



# What to Consider When Developing a Monitoring Strategy



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# Before We Start...



# Types of Monitoring Objectives

- Ambient Air Quality Standards (regulatory)
- Emission point (source contribution)
- Exposure
- Research
- Localized impacts from pollution sources (gradients)



# Agency Ambient Monitoring Design Objectives

- Provide air pollution information to the general public
- Determine compliance with air quality standards
- Support air pollution research studies



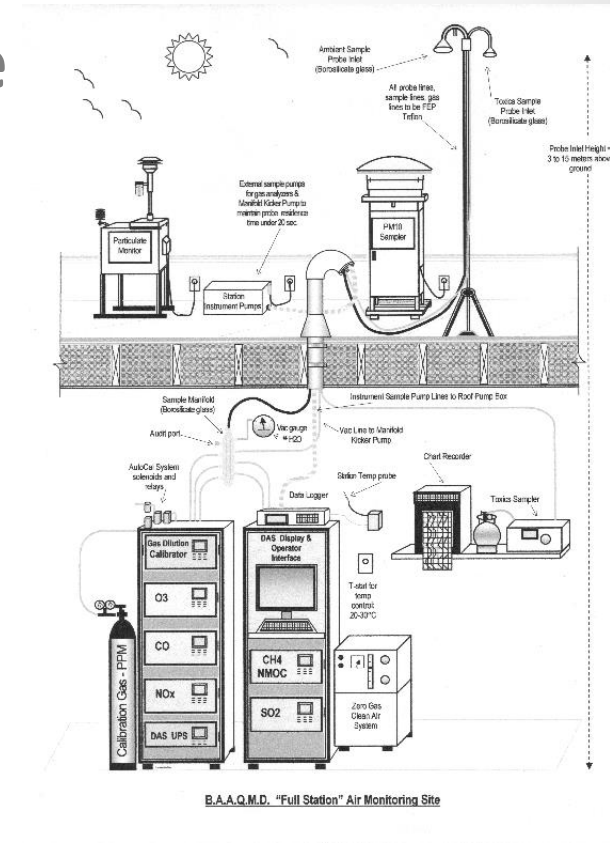
# Determining Data Requirements

- Representative compounds of interest
- Spatial and temporal representativeness
- Data quality (accuracy, precision, bias, etc.)
  - Data quality needed to take action
  - Measurement timeframes appropriate for risks of exposure
  - Uniformity of measurements
- Locations chosen need to be representative based on monitoring goal



# Location Requirements

- Locations that are representative of appropriate scale
- Locations that can represent populations/sources
- Data that represents actual concentrations over time (meteorology and topography)
- Documentation that demonstrates uniform and appropriate data quality



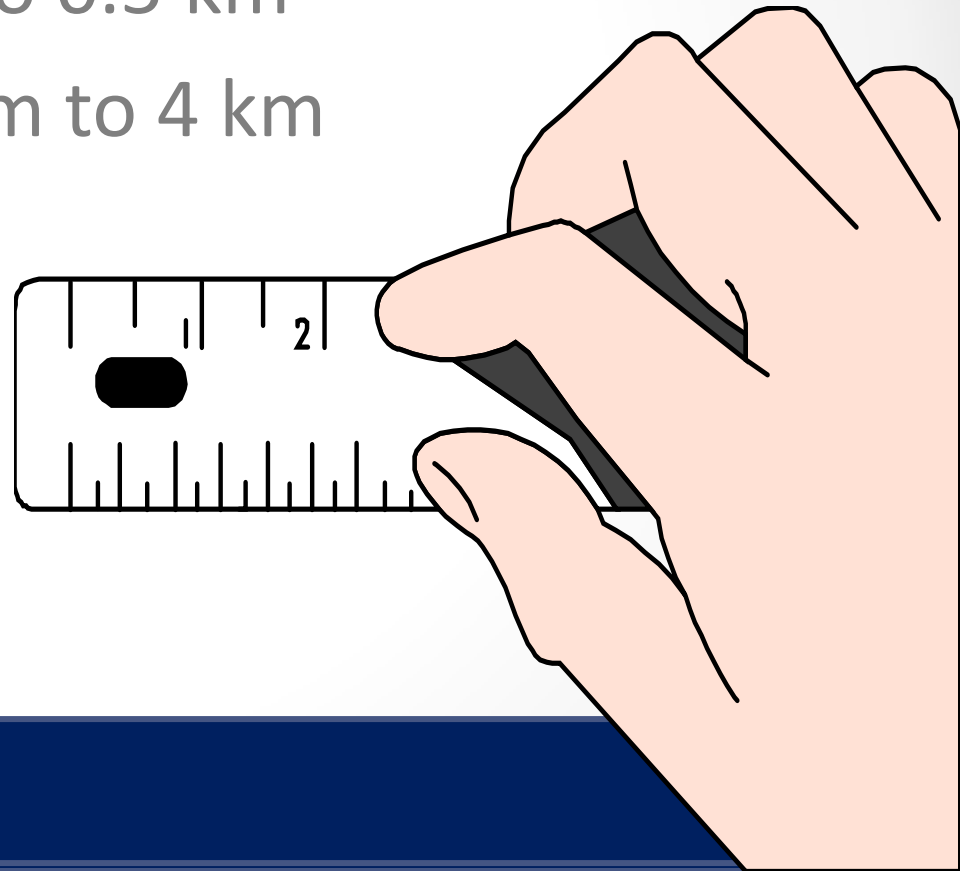
# Monitoring Design Site Types

- Highest concentration
- Typical concentrations in areas of high population density
- Source impacts
- Background
- Transport
- Visibility and other welfare impacts
- Validation/relationship to other measurements



# Scales of Representativeness

- Micro – 100 meters or less
- Middle – 100 meters to 0.5 km
- Neighborhood – 0.5 km to 4 km







**Micro Scale Site**  
**Usually Source**  
**Oriented**

**Up**  
**to**  
**100 m**



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# Middle Scale Site =

# High Concentration/Source Impacts

100 m  
to  
0.5 km

Richmond Pkwy

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0.5 km  
to  
4 km

Neighborhood Scale  
Site – Most common  
as it balances  
impacts and area



# Additional Scales of Representativeness

- Urban – 4 to 50 km (Usually population oriented sites)
- Regional – 10 to 100s of km (Usually transport sites) - PAMS
- National and Global - >100s of km (Usually background sites)



# Other Considerations

- Consistent procedures and equipment used for project
- Consistent data management and appropriate chain of custody
- Overall considerations of data defensibility and appropriate amount of data to meet desired conclusions of monitoring goal



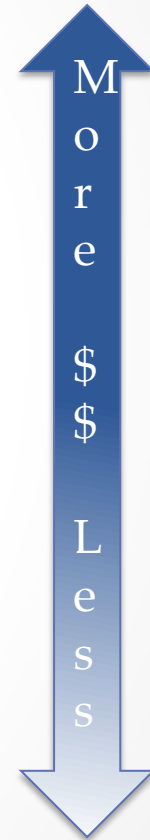
# Instrumentation Considerations

- Measurement error
- Stability
- Calibration / QC / QA
- Data reporting capabilities
- Power / Security / Safety
- Interferences
- Ease of operation
- Reliability
- Cost / Resource needs



# Instrumentation Selection

- **Regulatory Monitors**
  - Federal Reference Method
    - Operation and performance defined in CFR
  - Federal Equivalent Method
    - Meets performance criteria in CFR vs. FRM
  - Approved Regional Method
    - With EPA approval
- **Screening & Research Monitors**
  - Lower precision & accuracy
  - Confidence improved by colocation
- **Personal & Industrial Monitors**
  - Portable; lower cost



# Conclusion



Keep asking these questions to define your monitoring objectives and maximize your data quality!

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