SEPTEMBER 3, 2023 SUMMA CANISTER REPORT
COMMERCE CITY NORTH DENVER COMMUNITY AIR MONITORING NETWORK
COMMERCE CITY, COLORADO

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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) continuous, near real-time monitoring for the following analytes: carbon monoxide (CO), sulfur dioxide (SO_2), hydrogen sulfide (H_2S), nitrogen oxide or nitric 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 6-liter evacuated stainless steel ("Summa") canisters; and (3) periodic real-time air monitoring throughout 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.

Approach number two consists of collection of air data to measure the presence of specific VOCs. This approach has two parts: collection of planned air samples and collection of unplanned, VOC sensor-triggered air samples. Planned air samples were collected across 13 different locations, ten from within the CCND neighborhoods and three from non-CCND locations (urban and rural background), over a 1-hour time period by a field technician, in Q3 2023. VOC sensor-triggered samples are collected automatically when total VOCs are detected at an airborne concentration of 1 part per million (ppm) or higher for 1 minute or longer. This report analyzes the data from a VOC sensor-triggered air sample collected at the Refinery Business Center (CM2) on September 3, 2023.

Health scientists from CTEH, LLC (CTEH®) (a subsidiary company of Montrose) performed a screening-level human health risk assessment based on the data collected by Montrose. A screening-level assessment uses the most health conservative assumptions about exposure and chemical toxicity. This risk assessment was conducted to determine whether measured concentrations of individual or cumulative (combined) VOCs could potentially cause acute (short-term) adverse health effects. The health risk calculations described in this report were performed per federal and state guidance. The risk assessment of the September 3, 2023, one-hour triggered sample at the Refinery Business Center (CM2) resulted in the following overall findings:

- All measured VOCs (individual and cumulative) were below their respective acute health-based reference levels.
- The cumulative acute health risks calculated from the sensor-triggered event sample were consistent with the planned air sample collected at the same location during the previous quarter.
- The measured concentrations during this triggered sample are not expected to cause an appreciable risk of adverse acute health effects, even for sensitive sub-populations.

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), nitric 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 Summa canisters; and (3) periodic real-time air monitoring throughout 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.

The objective of this report is to provide results from a sensor-triggered canister sample collected on September 3, 2023, at the Refinery Business Center (CM2). The measured concentrations for this single sample were compared to established acute (short-term) health-based reference levels and compared to planned samples collected at the same location.

1.1 Air Monitoring Site Description

Ten monitors and Summa canister sampling locations were positioned throughout the CCND neighborhoods within a three-mile radius of the refinery operations. 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 TEN CCND MONITOR LOCATIONS

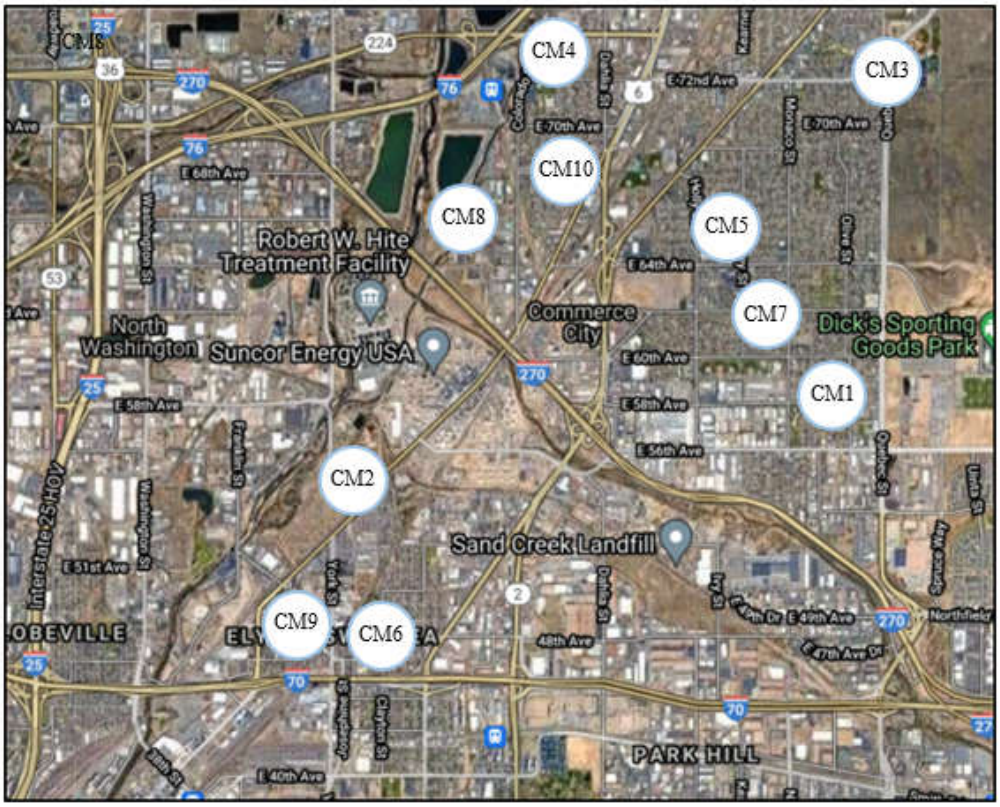


TABLE 1-1
CCND MONITORS AND SUMMA CANISTER SAMPLING LOCATIONS

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	39.79623, -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	39.81457, -104.91928	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	39.82026, -104.93663	1.3	East 68th Ave. & Birch St., Commerce City

2.0 METHODS

2.1 Air Sampling Methods

A VOC sensor-triggered air sample collection occurred at 5:14 p.m. at the CM2 – Refinery Business Center location on September 3, 2023.

Air sample collection is triggered by the VOC monitors upon detection of 1 ppm or greater total VOCs for a 1-minute average. A triggered sample is collected over a 1-hour period by an Entech Instruments Silonite™ CS1200E Passive Canister Sampler connected to 6-liter chemically inert stainless steel "Summa" canister. Prior to deployment, the Summa canister was cleaned and blanked for use according to laboratory Standard Operating Procedures (SOP). Air sampling and analysis was conducted in accordance with the Quality Assurance Project Plan (QAPP) available online at www.ccnd-air.com/documents. The triggered canister sample was shipped to Enthalpy Analytical in Durham, North Carolina. The United States Environmental Protection Agency (USEPA) Compendium Method TO-14A "*Determination of Volatile Organic Compounds (VOCs) in Ambient Air using Specially Prepared Canisters with Subsequent Analysis by Gas Chromatography*" and TO-15 entitled "*Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)*" was followed for both sampling and analysis methodology. A total of 59 analytes were selected for analysis in this assessment based on the typical suite of analytes monitored for in urban and industrial areas and accounting for laboratory analysis capabilities (Table 1-2).

Planned air samples at ten CCND monitoring locations, which were used in this report to compare to the triggered canister data, were collected during the third quarter of 2023 during a time when near real-time VOC monitors indicated total VOC concentrations to be less than the 1-ppm trigger level. The planned samples were collected and analyzed using the same methods as the triggered sample and full results are available in a separate report.

TABLE 1-2
SELECTED ANALYTES MEASURED IN SUMMA CANISTERS

Ethylene	Isopentane	3-Methylpentane	3-Methylheptane	2,4-Dimethylpentane
Acetylene	1-Pentene	1-Hexene	Nonane	2,3-Dimethylpentane
Ethane	Pentane	1,3-Butadiene	3-Ethyltoluene	1,2,3-Trimethylbenzene
Propylene	Isoprene	Heptane	2-Ethyltoluene	1,3,5-Trimethylbenzene
Propane	Trans-2-Pentene	2-Methylhexane	Decane	2,2,4-Trimethylpentane
Isobutane	Cis-2-Pentene	Toluene	Ethylbenzene	Tetrachloroethene
1-Butene	2,2-Dimethylbutane	3-Methylhexane	m-Diethylbenzene	1,2,4-Trimethylbenzene
Butane	Cyclopentane	Methylcyclohexane	p-Diethylbenzene	Methylcyclopentane
Trans-2-Butene	Cyclohexane	Hexane	Undecane	2,3,4-Trimethylpentane
Cis-2-Butene	2-Methylpentane	2-Methylheptane	Dodecane	2,3-Dimethylbutane
m-/p-Xylenes	o-Xylene	4-Ethyltoluene	Benzene	Carbon disulfide
n-Octane	Isopropylbenzene	n-Propylbenzene	Naphthalene	

2.2 Screening Health Risk Assessment Methods

CTEH® conducted a screening-level public health risk assessment consistent with federal risk assessment guidelines to determine whether the detected concentrations of individual or cumulative (combined) analytes in the triggered air sample could potentially pose acute (short-term) health impacts and evaluate the data compared to samples collected during planned non-event conditions. A tiered approach to the risk assessment was used. This approach involves one or more iterative steps (or tiers) being performed in which health risks are calculated and evaluated multiple times. In most cases, risk assessors cannot know exactly the level of chemical exposure experienced by individuals or communities.

The first-tier evaluation of the triggered sample made a health-protective assumption that represents an exposure to a person located at that sampling location for an entire hour during the time the sample was collected. Additionally, the first tier assumes that all analytes measured are exerting an effect on the body in a similar manner, which is rarely the case. If the resulting risk values indicate the lack of likely adverse health effects under these worst-case conditions, then the risk assessment is complete. However, if the risk values suggest a potential for adverse health effects, then a second tier of risk calculations are performed, but this time using more detailed assumptions about exposure that are still simple representations of the real world but are more realistic than the first-tier, worst-case assumptions. Each successive tier represents a more complete characterization of exposure variability and/or uncertainty that requires a corresponding increase in calculation complexity and scientific level of effort.

The first tier of this risk assessment process is called a screening-level risk assessment. The conservative assumptions used for this level of risk calculation represent exposure conditions at the distinct sampling location for the entire sampling duration. An exceedance of an acceptable risk level (defined below) does not necessarily indicate that adverse health effects are likely. The Agency for Toxic Substances and Disease Registry (ATSDR) states, "*when health assessors find exposures higher than the MRLs (ATSDR's specific health-based reference levels), it means that they may want to look more closely at a site*"[1]. In other words, screening-level findings of an estimated exposure to a VOC being higher than a health-based reference level do NOT indicate an actual likelihood of adverse effects but do indicate a need to move to a second tier of analysis and refine the risk assessment process with more realistic detail to determine if an actual risk exists that needs to be mitigated.

The screening-level risk assessment reported here includes calculated hazards from exposure to individually measured chemicals as well as exposure to all measured chemicals at once (cumulative). For individual chemicals, an acute health hazard value was calculated as the exposure concentration (EC) divided by the chemical-specific federal or state established human health-based Reference Level (RL) (Equation 1). The result is referred to as the hazard quotient (HQ). Estimates of EC were derived from the 1-hour average concentrations of each analyte. Using the measured values for the EC conservatively assumes that a hypothetical exposed individual occupies the sampling location area and breathes the measured concentration continuously for an hour up to multiple days (an acute exposure).

[1]Available at: https://www.atsdr.cdc.gov/minimalrisklevels/#:~:text=The%20ATSDR%2C%20in%20response%20to,minimal%20risk%20levels%20(MRLs).

The RLs used to calculate the HQs are previously established exposure levels below which no adverse effect in humans is expected. If available, RLs adopted by the Colorado Department of Public Health and Environment (CDPHE) were selected for use within this assessment. If the analyte was not listed by CDPHE, CTEH® followed a federal and state recommended hierarchy for selection of RLs[2]. Acute HQs were calculated as follows:

Eq. 1 – Hazard Quotient (HQ) Equation

$$HQ = EC / RL$$

Where:

HQ = Hazard Quotient

EC = 1-hour average air concentration

RL= Acute Health-based Reference Level (from USEPA, ATSDR, Cal EPA and TCEQ)

Health risks from potential cumulative exposures to all detected analytes were calculated by adding together each individual analyte's HQ calculated for a given sampling location. The sum of all the individual HQs is called a Hazard Index (HI). Adding together all the HQs is also a very health-conservative approach because it assumes that all the measured analytes exert an adverse effect on the body in a similar manner, which is rarely the case.

A HQ or HI of less than or equal to one is an indication that the estimated exposure is likely to be without an appreciable risk of adverse health effects, even for sensitive sub-populations. The potential for adverse health effects increases as HQ or HI increase above one, but it is not known by how much. Therefore, calculated hazard values in this assessment that are equal to or less than one indicates an acceptable risk level. HQ or HI values of greater than one would prompt a second-tier risk assessment beyond the screening-level assessment.

According to the USEPA and ATSDR, the federal agencies that establish the RLs note that these values "*are set below levels that, based on current information, might cause adverse health effects in the people most sensitive*." This is because RLs are based on observed toxicity in human or animal studies with an added safety factor to account for uncertainties in the toxicity data. For example, ATSDR identified the lowest observed adverse effect level (LOAEL) for acute exposure to benzene as 10,200 parts per billion (ppb), based on a study of mice exposed six hours per day for six days. ATSDR then applied a combined safety factor of 300 to derive the final RL to account for several uncertainties, including differences between mice and humans and for sensitive individuals[3]. Therefore, it is scientifically incorrect to assume that all real-world exposures to a chemical at levels higher than an RL likely will result in an adverse effect.

The USEPA also 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*

[2] Available at: https://drive.google.com/file/d/1P2KEvu0MFiyzQAOQtjQUclqR-WGh1bEX/view
[3] Available at: https://www.atsdr.cdc.gov/toxprofiles/tp3-c3.pdf

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 analyte, 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.

3.0 RESULTS

3.1 Summary of Air Sampling Results

The total VOC reading on the CM2 – Refinery Business Center monitor was part of an event (total VOCs measured above 1 ppm) that occurred at 5:14 p.m. on September 3, 2023. The total VOC reading was observed above 1 ppm for approximately 30 minutes and resulted in triggering a 1-hour Summa canister collection. The total VOC concentration during the several minute reading above 1 ppm was 4.47 ppm. When arriving onsite to collect the sample, it was discovered that the PID had been damaged from the heavy rains. The PID was replaced and calibrated accordingly. The decision to analyze the summa canister sample was made by Suncor.

The Summa canister's compound-specific concentration results are shown in Table 1-3. Prior to the total VOC reading above 1 ppm the winds were primarily coming from the South (S) but shifted to the North (N) during and after the event (Figures 1-2 and 1-3). Figure 1-2 provides the 1-minute total VOC concentrations and the wind direction data prior to, during and after this event period. Figure 1-3 displays a wind rose of data collected at the CM2 location from 4:14 p.m. to 6:14 p.m. on September 3, 2023.

Planned samples at ten CCND sampling locations (including the Refinery Business Center) were collected in Q3 2023 to evaluate typical VOC levels in the CCND neighborhoods. For comparison, a summary of the planned air sample taken at the CCND CM2 – the Refinery Business Center monitoring location is shown in Table 1-3.

TABLE 1-3
CM2 – REFINERY BUSINESS CENTER LOCATION PLANNED AND SENSOR -TRIGGERED EVENT SAMPLE CONCENTRATIONS (PPBV)

		Concentration (ppbv) CM2 - Suncor RBC	
		Planned Air Sample	Sensor Triggered Event Sample
Compound Name	Cas No	8/17/2023	9/3/2023
1-Butene	106-98-9	< 0.04	< 0.05
1-Hexene	592-41-6	< 0.04	< 0.05
1-Pentene	109-67-1	< 0.04	0.09 (J)
1,2,3-Trimethylbenzene	526-73-8	0.06 (J)	< 0.05
1,2,4-Trimethylbenzene	95-63-6	0.05 (J)	0.06 (J)
1,3-Butadiene	106-99-0	< 0.03	< 0.04
1,3-Diethylbenzene	141-93-5	< 0.04	0.09 (J)
1,3,5-Trimethylbenzene	108-67-8	< 0.03	< 0.04
1,4-Diethylbenzene	105-05-5	0.08 (J)	< 0.05
2-Ethyltoluene	611-14-3	< 0.04	0.21 (J)
2-Methylheptane	592-27-8	< 0.04	< 0.05
2-Methylhexane	591-76-4	0.17 (J)	< 0.05
2-Methylpentane	107-83-5	0.36 (J)	0.28 (J)
2,2-Dimethylbutane	75-83-2	< 0.04	< 0.05
2,2,4-Trimethylpentane	540-84-1	0.06 (J)	0.06 (J)
2,3-Dimethylbutane	79-29-8	< 0.04	< 0.05
2,3-Dimethylpentane	565-59-3	0.06 (J)	< 0.05
2,3,4-Trimethylpentane	565-75-3	< 0.04	< 0.05
2,4-Dimethylpentane	108-08-7	0.39 (J)	0.26 (J)
3-Ethyltoluene	620-14-4	< 0.04	0.31 (J)
3-Methylheptane	589-81-1	< 0.04	< 0.05
3-Methylhexane	589-34-4	0.25 (J)	0.23 (J)
3-Methylpentane	96-14-0	0.19 (J)	0.32 (J)
4-Ethyltoluene	622-96-8	< 0.05	< 0.06
Acetylene	74-86-2	0.49	0.11 (J)
Benzene	71-43-2	0.25 (J)	0.11 (J)
Butane	106-97-8	2.10	0.55
Carbon disulfide	75-15-0	< 0.03	0.10 (J)
Cis-2-Butene	590-18-1	< 0.04	< 0.05
Cis-2-Pentene	627-20-3	< 0.04	< 0.05
Cyclohexane	110-82-7	< 0.04	< 0.05
Cyclopentane	287-92-3	0.13 (J)	< 0.05
Decane	124-18-5	0.05 (J)	0.05 (J)
Dodecane	112-40-3	0.09 (J)	0.13 (J)
Ethane	74-84-0	12.00	4.10
Ethylbenzene	100-41-4	0.06 (J)	< 0.04
Ethylene	74-85-1	1.40	1.30
Heptane	142-82-5	0.12 (J)	0.09 (J)
Hexane	110-54-3	0.43	0.15 (J)
Isobutane	75-28-5	0.78	0.29 (J)
Isopentane	78-78-4	1.10	0.34 (J)
Isoprene	78-79-5	< 0.04	0.15 (J)
Isopropylbenzene	98-82-8	< 0.03	0.20 (J)
m,p-Xylenes	179601-23-1	0.15 (J)	< 0.13
Methylcyclohexane	108-87-2	0.14 (J)	< 0.05
Methylcyclopentane	96-37-7	0.26 (J)	< 0.05
n-Octane	111-65-9	< 0.04	0.08 (J)
Naphthalene	91-20-3	< 0.05	< 0.06
Nonane	111-84-2	< 0.04	< 0.05
o-Xylene	95-47-6	0.07 (J)	< 0.04
Pentane	109-66-0	1.10	0.34 (J)
Propane	74-98-6	5.30	1.90
Propylbenzene	103-65-1	< 0.03	< 0.04
Propylene	115-07-1	0.31 (J)	0.32 (J)
Tetrachloroethene	127-18-4	< 0.04	< 0.05
Toluene	108-88-3	0.48	0.24 (J)
Trans-2-Butene	624-64-6	< 0.04	< 0.05
Trans-2-Pentene	646-04-8	< 0.05	< 0.06
Undecane	1120-21-4	0.07 (J)	< 0.05

All results presented in ppb
Laboratory non-detections are reported as less than ("<") the method detection limit.
Result qualifiers: (J) flag indicates the reported value is an estimate and was detected below the reporting limit.

FIGURE 1-2
CM2 VOC AND WIND DIRECTION | SEPTEMBER 3, 2023, 4:14 P.M. – 6:14 P.M.

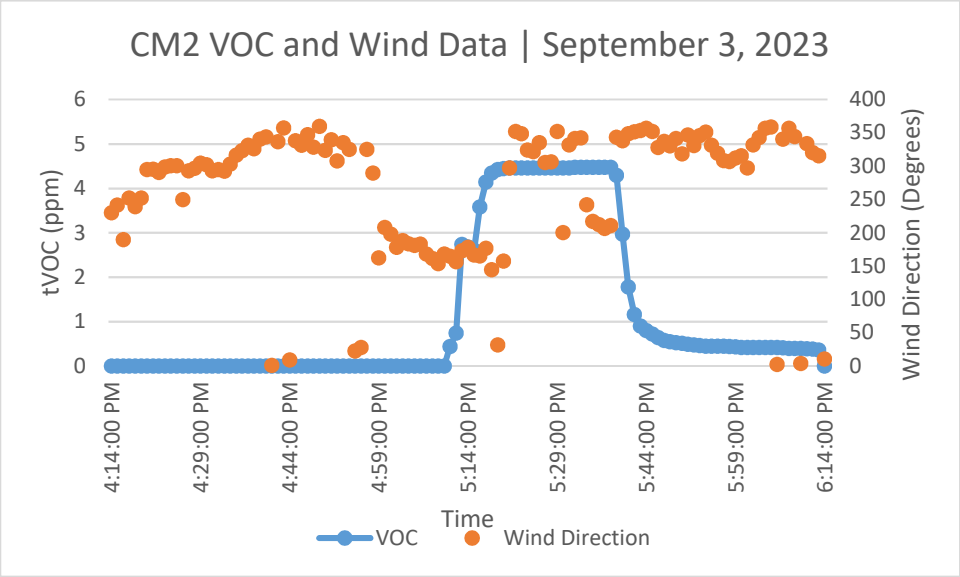
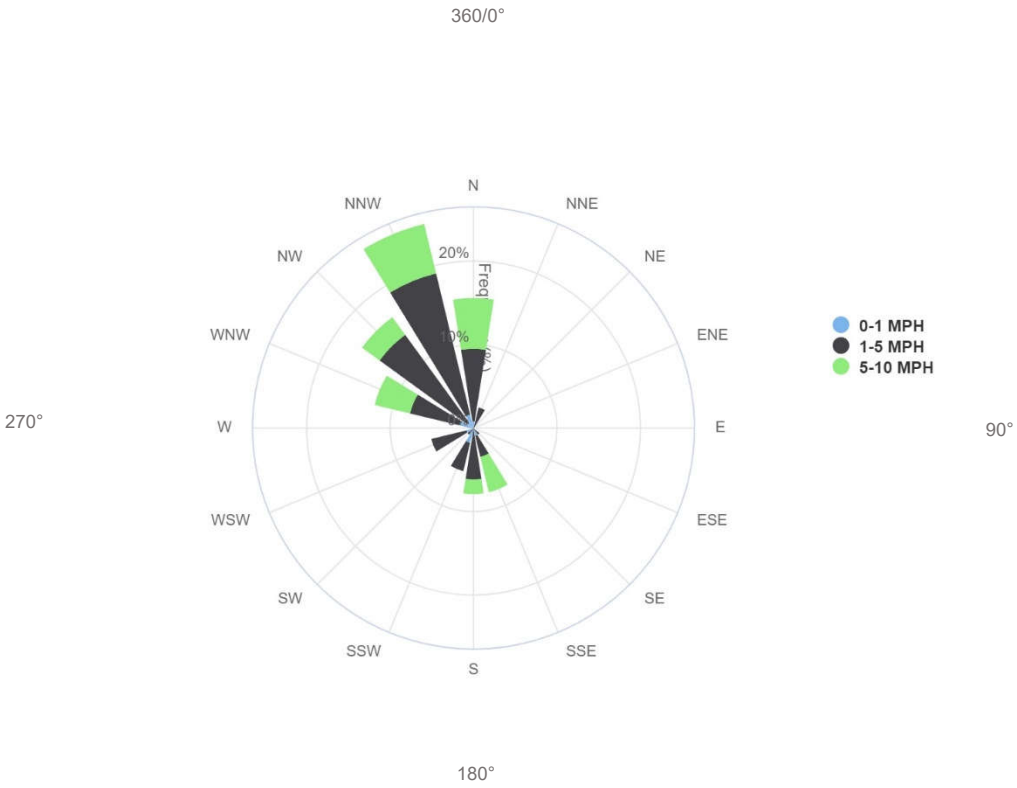


FIGURE 1-3
CM2 WIND ROSE | SEPTEMBER 3, 2023, 4:14 P.M. – 6:14 P.M.



3.2 Screening Health Risk Assessment Results

The purpose of this screening health risk assessment was to determine whether exposure to the concentrations of individual or cumulative VOCs measured in the September 3, 2023, sensor-triggered event sample, collected at the Refinery Business Center, could potentially pose acute (short-term) health hazards. According to USEPA guidelines (USEPA 1989, 2004), a HQ or HI less than or equal to one indicates that exposures are likely to be without any appreciable risk of adverse acute health effects, even for sensitive sub-populations. The calculated acute HQ and HI are summarized in Table 1-4. In general, the data and health risk assessment indicate:

- The September 3, 2023, sensor-triggered event sample concentrations were below their respective acute health-based reference levels (Table 1-4, Figure 1-4)
- The September 3, 2023, sensor-triggered event sample cumulative hazard index (CM2 HI = 0.03) was consistent with the planned air sample collected at the same location during the Q3 2023 (HI = 0.04, Figure 1-5).
- The measured concentrations during this triggered sample are not expected to cause an appreciable risk of adverse acute health effects, even for sensitive sub-populations.

TABLE 1-4
SUMMA CANISTER SCREENING HEALTH RISK ASSESSMENT: COMPOUND-SPECIFIC HAZARD QUOTIENTS AND HAZARD INDICES FOR CCND CM2 – REFINERY BUSINESS CENTER MONITORING SITE

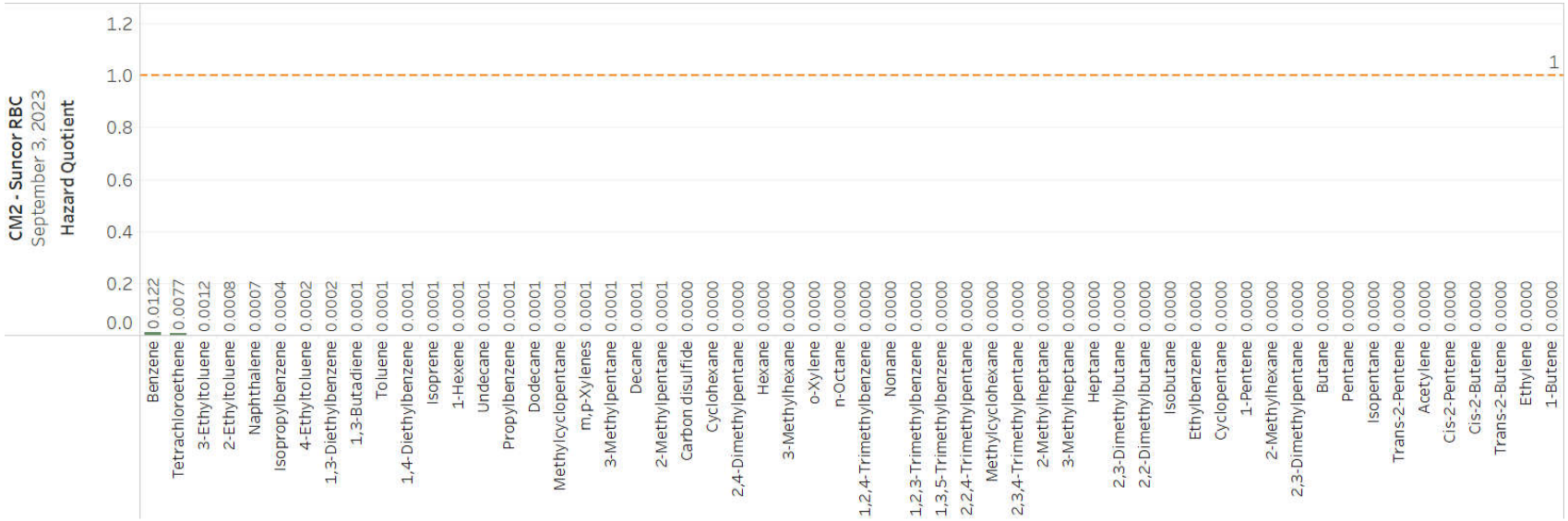
					Hazard Quotient CM2 - Suncor RBC	
					Planned Air Sample	Sensor Triggered Event Sample
Compound Name	Cas No	AEGL 1 60 min Value (ppb)	Health Based Reference Level (ppb)	Source	August 17, 2023	September 3, 2023
1-Butene	106-98-9	NR	27,000	TCEQ Short-Term AMCV	0.0000	0.0000
1-Hexene	592-41-6	NR	500	TCEQ Short-Term AMCV	0.0001	0.0001
1-Pentene	109-67-1	NR	12,000	TCEQ Short-Term AMCV	0.0000	0.0000
1,2,3-Trimethylbenzene	526-73-8	140,000	3,000	TCEQ Short-Term AMCV	0.0000	0.0000
1,2,4-Trimethylbenzene	95-63-6	140,000	3,000	TCEQ Short-Term AMCV	0.0000	0.0000
1,3-Butadiene	106-99-0	670,000	298	OEHHA Acute REL	0.0001	0.0001
1,3-Diethylbenzene	141-93-5	NR	450	TCEQ Short-Term AMCV	0.0001	0.0002
1,3,5-Trimethylbenzene	108-67-8	140,000	3,000	TCEQ Short-Term AMCV	0.0000	0.0000
1,4-Diethylbenzene	105-05-5	NR	450	TCEQ Short-Term AMCV	0.0002	0.0001
2-Ethyltoluene	611-14-3	NR	250	TCEQ Short-Term AMCV	0.0002	0.0008
2-Methylheptane	592-27-8	NR	4,100	TCEQ Short-Term AMCV	0.0000	0.0000
2-Methylhexane	591-76-4	NR	8,300	TCEQ Short-Term AMCV	0.0000	0.0000
2-Methylpentane	107-83-5	NR	5,400	TCEQ Short-Term AMCV	0.0001	0.0001
2,2-Dimethylbutane	75-83-2	NR	5,400	TCEQ Short-Term AMCV	0.0000	0.0000
2,2,4-Trimethylpentane	540-84-1	NR	4,100	TCEQ Short-Term AMCV	0.0000	0.0000
2,3-Dimethylbutane	79-29-8	NR	5,400	TCEQ Short-Term AMCV	0.0000	0.0000
2,3-Dimethylpentane	565-59-3	NR	8,300	TCEQ Short-Term AMCV	0.0000	0.0000
2,3,4-Trimethylpentane	565-75-3	NR	4,100	TCEQ Short-Term AMCV	0.0000	0.0000
2,4-Dimethylpentane	108-08-7	NR	8,300	TCEQ Short-Term AMCV	0.0000	0.0000
3-Ethyltoluene	620-14-4	NR	250	TCEQ Short-Term AMCV	0.0002	0.0012
3-Methylheptane	589-81-1	NR	4,100	TCEQ Short-Term AMCV	0.0000	0.0000
3-Methylhexane	589-34-4	NR	8,300	TCEQ Short-Term AMCV	0.0000	0.0000
3-Methylpentane	96-14-0	NR	5,400	TCEQ Short-Term AMCV	0.0000	0.0001
4-Ethyltoluene	622-96-8	NR	250	TCEQ Short-Term AMCV	0.0002	0.0002
Acetylene	74-86-2	NR	25,000	TCEQ Short-Term AMCV	0.0000	0.0000
Benzene	71-43-2	52,000	9	ATSDR Acute MRL	0.0278	0.0122
Butane	106-97-8	5,500,000	92,000	TCEQ Short-Term AMCV	0.0000	0.0000
Carbon disulfide	75-15-0	13,000	1,990	OEHHA Acute REL	0.0000	0.0000
Cis-2-Butene	590-18-1	NR	15,000	TCEQ Short-Term AMCV	0.0000	0.0000
Cis-2-Pentene	627-20-3	NR	12,000	TCEQ Short-Term AMCV	0.0000	0.0000
Cyclohexane	110-82-7	NR	1,000	TCEQ Short-Term AMCV	0.0000	0.0000
Cyclopentane	287-92-3	NR	5,900	TCEQ Short-Term AMCV	0.0000	0.0000
Decane	124-18-5	NR	1,000	TCEQ Short-Term AMCV	0.0001	0.0001
Dodecane	112-40-3	NR	1,720	CDPHE Acute	0.0001	0.0001
Ethane	74-84-0	NR	NA	NA	NA	NA
Ethylbenzene	100-41-4	33,000	5,000	ATSDR Acute MRL	0.0000	0.0000
Ethylene	74-85-1	NR	500,000	TCEQ Short-Term AMCV	0.0000	0.0000
Heptane	142-82-5	NR	8,300	TCEQ Short-Term AMCV	0.0000	0.0000
Hexane	110-54-3	NR	5,400	TCEQ Short-Term AMCV	0.0001	0.0000
Isobutane	75-28-5	NR	33,000	TCEQ Short-Term AMCV	0.0000	0.0000
Isopentane	78-78-4	NR	68,000	TCEQ Short-Term AMCV	0.0000	0.0000
Isoprene	78-79-5	NR	1,400	TCEQ Short-Term AMCV	0.0000	0.0001
Isopropylbenzene	98-82-8	50,000	510	TCEQ Short-Term AMCV	0.0001	0.0004
m,p-Xylenes	179601-23-1	130,000	2,000	ATSDR Acute MRL	0.0001	0.0001
Methylcyclohexane	108-87-2	NR	4,000	TCEQ Short-Term AMCV	0.0000	0.0000
Methylcyclopentane	96-37-7	NR	750	TCEQ Short-Term AMCV	0.0003	0.0001

NA = Not Available
NR = According to EPA, AEGL is "Not Recommended due to insufficient data"

Compound Name	Cas No	AEGL 1 60 min Value (ppb)	Health Based Reference Level (ppb)	Source	Hazard Quotient CM2 - Suncor RBC Planned Air Sample August 17, 2023	Hazard Quotient CM2 - Suncor RBC Sensor Triggered Event Sample September 3, 2023
n-Octane	111-65-9	NR	4,100	TCEQ Short-Term AMCV	0.0000	0.0000
Naphthalene	91-20-3	NR	95	TCEQ Short-Term AMCV	0.0005	0.0007
Nonane	111-84-2	NR	3,000	TCEQ Short-Term AMCV	0.0000	0.0000
o-Xylene	95-47-6	130,000	1,700	ATSDR Acute MRL	0.0000	0.0000
Pentane	109-66-0	NR	68,000	TCEQ Short-Term AMCV	0.0000	0.0000
Propane	74-98-6	5,500,000	NA	NA	NA	NA
Propylbenzene	103-65-1	NR	510	TCEQ Short-Term AMCV	0.0001	0.0001
Propylene	115-07-1	NR	NA	NA	NA	NA
Tetrachloroethene	127-18-4	35,000	6	ATSDR Acute MRL	0.0062	0.0077
Toluene	108-88-3	67,000	2,000	ATSDR Acute MRL	0.0002	0.0001
Trans-2-Butene	624-64-6	NR	15,000	TCEQ Short-Term AMCV	0.0000	0.0000
Trans-2-Pentene	646-04-8	NR	12,000	TCEQ Short-Term AMCV	0.0000	0.0000
Undecane	1120-21-4	NR	550	TCEQ Short-Term AMCV	0.0001	0.0001
				Hazard Index	**0.0372**	**0.0251**

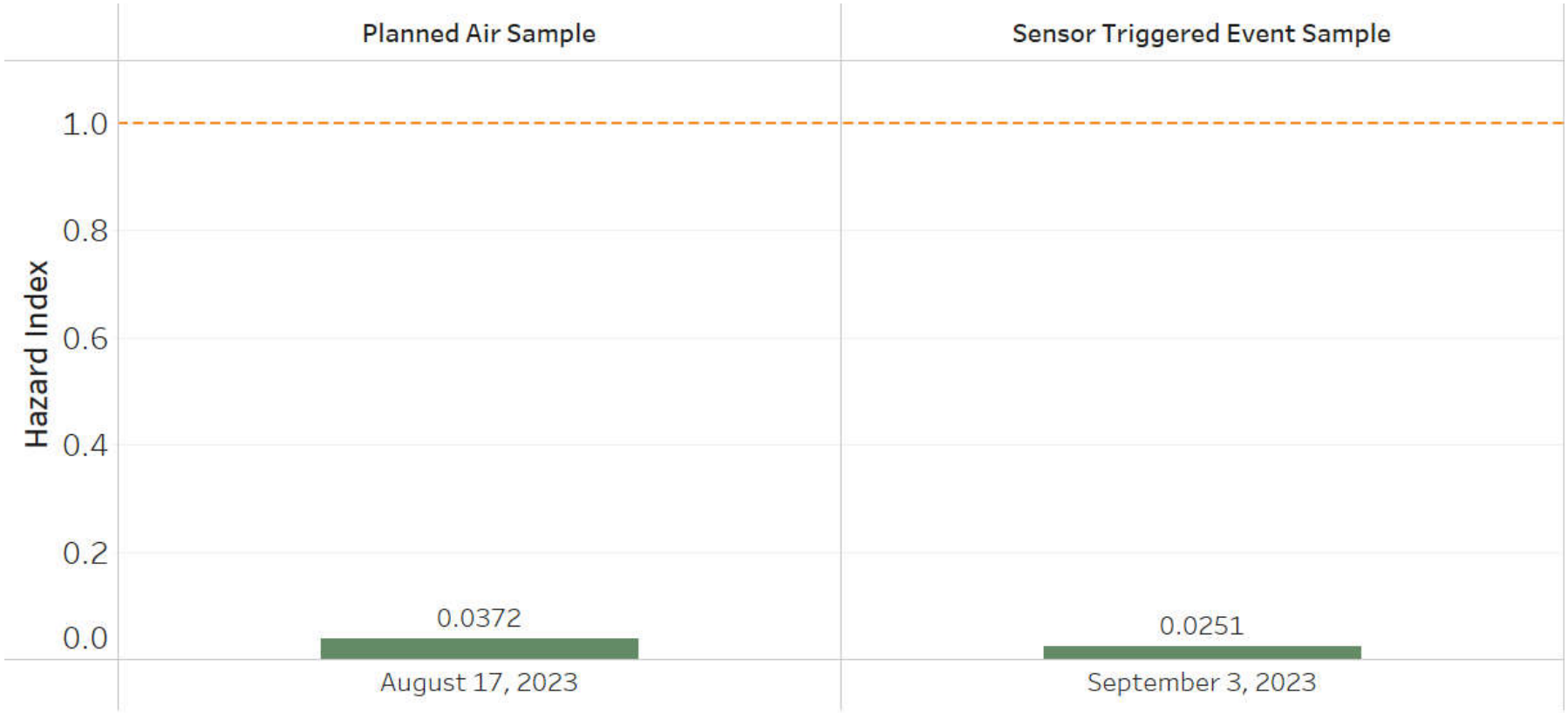
NA = Not Available
NR = According to EPA, AEGL is "Not Recommended due to insufficient data"

FIGURE 1-4
COMPOUND-SPECIFIC HAZARD QUOTIENTS FOR VOCS DETECTED IN THE SEPTEMBER 3, 2023, SENSOR-TRIGGERED EVENT SAMPLE AT CM2 – REFINERY BUSINESS CENTER LOCATION



Hazard quotient (HQ) is the exposure concentration (EC), or air concentration divided by the established health based reference level (RL) fo each compound. According to the EPA, a HQ less than 1 (orange line) indicates that exposures are likely to be without appreciable risk of adverse acute health effects, even for sensitive sub-populations. Propylene, propane, and ethane did not have RL and are not displayed.

FIGURE 1-5
HAZARD INDICIES AT THE CCND CM2 – REFINERY BUSINESS CENTER LOCATION FOR PLANNED AND SENSOR TRIGGERED AIR SAMPLES



Hazard Index (HI) is the sum of all combined hazard quotients (HQ). According to EPA, a HI less than or equal to one (orange line) indicates that exposures are likely to be without any appreciable risk of adverse acute health effects, even for sensitive sub-populations.

4.0 Uncertainty Evaluation

Scientific uncertainty is inherent in each step of the risk assessment process because all risk assessments incorporate a variety of assumptions and professional judgments (USEPA 1989, 2004). Therefore, the acute hazard estimates presented in this assessment are conditional estimates given a considerable number of assumptions about exposure and toxicity. This screening-level risk assessment relied on a combination of health-protective scenarios and toxicity information (i.e., exposure durations, toxicological uncertainty factors, cumulative risk evaluations). This approach was selected to help risk management decision making. Because of these assumptions, the estimates of acute hazards are themselves uncertain but likely to be over-estimated compared to actual.

This risk assessment did not address past or present health outcomes associated with current or past exposures. As such, this risk assessment cannot be used to make realistic predictions of biological effects and/or used to determine whether someone is ill (cancer or other adverse health effects) due to past or current exposures. This risk assessment was limited to inhalation exposures from outdoor exposures to all potential sources.

5.0 Program Changes

None at this time.

Prepared by:

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Montrose Air Quality Services

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CTEH®, LLC

APPENDIX A
SAMPLE CHAIN OF CUSTODIES

ENTHALPY ANALYTICAL

Air Chain of Custody Record

Lab No: 0923-926-100360

Page: 1 of 1

Turn Around Time (rush by advanced notice only)

7 Day:		5 Day:	X	3 Day:	
2 Day:		1 Day:		Custom TAT:	

CUSTOMER INFORMATION		PROJECT INFORMATION	
Company:	MAQS	Name:	Suncor
Report To:	Riley Kloss	Number:	PROJ-022555
Email:	rkloss@montrose-env.com	P.O. #:	PO-012395
Address:	990 W 43rd Ave, Denver, CO 80211	Address:	N/A
Phone:	303-670-0530	Global ID:	N/A
Fax:	N/A	Sampled By:	MAQS

Special Instructions:

**Canister pressure may increase as samples are shipping to a different elevation

	Sample ID (Location ID)	Type	Equipment Information			Sampling Information						Analysis Requested	
		(I) Indoor (A) Ambient (SV) Soil Vapor (S) Source	Canister ID	Size (1L, 3L, 6L, 15L)	Flow Controller ID	Sample Start Date	Sample Start Time	Vacuum Start ("Hg)	Sample End Date	Sample End Time	Vacuum End ("Hg)	TO-15 (BTEX)	Suncor List
001	1 RBC (CM2)	A	44313	6	N/A	9/3/23	5:14 PM	25	9/3/23	6:14 PM	1	x	x
002	2 Adams City Middle School (CM4)	A	44321	6	N/A	9/3/23	2:42 PM	25	9/3/23	3:42 PM	1	x	x
	3												
	4												
	5												
	6												
	7												
	8												
	9												
	10												

	Signature	Print Name	Company / Title	Date / Time
[1] Relinquished By:	Riley Kloss	Riley Kloss	MAQS/CPM	9/5/2023 15:30
[1] Received By:	Elijah Sulal	Elijah Sulal	Enthalpy / Tech.	9/7/23 11:34
[2] Relinquished By:				
[2] Received By:				
[3] Relinquished By:				
[3] Received By:				

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