

Case Study Summary Sheet #2

Client: US Army

Location: Morris County, NJ

Size: 50 feet long, 25 feet thick, 20 feet deep

Client Type: Government

Geology Type: Sand and Silt

Treatment Goal: Reduce Insitu Vinyl Chloride

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Project Summary

The FeroxSM Technology was selected as an *insitu* remedy to treat vinyl chloride (VC) contamination at an active federal government facility located in Morris County, NJ. The facility was placed on the National Priorities List in 1990 as a result of the contaminant levels. The primary contaminant, VC, was detected at concentrations as high as 739 µg/L in the soils and 1,520 µg/L in the groundwater. Contamination at the site is found primarily in the unconfined aquifer consisting of fine sands and extending to 20 ft. The FeroxSM application at the site included the injection of a special formulation Zero-Valent Iron (ZVI) powder into the subsurface to create a 4500-sq. ft Treatment Zone within a Class 2A aquifer. The Treatment Zone was designed to intercept and dechlorinate VC and other chlorinated volatile organic compounds emanating from an upgradient source area. The layout of the Treatment Zone is shown on the following page and consists of 12 pneumatic injection points.

More than 10,000 pounds of FeroxSM ZVI powder in the form of slurry were injected through pre-drilled boreholes into the formation utilizing a pressurized nitrogen gas based delivery system. During injections, pressure influence was seen as far as 40 feet away from the injection point. Field injection was completed within 3 weeks, despite adverse winter conditions.

Outcome

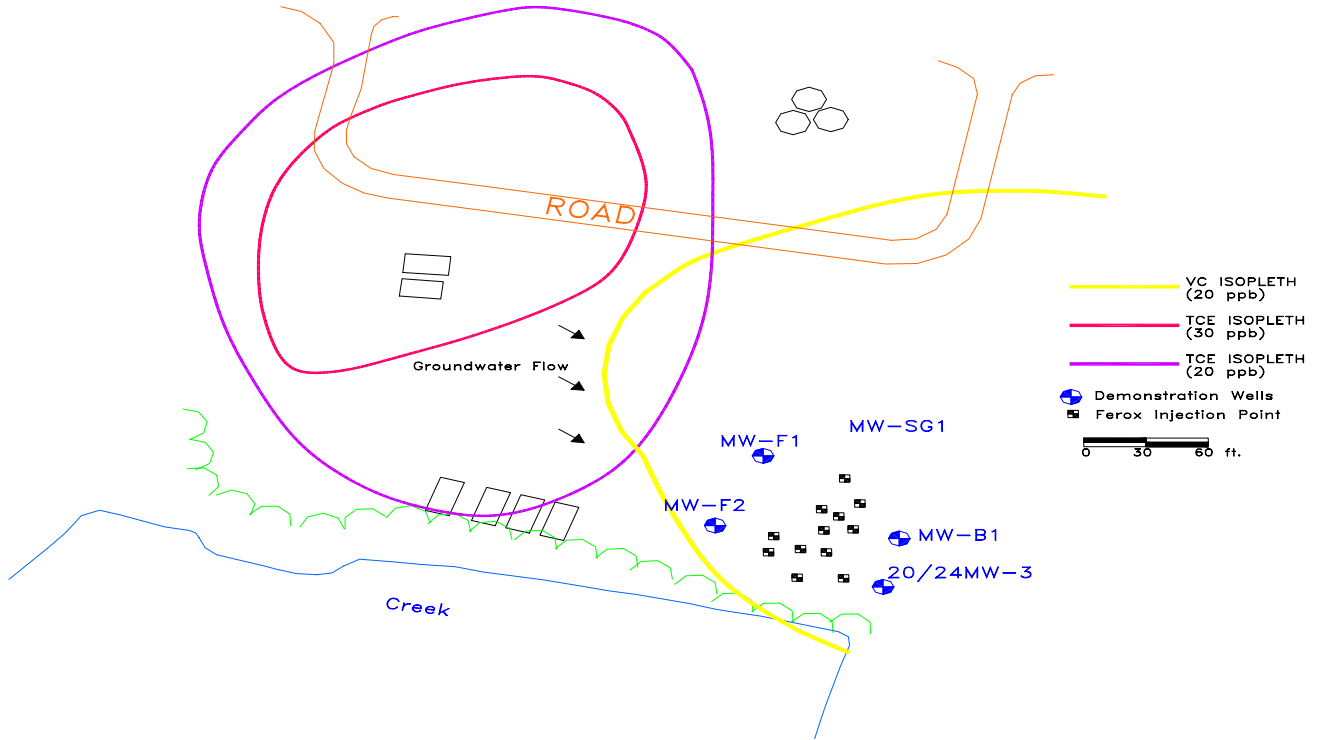
The project is currently under the post-injection monitoring program. To date, two post-injection field engineer standing by an injection point. The yellow hose conveys the pressurized nitrogen gas while the ZVI slurry is introduced via the blue hose.

action sampling rounds have been conducted onsite to evaluate the status and rate of dechlorination by the ZVI powder. A data summary table on the following page presents the results of the baseline and the post-injection groundwater sampling events. As evidenced in the table, Post-injection 1 results show an increase in CVOC concentrations for all wells. These temporary increases are commonly observed as the injection process makes connections with hydraulically isolated zones within the formation where residual contamination is located.

As evidence of the dechlorination process, the results of the second post-injection sampling in MW-1B show a decrease in CVOC concentrations and corresponding increases in chloride and iron concentrations. A slight increase in pH is detected in all wells as a result of the oxidation of the ZVI and the dechlorination process. An increase in pH is a commonly observed effect of the ZVI technology. However, unlike the conventional permeable reaction barrier (PRB) technology, the flexibility of the FeroxSM Technology in strategically emplacing designed dosages of the ZVI specific to different portions of the plume can minimize the increase in pH.



FEROXSM APPLICATION
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CVOC isopleths and as-built layout of the FeroxSM Treatment Zone.

Well ID	Event	TCE (ug/L)	<i>cis</i> -1,2-DCE (ug/L)	VC (ug/L)	Cl (mg/L)	Fe, Total (mg/L)	pH (s.u.)
MW-F1	Baseline	35	170	40	33	32	5.92
	Post-Inj. 1	70	320	120	31	222	6.68
	Post-Inj. 2	-	-	-	-	-	-
MW-F2	Baseline	<10	<10	<10	59	52	5.79
	Post-Inj. 1	<10	10	<10	58	148	6.69
	Post-Inj. 2	-	-	-	-	-	-
MW-SG1	Baseline	50	125	120	24	97	6.15
	Post-Inj. 1	70	140	360	21	138	6.55
	Post-Inj. 2	-	-	-	-	-	-
MW-B1	Baseline	330	950	300	59	45	6.32
	Post-Inj. 1	370	1400	630	71	44.2	6.70
	Post-Inj. 2	180	690	380	75	34.6	-
MW-3	Baseline	<10	62	200	97	10.2	6.28
	Post-Inj. 1	-	-	-	-	-	-
	Post-Inj. 2	354	59	310	100	30	-

The above table shows the results of the baseline and post-injection groundwater sampling. The post-injection samplings were conducted approximately 2 and 4 weeks after the FeroxSM injection.