4th of July, 2019
Air Quality Results for Maywood, CA

Created by Jennifer Lentz, Ph.D., Coalition for Clean Air
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Notes:
• Slides 2-6 in this presentation are from Sonoma Technology, Inc.’s (STI) October 17, 2019 Update, “Air Toxics and Heavy Metals: Evaluating Air Quality at a Maywood, California Elementary School” (Slides 7-9, 15)

• Slides 6 & 7 were created using data downloaded from PurpleAir’s website and have not had their values corrected using STI’s correction algorithm (which is why they are hidden)

• Slides 8-28 are based on data provided by STI of PM2.5 values corrected using STI’s algorithm based on when the sensors had been co-located with a SCAQMD BAM reference

• Slide 10 is an animation of slides 11-28
Toxic Metals

- Arsenic, As – used in semiconductor production
- Chromium, Cr – ingredient in stainless steel, chrome-plating
- Hexavalent chromium, Cr-6 – can be emitted during “hot-work”
- Manganese, Mn – ingredient in stainless steel, some batteries
- Nickel, Ni – ingredient in stainless steel, chrome-plating
- Lead, Pb – used in a wide range of applications, but largely banned in the US
Case Study: Metals in Fireworks

- Metal salts (some with chloride, Cl) are used to provide the colors in fireworks
  - Strontium = red
  - Calcium = orange
  - Sodium = yellow
  - Barium = green
  - Copper = blue
  - Magnesium, Aluminum = white

- Other metals have been added in the past or are present in illegal fireworks
  - Lead = crackle effect
  - Manganese = bright light
  - Nickel, chromium, others = igniter, propellant
Case Study: July 4th

- Fourth of July evident in concentrations of As, Ba, (Bi), Cl, Cu, K, Mn, (Pb), S, Ti, (V), Zn
- Effects seen starting around 8 p.m.
- Data used as a standalone case study

<table>
<thead>
<tr>
<th>Species</th>
<th># times above mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>As</td>
<td>14</td>
</tr>
<tr>
<td>Ba</td>
<td>233</td>
</tr>
<tr>
<td>Cl</td>
<td>23</td>
</tr>
<tr>
<td>Cu</td>
<td>165</td>
</tr>
<tr>
<td>K</td>
<td>280</td>
</tr>
<tr>
<td>Mn</td>
<td>45</td>
</tr>
<tr>
<td>(Pb)</td>
<td>242</td>
</tr>
<tr>
<td>S</td>
<td>26</td>
</tr>
<tr>
<td>Ti</td>
<td>17</td>
</tr>
<tr>
<td>(V)</td>
<td>35</td>
</tr>
<tr>
<td>Zn</td>
<td>10</td>
</tr>
</tbody>
</table>

- () = species below MDL >50% of the time
- July 4 is excluded from mean

Time series’ showing July 4th peak
Preliminary Results

• Concentrations of toxic metals were mostly below levels of concern
• July 4 – highest concentrations observed due to fireworks
• Total Cr exhibited weekday, morning peaks likely anthropogenic
• Correlation between Ni and Cr indicate potential chrome plating source(s)
July 4th - July 5th, 2019 Air Quality Index (AQI) for Corrected Particulate Matter < 2.5 micrometers (Corrected PM$_{2.5}$) for PurpleAir PA-II Monitors in Maywood, CA

Hazardous
Very Unhealthy
Unhealthy
Unhealthy for Sensitive Groups
Moderate
Good

| Sonoma Technology, Inc. developed a correction algorithm by collocating the PA-II monitors with a reference-grade instrument (a BAM) at a South Coast AQMD site in Feb, 2019, which was applied to the raw PM$_{2.5}$ ATM data |
Valores AQI para PM$_{2.5}$ corregido para Monitores PurpleAir PA-II en Maywood, CA

4 de julio – 5 de julio de Índice de calidad del aire (AQI) para materia particulada corregida <2.5 micrómetros (PM$_{2.5}$ corregido) para Monitores PurpleAir PA-II en Maywood, CA

*Sonoma Technology, Inc. desarrolló un algoritmo de corrección al colocar los monitores PA-II con un instrumento de grado de referencia (un BAM) en un sitio de South Coast AQMD en febrero de 2019, que se aplicó al PM$_{2.5}$ ATM sin procesar datos.
July 4, 2019

Sensor Locations

Air Quality

Good (0-50)
Moderate (51-100)
Unhealthy for Sensitive Groups (101 – 150)
Unhealthy (151 – 200)
Very Unhealthy (201 – 300)
Hazardous (301 – 500)
July 4, 2019

6 pm

Sensor Locations

Air Quality

- **Good (0-50)**
- **Moderate (51-100)**
  - Unhealthy for Sensitive Groups (101 – 150)
  - Unhealthy (151 – 200)
  - Very Unhealthy (201 – 300)
  - Hazardous (301 – 500)
July 4, 2019

7 pm

Sensor Locations

Air Quality

- **Good (0-50)**
- **Moderate (51-100)**
- **Unhealthy for Sensitive Groups (101 – 150)**
- **Unhealthy (151 – 200)**
- **Very Unhealthy (201 – 300)**
- **Hazardous (301 – 500)**
8 pm

July 4, 2019

Sensor Locations

Air Quality

- Good (0-50)
- Moderate (51-100)
- Unhealthy for Sensitive Groups (101 – 150)
- Unhealthy (151 – 200)
- Very Unhealthy (201 – 300)
- Hazardous (301 – 500)
July 4, 2019

Sensor Locations

Air Quality

- **Good** (0-50)
- **Moderate** (51-100)
- **Unhealthy for Sensitive Groups** (101 – 150)
- **Unhealthy** (151 – 200)
- **Very Unhealthy** (201 – 300)
- **Hazardous** (301 – 500)
10 pm

July 4, 2019

Sensor Locations

Air Quality

- Good (0-50)
- Moderate (51-100)
- Unhealthy for Sensitive Groups (101 – 150)
- Unhealthy (151 – 200)
- Very Unhealthy (201 – 300)
- Hazardous (301 – 500)
July 4, 2019

11 pm

Sensor Locations

Air Quality

- Good (0-50)
- Moderate (51-100)
- Unhealthy for Sensitive Groups (101 – 150)
- Unhealthy (151 – 200)
- Very Unhealthy (201 – 300)
- Hazardous (301 – 500)
July 5, 2019

1 am

Sensor Locations

Air Quality

- Good (0-50)
- Moderate (51-100)
- Unhealthy for Sensitive Groups (101 – 150)
- Unhealthy (151 – 200)
- Very Unhealthy (201 – 300)
- Hazardous (301 – 500)
July 5, 2019

2 am

Sensor Locations

Air Quality

- Good (0-50)
- Moderate (51-100)
- Unhealthy for Sensitive Groups (101 – 150)
- Unhealthy (151 – 200)
- Very Unhealthy (201 – 300)
- Hazardous (301 – 500)
July 5, 2019

3 am

Sensor Locations

Air Quality

- Good (0-50)
- Moderate (51-100)
- Unhealthy for Sensitive Groups (101 – 150)
- Unhealthy (151 – 200)
- Very Unhealthy (201 – 300)
- Hazardous (301 – 500)
July 5, 2019

4 am

Sensor Locations

Air Quality

- **Good (0-50)**
- **Moderate (51-100)**
- **Unhealthy for Sensitive Groups (101 – 150)**
- **Unhealthy (151 – 200)**
- **Very Unhealthy (201 – 300)**
- **Hazardous (301 – 500)**
July 5, 2019

5 am

Sensor Locations

Air Quality

- Good (0-50)
- Moderate (51-100)
- Unhealthy for Sensitive Groups (101 – 150)
- Unhealthy (151 – 200)
- Very Unhealthy (201 – 300)
- Hazardous (301 – 500)
July 5, 2019

6 am

Sensor Locations

Air Quality

- Good (0-50)
- Moderate (51-100)
- Unhealthy for Sensitive Groups (101 – 150)
- Unhealthy (151 – 200)
- Very Unhealthy (201 – 300)
- Hazardous (301 – 500)
July 5, 2019

7 am

Sensor Locations

Air Quality

- **Good (0-50)**
- **Moderate (51-100)**
- **Unhealthy for Sensitive Groups (101 – 150)**
- **Unhealthy (151 – 200)**
- **Very Unhealthy (201 – 300)**
- **Hazardous (301 – 500)**
Air Quality in Maywood, CA on the 4th of July (2019)

10 pm

Air Quality

- **Good (0-50)**
- **Moderate (51-100)**
- **Unhealthy for Sensitive Groups (101 – 150)**
- **Unhealthy (151 – 200)**
- **Very Unhealthy (201 – 300)**
- **Hazardous (301 – 500)**