

Conducting a Phase II Site Investigation

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Overview



Development of the Work Plan/SSQAPP



Coordination & Preparation



Field Work/Field Decisions



Post-Work QA/QC



Example Projects

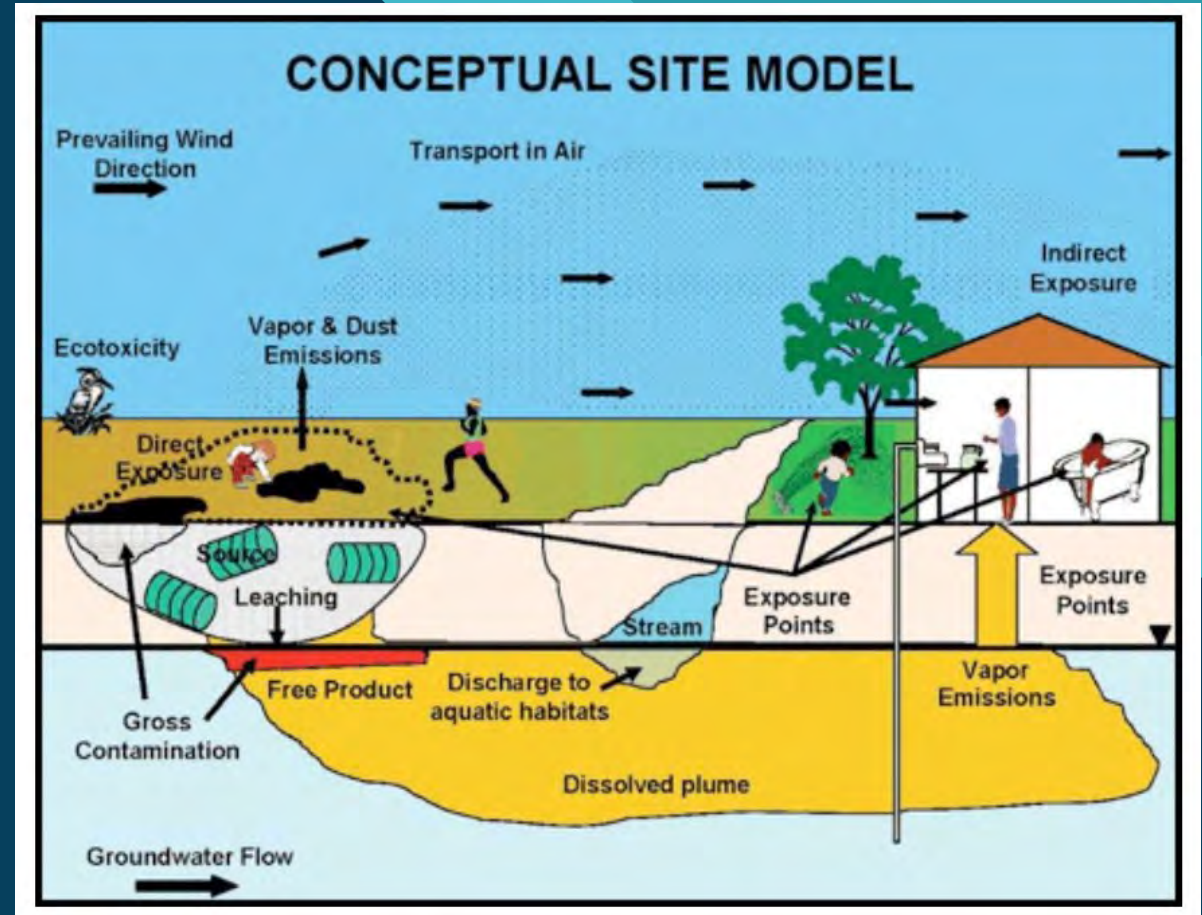
Turning the Conceptual Site Model into a Work Plan



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Elements of a Work Plan

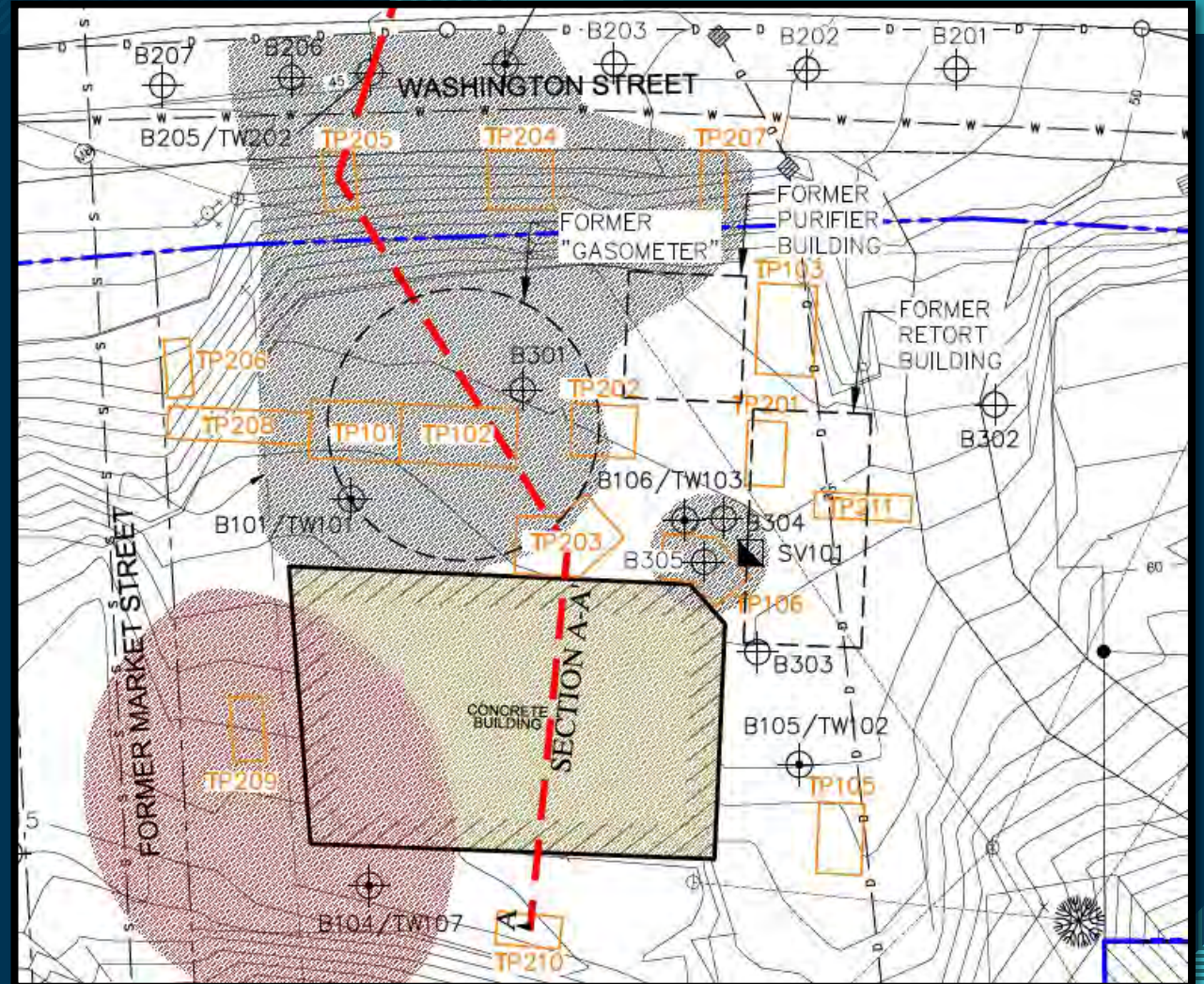
- Project Participants / Project Roles
- Background
 - Site History
 - Previous Investigations
 - Conceptual Site Model
- Data Quality Objectives
- Investigation Plan
 - QA / QC Procedures
- Schedule



Source: MEDEP RAGs; May 1, 2021

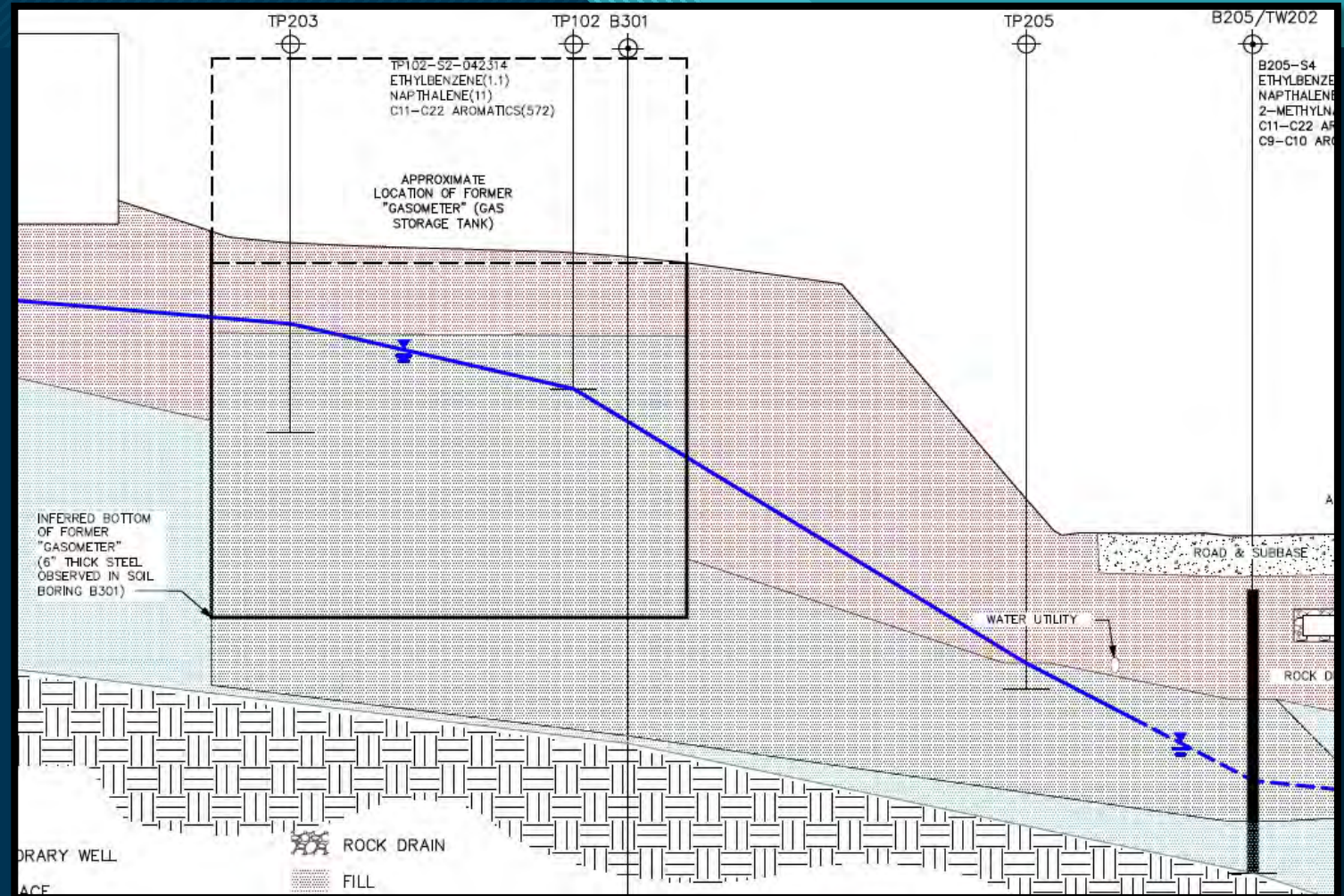
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- Areas of Concern - Originating from the RECs identified during the Phase I process; AOCs are further identified and defined in the CSM.
- Contaminants of Concern and applicable analytical methods
- How and where were the contaminants released? Sources & Sinks
- Where would we expect to find them?
- In what media would we expect to find them?



Turning the Conceptual Site Model into a Work Plan

- How would contaminants be expected to migrate from the original release location or original source media?
- What receptors may be at risk?
- What tools do you have to evaluate if the pathway is complete?



Turning the Conceptual Site Model into a Work Plan- Continued

Table 2-3: Conceptual Site Model (CSM) Summary

| AOC | Potential COC Source | COC Analytical Parameter | Potential Media Affected | Potential Exposure Routes | Potential Migration Pathways | Receptors |
|---|--|--|--|--|--|---|
| AOC 1: Site-Wide-Former Steam Plant Operations & Fill | Volatile and Semi-Volatile Petroleum Products, Chlorinated VOCs, PCBs, Acids, Metals, Combustion Byproducts (Ash) & Urban Fill | VOCs, SVOCs, VPH & EPH fractions, Metals, PCBs & APH | Concrete, Surficial Soil, Subsurface Soils, Groundwater & Soil Vapor | <ul style="list-style-type: none"> • Dermal contact with impacted soils or concrete. • Ingestion of particles via dirty hands or dust. • Inhalation of airborne soil/dust particles or impacted soil vapor. • Dermal contact with impacted groundwater. • Ingestion of impacted groundwater. • Vapor intrusion into occupied or future structures. | <ul style="list-style-type: none"> • Soil & Concrete: Physical transport as contaminants are adsorbed onto soil particles or concrete. • Stormwater runoff and dust particles during earthwork. • Groundwater: Migration of contaminants through the substrate via groundwater flow. • Soil Vapor: Migration with pressure gradients or via preferential pathways. | Potential receptors of contamination include humans (future site employees and construction workers) and the environment. |
| AOC 2: Boiler Ash Stockpile | Demolition of former Steam Plant's smokestack | TCLP- RCRA 8 Metals & Vanadium | Surficial Soil (if stockpile is disturbed) | <ul style="list-style-type: none"> • Dermal contact, ingestion or inhalation of particles via dirty hands or airborne dust. | <ul style="list-style-type: none"> • Stormwater runoff and dust particles during earthwork. | |
| AOC 3: Building Structures/Materials | Hazardous Building Materials | Asbestos, metals, PCB-ballasts, & heavy metals associated with building materials. | Interior and Exterior Building Components. | <ul style="list-style-type: none"> • Dermal contact with hazardous building materials and/or household items. • Inhalation of airborne dust particles from hazardous building materials. | <ul style="list-style-type: none"> • Ingestion of particles via dirty hands or dust. • Inhalation of airborne soil/dust particles. • Physical transport as contaminants are adsorbed onto soil particles. | |

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Data Needs

- Contaminants of Concern for each AOC, and appropriate analytical methods
- How many samples of each media are necessary from each AOC to make decisions?
- Target sample depths (soil)
- Where to locate samples (consider migration pathways, receptor locations, etc.)

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Data Quality Objectives

- Applicable Chemical Parameters
- Analytical Methods
Examples: PAHs by 8270 or PAHs using SIM TO-15 or TO-15 SIM
- Background Conditions
- Risk-based Guidelines/Standards
PFAS-specific considerations and constant changing guidelines/regulations?
- Intended data use

Table 2-1: Summary of Data Quality Objectives

| Matrix | Parameter | Methods | State or Federal Standard | Analytical Level ¹ | Data Evaluation Tier ² | Intended Data Use ³ |
|--|---|--|---|-------------------------------|-----------------------------------|--------------------------------|
| Soil | Per and Polyfluoroalkyl substances (PFAS) (MEDEP List of 28) | U.S. EPA Method 537.1 LC/MS/MS with isotope dilution | MEDEP Remedial Action Guidelines ⁴ | Level II | Tier I Plus | ID, CC, IR, FA, HS, FS |
| | Volatile Organic Compounds (VOCs) | U.S. EPA Method 8260 | | | | |
| | Semi-Volatile Organic Compounds (SVOCs) | U.S. EPA Method 625.1 | | | | |
| | Volatile Petroleum Hydrocarbons (VPH) | MADEP VPH (Method Rev 1.1) | | | | |
| | Extractable Petroleum Hydrocarbons (EPH) | MADEP EPH (Method Rev 1.1) | | | | |
| | Priority Pollutant 13 Metals (plus speciation of chromium) & Barium | U.S. EPA Methods ICP 6010D/200.7//7471B (Mercury) | | | | |
| Groundwater | PFAS (MEDEP List of 28), VOCs, SVOCs, VPH, EPH, Dissolved Priority Pollutant 13 Metals (plus speciation of chromium) & Barium | U.S. EPA Method 537.1 LC/MS/MS with isotope dilution | MEDEP Remedial Action Guidelines ⁴ | Level II | Tier I Plus | ID, CC, IR, FA, HS, FS |
| | | U.S. EPA Method 8260 | | | | |
| | | U.S. EPA Method 625.1 | | | | |
| | | MADEP VPH (Method Rev 1.1) | | | | |
| | | MADEP EPH (Method Rev 1.1) | | | | |
| U.S. EPA Methods ICP 6010D/200.7/245.1 (Mercury) | | | | | | |

Turning the Conceptual Site Model into a Work Plan

Investigation Methods

- Geophysical Methods/Ground Penetrating Radar
- Hand Tools (shovel, trowel, pickaxe)
- Test Pits (soil, lithology, visual evaluation)
- Soil Borings/Monitoring Wells (soil, groundwater, discrete locations, easy to repair, reproducibility, evaluate changes in data over time)
- Pore Water Samples (receptor is water body, ecological risk)
- Soil Vapor/Sub-Slab Vapor
- Indoor Air
- Field Screening/Evaluation (PID, XRF, Water Quality Parameters, air/vapor conditions)

Data Quality and Data Quality Objectives

Phase II Investigation evaluates and tests the Conceptual Site Model (Confirm or Dismiss RECs or Business Environmental Risks)

The quality and quantity of data necessary to generate legally defensible results on which decisions can be made

What are the applicable risk-based guidelines or standards?

What are the appropriate analytical methods to achieve those guidelines/standards?

- Communication with the laboratory
- Ensure laboratory is certified for the given methods within the given state
- Containers/preservation/hold times/turn around times

Examples: PAHs by 8270 or PAHs using SIM

TO-15 or TO-15 SIM

PFAS-specific considerations and constant changing guidelines/regulations?

Quality Assurance Protocols

- Laboratory Blanks, Surrogates, Matrix Spikes
- Field Blanks
- Field Duplicates
 - Acceptance Limits
- Equipment Blanks
- Standard Operating Procedures
 - Laboratory
 - Field Methods



Work Plan Review and Revisions



Input from Federal
Regulatory Agencies

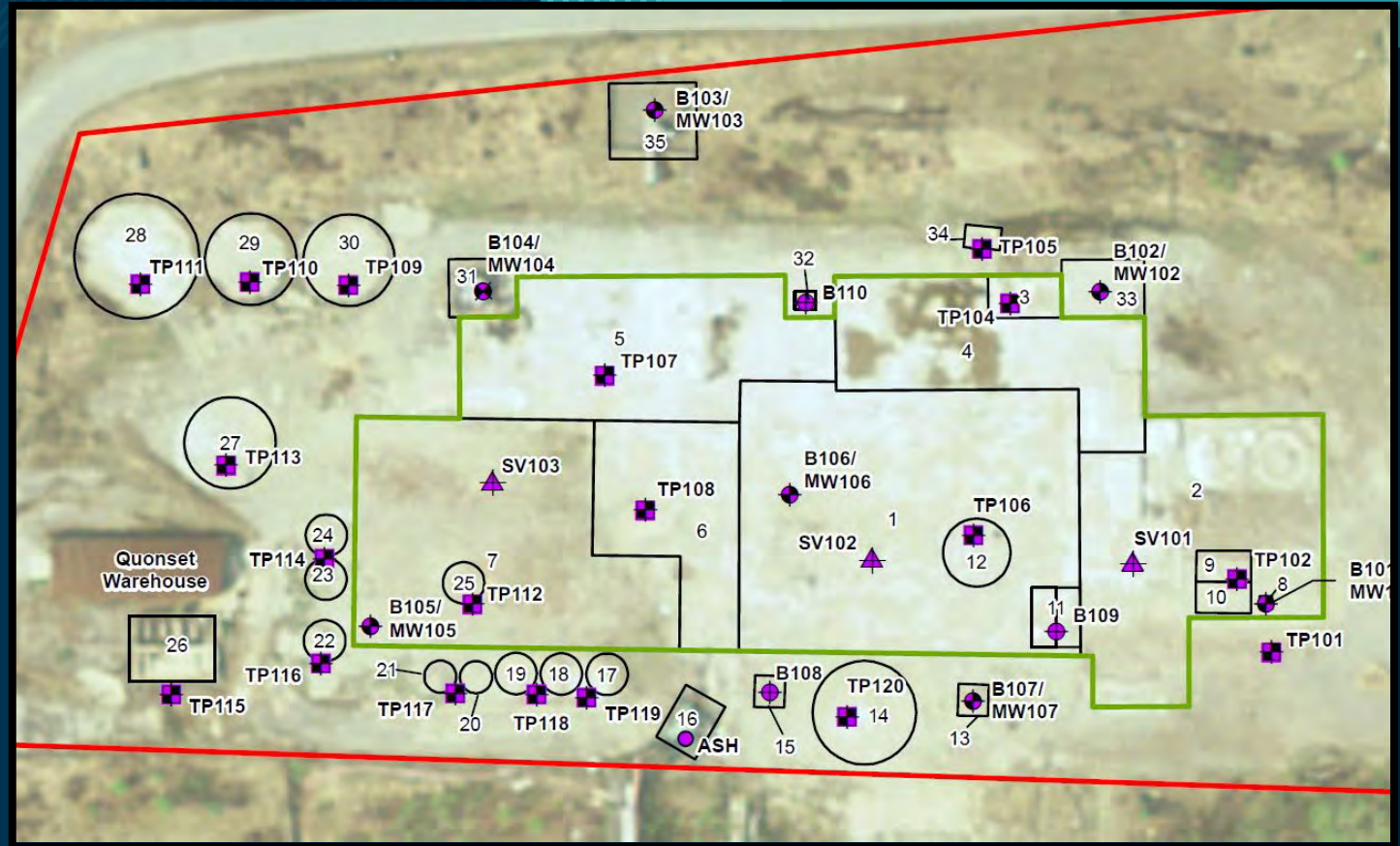
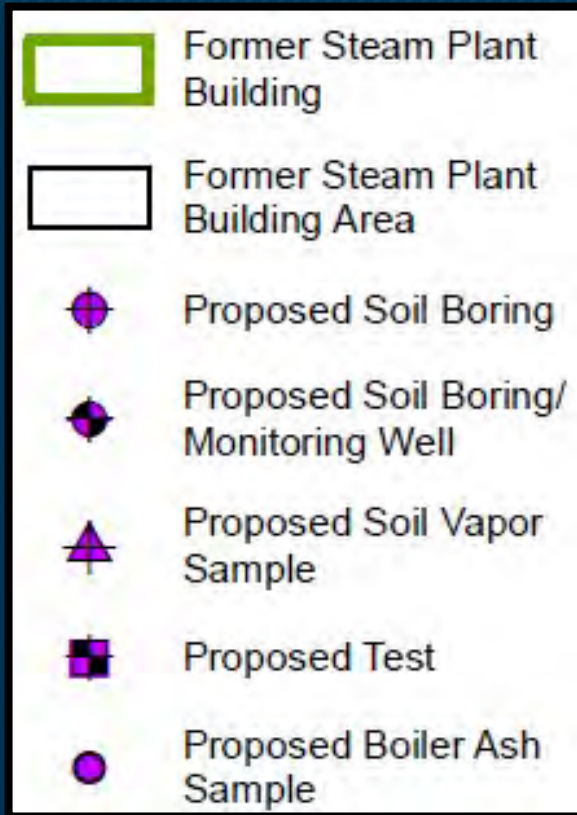


Input from
Stakeholders



Input from State
Regulatory Agencies

Example: Workplan/SSQAPP Development



- | | | |
|------------------------------|--------------------------------------|--------------------------------------|
| 1 - Steam Plant Boilers #1-3 | 8 - Waste Pit | 14 - Smokestack |
| 2 - Water Treatment Plant | 9 - 10,000-gallon Caustic Acid AST | 15 - Transformer |
| 3 - Oil Room | 10 - 10,000-gallon Sulfuric Acid AST | 16 - Boiler Ash Stockpile (Existing) |

Field Work / Field Decisions

Project Coordination/Implementation

- Health & Safety Plan
- Dig Safe / Utility Clearance
- Subcontractor Coordination
- Field Instruments
- Laboratory Coordination
- Property Owner, Stakeholders, Regulatory Agency Notification

Field Work / Field Decisions

Modifications to Work Plan/SSQAPP

- Re-locating sample locations (topography, site constraints, utilities, unexpected shallow refusal, lack of groundwater)
- Additional sample locations (time and budget considerations)
- What depth to collect samples (exposure pathways, redevelopment or waste characterization considerations)
- If proposed investigation method is unsuccessful, are there other methods you could use to answer the same or similar question?



Example: Field Modifications

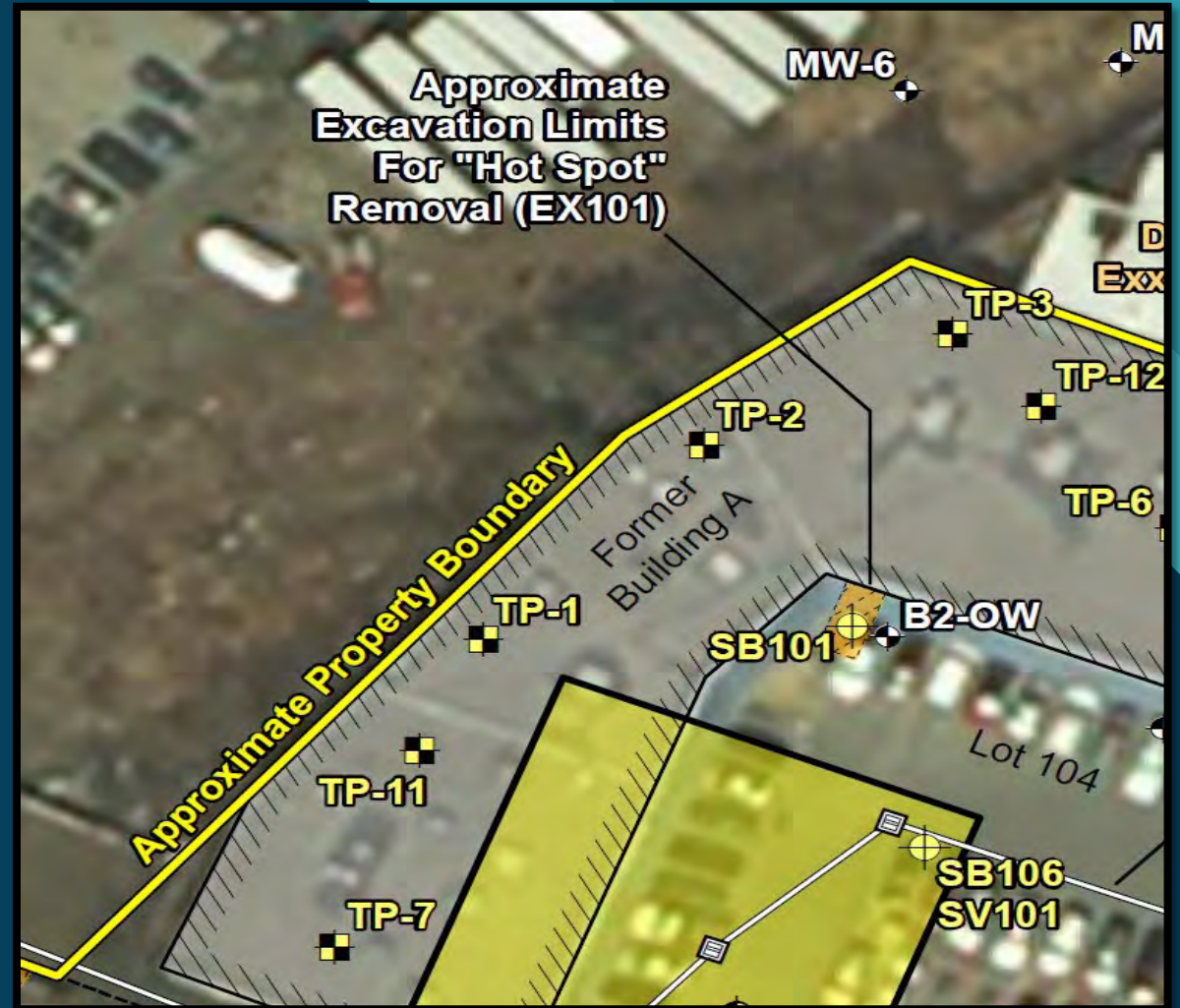


Workplan/SSQAPP Field Verification

- All tasks completed?
- All samples collected?
- Duplicates/blanks collected?
- Hold times/sample preservation?
- Modifications or deviations to workplan?
- Check all above and discuss with project staff before ending field investigation!!!!

Lessons Learned: Field Check QA/QC

- Former UST Piping Fill vs. Native: Modification for sample depths (PID results, vertical delineation of contamination)
- Hot-Spot Lead-Impacted Soils at Footprints of Former Buildings: XRF field screening resulted in modification to sampling program and lab analysis
- Free-Phase Petroleum Example: Expanding scope of work resulting from contamination discovery
- GPS Data Collection/Confirmation of Sample Locations



Phase II Conclusions

- Revisit RECs/Business Environmental Risks identified during the Phase I ESA process
- Discuss each AOC identified in the CSM
- What does the data tell you about exposure pathways? Complete/Incomplete? Is there a health risk?
- Multiple Lines of Evidence (similar or dissimilar contaminants in different media or distance/temporal variations)
- Update CSM and identify any data gaps that need additional investigation

Thank You!

Contact Us!

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