TCEQ Interoffice Memorandum

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Subject: Health Effects Review of 2012 Ambient Air Network Monitoring Data in Region 12, Houston

Key Points

- Notably, annual averages for all chemicals and metals were below their respective long-term air monitoring comparison values (AMCVs) for the third consecutive year in many years of sampling.
- The 2012 benzene concentration at the Marathon-sponsored site in Texas City is below TCEQ's long-term AMCV for the third consecutive year since monitoring began in 2005, and the annual benzene averages at other Texas City sites were also below the long-term AMCV.
- TCEQ has proposed removal of benzene from the Texas City Air Pollutant Watch List (Site# APWL1202) since data from recent years for the Marathon-sponsored site and other Texas City monitoring sites indicate sufficient achievements in reducing ambient air concentrations such that levels are no longer of concern for potential long-term, adverse health effects.
- Although benzene is currently on the Galena Park APWL (Site# APWL1206), data from 2008 to date continue to indicate sufficient achievements in reducing ambient air concentrations such that the reported levels are no longer of concern for potential long-term, adverse health effects. This determination should be considered in context with the APWL protocol.
- Only approximately 0.0004% of measured hourly concentrations exceeded an odor-based AMCV. A few hourly levels of styrene, isoprene, and/or 1-butene monitored at two Region 12 sites could result 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 low magnitude of the exceedances and other considerations (e.g., odor characteristics for isoprene and 1-butene) are not indicative of persistent, strong odors with the potential to cause odor-related health effects (e.g., nausea, headache).
- Lynchburg Ferry site data from recent years (2011-2012) demonstrate significant improvement in reducing exceedances of the styrene odor-based AMCV compared to historical data (2005-2010). The frequency, duration, and magnitude of these

concentrations have fallen sharply since 2005 such that for the last two years (2011-2012), they are within that routinely permitted for air permit applications. Thus, although styrene is currently listed on the APWL for this area (Site# APWL1204), 2011-2012 data indicate sufficient achievements in reducing ambient air concentrations such that the reported levels are no longer of concern for persistent, strong odors. This determination should be considered in context with the APWL protocol.

Background

The primary purpose of this memorandum is to convey the Toxicology Division's (TD) evaluation of ambient air toxics sampling conducted at monitoring sites in Region 12-Houston during 2012. The TD reviewed summary results for volatile organic compounds (VOCs) from 24-hour canister samples, 1-hour automated gas-chromatography (autoGC) VOC samples, 24- and 3-hour carbonyl samples, 24-hour polycyclic aromatic hydrocarbon (PAH)/semivolatile organic compound (SVOC) samples, and 24-hour metals samples from filters designed to collect particulate matter with an aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$) and from filters collecting particulate matter with an aerodynamic diameter of 10 microns or less (PM_{10}). 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 contains a list 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 summarized below:

- 24-hour canister VOC sampling at 17 sites
- 24-hour carbonyl sampling at 2 sites
- 3-hour carbonyl sampling at 1 site
- 24-hour metals sampling at 5 sites
- 24-hour PAH/SVOC sampling at 1 site
- 1-hour autoGC VOC monitoring at:
  - 12 TCEQ and/or Enhanced Industry-Sponsored Monitoring (EISM) sites
  - 2 Attorney General-Temporary Injunction Monitoring sites (TIM)
  - 1 US Environmental Protection Agency (EPA)/DOJ-Industry Agreement Monitoring site (EPA/DOJAM)

Table 1. Monitoring Sites Located in TCEQ Region 12

County	EPA Site ID	Site Location	Network	Monitored Compounds
Brazoria	48-039-1003	Clute 426 Commerce St.	TCEQ	VOC (24-hour canister)
Brazoria	48-039-0618	Danciger Along US Hwy 1459 in Brazoria County	EISM	VOC (autoGC)
Brazoria	48-039-1012	Freeport South Ave I 207 South Avenue I	TCEQ	Metals ($PM_{2.5}$)

County	EPA Site ID	Site Location	Network	Monitored Compounds
Brazoria	48-039-1016	Lake Jackson 109-B Brazoria Hwy 332-W	EISM	VOC (autoGC)
Brazoria	48-039-0619	Mustang Bayou FM 2917 @ County Road 169	EISM	VOC (24-hour canister)
Galveston	48-167-0005	Texas City, Ball Park 2516 ½ Texas Ave.	TCEQ	VOC (24-hour canister)
Galveston	48-167-0056	Texas City, 34th St. 2212 North 34th St.	EISM	VOC (autoGC)
Galveston	48-167-1034	Galveston, 99th St. 9511 Avenue V ½	TCEQ	VOC (24-hour canister)
Harris	48-201-0036	Jacinto Port 1st St. and Elsbeth St.	TCEQ	VOC (24-hour canister)
Harris	48-201-1039	Deer Park 4514 ½ Durant St.	TCEQ	VOC (autoGC, 24-hour canister), Carbonyls, Metals ($PM_{2.5}$, PM_{10}) , PAHs/SVOCs
Harris	48-201-0024	Houston, Aldine 4510 ½ Aldine Mail Rd.	TCEQ	VOC (24-hour canister), Metals ($PM_{2.5}$)
Harris	48-201-1035	Houston, Clinton 9525 ½ Clinton Dr.	TCEQ	VOC (autoGC), Carbonyls, Metals (PM_{10})
Harris	48-201-1034	Houston, East 1262 1/2 Mae Drive	TCEQ	Lead (TSP)
Harris	48-201-0057	Galena Park 304 Stewart St.	TCEQ/Harris County	VOC (24-hour canister/Auto GC-Benzene)
Harris	48-201-0026	Houston, Channelview 1405 Sheldon Rd.	TCEQ	VOC (autoGC)
Harris	48-201-0061	La Porte, Shoreacres 3903 ½ Old Hwy 146	TCEQ	VOC (24-hour canister)
Harris	48-201-0069	Houston, Milby Park 2201-a Central St.	TCEQ	VOC (autoGC)
Harris	48-201-6000	Houston, Cesar Chavez 4829A Galveston Rd.	TCEQ	VOC (autoGC)
Harris	48-201-1015	Baytown, Lynchburg Ferry 1001 B Lynchburg Rd.	TCEQ/EISM	VOC (autoGC, 24-hour canister)

County	EPA Site ID	Site Location	Network	Monitored Compounds
Harris	48-201-0617	Baytown, Wallisville Rd. 4727 Wallisville Rd.	EISM	VOC (autoGC)
Harris	48-201-0307	Houston, Manchester/Central 9401 ½ Manchester Rd.	TCEQ	VOC (24-hour canister)
Harris	48-201-0029	Tomball, NW Harris County 16822 Kitzman St.	TCEQ	VOC (24-hour canister)
Harris	48-201-0055	Houston, Bayland Park 6400 Bissonnet St.	TCEQ	VOC (24-hour canister)
Harris	48-201-0058	Baytown 7201 ½ Bayway Dr.	TCEQ	VOC (24-hour canister)
Harris	48-201-0803	Haden Rd. (HRM-3) 1504 ½ Haden Dr.	TCEQ/EISM	VOC (autoGC, 24-hour canister)
Harris	48-201-1049	Pasadena North [1] 702 Light Company Rd.	TCEQ	VOC (24-hour canister)
Galveston	N/A	BP North America Products, Inc.-Texas City 31st St. (Between Texas Ave. and 5th Ave.)	TIM	Benzene (autoGC)
Galveston	N/A	BP North America Products, Inc.-Texas City Logan St.	TIM	Benzene (autoGC)
Galveston	N/A	Marathon Petroleum Company, LLC-Texas City 11st St. S. at 6th Ave. S.	EPA/DOJAM	Benzene (autoGC)
Montgomery	48-339-0078	Conroe 9472A Hwy 1484	TCEQ	VOC (24-hour canister)

[1] Last sample of 2012 was collected on July 14th due to an electrical issue.

All data collected at TCEQ monitors are analyzed by the TCEQ laboratory and should meet a 75% data completeness objective. At EISM monitors, data are collected by a third party contractor and should also meet a 75% data completeness objective. The data collected at the EPA/DOJAM and TIM monitors are analyzed by a third party contractor and should meet an 85% data completeness objective. One-hour autoGC VOC and 3-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 air monitoring comparison values (AMCVs). 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., National Ambient Air Quality Standards (NAAQS), TCEQ health-, odor-, and vegetation-based AMCVs). Information on AMCVs may be obtained via the internet

(http://www.tceq.state.tx.us/implementation/tox/AirToxics.html) or by contacting the TD (512-239-3900).

Evaluation

1- and 3-Hour Concentrations

The vast majority of the 1-hour autoGC VOC and 3-hour carbonyl concentrations were below their respective TCEQ short-term, health-, odor-, and/or vegetation-based AMCVs. More specifically, about 99.9995% of the approximately 3,877,000 1-hour VOC measurements from TCEQ, EISM, and industry-sponsored autoGC monitors in Region 12 in 2012 were below their short-term AMCVs. Only four (approximately 0.0001%) hourly autoGC measurements collected in Region 12 in 2012 exceeded a TCEQ short-term, health-based AMCV (see discussion below). Approximately 0.0004% exceeded an odor-based AMCV, with no more than six exceedances for a chemical at any one site. Additionally, except for one very slight exceedance of the odor-based AMCV for acetaldehyde at Clinton Dr., all of the approximately 3,340 3-hour carbonyl concentrations measured in Region 12 in 2012 were below their respective AMCVs. That is, approximately 99.97% of the 3-hour carbonyl levels were below their respective short-term, health- and odor-based AMCVs. Therefore, we would not expect short-term, adverse health effects, vegetation effects, or odors to be associated with the vast majority of 1- and 3-hour measurements monitored in Region 12 in 2012.

Further evaluation was conducted for the monitored concentrations that exceeded their respective short-term, health- and/or odor-based AMCVs to determine the potential for adverse health effects or odors. Four concentrations of isoprene were the only instances in which any of the monitored 1-hour concentrations exceeded their respective short-term, health-based AMCVs in 2012. These exceedances occurred at the Lynchburg Ferry site monitor, where four hourly isoprene concentrations ranging from 25.1-155.4 ppb_v were above the current interim short-term, health-based AMCV of 20 ppb_v. However, this short-term AMCV was simply designed to help ensure that the long-term average at a site remains low (i.e., < 2 ppb_v) as opposed to being a short-term concentration of actual potential health concern. The TCEQ is currently in the final stages of assessing the health hazards/risks of isoprene, including deriving a final health-protective, short-term AMCV more representative of the actual potential for short-term, adverse health effects. Using the latest scientific assessment methods, the final short-term, health-based AMCV will likely be at least an order of magnitude higher than the current interim value. In addition, these monitored hourly exceedances are significantly below isoprene levels attributable to short-term, adverse health effects. Therefore, exposure to these hourly concentrations would not be expected to cause short-term, adverse health effects.

The monitored 1-hour autoGC VOC concentrations that exceeded their respective odor-based comparison levels in 2012 are shown below in Table 2. The total number of odor-based AMCV autoGC exceedances in Region 12 in 2012 (14 exceedances) is 26% lower than that in 2011 (19 exceedances), 81% lower than that in 2010 (75 exceedances), and also significantly lower compared to 2009 (37 exceedances), 2008 (82 exceedances), and 2007 (103 exceedances). In regard to 3-hour carbonyl sample results, one reported 3-hour acetaldehyde concentration (8.51 ppb_v) monitored at the Clinton Dr. site slightly exceeded the odor-based AMCV (8.5 ppb_v). Zero 3-hour concentrations of isovaleraldehyde exceeded its odor-based AMCV at Clinton Dr. in

2012, which represents a significant reduction (i.e., 100%) compared to three such exceedances in 2011, eighteen exceedances in 2010, and eight in 2009.

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 (ppb_v)	Odor-Based AMCV (ppb_v)
Milby Park	Styrene	6	52.5	25
	1-Butene	1	718.1	360
Lynchburg Ferry	Styrene	6	56.6	25
	Isoprene	1	155.4	48

The monitored odor-based AMCV exceedances would not be expected to cause direct acute adverse health effects (e.g., eye irritation). Additionally, the infrequency and low magnitude of the exceedances (e.g., all except three samples < 2 times the odor-based AMCV) and other considerations (e.g., odor characteristics for isoprene and 1-butene) are not indicative of persistent, strong odors with the potential to cause odor-related health effects (e.g., nausea, headache).

Air Pollutant Watch List (APWL) Area for Odorous Hourly Styrene Concentrations – Lynchburg Ferry

The number of 1-hour exceedances of the styrene odor-based AMCV at the Lynchburg Ferry site in 2012 (six) remains very low compared to historical exceedances (e.g., range of 27-92 exceedances for 2005-2010). The frequency, duration, and magnitude of these concentrations have fallen sharply since 2005 such that for the last two years (2011-2012), they are within that routinely permitted for air permit applications. This improvement is likely the result of efforts to reduce styrene emissions in this area and represents a maintained significant air quality improvement. In fact, using the six 2012 exceedances for each of the Lynchburg Ferry and Milby Park sites shows that the improvement in the frequency of odorous styrene concentrations calculated using the maximum for historical annual exceedances at the Lynchburg Ferry site (e.g., maximum reduction of 93% compared to 2005) is greater than that achieved at the Milby Park site (e.g., maximum reduction of 82% compared to 2008). The Milby Park site also had elevated frequencies of hourly odorous styrene concentrations for a period (2006-2008) but did not have styrene added to its APWL (Site # APWL1207). Goodyear mitigating the issue through operational changes, a reduction in permitted styrene emissions, and a Voluntary Emissions Reduction Agreement. Additionally, maximum hourly styrene concentrations at the Lynchburg Ferry site in recent years (2011-2012: 38.4-56.6 ppb_v) are much lower than those in previous

years (2005-2010: 102.0-494.4 ppb_v). Thus, both the frequency and magnitude of odorous styrene concentrations monitored at the Lynchburg Ferry site have shown significant improvement. Although styrene is currently listed on the APWL for this area (Site# APWL1204), the data discussed above from 2011-2012 indicate sufficient achievements in reducing ambient air concentrations such that the reported levels are no longer of concern for persistent, strong odors. This determination should be considered in context with the APWL protocol.

24-Hour Concentrations

The highest 24-hour isovaleraldehyde concentration in 2012 at the Deer Park site (0.275 ppb_v) exceeded the odor-based AMCV for this chemical (0.1 ppb_v), which is reported to be used in fragrances. The concentration monitored would not be expected to cause direct acute health effects. Additionally, although the perception of sufficiently strong and persistent unpleasant odors has the potential to cause odor-related health effects (e.g., nausea, headache), this concentration would not be expected to cause odor-related health effects due to the likely conservative nature of the odor-based AMCV for isovaleraldehyde and its odor characteristics. At the Mustang Bayou site in 2012, twelve acetaldehyde concentrations (8.52-16.4 ppb_v) and eighteen butyraldehyde concentrations (1.59-4.13 ppb_v) exceeded their respective odor-based AMCVs (8.5 and 1.4 ppb_v, respectively). These monitored concentrations would not be expected to cause direct acute health effects. Additionally, although the perception of sufficiently strong and persistent unpleasant odors has the potential to cause odor-related health effects (e.g., nausea, headache), these concentrations are not indicative of strong odors with the potential to cause odor-related health effects due to the likely conservative nature of the odor-based AMCVs (e.g., upper end of the 50% odor threshold detection ranges are 48.65 and 3.1 ppb_v for acetaldehyde and butyraldehyde, respectively), low magnitude of the exceedances (all acetaldehyde samples < 2 times the odor-based AMCV, with the same being true for all but four of the butryaldehyde samples which were < 3 times), and their odor characteristics (e.g., used in fragrances).

Annual Average Concentrations

In 2012, all annual averages were below their respective long-term AMCVs for the third consecutive year in many years of sampling in Region 12:

- Based on the approximately 6,600 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 the approximately 1,960 24-hour measurements, all annual average concentrations of carbonyls were also below their respective long-term AMCVs;
- Based on approximately 1,950 24-hour measurements, all annual average concentrations for PAHs/SVOCs were below long-term AMCVs; and
- Based on averages from approximately 86,400 24-hour canister measurements and approximately 3,877,000 hourly autoGC measurements (TCEQ, EISM, and three industry-sponsored autoGC sites), all annual VOC concentrations were also less than their respective long-term AMCVs.

In summary, 100% 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.

APWL Areas for Annual Benzene Concentrations – Galena Park and Texas City

Annual average benzene concentrations for 2012 at the Galena Park site (1.0 ppb_v based on every 6th day 24-hour canister data, 0.79 ppb_v based on 11-month autoGC data) and the Marathon-sponsored Texas City site (0.75 ppb_v based on autoGC data) remain well below the long-term AMCV, representing significant and maintained air quality improvements in these areas. Although benzene in the Galena Park area is currently on the APWL (Site# APWL1206), monitoring site data from 2008 to date indicate sufficient achievements in reducing ambient air concentrations such that the reported levels are no longer of concern for potential long-term, adverse health effects. The Lynchburg Ferry APWL area (Site# APWL1204) also had monitoring site annual benzene concentrations that were no longer of concern beginning in 2008, although benzene was removed from that APWL in 2010. Additionally, this year the TCEQ proposed that benzene be removed from the Texas City APWL area (Site# APWL1202) due to significant improvements in ambient air concentrations at the Marathon-sponsored site beginning in 2010 (since 2006, no other ambient air monitoring site in the Texas City APWL had annual benzene concentrations of potential long-term health concern). The improvements achieved at the Marathon-sponsored site in recent years are similar to those achieved at the Galena Park site since 2008. These considerations should be taken into account for the Galena Park area APWL (Site# APWL1206) in context with the APWL protocol.

If you have any questions regarding this memorandum, please contact Joseph T. Haney, Jr., M.S. by phone at (512) 239-5691 or by email at Joseph.Haney@tceq.texas.gov, or Heather Reddick, M.P.H. by phone at (512) 239-0154 or by email at Heather.Reddick@tceq.texas.gov. For questions regarding the APWL, you may visit the TCEQ website at http://www.tceq.state.tx.us/implementation/tox/AirPollutantMain/APWL_index.html.

Appendix 1. Monitored Air Toxics in Region 12 in 2012

List 1. Target VOC Analytes in Canister Samples*

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**
1-Hexene + 2-Methyl-1-Pentene**
1-Pentene
2,2,4-Trimethylpentane
2,2-Dimethylbutane (Neohexane)
2,3,4-Trimethylpentane
2,3-Dimethylbutane
2,3-Dimethylpentane
2,4-Dimethylpentane
2-Chloropentane**
2-Methyl-2-Butene**
2-Methylheptane
2-Methylhexane
2-Methylpentane (Isohexane)
3-Methyl-1-Butene
3-Methylheptane
3-Methylhexane
3-Methylpentane
4-Methyl-1-Pentene
Acetylene
Benzene
Bromomethane
c-1,3-Dichloropropylene
c-2-Butene
c-2-Hexene
c-2-Pentene
Carbon Tetrachloride
Chlorobenzene
Chloroform
Chloromethane (Methyl Chloride)
Cyclohexane
Cyclopentane
Cyclopentene
Dichlorodifluoromethane
Dichloromethane (Methylene Chloride)
Ethane
Ethyl Benzene
Ethylene
Ethylene Dibromide (1,2-Dibromoethane)
Ethylene Dichloride (1,2-Dichloroethane)
Isobutane
Isopentane (2-Methylbutane)
Isoprene
Isopropylbenzene (Cumene)
m & p-Xylene
m-Diethylbenzene
Methyl Chloroform (1,1,1-Trichloroethane)
Methylcyclohexane
Methylcyclopentane
m-Ethyltoluene
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
t-1,3-Dichloropropylene
t-2-Butene
t-2-Hexene
t-2-Pentene
Tetrachloroethylene
Toluene
Trichloroethylene
Trichlorofluoromethane
Vinyl Chloride

* See List 6 for additional canister analytes monitored only at the Mustang Bayou site.
** Not monitored at the Mustang Bayou Site.

List 2. Target Carbonyl Analytes

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

List 3. Target Metal Analytes

Aluminum ($PM_{2.5}$, PM_{10})	Chromium VI (TSP*)	Nickel ($PM_{2.5}$, PM_{10})
Antimony ($PM_{2.5}$, PM_{10})	Cobalt ($PM_{2.5}$, PM_{10})	Selenium ($PM_{2.5}$, PM_{10})
Arsenic ($PM_{2.5}$, PM_{10})	Copper ($PM_{2.5}$, PM_{10})	Tin ($PM_{2.5}$, PM_{10})
Barium ($PM_{2.5}$, PM_{10})	Lead ($PM_{2.5}$, PM_{10}, TSP**)	Vanadium ($PM_{2.5}$ ***)
Cadmium ($PM_{2.5}$, PM_{10})	Manganese ($PM_{2.5}$, PM_{10})	Zinc ($PM_{2.5}$, PM_{10})
Chromium ($PM_{2.5}$, PM_{10})	Molybdenum ($PM_{2.5}$, PM_{10})	

*Only monitored at the Deer Park monitoring site; TSP = total suspended particulate.
** Only monitored at the Deer Park and Houston East monitoring sites.
*** Only monitored at the Mustang Bayou monitoring site.

List 4. Target PAH Analytes

Acenaphthene	Benzo(g,h,i)perylene	Indeno(1,2,3-cd)pyrene
Acenaphthylene	Benzo(k)fluoranthene	Naphthalene
Anthracene	Chrysene	Phenanthrene
Benzo(a)anthracene	Dibenzo(a,h)anthracene	Pyrene
Benzo(a)pyrene	Fluoranthene	
Benzo(b)fluoranthene	Fluorene	

List 5. Target VOC Analytes in AutoG

1-Butene	Benzene	n-Heptane
1-Pentene	c-2-Butene	n-Hexane
1,2,3-Trimethylbenzene	c-2-Pentene	n-Nonane
1,2,4-Trimethylbenzene	Cyclohexane	n-Octane
1,3-Butadiene	Cyclopentane	n-Pentane
1,3,5-Trimethylbenzene	Ethane	n-Propylbenzene
2-Methyl-2-Butene*	Ethyl Benzene	n-Undecane*
2-Methylheptane	Ethylene	o-Xylene
2-Methylhexane	Isobutane	p-Xylene + m-Xylene
2,2-Dimethylbutane	Isopentane	Propane
2,2,4-Trimethylpentane	Isoprene	Propylene
2,3-Dimethylpentane	Isopropyl Benzene - Cumene	Styrene
2,3,4-Trimethylpentane	Methylcyclohexane	t-2-Butene
2,4-Dimethylpentane	Methylcyclopentane	t-2-Pentene
3-Methylheptane	n-Butane	Toluene
3-Methylhexane	n-Decane	
Acetylene		

*Only monitored at the Danciger, Lake Jackson, Texas City 34th St., Wallisville Rd., Haden Rd., and Lynchburg Ferry monitoring sites.

List 6. Additional Canister Analytes Monitored at Mustang Bayou

1,2,4-Trichlorobenzene	2-Methyl-2-Pentene	cis-2-Octene
1,2-Dichlorobenzene	2-Proponol	cis-3-Hexene
1,3-Dichlorobenzene	4-Nonene	cis-3-Methyl-2-Pentene
1,4-Dichlorobenzene	Acetaldehyde	cis-4-Methyl-2-Pentene
1,4-Dioxane	Acetone	Cyclohexene
1-Decene	Acetonitrile	Dichlorofluoromethane
1-Heptene	Acrylonitrile	Diethyl Ether
1-Hexene	alpha-Pinene	Ethyl Alcohol
1-Methylcyclohexene	Benzaldehyde	Fluorobenzene
1-Nonene	Benzyl Chloride	Freon 113
1-Octene	beta-Pinene	Freon 114
1-Undecene	Bromochloromethane	Heptanal
2,2,5-Trimethylhexane	Bromodichloromethane	Hexachlorobutadiene
2,2-Dimethylpropane	Bromoform	Hexanal
2,4,4-Trimethyl-1-Pentene	Butyl Benzene	Indan
2,4,4-Trimethyl-2-Pentene	Butyraldehyde	Indene
2,5-Dimethylhexane	Chlorodifluoromethane	Isobutene & 1-Butene
2-2-3-Trimethylpentane	Chloroethane	Isobutylbenzene
2-Ethyl-1-Butene	Chloroprene	Methanol
2-Methyl-1-Pentene	cis-1,2-Dichloroethene	Methyl Ethyl Ketone

Methyl Isobutyl Ketone	n-Butyl Alcohol	trans-1,2-Dichloroethylene
Methyl Tert-Butyl Ether	n-Propyl Alcohol	Vinyl Acetate
Methylcyclopentene	p-Chlorotoluene	Vinyl Bromide
Naphthalene	p-Isopropyltoluene	
n-Butyl Acrylate	tert-Butylbenzene	