CITY OF HOUSTON
Houston Health Department
Bureau of Pollution Control and Prevention

Ambient Air Sample Collected 2906 Lavender St. Houston, TX 77026 on April 26th-28th, 2021
By Peter Chen (Chemist IV) and Youjun Qin (Chemist IV)

Mobile Ambient Air Monitoring Laboratory (MAAML)
After Action Report
AMBIENT AIR ANALYSIS
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I. Purpose of Deployment:

Bureau of Pollution Control and Prevention staff collected ambient air data in the vicinity of the Union Pacific Railroad contamination site in response to requests from the community.

II. Definitions:

MAAML - Mobile Ambient Air Monitoring Laboratory
VOCs - Volatile Organic Compounds
GC/MS - Gas Chromatograph/Mass Spectrometer
O₃ - Ozone
NO₂ - Nitrogen dioxide
µg/m³ - Microgram(s) per cubic meter
EPA - Environmental Protection Agency
NAAQS - National Ambient Air Quality Standards
ppb - Part(s) per billion by volume
TCEQ - Texas Commission on Environmental Quality
ESL - Effects Screening Level
PM - Particulate matter
PM₂.₅ - Particulate matter 2.5 microns or smaller
PM₁₀ – Particulate matter 10 microns or smaller
ND – non-detectable

III. Preparation/Set-up:

Mobile laboratory project chemists deployed the MAAML at Lavender St. to monitor for VOCs by GC/MS, PM using a GRIMM Technologies PM monitor and O₃ and NO₂ using gas-specific analyzers.
IV. Summary Table and Comments:

The ambient air was monitored at the same location, close to Liberty and Lavender St. intersection, from April 26-28, 2021. Shown below in Table 1 are the results of the analysis.

<table>
<thead>
<tr>
<th>Collection date</th>
<th>Apr 26, 2021</th>
<th>Apr 27, 2021</th>
<th>Apr 28, 2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sampling collection time</td>
<td>800~1500 CST (7-hour)</td>
<td>900 to 1500 (6-hour)</td>
<td>900 to 1500 (6-hour)</td>
</tr>
<tr>
<td>Sampling location</td>
<td>29.788042°, -95.320237° Close to Liberty and Lavender St. Intersection</td>
<td>29.788042°, -95.320237° Close to Liberty and Lavender St. Intersection</td>
<td>29.788042°, -95.320237° Close to Liberty and Lavender St. Intersection</td>
</tr>
<tr>
<td>Wind direction</td>
<td>Southeast</td>
<td>Southeast</td>
<td>Southeast</td>
</tr>
<tr>
<td>Wind speed</td>
<td>6.6 to 9.5 mph</td>
<td>6.8 to 8.1 mph</td>
<td>12.1 to 13.6 mph</td>
</tr>
<tr>
<td>Field observations</td>
<td>No evident odors or plumes</td>
<td>No evident odors or plumes</td>
<td>No evident odors or plumes</td>
</tr>
<tr>
<td>Analytical results Detected VOCs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,3-Butadiene</td>
<td>0.0~0.4 ppb TCEQ ESL long term: 4.5 ppb</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>Benzene</td>
<td>0.1~0.3 ppb TCEQ ESL long term: 1.4 ppb</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>TCEQ ESL long term: 4.5 ppb</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benzen</td>
<td>0.1~0.2 ppb TCEQ ESL long term: 1.4 ppb</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethanol estimated</td>
<td>6.0~82.6 ppb TCEQ ESL long term: 1000 ppb</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbon Disulfide</td>
<td>0.0~0.4 ppb TCEQ ESL long term: 1 ppb</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM$_{2.5}$</td>
<td>Range: 2.0~4.6 μg/m$^3$ Average: 3.2 μg/m$^3$ EPA NAAQS 24-hour standard: 35 μg/m$^3$</td>
<td>Range: 6.4~9.4 μg/m$^3$ Average: 7.8 μg/m$^3$ EPA NAAQS 24-hour standard: 35 μg/m$^3$</td>
<td>Range: 6.2~13.3 μg/m$^3$ Average: 8.8 μg/m$^3$ EPA NAAQS 24-hour standard: 35 μg/m$^3$</td>
</tr>
<tr>
<td>PM$_{10}$</td>
<td>Range: 2.4~14.0 μg/m$^3$ Average: 5.0 μg/m$^3$ EPA NAAQS 24-hour standard: 150 μg/m$^3$</td>
<td>Range: 6.4~9.7 μg/m$^3$ Average: 7.9 μg/m$^3$ EPA NAAQS 24-hour standard: 150 μg/m$^3$</td>
<td>Range: 7.1~13.8 μg/m$^3$ Average: 9.8 μg/m$^3$ EPA NAAQS 24-hour standard: 150 μg/m$^3$</td>
</tr>
<tr>
<td>O$_3$</td>
<td>Range: 23.5~65.6 ppb Average: 54.7 ppb EPA NAAQS 8h standard: 75 ppb</td>
<td>Range: 11.5~25.2 ppb Average: 20.2 ppb EPA NAAQS 8h standard: 75 ppb</td>
<td>Range: 16.4~32.2 ppb Average: 27.1 ppb EPA NAAQS 8h standard: 75 ppb</td>
</tr>
<tr>
<td>NO$_2$</td>
<td>Range: 11.5~29.0 ppb Average: 18.2 ppb EPA NAAQS 1h standard: 100 ppb</td>
<td>Range: 6.0~18.1 ppb Average: 10.7 ppb EPA NAAQS 1h standard: 100 ppb</td>
<td>Range: 3.7~11.2 ppb Average: 6.7 ppb EPA NAAQS 1h standard: 100 ppb</td>
</tr>
</tbody>
</table>

Table 1 Summary of Ambient Air Monitoring Results
V. Analytical Results:

Monitoring ran from 800 to 1500 CST on **April 26, 2021**, using MAAML instrumentation to monitor VOCs, PM, O₃, and NO₂ with prevailing southeasterly winds at speeds from 6.6 to 9.5 mph (Figures 1a, 1b). During the run, the chemists noted no odors or emission plumes in the area. The concentration and the TCEQ long-term ESL are provided for 1,3 Butadiene and Benzene. Note, the TCEQ long-term ESL is provided only as a general reference for comparison as the concentrations reflect short-term, not long-term results.

1,3-Butadiene (0.0~0.4 ppb; TCEQ ESL long-term: 4.5 ppb) and Benzene (0.1~0.3 ppb; TCEQ long-term: 1.4 ppb) were detected. Concentrations for other confirmed VOCs ranged low.

On **April 26, 2021** 5-min average PM₂.₅ and PM₁₀ (GRIMM) concentrations ranged from 2.0 to 4.6 µg/m³ (average – 3.2 µg/m³ ) and 2.4 to 14.0 µg/m³ (average – 5.0 µg/m³), respectively (Figure 2), with no PM concentrations exceeding EPA NAAQS.

24h standards of 35 µg/m³ for PM₂.₅ and 150 µg/m³ for PM₁₀, respectively. 5-min average O₃ concentrations ranged from 23.5 to 65.6 ppb (average – 54.7 ppb) (Figure 3). Although the sampling period was not 8h, for general reference, O₃ concentrations did not exceed EPA NAAQS 8h standard of 75 ppb. 5-min average NO₂ concentrations ranged from 11.5 to 29.0 ppb (average – 18.2 ppb) (Figure 3). NO₂ concentrations did not exceed EPA NAAQS 1h standard of 100 ppb.

Figure 1a: Time series graph of wind speed and direction – Lavender St. (04/26/21)
Figure 1b: MAAML deployment site (29.788042°, -95.320237°) and prevailing wind – Lavender St. (04/26/21)

Figure 2: Time series graph of PM$_{2.5}$ and PM$_{10}$ concentrations – Lavender St. (04/26/21)

Note: Standards are used as a reference line but applicable only to 24-hour
Monitoring ran from 800 to 1500 CST on April 27, 2021, using MAAML instrumentation to monitor VOCs, PM, O₃, and NO₂ with prevailing southeasterly winds at speeds from 6.8 to 8.1 mph (Figures 4a, 4b). During the run, the chemists noted no odors or emission plumes in the area. The concentration and the TCEQ long-term ESL are provided for Ethanol and Benzene. Note, the TCEQ long-term ESL is provided only as a general reference for comparison as the concentrations reflect short-term, not long-term results.

Ethanol (6.0~82.6 ppb; TCEQ ESL long-term: 1000 ppb) and Benzene (0.1~0.2 ppb; TCEQ long-term: 1.4 ppb) were detected. Concentrations for other confirmed VOCs ranged low.

On April 27, 2021 5-min average PM₂.₅ and PM₁₀ (GRIMM) concentrations ranged from 6.4 to 9.4 µg/m³ (average – 7.8 µg/m³) and 6.4 to 9.7 µg/m³ (average – 7.9 µg/m³), respectively (Figure 5), with no PM concentrations exceeding EPA NAAQS 24h standards of 35 µg/m³ for PM₂.₅ and 150 µg/m³ for PM₁₀, respectively. 5-min average O₃ concentrations ranged from 11.5 to 25.2 ppb (average – 20.2 ppb) (Figure 6). Although the sampling period was not 8h, for general reference, O₃ concentrations did not exceed EPA NAAQS 8h standard of 75 ppb. 5-min average NO₂ concentrations ranged from 6.0 to 18.1 ppb (average – 10.7 ppb) (Figure 3). NO₂ concentrations did not exceed EPA NAAQS 1h standard of 100 ppb.
Figure 4a: Time series graph of wind speed and direction – Lavender St. (04/27/21)

Figure 4b: MAAML deployment site (29.788042°, -95.320237°) and prevailing wind – Lavender St. (04/27/21)
Figure 5: Time series graph of PM$_{2.5}$ and PM$_{10}$ concentrations – Lavender St. (04/27/21)

Note: Standards are used as a reference line but applicable only to 24-hour

Figure 6: Time series graph of O$_3$ and NO$_2$ concentrations – Lavender St. (04/27/21)

Note: Standards are used as a reference line but applicable only to 8h for O$_3$ and 1h for NO$_2$
Monitoring ran from 900 to 1500 CST on April 28, 2021 using MAAML instrumentation to monitor VOCs, PM, O$_3$, and NO$_2$ with prevailing southeasterly winds at speeds from 12.1 to 13.6 mph (Figures 7a, 7b). During the run, the chemists noted no odors or emission plumes in the area. The concentration and the TCEQ long-term ESL are provided for 1,3 Butadiene and Benzene. Note, the TCEQ long-term ESL is provided only as a general reference for comparison as the concentrations reflect short-term, not long-term results.

1,3-Butadiene (ND; TCEQ ESL long-term: 4.5 ppb) was not detected. Benzene (0.1~0.3 ppb; TCEQ long-term: 1.4 ppb) and Carbon Disulfide (0.0~0.4 ppb; TCEQ ESL long term: 1 ppb) were detected. Concentrations for other confirmed VOCs ranged low.

On April 28, 2021 5-min average PM$_{2.5}$ and PM$_{10}$ (GRIMM) concentrations ranged from 6.2 to 13.3 $\mu$g/m$^3$ (average – 8.8 $\mu$g/m$^3$ ) and 7.1 to 13.8 $\mu$g/m$^3$ (average – 9.8 $\mu$g/m$^3$), respectively (Figure 8), with no PM concentrations exceeding EPA NAAQS 24h standards of 35 $\mu$g/m$^3$ for PM$_{2.5}$ and 150 $\mu$g/m$^3$ for PM$_{10}$, respectively. 5-min average O$_3$ concentrations ranged from 16.4 to 32.2 ppb (average – 27.1 ppb) (Figure 9) with no O$_3$ concentrations exceeding EPA NAAQS 8h standard of 75 ppb. 5-min average NO$_2$ concentrations ranged from 3.7 to 11.2 ppb (average – 6.7 ppb) (Figure 9) with no NO$_2$ concentrations exceeding EPA NAAQS 1h standard of 100 ppb.

Figure 7a: Time series graph of wind speed and direction – Lavender St. (04/28/21)
Figure 7b: MAAML deployment site (29.788042°, -95.320237°) and prevailing wind – Lavender St. (04/28/21)

Figure 8: Time series graph of PM$_{2.5}$ and PM$_{10}$ concentrations – Lavender St. (04/28/21)

Note: Standards are used as a reference line but applicable only to 24-hour
Figure 9: Time series graph of O$_3$ and NO$_2$ concentrations – Lavender St. (04/28/21)

Note: Standards are used as a reference line but applicable only to 8h for O$_3$ and 1h for NO$_2$. 