

TCEQ Interoffice Memorandum

To: Nicole Bealle, Regional Director, R12
Andy Goodridge, Assistant Regional Director, R12
Jason Ybarra, Special Assistant to the Regional Director, R12

From: Janet Hamilton, Ph.D., D.A.B.T. *JH*
Stony Lo, Ph.D. *SL*
Michael Wei, Ph.D. *mw*
Toxicology, Risk Assessment, and Research Division Office of the
Executive Director

Date: June 24, 2024

Subject: Health Effects Review of 2022 Ambient Air Network Monitoring Data in
Region 12, Houston

Key Points

- All hourly concentrations (5,634,297 samples) were below their respective short-term health-based Air Monitoring Comparison Values (AMCVs).
- Approximately 0.00078% (44 out of 5,634,297 samples) of measured hourly concentrations exceeded an odor-based AMCV. Accordingly, a few hourly levels (e.g., 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 (e.g., eye irritation), 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).
- Approximately 0.000018% (1 out of 5,634,297 samples) of measured hourly concentrations exceeded a vegetation-based AMCV. This single hourly level exceedance was for ethylene and was measured at the Houston Deer Park #2 monitoring site.
- All reported 30-minute rolling averages were below the level of the state 30-minute hydrogen sulfide (H₂S) standard for residential areas (80 ppbv).
- With the exception of annual averages of ethylene dibromide, annual average concentrations of all other chemicals from 24-hour measurements were below their respective long-term AMCVs. At three Texas City/La Marque sites (2nd Ave, Ave A, and North Site), annual averages of ethylene dibromide exceeded the long-term health-based AMCV. These low magnitude exceedances would not be expected to cause adverse health effects.
- Annual average concentrations for all chemicals from 1-hour measurements and metals from 24-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 2022. 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.

The Texas City 11th St monitor was deactivated on December 9, 2021; therefore, there are no reported data for 2022 for this monitoring site. 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 (H₂S) sampling at:
 - 1 TCEQ site,
 - 3 EISM sites, and

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

- 1 HRM site.

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 2 nd 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 2022, 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 ₂ S
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 2022, 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 was activated on June 28, 2022 and began collecting data on July 4, 2022.

^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 ₂ S
Harris	48-201-1049	Pasadena Richey Elementary School ⁱ 702 Light Company Rd/ 610 2/3 South Richey St	TCEQ	VOC (autoGC, 24-hour canister)
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 ₂ S, VOC (24-hour canister)
Galveston	48-167-0615	Texas City BP 31st Street (Site 1) 302 31st Street South	EISM – Marathon Petroleum Co.	H ₂ S, 4 VOCs (SRIGC)
Galveston	48-167-0621	Texas City BP Logan Street (Site 3) 303 Logan Street	EISM – Marathon Petroleum Co.	H ₂ S, 4 VOCs (SRIGC)
Harris	48-201-0617	Wallisville Rd 4727 Wallisville Rd	EISM - HRM	VOC (autoGC)

ⁱ Site was previously named Pasadena North, in 2022 it was moved, switched to an autoGC sampler and renamed as Pasadena Richey Elementary School. The site name Pasadena North does not appear in TAMIS anymore and all data (canister data collected through May 29, 2022 and autoGC data which began collection on May 10, 2022) are now associated with the name Pasadena Richey Elementary School. Collection of canister data at 702 Light Company Rd ended on May 29, 2022 and collection of autoGC data at 610 2/3 South Richey St began on May 10, 2022.

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. One-hour autoGC VOC, 30-minute H₂S, 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 H₂S 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 H₂S (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 99.9992% of the 5,634,297 1-hour VOC measurements from the TCEQ, EISM, HRM, and TCLAMN network autoGC monitors in Region 12 were below their short-term AMCVs. All hourly concentrations were below their respective short-term health-based AMCVs. Forty-four hourly measurements (approximately 0.00078%) exceeded an odor-based AMCV over this time period (Table 2). One hourly measurement (approximately 0.000018%) exceeded a vegetation-based AMCV. Additionally, 100% of the 1,417 8-hour carbonyl concentrations measured in Region 12 were below their respective AMCVs. All reported 30-minute rolling averages were below the level of the state 30-minute H₂S standard (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.

Odor-Based AMCV Exceedances

The monitored 1-hour autoGC VOC concentrations that exceeded their respective odor-based comparison levels are shown in Table 2. In total, there were 44 odor-based AMCV exceedances by 1-hour autoGC data in Region 12. The majority of these exceedances occurred at the Clinton monitor during March 22-26, 2022 and the observed styrene exceedances were ≤ 4.2 times the odor-based AMCV of 26 ppbv. 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), and 2013 (8 exceedances), 2012 (14 exceedances), 2011 (19 exceedances), and 2009 (37 exceedances). However, they are significantly lower compared to 2010 (75 exceedances), 2008 (82 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)
Channelview	isoprene	1	65.96	47
Channelview Drive Water Tower	isoprene	1	61.32	47
Channelview Drive Water Tower	styrene	1	37.48	26

Site	Chemical	Number of 1-Hour Concentrations above Odor-Based AMCV	Maximum Measured Concentration (ppbv)	Odor-Based AMCV (ppbv)
Clinton	styrene	32	109.34	26
Lynchburg Ferry	1,3-butadiene	1	1,370.60	230
Lynchburg Ferry	styrene	2	56.74	26
Manchester East Avenue N	styrene	1	29.74	26
Milby Park	styrene	5	35.79	26

The monitored odor-based AMCV exceedances would not be expected to cause direct acute adverse health effects (e.g., eye irritation). Additionally, the infrequency (approximately 0.00078% of hourly measurements) and generally low magnitude of the exceedances (e.g., ≤ 6 times the odor-based AMCV) are not indicative of persistent, strong odors with the potential to cause odor-related health effects (e.g., nausea, headache), although exposure to some chemical concentrations could have resulted in the perception of odors.

Vegetation-Based AMCV Exceedances

One concentration of ethylene was the only instance in which any of the monitored 1-hour concentrations exceeded their respective short-term, vegetation-based AMCVs. This ethylene exceedance occurred at Houston Deer Park #2. The reported hourly ethylene concentration of 1,434.69 ppbv was measured on March 10, 2022 at 6 am. The measured value was 1.2 times higher than the vegetation-based 1-hour AMCV of 1,200 ppbv. The magnitude of the exceedance is low and transient in nature. This monitor is located in a residential area and there are no agricultural areas nearby that would be affected by the elevated concentration of ethylene. Considering the inherent precautionary nature of the 1-hour AMCV along with the underlying toxicity data, adverse vegetation effects would not be expected if exposure to this concentration had occurred.

24-Hour Concentrations

More than 51,324 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 823 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 ethylene dibromide.

- Based on the 5,563 24-hour metals measurements, all monitored annual average concentrations of metals were below their respective long-term comparison values (e.g., long-term AMCVs).
- Based on averages from 5,634,297 hourly autoGC measurements (TCEQ, EISM, HRM, and TCLAMN network autoGC sites), all annual VOC concentrations were also less than their respective long-term AMCVs.
- Based on averages from more than 51,324 24-hour canister measurements (TCEQ, HRM, and TCLAMN network canister sites), all annual VOC concentrations were also less than their respective long-term AMCVs except for ethylene dibromide at three Texas City/La Marque Sites (2nd Ave, Avenue A, and North Site).
 - The 2022 long-term averages of ethylene dibromide at three sites (2nd Ave [0.055 ppbv], Ave A [0.05 ppbv], and North Site [0.04 ppbv]) may exceed the long-term health-based AMCV of 0.029 ppbv. Because inhalation exposure of ethylene dibromide resulted in increased incidences of tumors in lifetime studies (2 yr in duration) in rats and mice, the TCEQ derived a toxicity factor based on the potential for carcinogenicity. The long-term AMCV of 0.029 ppbv is the ambient air concentration associated with an excess cancer risk of 1 in 100,000 (i.e., an increased risk above background of 0.001%), which assumes lifetime (70 yr) continuous exposure. However, the method detection limit (MDL), which is the minimum concentration of a chemical the laboratory would measure and report with 99% confidence that the analyte concentration is greater than zero, for this chemical is 0.1 ppbv and is well above the long-term, health-based AMCV (0.029 ppbv). In addition, twenty-eight of the thirty (28/30) samples collected at 2nd Ave were non-detects, fifty-six of the sixty samples (56/60) at Ave A were non-detects, and twenty-nine of the thirty (29/30) samples at the North Site were non-detects. Therefore, the sampling and analytical techniques currently used do not achieve a sufficiently low MDL for comparison of long-term averages predominantly driven by non-detects to the current long-term AMCV. Given the conservatism in the derivation of the long-term AMCV and that the majority of samples at each site were non-detects, these “exceedances” would not be expected to cause adverse health effects based on available toxicity data.

In conclusion, 99.86% of all 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, 100% of 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 \(texas.gov\)](https://www.tceq.texas.gov/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 Michael Wei, Ph.D. by phone at (512) 239-0540 or email at Michael.Wei@tceq.texas.gov. For questions regarding the APWL, you may visit the TCEQ website at <https://www.tceq.texas.gov/toxicology/apwl/apwl.html>.

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

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

List 2. Target Carbonyl Analytes

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

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 ^d	Isopropylbenzene	n-Pentane ^b
2-Methyl-2-Butene ^e	Methylcyclohexane	n-Propylbenzene
2-Methylheptane	Methylcyclopentane ^d	n-Undecane ^e
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, Galena Park, 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 Not monitored at the Houston Deer Park #2 monitoring site.

^e 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.

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

Vinyl Chloride