

Site Closure Sought after using ORC[®] Biobarrier to Enhance Aerobic Biodegradation of MTBE and TPHg

CASE SUMMARY

Former Service Station - Bishop, CA

Extensive methyl tertiary-butyl ether (MTBE) and total petroleum hydrocarbons as gasoline (TPHg) contamination was discovered within the subsurface as a result of leaking underground storage tanks (USTs) at a former service station. Following the removal of the leaking USTs, a total of 1,192 cubic yards of gasoline-impacted soil in the source area was excavated and transported off-site for treatment. Monitoring following the excavation activities revealed residual source contamination found in the capillary fringe immediately downgradient near Wells MW-6 and MW-7. Concentrations in Well MW-6 exceeded 7 parts per million (ppm) MTBE and approximately 11 ppm TPHg. Efforts to further delineate the plume revealed petroleum contamination extending 1,700 feet downgradient from the source. Early efforts were made to treat the downgradient plume utilizing an air sparging/vapor extraction system placed 800 feet downgradient from the site of the original release. This approach proved to be effective as MTBE and TPHg were reduced to non-detect levels downgradient from where it was installed. However, the source area continued to reveal MTBE and TPHg concentrations above the cleanup goals enforced by the California Regional Water Quality Board. To treat the source area and bring the site to closure, an enhanced bioremediation barrier (biobarrier) was designed and implemented using Oxygen Release Compound (ORC[®]).

REMEDIATION APPROACH

To address the source area, a total of 950 pounds of ORC was mixed with water to form a slurry and injected via direct-push technology. The 3 row ORC biobarrier was applied immediately downgradient from the release area (Figure 1). Wells MW-6 and MW-7 were monitored to observe the effectiveness of ORC.

Figure 1. ORC Biobarrier Injection Location

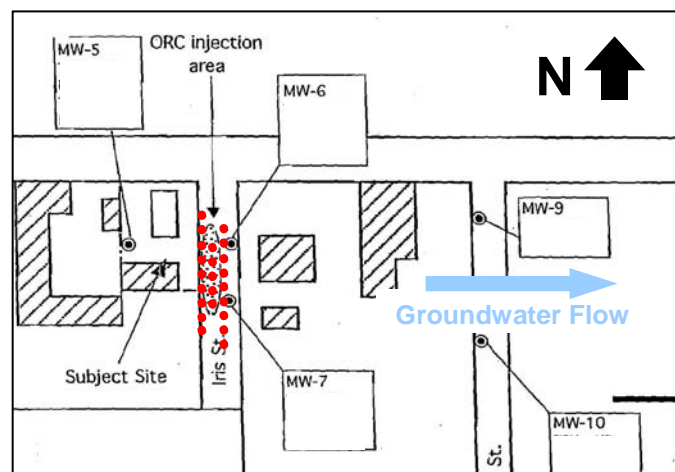


Table 1. ORC Application Details

Injection Points	Length of Biobarrier (ft)	Loading Rate (lbs/ft)	Injection Spacing (ft)
23	120	4	10

<i>f</i> Application Type: Biobarrier	<i>f</i> Soil Type: Fine to Medium Sand
<i>f</i> Product: ORC®	<i>f</i> Groundwater Gradient: 0.007 ft/ft
<i>f</i> Quantity Applied: 950 lbs	<i>f</i> Treatment Thickness: 10 feet
<i>f</i> Product Cost: \$9,452	<i>f</i> Depth to Groundwater: 3-6 feet

RESULTS

The post-ORC injection monitoring results show an effective reduction of MTBE and TPHg within one year. Well MW-6 indicates two MTBE concentration spikes likely caused by residual contamination from the soil entering into the groundwater (Graph 1). However, an MTBE reduction of 94% occurred between day 210 and 300 and concentrations reached non-detect shortly afterwards. TPHg concentrations declined by 70% within the first 30 days and continued on a downward trend, reaching non-detect levels approximately one year after the application.

In Well MW-7, reduction occurred immediately after injection with an MTBE decrease of 88% by day 120 (Graph 2). Concentrations reached non-detect less than a year after the ORC application. TPHg levels declined similarly to MTBE and reached non-detect in less than one year.

The effective treatment of MTBE and TPHg using ORC resulted in non-detect levels of both contaminants and has allowed the consultant to seek site closure status from the regulatory agency.

Concentrations vs. Time

