# **Texas Commission on Environmental Quality**

INTEROFFICE MEMORANDUM

То:	Georgie Volz, Regional Director Stuart Mueller, Air Section Manager TCEQ Region-10 Beaumont	Date:	December 22, 2005	
From:	Darrell D. McCant, Toxicology Section, Chief Engineer Office			
Subject:	Health Effects Review of 2004 Data Colle Monitoring Sites in Region 10-Beaumont	ected from	Ambient Air Network	

#### Conclusions

- Annual average concentrations for 94 of 96 volatile organic compounds (VOCs) and 16 metals from particulate matter less than 2.5 microns in diameter ( $PM_{2.5}$ ) were monitored at levels below health-based screening values, and would not be expected to cause adverse health effects
- Annual benzene levels exceeded both the long-term ESL and the target risk goal set by Toxicology Section (TS) at two of the nine VOC monitoring sites which monitor for 96 VOCs in Region 10 (Beaumont, City Service Center and Carroll Street Park). These benzene levels are not expected to cause immediate adverse health effects. However, because benzene is a known human carcinogen and the reported annual levels exceed our target risk goal these areas will remain on TCEQ's Air Pollutant Watch List (APWL), and TS will encourage efforts to reduce benzene emission in these areas.
- The annual 1,3-butadiene level did not exceed the long-term ESL, but did exceed the target risk goal of the TS at the Port Neches, 1225 Merriman Street site. It is noted that the Port Neches monitoring site has reported a downward trend from 1996 to 2004, but TS would like to see further reductions. Therefore, TS has placed 1,3-butadiene on the APWL and continues to encourage efforts to reduce its emissions in the area near the monitor.

## **Background Information**

This memorandum conveys the TS evaluation of ambient air sampling conducted at 11 monitoring sites in Region 10-Beaumont that reported summary results for 96 different VOCs and 16 species of metals ( $PM_{2.5}$ ) to TCEQ during 2004. The target analytes are listed in Table 1 and the monitoring sites are summarized in Table 2. The VOC data were obtained from eight Community Air Toxics Monitoring Network (CATMN) sites that collected 24-hour canister samples every sixth day and one automated gas chromatography (AutoGC) site that collected 1-hour samples continuously. The 24-hour canister samples are designed to provide representative long-term average concentrations and therefore, have limited use in evaluating the potential for acute health effects or odors. However, the Region's single 1-hour AutoGC sampling site (Port Arthur, Jefferson County Airport) reported area specific data adequate for providing short-term or peak concentrations that could be evaluated for the potential to cause acute adverse health

Georgie Volz, Stuart Mueller, Page 2 December 22, 2005

effects. In addition, annual averages from both 24- and 1-hour samples were evaluated for potential chronic health concern.

CATMN VOC		AutoGC VOC		Metals (PM <sub>2.5</sub> )
1,1,1-Trichloroethane	Ethyl Benzene	1,2,3-Trimethylbenzene	n-Heptane	Aluminum
1.1.2.2-		1.2.4-Trimethylbenzene	n-Hexane	Antimony
Tetrachloroethane	Ethylene	1.3.5-Trimethylbenzene	n-Nonane	Arsenic
1.1.2-Trichloroethane	Isobutane	1.3-Butadiene	n-Octane	Barium
1.1-Dichloroethylene	Isopentane	1-Butene	n-Pentane	Bervllium
1.2.3-	Isoprene	1-Hexene	n-Propylbenzene	Cadmium
Trimethylbenzene	Isopropylbenzene	1-Pentene	n-Undecane	Chromium
1,2,4-	Methyl Butyl Ketone	2,2,4-Trimethylpentane	o-Ethyltoluene	Cobalt
Trimethylbenzene	(MBK)	2,2-Dimethylbutane	o-Xylene	Copper
1,2-Dibromoethane	Methyl t-Butyl ether	2,3,4-Trimethylpentane	p-Diethylbenzene	Lead*
1,2-Dichloroethane	Methylcyclonexane	2,3-Dimethylbutane	p-Ethyltoluene	Manganese
1,2-Dichloropropane	Methylcyclopentane	2,3-Dimethylpentane	p-Xylene + m-Xylene	Molybdenum
1,3,5-	Methylene Chloride	2.4-Dimethylpentane	t-2-Butene	Nickel
Trimethylbenzene	Des a su s	2-Methyl-1-Pentene	t-2-Hexene	Selenium
1,3-Butadiene	Propane	2-Methyl-2-Butene	t 2 Dentena	Tin
1-Butene	Propylene	2-Methylheptane	t-2-Pentene	Zinc
1-Hexene+2-methyl-	Styrene	2-Methylhexane		
1-pentene	Letrachloroethylene	2-Methylpentane		*Lead is a criteria
1-Pentene	Perchloroethylene	3-Methyl-1-Butene		pollutant with a
2,2,4-	Trichlangethedene	3-Methyl-1-		corresponding
Trimethylpentane	Trichloroethylene	Butene+Cyclopentene		NAAOS and was not
2,2-Dimethylbutane -		3-Methylheptane		evaluated in this
Neohexane	Vinyl Chloride	3-Methylhexane		memorandum.
2,3,4-	c-2-Butene	3-Methylpentane		
Trimethylpentane	c-2-Hexene	4-Methyl-1-Pentene		
2,3-Dimethylbutane	c-2-Pentene	Acetylene		
2,3-Dimethylpentane	La hastanal da hasda	Benzene		
2,4-Dimethylpentane	Isobutyraldenyde	Cyclohexane		
2-Butanone	m-Dietnyibenzene	Cyclopentane		
2-Chloropentane	m-Ethyltoluene	Cyclopentene		
2-Methyl-2-Butene	n Butana	Ethane		
2-Methylheptane		Ethyl Benzene		
2-Methylhexane	n Hontono	Ethylene		
2-Methylpentane -	n Hayana	Isobutane		
Isohexane	n Nonane	Isobutene		
2-Methyl-3-Hexanone	n Octane	Isopentane		
3-Methyl-1-Butene	n Pentane	Isoprene		
3-Methylheptane	n-Propyl Acetate	Isopropyl Benzene - Cumene		
3-Methylhexane	n Propylhenzene	Methylcyclohexane		
3-Methylpentane	n-Undecane	Methylcyclopentane		
3-Hexanone	o-Ethyltoluene	Propane		
3-Pentanone	o-Xylene	Propylene		
4-Methyl-1-Pentene	n-Diethylbenzene	Styrene		
Acetylene	p-Ethyltoluene	Toluene		
Benzene	p-Xylene + $m$ -Xylene	a-Pinene		
Bromomethane	t-2-Butene	b-Pinene		
Butyl Acetate	t-2-Hexene	c-2-Butene		
Butyraldehyde	t-2-Pentene	c-2-Hexene		
cis 1,3-	trans-1-3-Dichloropropylene	c-2-Pentene		
Dichloropropylene	r a c c c c c c c c c c c c c c c c c c	m-Diethylbenzene		
Carbon Tetrachloride		m-Ethyltoluene		
Chlorobenzene		n-Butane		
Chloroform		n-Decane		
Chloroprene				
Cyclohexane				
Cyclopentane				
Cyclopentene				
Etnane				
Ethyl Acetate	1		1	

## Table 1: VOCs, PAHs, and Metals (PM<sub>2.5</sub>)

Georgie Volz, Stuart Mueller, Page 3 December 22, 2005

All measured VOCs and speciated metals (see Table 1), except for lead were compared to TCEQ health-based effects screening levels (ESLs). An ESL is a guideline concentration which is protective of the general public including sensitive members of the population, such as the elderly, children, and persons with pre-existing health conditions. Health-based ESLs are guideline comparison levels set well below levels at with adverse health effects have been reported in the scientific literature. If an air concentration of a pollutant is above the health-based ESL, it is not indicative that adverse effects will necessarily occur, but rather, that further evaluation may be warranted. This memorandum contains the evaluation of air monitoring data on a chemical-by-chemical basis. Generally, TCEQ requires a 75 percent data return for air monitoring data as a data completeness objective. All VOC data highlighted in this memorandum met the data completeness objective.

<u>County</u>	City and Site Location	EPA Site ID	Monitored Compounds
	Beaumont, Lamar University	482450009	VOCs
	Beaumont, Wheatley	482450011	VOCs
	Co-located	482459011	
	<u>Groves, 3355 Grandview</u> Avenue & 32 <sup>nd</sup> Street	482450014	VOCs
Jefferson	Port Neches, 1225 Merriman Street	482450017	VOCs
	Port Arthur, Jefferson County Airport	482450018	VOCs (AutoGC)
	Beaumont, City Service Center	482450019	VOCs
	Beaumont, Carroll Street Park	482450020	VOCs
	Hamshire, 12552 2 <sup>nd</sup> Street	482450022	Metals (PM <sub>2.5</sub> )
Orange	West Orange, Police Station	483611001	VOCs
	Port Arthur, Mauriceville	483611100	Metals (PM <sub>2.5</sub> )

Table 2: Region 10 Monitoring Sites Evaluated 2004

## Evaluation

## VOCs

## One-Hour

The annual one-hour average concentrations for all 68 VOCs at the Port Arthur, Jefferson Airport AutoGC site were either less than their respective method detection limits or long-term ESLs, and therefore do not present a health concern. The one-hour samples usually provide information about short-term and peak concentrations, which are used to assess the potential for acute health effects and odors. None of the 6,288 to 7,135 hours of AutoGC data reported peak concentrations above levels that would be consider a health or odor concern.

## 24-Hour

The annual 24-hour average concentration for all 96 VOCs at the eight CATMN sites, with the exception of benzene levels at the City Service Center and the Carroll Street Park sites, were either less than their respective method detection limits or their long-term ESLs. Therefore, these concentrations are not a health concern. However, because 24-hour composite samples do

Georgie Volz, Stuart Mueller, Page 4 December 22, 2005

not provide information about short-term and peak concentrations, potential for acute health effects and odor could not be fully evaluated. Additionally, reported annual 1,3-butadiene levels at the Port Neches, 1225 Merriman Street site warranted further discussion. Both benzene and 1,3-butadiene concentrations are discussed below.

#### Benzene

## City Service Center and Carroll Street Park

The annual average benzene concentrations at both the Carroll Street Park and the City Service Center CATMN sites were 1.3 and 1.2 part per billion by volume (ppbv), respectively. These annual benzene concentrations exceeded the long-term ESL for benzene (1 ppbv) and are above the target risk goal of the TS which is 1 in 10,000 (10<sup>-5</sup>). It is noted that these reported annual averages are within the acceptable risk range of 1 in 10,000 to 1 in 1 million (10<sup>-4</sup> to 10<sup>-6</sup>) as defined by the U.S. Environmental Protection Agency (U.S.EPA) and that the reported averages are considered typical of urban areas across the U.S. These benzene levels are not expected to cause adverse health effects. *Because benzene is a known human carcinogen and the reported averages exceed the TS target risk goal, it will remain on TCEQ's Air Pollutant Watch List (APWL). In addition, TS will encourage efforts to reduce benzene emissions in these areas.* 

## 1,3-Butadiene

## Port Neches, 1225 Merriman Street

The annual 1,3-butadiene concentration of 1.6 ppbv at the Port Neches, 1225 Merriman Street CATMN site did not exceed the current long-term ESL (5 ppbv), but did exceed TCEQ's target risk goal. In addition, trend analysis indicates that ambient concentrations of 1,3-butadiene at the Port Neches monitor, have declined from 1996 to 2004 due to cooperative agreements with industries such as Huntsman's C-4 facility and ISP Synthetic Elastomers LP (formerly Ameripol Synpol) which are located approximately 0.4 mile southeast of the monitoring site. Annual average 1,3-butadiene concentrations at the Port Neches monitor decreased from 8.3 ppbv in 1996 to 1.6 ppbv in 2004 (Figure 1). However, the nine-year average of 3.5 ppbv exceeds the target risk goal of TS and is outside the acceptable risk range as defined by U.S. EPA. *Despite the downward trend in 1,3-butadiene levels in Port Neches near the Huntsman C-4 facility, 1,3-butadiene will remain on APWL and TS will encourage even further reductions of 1,3-butadiene emissions in the area.* 

## <u>Metals</u>

The annual average concentrations for all speciated metals (Table 1) from the 24-hour  $PM_{2.5}$  metal samples collected in both Jefferson County (Hamshire, 12552 2<sup>nd</sup> Street) and Orange County (Port Arthur, Mauriceville) in 2004 were less than their respective annual (long-term) health-based ESLs. Therefore no adverse health effects would be *expected*.

If you have any questions regarding this evaluation, please contact me at (512)-239-4477.

Georgie Volz, Stuart Mueller, Page 5 December 22, 2005



Figure 1: Port Neches, 1225 Merriman Street 1,3-butadiene

cc (via email): Casso, Reuben – EPA Region 6

Georgie Volz, Stuart Mueller, Page 6 December 22, 2005