Perimeter Air Monitoring Technical Guidance Training
Day 2 of 2

January 24, 2024 9am-12pm

Contaminated Site Remediation & Redevelopment (CSRR)

Moderators

Alissa Ambacher

Co-Moderator
NJDEP/CSRR Training Committee

Ryan Callaghan

Co-Moderator
NJDEP/CSRR Training Committee

Continuing Education Credits

Site Remediation Professional Licensing (SRPL) Board

has approved

2.5 Technical CECs

for this Training Session

Attendance Requirements:

- **Webinar participants**: must be logged-in for the entire session and answer all poll questions (randomly inserted in the presentation)

CECs: What's the Process?

Since the SRPL Board has approved CECs for the course:

- NJDEP compiles a list of "webinar" participants eligible for CECs and provides the list to the Licensed Site Remediation Professional Association (LSRPA)
- LSRPA will email eligible participants a link to an LSRPA webpage with certificate access instructions
- Certificates are issued by the LSRPA after paying a *$25 processing fee*

Test Your Knowledge

EXAMPLE WEBINAR QUIZ SLIDE

Test Poll

EXAMPLE WEBINAR QUIZ SLIDE

Why are you here today?

A. Earn CECs
B. Learn more about ECCC
C. Learn more about CSRR

Remember!

Please fill out the Course Evaluation here:

https://www.surveymonkey.com/r/JJYDCZ2

Communication

Question Function

- Please use the **questions function** to ask any questions you may have for the presenters at any time during the presentation. These will be addressed during the questions segments.
- If a question isn't addressed during a question segment of the presentation, it will be answered after the presentation.
- In order for a question to be answered live, the question must not be case specific and must be relatively short

Chat Function

- Please use the **chat function** to advise the Department of technical issues with the presentation.
- Please do not use the chat function to comment on presentations, to ask questions, or to answer other attendees' questions.

Your Job in this Training

- Participate!
- Complete polls
- Provide feedback

January 23 - 24, 2024

NJDEP Perimeter Air Monitoring Guidance Training

Credits
2.5 Technical Credits for Day One and
2.5 Technical Credits for Day Two
(Course # 2024-003)

NJ Licensed Site Remediation Professionals Association

Thank You to Our Annual Partners

Diamond Partners

Platinum Partners

Academic Institution Partner

Gold Partners

Silver Partners

UPCOMING LSRPA COURSES & EVENTS

- **Aspiring Professionals Series: Understanding Risks and Liabilities**
  - **January 25, 2024 - Session I – LSRP Third-Party Reliance & LSRP Liability**
  - **February 1, 2024 - Session II – Risk Management/Insurance**
  - **February 15, 2024 - Session III – LSRPs Practitioner's Perspective**

- **February 13, 2024 – LSRPA Virtual Regulatory Roundtable**

  Mitigating Delays Due to Offsite Access

  Instructors: Jordan M. Asch, Esq., Riker Danzig
  Alexander J. Saltzman, LSRP, French & Parrello
  William Lindner, Director- Environmental Services, NJ Natural Gas Company
  Moderator: Ken Haduch, LSRP, ERM

- **February 15, 2024 – NJ Site Remediation Professional Licensing Board Rule Updates**

  Instructors: Kathi Stetser, LSRP, GEI Consultants, Inc.
  Joann Held, NJSRPL Board Member
  Joanne Vos, Esq., Maraziti Falcon, LLP

- **February 29, 2024 – NJDEP Field Sampling Procedures Manual Training**

Visit LSRPA.org for details and registration

UPCOMING LSRPA COURSES & EVENTS

- **March 12, 2024 – LSRPA Virtual Regulatory Roundtable**

  Unmanned Aerial Systems (UAS) Applications for Environmental Assessments, Due Diligence & Remediation Planning

  Instructors: James J. Heiser, President, DPK Consulting
  Golky Barrios, UAS Operations Manager, DPK Consulting
  Moderator: Kassidy Klink, PG LSRP, Nova Group, GBC, Peak Environmental Division

- **March 19, 2024 – Remediation Funding Source and Financial Assurance Training for Environmental Practitioners**

  Instructors: Jennifer MacLeod, NJDEP, Remediation Funding Source Coordinator
  Vincent Fasanella, NJDEP, Financial Assurance Coordinator
  Christopher Venezia, LSRP, ESA Environmental Consultant

- **April 16 & 18, 2024 – LSRPA Hazardous Waste Operations and Emergency Response 8 Hour Refresher Training**

  Instructor: David Sweeney, LSRPA, Assistant Executive Director

Visit LSRPA.org for details and registration


NEW JERSEY
SITE REMEDIATION
CONFERENCE
NEW JERSEY SITE REMEDIATION CONFERENCE
HYATT REGENCY NEW BRUNSWICK
APRIL 3 & 4, 2024


Society of Women
Environmental Professionals
New Jersey Chapter
LSRPA
BCONE
BROWNFIELD COALITION OF THE NORTHEAST
SAVE THE DATE
BATTLE OF THE BANDS
SCHOLARSHIP FUNDRAISER
MAY 9, 2024
MARTELL'S TIKI BAR
308 BOARDWALK
POINT PLEASANT
Is your band ready to rock? Contact battleofthebands@njswep.org

New Jersey Licensed Site Remediation Professionals Association

@NJLSRPA

facebook

NJ LSRPA Licensed Site Remediation Prof Assoc

@NJLSRPA

Stay connected through lsrpa.org and these social media platforms.

DON'T FORGET TO RENEW YOUR MEMBERSHIP FOR 2024

SCAN ME

Not a Member of the LSRPA?

Advance your knowledge, expertise and career. Get the most current regulatory and technical updates. Network and join committees!

JOIN TODAY!

https://bit.ly/joinlsrpa

NJ LICENSED SITE REMEDIATION PROFESSIONALS ASSOCIATION
LSRPA

THANK YOU!


NJ LICENSED SITE REMEDIATION
LSRPA
PROFESSIONALS ASSOCIATION

Perimeter Air Monitoring Technical Guidance: Overview of Day One

January 24, 2024

Erica Snyder, Research Scientist
Bureau of Environmental Evaluation & Risk Assessment
Contaminated Site Remediation & Redevelopment

What is Perimeter Air Monitoring (PAM)?

- Collection and evaluation of real-time and analytical air data
  - Determine if off-site receptor exposures are maintained at levels protective of human health
- Proactively reduce potential impacts to human health before they occur
- Document PAM program is effective in protecting off-site receptors

When is PAM Required at My Site?

PAM is required by the Technical Requirements for Site Remediation at N.J.A.C. 7:26E-5.5(b)7

- Project duration greater than 20 working days within a 30-day period
- Remediation activities with the potential to generate air emissions
- Off-site receptors may be impacted

PAM Plan Development: Steps 1-5

Step 1: Identify Contaminants of Concern (COCs)

Step 2: Identify Potential Airborne Exposures

- Conceptual Site Model (CSM)

Step 3: Establish Health-Based Threshold Values (HBTV) and response levels

- PAM calculator and User's Guide

PAM Plan Development: Steps 1-5 (Cont.)

Step 4: Identify Monitoring Methods and Technologies

- Real-time monitoring equipment
- Confirmatory sampling analyses

Step 5: Identify Sampling and Monitoring Locations and Schedule

- Number and location of monitoring stations
- Fixed versus mobile
- Frequency of sampling

Topics for Today's PAM Technical Guidance Training

Step 6: Actions to Address Exceedances of the HBTV and response level

Step 7: PAM Plan Review, Modifications, and Documentation

Topics for Today's PAM Technical Guidance Training (Cont.)

- Quality Assurance Considerations
- Other Considerations
  - Contaminant-Specific Concerns
  - Asbestos
  - Air Permits
  - Hot Spots
  - Best Management Practices

Topics for Today's PAM Technical Guidance Training (Cont.)

- Case Study

- Technical Consultation Process

Step 6: Actions to Address Exceedances of the Response Levels and HBTVs

January 24, 2024

Erica Snyder, Research Scientist
Bureau of Environmental Evaluation & Risk Assessment
Contaminated Site Remediation & Redevelopment

Actions to Address Exceedances of the Response Level

Real-time monitoring instrumentation

- Response level
- Data evaluated in 15-minute Time Weighted Average (TWA)

Actions to Address Exceedances of the Response Level (Cont.)

Exceedance at perimeter of the site (first 15-minute TWA)

- Evaluate remediation activities
- Inspect instrumentation
- Inspect onsite and offsite for external source of air emissions
- Evaluate meteorological conditions

Document exceedance and actions taken

Actions to Address Exceedances of the Response Level (Cont.)

Exceedance at perimeter of the site (second 15-minute TWA – 30 minutes total)

- Implement vapor and/or dust corrective measures
  - Water, tarping, foam
- Adjust size of remedial area
- Reduce the rate of emissions generating activities

Document exceedance and actions taken

Actions to Address Exceedances of the Response Level (Cont.)

Exceedance at perimeter of the site (third 15-minute TWA – 45 minutes total)

- Continue to implement vapor and/or dust corrective measures
- Modify remedial operations
- Confirmatory sample
  - 1-hr confirmatory sample option

Document exceedance, actions taken, analytical results

Actions to Address Exceedances of the Response Level (Cont.)

Exceedance at perimeter of the site (fourth 15-minute TWA – 60 minutes total)

Actions to Address Exceedances of the Response Level (Cont.)

- Remedial operations may resume once the issue is resolved

- If exceedances occur again upon start-up
  - Shut down operations
  - Implement alternative emission controls

Test Your Knowledge

Poll #1

A response level is an HBTV-based time weighted average screening air concentration monitored in real-time.

A. True
B. False

Poll #1

A response level is an HBTV-based time weighted average screening air concentration monitored in real-time.

A. True
B. False

Actions to Address Exceedances of the HBTVs

- Laboratory analysis
- Samples should be collected over the duration of the workday when possible
- Expedited laboratory turnaround time recommended
- Implementation of engineering controls and work modifications
  - Cease remedial operations until alterations can be implemented

Other Considerations

- Proximity to off site receptors
- Contaminants of Concern (COCs)
- Visible dust leaving the site
- Dust suppression activities when remedial operations have ceased

Other Considerations (Cont.)

- Sudden spikes in air concentrations
  - Inspect instrumentation and potential sources of air emissions
  - **A SPIKE CAN RESULT IN HBTV EXCEEDANCE!!**

Documentation of Exceedances

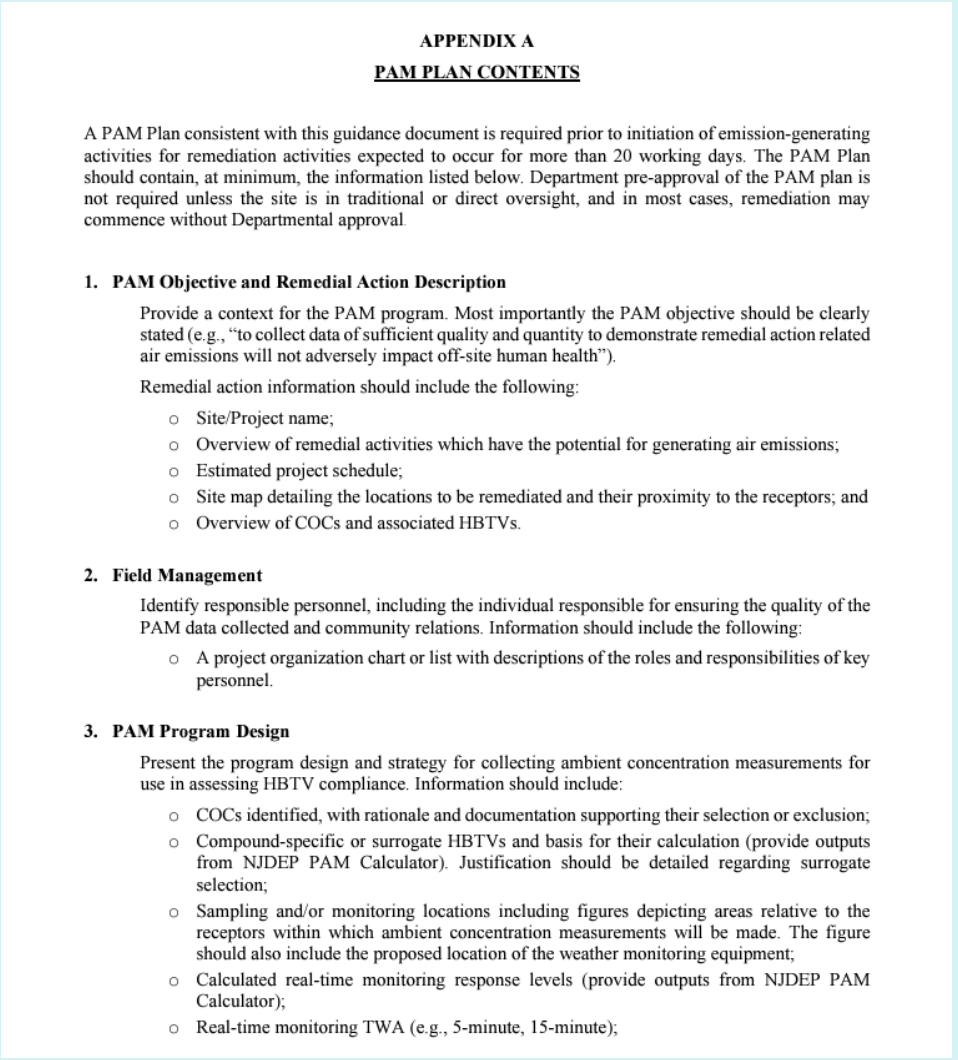
- DOCUMENT, DOCUMENT, DOCUMENT!
- Document exceedances and actions taken to address the exceedances
- Document exceedances not caused by remedial operations and the source of those emissions
- If emissions are attributable to offsite source: 1-877-WARN-DEP

Step 7: PAM Plan Review, Modifications, & Documentation

Erica Snyder, Research Scientist
Bureau of Environmental Evaluation & Risk Assessment
Contaminated Site Remediation & Redevelopment

PAM Plan Preparations

- Remedial Action Workplan
- Section 5.7 and Appendix A of PAM Technical Guidance provide elements required in PAM plan



APPENDIX A

PAM PLAN CONTENTS

A PAM Plan consistent with this guidance document is required prior to initiation of emission-generating activities for remediation activities expected to occur for more than 20 working days. The PAM Plan should contain, at minimum, the information listed below. Department pre-approval of the PAM plan is not required unless the site is in traditional or direct oversight, and in most cases, remediation may commence without Departmental approval.

1. **PAM Objective and Remedial Action Description**

   Provide a context for the PAM program. Most importantly the PAM objective should be clearly stated (e.g., "to collect data of sufficient quality and quantity to demonstrate remedial action related air emissions will not adversely impact off-site human health").

   Remedial action information should include the following:

   - Site/Project name;
   - Overview of remedial activities which have the potential for generating air emissions;
   - Estimated project schedule;
   - Site map detailing the locations to be remediated and their proximity to the receptors; and
   - Overview of COCs and associated HBTVs.

2. **Field Management**

   Identify responsible personnel, including the individual responsible for ensuring the quality of the PAM data collected and community relations. Information should include the following:

   - A project organization chart or list with descriptions of the roles and responsibilities of key personnel.

3. **PAM Program Design**

   Present the program design and strategy for collecting ambient concentration measurements for use in assessing HBTV compliance. Information should include:

   - COCs identified, with rationale and documentation supporting their selection or exclusion;
   - Compound-specific or surrogate HBTVs and basis for their calculation (provide outputs from NJDEP PAM Calculator). Justification should be detailed regarding surrogate selection;
   - Sampling and/or monitoring locations including figures depicting areas relative to the receptors within which ambient concentration measurements will be made. The figure should also include the proposed location of the weather monitoring equipment;
   - Calculated real-time monitoring response levels (provide outputs from NJDEP PAM Calculator);
   - Real-time monitoring TWA (e.g., 5-minute, 15-minute);

PAM is an Iterative Process

Relocation of monitoring stations

Data Review

Adjustment to area of remedial operations

Validation of response levels

Alternative to vapor/dust suppression methods employed

Adjustment to confirmatory sampling frequency

Document, Document, Document

- Document real-time and confirmatory air sampling data
- Document exceedances and actions taken to address the exceedances
- Adjustments to PAM Program
- Adjustments to real-time response level
- QA/QC Procedures

PAM Plan Modifications

A revised PAM Plan <u>is not necessary</u> for these modifications:

- Adjustments to real-time response level
- Monitoring technologies and methods
- Frequency of confirmatory sampling
- Location and total number of monitoring stations
- Minor remedial operation adjustments

Document in final PAM Report and provide justification

PAM Plan Modifications (Cont.)

A revised PAM Plan <u>is necessary</u> for these modifications:

- Adjustments to the HBTV that result in a more stringent value
- Significant adjustments to remedial operations/activities
- Contaminants added to the PAM plan

PAM Report

- RAR Submission
- Section 5.7.3 and Appendix A of the PAM Technical Guidance provide the elements required in the final PAM Report

PAM Final Report

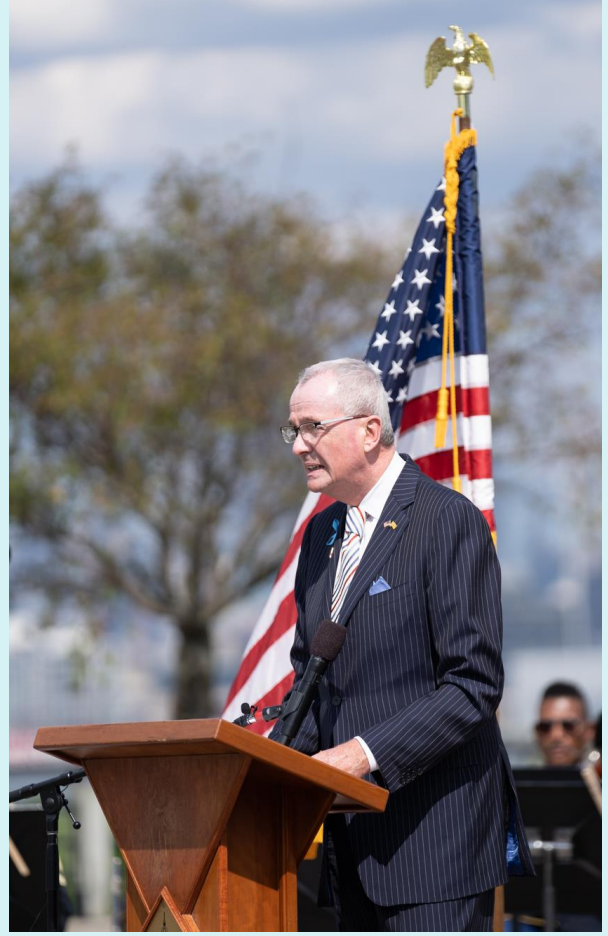
A PAM report must be provided following completion of the remedial activities. The report must contain:

- Contaminants monitored;
- HBTVs, Response Levels, and their basis;
- Site map(s) showing actual monitoring locations and receptors, and modified locations if applicable;
- Details of any modifications made to the PAM plan during implementation, and supporting documentation to justify the modifications;
- All exceedances encountered with appropriate explanation of how they were resolved;
- Daily data evaluation, including results from upwind stations, and overall results summaries. Problems identified and actions implemented for their resolution should also be noted;
- All data deliverables, including data logging files from the meteorological and monitoring stations, and daily wind roses (include as appendices);
- All results and QA/QC documentation for confirmatory laboratory analysis;
- All equipment calibration records and certification sheets; and,
- All sample or measurement traceability documentation (e.g., chain-of-custody records, sample or measurement location maps/drawings, and any other records/notes pertinent to the assessment of measurement quality).

Other Documentation Requirements

- Local and county requirements

- Federal requirements under Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)



Thank you!

Quality Assurance Considerations

January 24, 2024

Robert L. Scotto
Minnich and Scotto, Inc.

Topics

- Introduction
- Precision, Accuracy, Representativeness, Comparability, Completeness and Sensitivity (PARCCS) Criteria
- Planning Documents
- Air Measurement Methods (Sampling vs. Monitoring)

Introduction

PAM Program Objective

To demonstrate protection of human health from exposure to air emissions associated with the remedial action

- The quality of the data is meaningful only as it relates to its intended use
- For example, demonstration that HBTVs have not been exceeded

PARCCS Criteria

Refers to the following data quality attributes:

- Precision
- Accuracy
- Representativeness
- Comparability
- Completeness
- Sensitivity

- PARCCS criteria comprise the program's Data Quality Objectives (DQOs)

PARCCS Criteria (Cont.)

What is a DQO?

Performance and acceptance criteria established to support collection of scientifically reproducible and reliable data

PARCCS Criteria (Cont.)

Detailed guidance is set forth in the NJDEP Contaminated Site Remediation & Redevelopment (CSRR) Documents (April 2014):

- Quality Assurance Project Plan Technical Guidance
- Data Quality Assessment and Data Usability Evaluation Technical Guidance

PARCCS Criteria (Cont.)

- Precision: Closeness of agreement between a series of measurements
- Accuracy: Agreement between the measured value and the true value
- Representativeness: How well the measured data quantifies the exposure concentrations in the community of concern
- Comparability: Refers to the equivalency between sets of data
- Completeness: The amount of valid data required to support project decisions
- Sensitivity: The capability of a measurement method to quantify an ambient air concentration below the level of concern

Planning Documents

- PAM Plan: Presents the program objective, and provides and references the sampling/monitoring Standard Operating Procedures (SOPs) to be employed
- Quality Assurance Program Plan (QAPP): Documents how the program objective will be achieved in terms of the specific DQO established for each PARCCS element
- It is generally acceptable to incorporate the above elements into a single document

Types of Air Measurement Methods

Sampling and Analysis: A sample is collected, either on an absorbing media or in an evacuated canister, and then analyzed at a laboratory (typically located off-site)

Real-Time Monitoring: Contaminant concentrations are read directly, typically from a hand-held instrument

Note: Appendix E provides a detailed listing of air measurement DQO applicability

Sampling and Analysis: Addressing DQOs (PARCCS Criteria)

<u>Sensitivity</u> (based on HBTVs)

- NJDEP-certified method selection
- Requests can be made to Office of Quality Assurance for methods that are not yet certified

<u>Precision and Accuracy</u> (analytical)

- Quality Control (QC) samples (trip/field blanks, field duplicates)
- National Environmental Laboratory Accreditation Program (NELAP) Certified (e.g., method blanks and spikes)

Sampling and Analysis: Addressing DQOs (PARCCS Criteria) (Cont.)

Representativeness (actual exposure based on project duration)

- Spatial – Locations representative of the most vulnerable potential receptors
- Temporal – HBTV averaging period (i.e., 20-225 days, typically 8-12 hour day)
- Consider background source attribution

Comparability

- Sample collection and analysis method consistent over project duration

Sampling and Analysis (Cont.)- Documentation and Recordkeeping

Sample Traceability (space and time)

- Sample Chain-of-Custody documents
- Field documentation (e.g., logbooks, photos, sample location maps)

Data Reporting and Validation (N.J.A.C. 7:26E Appendix A)

- Laboratory data package / summary report
- Laboratory analysis validation documentation

Real-Time Monitoring: Addressing DQOs (PARCCS Criteria)

Sensitivity: based on the program action level (i.e., response level)

- Instrument selection

Precision and Accuracy

- Factory calibration
- Set-up and inspection
- Field calibration (performance and checks)
- Field duplicate measurements (collocated)

Real-Time Monitoring: Addressing DQOs (PARCCS Criteria) (Cont.)

Representativeness (maximum potential short-term exposure)

- Spatial – Locations downwind of maximum emissions (i.e., hotspots)
- Temporal – response level averaging period (5-15 minutes)

Comparability

- Instrument technology consistent over project duration

Real-Time Monitoring (Cont.): Documentation and Recordkeeping

Measurement Traceability (space and time)

- Instrument model and serial number (associated with each measurement)
- Field documentation (e.g., logbooks, photos, measurement location maps)

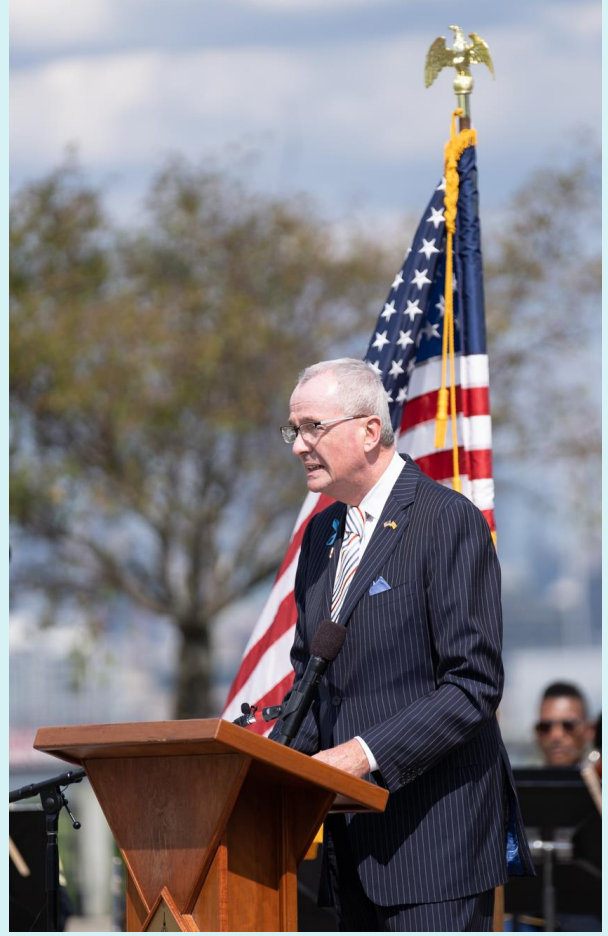
Calibration (associated with each instrument)

- Manufacturer calibration certificate (or record)
- Field bump tests / calibration
- Zeroing

Real-Time Monitoring (Cont.): Documentation and Recordkeeping (Cont.)

Measurement Reporting (N.J.A.C. 7:26I-6.27)

- Data processing software
- Raw data (upon which reported concentrations are based)



Thank you!

Other Considerations

January 24, 2024

Erica Snyder, Research Scientist
Bureau of Environmental Evaluation & Risk Assessment
Contaminated Site Remediation & Redevelopment

Chemical- Specific Concerns

- The PAM guidance recognizes that PCBs, mercury, and naphthalene can be present in ambient air in both volatile and/or particulate forms
  - Mercury and naphthalene also recognized as volatile contaminants in the Vapor Intrusion Technical Guidance
  - PCBs recognized as volatile in certain circumstances by NJDEP's Science Advisory Board

Chemical-Specific Real-Time Monitoring Concerns

- Real-time monitoring instrumentation available for mercury and naphthalene

- Real-time monitoring instrumentation for volatile PCBs is not readily available or practical

Chemical- Specific Analytical Sampling Concerns

- Confirmatory analytical sampling
  - Commencement of remedial activities for the first 3 or more days
  - Areas where the highest COC concentrations are present

Asbestos

- Asbestos level of 0.01 fibers per cubic centimeter of air
- Analysis via phase-contrast microscopy
- No real-time monitoring instrumentation available for asbestos fibers
- Sampling for asbestos and PM_{10} to be conducted daily

Air Permit Requirements

- Air permit not required for movement of contaminated material
- Air permit may be required if equipment for operations at a remediation site belong to a significant source category listed at N.J.A.C. 7:27-8.2(c)2
  - Examples where air permit may be required include in-situ stabilization (ISS), soil vapor extraction (SVE), and thermal treatment
- Air permit may be required for emissions of odorous contaminants and require an Odor Management Plan

Test Your Knowledge

Poll #2

Real-time monitoring stations at the perimeter can be mobile, stationary, or a combination of both.

A. True
B. False

Poll #2

Real-time monitoring stations at the perimeter can be mobile, stationary, or a combination of both.

A. True
B. False

Best Management Practices

- Best management practices should be employed during working hours and non-working hours
  - Wetting of areas
  - Application of tarps or foam on stockpiles
  - Avoiding emissions generating activities on windy days

- If concerned, best management practices may not be protective enough, 24-hour PAM recommended

Other Considerations – Hot Spots

January 24, 2024

Robert L. Scotto
Minnich and Scotto, Inc.

Topics

- Hot-Spot Definition
- Soil Treatability Considerations
- Real-Time Monitoring Methods
- Response-Level Compliance

Hot-Spot Definition

Unanticipated concentration levels in the soil which exceed the remediation standard or the background concentration by a factor of 10 or more

Hot-Spot Definition (Cont.)

- Because hot-spot emissions may cause acute exposure to the downwind community, all air monitoring must be performed in real time

- While certainly necessary, such monitoring should only be the “last line of defense” and never the only line of defense

Soil Treatability Considerations

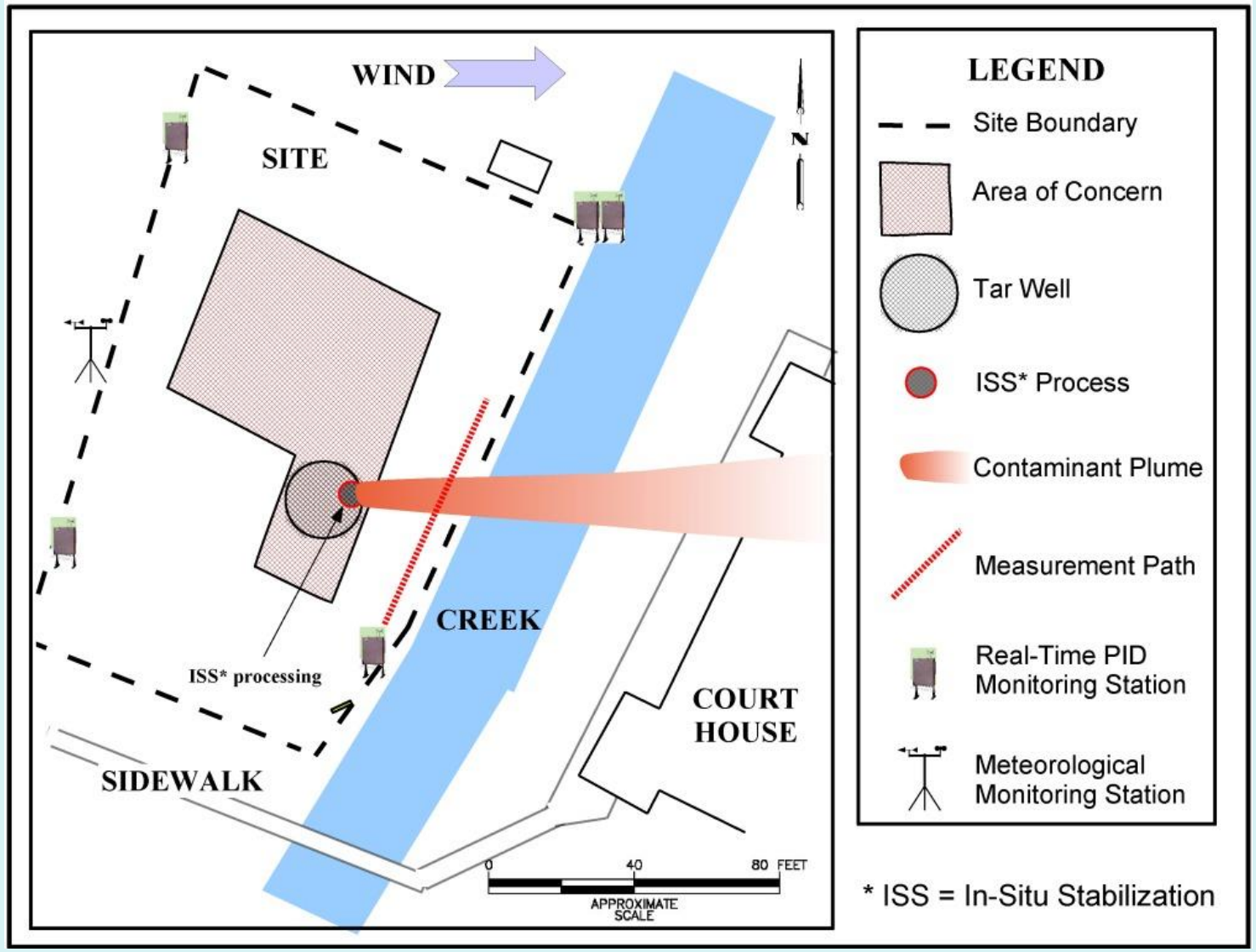
- Stabilization of hydrocarbon-contaminated soils (e.g., coal-tar cleanups) may require performance of bench- and/or pilot-scale studies
- Compliance with the HBTV and response level should be demonstrated – *a priori* – for the remedial alternative ultimately selected
- Emission factors (mass per time per unit volume treated) should be derived and scaled up to reflect the selected remedial alternative
- Demonstration of HBTV compliance is accomplished via use of dispersion modeling or a simple nomograph

Real-Time Monitoring Methods

Hand-held instruments, e.g., photoionization detectors (PIDs)

Stand-off instruments, i.e., open-path systems such as EPA Method TO-16 (Fourier Transform Infrared (FTIR) spectroscopy)

Real-Time Monitoring Methods (Cont.)



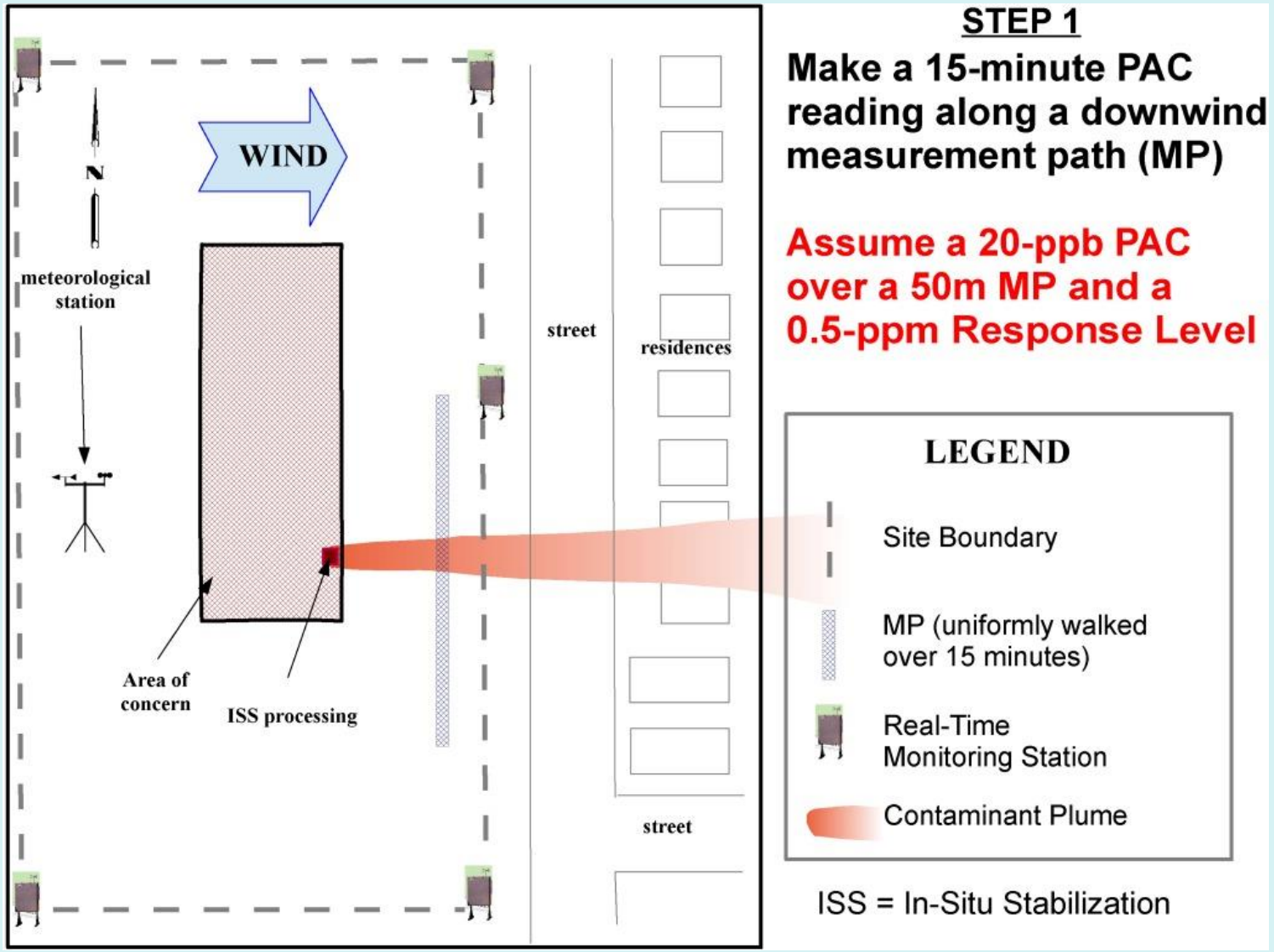
Traditional Point-Monitoring Methods Not Appropriate

Response-Level Compliance: The Path-Averaged Concentration (PAC)

- A path-averaged concentration (PAC) is generated by walking a hand-held instrument along the measurement path, downwind of the hot spot, over a 15-minute period; this yields the mean or average concentration along the entire measurement path (i.e., the path-averaged concentration)

- The 15-minute path-averaged concentration is reworked to yield an *adjusted downwind concentration (ADC)*
    - Conservatively assumes all site emissions emanate from a single small hot spot, regardless of actual hot-spot distribution across the site

Response-Level Compliance (Cont.)



STEP 1

Make a 15-minute PAC reading along a downwind measurement path (MP)

Assume a 20-ppb PAC over a 50m MP and a 0.5-ppm Response Level

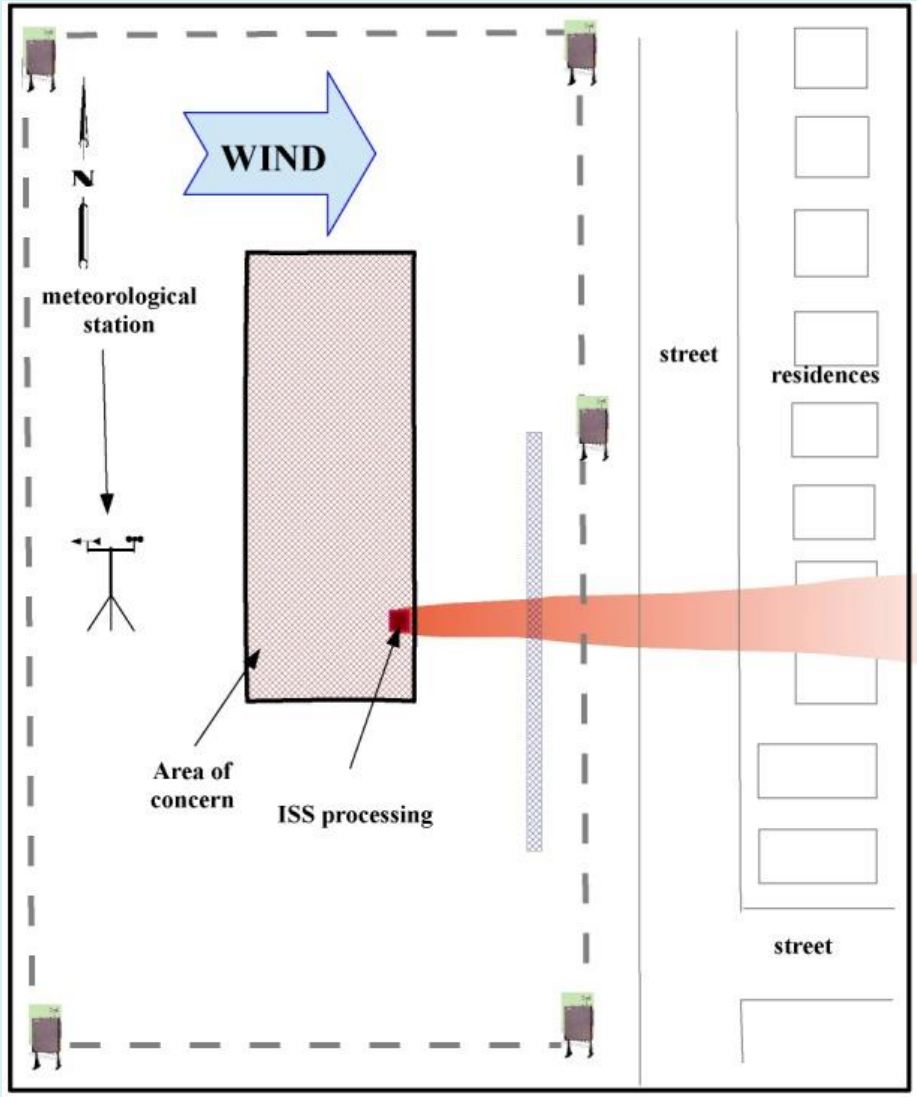
LEGEND

- Site Boundary
- MP (uniformly walked over 15 minutes)
- Real-Time Monitoring Station
- Contaminant Plume

ISS = In-Situ Stabilization

Not Exceeded

Response-Level Compliance (Cont.)



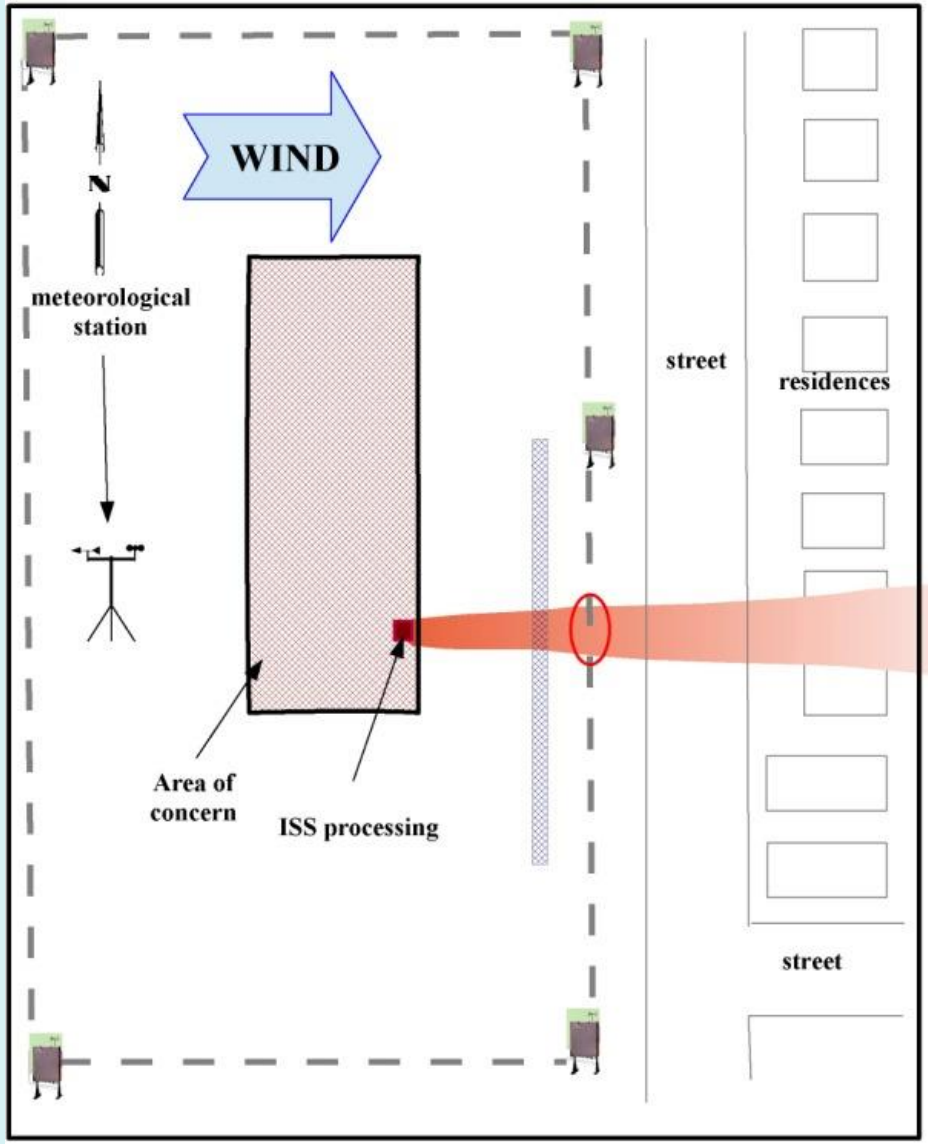
STEP 2

Estimate a hot-spot width (HSW) (e.g., the ISS soil handing / disturbance area)

Assume a 5m HSW

Not Exceeded

Response-Level Compliance (Cont.)



STEP 3

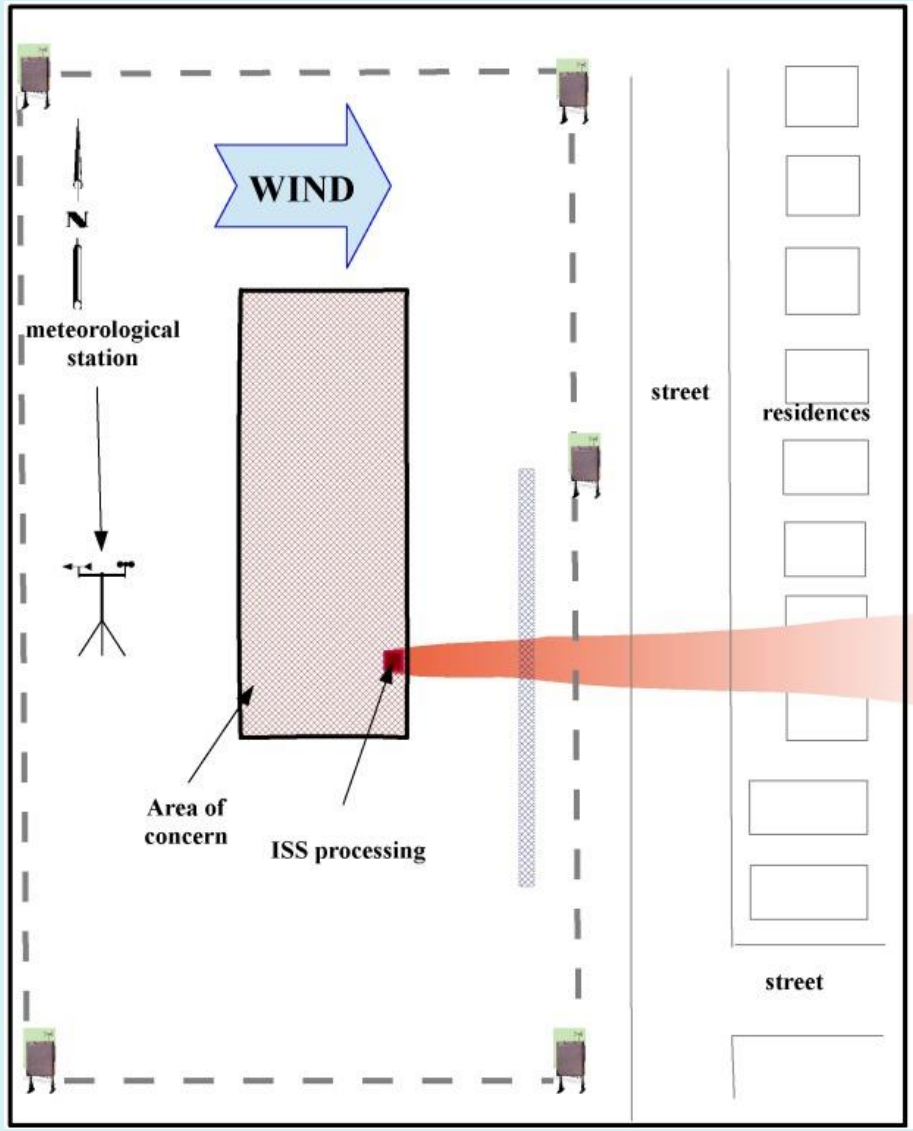
Calculate adjusted ADC; compare to Response Level

ADC = (PAC x MP) / HSW
ADC = (20 ppb x 50m) / 5m
ADC = 200 ppb (0.2 ppm)

Response Level Not Exceeded

Not Exceeded

Response-Level Compliance (Cont.)



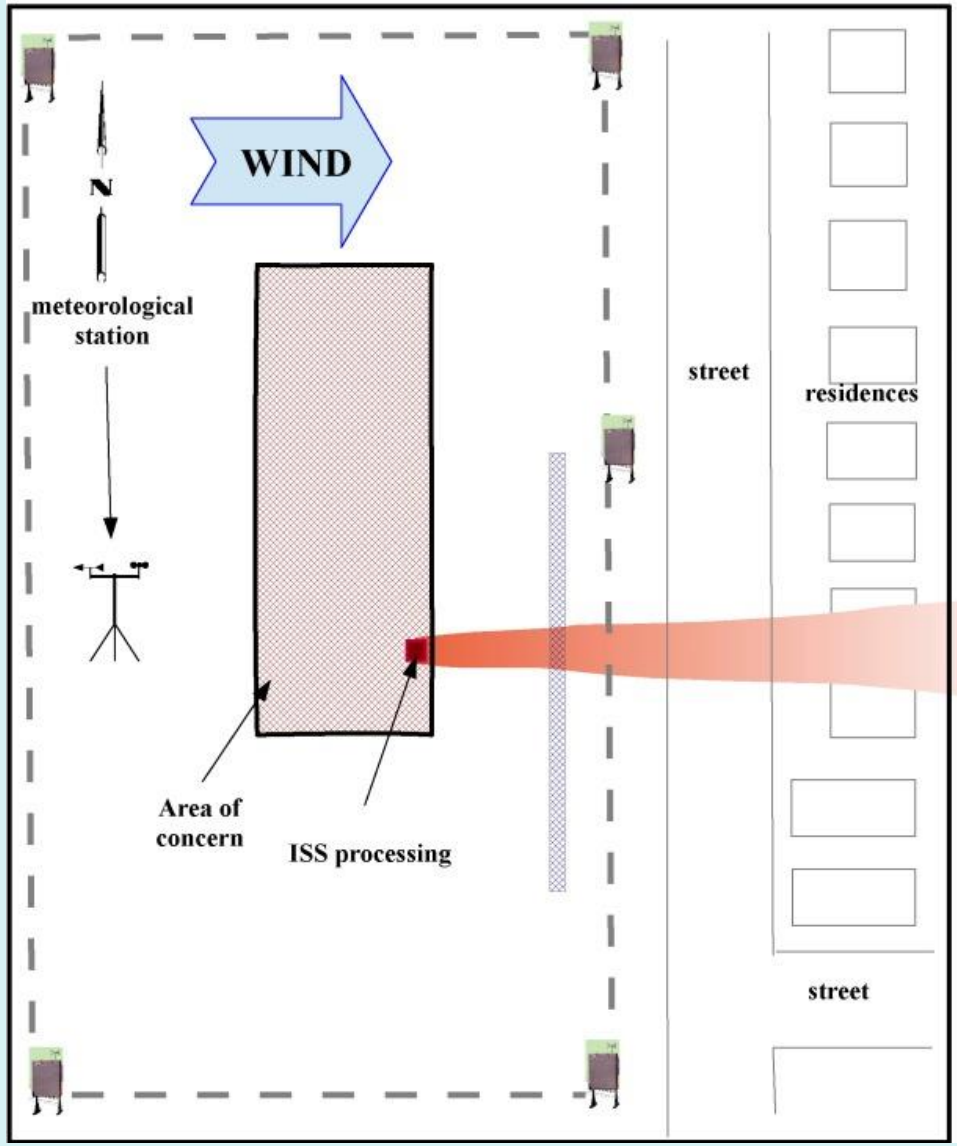
STEP 1

Make a 15-minute PAC reading along a downwind measurement path (MP)

Assume a 100-ppb PAC over a 50m MP and a 0.5-ppm Response Level

Exceeded

Response-Level Compliance (Cont.)



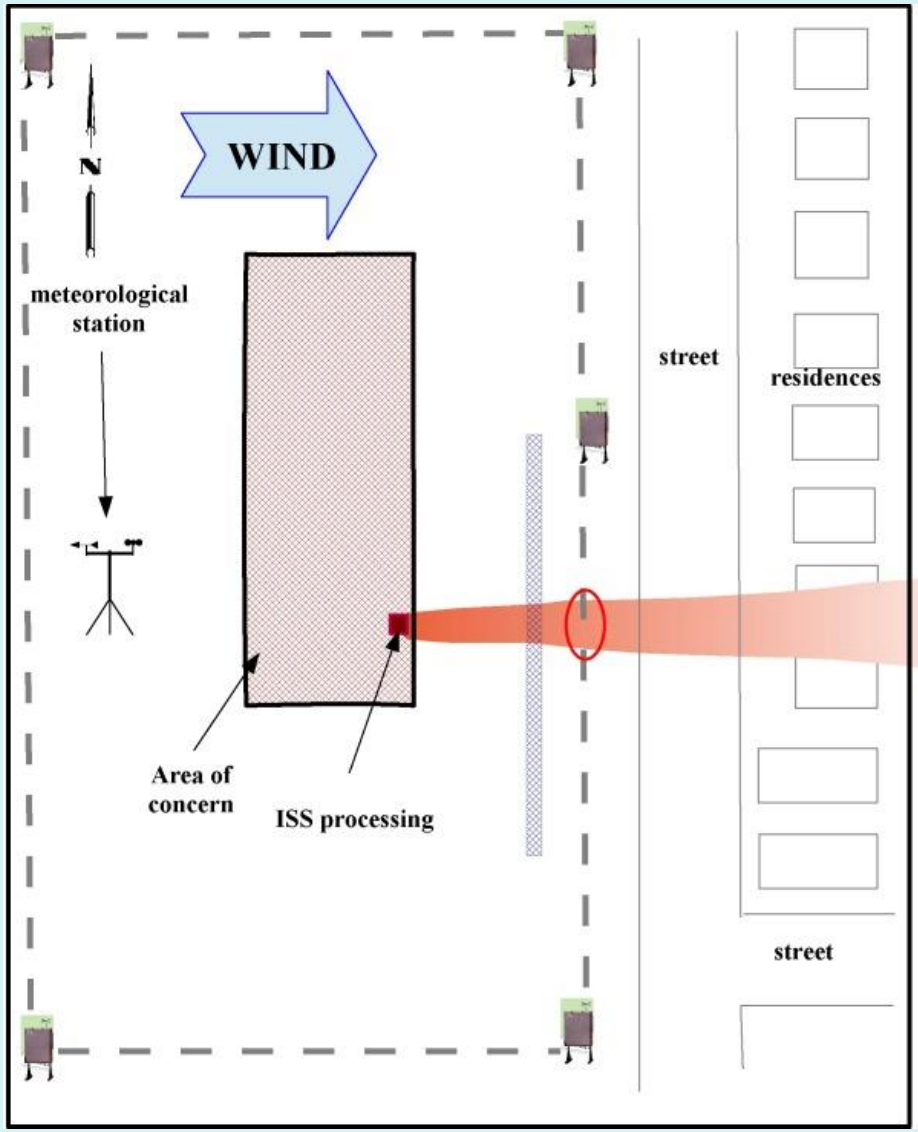
STEP 2

Estimate a hot-spot width (HSW) (e.g., the ISS soil handing / disturbance area)

Assume the same 5m HSW

Exceeded

Response-Level Compliance (Cont.)



STEP 3

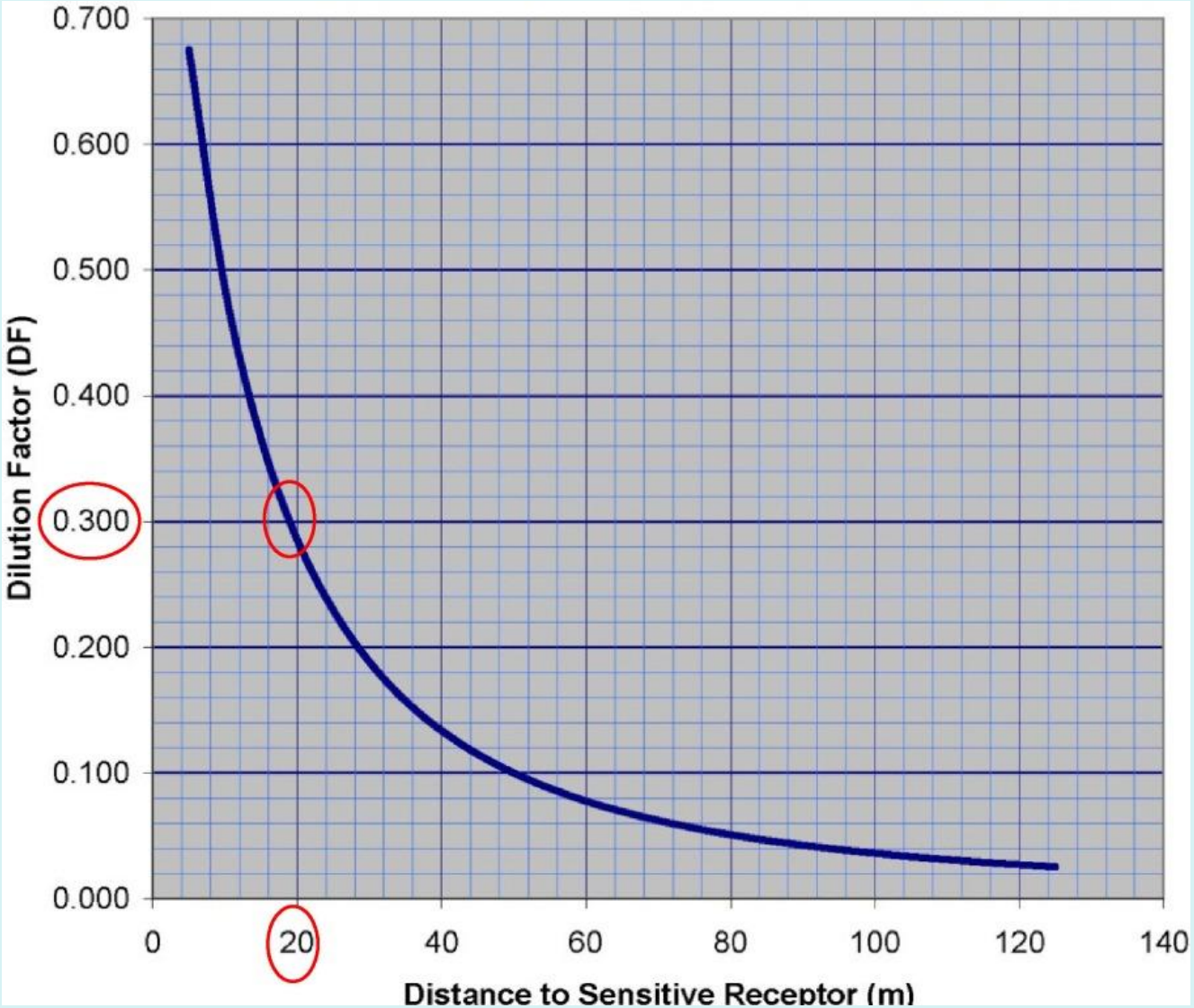
Calculate adjusted ADC; compare to Response Level

ADC = (PAC x MP) / HSW
ADC = (100 ppb x 50m) / 5m
ADC = 1,000 ppb (1.0 ppm)

Response Level Exceeded

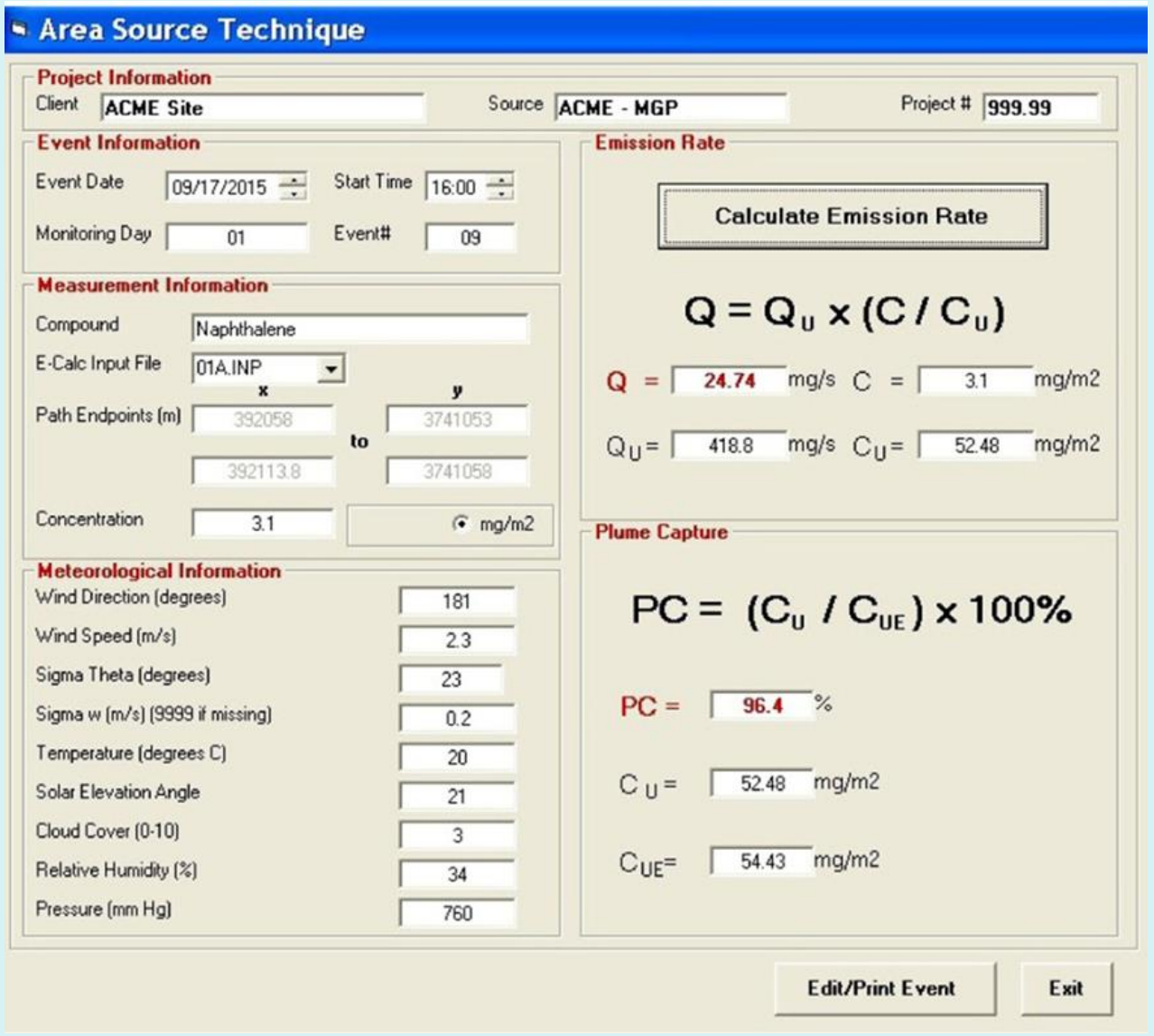
Exceeded

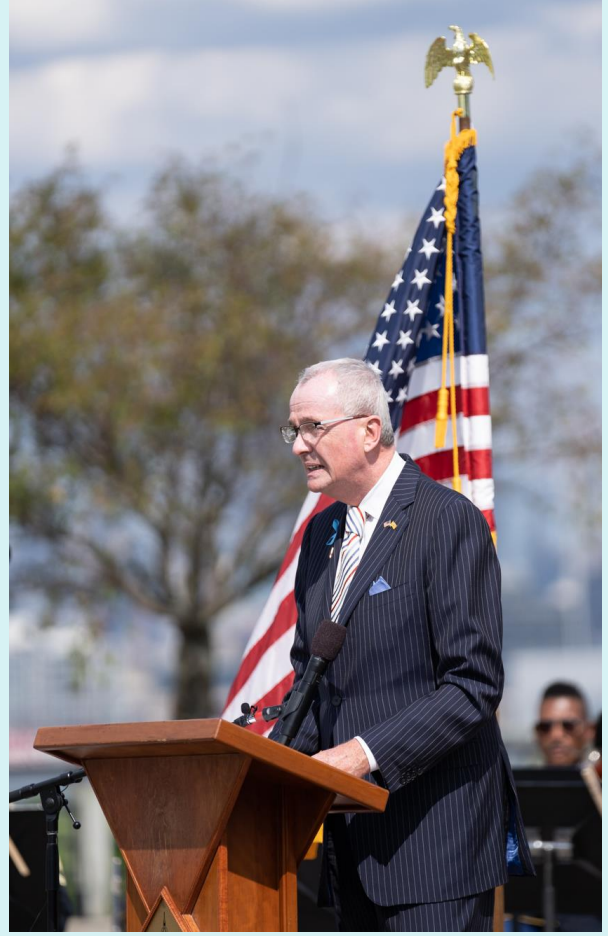
Response-Level Compliance (Cont.): "Credit" for Plume Dispersion



- The distance to downwind residences can greatly affect the hot-spot impact
- Nomograph represents plume dilution as a function of distance to nearest sensitive receptor (assumes stable conditions)
- For example, at 20 meters downwind, the DF is 0.300 (i.e., the ADC is reduced by 70%)

Response-Level Compliance (Cont.): Sample Emissions-Calculation Software (Treatability Study)





Thank you!

Perimeter Air Monitoring Technical Guidance Training Day 2 of 2

January 24, 2024

Questions?

Appendix F - Case Study

January 24, 2024

Amanda Gettelfinger, Research Scientist
Bureau of Environmental Evaluation & Risk Assessment
Contaminated Site Remediation & Redevelopment

Site Description

Remedial Activities

- Full site characterization previously conducted
- Remediation to include excavation and off-site transport
- Remedial Schedule:
  - Anticipated to take 90 working days in a calendar year (120 days, conservatively)
  - 8-hour workdays anticipated
  - 5-day work week anticipated

General PAM Application

- Designated full-time PAM technician strongly suggested

- Responsibilities include, but are not limited to:
  - Starting up and shutting down PAM stations
  - Documenting field activities, weather conditions, equipment malfunction, etc.
  - Performing zeroing, bump testing, in-field calibration, etc.
  - Collection of confirmatory samples
  - Maintaining all PAM equipment

Step 1 – Identify COCs: Particulates (Metals, PAHs, SVOCs)

Table 1 Particulate Contaminants (metals, PAHs) Identified Exceeding Most Stringent NJDEP Soil Remediation Standard	
Contaminants	95% UCL Soil Concentration (mg/kg)
Arsenic	73
Lead	2990
Mercury	24.8
Nickel	295
Benzo(a)anthracene	1190
Benzo(a)pyrene	95
Dibenz(a,h)anthracene	101
Indeno(1,2,3-cd)pyrene	304

- Conduct outlier analysis
- If 95% Upper Confidence Limit (UCL) exceeds maximum COC concentration at the site, use max. COC concentration in calculator

Step 1 – Identify COCs: Volatiles

Table 2

Volatile Organic Contaminants Identified Exceeding Most Stringent NJDEP Soil Remediation Standard

Contaminants	95% UCL COC Concentration at Site (mg/kg)	Sample Location	Total VOCs at Site* (mg/kg)	Percent Individual VOC/Total VOCs at Site (%)**
Benzene	3,059	SB-4	53,842	5.68
Toluene	6,604	SB-4	53,842	12.27
Chlorobenzene	1,899	SB-12	53,842	3.53
Vinyl Chloride	1,741	SB-7	53,842	3.23
Trichloroethene	290	SB-12	53,842	0.54
Mercury	24.8	SB-9	53,842	0.046

* Total VOCs at the Site refers to the summation of all concentrations of VOCs detected at the site during all phases of investigation.

**[% of Total Volatiles = (Individual VOC soil concentration (mg/kg)/Total VOCs soil concentration (mg/kg)) X 100]

Step 2 – Identify Potential Airborne Exposures

Conceptual Site Model (CSM) development

- Considerations
  - Physical setting
  - Nature and extent of contamination
  - Work tasks to be performed for the purposes of remedial action
  - Fate and transport of contamination
  - Off-site receptors

Based on CSM, what exposure pathways exist?

- Perimeter air monitoring addresses only inhalation exposure at the perimeter for receptor protection
- Other exposure scenarios should be identified and addressed in the site-specific health and safety plan

Step 3 – HBTVs and Response Levels for VOCs and Particulates

Table 4a.

Particulate HBTVs and Response Levels		
Contaminant	**HBTV ($\mu g/m^3$)**	**Response Level ($\mu g/m^3$)**
Arsenic	0.149	150
Lead	0.450	150
Mercury	2.74	150
Nickel	0.128	150
Benzo(a)anthracene	10.6	150
Benzo(a)pyrene	0.0183	150
Dibenz(a,h)anthracene	1.06	150
Indeno(1,2,3-cd)pyrene	10.6	150

Table 4b.

VOC HBTVs and Response Levels		
Contaminant	**HBTV (ppbv)**	**Response Level (ppbv)**
Benzene	85.7	1,510
Toluene	12,100	98,700
Chlorobenzene	99.1	808
Vinyl Chloride	357	11,100
Trichloroethylene	3.40	629
Mercury[1]	0.33	0.33

[1] Because real-time monitoring for mercury vapor is accomplished using a mercury-specific meter, the HBTV is used as the response level.

Step 3 –HBTVs and Response Levels

NJDEP Perimeter Air Monitoring HBTV and Response Level Calculator

Site Name:	Case Study	Averaging Time (year)	Exposure Time (hours/24 hours)	Exposure Frequency (days/365	Exposure Duration (year)	Number of Contaminants (Up to 4)
Site PI #:	0					
Evaluated by:	Amanda Gettelfinger					
Date:	January 24, 2024	1 (NC), 70 (C)	8	120	1	3

Trichloroethene (TCE) (Trichloroethylene)			79-01-6		
Analyzed as Volatile					
Inhalation Reference Concentration (µg/m3)	2.00E+00	HBTV (µg/m3)	1.83E+01	HBTV (ppbv)	3.40E+00
Percent of Total Volatiles in Air	5.40E-01	Response Level (µg/m3)	3.38E+03	Response Level (ppbv)	6.29E+02

Benzo(a)pyrene			50-32-8
Analyzed as Particulate			
Inhalation Reference Concentration (µg/m3)	2.00E-03	HBTV (µg/m3)	1.83E-02
Soil Concentration (mg/kg)	9.50E+01	Response Level (µg/m3)	1.50E+02

Value Exceeds NAAQS of 150 ug/m3; therefore, value defaults to NAAQS limit

Mercury (total)			7439-97-6		
Provide Justification for Analyzing as Volatile or Particulate					
Inhalation Reference Concentration (µg/m3)	3.00E-01	HBTV (µg/m3)	2.74E+00	HBTV (ppbv)	3.34E-01
Percent of Total Volatiles in Air	1.00E+02	Response Level (µg/m3)	2.74E+00	Response Level (ppbv)	3.34E-01
Soil Concentration (mg/kg)	2.48E+01	Response Level (µg/m3)	1.50E+02		

For further guidance regarding analyzing CoCs as volatiles or particulates, refer to the User's Guide, Section 5.2.

Value Exceeds NAAQS of 150 ug/m3; therefore, value defaults to NAAQS limit

Step 4 – Select Methods and Technologies (Real-Time)

Determined that use of surrogates for monitoring groups of contaminants using a non-specific meter (e.g., total volatile organic compounds (TVOCs) for volatiles) is acceptable

Technologies:

- PID for TVOCs (not to exceed the response level for TCE, per Step 3)
- Dust meter for PM_{10} (not to exceed the NAAQS 24-hour concentration for dust, per Step 3)
- Mercury-specific meter for mercury (use HBTV of 0.33 ppbv)
- Telemetry system to convey weather data

Table 5

Contaminant	Ionization Potential (eV)	Case Study Response Levels (ppbv)
Benzene	9.25	1,510
Toluene	8.82	98,700
Chlorobenzene	9.07	2,810
Vinyl Chloride	10.00	11,100
Trichloroethene	9.45	629

Step 4 – Select Methods and Technologies (Real-Time)

- Considerations for selection of real-time monitoring methods:
  - Sensitivity
  - Ease of use in the field
  - Reliability of equipment

- 15-minute time-weighted average selected for use with real-time monitoring equipment at the perimeter.

Step 4 – Select Methods and Technologies (Confirmatory)

Table 6

Contaminant	Method	Technique	Pump/Flow Rate	Analytical Sensitivity Meets HBTV (Yes/No)
Benzene	TO-15	GC/MS[1]	1-, 8-, or 24-hr	Yes
Toluene	TO-15	GC/MS	1-, 8-, or 24-hr	Yes
Chlorobenzene	TO-15	GC/MS	1-, 8-, or 24-hr	Yes
Trichloroethene	TO-15	GC/MS	1-, 8-, or 24-hr	Yes
Vinyl Chloride	TO-15	GC/MS	1-, 8-, or 24-hr	Yes
Mercury	Mod. NIOSH[2] 6009	CVAA[3]	0.15-0.25 lpm[4]	Yes

1. GC/MS – Gas chromatograph mass spectrometer
2. NIOSH – National Institute for Occupational Safety and Health
3. CVAA – Cold vapor atomic absorption
4. LPM – liters per minute

- For confirmatory sampling procedures that require the use of a pump with an internal battery (Mod. NIOSH 6009), spare pump will remain onsite
- Care will be taken to place confirmatory sampling equipment away from emissions generating equipment

Step 4 – Select Methods and Technologies (Confirmatory)

Table 7

Compound	Method	Technique	Pump/Flow Rate	Analytical Sensitivity Meets HBTV (Yes/No)
Arsenic	Mod. NIOSH[1] 7303	ICP/AES[2]	1-4 lpm[3]	Yes
Lead	Mod. NIOSH 7303	ICP/AES	1-4 lpm	Yes
Nickel	Mod. NIOSH 7303	ICP/AES	1-4 lpm	Yes
Mercury	Mod. NIOSH 6009	CVAA[4]	0.15-0.25 lpm	Yes
Benzo(a)anthracene	TO-13A	PUF[5] and GC/MS[6]	8 ft^3/min (0.225 m^3/min) ±10%	Yes
Benzo(a)pyrene	TO-13A	PUF and GC/MS	8 ft^3/min (0.225 m^3/min) ±10%	Yes
Dibenz(a,h)anthracene	TO-13A	PUF and GC/MS	8 ft^3/min (0.225 m^3/min) ±10%	Yes
Indeno(1,2,3-cd)pyrene	TO-13A	PUF and GC/MS	8 ft^3/min (0.225 m^3/min) ±10%	Yes

1. NIOSH – National Institute for Occupational Safety and Health
2. ICP/AES – Inductively coupled plasma atomic emission spectroscopy
3. LPM – liters per minute
4. CVAA – Cold vapor atomic absorption
5. PUF – Polyurethane foam
6. GC/MS – Gas chromatograph mass spectrometer

- For confirmatory sampling procedures that require the use of a pump with an internal battery (e.g., Mod. NIOSH 7303), spare pump will remain onsite
- For confirmatory sampling procedures that require an external power source (TO-13A), extension cord will be run from an onsite trailer with electrical hookup or a generator with a gas reservoir capable of running for the duration of the workday will be connected.
- Care will be taken to ensure that the emissions from the generator are not impacting the results of air sample collection

Step 5 – Identify Sampling and Monitoring Locations and Schedule

- On-Site Trailers
- PAM station
- Weather telemetry hub
- WSD meter

Step 5 – Identify Sampling and Monitoring Locations and Schedule

- On-Site Trailers
- PAM station
- Weather telemetry hub
- WSD meter
- Remediation area

Step 5 – Identify Sampling and Monitoring Locations and Schedule

Real-time Monitoring

Schedule:

- Perimeter air monitoring conducted during all soil disturbing activities
- Equipment powered on, zeroed, and bump tested (as applicable) prior to commencement of soil disturbing activities
- Equipment calibrated in-field at designated frequencies (per equipment User's Manual) prior to commencement of soil disturbing activities
- Weather monitoring to operate for the duration of workday

Set-up:

- Each PAM station will have PID, dust meter, and mercury meter inside weather-proof enclosure; will be connected to telemetry
- Extra real-time equipment on chargers in trailers
- Full weather station near in parking lot (near trailers)
- WSD's co-located with west PAM station and one of the three east PAM stations

Step 5 – Identify Sampling and Monitoring Locations and Schedule

Confirmatory Sampling

Schedule:

1. Pre-remedial analytical air samples collected for three consecutive days prior to the commencement of remedial activities (use same methods selected in Step 4 for VOCs, particulate, and mercury) for duration of proposed workday (8 hours)
2. Confirmatory air samples collected for all site COCs for the first three consecutive days of remedial activities at the anticipated prevailing downwind locations for duration of workday. The confirmatory samples will be collected for the duration of the workday
3. If HBTVs not exceeded during previous step, confirmatory sampling reduced to once per week for all COCs, rotating days of week

* For mercury, if confirmatory air sample data consistently demonstrates that one of the forms of mercury is not present in air, discretion will be used to discontinue sampling for that fraction

Step 5 – Identify Sampling and Monitoring Locations and Schedule (Cont.)

Confirmatory Sampling

Set-up:

- Multiple downwind air samples may be collected; only one series of samples from one location submitted for analysis
- Confirmatory samples set up away from emissions generating equipment, and activities not related to remediation
- Trip blanks, field blanks, duplicates collected in accordance with site-specific Quality Assurance Protection Plan

Step 5 – Identify Sampling and Monitoring Locations and Schedule (Cont.)

Shorter Duration Confirmatory Sampling

A shorter-duration confirmatory sample (1-hour duration) will be collected if an exceedance is sustained or surpasses 45 minutes in duration at the perimeter

- Collected at the perimeter station exhibiting exceedance and will be specific to the volatile or particulate fraction (or both)
- Each confirmatory sampling method for that fraction (e.g., TO-13A, NIOSH method 7303, and NIOSH method 6009 for particulate) will be collected for one hour
- Expedited turnaround time
- Results will be reviewed to determine whether site COCs were present during alarm condition, and whether work practices need to be adjusted
- When PIDs are denoting an exceedance, presence or absence analysis will be conducted using a TCE-specific colorimetric gas tube and manual tube pump
  - If colorimetric gas tube indicates TCE is present during or after the alarm condition, soil disturbing work will be halted, and work practices will be amended

*See Step 6 for additional information on responses to alarm conditions

Step 5 – Identify Sampling and Monitoring Locations and Schedule (Cont.)

Confirmatory Sampling

- If HBTVs are exceeded during the first three days of confirmatory sampling OR during weekly confirmatory sampling:
  - Assess analytical data to see if new COCs are present
  - Determine whether the incorrect real-time monitoring equipment was selected to detect COCs at perimeter
  - Determine whether incorrect surrogate was selected for real-time monitoring of COCs
  - Determine if characterization data was insufficient to calculate HBTVs and response levels

Step 6 – Select Actions to Address Exceedances of Perimeter Response Levels

Action to Address Real-time Exceedances at Perimeter

If 15-minute TWA for TVOCs or PM10 is exceeded:

- Exceedance > 15 min – check instrumentation, identify possible emission sources
- Exceedance > 30 min – engineering controls (e.g., dust suppression) if from site related activities
- Exceedance > 45 min – continued engineering controls, collection of 1-hour confirmatory sample, collection of colorimetric gas tube sample (see confirmatory sampling schedule)
- Exceedance > 60 min – continued engineering controls, work cessation

- Document, document, document!

Step 7 – PAM Plan Review, Modifications, and Documentation

PAM Plan Modifications

All PAM plan modifications will be included in the final PAM report. Examples of modifications may include:

1. Relocation of perimeter air monitoring stations - document
2. Change in real-time monitoring methods – document
3. Change in confirmatory air sampling methods – document
4. Change in selected remedial activities – revise PAM plan
5. Change in work duration (day length or project length) (recalculate HBTVs) – revise PAM plan
6. Collection and inclusion of new characterization data – revise PAM plan
7. Other

Step 7 – PAM Plan Review, Modifications, and Documentation (Cont.)

PAM Plan Documentation (see Appendix A of PAM Technical Guidance)

To be included (at minimum) in final PAM Report:

1. Contaminants monitored
2. Tabulated soil data used for calculations
3. HBTVs and response levels
4. Site map with monitoring locations
5. Modifications made
6. Daily summary logs
7. Data deliverables
8. QA/QC documentation
9. Monitoring equipment zeroing/bump testing/calibration logs
10. Exceedance and corrective action logs
11. Community relations issues/procedures

QA/QC Considerations

- Daily QA/QC
  - Perform and document zeroing, bump testing, in-field calibration (as needed)
  - Documentation of site activities, weather conditions, perimeter exceedances, confirmatory samples collected
  - Documentation of real-time monitor issues and corrective actions
  - On-site filing of calibration information for each piece of real-time equipment and lab certifications for confirmatory sampling equipment

- Quality Assurance Sample Collection
  - Trip/field blanks and duplicates will be collected at frequency specified in the site-specific Quality Assurance Project Plan

Test Your Knowledge

Poll #3

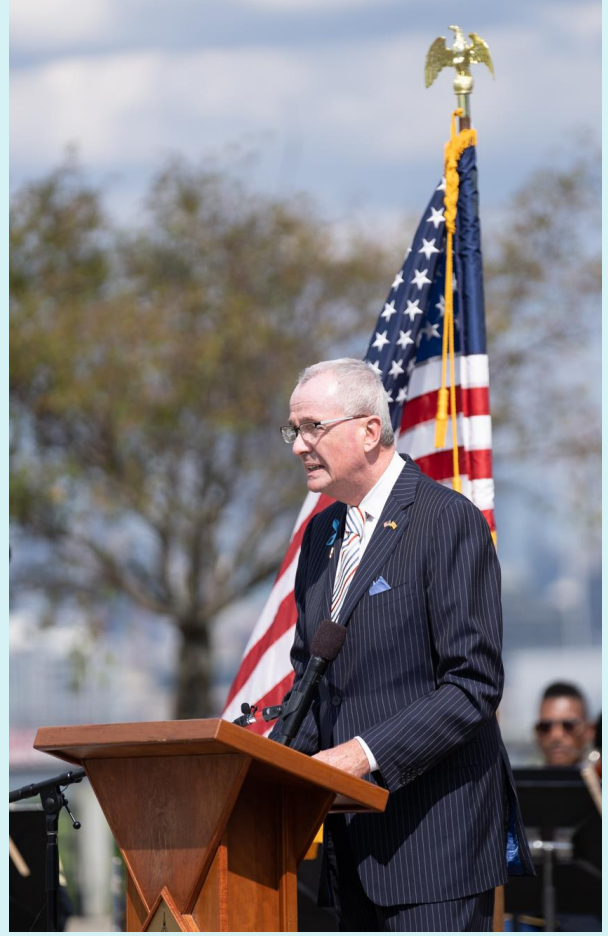
Which modifications to a PAM Plan should be documented?

A. Real-time monitoring location changes
B. Change in remediation methods
C. Change in work duration
D. All of the above

Poll #3

Which modifications to a PAM Plan should be documented?

A. Real-time monitoring location changes
B. Change in remediation methods
C. Change in work duration
D. All of the above



Thank you!

Technical Consultations for Perimeter Air Monitoring (PAM)

January 24, 2024

Allan Motter, Chief
Bureau of Environmental Evaluation and Risk Assessment
Contaminated Site Remediation & Redevelopment

Technical Consultations for Perimeter Air Monitoring (PAM)

Department Contacts

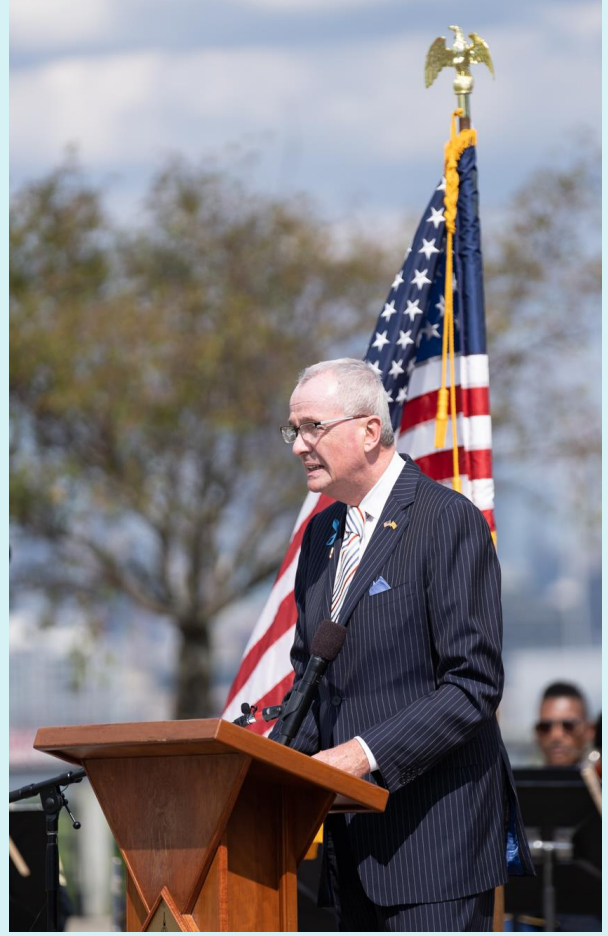
- Erica Snyder: 609-984-0325; Erica.Snyder@dep.nj.gov
- Amanda Gettelfinger: 609-633-0743; Amanda.Gettelfinger@dep.nj.gov

- Issues related to guidance document
- Applicability issues

Technical Consultations for Perimeter Air Monitoring (PAM)

Technical Consultations

- Allan Motter: Allan.Motter@dep.nj.gov
- Agenda identifying all issues at time of request
- Send PowerPoint/figures/tables one week before technical consultations
- Request prior to submittal of document
- Not to be used for Notice of Incomplete (NOI) discussions (address these through chain of command)



Thank you!

Reminders!

- Questions not answered today will be answered via email in the coming weeks
- Please fill out the Course Evaluation here:

  https://www.surveymonkey.com/r/JJYDCZ2
- Look out for an email from the LSRPA for CEC certificate access
- Slides and presentation will be posted on the CSRR Training page

Thank you!