TCEQ Interoffice Memorandum

To: Nicole Bealle, Regional Director, R12

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Subject: Health Effects Review of 2023 Ambient Air Network Monitoring Data in Region 12, Houston

Key Points

- One out of 5,570,009 measured hourly concentrations (or approximately 0.000018%) exceeded a health-based Air Monitoring Comparison Value (AMCV). This single hourly level exceedance was for 1,3-butadiene and was measured at the Houston Deer Park #2 site.
- Twenty-four out of 5,570,009 measured hourly concentrations (or approximately 0.00043%) exceeded an odor-based AMCV. Accordingly, a few hourly levels (e.g., 1-pentene; 1,3-butadiene; isoprene; and styrene) at six Region 12 sites could have resulted in the perception of odors if people were exposed. Assuming exposure, the monitored concentrations would not be expected to cause direct, short-term adverse health effects, and the infrequency and generally low magnitude of the exceedances are not indicative of persistent, strong odors with the potential to cause odor-related health effects (e.g., nausea, headache).
- Two reported 30-minute rolling averages of hydrogen sulfide (H_2S) were above the numerical value of the 30-minute state H_2S standard for residential areas (80 ppbv) at the Texas City BP 31st Street monitor. The measured levels of H_2S could result in the perception of odors if exposure were to occur.
- With the exception of annual averages of chromium $PM_{2.5}$, annual concentrations for all other chemicals and metals from 24-hour measurements were below their respective AMCVs. At the Houston North Wayside monitor the annual average concentration from July 2022 to July 2023 of chromium $PM_{2.5}$ exceeded the long-term health-based AMCV. The long-term AMCV is based on a form of chromium (hexavalent) that generally represents only a small fraction of environmental chromium (e.g., approximately 1%). Importantly, the annual average is well below the more comparable long-term AMCV for other forms of chromium and that which more reasonably assumes 1% hexavalent chromium, or even conservatively assuming 10% hexavalent chromium.
- Annual average concentrations for all chemicals from 1-hour measurements were below their respective long-term AMCVs.

Background

The primary purpose of this memorandum is to convey the Toxicology, Risk Assessment, and Research Division's (TD) evaluation of ambient air toxics sampling conducted at monitoring sites in Region 12-Houston during 2023. The TD reviewed summary results for volatile organic compounds (VOCs) from 24-hour canister samples, 1-hour automated gas-chromatography (autoGC) VOC samples, 8-and 24-hour carbonyl samples, 30-minute rolling averages of 5-minute hydrogen sulfide samples, and 24-hour metals samples from filters designed to collect particulate matter with an aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$).

Historically, this memorandum has evaluated data from the TCEQ and Enhanced Industry-Sponsored Monitoring (EISM) sites, which are reported to the TCEQ on a regular basis. Industry-sponsored air monitoring networks that are not routinely reported to the TCEQ are also included. The TD requested these data from the respective industry groups and included them in our evaluation, as detailed below. Only summary data on high values and averages are provided for the Houston Regional Monitoring (HRM) 24-hour canister sites; the total number of 24-hour canister samples collected over the year is not known. Therefore, a qualifier of 'more than' is used before values that include these data. Except for lead, data for criteria pollutants (i.e., compounds having National Ambient Air Quality Standards [NAAQS]) were not evaluated for this memorandum. Appendix 1. Monitored Air Toxics in Region 12 contains the lists of the target analytes evaluated for this review.

Information regarding monitoring sites and target analyte data reviewed by the TD is presented in Table 1 and is summarized below.

- 24-hour canister VOC sampling at:
  - 8 TCEQ sites,
  - 6 HRM sites outside of the EISM sites, and
  - 3 Texas City/La Marque Community Air Monitoring Network (TCLAMN) sites.
- 24-hour carbonyl sampling at 2 [a] sites.
- 8-hour carbonyl sampling at 1 [a] site.
- 24-hour metals sampling at 4 sites.
- 1-hour autoGC VOC sampling at:
  - 10 TCEQ sites,
  - 7 EISM sites,
  - 1 TCLAMN site, and
  - 2 HRM sites.
- 5-minute hydrogen sulfide (H_2S) sampling at:
  - 1 TCEQ site,
  - 3 EISM sites, and
  - 1 HRM site.

[a] Carbonyl sampling is seasonal, depending on the site, for part of the year with durations of 8 or 24 hours.

Table 1. Monitoring Sites Located in TCEQ Region 12

County	EPA Site ID	Site Name and Location	Network	Monitored Compounds
Galveston	N/A	2nd Avenue Monitoring Station (29.386981, -94.91912)	TCLAMN [b]	VOC (autoGC; 24-hour canister, 1/12 days [c])
Galveston	N/A	Avenue A Monitoring Station (29.37435, -94.96364)	TCLAMN	VOC (24-hour canister)
Harris	48-201-6000	Cesar Chavez 4829A Galveston Rd	TCEQ	VOC (autoGC)
Harris	48-201-0026	Channelview 1405 Sheldon Rd	TCEQ	VOC (autoGC)
Harris	48-201-0036	Channelview Drive Water Tower 15913 Channelview Drive	TCEQ	VOC (autoGC)
Harris	48-201-1035	Clinton 9525 ½ Clinton Dr	TCEQ	VOC (autoGC), Carbonyls [d] Metals ($PM_{2.5}$)
Brazoria	48-039-1003	Clute 426 Commerce St	TCEQ	VOC (24-hour canister)
Brazoria	48-039-1012	Freeport South Ave I 207 South Avenue I	TCEQ	Metals ($PM_{2.5}$)
Harris	48-201-0057	Galena Park 1713 2nd St	TCEQ	VOC (autoGC, 24-hour canister)
Harris	48-201-0055	Houston Bayland Park 6400 Bissonnet St	TCEQ	VOC (24-hour canister)

[b] TCLAMN – Texas City/La Marque Community Air Monitoring Network.
[c] The typical schedule for 24-hour canisters is to collect one 24-hour sample every six days. This sampler is collecting one 24-hour sample every twelve days.
[d] This carbonyl sampler collects seasonally. In 2023, one 24-hour sample was collected every six days from April through October. From January through March and November through December no samples were collected.

County	EPA Site ID	Site Name and Location	Network	Monitored Compounds
Harris	48-201-1039	Houston Deer Park #2 4514 ½ Durant St	TCEQ	VOC (autoGC, 24-hour canister), Carbonyls [e], Metals ($PM_{2.5}$)
Harris	48-201-0046	Houston North Wayside [f] 7330 ½ North Wayside	City of Houston Health Department	Metals ($PM_{2.5}$)
Harris	48-201-0803	HRM #3 Haden Rd 1504 ½ Haden Rd	TCEQ/EISM – HRM [g]	VOC (24-hour canister/ autoGC)
Harris	N/A	HRM 1 Central Street 1501 Central Street, Houston	HRM	VOCs (24-hour canister)
Harris	N/A	HRM 4 Sheldon Rd 16200 Miller Road 1, Channelview	HRM	VOC (24-hour canister)
Harris	48-201-0807	HRM 7 Baytown 4621-4639 W. Baker Rd	HRM	VOC (autoGC, 24-hour canister)
Harris	N/A	HRM 8 LaPorte 11426 Fairmont Pkwy, La Porte	HRM	VOC (24-hour canister)
Chambers	N/A	HRM 10 Mont Belvieu 13618 Hatcherville Rd, Mont Belvieu	HRM	VOC (24-hour canister)
Chambers	N/A	HRM 11 E Baytown 8620 West Bay Rd, Baytown	HRM	VOC (24-hour canister)
Harris	48-201-1614	HRM 16 Deer Park 600-658 Luella Ave	HRM	VOC (autoGC), H_2S
Brazoria	48-039-1016	Lake Jackson 109-B Brazoria Hwy 332-W	EISM – FI Group [h]	VOC (autoGC)

[e] This carbonyl sampler collects seasonally. In 2023, one 24-hour sample was collected every six days from April through May and September through October. From June through August, this sampler switched to a more intensive sampling schedule where it collected three 8-hour samples every three days. From January through March and November through December no samples were collected.
[f] This monitor collected data from January 1, 2023 to July 14, 2023. This monitor was deactivated on July 15, 2023.
[g] HRM – Houston Regional Monitoring.
[h] FI Group – Freeport Industry Group.

County	EPA Site ID	Site Name and Location	Network	Monitored Compounds
Harris	48-201-1015	Lynchburg Ferry 4364 Independence Parkway South	TCEQ/EISM - HRM	VOC (24-hour canister/ autoGC)
Harris	48-201-0307	Manchester East Avenue N 9415 East Avenue N	TCEQ	VOC (autoGC)
Harris	48-201-0069	Milby Park 2201A Central St	TCEQ	VOC (autoGC)
Galveston	N/A	North Site (29.429228, -94.971503)	TCLAMN	VOC (24-hour canister, 1/12 days)
Brazoria	48-039-1607	Oyster Creek 901 County Road 792	EISM - Freeport LNG	VOC (autoGC), H_2S
Harris	48-201-1049	Pasadena Richey Elementary School 610 2/3 South Richey St	TCEQ	VOC (autoGC)
Harris	48-201-0061	Shore Acres 3903 ½ Old Hwy 146	TCEQ	VOC (24-hour canister)
Galveston	48-167-0056	Texas City 34th St 2212 North 34th St	EISM - TCLAMN	VOC (autoGC)
Galveston	48-167-0005	Texas City Ball Park 2516 ½ Texas Ave	TCEQ	H_2S, VOC (24-hour canister)
Galveston	48-167-0615	Texas City BP 31st Street (Site 1) 302 31st Street South	EISM – Marathon Petroleum Co.	H_2S, 4 VOCs (SRIGC)
Galveston	48-167-0621	Texas City BP Logan Street (Site 3) 303 Logan Street	EISM – Marathon Petroleum Co.	H_2S, 4 VOCs (SRIGC)
Harris	48-201-0617	Wallisville Rd 4727 Wallisville Rd	EISM - HRM	VOC (autoGC)

All data collected at TCEQ monitors are analyzed by the TCEQ laboratory and should meet a 75% data completeness objective. At EISM and industry network monitors, data are collected by a third-party contractor and should also meet a 75% data completeness objective. Data that do not meet a 75% completeness cannot be evaluated on a long-term basis. One-hour autoGC VOC, 30-minute H_2S, as well as 8-hour carbonyl data were evaluated for potential acute health (e.g., irritation), odor, and vegetation concerns, as were any 24-hour sample results (e.g., VOCs, carbonyls, metals) that exceeded short-term AMCVs. Twenty-four-hour air samples collected

every 6th day on a yearly basis are designed to provide representative long-term average concentrations. To enable evaluation of 24-hour monitoring data more fully, the TCEQ has developed 24-hour AMCVs for specific chemicals. As such, 24-hour sample results were compared to the available TCEQ 24-hour AMCVs for the following:

- 1,3-Butadiene
- 2,2-Dimethylbutane
- 2,3-Dimethylbutane
- 2-Methylpentane
- 3-Methylpentane
- Acrolein
- Aluminum
- Arsenic
- Benzene
- Cadmium
- Carbon tetrachloride
- Chromium
- Cobalt
- Crotonaldehyde
- Ethylene dibromide
- Ethylene dichloride
- Formaldehyde
- Manganese
- Molybdenum
- Nickel
- n-Hexane
- Vanadium

However, because short-term or peak concentrations may be significantly different than 24-hour sample concentrations, daily concentrations have limited use in evaluating the potential for more acute (e.g., 30-60 minute) health effects, unlike the shorter-term data reviewed herein (e.g., 1-hour autoGC data, 30-minute H_2S data). The annual averages from 1-hour autoGC and 24-hour samples (VOCs, carbonyls, and metals) were evaluated for potential chronic health and vegetation concerns. Measured chemical concentrations were compared to appropriate comparison values (e.g., the National Ambient Air Quality Standards [NAAQS] value, TCEQ health-, odor-, and vegetation-based AMCVs). Hydrogen sulfide samples were compared to the numerical value of the 30-minute residential state standard for H_2S (80 ppbv). Information on AMCVs may be obtained via the internet (https://www.tceq.texas.gov/toxicology/amcv/about) or by contacting the TD by phone at (512) 239-1795 or by email at TOX@tceq.texas.gov. Exceedance of an AMCV does not necessarily mean that adverse effects would be expected (e.g., health-based AMCVs are set at levels well below concentrations at which adverse effects have been observed), but rather that further evaluation is required.

Evaluation

30-Minute, 1-hour and 8-hour Concentrations

The vast majority of the 1-hour autoGC VOC concentrations were below their respective TCEQ short-term, health-, odor-, and/or vegetation-based AMCVs. For example, about 99.9995% of the 5,570,009 1-hour VOC measurements from the TCEQ, EISM, HRM, and TCLAMN network autoGC monitors in Region 12 were below their short-term AMCVs. One hourly concentration (approximately 0.000018%) exceeded the respective short-term health-based AMCV. Twenty-four hourly measurements (approximately 0.00043%) exceeded an odor-based AMCV over this time period (Table 2). Additionally, all 1,406 8-hour carbonyl concentrations measured

in Region 12 were below their respective AMCVs. Two 30-minute rolling averages were above the numerical value of the state 30-minute H_2S standard for residential areas (80 ppbv). Therefore, the TD would not expect short-term, adverse health effects, vegetation effects, or odors to be associated with the vast majority of 1-hour, 8-hour, or 30-minute measurements monitored in Region 12. Further evaluation was conducted for the monitored concentrations that exceeded their respective short-term, odor- and/or vegetation-based AMCVs to determine the potential for adverse health effects, odors, or effects on vegetation.

Health-Based AMCV Exceedance

One concentration of 1,3-butadiene was the only instance in which any of the monitored 1-hour concentrations exceeded their respective short-term, health-based AMCVs. This 1,3-butadiene exceedance occurred at Houston Deer Park #2. The reported hourly concentration of 1,789 ppbv was measured on July 31 at 1 pm. The measured value was 1.05 times higher than the health-based AMCV of 1,700 ppbv. The magnitude of the exceedance is very low and transient in nature. Considering the inherent precautionary nature of the 1-hour health-based AMCV along with the underlying toxicity data, adverse health effects would not be expected if exposure to this concentration occurred. The measured value also was higher than the odor-based AMCV of 230 ppbv, as noted in Table 2.

Odor-Based AMCV Exceedances

The monitored 1-hour autoGC VOC concentrations that exceeded their respective odor-based comparison values are shown in Table 2. In total, there were 24 odor-based AMCV exceedances by 1-hour autoGC data in Region 12. The total number of exceedances are higher than the number of exceedances in 2021 (17 exceedances), 2020 (5 exceedances), 2019 (6 exceedances), 2018 (11 exceedances), 2017 (5 exceedances), 2016 (7 exceedances), 2015 and 2014 (5 exceedances each year), 2013 (8 exceedances), 2012 (14 exceedances), and 2011 (19 exceedances). However, they are significantly lower compared to 2022 (44 exceedances), 2010 (75 exceedances), 2008 (82 exceedances), 2009 (37 exceedances), and 2007 (103 exceedances).

Table 2. Odor-Based AMCV Exceedances by 1-Hour AutoGC VOC Concentrations

Site	Chemical	Number of 1-Hour Concentrations above Odor-Based AMCV	Maximum Measured Concentration (ppbv)	Odor-Based AMCV (ppbv)
Cesar Chavez	1,3-butadiene	1	388	230
Channelview Drive Water Tower	isoprene	1	314	47

Site	Chemical	Number of 1-Hour Concentrations above Odor-Based AMCV	Maximum Measured Concentration (ppbv)	Odor-Based AMCV (ppbv)
Channelview Drive Water Tower	styrene	3	53	26
Houston Deer Park #2	1,3-butadiene	2	1,789 [i]	230
HRM 7 Baytown	1-pentene	1	131	100
HRM 7 Baytown	isoprene	1	119	47
Lynchburg Ferry	1,3-butadiene	1	294	230
Lynchburg Ferry	isoprene	2	194	47
Lynchburg Ferry	styrene	3	91	26
Milby Park	styrene	9	85	26

The monitored odor-based AMCV exceedances would not be expected to cause direct acute adverse health effects. Additionally, the infrequency (approximately 0.00043% of hourly measurements) and generally low magnitude of the exceedances (e.g., ≤ 7.8 times the odor-based AMCV) are not indicative of persistent, strong odors with the potential to cause odor-related indirect health effects (e.g., nausea, headache), although exposure to some chemical concentrations could have resulted in the perception of odors.

H_2S 30-minute Concentrations

Two reported 30-minute concentrations of H_2S were above the numerical value of the 30-minute state H_2S standard for residential areas (80 ppbv). These occurred at the Texas City BP 31st Street monitor. The 30-minute concentrations were 90 and 98 ppbv and occurred from 3:45 to 3:50 am on December 23, 2023. Because the odor threshold for H_2S is 0.5-300 ppbv, the

[i] As noted in the above section entitled "Health-Based AMCV Exceedance", the concentration of 1,789 ppbv also exceeded the short-term health-based AMCV of 1,700 ppbv for 1,3-butadiene. The other concentration that exceeded the odor-based AMCV for 1,3-butadiene was 447 ppbv.

measured levels of H_2S could result in the perception of odors if exposure were to occur. Overall, these concentrations are much lower than concentrations that are known to produce adverse health effects; the lowest concentration that has shown H_2S-specific health effects in people (mild respiratory effects in 2 out of 10 asthmatic individuals exposed for 30 minutes) is 2,000 ppbv.

24-Hour Concentrations

More than 47,796 24-hour canister VOC measurements, for which there are 24-hour, chemical-specific AMCVs available, were below their health- and welfare-based AMCVs in Region 12.

All 827 24-hour carbonyl measurements were below their health- and welfare-based AMCVs in Region 12.

Therefore, these monitored concentrations would not be expected to cause short-term adverse health effects or odorous conditions.

Annual Average Concentrations

All annual averages were below their respective long-term AMCVs, except for chromium $PM_{2.5}$.

- Based on averages from 5,570,009 hourly autoGC measurements (TCEQ, EISM, HRM, and TCLAMN network autoGC sites), all annual VOC concentrations were less than their respective long-term AMCVs.
- Based on averages from more than 47,796 24-hour canister measurements (TCEQ, HRM, and TCLAMN network canister sites), all annual VOC concentrations were less than their respective long-term AMCVs.
- Based on the averages from 5,632 24-hour metals measurements, all monitored annual average concentrations of metals were below their respective long-term comparison values (e.g., long-term AMCVs), with the exception of the annual average chromium $PM_{2.5}$ concentration from July 2022 to July 2023, at the Houston North Wayside site.
    - The Houston North Wayside site collected samples from July 4, 2022, to July 14, 2023, and the monitor was deactivated on July 15, 2023. The average annual chromium $PM_{2.5}$ concentration from July 2022 to July 2023 was 0.0084 µg/m^3, which is 1.95 times greater than the AMCV of 0.0043 µg/m^3. The long-term AMCV is based on a form of chromium (hexavalent) that generally represents only a small fraction of environmental chromium (e.g., approximately 1%). The annual average is well below the long-term AMCV for other forms of chromium (0.14 µg/m^3) and that which reasonably assumes 1% hexavalent chromium (0.11 µg/m^3), or even that which very conservatively assumes 10% hexavalent chromium (0.034 µg/m^3).

In conclusion, approximately 99.95% annual averages were below their respective long-term AMCVs, and no long-term, adverse health or vegetation effects would be expected due to exposure to those concentrations.

Freeport Air Pollutant Watch List (APWL) Area for Arsenic, Cobalt, Nickel, & Vanadium

Elevated short-term nickel, arsenic, vanadium, and cobalt levels exceeding their respective short-term AMCVs were measured near Gulf Chemical and Metallurgical Corporation in Freeport during yearly mobile monitoring trips conducted 2005-2010. Due to the elevated metals concentrations, the Freeport area (Site# 1201 [j]) was added to the APWL in 2005. In May 2011, the Freeport South Avenue I monitoring site was activated. This site is located northeast of the facility of concern, within a residential area, and monitors for speciated $PM_{2.5}$ metals. Since this site's activation in May of 2011, all speciated $PM_{2.5}$ metals short-term and annual averages have been below their respective AMCVs; no adverse health effects would be expected due to exposure to these concentrations. The TCEQ will continue to evaluate relevant air monitoring data and any additional information for this APWL site within the context of the APWL (APWL Protocol Revised (texas.gov). For questions regarding the APWL, you may visit the TCEQ website at https://www.tceq.texas.gov/toxicology/apwl/apwl.html.

If you have any questions regarding this memorandum, please contact Janet Hamilton, Ph.D., D.A.B.T. by phone at (512) 239-0557 or email at Janet.Hamilton@tceq.texas.gov, or Stony Lo, Ph.D. by phone at (512) 239-0576 or email at Stony.Lo@tceq.texas.gov, or Kaitlin Rentschler, M.S., M.P.H. by phone at (512) 239-1809 or email at Kaitlin.Rentschler@tceq.texas.gov.

[j] https://www.tceq.texas.gov/downloads/toxicology/air-pollutant-watch-list/maps/1201freeport.pdf

Appendix 1. Monitored Air Toxics in Region 12

List 1. Target VOC Analytes in Canister Samplers

1,1,2,2-Tetrachloroethane
1,1,2-Trichloroethane
1,1-Dichloroethane
1,1-Dichloroethylene
1,2,3-Trimethylbenzene
1,2,4-Trimethylbenzene
1,2-Dichloropropane
1,3,5-Trimethylbenzene
1,3-Butadiene
1-Butene [a]
1-Hexene & 2-Methyl-1-Pentene [a]
1-Pentene
2,2,4-Trimethylpentane
2,2-Dimethylbutane [a]
2,3,4-Trimethylpentane
2,3-Dimethylbutane
2,3-Dimethylpentane
2,4-Dimethylpentane
2-Chloropentane [a]
2-Methyl-2-Butene
2-Methylheptane
2-Methylhexane [a]
2-Methylpentane [a]
3-Methyl-1-Butene
3-Methylheptane
3-Methylhexane
3-Methylpentane
4-Methyl-1-Pentene
Acetylene
Benzene
Bromomethane
Carbon Tetrachloride [a]
Chlorobenzene
Chloroform
Chloromethane
cis-1,3-Dichloropropene
cis-2-Butene
cis-2-Hexene
cis-2-Pentene
Cyclohexane
Cyclopentane
Cyclopentene
Dichlorodifluoromethane
Dichloromethane [a]
Ethane
Ethylbenzene
Ethylene
Ethylene Dibromide [a]
Ethylene Dichloride [a]
Isobutane
Isopentane
Isoprene
Isopropylbenzene [a]
m-Diethylbenzene
Methyl Chloroform [a]
Methylcyclohexane
Methylcyclopentane
m-Ethyltoluene
m-/p-Xylene
n-Butane
n-Decane
n-Heptane
n-Hexane
n-Nonane
n-Octane
n-Pentane
n-Propylbenzene
n-Undecane
o-Ethyltoluene
o-Xylene
p-Diethylbenzene
p-Ethyltoluene
Propane
Propylene
Styrene
Tetrachloroethylene
Toluene
trans-1,3-Dichloropropene
trans-2-Butene
trans-2-Hexene
trans-2-Pentene
Trichloroethylene
Trichlorofluoromethane
Vinyl Chloride

[a] Not monitored at the HRM 1, 4, 7, 8, 10, and 11 sites.

List 2. Target Carbonyl Analytes

2,5-Dimethylbenzaldehyde
Acetaldehyde
Acetone
Acrolein - Unverified
Benzaldehyde
Butyraldehyde
Crotonaldehyde
Formaldehyde
Heptanal
Hexanaldehyde
Isovaleraldehyde
Methyl Ethyl Ketone (MEK)
Methacrolein
o-Tolualdehyde
Propionaldehyde
Valeraldehyde
m & p-Tolualdehyde

List 3. Target Metal Analytes

Aluminum ($PM_{2.5}$)	Cobalt ($PM_{2.5}$)	Selenium ($PM_{2.5}$)
Antimony ($PM_{2.5}$)	Copper ($PM_{2.5}$)	Tin ($PM_{2.5}$)
Arsenic ($PM_{2.5}$)	Lead ($PM_{2.5}$)	Vanadium ($PM_{2.5}$)
Barium ($PM_{2.5}$)	Manganese ($PM_{2.5}$)	Zinc ($PM_{2.5}$)
Cadmium ($PM_{2.5}$)	Molybdenum ($PM_{2.5}$)	
Chromium ($PM_{2.5}$)	Nickel ($PM_{2.5}$)	

List 4. Target VOC Analytes in AutoGC

1,2,3-Trimethylbenzene [a]	Acetylene	Toluene [b]
1,2,4-Trimethylbenzene	Benzene [b,c]	cis-2-Butene
1,3,5-Trimethylbenzene	Cyclohexane	cis-2-Pentene
1,3-Butadiene [c]	Cyclopentane	m/p Xylene
1-Butene	Ethane	n-Butane
1-Pentene	Ethylbenzene	n-Decane
2,2,4-Trimethylpentane	Ethylene	n-Heptane
2,2-Dimethylbutane	Isobutane	n-Hexane [b]
2,3,4-Trimethylpentane	Isopentane	n-Nonane
2,3-Dimethylpentane	Isoprene	n-Octane
2,4-Dimethylpentane	Isopropylbenzene	n-Pentane [b]
2-Methyl-2-Butene [d]	Methylcyclohexane	n-Propylbenzene
2-Methylheptane	Methylcyclopentane	n-Undecane [d]
2-Methylhexane	Propane	o-Xylene
3-Methylheptane	Propylene	trans-2-Butene
3-Methylhexane	Styrene	trans-2-Pentene

[a] Only monitored at the Cesar Chavez, Channelview Drive Water Tower, Clinton, Galena Park, Houston Deer Park #2, HRM 7 Baytown, HRM 16 Deer Park, Lake Jackson, Lynchburg Ferry, Manchester East Avenue N, Milby Park, Oyster Creek, Pasadena Richey Elementary School, Texas City 34th St, and Wallisville Rd monitoring sites.

[b] These are the only compounds monitored at the Texas City BP Logan St and Texas City BP 31st St sites.

[c] 2nd Avenue Monitoring Station only monitored for these compounds, in addition to that in List 5.

[d] Only monitored at the HRM #3 Haden Rd, HRM 7 Baytown, HRM 16 Deer Park, Lake Jackson, Lynchburg Ferry, Oyster Creek, Texas City 34th St, and Wallisville Rd monitoring sites.

List 5. Additional AutoGC Analyte Monitored at 2nd Avenue Monitoring Site

Vinyl Chloride