Geoprobe Optical Imaging Profiler (OIP)

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Geoprobe Systems, Salina, Kansas.
Note: A Patent is Pending for this System.
OIP Description

- **Purpose:** Detecting UV induced fluorescence of non aqueous phase fuel hydrocarbons in soil.
- **Method:** High intensity UV light directed at the soil causes hydrocarbons present in the soil to fluoresce. An Image of the soil is captured by the camera and analyzed for fluorescence.
- Visible light images of the soil may also be obtained.
OIP Description

- **OIP Probe**: Robust with simple connection to the trunkline.

- **Driveable**: Using 7822 series machines and drive cushions.

- **Compatible**: With Geoprobe 1.5 inch and 1.75 inch rod systems.
• Optical Window: Removeable, approximately 13mm optical opening.

• Probe: 44mm diameter.

• Probe Contains 2 Light Sources:
  – UV (265 nm).
  – Visible.
Typical OIP image of hydrocarbon fluorescence using the UV light source.
Instrumentation to run optical logs includes the FI6000 and the OIP Interface. A laptop computer is also required.
OIP System QA

• To assure proper operation of the OIP system, the OIP probe is exposed to cuvette samples of target fuels before and after each log.

The OIP Log

- Images captured every 15mm (.05 ft.).
- Images are analyzed for fluorescence in real time.
- The percent of the image area representing fuel fluorescence is recorded on the log.

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Fluorescence (%)</th>
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<tbody>
<tr>
<td>3.0m</td>
<td>0% detected</td>
</tr>
<tr>
<td>5.7m</td>
<td>50.2% detected</td>
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[Graph showing EC log and fluorescence (% area) for different depths]
OIP Logs can be opened using Geoprobe’s DI Viewer software. The user can view OIP optical images at any selected interval in the log. The DI Viewer also may be used to develop log cross sections and overlays.
Cross Section of Logs at crude oil spill site.

Fluorescence
Elec. Cond.
OIP Data Examples:
Crude Oil Fluorescence

Image at 0.76m

Image at 3.3m
OIP Data Examples: Crude Oil Fluorescence

Image at 4.2m

Image at 6.55m
OIP Data Examples: Crude Oil Fluorescence

Image at 7.0m

Image at 8.82m
OIP Data Examples: Gasoline Fluorescence

Image at 1.05m

Image at 1.62m
OIP Data Examples: Gasoline Fluorescence

Image at 3.1m

Image at 4.0m
Visible images of soil may be obtained by stopping the probe and switching to the visible light source. The above images are of the same soil made with the two different light sources. Visible light images are useful for assessing the type of soil where hydrocarbons are found.
OIP Summary

• The OIP System is capable of capturing both UV and Visible light images of soil.
• Primary use is to log fluorescence of non-aqueous phase hydrocarbons with depth.
• Image Analysis is used to identify fuel fluorescence in optical images and to create a log of fluorescence with depth.
• Images can be visually examined after the log is run.
• Images can show spatial distribution of hydrocarbons in the matrix and serve as a QC check of the log.
OIP Summary

- The OIP probe is driveable using Geoprobe 54, 66, and 78 series machines.
- Visible images of the soil may be examined to identify changes in texture and color.