

In Situ Sorption and Biodegradation of Petroleum Hydrocarbons

Amita Oka (aoka@langan.com), Kawalpreet Kaur, Steven Sherman, Stewart Abrams, and Michael Spievack
(Langan Engineering and Environmental Services, Princeton, NJ)

Background/Objectives. Site constraints limited the extent of soil excavation and removal of source material impacted with petroleum hydrocarbons at a Florida site. Oxidant application was completed in the limited excavation zone as an interim remedial measure. After completing three quarterly groundwater sampling events, groundwater conditions returned to baseline and levels of groundwater contaminants of concern (COC), namely trimethylbenzenes (TMB), isopropyl benzene, xylenes, and naphthalene remained above the natural attenuation default concentration (NADC) levels. Considering the high levels of soil total organic carbon, and results of the treatability testing, application of activated carbon formulation BOS 200® was chosen for implementation of additional remedial measures at the site.

Approach/Activities. Remedial activities were completed in two treatment zones, Zone A below the former excavation area and Zone B encompassing the downgradient plume. Zone A was characterized by deeper impacts of COCs, while impacts in Zone B were relatively shallower. Remedial amendments including BOS 200® and Trap & Treat™ bacterial concentrate were applied at 14 locations in Zone A and 47 locations in Zone B. To accommodate site construction activities, injection points were pre-established during re-surfacing of the injection area. Injection points were advanced using direct push technology up to 20 feet below ground surface with a grid spacing of 7.5 feet and injections were performed using 2 foot intervals. Field monitoring was performed to assess distribution of the remedial reagents during injections and to identify any surfacing/daylighting. In addition to the baseline groundwater sampling event completed before the injection activities, groundwater samples were collected one month after injections, and quarterly thereafter. Contingent injections of sulfate solution are planned upgradient of the site through permanent injection wells, if the sulfate groundwater concentrations decrease to low levels. That would indicate that gypsum applied as a part of BOS 200® formulation has been depleted and amendment of additional electron acceptor is necessary.

Results/Lessons Learned. Application of remedial reagents was completed as planned. Post-injection groundwater monitoring was continued with quarterly events after the first groundwater sampling event. Favorable trends in groundwater concentrations of COCs were observed after BOS 200® application in both Zone A and Zone B, and the need for contingent sulfate injections is not foreseen.