(The) Less Than Ideal Path to the Remediation of a Petroleum Release Site: A Case Study in Trials and Tribulations

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Introduction

Standard approaches to remediation of heavily impacted groundwater at a site ideally start with a thorough understanding of the extents and amount of impacts, the geology and hydrogeology, and contaminant transport mechanisms. While detailed investigation is the preferred approach, what do you do when a client favours action over additional investigation and monitoring that would be needed to properly understand the issues? This presentation focuses on a case study of a heavily petroleum hydrocarbon-impacted site, with initial groundwater concentrations in excess of 400 milligrams per litre of dissolved phase toluene, with potential for residual LNAPL in areas of the site. Characteristics of the project included deep groundwater impacts, complex geology including multiple soil layers and bedrock, multiple landowners and stakeholders, and client direction to achieve progress with mass removal of impacts instead of a more traditional and desired approach to get a complete understanding of the contamination before proceeding to remediation.

Challenges

The challenges faced for this project required flexible and creative solutions, outside the normal step-wise approach that would often be followed. Specific challenges, the approach followed, and whether or not were successful, will be discussed in the presentation. Some challenges included:

- Direction to initiate remediation activities instead of more characterization,investigation and monitoring
- Prevention of access to contaminated portions of the site due to landowner issues and infrastructure
- Changing regulations
- Seasonal operation and use of pilot scale equipment for longer term remediation
- Deep contamination and significant heterogenic subsurface
- Site security and vandalism
- Permitting
- Stakeholder, landowner, and regulator interactions

Overall results of approach

The overall remediation system employed included a multi-phase extraction system combined with a pneumatic air lift system. Results of this remedial approach will be discussed in the presentation. Despite uncertainties, challenges, and a variety of stakeholder interests/objectives, the implemented approach, including creative solutions to site-specific challenges has proven to be successful with significant changes in impacted areas affecting several properties being reduced down to a few minor areas of impact on only one property. Client, landowners, and regulators interests and objectives have been addressed in responsible and cost-effective strategies.

Conclusions

While traditional scientific approaches to investigation and remediation are always preferred to set realistic goals and objectives, to increase the chances of success of a remediation program, and to follow typical best-practices and regulatory guidelines, consultants are often faced with financial and regulatory challenges to be innovative and creative. This presentation details a case study of challenges, how they were resolved, the success of the approaches at the end of the day shows how remediation endpoints were achieved.

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Rob Dauk is a Senior Environmental Engineer and Principal with GHD, based in Western Canada. Rob has 23 years of environmental engineering experience and is known for his experience completing in-situ remediation of complex contaminated soil and groundwater challenges. He has completed monitoring and investigation programs and has managed the design, operation, and optimization of successful in-situ remediation programs at industrial/commercial properties in Western Canada. His projects have involved using a wide range of in-situ techniques including soil vapour extraction, air sparge, in-situ chemical oxidation, enhanced bioremediation, and other groundwater remediation approaches. Rob has a B.Eng. (2002) in Geological Engineering from the University of Saskatchewan in Saskatoon, Saskatchewan, and an MBA (2011) from the University of Calgary, in Calgary, Alberta.

Stephen Ball

Stephen Ball is a Project Director and Principal with GHD, based in Calgary, Alberta. He brings extensive experience in environmental consulting, with a focus on remediation,contaminated sites assessment, and the development of remedial action plans. Stephen is known for his expertise in environmental auditing and compliance assessments,particularly within the oil and gas sector and gas station design projects across Western

Canada. He is actively involved in digital initiatives and contributes to strategic planning and execution within the GHD's Contamination Assessment & Remediation Team. Stephen holds a Bachelor of Applied Science, a Masters of Science and MBA.