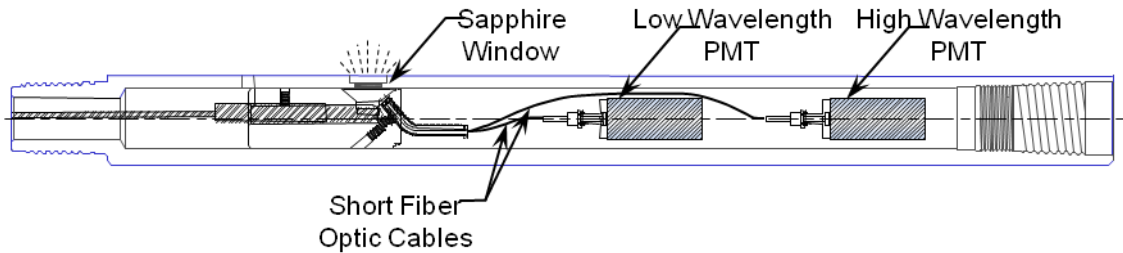


# Fuel Fluorescence Detector

Lankelma Inc's fuel fluorescence detector (FFD), is used to delineate hydrocarbon contamination versus depth. The FFD detects the fluorescence produced by aromatic hydrocarbons when excited by an ultraviolet light source. Typical contaminants detected by the FFD are jet fuel, diesel, unleaded gasoline, home heating and motor oil. Total petroleum hydrocarbon (TPH) values as low as 100 ppm can be detected in sandy soils.

*Fuel fluorescence detector (patent no. 5128882)*



The FFD contains dual downhole photomultiplier tubes (PMTs), which permits differentiation between lighter fuels, which fluoresce more intensely at short wavelengths, and heavier fuels, which fluoresce more intensely at longer wavelengths.

The FFD provides a continuous, real-time output of fluorescence over the entire depth of investigation. Multiple FFD profiles across a site can be combined to develop a three-dimensional model of the plume. Lankelma Inc's FFD is coupled to a CPT probe, providing detail soils information simultaneously with FFD data.

## Advantages

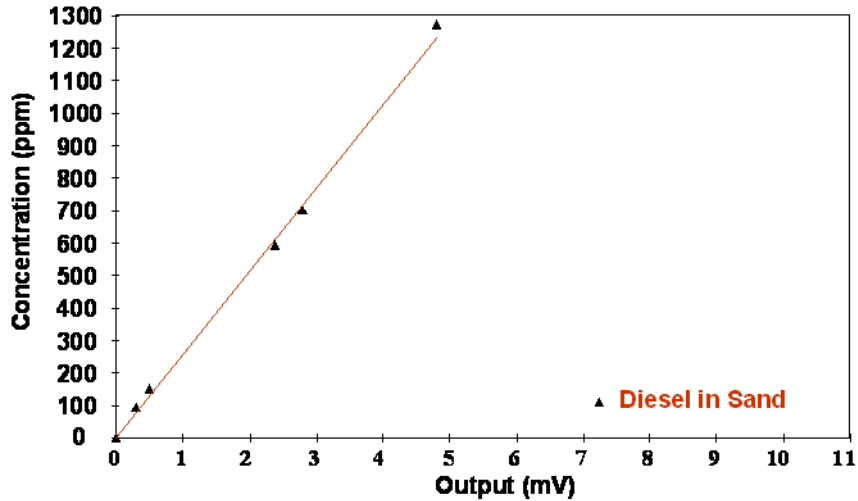
- Significantly reduces time required to delineate petroleum hydrocarbon contamination.
- Employees are not exposed to contaminants, adding to site safety.
- The FFD Module is attached directly behind the cone penetrometer.
- Recording FFD and CPT data in a single push contributes to site information and project efficiency.
- A complete, real time profile is created from ground surface to depth of penetration, identifying important layers that may be missed in an interval sampling approach.
- Drilling waste is virtually eliminated, resulting in significant hazardous disposal waste cost savings.
- Soil sampling can be used to develop site specific calibrations.

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## What fluoresces?

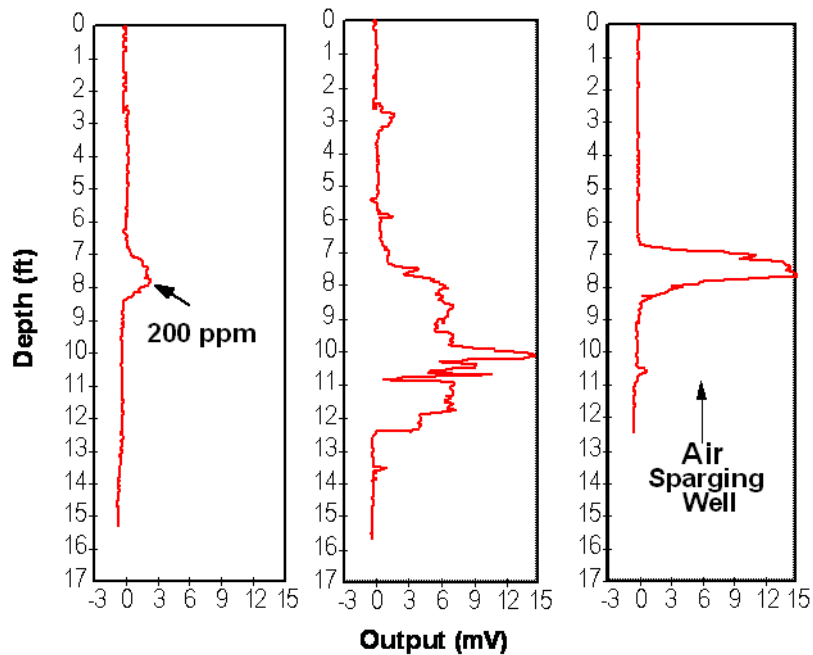
- All compounds exhibit adsorption(UV or visible), but only few fluoresce.
- Most contain aromatic rings.
- Nearly all fuel compounds:  
BTEX, Naphthalene, Anthracene, Pyrene
- Chlorinated solvents do not fluoresce in UV or visible range.

### FFD response



**\*Concentration determined by EPA method 418.1**

*Plot from three pushes conducted in a line transect across a hydrocarbon contaminate plume*



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