Application of MIP® and UVOST® to Delineate Subsurface Contamination and Real Time Decision Support Tools

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Historically, many remediation efforts have failed due to inadequate site characterization and/or over-generalized and misleading conceptual site models. This resulted in costly remediation efforts that did not achieve expectations or regulatory goals. Today, many older remedial technologies are being reassessed and optimized. In many cases they are being replaced by new, emerging remedial technologies or a combination of technologies. Oftentimes, the same mistake is being made and the redesign still does not have an adequate amount of information to create an effective cleanup. This is a costly way to do business.

The need for total mass characterization including sorbed, dissolved, free-phase liquid and vapor phase site data prior to remediation is critical to project success. To assess the effectiveness of the method also requires a thorough assessment after treatment to determine if additional treatments are required. Fortunately with the emergence of a variety of direct sensing tools such as the Membrane Interface Probe and optical methods (fluorescence) much more information can be collected in a short amount of time and more accurate site models can be built.

These tools gather thousands of measurements on the geology, hydrology, and nature and extent of the subsurface contaminants. The data can be processed into high-definition 2D and 3D images of the site, which provide much greater detail than is normally available for designing a remediation approach. With this detail, both the owner and the regulator will be able to determine what areas can be remediated and which cannot, which results in more realistic expectations of the remediation effort.

Continuous fluorescence-based optical logging tools such as the ROST, UVIF, and FFD can be useful and are widely used for mapping hydrocarbons in the subsurface. However, these *indirect sensing tools* are not always reliable for mapping free product, are limited for dissolved phase hydrocarbons and not appropriate for vapor phase hydrocarbons. They also experience interferences with naturally occurring soils that fluoresce even when not stained with hydrocarbons. As a result, their use has been limited and always requires interpretation.

The membrane interface probe (MIP) offers a complementary approach to mapping hydrocarbons in both the saturated and unsaturated zones. It is a *direct measure* of the presence of volatile organic compounds and therefore has fewer limitations and wider applications. It is being used for initial assessments, for focusing remediation, and for monitoring the effectiveness of remediation and natural attenuation. It has proven effective for mapping the extent of free-phase hydrocarbons, dissolved-phase plumes, and the extent of vapor migration.

There are a number of enhancements to the basic technologies that make them even more effective as a tool for characterizing hydrocarbons. For sites with a mix of products, it is commonly beneficial to run both types of sensors, MIP, and fluorescence. On sites with free product, operating protocols require modification to improve the accuracy when mapping the occurrence and extent of the free- product phase.

With the increased interest in vapor migration into residential units, the MIP has been incorporated into a number of EPA-approved work plans to help implement the assessment protocols of their Guidance Document. On these projects, enhancements were required to detect vapors at very low concentrations and to map the predominant migration pathways from the sources and the groundwater plumes into the vadose zones around critical buildings. The MIP provided the detail that was necessary to adequately assess the potential for vapor intrusion into the residences.

To determine the effectiveness of the remediation effort, post-treatment surveys are conducted. These surveys reveal not only the success of the efforts but also show where the original chemicals may have been mobilized. In some cases, they will show where a subsequent application is necessary. Direct sensing surveys are both time- and cost-effective in providing much more realistic assessment of subsurface conditions than a limited number of monitoring wells or discrete samples spread throughout the application area.

Biography

John Sohl along with Ned Tillman is a co-founder of COLUMBIA Technologies. John served in the US Navy for 20 years and holds a BS in Engineering from the United States Naval Academy and an MBA from Chaminade University of Honolulu. COLUMBIA Technologies is located at 1450 S Rolling Road, Baltimore, MD 21227. John can be reached at jsohl@columbiadata.com and 410-536-9911.

MEETING LOGISTICS:

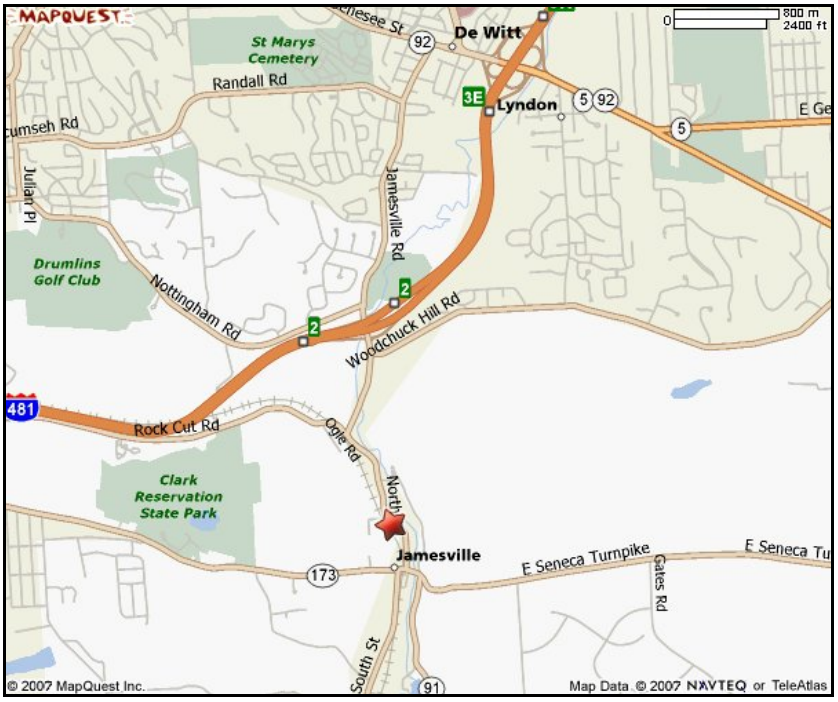
The meeting will take place on Thursday, March 20, 2008 at the **Glen Loch Restaurant in Jamesville**. Directions are provided below.

A social hour will start at 5:30 pm and will be followed by a dinner starting at 6:30 p.m. The presentation by Mr. Sohl will begin at about 7:30 p.m.

The cost of the dinner/meeting is:

- Members – Dinner & Meeting - $25
- Members – Meeting only - $5
- Nonmembers – Dinner & Meeting $30
- Nonmembers – Meeting only $10
- Students – Dinner & Meeting $15
- Students – Meeting only $5
- CNYAPG will sponsor first 4 students for Dinner & Meeting

Please RSVP by Wednesday, March 19th Noon to Annette at Parratt-Wolff, info@pwinc.com or (315) 437-1429.



Directions to the Glen Loch Restaurant – www.glenloch.net

4626 North Street, Jamesville, NY 13078. 315-469-6969

Take Route 481 to Exit 2 in Jamesville. Go South on Jamesville Road (up the hill) until you come to a three way intersection. Bear left onto North Street. Continue down this road, and you will see the Glen Loch on your left.