Are exceedances of polycyclic aromatic hydrocarbon guidelines limiting management and closure options at your site?

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Concentrations of polycyclic aromatic hydrocarbons (PAHs) greater than regulatory guidelines in soil and groundwater are commonly detected during environmental site assessments (ESAs). However, guidelines for PAHs, especially non-carcinogenic PAHs, are based on conservative assumptions. For example, although PAHs are known to be biodegradable, degradation was not considered in the development of the generic Tier 1 guidelines. Nonetheless, the PAH guidelines are a useful screening tool within the ESA process but should be properly understood and used appropriately.

Due to conservatism within the guidelines, exceedances of the PAH guidelines may not always be associated with risk of adverse effects to human health or the environment, and as such may not necessarily represent appropriate remediation end points.

PAHs are complex hydrocarbons comprised of two or more fused benzene rings. They are divided into two groups (carcinogenic and non-carcinogenic compounds) based on scientific studies identifying PAHs that are known or strongly suspected to act as carcinogens in humans or other mammals.

Carcinogenic human health effects are assessed based on a group of carcinogenic PAHs using relative cancer potencies (i.e., Benzo[a]pyrene Total Potency Equivalents) and an index of additive cancer risk.

In addition, the concentration of some individual carcinogenic PAHs must be compared to the appropriate guideline protective of ecological receptors. Non-carcinogenic effects are assessed on an individual PAH basis but are also considered within the guidelines for petroleum hydrocarbon (PHC) fraction analysis.

Trace Associates Inc.'s (Trace) technical experts routinely encounter PAH exceedances and have successfully navigated regulatory requirements to explain the exceedances, address realistic risk, and avoid unnecessary remediation.

Appropriate data assessment through appropriate sampling, screening, and an in-depth understanding and correct application of the guidelines related to PAHs and PHCs is critical for developing a management strategy. PAHs are included within the PHC mixture and the toxicity of non-carcinogenic PAHs to ecological receptors is inherently considered within the PHC guidelines.

Trace has many options when comes to understanding site chemistry and has project examples where the following strategies have been used:

- Assess background conditions using statistical analysis to identify generalized non-point source anthropogenic concentrations not related to site activities and not requiring remediation (e.g., PAHs in surface soils in urban/industrial areas).
- Integrate data from multiple media (e.g., soil and groundwater), and for PAHs and PHCs to support site assessment and to tailor suitable remediation levels to a site.
- Develop Tier 2 site-specific objectives through Tier 2 elimination and adjustment based on site-specific conditions (e.g., distance to surface water) or by conducting a human health and/or ecological risk assessment.
- Engage support from a professional chemist to conduct forensic analysis when necessary.

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Interested in exploring potential options for your PAH-impacted sites? Please contact Jan or Sylvain. We would be happy to answer your questions!

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