Direct Sonic Injection for Enhanced Remediation

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Redox Tech
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- Founded in 1995.
- Completed over 3000 *in situ* remediation projects
- Provide Products and Services
- Own 13 Geoprobe Direct Push Rigs
- Two Geoprobe Rotosonic rigs (8140LC and 8150LS)
- Own Two Proprietary Soil Blenders
- Recently purchased Large Diameter Augers

Sonic Drilling

Core Barrel Advancement

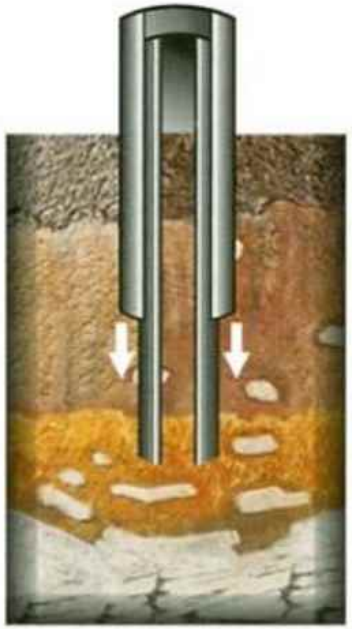
No fluids, air, or mud used during coring.

Step 1

Casing Override

Water possibly used between casings.

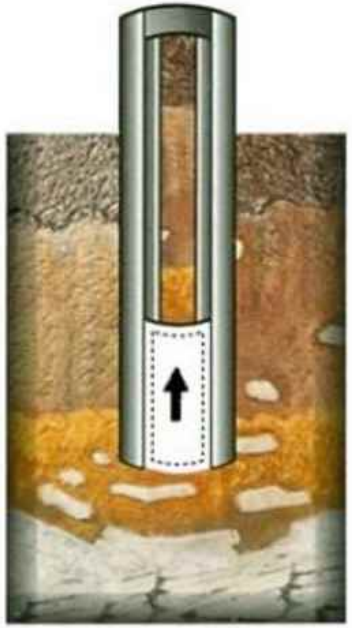
Step 2



Core Barrel Retrieval

Barrel retrieval for sample extrusion.

Step 3



Repeat Core Barrel Advancement

Advancement following sample extrusion.

Step 4

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Materials Injected

Emulsifed Oil (ABC-Olé)
ABC+ (carbon substrate +ZVI)
ZVI with Guar
BioAvailable Absorbent Material (BAM)
Calcium Peroxide
Sulfate Solution (SBC)

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Geologic Environments

- Saprolite
- Limestone Mud
- Alluvium
- Partially weather rock
- Dolomitic Limestone
- Atlantic Coast Plain
- Glacial Outwash

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Sonic Techniques

- Core, override casing, backfill with bentonite, direct push injection with Geoprobe
- Core, Override casing and set one or two packers
- Direct Sonic Injection
  - Most situations no core recovery is required which minimizes waste and speeds up the process
  - If core recovery is required, can proceed back down with injection tooling
  - Both bottom-up and top-down can be implemented
  - One drill rig for a wide variety of geologic environments – bedrock, fractured bedrock, saprolite, flowing sands, etc

Generation 1

Modified Closed Face Bit (Gen 2)

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Don’t Try This at Home

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Sonic Injection without Head

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Sonic Injection Through Head

Utilized Top Down without removing head

8140LC has worked inside buildings

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Proprietary Retractable Nozzle (Gen 3)

* Not Actual Tool

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ADVANTAGES

- One rig for all geologic conditions encountered on site
- Very unlikely to have refusal
- Eliminate cuttings associated with HSA or Air Rotary
- Easily implement top-down or bottom-up
- Injection of slurries or water solutions
- Depths to 200 feet with our available rigs

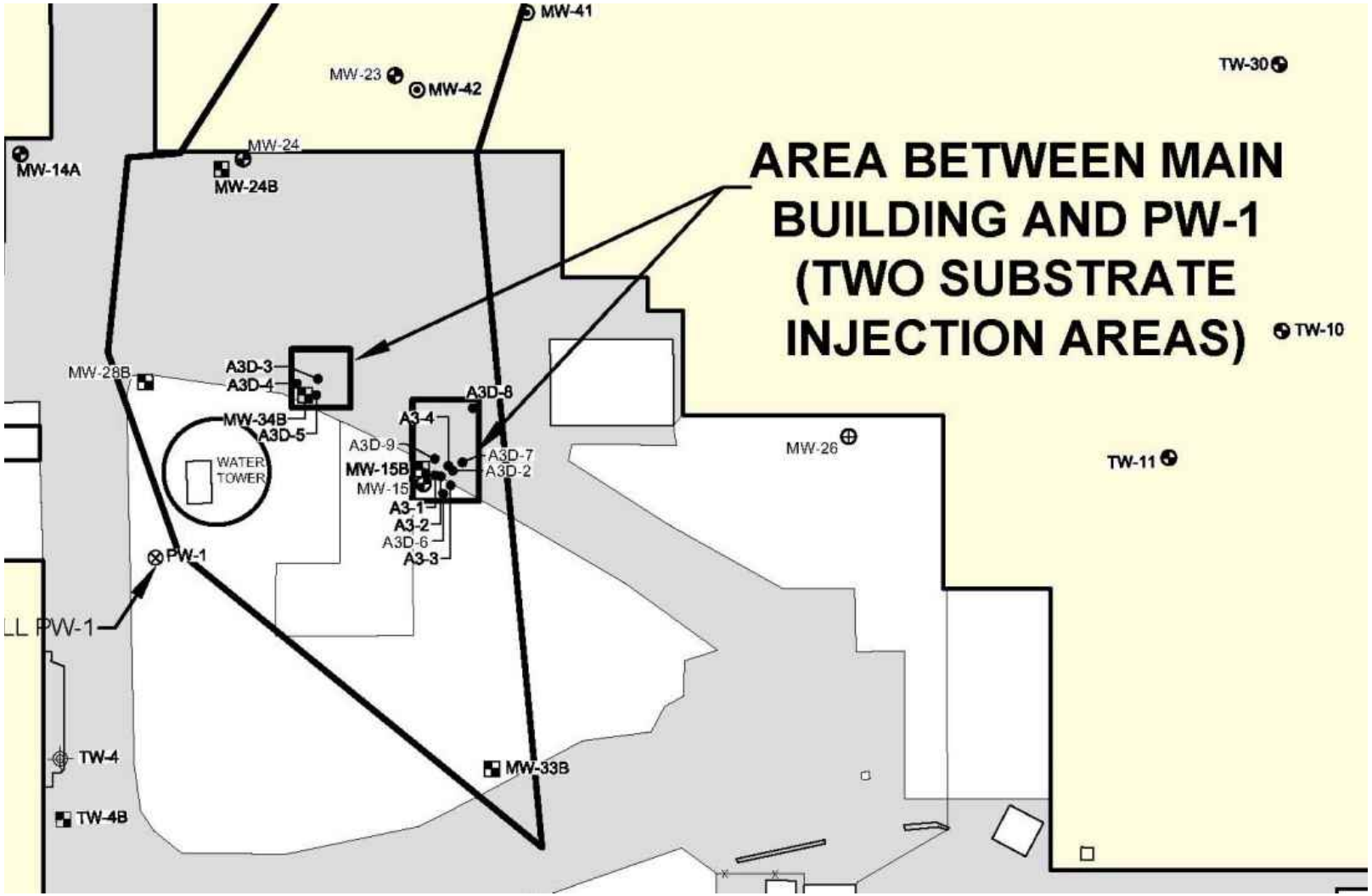
DISADVANTAGES

- Casing is very expensive so we have never injected persulfate
- Have had coring casing locked in, which required overdrilling
- Larger than a geoprobe so limitations on access

Case Study

- Active Industrial Site in Upstate South Carolina
- Injection of ABC+ (liquid carbon substrate plus ZVI)
- Piedmont Geology Targeting Saprolite and Partially Weather Rock
- Continuous Top Down Injections with Rotosonic Rig
- Pumps and Mixing Separate from Rotosonic Rig

Site Layout



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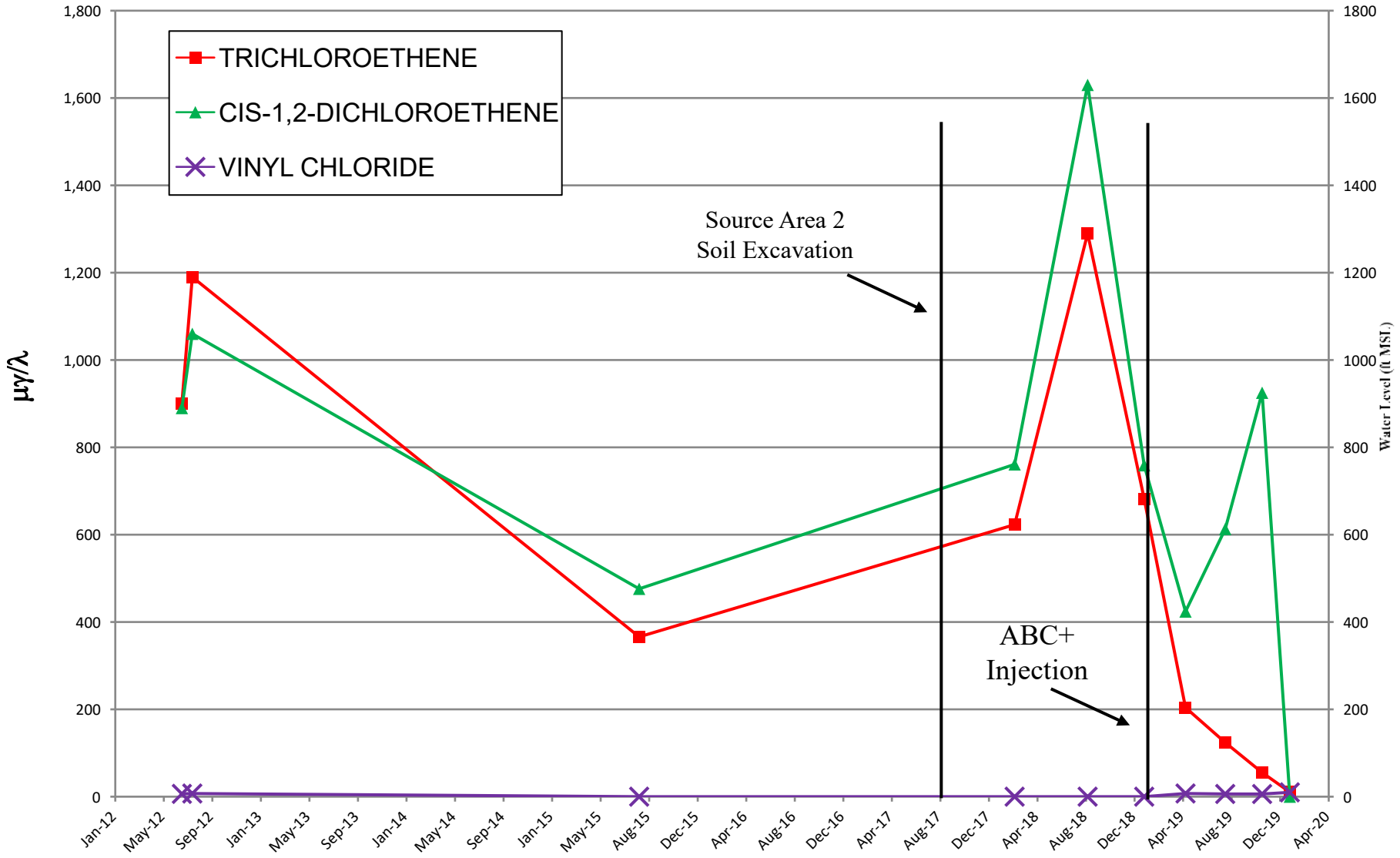
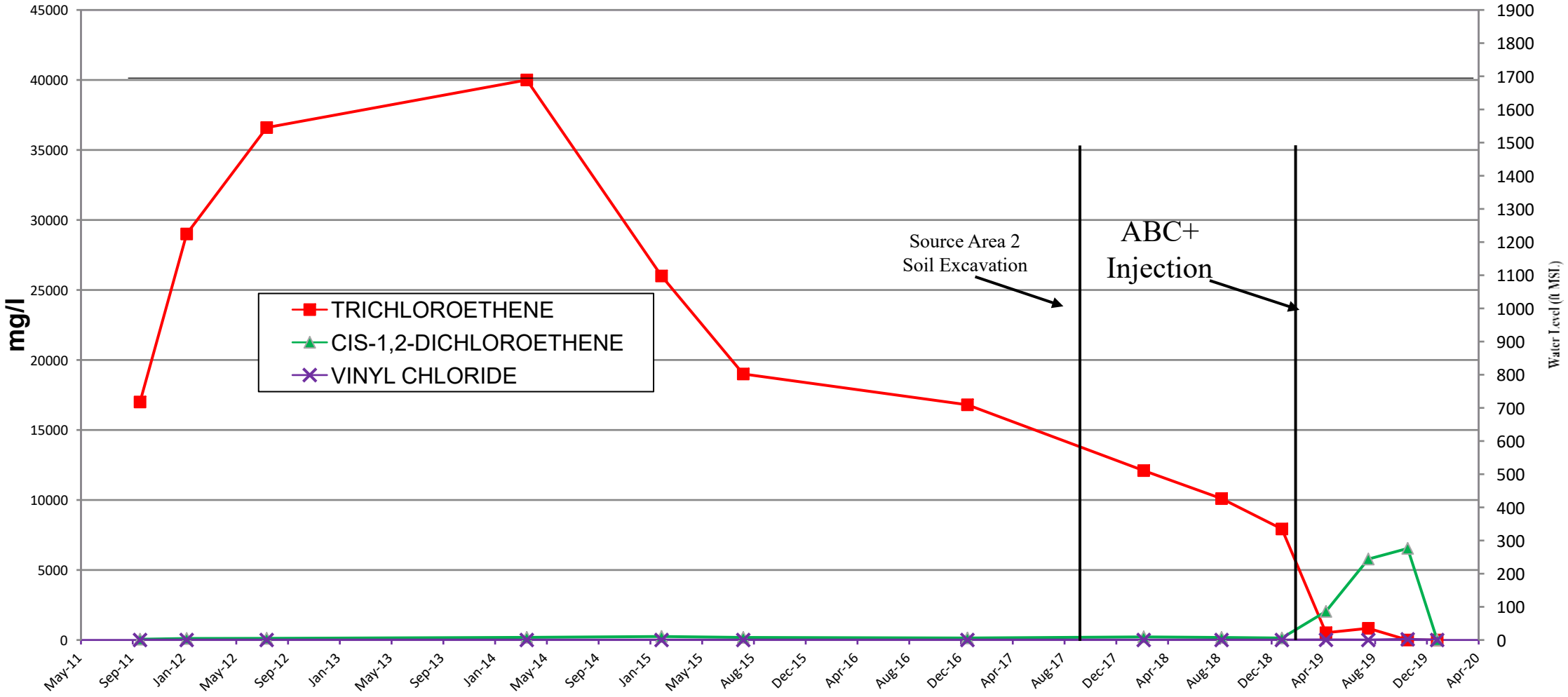
SAPROLITE WELL – MW15



Bedrock Well MW-15B



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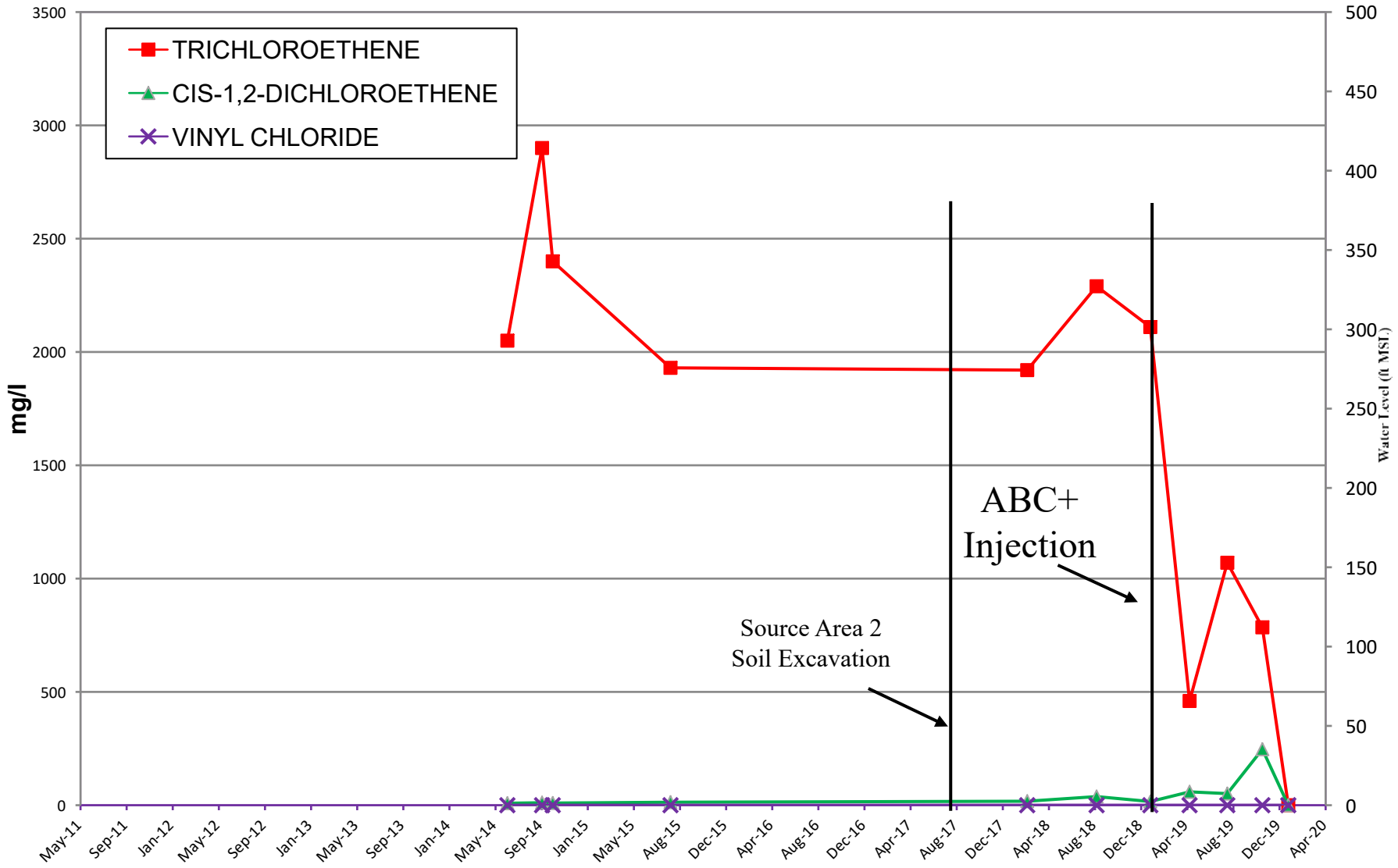
Bedrock Well MW-34B



Upcoming Projects

- Top Down injection of BAM in Central Georgia from 45 feet bls to top of bedrock at 95 feet bls
- Top Down injection of ABC+ from 65 to 125 feet bls in Alluvium in Southern California
- Injection of ABC+ into saprolite and PWR inside of an active industrial facility in NC
- Injection of ABC-Olé into Dolomitic Limestone in Indiana (requires pre-coring)

Contact Information

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