

CASE STUDY

In June 2009, a series of soil samples taken under a residential building in Montreal, Quebec, Canada, revealed the existence of petroleum hydrocarbon concentrations exceeding the applicable provincial environmental criteria.

The results indicated petroleum hydrocarbon concentrations in the center of the contaminated area—the “hotspot”—were 1,200 mg/kg.

Since the contamination was under the concrete slab of an underground parking garage, close to the footing of the exterior wall of the building, and the excavation of the soil posed significant technical difficulties, it was decided to use in situ remediation as a means to rehabilitate the site.

Enutech, Inc. (Saint-Laurent, Quebec, Canada), an environmental company that specializes in in situ remediation of contaminated sites, was selected to rehabilitate the site.

Treatment

The project consisted of installing seven injection wells in and around the contaminated area and injecting a solution of biosurfactants and the appropriate type of bacteria in the affected soil (Figure 1).

The biosurfactant that was used, called Stimulus[†], is a liquid plant extract produced by Bionetix International. The biosurfactant has the ability to desorb and emulsify the petroleum hydrocarbon adsorbed onto soil particles, making it vulnerable to bacterial biodegradation. The bacterial culture, called BCP35S[†], was injected at the same time as the biosurfactant. The culture contains different naturally occurring bacteria that are well adapted to petroleum hydrocarbon contaminated environments and are used to treat such contaminants.

After two series of injections in the contaminated soil using a solution of the

Bioremediation of Petroleum Hydrocarbon-Contaminated Soil under a Residential Building

BIONETIX INTERNATIONAL, *Sainte-Anne-de-Bellevue, Quebec, Canada*

The soil beneath a residential parking area had become contaminated with petroleum hydrocarbons. The remediation program involved the injection of a solution comprising a biosurfactant, bacterial culture, and other additives. After two series of injections of the solution over a 10-month period, results indicated that petroleum hydrocarbon concentrations were virtually undetectable.

[†]Trade name.

biosurfactant, bacterial culture, and other additives, samples were taken from the hotspot and analyzed in a certified laboratory.

The results showed that petroleum hydrocarbon concentrations in the soil were undetectable (<100 mg/kg) where concentrations were 1,200 mg/kg approximately 10 months before (Figure 2). Since petroleum hydrocarbons were undetectable in the once-contaminated soil, the biodegradation of the sum total of those hydrocarbons most likely occurred in fewer than 10 months.

However, because biodegradation of 1,200 mg/kg of petroleum hydrocarbons occurred within 10 months, it can be extrapolated that the environmental goal (700 mg/kg in this case) was achieved in approximately four or five months, assuming the degradation rate was constant.

Conclusions

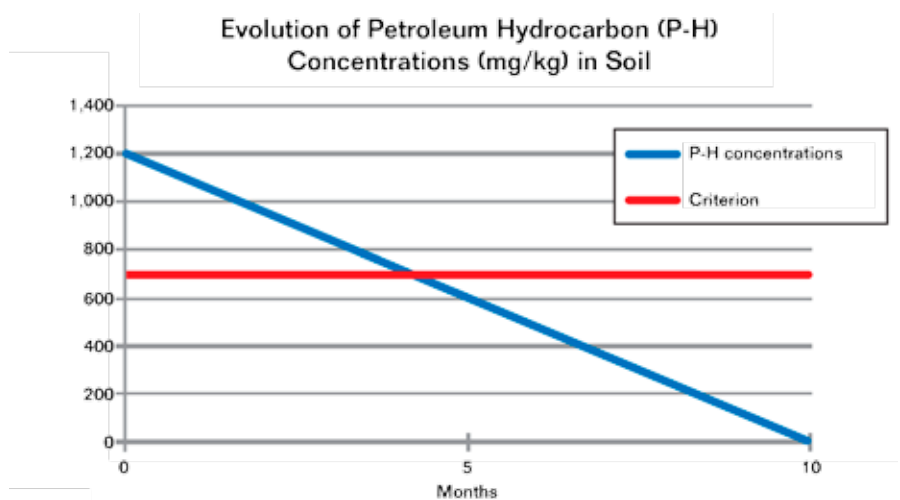
Overall, the results show that sites contaminated with petroleum hydrocarbons can be rehabilitated with the in situ remediation method used in this case, achieved with repeated injections of a solution of biosurfactants and specialized bacterial cultures. In situ remediation using this method proves to be a practical and economical way of achieving compliance with environmental criteria. *MP*

FIGURE 1



Injection of a remedial solution to decontaminate the soil.

FIGURE 2



Remediation of petroleum hydrocarbon concentrations in the hotspot.