

TCEQ Interoffice Memorandum

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Subject: Toxicological Evaluation of 2017-2019 Ambient Air Network Monitoring
Data in Region 4, Dallas/Fort Worth

Conclusions

- All 24-hour and three-year average concentrations of volatile organic compounds (VOCs) reported at Texas Commission on Environmental Quality (TCEQ) Region 4-Dallas/Fort Worth canister monitoring sites were below their respective short-term and long-term air monitoring comparison values (AMCVs), respectively, and would not be expected to cause acute or chronic adverse health effects, vegetation effects, or odor concerns.
- All 8-hour, 24-hour, and three-year average concentrations of carbonyls were below their respective short-term and long-term AMCVs, respectively, and would not be expected to cause acute or chronic adverse health effects, vegetation effects, or odor concerns.
- All hourly and three-year average concentrations of VOCs from 1-hour automated gas chromatograph (autoGC) monitoring sites were below their respective AMCVs and would not be expected to cause adverse health effects, vegetation effects, or odor concerns.
- Reported concentrations of hydrogen sulfide (H₂S) were below the numerical value of the 30-minute state standard for residential areas.
- All 24-hour and three-year average concentrations of speciated metals were below their respective short-term and long-term AMCVs and would not be expected to cause chronic adverse health effects.
 - The 2018 chromium PM_{2.5} annual average concentration was 0.0060 ppb_v at the Midlothian site, which is 1.4 times greater than the AMCV of 0.0043 ppb_v. However, the three-year chromium PM_{2.5} average (0.0028 ppb_v) is lower than the respective long-term AMCV, which is a more appropriate comparison as the long-term AMCV is a lifetime value.
- Air quality in the Barnett Shale area continues to be monitored. Detailed information is available on the TCEQ's Barnett Shale webpage.

Background

The Toxicology, Risk Assessment, and Research Division (TD) has reviewed ambient air sampling data collected from 38 network monitoring sites in TCEQ Region 4, Dallas/Fort Worth. The TD reviewed air monitoring summary results for VOCs and carbonyls from 1-hour and 24-hour samples collected continuously and every sixth-day, respectively. In addition, the TD evaluated the criteria pollutant lead from a health perspective in this memorandum. For complete lists of all chemicals evaluated, please see Lists 1 through 4 in Attachment A. Table 1 lists the

monitoring sites and provides a link to more information about the sites. A brief summary of the monitoring sites is provided below:

- 1-hour autoGC VOC monitoring at 15 sites
- Every sixth-day 24-hour canister VOC sampling at 13 sites
- Carbonyl sampling at 2 sites
 - Every sixth-day 24-hour carbonyl sampling at 1 site
 - Three 8-hour every three-days carbonyl sampling at 1 site
- H₂S sampling at 1 site
- Metals sampling at 7 sites
 - Every sixth-day 24-hour lead total suspended particle (TSP) sampling at 5 sites
 - Every third-day or sixth-day 24-hour metals PM_{2.5} sampling at 2 sites

Table 1. Monitoring Sites Located in TCEQ Region 4

Site Name and Location	County	EPA Site ID	Monitored Compounds
Arlington UT Campus , 1101 S. Pecan St.	Tarrant	48-439-1018	VOCs (autoGC)
Dallas Elm Fork , 2171 Manana Drive	Dallas	48-113-1505	VOCs (autoGC)
Dallas Hinton , ^a 1415 Hinton Street	Dallas	48-113-0069	VOCs (autoGC, 24-hour canister), Carbonyls, Metals (PM _{2.5})
Decatur Thompson , 301 E Thompson Street	Wise	48-497-0088	VOCs (autoGC)
Denton Airport South , Denton Municipal Airport	Denton	48-121-0034	VOCs (24-hour canister)
DISH Airfield , 9800 Clark Airport Road	Denton	48-121-1013	VOCs (autoGC)
Eagle Mountain Lake , 14290 Morris Dido Newark Road	Tarrant	48-439-0075	VOCs (autoGC)
Everman Johnson Park , 633 Everman Parkway	Tarrant	48-439-1009	VOCs (autoGC)
Flower Mound Shiloh , 4401 Shiloh Road	Denton	48-121-1007	VOCs (autoGC)
Fort Worth Benbrook Lake , 7001 Lakeside Drive	Tarrant	48-439-1503	VOCs (autoGC)
Fort Worth Joe B. Rushing Road , Road 2525 Joe B. Rushing Road	Tarrant	48-439-1065	VOCs (autoGC)

Site Name and Location	County	EPA Site ID	Monitored Compounds
Fort Worth Northwest , 3317 Ross Avenue	Tarrant	48-439-1002	VOCs (autoGC, 24-hour canister), Carbonyls
Frisco 5th Street , ^b 7471 South 5th Street	Collin	48-085-0003	Lead (TSP)
Frisco 7 , ^b 6931 Ash Street	Collin	48-085-0007	Lead (TSP)
Frisco Eubanks , 6601 Eubanks Street	Collin	48-085-0009	Lead (TSP)
Frisco Stonebrook , 7202 Stonebrook Parkway	Collin	48-085-0029	Lead (TSP)
Gainesville Doss Street , 1112 Doss Street	Cooke	48-097-1504	VOCs (24-hour canister)
Godley FM2331 , 12404 FM2331	Johnson	48-251-1501	VOCs (autoGC)
Grapevine Fairway , 4100 Fairway Drive	Tarrant	48-439-3009	VOCs (24-hour canister)
Greenville , 824 Sayle Street	Hunt	48-231-1006	VOCs (24-hour canister)
Italy , 900 Farm to Market Road 667	Ellis	48-139-1044	VOCs (24-hour canister)
Johnson County Luisa , 2420 Luisa Lane	Johnson	48-251-1008	VOCs (24-hour canister)
Keller , FAA Site off Alta Vista Road	Tarrant	48-439-2003	VOCs (24-hour canister)
Kennedale Treepoint Drive , 5419 Treepoint Drive	Tarrant	48-439-1062	VOCs (autoGC)
Lancaster Cedardale , 1930 Cedardale Road	Dallas	48-113-1500	VOCs (24-hour canister)
Mansfield Flying L Lane , 1310 Flying L Lane	Johnson	48-251-1063	VOCs (autoGC)
Midlothian OFW , 2725 Old Fort Worth Road	Ellis	48-139-0016	VOCs (24-hour canister), Metals (PM _{2.5}), H ₂ S

Site Name and Location	County	EPA Site ID	Monitored Compounds
Mineral Wells 23rd Street , 2000 NE 23rd Street	Palo Pinto	48-363-1502	VOCs (24-hour canister)
Rhome Seven Hills Road , 639 CR 4651	Wise	48-497-1064	VOCs (autoGC)
Terrell Temtex , ^c 2988 Temtex Boulevard	Kaufman	48-257-0020	Lead (TSP)
Weatherford Highway 180 , ^d 2253 Fort Worth Hwy	Parker	48-367-1506	VOCs (24-hour canister)

^a Prior to June 1, 2019, the Dallas Hinton carbonyl sampler collected one 24-hour sample every six days from January through May and September through December. From June through August, this sampler switched to a more intensive sampling schedule where it collected eight 3-hour samples every three days. Beginning June 1, 2019, the sampling schedule was updated, so the carbonyl sampler collects one 24-hour sample every six days from April through May and September through October. From June through August, this sampler switches to a more intensive sampling schedule where it collects three 8-hour samples every three days. No samples are collected from November through March.

^b The Frisco 7 and Frisco 5th Street monitors were decommissioned on December 31, 2018.

^c An additional collocated lead TSP sampler was added to the Terrell Temtex site on April 13, 2017.

^d The Weatherford Highway 180 monitor was deactivated on January 22, 2019 and reactivated on March 17, 2020.

The TCEQ Monitoring Division reported the data for all chemicals evaluated in this memorandum. All data (84 VOCs (canister), 48 VOCs (autoGC), 17 carbonyls, H₂S, 16 metals (PM_{2.5} or TSP)) highlighted in this evaluation met TCEQ's three-year data completeness objective of 75 percent data return except for the following:

- Arlington UT Campus (autoGC: 1,2,3-trimethylbenzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, n-decane, n-undecane)
- Dallas Hinton (autoGC: 1-pentene, 1,3-butadiene, 1,3,5-trimethylbenzene, 2-methylheptane, acetylene, cis-2-butene, isoprene, n-hexane, trans-2-pentene)
- Decatur Thompson (autoGC: 1,2,3-trimethylbenzene)
- DISH Airfield (autoGC: 1,2,3-trimethylbenzene)
- Eagle Mountain Lake (autoGC: 1,2,3-trimethylbenzene)
- Everman Johnson Park (autoGC: 1,2,3-trimethylbenzene, acetylene)
- Flower Mound Shiloh (autoGC: 1,2,3-trimethylbenzene)
- Fort Worth Benbrook Lake (autoGC: 1,2,3-trimethylbenzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, n-decane, n-undecane)
- Fort Worth Joe B. Rushing Road (autoGC: 1,2,3-trimethylbenzene, acetylene)
- Fort Worth Northwest (autoGC: 1-pentene, 1,2,3-trimethylbenzene, 1,2,4-trimethylbenzene, 1,3-butadiene, 1,3,5-trimethylbenzene, 2-methylheptane, 2-methylhexane, 2,2,4-

trimethylpentane, 2,3-dimethylpentane, 2,3,4-trimethylpentane, 2,4-dimethylpentane, 3-methylheptane, 3-methylhexane, acetylene, benzene, cis-2-butene, cis-2-pentene, cyclohexane, ethylbenzene, isoprene, isopropylbenzene, methylcyclohexane, methylcyclopentane, n-decane, n-heptane, n-hexane, n-nonane, n-octane, n-propylbenzene, o-xylene, p-xylene + m-xylene, styrene, toluene)

- Godley FM2331 (autoGC: 1,2,3-trimethylbenzene)
- Kennedale Treepoint Dr (autoGC: 1,2,3-trimethylbenzene)
- Mansfield Flying L Lane (autoGC: 1,2,3-trimethylbenzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, n-decane, n-undecane)
- Rhome Seven Hills Road (autoGC: 1,2,3-trimethylbenzene)
- Weatherford Highway 180 (canister: all VOCs)

One-hour autoGC VOC samples were compared to TCEQ's short-term AMCVs. Twenty-four-hour air samples collected every third- or sixth-day for one year are designed to provide representative long-term average concentrations. In order to be able to evaluate 24-hour monitoring data more fully, TCEQ has developed 24-hour AMCVs for specific chemicals. As such, 24-hour samples were compared to the available TCEQ 24-hour AMCVs (1,3-butadiene, 2,2-dimethylbutane, 2,3-dimethylbutane, 2-methylpentane, 3-methylpentane, benzene, ethylene dichloride, acrolein, chromium, cadmium, cobalt, crotonaldehyde, n-hexane, and formaldehyde). However, because short-term or peak concentrations are not necessarily captured by 24-hour samples, daily concentrations have limited use in evaluating the potential for acute health effects. Therefore, the TD evaluated the reported three-year average concentrations from 1-hour autoGC and 24-hour samples for each target analyte for potential chronic health and vegetation concerns by comparing measured chemical concentrations to their respective long-term AMCVs. More information about AMCVs is available on the Toxicology's [AMCV](#) webpage. H₂S samples were compared to the 30-minute state standard for H₂S.

As lead is a criteria pollutant, applicable lead TSP levels (i.e., rolling three-month averages) were compared to the appropriate comparison value (i.e., 0.15 µg/m³); however, annual average lead TSP concentrations were also evaluated since they are more representative of long-term lead exposure from a health perspective.

Evaluation

VOCs

Short-Term Data

All hourly average concentrations of the 48 VOCs reported at the 15 autoGC sites were either not detected or below their respective short-term and 24-hour AMCVs. All 24-hour average concentrations of the 84 VOCs reported at each of the 13 every sixth-day 24-hour canister monitoring sites were either not detected or below their respective short-term and 24-hour AMCVs. Therefore, acute adverse health effects, odorous conditions, or vegetation effects would not be expected to occur as a result of exposure to the reported levels of VOCs at these 15 autoGC monitoring sites.

Long-Term Data

The 2017-2019 three-year average concentrations of the 48 VOCs evaluated at the 15 autoGC monitoring sites and the 84 VOCs reported at each of the 13 every sixth-day 24-hour canister monitoring sites were well below their respective long-term AMCVs. Exposure to the reported three-year average concentrations would not be expected to cause chronic adverse health or vegetation effects.

H₂S

All reported short-term H₂S concentrations measured at the Midlothian OFW site were below the numerical value of the 30-minute state residential standard of 80 ppb.

Carbonyls

The 2017-2019 8-hour, 24-hour, and three-year average concentrations of the 17 carbonyls reported at the Fort Worth Northwest and Dallas-Hinton sites were below their respective short-term and long-term AMCVs. Exposure to the reported three-year average concentrations would not be expected to cause acute or chronic adverse health or welfare effects.

Metals

The 2017-2019 24-hour and three-year average concentrations of the 16 metals at the Dallas Hinton and the Midlothian OFW monitoring sites were below their respective short-term and long-term AMCVs. Exposures to the reported levels of these metals would not be expected to cause acute or chronic adverse health or welfare effects.

The 2018 chromium PM_{2.5} annual average concentration was 0.0060 ppb_v at the Midlothian site, which is 1.4 times greater than the AMCV of 0.0043 ppb_v. However, the three-year chromium PM_{2.5} average (0.0028 ppb_v) is lower than the respective long-term AMCV, which is a more appropriate comparison as the long-term AMCV is a lifetime value. Moreover, as previously mentioned, the long-term AMCV is based on a form of chromium (hexavalent) that generally represents only a small fraction of environmental chromium (e.g., ≈1%). Importantly, all annual averages are well below the more comparable long-term AMCV for other forms of chromium (0.14 µg/m³) and that which more reasonably assumes 1% hexavalent chromium (0.11 µg/m³), or even that which very conservatively assumes 10% hexavalent chromium (0.034 µg/m³).

Lead

On November 12, 2008, the U.S. Environmental Protection Agency (EPA) finalized the 0.15 µg/m³ NAAQS for lead based on a rolling three-month average concentration (73 Federal Register 66964). In general, the rule requires source-oriented ambient air lead monitoring at sites with actual annual lead emissions of one or more tons per year. Based on their reported emissions, two lead-acid battery recycling facilities, namely Exide Technologies, Inc. and ECS Refining Texas LLC (hereafter called Exide and ECS, respectively), were subject to these source-oriented lead monitoring requirements in TCEQ Region 4. The 2017-2019 rolling three-month averages of lead TSP at the Eubanks monitor near Exide and at the Terrell Temtex site near ECS were below the 0.15 µg/m³ lead NAAQS.

Lead TSP Monitors around Exide

The Exide facility, a secondary lead smelter, was active from 1964 through November 2012. Three lead TSP monitors (Frisco 7, Frisco Eubanks, and Frisco 5th St.) were established in mid-1990 or earlier and an additional monitor (Frisco Stonebrook) was activated on January 7, 2011. Additional details about the Exide facility and surrounding area are available through the TCEQ websites for the remediation of the [Exide site](#) and the [latest lead-related planning activities](#) in the Dallas Fort Worth area. On November 30, 2012, Exide closed its doors, and clean up and demolition began in December of the same year. The Frisco 7 and Frisco 5th Street monitors were decommissioned on December 31, 2018.

Reported Lead TSP Concentrations from Monitors around Exide

Annual average concentrations of lead TSP from Frisco 7, Frisco Eubanks, and Frisco 5th St. monitors have been fairly consistent since 1995, with some variations (annual average lead TSP for 2002-2018 can be found in Figure 1). Higher concentrations have been reported from the Frisco Eubanks monitor and lower lead TSP concentrations were reported from all other monitors. While the NAAQS for lead was lowered ten-fold in 2008 from 1.5 to 0.15 $\mu\text{g}/\text{m}^3$, the ambient lead TSP concentrations around Exide did not change significantly at that time. However, since the closure of the facility in November of 2012, lead levels at the Eubanks monitor have fallen below the 0.15 $\mu\text{g}/\text{m}^3$ NAAQS. Lead concentrations at the three additional ambient lead TSP monitors have also continued to decline since that time.

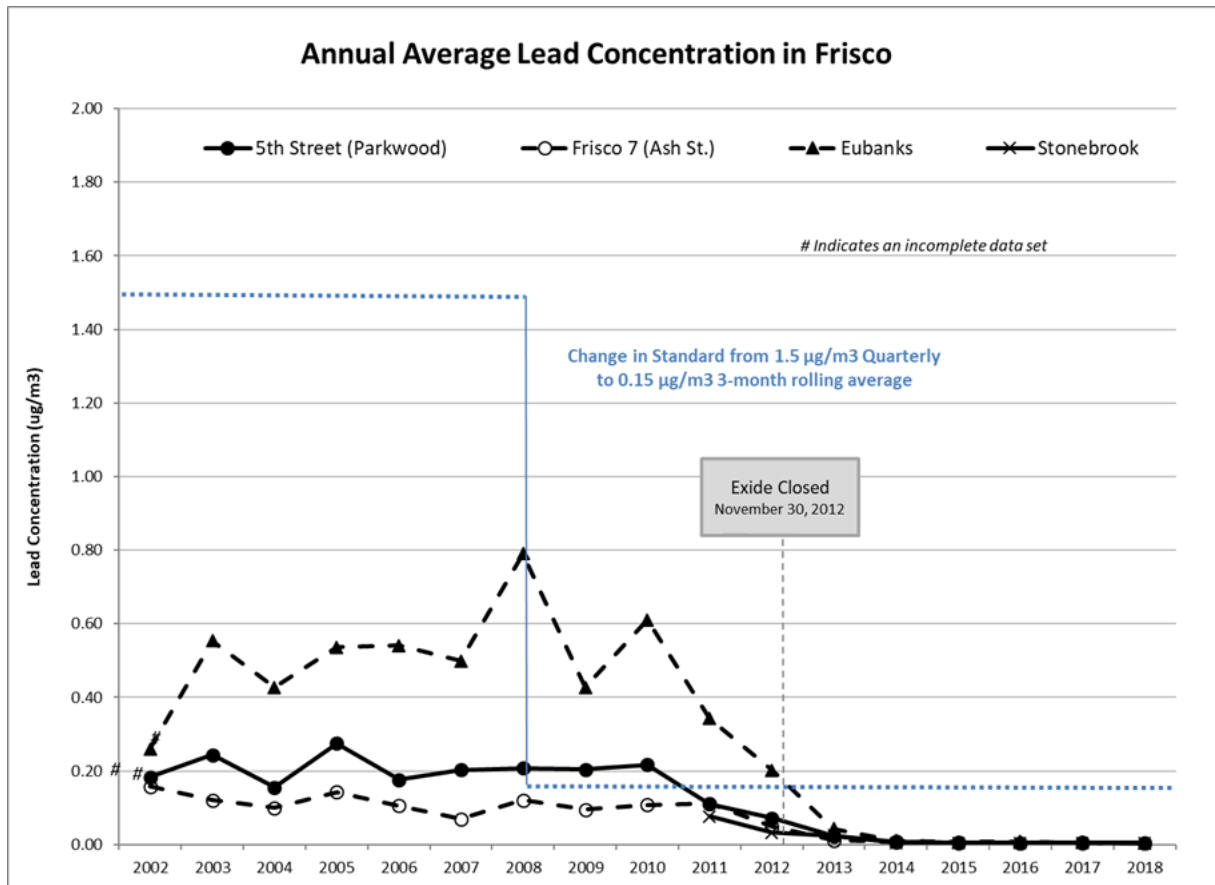


Figure 1. Annual Average Lead TSP Concentrations from Monitors around the Exide Facility from 2002 to 2018

Lead Summary

Although historical lead TSP concentrations at the Eubanks monitor near Exide exceeded the 0.15 µg/m³ NAAQS, current air monitoring data indicate that lead concentrations are well below the NAAQS at all monitor sites surrounding the former facility and that the concentrations at the Eubanks monitor are now well below the 0.15 µg/m³ NAAQS. On June 29, 2017, the U.S. EPA proposed the redesignation of the Frisco, Collin County area, as attainment for the 2008 lead NAAQS. No comments were received on the proposed redesignation, and the EPA designed the area as in attainment following the 30-day public comment period.

Investigations of Air Quality and Barnett Shale Activities

In response to concerns about air emissions from oil and gas operations in the Barnett Shale area, the TCEQ has performed extensive mobile monitoring and has significantly expanded the network of stationary samplers that measure VOCs. Based on the current complaint prioritization guidance updated on February 28, 2019, citizen complaints concerning odor from an oil or natural gas site with a TCEQ-documented odor nuisance condition in the previous 12 months will be given an “Expedited Response” priority for investigation. Complaints received that do not require dispatch of Emergency Response personnel, but that report human health effects are given an “Immediate Response” priority. For Expedited and Immediate Response complaints, an

on-site investigation is conducted by the Dallas/Fort Worth Region staff within one working day of receipt of the complaint by the regional office. All other oil and natural gas related complaints are given priority in accordance with the Field Operations Standard Operating Procedures. In addition, the Dallas/Fort Worth regional staff conducts periodic reconnaissance investigations in selected areas and the regional office also conducts monitoring, as time and resources permit, at the request of the public and other interested parties. Scheduled compliance investigations are also conducted at natural gas sites to determine compliance with applicable rules and regulations. Detailed information is available on the TCEQ's [Oil and Gas Activities](#). For specific information about the Barnett Shale Area, click on the link for [Barnett Shale Geological Area](#) under the Air Quality section.

If you have any questions regarding the contents of this review, please do not hesitate to contact Jessica Myers by phone at (512) 239-3444 or via email at Jessica.Myers@tceq.texas.gov.

Attachment A

List 1. Target VOC Analytes in Canister Samples

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

List 2. Target Carbonyl Analytes

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

List 3. Target Metal Analytes

Aluminum (PM _{2.5})	Chromium (PM _{2.5} and TSP)	Molybdenum (PM _{2.5}) ^a
Antimony (PM _{2.5})	Cobalt (PM _{2.5})	Nickel (PM _{2.5} and TSP)
Arsenic (PM _{2.5})	Copper (PM _{2.5})	Selenium (PM _{2.5})
Barium (PM _{2.5})	Lead (TSP and PM _{2.5})	Tin (PM _{2.5})
Cadmium (PM _{2.5})	Manganese (PM _{2.5})	Zinc (PM _{2.5})

List 4. Target VOC Analytes in AutoGC

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

^a Only measured at the Midlothian monitoring site