2021 Q3 SENSOR REPORT
COMMERCE CITY NORTH DENVER
COMMUNITY AIR MONITORING NETWORK
COMMERCE CITY, COLORADO

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Document Number:	**017AS-009388-RT-73**
Report Period:	**August 16 – September 30, 2021**
Submittal Date:	**October 31, 2021**

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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) providing continuous, near real-time monitoring for the following analytes1: carbon monoxide (CO), sulfur dioxide (SO_2), hydrogen sulfide (H_2S), nitrogen oxide (NO), 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 1-liter evacuated stainless steel ("Summa") canisters; and (3) periodic real-time air monitoring throughout neighborhoods using a mobile monitoring van laboratory to detect the presence of specific VOCs. This report details approach number 1, 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 installed at eight locations across the CCND neighborhoods during the third quarter of 2021. The air monitoring preliminary data was made available in near real-time at ccnd-air.com beginning on August 16, 2021. The sensors used in this program integrate different technologies including a photoionization detector for VOCs; an electrochemical sensor for CO, NO, NO_2, H_2S, and SO_2; laser scattering for $PM_{2.5}$; and a sonic anemometer for wind speed and direction. The sensors' small size, affordability, solar power, and cellular communication capabilities allow for more flexibility in siting options. That is, these features allow more monitors to be deployed in more places, while, as discussed in section 1.2, sensor-based technologies do have certain monitoring limitations. These types of sensor-based technologies are being progressively deployed in international, state and local air monitoring programs. 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 (a subsidiary company of Montrose Environmental Group) evaluated the air monitoring data and compared them to air quality standards, health-based reference values, and previously published regional data to determine if the measured air quality may have the potential for adverse effects on community health.

The results of this assessment indicate the following:

- The analyte levels at each location were below their respective acute health-based reference levels, if available, or within the range of previously published regional data.

[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.

- The monitored analyte levels at locations within the CCND neighborhoods are lower than USEPA's ambient air quality standards (which are provided for informational and not compliance purposes).

1.0 INTRODUCTION

Montrose Environmental Group- Air Quality Services, LLC (Montrose) was contracted by Suncor to deploy, operate, and maintain an air quality monitoring network in the Commerce City and North Denver (CCND) neighborhoods. Air monitoring was accomplished through three separate technical approaches: (1) providing continuous, near real-time monitoring for the following analytes: carbon monoxide (CO), sulfur dioxide (SO2), hydrogen sulfide (H2S), nitrogen oxide (NO), nitrogen dioxide (NO2), particulate matter (PM2.5), and total volatile organic compounds (VOCs); (2) periodic collection and laboratory analysis for the presence of specific VOCs from Summa canisters; and (3) periodic real-time air monitoring throughout entire neighborhoods using a mobile monitoring van to detect presence of specific VOCs. 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 1, the continuous, near real-time monitoring for the analytes listed. The Summa canister sampling and mobile monitoring van data are presented in separate reports. Preliminary sensor data was made available in near real-time at ccnd-air.com beginning on August 16, 2021. Air monitoring, sampling, and analysis from all three phases were conducted in accordance with the Quality Assurance Project Plan (QAPP) that can be found online at ccnd-air.com/documents.

1.1 Air Monitoring Site Description

Continuous air monitoring sensors were installed at eight locations across CCND neighborhoods within a three-mile radius of refinery operations during the third quarter of 2021. The monitor locations are shown in Figure 1-1 and described in Table 1-1; they 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 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	39.80164, -104.90882	2.0	E 58th Ave & Oneida St, Commerce City
CM2	RBC	39.79599, -104.95603	0.70	Brighton Blvd & York St, Commerce City
CM3	Adams Highschool	39.82736, -104.90193	2.9	E 72nd Ave & Quebec Pkwy, Commerce City
CM4	Adams Middle School	39.82893, -104.93499	1.9	Birch St & E 72nd Ave, Commerce City
CM5	Central	39.81457, -104.91928	1.7	Holly St & E 64th Ave, Commerce City
CM6	Focus	39.78436, -104.95663	1.4	Columbine St & 48th Ave, Denver
CM7	Kearney	39.80888, -104.91545	1.7	E 62nd Ave & Kearney St, Commerce City
CM8	Monroe	39.8156, -104.94503	0.85	Monroe St & E 64th Ave, Denver

1.2 Methodology

1.2.1 Continuous Monitoring

The sensors used in the CCND network were manufactured by Lunar Outpost (Canary-S sensor), a Colorado-based company, and AQMesh (Pod), a United Kingdom-based company. The near-Federal Equivalency Method (FEM) AQM65 monitors used for quality assurance of the network 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 being performed using a variety of technology, 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	Lunar Outpost
SO_2	Electrochemical Sensor	AQMesh
CO	Electrochemical Sensor	AQMesh
NO	Electrochemical Sensor	AQMesh
NO_2	Electrochemical Sensor	AQMesh
H_2S	Electrochemical Sensor	AQMesh
$PM_{2.5}$	Laser Scattering	Lunar Outpost
Wind Speed, Wind Direction	Sonic Anemometer	Lunar Outpost
Temperature, Relative Humidity, Barometric Pressure	Solid State	Lunar Outpost

The sensors 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. The AQM65 monitors the ambient air via a pump that pulls the sample into the individual analyte specific gas modules for analysis. Each device used in this project is solar-powered and transmits data via cellular communication.

The Photoionization Detector (PID) sensors used to measure VOC contains 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 stability of the detector.

Electrochemical sensors measure the concentration of a specific gas (SO_2, CO, NO, 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 of 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. The AQMesh Pod collect sensor temperature and ambient relative humidity data and correct for these interferences via algorithms that were developed during extensive global comparisons with reference data. Extreme temperature and humidity conditions can cause the liquid electrolyte to dry up and cause erratic readings on the monitors. The AQMesh Pod monitors for conditions that can cause these erratic readings and automatically invalidates this data to improve the overall quality of the data the sensors are reporting.

Additionally, electrochemical sensors have known cross sensitivity to other compounds. Some significant cross sensitivities include ozone causing a response on the NO_2 sensor. This program mitigates this issue by using an ozone filter on the face of the NO_2 sensor. Similarly, the SO_2 sensor can have a response caused by the presence of H_2S. Again, the SO_2 sensor has a built-in filter to mitigate the H_2S interference. The SO_2 sensor has additional interference from NO_2. The AQMesh data processing algorithms incorporate any data correction for these interferences.

The sensor data are intended to be used for informational purposes only and cannot be used for official compliance determination. The accuracy of sensors used in the program is not as high as certified ambient air monitoring equipment used by federal and local officials for National Ambient Air Quality Standard (NAAQS) compliance monitoring. State regulatory compliance data can be found on the CDPHE air quality website at https://www.colorado.gov/airquality .

The sampled particles 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.

Sensors like the Lunar Outpost Canary-S and AQMesh Pod 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 over one hour to improve the signal-to-noise of the instrument readings.

All sampling and quality assurance procedures were performed by Montrose.

1.2.2 Assessment of Community Health Implications

Health scientists from CTEH, LLC (a subsidiary company of Montrose Environmental Group) evaluated the air monitoring data collected by Montrose from August through September 2021. Results were compared to various standards, health-based reference levels, and previously published regional data to determine if the measured air quality may have the potential for adverse health effects within the surrounding communities.

The analytes CO, NO_2, SO_2, and $PM_{2.5}$ are all listed by the United States Environmental Protection Agency (USEPA) as "criteria pollutants". These analytes were identified in the U.S. federal Clean Air Act as airborne pollutants that, at certain levels, may adversely impact public health and welfare and for which National Ambient Air Quality Standards (NAAQS) would be established and updated based on the periodically reviewed scientific data associating criteria pollutant levels and public health impacts. Unlike chemical-specific health reference values, the NAAQS provide air quality standards designed to protect public health at the regional level. 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. Maximum or average analyte levels in this report that are higher than their respective NAAQS does not indicate that adverse health effects are likely. However, these data reported herein are used to determine if the potential may be identified for their values to negatively impact air quality and public health going forward.

H_2S and NO are not criteria pollutants but were selected to be monitored because of the potential to produce reactive nitrogen compounds in the air (NO), or because of presence in some grades of crude oil and its refined products (H_2S). Average and maximum NO levels for the Front Range region have been previously measured and reported by the Colorado Air Pollution Control Division (APCD)[3]. The maximum and average NO levels measured by Montrose from August through September 2021 are compared to the regional values reported by APCD. The health reference values for H_2S were developed by the Agency for Toxic Substances and Disease Registry (ATSDR)[4]. The ATSDR acute health-based reference levels (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 1-hour rolling average H_2S levels recorded in each CCND neighborhood were compared to an ATSDR acute-health-based reference level.

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] USEPA NAAQS Table, available online at https://www.epa.gov/criteria-air-pollutants/naaqs-table
[3] CO APCD 2019 Air Quality Data Report, available online at https://www.colorado.gov/airquality/tech_doc_repository.aspx?action=open&file=2019AnnualDataReport.pdf
[4] ATSDR MRL List available online at https://wwwn.cdc.gov/TSP/MRLS/mrlsListing.aspx

1.2.3 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 we expect a data point every 5 minutes, we would expect a total of 12 data points over a 1-hour period. If only 11 data points were received, the data recovery for that hour would be 92%. The data recovery during the reporting period meets the QAPP targets and are presented in Table 1-3.

TABLE 1-3
CCND MONITORING TECHNOLOGY

Location ID	AQMesh (excluding periods of adverse atmospheric conditions)	AQMesh (include periods of adverse atmospheric conditions)	Lunar Outpost
CM1	100%	85%	100%
CM2	100%	80%	100%
CM3	100%	85%	100%
CM4	100%	87%	97%
CM5	100%	83%	100%
CM6	100%[5]	85%[5]	100%
CM7	100%	87%	100%
CM8	100%	84%	100%

Data recovery may be below 100% for a number of reasons including instrument malfunction, instrument communication issues, monitor downtime when performing quality assurance procedures, 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 can affect a monitor's ability to provide reliable data.

On September 16, 2021, it was discovered that the NO_2 module in the AQMesh Pod installed at CM6 was erratically producing large negative and positive values that ranged from -314 to 718 ppb. The AQMesh Pod was replaced with a backup monitor at approximately 10:30 a.m. on September 16, 2021. AQMesh was contacted to help determine the issue with the monitor. AQMesh confirmed that the NO_2 module was faulty, potentially attributable to a number of reasons including the container of the electrolyte inside the electrochemical sensor becoming compromised. The module was shipped back to AQMesh for further investigation. The replacement monitor did not observe the same erratic readings further supporting that the original NO_2 module was damaged, and that the readings were not due to real events or a cross-

[5] The data recovery for the NO_2 module at CM6 was 31% due to the damaged module

interferant gas being present. For this reason, the NO_2 data collected prior to the monitor being replaced on September 16, 2021, at CM6 was invalidated.

Data gaps can be observed throughout the charts for the AQMesh Pod monitoring compounds (CO, NO, NO_2, H_2S, and SO_2). This is due to a limitation in the electrochemical technology used in the monitors. As referenced previously, there is a liquid electrolyte present within the sensors that can dry out if there is a combination of high temperature and low humidity. When this occurs the data output by the sensors can cause erratic readings and thus is unreliable. Through extensive studies conducted by AQMesh this typically begins to occur when temperatures exceed ~86°F and relative humidity is below 30%. The AQMesh Pod's internal quality assurance and procedures automatically invalidates this data to improve the overall quality of the data the sensors are reporting.

1.2.4 Summary of Results

The 1-hour rolling average results for CO, NO, NO_2, $PM_{2.5}$, H_2S, SO_2, and VOC during this reporting period can be found in Table 1-4. Figures 1-2 through 1-8. The gas (CO, NO, NO_2, H_2S, SO_2, and VOC) data is reported on a 1-hour rolling average updated every 5 minutes. The $PM_{2.5}$ data presented on the website is a 1-hour block average to align with the other $PM_{2.5}$ sensor-based monitoring programs around the local community. Values reported as zero do not necessarily mean that the analyte is not present, but instead indicates that the analyte is present below the detectable level of the instrument.

CO, NO, NO_2, VOC, and $PM_{2.5}$ were relatively consistent across the network over the reporting period. CO, NO, and NO_2 had elevated periods in the morning, which is typical due to rush hour traffic and consistent with the CDPHE monitoring data collected in the area.

$PM_{2.5}$ concentrations neared the NAAQS 24-hour average value of 35 ug/m^3 on September 8, 2021. Elevated readings near these levels were reported by CDPHE across the state on this date and is likely due to wildfires burning in the western United States. Therefore, these elevated readings are not likely due to local sources.

Elevated SO_2 and H_2S 1-hour rolling averages consistently occurred in the evenings over the reporting period. These elevated readings coincide with when the AQMesh Pods come out of the Extreme Environment Mode previously discussed. It is likely that these readings do not truly represent elevated levels of SO_2 and H_2S but are artifacts of the extreme temperature and humidity that sensor was exposed to during the hours prior. This is supported by elevated readings not being present on days when the unit does not go into Extreme Environment Mode. The SO_2 data anomalies is also supported by other CDPHE monitors in the region not reporting elevated readings during any of the periods that the AQMesh Pods did. CDPHE does not monitor for H_2S so the same comparison cannot be made.

The Clean Air Act requires USEPA to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. AEGLs are used by emergency planners and responders worldwide as guidance for emergency response situations. Minimal Risk Levels (MRLs), provided by the ATSDR are intended to serve as a screening tool to help public health professionals determine where further evaluation may be needed. Exposure to a level above the health-based reference levels outlined in this report does NOT necessarily mean that adverse health effects will occur. Table 1-4 and Graphs 2-8 indicate readings for the monitoring period relative to the health-based reference levels (if applicable).

TABLE 1-4
CCND MONITORS RESULTS SUMMARY

Analyte	Sites with Exceedances	NAAQ Standard (duration)	Health-based Reference Value (Source)
CO	None	**35 ppm** (1-hour average not to be exceeded more than one per year)	**83 ppm** (1-hour USEPA AEGL-2)
NO	NA	NA	NA
NO_2	None	**100 ppb** (98th percentile of 1-hour daily maximum, averaged over 3 years)	**500 ppb** (1-hour USEPA AEGL-1)
SO_2	None	**75 ppb** (99th percentile of 1-hour daily maximum concentrations, averaged over 3 years)	**200 ppb** (1-hour USEPA AEGL-1)
H_2S	None	NA	**70 ppb** (acute[6] ATSDR MRL) **510 ppb** (1-hour USEPA AEGL-1)
$PM_{2.5}$	None	**35 µg/m^3** (98th percentile of 24-hour daily average concentrations, averaged over 3 years)	NA
VOC	NA	NA	NA

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

1.2.4.1 Carbon Monoxide (CO)

Figure 1-2 shows the 1-hour rolling averages of CO from August 16, 2021, through September 30, 2021. The USEPA NAAQS for CO is 35 ppm as a 1-hour average not to exceeded twice in one year. Figure 1-2 shows that all of the measured 1-hour average CO values in all CCND neighborhoods were more than seven times lower than the CO NAAQS concentration. Thus, CO levels such as those measured in the CCND neighborhoods would not contribute to an annual exceedance of the NAAQS. Further, the maximum measured CO values in the CCND neighborhoods are more than 17 times lower than the 1-hour USEPA AEGL-2 of 83 ppm.

1.2.4.2 Nitric Oxide (NO)

Figure 1-3 shows the 1-hour rolling averages of NO from August 16, 2021, through September 30, 2021. There are no established USEPA NAAQS, health-based reference level, or USEPA AEGL-1 value for NO. Thus, measured NO levels were compared to NO levels published by Air Pollution Control Division (APCD) in 2019. The annual average NO levels reported by APCD for Denver (four locations), Jefferson County, and Weld County ranged from 0.7 to 34.7 ppb, while the 1-hour rolling average NO values measured by Montrose in the CCND neighborhoods ranged from 5.2 to 8.6 ppb. Likewise, the maximum NO values reported by APCD ranged from 22 to 340 ppb, while the maximum 1-hour rolling average values measured by Montrose ranged from 42.5 to 95.4 ppb.

1.2.4.3 Nitrogen Dioxide (NO_2)

Figure 1-4 shows the 1-hour rolling averages of NO_2 from August 16, 2021, through September 30, 2021. The USEPA NAAQS for NO_2 is 100 ppb as the 98th percentile of 1-hour daily maximum concentrations, averaged over three years. Figure 1-4 shows that all measured 1-hour average NO_2 values in all CCND neighborhoods were at least 20% lower than the NO_2 NAAQS concentration. Thus, NO_2 levels such as those measured in the CCND neighborhoods would not contribute to an annual exceedance of the NAAQS. Further, the maximum measured 1-hour average NO_2 values in the CCND neighborhoods are more than six times lower than the 1-hour USEPA AEGL-1 for NO_2 of 500 ppb.

1.2.4.4 Sulfur Dioxide (SO_2)

Figure 1-5 shows the 1-hour rolling averages of SO_2 from August 16, 2021, through September 30, 2021. The USEPA NAAQS for SO_2 is 75 ppb as 99th percentile of 1-hour daily maximum concentrations, averaged over three years. Figure 1-5 shows that all measured 1-hour average SO_2 values in all CCND neighborhoods were at or lower than 60 ppb. Thus, SO_2 levels such as those measured in the CCND neighborhoods would not contribute to an annual exceedance of the NAAQS. Further, the maximum measured 1-hour average SO_2 values in the CCND neighborhoods are more than three times lower than the 1-hour USEPA AEGL-1 for SO_2 of 200 ppb.

1.2.4.5 Hydrogen Sulfide (H_2S)

Figure 1-6 shows the 1-hour rolling averages of H_2S from August 16, 2021, through September 30, 2021. Figure 1-6 shows that the maximum 1-hour average H_2S values in all CCND neighborhoods were more than three 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 duration health effects, even in sensitive sub-populations. Further, the maximum measured 1-hour average H_2S values in the CCND neighborhoods are more than 17 times lower than the 1-hour USEPA AEGL-1 for H_2S of 510 ppb.

1.2.4.6 Particulate Matter ($PM_{2.5}$)

Figures 1-7a and 1-7b show the 1-hour and 24-hour block averages of $PM_{2.5}$, respectively, from August 16, 2021, through September 30, 2021. 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. Figure 1-7b shows a single 24-hour period in which average measured $PM_{2.5}$ at the CM2 monitoring location exceeded the NAAQS level of 35 µg/m^3. The 98th percentile of measured 24-hour block average values in the CCND neighborhoods ranged from 29 µg/m^3 to 32 µg/m^3. Thus, 24-hour block average $PM_{2.5}$ levels such as those measured in the CCND neighborhoods would not contribute to an annual exceedance of the NAAQS.

1.2.4.7 Total Volatile Organic Compounds (VOC)

Figure 1-8 shows the 1-hour rolling averages of total VOCs from August 16, 2021, through September 30, 2021. 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 toxic 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 1 minute or longer. During the third quarter of 2021, total VOC levels exceeded 1 ppm on two separate occasions, which triggered the capture of two air samples. The results of those sensor-triggered events are presented in a separate report found ccnd-air.com/Documents.

FIGURE 1-2
CCND COMMUNITY MONITORING CO DATA (1-HOUR ROLLING AVERAGES)

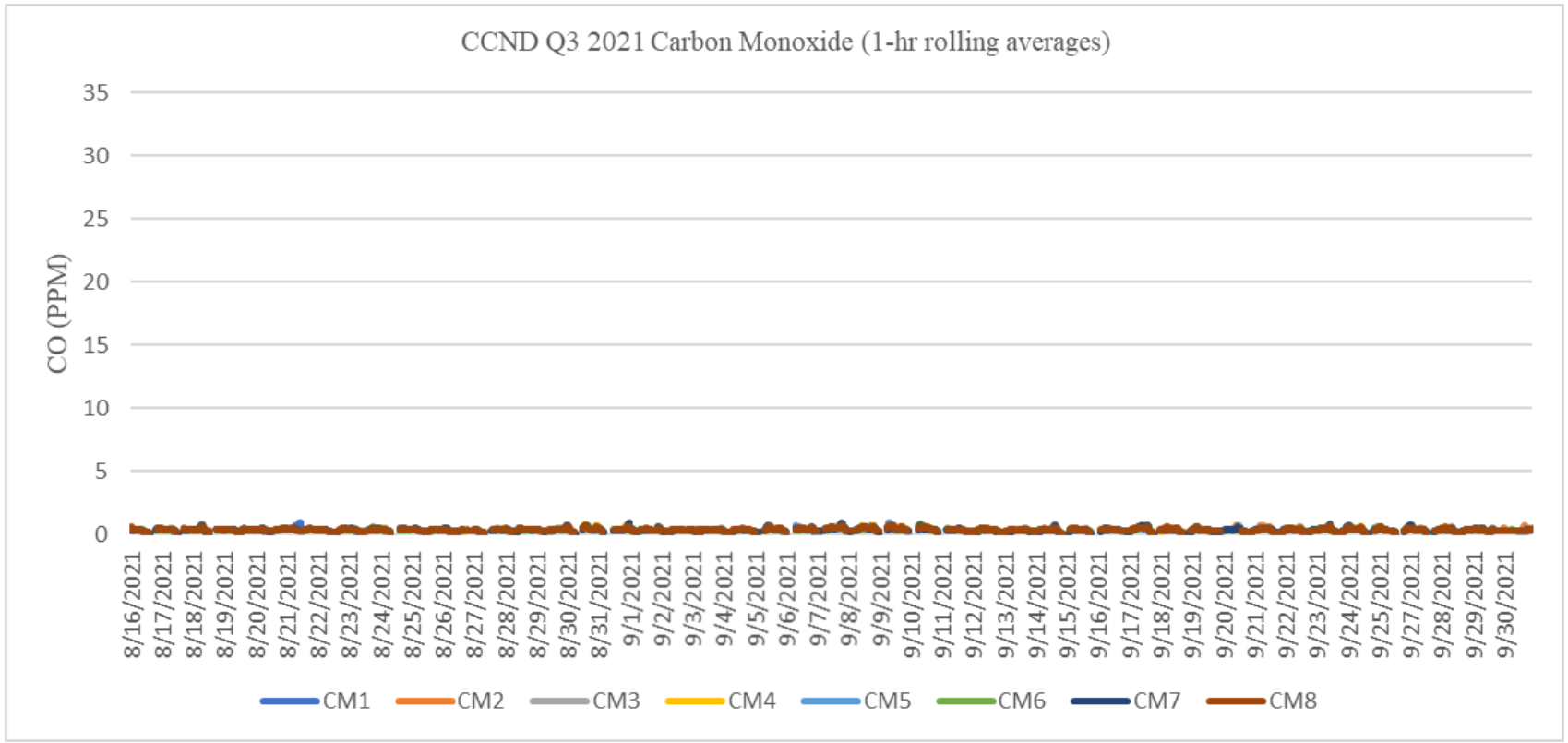


FIGURE 1-3
CCND COMMUNITY MONITORING NO DATA (1-HOUR ROLLING AVERAGES)

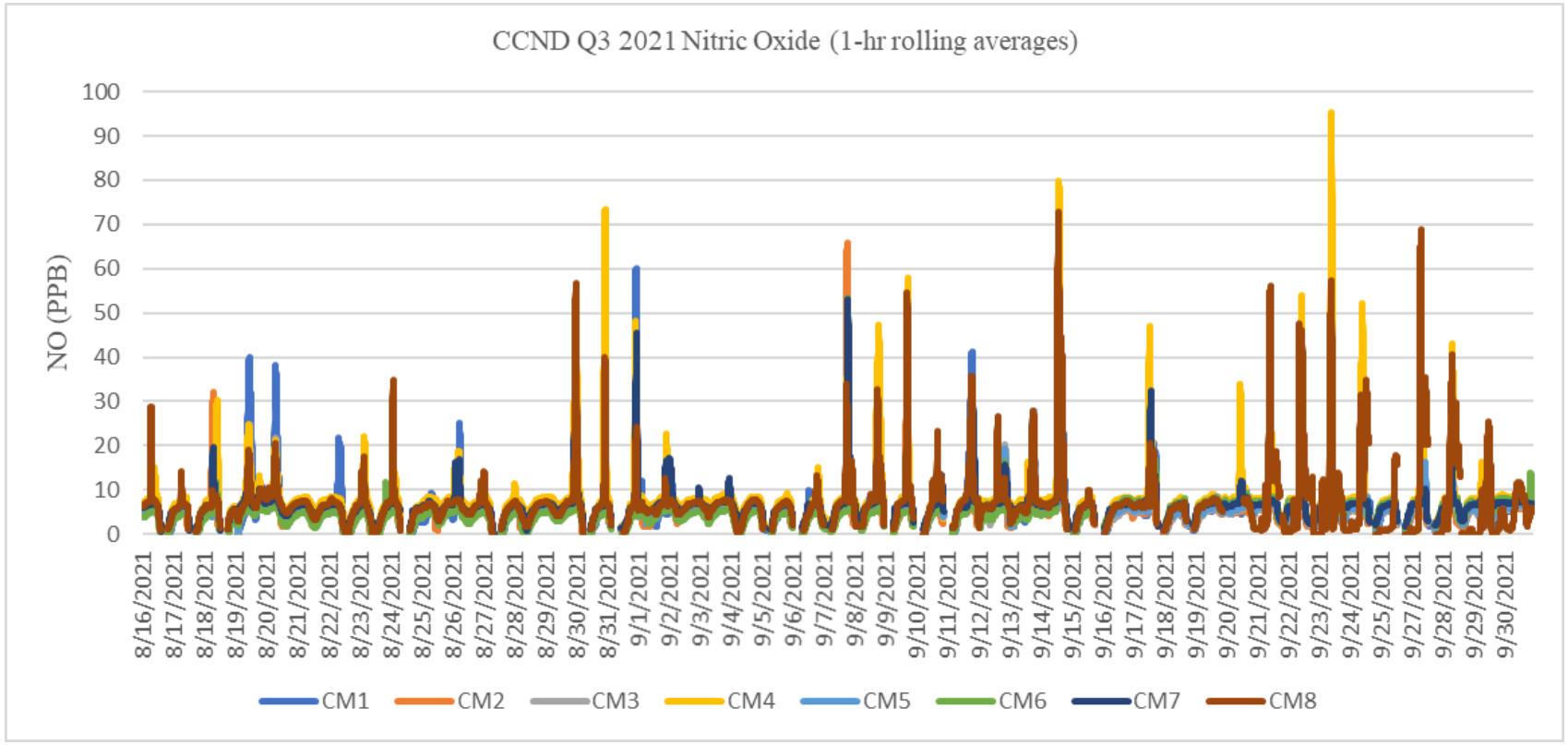


FIGURE 1-4
CCND COMMUNITY MONITORING NO_2 DATA (1-HOUR ROLLING AVERAGES)

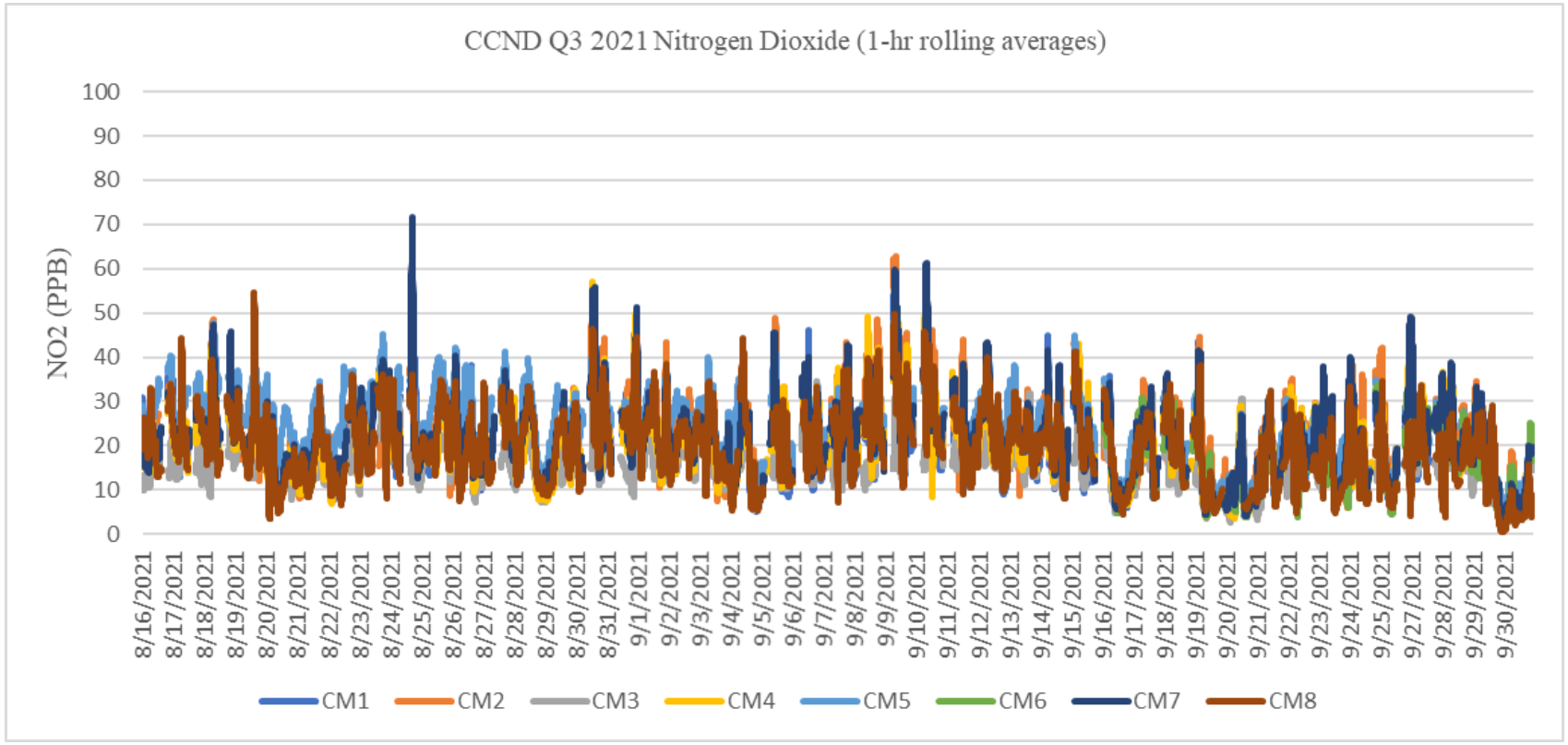


FIGURE 1-5
CCND COMMUNITY MONITORING SO_2 DATA (1-HOUR ROLLING AVERAGES)

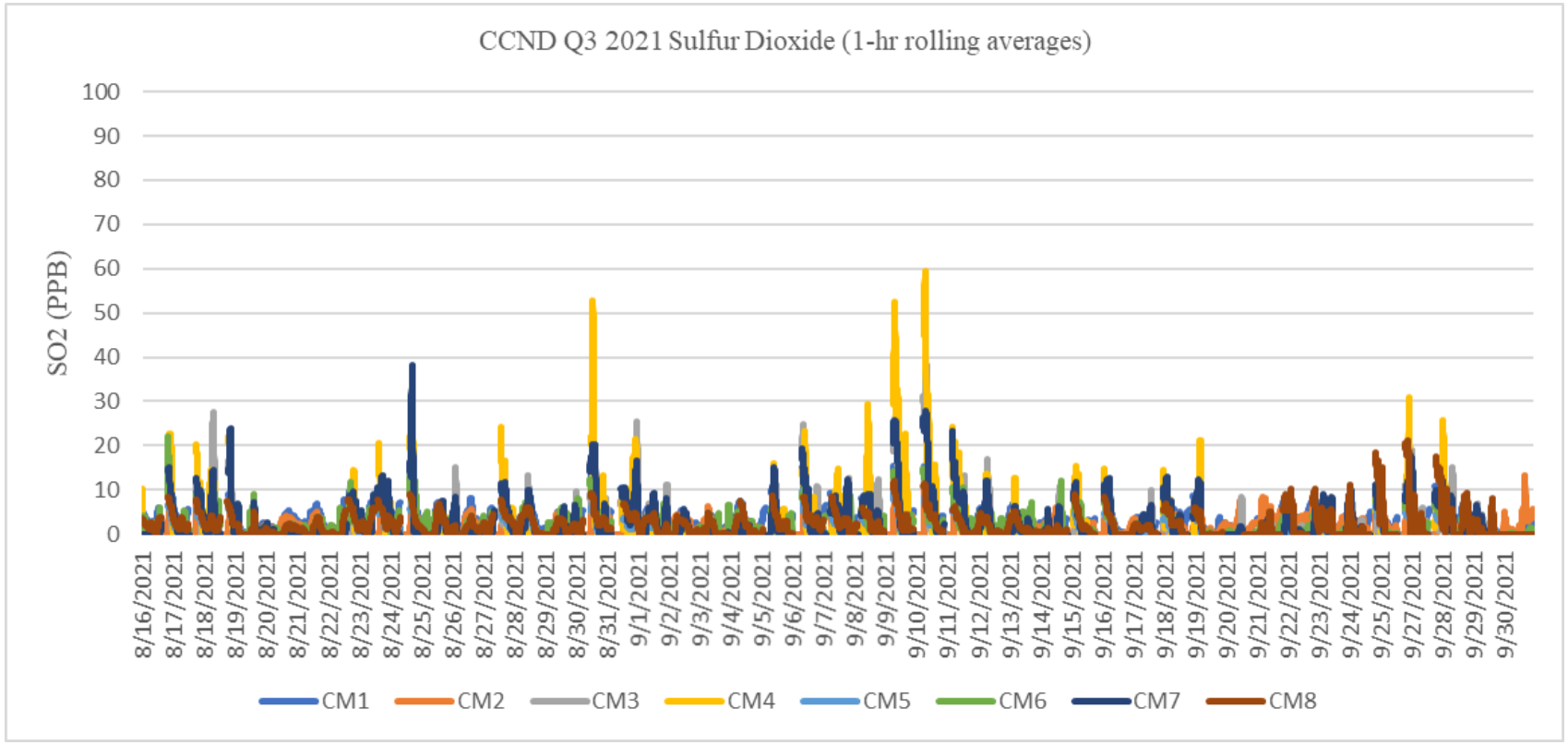


FIGURE 1-6
CCND COMMUNITY MONITORING H_2S DATA (1-HOUR ROLLING AVERAGES)

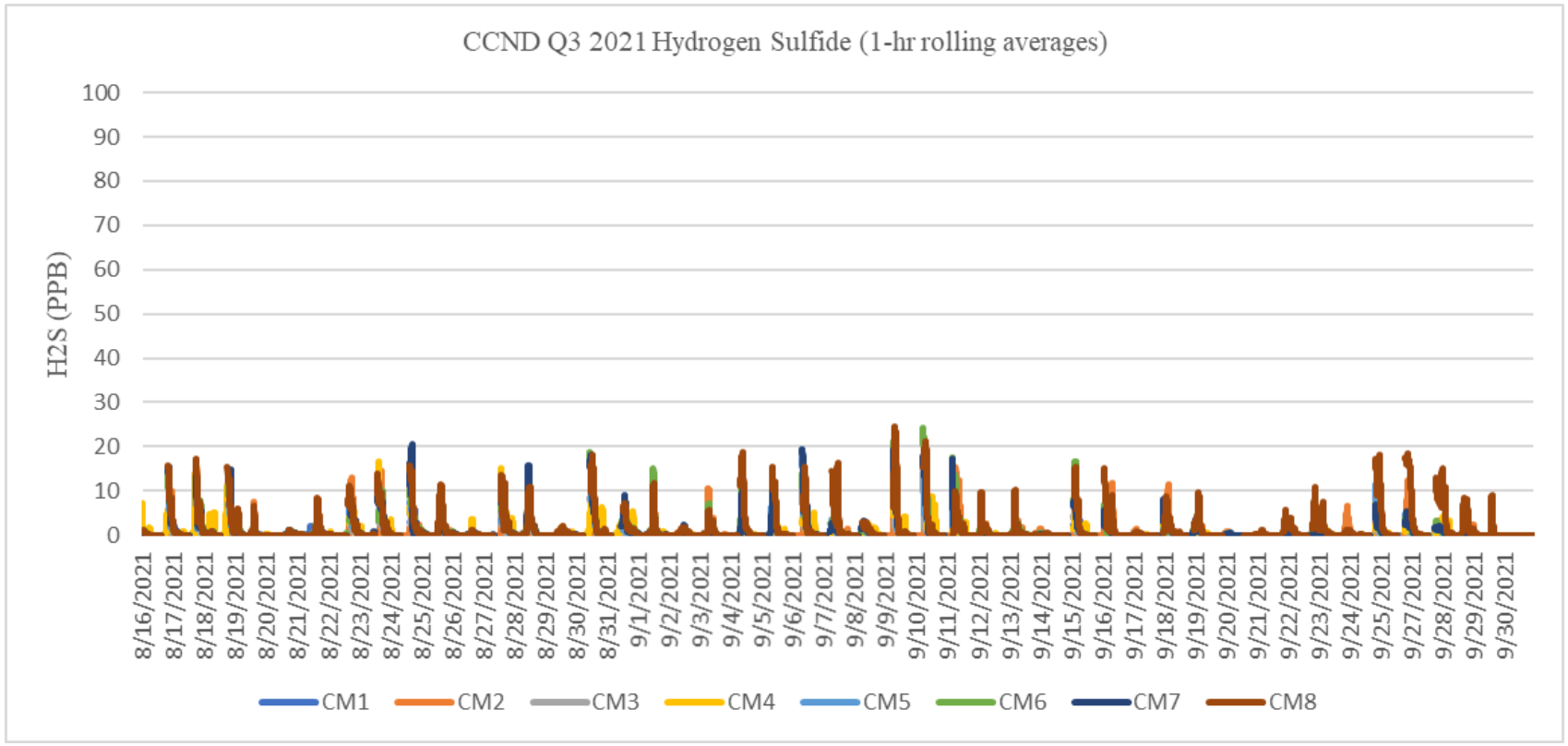


FIGURE 1-7A
CCND COMMUNITY MONITORING $PM_{2.5}$ DATA (1-HOUR BLOCK AVERAGES)

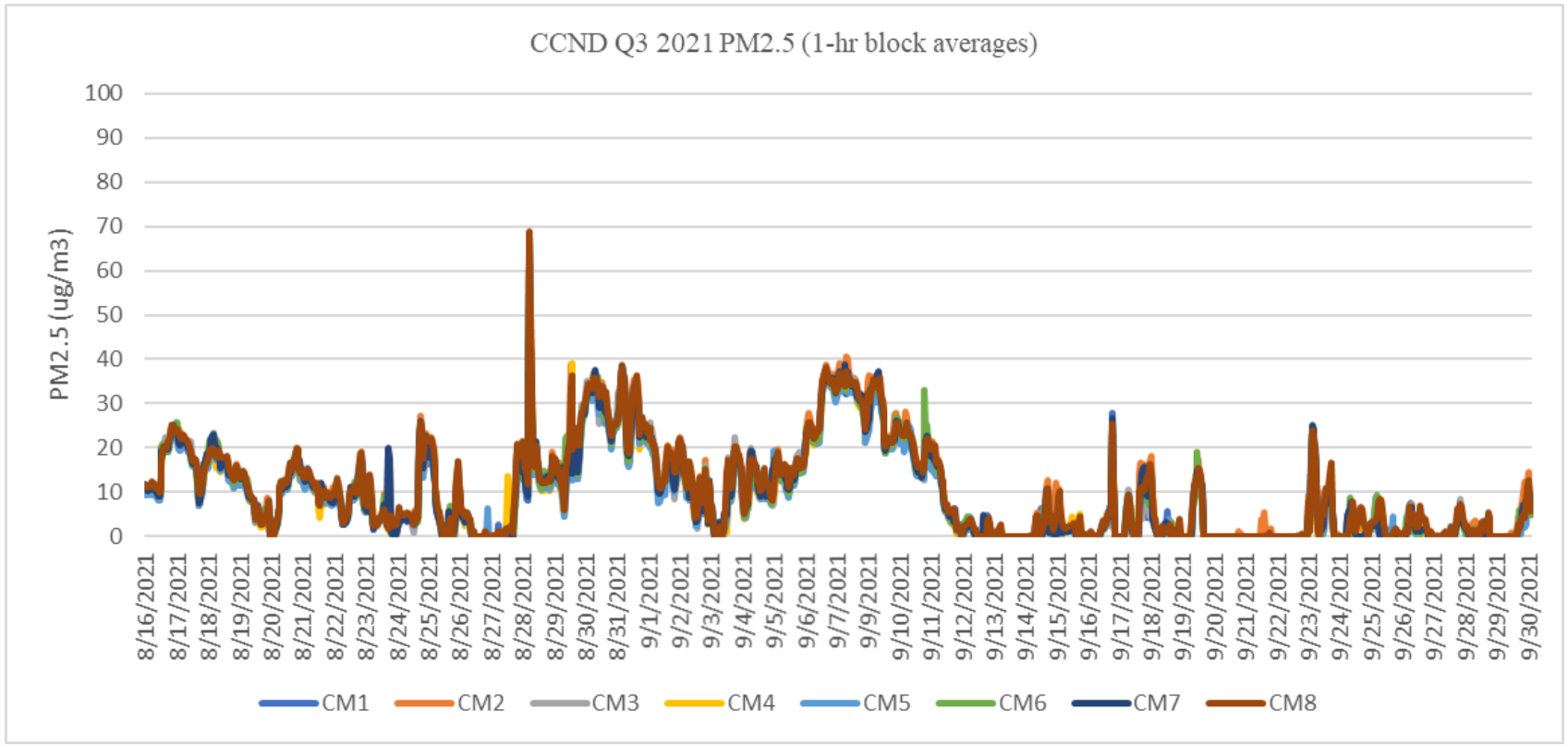


FIGURE 1-7B
CCND COMMUNITY MONITORING $PM_{2.5}$ DATA (24-HOUR BLOCK AVERAGES)

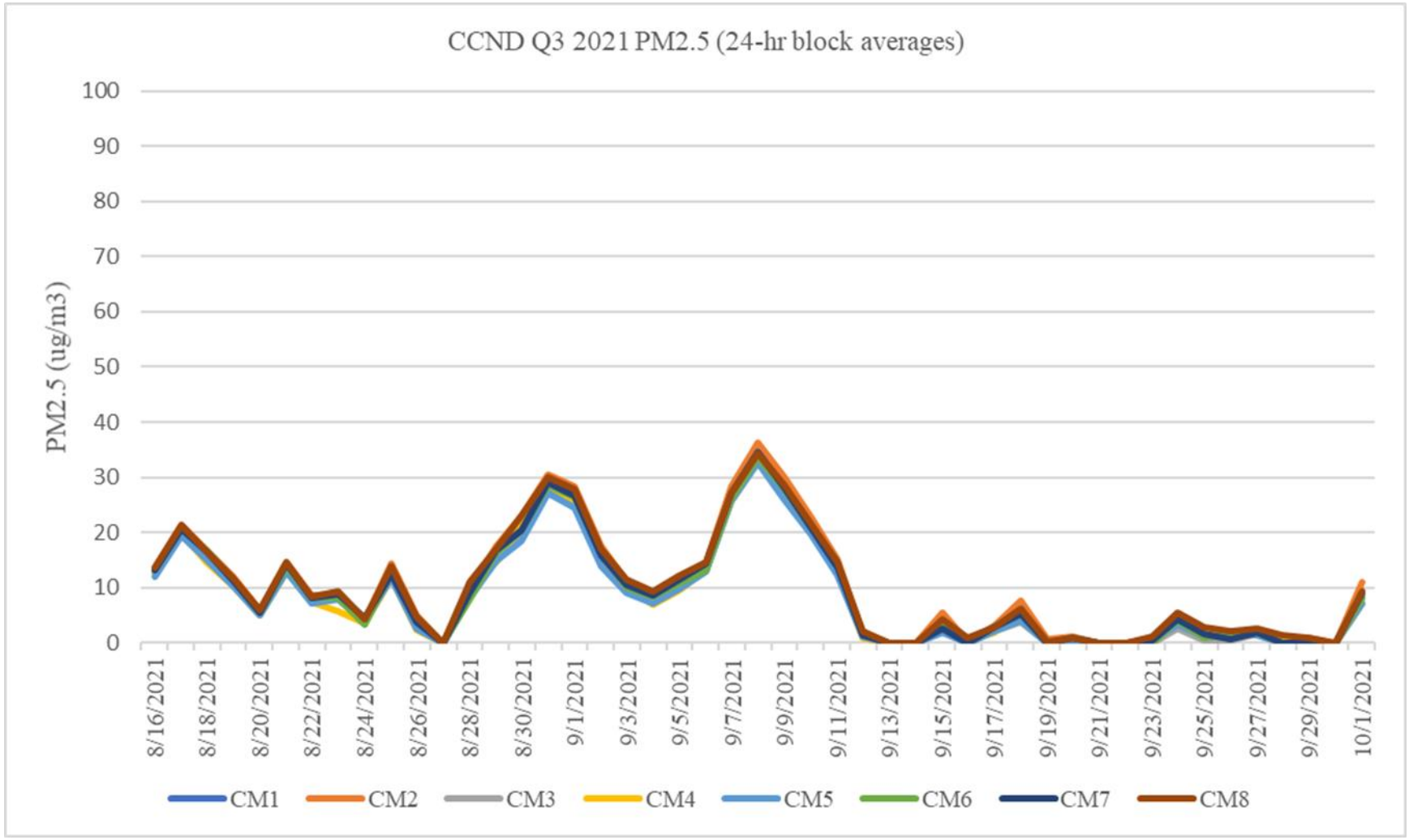
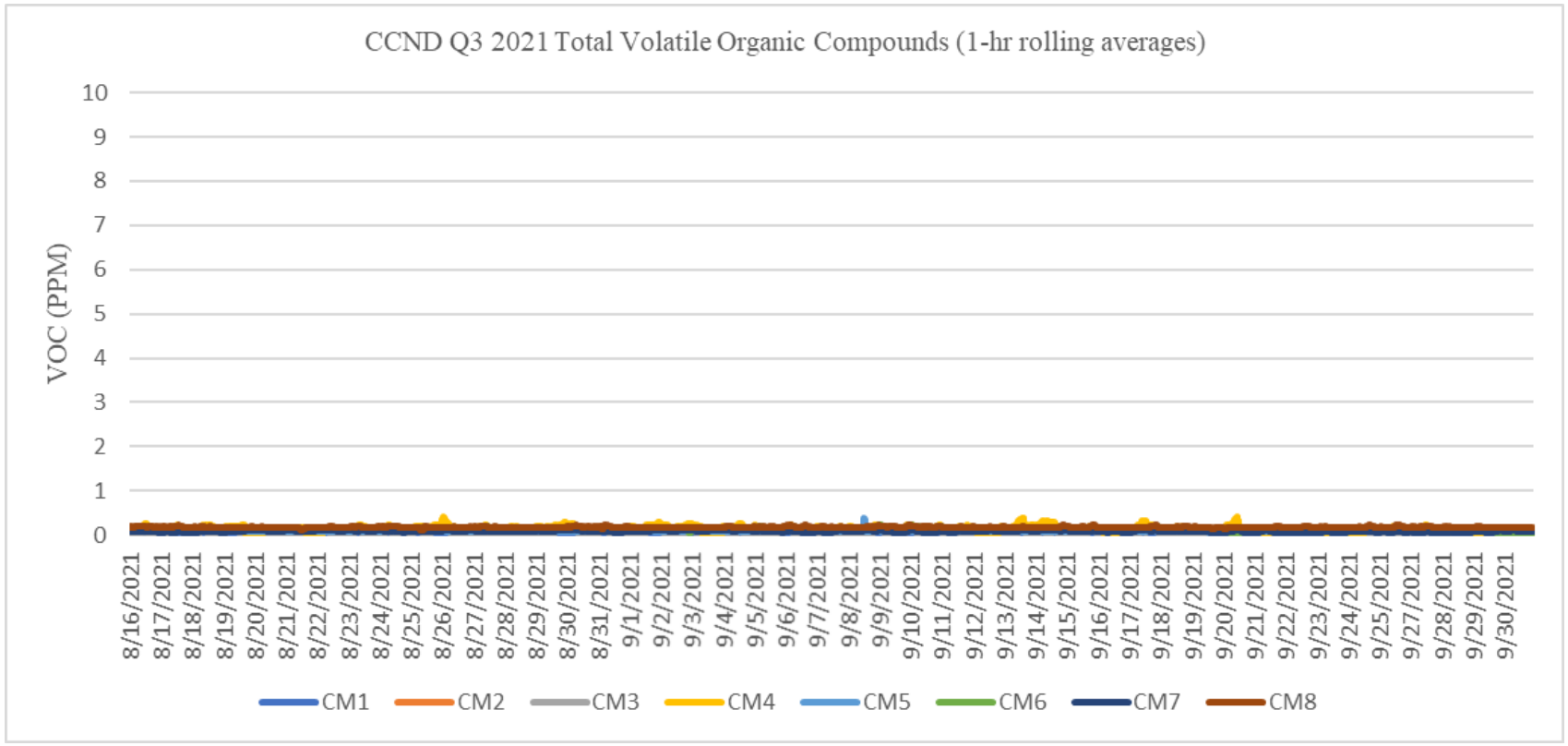


FIGURE 1-8
CCND COMMUNITY MONITORING VOC DATA (1-HOUR ROLLING AVERAGES)



1.3 Program Changes

No program changes occurred during this reporting period.

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APPENDIX A
CALIBRATION AND QA/QC DATA

				Validation Results Table																	
				CO Error			NO Error			NO2 Error			SO2 Error			H2S Error			VOC Error		
AQMesh Monitor Serial Number	Lunar Outpost Monitor Serial Number	Community Monitor Location	Validation Date	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<25%)	Span (<25%)
2450728	Mon_Dutch_001	CM1	9/27/2021	10%	12%	49%	1%	24%	37%	2%	26%	46%	0%	40%	47%	0%	44%	49%	0%	10%	12%

				Validation Results Table																	
				CO Error			NO Error			NO2 Error			SO2 Error			H2S Error			VOC Error		
AQMesh Monitor Serial Number	Lunar Outpost Monitor Serial Number	Community Monitor Location	Validation Date	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<25%)	Span (<25%)
2450729	Mon_Dutch_002	CM2	9/28/2021	10%	24%	49%	1%	20%	41%	2%	16%	50%	0%	46%	39%	1%	48%	46%	1%	2%	3%

				Validation Results Table																	
				CO Error			NO Error			NO2 Error			SO2 Error			H2S Error			VOC Error		
AQMesh Monitor Serial Number	Lunar Outpost Monitor Serial Number	Community Monitor Location	Validation Date	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<25%)	Span (<25%)
2450730	Mon_Dutch_005	CM3	9/28/2021	5%	9%	50%	2%	30%	31%	1%	36%	35%	0%	48%	45%	0%	43%	45%	1%	5%	10%

				Validation Results Table																	
				CO Error			NO Error			NO2 Error			SO2 Error			H2S Error			VOC Error		
AQMesh Monitor Serial Number	Lunar Outpost Monitor Serial Number	Community Monitor Location	Validation Date	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<25%)	Span (<25%)
2450732	Mon_Dutch_006	CM4	9/29/2021	10%	24%	46%	2%	38%	31%	2%	39%	36%	0%	46%	44%	0%	45%	45%	0%	3%	3%

				Validation Results Table																	
				CO Error			NO Error			NO2 Error			SO2 Error			H2S Error			VOC Error		
AQMesh Monitor Serial Number	Lunar Outpost Monitor Serial Number	Community Monitor Location	Validation Date	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<25%)	Span (<25%)
2450733	Mon_Dutch_007	CM5	9/29/2021	5%	9%	48%	2%	30%	49%	3%	32%	47%	1%	46%	46%	1%	47%	43%	1%	2%	8%

				Validation Results Table																	
				CO Error			NO Error			NO2 Error			SO2 Error			H2S Error			VOC Error		
AQMesh Monitor Serial Number	Lunar Outpost Monitor Serial Number	Community Monitor Location	Validation Date	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<25%)	Span (<25%)
2450737	Mon_Dutch_009	CM6	9/30/2021	3%	16%	40%	1%	38%	30%	2%	32%	26%	0%	39%	39%	8%	41%	45%	4%	1%	4%

				Validation Results Table																	
				CO Error			NO Error			NO2 Error			SO2 Error			H2S Error			VOC Error		
AQMesh Monitor Serial Number	Lunar Outpost Monitor Serial Number	Community Monitor Location	Validation Date	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<25%)	Span (<25%)
2450735	Mon_Dutch_008	CM7	9/30/2021	3%	3%	44%	1%	22%	35%	3%	18%	40%	0%	44%	45%	0%	49%	46%	0%	7%	7%

				Validation Results Table																	
				CO Error			NO Error			NO2 Error			SO2 Error			H2S Error			VOC Error		
AQMesh Monitor Serial Number	Lunar Outpost Monitor Serial Number	Community Monitor Location	Validation Date	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<50%)	Span (<50%)	Zero (<10%)	Precision (<25%)	Span (<25%)
2450731	Mon_Dutch_010	CM8	10/1/2021	5%	31%	44%	2%	23%	38%	1%	21%	49%	0%	39%	43%	0%	38%	44%	0%	2%	3%

APPENDIX B
FIELD DATA SHEETS

AQM Serial Number	831	831	831
Community Monitor Location	6	6	6
Date	8/2/2021	9/16/2021	10/4/2021
Operator	AH	AH	AH
Gas Inlet			
Gas Validation Checks (weekly) (Review Monthly)	Pass	Pass	Pass
Flow Rate (Quarterly)	Pass	NA	NA
Filter Change (Quarterly)	Pass	NA	NA
Field Calibration (Quarterly)	Pass	NA	NA
Particulate Monitor			
Flow Rate (Quarterly)	Pass	NA	NA
Filter Change (Quarterly)	Pass	NA	NA
Check for Leaks (Quarterly)	Pass	NA	NA
Check Zero (Quarterly)	Pass	NA	NA
Check laser and detector (Quarterly)	Pass	NA	NA
Clean Cyclone (Quarterly)	Pass	NA	NA
Notes:	Initial Validation		

AQM Serial Number	830	830	830
Community Monitor Location	7	7	7
Date	8/2/2021	9/16/2021	10/4/2021
Operator	AH	AH	AH
Gas Inlet			
Gas Validation Checks (weekly) (Review Monthly)	Pass	Pass	Pass
Flow Rate (Quarterly)	Pass	NA	NA
Filter Change (Quarterly)	Pass	NA	NA
Field Calibration (Quarterly)	Pass	NA	NA
Particulate Monitor			
Flow Rate (Quarterly)	Pass	NA	NA
Filter Change (Quarterly)	Pass	NA	NA
Check for Leaks (Quarterly)	Pass	NA	NA
Check Zero (Quarterly)	Pass	NA	NA
Check laser and detector (Quarterly)	Pass	NA	NA
Clean Cyclone (Quarterly)	Pass	NA	NA
Notes:	Initial Validation		

AQM Serial Number	829	829	829
Community Monitor Location	2	2	2
Date	8/2/2021	9/16/2021	10/4/2021
Operator	AH	AH	AH
Gas Inlet			
Gas Validation Checks (weekly) (Review Monthly)	Pass	Pass	Pass
Flow Rate (Quarterly)	Pass	NA	NA
Filter Change (Quarterly)	Pass	NA	NA
Field Calibration (Quarterly)	Pass	NA	NA
Particulate Monitor			
Flow Rate (Quarterly)	Pass	NA	NA
Filter Change (Quarterly)	Pass	NA	NA
Check for Leaks (Quarterly)	Pass	NA	NA
Check Zero (Quarterly)	Pass	NA	NA
Check laser and detector (Quarterly)	Pass	NA	NA
Clean Cyclone (Quarterly)	Pass	NA	NA
Notes:	Initial Validation		

APPENDIX C
CALIBRATION GAS CERTIFICATION SHEETS

Airgas
an Air Liquide company

Airgas USA, LLC
525 North Industrial Loop Road
Tooele, UT 84074
Airgas.com

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Rear

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E04NI99E80A0082	Reference Number:	153-402137965-1
Cylinder Number:	LL65270	Cylinder Volume:	83.5 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2216 PSIG
PGVP Number:	B72021	Valve Outlet:	660
Gas Code:	CO,NO,NOX,SO2,BALN	Certification Date:	Jun 21, 2021

Expiration Date: Jun 21, 2029

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	100.0 PPM	102.6 PPM	G1	+/- 1.1% NIST Traceable	06/14/2021, 06/21/2021
NITRIC OXIDE	100.0 PPM	102.5 PPM	G1	+/- 1.2% NIST Traceable	06/14/2021, 06/21/2021
SULFUR DIOXIDE	100.0 PPM	99.26 PPM	G1	+/- 1.0% NIST Traceable	06/14/2021, 06/21/2021
CARBON MONOXIDE	500.0 PPM	500.8 PPM	G1	+/- 0.7% NIST Traceable	06/14/2021
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	20061011	CC733024	98.61 PPM NITRIC OXIDE/NITROGEN	0.9%	Oct 06, 2026
PRM	12386	D685025	9.91 PPM NITROGEN DIOXIDE/AIR	2.0%	Feb 20, 2020
GMIS	401648675102	CC500959	5.074 PPM NITROGEN DIOXIDE/NITROGEN	2.1%	Feb 01, 2023
NTRM	16010210	KAL003217	97.69 PPM SULFUR DIOXIDE/NITROGEN	0.8%	Dec 23, 2021
NTRM	16010223	KAL003822	97.69 PPM SULFUR DIOXIDE/NITROGEN	0.8%	Dec 23, 2021
NTRM	13010115	ND47957	495.4 PPM CARBON MONOXIDE/NITROGEN	0.6%	Jul 03, 2024

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet iS50 AUP2010228 CO MCO	FTIR	Jun 10, 2021
Nicolet iS50 AUP2010228 NO LNO	FTIR	Jun 10, 2021
Nicolet iS50 AUP2010228 NO2 impurity	FTIR NO2 impurity	Jun 10, 2021
Nicolet iS50 AUP2010228 SO2 MSO2	FTIR	Jun 16, 2021

Triad Data Available Upon Request

Approved for Release

Airgas
an Air Liquide company

Airgas USA, LLC
9810 BAY AREA BLVD
Pasadena, TX 77507
Airgas.com

830
Kar

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Customer:	MONTROSE AIR QUALITY SERVICES		
Part Number:	E02NI99E80A0614	Reference Number:	163-402136839-1
Cylinder Number:	LL67806	Cylinder Volume:	83.4 CF
Laboratory:	124 - Pasadena (SG06) - TX	Cylinder Pressure:	2215 PSIG
PGVP Number:	A32021	Valve Outlet:	330
Gas Code:	H2S,BALN	Certification Date:	Jun 29, 2021

Expiration Date: Jun 29, 2024

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
HYDROGEN SULFIDE	100.0 PPM	100.3 PPM	G1	+/- 1.8% NIST Traceable	06/22/2021, 06/29/2021
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	11010521	AAL073605	97.3 PPM HYDROGEN SULFIDE/NITROGEN	+/-1.2%	May 14, 2023
RGM	12345	CC157347	197.3 PPM HYDROGEN SULFIDE/NITROGEN	+/-0.5%	Nov 12, 2017
GMIS	124498495101	CC431119	201.9 PPM HYDROGEN SULFIDE/NITROGEN	+/-0.5%	Aug 21, 2022

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
AAI OMA-406H	NDUV	Jun 04, 2021

Triad Data Available Upon Request

Approved for Release

Airgas
an Air Liquide company

Airgas USA, LLC
9810 BAY AREA BLVD
Pasadena, TX 77507
Airgas.com

831
FP

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Customer:	MONTROSE AIR QUALITY SERVICES		
Part Number:	E02NI99E80A0614	Reference Number:	163-402136839-1
Cylinder Number:	BLM003661	Cylinder Volume:	83.4 CF
Laboratory:	124 - Pasadena (SG06) - TX	Cylinder Pressure:	2215 PSIG
PGVP Number:	A32021	Valve Outlet:	330
Gas Code:	H2S,BALN	Certification Date:	Jun 29, 2021

Expiration Date: Jun 29, 2024

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.

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ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
HYDROGEN SULFIDE	100.0 PPM	101.6 PPM	G1	+/- 1.4% NIST Traceable	06/22/2021, 06/29/2021
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
GMIS	124498495101	CC431119	201.9 PPM HYDROGEN SULFIDE/NITROGEN	+/-0.5%	Aug 21, 2022
RGM	12345	CC157347	197.3 PPM HYDROGEN SULFIDE/NITROGEN	+/-0.5%	Nov 12, 2017

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
AAI OMA-406H	NDUV	Jun 04, 2021

Triad Data Available Upon Request

Approved for Release

Airgas
an Air Liquide company

Airgas USA, LLC
525 North Industrial Loop Road
Tooele, UT 84074
Airgas.com

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FP

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E04NI99E80A0082	Reference Number:	153-402137965-1
Cylinder Number:	LL47158	Cylinder Volume:	83.5 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2216 PSIG
PGVP Number:	B72021	Valve Outlet:	660
Gas Code:	CO,NO,NOX,SO2,BALN	Certification Date:	Jun 21, 2021

Expiration Date: Jun 21, 2029

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	100.0 PPM	102.9 PPM	G1	+/- 1.2% NIST Traceable	06/14/2021, 06/21/2021
NITRIC OXIDE	100.0 PPM	102.7 PPM	G1	+/- 1.4% NIST Traceable	06/14/2021, 06/21/2021
SULFUR DIOXIDE	100.0 PPM	99.54 PPM	G1	+/- 1.4% NIST Traceable	06/14/2021, 06/21/2021
CARBON MONOXIDE	500.0 PPM	502.3 PPM	G1	+/- 0.8% NIST Traceable	06/14/2021
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	20061011	CC733024	98.61 PPM NITRIC OXIDE/NITROGEN	0.9%	Oct 06, 2026
PRM	12386	D685025	9.91 PPM NITROGEN DIOXIDE/AIR	2.0%	Feb 20, 2020
GMIS	401648675102	CC500959	5.074 PPM NITROGEN DIOXIDE/NITROGEN	2.1%	Feb 01, 2023
NTRM	16010210	KAL003217	97.69 PPM SULFUR DIOXIDE/NITROGEN	0.8%	Dec 23, 2021
NTRM	16010223	KAL003822	97.69 PPM SULFUR DIOXIDE/NITROGEN	0.8%	Dec 23, 2021
NTRM	13010115	ND47957	495.4 PPM CARBON MONOXIDE/NITROGEN	0.6%	Jul 03, 2024

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet iS50 AUP2010228 CO MCO	FTIR	Jun 10, 2021
Nicolet iS50 AUP2010228 NO LNO	FTIR	Jun 10, 2021
Nicolet iS50 AUP2010228 NO2 impurity	FTIR NO2 impurity	Jun 10, 2021
Nicolet iS50 AUP2010228 SO2 MSO2	FTIR	Jun 16, 2021

Triad Data Available Upon Request

Approved for Release

GASCO AFFILIATES, LLC.

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

CERTIFICATE OF ANALYSIS

Date: June 8, 2021
Order Number: 22039172
Lot Number: 304-402132386-1

Customer: Cal Gas Direct Inc

Use Before: 06/08/2025

Component	Requested Concentration	Analytical Result (+/- 2%)
Isobutylene	200 PPM	193 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:
Omar Reyes
Omar Reyes

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