LSP Association
assess. advise. restore.
405 Concord Avenue #352, Belmont, MA 02478
617-977-4304 • info@lspa.org • www.lspa.org

Environmental Forensics 2023

Agenda

Part 1: Forensic Insights from VPH, EPH, and APH Data (Emsbo-Mattingly) The MassDEP VPH, EPH, and APH methods determine target and non-target analytes while simultaneously generating chemical fingerprints capable of identifying a wide range of hydrocarbon products. This presentation will present the hydrocarbon signatures of petroleum and tar products using MassDEP and forensic methods to track changes in these signatures imposed by various weathering processes. The presentation will conclude with reflections on future trends concerning hydrocarbon regulations.

Part 2: Perchlorate (Benotti) Perchlorate is a chemical oxidizer used in rocket propellant, explosives, fireworks, and road flares. It is regulated in Massachusetts as human exposure to high levels of perchlorate can lead to thyroid disruption. While not pervasive throughout Massachusetts, it has been found in some drinking water supplies. This presentation will take the audience through the uses of perchlorate and how the source of perchlorate may be determined using advanced chemical fingerprinting.

Part 3: Advanced Chlorinated VOC Groundwater Plume Characterization (Litman/Flanders) The origin of chlorinated VOCs (CVOCs) in soil, groundwater, and air can become complex in areas with multiple historical releases and complex hydrology. Fortunately, multiple lines of hydrological, chemical, and isotopic evidence can help develop more reliable conceptual site models. A tiered strategy considers spatial gradients of CVOC analytes and reductive dechlorination byproducts, as well as biodegradation degradation ratios and isotope ratios of carbon and chlorine to differentiate historical releases of solvents, such as, trichloroethylene (TCE) and tetrachloroethylene (PCE).

Question & Answer

30 Minute Break

Part 4: Distinguishing Per- and polyfluoroalkyl Substance (PFAS) Sources (Benotti) Per- and Polyfluoroalkyl Substances (PFAS) are ubiquitous in the environment, particularly in industrialized or urbanized settings. The source attribution of PFAS contamination is a developing field, and investigators have to navigate different methods having different levels of data quality as well as different approaches to distinguishing source. This presentation will present the story of PFAS, focusing on forensics investigations. What can we do now and what is happening in the research space that may improve our understanding.

405 Concord Avenue #352, Belmont, MA 02478
617-977-4304 • info@lspa.org • www.lspa.org

Part 5: ASTM Methods for Determining Site Specific Background (Litman) Methods for estimating background are evolving. ASTM recently released a method for determining site specific background using onsite data, as opposed to methods requiring roughly equivalent reference areas. Site-specific background is an especially important concept when evaluating ubiquitous contaminants, like PAHs, PCBs, dioxins, and metals. Case studies will demonstrate how the new protocol operates.

Part 6: Heavy Metals (Emsbo-Mattingly) Forensic microscopy is particularly useful for distinguishing the origin of heavy metals and other OHM, because the morphology of industrial ash, metal alloys, metal refinery byproducts, and other anthropogenic wastes typically differ from naturally occurring minerals in soil and sediment. Contaminants attributed to anthropogenic fill, fly ash, slag, metallurgical wastes, lead- and PCB-containing paint chips, and wildfire debris can be identified by the combined application of stereobinocular microscopy, polarized light microscopy (PLM), Fourier transformed infrared microscopy (FTIR), confocal Raman microscopy, scanning electron microscopy (SEM), transmission electron microscopy (TEM), energy dispersive X-ray spectrometers (EDS), wavelength dispersive spectrometers (WDS), and electron microprobe analysis (EMPA). A visual catalog of reference samples will demonstrate what lies just beyond our visual range.

Question & Answer