



2017 ITRC PROJECT PROPOSAL

Key Information Needed to Develop Strategies to Address Environmental Releases of Per- and Polyfluoroalkyl Substances (PFASs)

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Proposals Topical Area

Per- and Polyfluoroalkyl Substances (PFASs): information needed by technical and regulatory stakeholders to develop effective strategies for addressing environmental releases.

Proposal Summary

Problem Statement.

Per- and polyfluoroalkyl substances (PFASs) such as perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) are a large and complex class of anthropogenic compounds whose prevalence in the environment (surface water, groundwater, sediment, fish, drinking water, and other exposure pathways) is becoming broadly recognized in the United States (US). Certain PFASs are believed to be environmentally persistent and bioaccumulative, and suspected to pose human health risks. A resource of key technical information related to the source, analytics, fate and transport, and remedial options is needed for stakeholders to efficiently and effectively develop risk management strategies for PFASs found in the environment.

PFASs have been widely used since the 1950's in numerous industrial and residential applications due to their stability and unique chemical properties. For example, they are found in aqueous film-forming foam (AFFF) utilized for Class B firefighting, metal plating baths,

mining and oil surfactants, and in a wide range of consumer products such as carpet treatments, non-stick cookware, water-resistant cloth, and food packaging materials.

PFASs have been identified in the environment globally. Environmental sources include primary manufacturing plants and wide-spread use of AFFF by the Department of Defense and other emergency response facilities. Furthermore, newly discovered sites in the northeast US indicate that PFASs may be present in the environment due to releases from intermediate manufacturing facilities, waste disposal facilities and potentially other sources. Recent publicity in the US involving high profile cases of human exposure in New York (Hoosick Falls), Vermont (Bennington), and New Hampshire (Former Pease Air Force Base) as well recent litigation surrounding long-standing cases in West Virginia (Parkersburg), Minnesota (Cottage Grove, Oakdale, and Woodbury), and Alabama (Decatur) have further focused public and regulatory scrutiny on PFASs and demonstrates the need for a concise technical resource for regulators and other stakeholders

The scientific community's understanding of PFAS sources, environmental fate and transport, analytical methods, and remediation is growing rapidly. However, there is no central clearing house or scientific resource available to States and associated stakeholders that summarizes the latest science and emerging technologies in a manner that helps States and stakeholders address PFASs in the environment. As a result, there is a gap in the broad technical understanding necessary for informed and expedited decisions by regulators and policy makers. An ITRC technical team representing a range of experts in these separate fields offers the promise of providing the necessary resources specific for regulators, environmental practitioners, and stakeholders.

Specific Technical, Knowledge, and/or Regulatory Barriers that will be Addressed. The project team will develop a unified summary of the state of the art in the areas of environmental sources, fate and transport, site characterization and analytical methodology, remediation, and currently available standards or health advisory guidelines. Such a centralized resource would be valuable for regulators and the regulated community, as well as for consulting and remediation practitioners. The proposed Fact Sheets and final Technical Regulatory document from this effort will facilitate communication and planning, and aid in the selection of appropriate responses to environmental releases of PFASs. The document will also identify technical challenges and uncertainties and additional research needs.

The proposed team will fully meet the core ITRC purpose and mission:

- To advance innovative environmental decision making;
- To reduce barriers to the use of innovative environmental technologies;
- To provide guidance and training on implementing innovative solutions;
- To help provide nation-wide harmonized approaches to using innovative environmental technologies.

Project Approach and Implementation. The proposed team will focus on seven core subjects, summarized as follows:

- (1) ***History, Use and Environmental Sources.*** Develop an overview of the manufacturing history of PFASs, the different manufacturing processes, including details regarding where these compounds have been used in industrial and consumer applications. A

summary of potential environmental sources will include characteristics of commonly recognized sources (AFFF fire training areas) as well as other potential sources to the environment (landfills, municipal wastewater treatment facilities, composted treatment sludge, and manufacturers both using PFASs and manufacturing PFAS compounds) and potential global anthropogenic background sources.

- (2) ***Nomenclature Overview and Physicochemical Properties.*** Provide an overview of this very complex class of compounds, appropriate nomenclature, physicochemical properties, precursors, and a discussion of variability in these characteristics across the class.
- (3) ***Fate and Transport.*** Summarize the state of knowledge regarding fate and transport of PFASs, including a summary of air, water, soil and biological transport characteristics and consideration of how physicochemical properties affect environmental fate and transport.
- (4) ***Site Characterization Tools, Sampling Techniques, and Laboratory Analytical Methods.*** Provide a review of the currently available field and laboratory analytical methods in the US and globally. This is a critical element of the project because there are currently limited standardized laboratory analytical methods in the US for soil, water, biota or other environmental media (currently only EPA Method 537.1, a method for drinking water). There are also currently no broadly-accepted procedures or guidelines for soil or groundwater sampling, and little common knowledge regarding what field characterization tools may be applicable to PFASs.
- (5) ***Remediation Technologies and Methods.*** Summarize the current remediation and exposure mitigation methods, including chemical and biological degradation (including intermediate and final degradation products), carbon and resin adsorption, and other potential methods, under in-situ, ex-situ, and point-of-use applications. Items of particular current concern will be addressed such as the potential for some methods to transform PFASs into more toxic and/or mobile forms.
- (6) ***Regulatory Summary.*** Summarize currently available cleanup criteria and health advisories at the State and Federal levels and internationally, for human and ecological receptors in all media. This summary will present both promulgated rules and regulatory guidance criteria as well as reference to source information. Discussion regarding toxicity inputs and underlying derivation methods will not be included.
- (7) ***Technical Challenges and Uncertainties.*** Provide a summary of relevant technical challenges and uncertainties that exist in site characterization, analytical chemistry, remediation technologies, and waste management and disposal options. A review of various case studies and lessons learned will be presented to highlight relevant issues. Data gaps identified serve as potential focused research needs that will specifically enhance stakeholder responses.

Our proposed general approach is to first develop a set of technical fact sheets for six of the seven core subjects. These fact sheets are intended to provide a product of high value to regulators and the regulated community, which can be produced rapidly (within approximately six months). A fact sheet will not be produced for the Technical Challenges and Uncertainty Analysis; this core subject will be utilized to focus development of a subsequent Technical and Regulatory Guidance document.

General Project Schedule. This proposal is submitted in response to a solicitation for 2017 teams. A **realistic general schedule** (based upon a start date in January 2017) is as follows:

- (1) Begin work at a kickoff meeting for the Team at the 2017 Spring meeting (March). Engage members and develop first-level outlines for each fact sheet, and begin assignments to subgroups for the seven core subject areas.
- (2) Conduct monthly team conference calls to refine the outline and strategy, and summarize progress.
- (3) Conduct quarterly communication forums/webinars to share progress and plans with all interested ITRC stakeholders.
- (4) Develop draft fact sheets by June 2017 for three of the 6 Fact Sheets (including History, Use, and Environmental Sources, Nomenclature Overview and Physiochemical Properties, and the Regulatory Summary).
- (5) Conduct a review of the first three draft fact sheets starting in July 2017.
- (6) Develop draft fact sheets by August 2017 for the remaining three of the 6 Fact Sheets (including Fate and Transport, Site Characterization Tools, Sampling Techniques, and the Laboratory Methods).
- (7) Complete and finalize the first three draft fact sheets by September 2017.
- (8) Conduct a review of the remaining three draft fact sheets starting in September 2017.
- (9) Conduct a team meeting at the 2017 Fall Meeting, to finalize the remaining fact sheets and develop an outline for a Technical and Regulatory Guidance document.
- (10) Complete an initial rough draft of the Technical and Regulatory Guidance document for discussion and commence the internet based-training preparation during the 2018 Spring Meeting.
- (11) Complete final Technical and Regulatory Document for external review by January 2019.
- (12) Complete final revisions and develop web-based training materials by October 2019.

Our proposal team understands both the urgency and the importance of delivering both the Fact Sheets and the Technical and Regulatory Document in an expeditious manner to stakeholders. As such, a more aggressive **preferred schedule** is also outlined below. This schedule assumes that Teams can be assembled by January 2017.

- (1) Begin work at a kickoff meeting for the Team in January 2017. Engage members and develop first-level outlines for each fact sheet, and begin assignments to subgroups for the seven core subject areas.
- (2) Conduct monthly team conference calls to refine the outline and strategy, and summarize progress.
- (3) Conduct quarterly communication forums/webinars to share progress and plans with all interested ITRC stakeholders.
- (4) Develop draft fact sheets by March 2017 in advance of the 2017 Spring Meeting for three of the 6 Fact Sheets (including History, Use, and Environmental Sources, Nomenclature Overview and Physiochemical Properties, and the Regulatory Summary).
- (5) Conduct a review of the first three draft fact sheets starting in April 2017.
- (6) Complete and finalize the first three draft fact sheets by June 2017.

- (7) Develop draft fact sheets by July 2017 for the remaining three of the 6 Fact Sheets (including Fate and Transport, Site Characterization Tools, Sampling Techniques, and the Laboratory Methods).
- (8) Conduct a review of the remaining three draft fact sheets starting in September 2017.
- (9) Conduct a team meeting at the 2017 Fall Meeting, to finalize the fact sheets and develop an outline for a Technical and Regulatory Guidance document.
- (10) Complete an initial rough draft of the Technical and Regulatory Guidance document for discussion and commence the internet based-training preparation during the 2018 Spring Meeting.
- (11) Complete final Technical and Regulatory Document for external review by January 2019.
- (12) Complete final revisions and develop web-based training materials by October 2019.

A table of the originally proposed schedule, the revised schedule and the preferred schedule is presented below.

Scope Element	Original	Revised	Preferred Schedule
Team Kick-off	Late 2016	Mar-17	Jan-17
Draft Fact Sheets	Mar-17	Jun-17	Mar-17/July-17
<i>History, Use, Env Sources</i>	Mar-17	Jun-17	Mar-17
<i>Nomenclature Overview, Phys/chem properties</i>	Mar-17	Jun-17	Mar-17
<i>Fate and Transport</i>	Mar-17	Aug-17	Jul-17
<i>Site Characterization Tools, Sampling Techniques, lab analytical methods</i>	Mar-17	Aug-17	Jul-17
<i>Remediation Technologies and Methods</i>	Mar-17	Aug-17	Jul-17
<i>Regulatory Summary</i>	Mar-17	Jun-17	Mar-17
Review Draft Fact Sheets	Apr-17	July-17/Sept-17	April-17/July-17
Finalize Fact sheets- Fall Meeting	Jun-17	Sept-17/Oct-17	June-17/Oct-17
Outline for Tech Reg Document- Fall Meeting	Oct-17	Oct-17	Oct-17
Rough Draft Tech Reg Document- Spring Meeting	Apr-18	Apr-18	Apr-18
Commence Internet-based training preparation	Apr-18	Apr-18	Apr-18
Final Draft Tech Reg Document- distribution for review	Jan-19	Jan-19	Jan-19
Final revisions and web-based doc- Fall Meeting	Oct-19	Oct-19	Oct-19

Proposed Personnel

States. The following states have expressed interest in the project:

Connecticut, Florida, Maine, Michigan, Minnesota, New Jersey, New York, Vermont.

Industry. The following IAP members have expressed interest in the project:

Amec Foster Wheeler, Arcadis, Battelle, CDM Smith, Dajak, ECT2, ERM, Geosyntec, Geo-Cleanse International, GSI Environmental, Integral Consulting Inc., and Test America.

Academia. The following academic institutions have expressed interest in the project:

Tufts University, Yale University (stakeholder), Clarkson University

Government Agencies. The following Department of Defense members have expressed interest in the project: US Navy and SERDP/ESTCP

Summary of Deliverables (primary project product(s))

- (1) The team will develop fact sheets for six of the seven subject matter areas, which will be distributed in the first six to twelve months. The fact sheets will provide detailed technical information for use by regulatory agencies and the regulated community, including status of the science for the subject matter area, current challenges surrounding the topic, and a summary of authoritative reference materials for users that want to learn more.
- (2) The team will develop a Technical and Regulatory Document on the issues summarized above with emphasis on providing a unified and comprehensive technical document on the current state of the practice and knowledge of the seven core subjects.
- (3) The team will develop an internet-based training module for presentation as part of ITRC's ongoing training program.
- (4) The team will seek out additional technology transfer opportunities. For example, Battelle has expressed interest in providing opportunities including short courses, platform sessions, and/or discussion panels at their two annual meetings.

Targeted Users (who will use products generated by this project?)

The primary targeted users of these documents and training will be state and federal personnel in regulatory programs tasked with characterizing and remediating state, Superfund, RCRA, and other sites that may be impacted with PFASs, and for programs that are developing strategies to address this set of emerging contaminants. We also expect consultants to use the products as well as stakeholders and the regulated community.

Identification of Potential Funding Partners (federal agency sponsor or industry support for the project?)

Support will be solicited from the following sources:

Air Force or Navy via BAA or other mechanisms

Department of Defense via the ESTCP / SERDP program

National Science Foundation