Advancing Environmental Solutions

ITRC PFAS Team

ROUNDTABLE WEBINAR SESSION 4:

Human and Ecological Health Effects, Site Risk Assessment, Regulations, Risk Communication and Stakeholder Perspectives

Sponsored by: Interstate Technology and Regulatory Council (www.itrcweb.org)
Hosted by: US EPA Clean Up Information Network (www.cluin.org)

ECOS ERIS ENVIRONMENTAL RESEARCH INSTITUTE OF THE STATES

PFAS Roundtable Webinar

- Introduction
- ITRC PFAS Resources
  - Find everything online at: https://pfas-1.itrcweb.org
- Roundtable format
- Roundtable Q&A

Thank you for joining this ITRC PFAS Roundtable!

ITRC – Shaping the Future of Regulatory Acceptance

- Host Organization
- Network - All 50 states, PR, DC
- Federal Partners
  - DOE
  - DOD
  - EPA
- ITRC Industry Affiliates Program
- Academia
- Community Stakeholders

- Disclaimer
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  - Partially funded by the US government
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PFAS Technical and Regulatory Guidance

- Web document (April 2020, editorial revisions September 2020, updates coming in June 2021)

What are PFAS?	How do they behave in the environment?	Why are we concerned about PFAS?	How do we evaluate PFAS in the environment?	How do we remediate PFAS?	What are the major concerns and how do we share what we know?
• Introduction • History and use • Naming conventions • PFAS releases to the environment • Firefighting foams	• Physical and chemical properties • Fate and transport processes • Media-specific occurrence	• Human and ecological health effects • Site risk assessment • Regulations • Surface water quality	• Site characterization • Sampling and analytical methods • Case studies	• Treatment technologies • Case studies	• Stakeholder perspectives • Risk communication

- 11 Fact Sheets (2017/2018, August 2020)
- Ten video training modules published on YouTube (April 2020)
- Risk Communication Toolkit (published June 2020) https://rct-1.itrcweb.org

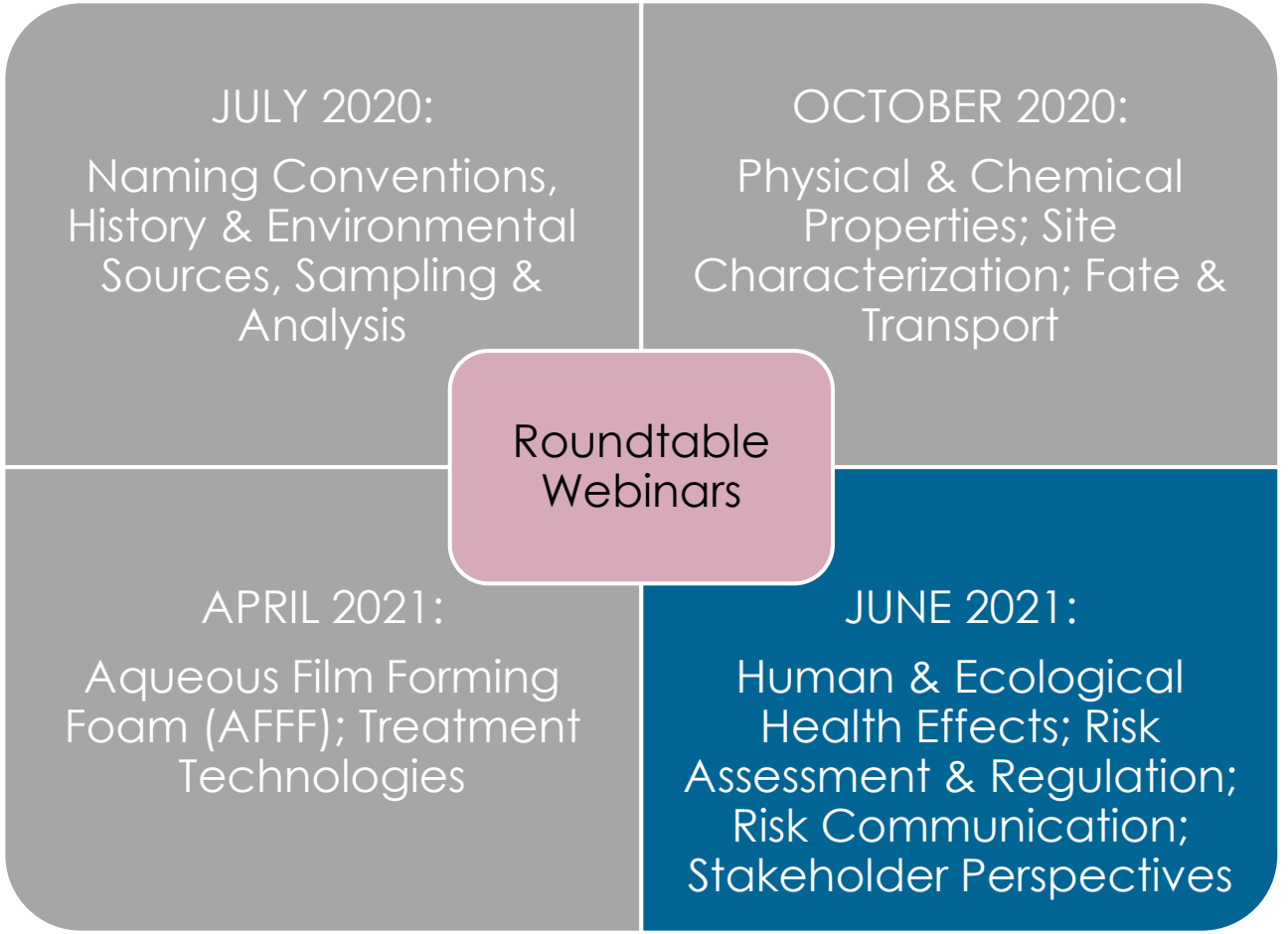
Document Information: External files

- Twelve external files for additional detailed information
  - PFAS Water and Soil Values – updated regularly, includes US and some International values
  - Basis for PFOA and PFOS drinking water values in the US
  - Physical and chemical properties
  - Bioconcentration factors tables
  - Ecological toxicity data summary
  - Toxicological effects in mammalian species for some PFAS
  - Analytical methods
  - Treatment technologies
  - Water treatment case studies operation summaries
  - Social Factors vision board

Session 4 - Topics

- Human and Ecological Health Effects
- Site Risk Assessment
- Regulations
- Risk Communication
- Stakeholder Perspectives

- Past sessions
  - Recordings available on Clu-In
  - Q&A digests available on itrcweb.org



Housekeeping

- Session time is 2 hours
- Participants are on mute
- This event is being recorded
- Download slides for today at the CLU-IN training page
  https://clu-in.org/conf/itrc/PFAS-Round4/
  Under "Download Training Materials"
- Need confirmation of your participation today?
  - Fill out the online feedback form and check box for confirmation email and certificate

Technical Difficulties?

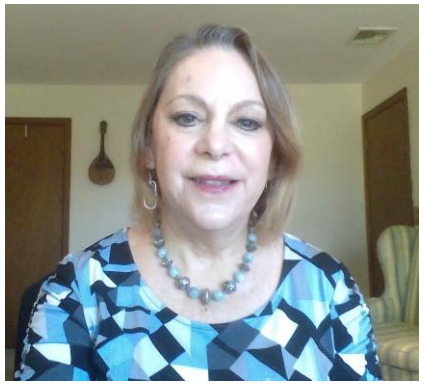
Request support through the Q&A Pod

Roundtable Format

- The moderator will read questions for a response by the panelist(s)
- Questions are selected from those submitted with:
  - participant registration
  - prior PFAS training classes
  - PFAS team members
- Today you may submit additional questions by typing in the Q&A pod
- It may not be possible to answer all questions during the live webinar
- A Q&A digest with references to the PFAS Technical and Regulatory Guidance Document will be made available

Gloria Post, NJ DEP

Kristi Herzer,
Vermont DEC

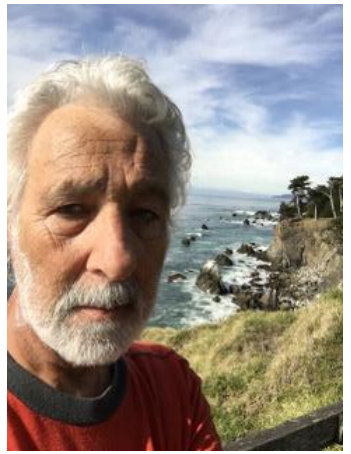


Kerry Kirk Pflugh, NJ DEP

Kevin Long,
Terraphase

Chris McCarthy,
Jacobs

Linda Hall, Consulting
Toxicologist



Peter Strauss, P.M.
Strauss & Associates

Session 4 Panelists

Session 4 - Topics

- Human and Ecological Health Effects
- Site Risk Assessment
- Regulations
- Risk Communication
- Stakeholder Perspectives

https://pfas-1.itrcweb.org

Risk Communication

https://pfas-1.itrcweb.org

PFAS-1 Risk Communication Resources

- Section 13 – Stakeholder Perspectives
  - Stakeholder Concerns
  - Specific Tribal Stakeholder Concerns
  - Stakeholder Resources
- Section 14 – Risk Communication
  - Role of Risk Perception
  - Risk Communication Challenges
  - Planning and Engagement Tools with PFAS examples
- Section 15.4 – PFAS Risk Communication case studies

Key Aspect of Risk Communication

1. How Communities See Risk
2. Building Trust and Credibility
3. Releasing Information Effectively
4. Interacting with Communities
5. Explaining Risk and Management Strategies

NJDEP 1991

How Communities See Risk

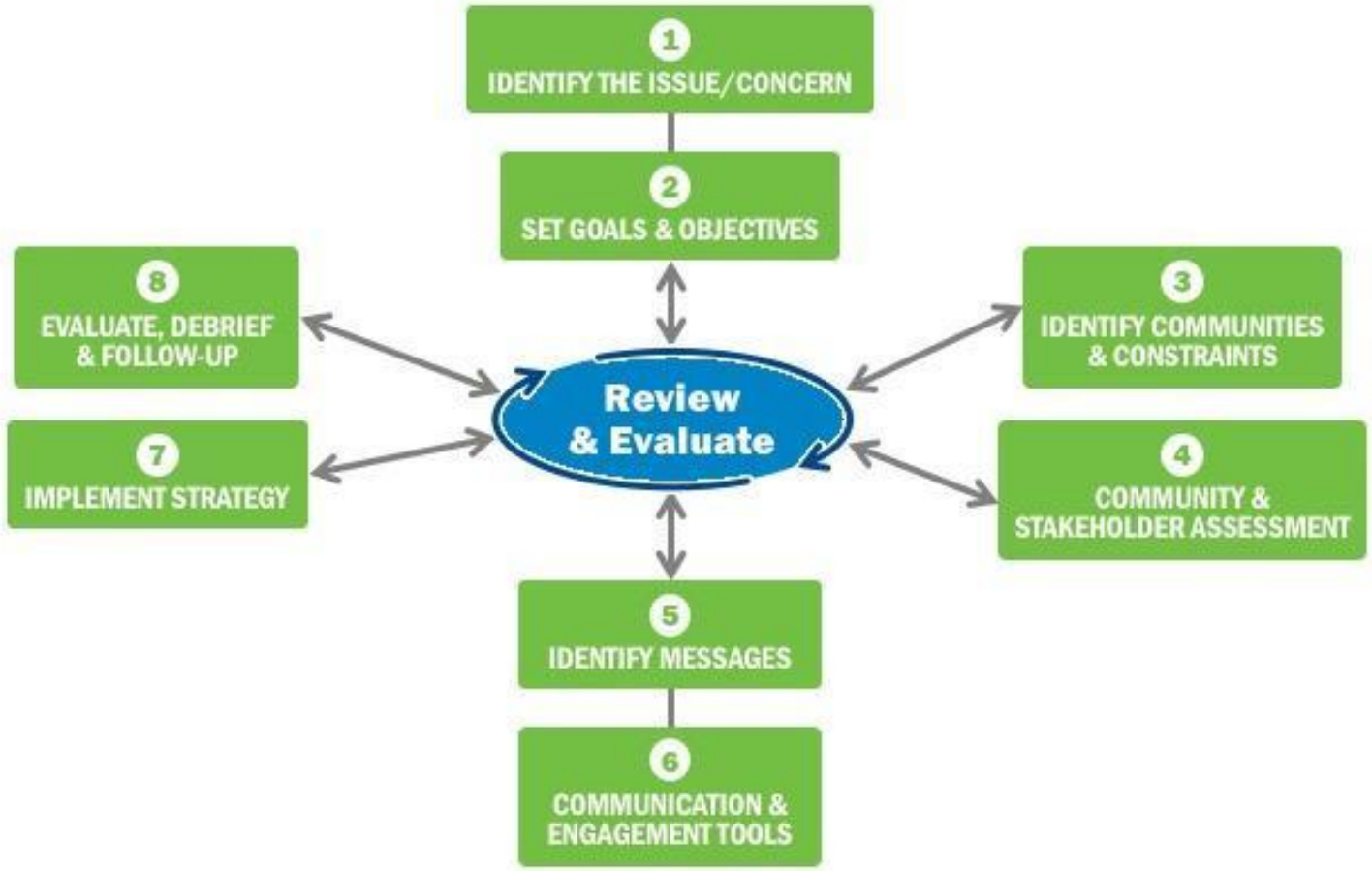
OUTRAGE FACTORS	
Voluntary/Acceptable	**Involuntary/Unacceptable**
· Individual Control	· No/little control
· Fair	· Unfair
· Info from trusted sources	· Info from strangers
· Morally right	· Unethical
· Natural	· Artificial
· Familiar	· Unfamiliar

Adapted from USEPA 2007. Communicating Radiation Risks. EPA-402-F-07-008. Washington, D.C.: Office of Radiation and Indoor Air US Environmental Protection Agency
NJDEP 1991.

Develop a Risk Communication Plan

Risk communication plan process adapted from NJDEP and Rutgers University

Modified from NJDEP 2014



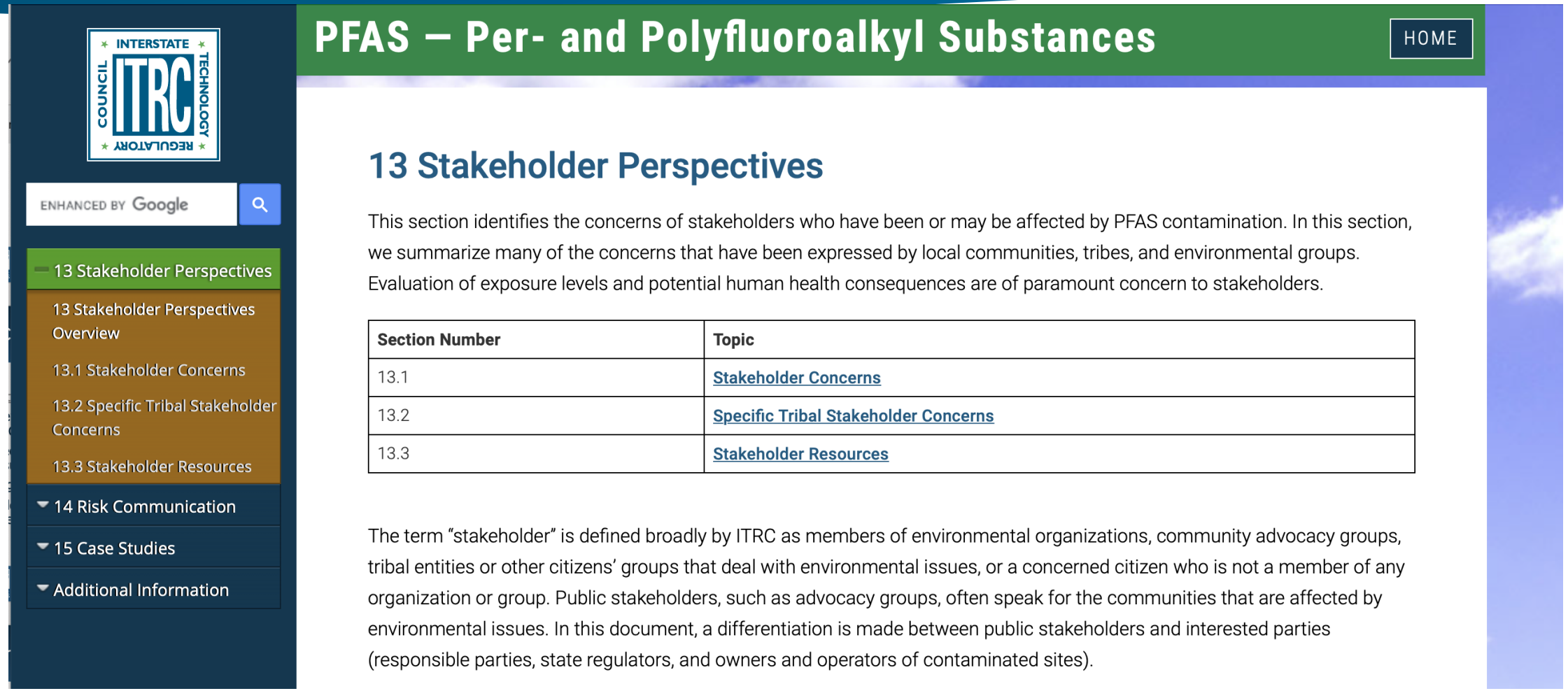
https://rct-1.itrcweb.org/

RCT-1, Figure 4-1, Communication Plan Description

Stakeholder Perspectives

https://pfas-1.itrcweb.org

PFAS-1 Document Section 13



Regulations

https://pfas-1.itrcweb.org

Federal Agencies and Programs

- **USEPA**
  - Safe Drinking Water Act (**SDWA**)
    - National Primary Drinking Water Standards (MCLs)
    - Unregulated Contaminants Monitoring Rule (UCMR)
  - Toxic Substances Control Act (**TSCA**)
  - Toxic Release Inventory (**TRI**)
  - Clean Air Act (**CAA**)
  - Clean Water Act (**CWA**)
  - Comprehensive Environmental Response, Compensation, and Liability Act (**CERCLA**)
- **Food and Drug Administration (FDA)**

UCMR 3 Detections

PFOS and PFOA Detections in Public Water Supplies

US EPA Lifetime Health Advisory(LHA): 70 parts per trillion (ppt) for PFOS + PFOA

Map data ©2016 Google

Figure used with permission from Andy Eaton, Eurofins-Eaton Analytical

PFAS Water and Soil Values Table

January 2021

Standards and guidance values for PFAS in groundwater, drinking water, and surface water/effluent (wastewater).

This Table belongs with the ITRC PFAS Technical and Regulatory Guidance Document. The values included here were confirmed to be in use as of the end of the calendar month for which this table is prepare
1.itrcweb.org/about-itrc/#disclaimer

Location	Agency / Dept	Year Last Updated	Standard / Guidance	Type	Promulgated Rule (Y/N/O)	Footnote	PFOA	P
							335-67-1	176
U.S. Environmental Protection Agency								
USEPA	Office of Water	2016	HA	DW	N	a	0.070	0.
	Regions	2014	RSL	GW	N	b		
	Regions	2018	RSL Calculation	GW	N	c	0.400	0.
	OLEM	2019	Interim Recommendation	GW	N	m	0.040	0.
U.S. States								
Alaska (AK)	DEC	2016	CL	GW	Y		0.400	0.
	DEC	2018	Action Level	DW/GW/SW	N	a	0.070	0.
California (CA)	SWRCB	2018	NL	DW	N		0.005	0.
	SWRCB	2018	RL (CA)	DW	Y		0.010	0.
Colorado (CO)	DPHE	2018	GQS	GW	Y	d	0.070	0.
	WQCC	2020	Translation Levels	GW/SW	Y	q	0.070	0.
Connecticut (CT)	DPH	2016	AL	DW/GW	N	e	0.070	0.
Delaware (DE)	DNREC	2016	RL	GW	N	a	0.070	0.
	DNREC	2016	SL	GW	N	a	0.070	0.
Florida (FL)	FDEP	2019	PGCTL	GW	O	n	0.070	
	FDEP	2019	SL	SW	O	n	0.500	0.
Indiana (IN)	DEM	2019	SL (tap)	Protected GW	Y			

PFAS-1, Water and Soil Values Tables,
https://pfas-1.itrcweb.org/fact-sheets/

Human Health Effects

https://pfas-1.itrcweb.org

PFAS-1 Human Health Effects Resources

- Section 7.1 Human Health Effects
- Section 17.2 Additional Human Health Effects information
  - Human Biomonitoring and Sources of Exposure
  - Toxicokinetics
  - Human Epidemiology Studies
  - Animal Toxicology Studies
  - Data Gaps and Research Needs

Health Effects of PFOA and/or PFOS

- Animal
  - ❑ Liver effects
  - ❑ Immunological effects
  - ❑ Developmental effects
  - ❑ Endocrine effects (thyroid)
  - ❑ Reproductive effects
  - ❑ Hematological (blood) effects
  - ❑ Neurobehavioral effects
  - ❑ Tumors (liver, testicular*, pancreatic*)

* PFOA Only

- Human (possible links)
  - ❑ Liver effects (serum enzymes/bilirubin, cholesterol)
  - ❑ Immunological effects (decreased vaccination response, asthma)
  - ❑ Developmental effects (birth weight)
  - ❑ Endocrine effects (thyroid disease)
  - ❑ Reproductive effects (decreased fertility)
  - ❑ Cardiovascular effects (pregnancy induced hypertension)
  - ❑ Cancer* (testicular, kidney)

PFAS-1, Figure 7-1. Some health effects of PFOA and/or PFOS identified from published studies (not exhaustive).

Factors Impacting Numerical Values PFAS Drinking Water Guidelines

Drinking Water Guideline = $\frac{\text{Reference Dose (mg/kg/day) x Relative Source Contribution (\%)}}{\text{Drinking Water Consumption Rate (L/kg/day)}}$

	Factor	Explanation	Examples	Impact
Reference Dose **(POD ÷ Total UF; also includes animal-to-human extrap. factor)**	**Point of Departure (POD):** • **NOAEL** • **LOAEL** • **Benchmark Dose (BMDL)**	Dose (mg/kg/day) from animal study used as starting point	• LOAEL for ↓ offspring body weight in rats • NOAEL for ↓ immune response in mice	**↑ POD** **↑ Guideline**
	Uncertainty factors (UFs)	• POD is divided by individual UFs of 1-10 • Total UF generally 30-300	• Interindividual • Animal-to-human • Data gaps	**↑ Total UF** **↓ Guideline**
	Animal-to-human dose extrapolation	To account for higher internal levels in humans than lab animals from same dose	• Serum PFAS levels as dose metric • Human-to-animal half-life ratio	**Depends on specifics of approach**
Exposure	**Drinking water consumption rate**	• L/kg/day. • Based on daily ingestion (L/day) and body wt. (kg)	• Infant > Lactating Woman > Default Adult • Alternatively, model that predicts exposure to breast fed infant from mother exposed via drinking water	**↑ Ingestion rate** **↓ Guideline**
	Relative Source Contribution (RSC)	Accounts for non-drinking water exposure sources (e.g. food, air)	• Default - 20% • 20-80% based on chemical-specific data	**↓ RSC** **↓ Guideline**

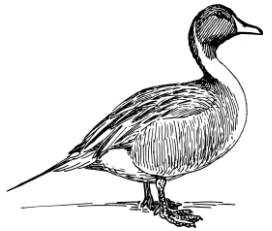
Ecological Health Effects

https://pfas-1.itrcweb.org

PFAS-1 Ecological Health Effects Resources

- Section 7.2 Ecological Toxicology
  - Currently available toxicity information
    - Invertebrates – terrestrial, freshwater, and marine: mostly PFOS
    - Vertebrates – Fish, Amphibians, Birds, Mammalian Wildlife
    - Plants
- Section 9.2 Ecological Risk Assessment (ERA)
  - Extensive new information being published June 2021
  - Information currently available to conduct ERA
  - Ecological effects assessment – including media screening values
  - Exposure Assessment
  - Risk Characterization

Toxicity of PFAS to Non-human Receptors

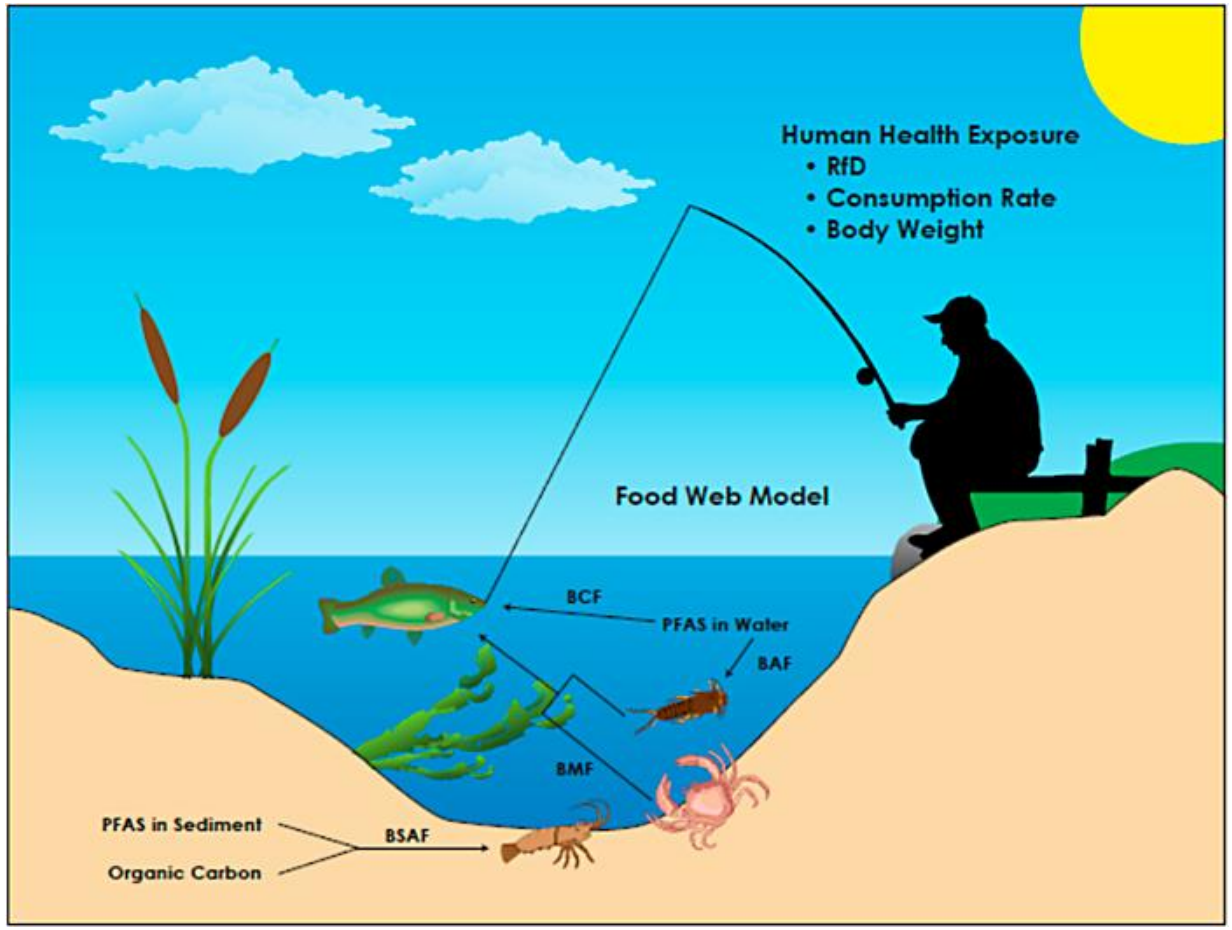


- Wildlife effects (mammals and birds)
  - PFOS well studied for terrestrial mammals (less so for other PFAS)
  - Accurate extrapolation to marine mammals is uncertain
  - Data for all PFAS is limited for birds and sparse for reptiles/amphibians
  - Endpoints: reproduction/survival and kidney/liver

- Aquatic toxicity data (fish, invertebrates) for some compounds
  - Most direct toxic effects occur at concentrations > higher than other concerns (e.g., drinking water)
  - SSDs have supported freshwater and marine thresholds for PFOS and PFOA

- Plants and soil invertebrates relatively insensitive
  - Effects occur in the mg/kg range (higher than other concerns)
  - Very limited data for 5 different PFAS

Bioaccumulation from sediment and surface water

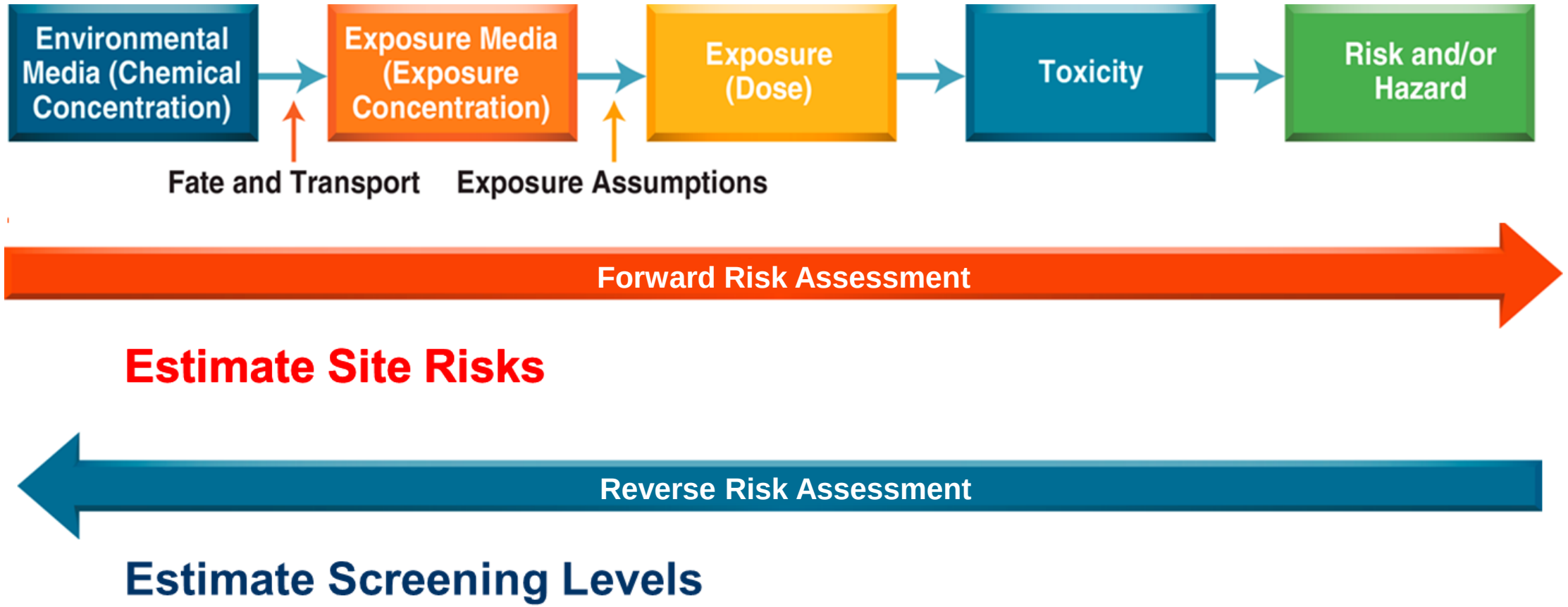


PFAS-1, Figure 17-1 *(Source: J. Conder, Geosyntec. Used with permission.)*

Site Risk Assessment

https://pfas-1.itrcweb.org

Risk Assessment Forms



ITRC 2015. Decision Making at Contaminated Sites: Issues and Options in Human Health Risk Assessment.
PFAS-1, Section 9. Site Risk Assessment

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PFAS Team Schedule – through December 2021

- Continue work on updating technical information and regulatory approaches in this rapidly evolving subject
- June 2021 Document update coming soon to pfas-1.itrcweb.org
- December 2021 Document update
  - Draft out for external review now through July 16, contact the team leaders to provide review of the content https://itrcweb.org/teams/active/pfas
- Virtual Workshops and Outreach

Thank you for attending!

- Email further questions on today's session to: training@itrcweb.org
- Feedback Form: https://clu-in.org/conf/itrc/PFAS-Round4/feedback.cfm
  - *Please use the Feedback Form to ask questions for future PFAS Roundtables*

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