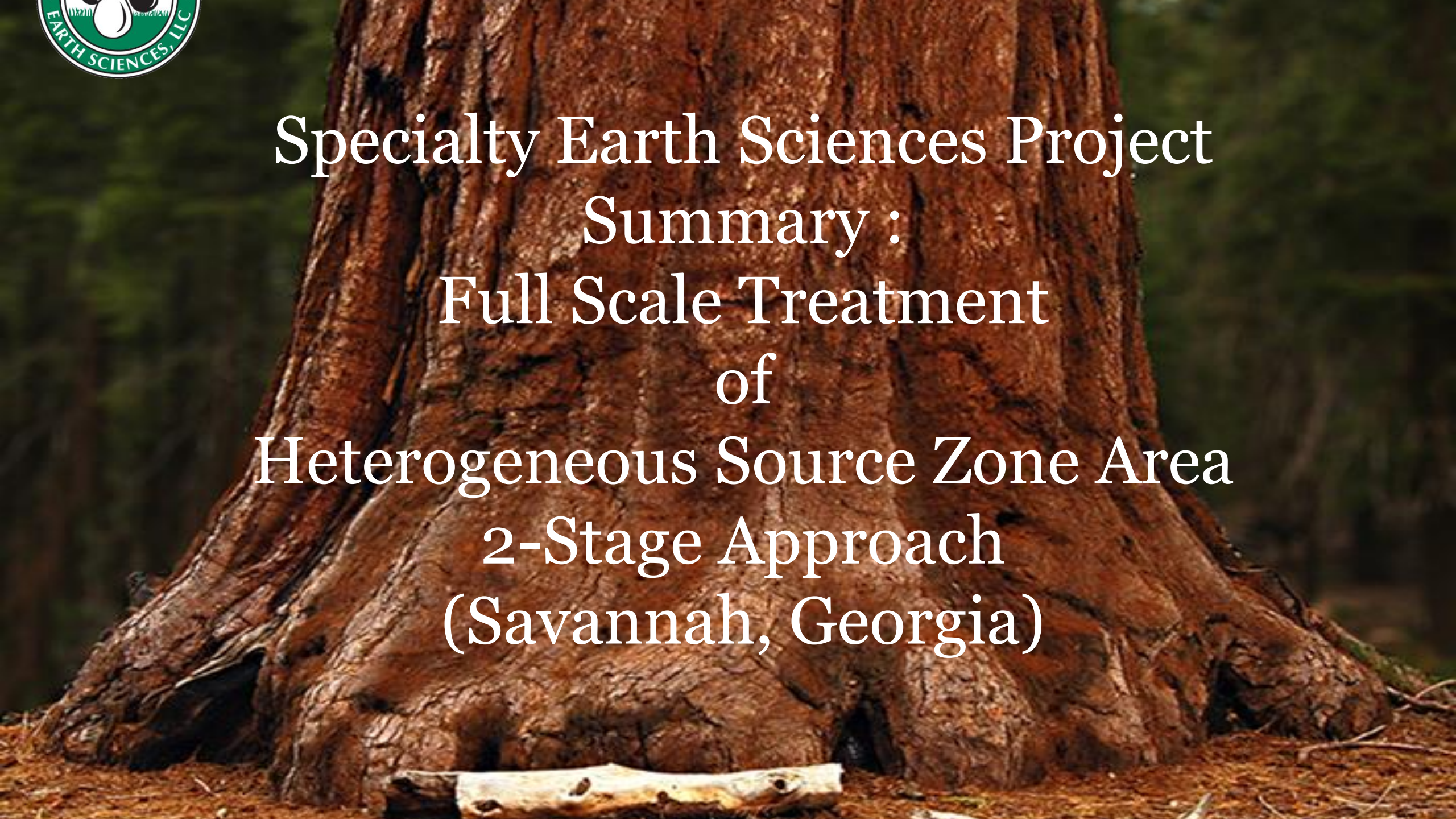


Specialty Earth Sciences Project Summary : Full Scale Treatment of Heterogeneous Source Zone Area 2-Stage Approach (Savannah, Georgia)

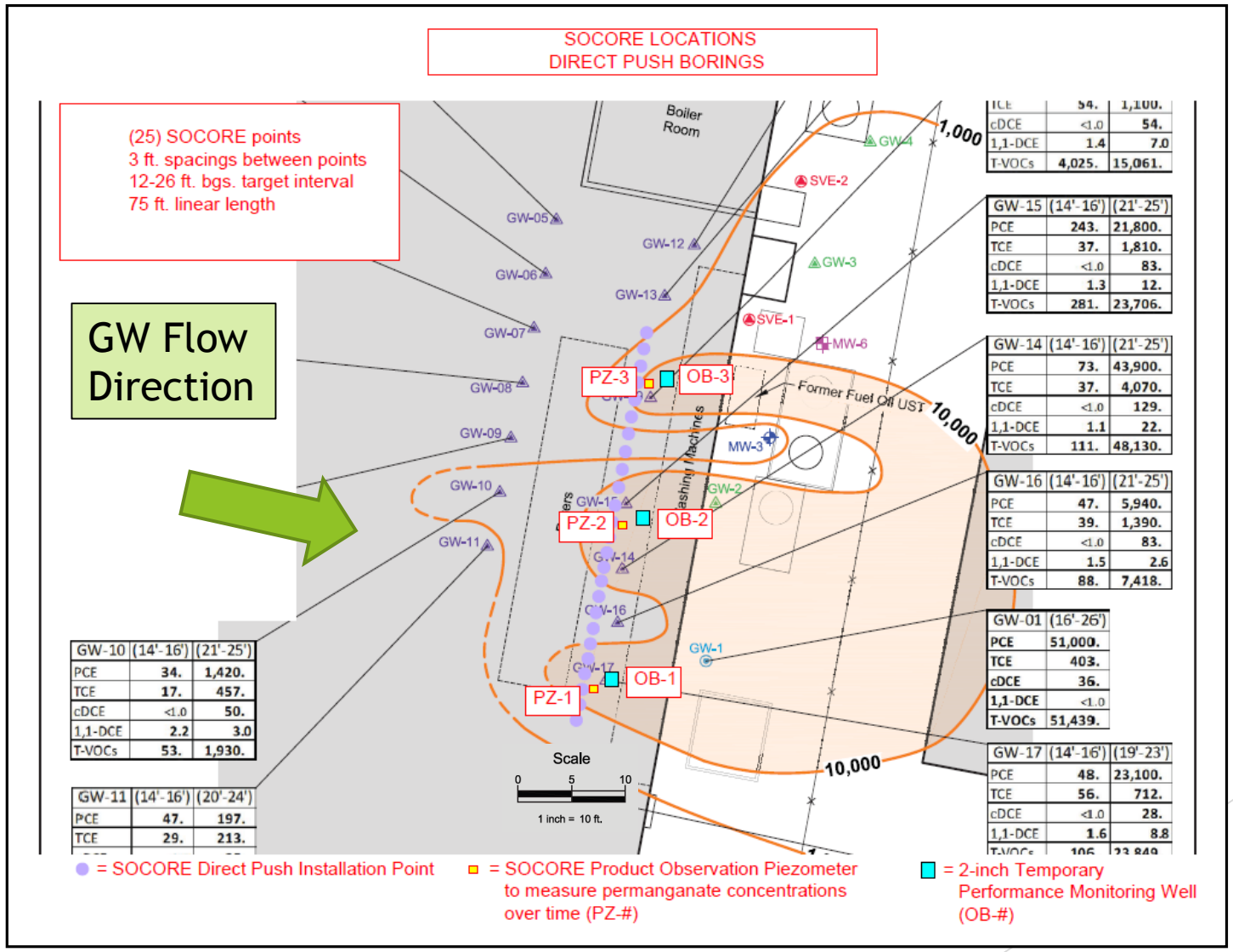
Full-Scale Source Zone Treatment

- 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



Treatment Area Schematic



TCE	54.	1,100.
cDCE	<1.0	54.
1,1-DCE	1.4	7.0
T-VOCs	4,025.	15,061.

GW-15	(14'-16')	(21'-25')
PCE	243.	21,800.
TCE	37.	1,810.
cDCE	<1.0	83.
1,1-DCE	1.3	12.
T-VOCs	281.	23,706.

GW-14	(14'-16')	(21'-25')
PCE	73.	43,900.
TCE	37.	4,070.
cDCE	<1.0	129.
1,1-DCE	1.1	22.
T-VOCs	111.	48,130.

GW-16	(14'-16')	(21'-25')
PCE	47.	5,940.
TCE	39.	1,390.
cDCE	<1.0	83.
1,1-DCE	1.5	2.6
T-VOCs	88.	7,418.

GW-01	(16'-26')
PCE	51,000.
TCE	403.
cDCE	36.
1,1-DCE	<1.0
T-VOCs	51,439.

GW-17	(14'-16')	(19'-23')
PCE	48.	23,100.
TCE	56.	712.
cDCE	<1.0	28.
1,1-DCE	1.6	8.8
T-VOCs	106	23,849

GW-10	(14'-16')	(21'-25')
PCE	34.	1,420.
TCE	17.	457.
cDCE	<1.0	50.
1,1-DCE	2.2	3.0
T-VOCs	53.	1,930.

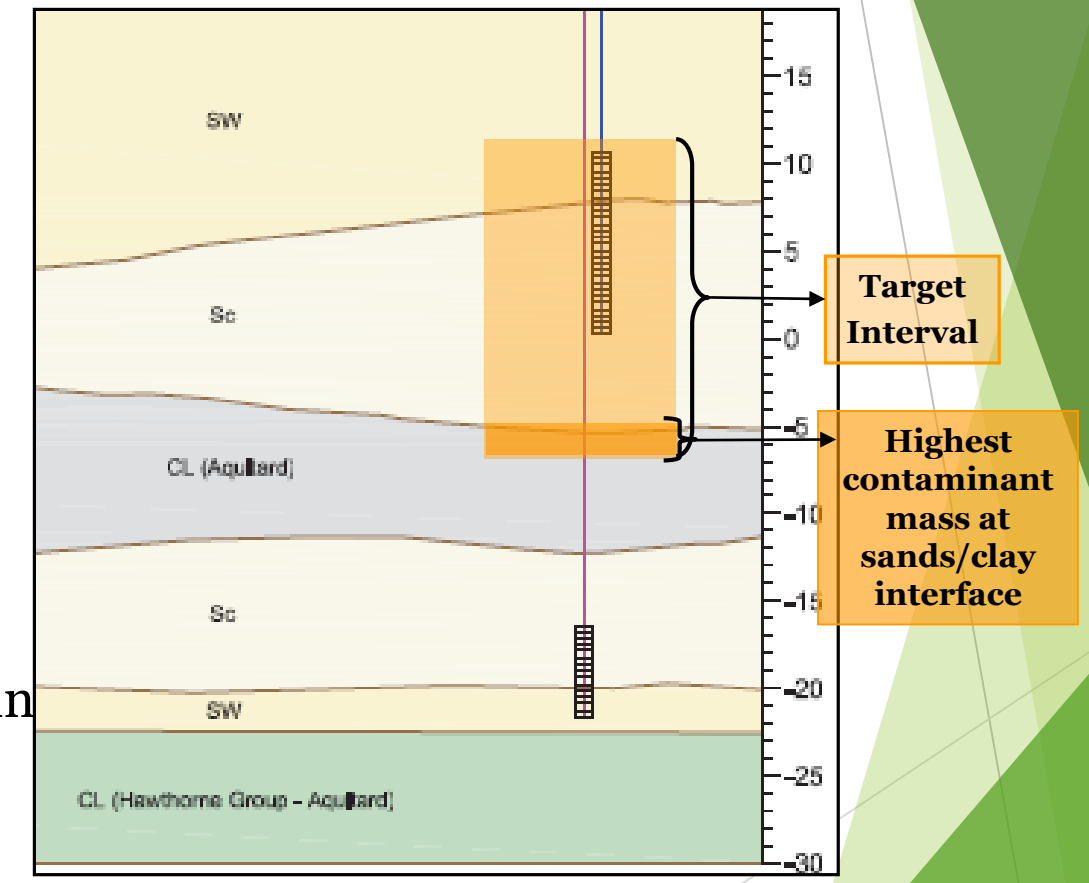
GW-11	(14'-16')	(20'-24')
PCE	47.	197.
TCE	29.	213.

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 toolin



Step 1: Liquid Injection

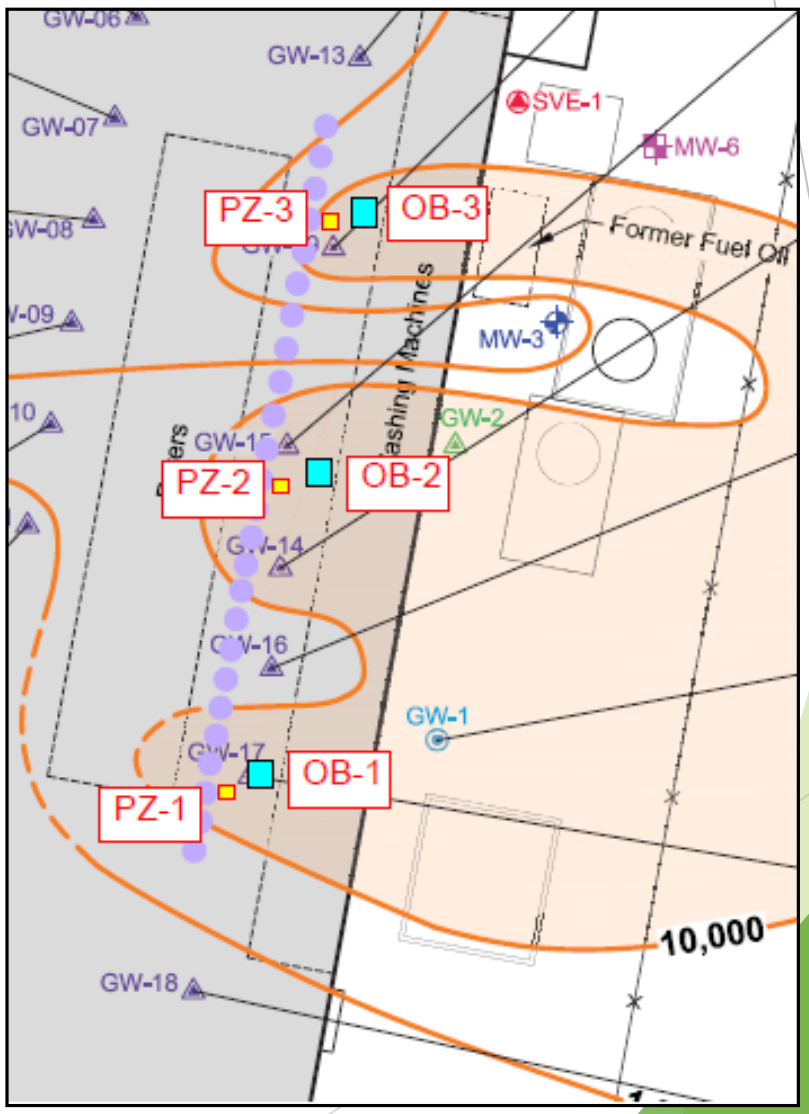
- Top-down liquid injection:
  - Soften source zone CVOC mass
  - Lessen demand on SOCORE material
- 10% $NaMnO_4$
- 105 gallon/point



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**

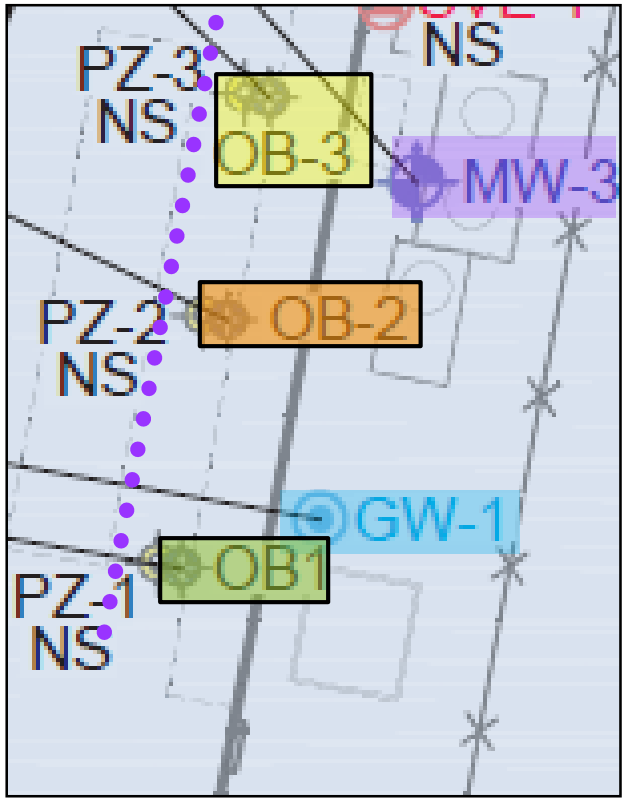




Cylinders: 12’ – 20’ bgs

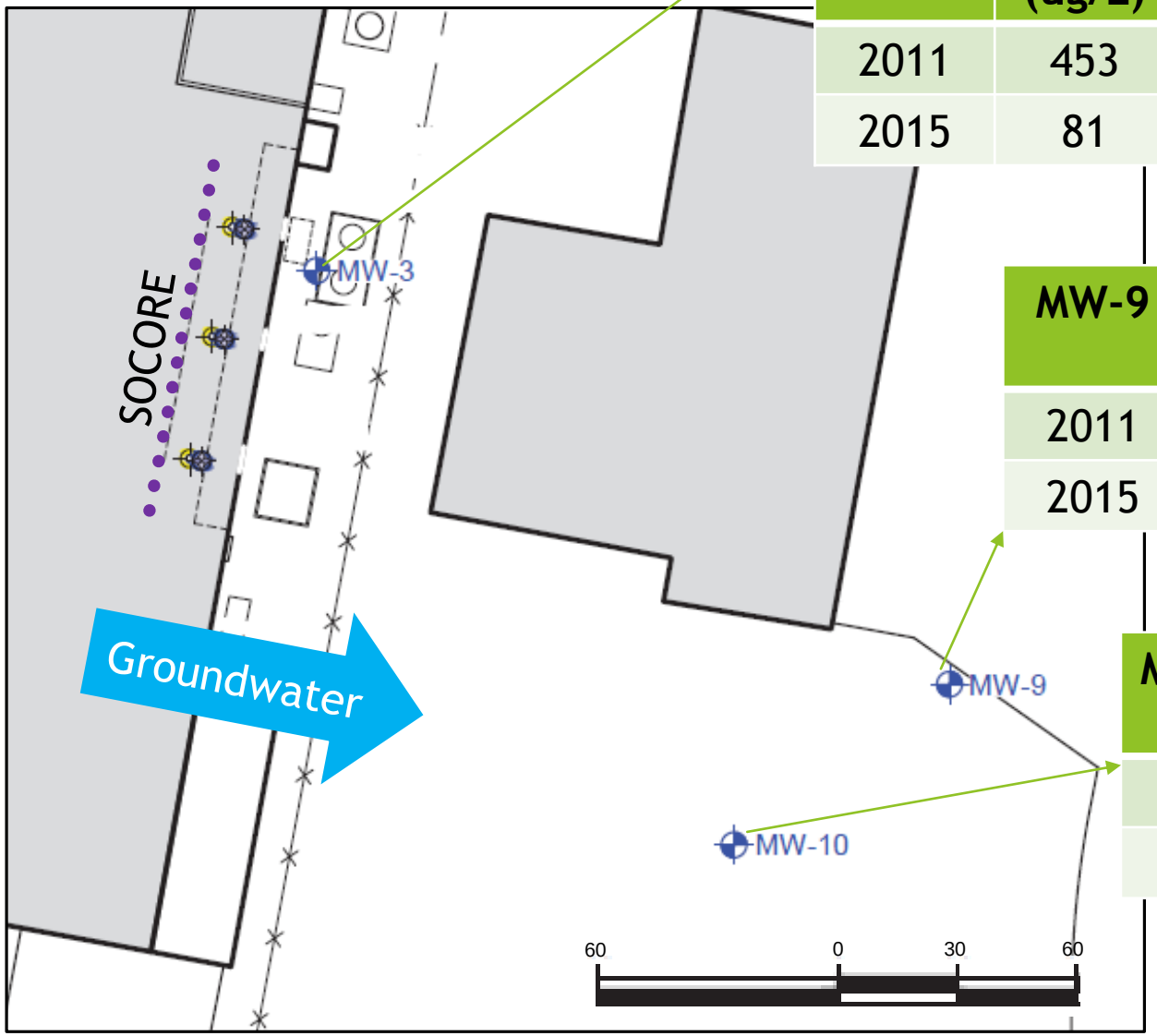
<u>*Technical Pearl*</u> ↑ surface area to volume ratio of cylinder shape (compared to sphere) results in lower sustained release rate, better suited to sandy formations where advective flow governs transport

GW Monitoring Data: CVOC's



	Baseline Total CVOC	1 year Total CVOC	2 year Total CVOC	% CVOC Reduction at 2 years
OB-1	1994 (ug/L)	124 (ug/L)	186 (ug/L)	84.4%
OB-2	4261 (ug/L)	407 (ug/L)	347 (ug/L)	91.8%
OB-3	4028 (ug/L)	163 (ug/L)	47 (ug/L)	98.8%
GW-1	51,439 (ug/L)	15,934 (ug/L)	5507 (ug/L)	89.3%
MW 3	455 (ug/L)	372 (ug/L)	105 (ug/L)	76.9%

Most recent data from historical monitoring wells located in target treatment area:



MW-3	PCE (ug/L)	TCE (ug/L)	Total CVOC
2011	453	2.3	455
2015	81	17	105

MW-9	PCE (ug/L)	TCE (ug/L)	Total CVOC
2011	846	595	1489
2015	84	42	128

MW-10	PCE (ug/L)	TCE (ug/L)	Total CVOC
2011	16	36	63
2015	ND	1.8	14