

COST-EFFECTIVE TECHNOLOGY REDUCES PETROLEUM HYDROCARBONS



Next Environmental Inc.

Phillip Lowery (Next Environmental, British Columbia, Canada)

David Clexton (Regenesis, San Clemente, CA)

SITE DESCRIPTION

The site was developed in the early 1970s as a car dealership and service station. The service station was comprised of 2 fueling pads each with 2 pump islands and 4 gasoline underground storage tanks (USTs) as well as 1 diesel UST. In the late 1980s, the facility was decommissioned and soil excavation activities were completed as a quick fix remedy to remove contaminated soils discovered around the tank pit area. The leaking USTs were removed and approximately 250 m³ of contaminated soil was excavated and disposed of off-site at a permitted facility. One new UST and single pump were installed and operated until early 2000 when extensive site investigations revealed a petroleum hydrocarbon plume around the source area and downgradient.

Well BH205A (ug/L)		Well BH206 (ug/L)		Well BH303 (ug/L)	
VPH	2,800	VPH	13,000	VPH	5,600
LEPH	2,400	LEPH	2,600	LEPH	2,000
Naphthalene	190	Naphthalene	240	Naphthalene	160

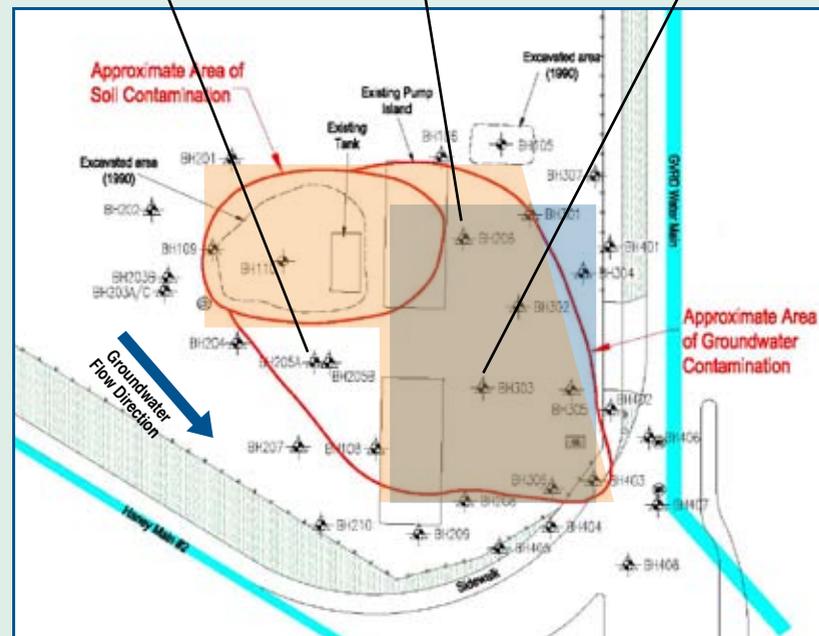


Figure 1. Site Map Showing Initial Concentrations, Application Areas, and the Extent of Soil and Groundwater Contamination

APPLICATION #1 - ORC

APPLICATION #2-3 - ORC ADVANCED

REMEDIATION APPROACH

A remedial plan was designed to include a larger excavated area near the source and an in-situ grid treatment via enhanced aerobic bioremediation to treat the downgradient plume. Excavation activities removed approximately 1,300 m³ of contaminated soil. A total of 1,350 lbs of ORC was applied in the excavation backfill and as part of the downgradient plume grid injection. A year later, an enhanced version of ORC Advanced[®] also applied to the downgradient plume. In this event, a total of 500 lbs of ORC Advanced[®] was injected near wells BH206, BH302, and BH303. A follow up injection using 1,650 lbs of ORC Advanced[®] was applied a year later to further enhanced bioremediation activity within the downgradient plume.

SITE DETAILS

- Soil Type: Sand
- Treatment Area: 11,300 ft²
- ORC Applied: 1,350 lbs
- ORC Advanced Applied: 2,145 lbs

CLEANUP GOALS

- VPH: 1,500 ug/L
- LEPH: 500 ug/L
- Naphthalene: 10 ug/L



Figure 2. Excavation Activities



Figure 3. ORC Advanced Slurry

RESULTS

Application #1 – Source and Plume Treatment

Within the source area, petroleum hydrocarbons were reduced significantly. VPH levels declined in BH206 from 13,000 to 4,300 ug/L while LEPH was reduced by 50%. In the downgradient plume, VPH was reduced by 80% while LEPH concentrations dropped from 2,000 to 250 ug/L then rose to 1,300 ug/L.

Application #2 – Plume Treatment

The trend near the source indicated an initial increase in both VPH and LEPH following the ORC Advanced injection. Concentrations were then reduced by 77% and 80%, respectively, for VPH and LEPH. Downgradient well BH303 showed a decline in both VPH and LEPH to below cleanup goals.

Application #3 – Plume Treatment

VPH and LEPH concentrations continued to be reduced near the source area. Well BH206 reached the cleanup goal in VPH while LEPH declined to 550 ug/L. Downgradient, VPH and LEPH levels remained below cleanup goals.

Table 1:
Naphthalene Reduction (ug/L)
(MCL: 10 ug/L)

Well	BL	Day 990	Percent Reduction
BH205A	170	32	81%
BH206	240	7.4	97%
BH302	140	6.7	95%
BH303	160	ND	99%
BH306	35	ND	99%
BH403	49	4.9	90%

Graph 1:
VPH Reduction - BH206

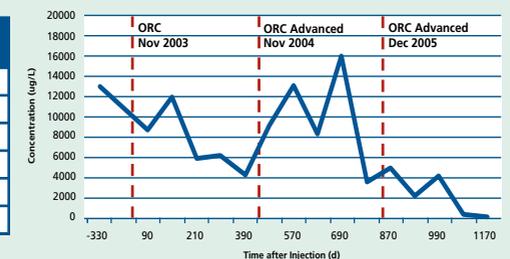


Figure 4. Time Lapse VPH Contaminant Contours Across the Plume

