

Texas Commission on Environmental Quality

INTEROFFICE MEMORANDUM

To: Susan Clewis, Regional Director, R14
David Turner, Air Section Manager, R14
David Bower, Coastal Texas Area Director

Date: October 16, 2008

From: Neeraja K. Erraguntla, Ph.D.
Toxicology Section, Chief Engineer's Office

Subject: Health Effects Review of the 2007 Ambient Air Network Monitoring Sites in Region 14
– Corpus Christi

Key Findings

- Long-term exposures to the reported annual average concentrations of 95 volatile organic compounds (VOCs) and 14 metals (measured as particulate matter less than 2.5 microns in diameter, PM_{2.5}) monitored at Texas Commission on Environmental Quality (TCEQ) and Corpus Christi Air Quality Project (CCAQP) sites in 2007 are not expected to cause chronic adverse health effects.
- Short-term exposures to the reported hourly concentrations of 46 VOCs from the automated gas chromatographs (autoGCs) are not expected to cause short-term adverse health effects.
- Reported short-term benzene levels measured at the J. I. Hailey and the Port Grain Elevator monitoring sites through the CCAQP exceeded the TCEQ's short-term health-based comparison value of 180 ppb_v. The weight of scientific evidence indicates that short-term exposures to the measured benzene levels would not be expected to cause adverse health effects. However, frequent short-term exposures to the highest reported concentrations or exposure to higher concentrations would reduce the margin of safety afforded by the comparison values.
- Potentially-odorous VOC concentrations were measured in short-term samples collected through the CCAQP. Exposure to the reported odorous compounds is not expected to cause short-term health effects such as respiratory irritation. However, some people would be expected to experience odor related health effects such as headaches if exposed to these levels.

Background

This memorandum conveys the Toxicology Section's (TS) evaluation of ambient air sampling measured at TCEQ and [Corpus Christi Air Quality Project \(CCAQP\)](#) monitoring sites in TCEQ Region 14-Corpus Christi during 2007. Table 1 lists the sites and provides links to additional site information. Target analytes are listed in Table 2. The short-term data included hourly VOC data from autoGCs, 20-minute and 1-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, and autoGC data. These monitoring results included 14 metals and up to 95 VOCs depending on the sampling method. Figure 1 is a depiction of the annual averages levels of benzene at TCEQ and CCAQP monitoring sites in Corpus Christi. Figure 2 is a map of TCEQ and CCAQP Sites which provided ambient air measurements for this evaluation.

Measured short-term and annual averages were compared to appropriate comparison values. All VOC and metals data evaluated in this memorandum exceeded a 75 percent data completeness objective, which is expected to provide sufficiently-representative annual average VOC concentrations. The 2007 CCAQP data do not meet the TCEQ's 75 percent data completeness objective. The TS, will therefore evaluate the CCAQP data only from a short-term health perspective.

Because 24-hour air samples are designed to provide representative long-term average concentrations,

annual averages from 24-hour samples were evaluated for potential chronic health concerns. Short-term or peak concentrations are not captured by 24-hour samples; therefore, daily maximum concentrations have limited use in evaluating the potential for acute health effects.

Table 1. TCEQ and CCAQP Air Monitoring Sites in Corpus Christi, Nueces County			
Site	Monitor ID	TCEQ/CCAQP Monitoring Sites	Monitored Chemicals
Huisache 3810 Huisache St	48-355-0032	TCEQ	VOCs (every-6 th -day 24-hr canister)
Hillcrest 1802 Nueces Bay Blvd	48-355-0029	TCEQ	VOCs (every-6 th -day 24-hr canister)
Dona Park 5707 Up River Rd	48-355-0034	TCEQ	VOCs (every-6 th -day 24-hr canister) Metals (every-6 th -day 24-hr PM _{2.5})
Solar Estates 9122 Leopard St	48-355-0041	CCAQP	VOCs (hourly autoGC)
Oak Park 842 Erwin St	48-355-0035	CCAQP	VOCs (hourly autoGC)
Port Grain Elevator 2001B E Navigation Blvd	48-355-0036	CCAQP	VOCs (triggered short-term canister)
J.I. Hailey 2702B E Navigation Blvd	48-355-0037	CCAQP	VOCs (triggered short-term canister)
West End Inner Harbor 3149B Suntide Rd	48-355-0038	CCAQP	VOCs (triggered short-term canister)
FHR Easement Off Up River Rd 8401B Up River Rd	48-355-0039	CCAQP	VOCs (triggered short-term canister)

EVALUATION

Short-term Concentrations

Hourly concentrations of all 46 VOCs monitored at the Solar Estates and Oak Park autoGCs were less than their appropriate comparison values and would not be expected to cause short-term adverse health effects or odors. Reported concentrations of all VOCs except for benzene at two of the CCAQP sites (i.e., J. I. Hailey site and the Port Grain Elevator site) and a few VOCs (i.e., toluene, 2-methylpentane, isoprene, 2-methyl-1-pentene, 2-methyl-2-butene, isopentane, and 1-pentene) at the J. I. Hailey site were below their respective health-based comparison values. Benzene and the above mentioned VOCs that exceeded their respective odor-based comparison values are discussed below.

Benzene at the J.I. Hailey and Port Grain Elevator Monitoring Sites

At the J. I. Hailey monitoring site, two of the reported concentrations of benzene exceeded benzene's appropriate comparison value of 180 ppb_v (maximum concentration of 407.3 ppb_v). At the Port Grain Elevator monitoring site, one reported concentration exceeded benzene's appropriate comparison value of 180 ppb_v (maximum concentration of 196 ppb_v). Although the weight of scientific evidence indicates that short-term exposures to these measured benzene levels would not be expected to cause adverse health effects, frequent short-term exposures to the highest reported concentrations or exposure to higher concentrations would reduce the margin of safety afforded by the comparison values.

VOCs Exceeding Odor-Based Values at the J.I Hailey Monitoring Site

In the short-term triggered samples collected by the CCAQP at the J. I. Hailey monitoring site, a few VOCs (i.e., toluene, 2-methylpentane, isoprene, 2-methyl-1-pentene, 2-methyl-2-butene, isopentane, and 1-pentene) exceeded their respective odor-based appropriate comparison values but not their respective health-based comparison values. Short-term exposures to the reported concentrations of the VOCs that exceeded their respective odor-based comparison levels would not be expected to cause direct short-term adverse health effects such as respiratory irritation. However, exposure to the concentrations would be expected to be odorous to some people. Exposure to certain odors can cause odor-related health effects such as headaches in some people. Exposure to the reported concentrations of all VOCs from the CCAQP monitoring sites would not be expected to cause short-term health effects.

Long-term Concentrations

The annual average concentrations of all 95 VOCs and all 14 PM_{2.5} metals were at or below their appropriate comparison values. Exposure to the reported annual average concentrations of all the VOCs and metals would not be expected to cause chronic health effects. Benzene levels at the Huisache site have historically been of interest and are discussed below.

The Huisache monitoring site is no longer considered to be located in a residential area as it was when it was first established in 1998. With the exception of one residential lot, which the TS understands is vacant; the former neighborhood surrounding the Huisache monitoring site is now industrial property. Therefore, the benzene levels described for the Huisache site do not reflect community air quality, but are included in this evaluation primarily to provide continuity of air quality evaluation provided for this site. The 2007 annual average benzene concentration at Huisache was 1.4 ppb_v and was based on every-sixth-day sampling. The benzene levels continued a six-year downward trend and are shown in Figure 1. 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 that are farther away from the Huisache site. Annual average benzene levels at other TCEQ sites included 0.85 ppb_v at Hillcrest and 0.34 ppb_v at Dona Park, while the CCAQP reported 0.32 ppb_v at Solar Estates and 0.61 ppb_v at Oak Park. Annual average benzene levels at these five sites are less than or are at the TCEQ's long-term appropriate comparison value of 1.4 ppb_v and are not expected to cause long-term adverse health effects.

Information on the appropriate comparison values can be obtained by contacting the TS (512-239-1795). If you have any questions regarding this memorandum, please do not hesitate to contact me at 512-239-2492 or email me at nerragun@tceq.state.tx.us.

cc: (via email)

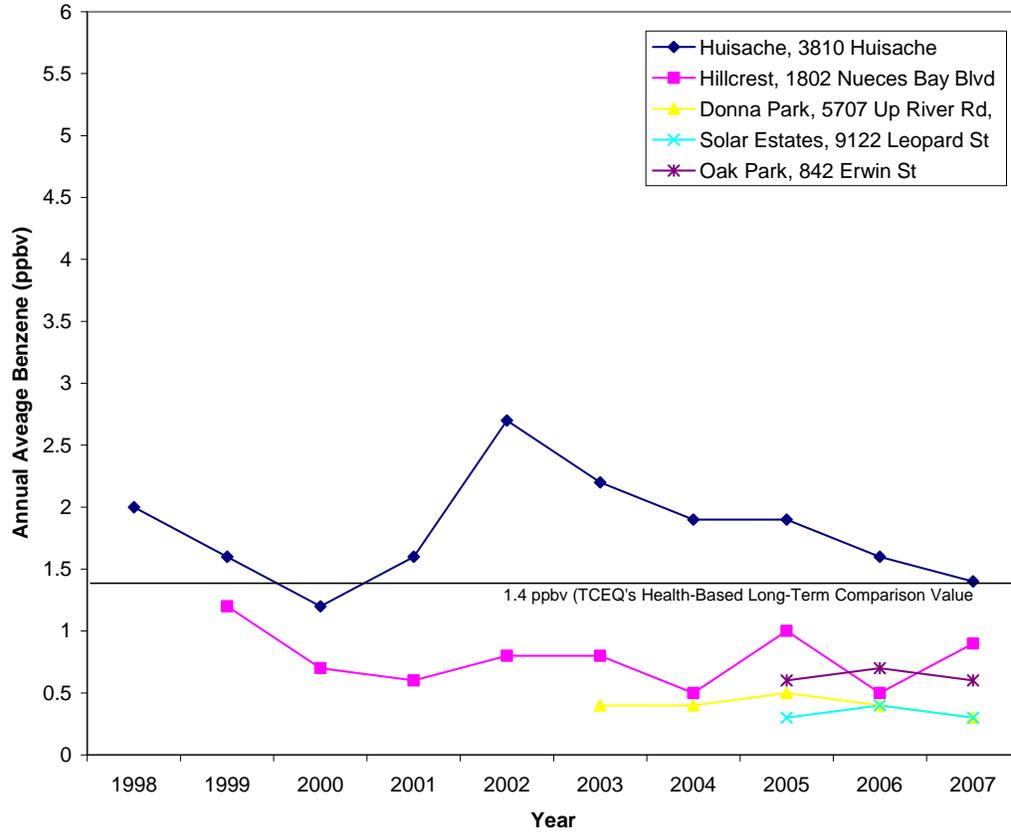
Casso, Ruben- EPA Region 6, Dallas

Prosperie, Susan- Department of State Health Services

Table 2. Target Analytes

95 VOCs (canister samples)		46 VOCs (canister samples)	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-	t-2-Pentene	
Chloroform	Dichloropropylene	Toluene	
Cyclohexane	Trichloroethylene		
	Trichlorofluoromethane		
	Vinyl Chloride		

Figure1: Annual Average Benzene Levels (ppbv) at TCEQ Air Toxics Monitoring Sites in Corpus Christi



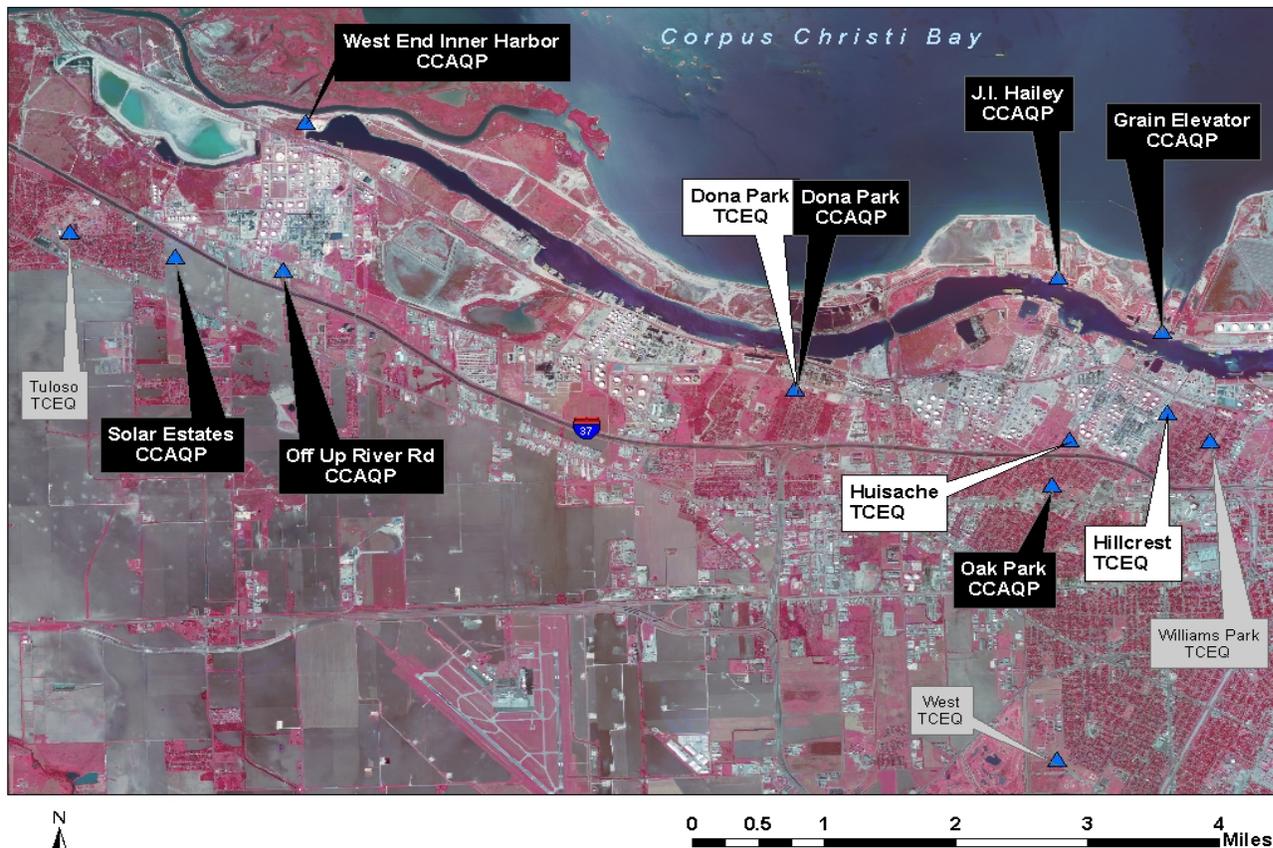


Figure 2: Map of TCEQ (white) and CCAQP (black) Sites Which Provided Ambient Air Measurements for this Evaluation.