TCEQ Interoffice Memorandum

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Subject: Toxicological Evaluation of 2021 Ambient Air Network Monitoring Data in Region 4, Dallas/Fort Worth

Conclusions

- All 24-hour and annual average concentrations of volatile organic compounds (VOCs) from canister monitoring sites were below their respective short-term and long-term air monitoring comparison values (AMCVs) and would not be expected to cause acute or chronic adverse health effects, vegetation effects, or odor concerns.
- All 8-hour, 24-hour, and annual average concentrations of carbonyls were below their respective short-term and long-term AMCVs and would not be expected to cause acute or chronic adverse health effects, vegetation effects, or odor concerns.
- All hourly and annual 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 (H_2S) were below the numerical value of the 30-minute state standard for residential areas.
- All 24-hour and annual 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. Additionally, rolling three-month average concentrations for lead total suspended particulate (TSP) are below the value (0.15 µg/m^3) associated with the lead National Ambient Air Quality Standard (NAAQS).

Background

The Toxicology, Risk Assessment, and Research Division (TD) has reviewed ambient air sampling data collected from 36 network monitoring sites in TCEQ Region 4, Dallas/Fort Worth. The TD reviewed air monitoring summary results for VOCs, carbonyls, speciated metals, and H2S (see bulleted list below for details). In addition, the TD evaluated the criteria pollutant lead from a health perspective. 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
    - Seasonal every sixth-day 24-hour carbonyl sampling at 1 site
    - Seasonal every sixth-day carbonyl sampling that switches to seasonal collection of three 8-hour samples every third-day carbonyl sampling at 1 site
- H_2S sampling at 1 site
- Metals sampling at 5 sites
    - Every sixth-day 24-hour lead total suspended particle (TSP) sampling at 3 sites
    - Every third-day 24-hour metals $PM_{2.5}$ sampling at 1 site
    - Every sixth-day 24-hour metals $PM_{2.5}$ sampling at 1 site

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, 2525 Joe B. Rushing Road	Tarrant	48-439-1065	VOCs (autoGC)

Site Name and Location	County	EPA Site ID	Monitored Compounds
Fort Worth Northwest, [b] 3317 Ross Avenue	Tarrant	48-439-1002	VOCs (autoGC, 24-hour canister), Carbonyls
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 FM 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_2S
Mineral Wells 23rd Street, 2000 NE 23rd Street	Palo Pinto	48-363-1502	VOCs (24-hour canister)

Site Name and Location	County	EPA Site ID	Monitored Compounds
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 Tin Top Road [c], 2753 Tin Top Road	Parker	48-367-1506	VOCs (24-hour canister)

[a] The Dallas Hinton 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. The metals sampler collects one 24-hour sample every three days.
[b] The Fort Worth Northwest carbonyl sampler collects one 24-hour sample every six days from April through October. No samples are collected from November through March. The metals sampler collects one 24-hour sample every six days.
[c] Weatherford Highway 180 was relocated in 2020 and had a subsequent name change to Weatherford Tin Top Road, the name change was updated in TAMIS on 2/22/2023.

The TCEQ Monitoring Division reported the data for all chemicals evaluated in this memorandum. All data (84 VOCs (canister), 48 VOCs (autoGC), 17 carbonyls, H_2S, 16 metals ($PM_{2.5}$ or TSP) highlighted in this evaluation met TCEQ's annual data completeness objective of 75 percent data return except for the site monitor chemicals and durations identified in Attachment B.

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. To enable evaluation of 24-hour monitoring data more fully, TCEQ 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 dibromide, ethylene dichloride, acrolein, aluminum, arsenic, chromium, cadmium, cobalt, manganese, molybdenum, nickel, vanadium, crotonaldehyde, n-hexane, and formaldehyde). 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 the annual average chemical concentrations to their respective long-term AMCVs. More information about AMCVs is available on the Toxicology's AMCV webpage. H_2S samples were compared to the numerical value of the 30-minute residential state standard for H_2S (80 ppb).

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., the level of the NAAQS, 0.15 µg/m^3); 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 monitoring sites.

Long-Term Data

The 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.

H_2S

All reported short-term H_2S concentrations measured at the Midlothian OFW site were below the numerical value of the 30-minute state residential standard of 80 ppb.

Carbonyls

The 8-hour and 24-hour concentrations of the 17 carbonyls reported at the Fort Worth Northwest and Dallas-Hinton sites were below their respective short-term AMCVs. Exposure to these concentrations would not be expected to cause acute adverse health or welfare effects. Because these data are collected seasonally, they do not meet 75% completeness for long-term comparison.

Metals

The 24-hour and annual 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. The 72 percent data completeness for all metals at the Midlothian OFW site was slightly lower than TCEQ's 75 percent data completeness objective. Exposures to the reported levels of these metals would not be expected to cause acute or chronic adverse health or welfare effects.

Lead

The U.S. Environmental Protection Agency's (EPA) National Ambient Air Quality Standard (NAAQS) for lead of 0.15 µg/m^3 is based on a rolling three-month average concentration (73

Federal Register 66964). In general, the EPA 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, 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. Although, Exide ceased operations on November 30, 2012 and ECS ceased operations in 2018, three lead (TSP) monitors are still in operation. While the maximum 2021 concentrations of lead TSP at the Terrell Temtex site (0.162 µg/m^3 at Parameter Occurrence Code [POC] 1 and 0.175 µg/m^3 at POC 2) near ECS was slightly higher than the level of the lead NAAQS (0.15 µg/m^3), the next highest values (0.0926 µg/m^3 at POC 1 and 0.0796 µg/m^3 at POC 2) were below the lead NAAQS. Moreover, the quarterly mean and annual mean values for lead at the Terrell Temtex site were lower than 0.15 µg/m^3, indicating that rolling three-month average concentrations would be below the value (0.15 µg/m^3) associated with the NAAQS. Maximum lead concentrations at other sites (e.g., Frisco monitors near Exide) were below the value (0.15 µg/m^3) associated with the NAAQS.

If you have any questions regarding the contents of this review, please do not hesitate to contact Joseph Haney by email at Joseph.Haney@tceq.texas.gov or Allison Jenkins at Allison.Jenkins@tceq.texas.gov.

Attachment A

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
Carbon Tetrachloride
Chlorobenzene
Chloroform
Chloromethane (Methyl Chloride)
cis-1,3-Dichloropropene
cis-2-Butene
cis-2-Hexene
cis-2-Pentene
Cyclohexane
Cyclopentane
Cyclopentene
Dichlorodifluoromethane
Dichloromethane (Methylene Chloride)
Ethane
Ethylbenzene
Ethylene
Ethylene Dibromide (1,2-Dibromoethane)
Ethylene Dichloride (1,2-Dichloroethane)
Isobutane
Isopentane (2-Methylbutane)
Isoprene
Isopropylbenzene (Cumene)
m-Diethylbenzene
m-Ethyltoluene
m/p Xylene
Methyl Chloroform (1,1,1-Trichloroethane)
Methylcyclohexane
Methylcyclopentane
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

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 ($PM_{2.5}$)	Molybdenum ($PM_{2.5}$) [a]
Antimony ($PM_{2.5}$)	Cobalt ($PM_{2.5}$)	Nickel ($PM_{2.5}$)
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

Attachment B

The following table identifies site monitor chemicals and durations not meeting TCEQ's data completeness objective of 75 percent data return in 2021.

AutoGC Site	Chemical	Duration
Arlington UT Campus	1,2,3-Trimethylbenzene	1 HOUR
Dallas Hinton	Isoprene	1 HOUR
Dallas Hinton	cis-2-Pentene	1 HOUR
Decatur Thompson	1,2,3-Trimethylbenzene	1 HOUR
Decatur Thompson	Acetylene	1 HOUR
DISH Airfield	1,2,3-Trimethylbenzene	1 HOUR
Eagle Mountain Lake	1,2,3-Trimethylbenzene	1 HOUR
Eagle Mountain Lake	Acetylene	1 HOUR
Everman Johnson Park	1,2,3-Trimethylbenzene	1 HOUR
Everman Johnson Park	1-Butene	1 HOUR
Flower Mound Shiloh	1,2,3-Trimethylbenzene	1 HOUR
Fort Worth Benbrook Lake	1,2,3-Trimethylbenzene	1 HOUR
Fort Worth Benbrook Lake	1-Butene	1 HOUR
Fort Worth Joe B. Rushing Road	1,2,3-Trimethylbenzene	1 HOUR
Fort Worth Northwest	1,2,4-Trimethylbenzene	1 HOUR
Fort Worth Northwest	1,3,5-Trimethylbenzene	1 HOUR
Fort Worth Northwest	Acetylene	1 HOUR
Fort Worth Northwest	Isoprene	1 HOUR
Fort Worth Northwest	n-Decane	1 HOUR
Godley FM2331	1,2,3-Trimethylbenzene	1 HOUR
Godley FM2331	1-Butene	1 HOUR
Kennedale Treepoint Drive	1,2,3-Trimethylbenzene	1 HOUR
Kennedale Treepoint Drive	Styrene	1 HOUR
Mansfield Flying L Lane	1,2,3-Trimethylbenzene	1 HOUR

Carbonyl Site	Chemical	Duration
Dallas Hinton	Propionaldehyde	24 HOURS
Fort Worth Northwest	Propionaldehyde	24 HOURS

Metals Site	Chemical	Duration
Midlothian OFW	Aluminum $PM_{2.5}$	24 HOURS
Midlothian OFW	Antimony $PM_{2.5}$	24 HOURS
Midlothian OFW	Arsenic $PM_{2.5}$	24 HOURS
Midlothian OFW	Barium $PM_{2.5}$	24 HOURS
Midlothian OFW	Cadmium $PM_{2.5}$	24 HOURS

Midlothian OFW	Chromium $PM_{2.5}$	24 HOURS
Midlothian OFW	Cobalt $PM_{2.5}$	24 HOURS
Midlothian OFW	Copper $PM_{2.5}$	24 HOURS
Midlothian OFW	Lead $PM_{2.5}$	24 HOURS
Midlothian OFW	Manganese $PM_{2.5}$	24 HOURS
Midlothian OFW	Molybdenum $PM_{2.5}$	24 HOURS
Midlothian OFW	Nickel $PM_{2.5}$	24 HOURS
Midlothian OFW	Selenium $PM_{2.5}$	24 HOURS
Midlothian OFW	Tin $PM_{2.5}$	24 HOURS
Midlothian OFW	Vanadium $PM_{2.5}$	24 HOURS
Midlothian OFW	Zinc $PM_{2.5}$	24 HOURS