

SITE BACKGROUND

- » Former Dry Cleaner
- » Definitive source not identified
- » Site Geology
 - > Shallow “Saprolite” Zone
 - > Intermediate “Top-of-Bedrock” Zone
 - > Deep “Bedrock” Zone

SITE CHALLENGES

With the high mass loading per borehole, daylighting, or surfacing of ZVI product, became our greatest challenge. Quantity of daylighted material, flowrate out of the daylighted locations, distance from injection point and target mass per interval were all variables that were taken into consideration when managing daylighting as it occurred. Modifications to the injection strategy in the field were:

- » Use a high quality, highly reactive ZVI iron powder (Ferox Flow) that is effective at lower loading rates (*see Treatability Results*)
- » reduction of water volume (creating a higher density mix)
- » reducing the duration of the pneumatic fracture events
- » elimination of the fracture events at shallower intervals or locations where fracture networks from previous location were already in existence.

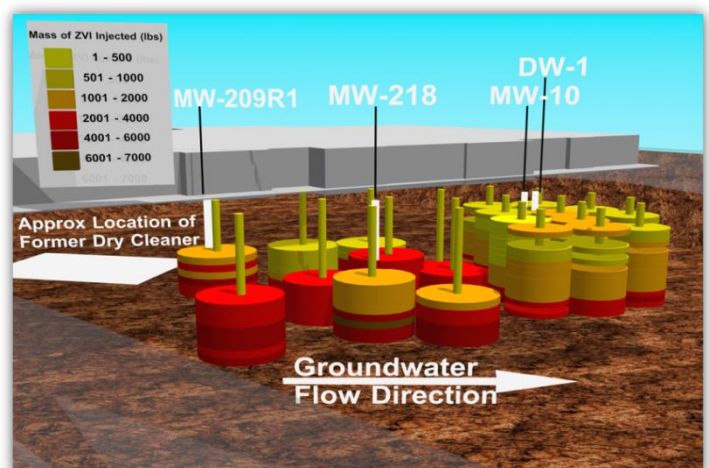
While daylighting was a challenge, it was also a visual means of determining radius of influence. Daylighting was observed up to 75 feet away from injection points, indicating that the design ROI was met and exceeded.

REMEDIAL APPROACH

- » Groundwater Modeling
- » Geochemical Review
 - > Aerobic
 - > No daughter products
 - > Slightly acidic
 - > Very high concentrations
- » Site-specific treatability
- » Selected approach
 - > Ferox Flow ZVI reactive iron powder
 - > Designed to be injected as a slurry for dissolved phase contaminants
 - > Medium grade
- » Pneumatic fracturing

INJECTION BY THE NUMBERS

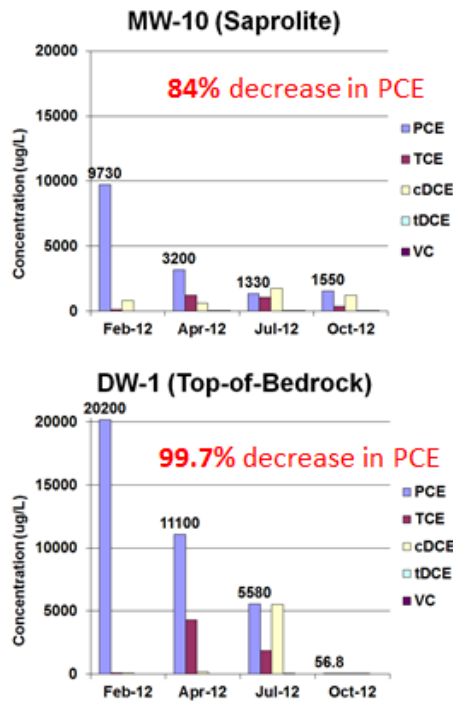
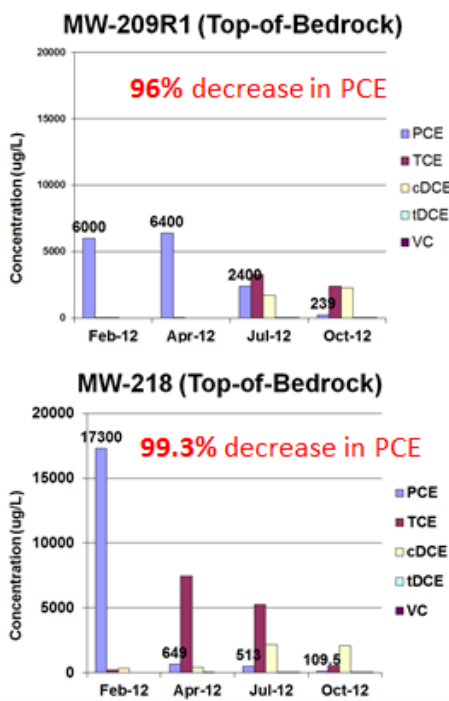
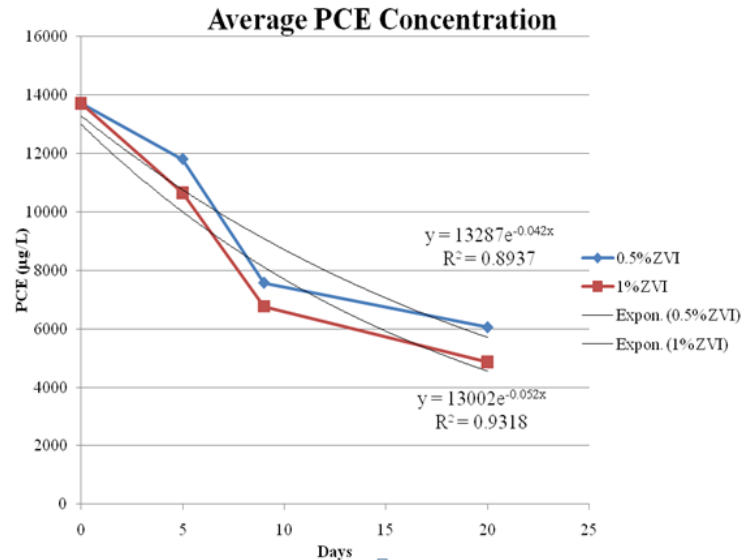
- » 21 injection points
- » 401,310 lbs (182 metric tons) Ferox Flow ZVI reactive iron powder injected
- » 179,360 gallons of water used
- » 29 days of injection



Final Injection Configuration

TREATABILITY RESULTS

- » Two dosages
 - > 0.5 % Ferox Flow ZVI reactive iron powder
 - > 1.0% Ferox Flow ZVI reactive iron powder
- » Approximately 50% reduction total cVOCs in 2 weeks
- » The treatment goal could be reached with the lower dose of 0.5% within 65 days



ANALYTICAL RESULTS

Data represented here is up to 8 months post injection and relative to PCE concentration in ug/L.

This data is showing some sequential dechlorination with some daughter product generation indicating a bio-augmented process is occurring as well.

CONCLUSIONS

Met aggressive project schedule and budget by:

- » Using Hepure's high quality reactive iron powders
- » High volume pneumatic fracturing injection procedure (averaging >13,000lbs/day)

Treatment goal met 8 months after application