



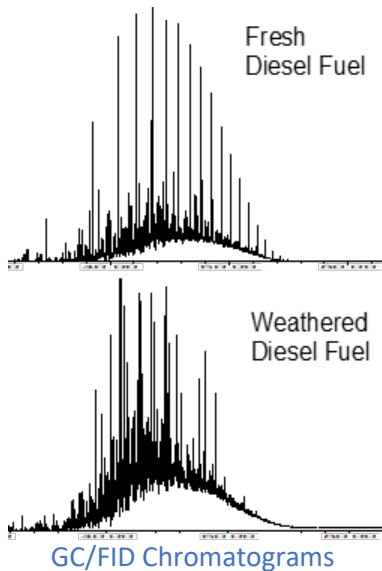
NewFields Note

Diesel Fuel, Fuel Oil and Bio-Diesel Fingerprinting

Contaminant Identification, Differentiation, and Source Attribution

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.*

Fingerprinting Middle Distillate Fuels: Diagnostic features arising from the parent crude oil feedstock and the effects of refining and blending, interpreted in light of regulatory changes and environmental weathering, allow for the distinction between different sources of distillate fuels and their likely age(s).



Distillate fuels in the subsurface weather, predominantly via biodegradation, a in predictable manner, such as preferential removal of the more susceptible n-alkanes and retention of PAHs and isoprenoids (see left). The rate rate(s) of biodegradation, however, depend on site-specific conditions. Thus,

$$\text{Degree of Biodegradation} \neq \text{Age}$$

$$\text{Degree of Biodegradation} = \text{Age} \times \text{Rate of Biodegradation}$$

CONSIDERATIONS IN DISTILLATE FINGERPRINTING

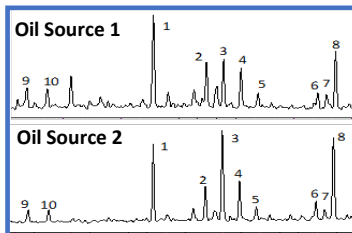
- Parent Crude Oil Feedstock
 - Diesel range biomarkers (Sesqui- & Di-terpanes)
 - Alkyl-PAH isomers
- Blending Features
 - Fatty acid methyl esters (FAMES)
 - n-alkyl-cyclohexanes
- Hydrodesulfurization Effects
 - Molecular & Isomer Patterns
 - Sulfur content
- Regulatory History
 - Sulfur maxima over time
- Weathering effects and rate(s)

Applications of Distillate Fingerprinting Studies

- Distinguish single vs. multiple sources/spills.
- Assess recent/on-going vs. historic release(s).
- Constrain age based on blending practices and sulfur regulatory history.
- Quantify source zone depletion (mass loss) due to remediation or natural attenuation.

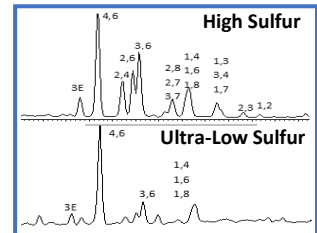
Distillate Fingerprints Vary With

Crude Oil Feedstock



Sesquiterpanes

Level of Desulfurization



C₂-Dibenzothiophenes

For additional information, please contact your NewFields Technical Lead. Or send us an email at Science_Info@newfields.com!

<https://www.newfields.com>

