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Fuel Fluorescence Logging Using the Optical Imaging Profiler (OIP): A New High Resolution Direct Push Tool for Delineating LNAPL

Daniel Pipp (pippd@geoprobe.com) and Thomas M. Christy (christyt@geoprobe.com)
(Geoprobe Systems, Salina, KS, USA)
Jonathon Wiley (Jonathon@stockdrilling.com) (Stock Drilling, Ida, MI, USA)
Sheryl Doxtader (doxtaders@michigan.gov) (Michigan DEQ, Jackson, MI, USA)
John Fontana (jfontana@VistaGeoScience.com) (Vista GeoScience, Golden, CO, USA)

Background/Objectives. The Optical Image Profiler (OIP), recently developed by Geoprobe Systems®, is a percussion driven, direct push tool that utilizes modern UV LED and micro camera technology to generate and capture fuel fluorescence in image form. The images, taken at 30 Hz, are then analyzed by the software for typical fluorescence color exhibited by fuels. The software outputs an instantaneous graphical log of NAPL distribution and relative magnitude. During stopping points in the logging process, the light source can be switched from the standard UV LED to a visible LED to capture soil texture characteristics and visual information about the distribution of hydrocarbons in the soil matrix. Soil electrical conductivity is run simultaneously to the fluorescence log in the OIP tool.
We will provide an overview of the components and how the OIP system creates and analyzes fuel fluorescence. We will look at how the OIP system compares to the existing LIF tool UVOST®.

Approach/Activities. The OIP system has been used on a variety of sites with LNAPL contaminants ranging from crude oil to gasoline. When the OIP logs are run the operator will stop at specific depths and capture visible still images of the soil which can be used to evaluate the surrounding soil matrix. Example logs, fluorescence and visible images will be shown from a few sites as well as comparison cross sections of OIP and UVOST® logs from a former truck stop site where the two technologies were run side by side.

Results/Lessons Learned. The logs of fluorescence generated from the OIP have shown good agreement with fluorescence logs generated using LIF technology; even though these two logging techniques use entirely different methods to create and measure fuel fluorescence. The visible image capture ability has shown to be a desirable feature of the OIP system and has provided valuable information about the soil matrix that the LNAPL is or is not traveling in.