Regulatory, Technical and Communication Challenges for Licensed Environmental Remediation Professionals

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Framework

- Duties and Responsibilities of the Licensed Professional
- PFAS Technical Issues
- PFAS Regulatory Issues
Duties and Responsibilities of the Licensed Professional

- Authority and responsibility of signature
- "Hold paramount protection of human health and safety and the environment"
- By signing a document the Licensed Professional certifies compliance with law and regulation
- Licensed Professionals have a legal, moral and professional responsibility to protect receptors
PFAS Technical Issues

- Well over 1,000 individual compounds
- Unique chemical/physical properties
  - Carbon tail, C-F bonds, charged functional group
  - High thermal, chemical stability
  - Water soluble
  - PBT characteristics
- Sources
  - Primary production plants
  - Manufacturing sites with PFAS use
  - Consumer products
  - Fire-fighting foams (e.g., AFFF)
  - Municipal solid waste landfills
  - Wastewater treatment plants
    - Effluent, biosolids

PFOA: Perfluorooctanoic acid (C8)
PFOS: Perfluorooctane sulfonate
PFAS Technical Issues (continued)

- Analytical method limitations
  - Drinking water vs. contaminated groundwater
  - Other matrices

- Action levels in the low ppt (ng/kg or ng/L) levels
  - Avogadro constant: $6.022140857 \times 10^{23}$ mol$^{-1}$
  - PPT: $10^{-12}$
PFAS Regulatory Issues

- **USEPA**
  - Health Advisory Level
  - Hazardous Materials Lists

- **States**
  - Which compounds
  - Which regulatory tool
  - What concentration
  - What media
Ariadne’s Thread

Maître des Cassoni Campana, Thésée et le Minotaure (16ème siècle), Musée du petit Palais, Avignon
Approach

- Have a good mental picture
- Understand PFAS properties
- Have a good project plan
  - Update as needed
- Understand available tools and limitations
The goal of a conceptual site model is to provide a description of relevant site features and the surface and subsurface conditions to understand the extent of identified contaminants of concern and the risk they pose to receptors. The conceptual site model is an iterative tool that should be developed and refined as information is obtained during review of the site history and continues throughout the site and/or remedial investigation. The level of detail of the conceptual site model should match the complexity of the site and available data. Development and refinement of the conceptual site model will help identify investigative data gaps in the characterization process and can ultimately support remedial decision making.
The Site Conceptual Model (continued)

- Where are the source(s)?
  - Confirmed or suspected?
  - Type of activity?
  - Other contaminants present?

- Any source(s) not related to my site?
  - Confirmed or suspected?
  - Specific or regional?
  - Type of source?
  - Other contaminants present?
What is the hydrogeologic model?
- Glacial, bedrock, historic fill
- Hydraulic boundaries
- Velocities and directionality

What hydrogeologic features might affect fate and transport?
- Materials with contrasting adsorption properties
- Look for unexpected detections
The Site Conceptual Model (continued)

- What site activities might affect contaminant behavior?
  - Past or current active remediation
  - Large construction projects

- Where are the receptors?
  - On-site? Off-Site?
  - Isolated? Concentrated?
  - Types of receptors?

- What is between the receptors and the site?
  - Changes in geology?
  - Other sources?
The Site Conceptual Model (continued)

- Other contaminants present?
  - What patterns are manifested?

- What are the properties of the PFAS compounds?
  - Solubility and adsorption
  - Leachability
  - Micelles

- What are some groundwater properties?
  - pH? Temp?
  - Other compounds?
The Site Conceptual Model (continued)

- What information is missing?
- What information can be easily obtained?
- What information can be deduced?
- What information may be difficult to obtain?
- The more questions we ask the better the picture we develop.
- As the data set develops, use data visualization tools to see patterns and relationships.
The Site Conceptual Model (continued)
The Project Plan

- Term used generically, to include a range of documents
- Well defined objectives
  - Why are we doing this work?
  - What will happen next?
- Well defined Data Quality Objectives (DQO)s
  - How much information do I need?
  - What standards will I compare my results to?
  - How “strong” does the data have to be?
  - What error can I tolerate?
The Project Plan (continued)

- Well defined sampling program
  - What analytical methods to use
    - Leachability TCLP/SPLP/Serial Extraction?
  - Sampling equipment and methods
    - Direct, Indirect, time-averaging
  - Field documentation
  - Duplicates, blanks, spikes

- Discuss DQOs with lab
  - Method Detection Limits (MDLs), Reporting Limits (RLs), QC limits
  - Matrix issues?
  - Spike study?
Communication

- Engage the regulators early on
  - Establish clear expectations for goals and objectives
  - Establish clear expectations for scope and schedule
  - Maintain regular communication

- Identify actual or potential receptors as early in the process as possible
  - The public can be expected to be emotional
  - Be factual
  - Be sincere
  - Be consistent
  - Don’t start something if you know you cannot follow through
Historical Perspective

- Standards Setting has had a long and winding course
  - Expect that PFAS will be similar
- Different parties respond to different triggers
  - Avoid confrontation
Final Thoughts

- Science is still evolving
  - New toxicological data
  - New analytical methods
  - New field studies
  - New treatment methods

- Regulation is still evolving
  - Federal Standards and Hazardous Material listing pending
  - State regulations in various stages of development

- Taking an approach of carefully and deliberately building the site model will get us to where we need to go

Track and participate in stakeholder processes
Thank You