2023 Q4 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 fourth quarter 2023 sampling period (November 7-November 9), the mobile monitoring van was in a total of six neighborhoods and collected more than 51,396 data points across three days of monitoring, resulting in approximately 30,234 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), 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 approximately 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	11/9/23	12:20	14:32	7,833	4,306
Dupont	1.4	11/7/23	16:36	18:50	7,952	4,425
Elyria-Swansea	1.2	11/8/23	16:56	19:03	7,590	4,063
Globeville	0.44	11/8/23	14:24	16:29	7,450	3,923
Pioneer Park	1.7	11/7/23	10:51	14:01	11,364	7,837
Western Hills	1.6	11/9/23	9:32	12:07	9,207	5,680

*Data completeness threshold set at 98%

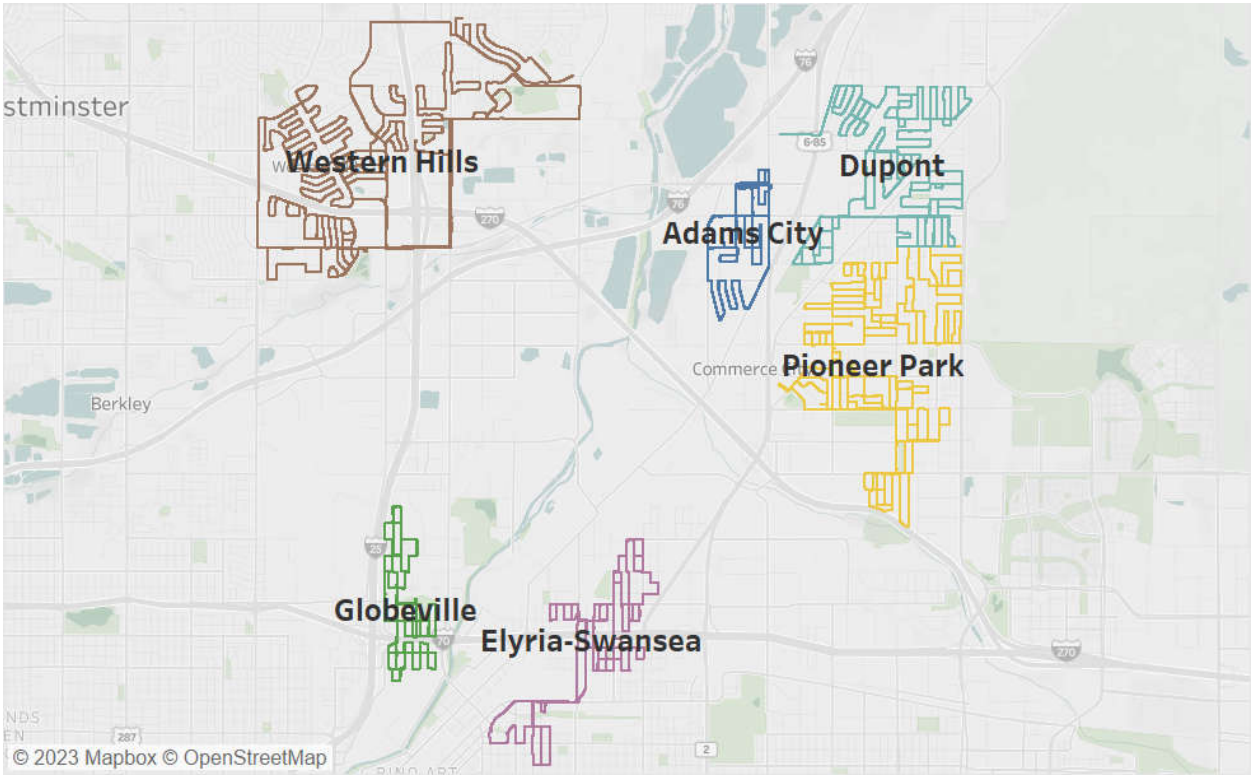
2.2 Mobile Monitoring Van Air Sampling Methods

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. 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

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

[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

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, 30,234 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 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.

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

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

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 three days, six neighborhoods were monitored for 65 chemicals, collecting more than 51,396 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 five highest 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).

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.

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.

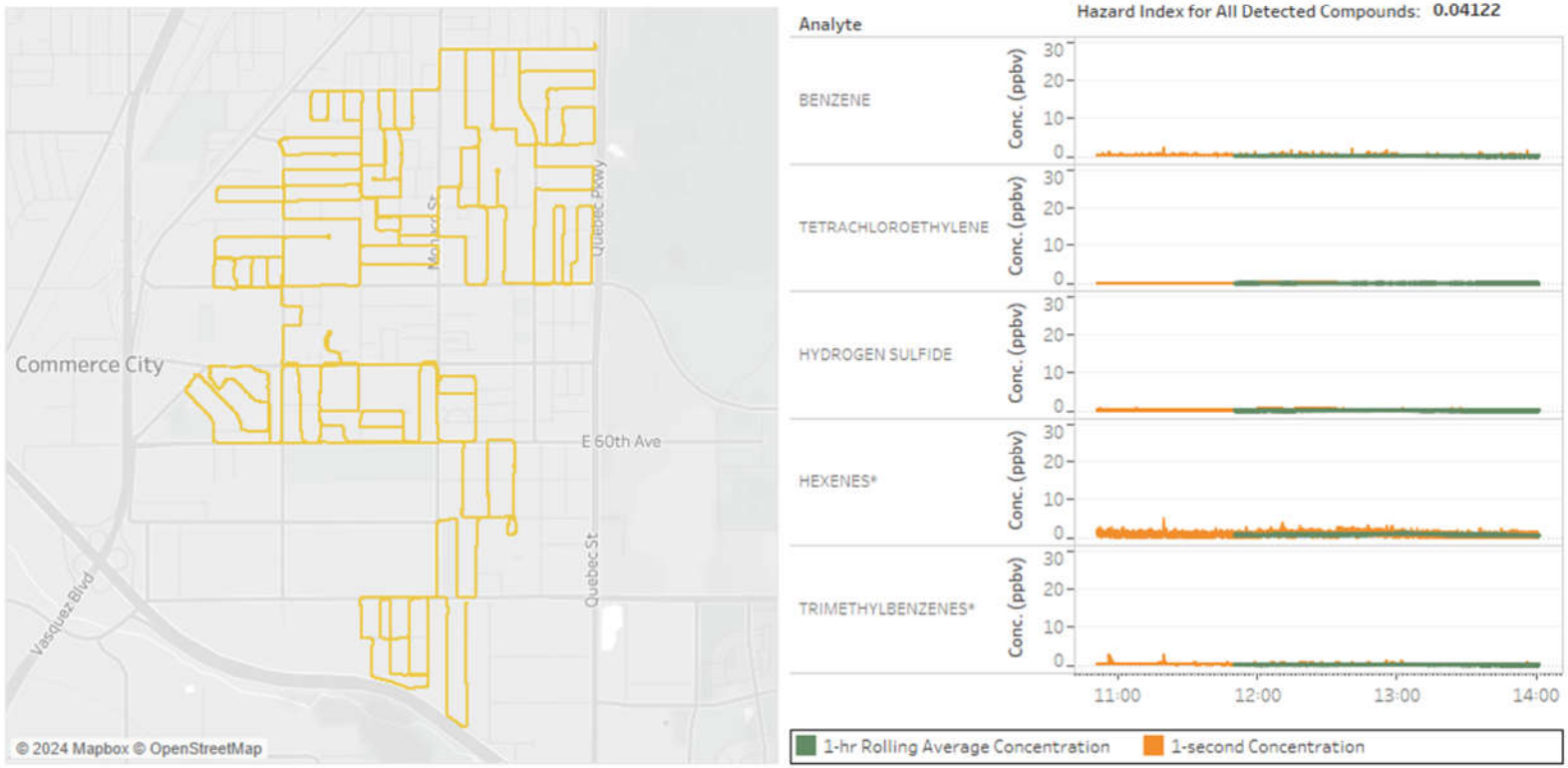
- All HQs were less than one for all detected chemicals, indicating that the maximum 1-hour rolling average concentration for each chemical was below its respective acute RL in all six neighborhoods (Figure 3-1 through 3-6).

- 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 80% 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
PIONEER PARK NEIGHBORHOOD: NOVEMBER 7, 2023

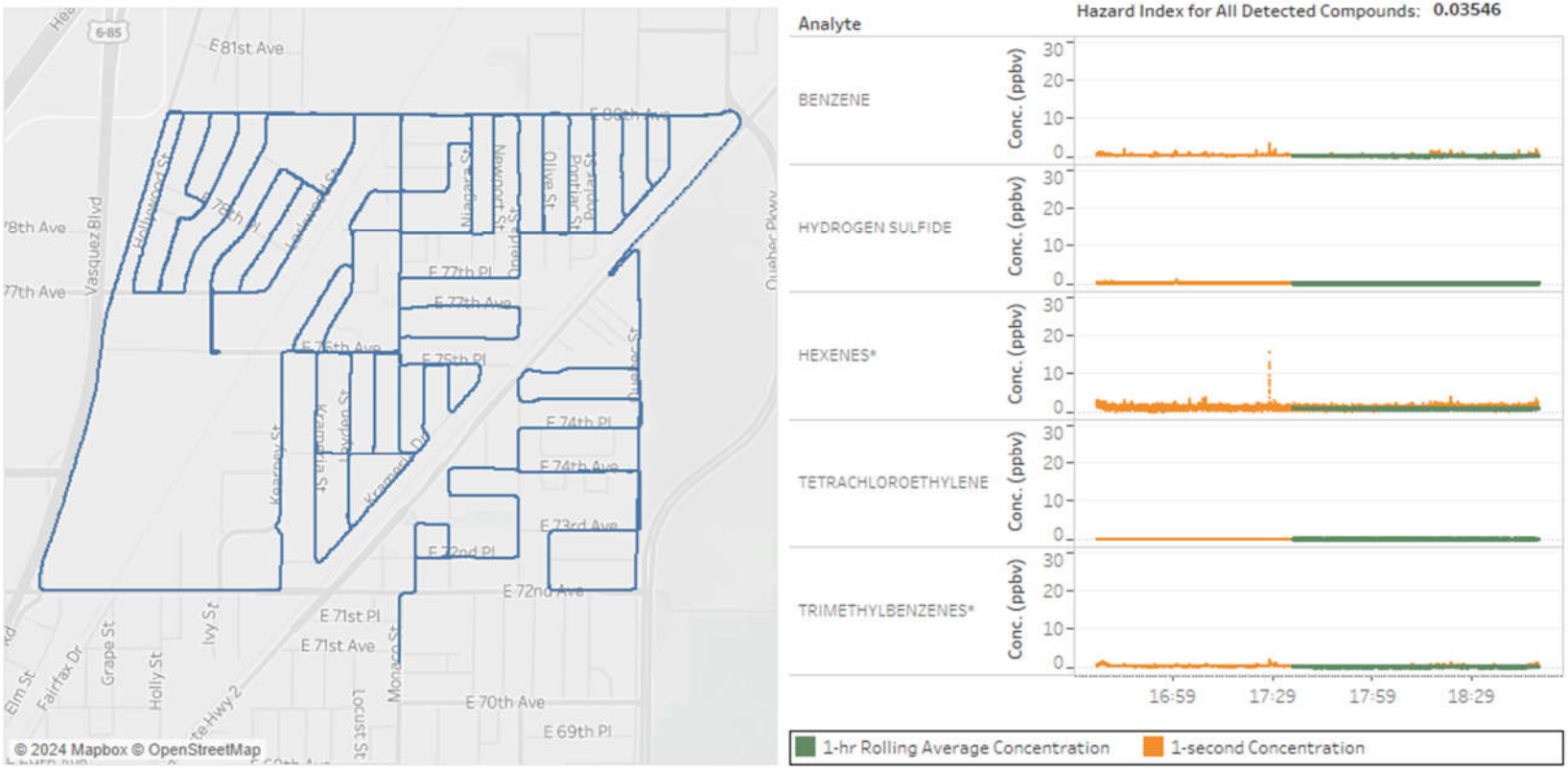
Analyte	Maximum 1-second Concentration (ppbv)	Count of 1-hr Rolling Averages Derived (#)	Average 1-hr Rolling Average (ppbv)	Maximum 1-hr Rolling Average (ppbv)	AEGL 1 60-min Value (ppbv)	Health Reference Level (ppbv)	Hazard Quotient
BENZENE	2.07	7,837	0.21	0.24	52,000	9	0.02616
TETRACHLOROETHYLENE	0.10	7,837	0.01	0.03	35,000	6	0.00424
HYDROGEN SULFIDE	0.68	7,837	0.18	0.23	510	70	0.00324
HEXENES*	4.73	7,837	0.83	1.05	NR	500	0.00211
TRIMETHYLBENZENES*	2.52	7,837	0.19	0.24	NR	250	0.00097



*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: NOVEMBER 7, 2023

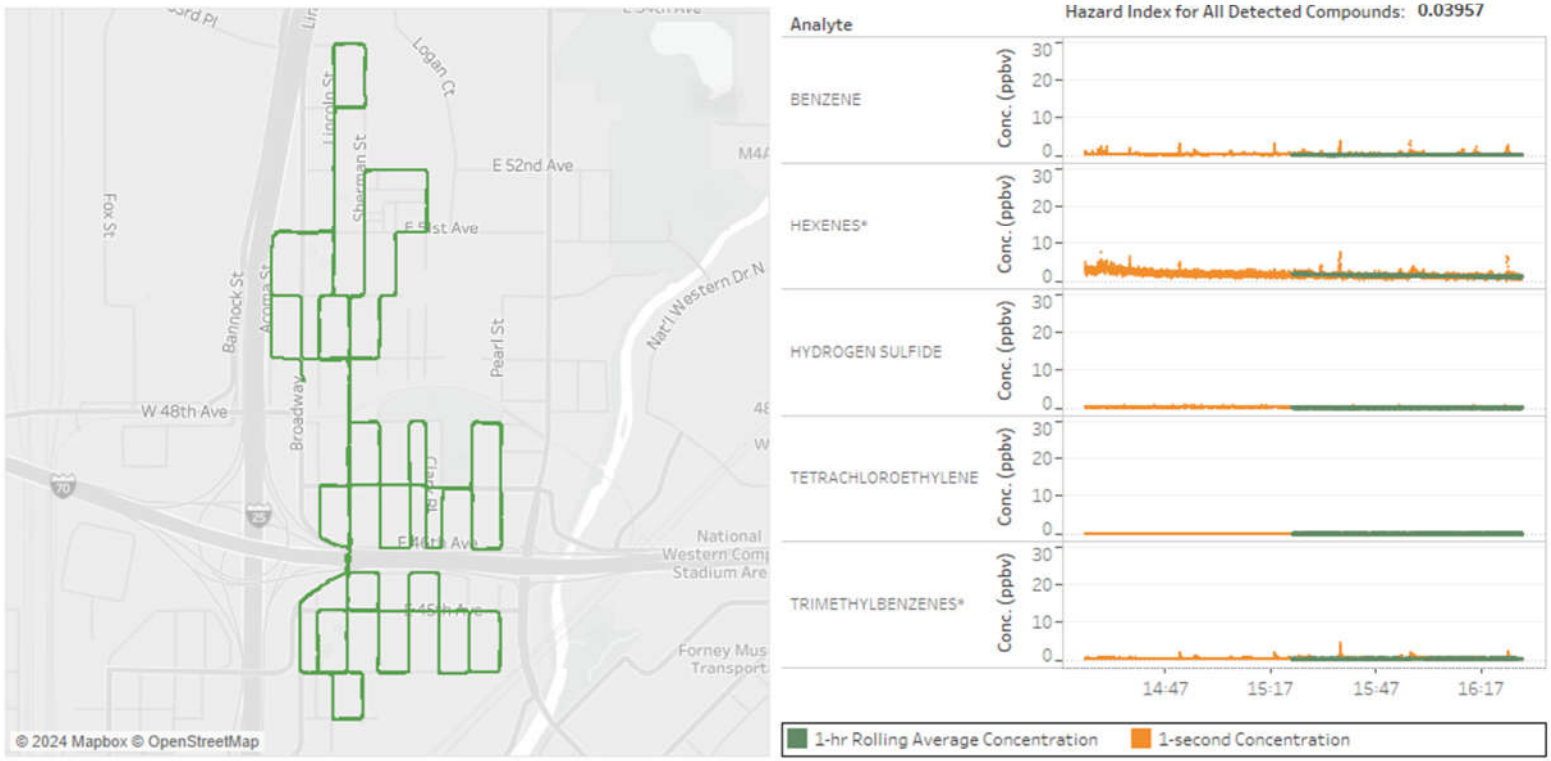
Analyte	Maximum 1-second Concentration (ppbv)	Count of 1-hr Rolling Averages Derived (#)	Average 1-hr Rolling Average (ppbv)	Maximum 1-hr Rolling Average (ppbv)	AEGL 1 60-min Value (ppbv)	Health Reference Level (ppbv)	Hazard Quotient
BENZENE	3.16	4,425	0.20	0.24	52,000	9	0.02681
HYDROGEN SULFIDE	0.86	4,425	0.14	0.14	510	70	0.00204
HEXENES*	15.40	4,425	0.94	1.02	NR	500	0.00204
TETRACHLOROETHYLENE	0.04	4,425	0.01	0.01	35,000	6	0.00108
TRIMETHYLBENZENES*	1.94	4,425	0.16	0.22	NR	250	0.00086



*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
GLOBEVILLE NEIGHBORHOOD: NOVEMBER 8, 2023

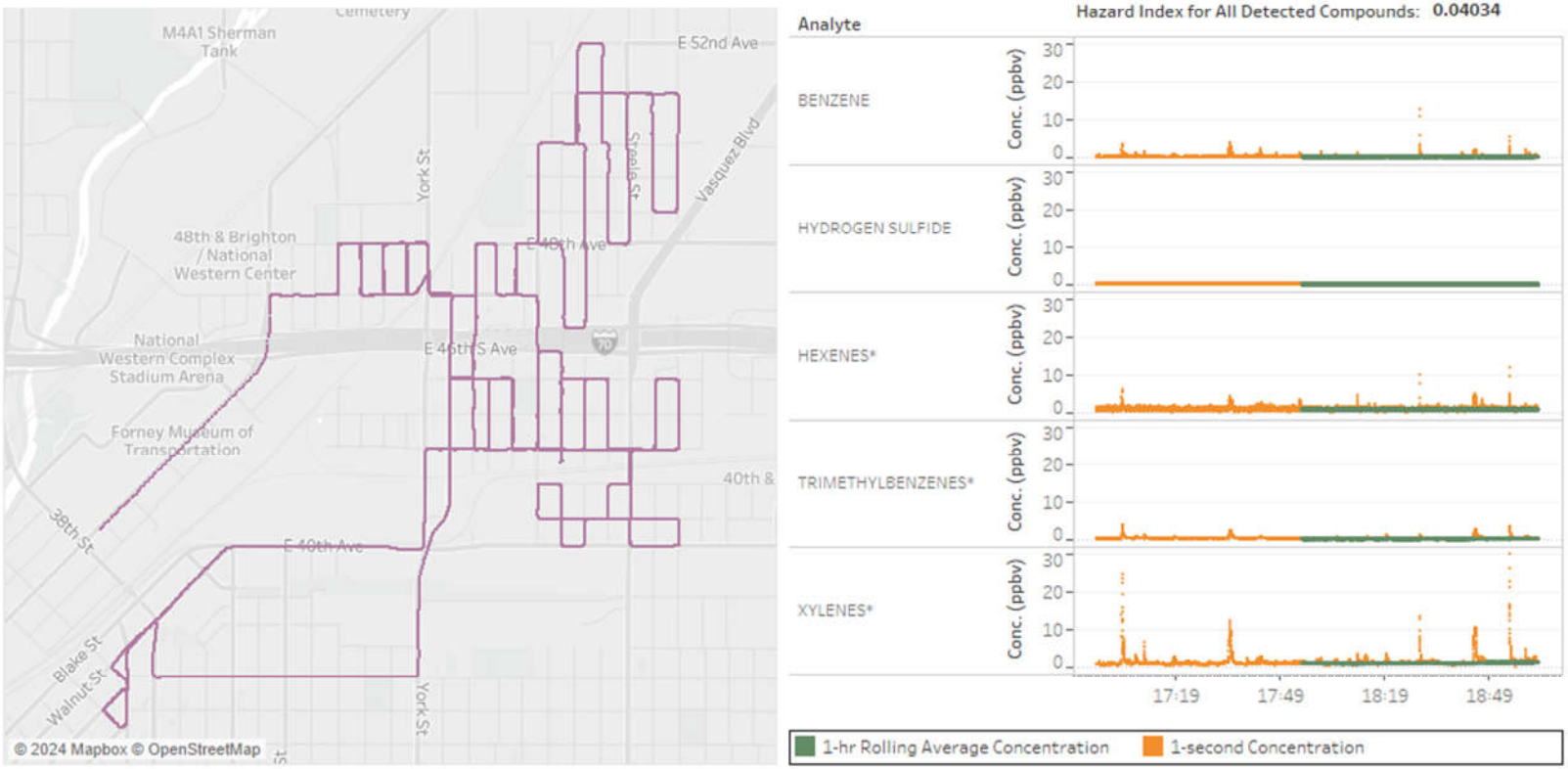
Analyte	Maximum 1-second Concentration (ppbv)	Count of 1-hr Rolling Averages Derived (#)	Average 1-hr Rolling Average (ppbv)	Maximum 1-hr Rolling Average (ppbv)	AEGL 1 60-min Value (ppbv)	Health Reference Level (ppbv)	Hazard Quotient
BENZENE	3.75	3,923	0.22	0.24	52,000	9	0.02661
HEXENES*	7.47	3,923	1.52	2.00	NR	500	0.00399
HYDROGEN SULFIDE	0.58	3,923	0.19	0.20	510	70	0.00279
TETRACHLOROETHYLENE	0.05	3,923	0.01	0.01	35,000	6	0.00164
TRIMETHYLBENZENES*	4.33	3,923	0.34	0.37	NR	250	0.00148



*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
ELYRIA-SWANSEA NEIGHBORHOOD: NOVEMBER 8, 2023

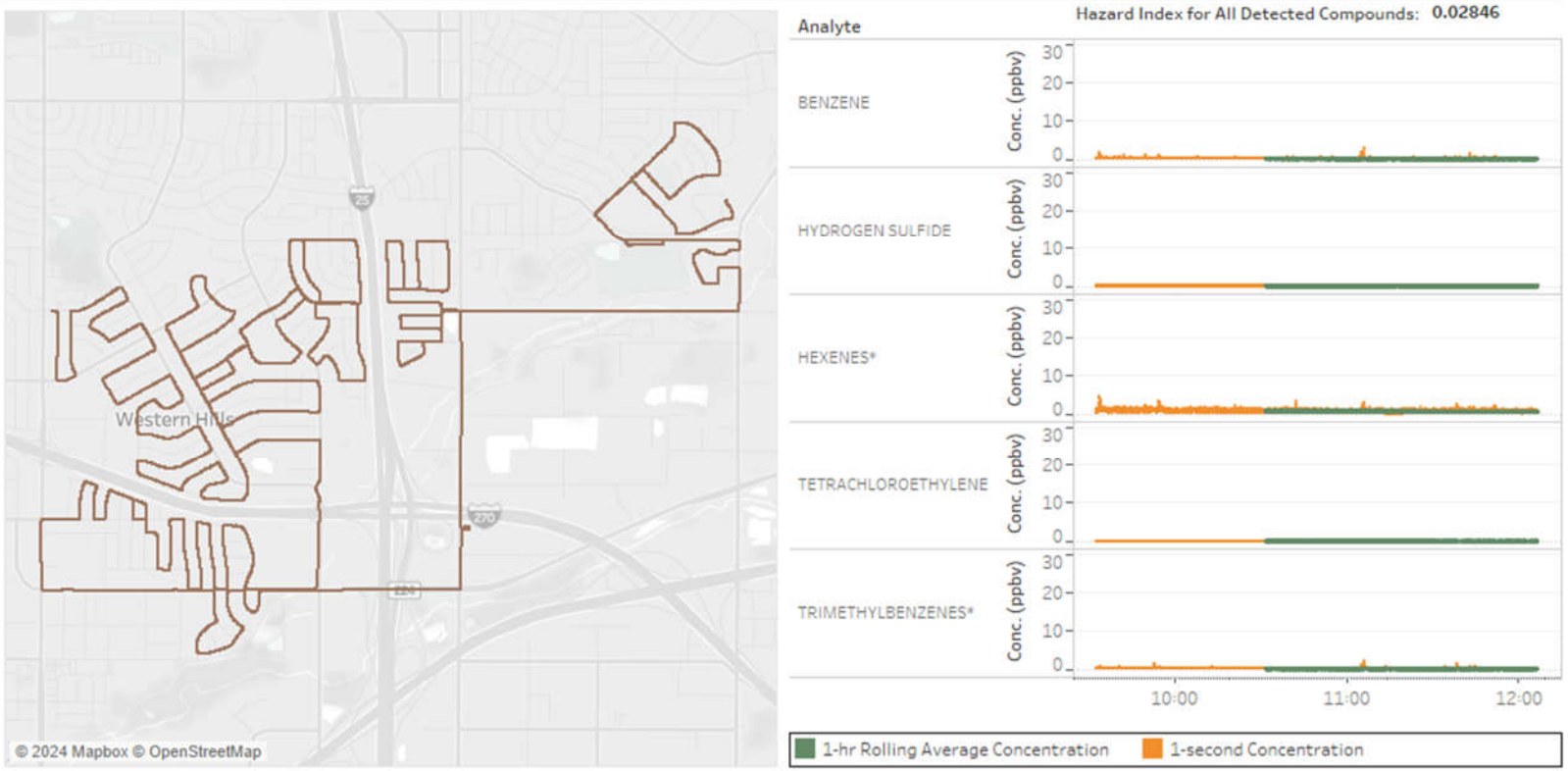
Analyte	Maximum 1-second Concentration (ppbv)	Count of 1-hr Rolling Averages Derived (#)	Average 1-hr Rolling Average (ppbv)	Maximum 1-hr Rolling Average (ppbv)	AEGL 1 60-min Value (ppbv)	Health Reference Level (ppbv)	Hazard Quotient
BENZENE	12.64	4,063	0.25	0.28	52,000	9	0.03056
HYDROGEN SULFIDE	0.51	4,063	0.19	0.19	510	70	0.00275
HEXENES*	12.08	4,063	0.98	1.01	NR	500	0.00203
TRIMETHYLBENZENES*	4.02	4,063	0.34	0.39	NR	250	0.00157
XYLENES*	30.06	4,063	1.21	1.43	130,000	2,000	0.00071



*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
WESTERN HILLS NEIGHBORHOOD: NOVEMBER 9, 2023

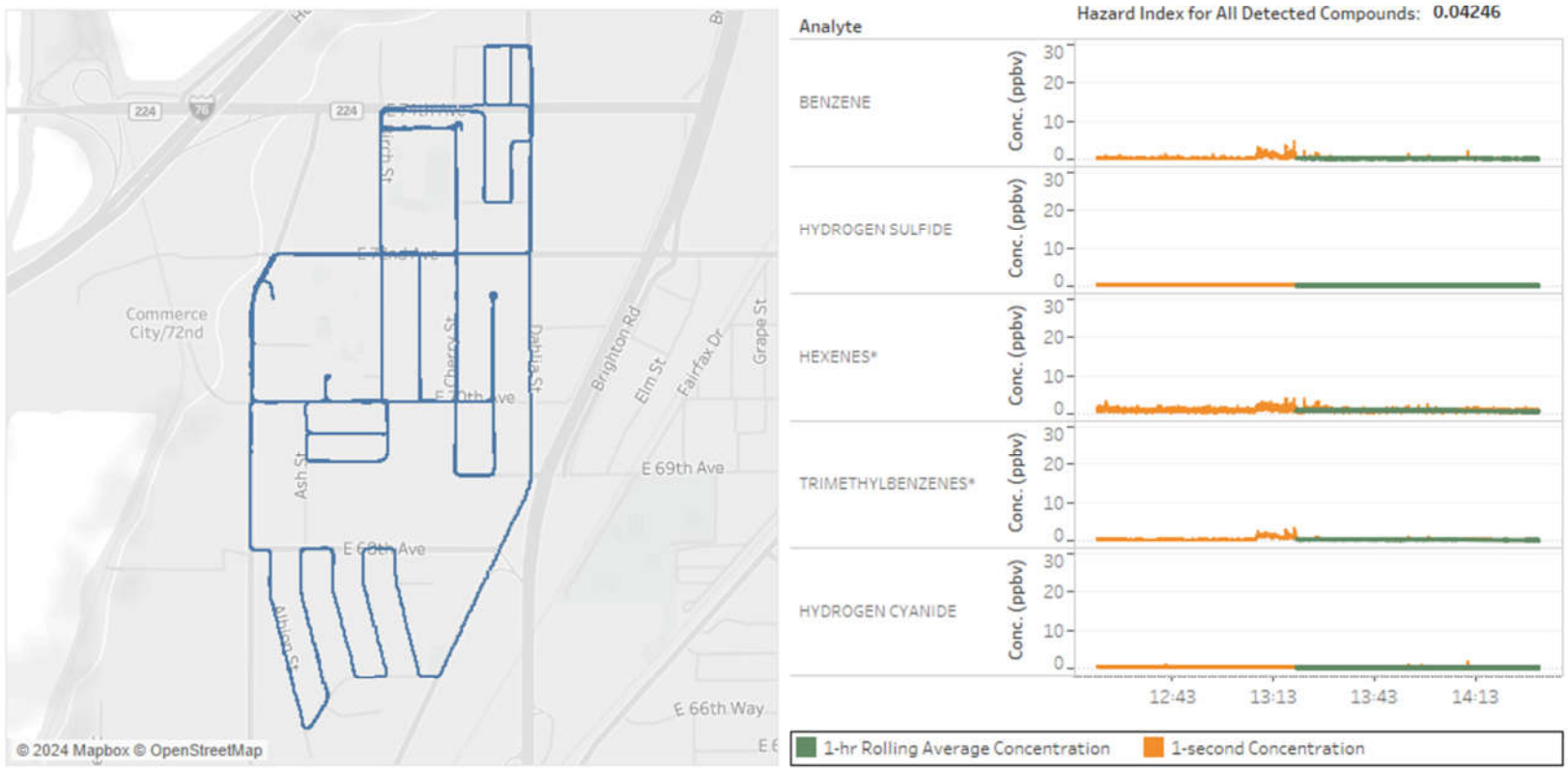
Analyte	Maximum 1-second Concentration (ppbv)	Count of 1-hr Rolling Averages Derived (#)	Average 1-hr Rolling Average (ppbv)	Maximum 1-hr Rolling Average (ppbv)	AEGL 1 60-min Value (ppbv)	Health Reference Level (ppbv)	Hazard Quotient
BENZENE	2.87	5,680	0.16	0.19	52,000	9	0.02123
HYDROGEN SULFIDE	0.42	5,680	0.12	0.14	510	70	0.00198
HEXENES*	4.60	5,680	0.70	0.84	NR	500	0.00168
TETRACHLOROETHYLENE	0.03	5,680	0.00	0.00	35,000	6	0.00074
TRIMETHYLBENZENES*	2.05	5,680	0.16	0.18	NR	250	0.00073



*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
ADAMS CITY NEIGHBORHOOD: NOVEMBER 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	4.72	4,306	0.27	0.31	52,000	9	0.03428
HYDROGEN SULFIDE	0.47	4,306	0.16	0.17	510	70	0.00240
HEXENES*	3.85	4,306	0.83	0.90	NR	500	0.00180
TRIMETHYLBENZENES*	2.91	4,306	0.29	0.34	NR	250	0.00137
HYDROGEN CYANIDE	1.55	4,306	0.17	0.18	2,000	308	0.00060



*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

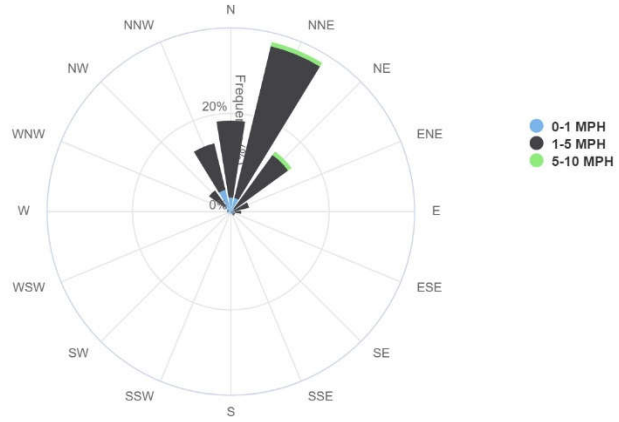
In a real-time PTR-TOF analysis, it is not possible to speciate isomers, or chemical compounds that have the same molecular weight. For example, n-hexane, 2-methyl pentane and 2,2-dimethyl butane all have a molecular mass of 86.178 g/mol. In order to provide the most conservative determination of concentration 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

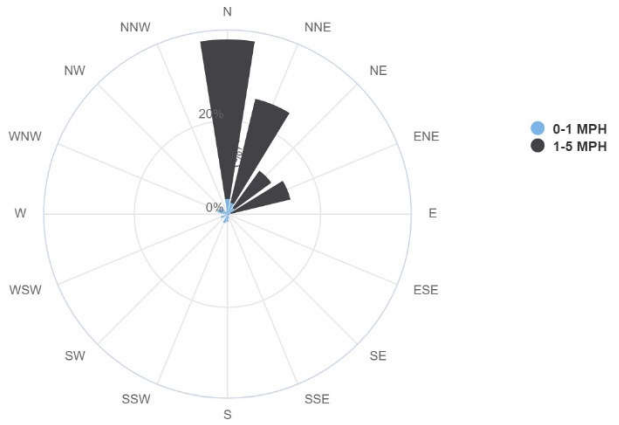
Group Name	Specific Isomers
Xylenes	Ethyl Benzene
	o-Xylene
	m-Xylene
	p-Xylene
Dimethylcyclohexanes	Ethylcyclohexane
	cis-1,3-Dimethylcyclohexane
	trans-1,2-Dimethylcyclohexane
	trans-1,3-Dimethylcyclohexane
Octanes	n-Octane
	2-Methylheptane
	3-Methylheptane
	2,2,4-Trimethylpentane
	2,3,4-Trimethylpentane
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

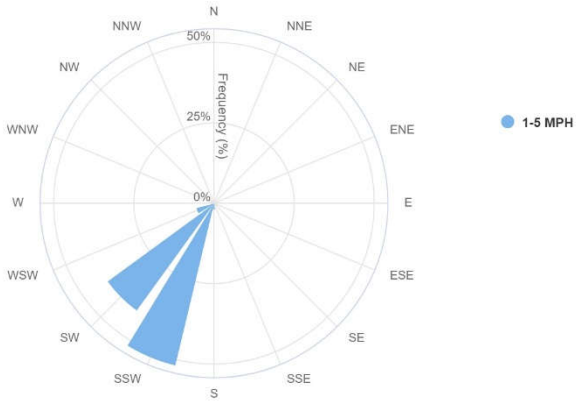
Wind Rose | Pioneer Park (CM7) 10:30am – 2:30pm, November 7, 2023



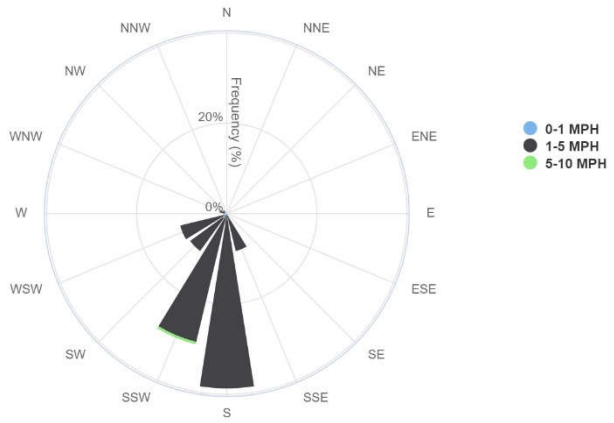
Wind Rose | Dupont (CM3) 4:30pm – 9:00pm, November 7, 2023



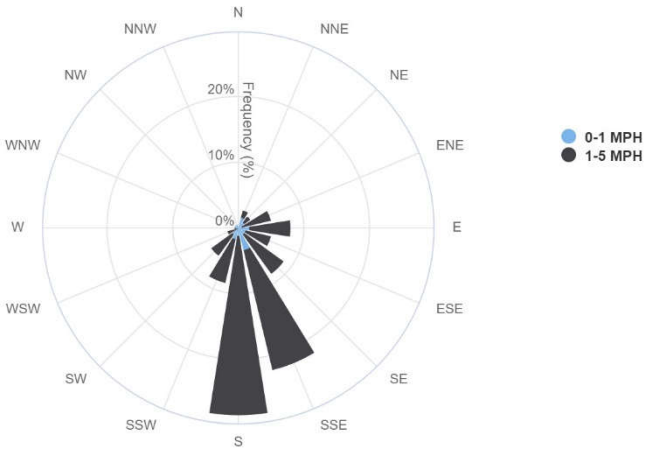
Wind Rose | Elyria-Swansea (CM6) 4:30pm – 7:30pm, November 8, 2023



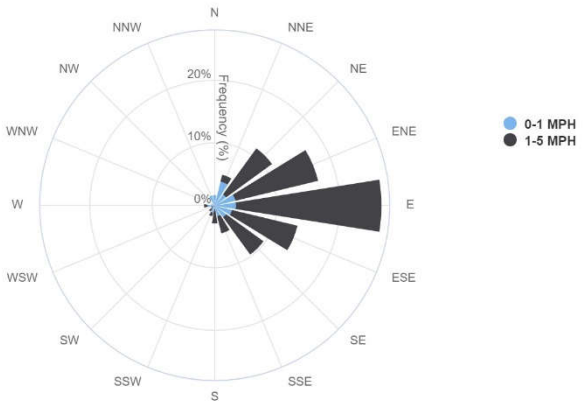
Wind Rose | Globeville (CM6) 14:00pm – 4:30pm, November 8, 2023



Wind Rose | Adams City (CM4) 12:00pm – 3:00pm, November 9, 2023



Wind Rose | Western Hills (CM4) 9:30am – 12:30pm, November 9, 2023



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

Mobile Laboratory Sampling Data Summary and Risk Assessment

Adams City Neighborhood | November 9, 2023

Analyte	Cas No	Count of 1-second Concentrations (#)	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	Health Reference Level (ppbv)	Screening Value Source	Hazard Quotient
1,3 BUTADIENE	106-99-0	7,833	0.09	4,306	0.01	0.01	670,000	298	OEHHA Acute REL	0.00003
ACETYLENE	74-86-2	7,833	1.32	4,306	0.21	0.23	NR	25,000	TCEQ Short-Term AMCV Health	0.00001
BENZENE	71-43-2	7,833	4.72	4,306	0.27	0.31	52,000	9	ATSDR Acute MRL	0.03428
BUTANES*	75-28-5	7,833	122.70	4,306	2.18	2.42	NR	33000	TCEQ Short-Term AMCV Health	0.00007
BUTENES*	590-18-1	7,833	19.62	4,306	1.60	1.84	NR	15000	TCEQ Short-Term AMCV Health	0.00012
CARBON DISULFIDE	75-15-0	7,833	0.02	4,306	0.00	0.00	13,000	1,991	OEHHA Acute REL	0.00000
CYCLOPENTANES*	287-92-3	7,833	24.09	4,306	1.82	2.08	NR	5,900	TCEQ Short-Term AMCV Health	0.00035
DECANES	124-18-5	7,833	0.06	4,306	0.02	0.02	NR	1,000	TCEQ Short-Term AMCV Health	0.00002
DIETHYLBENZENES*	141-93-5	7,833	0.10	4,306	0.02	0.02	NR	450	TCEQ Short-Term AMCV Health	0.00005
DIMETHYLCYCLOHEXANES*	638-04-0	7,833	0.07	4,306	0.02	0.02	NR	4,000	CDPHE	0.00001
DODECANES	112-40-3	7,833	0.01	4,306	0.00	0.00	NR	1720	CDPHE	0.00000
ETHYLENE	74-85-1	7,833	25.54	4,306	6.48	6.52	NR	500,000	TCEQ Short-Term AMCV Health	0.00001
HEPTANES*	142-82-5	7,833	0.10	4,306	0.04	0.05	NR	8,300	TCEQ Short-Term AMCV Health	0.00001
HEXANES*	110-54-3	7,833	0.44	4,306	0.30	0.31	NR	5,400	TCEQ Short-Term AMCV Health	0.00006
HEXENES*	592-41-6	7,833	3.85	4,306	0.83	0.90	NR	500	TCEQ Short-Term AMCV Health	0.00180
HYDROGEN CYANIDE	74-90-8	7,833	1.55	4,306	0.17	0.18	2,000	308	OEHHA Acute REL	0.00060
HYDROGEN SULFIDE	7783-06-4	7,833	0.47	4,306	0.16	0.17	510	70	ATSDR Acute MRL	0.00240
ISOPRENE	78-79-5	7,833	0.81	4,306	0.15	0.16	NR	1,400	TCEQ Short-Term AMCV Health	0.00011
METHANOL	67-56-1	7,833	57.78	4,306	4.97	5.08	530,000	21,366	OEHHA Acute REL	0.00024
METHYLCYCLOHEXANE	108-87-2	7,833	0.12	4,306	0.04	0.04	NR	4,000	TCEQ Short-Term AMCV Health	0.00001
NONANES	111-84-2	7,833	0.03	4,306	0.00	0.00	NR	3,000	TCEQ Short-Term AMCV Health	0.00000
OCTANES*	111-65-9	7,833	0.49	4,306	0.03	0.04	NR	4,100	TCEQ Short-Term AMCV Health	0.00001
PENTANES*	109-66-0	7,833	0.34	4,306	0.27	0.27	NR	68,000	TCEQ Short-Term AMCV Health	0.00000
PROPYLENE	115-07-1	7,833	7.14	4,306	0.67	0.75	NR	NA	NE	
STYRENE	100-42-5	7,833	0.17	4,306	0.04	0.05	20,000	5,000	ATSDR Acute MRL	0.00001
TETRACHLOROETHYLENE	127-18-4	7,833	0.02	4,306	0.00	0.00	35,000	6	ATSDR Acute MRL	0.00001
TOLUENE	108-88-3	7,833	10.52	4,306	0.64	0.74	67,000	2,000	ATSDR Acute MRL	0.00037
TRIMETHYLBENZENES*	622-96-8	7,833	2.91	4,306	0.29	0.34	50,000	250	TCEQ Short-Term AMCV Health	0.00137
UNDECANES	1120-21-4	7,833	0.02	4,306	0.00	0.00	NR	550	TCEQ Short-Term AMCV Health	0.00000
XYLENES*	1330-20-7	7,833	12.27	4,306	0.83	0.98	130,000	2,000	ATSDR Acute MRL	0.00049
									Hazard Index	0.04246

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 group was selected for use in this assessment (See Appendix A)

CCND Mobile Monitoring Van
2023 Q4

Mobile Laboratory Sampling Data Summary and Risk Assessment
DuPont Neighborhood | November 7, 2023

Analyte	Cas No	Count of 1-second Concentrations (#)	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	Health Reference Level (ppbv)	Screening Value Source	Hazard Quotient
1,3 BUTADIENE	106-99-0	7,952	0.12	4,425	0.01	0.01	670,000	298	OEHHA Acute REL	0.00005
ACETYLENE	74-86-2	7,952	1.44	4,425	0.22	0.23	NR	25,000	TCEQ Short-Term AMCV Health	0.00001
BENZENE	71-43-2	7,952	3.16	4,425	0.20	0.24	52,000	9	ATSDR Acute MRL	0.02681
BUTANES*	75-28-5	7,952	18.34	4,425	2.21	2.54	NR	33000	TCEQ Short-Term AMCV Health	0.00008
BUTENES*	590-18-1	7,952	28.43	4,425	1.17	1.58	NR	15000	TCEQ Short-Term AMCV Health	0.00011
CARBON DISULFIDE	75-15-0	7,952	0.05	4,425	0.00	0.00	13,000	1,991	OEHHA Acute REL	0.00000
CYCLOPENTANES*	287-92-3	7,952	37.82	4,425	2.61	3.07	NR	5,900	TCEQ Short-Term AMCV Health	0.00052
DECANES	124-18-5	7,952	0.07	4,425	0.02	0.03	NR	1,000	TCEQ Short-Term AMCV Health	0.00003
DIETHYLBENZENES*	141-93-5	7,952	0.08	4,425	0.03	0.03	NR	450	TCEQ Short-Term AMCV Health	0.00006
DIMETHYLCYCLOHEXANES*	638-04-0	7,952	0.14	4,425	0.04	0.04	NR	4,000	CDPHE	0.00001
DODECANES	112-40-3	7,952	0.02	4,425	0.00	0.00	NR	1720	CDPHE	0.00000
ETHYLENE	74-85-1	7,952	168.33	4,425	5.61	6.34	NR	500,000	TCEQ Short-Term AMCV Health	0.00001
HEPTANES*	142-82-5	7,952	0.27	4,425	0.10	0.12	NR	8,300	TCEQ Short-Term AMCV Health	0.00001
HEXANES*	110-54-3	7,952	0.30	4,425	0.06	0.07	NR	5,400	TCEQ Short-Term AMCV Health	0.00001
HEXENES*	592-41-6	7,952	15.40	4,425	0.94	1.02	NR	500	TCEQ Short-Term AMCV Health	0.00204
HYDROGEN CYANIDE	74-90-8	7,952	0.61	4,425	0.10	0.15	2,000	308	OEHHA Acute REL	0.00048
HYDROGEN SULFIDE	7783-06-4	7,952	0.86	4,425	0.14	0.14	510	70	ATSDR Acute MRL	0.00204
ISOPRENE	78-79-5	7,952	0.93	4,425	0.14	0.15	NR	1,400	TCEQ Short-Term AMCV Health	0.00011
METHANOL	67-56-1	7,952	54.99	4,425	1.13	1.57	530,000	21,366	OEHHA Acute REL	0.00007
METHYLCYCLOHEXANE	108-87-2	7,952	0.28	4,425	0.07	0.07	NR	4,000	TCEQ Short-Term AMCV Health	0.00002
NONANES	111-84-2	7,952	0.07	4,425	0.02	0.02	NR	3,000	TCEQ Short-Term AMCV Health	0.00001
OCTANES*	111-65-9	7,952	0.20	4,425	0.05	0.06	NR	4,100	TCEQ Short-Term AMCV Health	0.00001
PENTANES*	109-66-0	7,952	0.48	4,425	0.02	0.03	NR	68,000	TCEQ Short-Term AMCV Health	0.00000
PROPYLENE	115-07-1	7,952	12.74	4,425	0.33	0.49	NR	NA	NE	
STYRENE	100-42-5	7,952	0.94	4,425	0.07	0.09	20,000	5,000	ATSDR Acute MRL	0.00002
TETRACHLOROETHYLENE	127-18-4	7,952	0.04	4,425	0.01	0.01	35,000	6	ATSDR Acute MRL	0.00108
TOLUENE	108-88-3	7,952	33.49	4,425	0.64	0.92	67,000	2,000	ATSDR Acute MRL	0.00046
TRIMETHYLBENZENES*	622-96-8	7,952	1.94	4,425	0.16	0.22	50,000	250	TCEQ Short-Term AMCV Health	0.00086
UNDECANES	1120-21-4	7,952	0.06	4,425	0.02	0.02	NR	550	TCEQ Short-Term AMCV Health	0.00004
XYLENES*	1330-20-7	7,952	20.56	4,425	0.74	1.02	130,000	2,000	ATSDR Acute MRL	0.00051
									Hazard Index	0.03546

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 group was selected for use in this assessment (See Appendix A)

CCND Mobile Monitoring Van
2023 Q4

Mobile Laboratory Sampling Data Summary and Risk Assessment

Elyria-Swansea Neighborhood | November 8, 2023

Analyte	Cas No	Count of 1-second Concentrations (#)	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	Health Reference Level (ppbv)	Screening Value Source	Hazard Quotient
1,3 BUTADIENE	106-99-0	7,590	0.14	4,063	0.01	0.01	670,000	298	OEHHA Acute REL	0.00004
ACETYLENE	74-86-2	7,590	0.90	4,063	0.26	0.27	NR	25,000	TCEQ Short-Term AMCV Health	0.00001
BENZENE	71-43-2	7,590	12.64	4,063	0.25	0.28	52,000	9	ATSDR Acute MRL	0.03056
BUTANES*	75-28-5	7,590	17.86	4,063	2.35	2.48	NR	33000	TCEQ Short-Term AMCV Health	0.00008
BUTENES*	590-18-1	7,590	41.37	4,063	1.72	1.79	NR	15000	TCEQ Short-Term AMCV Health	0.00012
CARBON DISULFIDE	75-15-0	7,590	0.03	4,063	0.00	0.00	13,000	1,991	OEHHA Acute REL	0.00000
CYCLOPENTANES*	287-92-3	7,590	30.29	4,063	1.13	1.23	NR	5,900	TCEQ Short-Term AMCV Health	0.00021
DECANES	124-18-5	7,590	0.06	4,063	0.03	0.03	NR	1,000	TCEQ Short-Term AMCV Health	0.00003
DIETHYLBENZENES*	141-93-5	7,590	0.10	4,063	0.03	0.03	NR	450	TCEQ Short-Term AMCV Health	0.00006
DIMETHYLCYCLOHEXANES*	638-04-0	7,590	0.41	4,063	0.02	0.03	NR	4,000	CDPHE	0.00001
DODECANES	112-40-3	7,590	0.01	4,063	0.00	0.00	NR	1720	CDPHE	0.00000
ETHYLENE	74-85-1	7,590	7.92	4,063	7.17	7.18	NR	500,000	TCEQ Short-Term AMCV Health	0.00001
HEPTANES*	142-82-5	7,590	0.12	4,063	0.06	0.07	NR	8,300	TCEQ Short-Term AMCV Health	0.00001
HEXANES*	110-54-3	7,590	0.40	4,063	0.31	0.31	NR	5,400	TCEQ Short-Term AMCV Health	0.00006
HEXENES*	592-41-6	7,590	12.08	4,063	0.98	1.01	NR	500	TCEQ Short-Term AMCV Health	0.00203
HYDROGEN CYANIDE	74-90-8	7,590	0.58	4,063	0.17	0.18	2,000	308	OEHHA Acute REL	0.00057
HYDROGEN SULFIDE	7783-06-4	7,590	0.51	4,063	0.19	0.19	510	70	ATSDR Acute MRL	0.00275
ISOPRENE	78-79-5	7,590	2.32	4,063	0.17	0.19	NR	1,400	TCEQ Short-Term AMCV Health	0.00013
METHANOL	67-56-1	7,590	23.80	4,063	5.55	5.64	530,000	21,366	OEHHA Acute REL	0.00026
METHYLCYCLOHEXANE	108-87-2	7,590	0.28	4,063	0.06	0.06	NR	4,000	TCEQ Short-Term AMCV Health	0.00001
NONANES	111-84-2	7,590	0.04	4,063	0.01	0.01	NR	3,000	TCEQ Short-Term AMCV Health	0.00000
OCTANES*	111-65-9	7,590	0.08	4,063	0.03	0.04	NR	4,100	TCEQ Short-Term AMCV Health	0.00001
PENTANES*	109-66-0	7,590	0.40	4,063	0.27	0.27	NR	68,000	TCEQ Short-Term AMCV Health	0.00000
PROPYLENE	115-07-1	7,590	23.84	4,063	0.89	0.94	NR	NA	NE	
STYRENE	100-42-5	7,590	0.23	4,063	0.05	0.05	20,000	5,000	ATSDR Acute MRL	0.00001
TETRACHLOROETHYLENE	127-18-4	7,590	0.03	4,063	0.00	0.00	35,000	6	ATSDR Acute MRL	0.00048
TOLUENE	108-88-3	7,590	29.99	4,063	0.93	1.18	67,000	2,000	ATSDR Acute MRL	0.00059
TRIMETHYLBENZENES*	622-96-8	7,590	4.02	4,063	0.34	0.39	50,000	250	TCEQ Short-Term AMCV Health	0.00157
UNDECANES	1120-21-4	7,590	0.03	4,063	0.00	0.00	NR	550	TCEQ Short-Term AMCV Health	0.00000
XYLENES*	1330-20-7	7,590	30.06	4,063	1.21	1.43	130,000	2,000	ATSDR Acute MRL	0.00071
									Hazard Index	0.04034

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 group was selected for use in this assessment (See Appendix A)

CCND Mobile Monitoring Van
2023 Q4

Mobile Laboratory Sampling Data Summary and Risk Assessment

Globeville Neighborhood | November 8, 2023

Analyte	Cas No	Count of 1-second Concentrations (#)	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	Health Reference Level (ppbv)	Screening Value Source	Hazard Quotient
1,3 BUTADIENE	106-99-0	7,450	0.13	3,923	0.01	0.02	670,000	298	OEHHA Acute REL	0.00005
ACETYLENE	74-86-2	7,450	0.98	3,923	0.38	0.39	NR	25,000	TCEQ Short-Term AMCV Health	0.00002
BENZENE	71-43-2	7,450	3.75	3,923	0.22	0.24	52,000	9	ATSDR Acute MRL	0.02661
BUTANES*	75-28-5	7,450	44.33	3,923	2.71	3.10	NR	33000	TCEQ Short-Term AMCV Health	0.00009
BUTENES*	590-18-1	7,450	18.71	3,923	2.03	2.28	NR	15000	TCEQ Short-Term AMCV Health	0.00015
CARBON DISULFIDE	75-15-0	7,450	0.03	3,923	0.00	0.00	13,000	1,991	OEHHA Acute REL	0.00000
CYCLOPENTANES*	287-92-3	7,450	28.81	3,923	2.04	2.91	NR	5,900	TCEQ Short-Term AMCV Health	0.00049
DECANES	124-18-5	7,450	0.18	3,923	0.05	0.07	NR	1,000	TCEQ Short-Term AMCV Health	0.00007
DIETHYLBENZENES*	141-93-5	7,450	0.08	3,923	0.03	0.03	NR	450	TCEQ Short-Term AMCV Health	0.00007
DIMETHYLCYCLOHEXANES*	638-04-0	7,450	0.23	3,923	0.04	0.05	NR	4,000	CDPHE	0.00001
DODECANES	112-40-3	7,450	0.01	3,923	0.00	0.00	NR	1720	CDPHE	0.00000
ETHYLENE	74-85-1	7,450	7.74	3,923	7.13	7.13	NR	500,000	TCEQ Short-Term AMCV Health	0.00001
HEPTANES*	142-82-5	7,450	0.38	3,923	0.12	0.15	NR	8,300	TCEQ Short-Term AMCV Health	0.00002
HEXANES*	110-54-3	7,450	0.69	3,923	0.34	0.36	NR	5,400	TCEQ Short-Term AMCV Health	0.00007
HEXENES*	592-41-6	7,450	7.47	3,923	1.52	2.00	NR	500	TCEQ Short-Term AMCV Health	0.00399
HYDROGEN CYANIDE	74-90-8	7,450	0.69	3,923	0.07	0.10	2,000	308	OEHHA Acute REL	0.00032
HYDROGEN SULFIDE	7783-06-4	7,450	0.58	3,923	0.19	0.20	510	70	ATSDR Acute MRL	0.00279
ISOPRENE	78-79-5	7,450	1.45	3,923	0.22	0.25	NR	1,400	TCEQ Short-Term AMCV Health	0.00018
METHANOL	67-56-1	7,450	14.79	3,923	5.07	5.21	530,000	21,366	OEHHA Acute REL	0.00024
METHYLCYCLOHEXANE	108-87-2	7,450	0.26	3,923	0.09	0.12	NR	4,000	TCEQ Short-Term AMCV Health	0.00003
NONANES	111-84-2	7,450	0.14	3,923	0.02	0.04	NR	3,000	TCEQ Short-Term AMCV Health	0.00001
OCTANES*	111-65-9	7,450	0.27	3,923	0.07	0.11	NR	4,100	TCEQ Short-Term AMCV Health	0.00003
PENTANES*	109-66-0	7,450	0.39	3,923	0.28	0.28	NR	68,000	TCEQ Short-Term AMCV Health	0.00000
PROPYLENE	115-07-1	7,450	5.38	3,923	0.84	0.87	NR	NA	NE	
STYRENE	100-42-5	7,450	0.22	3,923	0.06	0.07	20,000	5,000	ATSDR Acute MRL	0.00001
TETRACHLOROETHYLENE	127-18-4	7,450	0.05	3,923	0.01	0.01	35,000	6	ATSDR Acute MRL	0.00164
TOLUENE	108-88-3	7,450	22.69	3,923	0.87	0.96	67,000	2,000	ATSDR Acute MRL	0.00048
TRIMETHYLBENZENES*	622-96-8	7,450	4.33	3,923	0.34	0.37	50,000	250	TCEQ Short-Term AMCV Health	0.00148
UNDECANES	1120-21-4	7,450	0.08	3,923	0.01	0.03	NR	550	TCEQ Short-Term AMCV Health	0.00005
XYLENES*	1330-20-7	7,450	25.71	3,923	1.13	1.26	130,000	2,000	ATSDR Acute MRL	0.00063
									Hazard Index	0.03957

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 group was selected for use in this assessment (See Appendix A)

CCND Mobile Monitoring Van
2023 Q4

Mobile Laboratory Sampling Data Summary and Risk Assessment

Pioneer Park Neighborhood | November 7, 2023

Analyte	Cas No	Count of 1-second Concentrations (#)	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	Health Reference Level (ppbv)	Screening Value Source	Hazard Quotient
1,3 BUTADIENE	106-99-0	11,364	0.29	7,837	0.03	0.06	670,000	298	OEHHA Acute REL	0.00020
ACETYLENE	74-86-2	11,364	1.65	7,837	0.32	0.40	NR	25,000	TCEQ Short-Term AMCV Health	0.00002
BENZENE	71-43-2	11,364	2.07	7,837	0.21	0.24	52,000	9	ATSDR Acute MRL	0.02616
BUTANES*	75-28-5	11,364	18.65	7,837	3.95	5.19	NR	33000	TCEQ Short-Term AMCV Health	0.00016
BUTENES*	590-18-1	11,364	14.21	7,837	1.61	2.33	NR	15000	TCEQ Short-Term AMCV Health	0.00016
CARBON DISULFIDE	75-15-0	11,364	0.11	7,837	0.01	0.02	13,000	1,991	OEHHA Acute REL	0.00001
CYCLOPENTANES*	287-92-3	11,364	19.52	7,837	2.80	3.61	NR	5,900	TCEQ Short-Term AMCV Health	0.00061
DECANES	124-18-5	11,364	0.40	7,837	0.08	0.16	NR	1,000	TCEQ Short-Term AMCV Health	0.00016
DIETHYLBENZENES*	141-93-5	11,364	0.13	7,837	0.04	0.05	NR	450	TCEQ Short-Term AMCV Health	0.00011
DIMETHYLCYCLOHEXANES*	638-04-0	11,364	0.07	7,837	0.01	0.02	NR	4,000	CDPHE	0.00001
DODECANES	112-40-3	11,364	0.02	7,837	0.00	0.00	NR	1720	CDPHE	0.00000
ETHYLENE	74-85-1	11,364	34.53	7,837	6.14	6.28	NR	500,000	TCEQ Short-Term AMCV Health	0.00001
HEPTANES*	142-82-5	11,364	0.24	7,837	0.09	0.11	NR	8,300	TCEQ Short-Term AMCV Health	0.00001
HEXANES*	110-54-3	11,364	0.21	7,837	0.08	0.09	NR	5,400	TCEQ Short-Term AMCV Health	0.00002
HEXENES*	592-41-6	11,364	4.73	7,837	0.83	1.05	NR	500	TCEQ Short-Term AMCV Health	0.00211
HYDROGEN CYANIDE	74-90-8	11,364	0.91	7,837	0.15	0.25	2,000	308	OEHHA Acute REL	0.00081
HYDROGEN SULFIDE	7783-06-4	11,364	0.68	7,837	0.18	0.23	510	70	ATSDR Acute MRL	0.00324
ISOPRENE	78-79-5	11,364	1.54	7,837	0.27	0.58	NR	1,400	TCEQ Short-Term AMCV Health	0.00041
METHANOL	67-56-1	11,364	9.14	7,837	2.05	2.32	530,000	21,366	OEHHA Acute REL	0.00011
METHYLCYCLOHEXANE	108-87-2	11,364	0.16	7,837	0.04	0.06	NR	4,000	TCEQ Short-Term AMCV Health	0.00001
NONANES	111-84-2	11,364	0.15	7,837	0.03	0.05	NR	3,000	TCEQ Short-Term AMCV Health	0.00002
OCTANES*	111-65-9	11,364	0.17	7,837	0.05	0.07	NR	4,100	TCEQ Short-Term AMCV Health	0.00002
PENTANES*	109-66-0	11,364	0.68	7,837	0.27	0.28	NR	68,000	TCEQ Short-Term AMCV Health	0.00000
PROPYLENE	115-07-1	11,364	4.32	7,837	0.37	0.51	NR	NA	NE	
STYRENE	100-42-5	11,364	0.48	7,837	0.03	0.05	20,000	5,000	ATSDR Acute MRL	0.00001
TETRACHLOROETHYLENE	127-18-4	11,364	0.10	7,837	0.01	0.03	35,000	6	ATSDR Acute MRL	0.00424
TOLUENE	108-88-3	11,364	13.60	7,837	1.12	1.72	67,000	2,000	ATSDR Acute MRL	0.00086
TRIMETHYLBENZENES*	622-96-8	11,364	2.52	7,837	0.19	0.24	50,000	250	TCEQ Short-Term AMCV Health	0.00097
UNDECANES	1120-21-4	11,364	0.17	7,837	0.05	0.07	NR	550	TCEQ Short-Term AMCV Health	0.00013
XYLENES*	1330-20-7	11,364	11.40	7,837	1.04	1.31	130,000	2,000	ATSDR Acute MRL	0.00065
									Hazard Index	0.04122

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 group was selected for use in this assessment (See Appendix A)

CCND Mobile Monitoring Van
2023 Q4

Mobile Laboratory Sampling Data Summary and Risk Assessment
Western Hills Neighborhood | November 9, 2023

Analyte	Cas No	Count of 1-second Concentrations (#)	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	Health Reference Level (ppbv)	Screening Value Source	Hazard Quotient
1,3 BUTADIENE	106-99-0	9,207	0.11	5,680	0.01	0.01	670,000	298	OEHHA Acute REL	0.00003
ACETYLENE	74-86-2	9,207	0.87	5,680	0.21	0.24	NR	25,000	TCEQ Short-Term AMCV Health	0.00001
BENZENE	71-43-2	9,207	2.87	5,680	0.16	0.19	52,000	9	ATSDR Acute MRL	0.02123
BUTANES*	75-28-5	9,207	9.82	5,680	1.85	2.08	NR	33000	TCEQ Short-Term AMCV Health	0.00006
BUTENES*	590-18-1	9,207	23.96	5,680	1.63	1.94	NR	15000	TCEQ Short-Term AMCV Health	0.00013
CARBON DISULFIDE	75-15-0	9,207	0.03	5,680	0.00	0.00	13,000	1,991	OEHHA Acute REL	0.00000
CYCLOPENTANES*	287-92-3	9,207	33.71	5,680	1.69	2.15	NR	5,900	TCEQ Short-Term AMCV Health	0.00036
DECANES	124-18-5	9,207	0.07	5,680	0.01	0.01	NR	1,000	TCEQ Short-Term AMCV Health	0.00001
DIETHYLBENZENES*	141-93-5	9,207	0.15	5,680	0.02	0.02	NR	450	TCEQ Short-Term AMCV Health	0.00005
DIMETHYLCYCLOHEXANES*	638-04-0	9,207	0.17	5,680	0.03	0.03	NR	4,000	CDPHE	0.00001
DODECANES	112-40-3	9,207	0.01	5,680	0.00	0.00	NR	1720	CDPHE	0.00000
ETHYLENE	74-85-1	9,207	14.66	5,680	7.12	7.39	NR	500,000	TCEQ Short-Term AMCV Health	0.00001
HEPTANES*	142-82-5	9,207	0.17	5,680	0.05	0.07	NR	8,300	TCEQ Short-Term AMCV Health	0.00001
HEXANES*	110-54-3	9,207	0.41	5,680	0.17	0.17	NR	5,400	TCEQ Short-Term AMCV Health	0.00003
HEXENES*	592-41-6	9,207	4.60	5,680	0.70	0.84	NR	500	TCEQ Short-Term AMCV Health	0.00168
HYDROGEN CYANIDE	74-90-8	9,207	0.87	5,680	0.13	0.14	2,000	308	OEHHA Acute REL	0.00046
HYDROGEN SULFIDE	7783-06-4	9,207	0.42	5,680	0.12	0.14	510	70	ATSDR Acute MRL	0.00198
ISOPRENE	78-79-5	9,207	0.94	5,680	0.13	0.15	NR	1,400	TCEQ Short-Term AMCV Health	0.00011
METHANOL	67-56-1	9,207	38.61	5,680	5.39	5.57	530,000	21,366	OEHHA Acute REL	0.00026
METHYLCYCLOHEXANE	108-87-2	9,207	0.13	5,680	0.04	0.04	NR	4,000	TCEQ Short-Term AMCV Health	0.00001
NONANES	111-84-2	9,207	0.04	5,680	0.01	0.01	NR	3,000	TCEQ Short-Term AMCV Health	0.00000
OCTANES*	111-65-9	9,207	0.15	5,680	0.02	0.02	NR	4,100	TCEQ Short-Term AMCV Health	0.00001
PENTANES*	109-66-0	9,207	0.43	5,680	0.27	0.28	NR	68,000	TCEQ Short-Term AMCV Health	0.00000
PROPYLENE	115-07-1	9,207	5.05	5,680	0.26	0.33	NR	NA	NE	
STYRENE	100-42-5	9,207	0.14	5,680	0.00	0.01	20,000	5,000	ATSDR Acute MRL	0.00000
TETRACHLOROETHYLENE	127-18-4	9,207	0.03	5,680	0.00	0.00	35,000	6	ATSDR Acute MRL	0.00074
TOLUENE	108-88-3	9,207	8.60	5,680	0.41	0.45	67,000	2,000	ATSDR Acute MRL	0.00023
TRIMETHYLBENZENES*	622-96-8	9,207	2.05	5,680	0.16	0.18	50,000	250	TCEQ Short-Term AMCV Health	0.00073
UNDECANES	1120-21-4	9,207	0.04	5,680	0.01	0.01	NR	550	TCEQ Short-Term AMCV Health	0.00002
XYLENES*	1330-20-7	9,207	9.95	5,680	0.51	0.56	130,000	2,000	ATSDR Acute MRL	0.00028
									Hazard Index	0.02846

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 group was selected for use in this assessment (See Appendix A)

APPENDIX D
PTR CALIBRATION AND QA/QC DATA

Notable Sampling Events During Test Program

11-7-23 Pioneer Park Neighborhood

11:20 E64th and Niagra: Benzene, toluene and xylene spike, Trash truck exhaust

11-7-23 Dupont Neighborhood

17:27 E80th and Monaco Intersection: Benzene, toluene, hexenes car exhaust

11-8-23 Globeville and Elyria-Swansea Neighborhoods

15:50 Leaf and 47th Intersection: Benzene, toluene, xylenes, hexene, auto exhaust.
16:37 Lincoln and 53rd Intersection: Benzene, hexenes auto exhaust
17:04 Exhaust Spikes: benzene, toluene, xylenes
18:34 40th and York Intersection: benzene, toluene, xylenes auto exhaust
18:28 Clayton and 48th Intersection: benzene, toluene, hexenes auto exhaust
18:55 Vine and 48th Intersection: benzene, toluene, hexenes, Unknown

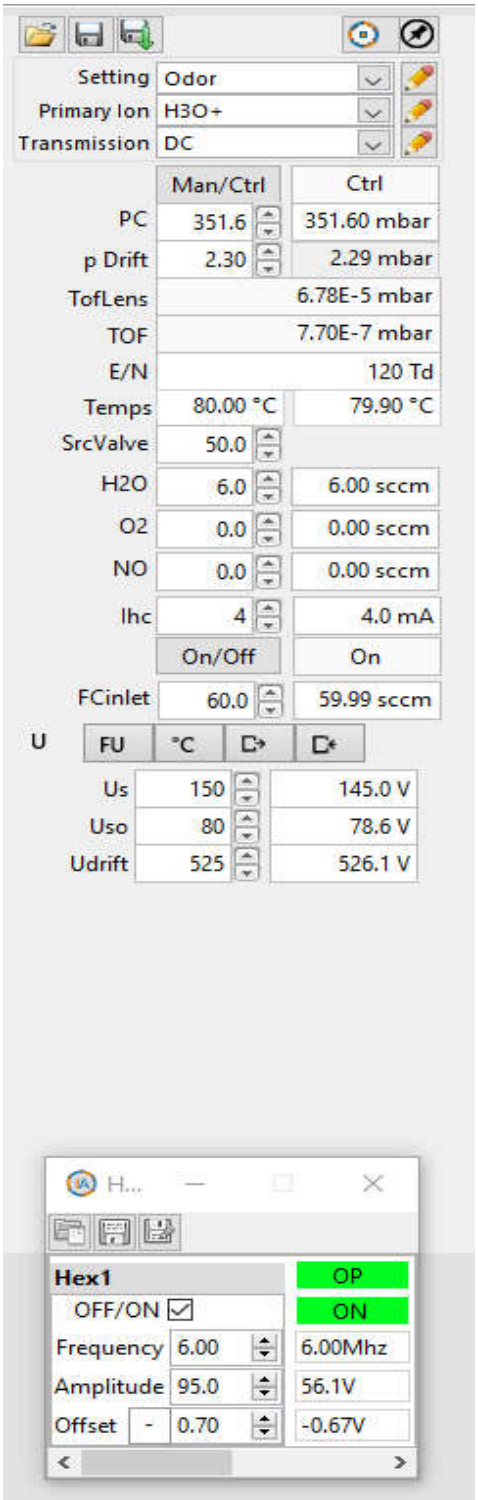
11-9-23 Western Hills Neighborhood

9:50 Bronco and Greenwood: hexene and alkene spike, unknown

11-9-23 Adams City Neighborhood

13:10-13:26 Circle K Station: Benzene, Toluene, Trimethylbenzenes and hexenes

CCND Neighborhood Monitoring Program
4th Quarter 2023
PTR Operational Parameters
11/5/2023 PTR Initial Calibration



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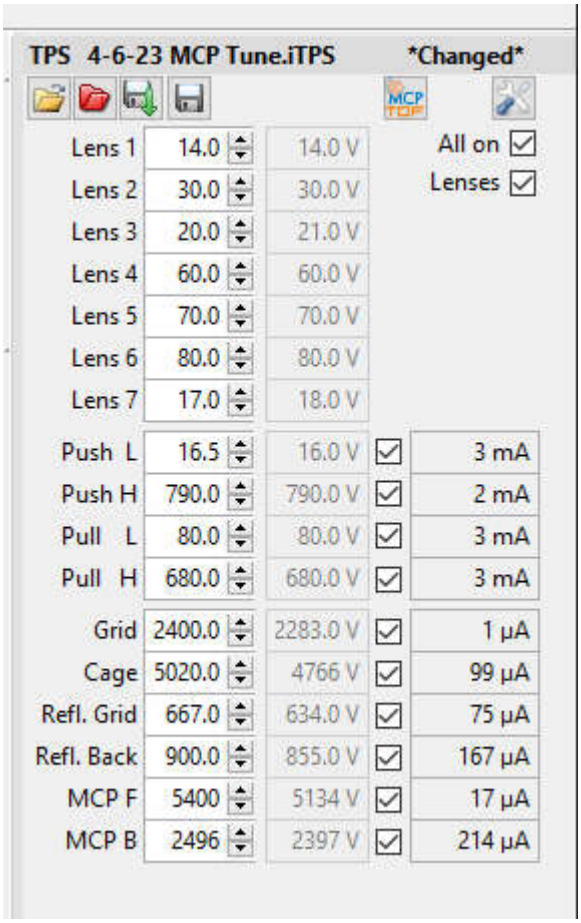
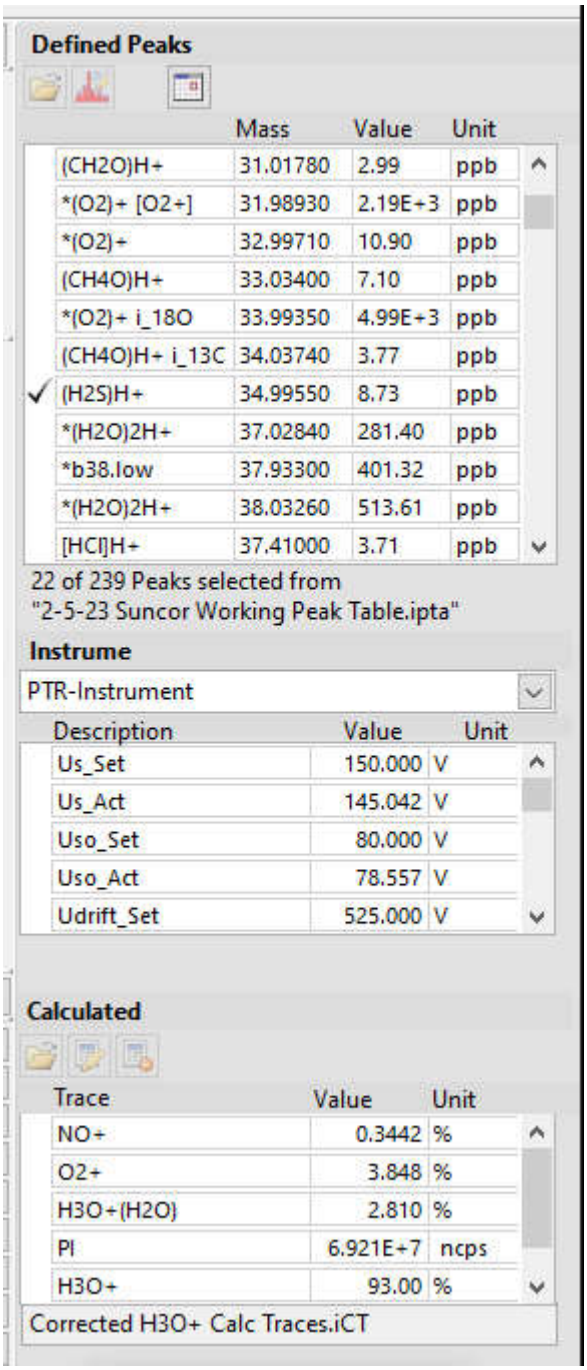


TOF Voltages



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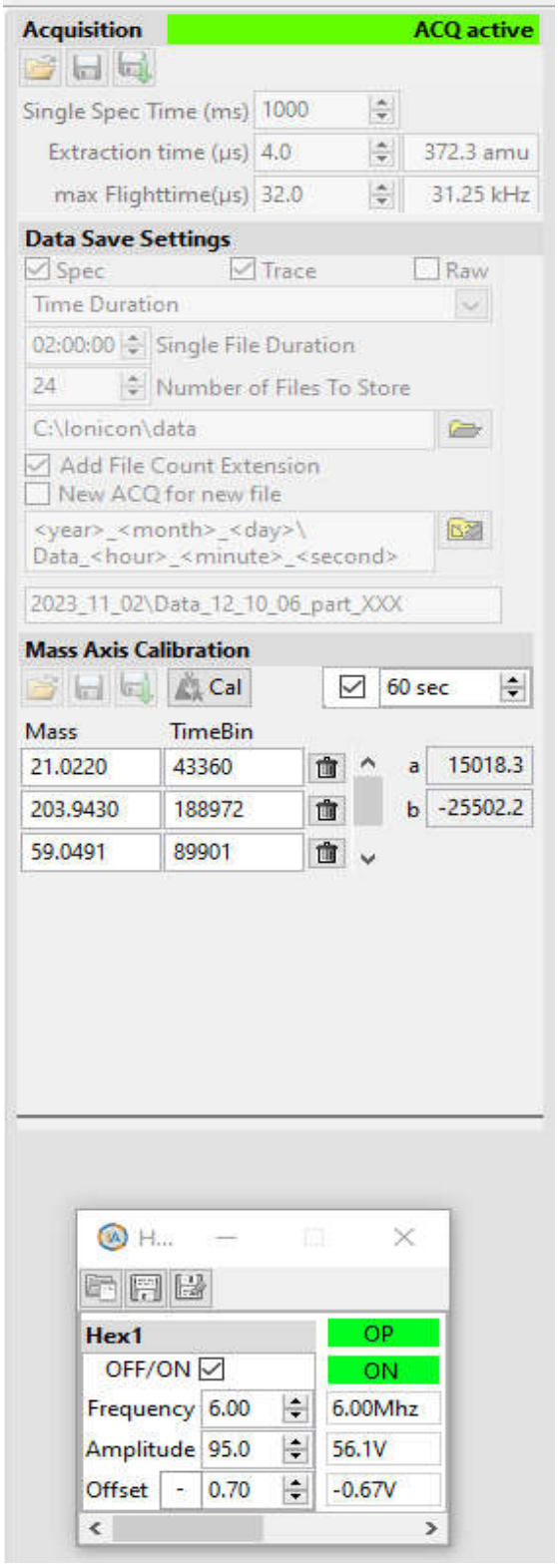

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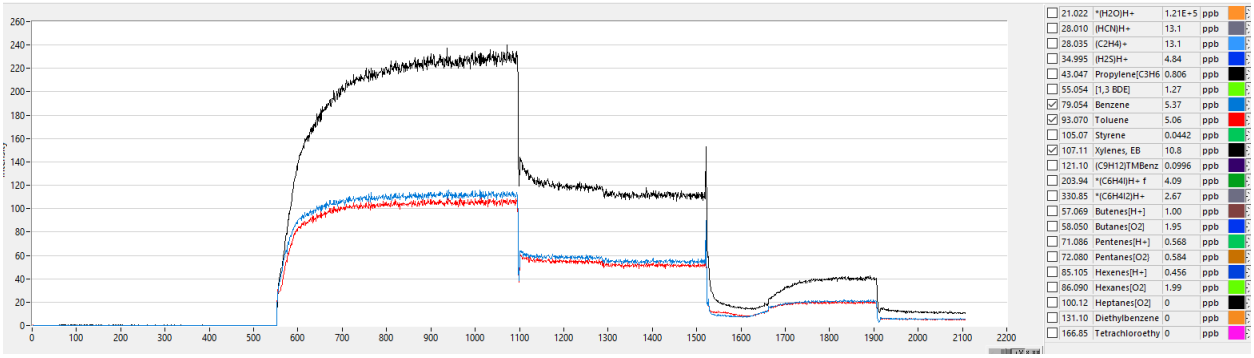
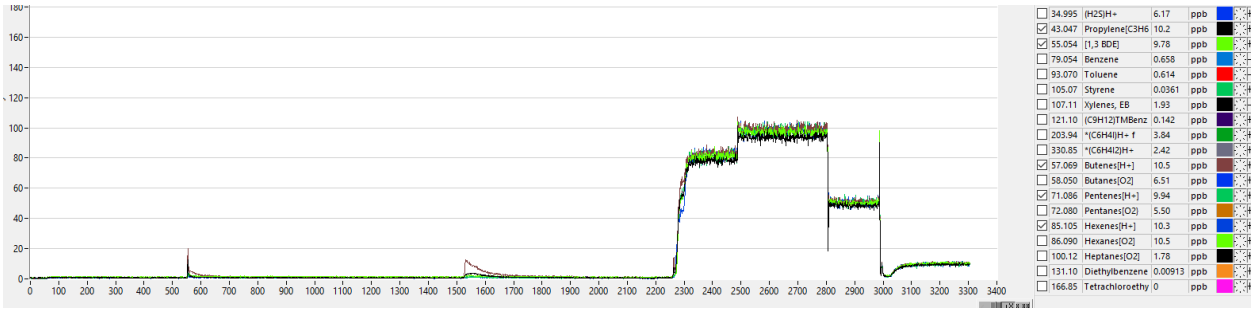


BTEX 100, 50, 20 and 5 ppb



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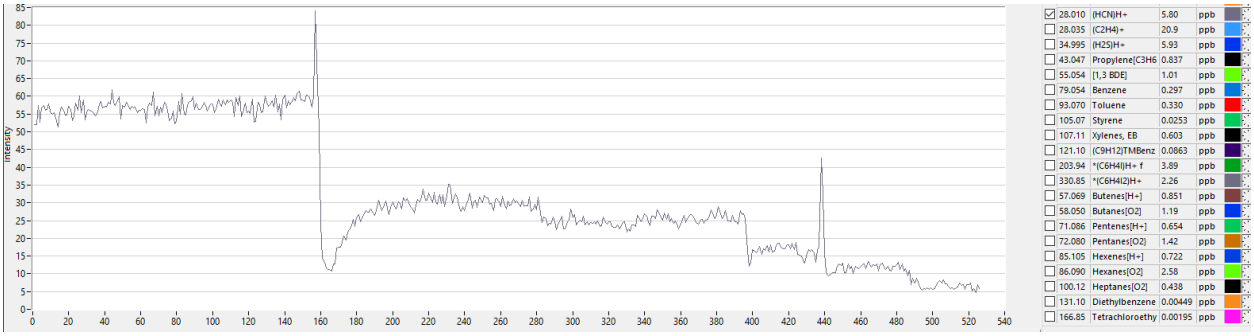

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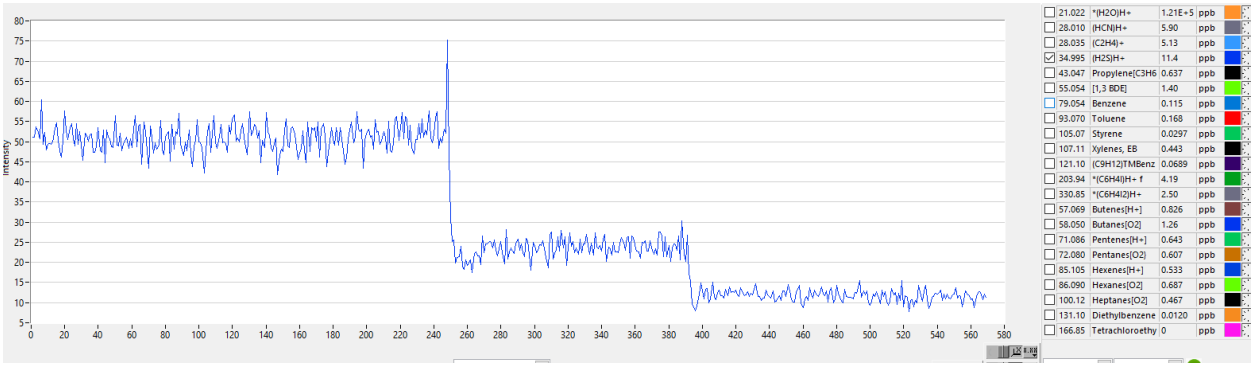
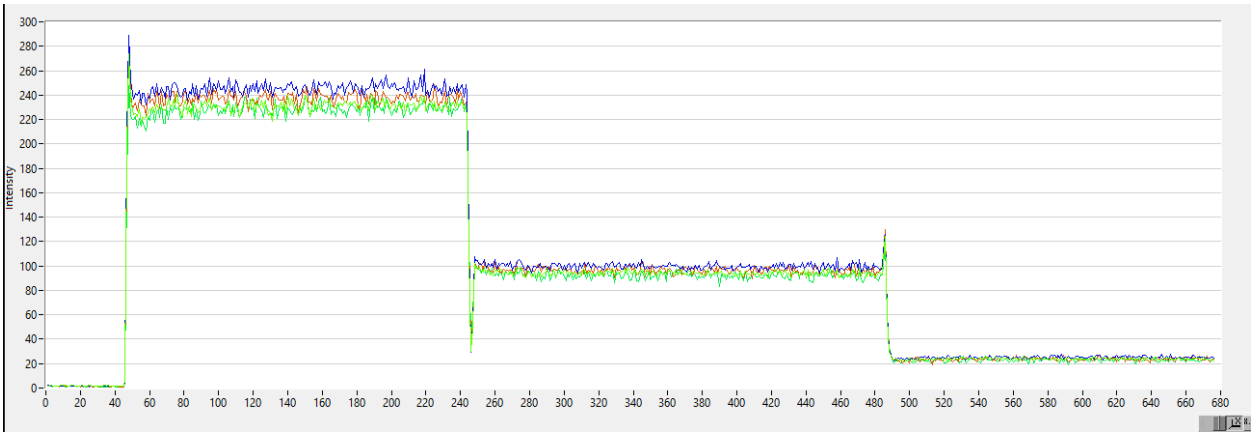
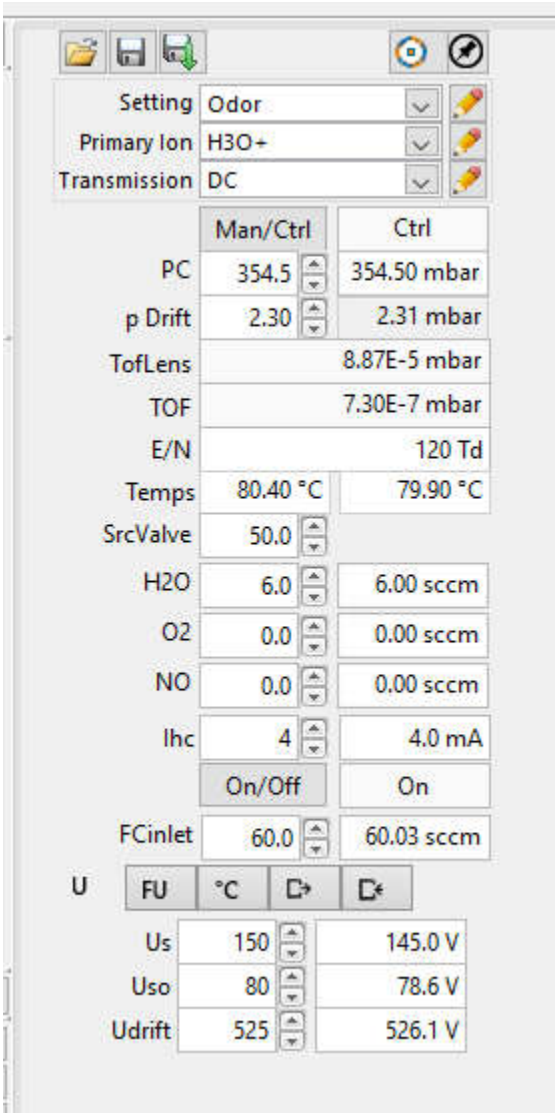


H2S 50, 20 and 10 ppb



Alkanes 250, 100 and 25 ppb

11-7-23 PTR Screenshots
Pioneer Park



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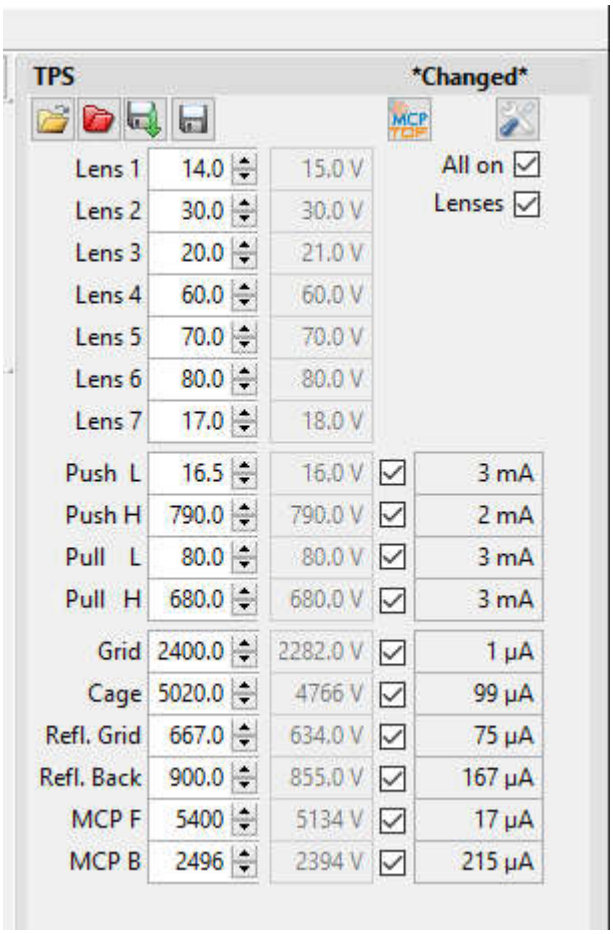
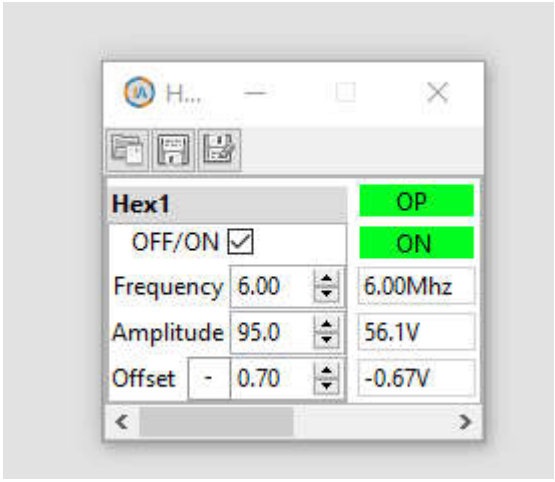


TOF Voltages



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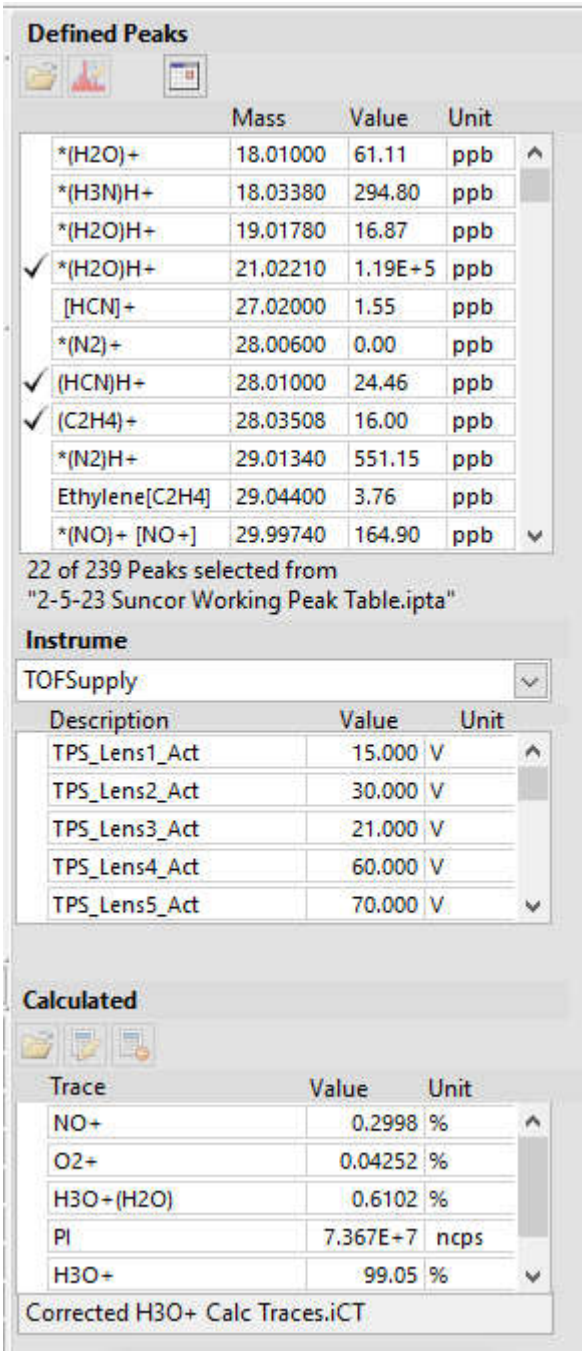
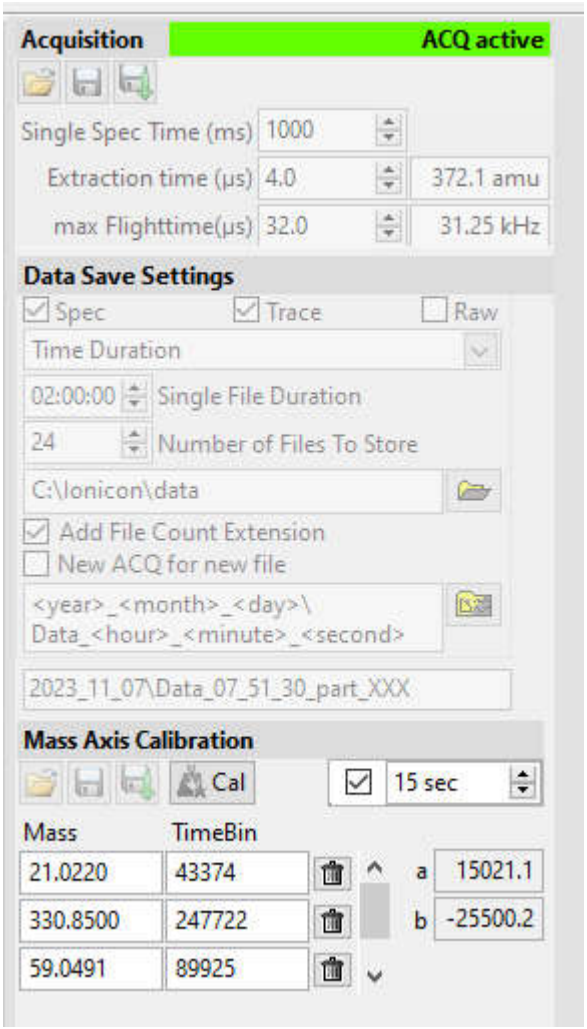
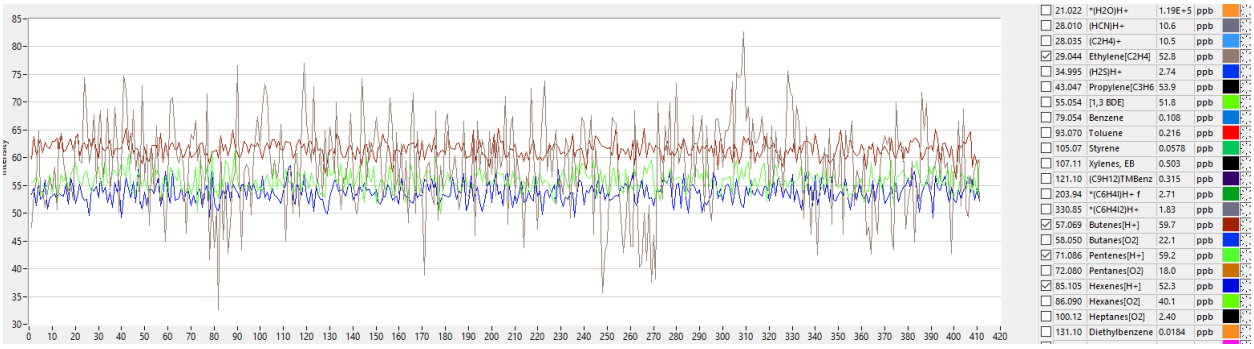


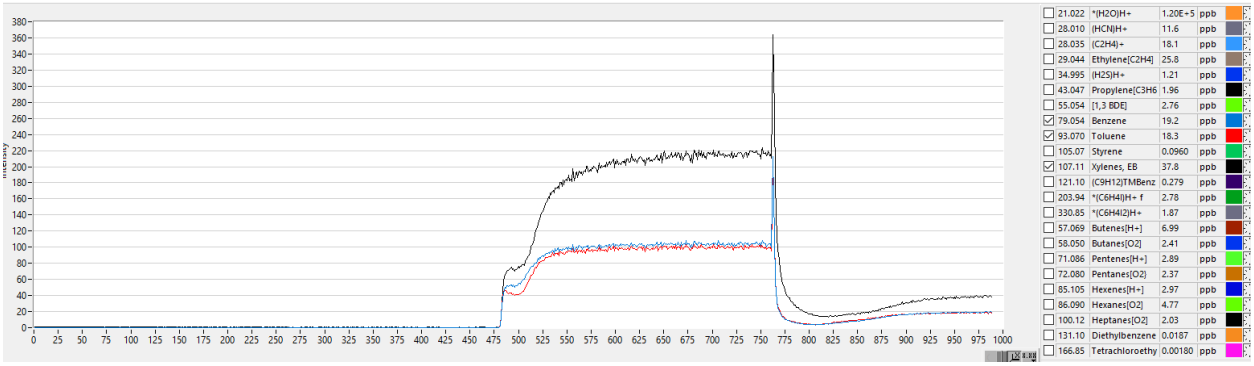
Peaks and Traces



Acquisition Settings


Alkenes Cal check

CCND Mobile Monitoring Van
2023 Q4



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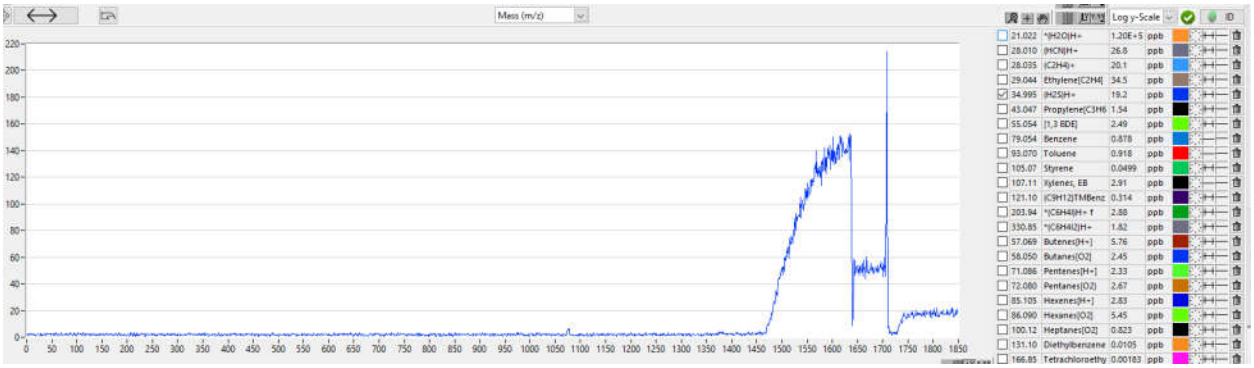

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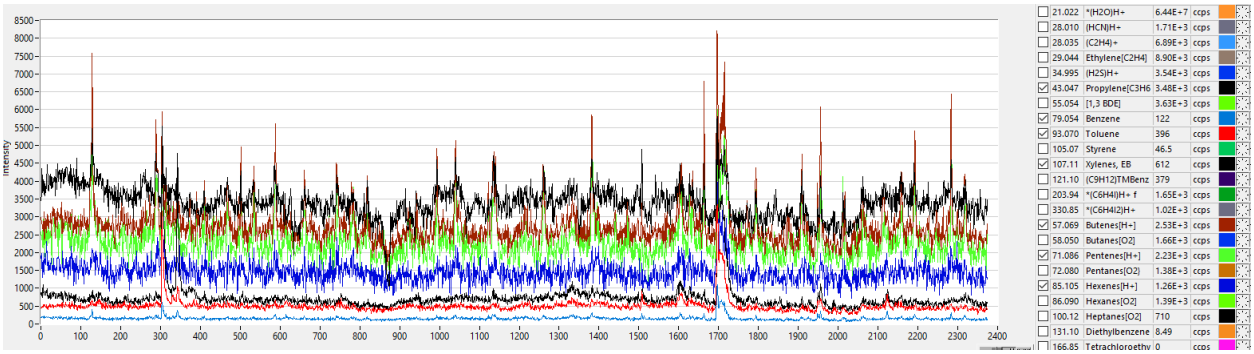
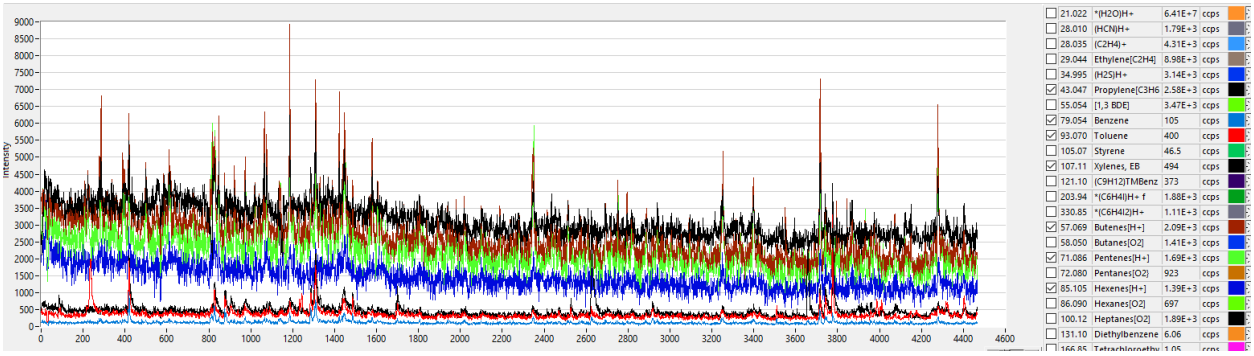


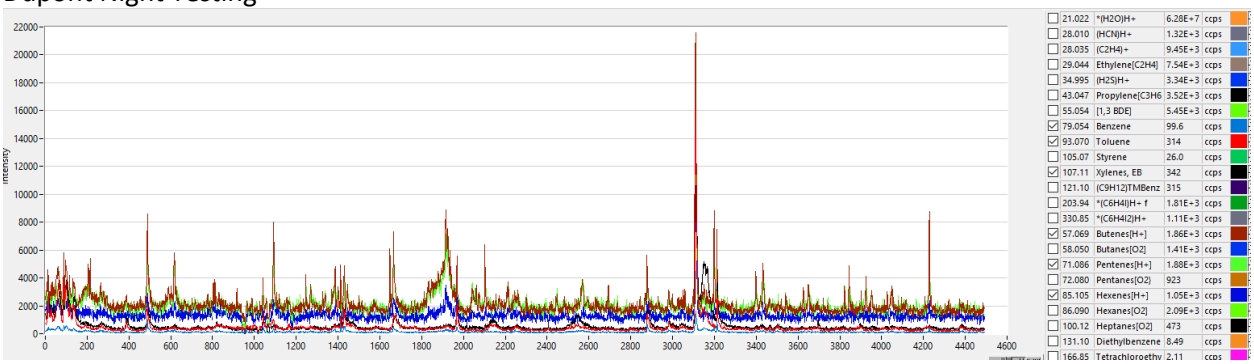
Pioneer Park Raw Data Morning



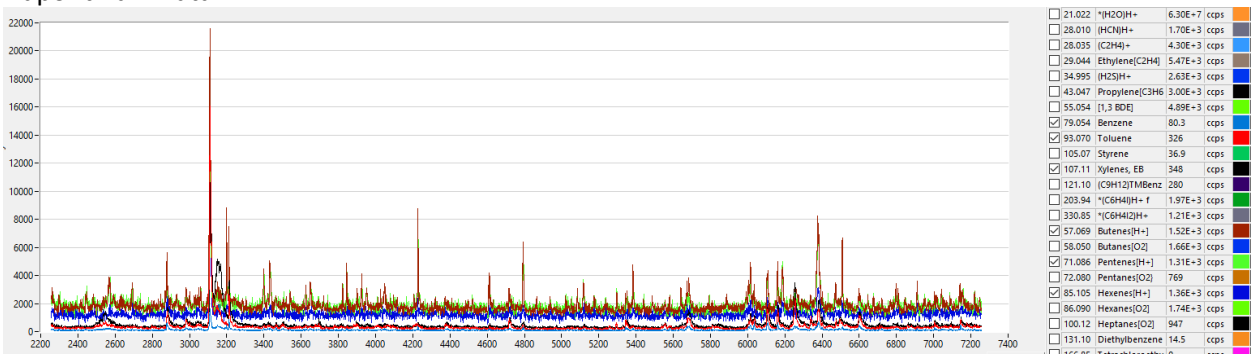
Afternoon Data Raw

11-7-23

Dupont Night Testing

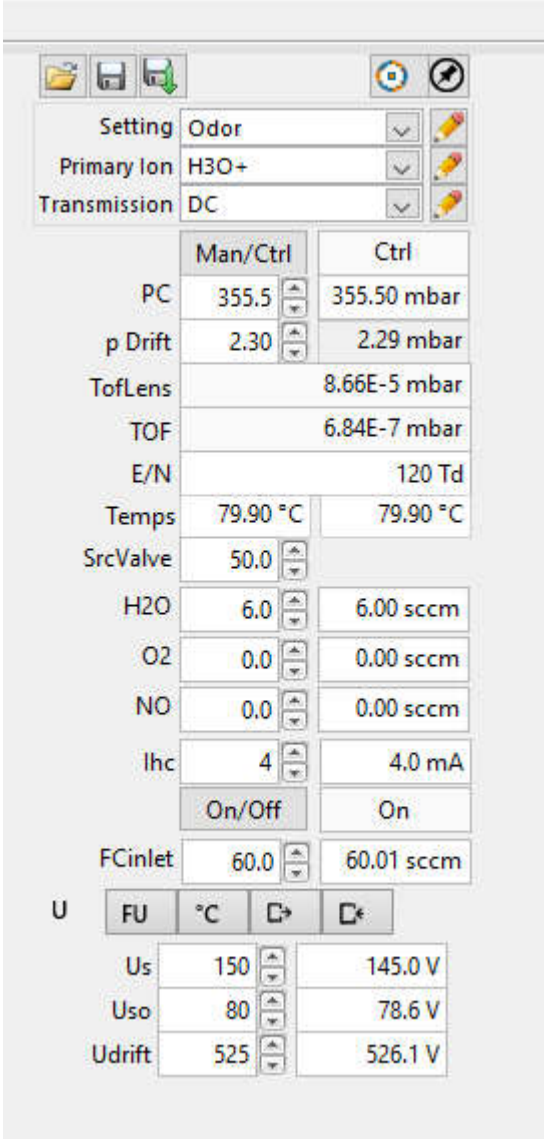


Dupont Raw Data

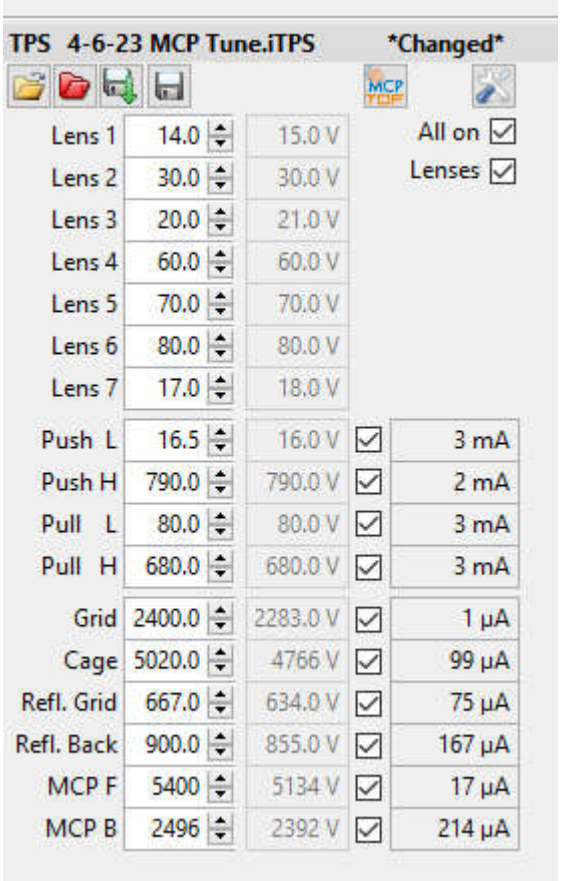


Dupont Night Data

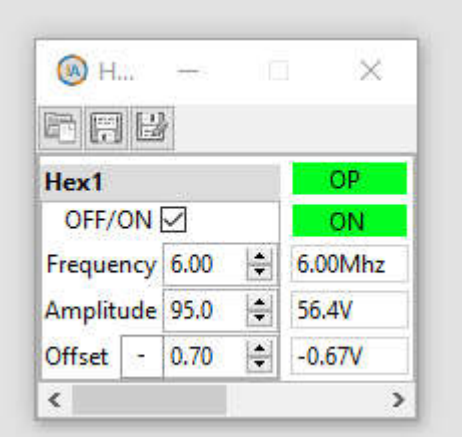
11-8-23
Globeville and E-Swansea PTR Screenshots



Production Settings



TOF Lenses



Hexapole Settings

Defined Peaks

	Mass	Value	Unit
*(O2)+ i_18O	33.99350	2.09E+6	ccps
(CH4O)H+ i_13C	34.03740	929.61	ccps
✓ (H2S)H+	34.99550	3.95E+3	ccps
*(H2O)2H+	37.02840	5.25E+5	ccps
*b38.low	37.93300	6.08E+5	ccps
*(H2O)2H+	38.03260	1.07E+6	ccps
[HCl]H+	37.41000	7.42E+3	ccps
*b38.high	38.13300	4.80E+5	ccps
*(H2O)2H+	39.03270	1.12E+6	ccps
(C3H4)H+	41.03860	3.47E+3	ccps
(C2H3N)H+	42.03380	465.59	ccps

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

Instrume

TOFSupply

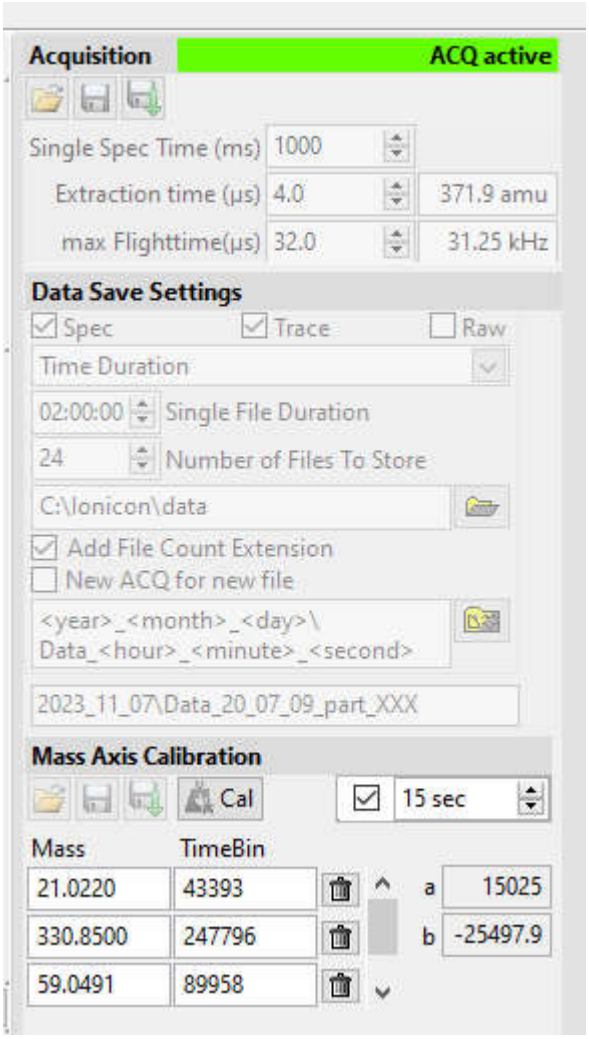
Description	Value	Unit
TPS_Lens1_Act	15.000	V
TPS_Lens2_Act	30.000	V
TPS_Lens3_Act	21.000	V
TPS_Lens4_Act	60.000	V
TPS_Lens5_Act	70.000	V

Calculated

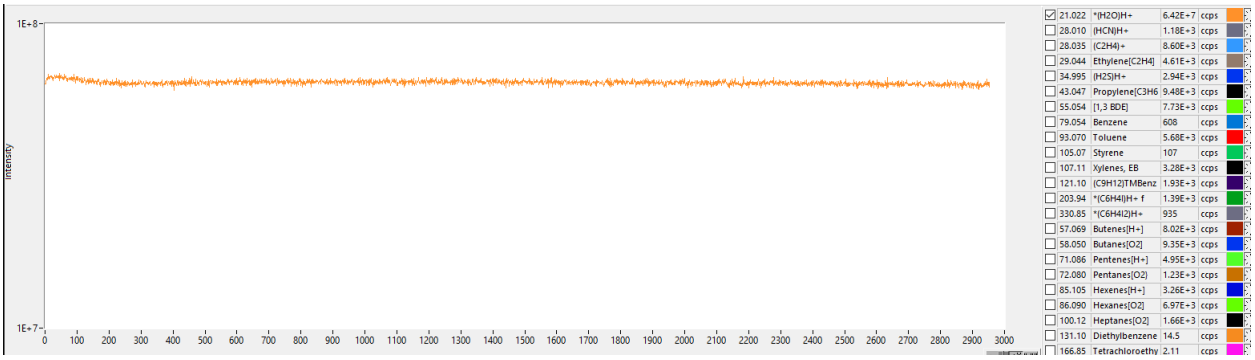
Trace	Value	Unit
NO+	1.117	%
O2+	3.196	%
H3O+(H2O)	1.707	%
PI	6.551E+7	ncps
H3O+	93.98	%

Corrected H3O+ Calc Traces.iCT

Peaks and Traces

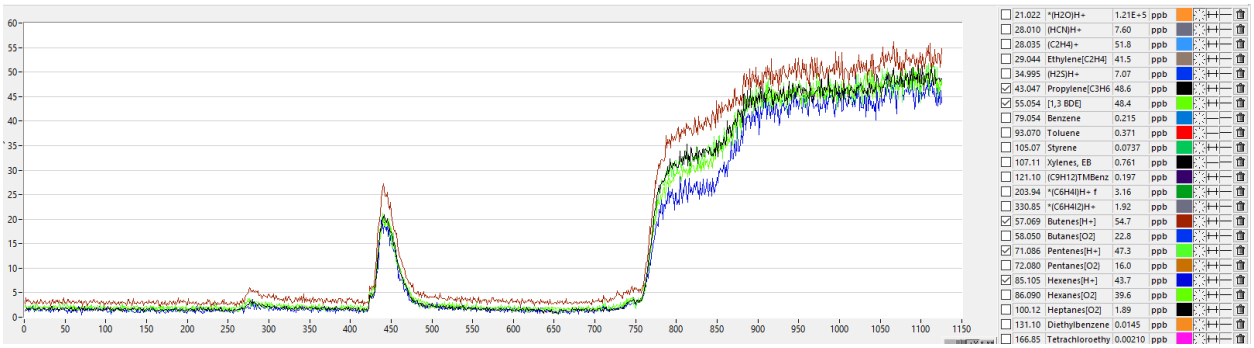


Acquisition Settings

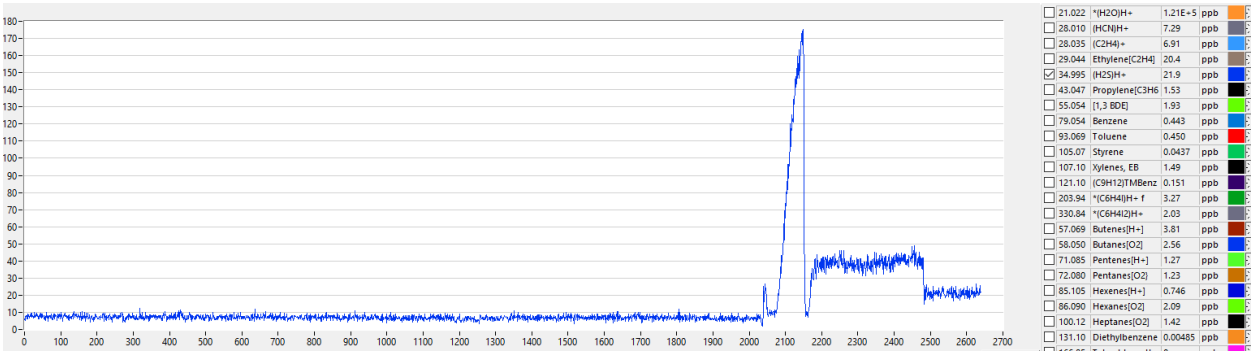


Hydronium Stability

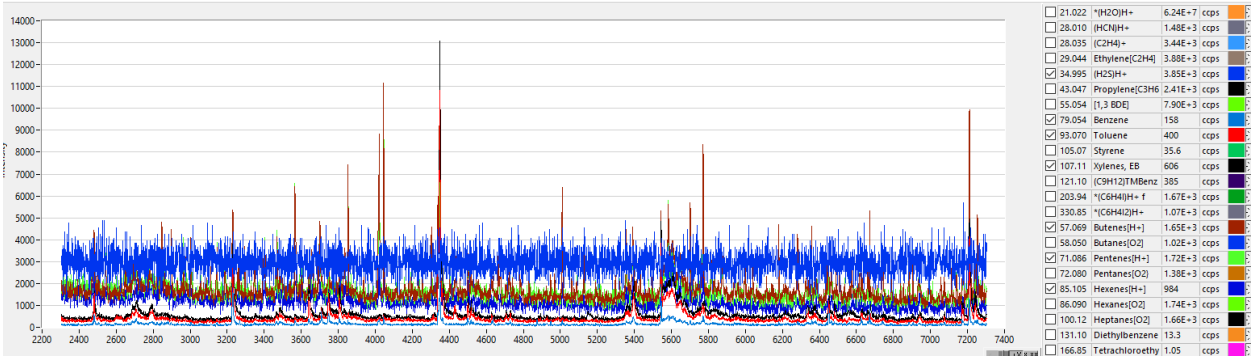
CCND Mobile Monitoring Van
2023 Q4



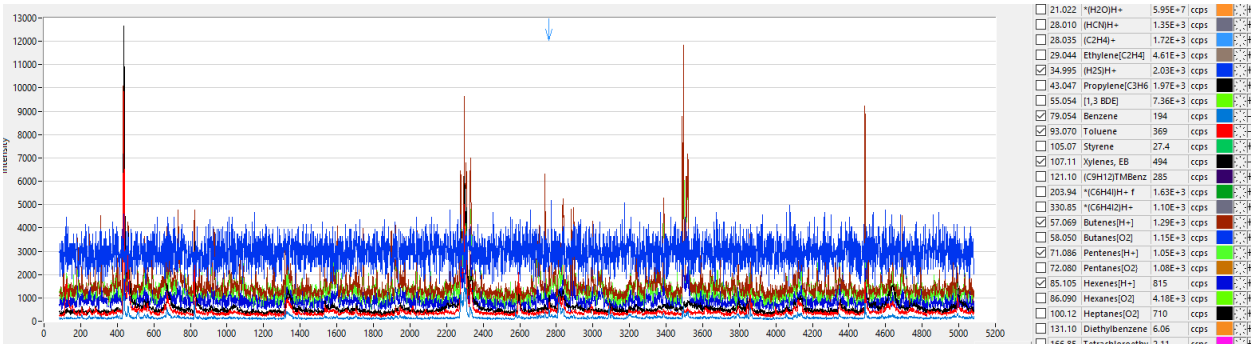
Alkenes Cal Check



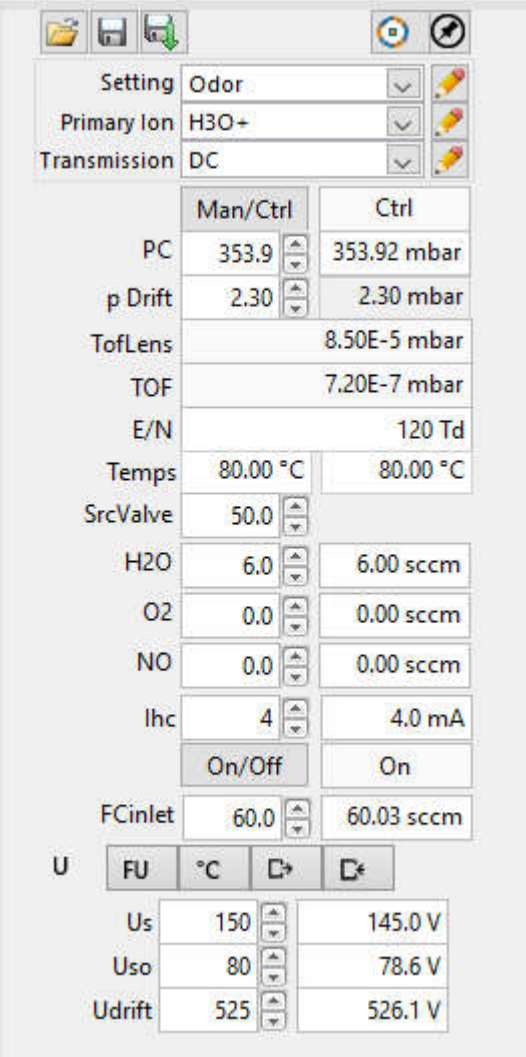
H2S Cal Check



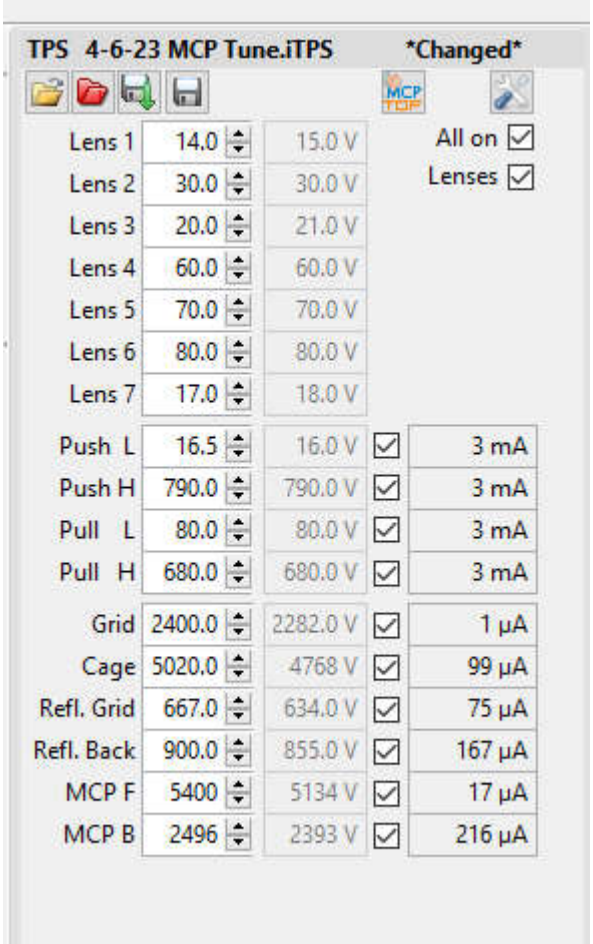
Globeville Raw Data



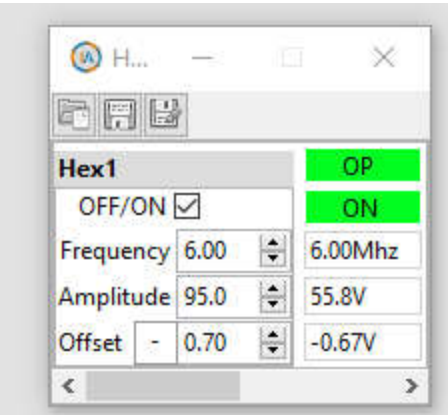
E-Swansea Night Testing Raw Data
11-9-23 Western Hills
PTR Screenshots



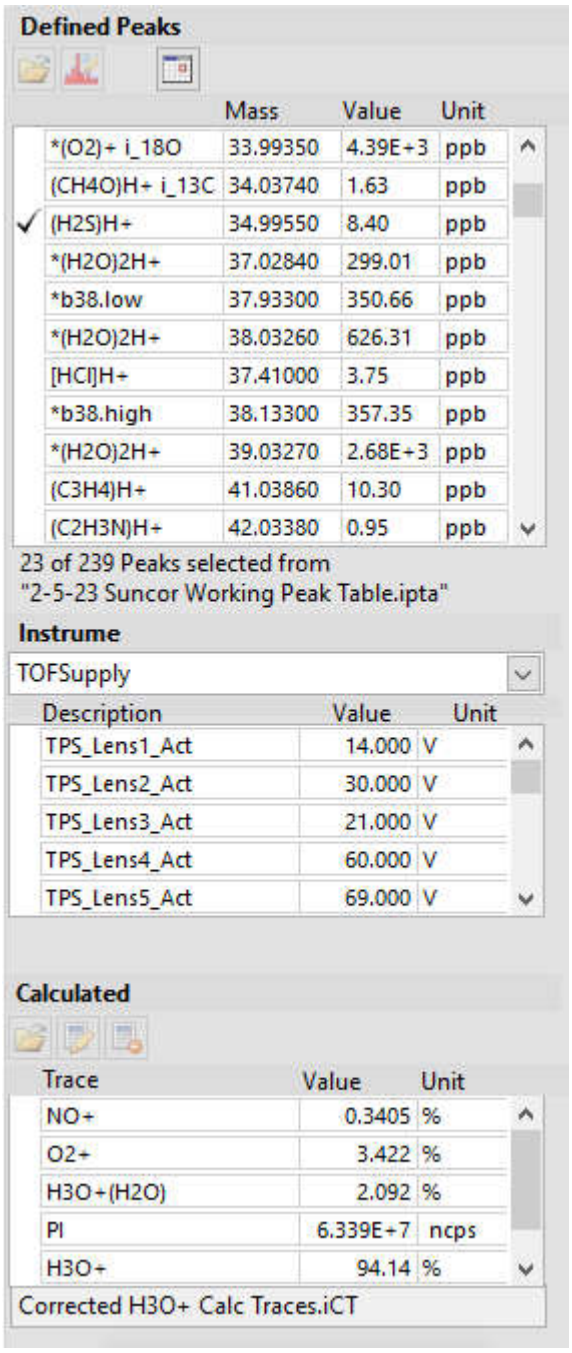
Production Settings



TOF Lenses



Hexapole Settings



Defined Peaks

	Mass	Value	Unit
*(O2)+ i_18O	33.99350	4.39E+3	ppb
(CH4O)H+ i_13C	34.03740	1.63	ppb
✓ (H2S)H+	34.99550	8.40	ppb
*(H2O)2H+	37.02840	299.01	ppb
*b38.low	37.93300	350.66	ppb
*(H2O)2H+	38.03260	626.31	ppb
[HCl]H+	37.41000	3.75	ppb
*b38.high	38.13300	357.35	ppb
*(H2O)2H+	39.03270	2.68E+3	ppb
(C3H4)H+	41.03860	10.30	ppb
(C2H3N)H+	42.03380	0.95	ppb

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

Instrume

TOFSupply

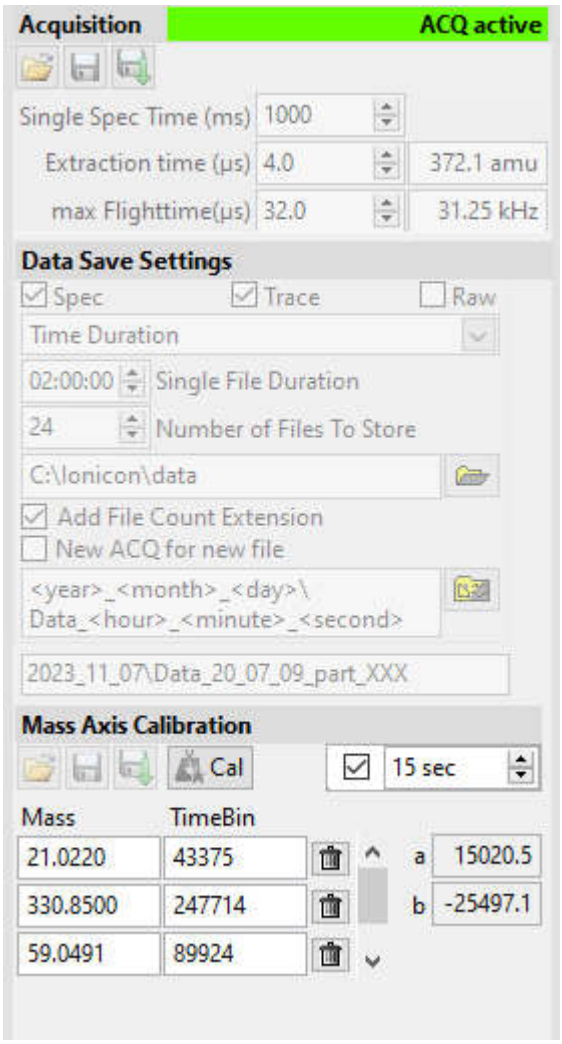
Description	Value	Unit
TPS_Lens1_Act	14.000	V
TPS_Lens2_Act	30.000	V
TPS_Lens3_Act	21.000	V
TPS_Lens4_Act	60.000	V
TPS_Lens5_Act	69.000	V

Calculated

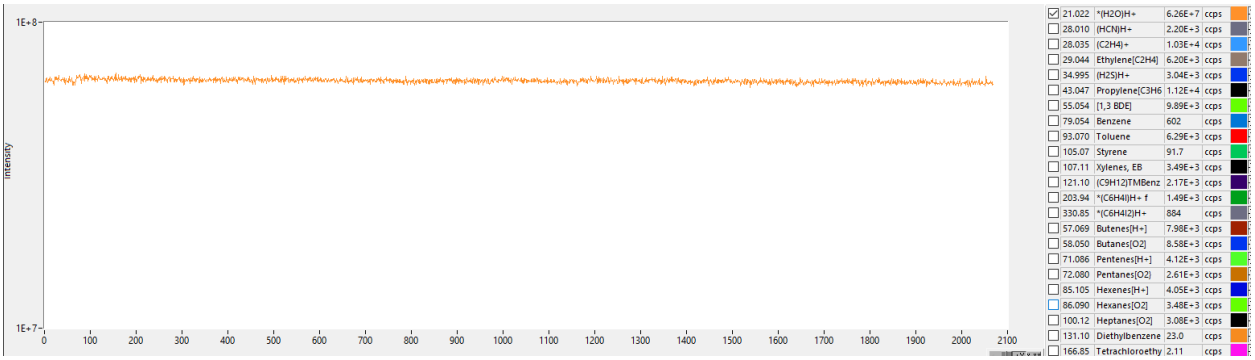
Trace	Value	Unit
NO+	0.3405	%
O2+	3.422	%
H3O+(H2O)	2.092	%
PI	6.339E+7	ncps
H3O+	94.14	%

Corrected H3O+ Calc Traces.iCT

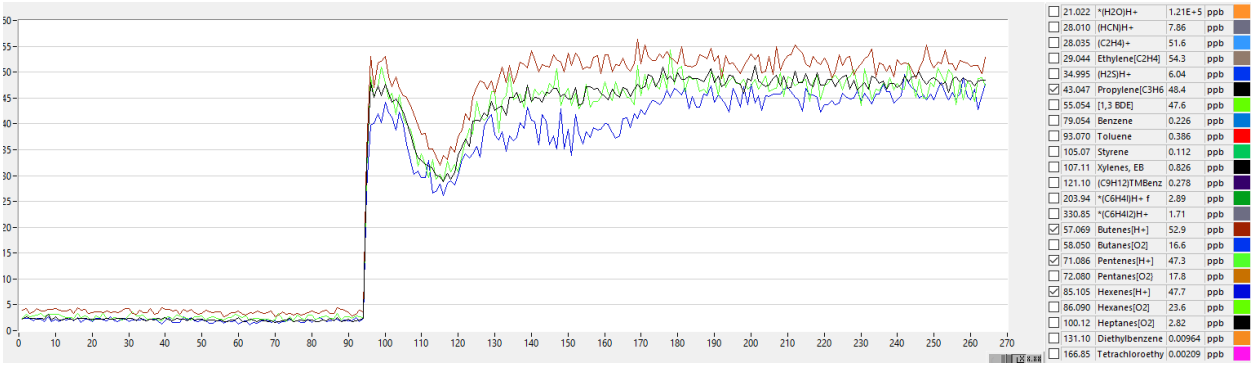
Peaks and Traces



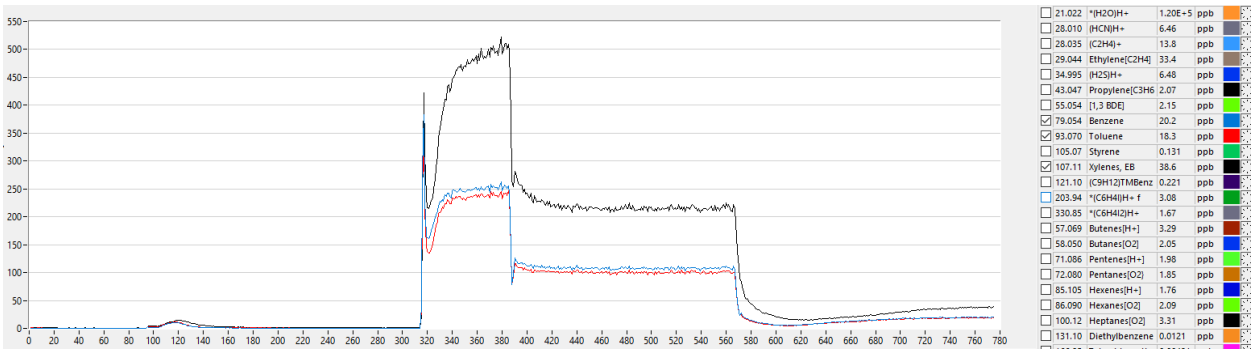
Acquisition Parameters



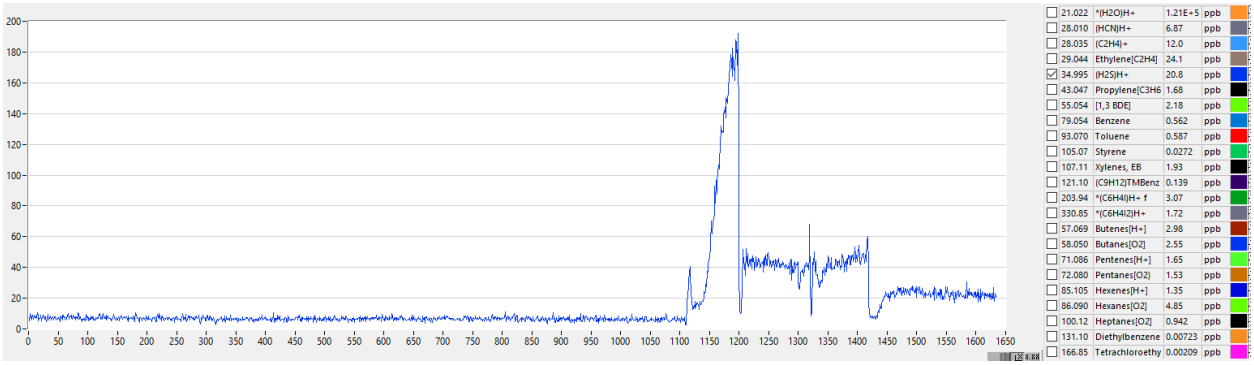
Hydronium Stability



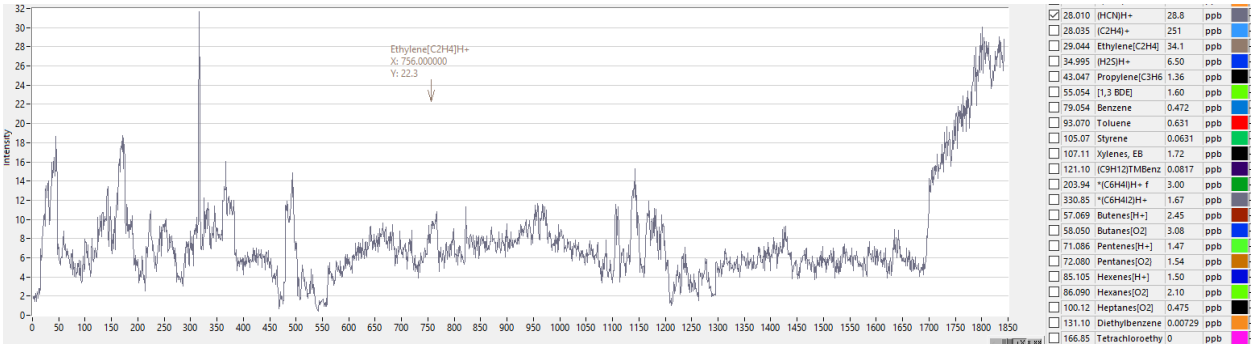
Alkenes Cal Check



BTEX Cal Check

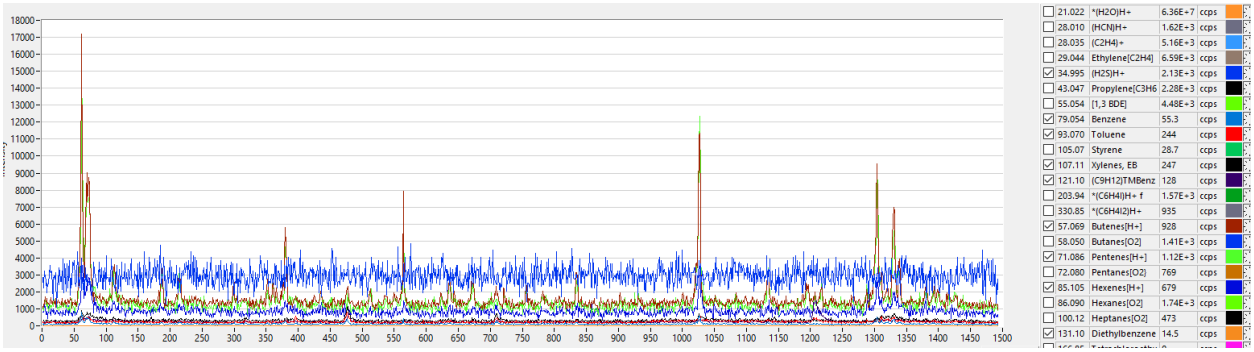


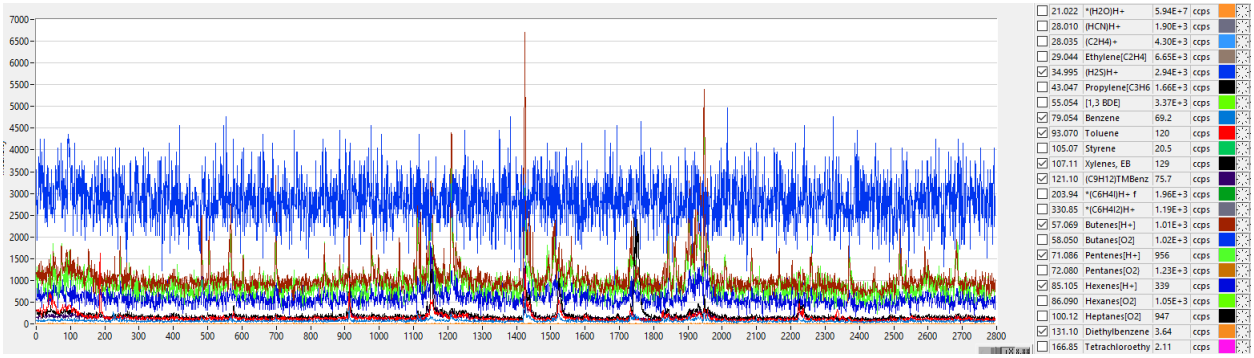
H2S Cal Check



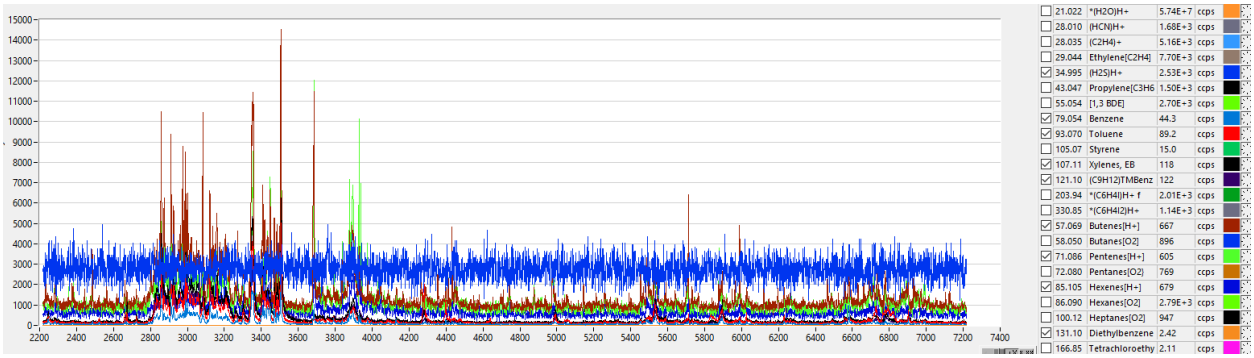
HCN Cal Check

CCND Mobile Monitoring Van
2023 Q4





Western Hills Raw Data



Adams City Raw Data

PTR Daily Calibration Checks

Initial Instrument Calibration						
Date	Time	Calibration Gas Component	Calibration Value (ppb v)	Response (ppb v)	Difference (% of value)	Pass/Fail
11/5/2023	10:22	Benzene	100	110	10.0	Pass
		Toluene	100	108	8.0	Pass
		Xylenes	200	220	10.0	Pass
	10:28	Benzene	50	52.9	5.8	Pass
		Toluene	50	50.6	1.2	Pass
		Xylenes	100	110	10.0	Pass
	10:35	Benzene	20	20.7	3.5	Pass
		Toluene	20	20.8	4.0	Pass
		Xylenes	40	40.1	0.3	Pass
	10:39	Benzene	5	5.21	4.2	Pass
		Toluene	5	5.06	1.2	Pass
		Xylenes	10	10.4	4.0	Pass
	10:50	Ethylene	100	99.6	-0.4	Pass
		Propylene	100	98.3	-1.7	Pass
		1-Butene	100	97.2	-2.8	Pass
		1-Pentene	100	97.8	-2.2	Pass
		1-Hexene	100	98.7	-1.3	Pass
		1,3-Butadiene	100	102	2.0	Pass
	10:52	Ethylene	50	49.7	-0.6	Pass
		Propylene	50	50.1	0.2	Pass
		1-Butene	50	52.4	4.8	Pass
		1-Pentene	50	49.9	-0.2	Pass
		1-Hexene	50	51.3	2.6	Pass
		1,3-Butadiene	50	49.9	-0.2	Pass
	10:58	Ethylene	10	11.8	18.0	Pass
		Propylene	10	9.87	-1.3	Pass
		1-Butene	10	10.9	9.0	Pass
		1-Pentene	10	10.4	4.0	Pass
		1-Hexene	10	10.2	2.0	Pass
		1,3-Butadiene	10	10.6	6	Pass
	11:06	HCN	50	54.6	9.2	Pass
	11:10	HCN	25	25.6	2.4	Pass
	11:12	HCN	10	10.8	8.0	Pass
	11:14	HCN	5	5.6	12.0	Pass
	11:35	H_2S	50	50.8	1.6	Pass
	11:37	H_2S	20	20.2	1.0	Pass
	11:39	H_2S	10	10.3	3.0	Pass
	12:03	Butane	250	249	-0.4	Pass
		Pentane	250	243	-2.8	Pass
		Hexane	250	238	-4.8	Pass
		Heptane	250	236	-5.6	Pass
	12:06	Butane	100	97.6	-2.4	Pass
		Pentane	100	92.7	-7.3	Pass
		Hexane	100	94.8	-5.2	Pass
		Heptane	100	98.9	-1.1	Pass
	12:09	Butane	25	25.6	2.4	Pass
		Pentane	25	24.3	-2.8	Pass
		Hexane	25	23.1	-7.6	Pass
		Heptane	25	24.5	-2.0	Pass

Instrument Calibration Check						
Date	Time	Calibration Gas Component	Calibration Value (ppb v)	Response (ppb v)	Difference (% of value)	Pass/Fail
11/7/2023	9:01	Ethylene	50	54.1	8.2	Pass
Pioneer Park		Propylene	50	53.6	7.2	Pass
Dupont		1-Butene	50	52.4	4.8	Pass
		1-Pentene	50	55.6	11.2	Pass
		1-Hexene	50	51.7	3.4	Pass
		1,3-Butadiene	50	53.4	6.8	Pass
	9:08	Benzene	100	103	3.0	Pass
		Toluene	100	102	2.0	Pass
		Xylenes	200	214	7.0	Pass
	9:11	Benzene	20	19.3	-3.5	Pass
		Toluene	20	18.6	-7.0	Pass
		Xylenes	40	39	-2.5	Pass
	9:17	HCN	25	25.5	2.0	Pass
	9:24	H_2S	50	50.3	0.6	Pass
	9:26	H_2S	20	21.3	6.5	Pass
	9:30	Butane	150	161	7.3	Pass
		Pentane	150	154	2.7	Pass
		Hexane	150	148	-1.3	Pass
		Heptane	150	147	-2.0	Pass
	7:48	HCN	25	23.8	-4.8	Pass
	7:46	H_2S	20	19.9	-0.5	Pass
	7:30	Butane	150	158	5.3	Pass
		Pentane	150	155	3.3	Pass
		Hexane	150	143	-4.7	Pass
		Heptane	150	144	-4.0	Pass
	7:38	Benzene	20	18.8	-6.0	Pass
		Toluene	20	17.9	-10.5	Pass
		Xylenes	40	38.2	-4.5	Pass
	7:28	Ethylene	50	46.9	-6.2	Pass
		Propylene	50	51.9	3.8	Pass
		1-Butene	50	55.4	10.8	Pass
		1-Pentene	50	52.6	5.2	Pass
		1-Hexene	50	51.2	2.4	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
11/8/2023	13:00	Ethylene	50	47.2	-5.6	Pass
Globeville		Propylene	50	51.3	2.6	Pass
E- Swansea		1-Butene	50	50.9	1.8	Pass
		1-Pentene	50	48.1	-3.8	Pass
		1-Hexene	50	46.5	-7.0	Pass
		1,3-Butadiene	50	50.4	0.8	Pass
	13:05	Benzene	100	104	4.0	Pass
		Toluene	100	98.6	-1.4	Pass
		Xylenes	200	189	-5.5	Pass
	13:12	Benzene	20	21.9	9.5	Pass
		Toluene	20	20.7	3.5	Pass
		Xylenes	40	41.6	4.0	Pass
	12:53	HCN	25	24.2	-3.2	Pass
	13:24	H_2S	50	48.4	-3.2	Pass
	13:26	H_2S	20	19.7	-1.5	Pass
	13:15	Butane	150	141	-6.0	Pass
		Pentane	150	146	-2.7	Pass
		Hexane	150	138	-8.0	Pass
		Heptane	150	141	-6.0	Pass
	19:33	HCN	25	23.3	-6.8	Pass
	19:30	H_2S	20	19.6	-2.0	Pass
	19:48	Butane	150	146	-2.7	Pass
		Pentane	150	139	-7.3	Pass
		Hexane	150	142	-5.3	Pass
		Heptane	150	141	-6.0	Pass
	19:40	Benzene	20	18.4	-8.0	Pass
		Toluene	20	19.5	-2.5	Pass
		Xylenes	40	38.4	-4.0	Pass
	19:44	Ethylene	50	48.6	-2.8	Pass
		Propylene	50	48.1	-3.8	Pass
		1-Butene	50	51.6	3.2	Pass
		1-Pentene	50	47	-6.0	Pass
		1-Hexene	50	48.3	-3.4	Pass
		1,3-Butadiene	50	47.7	-4.6	Pass

Instrument Calibration Check						
Date	Time	Calibration Gas Component	Calibration Value (ppb v)	Response (ppb v)	Difference (% of value)	Pass/Fail
11/9/2023	8:24	Ethylene	50	51.5	3.0	Pass
Western Hills		Propylene	50	48.7	-2.6	Pass
Adams City		1-Butene	50	50.8	1.6	Pass
		1-Pentene	50	49.5	-1.0	Pass
		1-Hexene	50	46.6	-6.8	Pass
		1,3-Butadiene	50	47.9	-4.2	Pass
	8:31	Benzene	100	106	6.0	Pass
		Toluene	100	98.9	-1.1	Pass
		Xylenes	200	212	6.0	Pass
	8:34	Benzene	20	19.9	-0.5	Pass
		Toluene	20	19.2	-4.0	Pass
		Xylenes	40	38.2	-4.5	Pass
	8:52	HCN	25	26	4.0	Pass
	8:45	H_2S	50	48.2	-3.6	Pass
	8:48		20	20.8	4.0	Pass
	8:39	Butane	150	145	-3.3	Pass
		Pentane	150	146	-2.7	Pass
		Hexane	150	144	-4.0	Pass
		Heptane	150	139	-7.3	Pass
	15:26	HCN	25	24.1	-3.6	Pass
	15:31	H_2S	20	19.8	-1.0	Pass
	15:47	Butane	150	144	-4.0	Pass
		Pentane	150	143	-4.7	Pass
		Hexane	150	150	0.0	Pass
		Heptane	150	135	-10.0	Pass
	15:44	Benzene	20	19.8	-1.0	Pass
		Toluene	20	18.7	-6.5	Pass
		Xylenes	40	35.4	-11.5	Pass
	15:35	Ethylene	50	54.6	9.2	Pass
		Propylene	50	48.6	-2.8	Pass
		1-Butene	50	50.6	1.2	Pass
		1-Pentene	50	47.9	-4.2	Pass
		1-Hexene	50	48.5	-3.0	Pass
		1,3-Butadiene	50	47.9	-4.2	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 Specialty Gases
Airgas USA LLC
6141 Easton Road
Plumsteadville, PA 18949
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: CERTIFIED STANDARD-SPEC

Part Number:	X02NI99C15A0A19	Reference Number:	SG02-IC000027612-1
Cylinder Number:	CC524330	Cylinder Volume:	142.0 CF
Laboratory:	124 - Plumsteadville - PA	Cylinder Pressure:	2015 PSIG
Analysis Date:	Aug 10, 2023	Valve Outlet:	350SS
Lot Number:	SG02-IC000027612-1		

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 CYANIDE	1.000 PPM	0.9980 PPM	+/-5%
NITROGEN	Balance		

Permanent Notes:-NA-

Notes: Analysis Date 8/7/2023
Expiration Date 8/7/2024
Blend Tolerance +/-20%
Analytical Tolerance +/-5%

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: MONTROSE AIR QUALITY SERVICES LLC - HENDERSON , CO
Part Number: X07NI99C15A00A9
Cylinder Number: EB0157463
Laboratory: 124 - La Porte Mix - TX
Analysis Date: Aug 25, 2023
Lot Number: 126-402805383-1A

Reference Number: 126-402805383-1A
Cylinder Volume: 144.0 CF
Cylinder Pressure: 2015 PSIG
Valve Outlet: 350

Expiration Date: Aug 25, 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
1 BUTENE	1.000 PPM	1.104 PPM	+/- 10%
1 HEXENE	1.000 PPM	1.123 PPM	+/- 10%
1 PENTENE	1.000 PPM	1.119 PPM	+/- 10%
1,3 BUTADIENE	1.000 PPM	1.000 PPM	+/- 10%
ETHYLENE	1.000 PPM	1.172 PPM	+/- 10%
PROPYLENE	1.000 PPM	1.153 PPM	+/- 10%
NITROGEN	Balance		

Notes:MONTROSE AIR QUALITY SERVICES LLC
PO#: PO-049252

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