

Agenda for Environmental Forensics, Course 1, November 29, 2022, 10 am – 2:15 pm
Environmental Forensics of Hydrocarbon Chemicals: Survey of Applications, Approaches, Capabilities, and Limitations

10:00-10:30 AM: What is Environmental Forensic Science

- Goals, and applications
- General approaches to an environmental forensic investigation

10:30-11:15 AM: Hydrocarbon Chemistry

- Hydrocarbon chemistry overview
- Petrogenic substances – crude oil, coal and refined petroleum products
- Pyrogenic substances – MGP and other pyrolytic tars, creosote, pitch, incomplete combustion products

Q&A

11:15-11:45 AM: Transport and fate of hydrocarbons and why it is important for forensics

- Major transport and fate processes
- DNAPL and LNAPL transport and fate
- Solubility and volatility
- Environmental weathering of hydrocarbons and impact of weathering on hydrocarbon source fingerprints

11:45-12:15 PM: 30-minute break

12:15-1:00 PM: Sampling Considerations, Analytical Methods, and Quality Control

- Basic elements of a forensic sampling design
- Source and background sampling
- Example forensic sampling designs
- Forensic hydrocarbon analytical methods
- QA/QC issues and their impact on source identification

Q&A

1:00-2:00 PM: Hydrocarbon Forensics

- Review of hydrocarbon/PAH sources
- GC/FID fingerprinting
 - GC/FID chromatogram patterns for hydrocarbon sources
 - Case studies – source identification with GC/FID chromatograms
- Concentration fingerprinting
 - PAH profiles for hydrocarbon sources
 - Profile evaluation and comparison
 - Diagnostic ratios
 - Advanced methods examples – multivariate statistics, mixing models, age dating
 - Quantitative chemical fingerprinting – how confident am I?
 - Case studies – forensic investigations using concentration fingerprinting

Q&A

2:15 PM: Adjourn