Developing a community air monitoring network to assess the impact of refinery emissions

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Background

- Community air quality concerns about flaring, leaks, and overall refinery activities

- In 2015, U.S. EPA adopted 40 CFR 63.658 requiring fenceline air monitoring at petroleum refineries for benzene using passive samplers

- AB 1647 requires fenceline and community air monitoring systems to be installed on and near petroleum refineries

- South Coast AQMD developed Rule 1180

Refineries in the South Coast Air Basin, September 2015
South Coast AQMD Rule 1180

- Rule 1180 adopted in December 2017
- Fenceline monitoring by refineries
  - South Coast AQMD approves refinery plans
- Community air monitoring stations
  - Operated by South Coast AQMD
- Refinery fenceline and community air monitoring to continue indefinitely
Rule 1180 Refineries

Applies to all petroleum refineries in the Basin with throughput capacity over 40,000 barrels per day of crude oil.
Fenceline Air Monitoring

- Conducted by the refineries

- Guidelines:
  - Continuous air quality information (5-min averages)
  - Data will be shared with the public in real-time via dedicated websites

- NOTE: Not intended for emergency notification
  - It may provide additional useful information for emergency situations

- Criteria Air Pollutants
  - Sulfur Dioxide
  - Nitrogen Oxides

- Volatile Organic Compounds
  - Total VOCs (Non-Methane Hydrocarbons)
  - Formaldehyde
  - Acetaldehyde
  - Acrolein
  - 1,3-Butadiene
  - Styrene
  - BTEX Compounds (Benzene, Toluene, Ethylbenzene, Xylenes)

- Other Compounds
  - Hydrogen Sulfide
  - Carbonyl Sulfide
  - Ammonia
  - Black Carbon
  - Hydrogen Cyanide
  - Hydrogen Fluoride*
Fenceline Air Monitoring

- Adequate fenceline coverage
  - Open path technology
  - Point monitors
- Maintain good detection capabilities
  - UV-DOAS; FTIR; H2S and BC point monitors
- Maintain appropriate pathlength
Community Air Monitoring

- Network of 10 air monitoring stations in communities neighboring seven major refineries
- Conducted by the South Coast AQMD
- Continuous air quality information
- Data will be shared with the public in near real-time via dedicated website

<table>
<thead>
<tr>
<th>Refinery</th>
<th>Number of Stations</th>
</tr>
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<tbody>
<tr>
<td>Marathon, Carson</td>
<td>3</td>
</tr>
<tr>
<td>Marathon Wilmington</td>
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</tr>
<tr>
<td>Torrance Refining Company</td>
<td>2</td>
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<tr>
<td>Chevron El Segundo</td>
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<tr>
<td>Phillips 66 Carson</td>
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<tr>
<td>Phillips 66 Wilmington</td>
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</tr>
<tr>
<td>Valero Wilmington</td>
<td>1</td>
</tr>
</tbody>
</table>
Community Site Selection

Site suitability for air quality monitoring

Proximity to Sensitive Receptors and Environmental Justice

Proximity to Refinery and Non-Refinery Sources

Community Air Monitoring Site

Infrastructure, Access and Safety

Long Term Availability

Meteorology
Community Site selection (Carson, Wilmington, Long Beach)

- 5 refineries
  - Marathon Carson and Wilmington
  - Phillips 66 Carson and Wilmington
  - Valero Wilmington

- Communities of Carson Wilmington, Long Beach

- Complex wind patterns

- Evaluated approximately 30 potential sites
Community Site selection (Torrance Refinery)

- Torrance refinery
- Torrance Community
- Consistent wind patterns
  - Dominated by coastal sea breeze from southwest
- Evaluated 13 potential sites
Community Site selection (Chevron El Segundo Refinery)

- Chevron refinery

- Communities of El Segundo, Manhattan Beach, Hawthorne, Del Aire.

- Consistent wind patterns
  - Dominated by coastal sea breeze from southwest

- Evaluated 19 potential sites
Air Monitoring Equipment Selection

- Instrument Performance and measurement time resolution
- Multi-pollutant detection capability
- Level of expertise required to operate the instrument
- Expertise and reliability of manufacturer
- Community Air Monitoring Equipment
- Maintenance and Calibration Requirements
- Cost (including operations)
- Size, weight, energy consumption, spare parts, software
- Cost (including operations)
Community Air Monitoring Instrumentation

- White cell multi-pollutant analyzers – time resolution ~5 min
  - UV-DOAS – BTEX, SO2, HCHO
  - FTIR - 1,3-butadiene, acetaldehyde, acrolein, NH3, HCN, total VOC’s
- Automated mini GC – time resolution ~1 hr
  - Very sensitive 0.1 ppb detection limit for VOC’s including BTEX
- Chemiluminescence/Pulsed fluorescence – time resolution 5 min
  - H₂S
- Off-axis integrated cavity output spectroscopy (OA-ICOS)
  - HF and H₂S (for refineries with HF)
- Aethelometer
  - Black carbon (BC)
- Meteorology station
Community Air Monitoring Timeline

- **June 2019**: Community meetings to collect public feedback on Refinery Community Monitoring
- **Fall 2019**: Draft Community Air Monitoring Plan
- **Public Meeting to collect feedback**
- **Jan 2020**: Set-up of Rule 1180 community air monitoring network
- **Community air monitoring begins**
Linking Fenceline and Community air Monitoring
Summary

- Rule 1180 will establish
  - Fenceline air monitoring at seven major refineries
  - Community monitoring network in communities near refineries

- Understand the impact of refinery emissions on air quality in communities

- Display air quality data to the public in near real time via a user friendly website
  - Including notifications based on well established health-based standards (NAAQS; CAAQS; OEHHA)

- Educational material to better understand / interpret the collected fenceline and community data
Thank You

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