Addressing Uncertainties in PFAS Risk Assessment

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Background/Objectives. A wide range of uncertainties present sizeable challenges to assessing the human health risks associated with poly- and perflourinated alkyl substances (PFAS) in the environment. In the face of mounting political and legal pressure, EPA and State agencies are rushing toward decisions on regulatory standards and remediation strategies despite large scientific uncertainty.

The objective of this work is to systematically identify key uncertainties inherent to PFAS risk assessment, describe their influence on PFAS risk characterization, and evaluate the impact of these uncertainties on the development of strategies for standard-setting, remediation, and research planning.

Approach/Activities. Diagrams are developed for broad categories of PFAS depicting their life cycle from manufacture through uses and disposal. Based on these life cycles, general (non-detailed) conceptual models are developed depicting sources/forms of PFAS and precursors, potential release mechanisms and affected media, fate and transport (including potential transformations), exposure pathways, receptors, and potential dose-response mechanisms. Next, influence diagrams are overlain on each component of these conceptual models identifying key uncertainties that may influence the outcome of each component and subsequently the overall risk. This includes being as specific as possible at this time about uncertain or incomplete understanding of processes and mechanisms, data gaps and measurement uncertainty/variability, uncertainty about model form (e.g., linear/non-linear, thresholds, etc.), and uncertainty about input parameters and assumptions. The ranges of these uncertainties are characterized.

Results/Lessons Learned. The result is a first-order level of understanding of how the combination of different sources and types of uncertainty impacts the current ability to estimate PFAS human health risks and identification of where actions (e.g., research and data-gathering) to reduce uncertainty can be most effective. The lessons learned can be used to develop a path forward for standard-setting, remediation strategies, and research planning.