Fence Line Monitoring
&
Challenges for Implementation

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Air Pollution

➢ Great progress in past few years in reducing air pollution from stacks

  ✓ Visibly ugly and smelly smoke greatly reduced

➢ Less progress on reducing fugitive emissions

  ✓ Especially for pollutants that are hard to see or smell

Making the Invisible Visible

- Technology advances are now giving us the ability to see invisible fugitive emissions

- Pollution that is visible enhances our ability to reduce or treat it. And sometimes enables industry to save money on lost feedstock or product.

- Environmental enforcement programs are using advanced emissions monitoring to great success.

Next Generation Air Monitoring

- Traditionally, air pollution is measured by expensive, stationary and complex air-monitoring instrumentation. Only a few organizations, like CPCB, SPCBs and some large scale industries, typically collect data of such high quality. As air quality management problems become more complex, there is a need for enhanced air quality and exposure monitoring capabilities.

- The main areas of next generation air monitoring are :

- *Low Cost Sensors*

- *Mobile Monitoring*

- *Passive Fenceline Monitoring*

- *Satellite derived data driven approach*

- *Data Fusion Approaches*
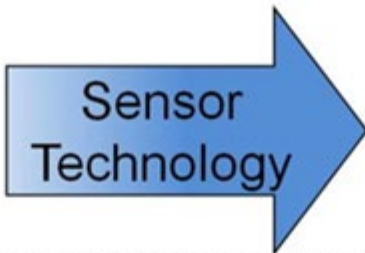
	Current Approach	Sensor Technology →	New Paradigm
How data are collected?			
Who collects the data?	Limited Mostly to Governments, Industry, and Researchers		Expanded Use by Communities and Individuals
Why data are collected?	Compliance Monitoring, Enforcement, Trends, Research		New and Enhanced Applications
How data are accessed?	Government Websites, Permit Records, Research Databases		Increased Data Availability and Access

Why Monitor around Fencelines?

Why Monitor around Fencelines?

- Purpose: "Backstop" to detect under-counted emissions (particularly fugitives)
- Certain emissions sources (e.g., fugitive leaks) difficult to quantify with methods currently available
- Uncertainties in emissions estimates related to mischaracterization of emission sources:
  - Exclusion of nonroutine emissions
  - Omission of sources that are unexpected, not measured, or not considered part of the affected source
  - Improper characterization of sources for emission models and emission factors

What is Benzene?

▶ Benzene is a colorless hazardous air pollutant with a sweet odor

    ▶ Used in the production of a wide variety of products including rubber, plastic, nylon and synthetic fibers

    ▶ Component of crude oil, gasoline, and cigarette smoke

    ▶ Highly flammable

    ▶ Evaporates into air quickly

    ▶ Human carcinogen via all routes of exposure

Why Monitor for Benzene?

▶ Benzene is found in nearly all refinery processes and waste streams

▶ Majority of refinery benzene emissions are estimated to be from leaky pipes, valves and equipment and waste water sources

▶ Exposure to benzene can lead to a variety of health effects, including increased risk of cancer

▶ Exposure to benzene was one of the primary contributors to health risks associated with refinery emissions

Benzene monitor

Why Use Passive Diffusive Tube Monitoring?

▶ Allows for continual monitoring of pollutant concentrations around the entire plant

▶ Has detection limits low enough to be able to detect the concentrations of the pollutants in the ambient air near a refinery during typical operating conditions
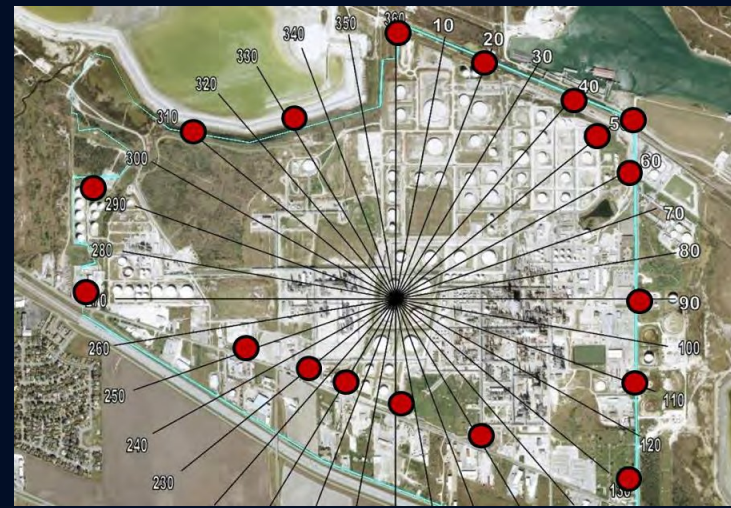
What is the "Action Level" for Fenceline Monitoring?

6.3 μg/m³

0.2 μg/m³

ΔC for a 2 week period = high - low = 6.3 μg/m³ - 0.2 μg/m³ = 6.1 μg/m³
Action Level = Annual Average ΔC < 9 μg/m³

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What are the Benefits of Monitoring to the Public?

► Encouraging early detection and correction of problems before they rise to the corrective action level

► Identifying toxic air emissions from refinery emissions sources such as equipment leaks and wastewater systems

  ► Taking advantage of low concentration level sampling technology for hazardous air pollutants emitted from industry

► Providing information on toxic air emissions to national, state and local officials and the public

► Providing requirements for refineries to take action to correct toxic air emissions from industry emission leaks

  ► Protecting public health in communities surrounding the industries

Other Benefits of Fence Line Monitoring

- Trust and Relationship is gained through
  - Consistency
  - Honesty
  - Transparency
- Proactive
- Learning from established Fence Line Monitors
- These communities change with time
- View the Community as a part of the industry

Challenges to Implementation

- Siting of Sensors

- Number of Sensors

- Frequency of Sampling

- Method of Analysis of Samples

Challenges to Implementation

- Data Reporting

- Data Display in Public Domain

Fenceline Monitoring – Monitor Siting

► 12-24 monitors (based on size of facility) are required around the perimeter of industry

▶ Additional monitors required if sources are near fenceline

► Monitors have to be placed following requirements specified by regulators

► Geographic coordinates for each monitoring location have to be reported

Fenceline Monitoring – Data Collection

► At least one sample collected from each individual monitoring location every two weeks

► The highest and lowest concentration is identified for each bi-week sampling period

► The "delta C (ΔC)" for that monitoring period is calculated as the difference of these two concentrations

► 26 consecutive bi-week ΔC values are averaged to calculate an annual average ΔC value

Fenceline Monitoring – Data Reporting

► Upon completion of the first year of monitoring, data can be reported to regulator through online monitoring system

  ► Includes actual measurements for each 2 week period for each monitoring station

► Industries must maintain the annual average ΔC value at or below prescribed norms specified by regulator time to time
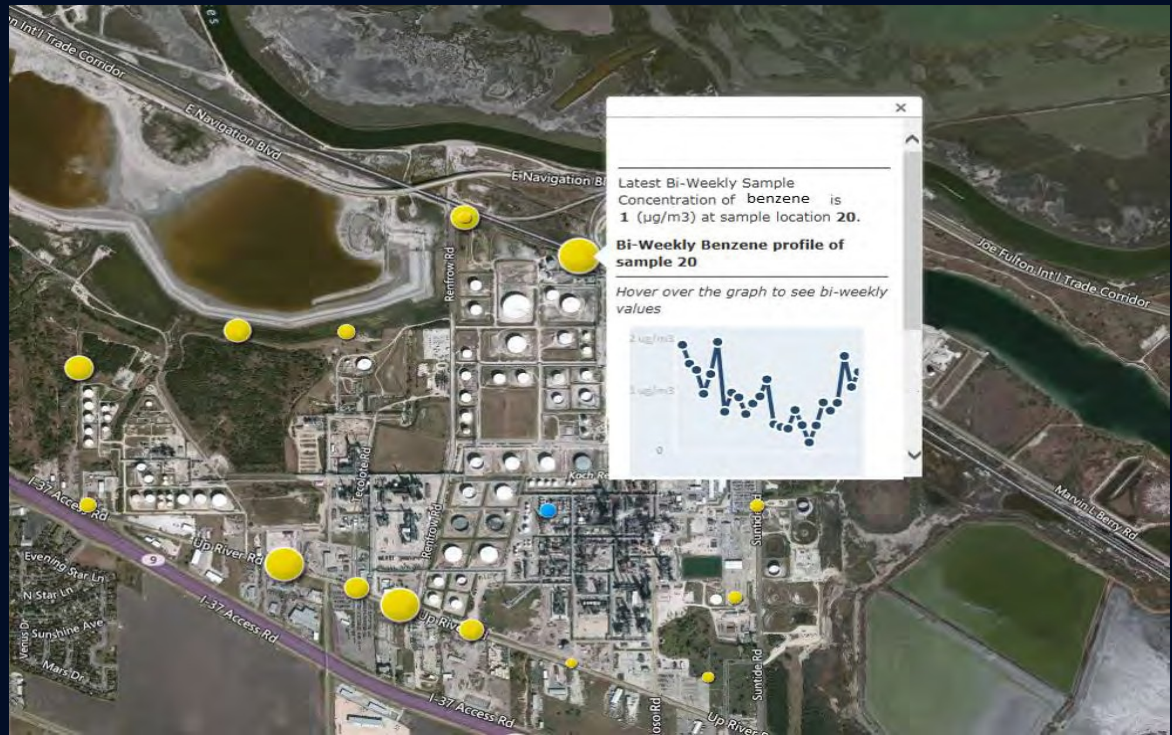
Public Display of Data

data are for demonstration purposes only

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Thanks

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