TCEQ Interoffice Memorandum

To: Susan Clewis, Regional Director

From: Darrell McCant, B.S
Toxicology Division, Office of the Executive Director

Date: August 26, 2015

Subject: Health Effects Review of 2014 Ambient Air Network Monitoring Data in Region 14, Corpus Christi

Conclusions

- All hourly and annual average concentrations of volatile organic compounds (VOCs) reported at Texas Commission on Environmental Quality (TCEQ) Region 14 automated gas chromatograph (autoGC) monitoring sites and at the industry-sponsored monitoring sites were below their 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 24-hour and annual average concentrations of VOCs from canister samples were below their respective TCEQ AMCVs and would not be expected to cause acute or chronic adverse health effects, vegetation effects, or odor concerns.
- All 24-hour annual average concentrations of speciated metals were below their respective comparison value and would not be expected to cause chronic adverse health effects or vegetation effects.

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 14, Corpus Christi during 2014. Historically, this memorandum has evaluated data from the TCEQ and Corpus Christi Air Quality Project (CCAQP) sites, of which the continuous measurements are reported to the TCEQ on a regular basis. For this memorandum, 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 it in our evaluation, as detailed below.

The TD has reviewed ambient air sampling data collected from a total of 19 monitoring sites in TCEQ Region 14, Corpus Christi. From the TCEQ sites, the TD reviewed summary results for volatile organic compounds (VOCs) from 24-hour every sixth-day canister samples, 1-hour automated gas chromatography (autoGC) VOC samples, 20-minute event-triggered VOC samples, and 24-hour metals samples from filters designed to collect particulate matter with an aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$). Except for lead, data for criteria pollutants

(i.e., compounds having National Ambient Air Quality Standards) were not evaluated for this memorandum.

This memorandum conveys the TD's evaluation of ambient air sampling measurements from:

- 24-hour canister VOC sampling at:
  - 3 TCEQ sites
  - 5 the Corpus Christi Industrial Monitoring Network Air Quality Program (CCNET) sites
  - 5 Formosa Plastics Corporation sites
- 24-hour $PM_{2.5}$ metals sampling at:
  - 1 TCEQ site
- 1-hour autoGC VOC sampling at:
  - 1 TCEQ site
  - 2 CCAQP sites
  - 1 CCNET site (benzene only)
- Event-triggered VOC sampling at:
  - 4 CCAQP sites (20-minute)

Table 1 lists the sampling locations and provides links to more information on the TCEQ and CCAQP sites. Lists of target analytes at these monitoring locations are also included in Attachment A. Figure 1 is a map indicating the specific locations of the TCEQ, CCAQP, and CCNET air monitoring sites in Corpus Christi, TX. Figure 2 is a map indicating the specific locations of the Formosa Plastic Corporation air monitoring sites in Point Comfort, Texas. For additional information on event-triggered VOC canister sampling data from the CCAQP network, please see http://www.utexas.edu/research/ceer/ccaqp/canister_data.htm.

For the short-term health and welfare evaluations, the TD compared the hourly measured concentrations of the VOCs collected from autoGC sites to their respective short-term air monitoring comparison values (AMCVs). Twenty-four-hour air samples, collected every sixth-day for a 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 for 1,3-butadiene and benzene. 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 acute health effects. The annual averages from 1-hour autoGC and 24-hour samples (VOCs 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). More information about AMCVs is available online at: https://www.tceq.texas.gov/toxicology/AirToxics.html#list.

All data collected at TCEQ monitors are analyzed by the TCEQ laboratory and met a 75% data completeness objective, including the CCAQP autoGC data.

Evaluation

Short-Term (Hourly, 24-hour, and Event-Triggered) Data

VOCs

The reported hourly average concentrations of each of the 46 VOCs reviewed from CCAQP (Oak Park and Solar Estates) and the TCEQ (Corpus Christi Palm) autoGC monitoring sites, as well as benzene from the CCNET (Corpus Christi Huisache) autoGC monitoring site, were below their respective short-term AMCVs. Similarly, all 24-hour canister VOC concentrations were below respective odor thresholds. The reported 24-hour benzene and 1,3-butadiene concentrations from CCAQP, TCEQ, CCNET, and Formosa Plastics Corporation sponsored monitoring networks were below TCEQ's 24-hour AMCVs for benzene and 1,3-butadiene. The reported 20-minute VOC concentrations from CCAQP event-triggered canisters were also below TCEQ's respective acute AMCVs. Therefore, acute adverse health or vegetation effects and odor nuisances are not expected to occur as a result of short-term exposure to the reported levels of these chemicals.

Long-Term Data

VOCs

The TD evaluated the reported annual average concentrations for each targeted VOC for potential chronic health and vegetation concerns by comparing the measured chemical concentrations to their respective long-term AMCVs. Annual average concentrations of 46 VOCs at the Oak Park and the Solar Estates CCAQP autoGC monitoring sites and annual average concentrations of 46 VOCs at the Palm TCEQ autoGC monitoring site were reported to be below their respective long-term AMCVs. The reported annual average concentrations of the 84 VOCs evaluated at the TCEQ canister monitoring sites (i.e., Corpus Christi Huisache, Corpus Christi Hillcrest, and Dona Park) were also below their respective long-term AMCVs. The reported annual average concentrations of the five VOCs evaluated at the Formosa Plastics Corporation monitoring sites and the 17 VOCs evaluated at CCNET monitoring sites were below their respective long-term AMCVs. Exposure to these reported concentrations would not be expected to result in long-term adverse health or vegetation effects.

Metals

All annual average $PM_{2.5}$ metals concentrations collected at the Corpus Christi Dona Park monitoring site were below their respective comparison values. Exposure to these reported concentrations would not be expected to result in long-term adverse health effects.

If you have any questions regarding this memorandum, please contact Darrell McCant (512-239-4477) by phone or by email at Darrell.McCant@tceq.texas.gov.

Table 1: Air Monitoring Sites in Region 14, Corpus Christi

Site Name and Location	EPA Site ID	Network	County	Monitored Compounds
Corpus Christi Hillcrest 1802 Nueces Bay Blvd	48-355-0029	TCEQ	Nueces	VOCs (every 6th-day 24-hr canister)
Corpus Christi Huisache 3810 Huisache St	48-355-0032	TCEQ/CCNET[1]	Nueces	VOCs (every 6th-day 24-hr canister);VOC (autoGC, benzene)
Dona Park 5707 Up River Rd	48-355-0034	TCEQ/CCAQP[2]	Nueces	VOCs (every 6th-day 24-hr canister); Metals (every 6th-day 24-hr $PM_{2.5}$); VOCs (20-min event-triggered canister)
Corpus Christi Palm 1511 Palm Drive	48-355-0083	TCEQ	Nueces	VOCs (autoGC)
Crossley Elementary School (CC01) (27.80118, -97.41633)	N/A	CCNET	Nueces	VOCs (split schedule[3] 24-hr canister)
FHR Easement 8401B Up River Road	48-355-0039	CCAQP	Nueces	VOCs (20-min event-triggered canister)
J.I Hailey Site 2702B East Navigation Blvd	48-355-0037	CCAQP	Nueces	VOCs (20-min event-triggered canister)
Oak Park 842 Erwin St	48-355-0035	CCAQP	Nueces	VOCs (autoGC)
Oak Park Elementary School (CC02) (27.79940, -97.43255)	N/A	CCNET	Nueces	VOCs (split schedule 24-hr canister)
Port Grain Elevator 2001B East Navigation Blvd	48-355-0036	CCAQP	Nueces	VOCs (20-min event-triggered canister)
Point Comfort Park Site (28.68183, -96.56072)	N/A	Formosa Plastics Corporation	Calhoun	VOCs (every 6th-day 24-hr canister)

[1] CCNET – Corpus Christi Industrial Monitoring Network Air Quality Program
[2] CCAQP – Corpus Christi Air Quality Project

Site Name and Location	EPA Site ID	Network	County	Monitored Compounds
Point Comfort City Hall Site (28.67776, -96.55440)	N/A	Formosa Plastics Corporation	Calhoun	VOCs (every 6th-day 24-hr canister)
Point Comfort School Site (28.67806, -96.55776)	N/A	Formosa Plastics Corporation	Calhoun	VOCs (every 6th-day 24-hr canister)
Point Comfort Plant Site (28.68161, -96.55162)	N/A	Formosa Plastics Corporation	Calhoun	VOCs (every 2nd-day 24-hr canister)
Point Comfort North Site (28.71832, -96.55507)	N/A	Formosa Plastics Corporation	Calhoun	VOCs (once a month)
Solar Estates 9122 Leopard St	48-355-0041	CCAQP	Nueces	VOCs (autoGC)
Tuloso-Midway Middle School (KH01) (27.83317, -97.55750)	N/A	CCNET	Nueces	VOCs (split schedule 24-hr canister)
Tuloso-Midway Elementary School (KH02) (27.82167, -97.52500)	N/A	CCNET	Nueces	VOCs (split schedule 24-hr canister)
Up River Road (CC03) (27.80883, -97.47533)	N/A	CCNET	Nueces	VOCs (split schedule 24-hr canister)

Attachment A

List 1. Target VOC Analytes in TCEQ and/or Industrial Canister sites (Formosa Plastics Corporation and CCNET,

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

[1] Formosa Plastics Corporation Target Analytes
[2] CCNET Target Analytes (Methyl t-Butylether and Naphthalene are CCNET only)

List 2. Target Metal Analytes

Aluminum ($PM_{2.5}$)	Chromium ($PM_{2.5}$)	Molybdenum ($PM_{2.5}$)
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 ($PM_{2.5}$,)	Tin ($PM_{2.5}$)
Cadmium ($PM_{2.5}$)	Manganese ($PM_{2.5,}$)	Zinc ($PM_{2.5}$)

List 3. Target Analytes: 46 VOCs at AutoGC sites and 52 VOCs at Event-Trigger sites

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

[1] AutoGCs only.
[2] Only Target Analyte at the CCNET - Huisache autoGC
[3] Only in Event-Trigger Canisters

Figure 1: Air Monitor Locations in the Corpus Christi Bay Area, Nueces County, Texas

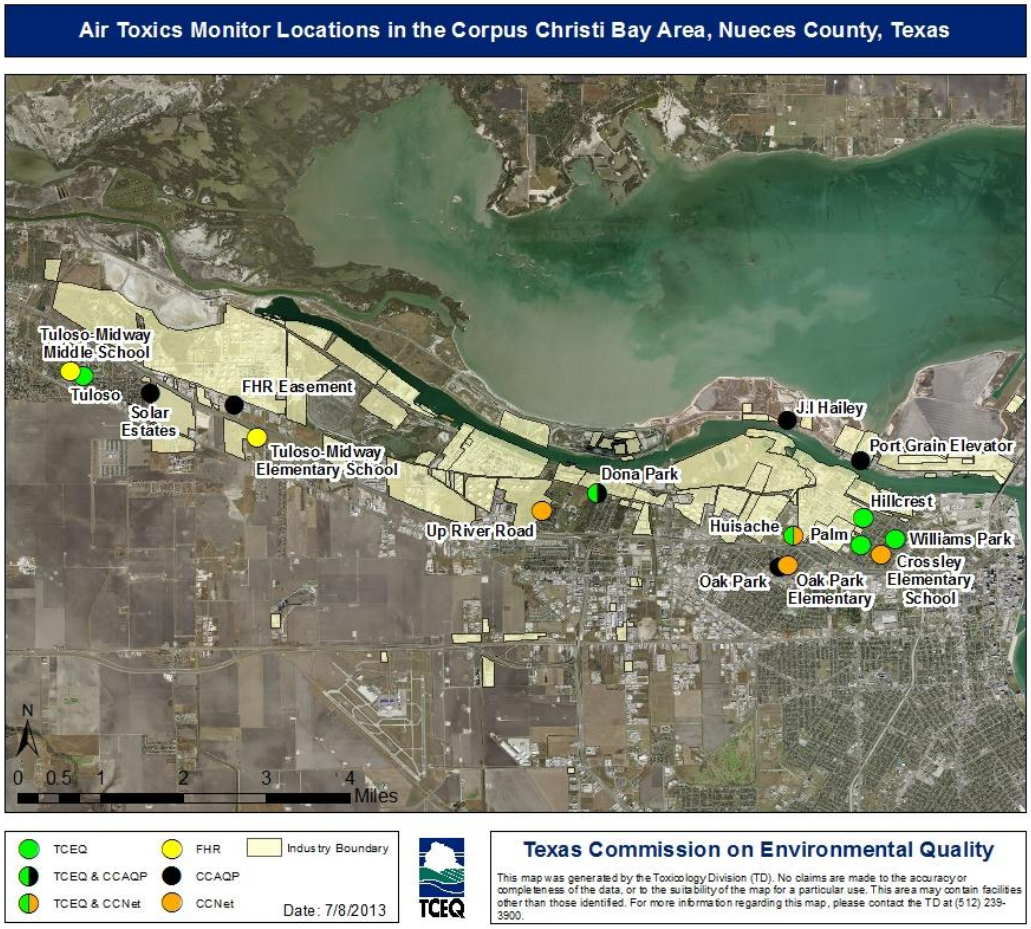

Figure 2: Industry-Sponsored Air Toxics Monitoring Locations in Point Comfort, Calhoun County, Texas