A.2 TPH Analytical Methods

Understanding the analytical methods is crucial for the interpretation of TPH results.

1. Definitions for TPH vary for different regulatory jurisdictions and for different analytical laboratories.
2. The TPH analytical method defines the result; no single method may be appropriate for all types of petroleum hydrocarbons. The method choice may depend on the type of petroleum, the analyzed media (waste, soil, sediment, water, or air), regulatory requirements, degree of weathering, and the purpose of the data.
3. Based on the details of the method used, TPH concentrations may be obtained as:
   - a single concentration or specified carbon range concentrations (e.g., "diesel" or "medium" range) with or without removal of nonhydrocarbons
   - fractionated by chemical class prior to analysis (e.g., aliphatics versus aromatics)
4. There are no federal or EPA gas chromatography-based methods developed specifically for TPH.
   - EPA SW-846 Method 8015C includes guidelines for gasoline range organics (GRO) and diesel range organics (DRO) and general comments about the applicability to petroleum hydrocarbons. These guidelines were added to a method that was originally developed for determining the concentrations of various nonhalogenated organic compounds ("RCRA compounds") by GC/FID.
   - TPH methods are typically defined under state programs. Most methods in use cite EPA SW-846 Method 8015C and qualify it as "modified."
5. TPH methods identified by a product type (gasoline range, diesel range, etc.) do not necessarily identify the presence of the specified product, but only that some of the measured material might fall in the compositional range of the named product.
   - Expert evaluation of analysis results (including chromatograms) may help in assessing the product type.
6. TPH analyses are defined by a required combination of collection, extraction, cleanup, separation, and quantification methods. Each of the TPH analysis steps has multiple options and will produce different results.
   - If laboratories use the same extraction solvent, same extraction techniques, same calibration type standard, and same carbon range (or ranges), data should be comparable for petroleum hydrocarbons. However, the higher the proportion of metabolites in a sample the more difficult it is to obtain comparable results. Polar metabolites are more difficult to extract from environmental samples than hydrocarbons and they are less amenable to analysis and quantitation by gas chromatography.
   - Variability and uncertainty may be somewhat higher than for single compound measurements.
   - Additional sample preparation steps increase variability.
   - Analysis results presented without listing the specifics for each of the collection, extraction, cleanup, separation, and quantification steps may be of limited or no use; they may cause problems in interpretation or make it impossible to compare results.
7. CAUTION: You can't always get what you want, but if you try sometimes you may get what you need:
   - Different TPH analysis methods may be preferred by the project manager or responsible party.
   - The same method may be performed differently by different laboratories.

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November 2018

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