



# Regulatory, Technical and Communication Challenges for Licensed Environmental Remediation Professionals

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COMMITMENT & INTEGRITY DRIVE RESULTS

# Framework

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





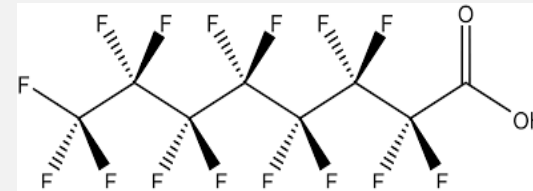
# Duties and Responsibilities of the Licensed Professional

- 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

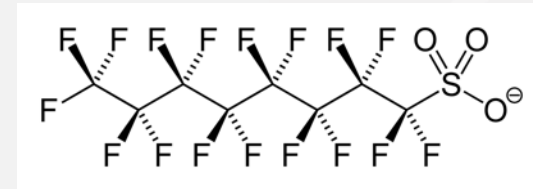


# PFAS Technical Issues

- 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:  $6.022140857 \times 10^{23} \text{ mol}^{-1}$
  - 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 Site Conceptual Model

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?



# The Site Conceptual Model (continued)

- 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





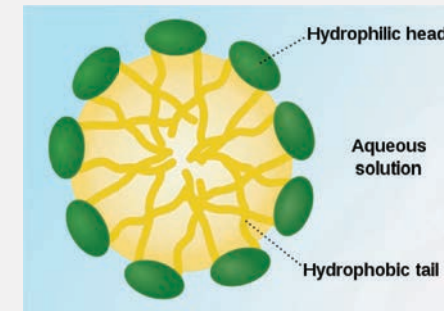
# The Site Conceptual Model (continued)

- 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?



<https://commons.wikimedia.org/w/index.php?curid=2902736>

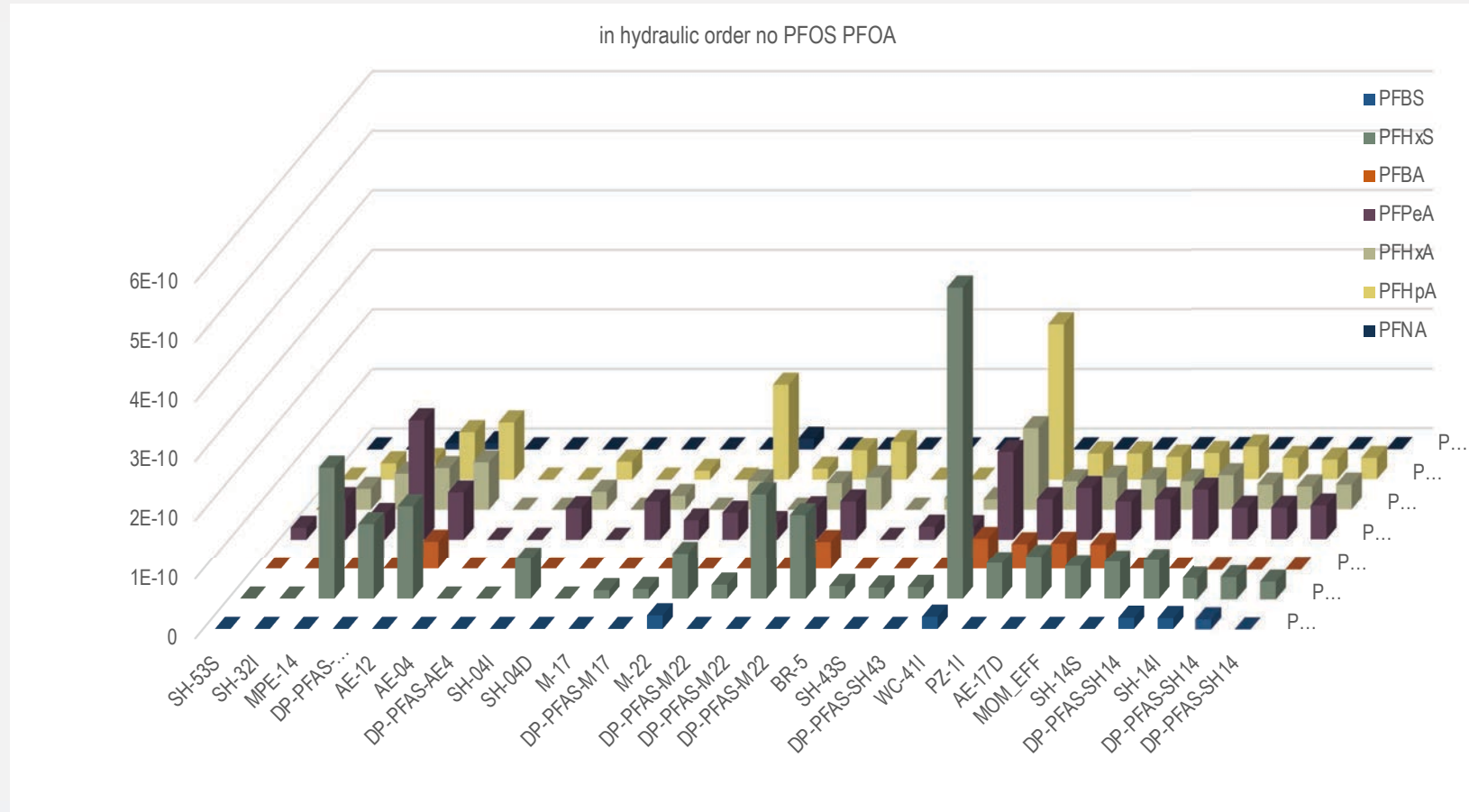
# The Site Conceptual Model (continued)

- 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

