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Sampling for Total Petroleum Hydrocarbons

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Outline

- Current Regulatory Framework
- Overview of Soil Remediation Standard Applicability
- Conceptual Site Models for TPH Sampling
- Sampling Plans for TPH
- Key Takeaways

Current Regulatory Framework

- Env-Or 600 readopted with an effective date of November 4, 2025
- Changes to TPH Soil Remediation Standards (SRS)
  - SRS for TPH is no longer a single value (10,000 ppm)
  - SRS for TPH is divided into two carbon ranges
  - SRS applicability is based on sampling depth
  - SRS are risk-based direct contact standards

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Current Regulatory Framework (cont.)

Table 600-2
SOIL REMEDIATION STANDARDS

Chemical Name	CAS No.	Concentration (mg/kg)
Total Petroleum Hydrocarbons – Gasoline Range Organics		390* 4,000**
Total Petroleum Hydrocarbons – Diesel Range Organics		480* 4,200**

* For soil less than 2 feet from the ground surface.

** For soil greater than 2 feet from the ground surface.

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Current Regulatory Framework (Cont.)

- GRO (C6-C10)
  - Gasoline, kerosene, jet fuel
  - Surrogate used for derivation was an average of trimethylbenzenes.
- DRO (C10-C28)
  - Diesel fuel, heating oil, motor oil
  - Surrogate used for derivation is naphthalene.

Soil Remediation Standard Applicability

- Applicability of the of TPH SRS is based on depth
  - Soil within 2 feet of grade is potentially accessible to a young child (subject to the lower standard).
  - Soil deeper than that is potentially accessible to an adult worker (subject to the higher standard).

- Depth measured from grade (feet below grade = fbg)
  - Grade measured from direct contact exposure point (exterior = topographical / interior = basement floor)
  - Physical barriers (i.e. concrete flooring) do not change the applicable standard.

Conceptual Site Model (CSM)

- **A complete CSM is necessary to determine an appropriate sampling plan.**
- Nature of the petroleum:
  - Is this a recent release where there is access to the virgin product?
  - Is the product clearly gasoline or diesel? Or is the product some sort of blend?
  - Is contamination comingled from multiple release sources?
  - Is the release from a completely unknown source?

Conceptual Site Model (Cont.)

- Was the origin of the release:
  - Below an underground storage tank?
  - From an aboveground tank or aboveground component such as piping or a filter?
  - Below a dispenser island or sump?
  - From a tank top sump or vapor release?
- Pertinent site characteristics:
  - What is the depth to water? Does the site normally flood?
  - Are there shallow utilities or preferential pathways?

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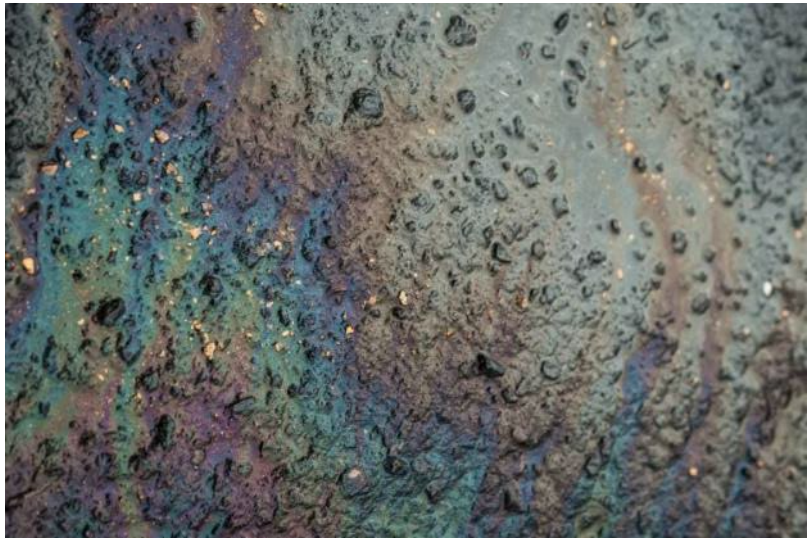
Sampling Plan – Shallow Interval

- Do I need to sample 0-2fbg?
  - If impacts are noted in this interval and/or the CSM indicates that the release was likely to impact the 0-2fbg, then yes.
  - If there is no reason to suspect impacts in the 0-2fbg interval, then a responsible party does not always need to sample 0-2fbg. This decision needs be documented.



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Sampling Plan – Composite and Discrete Sampling

- Should I collect a composite or a discrete?
  - Composite sampling is most appropriate when there are NO impacts observed (i.e. clean tank closures).
  - Composite samples that include the 0-2fbg interval will be subject to the **lower** standard (e.g. 0-5fbg sample must meet the 0-2fbg standard).
  - Composite samples need to be composed of substantially similar aliquots.
    - Visual observations
    - PID readings
    - Similar geology
    - Similar shake test results (i.e. all negative)
  - A minimum of 2 discrete samples are preferred if evidence of a release has occurred.
    - Precise measurement of the depth of discrete sample is necessary.

Sampling Plan – Endpoints

- Excavation confirmation sampling
  - Collect discrete samples from the **most contaminated interval** and **depth of sample must be measured and reported.**
  - For surficial releases that also impact soil below 2fbg, two samples per sidewall may be appropriate (or shallow sidewalls plus multiple bottom samples may be appropriate).
  - Composite samples may be acceptable if petroleum impacts are no longer observed at the extent of the excavation.

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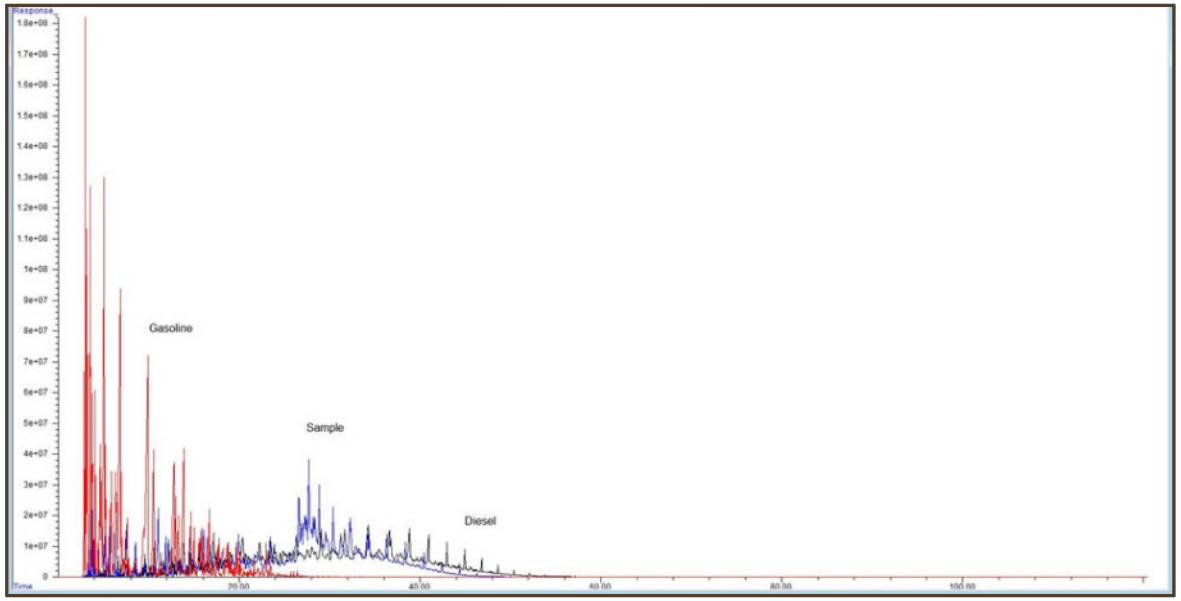
Sampling Plan – Fingerprinting

- Should I collect a sample for fingerprinting?
  - If the release type is unknown or is of a carbon range not represented by the GRO/DRO ranges, a fingerprint may be necessary to determine appropriate analysis.
  - The default analyses are as follows: kerosene (GRO), blended fuels (DRO), transformer oil (DRO), hydraulic oil (DRO)



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Key Takeaways

- **Depth is important!!!**
- Field measurements and observations should be documented.
- Justify your sample collection!
  - Discrete versus composite
  - Composite aliquots
  - Depth intervals sampled
  - Carbon range analyzed

Contacts for Questions

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