MATES V
ENHANCED MONITORING:
POTENTIAL PROJECTS

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MATES V Technical Advisory Group Meeting
August 24, 2017

Cleaning the Air That We Breathe…
Measurements conducted in September 2015 by multiple vendors suggest that fugitive VOC emissions from SCAB refineries may be underestimated (2015 Fluxsense report).

Incorporate enhanced monitoring of communities adjacent to refineries into MATES V framework:
- Mobile monitoring to measure local-scale gradients
- Fenceline monitoring at SCAB refineries to identify potential leaks and better characterize emissions
- Work with communities on air quality

Lessons learned would assist with future monitoring efforts.
MOBILE COMMUNITY SURVEYS (FLUXSENSE)

- Mobile laboratory equipped with optical remote sensing and in-situ optical instruments:
  - Concentration mapping
    - BTEX by UV-DOAS White cell
    - VOC's – MeFTIR cell
  - Emission flux measurements
    - VOC's by Solar Occultation Flux (SOF)
    - HCHO, NO₂, SO₂ by DOAS
    - BTEX, CH₄, NH₃ by combining SOF and UV-DOAS

Example of benzene concentration mapping

Example of plume detection at a refinery
MOBILE COMMUNITY SURVEYS (FLUXSENSE)

- Proposed use within MATES V
  - Guide placement of other monitors
  - Characterize refinery emissions and identify leaks
  - Conduct periodic community surveys
    - Identify hot-spots
    - Provide insights on small-scale gradients

Example of plume detection at a refinery

Example of benzene concentration mapping
AIRBORNE OPTICAL REMOTE SENSING (AEROSPACE)

- Aerospace Corporation’s Hyperspectral Thermal-Infrared Imaging
  - Developed over the past 20+ years
  - Airborne “Mako” and “SEBASS” hyperspectral images
  - Large area coverage
    - 20 km² / min (at 2-m GSD) from 12,500 ft (3.8 km) AGL
    - Suitable for regional-scale surveying
    - Multiple compounds detected simultaneously

Gas plumes detection at an oil refinery

Ammonia, Sulfur Dioxide, Ethene, Methane
Proposed use within MATES V

- Periodic aerial surveys of the SCAB to:
  - Identify potential emission sources
  - Aid selection of locations for enhanced monitoring
- Analysis of historical measurements over the SCAB

Gas plumes detection at an oil refinery

- Ammonia
- Sulfur Dioxide
- Ethene
- Methane
Develop / deploy an optical tent at one SCAB refinery

- Use of elevated Long Path DOAS and UV LED light source
- Pollutants detected: BTEX and other aromatic hydrocarbons, HCHO, and SO2
- Continuous (24/7) operation
- Real-time feedback for facility operator(s)
- Community alarms for accidental releases

Successfully deployed in Houston, TX, during 2015 BEE-TEX study

- BTEX measurements over residential area near a refinery

Requires approval from / collaboration with a refinery
COMMUNITY DEPLOYMENT OF “LOW-COST” SENSORS

- Work with community members to deploy “low-cost” sensors
  - EPA STAR grant: 500+ sensors for PM2.5/10, O3, NOx, T, RH
  - Community scale grant: prototype sensors for VOCs, PM, and winds
    - Apply dispersion models to identify sources
  - Incorporate data from other monitoring network(s)

- Qsense cloud
  - “Cloud Calibration” methods to address “low-cost” sensor limitations
  - Navigate geospatial and temporal data on dedicated website
  - Centralize data from multiple air monitoring devices
UPCOMING PROJECT:
TORRANCE COMMUNITY MONITORING

- Collaborative project between:
  - Sonoma Technology – monitoring
  - City of Torrance – alert and notification

- Monitoring components:
  - Open-path fenceline network
    - Real-time monitoring of HCN, HF, H$_2$S, benzene, SO$_2$, and other air toxic pollutants
  - Community monitoring
    - Four air monitoring stations for air toxics
  - Community engagement
    - Deploy ~50 “low-cost” PM sensors in communities

*Project timeline may not coincide with MATES V*