

Texas Commission on Environmental Quality

INTEROFFICE MEMORANDUM

To: Susan Clewis, Director, Region 14 – Corpus Christi **Date:** July 3, 2007
David Turner, Air Section Manager, Region 14 –
Corpus Christi
David Bower, Coastal Texas Area Director

From: Vincent Leopold, Toxicology Section, Chief Engineer's Office

Subject: Health Effects Review of Air Monitoring Data Collected in TCEQ Region 14
Corpus Christi during 2006

CONCLUSIONS

- Concentrations of volatile organic compounds (VOCs) and metals monitored at TCEQ and Corpus Christi Air Quality Project sites in 2006 are not expected to cause adverse health effects.
- Potentially-odorous VOC concentrations were measured in four short-term samples collected along the Corpus Christi Ship Channel Inner Harbor.

BACKGROUND

This memorandum conveys my evaluation of ambient air pollutant concentrations measured at TCEQ and [Corpus Christi Air Quality Project \(CCAQP\)](#) monitoring sites in TCEQ Region 14–Corpus Christi during 2006. [Figure 1](#) shows the location of these monitoring sites, and [Table 1](#) lists the sites and provides links to additional site information. I reviewed short-term and annual average concentrations for VOCs and metals. Short-term data was collected from hourly automated gas chromatograph (autoGC) VOC samples, 20-minute and 1-hour canister VOC samples, 24-hour canister VOC samples, and metals speciated from 24-hour PM_{2.5} filter samples. Annual average concentrations were calculated from every-sixth-day 24-hour VOC and metal data. These monitoring results included 14 metals and up to 95 VOCs depending on the sampling method. Target analytes are listed in [Table 2](#).

Measured 20-minute and 1-hour concentrations were compared to short-term [Effects Screening Levels \(ESLs\)](#). Measured 24-hour concentrations were also compared to short-term ESLs although they are primarily used to calculate annual averages. Annual average concentrations were compared to long-term ESLs. All VOC data evaluated in this memorandum exceeded a 75 percent data completeness objective, which is expected to provide sufficiently-representative annual average VOC concentrations. However, metals data were 63 percent complete and may be more limited in their representation of annual average levels.

EVALUATION

Long-term Concentrations

Calculated from 24-hour samples, the annual average concentrations of all 95 VOCs and all 15 PM_{2.5} metals were below their long-term ESLs except benzene at the Huisache site.

All annual average concentrations, including benzene, would not be expected to cause chronic health effects. Benzene is discussed further below.

The 2006 annual average benzene concentration at Huisache was 1.57 ppbv based on every-sixth-day sampling. A co-located industry-sponsored autoGC, which is expected to provide a more representative annual average because of its continuous sampling schedule, reported an annual average of 1.4 ppbv benzene. These benzene levels continued a four-year downward trend shown in [Figure 2](#). The 2006 benzene averages at Huisache (1.57 and 1.4 ppbv) are above the long-term ESL. Given the local meteorology and proximity of the Huisache monitor to industrial sources of benzene, it is expected that these sources would have less influence on benzene concentrations in communities to the east, south and west of the Huisache site. Annual average benzene levels at other TCEQ sites included 0.49 ppbv at Hillcrest and 0.43 ppbv at Dona Park, while the CCAQP reported 0.37 ppbv at Solar Estates and 0.69 ppbv at Oak Park. Benzene levels at these four sites are less than the long-term ESL of 1 ppbv and not expected to cause adverse health effects.

Short-term Concentrations

Hourly concentrations of all 46 VOCs monitored at the Solar Estates and Oak Park autoGCs would not be expected to cause adverse health effects or odors. In the short-term triggered samples collected by the CCAQP, concentrations of all 54 VOCs would not be expected to cause health effects or odors except the following potentially-odorous VOC concentrations which were measured in four 20-minute samples:

- 145 ppbv 2-methylpentane at the J.I. Hailey site exceeded the 83 ppbv odor-based ESL
- 15 ppbv isoprene at the West End Inner Harbor site exceeded the 5 ppbv odor-based ESL
- 31 ppbv 1-pentene at the West End Inner Harbor site exceeded the 30 ppbv odor-based ESL
- 76 ppbv isoprene at the West End Inner Harbor site exceeded the 5 ppbv odor-based ESL

Although these concentrations would not be expected to cause direct adverse health effects such as respiratory irritation, some people would be expected to detect odors if exposed to these VOC levels.

All 24-hour VOC and metal concentrations were below levels that would cause acute health effects or odors.

Please contact me at 512-239-1784 if you have any questions regarding this memorandum.

cc (via e-mail):

Casso, Ruben – EPA Region 6, Dallas

Prosperie, Susan – Department of State Health Services

Table 1. TCEQ and CCAQP Air Monitoring Sites With Pollutant Measurements Evaluated in this Memorandum			
Site	City, County	Monitor ID	Monitored Chemicals
<u>Huisache</u> <u>3810 Huisache St</u>	Corpus Christi, Nueces County	483550032	VOCs (every-6 th -day 24-hr canister)
<u>Hillcrest</u> <u>1802 Nueces Bay Blvd</u>		483550029	VOCs (every-6 th -day 24-hr canister)
<u>Dona Park</u> <u>5707 Up River Rd</u>		483550034	VOCs (every-6 th -day 24-hr canister) VOCs (triggered short-term canister) Metals (every-6 th -day 24-hr PM _{2.5})
<u>Solar Estates</u> <u>9122 Leopard St</u>		483550041	VOCs (hourly autoGC) VOCs (triggered short-term canister)
<u>Oak Park</u> <u>842 Erwin St</u>		483550035	VOCs (hourly autoGC) VOCs (triggered short-term canister)
<u>“Port Grain Elevator”</u> <u>2001B E Navigation Blvd</u>		483550036	VOCs (triggered short-term canister)
<u>J.I. Hailey</u> <u>2702B E Navigation Blvd</u>		483550037	VOCs (triggered short-term canister)
<u>West End Inner Harbor</u> <u>3149B Suntide Rd</u>		483550038	VOCs (triggered short-term canister)
<u>FHR Easement Off Up</u> <u>River Rd</u> <u>8401B Up River Rd</u>		483550039	VOCs (triggered short-term canister)

Table 2. Target Analytes			
95 VOCs (canister samples)		46 VOCs (autoGC)	14 Metals (PM_{2.5})
1,1,1-Trichloroethane	Cyclopentane*	1,2,3-Trimethylbenzene	Aluminum
1,1,2,2-tetrachloroethane	Cyclopentene*	1,2,4-Trimethylbenzene	Antimony
1,1,2-Trichloroethane	Dichlorodifluoromethane	1,3,5-Trimethylbenzene	Arsenic
1,1-Dichloroethane	Ethane*	1,3-Butadiene	Barium
1,1-Dichloroethylene	Ethyl Acetate	1-Butene	Cadmium
1,2,3-Trimethylbenzene	Ethyl Benzene*	1-Pentene	Chromium
1,2,4-Trimethylbenzene*	Ethylene*	2,2,4-Trimethylpentane	Cobalt
1,2-Dibromoethane	Isobutane*	2,2-Dimethylbutane	Copper
1,2-Dichloroethane	Isobutyraldehyde	2,3,4-Trimethylpentane	Manganese
1,2-Dichloropropane	Isopentane*	2,3-Dimethylpentane	Molybdenum
1,3,5-Trimethylbenzene*	Isoprene*	2,4-Dimethylpentane	Nickel
1,3-Butadiene*	Isopropylbenzene*	2-Methylheptane	Selenium
1-Butene*	m-Diethylbenzene	2-Methylhexane	Tin
1-Hexene+2-methyl-1-pentene*	Methyl Butyl Ketone (MBK)	3-Methylheptane	Zinc
1-Pentene*	Methyl chloride	3-Methylhexane	
2,2,4-Trimethylpentane*	Methyl t-Butyl Ether	Acetylene	
2,2-Dimethylbutane (Neohexane)*	Methylcyclohexane*	Benzene	
2,3,4-Trimethylpentane*	Methylcyclopentane*	c-2-Butene	
2,3-Dimethylbutane*	Methylene Chloride	c-2-Pentene	
2,3-Dimethylpentane*	Methylisobutylketone	Cyclohexane	
2,4-Dimethylpentane*	m-Ethyltoluene	Cyclopentane	
2-Butanone	n-Butane*	Ethane	
2-Chloropentane	n-Decane	Ethyl Benzene	
2-Methyl-2-Butene*	n-Heptane*	Ethylene	
2-Methyl-3-Hexanone	n-Hexane*	Isobutane	
2-Methylheptane*	n-Nonane*	Isopentane	
2-Methylhexane*	n-Octane*	Isoprene	
2-Methylpentane (Isohexane)*	n-Pentane*	Isopropylbenzene	
3-Hexanone	n-Propyl Acetate	Methylcyclohexane	
3-Methyl-1-Butene*	n-Propylbenzene*	Methylcyclopentane	
3-Methylheptane*	n-Undecane	n-Butane	
3-Methylhexane*	o-Ethyltoluene	n-Decane	
3-Methylpentane*	o-Xylene*	n-Heptane	
3-pentanone	p-Diethylbenzene	n-Hexane	
4-Methyl-1-Pentene*	p-Ethyltoluene	n-Nonane	
Acetylene*	Propane*	n-Octane	
Benzene*	Propylene*	n-Pentane	
Bromomethane	p-Xylene + m-Xylene*	n-Propylbenzene	
Butyl Acetate	Styrene*	o-Xylene	
c-1,3-Dichloropropylene	t-2-Butene*	Propane	
c-2-Butene*	t-2-Hexene*	Propylene	
c-2-Hexene*	t-2-Pentene*	p-Xylene + m-Xylene	
c-2-Pentene*	Tetrachloroethylene (Perc)	Styrene	
Carbon Tetrachloride	Toluene*	t-2-Butene	
Chlorobenzene	trans-1-3-dichloropropylene	t-2-Pentene	
Chloroform	Trichloroethylene	Toluene	
Cyclohexane*	Trichlorofluoromethane		
	Vinyl Chloride		
* 54 VOCs were reported for CCAQP canisters; all 95 VOCs were reported for TCEQ canisters.			

Figure 1. Map of TCEQ (white) and CCAQP (black) Sites Which Provided Air Pollutant Measurements for this Evaluation.

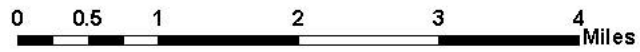
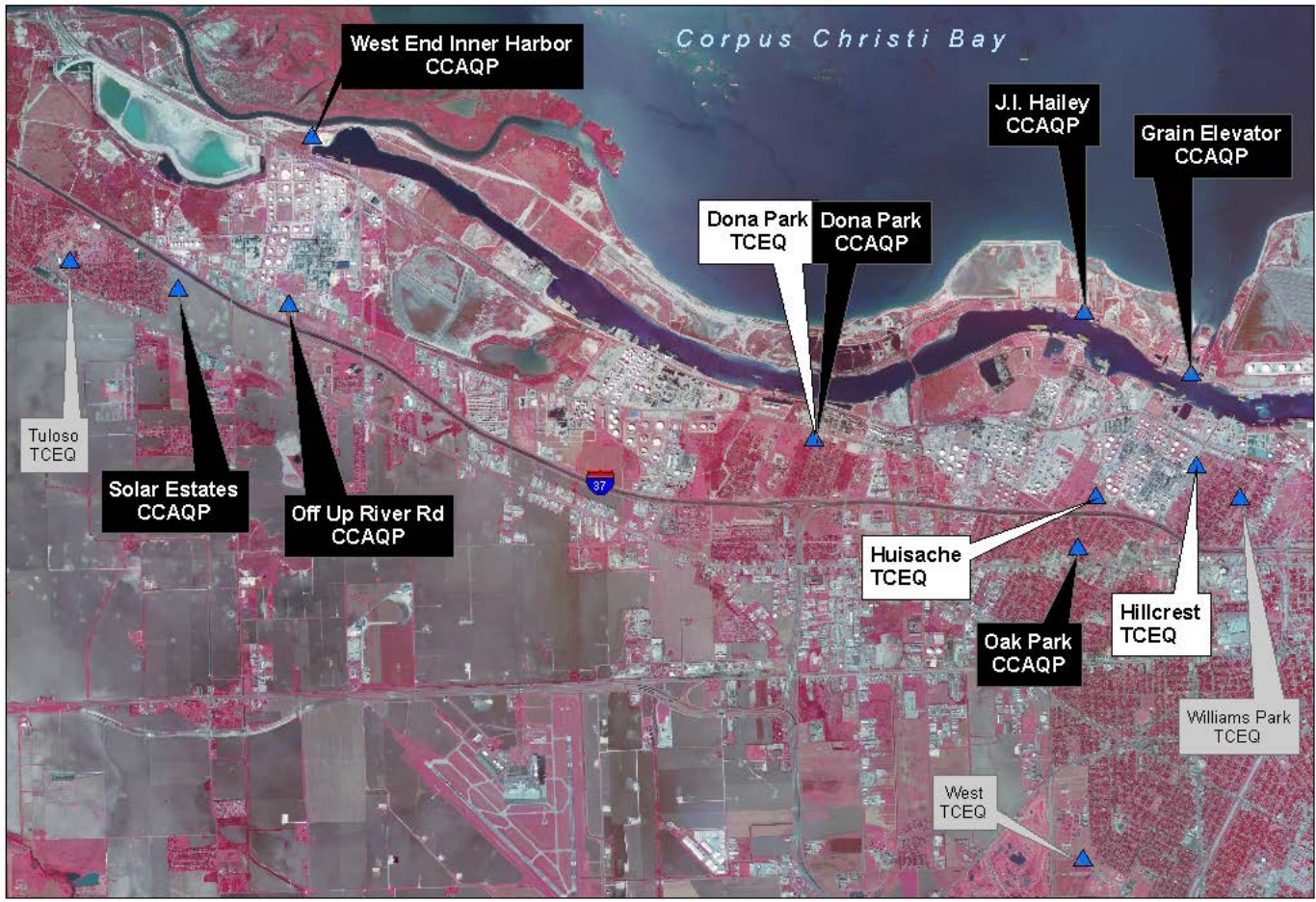


Figure 2. Benzene Annual Average Trends at Corpus Christi Air Monitoring Sites.

