

Integrating Remedial Infrastructure into a Retail Petroleum Facility Upgrade: Lessons Learned in Long-Term Contaminated Site Management

Aaron Madsen (aaron.madsen@amecfw.com) and Rachel Peters (Federated Cooperatives Limited, Saskatoon, SK, Canada)

Background/Objectives. An Environmental Site Assessment completed prior to a planned upgrade of an operating gas bar, which has existed in different configurations for over 35 years, identified widespread petroleum hydrocarbon impacted soil and groundwater at depths up to 7.6 m, as well as light non-aqueous phase liquids. Further, an abandoned storm sewer line located directly under the existing pump island was acting as both a conduit and a reservoir for impacts. Given a short timeframe between the assessment and initiation of construction, as well as the depth of impacts, traditional remedial efforts such as excavation were not considered feasible. The impacts were delineated within the larger property boundaries, however full delineation of impacts was not achieved due to limitations of the existing site configuration (i.e. building locations). An effort was made to incorporate a remedial approach that used key amendment delivery learnings from recent research projects completed through the Sustainable In Situ Remediation Cooperative Alliance (SIRCA).

Approach/Activities. Due to the proposed configuration of the upgraded site, including building the new pump islands over a large portion of impacted area, the impacted area would not be accessible following construction for a typical amendment delivery program. The remainder of the impacts were under the parking lot of the associated convenience store, and site owners hoped to minimize future destructive work which would affect the new asphalt. The key challenges encountered during the system installation were as follows:

1. The majority of the system infrastructure would have to be installed ahead of construction completion, and would not be accessible following construction
2. Available space on the site was very limited for surface infrastructure
3. The system had to be installed during specific windows of the construction schedule. The construction schedule was very tight, and changed on a regular basis due primarily to weather delays.

Results/Lessons Learned. The long term remedial plan for this site is based on successes observed at recent SIRCA research sites in which a low concentration remedial solution is metered along with water into a series of subsurface infiltrators. To resolve the above-mentioned challenges a very simple and practical system was designed to allow for enhanced insitu biostimulation without disruption to the operation of an active petroleum gas bar. The site infiltrators consist of large bore test holes drilled with a piling rig and backfilled with pea gravel. Slotted pipe was installed into the test holes and connected with flexible tubing to a centralized header system. The infiltrators and distribution lines were all completed beneath the site infrastructure and were installed in conjunction with the petroleum infrastructure on site. Working with the construction contractor, a small fenced area was established adjacent to the car wash to contain the future remedial solution delivery system. This location was key because it allowed a quick water connection to the metering pump, which negated the need for large volumes of water to be stored on site. Power for the metering pump was installed as part of construction. Regular contact with the contractor was essential to ensure that installation of the system could be completed with minimal interference on construction activities.