Specialty Earth Sciences Project
Summary:
Full Scale Treatment of
Heterogeneous Source Zone Area
2-Stage Approach
(Savannah, Georgia)
Full-Scale Source Zone Treatment

- Client seeking remedial alternatives for operating commercial laundry facility
- Heterogeneous source zone area treatment
- Site operations required:
  - **Rapid implementation**
  - **Second shift access only**
  - **All equipment and materials cleared daily prior to first shift workers reporting for duty**
Site Layout

Target area
Treatment Area Schematic

- GW Flow Direction

SOCORE LOCATIONS
DIRECT PUSH BORINGS

(25) SOCORE points
3 ft. spacings between points
12-20 ft. bgs. target interval
75 ft. linear length

= SOCORE Direct Push Installation Point
■ = SOCORE Product Observation Piezometer
to measure permanganate concentrations
over time (PZ-#)
□ = 2-inch Temporary Performance Monitoring Well
(GB-#)
Site Specific Characteristics

• **CVOC’s**: PCE, TCE, DCE, VC

• **Geological features**: Sandy aquifer underlain by clays

• **2-stage remedial approach**:
  1. liquid injection via DPT
  2. followed by SOCORE Cylinder and Sphere installation via DPT tooling
Step 1: Liquid Injection

• Top-down liquid injection:
  - Soften source zone CVOC mass
  - Lessen demand on SOCORE material
• 10% NaMnO₄
• 105 gallon/point
Step 2: SOCORE Interceptor

- 75 ft length (3’ spacing)
- 12’-26’ bgs target depth (extending 2-3’ into clay formation)
- 3 SOCORE observation piezometers
- 3 – 2” temporary performance monitoring wells

*Both Spheres and Cylinders*
Step 2(A): Spheres deployed into **tight clays**

*Technical Pearls*

• We tailor SOCORE product shape/size to site specific geological features
• Smaller/spherical product used for clays and LPM:
  ➢ higher sustained release rate
  ➢ better contact with formation
  ➢ concentration gradient driven diffusion

Spheres: 20’ – 26’ bgs
2-Stage Remedial Approach

Step 2(B): Cylinder deployment into transmissive sands

Cylinders: 12’ – 20’ bgs

*Technical Pearl* surface area to volume ratio of cylinder shape (compared to sphere) results in lower sustained release rate, better suited to sandy formations where advective flow governs transport
# GW Monitoring Data: CVOC's

![Map of monitoring locations]

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>1 year</th>
<th>2 year</th>
<th>% CVOC Reduction at 2 years</th>
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<tbody>
<tr>
<td>OB-1</td>
<td>1994 (ug/L)</td>
<td>124 (ug/L)</td>
<td>186 (ug/L)</td>
<td>84.4%</td>
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<tr>
<td>OB-2</td>
<td>4261 (ug/L)</td>
<td>407 (ug/L)</td>
<td>347 (ug/L)</td>
<td>91.8%</td>
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<tr>
<td>OB-3</td>
<td>4028 (ug/L)</td>
<td>163 (ug/L)</td>
<td>47 (ug/L)</td>
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<td>GW-1</td>
<td>51,439 (ug/L)</td>
<td>15,934 (ug/L)</td>
<td>5507 (ug/L)</td>
<td>89.3%</td>
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<tr>
<td>MW 3</td>
<td>455 (ug/L)</td>
<td>372 (ug/L)</td>
<td>105 (ug/L)</td>
<td>76.9%</td>
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Most recent data from historical monitoring wells located in target treatment area:

<table>
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<tr>
<th></th>
<th>MW-3</th>
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<tr>
<td></td>
<td>PCE</td>
<td>TCE</td>
<td>Total</td>
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<tr>
<td>2011</td>
<td>453</td>
<td>2.3</td>
<td>455</td>
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<td>2015</td>
<td>81</td>
<td>17</td>
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<tr>
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<td>Total</td>
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</tr>
<tr>
<td>2011</td>
<td>846</td>
<td>595</td>
<td>1489</td>
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<td>2015</td>
<td>84</td>
<td>42</td>
<td>128</td>
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<tr>
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<tr>
<td>2011</td>
<td>16</td>
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<td>2015</td>
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