

Latest Developments in TPH Risk-Based Strategies

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Background/Objectives. The purpose of this presentation is to provide a review of various concepts and strategies to use when managing human health risks associated with total petroleum hydrocarbon (TPH) sites. The three facets of a TPH risk-based evaluation include:

- Understanding TPH chemistry and selecting the right analytical methods
- Understanding TPH fate and transport once it enters the environment, specifically:
 - Partitioning of aliphatics versus aromatics across different media, and
 - Weathering processes and resulting petroleum metabolites
- Understanding toxicity of TPH, including how to assign appropriate toxicity values to a TPH mixture containing thousands of compounds.

Once you have these basics down, you can confidently work with your regulatory agency to form a risk-based approach that is technically-sound and won't break the bank.

Approach/Activities. How do we collect TPH measurements in different environmental media? The answer lies in the TPH analytical method that is selected, as the analytical method defines TPH and provides an approximate concentration of total hydrocarbons in a complex mixture, in addition to hydrocarbon size and distribution in the environment.

Once released into the environment, TPH can migrate from one media to another through partitioning. For example, TPH from a release area could dissolve into soil leachate and migrate downward into groundwater. Once in groundwater, TPH could volatilize into soil vapor, emanate up through the unsaturated zone, and through building cracks into indoor air. Therefore, it is important to understand TPH source and migration pathways when selecting the appropriate analytical methods and media for your site investigation.

TPH weathering (also called biodegradation) is a major contributor to TPH hydrocarbon mass reduction in the environment. Biodegradation also generates petroleum metabolites that can be further degraded in a stepwise process. How do we address petroleum metabolites when conducting a risk assessment, especially when toxicity information on individual metabolites is limited? The answer may depend on your regulatory agency guidance on metabolites (if they have one).

Results/Lessons Learned. Understanding how to conduct a TPH risk assessment starts with understanding the TPH source mixture, as well as fate and transport mechanisms, including weathering processes, that may occur at your site. What specific TPH analysis methods you choose will impact the rest of your risk assessment, especially your selection of screening levels and toxicity values. Understanding regulatory requirements for TPH at your site paired with your understanding of TPH fate and transport will help you form a strategic risk-based approach.