

# Texas Commission on Environmental Quality

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## INTEROFFICE MEMORANDUM

**To:** Georgie Volz, Regional Director  
Heather Ross, Air Section Manager  
TCEQ Region-10 Beaumont  
David Bower, Area Director

**Date:** July 27, 2007

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

**Subject:** Health Effects Review of 2006 Data Collected from Ambient Air Network  
Monitoring Sites in Region 10-Beaumont

### Conclusions

- Reported annual average concentrations for all the 95 volatile organic compounds (VOCs) and all 14 metals from particulate matter less than 2.5 microns in diameter (PM<sub>2.5</sub>) were at or below their respective effects screening levels (ESLs), and would not be expected to cause adverse health effects.
- Reported annual benzene concentrations at the Port Arthur City Service Center and Beaumont Carroll Street Park monitoring sites did not exceed benzene's long-term ESL. Based on previous data collected at these sites, benzene is on the TCEQ's Air Pollutant Watch List (APWL) for these areas of Port Arthur and Beaumont. However, if the benzene levels in these areas continue to show a downward trend, the Toxicology Section (TS) may recommend removal of these sites as APWL sites for benzene in the future.
- The reported annual 1,3-butadiene levels did not exceed the long-term ESL for 1,3-butadiene at the Port Neches-1225 Merriman Street monitoring site, and 1,3-butadiene concentrations have reported a downward trend at this site since monitoring began in 1996. However, 1,3-butadiene in this area of Port Neches will remain on the TCEQ's APWL while the TS re-evaluates 1,3-butadiene's long-term screening value using the most recent toxicity data and the new ESL derivation process. The TS continues to encourage efforts to minimize 1,3-butadiene emissions in this Port Neches area.

### Background Information

This memorandum conveys the TS's evaluation of ambient air sampling conducted at ten sites in Region 10-Beaumont during 2006. The TS reviewed air monitoring summary results for 95 VOCs and 14 metals (PM<sub>2.5</sub>) from seven Community Air Toxics Monitoring Network (CATMN) sites and 46 VOCs from three automated gas chromatography sites (autoGC). At the CATMN sites, 24-hour canister samples were collected every sixth day. The 24-hour data is designed to provide representative long-term average concentrations and has limited use in evaluating acute health effects or odors that could be caused by short-term or peak concentrations. At the autoGC sites, 40 minute samples are generally collected each hour for the entire year. The autoGC data is representative of both short-term and long-term concentrations and is useful for evaluating both short- and long-term health effects.

The target analytes from the CATMN sites are listed in Table 1 and the target analytes from the autoGC sites are listed in Table 2. Information about the monitoring sites is summarized in Table 3. All reported analytes were evaluated on a chemical-by-chemical basis. The reported VOC data were compared to their respective TCEQ ESLs. Information on the ESLs can be obtained by contacting the TS at 512-239-1795 or visiting the following website: <http://www.tceq.state.tx.us/implementation/tox/esl/ESLMain.html>

Generally, the TCEQ requires a 75 percent data return for air monitoring data as a data completeness objective. With the exception of the VOC data from the autoGC monitors that was only collected during a portion of 2006, all data highlighted in this memorandum met the data completeness objective.

## **Evaluation**

### VOCs

Exposure to the annual average concentrations of each of the VOCs from the CATMN sites would not be expected to result in long-term adverse health effects. Discussed below are the reported annual benzene concentrations at the City Service Center and the Carroll Street Park monitoring sites, as well as the annual 1,3-butadiene levels at the Port Neches-1255 Merriam Street monitoring site. While the annual benzene levels at the City Service Center and the Carroll Street Park sites did not exceed the long-term ESL for benzene, these sites are on the APWL for benzene and therefore warrant further discussion. Similarly, even though the reported annual levels of 1,3-butadiene did not exceed the TCEQ's current long-term screening level for 1,3-butadiene, the TS included discussion on 1,3-butadiene concentrations reported at the Port Neches site for two reasons. The first reason is that the Port Neches site is on the APWL for 1,3-butadiene. Secondly, the TS is in the process of re-evaluating the current 1,3-butadiene long-term screening value using the new ESL derivation process.

The autoGC monitors at the Nederland High School site (EPA Site ID: 482451035) and the Beaumont Lamar site (EPA Site ID: 482450009) were operational beginning in August 2006. The autoGC monitor at the Hamshire site (EPA Site ID: 482450022) was operational only from July – September 2006. The TS therefore evaluated the reported autoGC data only on a short-term basis and did not evaluate the data with a long-term objective. Exposure to the reported concentrations of VOCs from all of the autoGC monitors would not be expected to result in short-term adverse health effects.

### Benzene

#### *The City Service Center and the Carroll Street Park Monitors*

The reported 2006 annual average benzene concentrations at both the City Service Center (0.65 ppb<sub>v</sub>) and at the Carroll Street Park (0.85 ppb<sub>v</sub>) monitoring sites were below their respective 2005 annual averages and the TCEQ's long-term ESL of 1 ppb<sub>v</sub> for benzene. The areas surrounding the City Service Center and the Carroll Street Park monitoring sites are on the TCEQ's APWL for benzene (APWL site # APWL 1003 and APWL 1002 respectively). However, if the benzene concentrations in both the areas continue to show a downward trend, the TS may recommend removal of these sites from the APWL in the future. In addition, benzene is one of the constituents monitored in the Huntsman-Port Arthur Aromatic & Olefin Facility's

Supplemental Environmental Project which includes two fence-line VOC monitors, with one of the fence-line monitors located less than a quarter of a mile from the nearest neighborhood along Levee Rd. The 2006 annual average benzene concentration reported at the Levee Rd. monitor (1.66 ppb<sub>v</sub>) was above the TCEQ's long-term ESL of 1.0 ppb<sub>v</sub> for benzene. However, the reported annual benzene concentration at the fence-line monitor for 2006 was less than the reported annual benzene concentrations for 2004 (3.41 ppb<sub>v</sub>) and 2005 (3.25 ppb<sub>v</sub>).

### 1,3-Butadiene

#### *Port Neches, 1225 Merriman Street*

The annual average 1,3-butadiene concentration of 1.4 ppb<sub>v</sub> at the Port Neches monitoring site did not exceed the TCEQ's current long-term screening value of 5 ppb<sub>v</sub>. As shown in Figure 1, trend analysis of annual 1,3-butadiene concentrations from 1996 to 2006 indicates that ambient concentrations at the Port Neches monitor have declined due to cooperative agreements between TCEQ and industries sources such as Huntsman's C-4 facility and ISP Synthetic Elastomers LP (formerly Ameripol Synpol). The most recent agreement requires Huntsman C-4 to conduct fence-line VOC monitoring at a site that is approximately 0.4 mile southeast of the CATMN site. The Huntsman-sponsored monitor for 2004, 2005, and 2006 reported annual average 1,3-butadiene concentrations of 1.9, 1.5, and 1.8 ppb<sub>v</sub> respectively. For the past six years at the Port Neches monitoring site (see Figure 1) and for the past three years at the Huntsman-sponsored monitoring site reported annual 1,3-butadiene concentrations were below 5 ppb<sub>v</sub>. The TS is in the process of re-evaluating the current 1,3-butadiene long-term ESL using the latest toxicity information and the new ESL derivation process. The APWL listing for 1,3-butadiene in this area (APWL site # 1004) will be re-evaluated when the long-term screening value has been updated.

### Metals

The reported annual average concentrations for all speciated metals (Table 1) from the 24-hour PM<sub>2.5</sub> metal samples collected in Jefferson County (Memorial School) in 2006 were less than their respective long-term health-based ESLs. No adverse health effects would be expected from exposure to the reported concentrations of the measured PM<sub>2.5</sub> metals.

If you have any questions regarding this evaluation, please contact me at 512-239-2492 or email me at [nerragun@tceq.state.tx.us](mailto:nerragun@tceq.state.tx.us)

**Table 1: List of Monitored VOCs and metals (CATMN)**

<b>VOCs (CATMN)</b>	Chloroform	o-Ethyltoluene
1,1,1-Trichloroethane	Cyclohexane	o-Xylene
1,1,2,2-Tetrachloroethane	Cyclopentane	p-Diethylbenzene
1,1,2-Trichloroethane	Cyclopentene	p-Ethyltoluene
1,1-Dichloroethane	Ethane	p-Xylene + m-Xylene
1,1-Dichloroethylene	Ethyl Acetate	t-2-Butene
1,2,3-Trimethylbenzene	Ethyl Benzene	t-2-Hexene
1,2,4-Trimethylbenzene	Ethylene	t-2-Pentene
1,2-Dibromoethane	Isobutane	trans-1,3-Dichloropropylene
1,2-Dichloroethane	Isopentane	<b>Metals PM<sub>2.5</sub></b>
1,2-Dichloropropane	Isoprene	Aluminum
1,3,5-Trimethylbenzene	Isopropylbenzene	Antimony
1,3-Butadiene	Methyl Butyl Ketone (MBK)	Arsenic
1-Butene	Methyl t-Butyl Ether (MTBE)	Barium
1-Hexene+2-methyl-1-pentene	Methylcyclohexane	Berillium
1-Pentene	Methylcyclopentane	Cadmium
2,2,4-Trimethylpentane	Methylene Chloride	Chromium
2,2-Dimethylbutane -	Methylisobutylketone	Cobalt
Neohexane	Propane	Copper
2,3,4-Trimethylpentane	Propylene	Manganese
2,3-Dimethylbutane	Styrene	Molybdenum
2,3-Dimethylpentane	Tetrachloroethylene	Nickel
2,4-Dimethylpentane	Toluene	Tin
2-Butanone	Trichloroethylene	Zinc
2-Chloropentane	Trichlorofluoromethane	
2-Methyl-2-Butene	Vinyl Chloride	
2-Methylheptane	c-2-Butene	
2-Methylhexane	c-2-Hexene	
2-Methylpentane - Isohexane	c-2-Pentene	
2-Methyl-3-Hexanone	Dichlorodifluoromethane	
3-Methyl-1-Butene	Isobutyraldehyde	
3-Methylheptane	m-Diethylbenzene	
3-Methylhexane	m-Ethyltoluene	
3-Methylpentane	Methyl Chloride	
3-Hexanone	n-Butane	
3-Pentanone	n-Decane	
4-Methyl-1-Pentene	n-Heptane	
Acetylene	n-Hexane	
Benzene	n-Nonane	
Bromomethane	n-Octane	
Butyl Acetate	n-Pentane	
cis 1,3-Dichloropropylene	n-Propyl Acetate	
Carbon Tetrachloride	n-Propylbenzene	
Chlorobenzene	n-Undecane	

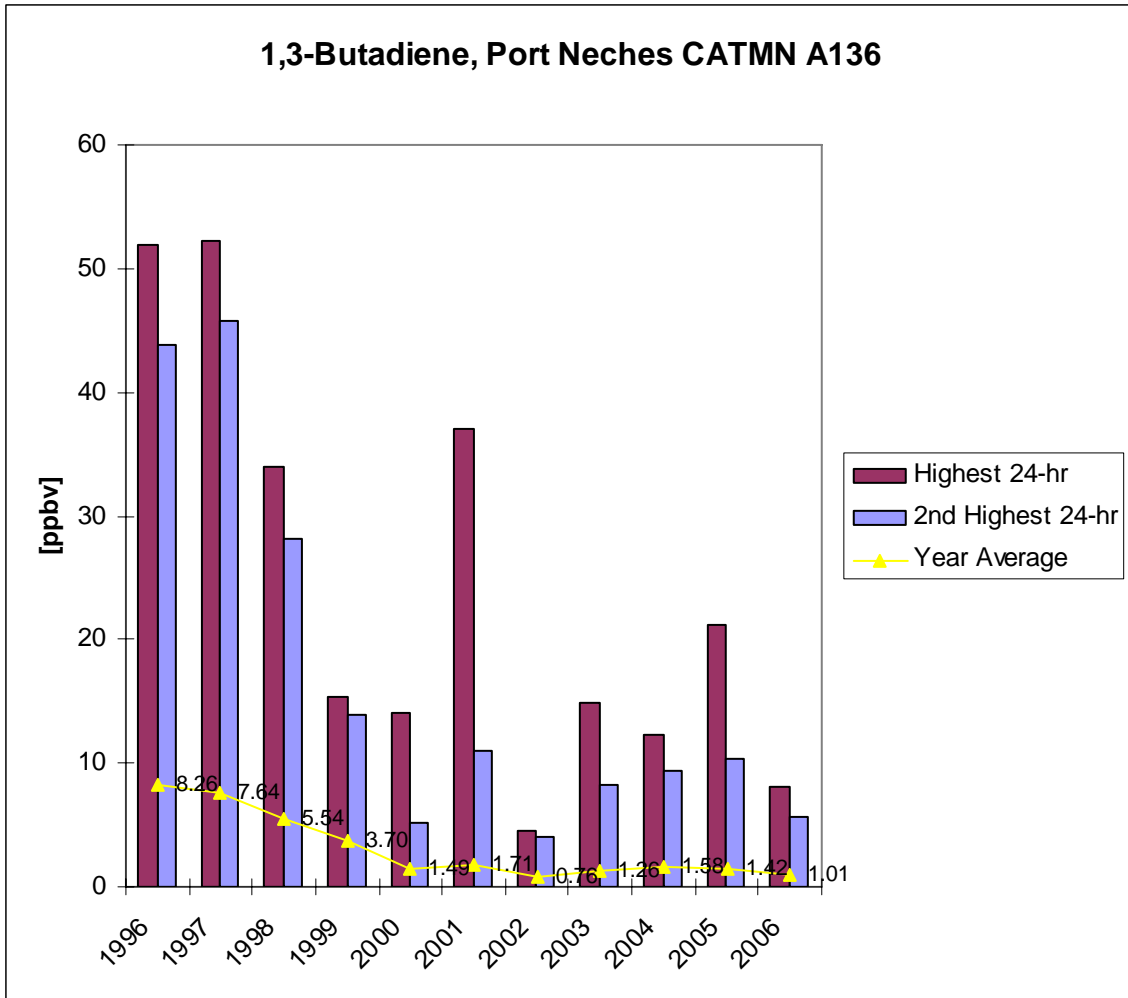
**Table 2: List of Monitored VOCs (autoGC)**

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

**Table 3: Region 10 Monitoring Sites Evaluated in 2006**

County	City and Site Location	EPA Site ID	Monitored Compounds
Jefferson	<a href="#">Port Arthur, 800 El Vista Rd</a>	48-245-0011	<sup>b</sup> VOCs
Jefferson	<a href="#">Grooves, 3355 Grandview Avenue &amp; 32<sup>nd</sup> Street</a>	48-245-0014	<sup>b</sup> VOCs
Jefferson	<a href="#">Port Neches, 1225 Merriman Street</a>	48-245-0017	<sup>b</sup> VOCs
Jefferson	<a href="#">Port Arthur, Jefferson County Airport</a>	48-245-0018	<sup>b</sup> VOCs
Jefferson	<a href="#">Port Arthur, City Service Center</a>	48-245-0019	<sup>b</sup> VOCs
Jefferson	<a href="#">Beaumont, Carroll Street Park</a>	48-245-0020	<sup>b</sup> VOCs
Jefferson	<a href="#">Port Arthur, Memorial School</a>	48-245-0021	<sup>b</sup> Metals (PM <sub>2.5</sub> )
Jefferson	<a href="#">Nederland, Nederland High School</a>	48-245-1035	<sup>c</sup> VOCs
Jefferson	<a href="#">Hamshire, 12552 2<sup>nd</sup> Street</a>	48-245-0022	<sup>c</sup> VOCs
Jefferson	<a href="#">Beaumont, 1086 Vermont Avenue</a>	48-245-0009	<sup>a</sup> VOCs

<sup>a</sup>24-hour Canister and One-hour AutoGC; <sup>b</sup> 24-hour Canister only; <sup>c</sup>Auto-GC only



**Figure 1: 1,3-butadiene Trend Data at the Port Neches, 1225 Merriman Street Monitor Site**

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