# Oxygen Barrier BTEX Remediation at a Pipeline Spill in California

Contaminants	Application Method	Soil Type	Groundwater Velocity
BTEX	Oxygen Barrier	Silty Clays	0.5 ft/day

At a West Coast site owned by a major pipeline company, an ORC oxygen barrier was installed in an area of high BTEX contamination and in an area of lower BTEX contamination. Results of downgradient monitoring well sampling indicate that a significant risk reduction has been achieved in the high BTEX area and a cleanup to MCL's has been achieved in the low BTEX area.

Site Description and Remedial Design
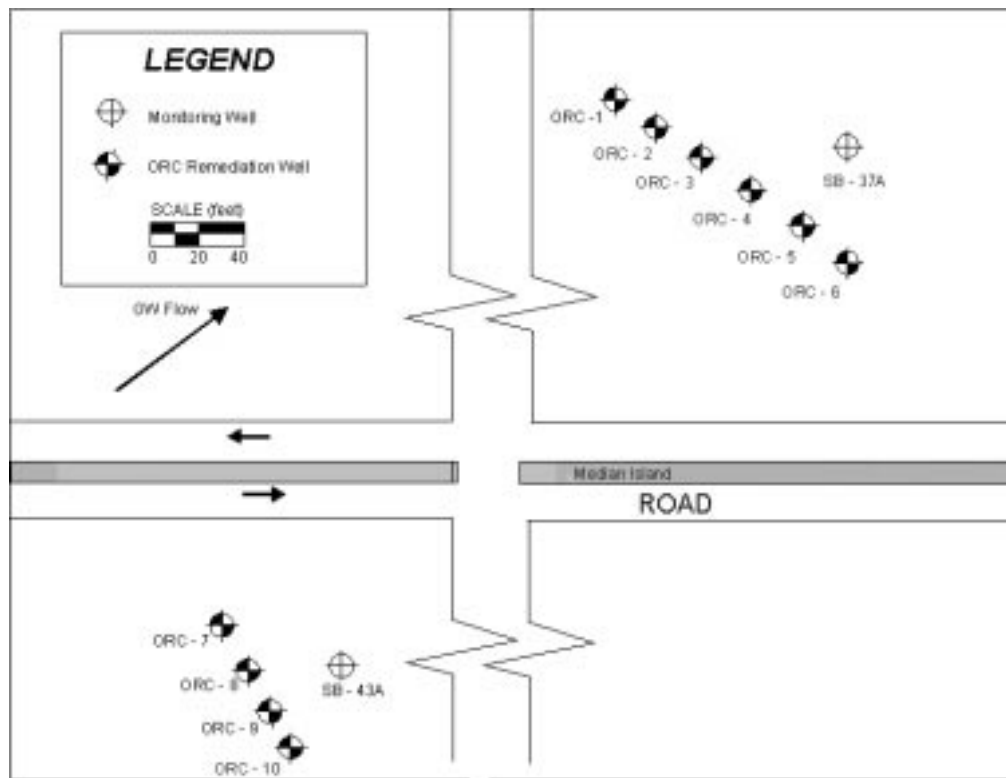
The affected aquifer beneath the site is composed of silty clays and clayey silts. Groundwater flow is towards the northeast with a gradient of 0.009 foot per foot. The water table is between 15 and 22 feet below ground surface. Groundwater velocity is about 0.5 foot per day.

A total of eighty 3 3/8" diameter ORC socks were installed in the two barriers. The larger barrier consisted of 48 socks in 6 Wells (ORC 1- ORC 6). The monitoring point is designated as SB-37A at 40' downgradient of the barrier. This was the more highly contaminated region. The smaller barrier, designated by ORC 7-ORC 10, was installed in the same manner, using 32 socks, in the less contaminated region. The downgradient monitoring point is SB-43A, also at 40' downgradient.
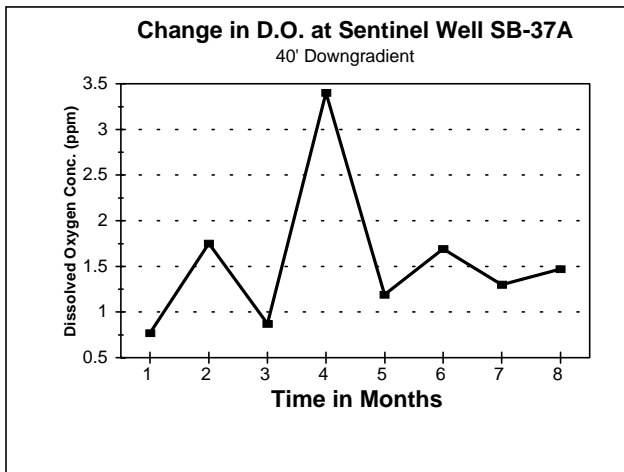
Results

<u>High Contamination Zone</u>
The first measurement was made after 6 weeks and monthly thereafter for two more months (Week 6, 10 and 14) following installation of the socks. Substantial increases in D.O. and reductions in TPH-G and BTEX were recorded (Figures 1 and 2). The first measurements, at 6 weeks after installation, can be considered a background condition, since oxygen would not have reached the sentinel wells (40' downgradient) until Week 10. The first significant results are at Week 14. The lag could be due to heavy initial oxygen consumption in the source wells.
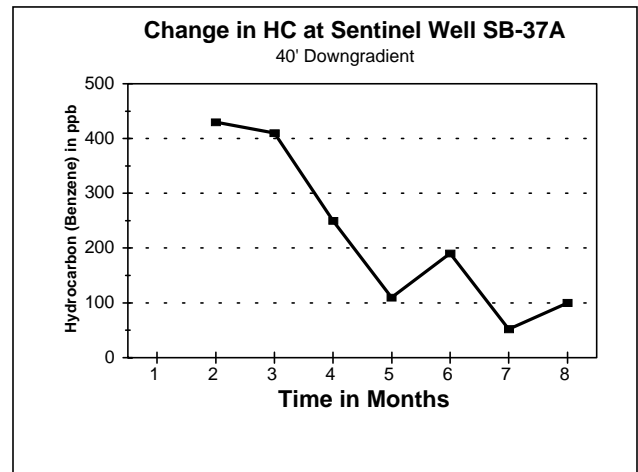
<u>Low Contamination Zone</u>
Well SB-43A, also 40' from the source, was the sentinel well for the 4-well barrier placed in the low concentration area. The same program was run as presented above. The results are given in Figure 3 and 4.
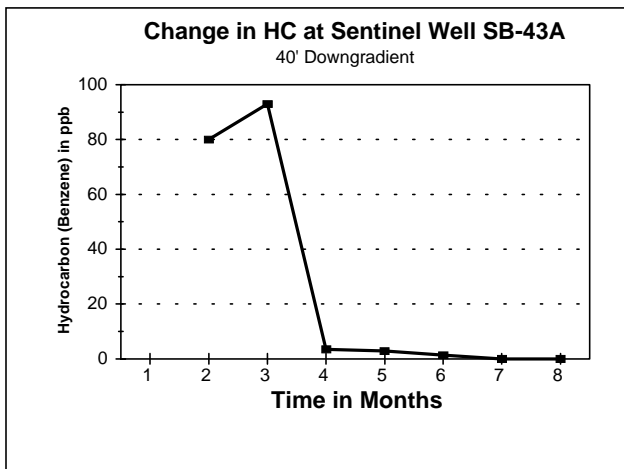
Figure 1

Change in D.O. at Sentinel Well SB-37A
40' Downgradient

Figure 2

Change in HC at Sentinel Well SB-37A
40' Downgradient

Figure 3

Change in HC at Sentinel Well SB-43A
40' Downgradient

Figure 4

Change in D.O.at Sentinel Well SB-43A
40' Downgradient