Managing PFAS at Brownfields Sites

NEBC Northwest Remediation Conference

May 2, 2023

Panel

Ivy Anderson, Attorney General's Office

Arianne Fernandez, Ecology's Toxics Cleanup Program

Bob Anderson, Geosyntec Consultants

Moderator:
Priscilla Tomlinson, Ecology's Toxics Cleanup Program

Department of Ecology

What are PFAS?

Chemical properties

Carbon chain with fluorine atoms

Over 10,000 chemicals in family

Highly persistent “forever chemicals”

Bioaccumulative

Highly toxic

Highly mobile in groundwater

Industrial uses

Repel soil, water, oil, stains

Reduce friction

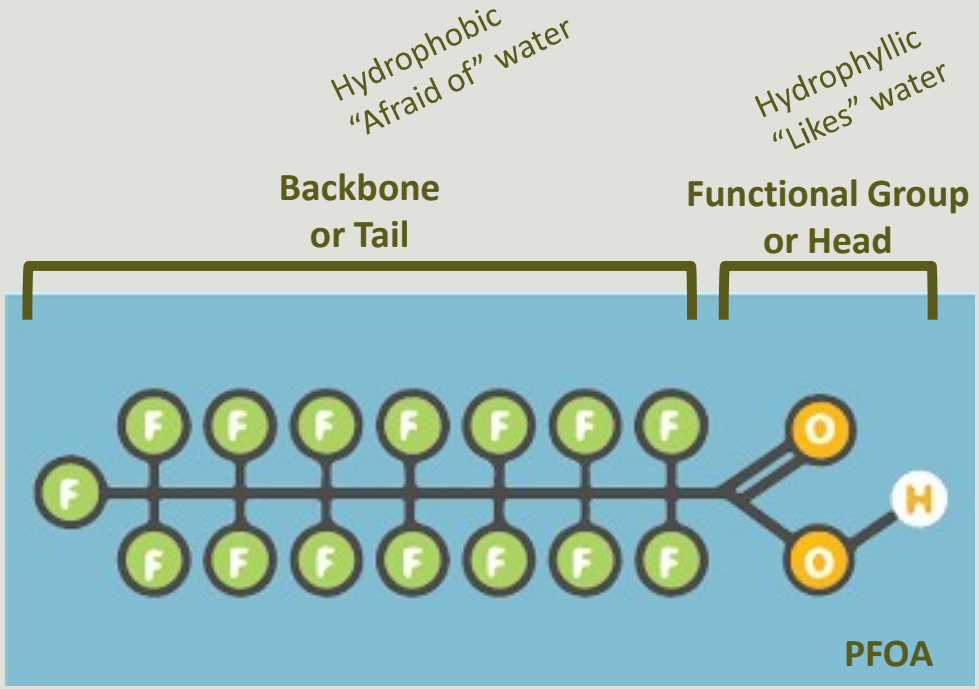
Stable at high temperature

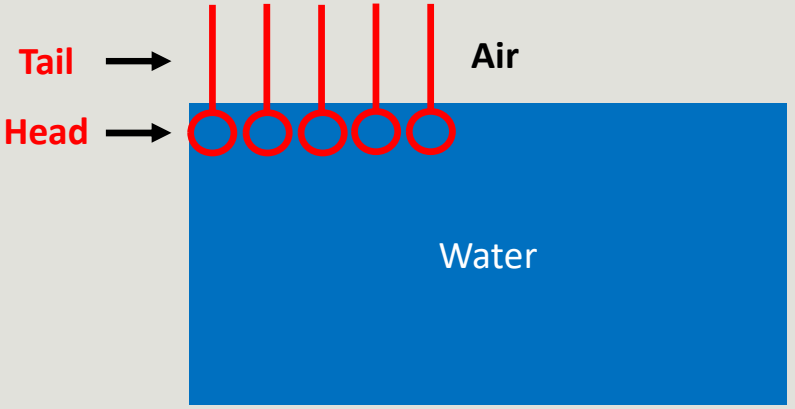
Act as surfactants

Coat surfaces

California Air Resources Board

Chemical structure





Utah Department of Environmental Quality

PFAS in TCP's Cleanup Levels and Risk Calculation database

Abbreviation	Name
PFBA	Perfluorobutanoic acid
PFBS	Perfluorobutane sulfonic acid
PFHxS	Perfluorohexane sulfonic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonic acid
PFNA	Perfluorononanoic acid
HFPO-DA (GenX)	Hexafluoropropylene oxide dimer acid

Coming soon:

PFHxA

Perfluorohexanoic acid

Where do we find PFAS?

Firefighting training areas

Chrome plating operations

Landfills

Biosolid application areas

Aviation and aerospace

Automotive

Herbicides and pesticides

Building and construction

Electronics

Energy

Food processing

Oil production

Mining

Paper and packaging

Photolithography, semiconductor

Textiles, leather, appare

Ivy Anderson

Attorney General's Office

EPA'S PFAS STRATEGIC ROADMAP

October 18, 2021 – EPA announced the *PFAS Strategic Roadmap*

Three central directives: **Research, Restrict, Remediate**

- **Research** – increase understanding of PFAS
- **Restrict** – preventing PFAS from entering the environment
- **Remediate** – broaden and quicken cleanup of PFAS contamination

Details EPA plans from 2021 to 2024 with expected dates

Updates provided in EPA Virtual Listening Sessions

FEDERAL REGULATION OF PFAS

National Primary Drinking Water Regulation

March 29, 2023 – EPA proposed rule for six PFAS (comment period ends May 30th) with an anticipated finalized rule by the end of 2023

Establish a Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs)

Requires public water systems to monitor for those PFAS, notify the public of the levels, and reduce the levels if exceeded

Toxic Substances Control Act (TSCA)

January 2023 – EPA proposed a significant new use rule to prevent anyone from resuming use of inactive PFAS without EPA review. Comment period closed in April.

FEDERAL REGULATION OF PFAS

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA- Superfund)

September 2022 -- EPA issued a Notice of Proposed Rulemaking regarding designating PFOA and PFOS as hazardous substances. Currently reviewing comments.

April 13, 2023 – EPA issued an Advanced Notice of Proposed Rulemaking on whether to designate other PFAS compounds, precursors, and categories of PFAS. Comments due June 12th.

Clean Water Act

December 2022 – EPA issued a memo providing guidance to states on using the NPDES permitting program to reduce PFAS pollution.

2022– EPA proposed aquatic life criteria for PFOA and PFOS

WASHINGTON'S CHEMICAL ACTION PLAN

The Departments of Ecology and Health developed a statewide **Chemical Action Plan** (CAP) for PFAS, published in November 2021. The plan summarizes what is known about PFAS contamination in Washington and recommends actions to address contamination and human exposure.

Recommendations include expanded testing and mitigation for PFAS in drinking water, reduction of PFAS uses that release PFAS into food, drinking water, or the environment, and additional evaluation of PFAS in waste streams (landfill leachate, biosolids, sewage treatment outfalls, etc.)

WASHINGTON REGULATION OF PFAS

RCW 70A.400: no use of PFAS fire fighting foam for training; sale of PFAS fire fighting foam prohibited (some exceptions)

RCW 70A.222: conducting alternatives assessment to see if safer alternatives to PFAS in food packaging. Restrictions begin in February 2023.

RCW 70A.350 – PFAS is a priority chemical class, identifying consumer products that are a significant source of PFAS, reduce exposure to people and sensitive species

DOH rulemaking -- Set drinking water State Action Levels (SAL) for 5 PFAS compounds, includes requirements for monitoring, recordkeeping and reporting, and follow-up actions.

MTCA – Ecology issued a draft Guidance for Investigating and Remediating PFAS, out for public comment in December 2022.

Arriane Fernanez

Ecology's Toxics Cleanup Program

PFAS and Brownfields

- Funding options
- Property acquisition: All Appropriate Inquiries
- Phase I ESA
- Model Toxics Control Act assessment
- Unique fate and transport

Brownfields funding helps people meet MTCA cleanup requirements

EPA FUNDING
EPA Cleanup, Multipurpose

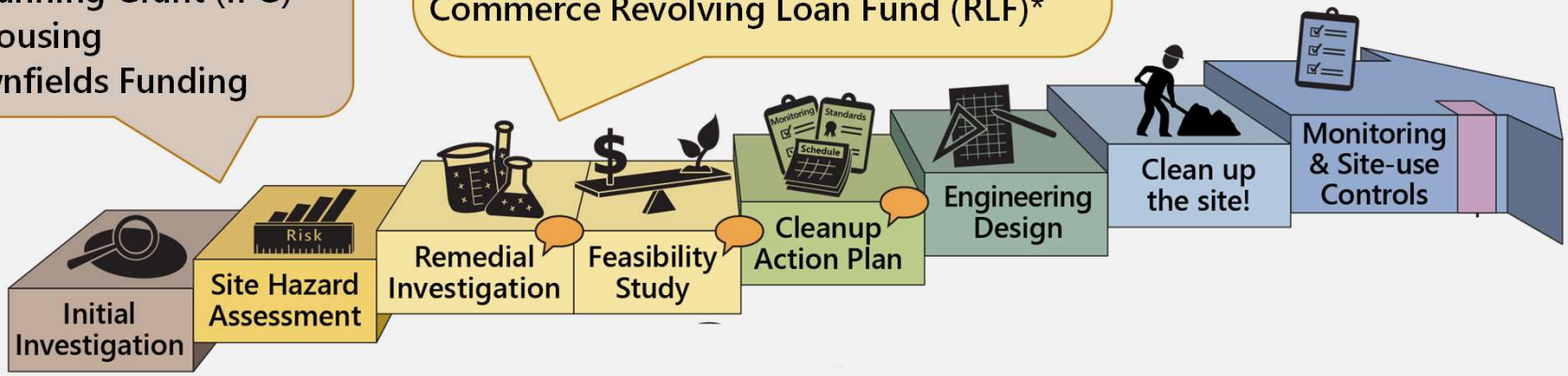
STATE FUNDING
Remedial Action Grant (RAG)
Affordable Housing
Flexible Brownfields Funding
Commerce RLF and Grant

EPA FUNDING
128(a) State Response Program (SRP)
EPA Assessment, Multipurpose
Targeted Brownfields Assistance (TBA)

STATE FUNDING
Integrated Planning Grant (IPG)
Remedial Action Grant (RAG)
Affordable Housing
Flexible Brownfields Funding
Commerce Revolving Loan Fund (RLF)*

EPA FUNDING
128(a) State Response Program (SRP)
Technical assistance

STATE FUNDING
Integrated Planning Grant (IPG)
Affordable Housing
Flexible Brownfields Funding



Plan	Assess			Clean up
Planning	Initial Investigation/ Phase I & II ESA	RI/FS	CAP	EDR/Cleanup

PFAS drivers - federal

- Federal funding requires an All Appropriate Inquiries prior to purchase
- Phase I Environmental Site Assessment - E1527-21 Standard
  - Non-Scope Considerations – Emerging contaminants
  - Recipient can request PFAS

Key EPA Actions to Address PFAS | US EPA

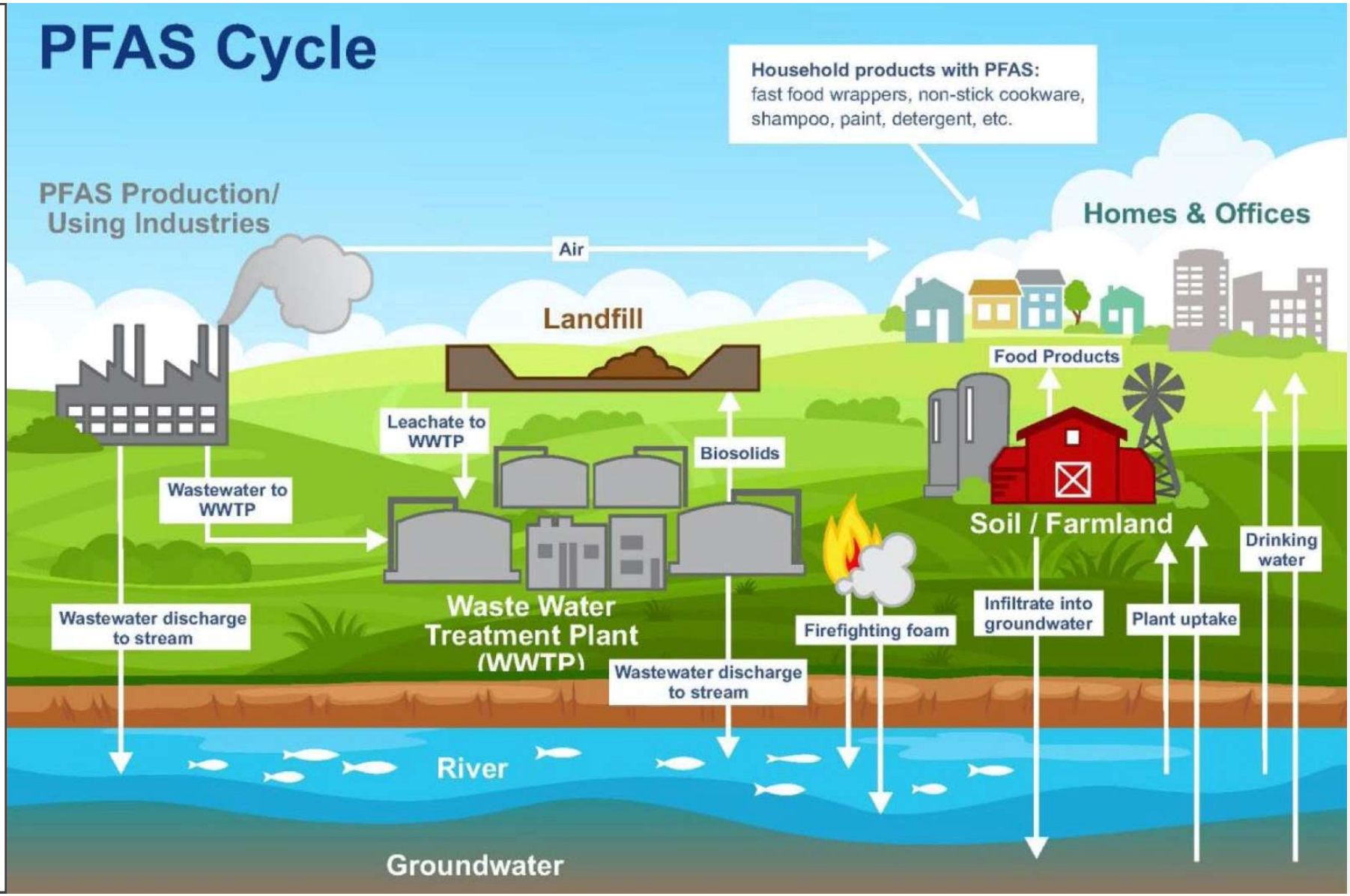
PFAS drivers - state

- PFAS designated as a hazardous substance
- Must consider during planning and site assessment
- State funding requires following the Model Toxics Control Act

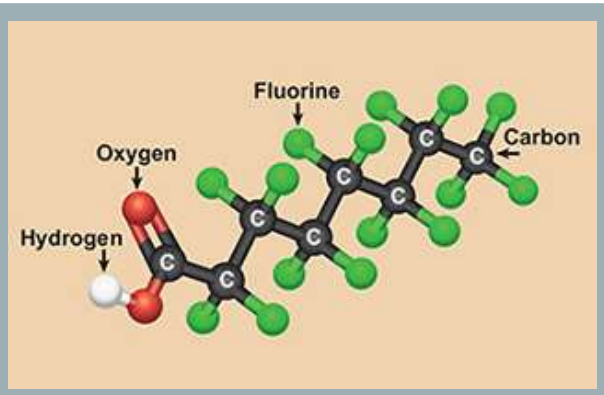
Don’t forget…

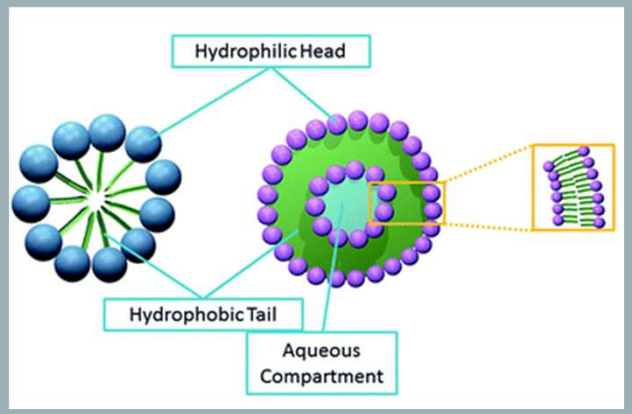
Funding is available!

More to it


PFAS Cycle
Household products with PFAS:
fast food wrappers, non-stick cookware, shampoo, paint, detergent, etc.
PFAS Production/ Using Industries
Air
Homes & Offices
Landfill
Food Products
Leachate to WWTP
Biosolids
Wastewater to WWTP
Soil / Farmland
Drinking water
Wastewater discharge to stream
Waste Water Treatment Plant (WWTP)
Firefighting foam
Infiltrate into groundwater
Plant uptake
Wastewater discharge to stream
River
Groundwater

PFAS unique fate and transport





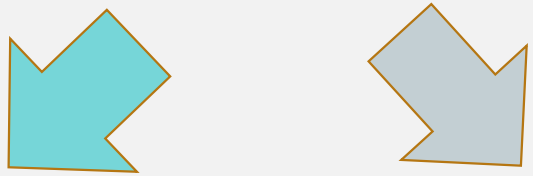
- Breaks up into fully fluorinated form
- Can form micelles (cell lipid-like structure)
- Collects at interfaces
- Can move quickly to water
- Sediment may act as slow release source
- Interacts and can bind to proteins
- Bioaccumulates in organs, bone, blood, not fat

Classic

INFRASTRUCTURE

Brownfields Program now has 2 EPA grants from
State & Tribal Response Program

(think of them as happy siblings)



Classic or "Regular" grant

$1 million/year

Indefinitely, 2-year grants

Since 2005

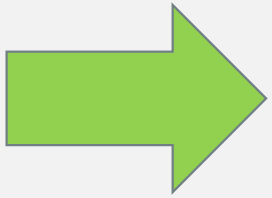
Infrastructure grant

$1 million/year

Five years only

Through 2027

Justice40 Initiative for EPA funds only

40% of benefits  **Disadvantaged communities**

What investments fall within Justice40?

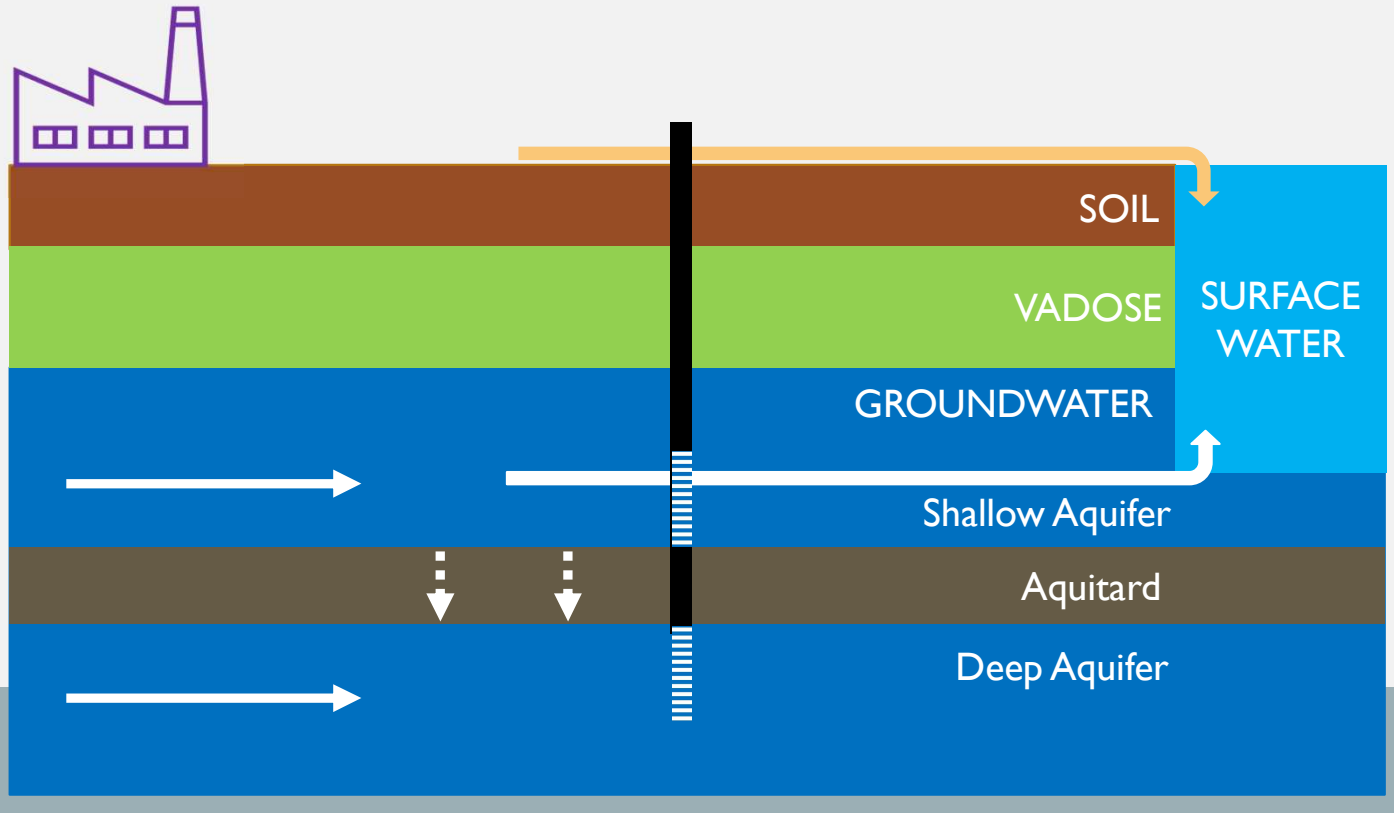
…climate change, clean energy and energy efficiency, clean transit, affordable and sustainable housing, training and workforce development, **remediation and reduction of legacy pollution**, and development of critical clean water and wastewater infrastructure.

The White House, Justice40 | https://www.whitehouse.gov/environmentaljustice/justice40/

Bob Anderson

Geosyntec Consultants

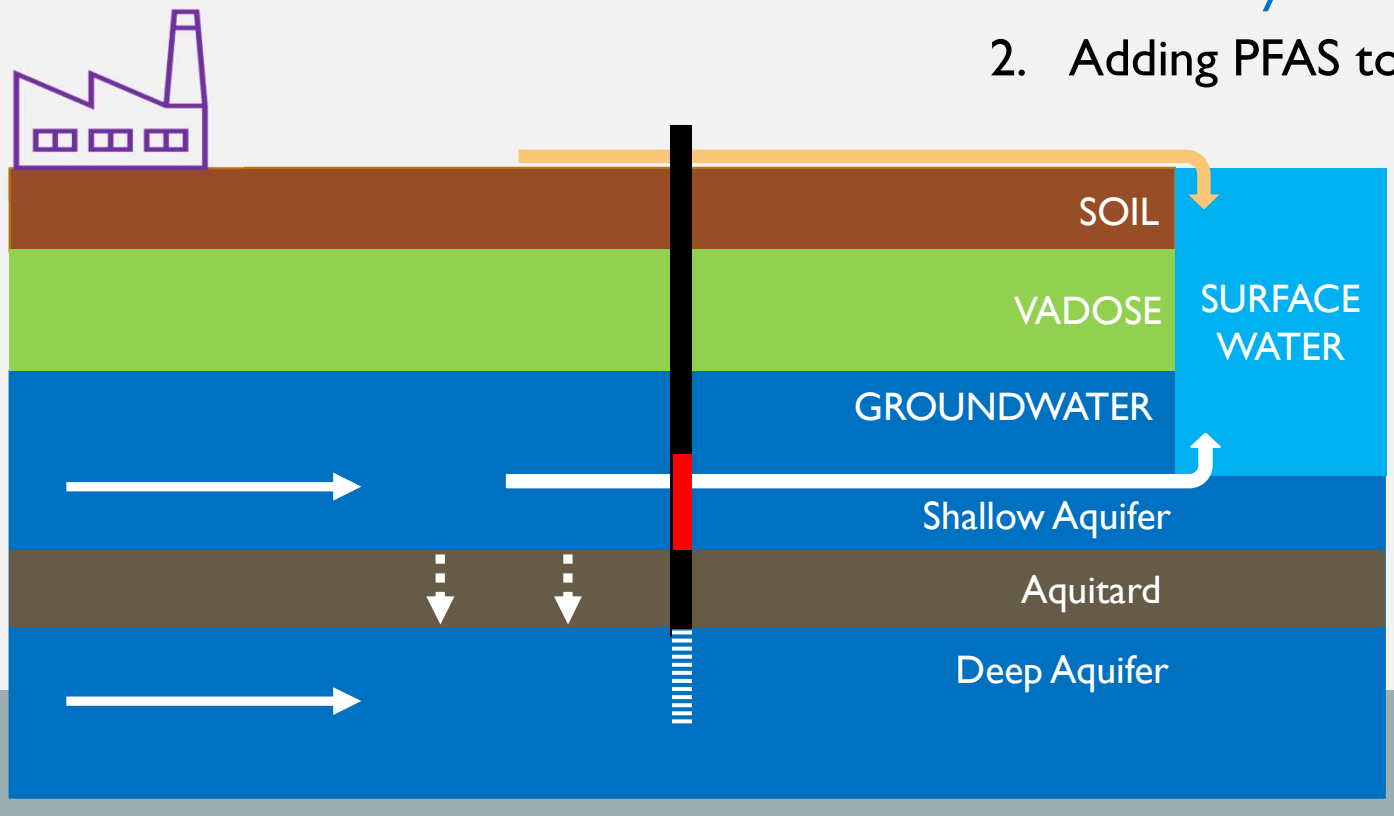
SITE CHARACTERIZATION



SITE CHARACTERIZATION

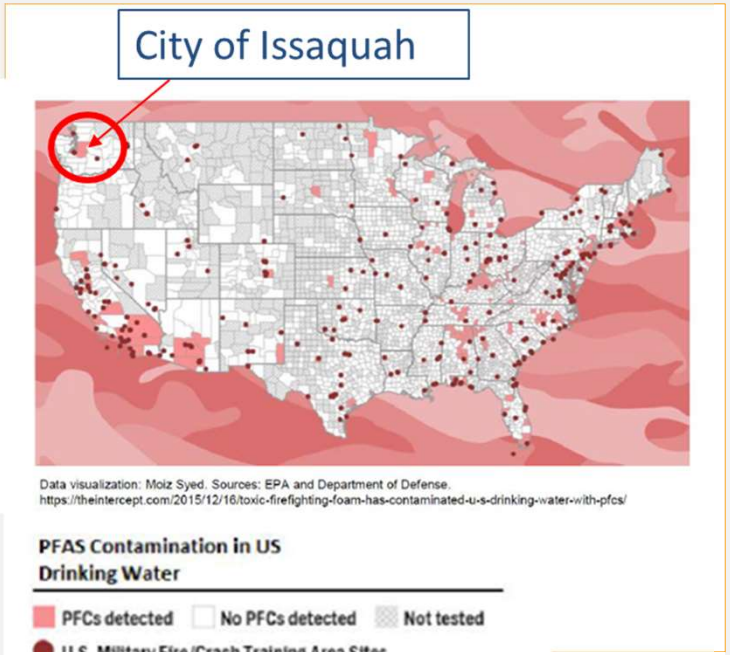
Two Examples:

1. Discovery via water supply sampling
2. Adding PFAS to an existing site clean-up



PFOS DISCOVERY VIA PUBLIC WATER SUPPLY SAMPLING

Site characterization may not start at the release site



EPA/US DOD Map published Dec. 2016

"What the heck is PFOS and where did it come from???"… *Sheldon Lynne, Public Works Director, September 2015*

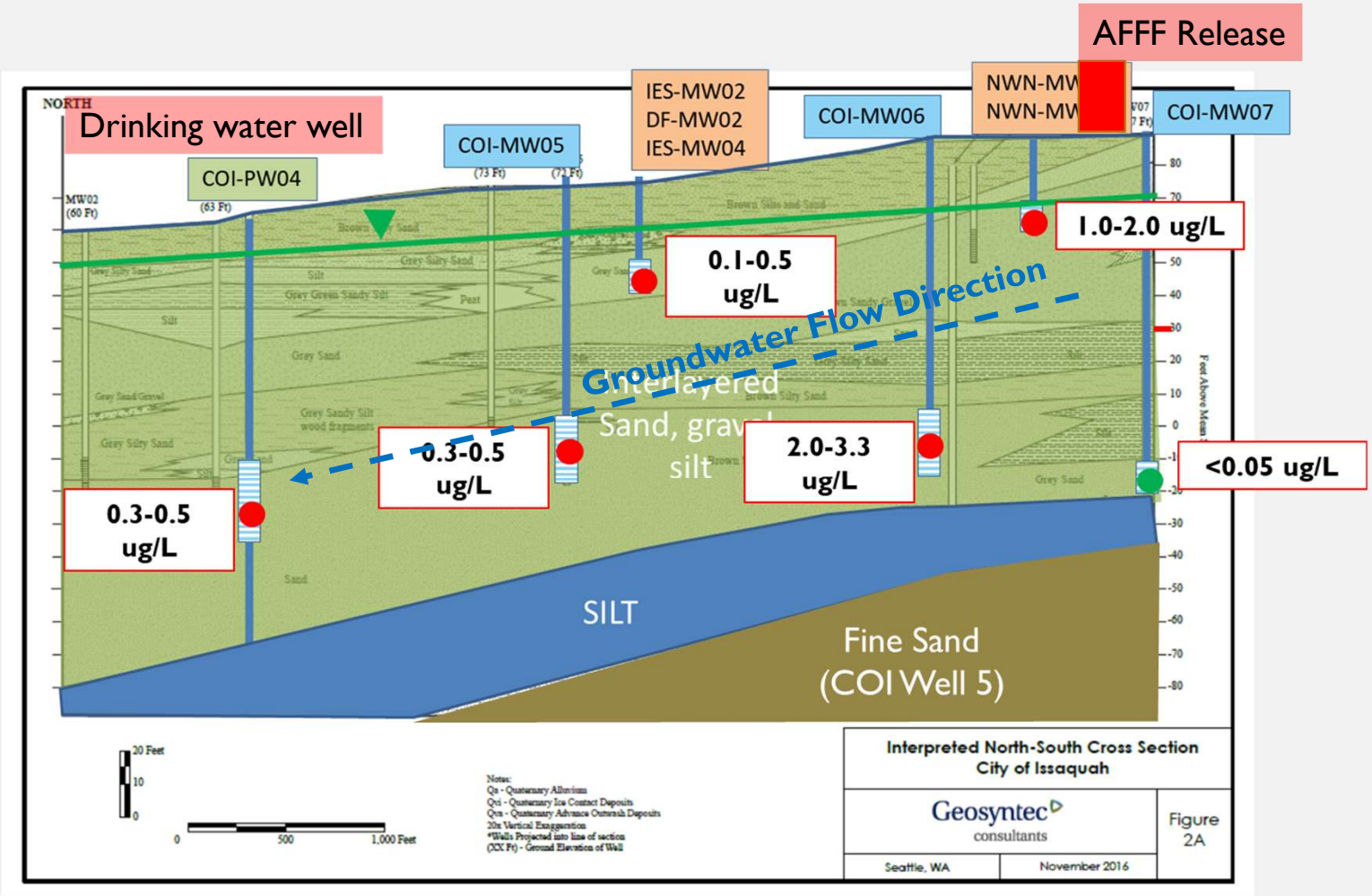
INITIAL PRIORITY IS ALWAYS TREATMENT OF POTABLE SUPPLY

Granular Activated Carbon (GAC) Treatment System

<u>City of Issaquah Initial Actions</u>

- Notify community and elected officials
- Wells 4 and 5 removed from service
- Install treatment before summer peak demand
- Accelerate technical studies
- Consult/collaborate with Ecology and other parties
- Develop funding strategy

FOLLOW THE DATA UPGRADIENT FROM IMPACTED WELLS



INVESTIGATE ALL POTENTIAL SOURCE AREAS

Soil

	Area 1		Area 2				Area 3	
	Decision Unit 05/06 (HQ)		Decision Unit 01/02 (IES)				Decision Unit 03/04 (RT/MF)	
Soil	DU-05	DU-06	DU-01A	DU-01B	DU02-A	DU-02B	DU-04	DU-03
Results (mg/kg)								
PFOS	0.024	0.026	0.003	0.002	0.085	0.016	0.002	0.014
PFHxS	0.004	0.005	0.000	0.000	0.002	0.001	0.000	0.002
PFBS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
PFOA	0.001	0.002	0.001	0.000	0.001	0.000	0.000	0.001
PFHxA	0.001	0.001	0.000	0.000	0.001	0.000	0.000	0.001
PFNA	0.001	0.001	0.000	0.000	0.001	0.000	0.000	0.002
PFOS+PFOA	0.02477	0.0275	0.0039	0.0024	0.08594	0.01642	0.00225	0.015

Groundwater

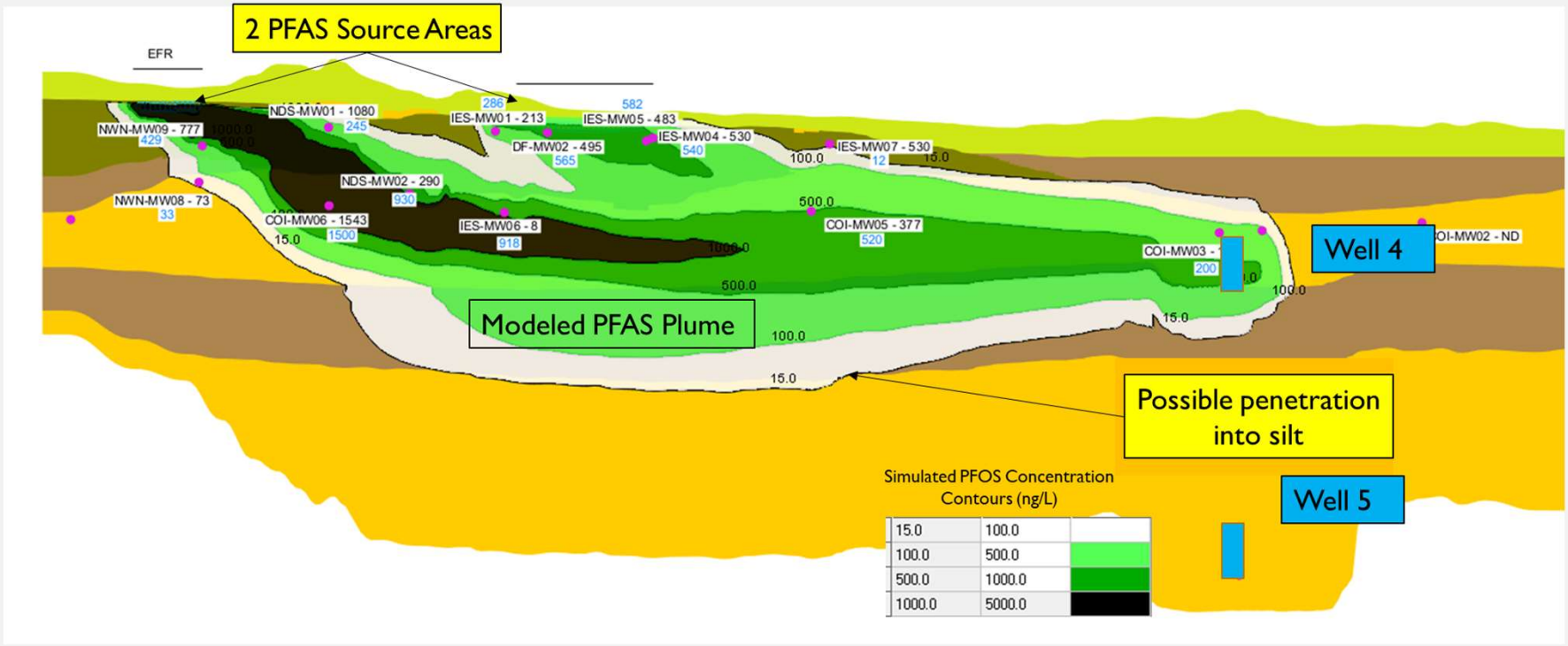
	GROUNDWATER														
	Area 1						Area 2								
	Decision Unit 05/06(HQ)						Decision Unit 01/02 (IES/DF)								
Groundwater															
	COI-MW07	NWN-MW01	COI-MW06	NWN-MW04	NWN-MW03	NWN-MW02	IES-MW02	DF-MW02	IES-MW04	COI-MW05	IES-MW03	IES-MW05	DF-MW03	IES-MW01	COI-MW04
Boring/Well Depth	110	30	100	30	23	30	25	25	30	90	25	30	30	26	90
Results (ug/L)															
PFOS	0.003	0.052	3.300	2.200	1.000	0.086	0.530	0.550	0.380	0.290	0.240	0.190	0.130	0.076	0.002
PFHxS	0.003	0.013	1.100	0.610	0.260	0.140	0.260	0.230	0.120	0.140	0.190	0.062	0.033	0.065	0.003
PFBS	0.001	0.007	0.230	0.140	0.061	0.012	0.055	0.022	0.022	0.050	0.050	0.019	0.008	0.015	0.002
PFOA	0.002	0.012	0.250	0.200	0.160	0.009	0.037	0.010	0.019	0.019	0.019	0.010	0.006	0.006	0.000
PFHxA	0.001	0.023	0.600	0.670	0.550	0.010	0.100	0.012	0.034	0.080	0.062	0.018	0.012	0.016	0.000
PFNA	0.000	0.003	0.150	0.057	0.130	0.004	0.022	0.025	0.033	0.011	0.007	0.008	0.009	0.001	0.000
PFOS + PFOA	0.006	0.064	3.550	2.400	1.160	0.095	0.567	0.560	0.399	0.309	0.259	0.200	0.136	0.082	0.002
Total PFAS	0.011	0.110	5.630	3.877	2.161	0.261	1.004	0.849	0.608	0.590	0.568	0.306	0.198	0.179	0.007

"Decision Units" – Areas

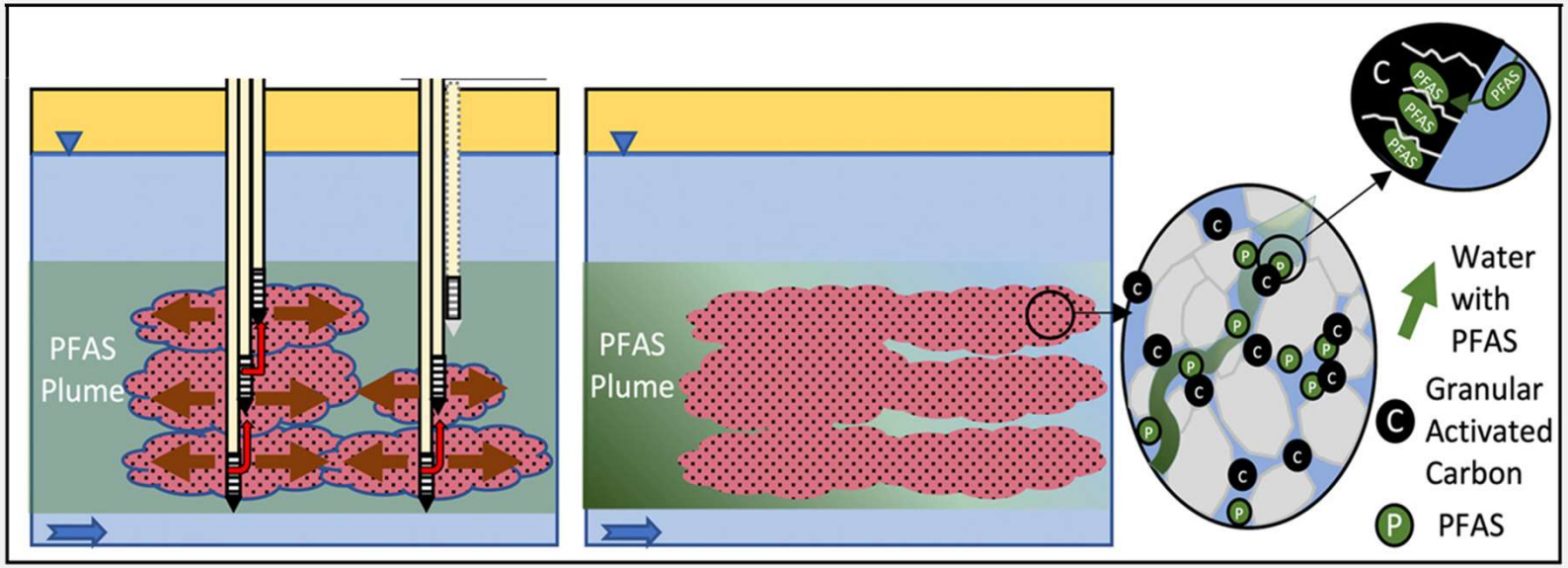
Variable concentrations of specific PFAS compounds…..

- Source proximity
- Specific transport properties

USE MULTIPLE TOOLS TO CHARACTERIZE AND INVESTIGATE

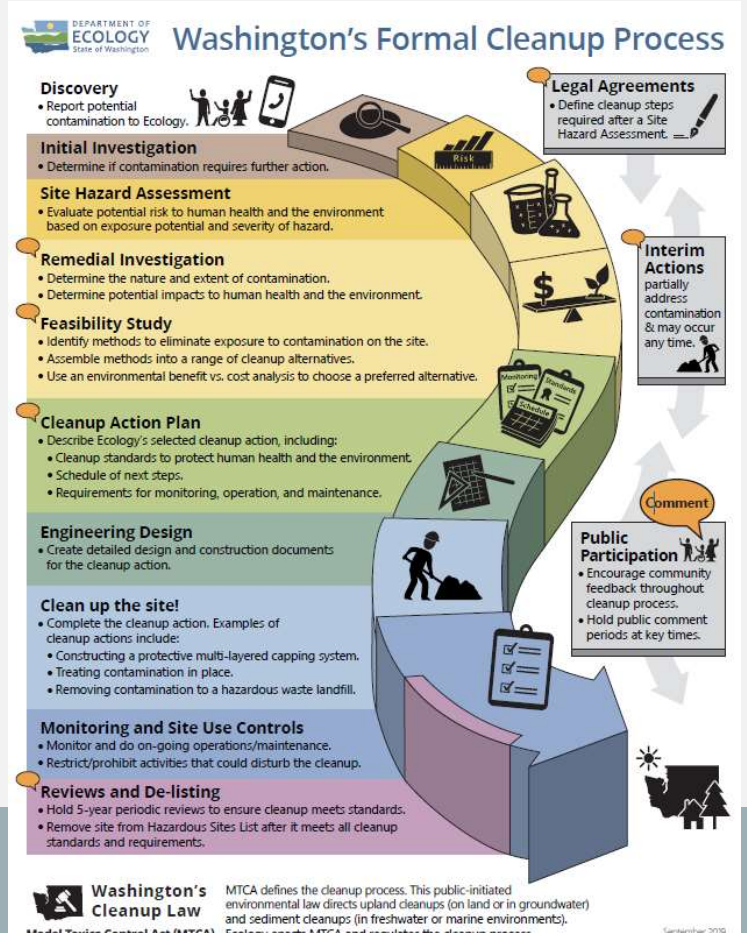


EVALUATE REMEDIAL TECHNOLOGY – REACTIVE BARRIER



Remediation Journal, Volume: 32, Issue: 4, Pages: 239-257, First published: 04 August 2022, DOI: (10.1002/rem.21731)

BEGIN MTCA CLEANUP PROCESS



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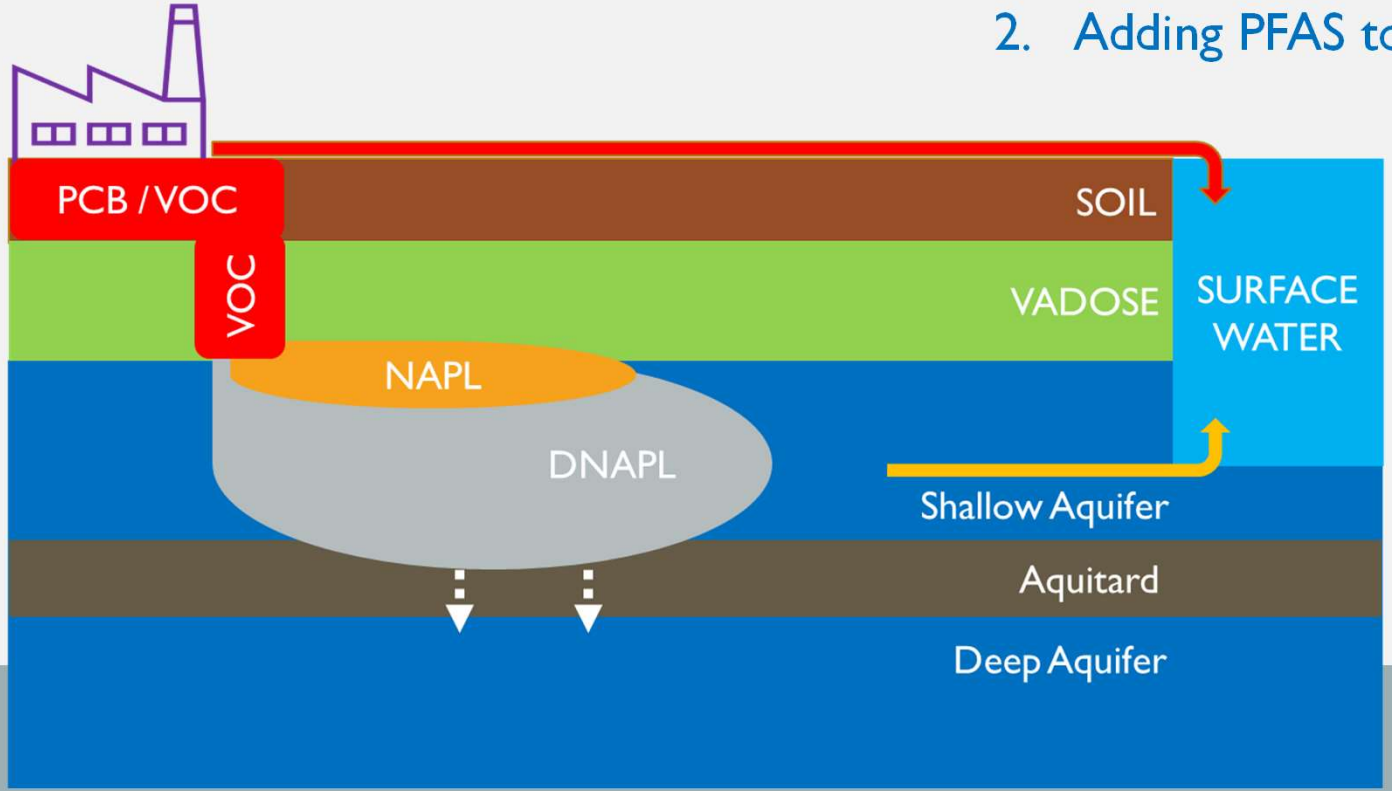
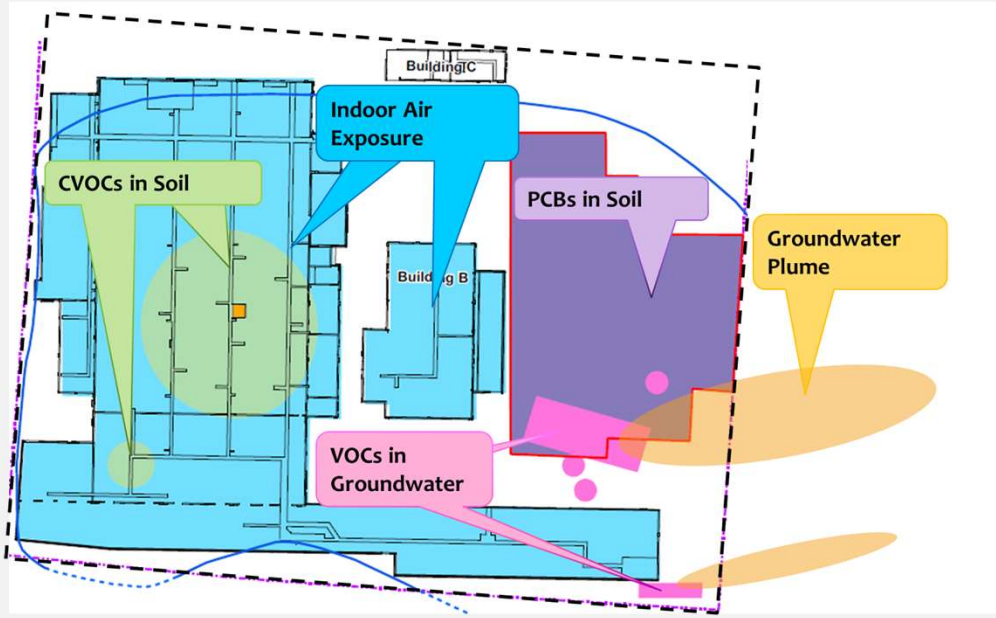
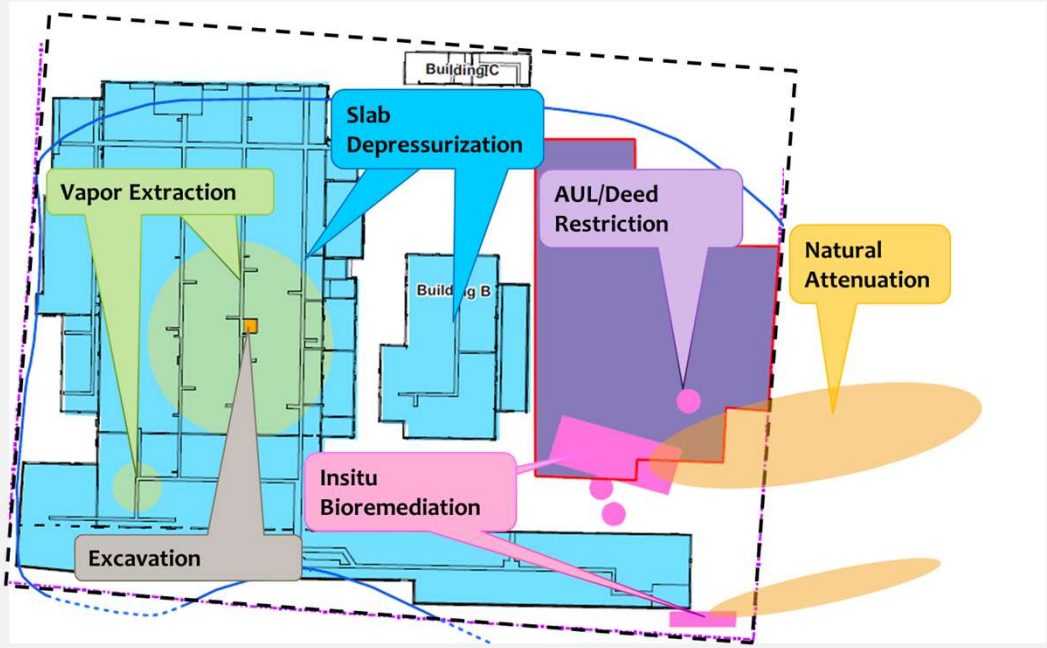


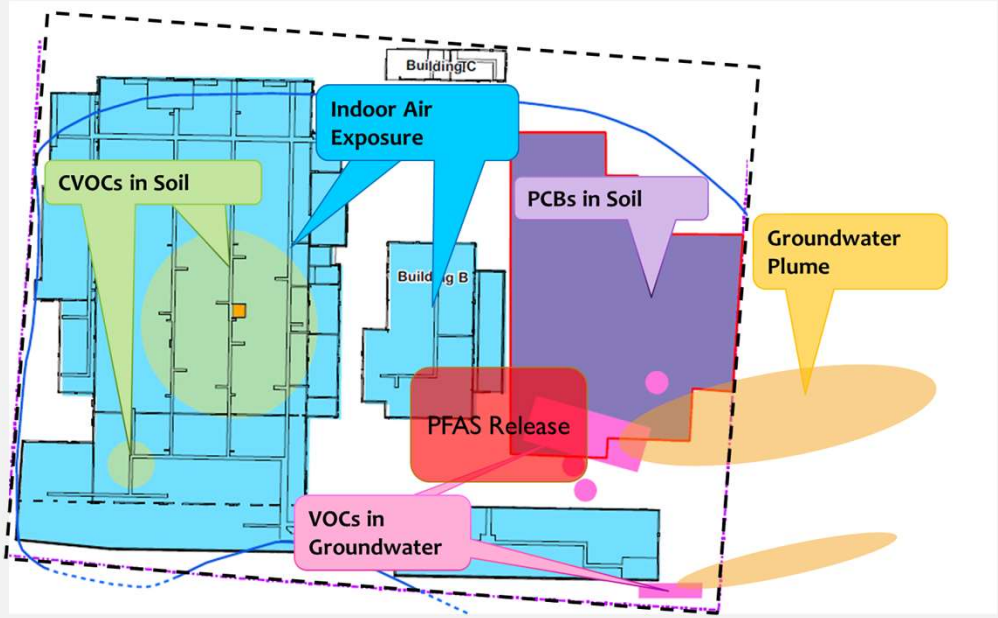
“TYPICAL” CONTAMINATED SITE



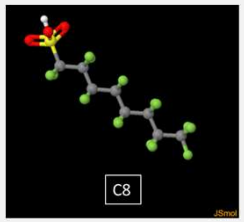


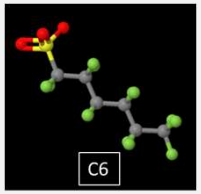
WHAT'S DIFFERENT ?

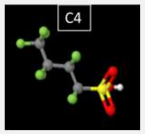
AFFF = Aqueous Fire Fighting Foam



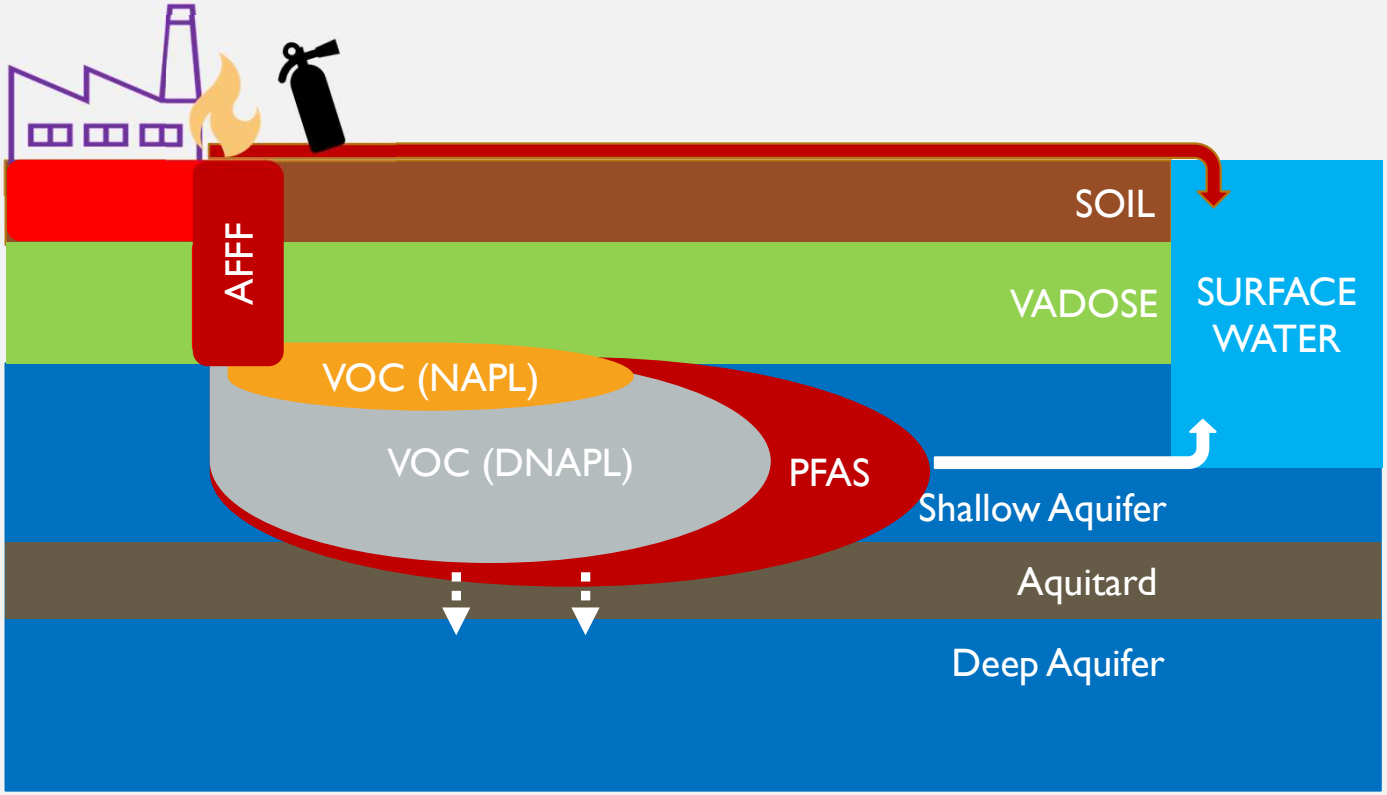
PFAS







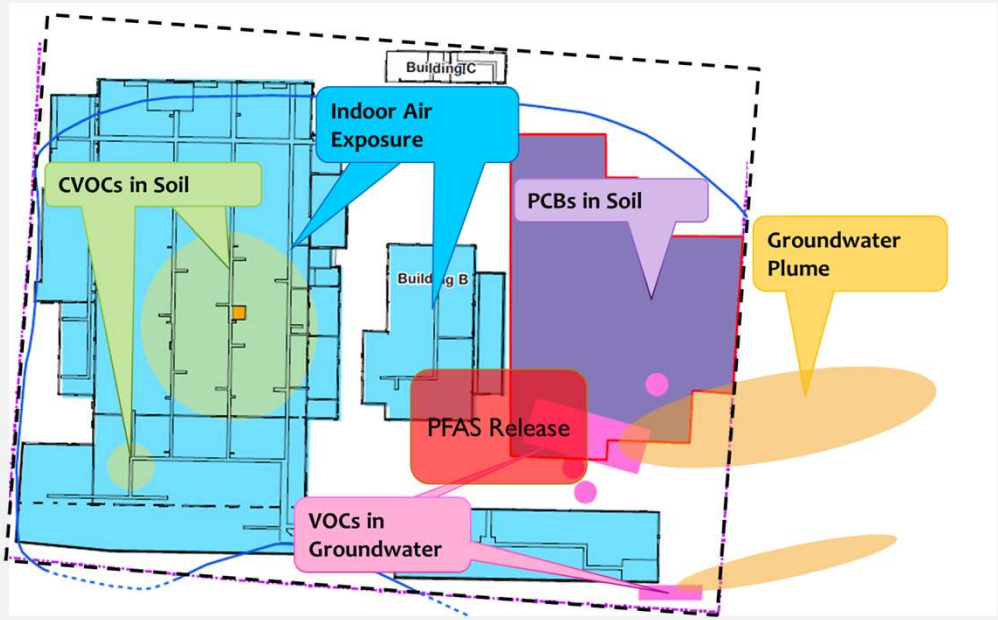
SITE CHARACTERIZATION

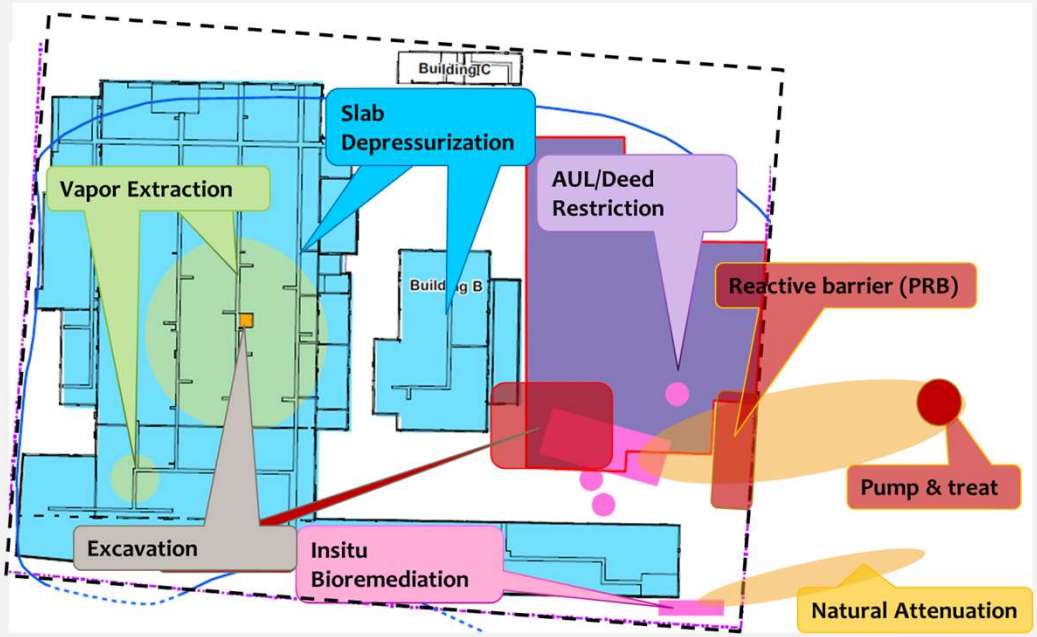


PFAS

- vapor pressure
- sorption
- density
- solubility
- biodegradation

REVISED CLEANUP STRATEGY (EXAMPLE)





SUMMARY

- PFAS characterization may start at a key receptor such as a drinking water system.
  - PFAS sampling is required for all public water systems
  - If detected, follow the flowpaths and characterize all possible source areas
  - Prioritize source areas and explore fate & transport scenarios
  - Begin the clean-up process with a strong foundation and collaborative approach

- PFAS characterization will add complexity to an existing site clean-up
  - 7 new regulated PFAS compounds and possibly more in the future
  - More mobile and persistent compared to many contaminants
  - Areas slated for activity restrictions or natural attenuation remedies may need modification
  - Be sure and inventory all potable water supplies downgradient of a site

PFAS at Brownfields sites

Don’t bury your head in the sand – look for PFAS where warranted

Technical and regulatory assistance is available

- Arianne Fernandez, Ecology
- TCP guidance coming soon
- ITRC

Funding is available for all phases of Brownfields development projects

Expect technical and regulatory environments to change for the foreseeable future

Department of Ecology

Technical assistance

Interstate Technical and Regulatory Council (ITRC)

Fact sheets
Technical and regulatory guidance document
Training videos

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

Toxics Cleanup Program

Guidance for Investigating and Remediating PFAS Contamination in Washington State

Coming in July

Thank you to CCLR for supporting the organization of this session

- CCLR provides FREE technical assistance to brownfield communities
- U.S. EPA's Technical Assistance to Brownfields (TAB) provider for EPA Region 10 including Alaska, Idaho, Oregon, and Washington
- Expertise in:
  - Community planning and development
  - Grant procurement, management and economic development strategies
  - Environmental Justice and equity
  - Environmental assessments and cleanup
  - Navigating regulations

CENTER FOR CREATIVE LAND RECYCLING

RECLAIM. CONNECT. TRANSFORM.

Reach out to them anytime with questions!

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