

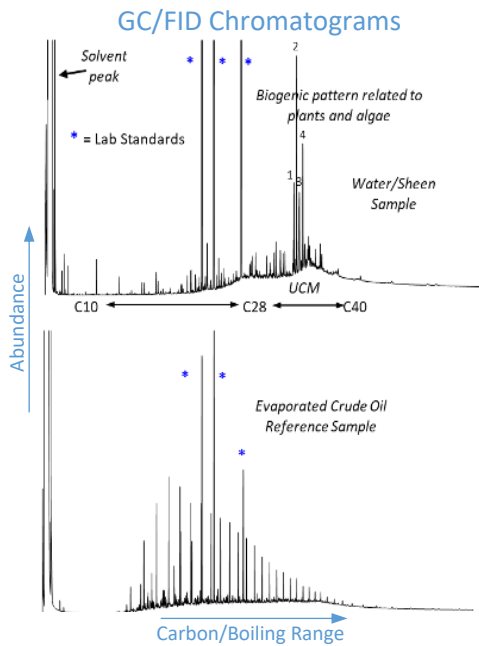
# NewFields Note

## GC/FID Chromatograms Reveal TPH's True Identity

An important piece of forensic information that's often ignored

**NewFields Note:** Technical information in a condensed, easily digestible format that is intended to promote environmental science education, knowledge transfer, and empowerment ... *one note at a time.*

**GC/FID Chromatogram:** GC/FID chromatograms provide a "chemical picture" of the volatile and/or extractable material(s) present in environmental samples. Labs automatically create them as part of any EPA 8015 TPH analysis and despite being available, are seldom provided without being requested. Different labs produce chromatograms of different quality/resolution. Those GC/FID chromatograms of sufficient quality provide valuable information to the forensic investigator such as the carbon/boiling range and identity of the material measured as TPH in the sample.



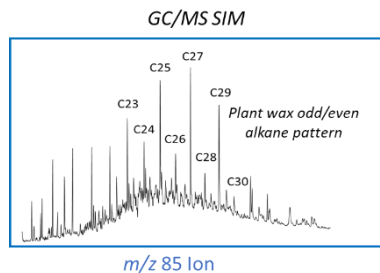
**Oil Sheen Example:** The chromatogram for a sheen sample collected to investigate a suspected overwater crude oil leak is shown (top left). The lab reported the sheen contained 530,000 mg/kg<sub>oil</sub> of TPH (C<sub>9</sub>-C<sub>44</sub>). The FID, however, reveals the sheen was predominantly biogenic material (i.e. derived from algae and other decaying plant matter) and not the crude oil that leaked (bottom left reference). Without review of the "sheen" sample's chromatogram, the high "TPH" concentration reported would have erroneously been assumed to be leaked crude oil.

### CONSIDERATIONS IN EVALUATING TPH RESULTS

- What is the source of the TPH?
- DRO and ORO doesn't always equal diesel fuel and lube oil
- TPH does not always indicate petroleum hydrocarbons but can include:
  - Natural organic matter (plant and bacterial debris)
  - Animal tissue and fats
  - Polars (non-hydrocarbon)
  - Non-petroleum contaminants
- Request *properly-scaled* GC/FID chromatograms from the lab
  - The highest (non-lab standard) peak should rise ~ ¾ of the chromatogram's height
  - A second chromatogram scaled to better see the baseline may be necessary
  - Request the corresponding lab (solvent) blanks for comparison

### Additional Confirmation Analysis

The sheen's GC/FID chromatogram included a series of large, resolved peaks (#1-4 above) that were atypical of petroleum, i.e., of unknown origin. Subsequent GC/MS analysis revealed the presence of plant wax-derived *n*-alkanes and the identities of the four unknown peaks as sterols from algae (right).



GC/MS Full Scan		Source
ID	Top 4 Compounds	
1	Cholesta-5,22-dien-3-ol, (3.beta.)-	Algae
2	Cholest-5-en-3-ol (3.beta.)-	Algae
3	Ergosta-4,22-dien-3.beta.-ol	Algae
4	Ergosta-5,24-dien-3-ol, (3.beta.)-	Algae

For additional information, please contact your NewFields Technical Lead. Or send us an email at [Science\\_Info@newfields.com](mailto:Science_Info@newfields.com)!

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