

TCEQ Interoffice Memorandum

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From: Jessica Myers, Ph.D. JM
Toxicology Division, Office of the Executive Director

Date: November 6, 2017

Subject: Toxicological Evaluation of 2016 Ambient Air Network Monitoring Data
in Region 4, Dallas/Fort Worth

Conclusions

- All 24-hour and annual 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 3-hour, 24-hour, and annual 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.
- With the exception of a single 1-hour isoprene sample, all hourly and annual average concentrations of VOCs from 1-hour automated gas chromatograph (autoGC) monitoring sites were below their respective TCEQ AMCVs and would not be expected to cause adverse health effects, vegetation effects, or odor concerns.
 - A single 1-hour isoprene concentration of 20.71 ppb_v measured at the Flower Mound autoGC monitoring site exceeded the short-term health-based AMCV of 20 ppb_v. This infrequent, low magnitude exceedance would not be expected to cause acute adverse health effects.
- Reported concentrations of hydrogen sulfide (H₂S) were below the 30-minute state standard for residential areas.
- All 24-hour and annual average concentrations of speciated metals were less than their respective TCEQ short-term and long-term AMCVs and would not be expected to cause chronic adverse health effects.
 - The Dallas Morrell area was removed from the TCEQ's Air Pollutant Watch List (APWL0401) and the monitoring site was deactivated in 2016.
- 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 Division (TD) has reviewed ambient air sampling data collected from 32 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
- Every sixth-day 24-hour carbonyl sampling at 2 sites
- Eight 3-hour sampling every three-days carbonyl at 1 site
- H₂S sampling at 1 site
- Metals sampling at 8 sites (the Dallas Morrell monitor was deactivated on 6/1/2016, so the data were included but incomplete)
 - Every sixth-day 24-hour lead TSP sampling at 6 sites (one site deactivated 12/31/2016)
 - Every sixth-day 24-hour chromium and nickel PM₁₀ sampling at 1 site (site deactivated on 6/1/2016)
 - 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}), Lead (TSP)
Dallas Morrell , ^b 3049 Morrell Street	Dallas	48-113-0018	Metals (PM ₁₀)
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)

Site Name and Location	County	EPA Site ID	Monitored Compounds
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)
Fort Worth Northwest , 3317 Ross Avenue	Tarrant	48-439-1002	VOCs (autoGC, 24-hour canister), Carbonyls
Frisco 5th Street , 7471 South 5th Street	Collin	48-085-0003	Lead (TSP)
Frisco 7 , 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)

Site Name and Location	County	EPA Site ID	Monitored Compounds
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
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 , 2988 Temtex Boulevard	Kaufman	48-257-0020	Lead (TSP)
Weatherford Highway 180 , 2253 Fort Worth Hwy	Parker	48-367-1506	VOCs (24-hour canister)

^a The Dallas Hinton metals data was collected by the U.S. EPA but issues with EPA's lab has delayed its reporting in the EPA AQS database. Lead TSP was deactivated at this site on December 31, 2016. The carbonyl sampler collects one 24-hour sample every six days from January through May and September through December. From June through August, this sampler switches to a more intensive sampling schedule where it collects eight 3-hour samples every three days.

^b The Dallas Morrell monitor was decommissioned on June 1, 2016.

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}, PM₁₀, or TSP)) highlighted in this evaluation met TCEQ's 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, acetylene, n-decane, n-undecane)
- Dallas Elm Fork (autoGC: 1,2,3-trimethylbenzene)
- Dallas Hinton (autoGC: 1,2,3-trimethylbenzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 1,3-butadiene, acetylene, cis-2-butene, n-decane, n-hexane)
- Dallas Morrell (PM₁₀ metals: nickel, chromium)
- Eagle Mountain Lake (autoGC: 1,2,3-trimethylbenzene)
- Flower Mound Shiloh (autoGC: 1,2,3-trimethylbenzene)
- Fort Worth Northwest (autoGC: 1,2,3-trimethylbenzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, acetylene, n-decane)
- Kennedale Treepoint Dr (autoGC: 1,2,3-trimethylbenzene)
- Rhome 7 Hills Road (autoGC: 1,2,3-trimethylbenzene)

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 annual 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

With the exception of a single 1-hour isoprene sample, 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. A single 1-hour isoprene concentration of 20.71 ppb_v measured at the Flower Mound autoGC monitoring site exceeded the short-term health-based AMCV of 20 ppb_v. This infrequent, low magnitude exceedance would not be expected to cause acute adverse health effects.

Long-Term Data

The 2016 annual 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 annual 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 30-minute state residential standard of 80 ppb.

Carbonyls

The 2016 3-hour, 24-hour, and annual 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 annual average concentrations would not be expected to cause acute or chronic adverse health or welfare effects.

Metals

The 2016 24-hour and annual average concentrations of the 16 metals at the Midlothian OFW and Dallas Hinton monitoring sites were well 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 Dallas Morrell site, which reported nickel and chromium concentrations, was decommissioned in June, 2016. Although the data were incomplete, the available measured concentrations of both nickel and chromium were below their respective health-based AMCVs. Nickel at the Dallas Morrell site was also removed from the TCEQ's Air Pollutant Watch List ([APWL0401](#)) in 2016.

Lead

On November 12, 2008, the U.S. Environmental Protection Agency (EPA) finalized the new 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 2016 rolling three-month averages of lead TSP at the Eubanks monitor near Exide and at the Terrell Temtex site near ECS were also below the 0.15 µg/m³ lead NAAQS. The 2016 rolling three-month averages of lead TSP at the Dallas Hinton monitor were also below the 0.15 µg/m³ lead NAAQS, and this lead TSP monitor was deactivated on December 31, 2016.

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.

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 2002-2016 can be found in Figure 2). 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, as measured by the three other ambient lead TSP monitors, have also continued to decline since that time.

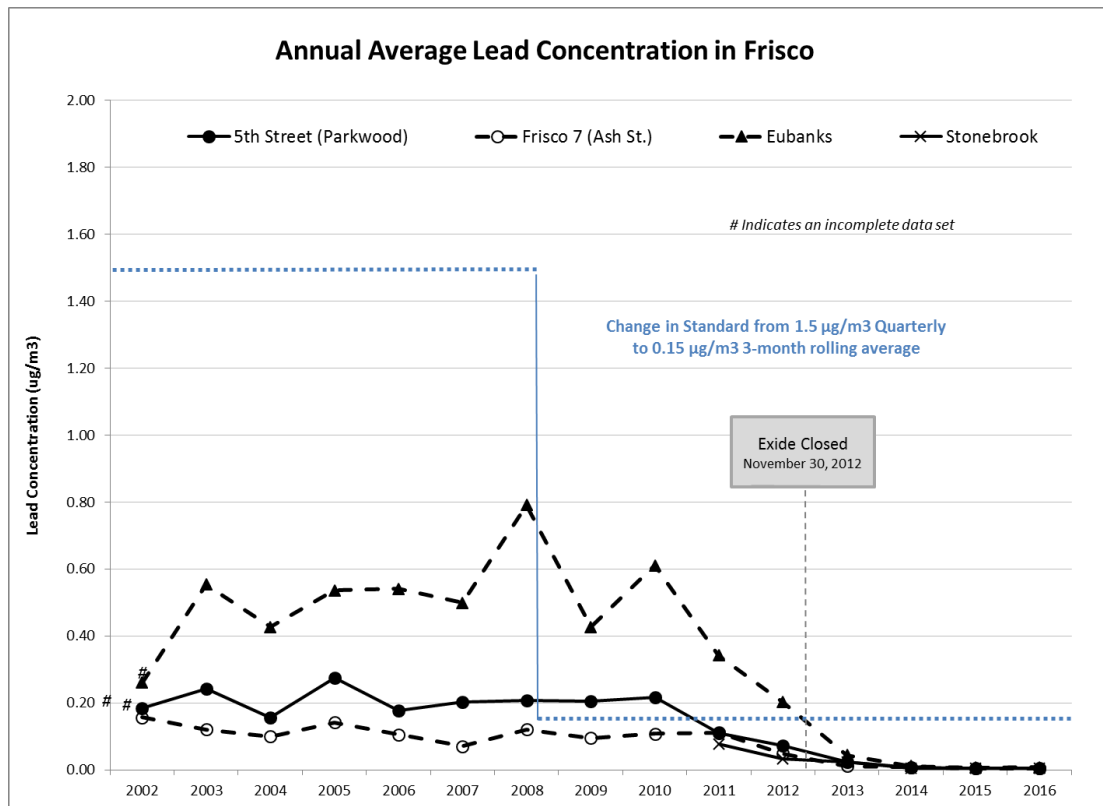


Figure 1. Annual Average Lead TSP Concentrations from Monitors around the Exide Facility from 2002 to 2016

Lead Summary

Although historical lead TSP concentrations at the Eubanks monitor near Exide exceeded the 0.15 $\mu\text{g}/\text{m}^3$ NAAQS, current air monitoring data indicate that lead concentrations are well below the NAAQS at all four monitor sites surrounding the facility and that the concentrations at the Eubanks monitor are now well below the 0.15 $\mu\text{g}/\text{m}^3$ 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.

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 December 5, 2014, 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-Trichloroethane)
1,1,2-Trichloroethane	Carbon Tetrachloride	Methylcyclohexane
1,1-Dichloroethane	Chlorobenzene	Methylcyclopentane
1,1-Dichloroethylene	Chloroform	n-Butane
1,2,3-Trimethylbenzene	Chloromethane (Methyl Chloride)	n-Decane
1,2,4-Trimethylbenzene	cis-1,3-Dichloropropene	n-Heptane
1,2-Dichloropropane	cis-2-Butene	n-Hexane
1,3,5-Trimethylbenzene	cis-2-Hexene	n-Nonane
1,3-Butadiene	cis-2-Pentene	n-Octane
1-Butene	Cyclohexane	n-Pentane
1-Hexene+2-Methyl-1-Pentene	Cyclopentane	n-Propylbenzene
1-Pentene	Cyclopentene	n-Undecane
2,2,4-Trimethylpentane	Dichlorodifluoromethane	o-Ethyltoluene
2,2-Dimethylbutane (Neohexane)	Dichloromethane (Methylene Chloride)	o-Xylene
2,3,4-Trimethylpentane	Ethane	p-Diethylbenzene
2,3-Dimethylbutane	Ethylbenzene	p-Ethyltoluene
2,3-Dimethylpentane	Ethylene	Propane
2,4-Dimethylpentane	Ethylene Dibromide (1,2-Dibromoethane)	Propylene
2-Chloropentane	Ethylene Dichloride (1,2-Dichloroethane)	Styrene
2-Methyl-2-Butene	Isobutane	Tetrachloroethylene
2-Methylheptane	Isopentane (2-Methylbutane)	Toluene
2-Methylhexane	Isoprene	trans-1-3-Dichloropropene
2-Methylpentane (Isohexane)	Isopropylbenzene (Cumene)	trans-2-Butene
3-Methyl-1-Butene	m-Diethylbenzene	trans-2-Hexene
3-Methylheptane	m-Ethyltoluene	trans-2-Pentene
3-Methylhexane	m/p Xylene	Trichloroethylene
3-Methylpentane		Trichlorofluoromethane
4-Methyl-1-Pentene		Vinyl Chloride
Acetylene		
Benzene		

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} , PM ₁₀ and TSP)	Molybdenum (PM _{2.5})
Antimony (PM _{2.5})	Cobalt (PM _{2.5})	Nickel (PM _{2.5} , PM ₁₀ 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		