Texas Commission on Environmental Quality

INTEROFFICE MEMORANDUM

To: Tony Walker, Region 4 Director
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Ricky Anderson, North Central and West Texas Area Director

Date: December 19, 2008

From: Gulan Sun, Ph. D.
Toxicology Section, Chief Engineer's Office

Subject: Health Effects Review of 2007 Ambient Air Network Monitoring Sites in Region 4-Dallas/Fort Worth

Conclusions

- All hourly average concentrations of the 46 volatile organic compounds (VOCs) reported at Texas Commission on Environmental Quality (TCEQ) Region 4-Dallas/Fort Worth automated gas chromatograph (autoGC) monitoring sites were below their TCEQ short-term health-based comparison values and odor thresholds, and would not be expected to cause short-term adverse health effects or odor concerns.
- Annual average concentrations of all 95 volatile organic compounds (VOCs), 17 carbonyls, 14 metals (measured as particulate matter with an aerodynamic diameter 2.5 microns or less, $PM_{2.5}$) and 2 metals (measured as Total Suspended Particulate (TSP)) reported at TCEQ Region 4-Dallas/Fort Worth monitoring sites, except nickel TSP at Dallas-Morrell site, were below their TCEQ long-term health-based comparison values and would not be expected to cause chronic adverse health effects.
- Annual nickel TSP levels at the Dallas-Morrell site have exceeded the long-term nickel health-based comparison values in 2007. Elevated annual nickel levels have been detected at the Morrell site since 1987. 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 site, and the Toxicology Section (TS) advises reductions in nickel concentrations to levels less than or equal to 0.06 microgram per cubic meter ($\mu g/m^3$). Nickel will remain on the TCEQ's Air Pollutant Watch List (APWL) at the Dallas-Morrell site.

Background

Ambient air sampling conducted at monitoring network sites in Region 4-Dallas/FortWorth during 2007 was evaluated by the TS. Table 1 contains information regarding the 12 air toxics monitoring sites located in Region 4-Dallas/Forth Worth. Of the 12 sites, one site in Ellis County (EPA Site ID 48-139-0015) was inactivated on August 22, 2007, while a new site in Ellis County (EPA Site ID 48-139-1044) was established on August 21, 2007. 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. Metals from 24-hour filter samples (either as $PM_{2.5}$ or TSP) 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 percent data return. One-hour air samples were compared to short-term TCEQ appropriate comparison values. Twenty-four-hour air samples collected every sixth day for a year 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.

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 appropriate comparison values. Information on the appropriate comparison values can be obtained by contacting the TS 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	48-113-0057	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 Airport	48-121-0034	VOCs[b]
Ellis	Midlothian, 4252 Waterworks	48-139-0015 (Inactive on August 22, 2007)	VOCs[b]
Ellis	Midlothian, 2725 Old Fort Worth Road.	48-139-0016	VOCs[b], Metals ($PM_{2.5}$)
Ellis	900 FM 667 Ellis County	48-139-1044 (Activation Date: August 21, 2007)	VOCs[b]
Kaufman	Kaufman, 3790 South Houston St.	48-257-0005	VOCs[b]
Tarrant	Fort Worth (Northwest), 3317 Ross Avenue	48-439-1002	VOCs[a], Carbonyl
Tarrant	Grapevine, 4100 Fairway Dr.	48-439-3009	VOCs[b]
Hunt	Greenville, 824 Sayle St	48-231-1006	VOCs[b]

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

Evaluation

VOCs
Hourly average concentrations of the 46 VOCs reported at the two autoGC sites, Fort Worth-Northwest and Dallas-Hinton, were below short-term health-based comparison values and odor thresholds. Exposures to the reported hourly average concentrations would not be expected to cause adverse short-term health effects or odor concerns.

Annual average concentrations of the 95 VOCs reported at each of the ten 24-hour canister monitoring sites for 2007 were well below long-term appropriate comparison values. Exposure to the reported annual average concentrations would not be expected to cause chronic adverse health or vegetative effects.

Carbonyls
Annual average concentrations of the 17 carbonyls reported at the Fort Worth-Northwest and Dallas-Hinton sites were below long-term appropriate comparison values. Exposure to the reported annual average concentrations would not be expected to cause chronic adverse health effects.

Metals
At the three sites reporting speciated $PM_{2.5}$ metals, annual average concentrations of all 14 metals were well below their respective long-term health-based comparison values. Exposures to the reported levels of these metals (measured as $PM_{2.5}$) would not be expected to cause chronic adverse health effects.

At the Dallas-Morrell site, only nickel and chromium measured as TSP were reported. The annual average concentration of chromium (as TSP) was below its long-term health-based comparison level. Exposure to the reported annual concentration of chromium (as TSP) would not be expected to cause chronic adverse health effects. The annual average concentration of nickel (as TSP) was above the long-term comparison value, as discussed below.

Nickel
The 2007 annual average nickel (as TSP) concentration (0.14 µg/m^3) exceeded the current long-term comparison value (0.015 µg/m^3) and the TCEQ's long-term goal (0.06 µg/m^3) for ambient nickel levels. The long-term comparison value for nickel is currently under review by the TS, and the goal of 0.06 µg/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 the forms of nickel that may be carcinogenic. The air monitoring data from the Dallas-Morrell site are representative of total nickel concentration, and do not indicate the specific forms of nickel. Dal Chrome Co., Inc. is known to emit mainly metallic nickel and is expected to be the predominant nickel emissions source in vicinity of the Dallas-Morrell site. Metallic nickel is reported to be a non-carcinogenic form of nickel.

Elevated annual nickel levels have been detected at the Morrell site since 1987. From 1987 through 1994, the annual nickel concentrations ranged approximately from 0.6 to 0.9 µg/m^3. Beginning in 1995, the annual nickel levels decreased and since 1997 have stabilized in the range of 0.1 to 0.3 µg/m^3 (Figure 1). The reductions in annual nickel levels first observed in 1995 are attributed to actions taken by Dal Chrome, which is located 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 µg/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)-239-1336 or email me at gsun@tceq.state.tx.us.

cc (via email):
Casso, Ruben – EPA Region 6
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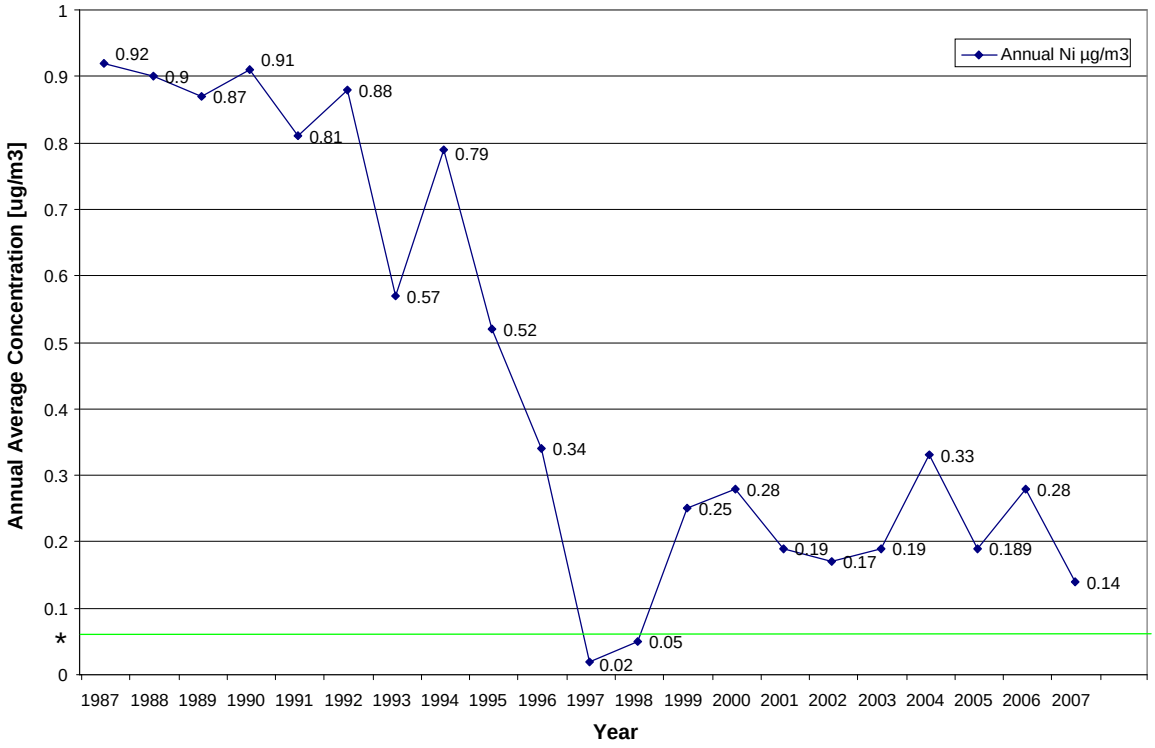
Table 2: Target Analytes for Ambient Air Monitoring Network in Region 4-Dallas/Fort Worth

CATMN 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 ($PM_{2.5}$, TSP) 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