Quality Assurance and Quality Control System and Documentation for Compound Specific Isotope Analysis

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Background/Objectives. Use of compound specific isotope analysis (CSIA) is becoming more routine in both forensics and remediation. However, there are still a lot of concerns about using CSIA data: Is the uncertainty good enough to differentiate multiple sources? Is certification available for CSIA laboratories? Are the data well documented enough to support litigation? The information provided by CSIA is very powerful, but if it can't be used as documented support for site management decisions or as strong forensic evidence, that power is diminished. This project was driven by data user input and was undertaken to build a system that would provide that support and documentation.

Approach/Activities. Many environmental practitioners are familiar with the USEPA's SW846 method 8260. They are also familiar with chemistry laboratory certification programs such as NELAC, and with the USEPA's Guidance document for CSIA. While none of those resources were entirely relevant, they all contained good concepts and practices. Using those resources as a starting point and developing new procedures as needed, a quality analysis and quality control (QA/QC) plan was developed that was applicable to carbon, hydrogen or chlorine CSIA data.

NELAC is fairly prescriptive about what the report from a commercial chemistry laboratory must contain, and the USEPA contract laboratory program (CLP) has detailed formats for in-depth reporting of analyses of the concentrations of volatile or semi-volatile organic contaminants, but neither specifically addresses CSIA. It was decided to develop a custom software library that could process the CSIA data from all sources, perform the calculations and calibrations, and consistently apply all of the QAQC checks. That software would then populate all of that information into forms designed to be printed on standard paper, read by a person, and would contain all of the information about the raw results from the instrument, the calibration and the QAQC checks. Since every sample would have to go through this system, every sample would be treated equally and the detailed documentation would be available for every sample.

Results/Lessons Learned. The system facilitates a thorough data validation process and makes it easy to supply extensive and thorough documentation to support the CSIA data.