

TCEQ Interoffice Memorandum

To: Leroy Biggers, Regional Director, R5
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Office of the Executive Director
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Date: March 17, 2021

Subject: Health Effects Review of 2017-2019 Ambient Air Network Monitoring Data in Region 5, Tyler

Conclusions

All 24-hour, annual and three-year average measured concentrations of volatile organic compounds (VOCs) at the Longview and Karnack monitoring locations in Region 5 from 2017-2019 were below their respective Texas Commission on Environmental Quality (TCEQ) air monitoring comparison values (AMCVs) and would not be expected to cause adverse health effects or welfare effects.

All 24-hour, annual, and three-year average measured concentrations of polycyclic aromatic hydrocarbons (PAHs), carbonyls, the speciated metals from particulate matter less than 10 microns in diameter (PM_{10}), or the speciated metals from particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), except for the chromium $PM_{2.5}$ annual average in 2018 at the Karnack monitoring location, were below their respective TCEQ AMCVs and would not be expected to cause adverse health or welfare effects.

- The 2018 chromium $PM_{2.5}$ annual average concentration at Karnack exceeded the long-term health-based AMCV. However, the three-year average chromium $PM_{2.5}$ average was below the long-term health-based AMCV, which is a more appropriate comparison as the long-term AMCV is a lifetime value. Moreover, the long-term AMCV is based on a form of chromium (hexavalent) that generally represents only a small fraction of environmental chromium (e.g., $\approx 1\%$). All annual averages are well below the more comparable long-term AMCV for other forms of chromium which more reasonably assumes 1% hexavalent chromium (or even that which very conservatively assumes 10% hexavalent chromium).

Background

This memorandum conveys the Toxicology, Risk Assessment, and Research Division's (TD's) evaluation of ambient air sampling conducted at two ambient air network monitoring sites in Region 5, Tyler from 2017-2019. Ambient air 24-hour canister samples were collected every sixth-day from (1) a site located at Gregg County Airport in Longview [24-hour VOC], and from (2) a site located at Highway 143 and Spur 449 in Karnack [24-hour VOC, PAH, carbonyl, and speciated metals ($PM_{2.5}$ & PM_{10})]; these results were evaluated on a chemical-by-chemical basis. All data collected for the Longview and Karnack monitoring site met the data completeness objective of 75 percent data return from 2017-2019, except for carbonyl, PM_{10} , PAHs, and

acrolein-verified at the Karnack site. The Karnack monitoring site was deactivated for carbonyls, PM₁₀, PAHs, and acrolein-verified monitoring on 6/30/2018. Thus, data for these parameters were incomplete for 2018 and unavailable for 2019. Information about the Region 5 monitoring sites is presented in Table 1, along with hyperlinks to the monitoring site maps and more detailed information. Complete lists of all target analytes are provided in Attachment A.

Table 1. Monitoring Sites Located in TCEQ Region 5

| Site Name and Location | County | Monitor ID | Monitored Compounds |
|--|---------------|-------------------|---|
| <u>Longview</u> Gregg Co Airport near Longview | Gregg | 481830001 | VOCs (24-h canister) |
| <u>Karnack</u> Hwy 134 and Spur 449 | Harrison | 482030002 | VOCs (24-h canister), PAHs, carbonyls, and metals (PM _{2.5} & PM ₁₀) |

The TCEQ Monitoring Division reported the data for all chemicals evaluated in this memorandum. Because short-term or peak concentrations are not necessarily captured by 24-hour samples, daily concentrations have limited use in evaluating the potential for acute health effects. Rather, 24-hour air samples collected every-sixth day for a year are intended to provide representative long-term average concentrations. Therefore, the TD evaluated the reported annual average concentrations from 24-hour samples for each target analyte for potential chronic health and vegetation concerns by comparing measured chemical concentrations to long-term AMCVs or, for lead, to the applicable comparison level. In order to be able to evaluate 24-hour monitoring data more fully, TCEQ has also developed 24-hour acute AMCVs for specific chemicals. As such, 24-hour samples were compared to the available TCEQ 24-hour AMCVs for 1,3-butadiene, 2,2-dimethylbutane, 2,3-dimethylbutane, 2-methylpentane, 3-methylpentane, acrolein, benzene, cadmium, chromium, cobalt, manganese, crotonaldehyde, ethylene dibromide, ethylene dichloride, formaldehyde, and n-hexane. More information about AMCVs is available online at: <https://www.tceq.texas.gov/toxicology/AirToxics.html>.

Evaluation

Longview

All measured 24-hour, annual and three-year average concentrations of the 84 monitored VOCs at the Longview site were below their respective AMCVs and would not be expected to cause adverse chronic health or welfare effects.

Karnack

All measured 24-hour, annual and three-year average measured concentrations of the 85 VOCs, 16 PAHs, 17 carbonyls, 5 speciated PM₁₀ metals, and 15 speciated PM_{2.5} metals monitored for at the Karnack site were below their respective AMCVs, with the exception of the chromium PM_{2.5}

annual average in 2018, and would not be expected to cause adverse chronic health or welfare effects.

The 2018 chromium PM_{2.5} annual average concentration was 0.00766 ppb_v, which is 1.8 times greater than the AMCV of 0.0043 ppb_v. However, the three-year chromium PM_{2.5} average (0.0042 ppb_v) is lower than the respective long-term AMCV, which is a more appropriate comparison as the long-term AMCV is a lifetime value. Moreover, the long-term AMCV is based on a form of chromium (hexavalent) that generally represents only a small fraction of environmental chromium (e.g., ≈1%). Importantly, all annual averages are well below the more comparable long-term AMCV for other forms of chromium (0.14 µg/m³) and that which more reasonably assumes 1% hexavalent chromium (0.11 µg/m³), or even that which very conservatively assumes 10% hexavalent chromium (0.034 µg/m³).

Air Pollutant Watch List (APWL) Area

There is one APWL area ([APWL0501](#)) in Region 5 for hydrogen sulfide, which covers parts of both Bowie and Cass Counties. This area is discussed in detail in the 2012 [annual APWL](#) report.¹

If you have any questions about this evaluation, please contact Nnamdi Nnoli by email at nnamdi.nnoli@tceq.texas.gov or phone at (512) 239-1785.

¹ Report on the Air Pollutant Watch List Areas in Texas; Prepared by the Texas Commission on Environmental Quality, February 2012

Attachment A

List 1. Target VOC Analytes in Canister Samples

| | | |
|-------------------------------|-------------------------|---------------------------|
| 1,1,2,2-Tetrachloroethane | Bromomethane | Vinyl Chloride |
| 1,1,2-Trichloroethane | Carbon Tetrachloride | cis-1,3-Dichloropropene |
| 1,1-Dichloroethane | Chlorobenzene | cis-2-Butene |
| 1,1-Dichloroethylene | Chloroform | cis-2-Hexene |
| 1,2,3-Trimethylbenzene | Chloromethane | cis-2-Pentene |
| 1,2,4-Trimethylbenzene | Cyclohexane | m-Diethylbenzene |
| 1,2-Dichloropropane | Cyclopentane | m-Ethyltoluene |
| 1,3,5-Trimethylbenzene | Cyclopentene | m/p Xylene |
| 1,3-Butadiene | Dichlorodifluoromethane | n-Butane |
| 1-Butene | Dichloromethane | n-Decane |
| 1-Hexene & 2-Methyl-1-Pentene | Ethane | n-Heptane |
| 1-Pentene | Ethylbenzene | n-Hexane |
| 2,2,4-Trimethylpentane | Ethylene | n-Nonane |
| 2,2-Dimethylbutane | Ethylene Dibromide | n-Octane |
| 2,3,4-Trimethylpentane | Ethylene Dichloride | n-Pentane |
| 2,3-Dimethylbutane | Isobutane | n-Propylbenzene |
| 2,3-Dimethylpentane | Isopentane | n-Undecane |
| 2,4-Dimethylpentane | Isoprene | o-Ethyltoluene |
| 2-Chloropentane | Isopropylbenzene | o-Xylene |
| 2-Methyl-2-Butene | Methyl Chloroform | p-Diethylbenzene |
| 2-Methylheptane | Methylcyclohexane | p-Ethyltoluene |
| 2-Methylhexane | Methylcyclopentane | trans-1,3-Dichloropropene |
| 2-Methylpentane | Propane | trans-2-Butene |
| 3-Methyl-1-Butene | Propylene | trans-2-Hexene |
| 3-Methylheptane | Styrene | trans-2-Pentene |
| 3-Methylhexane | Tetrachloroethylene | |
| 3-Methylpentane | Toluene | |
| 4-Methyl-1-Pentene | Trichloroethylene | |
| Acetylene | Trichlorofluoromethane | |
| Acrolein-Verified* | | |
| Benzene | | |

*Not a target analyte at the Longview monitor in 2017-2019, and Karnack monitor after 6/30/2018

List 2. Target Metal Analytes

| | | |
|---|---|--|
| Aluminum (PM _{2.5}) | Chromium (PM _{2.5}) | Nickel (PM _{2.5} , PM ₁₀) |
| Antimony (PM _{2.5}) | Cobalt (PM _{2.5}) | Selenium (PM _{2.5}) |
| Arsenic (PM _{2.5} , PM ₁₀) | Copper (PM _{2.5}) | Tin (PM _{2.5}) |
| Barium (PM _{2.5}) | Lead (PM _{2.5} , PM ₁₀) | Vanadium (PM _{2.5}) |
| Cadmium (PM _{2.5} , PM ₁₀) | Manganese (PM _{2.5} , PM ₁₀) | Zinc (PM _{2.5}) |

List 3. Target PAH Analytes

| | | |
|------------------------|--------------------------|--------------------------|
| Acenaphthene | Benzo (g,h,i) perylene | Indeno (1,2,3-cd) pyrene |
| Acenaphthylene | Benzo (k) fluoranthene | Naphthalene |
| Anthracene | Chrysene | Phenanthrene |
| Benzo (a) anthracene | Dibenzo (a,h) anthracene | Pyrene |
| Benzo (a) pyrene | Fluoranthene | |
| Benzo (b) fluoranthene | Fluorene | |

List 4. Target Carbonyl Analytes

| | | |
|--------------------------|--------------------|---------------------|
| 2,5-Dimethylbenzaldehyde | Crotonaldehyde | Methacrolein |
| Acetaldehyde | Formaldehyde | Methyl Ethyl Ketone |
| Acetone | Heptanal | Propionaldehyde |
| Acrolein - Unverified | Hexanaldehyde | Valeraldehyde |
| Benzaldehyde | Isovaleraldehyde | o-Tolualdehyde |
| Butyraldehyde | m & p-Tolualdehyde | |