



## High-Resolution Site Characterization and the Development of a Better Conceptual Site Model: A NAPL Release Site Case Study

Kirklyn Davidson, SCG Remediation Services

Understanding contaminants and their interactions within the environment is crucial to implementing effective remediation strategies. Developing a detailed conceptual site model (CSM) significantly enhances the ability to treat contaminated sites and manage associated risks. High-resolution Site Characterization (HRSC) tools, such as the Membrane Interface Probe (MIP) and Ultraviolet Optical Screening Tool (UVOST), provide valuable insight into the spatial distribution of contaminants. These tools facilitate the creation of more robust CSMs and comprehensive remediation strategies.

SCG Remediation Services has applied HRSC technologies across a number of sectors including military, private sales, mining, and oil and gas. The principles presented in this case study can be used to improve CSMs to allow for a more thorough and accurate evaluation of risk where select NAPL impacts are present.

The purpose of this presentation is to highlight the advantages of HRSC technologies, particularly UVOST, which provides valuable data for assessing and managing risks associated with petroleum hydrocarbon contamination. Traditional investigation methods, such as monitoring wells and boreholes, often fall short of representing NAPL plume structures accurately due to scale limitations. By combining HRSC tools with traditional methods, more refined data on site stratigraphy, contaminant distribution, transport, and fate can be collected, enhancing the understanding of site dynamics.

UVOST employs laser-induced fluorescence (LIF) for real-time, in-situ field screening of petroleum hydrocarbon-impacted soils. When paired with an electrical conductivity sensor, it provides a comprehensive understanding of contaminant sources and stratigraphy, offering deeper insights into plume dynamics at contaminated sites.

This presentation provides a concise overview of the technology and its application at two NAPL release sites. The integration of HRSC tools with targeted soil and water sampling enhances understanding of NAPL distribution, enabling more informed risk management and effective remediation strategies. These strategies can and have been applied within the oil and gas industry to better inform remedial activities and planning to allow for the development of cost-effective remedial solutions at contaminated sites (abandoned well pads, refineries, pipelines, bulk storage tanks, etc.).

### Kirklyn Davidson

Kirklyn is a graduate from Acadia University with a BScH Environmental Geoscience (2018), and a MASc degree in Environmental Engineering from Dalhousie University (2020). During his education, he obtained practical experience by aiding in the delineation of contaminated sediment at Boat Harbour, one of the largest remedial projects in Nova Scotia since the Sydney Tar Ponds. He joined SCG Industries as a part of the technical team where he utilized various underwater sediment sampling techniques and worked as a lead field technician using the Ultraviolet Optical Screening Tool (UVOST). Kirklyn included both parts of the project (experience and data) for his undergrad and master's theses.

Mr. Davidson has brought a wealth of knowledge to SCG Remediation Services, and has developed the abilities to design, operate, and manage various remedial projects and systems, including:

- Water treatment systems for LNAPL/DNAPL contaminated sites (MPVE, DPE, Thermal, chemically enhanced)
- Soil and water sampling programs
- High Resolution Site Characterization Technologies (UVOST, TARGOST, MIHPT, LLMIP, OIPHPT)
- Chemical Injections for the in-situ treatment of contaminated sites

In his current position as Project Manager & Environment Geoscientist, Kirklyn manages the High-Resolution Site Characterization (HRSC) department, and on-site leads different projects in Nova Scotia, where he resides, and across Canada.