

In-Situ Permeable Reactive Barrier Remediation Optimization using High Resolution Site Characterization Tools – A Case Study

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Off-site liability and risk mitigation from subsurface impacts have become a key focus of the environmental industry. A common remedial technology to address off-site liability and risk mitigation involves the installation of a Permeable Reactive Barrier (PRB). Reasons for this resurgence in PRB popularity can be traced back to improvements in remedial amendments, technologies, sustainability and major improvements towards efficient, detailed Site characterization. Previous PRB installations largely relied on site wide information or information collected sporadically along the alignment to make decisions on design and installation details. Relying on limited information to design and install a robust PRB may lead to unintentional “holes” in the PRB or oversized and higher costs for the stakeholders involved.

Optimizing these remedial designs to achieve the project objectives and balance the costs of the project can be a challenging proposition without sufficient data along the PRB alignment. High Resolution Site Characterization (HRSC) tools have been developed, deployed and used on many sites in Canada and around the world. The ability to capture thousands of data points relating to contaminant presence, type, magnitude and distribution in the subsurface as well as detailed measurements of subsurface permeability heterogeneities from a single probe point is invaluable for robust PRB design. The data collected by the HRSC tools, coupled with targeted analytical data, can allow the PRB design to be optimized for an effective and cost-efficient solution.

This presentation reviews one case study where HRSC tools were deployed and compared with historical analytical data to design and implement a PRB. Furthermore, this presentation will discuss the potential information data gaps that would have arisen if just traditional methods were used to collect data for the PRB designs. Additionally, the final optimized design that was completed are compared to the theoretical PRB that would have been installed if data from the HRSC tools were not included to highlight potential pitfalls and optimization strategies for these in-situ remediation programs.

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Mr. O’Neill is a project manager at Vertex Environmental Inc. and has over 12 years of experience in environmental engineering. Patrick manages the high-resolution site characterization division and has years of experience designing and implementing high resolution site characterization programs targeting chlorinated solvents and petroleum hydrocarbons. Mr. O’Neill holds a Master’s degree from the University of Waterloo where he studied groundwater modeling of the Grand River watershed and how climate change scenarios will affect the watershed.