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Track: Aquatic Toxicology and Ecology

Session: The Wang Dang Doodle of Sediment Remediation

Abstract Title: Are PAHs the right metric for assessing toxicity related to oils, tars, creosote and similar contaminants in sediments?

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Abstract:

Oils, tars, and other non-aqueous phase hydrocarbon liquids (NAPLs) are common sources of contamination in aquatic sediments, and the toxicity of such contamination has generally been attributed to component chemicals, particularly PAHs. While there is no doubt PAHs can be toxic to aquatic organisms, it is not entirely clear that they are the only source of toxicity from NAPL contamination in sediment. Here we present an extensive series of experiments which consistently suggest that in addition to the toxicity of NAPL components like PAHs, the presence of a NAPL itself exerts additional toxicity to some sediment invertebrates, apparently through an alternative mode of action. Tests involving clean sediments spiked with mineral oil alone (a model NAPL), or mineral oil enriched with PAHs, affirm the idea that there are both PAH-driven and non-PAH-driven components to NAPL toxicity in sediments, and that the relative importance of the two are determined by the concentration of PAHs in the NAPL, relative to other hydrocarbon components. Experiments with field sediments have provided additional data consistent with NAPL toxicity. For example, treatment of field sediments with coconut charcoal can be shown to reduce PAH exposure in field sediments, but not their toxicity, behavior also shown by clean sediment spiked with mineral oil. Furthermore, solvent-extractable matter, a crude estimate of the NAPL concentration, is shown to correlate very strongly with toxicity of sediments from a wide variety of field sites. In this presentation we make our case for considering ostensibly “non-toxic” hydrocarbons as a cause of sediment toxicity, and discuss the resulting implications for contaminated sediment assessment and monitoring programs. (This abstract does not necessarily reflect EPA policy.)