results measured below the detectable level (or detection limit- DL) are displayed in the individual graphs at the end of this document.

This evaluation includes screening values from, the USEPA AEGL and ATSDR Minimal Risk Level (MRL) and includes the USEPA NAAQS for reference. AEGLs are used by emergency planners and responders worldwide as guidance for emergency response situations. Health reference levels, such as MRLs, are intended to serve as a screening tool to help public health professionals determine where further evaluation may be needed. As explained above in Section 2.2, the NAAQS values are presented in Table 1-4 for reference, but are not intended to be compared as the equipment used to collect these concentrations and the time they were collected is not appropriate for a comparison to the standards.. Table 1-4 and Figures 1-2 to 1-7 indicate readings for the monitoring period relative to the health-based reference values and the NAAQS.

TABLE 1-4
CCND MONITORS RESULTS SUMMARY

Analyte	Range Across Network[4]	NAAQS Values (Averaging time)	Health-based Reference Value (Source)
CO	<0.05 – 3.8 ppm (1-hour rolling average)	**35 ppm** (1-hour average not to be exceeded more than one per year)	**83 ppm** (1-hour USEPA AEGL-2)
NO_2	<20 – 166.7 ppb (1-hour rolling average)	**100 ppb** (98^{th} percentile of 1-hour daily maximum, averaged over 3 years)	**500 ppb** (1-hour USEPA AEGL-1)
SO_2	<50 – 86.2 ppb (1-hour rolling average)	**75 ppb** (99^{th} percentile of 1-hour daily maximum concentrations, averaged over 3 years)	**200 ppb** (1-hour USEPA AEGL-1)
H_2S	<10 – 27.5 ppb (24-hour rolling average)	NA	**70 ppb** (acute[5] ATSDR MRL)
H_2S	<10 – 76.7 ppb (1-hour rolling average)	NA	**510 ppb** (1-hour USEPA AEGL-1)
$PM_{2.5}$	<1 – 10.1 µg/m^3 (24-hour average)	**35 µg/m^3** (98^{th} percentile of 24-hour daily average concentrations, averaged over 3 years)	NA
Total VOC	<0.01 – 0.5 ppm (1-hour rolling average)	NA	NA

[4] The "<" symbol indicates that the recorded concentration was less than the instrument's detection limit

[5] An acute exposure is defined by ATSDR as 1-14 days

3.2 Carbon Monoxide (CO)

Figure 1-2 shows the 1-hour rolling averages of CO from October 1, 2024, through December 31, 2024. The USEPA NAAQS for CO is 35 ppm as a 1-hour average not to be exceeded more than once per year. Figure 1-3 shows that all the measured 1-hour rolling average CO values in all CCND neighborhoods were more than 9 times lower (maximum 1-hour rolling average: 3.8 ppm (+/- 25% due to measurement uncertainty)) than the CO NAAQS. Further, the maximum 1-hour rolling average CO concentration in the CCND neighborhoods were more than 21 times lower than the 1-hour USEPA AEGL-2 of 83 ppm.

3.3 Nitrogen Dioxide (NO_2)

Figure 1-3 shows the 1-hour rolling averages of NO_2 from October 1, 2024, through December 31, 2024. The USEPA NAAQS for NO_2 is 100 ppb as the 98^{th} percentile of 1-hour daily maximum concentrations, averaged over three years. The maximum 1-hour rolling average of 166.7 ppb (+/- 25% due to measurement uncertainty) at the CM7 location was above the NO2 NAAQS, however, this is a one 1-hour rolling average collected over October 1, 2024, through December 31, 2024 and not the appropriate duration or calculation to compare to the NAAQS and taken by sensors that are not at the regulatory compliance needed to compare against NAAQS. Importantly, the maximum measured 1-hour rolling average NO_2 concentration across all the CCND neighborhoods was at approximately three times lower than the 1-hour USEPA AEGL-1 for NO_2 of 500 ppb.

3.4 Sulfur Dioxide (SO_2)

Figure 1-4 shows the 1-hour rolling averages of SO_2 from October 1, 2024, through December 31, 2024. The USEPA NAAQS for SO_2 is 75 ppb as 99^{th} percentile of 1-hour daily maximum concentrations, averaged over three years. Although there were 1-hour rolling average concentrations of SO_2 above the NAAQS of 75 ppb, these were collected over October 1, 2024, through December 31, 2024 and not the appropriate duration or calculation to compare to the NAAQS and taken by sensors that are not at the regulatory compliance needed to compare against NAAQS. Importantly, the maximum measured 1-hour rolling average SO_2 concentrations (max: 86.2 ppb +/- 25% due to measurement uncertainty) measured across all the CCND neighborhoods was more than two times lower than the 1-hour USEPA AEGL-1 for SO_2 of 200 ppb.

3.5 Hydrogen Sulfide (H_2S)

Figures 1-5A and 1-5B show the 1-hour rolling and 24-hour rolling averages of H_2S, respectively, from October 1, 2024, through December 31, 2024. The maximum 24-hour rolling average for H_2S was 27.5 ppb (+/- 30% due to measurement uncertainty) and was more than two and a half times lower than the ATSDR acute-duration MRL of 70 ppb, thus, it is unlikely that H_2S levels measured in the CCND neighborhoods would result in an increased risk of adverse acute health effects. Further, the maximum 1-hour rolling average H_2S concentration in the CCND neighborhoods was 76.7 ppb (+/- 30% due to measurement uncertainty), more than six times lower than the one- hour USEPA AEGL-1 for H_2S of 510 ppb.

3.6 Particulate Matter ($PM_{2.5}$)

Figures 1-6A and 1-6B show the 1-hour and 24-hour block averages of $PM_{2.5}$, respectively, from October 1, 2024, through December 31, 2024. The USEPA NAAQS for $PM_{2.5}$ is 35 µg/m^3 as 98th percentile of 24-hour daily (block) average concentrations, averaged over 3 years. The measured 24-hour averages (maximum 24-hour average: 10.1 µg/m^3 (+/- 10 µg/m^3 for measurement uncertainty)) were below the NAAQS concentration at all CCND sensor locations. There was no health based reference value to compare to the 1-hour block averages of $PM_{2.5}$.

3.7 Total Volatile Organic Compounds (VOC)

Figure 1-7 shows the 1-hour rolling averages of total VOCs from October 1, 2024, through December 31, 2024. The measured maximum 1-hour average across this reporting period was 0.5 ppm (+/- 30% for measurement uncertainty). There are no NAAQS or health-based reference values for total VOCs because this measurement may be made of one to thousands of different chemical compounds having various thresholds of adverse health effects.

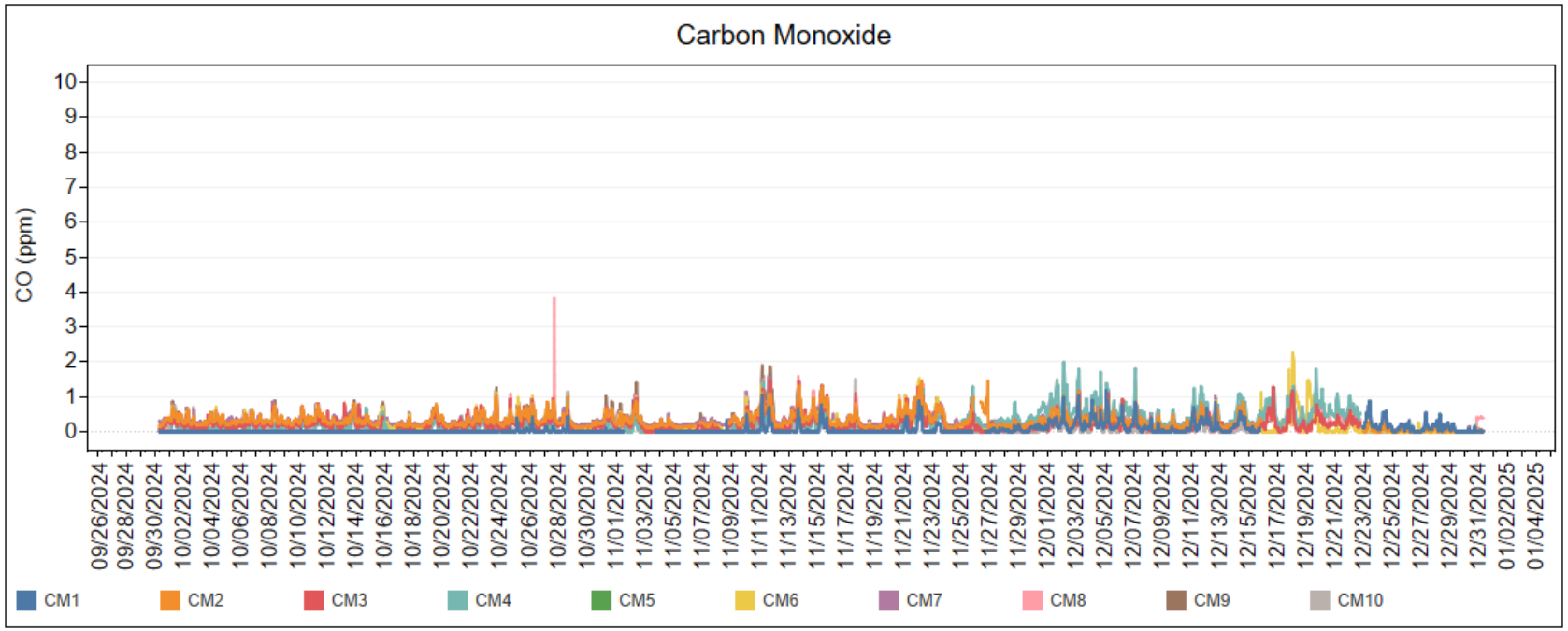
VOC sensor-triggered samples were collected automatically when instantaneous total VOCs were detected at an airborne concentration of 1 part per million (ppm) or higher for one minute or longer. During the fourth quarter of 2024, total VOC levels went above 1 ppm one time, which triggered the capture of one air sample. The results of the sensor-triggered events and health risk evaluations are presented in separate reports found at ccnd-air.com/Documents.

4.0 CONCLUSIONS

Continuous air monitoring sensors were operating at ten locations across the CCND neighborhoods during the monitoring period. The air monitoring data from October 1, 2024, through December 31, 2024 was compared to air quality health-based reference values to determine if the measured air quality may have the potential for adverse effects on community health. The results of this assessment indicate the 1-hour rolling averages for all analyte levels at all locations were below their respective acute health-based reference levels compared in this report, if available.

FIGURE 1-2
CCND COMMUNITY MONITORING CARBON MONOXIDE (CO) DATA[6]

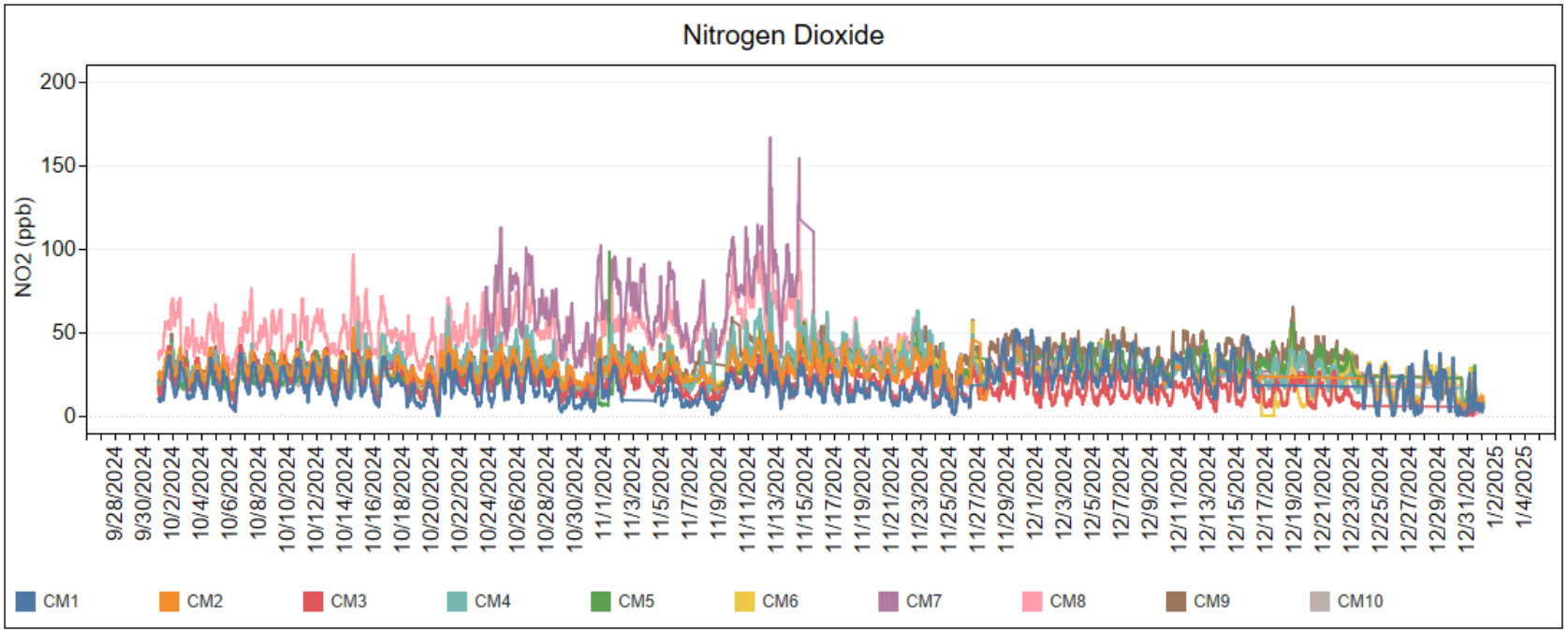
(1-HOUR ROLLING AVERAGES)



[6] The SensIT RAMP's detection limit for carbon monoxide is 0.05ppm.

FIGURE 1-3
CCND COMMUNITY MONITORING NITROGEN DIOXIDE (NO_2) DATA[7]

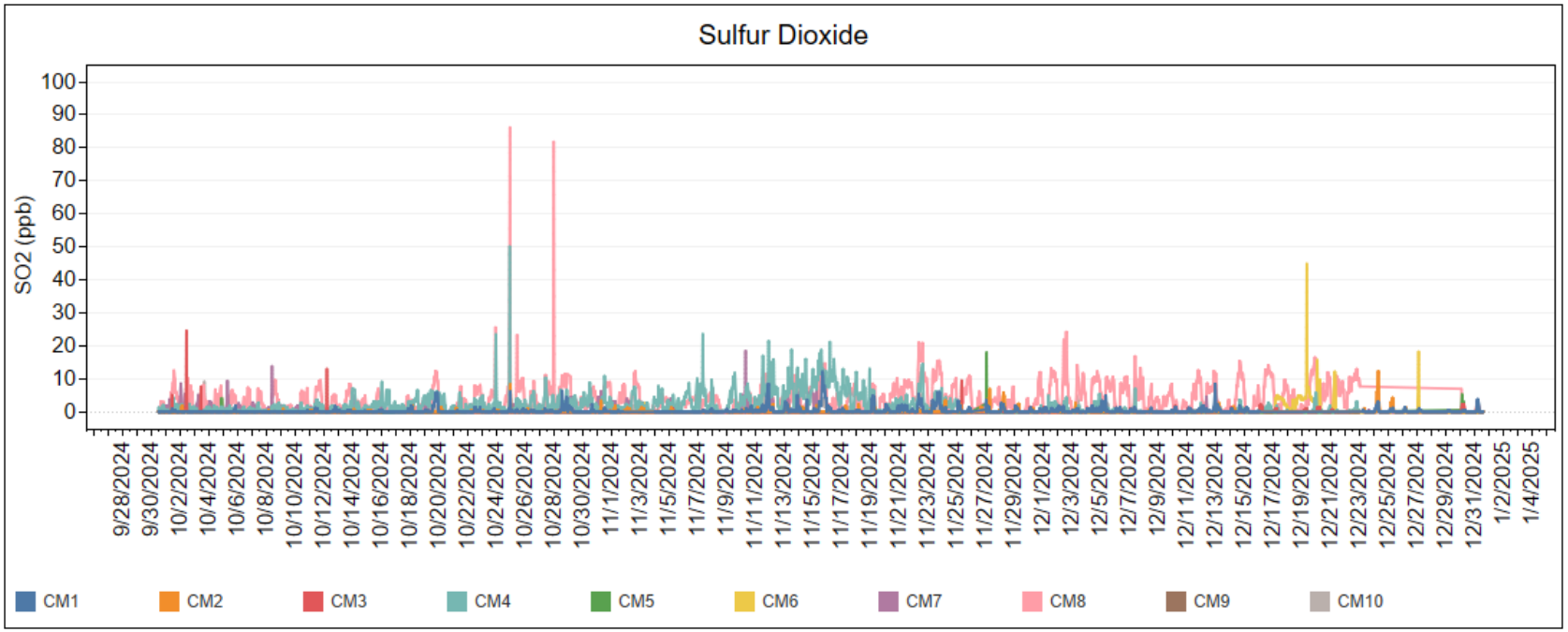
(1-HOUR ROLLING AVERAGES)



[7] The SensIT RAMP's detection limit for nitrogen dioxide is 20 ppb.

FIGURE 1-4
CCND COMMUNITY MONITORING SULFUR DIOXIDE (SO_2) DATA[8]

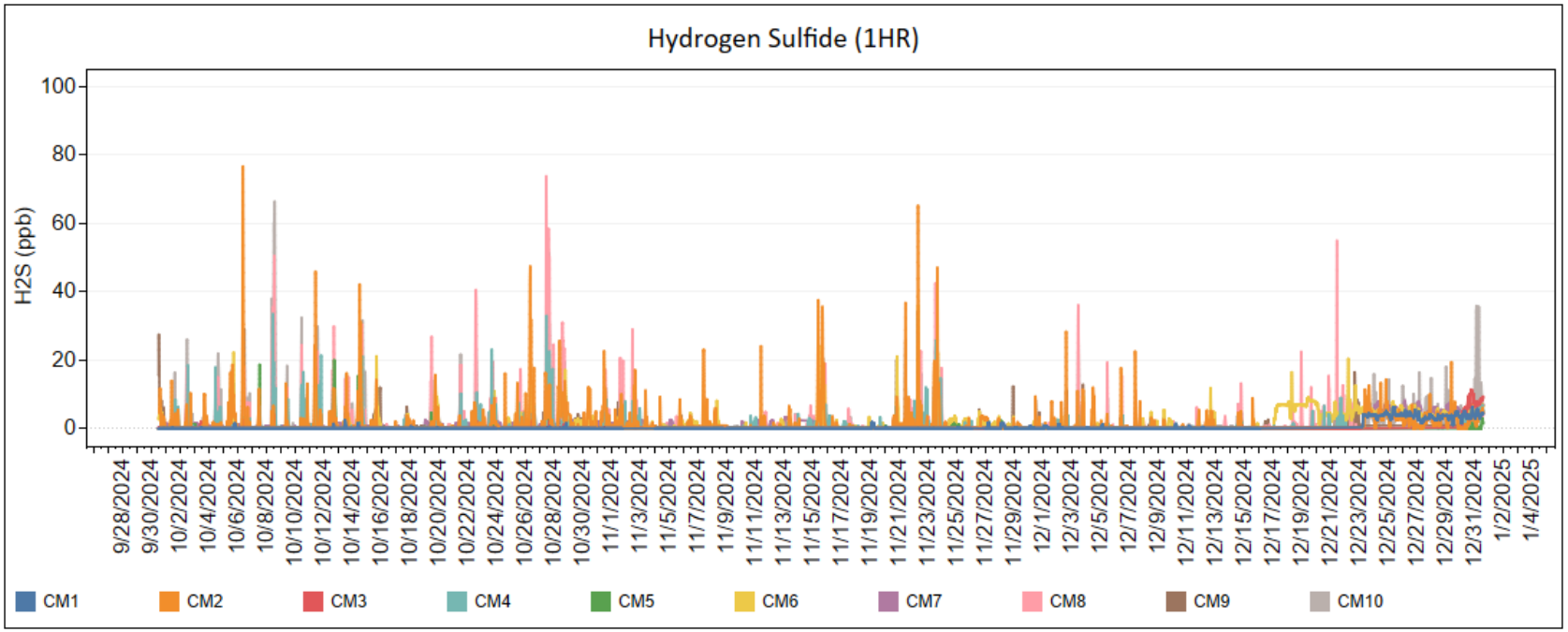
(1-HOUR ROLLING AVERAGES)



[8] The SensIT RAMP's detection limit for sulfur dioxide is 50 ppb.

FIGURE 1-5A
CCND COMMUNITY MONITORING HYDROGEN SULFIDE (H_2S) DATA[9]

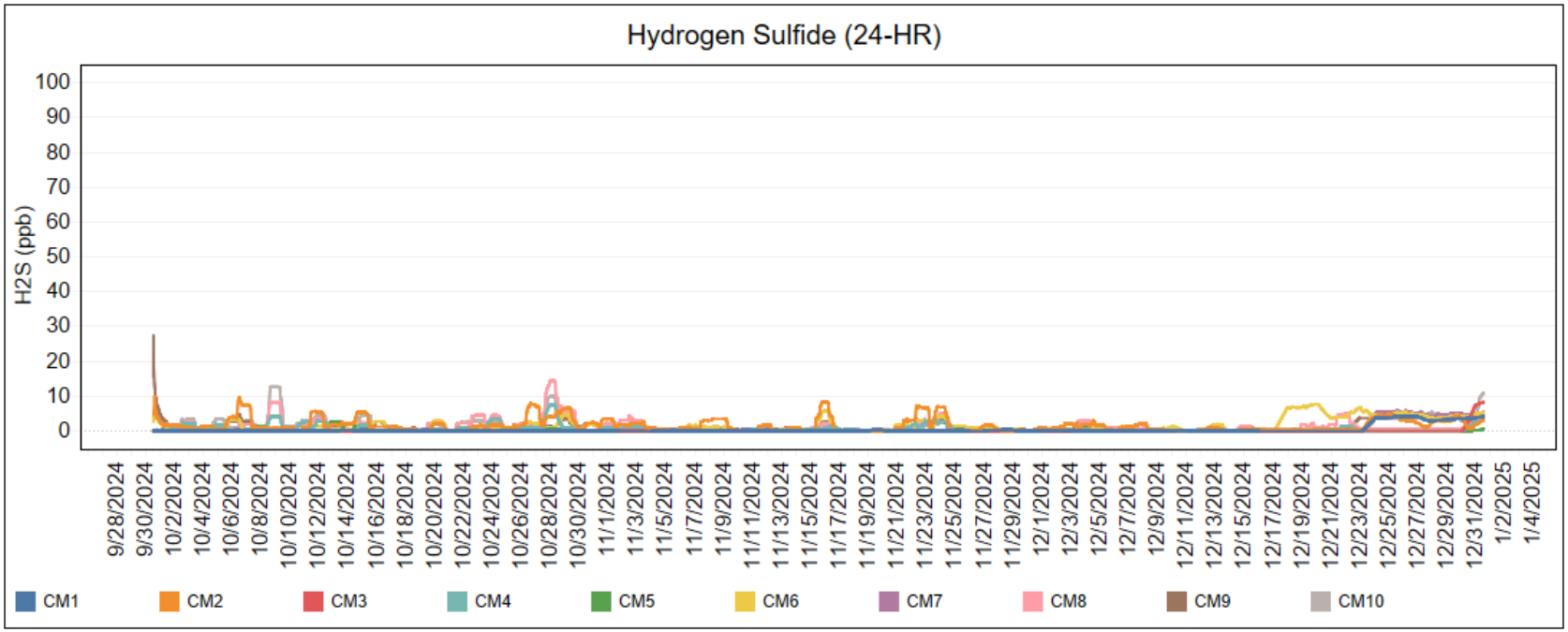
(1-HOUR ROLLING AVERAGES)



[9] The SensIT RAMP's detection limit for hydrogen sulfide is 10 ppb.

FIGURE 1-5B
CCND COMMUNITY MONITORING HYDROGEN SULFIDE (H_2S) DATA[10]

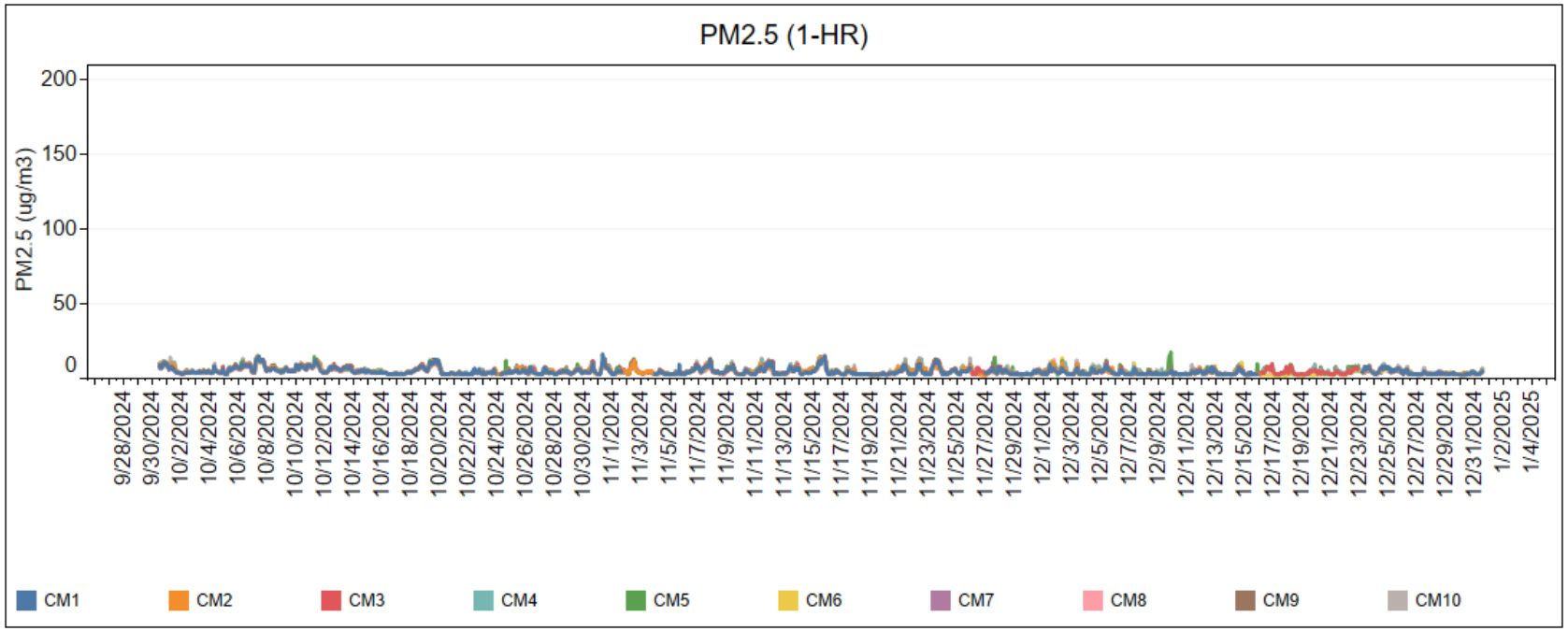
(24-HOUR ROLLING AVERAGES)



[10] The SensIT RAMP's detection limit for hydrogen sulfide is 10 ppb.

FIGURE 1-6A
CCND COMMUNITY MONITORING $PM_{2.5}$ DATA[11]

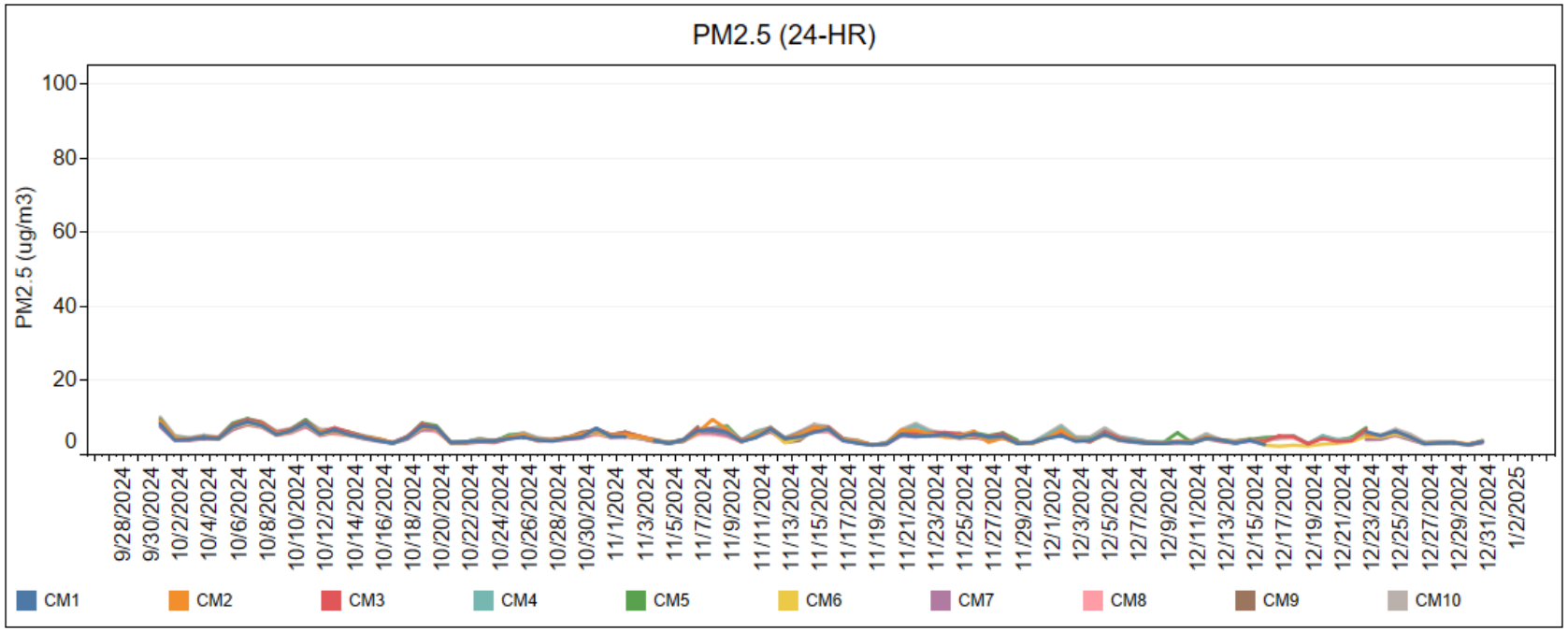
(1-HOUR BLOCK AVERAGES)



[11] The SensIT RAMP's detection limit for $PM_{2.5}$ is 1 µg/m^3.

FIGURE 1-6B
CCND COMMUNITY MONITORING $PM_{2.5}$ DATA[12]

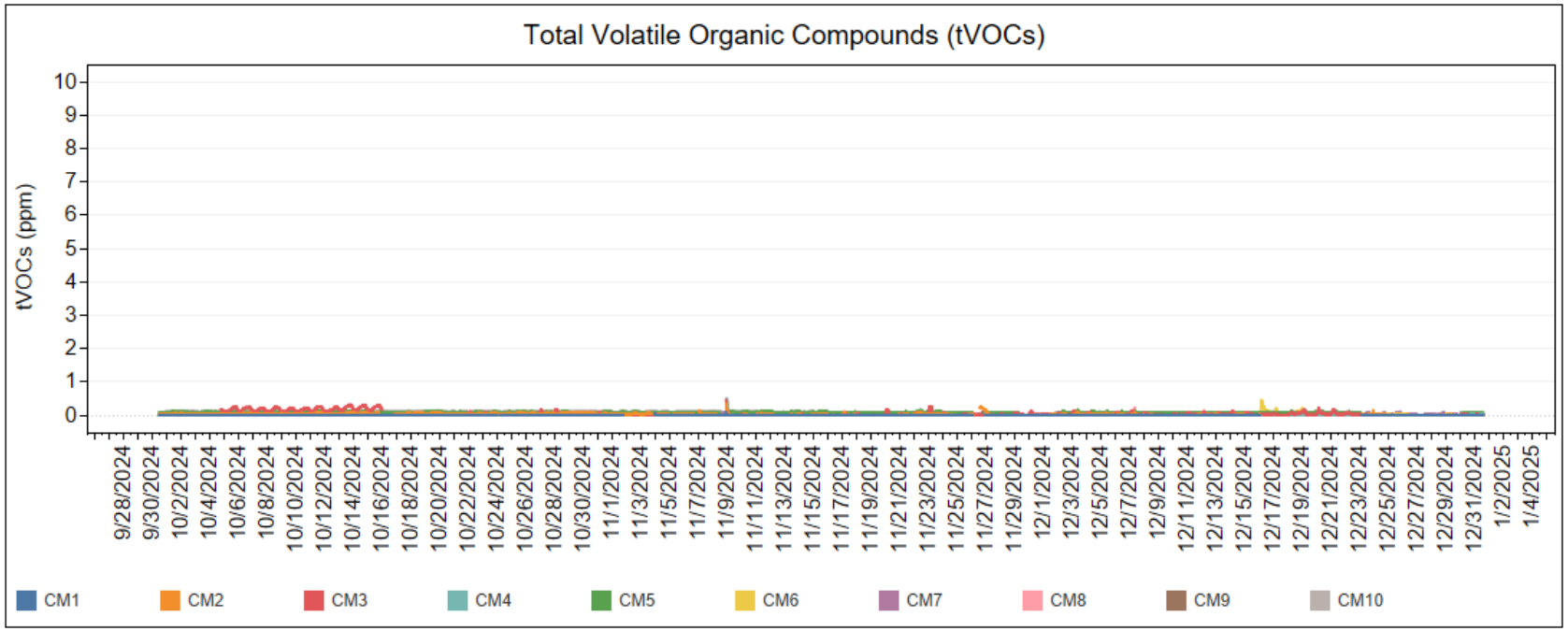
(24-HOUR BLOCK AVERAGES)



[12] The SensIT RAMP's detection limit for $PM_{2.5}$ is 1 µg/m^3.

FIGURE 1-7
CCND COMMUNITY MONITORING VOC DATA[13]

(1-HOUR ROLLING AVERAGES)

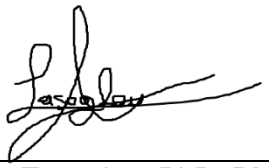


[13] The SensIT RAMP's detection limit for VOC is 0.01 ppm.

5.0 PROGRAM CHANGES

On December 20, 2024, the gas sensors (H_2S, SO_2, NO_2, CO) of the ten SENSIT RAMP system were replaced, as they were reaching their expiration date. The new sensors were allowed to equilibrate in ambient conditions and then they were calibrated. Prior to their deployment in the CCND network, the sensors were evaluated by being collocated with a Federal Equivalent Measurement (FEM) monitor and a near-FEM monitor. The SENSIT RAMPS with the new sensors were installed in the CCND network on December 30, 2024.

Prepared by:



Antonios Tasoglou, PhD, PMP
Emerging Technology Manager
Montrose Air Quality Services, LLC

Reviewed and Approved by:

Health Sciences Department
CTEH, LLC
350 Indiana St.
Golden, CO 80401

APPENDIX A
CALIBRATION AND QA/QC DATA

Rose Hill

		Validation Results Table														
		CO Error			NO2 Error			SO2 Error			H2S Error			VOC Error		
Community Monitor Location	Validation Date	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)
CM1	10/24/2024	24%	5%	0%	17%	20%	0%	3%	6%	0%	5%	4%	1%	3%	5%	0%
CM1	11/26/2024	4%	35%	0%	39%	40%	0%	4%	8%	0%	0%	5%	0%	6%	17%	0%
CM1	12/18/2024	20%	5%	0%	13%	14%	2%	13%	23%	1%	15%	9%	2%	12%	1%	2%

RBC

		Validation Results Table														
		CO Error			NO2 Error			SO2 Error			H2S Error			VOC Error		
Community Monitor Location	Validation Date	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)
CM2	10/29/2024	29%	17%	2%	27%	25%	1%	5%	32%	0%	9%	20%	0%	21%	24%	3%
CM2	11/26/2024	15%	13%	4%	25%	18%	3%	9%	18%	3%	33%	42%	0%	19%	22%	1%
CM2	12/18/2024	16%	2%	0%	11%	9%	2%	27%	32%	2%	14%	5%	2%	15%	13%	9%

Adams High

		Validation Results Table														
		CO Error			NO2 Error			SO2 Error			H2S Error			VOC Error		
Community Monitor Location	Validation Date	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)
CM3	10/16/2024	7%	3%	1%	10%	12%	2%	29%	58%	0%	3%	9%	0%	2%	9%	0%
CM3	11/25/2024	17%	24%	0%	27%	29%	0%	13%	22%	5%	14%	13%	0%	55%	38%	0%
CM3	12/26/2024	6%	36%	0%	9%	8%	4%	25%	21%	1%	13%	5%	3%	92%	3%	3%

Adams
Middle

		Validation Results Table														
		CO Error			NO2 Error			SO2 Error			H2S Error			VOC Error		
Community Monitor Location	Validation Date	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)
CM4	10/14/2024	13%	10%	1%	93%	87%	2%	5%	12%	0%	48%	76%	0%	22%	29%	0%
CM4	11/25/2024	32%	57%	0%	9%	11%	1%	6%	0%	0%	25%	22%	0%	76%	83%	0%
CM4	12/26/2024	22%	12%	0%	8%	8%	2%	30%	36%	0%	15%	5%	2%	44%	40%	0%

Central

		Validation Results Table														
		CO Error			NO2 Error			SO2 Error			H2S Error			VOC Error		
Community Monitor Location	Validation Date	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)
CM5	10/22/2024	-	-	-	10%	8%	0%	125%	66%	0%	113%	71%	0%	18%	21%	4%
CM5	11/26/2024	-	-	-	15%	17%	0%	55%	62%	3%	46%	45%	3%	16%	21%	4%
CM5	12/26/2024	2%	50%	0%	8%	2%	1%	19%	5%	2%	19%	8%	2%	94%	20%	5%

Focus Point

		Validation Results Table														
		CO Error			NO2 Error			SO2 Error			H2S Error			VOC Error		
Community Monitor Location	Validation Date	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)
CM6	10/30/2024	27%	15%	0%	19%	23%	1%	8%	54%	0%	15%	19%	2%	17%	14%	0%
CM6	11/13/2024	5%	30%	0%	23%	24%	0%	11%	37%	0%	27%	12%	0%	33%	19%	0%
CM6	12/18/2024	4%	2%	0%	14%	12%	2%	26%	33%	1%	16%	12%	2%	-	0%	4%

Kearney

		Validation Results Table														
		CO Error			NO2 Error			SO2 Error			H2S Error			VOC Error		
Community Monitor Location	Validation Date	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)
CM7	10/23/2024	27%	8%	4%	62%	55%	3%	35%	17%	0%	20%	19%	0%	13%	4%	0%
CM7	11/14/2024	25%	5%	3%	15%	21%	1%	28%	32%	0%	28%	36%	0%	18%	6%	0%
CM7	12/18/2024	24%	13%	0%	2%	7%	5%	12%	25%	1%	17%	8%	2%	7%	16%	5%

Monroe

		Validation Results Table														
		CO Error			NO2 Error			SO2 Error			H2S Error			VOC Error		
Community Monitor Location	Validation Date	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)
CM8	10/29/2024	28%	42%	0%	15%	20%	1%	-	-	-	6%	4%	0%	7%	11%	3%
CM8	11/22/2024	51%	116%	5%	31%	33%	2%	6%	2%	6%	15%	14%	0%	8%	3%	0%
CM8	12/26/2024	1%	69%	0%	10%	11%	3%	28%	33%	1%	13%	4%	3%	-	16%	3%

48th and Race

		Validation Results Table														
		CO Error			NO2 Error			SO2 Error			H2S Error			VOC Error		
Community Monitor Location	Validation Date	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)
CM9	10/30/2024	37%	13%	0%	5%	6%	2%	1%	34%	0%	2%	12%	1%	36%	40%	0%
CM9	11/13/2024	22%	17%	6%	16%	17%	1%	88%	62%	0%	-	-	-	37%	41%	0%
CM9	12/26/2024	8%	9%	0%	5%	3%	3%	25%	33%	0%	14%	12%	2%	-	6%	2%

Alsup

		Validation Results Table														
		CO Error			NO2 Error			SO2 Error			H2S Error			VOC Error		
Community Monitor Location	Validation Date	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)	Span (<30%)	Precision (<30%)	Zero (<10%)
CM10	10/22/2024	61%	18%	0%	26%	23%	0%	21%	28%	0%	171%	184%	0%	37%	38%	5%
CM10	11/15/2024	60%	9%	5%	11%	11%	1%	14%	9%	0%	55%	68%	0%	1%	5%	5%
CM10	12/18/2024	17%	2%	0%	12%	15%	3%	24%	44%	0%	24%	14%	1%	1%	3%	5%

APPENDIX B
FIELD DATA SHEETS

AQM Serial Number	829	830	831
Community Monitor Location	2	7	6
Date	12/30/2024	12/12/2024	12/12/2024
Operator	AT	AT	AT
Monthly Checks			
SO2 bottle (psi)	NA	✓	✓
H2S bottle (psi)	NA	✓	✓
Gas Validation Checks (weekly, reviewed Monthly)	✓	✓	✓
Quarterly Checks			
Gas Inlet			
Flow Rate	✓	✓	✓
Filter Change	✓	✓	✓
Field Calibration (CO, TVOC)	✓	✓	✓
Particulate Monitor			
Flow Rate	Failed	✓	✓
Filter Change	✓	✓	✓
Check for Leaks	Failed	Failed	Failed
Check Zero (+/- 3.0 ug/m^-3)	Failed	✓	✓
Check laser and detector (17.1 mA)	✓	✓	✓
Clean Cyclone	✓	✓	✓
Notes:	The PM sensors are to be replaced.		

APPENDIX C
CALIBRATION GAS CERTIFICATION SHEETS

GASCO AFFILIATES, LLC.

320 Scarlet Blvd.
Oldsmar, FL 34677
(800) 910-0051
fax: (866) 755-8920
www.gascogas.com

CERTIFICATE OF ANALYSIS

Date: August 17, 2025 **Customer:** Cal Gas Direct Inc.
Order Number: 24102390
Lot Number: 304-403151303-1 **Use Before:** 09/20/2026

Component	Requested Concentration	Analytical Result (+/- 5%)
Sulfur Dioxide	20 PPM	18.5 PPM
Air	Balance	Balance

Cylinder Size: 2.0 Cu. Ft.
Contents: 58 Liter

Valve: 5/8” -18UNF
Pressure: 500 psig

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/ or N.I.S.T. Gas Mixture reference materials.

Analyst:

Glenn Velez

GASCO AFFILIATES, LLC.

320 Scarlet Blvd.
Oldsmar, FL 34677
(800) 910-0051
fax: (866) 755-8920
www.gascogas.com

CERTIFICATE OF ANALYSIS

Date: August 17, 2025
Order Number: 24102390
Lot Number: 304-403151307-1

Customer: Cal Gas Direct Inc.

Use Before: 09/20/2028

Component	Requested Concentration	Analytical Result (+/- 2%)
Isobutylene	200 PPM	206.4 PPM
Air	Balance	Balance

Cylinder Size: 2.0 Cu. Ft.
Contents: 58 Liter

Valve: 5/8" -18UNF
Pressure: 500 psig

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/ or N.I.S.T. Gas Mixture reference materials.

Analyst:

Glenn Velez

GASCO AFFILIATES, LLC.

320 Scarlet Blvd.
Oldsmar, FL 34677
(800) 910-0051
fax: (866) 755-8920
www.gascogas.com

CERTIFICATE OF ANALYSIS

Date: August 17, 2025 **Customer:** Cal Gas Direct Inc.
Order Number: 24102390
Lot Number: 304-403151305-1 **Use Before:** 09/20/2026

Component	Requested Concentration	Analytical Result (+/- 5%)
Hydrogen Sulfide	20 PPM	21 PPM
Air	Balance	Balance

Cylinder Size: 2.0 Cu. Ft.
Contents: 58 Liter

Valve: 5/8” -18UNF
Pressure: 500 psig

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/ or N.I.S.T. Gas Mixture reference materials.

Analyst:

Glenn Velez

GASCO AFFILIATES, LLC.

320 Scarlet Blvd.
Oldsmar, FL 34677
(800) 910-0051
fax: (866) 755-8920
www.gascogas.com

CERTIFICATE OF ANALYSIS

Date: August 17, 2025
Order Number: 24102390
Lot Number: 304-403151306-1

Customer: Cal Gas Direct Inc.

Use Before: 09/20/2028

Component	Requested Concentration	Analytical Result (+/- 2%)
Carbon Monoxide	500 PPM	521 PPM
Nitrogen	Balance	Balance

Cylinder Size: 2.0 Cu. Ft.
Contents: 58 Liter

Valve: 5/8” -18UNF
Pressure: 500 psig

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/ or N.I.S.T. Gas Mixture reference materials.

Analyst:

Glenn Velez

THIS IS THE LAST PAGE OF THIS DOCUMENT