In-Situ Soil Remediation at a Former MGP Site in New Jersey

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Presentation Overview

- Intro & Site Specifics
- Means & Methods
- Project Performance
- Conclusions
- Q&A
Introduction

• Soil remediation project at former MGP Site
• Client - major utility company
• Combination excavation, T&D and ISS
• Contractor selection of excavator for mixing
• Project requirements:
  – Meet performance specifications
  – Present costs savings on the project
Site Specifics

• **Former:**
  – Paulsboro Municipal Gas Works Site
  – MGP operational 1909 – 1952

• **Current:**
  – Building used for office and storage space
  – Occupied during construction
Site Specifics

- Contaminated soil and NAPL
- Remedial investigation – impacts to GW
- Exceeded NJDEP GWQS both on & off-site
- Impacts delineated up to depths of 24’ BGS

- Contaminants of concern:
  – PAHs, VOCs, SVOCs and metals
Site Specifics

• Previous experience - Camden Gas site
  – first ISS project at an MGP site in New Jersey
  – Site contained last gasholder in NJ
  – New electrical substation to be constructed
Project Goals

meet specs

save $$$$

min. disturb

work safely
Project Goals

• Development of leaching criteria:
  – Site remediated under NJ Licensed Site Remediation Professional (LSRP) program
  – No regulatory leaching criteria available
  – Dilution-Attenuation Factor – source to POC
  – LSRP agreed to GWQS x DAF (13)
Stabilization Means

• Sampling:
  – Samples from highest levels of contamination
  – SPLP - total and baseline leachable levels

• Treatability Study reagents:
  – Portland cement
  – Ground granular blast furnace slag
  – Bentonite
  – Powdered activated carbon
Stabilization Means

Reagent Ratio - % of Unit Weight of Soil

- Slag, 6%
- Cement, 2%
- Carbon, 0.50%
Stabilization Methods

• Advantages of excavator mixing:
  – Cost efficient and effective up to 20 feet BGS
  – Common – familiarity factor with operators
  – Power to key into stiff clay layers
  – Work around obstructions / rock
  – Can remove large debris
  – Utilization of same equip. for multiple tasks
Stabilization Methods

• Advantages of excavator mixing vs. T&D:
  – Eliminate SRS & dewatering
  – Reduces odors & truck traffic
  – Lower cost / CY
Stabilization Methods

• Advantages of excavator mixing vs. auger mixing, mechanical attachment, etc.:
  – Mobilization and operating costs
  – Handling of obstructions
  – Presence of rock/stiff subgrade
Stabilization Methods

• Pre-cut – Excavate, T&D
  – Remove overburden to allow for “fluff”
  – Provide room for engineered cap & utilities
Stabilization Methods

• Obtain cell dimensions

- W
- L
- D
- 20’ ±
- VARIES
- 9’ – 16’

• Calculate reagent and no. batches reqd.
• Avg. production – 2 cells per day (750 CY)
• Confirm depth via survey of stick
Stabilization Methods

• Adjacent Structures:
  – ISS 15’ BGS at 10’ from edge of building and at 20’ from centerline of rail
  – Pre-cut top 3’ of soil
  – No SRS systems required
  – No signs of distress in structure or rail line as result of construction activities
Stabilization Methods
## Project Performance

### Results – Phase 1:

11,700 cubic yards of material treated (34 cells)

<table>
<thead>
<tr>
<th></th>
<th>UCS (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required @ 28 day</td>
<td>50</td>
</tr>
<tr>
<td>Avg. Results @ 7 day</td>
<td>160</td>
</tr>
<tr>
<td>Avg. Results @ 14 day</td>
<td>325</td>
</tr>
</tbody>
</table>
# Project Performance

## Results – Phase 1:

11,700 cubic yards of material treated (34 cells)

<table>
<thead>
<tr>
<th></th>
<th>Hydraulic Conductivity (cm/sec)</th>
<th>Leachability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required</td>
<td>1.0E-06</td>
<td>13 x GWQS</td>
</tr>
<tr>
<td>Avg. Results</td>
<td>1.3E-07</td>
<td>100% cells passing</td>
</tr>
</tbody>
</table>

GWQS = Ground Water Quality Standards.
ISS = approx. $\frac{1}{2}$ cost of T & D

WITHOUT consideration of SRS and dewatering
Conclusions

1. Efficient
2. Effective
3. Affordable

• Ideal application for:
  – Historical sites with large scale buried debris
  – Urban environments with adjacent structures and/or transportation
QUESTIONS?

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