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

Agenda for Environmental Forensics, Course 2, December 6, 2022, 10 am – 2:15 pm
Environmental Forensics of Non-Hydrocarbon Chemicals: Survey of Applications, Approaches, Capabilities, and Limitations

10:00-10:15 AM: Introduction to Environmental Forensics of Synthetic Organic Compounds and Byproducts

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

10:15-11:00AM: Polychlorinated Biphenyls (PCBs)

- PCB chemistry
- PCB contamination sources
- PCB analytical methods and QC issues
- PCB forensic fingerprinting methods
- PCB environmental weathering impacts on fingerprinting
- PCB forensic case studies

Q&A

11:00-11:30 AM: Dioxins and Furans (PCDD/PCDF)

- PCDD/PCDF chemistry
- PCDD/PCDF contamination sources
- PCDD/PCDF analytical methods and QC issues
- PCDD/PCDF transport and fate
- PCDD/PCDF forensic fingerprinting methods
- PCDD/PCDF basic fingerprinting case studies
- PCDD/PCDF multivariate statistics case study

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

12:15 – 12:35 PCDD/PCDF multivariate statistics case study

Q&A

12:35-1:00 PM: Chlorinated Solvents

- Chlorinated solvent chemistry
- Chlorinated solvent contamination sources
- Chlorinated solvent forensic fingerprinting methods
    - Basic fingerprinting
    - Use of additives and trackers
    - Use of compound-specific isotopes
- Chlorinated solvent forensic case studies

1:00-1:30 PM: PFAS chemistry, sources, analysis, and forensics

- PFAS history and contamination sources
- PFAS chemistry, fate and transport and weathering
- PCDD/PCDF analytical methods and QC issues
- PFAS forensic fingerprinting methods
- PFAS forensic case studies

Q&A

1:30-2:00 PM: Miscellaneous Topics

- Environmental Forensics Conceptual Site Models
- Allocation
- Costs and strategies for cost control
- Emerging and Advanced Methods

Q&A

2:15 PM: Adjourn