2023 Q1 MOBILE MONITORING VAN 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[1]: carbon monoxide (CO), sulfur dioxide (SO_2), hydrogen sulfide (H_2S), nitric oxide or 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 Summa canisters; and (3) periodic real-time air monitoring throughout neighborhoods using a mobile monitoring van to detect the presence of specific VOCs and hydrogen sulfide (H_2S). This report details approach number three, the periodic real-time air monitoring through six neighborhoods with the mobile monitoring van and a screening health risk analysis of the detected chemicals. Continuous real-time air monitoring and Summa canister sampling data are presented in separate reports.

The mobile monitoring van contains the equipment necessary to identify and quantitate individual chemicals present in ambient air at ultra-low concentrations. This equipment measures and reports concentrations of select chemicals at sub-parts per billion (ppb) levels and as quickly as one measurement per second. During the monitoring period, the mobile monitoring van followed a dense route through each of the six CCND residential neighborhoods that fall within a three-mile radius around the refinery. Accessible streets in the monitored neighborhoods were traversed at approximately 10 miles per hour (MPH) while collecting a data point for each chemical every 1 second. During the first quarter 2023 sampling period (February 6-10), the mobile monitoring van was in a total of six neighborhoods and collected more than 73,000 data points across five days of monitoring, resulting in approximately 51,600 1-hour rolling average concentrations. Meteorological conditions were also reported in real time.

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. This evaluation was consistent with federal and state risk assessment guidelines and was conducted to determine whether the estimated 1-hour maximum measured concentrations of individual or cumulative (combined) VOCs could potentially pose acute (short-term) health hazards. The air monitoring data and health risk assessment indicate:

- Air monitoring data and health risk assessment indicate all measured individual and combined air concentrations were below their respective acute health reference levels in all neighborhoods.
- Results indicate the measured concentrations are likely to be without any appreciable risk of adverse acute health effects, even for sensitive sub-populations.

[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, 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 stationary monitoring for the following analytes: carbon monoxide (CO), sulfur dioxide (SO_2), hydrogen sulfide (H_2S), nitric oxide or 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 Summa canisters; and (3) periodic real-time air monitoring throughout neighborhoods using a mobile monitoring van to detect the presence of specific chemicals. 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 three. The continuous real-time community air monitoring and Summa canister sampling 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 ccnd-air.com/documents.

2.0 MOBILE SAMPLING PROGRAM

2.1 Mobile Van Air Sampling Description

The mobile monitoring van is a Mercedes 2500 Sprinter Van outfitted with equipment necessary to identify and quantitate individual chemicals present in ambient air to ultra-low concentrations. The mobile monitoring van is equipped with an Ionicon Model 6000-X2 proton transfer reaction time-of-flight mass spectrometer (PTR-TOF-MS). This instrument provides concentrations of select chemicals at sub-parts per billion (ppb) levels and as quickly as one measurement per second. The mobile monitoring van is outfitted with an external sampling system, which transports ambient air from outside of the van into the PTR-TOF-MS sample inlet for immediate real-time analysis. The entire sampling system is comprised of Teflon or Teflon-coated materials, which ensures the lowest amount of sample loss due to surface absorption of chemical molecules. The mobile monitoring van incorporates a high-precision global positioning system (GPS), a sonic anemometer to measure wind direction and wind velocity and other incorporated meteorological (MET) sensors.

During the mobile monitoring program, groups of structurally similar chemicals (called isomers) that include the list of 65 chemicals in Table 2-1 were measured to determine the instantaneous ambient concentrations. Appendix A provides more detail on the need for isomer grouping. This list of chemicals was compiled based on the typical chemicals that are monitored in urban and industrial areas and the mobile monitoring van analysis capabilities.

The mobile monitoring van followed a driving route through each of the six CCND residential neighborhoods that fall within a three-mile radius around the refinery operations. Accessible streets in the neighborhoods were traversed at approximately 10 MPH while collecting a data point every 1 second. The details of the monitored neighborhoods are listed in Table 2-2 and are shown in Figure 2-1.

TABLE 2-1
MOBILE MONITORING VAN PROGRAM CHEMICALS[2]

o-Diethylbenzene	2-Methylhexane	Neopentane	Methyl-cyclopentane	o-Ethyltoluene (2-ethyltoluene)
1,3-Butadiene	2-Methylpentane	Ethylbenzene	m-Ethyltoluene	p-Diethylbenzene (1,4-diethylbenzene)
1-Butene	3-Methylheptane	Ethylcyclohexane	m/o/p-Xylenes	p-Ethyltoluene (4-ethyltoluene)
1-Hexene	3-Methylhexane	Ethylene	n-Butane	1,2,4-trimethylbenzene
1-Pentene	3-Methylpentane	Hydrogen Cyanide	n-Decane	Propylene (Propene)
Styrene	Acetylene	Hydrogen Sulfide	n-Dodecane	2,2,4-Trimethylpentane
2,2-Dimethylbutane	Benzene	i-Butane	n-Heptane	Tetrachloroethylene
Toluene	Carbon disulfide	i-Pentane	n-Hexane	2,3,4-Trimethylpentane
2,3-Dimethylbutane	trans-2-Butene	Isopentane	n-Nonane	trans-1,2-Dimethylcyclohexane
2,3-Dimethylpentane	cis-2-Butene	Isoprene	n-Octane	trans-1,3-Dimethylcyclohexane
2,4-Dimethylpentane	cis-2-Pentene	m-Diethylbenzene	n-Pentane	cis-1,3-dimethylcyclohexane
2-Methyl-2-butene	Cumene	Methanol	n-Propylbenzene	trans-2-Pentene
2-Methylheptane	Cyclohexane	Methyl-cyclohexane	n-Undecane	Cyclopentane

[2] See Appendix A for isomer analysis details

TABLE 2-2
NEIGHBORHOOD MONITORING PROGRAM DETAILS

Neighborhood	Area (square miles)	Sampling Date	Start Time	End Time	Total Data Points Collected	Total Hourly Rolling Averages Calculated
Adams City	0.41	2/7/23	17:41	21:01	12,040	8,441
Dupont	1.4	2/9/23	9:17	13:20	14,588	11,025
Elyria-Swansea	1.2	2/8/23	19:38	21:55	8,244	4,681
Globeville	0.44	2/8/23	17:10	19:25	8,085	4,486
Pioneer Park	1.7	2/6/23	10:41	14:56	15,276	11,677
Western Hills	1.6	2/10/23	9:05	13:12	14,822	11,259

2.2 Mobile Monitoring Van Air Sampling Methods

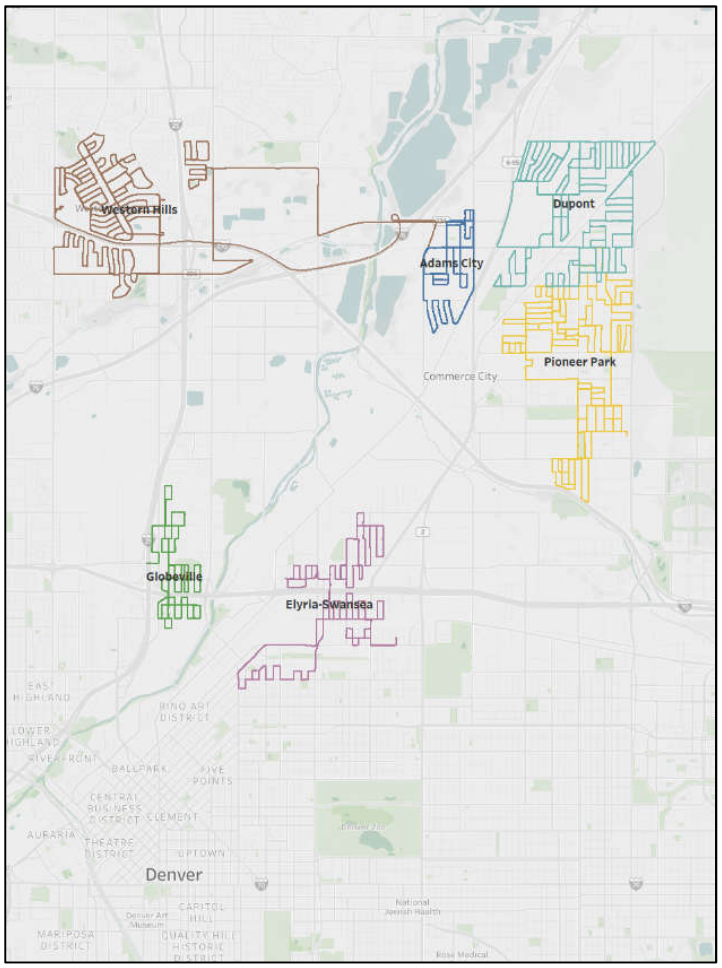
The PTR-TOF-MS calibration was checked, and the instrument was zeroed each day prior to collection of any ambient air data. The instrument was calibrated using United States Environmental Protection Agency (USEPA) protocol certified calibration gases. The multi-chemical cylinder standards were used to generate multiple point calibration curves for each commercially available chemical present in the standard. Note: Not all chemicals listed in Table 2-1 are available as certified calibration gases. The chemical dilutions were made using an Environics Model 4040 gas dilution system. The gas dilution system was validated using the appropriate USEPA methodology (40 Code of Federal Regulation Part 51 Appendix M, Method 205). Zero-count measurements were obtained to ensure proper baseline measurements were incorporated into the calculation of each chemical's concentration. Zero-count measurements were performed through the entire sampling system using ultra-high purity air. Post-testing calibration checks were performed on the instrument to ensure there was no significant drift during the course of the sampling event. Drift can cause an increase or decrease in the measured chemical concentrations, which can lead to both positive and negative biasing of the obtained results.

The mobile monitoring van collected continuous measurements throughout each neighborhood following the routes shown in Figure 2-1. Measurements that were collected from transition periods or from moving between neighborhoods were excluded in this assessment. However, in this quarter, the Western Hill program route had a mapping error in the routing program, so there is some data from a different neighborhood included in the Western Hill data.

The measurements were collected from the ambient environment at a height of 15 feet above grade at approximately 8 liters per minute using a Teflon-coated sampling boom and pump. The PTR-TOF-MS sampled a slip stream of this flow at approximately 100 ml/min. The sample was

introduced into the reaction tube of the PTR-TOF-MS and results were collected in 1-second intervals. See the attached Appendix D for specific PTR-TOF-MS instrument operation conditions.

FIGURE 2-1
MOBILE MONITORING VAN PROGRAM ROUTE THROUGH SIX NEIGHBORHOOD AREAS



2.3 Screening Health Risk Assessment Methods

CTEH® conducted a screening-level public health risk assessment, consistent with federal risk assessment guidelines, to determine whether exposure to the detected concentrations of individual or cumulative (combined) chemicals in the air could potentially pose acute (short-term) health impacts. 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. Therefore, the first tier involves use of exposure assumptions that are health-conservative. This means that data reflecting maximum exposure potential are plugged into the risk calculations. These are worst-case scenarios that typically represent exposure conditions higher than would be reasonably expected. Such calculations are very simple and assume a person is constantly exposed to the highest one hour rolling average concentration for each detected chemical. If the resulting risk values indicate the

lack of likely acute adverse health effects under these worst-case conditions, then the risk assessment is complete. However, if the risk values suggest a potential for acute 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 typically represent exposure conditions higher than would be reasonably expected. As such, 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*"[3]. In other words, screening-level findings of an estimated exposure to a specific or cumulative set of chemical(s) being higher than its reference level (RL) does NOT indicate an actual likelihood of adverse effects but does 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 acute risks from exposure to individually measured chemicals as well as exposure to all measured chemicals at once (cumulative). For individual chemicals, an acute health risk value was calculated as the exposure concentration (EC) divided by the chemical-specific federal or state established acute RL (Equation 1). The result is referred to as the hazard quotient (HQ). Estimates of EC were derived from 1-hour rolling average concentrations of each chemical for the entire measurement time in an individual CCND neighborhood. 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 and include ATSDR acute minimum risk levels (MRL), California EPA Office of Environmental Health Hazard Assessment (OEHHA) acute risk levels and Texas Commission on Environmental Quality (TCEQ) acute exposure guideline levels. If the chemical was not listed by CDPHE, a federal and state recommended hierarchy for selection of RLs was used[4]. For chemical isomer groups which were unable to be differentiated the lowest, most health-protective RL of the isomer group was selected for use in this assessment.

Acute HQs were calculated as follows:

Eq. 1 – Hazard Quotient (HQ) Equation

$$HQ = EC/RL$$

Where:

HQ= Hazard Quotient

EC= Maximum 1-hour rolling average air concentration

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

[4] https://drive.google.com/file/d/1P2KEvu0MFiyzQAOQtjQUclqR-WGh1bEX/view

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

Health risks from potential cumulative exposures to all detected chemicals were calculated by adding together each individual chemical's HQ calculated for a given neighborhood. 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 chemicals exert an adverse effect on the body in a similar manner, which is rarely the case.

An 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 acute 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. 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 these RLs, these values "*are set below levels that, based on current information, might cause adverse health effects in the people most sensitive*."[5] This is because RLs are based on observed toxicity in human or animal studies with an added safety factor to account for uncertainties and variabilities 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. Therefore, it is scientifically incorrect to assume that all real-world exposures to a chemical at levels higher than a RL will likely result in an adverse effect.

Using the maximum 1-hour rolling average for the EC conservatively assumes that a hypothetical maximally exposed individual occupies the monitored neighborhood and breathes the maximum 1-hour detected concentration continuously for an hour up to multiple days (an acute exposure). A 1-hour average concentration is more appropriate than a 1-second or 1-minute concentration for use in an acute health risk assessment. This is because 1-second exposures to the chemicals measured in this study do not cause adverse effects unless the levels are extremely high (i.e., tens of thousands to millions of ppb). Guidance values for use in emergency situations with extremely elevated levels of these chemicals are available and are discussed below. Across all neighborhoods, 51,569 1-hour rolling averages of chemical concentrations were calculated to derive the estimated ECs (Table 2-2). The range between the average and maximum rolling 1-hour average values provides a robust estimate of plausible outdoor exposures of persons occupying the monitored neighborhood while the mobile monitoring van was present (Figures 3-1 to 3-6).

The USEPA also has established values for use in emergency situations, termed Acute Exposure Guideline Levels (AEGLs). Unlike RLs 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*

[5] https://www.atsdr.cdc.gov/mrls/index.html#:~:text=ATSDR%20uses%20the%20no%20observed,to%20such%20substance%2Dinduced%20effects.

and the severity of effects described for each corresponding AEGL [i.e., AEGL-2 or AEGL-3].”[6] The AEGL-1 60-minute value, if available for the applicable chemical, was also used for comparison purposes because it is more precautionary (than AEGL-2 or AEGL-3) as the AEGL-1 level reflects protecting against acute health effects that are reversible upon cessation of exposure.

3.0 SUMMARY AND DISCUSSION OF RESULTS

3.1 Summary of Mobile Monitoring Van Results

A summary of mobile monitoring van results by neighborhood can be found in Table 2-2. Over five days, six neighborhoods were monitored for 65 chemicals, collecting more than 73,055 total data points. Individual neighborhood results are detailed in Figures 3-1 through 3-6. Each figure shows a map of the monitoring locations within each neighborhood, the chemicals that resulted in the top five calculated acute HQs and time profiles of the measured levels of these chemicals. The time profiles show all the 1-second data (orange) and calculated 1-hour rolling averages (green) of the monitoring data. Each green 1-hour average data point shown in these profiles reflects all the 1-second measurements collected over the previous hour. Thus, 1-hour rolling average values are shown on the time profiles only after one hour of data collection (Figure 3-1 through 3-6). The following events were noted during the sampling program: Several benzene spikes were seen during the Pioneer Park sampling event. These occurred at three different traffic intersections with a higher traffic volume. During the Adams City evening testing, a benzene spike was recorded near a gasoline filling station at 19:04. Two hexene spikes were recorded during the Globeville sampling event, but they could not be attributed to a specific source. One spike of benzene was measured at 9:57am at a traffic intersection during the Dupont Neighborhood testing program. No significant sampling events occurred during the Elyra-Swansea or Western Hills neighborhood testing programs.

Wind roses for each sampling day are provided in Appendix B. The data used to derive the wind roses were collected from the CCND community sensor location most local to the neighborhood being monitored on each day because the stationary source of MET data is more reliable than the MET station on the mobile monitoring van when the lab is moving.

3.2 Screening Health Risk Assessment Results

Acute health risks were calculated for each neighborhood. According to USEPA guidelines, an acute HQ or HI less than or equal to one (1) indicates that exposures are likely to be without any acute adverse health effects, even for sensitive sub-populations.

Maximum 1-hour rolling average concentrations for 65 chemicals measured in each neighborhood were compared to acute RLs to derive HQs. Figures 3-1 through 3-6 show concentrations of chemicals over the sampling time and summaries of results for chemicals resulting in the five highest HQs by neighborhood (if available). The estimated HI values (if available) shown in Figures 3-1 through 3-6 were calculated by summing the HQs of all detected chemicals measured in a given neighborhood. If any measured chemical resulted in a HQ greater than 1, then a separate figure would be shown for that chemical alone. Complete results for HQs for all chemicals detected in each neighborhood are available in Appendix C.

[6] https://www.epa.gov/aegl/about-acute-exposure-guideline-levels-aegls

In conclusion, the data collected during this study phase did not indicate a potential for acute adverse health effects from exposure to the measured chemicals, both individually and combined.

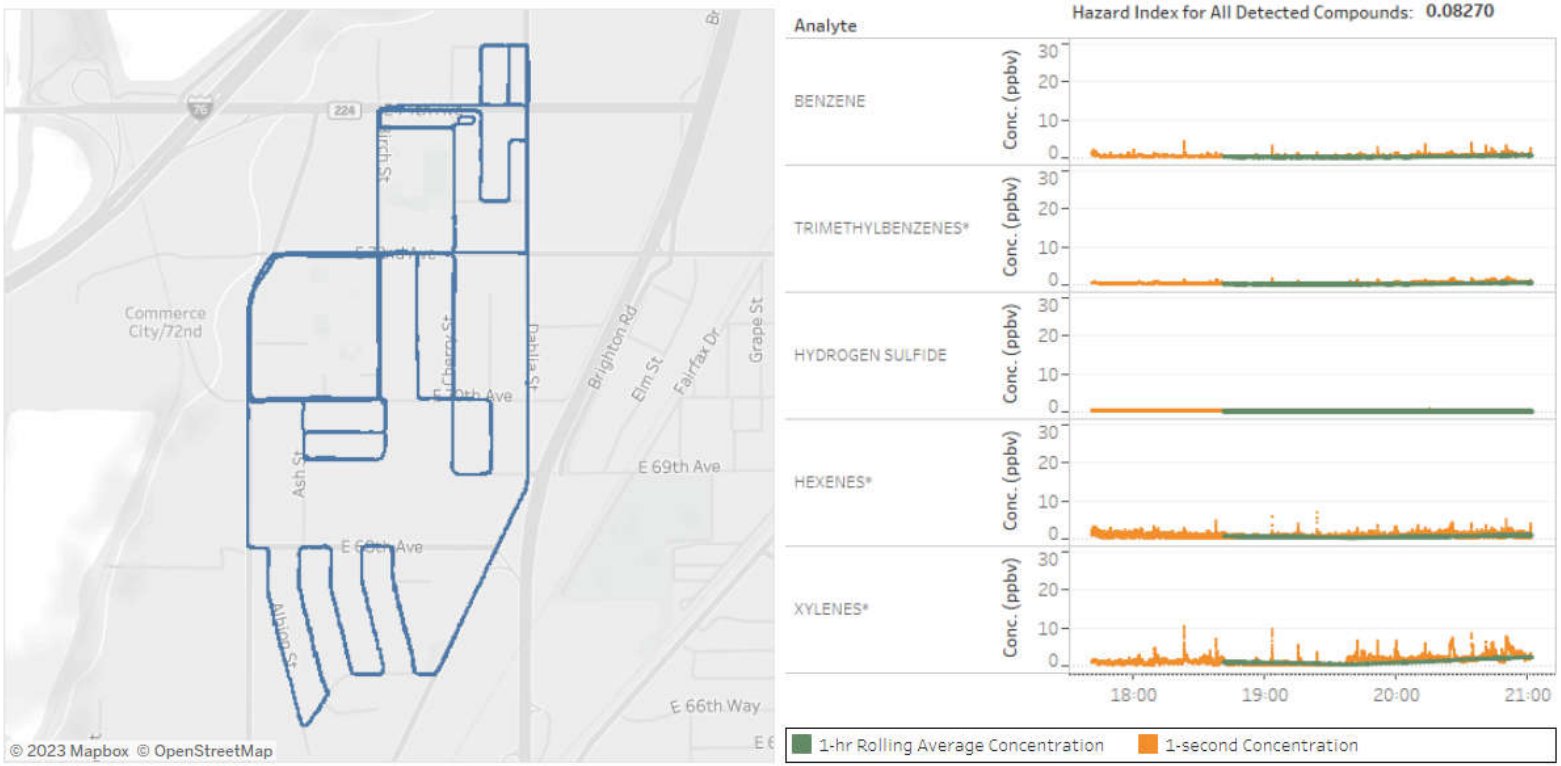
- All HQs were less than one for all detected chemicals, indicating that the maximum 1-hour rolling average concentration for each chemical was below its respective acute RL in all six neighborhoods (Figure 3-1 through 3-6).

- In this quarter, benzene, tetrachloroethylene, hydrogen sulfide, hexene group, hydrogen cyanide, xylenes, and trimethylbenzene group were the chemicals or isomer groupings resulting in the highest HQ in each neighborhood, accounting for over 90% of the total calculated HI values. However, all HI values calculated in all six neighborhoods were below one (Figures 3-1 through 3-6).

- These results indicate that the measured concentrations of chemicals, both individually and cumulative (combined), are likely to be without an appreciable risk of acute adverse health effects, even for sensitive sub-populations.

FIGURE 3-1
ADAMS CITY NEIGHBORHOOD: FEBRUARY 7, 2023

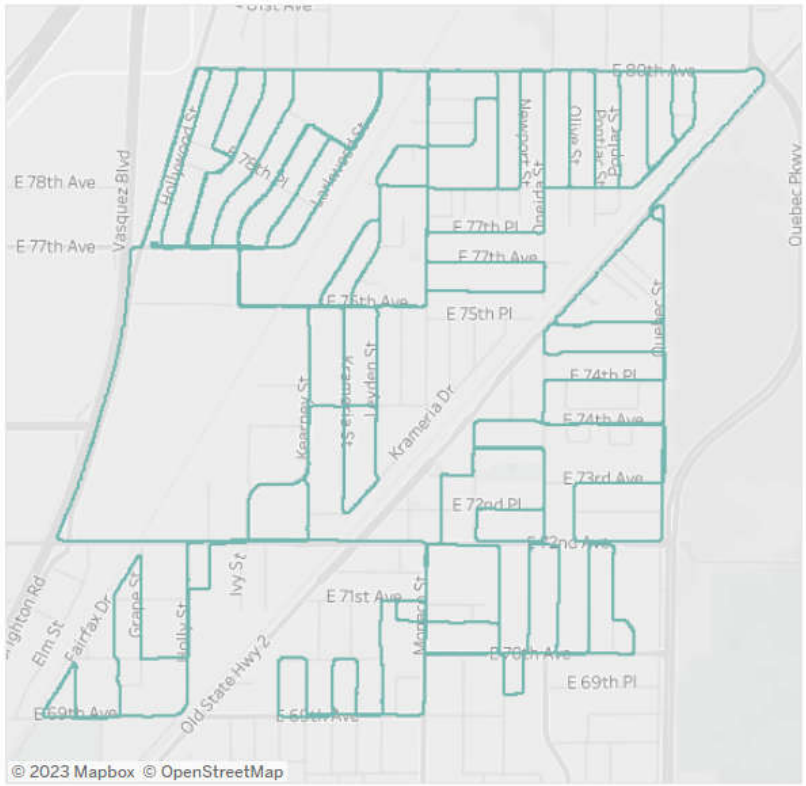
Analyte	Maximum 1-second Concentration (ppbv)	Count of 1-hr Rolling Averages Derived (#)	Average 1-hr Rolling Average (ppbv)	Maximum 1-hr Rolling Average (ppbv)	AEGL 1 60-min Value (ppbv)	Health Reference Level (ppbv)	Hazard Quotient
BENZENE	4.18	8,441	0.31	0.64	52,000	9	0.07110
TRIMETHYLBENZENES*	1.90	8,441	0.25	0.58	NR	250	0.00233
HYDROGEN SULFIDE	0.59	8,441	0.12	0.13	510	70	0.00192
HEXENES*	6.63	8,441	0.55	0.94	NR	500	0.00189
XYLENES*	10.23	8,441	1.08	2.32	130,000	2,000	0.00116



*The top 5 hazard quotients are reported in this dashboard. The hazard index represents cumulative risks including all unlisted analytes. The hazard quotient was calculated by comparing the acute health reference level to the maximum 1-hour rolling average. The comparative AEGL value is shown for comparison purposes. NR = According to EPA, the AEGL value is "not recommended due to insufficient data". *For analyte isomer groups which were unable to be differentiated, the lowest health reference value of the group was selected for use in this assessment (Appendix A).*

FIGURE 3-2
DUPONT NEIGHBORHOOD: FEBRUARY 9, 2023

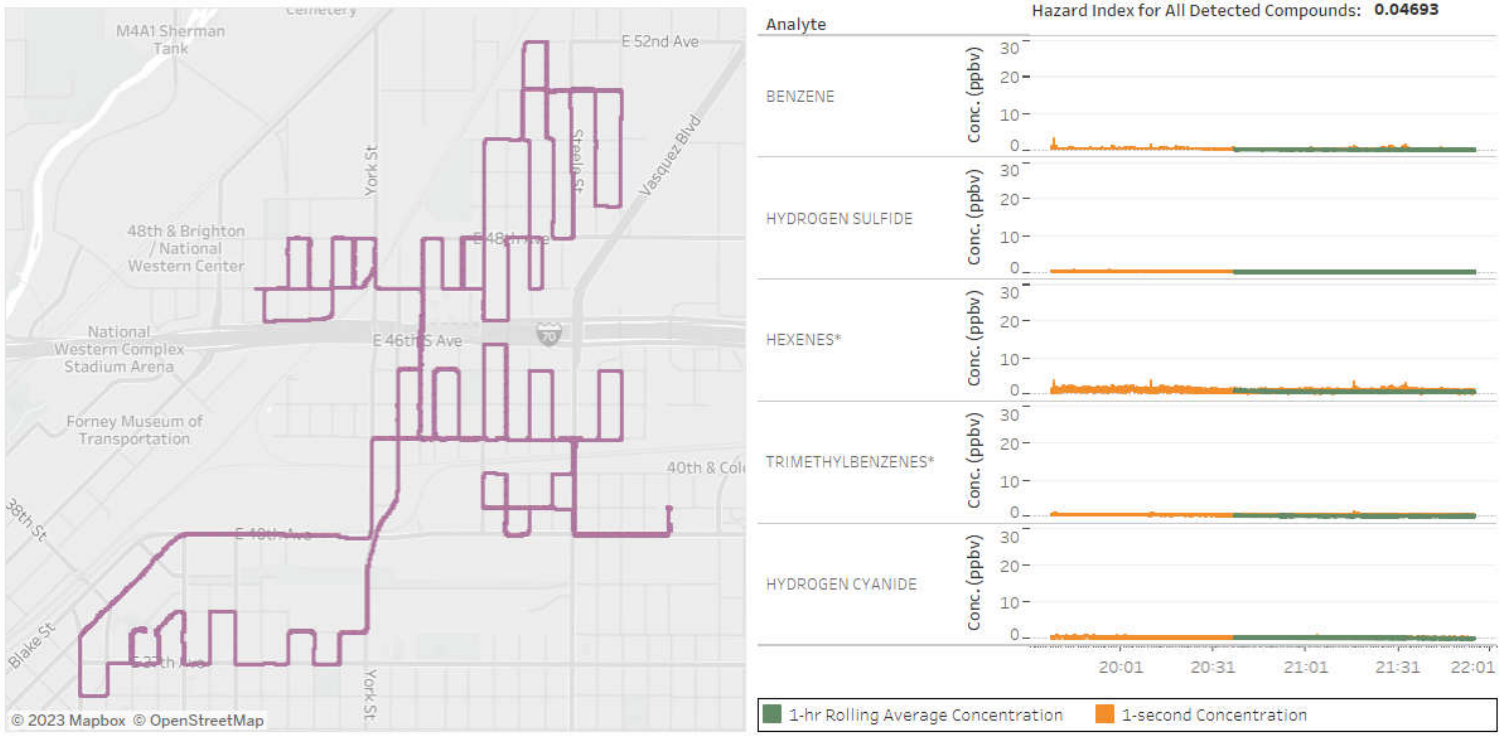
Analyte	Maximum 1-second Concentration (ppbv)	Count of 1-hr Rolling Averages Derived (#)	Average 1-hr Rolling Average (ppbv)	Maximum 1-hr Rolling Average (ppbv)	AEGL 1 60-min Value (ppbv)	Health Reference Level (ppbv)	Hazard Quotient
BENZENE	4.57	11,025	0.27	0.32	52,000	9	0.03552
HYDROGEN SULFIDE	0.54	11,025	0.14	0.16	510	70	0.00230
HEXENES*	3.70	11,025	0.63	1.05	NR	500	0.00210
HYDROGEN CYANIDE	1.17	11,025	0.20	0.25	2,000	308	0.00082
TRIMETHYLBENZENES*	1.50	11,025	0.11	0.16	NR	250	0.00064



*The top 5 hazard quotients are reported in this dashboard. The hazard index represents cumulative risks including all unlisted analytes. The hazard quotient was calculated by comparing the acute health reference level to the maximum 1-hour rolling average. The comparative AEGL value is shown for comparison purposes. NR = According to EPA, the AEGL value is "not recommended due to insufficient data". *For analyte isomer groups which were unable to be differentiated, the lowest health reference value of the group was selected for use in this assessment (Appendix A).*

FIGURE 3-3
ELYRA-SWANSEA NEIGHBORHOOD: FEBRUARY 8, 2023

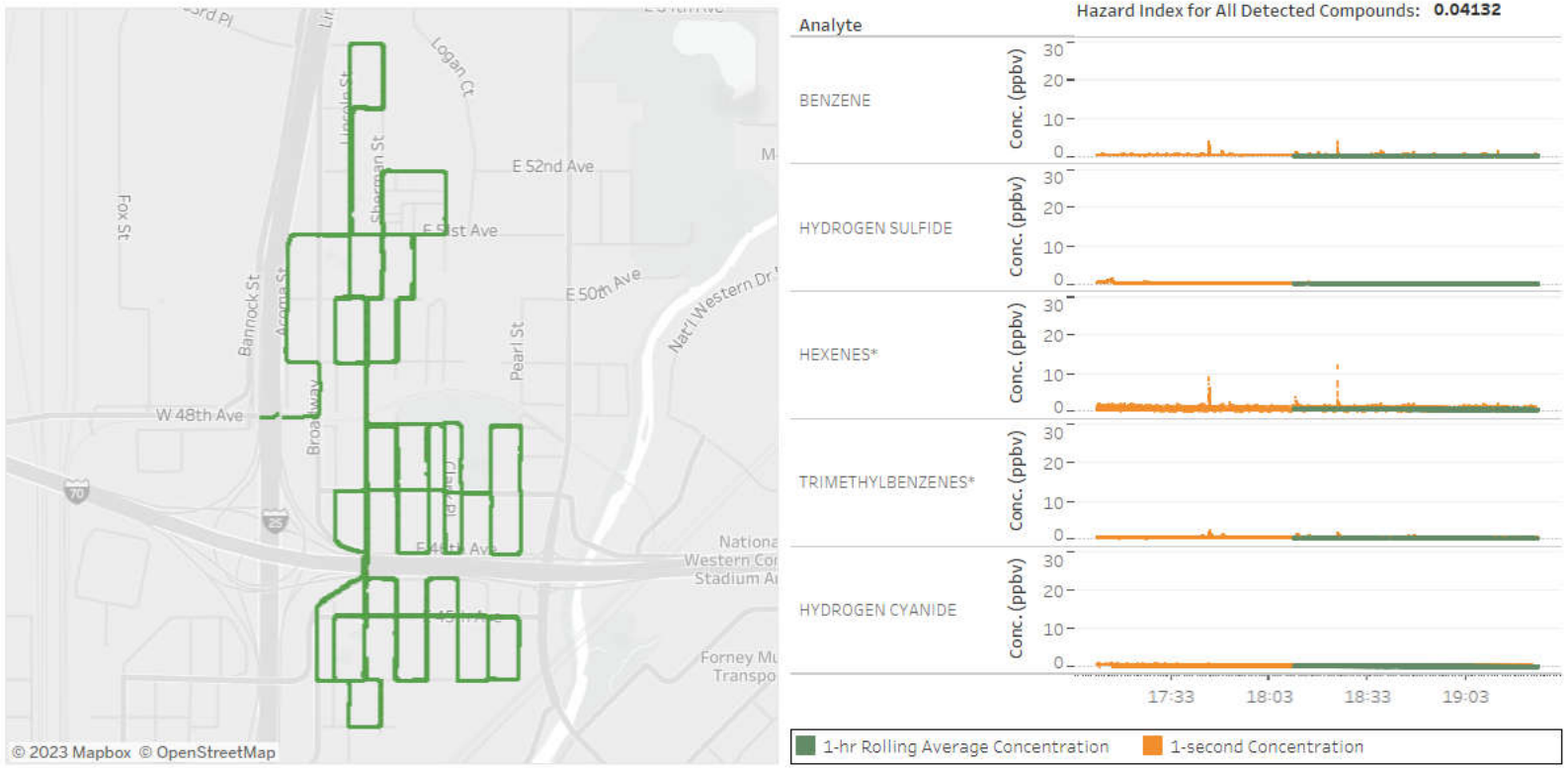
Analyte	Maximum 1-second Concentration (ppbv)	Count of 1-hr Rolling Averages Derived (#)	Average 1-hr Rolling Average (ppbv)	Maximum 1-hr Rolling Average (ppbv)	AEGL 1 60-min Value (ppbv)	Health Reference Level (ppbv)	Hazard Quotient
BENZENE	2.84	4,681	0.24	0.33	52,000	9	0.03691
HYDROGEN SULFIDE	0.56	4,681	0.22	0.24	510	70	0.00337
HEXENES*	3.94	4,681	0.79	1.05	NR	500	0.00210
TRIMETHYLBENZENES*	0.95	4,681	0.19	0.24	NR	250	0.00098
HYDROGEN CYANIDE	0.65	4,681	0.17	0.22	2,000	308	0.00072



*The top 5 hazard quotients are reported in this dashboard. The hazard index represents cumulative risks including all unlisted analytes. The hazard quotient was calculated by comparing the acute health reference level to the maximum 1-hour rolling average. The comparative AEGL value is shown for comparison purposes. NR = According to EPA, the AEGL value is "not recommended due to insufficient data". *For analyte isomer groups which were unable to be differentiated, the lowest health reference value of the group was selected for use in this assessment (Appendix A).*

FIGURE 3-4
GLOBEVILLE NEIGHBORHOOD: FEBRUARY 8, 2023

Analyte	Maximum 1-second Concentration (ppbv)	Count of 1-hr Rolling Averages Derived (#)	Average 1-hr Rolling Average (ppbv)	Maximum 1-hr Rolling Average (ppbv)	AEGL 1 60-min Value (ppbv)	Health Reference Level (ppbv)	Hazard Quotient
BENZENE	3.68	4,486	0.28	0.30	52,000	9	0.03302
HYDROGEN SULFIDE	1.39	4,486	0.15	0.20	510	70	0.00285
HEXENES*	12.19	4,486	0.63	0.68	NR	500	0.00137
TRIMETHYLBENZENES*	2.23	4,486	0.28	0.30	NR	250	0.00119
HYDROGEN CYANIDE	0.63	4,486	0.12	0.19	2,000	308	0.00061

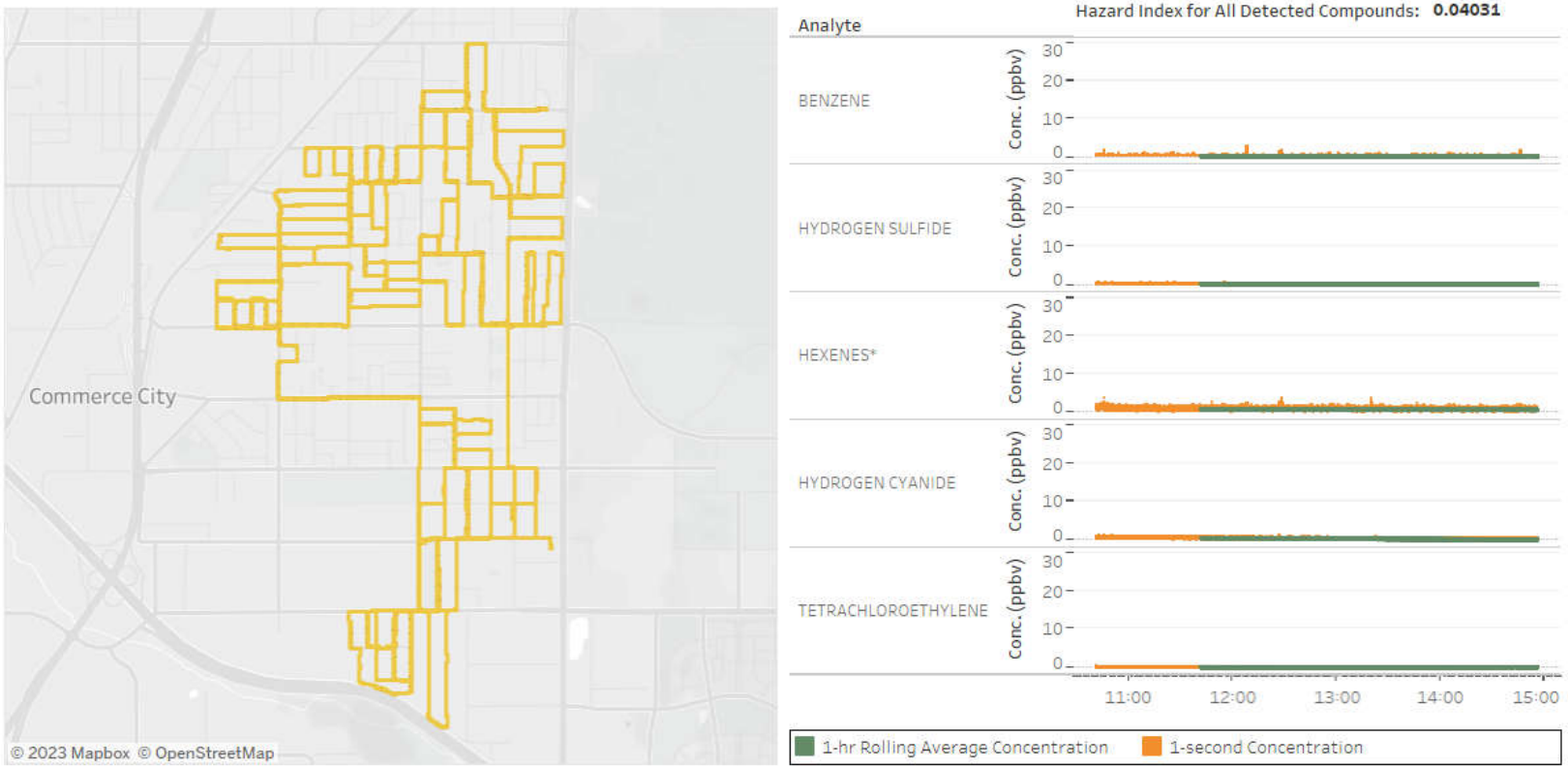


*The top 5 hazard quotients are reported in this dashboard. The hazard index represents cumulative risks including all unlisted analytes. The hazard quotient was calculated by comparing the acute health reference level to the maximum 1-hour rolling average. The comparative AEGL value is shown for comparison purposes. NR = According to EPA, the AEGL value is "not recommended due to insufficient data". *For analyte isomer groups which were unable to be differentiated, the lowest health reference value of the group was selected for use in this assessment (Appendix A).*

FIGURE 3-5
PIONEER PARK NEIGHBORHOOD: FEBRUARY 6, 2023

Analyte	Maximum 1-second Concentration (ppbv)	Count of 1-hr Rolling Averages Derived (#)	Average 1-hr Rolling Average (ppbv)	Maximum 1-hr Rolling Average (ppbv)	AEGL 1 60-min Value (ppbv)	Health Reference Level (ppbv)	Hazard Quotient
BENZENE	2.36	11,677	0.24	0.27	52,000	9	0.03051
HYDROGEN SULFIDE	0.50	11,677	0.14	0.19	510	70	0.00275
HEXENES*	3.73	11,677	0.66	0.78	NR	500	0.00157
HYDROGEN CYANIDE	1.01	11,677	0.18	0.41	2,000	308	0.00135
TETRACHLOROETHYLENE	0.09	11,677	0.00	0.01	35,000	6	0.00108

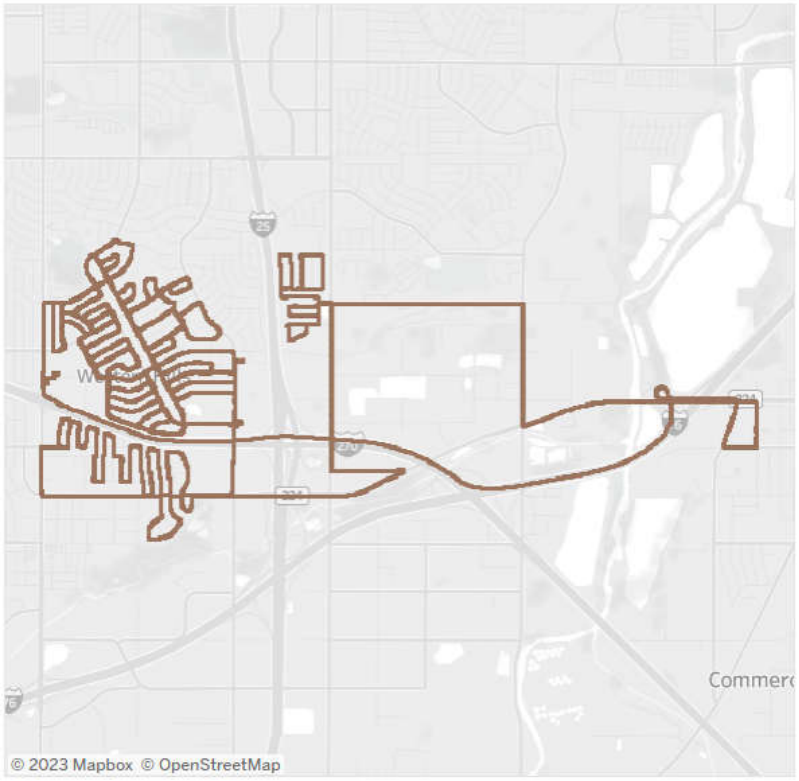
Hazard Index for All Detected Compounds: **0.04031**

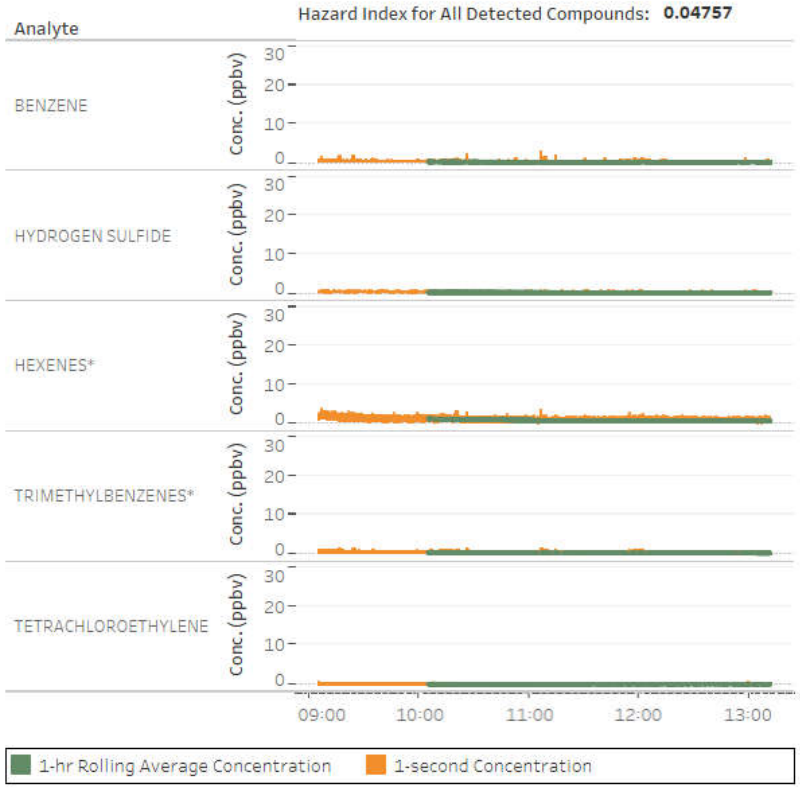


*The top 5 hazard quotients are reported in this dashboard. The hazard index represents cumulative risks including all unlisted analytes. The hazard quotient was calculated by comparing the acute health reference level to the maximum 1-hour rolling average. The comparative AEGL value is shown for comparison purposes. NR = According to EPA, the AEGL value is "not recommended due to insufficient data". *For analyte isomer groups which were unable to be differentiated, the lowest health reference value of the group was selected for use in this assessment (Appendix A).*

FIGURE 3-6
WESTERN HILLS NEIGHBORHOOD: FEBRUARY 10, 2023

Analyte	Maximum 1-second Concentration (ppbv)	Count of 1-hr Rolling Averages Derived (#)	Average 1-hr Rolling Average (ppbv)	Maximum 1-hr Rolling Average (ppbv)	AEGL 1 60-min Value (ppbv)	Health Reference Level (ppbv)	Hazard Quotient
BENZENE	2.58	11,259	0.26	0.32	52,000	9	0.03593
HYDROGEN SULFIDE	0.58	11,259	0.21	0.23	510	70	0.00331
HEXENES*	3.53	11,259	0.80	1.25	NR	500	0.00250
TRIMETHYLBENZENES*	1.15	11,259	0.22	0.29	NR	250	0.00116
TETRACHLOROETHYLENE	0.17	11,259	0.00	0.01	35,000	6	0.00105





*The top 5 hazard quotients are reported in this dashboard. The hazard index represents cumulative risks including all unlisted analytes. The hazard quotient was calculated by comparing the acute health reference level to the maximum 1-hour rolling average. The comparative AEGL value is shown for comparison purposes. NR = According to EPA, the AEGL value is "not recommended due to insufficient data". *For analyte isomer groups which were unable to be differentiated, the lowest health reference value of the group was selected for use in this assessment (Appendix A).*

3.3 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. Therefore, the acute hazard estimates presented in this assessment are estimates of risk due to a number of assumptions about exposure and toxicity. This screening-level risk assessment relied on a combination of health-protective exposure scenarios and input values (i.e., high-end exposures and conservative selection of lowest reference value per isomer). Because of these assumptions, the estimates of acute hazards are themselves uncertain but likely to be over-estimates of actual risk.

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.

3.4 Program Changes

No program changes occurred during this reporting period.

Respectfully Submitted:

Steven Yuchs, PhD.
Vice President, Technical
Ambient & Emerging Technology
Montrose Air Quality Services

Michael Lumpkin, PhD, DABT
Senior Toxicologist
CTEH®, LLC

APPENDIX A
ISOMER CHEMICAL SAMPLING DETAILS

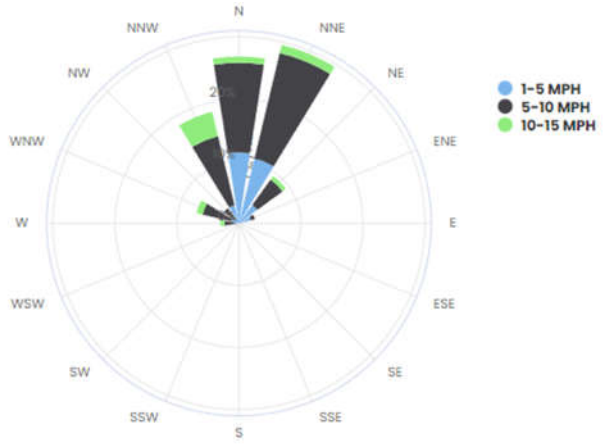
In a real-time PTR-TOF analysis, it is not possible to speciate isomers, or chemical compounds that have the same molecular weight. For example, n-hexane, 2-methyl pentane and 2,2-dimethyl butane all have a molecular mass of 86.178 g/mol. In order to provide the most conservative determination of concentration during this mapping program, each isomer's concentration is reported as the sum of all isomers with the same molecular weight. For the sake of simplicity, the calculations in the report refer to generic names for a group of specific isomers. The following table defines a simplified list of the many isomers that may comprise the generic groups reported.

Group Name	Specific Isomers
Butenes	1-Butene
	cis-2-Butene
	trans-2-Butene
Butanes	iso-Butane
	n-Butane
Cyclopentanes	Cyclopentane
	1-Pentene
	2-Methyl-2-butene
	cis-2-Pentene
	trans-2-Pentene
Pentanes	iso-Pentane
	n-Pentane
	neo-Pentane
Hexenes	1-Hexene
	Cyclohexane
	Methylcyclopentane
Hexanes	n-Hexane
	2-Methylpentane
	3-Methylpentane
	2,2-Dimethylbutane
	2,3-Dimethylbutane
Heptanes	n-Heptane
	2-Methylhexane
	3-Methylhexane
	2,3-Dimethylpentane
	2,4-Dimethylpentane

Group Name	Specific Isomers
Xylenes	Ethyl Benzene
	o-Xylene
	m-Xylene
	p-Xylene
Dimethylcyclohexanes	Ethylcyclohexane
	cis-1,3-Dimethylcyclohexane
	trans-1,2-Dimethylcyclohexane
	trans-1,3-Dimethylcyclohexane
Octanes	n-Octane
	2-Methylheptane
	3-Methylheptane
	2,2,4-Trimethylpentane
	2,3,4-Trimethylpentane
Trimethylbenzenes	Cumene
	1,2,4-Trimethylbenzene
	o-Ethyltoluene
	m-Ethyltoluene
	p-Ethyltoluene
	n-Propylbenzene
	1,3,5-Trimethylbenzene
Diethylbenzenes	o-Diethylbenzene
	m-Diethylbenzene
	p-Diethylbenzene
	All other $C_{10}H_{14}$ Isomers

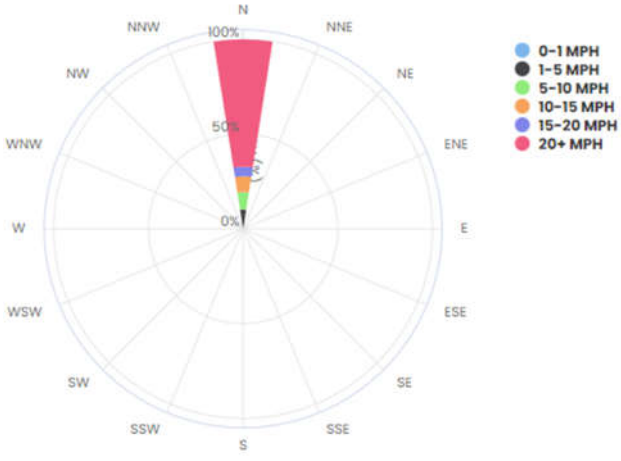
APPENDIX B
DAILY WIND ROSES

Wind Rose | CM4 (Adams Middle School) 9:00am – 1:30pm, February 10, 2023

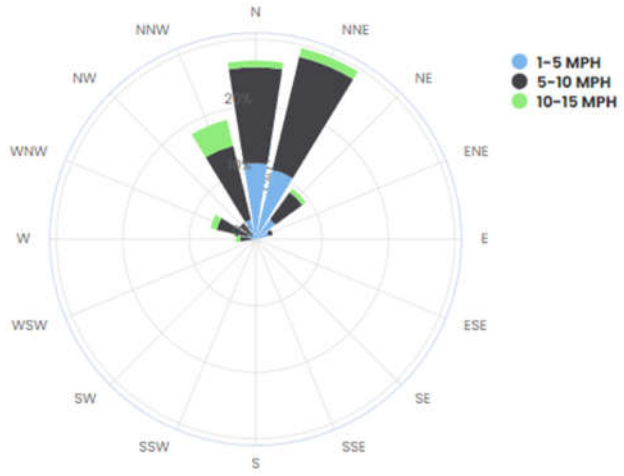


Wind Rose | CM3 (Adams City High School) 9:00am – 1:30pm, February 9, 2023

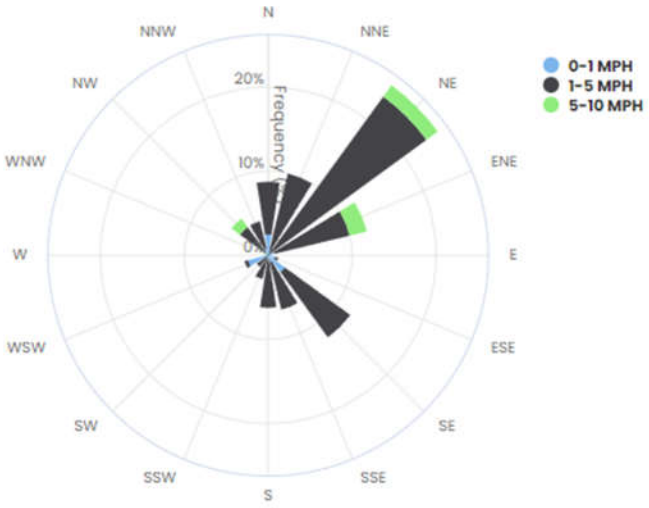
Wind Rose | CM7 (Kearney Middle School) 10:00am – 3:00pm, February 6, 2023



Wind Rose | CM6 (Focus Points Family Resource Center) 5:00pm – 10:00pm, February 8, 2023



Wind Rose | CM4 (Adams City Middle School) 5:30pm – 9:30pm, February 7, 2023



APPENDIX C
SCREENING RISK ASSESSMENT DETAILS
(ALPHABETICAL ORDER BY NEIGHBORHOOD NAME)

CCND Mobile Monitoring Van
2023 Q1

Mobile Laboratory Sampling Risk Scale (Hazard Quotient)

Adams City Neighborhood | February 7, 2023

Analyte	Cas No	Count of 1-second Concentrations (#)	Maximum 1-second Concentration (ppbv)	Count of 1-hr Rolling Averages Derived (#)	Maximum 1-hr Rolling Average (ppbv)	Health Reference Level (ppbv)	Screening Value Source	Hazard Quotient
1,3 BUTADIENE	106-99-0	12,040	0.16	8,441	0.02	298	OEHHA Acute REL	0.00005
ACETYLENE	74-86-2	12,040	0.86	8,441	0.29	25,000	TCEQ Short-Term AMCV Health	0.00001
BENZENE	71-43-2	12,040	4.18	8,441	0.64	9	ATSDR Acute MRL	0.07110
BUTANES*	75-28-5	12,040	11.61	8,441	2.88	33000	TCEQ Short-Term AMCV Health	0.00009
BUTENES*	590-18-1	12,040	26.38	8,441	2.08	15000	TCEQ Short-Term AMCV Health	0.00014
CARBON DISULFIDE	75-15-0	12,040	0.04	8,441	0.00	1,991	OEHHA Acute REL	0.00000
CYCLOPENTANES*	287-92-3	12,040	29.35	8,441	2.58	5,900	TCEQ Short-Term AMCV Health	0.00044
DECANES	124-18-5	12,040	0.11	8,441	0.05	1,000	TCEQ Short-Term AMCV Health	0.00005
DIETHYLBENZENES*	141-93-5	12,040	0.39	8,441	0.17	450	TCEQ Short-Term AMCV Health	0.00038
DIMETHYLCYCLOHEXANES*	638-04-0	12,040	0.27	8,441	0.09	4,000	CDPHE	0.00002
DODECANES	112-40-3	12,040	0.01	8,441	0.00	1720	CDPHE	0.00000
ETHYLENE	74-85-1	12,040	7.43	8,441	5.80	500,000	TCEQ Short-Term AMCV Health	0.00001
HEPTANES*	142-82-5	12,040	0.65	8,441	0.08	8,300	TCEQ Short-Term AMCV Health	0.00001
HEXANES*	110-54-3	12,040	0.42	8,441	0.24	5,400	TCEQ Short-Term AMCV Health	0.00005
HEXENES*	592-41-6	12,040	6.63	8,441	0.94	500	TCEQ Short-Term AMCV Health	0.00189
HYDROGEN CYANIDE	74-90-8	12,040	1.55	8,441	0.20	308	OEHHA Acute REL	0.00065
HYDROGEN SULFIDE	7783-06-4	12,040	0.59	8,441	0.13	70	ATSDR Acute MRL	0.00192
ISOPRENE	78-79-5	12,040	1.16	8,441	0.21	1,400	TCEQ Short-Term AMCV Health	0.00015
METHANOL	67-56-1	12,040	11.09	8,441	6.63	21,366	OEHHA Acute REL	0.00031
METHYLCYCLOHEXANE	108-87-2	12,040	0.19	8,441	0.07	4,000	TCEQ Short-Term AMCV Health	0.00002
NONANES	111-84-2	12,040	0.07	8,441	0.02	3,000	TCEQ Short-Term AMCV Health	0.00001
OCTANES*	111-65-9	12,040	0.38	8,441	0.08	4,100	TCEQ Short-Term AMCV Health	0.00002
PENTANES*	109-66-0	12,040	0.18	8,441	0.15	68,000	TCEQ Short-Term AMCV Health	0.00000
PROPYLENE	115-07-1	12,040	2.68	8,441	0.42	NA	NE	
STYRENE	100-42-5	12,040	0.30	8,441	0.12	5,000	ATSDR Acute MRL	0.00002
TETRACHLOROETHYLENE	127-18-4	12,040	0.32	8,441	0.01	6	ATSDR Acute MRL	0.00086
TOLUENE	108-88-3	12,040	17.15	8,441	1.95	2,000	ATSDR Acute MRL	0.00097
TRIMETHYLBENZENES*	622-96-8	12,040	1.90	8,441	0.58	250	TCEQ Short-Term AMCV Health	0.00233
UNDECANES	1120-21-4	12,040	0.09	8,441	0.04	550	TCEQ Short-Term AMCV Health	0.00006
XYLENES*	1330-20-7	12,040	10.23	8,441	2.32	2,000	ATSDR Acute MRL	0.00116
							Hazard Index	0.08270

NR = According to EPA, AEGL is "not recommended due to insufficient data"
NA = Not Available
NC = Not Calculated

*For analyte isomer groups which were unable to be differentiated, the lowest health reference value of the isomer roup was selected for use in the assessment (See Appendix A)

Mobile Laboratory Sampling Risk Scale (Hazard Quotient)

Dupont Neighborhood | February 9, 2023

Analyte	Cas No	Count of 1-second Concentrations (#)	Maximum 1-second Concentration (ppbv)	Count of 1-hr Rolling Averages Derived (#)	Maximum 1-hr Rolling Average (ppbv)	Health Reference Level (ppbv)	Screening Value Source	Hazard Quotient
1,3 BUTADIENE	106-99-0	14,588	2.45	11,025	0.02	298	OEHHA Acute REL	0.00008
ACETYLENE	74-86-2	14,588	0.96	11,025	0.20	25,000	TCEQ Short-Term AMCV Health	0.00001
BENZENE	71-43-2	14,588	4.57	11,025	0.32	9	ATSDR Acute MRL	0.03552
BUTANES*	75-28-5	14,588	8.85	11,025	0.96	33000	TCEQ Short-Term AMCV Health	0.00003
BUTENES*	590-18-1	14,588	10.95	11,025	2.45	15000	TCEQ Short-Term AMCV Health	0.00016
CARBON DISULFIDE	75-15-0	14,588	0.25	11,025	0.00	1,991	OEHHA Acute REL	0.00000
CYCLOPENTANES*	287-92-3	14,588	13.77	11,025	1.48	5,900	TCEQ Short-Term AMCV Health	0.00025
DECANES	124-18-5	14,588	0.08	11,025	0.03	1,000	TCEQ Short-Term AMCV Health	0.00003
DIETHYLBENZENES*	141-93-5	14,588	0.30	11,025	0.10	450	TCEQ Short-Term AMCV Health	0.00023
DIMETHYLCYCLOHEXANES*	638-04-0	14,588	0.12	11,025	0.07	4,000	CDPHE	0.00002
DODECANES	112-40-3	14,588	3.20	11,025	0.01	1720	CDPHE	0.00000
ETHYLENE	74-85-1	14,588	7.65	11,025	6.46	500,000	TCEQ Short-Term AMCV Health	0.00001
HEPTANES*	142-82-5	14,588	0.17	11,025	0.04	8,300	TCEQ Short-Term AMCV Health	0.00000
HEXANES*	110-54-3	14,588	0.35	11,025	0.08	5,400	TCEQ Short-Term AMCV Health	0.00001
HEXENES*	592-41-6	14,588	3.70	11,025	1.05	500	TCEQ Short-Term AMCV Health	0.00210
HYDROGEN CYANIDE	74-90-8	14,588	1.17	11,025	0.25	308	OEHHA Acute REL	0.00082
HYDROGEN SULFIDE	7783-06-4	14,588	0.54	11,025	0.16	70	ATSDR Acute MRL	0.00230
ISOPRENE	78-79-5	14,588	2.98	11,025	0.09	1,400	TCEQ Short-Term AMCV Health	0.00007
METHANOL	67-56-1	14,588	6.74	11,025	4.24	21,366	OEHHA Acute REL	0.00020
METHYLCYCLOHEXANE	108-87-2	14,588	0.15	11,025	0.09	4,000	TCEQ Short-Term AMCV Health	0.00002
NONANES	111-84-2	14,588	0.11	11,025	0.01	3,000	TCEQ Short-Term AMCV Health	0.00000
OCTANES*	111-65-9	14,588	0.16	11,025	0.02	4,100	TCEQ Short-Term AMCV Health	0.00001
PENTANES*	109-66-0	14,588	1.05	11,025	1.03	68,000	TCEQ Short-Term AMCV Health	0.00002
PROPYLENE	115-07-1	14,588	2.04	11,025	0.18	NA	NE	
STYRENE	100-42-5	14,588	0.92	11,025	0.07	5,000	ATSDR Acute MRL	0.00001
TETRACHLOROETHYLENE	127-18-4	14,588	0.08	11,025	0.00	6	ATSDR Acute MRL	0.00049
TOLUENE	108-88-3	14,588	7.16	11,025	0.39	2,000	ATSDR Acute MRL	0.00020
TRIMETHYLBENZENES*	622-96-8	14,588	1.50	11,025	0.16	250	TCEQ Short-Term AMCV Health	0.00064
UNDECANES	1120-21-4	14,588	0.07	11,025	0.02	550	TCEQ Short-Term AMCV Health	0.00004
XYLENES*	1330-20-7	14,588	7.98	11,025	0.93	2,000	ATSDR Acute MRL	0.00046
							Hazard Index	0.04374

NR = According to EPA, AEGL is "not recommended due to insufficient data"
NA = Not Available
NC = Not Calculated

*For analyte isomer groups which were unable to be differentiated, the lowest health reference value of the isomer roup was selected for use in the assessment (See Appendix A)

Mobile Laboratory Sampling Risk Scale (Hazard Quotient)

Elyria-Swansea Neighborhood | February 8, 2023

Analyte	Cas No	Count of 1-second Concentrations (#)	Maximum 1-second Concentration (ppbv)	Count of 1-hr Rolling Averages Derived (#)	Maximum 1-hr Rolling Average (ppbv)	Health Reference Level (ppbv)	Screening Value Source	Hazard Quotient
1,3 BUTADIENE	106-99-0	8,244	0.15	4,681	0.02	298	OEHHA Acute REL	0.00007
ACETYLENE	74-86-2	8,244	0.89	4,681	0.27	25,000	TCEQ Short-Term AMCV Health	0.00001
BENZENE	71-43-2	8,244	2.84	4,681	0.33	9	ATSDR Acute MRL	0.03691
BUTANES*	75-28-5	8,244	10.72	4,681	1.92	33000	TCEQ Short-Term AMCV Health	0.00006
BUTENES*	590-18-1	8,244	8.55	4,681	2.23	15000	TCEQ Short-Term AMCV Health	0.00015
CARBON DISULFIDE	75-15-0	8,244	0.03	4,681	0.00	1,991	OEHHA Acute REL	0.00000
CYCLOPENTANES*	287-92-3	8,244	10.44	4,681	2.44	5,900	TCEQ Short-Term AMCV Health	0.00041
DECANES	124-18-5	8,244	0.06	4,681	0.03	1,000	TCEQ Short-Term AMCV Health	0.00003
DIETHYLBENZENES*	141-93-5	8,244	0.16	4,681	0.09	450	TCEQ Short-Term AMCV Health	0.00021
DIMETHYLCYCLOHEXANES*	638-04-0	8,244	0.11	4,681	0.07	4,000	CDPHE	0.00002
DODECANES	112-40-3	8,244	0.01	4,681	0.00	1720	CDPHE	0.00000
ETHYLENE	74-85-1	8,244	8.01	4,681	7.47	500,000	TCEQ Short-Term AMCV Health	0.00001
HEPTANES*	142-82-5	8,244	0.08	4,681	0.04	8,300	TCEQ Short-Term AMCV Health	0.00001
HEXANES*	110-54-3	8,244	0.25	4,681	0.18	5,400	TCEQ Short-Term AMCV Health	0.00003
HEXENES*	592-41-6	8,244	3.94	4,681	1.05	500	TCEQ Short-Term AMCV Health	0.00210
HYDROGEN CYANIDE	74-90-8	8,244	0.65	4,681	0.22	308	OEHHA Acute REL	0.00072
HYDROGEN SULFIDE	7783-06-4	8,244	0.56	4,681	0.24	70	ATSDR Acute MRL	0.00337
ISOPRENE	78-79-5	8,244	0.62	4,681	0.28	1,400	TCEQ Short-Term AMCV Health	0.00020
METHANOL	67-56-1	8,244	6.58	4,681	4.29	21,366	OEHHA Acute REL	0.00020
METHYLCYCLOHEXANE	108-87-2	8,244	0.22	4,681	0.13	4,000	TCEQ Short-Term AMCV Health	0.00003
NONANES	111-84-2	8,244	0.08	4,681	0.06	3,000	TCEQ Short-Term AMCV Health	0.00002
OCTANES*	111-65-9	8,244	0.15	4,681	0.09	4,100	TCEQ Short-Term AMCV Health	0.00002
PENTANES*	109-66-0	8,244	0.24	4,681	0.21	68,000	TCEQ Short-Term AMCV Health	0.00000
PROPYLENE	115-07-1	8,244	1.14	4,681	0.38	NA	NE	
STYRENE	100-42-5	8,244	0.14	4,681	0.07	5,000	ATSDR Acute MRL	0.00001
TETRACHLOROETHYLENE	127-18-4	8,244	0.10	4,681	0.00	6	ATSDR Acute MRL	0.00025
TOLUENE	108-88-3	8,244	7.38	4,681	0.73	2,000	ATSDR Acute MRL	0.00037
TRIMETHYLBENZENES*	622-96-8	8,244	0.95	4,681	0.24	250	TCEQ Short-Term AMCV Health	0.00098
UNDECANES	1120-21-4	8,244	0.06	4,681	0.02	550	TCEQ Short-Term AMCV Health	0.00004
XYLENES*	1330-20-7	8,244	7.03	4,681	1.37	2,000	ATSDR Acute MRL	0.00068
							Hazard Index	0.04693

NR = According to EPA, AEGL is "not recommended due to insufficient data"
NA = Not Available
NC = Not Calculated

*For analyte isomer groups which were unable to be differentiated, the lowest health reference value of the isomer roup was selected for use in the assessment (See Appendix A)

CCND Mobile Monitoring Van
2023 Q1

Mobile Laboratory Sampling Risk Scale (Hazard Quotient)

Globeville Neighborhood | February 8, 2023

Analyte	Cas No	Count of 1-second Concentrations (#)	Maximum 1-second Concentration (ppbv)	Count of 1-hr Rolling Averages Derived (#)	Maximum 1-hr Rolling Average (ppbv)	Health Reference Level (ppbv)	Screening Value Source	Hazard Quotient
1,3 BUTADIENE	106-99-0	8,085	0.15	4,486	0.02	298	OEHHA Acute REL	0.00006
ACETYLENE	74-86-2	8,085	0.79	4,486	0.18	25,000	TCEQ Short-Term AMCV Health	0.00001
BENZENE	71-43-2	8,085	3.68	4,486	0.30	9	ATSDR Acute MRL	0.03302
BUTANES*	75-28-5	8,085	54.71	4,486	1.58	33000	TCEQ Short-Term AMCV Health	0.00005
BUTENES*	590-18-1	8,085	13.62	4,486	1.39	15000	TCEQ Short-Term AMCV Health	0.00009
CARBON DISULFIDE	75-15-0	8,085	0.03	4,486	0.00	1,991	OEHHA Acute REL	0.00000
CYCLOPENTANES*	287-92-3	8,085	16.86	4,486	1.61	5,900	TCEQ Short-Term AMCV Health	0.00027
DECANES	124-18-5	8,085	0.09	4,486	0.03	1,000	TCEQ Short-Term AMCV Health	0.00003
DIETHYLBENZENES*	141-93-5	8,085	0.21	4,486	0.11	450	TCEQ Short-Term AMCV Health	0.00025
DIMETHYLCYCLOHEXANES*	638-04-0	8,085	0.12	4,486	0.02	4,000	CDPHE	0.00001
DODECANES	112-40-3	8,085	0.02	4,486	0.00	1720	CDPHE	0.00000
ETHYLENE	74-85-1	8,085	8.61	4,486	7.57	500,000	TCEQ Short-Term AMCV Health	0.00002
HEPTANES*	142-82-5	8,085	0.10	4,486	0.05	8,300	TCEQ Short-Term AMCV Health	0.00001
HEXANES*	110-54-3	8,085	0.19	4,486	0.11	5,400	TCEQ Short-Term AMCV Health	0.00002
HEXENES*	592-41-6	8,085	12.19	4,486	0.68	500	TCEQ Short-Term AMCV Health	0.00137
HYDROGEN CYANIDE	74-90-8	8,085	0.63	4,486	0.19	308	OEHHA Acute REL	0.00061
HYDROGEN SULFIDE	7783-06-4	8,085	1.39	4,486	0.20	70	ATSDR Acute MRL	0.00285
ISOPRENE	78-79-5	8,085	0.74	4,486	0.18	1,400	TCEQ Short-Term AMCV Health	0.00013
METHANOL	67-56-1	8,085	5.60	4,486	4.36	21,366	OEHHA Acute REL	0.00020
METHYLCYCLOHEXANE	108-87-2	8,085	0.17	4,486	0.08	4,000	TCEQ Short-Term AMCV Health	0.00002
NONANES	111-84-2	8,085	0.04	4,486	0.01	3,000	TCEQ Short-Term AMCV Health	0.00000
OCTANES*	111-65-9	8,085	0.12	4,486	0.03	4,100	TCEQ Short-Term AMCV Health	0.00001
PENTANES*	109-66-0	8,085	0.23	4,486	0.20	68,000	TCEQ Short-Term AMCV Health	0.00000
PROPYLENE	115-07-1	8,085	2.10	4,486	0.32	NA	NE	
STYRENE	100-42-5	8,085	0.20	4,486	0.08	5,000	ATSDR Acute MRL	0.00002
TETRACHLOROETHYLENE	127-18-4	8,085	0.16	4,486	0.00	6	ATSDR Acute MRL	0.00035
TOLUENE	108-88-3	8,085	44.25	4,486	0.66	2,000	ATSDR Acute MRL	0.00033
TRIMETHYLBENZENES*	622-96-8	8,085	2.23	4,486	0.30	250	TCEQ Short-Term AMCV Health	0.00119
UNDECANES	1120-21-4	8,085	0.06	4,486	0.03	550	TCEQ Short-Term AMCV Health	0.00005
XYLENES*	1330-20-7	8,085	11.80	4,486	0.72	2,000	ATSDR Acute MRL	0.00036
							Hazard Index	0.04132

NR = According to EPA, AEGL is "not recommended due to insufficient data"
NA = Not Available
NC = Not Calculated

*For analyte isomer groups which were unable to be differentiated, the lowest health reference value of the isomer roup was selected for use in the assessment (See Appendix A)

CCND Mobile Monitoring Van
2023 Q1

Mobile Laboratory Sampling Risk Scale (Hazard Quotient)

Pioneer Park Neighborhood | February 6, 2023

Analyte	Cas No	Count of 1-second Concentrations (#)	Maximum 1-second Concentration (ppbv)	Count of 1-hr Rolling Averages Derived (#)	Maximum 1-hr Rolling Average (ppbv)	Health Reference Level (ppbv)	Screening Value Source	Hazard Quotient
1,3 BUTADIENE	106-99-0	15,276	0.15	11,677	0.02	298	OEHHA Acute REL	0.00006
ACETYLENE	74-86-2	15,276	0.73	11,677	0.13	25,000	TCEQ Short-Term AMCV Health	0.00001
BENZENE	71-43-2	15,276	2.36	11,677	0.27	9	ATSDR Acute MRL	0.03051
BUTANES*	75-28-5	15,276	12.89	11,677	1.48	33000	TCEQ Short-Term AMCV Health	0.00004
BUTENES*	590-18-1	15,276	17.99	11,677	1.55	15000	TCEQ Short-Term AMCV Health	0.00010
CARBON DISULFIDE	75-15-0	15,276	0.04	11,677	0.00	1,991	OEHHA Acute REL	0.00000
CYCLOPENTANES*	287-92-3	15,276	20.87	11,677	1.93	5,900	TCEQ Short-Term AMCV Health	0.00033
DECANES	124-18-5	15,276	0.09	11,677	0.04	1,000	TCEQ Short-Term AMCV Health	0.00004
DIETHYLBENZENES*	141-93-5	15,276	0.53	11,677	0.23	450	TCEQ Short-Term AMCV Health	0.00051
DIMETHYLCYCLOHEXANES*	638-04-0	15,276	0.06	11,677	0.02	4,000	CDPHE	0.00001
DODECANES	112-40-3	15,276	0.01	11,677	0.00	1720	CDPHE	0.00000
ETHYLENE	74-85-1	15,276	5.10	11,677	4.42	500,000	TCEQ Short-Term AMCV Health	0.00001
HEPTANES*	142-82-5	15,276	0.22	11,677	0.17	8,300	TCEQ Short-Term AMCV Health	0.00002
HEXANES*	110-54-3	15,276	0.23	11,677	0.13	5,400	TCEQ Short-Term AMCV Health	0.00002
HEXENES*	592-41-6	15,276	3.73	11,677	0.78	500	TCEQ Short-Term AMCV Health	0.00157
HYDROGEN CYANIDE	74-90-8	15,276	1.01	11,677	0.41	308	OEHHA Acute REL	0.00135
HYDROGEN SULFIDE	7783-06-4	15,276	0.50	11,677	0.19	70	ATSDR Acute MRL	0.00275
ISOPRENE	78-79-5	15,276	0.93	11,677	0.23	1,400	TCEQ Short-Term AMCV Health	0.00016
METHANOL	67-56-1	15,276	4.19	11,677	3.60	21,366	OEHHA Acute REL	0.00017
METHYLCYCLOHEXANE	108-87-2	15,276	0.25	11,677	0.05	4,000	TCEQ Short-Term AMCV Health	0.00001
NONANES	111-84-2	15,276	0.06	11,677	0.02	3,000	TCEQ Short-Term AMCV Health	0.00001
OCTANES*	111-65-9	15,276	0.08	11,677	0.03	4,100	TCEQ Short-Term AMCV Health	0.00001
PENTANES*	109-66-0	15,276	0.35	11,677	0.32	68,000	TCEQ Short-Term AMCV Health	0.00000
PROPYLENE	115-07-1	15,276	1.68	11,677	0.30	NA	NE	
STYRENE	100-42-5	15,276	0.20	11,677	0.10	5,000	ATSDR Acute MRL	0.00002
TETRACHLOROETHYLENE	127-18-4	15,276	0.09	11,677	0.01	6	ATSDR Acute MRL	0.00108
TOLUENE	108-88-3	15,276	7.47	11,677	0.51	2,000	ATSDR Acute MRL	0.00026
TRIMETHYLBENZENES*	622-96-8	15,276	1.19	11,677	0.18	250	TCEQ Short-Term AMCV Health	0.00072
UNDECANES	1120-21-4	15,276	0.06	11,677	0.03	550	TCEQ Short-Term AMCV Health	0.00005
XYLENES*	1330-20-7	15,276	6.39	11,677	0.97	2,000	ATSDR Acute MRL	0.00049
							Hazard Index	0.04031

NR = According to EPA, AEGL is "not recommended due to insufficient data"
NA = Not Available
NC = Not Calculated

*For analyte isomer groups which were unable to be differentiated, the lowest health reference value of the isomer roup was selected for use in the assessment (See Appendix A)

Mobile Laboratory Sampling Risk Scale (Hazard Quotient)

Western Hills Neighborhood | February 10, 2023

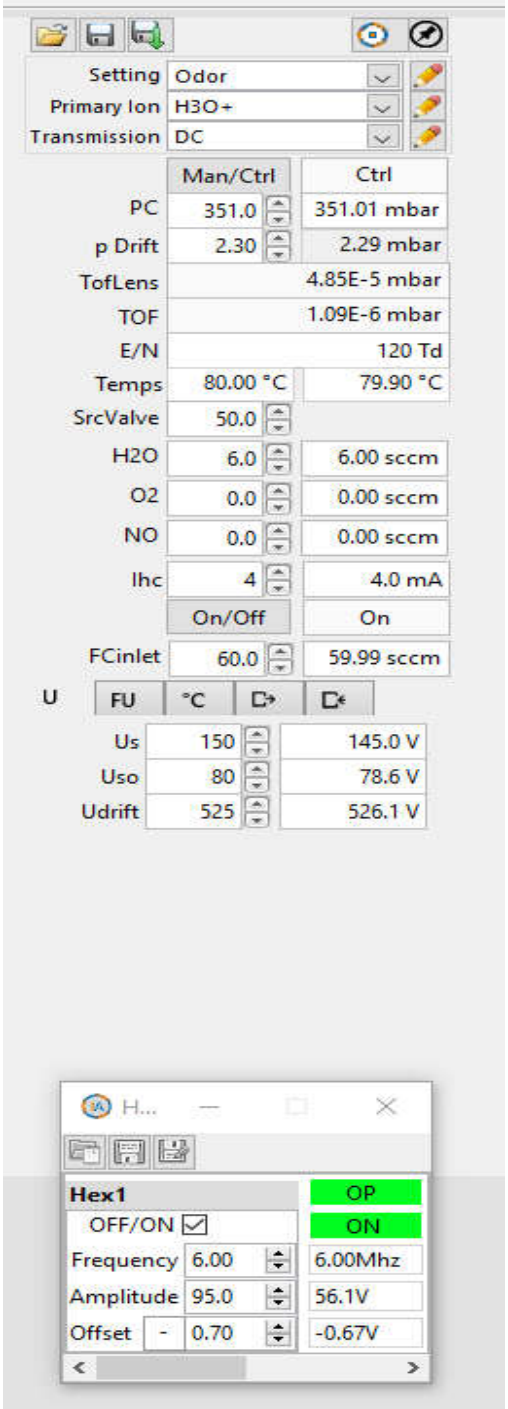
Analyte	Cas No	Count of 1-second Concentrations (#)	Maximum 1-second Concentration (ppbv)	Count of 1-hr Rolling Averages Derived (#)	Maximum 1-hr Rolling Average (ppbv)	Health Reference Level (ppbv)	Screening Value Source	Hazard Quotient
1,3 BUTADIENE	106-99-0	14,822	0.18	11,259	0.04	298	OEHHA Acute REL	0.00012
ACETYLENE	74-86-2	14,822	0.78	11,259	0.17	25,000	TCEQ Short-Term AMCV Health	0.00001
BENZENE	71-43-2	14,822	2.58	11,259	0.32	9	ATSDR Acute MRL	0.03593
BUTANES*	75-28-5	14,822	30.54	11,259	1.35	33000	TCEQ Short-Term AMCV Health	0.00004
BUTENES*	590-18-1	14,822	17.73	11,259	2.75	15000	TCEQ Short-Term AMCV Health	0.00018
CARBON DISULFIDE	75-15-0	14,822	0.04	11,259	0.00	1,991	OEHHA Acute REL	0.00000
CYCLOPENTANES*	287-92-3	14,822	23.21	11,259	2.88	5,900	TCEQ Short-Term AMCV Health	0.00049
DECANES	124-18-5	14,822	0.10	11,259	0.04	1,000	TCEQ Short-Term AMCV Health	0.00004
DIETHYLBENZENES*	141-93-5	14,822	0.34	11,259	0.13	450	TCEQ Short-Term AMCV Health	0.00029
DIMETHYLCYCLOHEXANES*	638-04-0	14,822	0.15	11,259	0.10	4,000	CDPHE	0.00002
DODECANES	112-40-3	14,822	0.02	11,259	0.00	1720	CDPHE	0.00000
ETHYLENE	74-85-1	14,822	10.20	11,259	8.03	500,000	TCEQ Short-Term AMCV Health	0.00002
HEPTANES*	142-82-5	14,822	0.10	11,259	0.04	8,300	TCEQ Short-Term AMCV Health	0.00000
HEXANES*	110-54-3	14,822	0.12	11,259	0.03	5,400	TCEQ Short-Term AMCV Health	0.00001
HEXENES*	592-41-6	14,822	3.53	11,259	1.25	500	TCEQ Short-Term AMCV Health	0.00250
HYDROGEN CYANIDE	74-90-8	14,822	0.76	11,259	0.26	308	OEHHA Acute REL	0.00084
HYDROGEN SULFIDE	7783-06-4	14,822	0.58	11,259	0.23	70	ATSDR Acute MRL	0.00331
ISOPRENE	78-79-5	14,822	0.86	11,259	0.20	1,400	TCEQ Short-Term AMCV Health	0.00014
METHANOL	67-56-1	14,822	6.11	11,259	4.49	21,366	OEHHA Acute REL	0.00021
METHYLCYCLOHEXANE	108-87-2	14,822	0.14	11,259	0.05	4,000	TCEQ Short-Term AMCV Health	0.00001
NONANES	111-84-2	14,822	0.04	11,259	0.01	3,000	TCEQ Short-Term AMCV Health	0.00000
OCTANES*	111-65-9	14,822	0.21	11,259	0.03	4,100	TCEQ Short-Term AMCV Health	0.00001
PENTANES*	109-66-0	14,822	0.14	11,259	0.12	68,000	TCEQ Short-Term AMCV Health	0.00000
PROPYLENE	115-07-1	14,822	3.85	11,259	0.23	NA	NE	
STYRENE	100-42-5	14,822	0.25	11,259	0.10	5,000	ATSDR Acute MRL	0.00002
TETRACHLOROETHYLENE	127-18-4	14,822	0.17	11,259	0.01	6	ATSDR Acute MRL	0.00105
TOLUENE	108-88-3	14,822	5.54	11,259	0.73	2,000	ATSDR Acute MRL	0.00036
TRIMETHYLBENZENES*	622-96-8	14,822	1.15	11,259	0.29	250	TCEQ Short-Term AMCV Health	0.00116
UNDECANES	1120-21-4	14,822	0.07	11,259	0.03	550	TCEQ Short-Term AMCV Health	0.00005
XYLENES*	1330-20-7	14,822	6.52	11,259	1.50	2,000	ATSDR Acute MRL	0.00075
							Hazard Index	0.04757

NR = According to EPA, AEGL is "not recommended due to insufficient data"
NA = Not Available
NC = Not Calculated

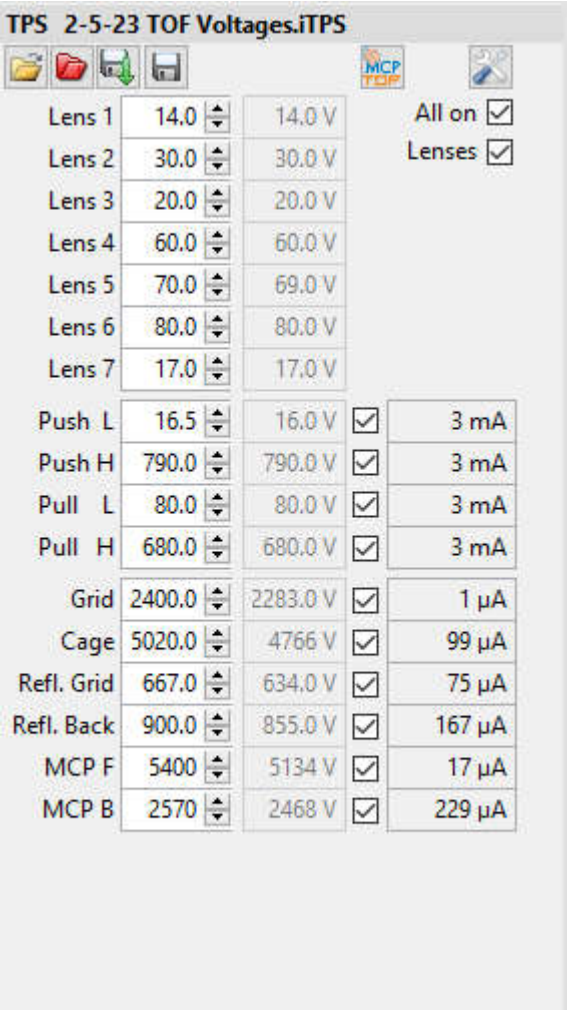
*For analyte isomer groups which were unable to be differentiated, the lowest health reference value of the isomer roup was selected for use in the assessment (See Appendix A)

APPENDIX D
CALIBRATION AND QA/QC DATA

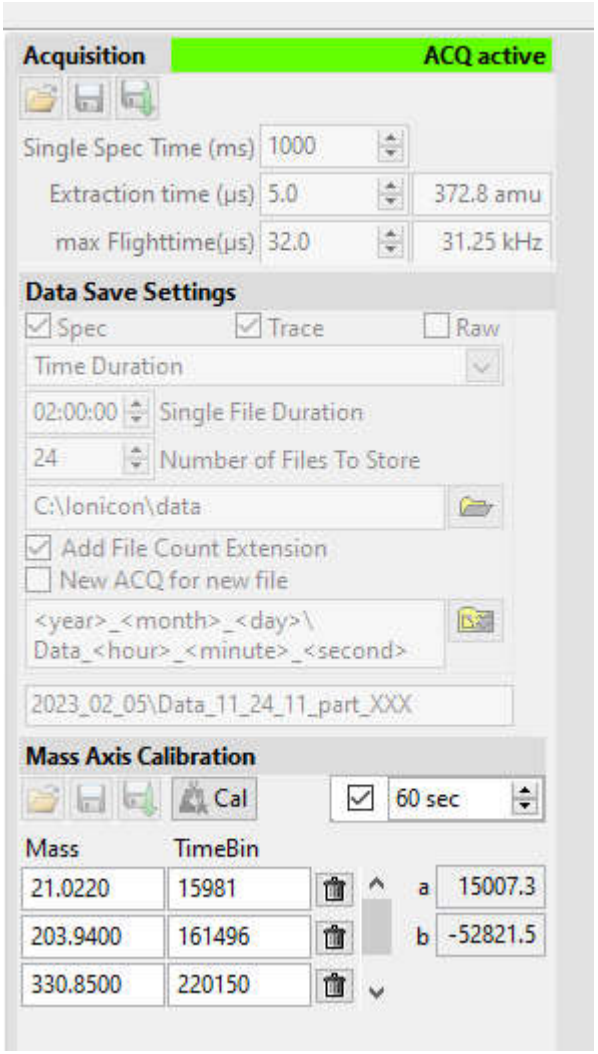
Commerce City Community Monitoring
1st Quarter 2023
Initial PTR Parameters and Calibrations



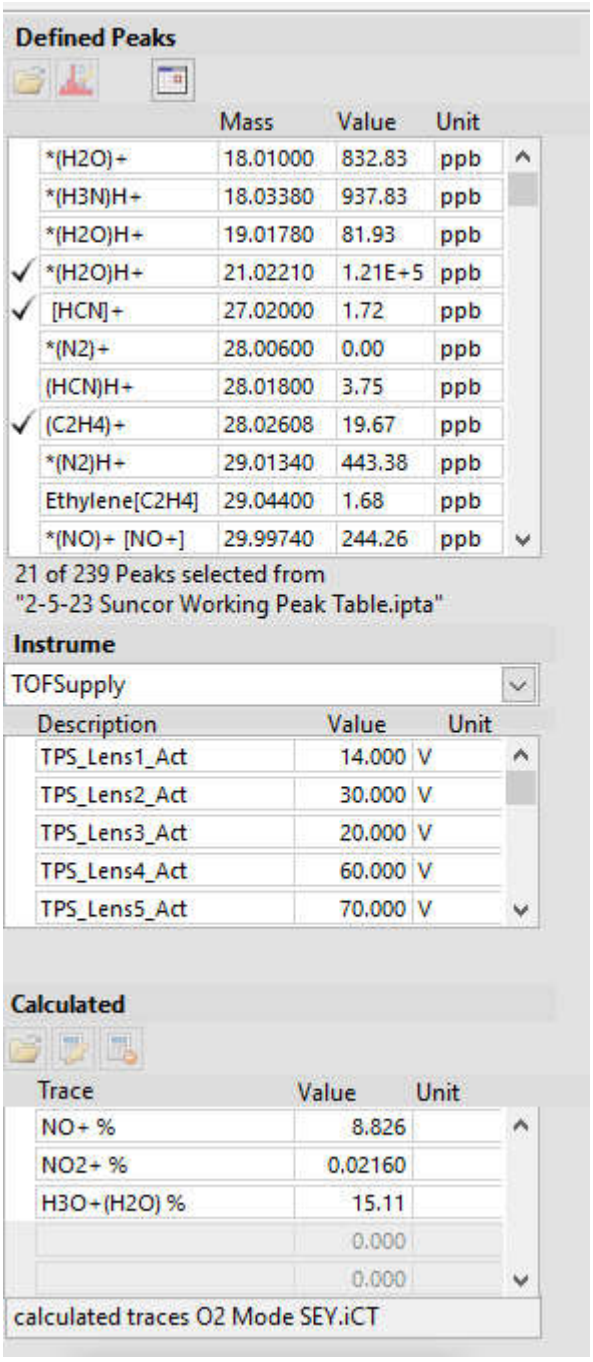
Production Settings



TOF Voltages



Acquisition Settings



Defined Peaks

	Mass	Value	Unit
*(H2O)+	18.01000	832.83	ppb
*(H3N)H+	18.03380	937.83	ppb
*(H2O)H+	19.01780	81.93	ppb
✓ *(H2O)H+	21.02210	1.21E+5	ppb
✓ [HCN]+	27.02000	1.72	ppb
*(N2)+	28.00600	0.00	ppb
(HCN)H+	28.01800	3.75	ppb
✓ (C2H4)+	28.02608	19.67	ppb
*(N2)H+	29.01340	443.38	ppb
Ethylene[C2H4]	29.04400	1.68	ppb
*(NO)+ [NO+]	29.99740	244.26	ppb

21 of 239 Peaks selected from
"2-5-23 Suncor Working Peak Table.ipta"

Instrume

TOFSupply

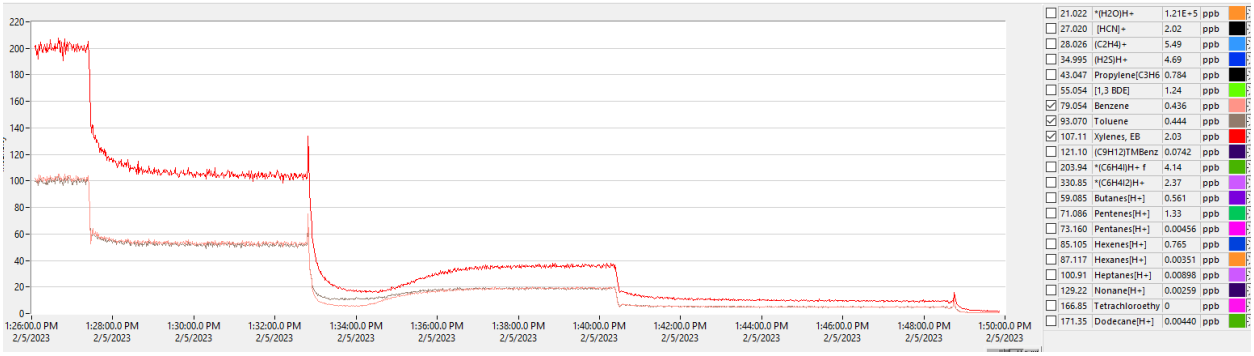
Description	Value	Unit
TPS_Lens1_Act	14.000	V
TPS_Lens2_Act	30.000	V
TPS_Lens3_Act	20.000	V
TPS_Lens4_Act	60.000	V
TPS_Lens5_Act	70.000	V

Calculated

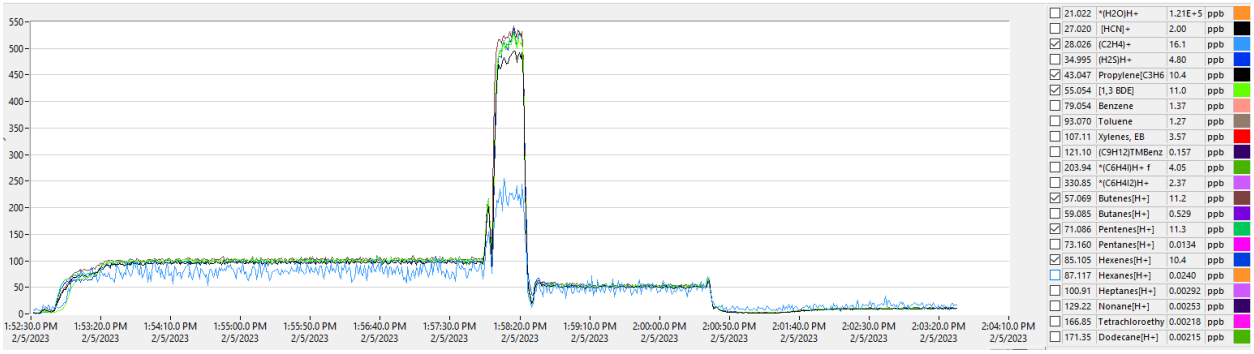
Trace	Value	Unit
NO+ %	8.826	
NO2+ %	0.02160	
H3O+(H2O) %	15.11	
	0.000	
	0.000	

calculated traces O2 Mode SEY.iCT

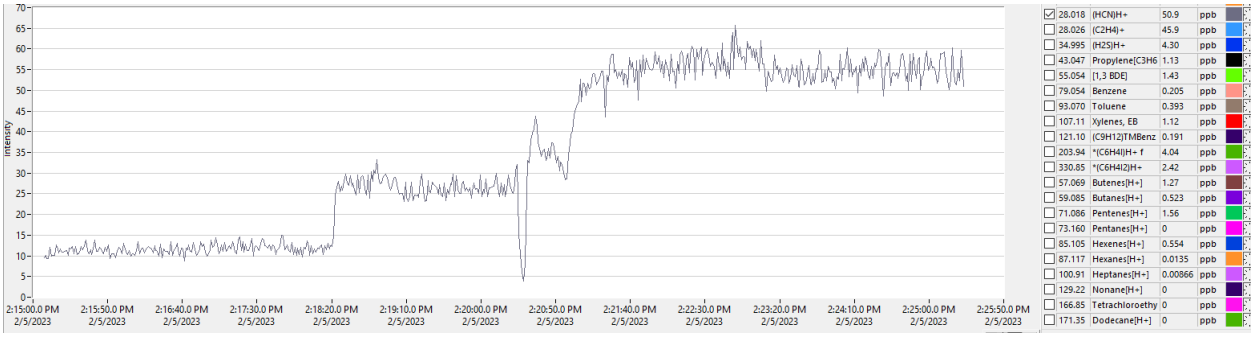
Peak Table and Traces



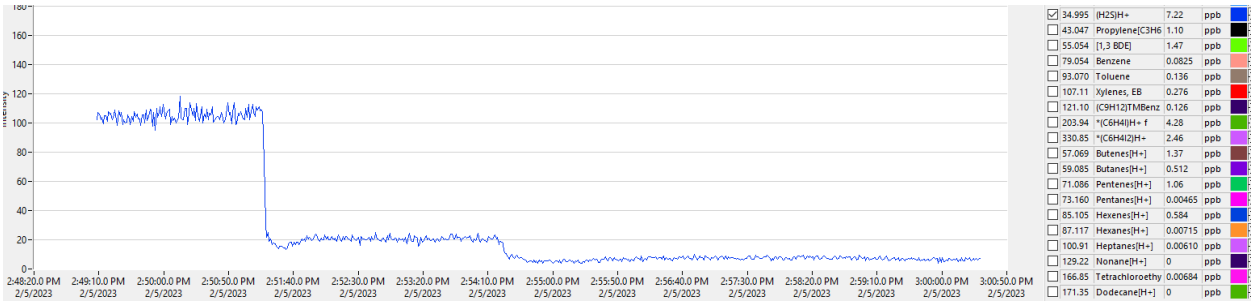
BTEX Calibrations 100, 50, 20 and 5 ppb B and T, 200,100,40 and 10 ppb EB and Xylene



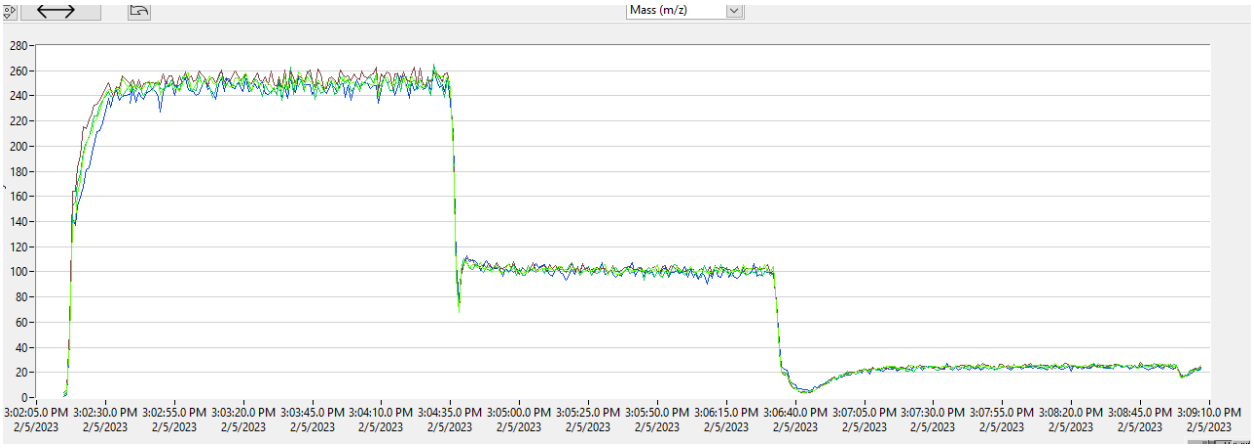
Alkenes Calibrations 100, 50 and 10 ppb



HCN Calibrations 50, 25 and 10 ppb

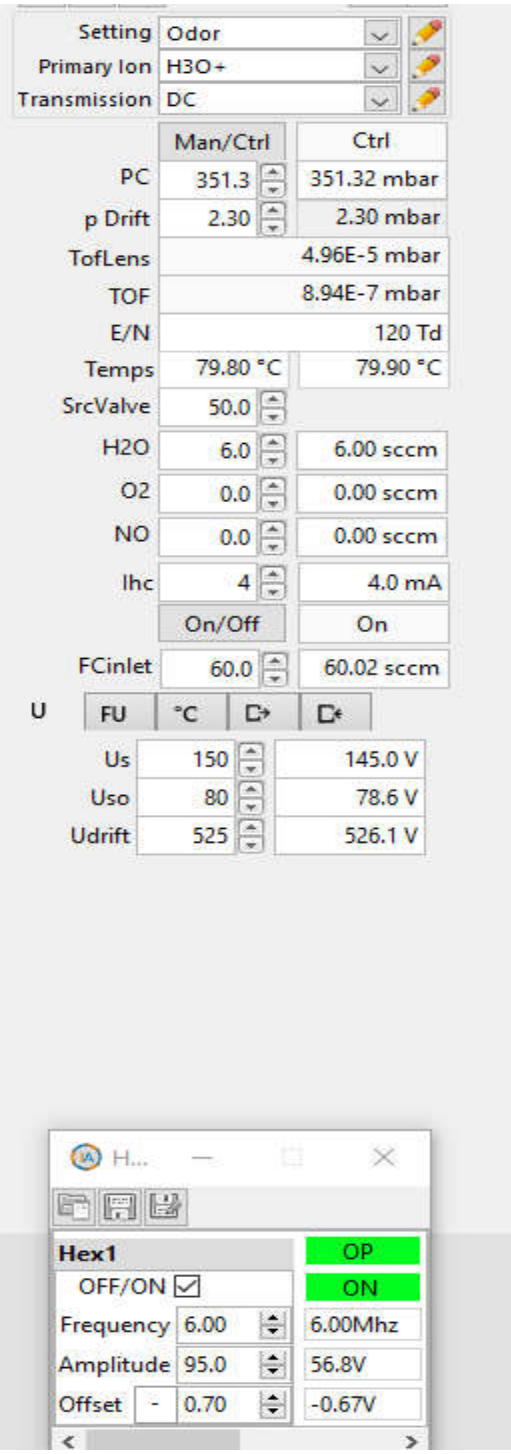


H2S Calibrations 100, 20 and 5 ppb

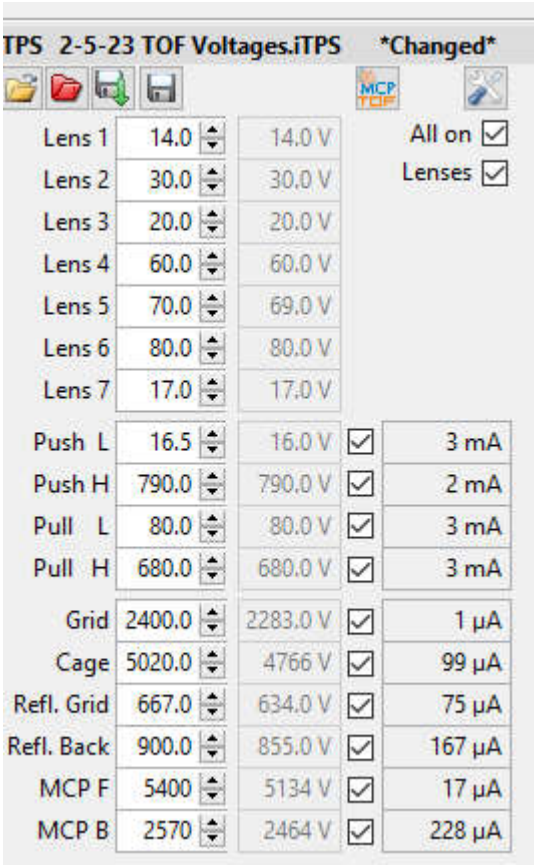


Alkanes 250, 100 and 25 ppb

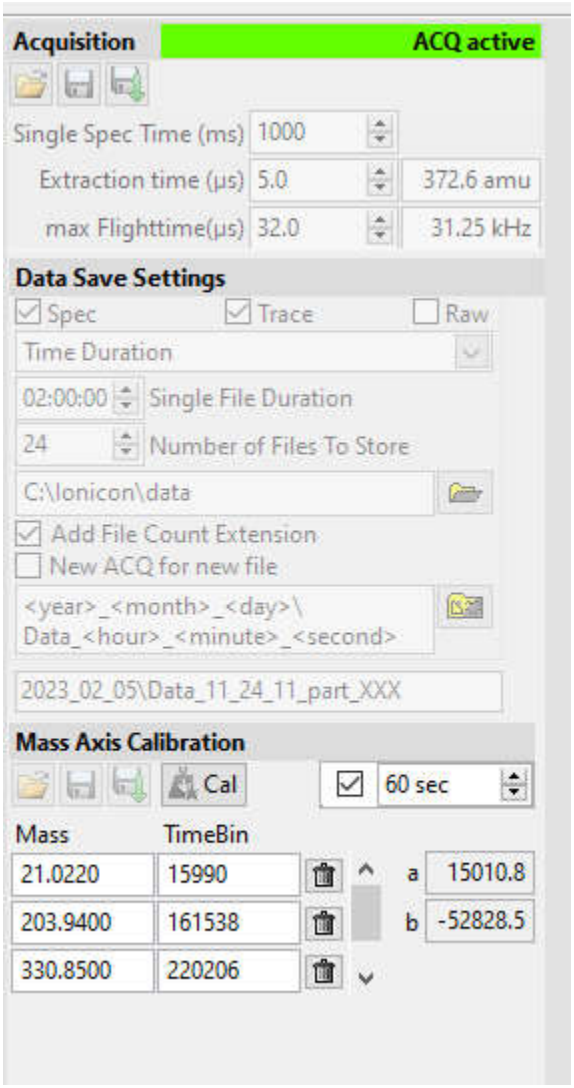
Pioneer Park
2-6-23 Screen Shots



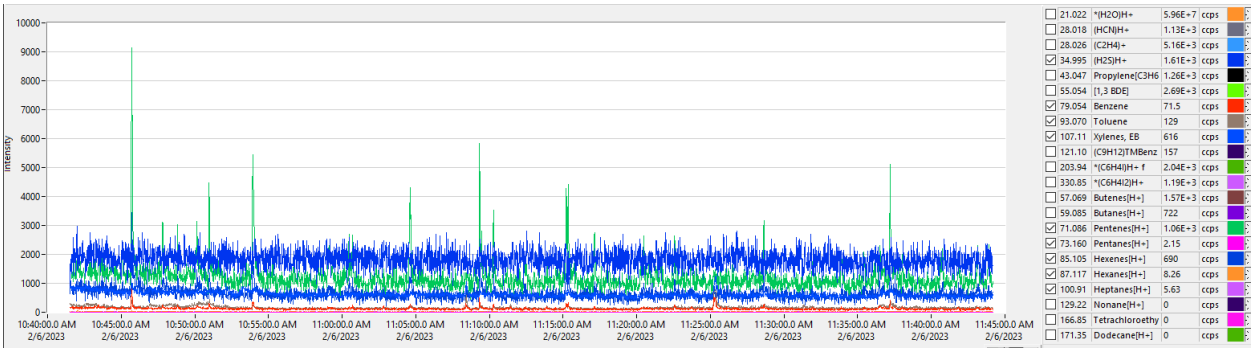
Production Settings



TOF Voltages

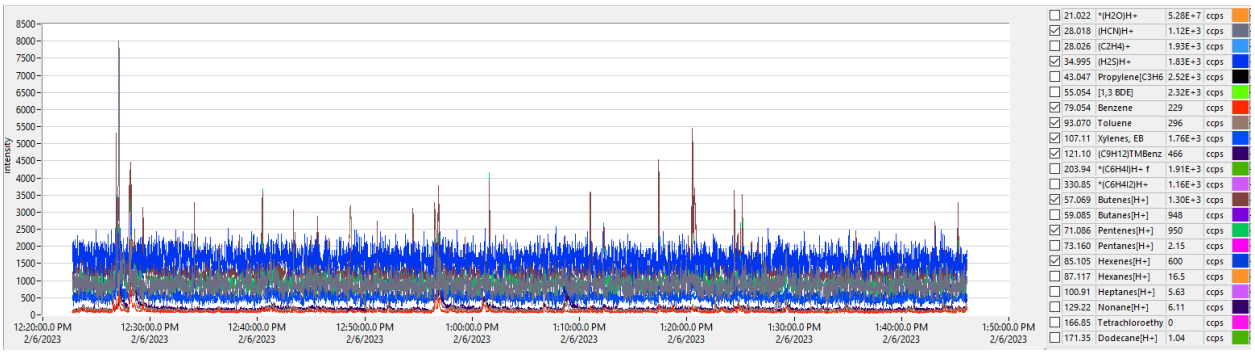


Acquisition Settings



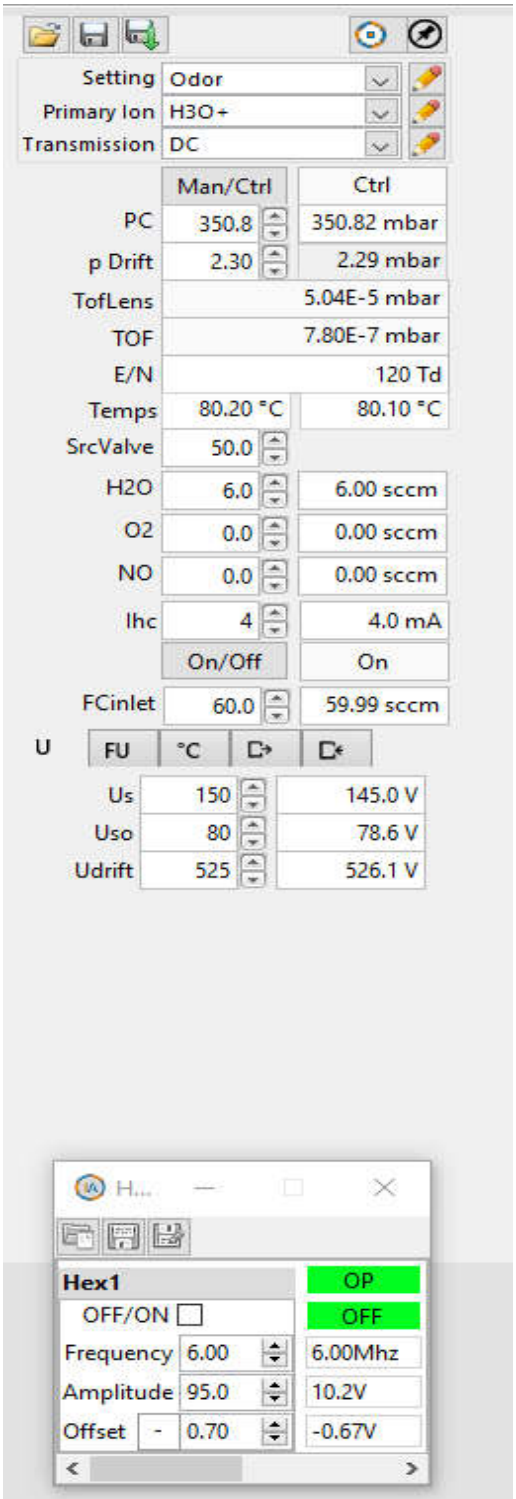
Pioneer Park

CCND Mobile Monitoring Van
2023 Q1



Pioneer Park

2-7-23 Adams City Evening/Night Testing
PTR Parameters



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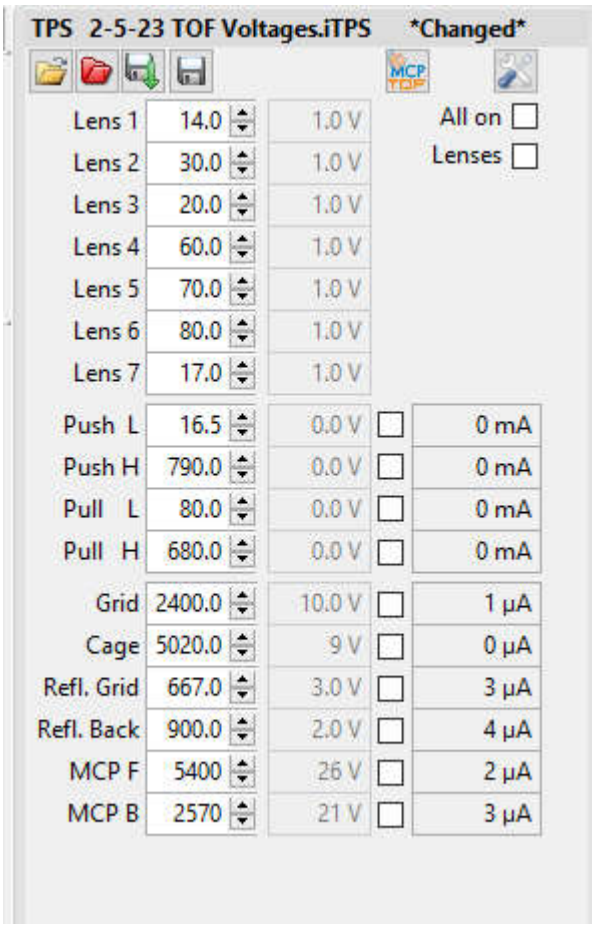
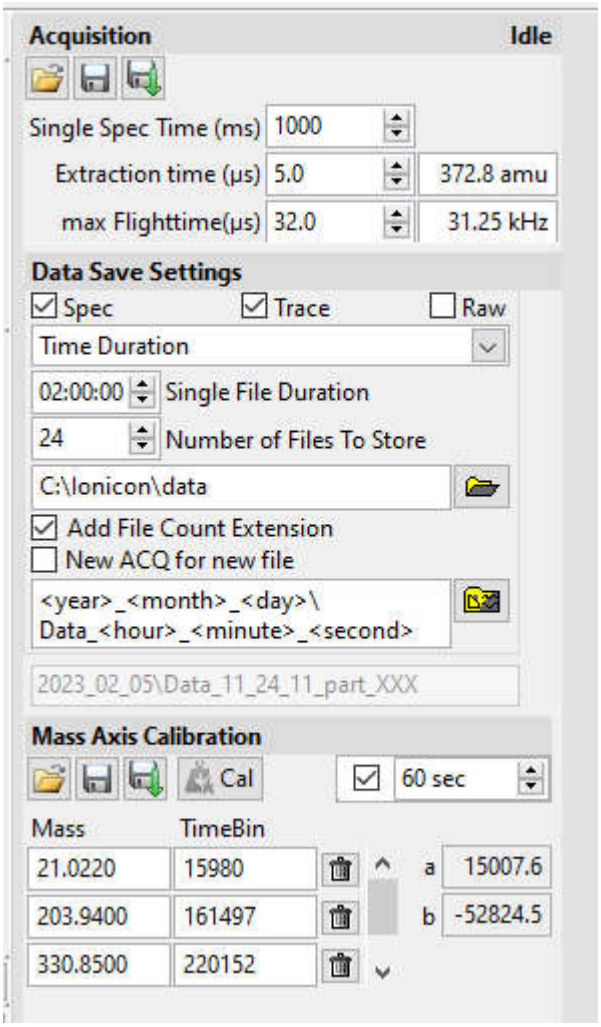
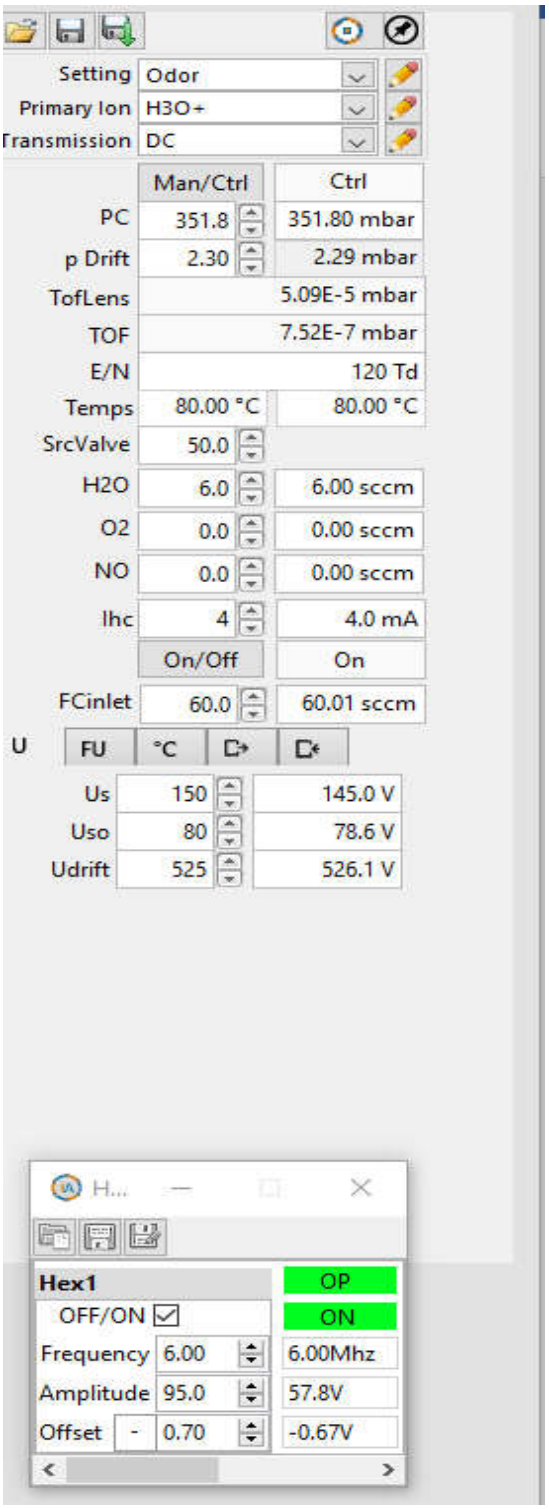


TOF Voltages

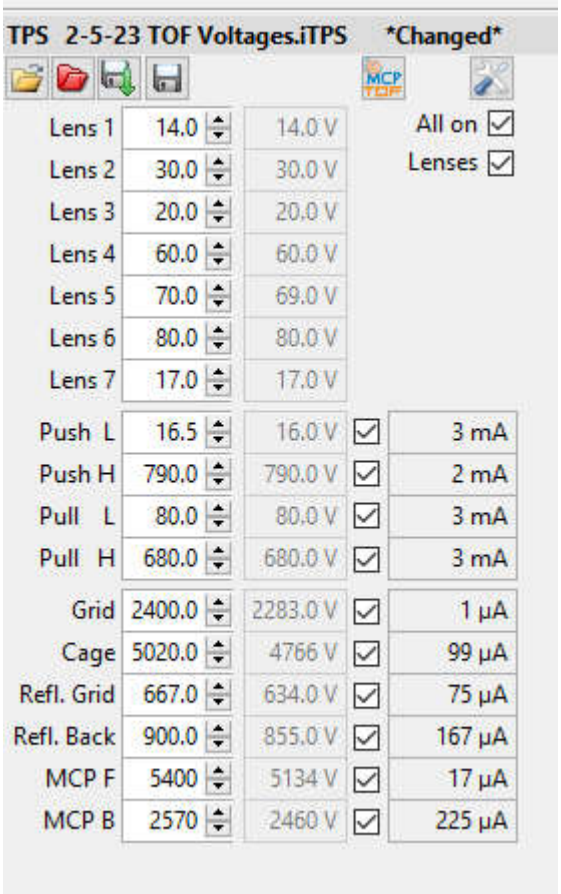


Production Settings

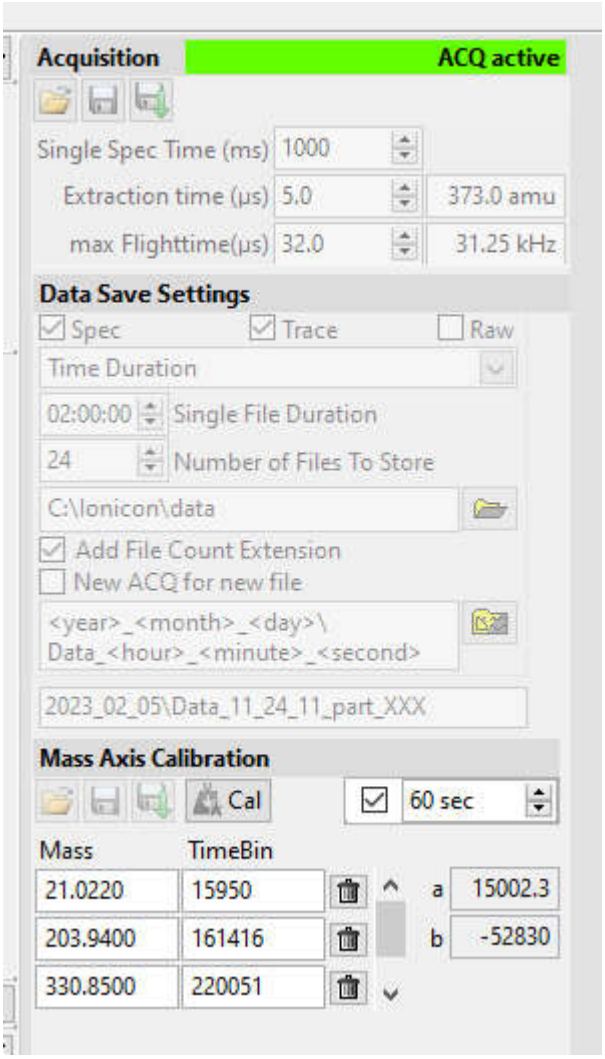
Globeville and E. Swansea
2-8-23



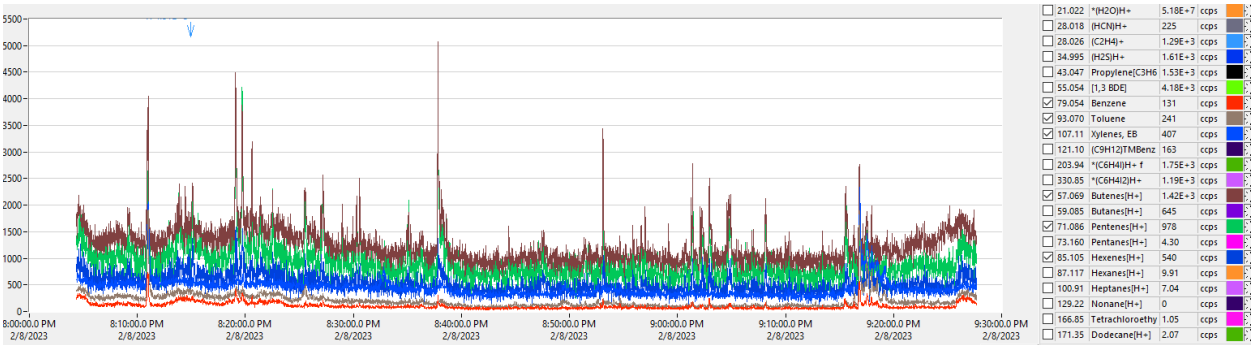
Production Settings


TPS 2-5-23 TOF Voltages.iTPS *Changed*
MCP TOF
All on
Lenses
Lens 1 14.0 14.0 V
Lens 2 30.0 30.0 V
Lens 3 20.0 20.0 V
Lens 4 60.0 60.0 V
Lens 5 70.0 69.0 V
Lens 6 80.0 80.0 V
Lens 7 17.0 17.0 V
Push L 16.5 16.0 V 3 mA
Push H 790.0 790.0 V 2 mA
Pull L 80.0 80.0 V 3 mA
Pull H 680.0 680.0 V 3 mA
Grid 2400.0 2283.0 V 1 µA
Cage 5020.0 4766 V 99 µA
Refl. Grid 667.0 634.0 V 75 µA
Refl. Back 900.0 855.0 V 167 µA
MCP F 5400 5134 V 17 µA
MCP B 2570 2460 V 225 µA

Lenses

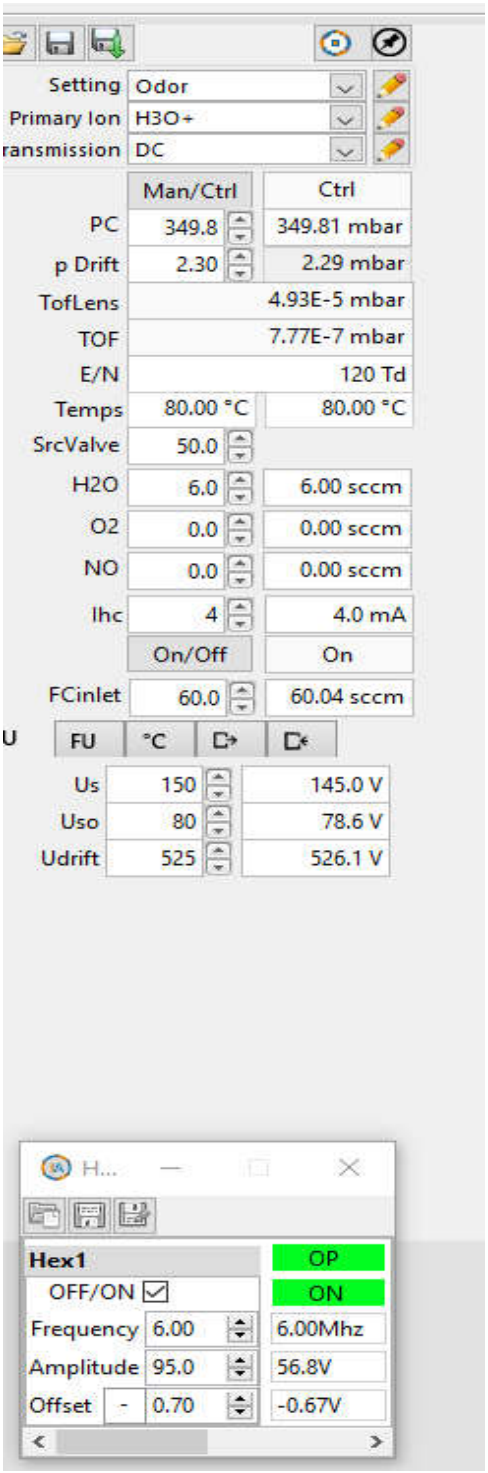


ACQuisition

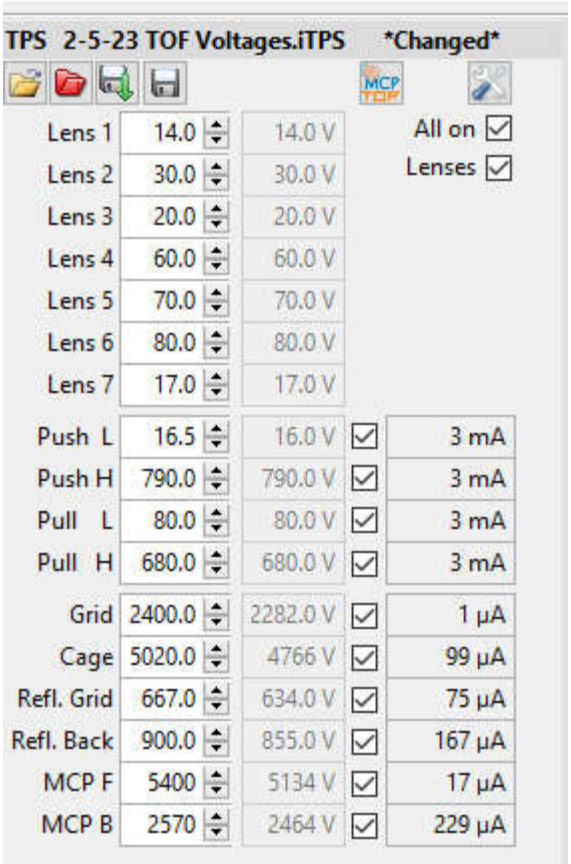


Swansea Night Testing

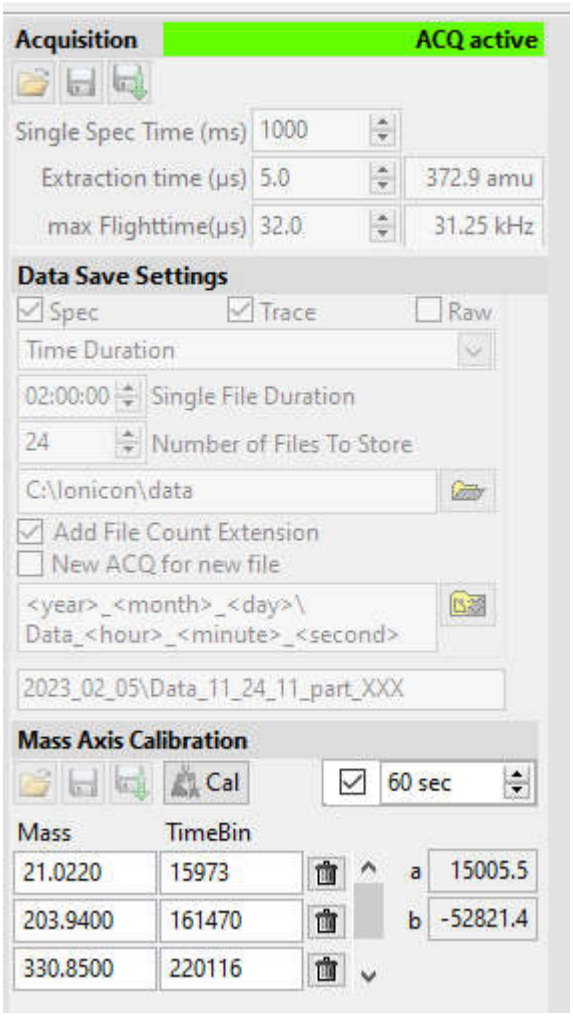
PTR Parameters Dupont
2-9-23



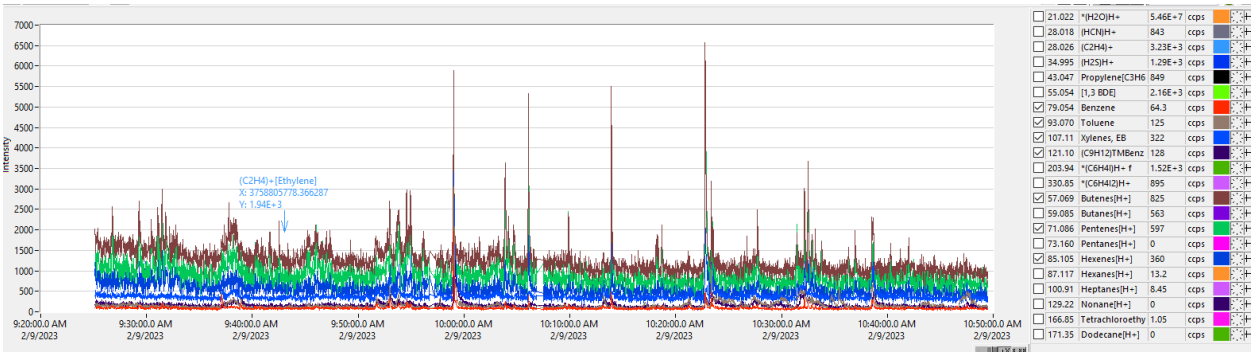
Production Parameters



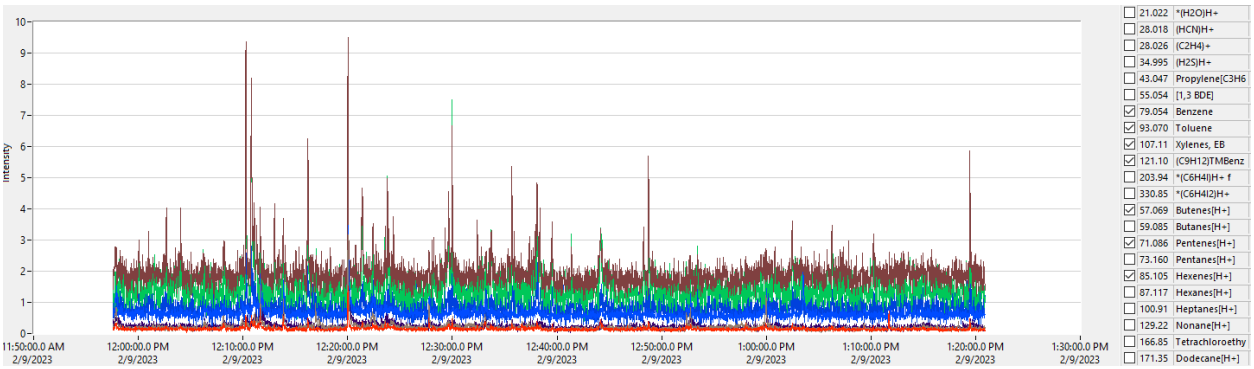
TOF Lens Voltages



Acquisition Parameters



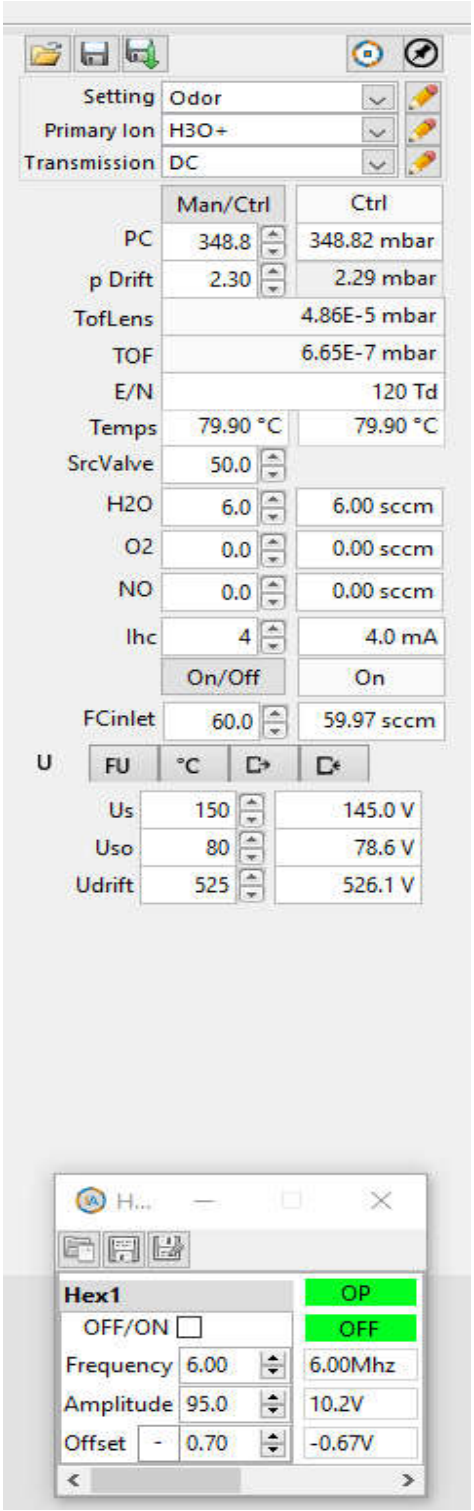
CCND Mobile Monitoring Van
2023 Q1



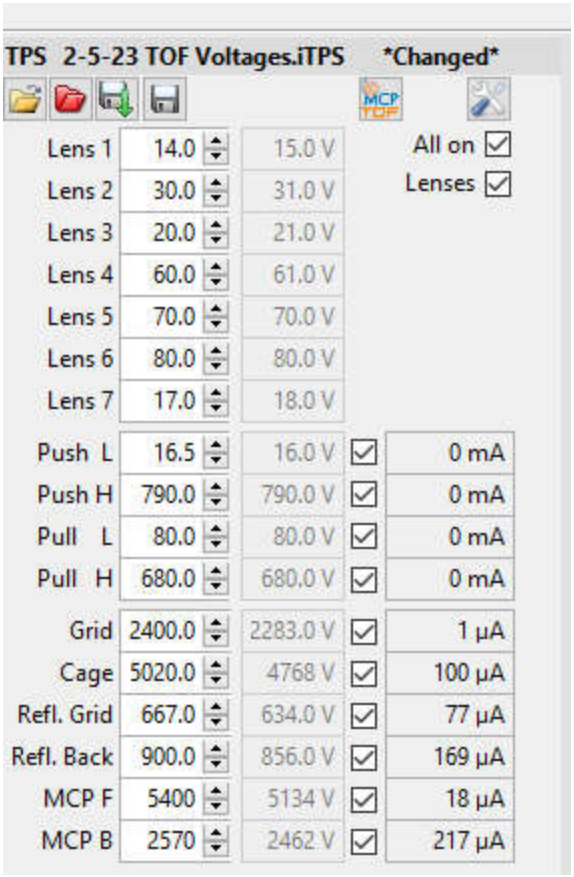
Dupont Neighborhood

CCND Mobile Monitoring Van
2023 Q1

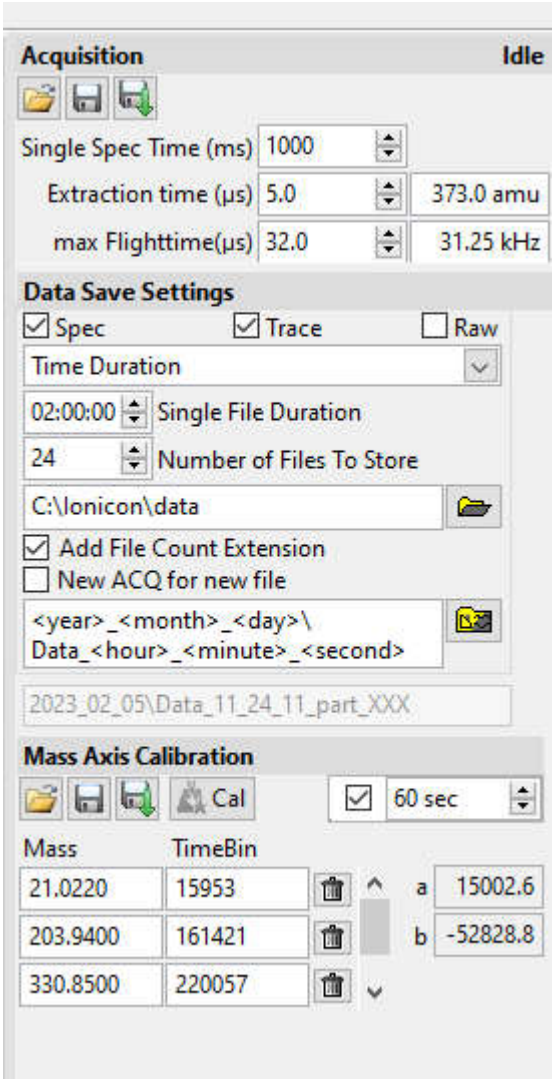
PTR Parameters Western Hills Neighborhood
2-10-23



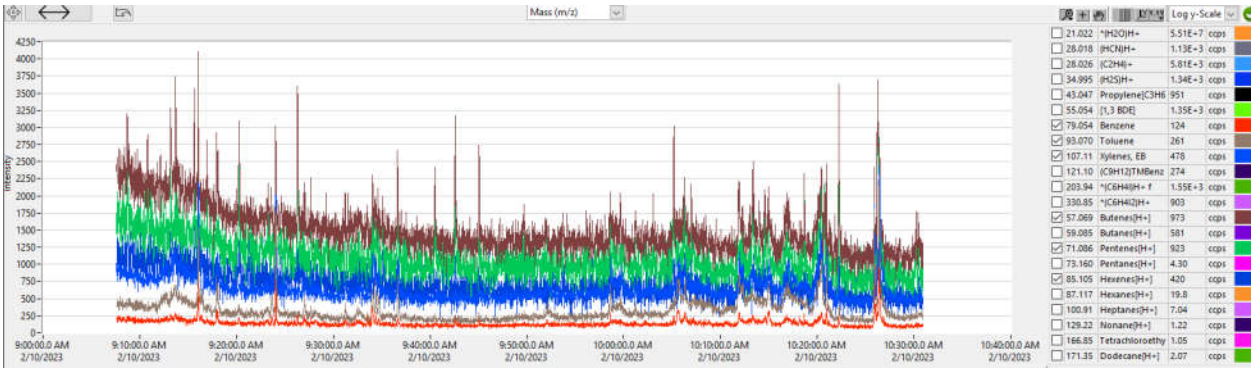
Production Settings



TOF Lenses Settings



Acquisition Settings



Western Hills

Initial Instrument Calibration						
Date	Time	Calibration Gas Component	Calibration Value (ppb v)	Response (ppb v)	Difference (% of value)	Pass/Fail
2/5/2023	13:26	Benzene	100	102	2.0	Pass
		Toluene	100	100.2	0.2	Pass
		Xylenes	200	201	0.5	Pass
	13:31	Benzene	50	52.7	5.4	Pass
		Toluene	50	52	4.0	Pass
		Xylenes	100	102	2.0	Pass
	13:38	Benzene	20	19.2	-4.0	Pass
		Toluene	20	18.9	-5.5	Pass
		Xylenes	40	37.4	-6.5	Pass
	13:47	Benzene	5	4.89	-2.2	Pass
		Toluene	5	4.92	-1.6	Pass
		Xylenes	10	9.6	-4.0	Pass
	13:56	Ethylene	100	91.8	-8.2	Pass
		Propylene	100	100.1	0.1	Pass
		1-Butene	100	104	4.0	Pass
		1-Pentene	100	104	4.0	Pass
		1-Hexene	100	101	1.0	Pass
		1,3-Butadiene	100	102	2.0	Pass
	13:59	Ethylene	50	50.3	0.6	Pass
		Propylene	50	48.1	-3.8	Pass
		1-Butene	50	49.1	-1.8	Pass
		1-Pentene	50	50.3	0.6	Pass
		1-Hexene	50	49.1	-1.8	Pass
		1,3-Butadiene	50	52.3	4.6	Pass
	14:03	Ethylene	10	10.6	6.0	Pass
		Propylene	10	10.1	1.0	Pass
		1-Butene	10	10.6	6.0	Pass
		1-Pentene	10	9.38	-6.2	Pass
		1-Hexene	10	10.4	4.0	Pass
		1,3-Butadiene	10	9.69	-3.1	Pass
	14:24	HCN	50	51.2	2.4	Pass
	14:19	HCN	25	24.2	-3.2	Pass
	14:17	HCN	10	9.73	-2.7	Pass
	14:50	H_2S	100	102	2.0	Pass
	14:53	H_2S	20	19.7	-1.5	Pass
	14:59	H_2S	5	5.6	12.0	Pass
	15:03	Butane	250	249	-0.4	Pass
		Pentane	250	249	-0.4	Pass
		Hexane	250	248	-0.8	Pass
		Heptane	250	251	0.4	Pass
	15:05	Butane	100	102	2.0	Pass
		Pentane	100	101	1.0	Pass
		Hexane	100	98.6	-1.4	Pass
		Heptane	100	99	-1.0	Pass
	15:08	Butane	25	25.5	2.0	Pass
		Pentane	25	24.3	-2.8	Pass
		Hexane	25	25	0.0	Pass
		Heptane	25	24.6	-1.6	Pass

Instrument Calibration Check						
Date	Time	Calibration Gas Component	Calibration Value (ppb v)	Response (ppb v)	Difference (% of value)	Pass/Fail
2/6/2022	9:01	Ethylene	50	53.5	7.0	Pass
Pioneer		Propylene	50	49.6	-0.8	Pass
Park		1-Butene	50	50.7	1.4	Pass
		1-Pentene	50	49.3	-1.4	Pass
		1-Hexene	50	48.6	-2.8	Pass
		1,3-Butadiene	50	49.4	-1.2	Pass
	9:08	Benzene	100	102	2.0	Pass
		Toluene	100	101	1.0	Pass
		Xylenes	200	204	2.0	Pass
	9:14	Benzene	20	18.9	-5.5	Pass
		Toluene	20	19.5	-2.5	Pass
		Xylenes	40	36.5	-8.8	Pass
	9:21	HCN	25	24.4	-2.4	Pass
	9:26	H_2S	100	98.6	-1.4	Pass
		H_2S	20	19.4	-3.0	Pass
	9:31	Butane	150	148	-1.3	Pass
		Pentane	150	148	-1.3	Pass
		Hexane	150	152	1.3	Pass
		Heptane	150	145	-3.3	Pass
	15:41	HCN	25	24.2	-3.2	Pass
	16:00	H_2S	50	46.9	-6.2	Pass
	16:03	Butane	150	146	-2.7	Pass
		Pentane	150	146	-2.7	Pass
		Hexane	150	148	-1.3	Pass
		Heptane	150	141	-6.0	Pass
	16:19	Benzene	20	18.6	-7.0	Pass
		Toluene	20	19.4	-3.0	Pass
		Xylenes	40	36.2	-9.5	Pass
	15:45	Ethylene	50	52	4.0	Pass
		Propylene	50	48.7	-2.6	Pass
		1-Butene	50	50.4	0.8	Pass
		1-Pentene	50	51.7	3.4	Pass
		1-Hexene	50	50.1	0.2	Pass
		1,3-Butadiene	50	51.3	2.6	Pass

Instrument Calibration Check						
Date	Time	Calibration Gas Component	Calibration Value (ppb v)	Response (ppb v)	Difference (% of value)	Pass/Fail
2/7/2023	16:02	Ethylene	50	47.9	-4.2	Pass
		Propylene	50	48.1	-3.8	Pass
		1-Butene	50	52.9	5.8	Pass
		1-Pentene	50	50.4	0.8	Pass
		1-Hexene	50	50.1	0.2	Pass
		1,3-Butadiene	50	52.4	4.8	Pass
	16:07	Benzene	100	97.4	-2.6	Pass
		Toluene	100	96.1	-3.9	Pass
		Xylenes	200	184	-8.0	Pass
	16:12	Benzene	20	20	0.0	Pass
		Toluene	20	19.9	-0.5	Pass
		Xylenes	40	37.2	-7.0	Pass
	16:17	HCN	25	24.2	-3.2	Pass
	16:32	H_2S	100	95.8	-4.2	Pass
	16:33	H_2S	20	20.9	4.5	Pass
	16:35	Butane	150	153	2.0	Pass
		Pentane	150	154	2.7	Pass
		Hexane	150	148	-1.3	Pass
		Heptane	150	151	0.7	Pass
	21:35	HCN	25	24.6	-1.6	Pass
	21:37	H_2S	20	24	20.0	Fail
	21:39	Butane	150	151	0.7	Pass
		Pentane	150	152	1.3	Pass
		Hexane	150	151	0.7	Pass
		Heptane	150	150	0.0	Pass
	21:47	Benzene	20	18.9	-5.5	Pass
		Toluene	20	19.4	-3.0	Pass
		Xylenes	40	37.8	-5.5	Pass
	21:50	Ethylene	50	48.3	-3.4	Pass
		Propylene	50	51	2.0	Pass
		1-Butene	50	52.5	5.0	Pass
		1-Pentene	50	51.5	3.0	Pass
		1-Hexene	50	50.6	1.2	Pass
		1,3-Butadiene	50	54	8.0	Pass

Instrument Calibration Check						
Date	Time	Calibration Gas Component	Calibration Value (ppb v)	Response (ppb v)	Difference (% of value)	Pass/Fail
2/8/2023	14:58	Ethylene	50	48.6	-2.8	Pass
Globeville		Propylene	50	51.1	2.2	Pass
E Swansea		1-Butene	50	54.6	9.2	Pass
		1-Pentene	50	53.3	6.6	Pass
		1-Hexene	50	49.9	-0.2	Pass
		1,3-Butadiene	50	51.6	3.2	Pass
	15:03	Benzene	100	98.5	-1.5	Pass
		Toluene	100	99.4	-0.6	Pass
		Xylenes	200	190	-5.0	Pass
	15:06	Benzene	20	19.7	-1.5	Pass
		Toluene	20	19.3	-3.5	Pass
		Xylenes	40	38	-5.0	Pass
	15:09	HCN	25	23.9	-4.4	Pass
	15:14	H_2S	100	102	2.0	Pass
			20	21.2	6.0	Pass
	15:19	Butane	150	149	-0.7	Pass
		Pentane	150	147	-2.0	Pass
		Hexane	150	147	-2.0	Pass
		Heptane	150	150	0.0	Pass
	22:28	HCN	25	23.5	-6.0	Pass
	22:22	H_2S	50	49.2	-1.6	Pass
	22:29	Butane	150	149	-0.7	Pass
		Pentane	150	144	-4.0	Pass
		Hexane	150	147	-2.0	Pass
		Heptane	150	146	-2.7	Pass
	22:37	Benzene	20	20.1	0.5	Pass
		Toluene	20	20.7	3.5	Pass
		Xylenes	40	38.5	-3.8	Pass
	22:25	Ethylene	50	48.2	-3.6	Pass
		Propylene	50	48.9	-2.2	Pass
		1-Butene	50	49.5	-1.0	Pass
		1-Pentene	50	48.3	-3.4	Pass
		1-Hexene	50	49.1	-1.8	Pass
		1,3-Butadiene	50	51.5	3.0	Pass

Instrument Calibration Check						
Date	Time	Calibration Gas Component	Calibration Value (ppb v)	Response (ppb v)	Difference (% of value)	Pass/Fail
2/9/2023	8:22	Ethylene	50	48.9	-2.2	Pass
Dupont		Propylene	50	49.7	-0.6	Pass
		1-Butene	50	53.9	7.8	Pass
		1-Pentene	50	53.3	6.6	Pass
		1-Hexene	50	48.3	-3.4	Pass
		1,3-Butadiene	50	52	4.0	Pass
	8:25	Benzene	100	101	1.0	Pass
		Toluene	100	99.2	-0.8	Pass
		Xylenes	200	193	-3.5	Pass
	8:27	Benzene	20	20.9	4.5	Pass
		Toluene	20	20.5	2.5	Pass
		Xylenes	40	40.8	2.0	Pass
	8:32	HCN	25	24.7	-1.2	Pass
	8:36	H_2S	100	97.4	-2.6	Pass
	8:37		20	20.1	0.5	Pass
	8:40	Butane	150	148	-1.3	Pass
		Pentane	150	146	-2.7	Pass
		Hexane	150	142	-5.3	Pass
		Heptane	150	149	-0.7	Pass
	14:04	HCN	25	24.5	-2.0	Pass
	14:01	H_2S	50	49.2	-1.6	Pass
	14:13	Butane	150	148	-1.3	Pass
		Pentane	150	142	-5.3	Pass
		Hexane	150	144	-4.0	Pass
		Heptane	150	149	-0.7	Pass
	14:08	Benzene	20	19.7	-1.5	Pass
		Toluene	20	19.8	-1.0	Pass
		Xylenes	40	39.8	-0.5	Pass
	14:11	Ethylene	50	48.9	-2.2	Pass
		Propylene	50	47.9	-4.2	Pass
		1-Butene	50	52.3	4.6	Pass
		1-Pentene	50	46.3	-7.4	Pass
		1-Hexene	50	49.7	-0.6	Pass
		1,3-Butadiene	50	48.8	-2.4	Pass

Instrument Calibration Check						
Date	Time	Calibration Gas Component	Calibration Value (ppb v)	Response (ppb v)	Difference (% of value)	Pass/Fail
2/10/2023	8:17	Ethylene	50	48.6	-2.8	Pass
Western		Propylene	50	52.1	4.2	Pass
Hills		1-Butene	50	54.7	9.4	Pass
		1-Pentene	50	52.2	4.4	Pass
		1-Hexene	50	55.4	10.8	Pass
		1,3-Butadiene	50	51.6	3.2	Pass
	8:20	Benzene	100	103	3.0	Pass
		Toluene	100	102	2.0	Pass
		Xylenes	200	209	4.5	Pass
	8:23	Benzene	20	20.2	1.0	Pass
		Toluene	20	19.7	-1.5	Pass
		Xylenes	40	38.3	-4.3	Pass
	8:25	HCN	25	25.8	3.2	Pass
	8:28	H_2S	100	98.3	-1.7	Pass
	8:29		20	21.2	6.0	Pass
	8:33	Butane	150	150	0.0	Pass
		Pentane	150	144	-4.0	Pass
		Hexane	150	148	-1.3	Pass
		Heptane	150	137	-8.7	Pass
	13:56	HCN	25	25.2	0.8	Pass
	13:46	H_2S	50	48.7	-2.6	Pass
	14:04	Butane	150	152	1.3	Pass
		Pentane	150	146	-2.7	Pass
		Hexane	150	143	-4.7	Pass
		Heptane	150	146	-2.7	Pass
	13:51	Benzene	20	19.7	-1.5	Pass
		Toluene	20	19.1	-4.5	Pass
		Xylenes	40	39.6	-1.0	Pass
	14:02	Ethylene	50	48.9	-2.2	Pass
		Propylene	50	48.3	-3.4	Pass
		1-Butene	50	48.7	-2.6	Pass
		1-Pentene	50	48.6	-2.8	Pass
		1-Hexene	50	46.8	-6.4	Pass
		1,3-Butadiene	50	49.5	-1.0	Pass

APPENDIX E
CALIBRATION GAS CERTIFICATION SHEETS

CERTIFICATE OF ANALYSIS

Grade of Product: CERTIFIED STANDARD-SPEC

Customer:	MONTROSE AIR QUALITY SERVICES LLC		
Part Number:	X02NI99C15W0061	Reference Number:	126-402278540-1
Cylinder Number:	CC519990	Cylinder Volume:	144.3 CF
Laboratory:	124 - La Porte Mix - TX	Cylinder Pressure:	2015 PSIG
Analysis Date:	Dec 14, 2021	Valve Outlet:	330
Lot Number:	126-402278540-1		

Expiration Date: Dec 14, 2024

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.

ANALYTICAL RESULTS

Component	Req Conc	Actual Concentration (Mole %)	Analytical Uncertainty
HYDROGEN SULFIDE	1.000 PPM	1.084 PPM	+/-5%
NITROGEN	Balance		

Notes:MONTROSE AIR QUALITY SERVICES LLC
PO3: PO018078

Signature on file
Approved for Release

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
616 Miller Cut Off Road
La Porte, TX 77571
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: CERTIFIED STANDARD-SPEC

Customer: *CRYSTAL LAKE , IL* MONTROSE AIR QUALITY SERVICES
Part Number: X06NI99C15A00A3
Cylinder Number: CC344804
Laboratory: 124 - La Porte Mix - TX
Analysis Date: Jul 30, 2021
Lot Number: 126-402159020-1

Reference Number: 126-402159020-1
Cylinder Volume: 144.3 CF
Cylinder Pressure: 2015 PSIG
Valve Outlet: 350

Expiration Date: Jul 30, 2024

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.

ANALYTICAL RESULTS

Component	Req Conc	Actual Concentration (Mole %)	Analytical Uncertainty
HEXANE	1.000 PPM	0.9950 PPM	+/- 5%
N BUTANE	1.000 PPM	1.002 PPM	+/- 5%
N HEPTANE	1.000 PPM	1.000 PPM	+/- 5%
N PENTANE	1.000 PPM	1.000 PPM	+/- 5%
PROPANE	1.000 PPM	1.009 PPM	+/- 5%
NITROGEN	Balance		

Notes:.

PO # PO-011307

Approved for Release

Airgas
an Air Liquide company

Airgas USA, LLC
4646 Linden Rd
Rockford, IL 61109
Airgas.com

CERTIFICATE OF BATCH ANALYSIS

Grade of Product: ZERO

Part Number:	AI Z15A	Reference Number:	152-402047887-1
Cylinder Analyzed:	CC235228	Cylinder Volume:	146.0 CF
Laboratory:	192 - Rockford IL Fill Plant (N513) - IL	Cylinder Pressure:	2000 PSIG
Analysis Date:	Mar 03, 2021	Valve Outlet:	590
Lot Number:	152-402047887-1		

ANALYTICAL RESULTS

Component	Requested Purity	Certified Concentration
AIR		
THC	< 1.0 PPM	0.043 PPM
Percent Oxygen	20-22 %	20.82 %
Moisture	< 3.0 PPM	0.07 PPM

Cylinders in Batch:

CC235228, XC002876B

Impurities verified against analytical standards traceable to NIST by weight and/or analysis.

Signature on file
Approved for Release

Airgas
an Air Liquide company

Airgas USA, LLC
6141 Easton Road
Bldg 1
Plumsteadville, PA 18949
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: CERTIFIED STANDARD-SPEC

Customer:	MONTROSE ENVIRONMENTAL GROUP		
Part Number:	X02AI99C15AH586	Reference Number:	160-401735121-1
Cylinder Number:	ALM060589	Cylinder Volume:	129.3 CF
Laboratory:	124 - Plumsteadville - PA	Cylinder Pressure:	2016 PSIG
Analysis Date:	Feb 19, 2020	Valve Outlet:	590
Lot Number:	160-401735121-1		

Expiration Date: Feb 19, 2023

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.

ANALYTICAL RESULTS

Component	Req Conc	Actual Concentration (Mole %)	Analytical Uncertainty
BENZENE	1.000 PPM	1.055 PPM	+/- 5%
AIR	Balance		

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
616 Miller Cut Off Road
La Porte, TX 77571
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: CERTIFIED STANDARD-SPEC

Customer:	MONTROSE AIR QUALITY SERVICES LLC - CRYSTAL LAKE ,		
Part Number:	X07NI99C15A00A9	Reference Number:	126-402159021-1
Cylinder Number:	CC164840	Cylinder Volume:	144.3 CF
Laboratory:	124 - La Porte Mix - TX	Cylinder Pressure:	2015 PSIG
Analysis Date:	Aug 09, 2021	Valve Outlet:	350
Lot Number:	126-402159021-1		

Expiration Date: Aug 09, 2023

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.

ANALYTICAL RESULTS

Component	Req Conc	Actual Concentration (Mole %)	Analytical Uncertainty
1 BUTENE	1.000 PPM	0.9918 PPM	+/- 5%
1 HEXENE	1.000 PPM	1.003 PPM	+/- 5%
1 PENTENE	1.000 PPM	1.005 PPM	+/- 5%
1,3 BUTADIENE	1.000 PPM	1.005 PPM	+/- 5%
ETHYLENE	1.000 PPM	1.087 PPM	+/- 5%
PROPYLENE	1.000 PPM	1.006 PPM	+/- 5%
NITROGEN	Balance		

Notes:
MONTROSE AIR QUALITY SERVICES LLC
PO#: PO-011307
NITROGEN BALANCE : 99.99939022%

Approved for Release

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