ENVIRONMENTAL FORENSIC GEOCHEMISTRY STUDIES

Spectrum Analytical, Inc. provides services in support of environmental forensic geochemistry studies associated with property transfer, insurance litigation from a release of contaminants, and cost/responsibility allocation at Superfund sites and other contaminated sites in terrestrial, marine or atmospheric environments. Through a variety of analytical tests and expertise in data interpretation/validation, Spectrum's experts can provide answers to critical environmental forensic questions such as when and how contamination occurred, who caused it, what is the extent and level of contamination, and what is the validity of the data obtained.

Spectrum's experts will work with the client to review and validate existing site assessment and remediation data and devise a site-specific forensic plan that will answer the questions posed by the client. The plan may include collecting additional and defensible site assessment data and conducting a series of analytical tests including isotope ratio measurements in order to form a strong line of scientific evidence that can be used in a court of law.

Spectrum uses its extensive expertise in analytical chemistry to implement tracer techniques (presence/absence of a chemical) and ratio techniques (relative amounts of chemicals) for forensic applications, as is discussed in the following forensic study approach for petroleum products. In addition, Spectrum draws on its site assessment and remediation expertise to review with the client trend techniques (spatial and temporal variations of contaminant concentrations) and quantity techniques (mass of contaminants over space and time).

The forensic study approach for petroleum products is discussed below. Other approaches for chlorinated solvents, PCBs and PAHs are also available.

FORENSIC GEOCHEMISTRY STUDY APPROACH FOR PETROLEUM PRODUCTS

Based on the forensic questions that are posed, the following approach is proposed:

1. Review of Relevant Site Assessment/Characterization Data

Existing site assessment/characterization data that can be used for the forensic investigation proposed is first identified. A thorough examination of the accuracy and reliability of the existing data is conducted. This includes sample collection techniques used, sample handling, analytical methodology and Quality Assurance/Quality Control methods used. Original copies of the existing data is requested from the client in order to conduct a proper evaluation. This includes sampling field notes, Chain of Custody (COC) forms, and analytical laboratory results with bench notes.

2. Usage of Validated Data

Data that is useable for the forensic study will be evaluated to determine if it is sufficient to answer the forensic questions posed. If that is the case, no further testing will be necessary.

3. Supplementary Sampling and Analysis Plan

If the existing data is not sufficient to address the forensic questions, additional sampling and analysis will be proposed. A plan will be developed by Spectrum and the client. In general, a preliminary GC/FID analysis is conducted on one or a combination of samples of free product (if available), groundwater and soil. This is necessary in order to identify the type of petroleum contamination present (gasoline, diesel, jet fuel, kerosene, etc.) and the approximate mixing ratios of the different products. The hydrocarbon (HC) patterns observed can also provide preliminary data information.

Based on the preliminary analysis, further testing may be required and one or a combination of the following analyses may be conducted:

- GC/MS VOC analysis for volatile compounds covering carbon range C3-C10.
- GC/MS SVOC analysis for semi-volatile compounds covering carbon range C8-C40.
- GC/ECD analysis for additives.
- Specific GC fingerprint analysis by GC/FID or GC/MS covering C8-C40.