Texas Commission on Environmental Quality

INTEROFFICE MEMORANDUM

To: Tony Walker, Region 4 Director
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Frank Espino, North Central Area Director

Date: May 31, 2007

From: Darrell D. McCant, B.S.
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Subject: Health Effects Review of 2006 Ambient Air Network Monitoring Sites in Region 4-Dallas/Fort Worth

Conclusions

- Annual average concentrations of all 95 volatile organic compounds (VOCs) were below their long-term Effects Screening Level (ESL) and would not be expected to cause adverse health effects.
- All hourly averages of the 46 VOCs reported at the Dallas-Hinton and Fort Worth-Northwest autoGC sites were below their short-term ESLs and odor thresholds and would not be expected to cause adverse health effects and odors.
- All 17 carbonyls measured were below levels that would be expected to cause adverse health effects.
- Annual nickel levels at the Dallas-Morrell site have historically exceeded the long-term nickel ESL and did so again in 2006. Metallic nickel is likely the major form of nickel detected at the site due to emissions from Dal Chrome Co., Inc. However, the presence of other nickel species in the particulate matter samples and other nickel sources in the area cannot be excluded. Nickel levels will continue to be monitored and assessed at the Dallas-Morrell, and the Toxicology Section (TS) advises reductions in nickel concentrations to levels less than or equal 0.06 microgram per cubic meter ($\mu g/m^3$). Nickel will remain on the Texas Commission on Environmental Quality's (TCEQ) Air Pollutant Watch List (APWL).

Background

Ambient air sampling conducted at monitoring network sites in Region 4-Dallas/FortWorth during 2006 was evaluated by the TS. Table 1 contains information regarding the 11 air toxics monitoring sites located in Region 4-Dallas/Forth Worth. The TS reviewed air monitoring summary results for VOCs and carbonyls from one-hour and 24-hour samples collected continuously and/or every sixth day. In addition, hourly VOC samples collected on forecasted high ozone days were reviewed as well. Speciated metals from 24-hour particulate matter less than or equal to 2.5 microns ($PM_{2.5}$) and total suspended particulate (TSP) filter samples collected every third or sixth day were also reviewed by TS. For a complete list of all chemicals evaluated, please see Table 2.

The TCEQ Monitoring Operations Division reported the data for all chemicals evaluated. This memorandum evaluates air monitoring data on a chemical-by-chemical basis. All VOCs, carbonyls, $PM_{2.5}$, and TSP data highlighted in this evaluation met TCEQ's data completeness objective of 75 per cent data return. One-hour air samples were compared to short-term TCEQ ESLs. Twenty-four-hour air samples collected every sixth day for a year are designed to provide representative long-term average concentrations. The TS evaluated the reported annual average concentrations for each target analyte for potential chronic health and vegetation concerns by comparing measured chemical concentrations to long-term TCEQ ESLs. Information on the ESLs can be obtained by contacting the Toxicology Section at 512-239-1795 or by visiting the TCEQ website:
http://www.tceq.state.tx.us/implementation/tox/esl/ESLMain.html

Table 1: Monitoring Site Information for Region 4-Dallas/Fort Worth

County	City and Site Location	EPA Site ID	Monitored Compounds
Dallas	Dallas, 1415 Hinton St.	48-113-0069	VOCs[a], Carbonyl, Metals ($PM_{2.5}$)
Dallas	Dallas, 3004 N. Westmoreland	8-113-0057	VOCs[b]
Dallas	Dallas, 3049 Morrell St	48-113-0018	Metals (TSP)
Dallas	Dallas, 717 South Akard Street	48-113-0050	Metals ($PM_{2.5}$)
Denton	Denton, Denton Municipal Air port	48-121-0034	VOCs[b,c]
Ellis	Midlothian, 1241 East Wyatt Road	48-139-0017	VOCs[b]
Ellis	Midlothian, 4252 Waterworks	48-139-0015	VOCs[b,c] , Metals ($PM_{2.5}$)
Kaufman	Kaufman, 3790 South Houston St.	48-257-0005	VOCs[b,c], Metals ($PM_{2.5}$)
Tarrant	Fort Worth (Northwest), 3317 Ross Avenue	48-439-1002	VOCs[a], Carbonyl
Tarrant	Grapevine, 4100 Fairway Dr.	48-439-3009	VOCs[b,c]
Hunt	Greenville, 824 Sayle St	48-231-1006	VOCs[b]

[a]24-hour Canister and One-hour AutoGC; [b] 24-hour Canister only; [c]One-hour Canister

Evaluation

VOCs

All hourly canister samples for the 95 VOCs collected at the four MultiCan sites were below short-term ESLs and odor thresholds. Also all hourly averages of the 46 VOCs reported at the two autoGC sites, Fort Worth-Northwest and Dallas-Hinton, were below short-term ESLs and odor thresholds. Therefore, all one-hour samples would not be expected to cause adverse short-term health effects and odors. Annual averages of the 95 VOCs reported at each of the nine 24-hour canister monitoring sites and autoGC sites for 2006 were well below long-term ESLs, and therefore would not be expected to cause adverse health or vegetative effects.

Carbonyls
Of the 17 carbonyls reported at the Fort Worth-Northwest and Dallas-Hinton sites, only annual average formaldehyde concentrations exceeded the long-term ESL. However, these concentrations do not present a human health concern, and annual formaldehyde levels are discussed below.

Formaldehyde
The reported formaldehyde annual averages at the Northwest site in Fort Worth (2.42 ppb_v) and at the Hinton site in Dallas (2.83) exceeded the long-term ESL for formaldehyde (1.2 ppb_v). Exposure to this annual average is not expected to pose unacceptable long-term health risks based on U.S. Environmental Protection Agency's (EPA) current review of toxicity data.

Metals
At the four sites reporting speciated $PM_{2.5}$ metals, annual averages of all 14 metals were well below their respective long-term ESLs and would not be expected to cause adverse health effects. At the Dallas-Morrell site, nickel speciated from TSP was reported above the long-term ESL. Nickel is discussed below.

Nickel
The 2006 annual average nickel concentration (0.275 $\mu g/m^3$) exceeded the current long-term ESL (0.015 $\mu g/m^3$) and the TCEQ's long-term goal (0.06 $\mu g/m^3$) for ambient nickel levels. The nickel ESL is currently under review by the TS, and the goal of 0.06 $\mu g/m^3$ for the annual average is based on a risk factor (published in USEPA 1999 National-Scale Air Toxic Assessment) that conservatively assumes that 65% of nickel emissions are in forms of nickel that may be carcinogenic. Air monitoring data from the Dallas-Morrell site show the total nickel concentration, but can not show what forms of nickel were present. Dal Chrome Co., Inc., which is expected to mainly emit metallic nickel, is expected to be the predominant nickel emissions source in vicinity of the Dallas-Morrell site, and metallic nickel is non-carcinogenic.

Elevated annual nickel levels have been detected at the Morrell site since 1987. From 1987 – 1994, the annual nickel concentrations ranged from approximately 0.6 to 0.9 $\mu g/m^3$. Beginning in 1995, the annual nickel levels decreased and since 1997 have stabilized in the range of 0.1 to 0.3 $\mu g/m^3$ (Figure 1). The reductions in annual nickel levels first observed in 1995 are attributed to actions taken by Dal Chrome, a known source of nickel upwind from the Morrell site.

It should be further emphasized that even though nickel levels are above TCEQ's long-term goal, the levels are considered acceptable according to the EPA. Nickel will continue to be monitored and assessed at the Dallas-Morrell site, and the TS advises reductions in nickel concentrations to annual average levels less than or equal to 0.06 $\mu g/m^3$ to reflect TCEQ's long-term goal. Nickel will remain on TCEQ's APWL

If you have any questions about this evaluation, please call me at (512)-239-4477 or email me at dmccant@tceq.state.tx.us.

cc (via email):

Casso, Ruben – EPA Region 6
Prosperie, Susan- Department of State Health Services

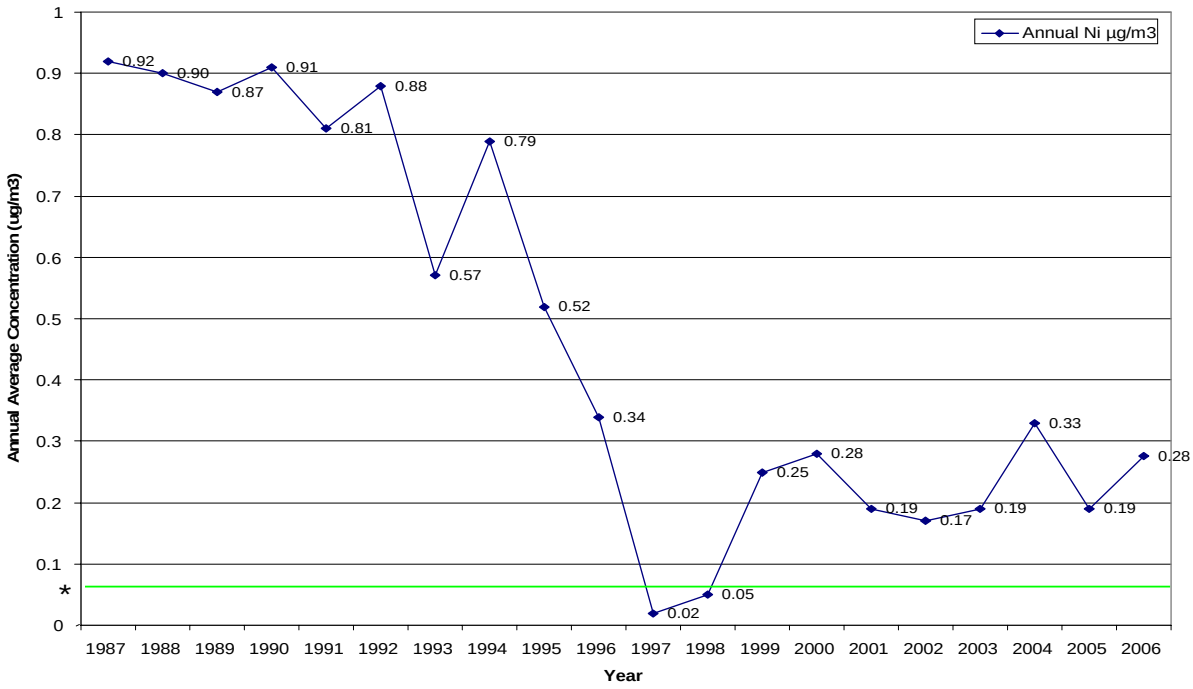
Table 2: Target Analytes for Ambient Air Monitoring Network in Region 4-Dallas/Fort Worth

CATMN and MultiCan VOCs		Metals

1,1,1-Trichloroethane 1,1,2,2-tetrachloroethane 1,1,2-Trichloroethane 1,1-Dichloroethylene 1,2,3-Trimethylbenzene 1,2,4-Trimethylbenzene 1,2-Dibromoethane 1,2-Dichloroethane 1,2-Dichloropropane 1,3,5-Trimethylbenzene 1,3-Butadiene 1-Butene 1-Hexene+2-methyl-1-pentene 1-Pentene 2,2,4-Trimethylpentane 2,2-Dimethylbutane - Neohexane 2,3,4-Trimethylpentane 2,3-Dimethylbutane 2,3-Dimethylpentane 2,4-Dimethylpentane 2-Butanone 2-Chloropentane 2-Methyl-2-Butene 2-Methylheptane 2-Methylhexane 2-Methylpentane - Isohexane 2-methyl-3-hexanone 3-Methyl-1-Butene 3-Methylheptane 3-Methylhexane 3-Methylpentane 3-hexanone 3-pentanone 4-Methyl-1-Pentene Acetylene Benzene Bromomethane Butyl Acetate CIS 1,3-dichloropropylene Carbon Tetrachloride Chlorobenzene Chloroform Chloroprene Cyclohexane Cyclopentane Cyclopentene Ethane Ethyl Acetate	Ethyl Benzene Ethylene Isobutane Isopentane Isoprene Isopropylbenzene Methyl Butyl Ketone (MBK) Methyl t-Butyl ether Methylcyclohexane Methylcyclopentane Methylene Chloride Methylisobutylketone Propane Propylene Styrene Tetrachloroethylene - Perchloroethylene Toluene Trichloroethylene Trichlorofluoromethane Vinyl Chloride c-2-Butene c-2-Hexene c-2-Pentene dichlorodifluoromethane isobutyraldehyde m-Diethylbenzene m-Ethyltoluene methyl chloride n-Butane n-Decane n-Heptane n-Hexane n-Nonane n-Octane n-Pentane n-Propyl Acetate n-Propylbenzene n-Undecane o-Ethyltoluene o-Xylene p-Diethylbenzene p-Ethyltoluene p-Xylene + m-Xylene t-2-Butene t-2-Hexene t-2-Pentene trans-1-3-dichloropropylene	Aluminum ($PM_{2.5}$) Antimony ($PM_{2.5}$) Arsenic ($PM_{2.5}$) Barium ($PM_{2.5}$) Cadmium ($PM_{2.5}$) Chromium ($PM_{2.5}$) Cobalt ($PM_{2.5}$) Copper ($PM_{2.5}$) Manganese($PM_{2.5}$) Molybdenum ($PM_{2.5}$) Nickel ($PM_{2.5}$, TSP) Selenium ($PM_{2.5}$) Tin ($PM_{2.5}$) Zinc ($PM_{2.5}$)

AutoGC VOCs		**Carbonyls**
1,2,3-Trimethylbenzene 1,2,4-Trimethylbenzene 1,3,5-Trimethylbenzene 1,3-Butadiene 1-Butene 1-Pentene 2,2,4-Trimethylpentane 2,2-Dimethylbutane 2,3,4-Trimethylpentane 2,3-Dimethylpentane 2,4-Dimethylpentane 2-Methylheptane 2-Methylhexane 3-Methylheptane 3-Methylhexane Acetylene Benzene Cyclohexane Cyclopentane Ethane Ethyl Benzene Ethylene Isobutane Isopentane Isoprene Isopropyl Benzene (Cumene) Methylcyclohexane Methylcyclopentane Propane Propylene Styrene Toluene c-2-Butene c-2-Pentene n-Butane	n-Decane n-Heptane n-Hexane n-Nonane n-Octane n-Pentane n-Propylbenzene o-Xylene p-Xylene + m-Xylene t-2-Butene t-2-Pentene	2,5-Dimethylbenzaldehyde Acetaldehyde Acetone Acrolein Benzaldehyde Butyraldehyde Crotonaldehyde (2-Butenal) Formaldehyde Heptaldehyde Hexanaldehyde Isovaleraldehyde m-Tolualdehyde MEK/Methacrolein o-Tolualdehyde p-Tolualdehyde Propanal (Propionaldehyde) Valeraldehyde

Figure 1: Annual Nickel (µg/m^3) at the Dallas-Morrell Site



* 0.06 ug/m3 reflects TCEQ's long-term goal for ambient Nickel levels