



## Assessment of Benzene Fenceline Monitoring Data for Corrective Action Planning and Near-field Source Correction

IPEC 2017  
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# Presentation Objectives

1. Review regulatory framework for benzene fenceline monitoring.
2. Provide a broad overview of fenceline monitoring requirements.
3. Examine some of the details and challenges associated with implementing a fenceline monitoring program.
4. Outline considerations for fenceline monitoring program design and implementation

# Refinery Sector Rule (RSR) Establishes Three Key Requirements

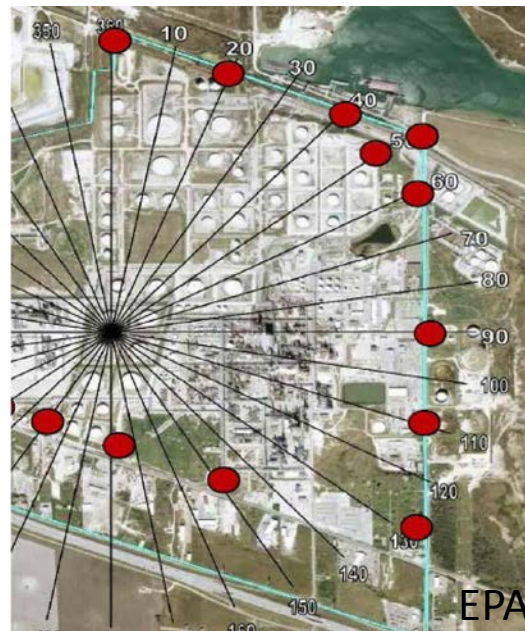
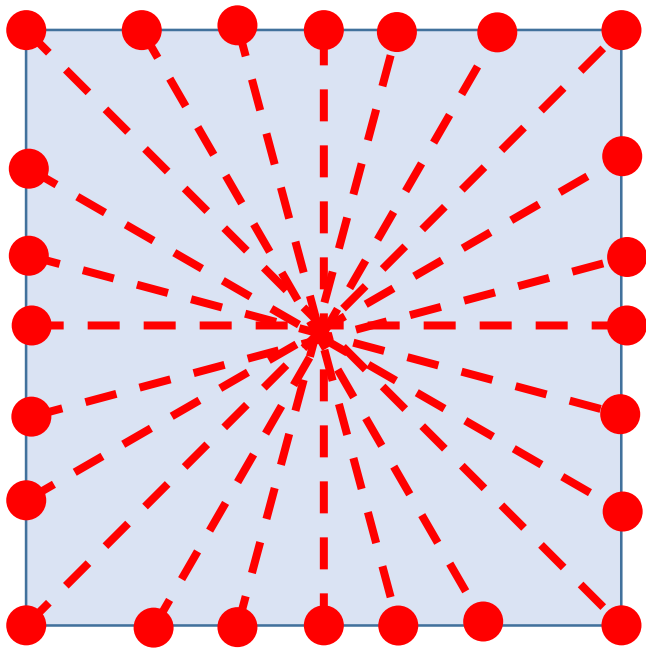
1. Emission control requirements for:
  - Storage Tanks
  - Flares
  - Delayed Coking Units
2. Elimination of exemptions to emission limits during startup, shutdown, and malfunctions
3. **Fenceline monitoring for benzene**
  - Method 325 A: VOC from Fugitive & Ambient Sources (Sampler Placement)
  - Method 325 B: VOC from Fugitive & Ambient Sources (Analysis)

# Fenceline Monitoring Program Requirements (1/3)

- Deploy a network of diffusive samplers around the perimeter of the site in accordance with EPA Method 325A.
- Two deployment options:
  1. Placed at different angles circling the geometric center of the facility along the fenceline. Size of property determines the angles.
  2. Placed along the fenceline every 2000 meters.
    - Monitor placed 1.5-3.0 m above the ground.
- Diffusive samplers analyzed by EPA Method 325B using GC/MS.

# Monitor Placement Varies with Facility Size (1a/3)

Facility Size, Acres	Angle, Degrees	Number of Monitors
Less than or equal to 750	30	12
Greater than 750 but less than 1500	20	18
Greater than 1500 acres	15	24



24 samplers placed along fenceline

Note that extra samplers are required near known sources of VOC emissions

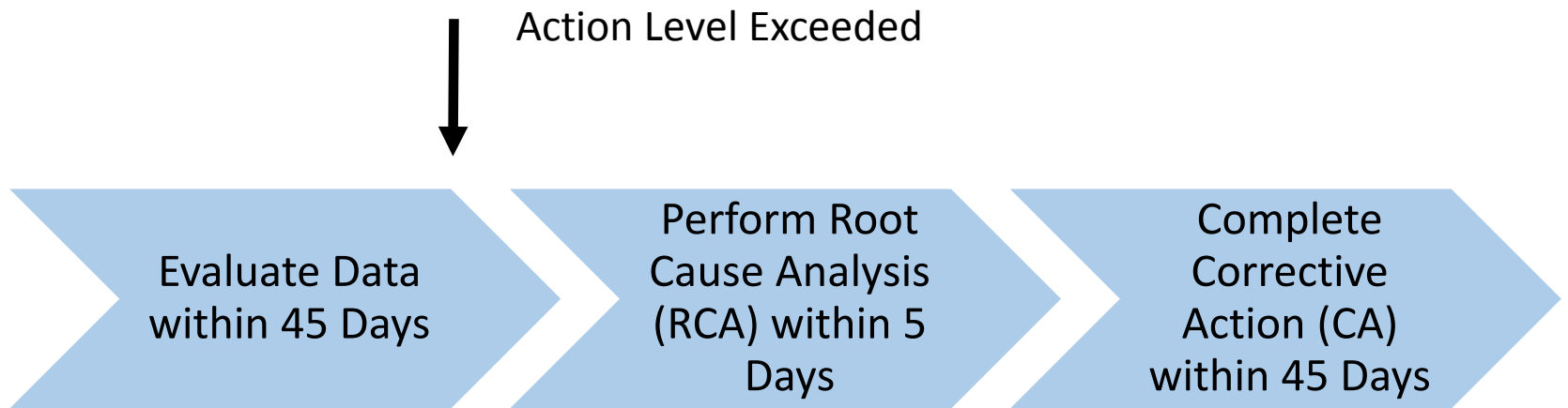
# Fenceline Monitoring Program Requirements (2/3)

- Sampling episode is defined as 14 days unless there is a reason to sample for a shorter period.
- Tubes placed in shelters and time and date are noted.
- Tubes are recovered, thermally desorbed to measure mass of collected benzene using GC/MS.
- The difference between the highest and lowest measured benzene concentrations is determined.
- Annual rolling average of the difference is calculated.
- Background and interfering near-field source adjustments are allowed if described in a sampling plan that is submitted to agency for review and approval.

# Fenceline Monitoring Program Requirements (3/3)

- Root Cause Analysis (RCA) & Corrective Action (CA) is required if difference in concentrations exceeds  $9 \mu\text{g}/\text{m}^3$  as a rolling annual average.
  - RCA
    - Method 21, optical gas imaging, visual inspections, additional 325A sampling
- Submit a formal Corrective Action Plan (CAP) to EPA if corrective action is ineffective or will take more than 60 days.
  - Attempted corrective actions, additional measures, schedules
- Report data quarterly using EPA's Compliance and Emissions Data Reporting Interface (CEDRI).

# Root Cause Analysis/Corrective Action Timeline



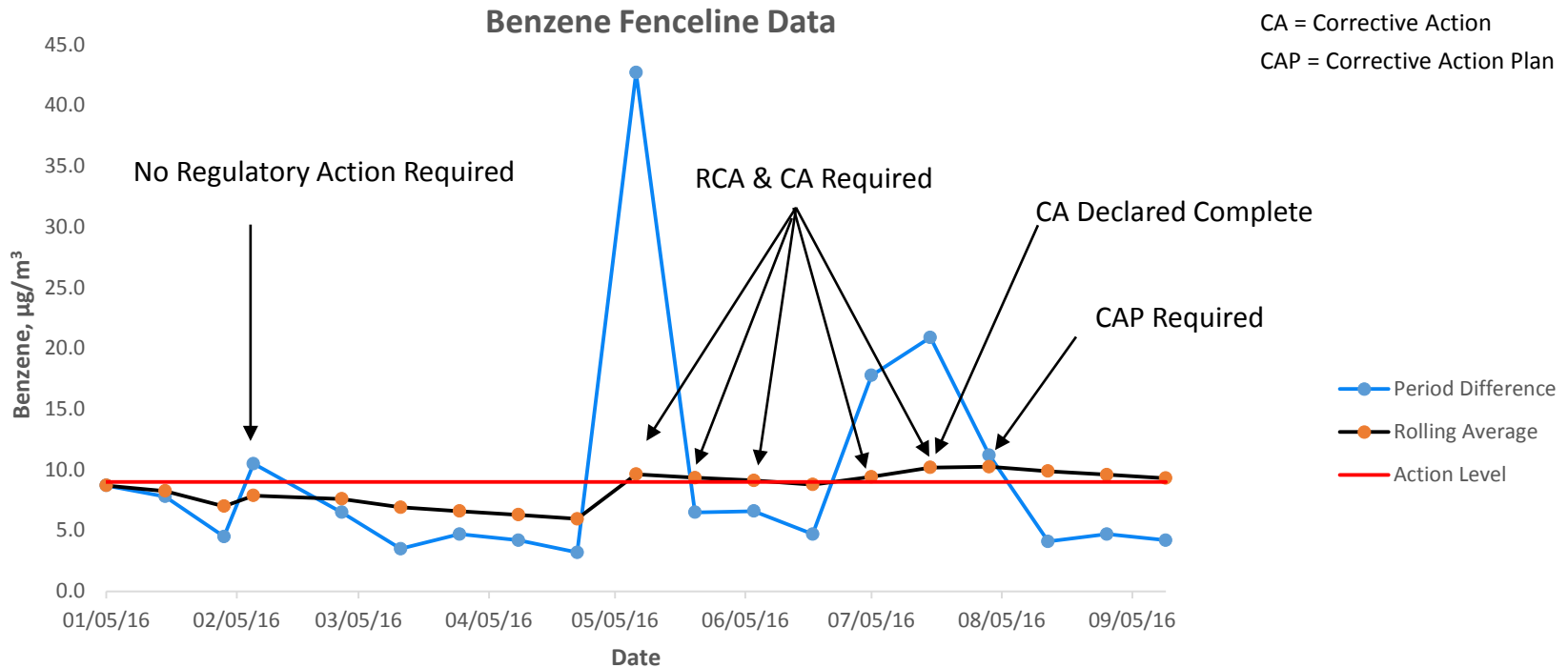
↑  
Sampling Period  
End Date

Submit Corrective Action Plan (CAP) to Agency within 60 days of triggering event if:

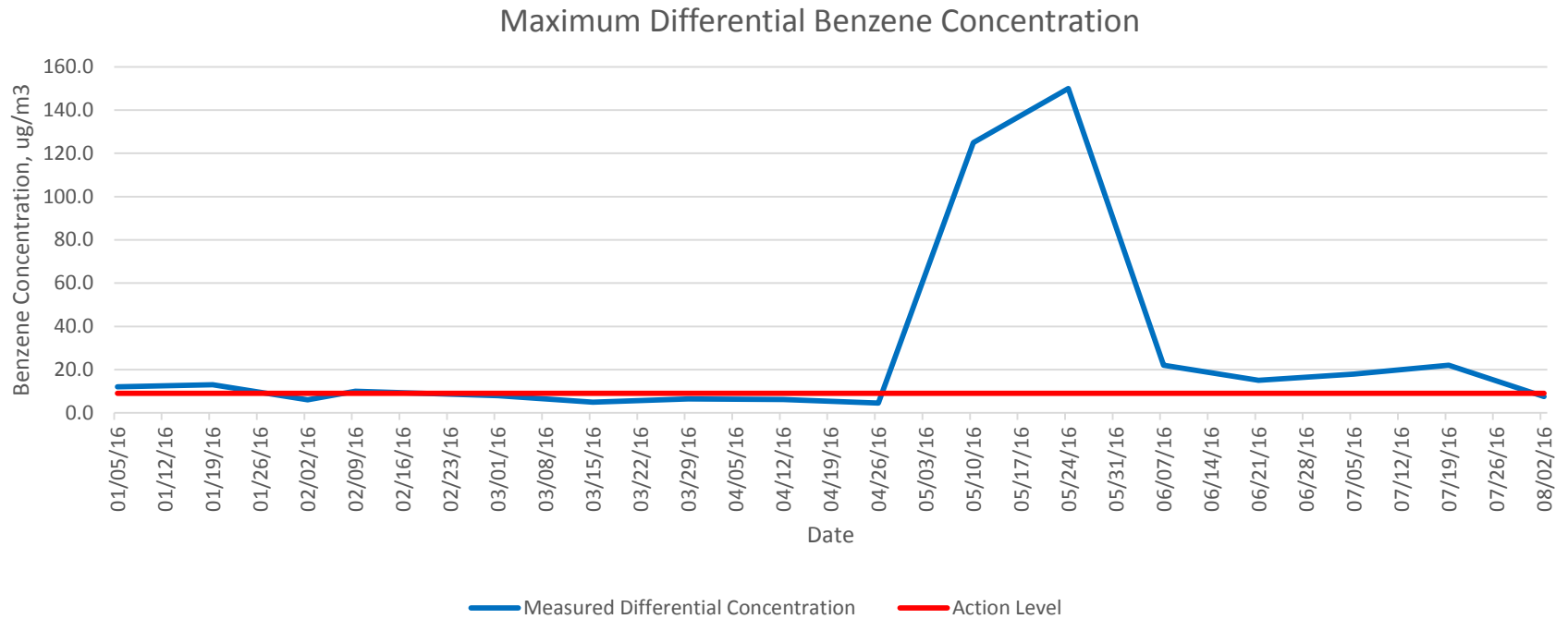
- Corrective Action Is Ineffective
- Corrective Action Takes Longer than 45 Days to Complete



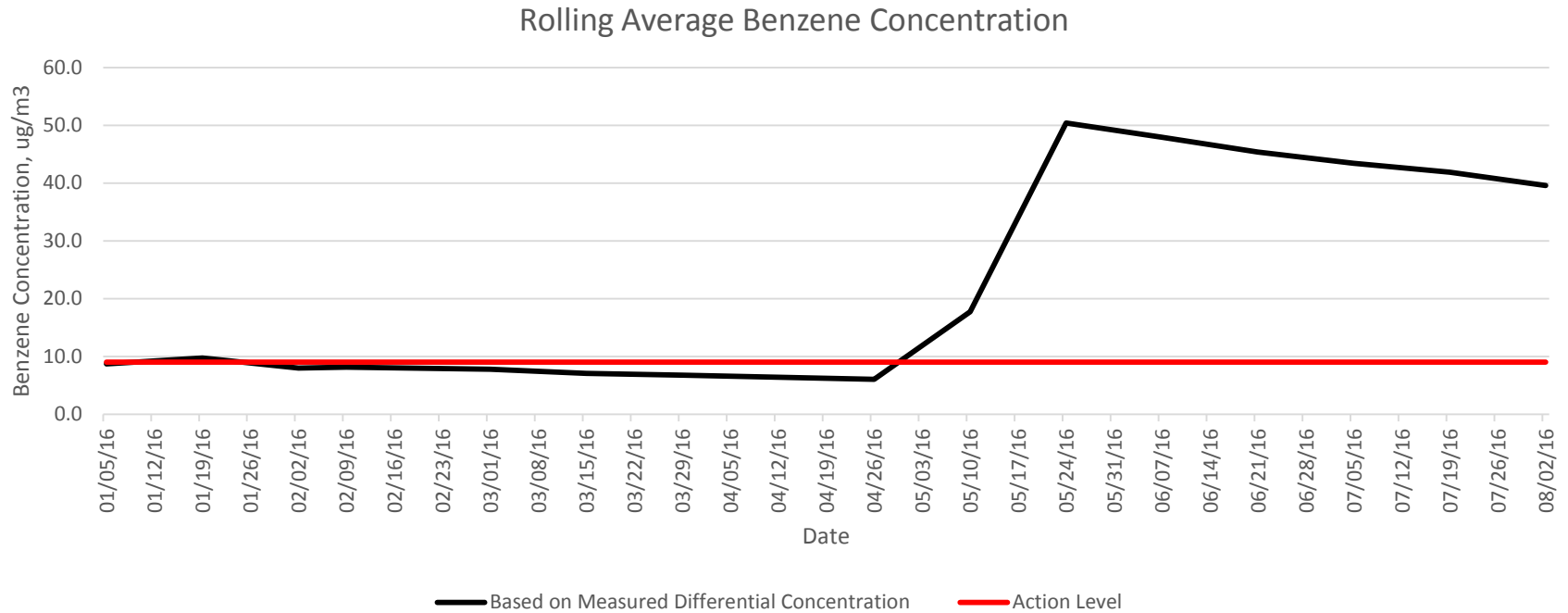
# Real World RCA and CAP Timeline



# Maximum Differential Concentrations.....



# Have Long-term Effect on the Calculated Rolling Average



# What Caused the Spike?

- Compliant tank cleaning operations.
  - Possibly an “interfering near-field source”

# Rule Allows for Interfering Near-field Source Correction

- Essentially subtract the contribution from the interfering source:

$$\Delta C_i = MFC_i - NFS_i - UB$$

where:

$\Delta C_i$  = Differential Concentration for location  $i$

$MFC_i$  = Measured Fenceline Concentration for location  $i$

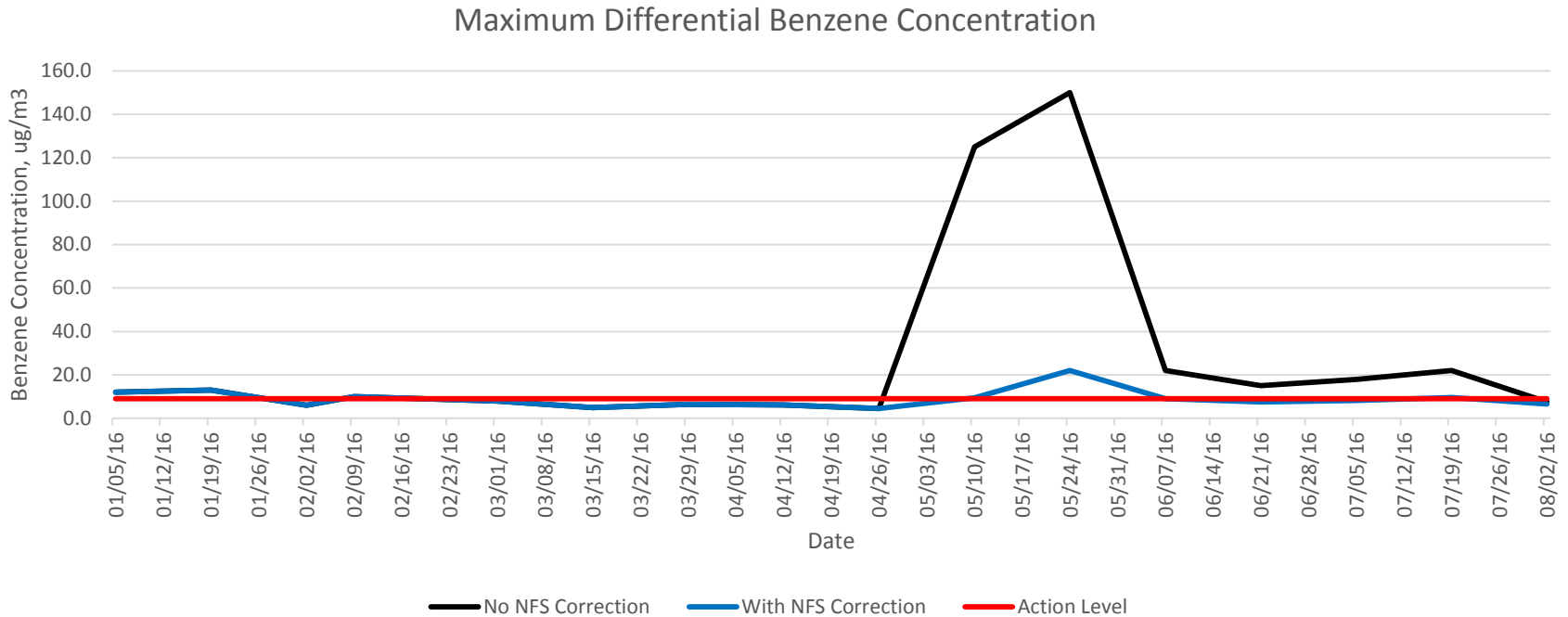
$NFS_i$  = Near-Field Interfering Source Concentration for location  $i$

$UB$  = Uniform Background Concentration

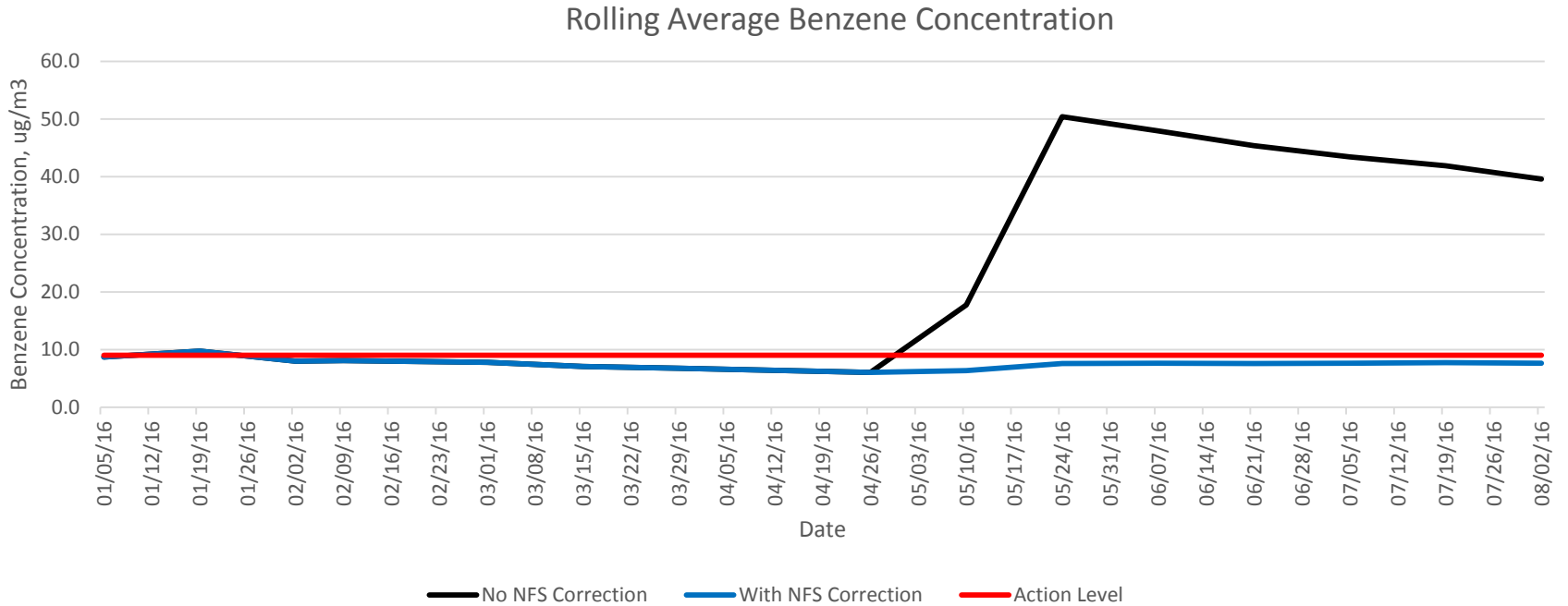
# NFS Correction Requires Site-Specific Monitoring Plan

- Site-Specific Monitoring Plan must:
  - Outline the justification for interfering NFS
  - Document criteria for UB sampling location(s) selection
  - Document criteria for interfering NFS sampling location(s) selection
  - Describe the fenceline measurement location(s) affected by the NFS(s)
  - Describe the calculation procedures
- When NFS correction are used, an on-site meteorological monitoring station is required to measure:
  - Temperature and barometric pressure (hourly)
  - Wind speed and direction (hourly)
  - Sigma theta (daily)

# Adjustment of Measurement Data for Interfering NFS Changes the Picture.....



# And the Rolling Average





# Fenceline Monitoring Program Design & Implementation Considerations

- Evaluate the data as it is generated.
- Under the RSR triggers for RCA, CA, and CAP.
- Test root cause analysis and corrective action plan approaches.
- If interfering NFS are identified, develop a site-specific monitoring plan.
- Site-specific monitoring plans require time to develop and time for approval.

Thank you

# Questions?

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