

# TCEQ Interoffice Memorandum

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**To:** Susan Clewis, Regional Director  
David Kennebeck, Air Section Manager  
Donna Phillips, Coastal and East Texas Area Director

**From:** Neeraja Erraguntla, Ph.D.  
Toxicology Division, Chief Engineer's Office

**Date:** March 24, 2011 *N.K.E*

**Subject:** Health Effects Review of 2009 Ambient Air Network Monitoring Data in Region 14, Corpus Christi

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## Conclusions

- The reported annual average concentrations of 84 volatile organic compounds (VOCs) measured in 24-hour canisters collected every sixth day, and 14 metals measured in particulate matter with an aerodynamic diameter of 2.5 microns or less (PM<sub>2.5</sub>) at Texas Commission on Environmental Quality (TCEQ) monitoring sites in 2009 were either not detected or were below their respective long-term air monitoring comparison values (AMCVs). These reported concentrations would not be expected to cause chronic adverse health or vegetative effects.
- Reported annual average concentrations of 46 VOCs from the automated gas chromatographs (autoGC) at the Corpus Christi Air Quality Project (CCAQP) monitoring sites were below their long-term AMCVs and would not be expected to cause chronic adverse health effects or vegetative effects.
- The reported hourly concentrations of VOCs from the autoGCs at the CCAQP sites would not be expected to cause short-term adverse health, nuisance odor concerns, or vegetative effects.
- The reported annual average benzene concentration at the Huisache monitor (1.33 ppb<sub>v</sub>) was slightly below the TCEQ's long-term AMCV of 1.4 ppb<sub>v</sub> and is not expected to cause adverse health or vegetative effects. Given the historical benzene concentrations at the site, TD's further investigation concluded that potential sources would have less influence on benzene concentrations in communities to the east, south, and west of the Huisache site. In addition, benzene levels at the other monitors closer to and within the community were reported well below the benzene long-term AMCV. However, the Toxicology Division (TD) recommends continued efforts to control and/or reduce benzene emissions in areas that potentially impact the Huisache monitor.

## Background

This memorandum conveys the TD's evaluation of ambient air sampling measurements from TCEQ's Community Air Toxics Monitoring Network (CATMN) sites and CCAQP monitoring

sites in Corpus Christi, Texas. Table 1 lists the sampling locations and provides a link to more information on the sites. Figure 2 in Attachment A is a map indicating the specific locations of the TCEQ and CCAQP air monitoring sites. The list of target analytes at these monitoring locations is also included in Attachment A.

From the TCEQ monitoring sites, the TD reviewed air monitoring summary results for 84 VOCs from three 24-hour every sixth-day canister samplers and 14 speciated metals (as PM<sub>2.5</sub>) from 24-hour filter samples collected every sixth day. All VOC and PM<sub>2.5</sub> data evaluated from the TCEQ monitoring sites met TCEQ's 75 percent annual data completeness objective; therefore, annual averages of these data are considered representative of long-term exposure. Because 24-hour air samples are designed to provide representative long-term average concentrations, annual averages from 24-hour samples were only evaluated for potential chronic health and welfare 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.

In addition to data collected at the TCEQ sites, the TD also reviewed air monitoring data for 46 VOCs from hourly samples collected by the autoGCs in the CCAQP network. Because of the shorter duration of samples from the CCAQP network (i.e., one hour or 20 minutes); the TD was able to evaluate the individual samples from a short-term health and welfare perspective. The VOC data from the two autoGCs in the CCAQP network also met the TCEQ data completeness objective of 75 percent, so the TD evaluated annual averages of the chemicals from the autoGCs from a long-term health and welfare perspective. The 2009 CCAQP data from the event-triggered canisters did not meet the TCEQ's 75 percent data completeness objective. Therefore, data from the event-triggered canisters were not evaluated from a long-term perspective.

For the health and welfare evaluation, the TD compared the measured hourly concentrations of each of the 46 VOCs from the two autoGC sites and the 20-minute concentrations of VOCs from the event-triggered canisters to their respective short-term AMCVs. The TD compared the annual averages of the hourly concentrations for the 46 VOCs from the two autoGC sites and the annual average concentrations of the 84 VOCs and the 14 speciated metals from the TCEQ monitoring sites to their respective long-term AMCVs. More information about AMCVs is available online at: <http://www.tceq.state.tx.us/implementation/tox/AirToxics.html#amecv>.

**Table 1. TCEQ and CCAQP Air Monitoring Sites in Region 14, Corpus Christi**

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

## Evaluation

### Short-Term Data

Measured hourly concentrations of each of the 46 VOCs reviewed from both the CCAQP autoGC monitoring sites (i.e., Oak Park and Solar Estates) were below their respective short-term AMCVs. Therefore, acute adverse health effects, odors, or vegetative effects are not expected to occur as a result of exposure to the reported levels of these chemicals at the Oak Park and Solar Estates monitoring sites.

While the CCAQP triggered sample sites are more representative of industrial property and do not reflect community air quality, they are included in this evaluation primarily to provide continuity of air quality evaluation. Short-term exposures to the reported concentrations of the all VOCs at the CCAQP triggered sample sites would not be expected to cause short-term adverse health effects.

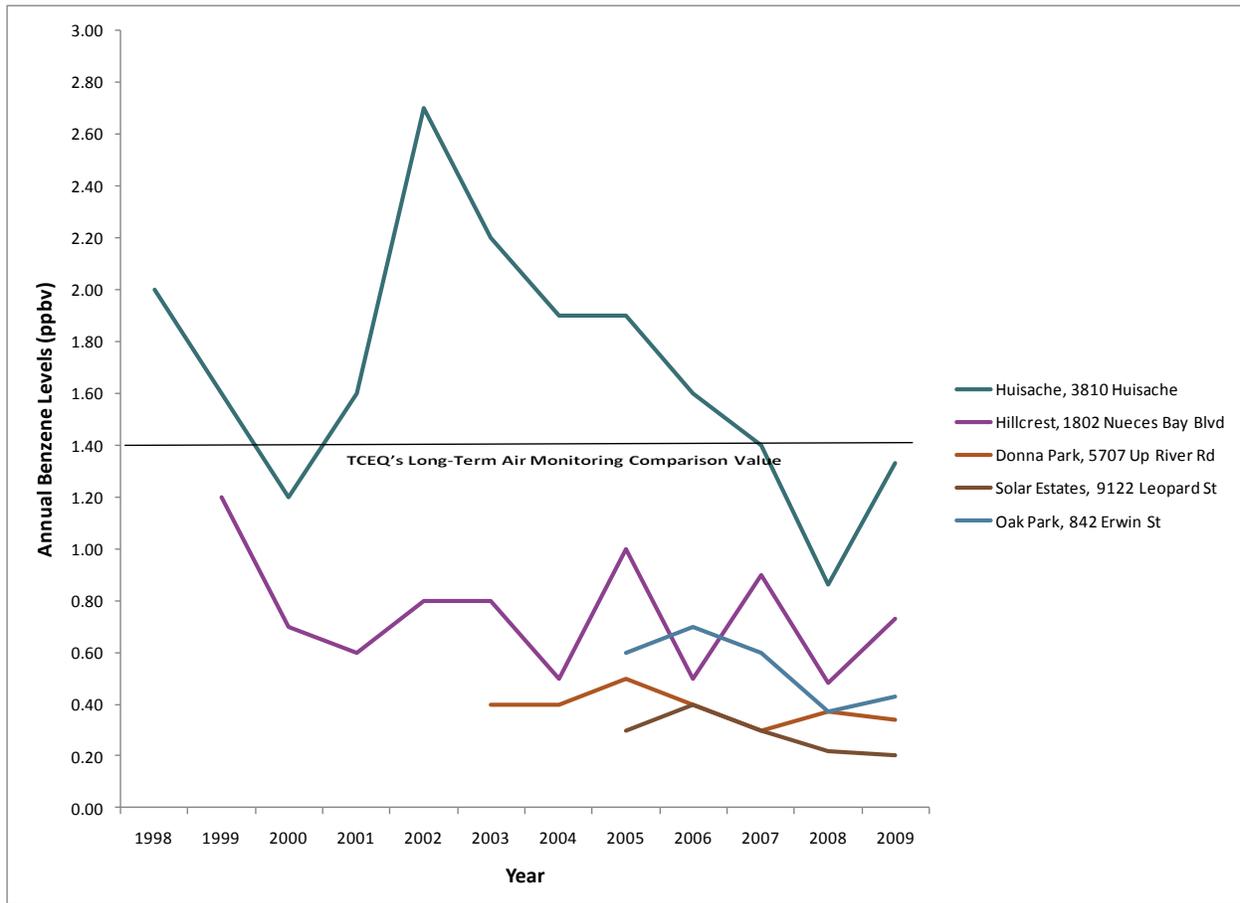
### Long-Term Data

The 2009 annual average concentrations of the 46 VOCs evaluated at the Oak Park and Solar Estates monitoring sites and annual average concentrations of the 84 VOCs evaluated at the TCEQ canister monitoring sites were well below their respective long-term AMCVs, except for benzene at the TCEQ Huisache monitoring site which was slightly below its long-term AMCV and is discussed below in more detail.

The 12-month average concentrations of the 14 metals were reported well below their respective long-term AMCVs. Exposures to the reported VOC and metal levels would not be expected to result in long-term adverse health or vegetative effects.

#### *Benzene concentrations at the Huisache monitor*

The reported annual average benzene concentration at the Huisache monitor (1.33 ppb<sub>v</sub>) was slightly below the TCEQ's long-term AMCV of 1.4 ppb<sub>v</sub> and would not be expected to cause adverse health effects (Figure 1). However, given historical benzene concentrations the TD conducted further investigation of the wind patterns. Wind patterns at the Huisache monitor from 2005 through 2010 and predominant wind direction at the Huisache monitor was southeasterly and away from the nearby neighborhood. Given the local meteorology and proximity of the Huisache monitor to industrial sources of benzene, it is expected that the sources that impact this monitor would have less influence on benzene concentrations in communities to the east, south and west of the Huisache site. Indeed, annual average benzene levels at other TCEQ sites showed lower benzene concentrations than those at the Huisache site (0.73 ppb<sub>v</sub> at Hillcrest, 0.34 ppb<sub>v</sub> at Dona Park, 0.20 ppb<sub>v</sub> at Solar Estates, and 0.43 ppb<sub>v</sub> at Oak Park). However, the TD recommends a continued effort to control and/or reduce benzene emissions in the areas that potentially impact the Huisache monitoring site.



**Figure 1. Annual Average Benzene Levels at TCEQ and CCAQP Air Toxics Monitoring Sites in Corpus Christi, Texas, 1998-2009**

## Regional Information

The regional office has and continues to play a pro-active role in reducing and maintaining reduced benzene levels. The regional staff has a heightened awareness to any regulatory matters involving benzene. Their primary mechanism for addressing these matters is through both scheduled and reactive compliance investigations which include hand held sampling and monitoring equipment. In addition, they participate in combined cooperative and constructive efforts with local community and industry representatives through a monthly forum which actively focuses on the potential sources and reductions of localized benzene emissions.

If you have any questions regarding the contents of this review, please do not hesitate to contact me at (512) 239-2492 or via email at [neeraja.erraguntla@tceq.texas.gov](mailto:neeraja.erraguntla@tceq.texas.gov).

cc (via email): Casso, Ruben- EPA Region 6, Dallas; Prosperie, Susan- Department of State Health Services

## Attachment A

### List 1. Target VOC Analytes in Canister Samples

1,1,1-Trichloroethane	3-Methylhexane	Methylcyclopentane
1,1,2,2-Tetrachloroethane	3-Methylpentane	Methylene Chloride
1,1,2-Trichloroethane	4-Methyl-1-Pentene	m-Ethyltoluene
1,1-Dichloroethane	Acetylene	n-Butane
1,1-Dichloroethylene	Benzene	n-Decane
1,2,3-Trimethylbenzene	Bromomethane	n-Heptane
1,2,4-Trimethylbenzene	c-1,3-Dichloropropylene	n-Hexane
1,2-Dibromoethane	c-2-Butene	n-Nonane
1,2-Dichloroethane	c-2-Hexene	n-Octane
1,2-Dichloropropane	c-2-Pentene	n-Pentane
1,3,5-Trimethylbenzene	Carbon Tetrachloride	n-Propylbenzene
1,3-Butadiene	Chlorobenzene	n-Undecane
1-Butene	Chloroform	o-Ethyltoluene
1-Hexene + 2-Methyl-1-Pentene	Cyclohexane	o-Xylene
1-Pentene	Cyclopentane	p-Diethylbenzene
2,2,4-Trimethylpentane	Cyclopentene	p-Ethyltoluene
2,2-Dimethylbutane - Neohexane	Dichlorodifluoromethane	Propane
2,3,4-Trimethylpentane	Ethane	Propylene
2,3-Dimethylbutane	Ethyl Benzene	Styrene
2,3-Dimethylpentane	Ethylene	t-1,3-Dichloropropylene
2,4-Dimethylpentane	Isobutane	t-2-Butene
2-Chloropentane	Isopentane	t-2-Hexene
2-Methyl-2-Butene	Isoprene	t-2-Pentene
2-Methylheptane	Isopropylbenzene	Tetrachloroethylene
2-Methylhexane	m & p-Xylene	Toluene
2-Methylpentane - Isohexane	m-Diethylbenzene	Trichloroethylene
3-Methyl-1-Butene	Methyl Chloride	Trichlorofluoromethane
3-Methylheptane	Methylcyclohexane	Vinyl Chloride

### List 2. Target Metal Analytes

Aluminum (PM <sub>2.5</sub> )	Chromium (PM <sub>2.5</sub> )	Nickel (PM <sub>2.5</sub> )
Antimony (PM <sub>2.5</sub> )	Cobalt (PM <sub>2.5</sub> )	Selenium (PM <sub>2.5</sub> )
Arsenic (PM <sub>2.5</sub> )	Copper (PM <sub>2.5</sub> )	Tin (PM <sub>2.5</sub> )
Barium (PM <sub>2.5</sub> )	Manganese (PM <sub>2.5</sub> )	Zinc (PM <sub>2.5</sub> )
Cadmium (PM <sub>2.5</sub> )	Molybdenum (PM <sub>2.5</sub> )	

**List 3. Target VOC Analytes in AutoGC**

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



**Figure 2. TCEQ and CCAQP Air Monitor Locations in the Corpus Christi Bay Area, Nueces County, Texas**