

COMPREHENSIVE MIP / MIHPT (C-MIP) TECHNOLOGY

TECHNOLOGY BRIEF: TB021-1

RAPID TRANSITION FROM INVESTIGATION TO REMEDIATION DESIGN

C-MIP REDUCES YOUR INVESTIGATION TIME BY 80%

INTRODUCTION

The Comprehensive Membrane Interface Probe Technology (**C-MIP**) is a *Qualitative* and *Quantitative* investigation tool for the *timely* Vertical and Horizontal Delineation of Volatile Organic Compounds (VOCs) in the subsurface. **C-MIP** Technology can be combined with Hydraulic Profiling Tool (HPT) which provides an estimate of the Hydraulic Conductivity (*K* value) of the Saturated Thickness (the Aquifer) in the subsurface simultaneously.

The current Stand-alone MIP, or MIP with HPT (MIHPT) provides a wealth of information about the subsurface as follows:

- The presence of *Total* VOCs in the subsurface and the associated depth (no VOC compound identification).
- The Technology provides high resolution data of the subsurface formation such as soil Electrical and Hydraulic Conductivities. Also, the Water Table can be discretely mapped and a great deal of Aquifer information/data can be derived from the MIHPT logs such as the *Operating Condition* of the Aquifer (*Confined vs. Unconfined* or the presence of "*Perched*" zone).
- Data from MIP / MIHPT can be used to map the possible Plume Migration Pathway in the subsurface. A combined (*expert*) analysis of the soil Electrical, Hydraulic conductivities, along with the HPT Line Pressure can defined the migration routes of the plume in the subsurface.
- The data of all MIP / MIHPT sensors can be intelligently mapped in cross-section (2D) or 3D distribution for further examination.

THE GOOD JUST GOT BETTER

The data-rich MIP / MIHPT (produces one reading per one inch of Depth) just got better to serve your Project Managers to investigate contaminated projects *Qualitatively* and *Quantitatively* (one-part per billion (PPB) resolution) at the *same speed* of the conventional MIP / MIHPT logging rate. In summary Timely and High-resolution Investigation with "*ZERO*" investigation-derived waste (IDW). The In-situ nature of the Technology eliminates the risk of sample degradation during field handling or shipping to fixed-base laboratory.

CONVENTIONAL vs. INNOVATIVE

MIP / MIHPT is a real-time direct sensing technology which detects the presence of *Total* VOCs in the subsurface using an array of detectors including Photo-, Flame-ionization and Halogen-specific Detectors (PID, FID and XSD, respectively). The wealth of data collected by the MIP / MIHPT logging includes the following:

- Qualitative detection of *Total* VOCs in the subsurface (no Identification).
- Depth to Water Table(s) and "Perched" zones.
- Estimated Hydraulic Conductivity (*K* value) of the Saturated Thickness (Aquifer).
- Plume Status: Using the different response of the detectors (Detectors' Response Differentiation (DRD)), one can infer the Plume migration trend, existing natural decay (Natural Attenuation) and Plume distribution in the subsurface (Migration Pathways).
- MIP / MIHPT data outline the areas of concern for further conventional sampling and off-site-laboratory Quantification of the detected VOCs.
- MIP / MIHPT data can be used to aid in the adequate placement of monitoring and remedial wells and adequate well design.
- MIP / MIHPT data can be used to map possible Migration Pathways of the Plume in the Vadose and Saturated zones.

C-MIP: HIGH RESOLUTION INVESTIGATION TECHNOLOGY

C-MIP is the combination of MIP / MIHPT screening with Positive VOC compound Identification in real-time (5 to 10 minutes) using a mobile gas-chromatograph. This compound Identification and Quantification (in 1 PPB Resolution) is conducted while maintaining the speed of MIP / MIHPT operation (all *real-time*). The Technology's VOCs measurements are 94 to 100% comparable to a fixed-base laboratory.

C-MIP is the answer to assist Project Managers in their investigation efforts to delineate the Vertical and Horizontal extent of VOC Plume cost-effectively and timely, In summary, **C-MIP** can provide you with the following:

- All the data typically obtained from the conventional MIP / MIHPT logging such as the Lithologic and Hydrogeologic data of the subsurface, in addition to the *Total* VOCs detected at Depth.
- **C-MIP** Quantify and Identify the detected VOCs with 1 PPB concentration sensitivity.

(C-MIP) HIGH RESOLUTION INVESTIGATION TECHNOLOGY

- **C-MIP** data is a great tool to focus the conventional sampling effort by targeting the areas and depths of real concern. However, **C-MIP** reduces the conventional sampling effort by 80% (by sending 20% of field screened samples for off-site lab confirmation).
- **C-MIP** is a great tool to assess Vapor Intrusion with compound-specific focus and risk assessment on the spot.
- Project Managers can confidently correlate respective VOCs concentrations in the vapor phase and in the soil matrix easily and in the field.
- **C-MIP** Technology can be used to troubleshoot and evaluate the efficacy of an on-going Remedial Action.

DELIVERABLES & DATA SHARING

Our team will generate Log Reports (LRs) immediately following the completion of the logging operation. The LR's consist of the following sub-reports:

- MIP / MIHPT Log printouts (Detectors' Response vs. Depth).
- Schematic representation of the Water Table and the estimated Hydraulic Conductivity (K value).
- MIP / MIHPT Pre-and Post-Log Standard Tests (MIP / MIHPT QA/QC sub-report).
- A table of detected VOCs with corresponding concentrations in PPB or PPM units at each sampling interval.
- Data of Field Blank, Standard Calibration and Field Duplicate Samples (GC QA/QC sub-report).
- Locational Data using GPS (with **RTK** Correction if required)
- All field data and reports can be shared securely with your Team Members across the Country in timely manner (minutes) to assist your Project Managers in field Decision-making.

THE EXTRA MILE

Imagine the possibilities of having high-resolution and spatially-defined Lithologic, Hydrogeologic and Chemical data of the subsurface, the presentation formats which are ENDLESS:

- **C-MIP** data can be spatially distributed in 2D and 3D using your choice of software platform (RockWorks®, 3D CAD, ...).
- MIP soil Electrical Conductivity data can be used in conjunction with other MIHPT data to map Sand Seams and Clay Layer Extents, thus delineating possible Migration Pathways to the standard and satisfaction of any Regulator in the Country. Moreover, this can be done in 2D and equally in 3D for in-depth site examination.
- VOCs Identification sampling can be conducted with no delay of logging operation at as many depth intervals as required.

CONCLUSION

C- MIP is a comprehensive **High-Resolution Site Characterization (HRSC)** Technology that could push your project from Investigation Phase into Remediation Design Phase in no time and with great deal of confidence.

CASE HISTORY

This Technology was applied at multiple projects. Ask for an Example Report.

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