Addressing Soil, Groundwater and Potable Water Sources Affected by PFAS Type Contaminants

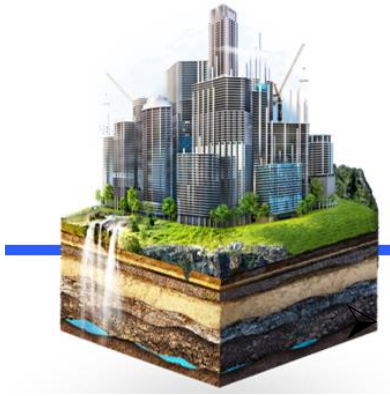
October 15th-17th, 2025

Banff, AB, Canada

Presented by
Jean Paré, P. Eng.

Presentation Agenda

- About us
- PFAS – One water perspective
- Intraplex Modular Approach
- Activated carbon form & Capture Mechanisms
- Utilization via Infiltration or Bank Filtration - schematic and economics
- Case Study
- Q & A



About us

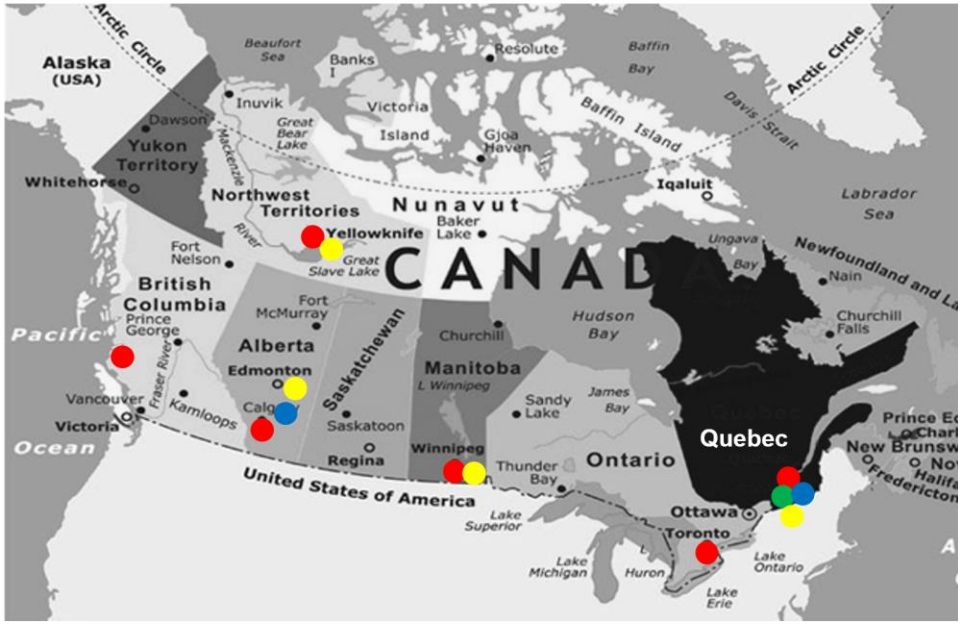
Chemco is a Nationwide own and operated Canadian company founded in 1988, specializing in providing chemical products and solution to the Environmental and Industrial sectors.

Main Divisions:

- **Aeronautics:** ChemR
- **Thermal Exchange Fluids**
- **Environmental Solutions**
  Air, Water, Groundwater and soil

PFAS Solution Provider

Chemco Warehouse locations



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ADVANCED OXIDATION TECHNOLOGY (AOT) *Since 2005*

EVONIK Leading Beyond Chemistry *Since 2005*

BIOCONSERVACION

CARBONE CANADA INC. *Since 2014*

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EthicalChem An Ethical Solutions, LLC Division *Since 2016*

Redox Tech

ChemCarb Sorption

SiREM *Since 2017*

Höganäs *Since 2018*

RioTinto *Since 2020*

intrapore *Since 2023*

cornelsen *Since 2024*

CANADIAN LEADER IN ENVIRONMENTAL SOLUTIONS

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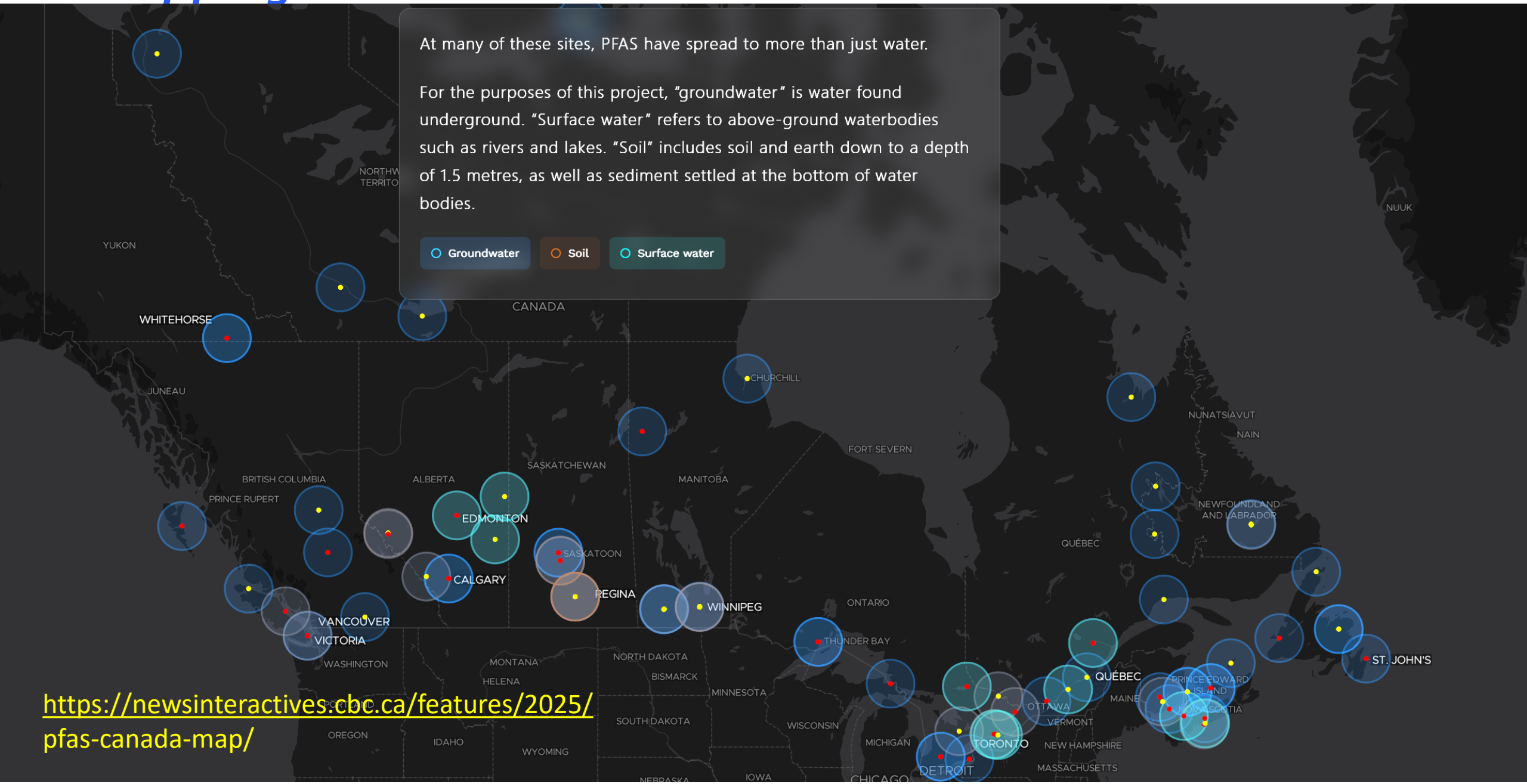
A few facts about PFAS compound

Mapping PFAS Across Canada



https://newsinteractives.cbc.ca/features/2025/pfas-canada-map/

PFAS
One Water Perspective

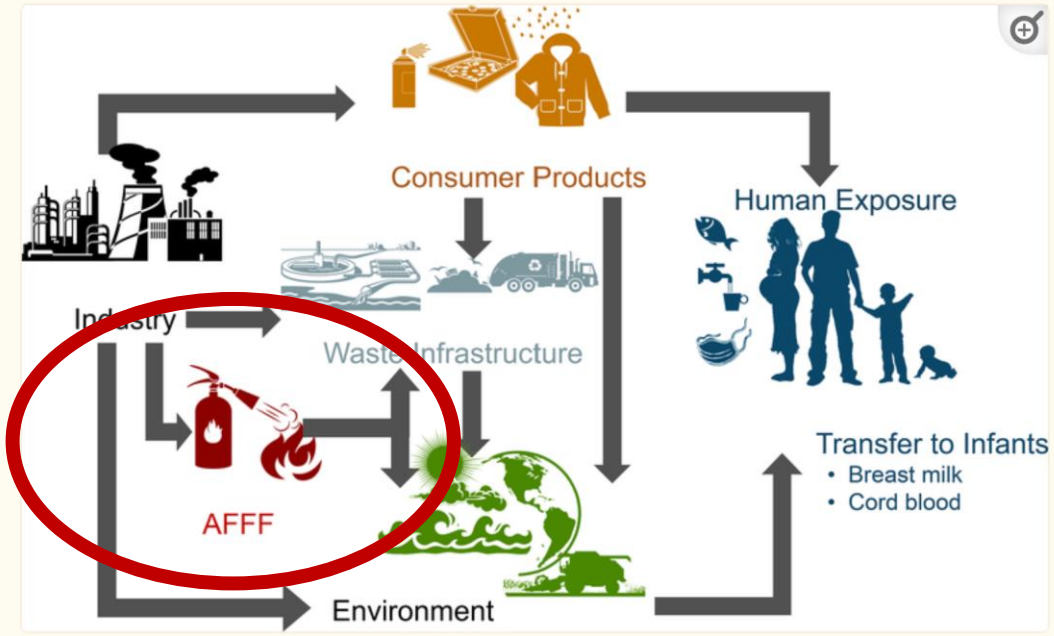


Figure 1.

Overview of PFAS exposure pathways for different human populations outside of occupational settings.

Table 1.

Literature estimates of sources contributions (%) to adult PFAS exposures.

PFAS	Diet	Dust	Tap water	Food Pkg.	Inhalation	Dermal	Other	Reference
PFOA	16	11		56	14		2[a]	Trudel et al.[25]
PFOA	85	6	1	3[b]			4[c]	Vestergren and Cousins[74]
PFOA	77	8	11		4			Haug et al.[76]
PFOA	66	9	24		<1	<1		Lorber and Egeghy[77]
PFOA	41		37				22[d]	Tian et al.[163]
PFOA	99		<1					Shan et al.[164]
PFOS	66	10	7		2		16[d]	Gebbink et al.[165]
PFOS	72	6	22		<1	<1		Egeghy and Lorber[75]
PFOS	96	1	1		2			Haug et al[76]
PFOS	81	15					4[a]	Trudel et al.[25]
PFOS	93		4				3[d]	Tian et al.[163]
PFOS	100		<1					Shan et al.[164]
PFBA		4	96					Gebbink et al.[165]
PFHxA	38	4	38		8		12[d]	Gebbink et al.[165]
PFOA	47	8	12		6		27[d]	Gebbink et al.[165]
PFDA	51	2	4		15		28[d]	Gebbink et al.[165]
PFDoDA	86	2	2		4		5[d]	Gebbink et al.[165]

Open in a separate window

[a]Carpet
[b]Consumer goods
[c]Precursors
[d]Indirect.

Source: A Review of the Pathways of Human Exposure to Poly- and Perfluoroalkyl Substances (PFASs) and Present Understanding of Health Effects

Journal of Exposure Science & Environmental Epidemiology

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Effects of PFAS on human health

Statistique Canada
https://www150.statcan.gc.ca › daily-quotidien

The Daily — Canadian Health Measures Survey

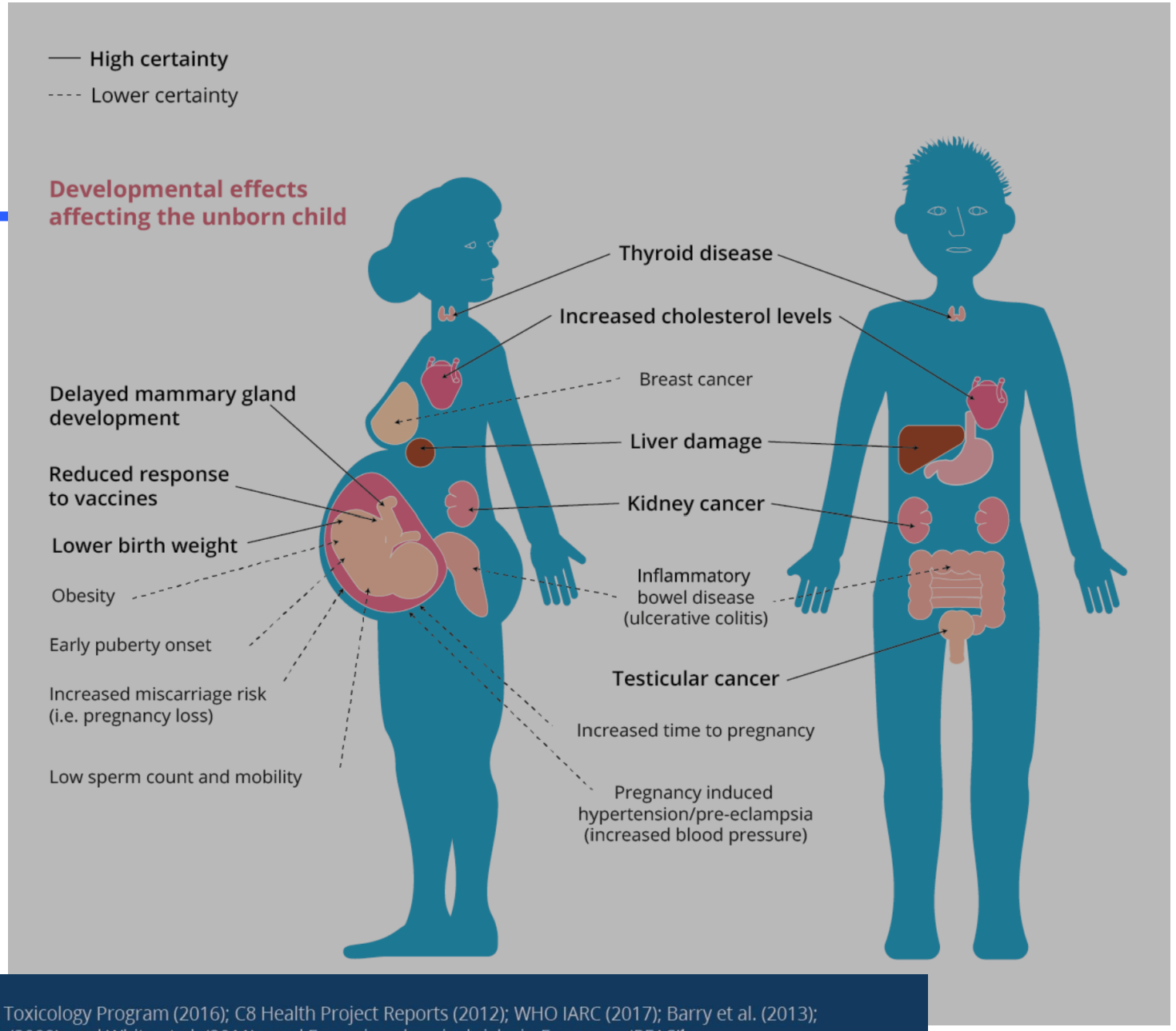
Nov 13, 2019 — More than four-fifths (81.5%) of Canadians had BPA detected in their urine, while 98.5% of Canadians had the following three PFAS in their blood ...

Almost all Canadians have BPA or PFAS in their body

BPA and PFAS were measured in Canadians aged 3 to 79 in the most recent cycle of the Canadian Health Measures Survey (CHMS). More than four-fifths (81.5%) of Canadians had BPA detected in their urine, while 98.5% of Canadians had the following three PFAS in their blood: perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA) and perfluorohexane sulfonate (PFHxS).

The average concentration of BPA among Canadians was 0.81 micrograms per litre (µg/L), while the average concentrations of these PFAS were 3.0 µg/L for PFOS, 1.3 µg/L for PFOA and 0.90 µg/L for PFHxS.

This is 173 times more than the 30 ng/L Federal Drinking Water Guideline



Sources: US National Toxicology Program (2016); C8 Health Project Reports (2012); WHO IARC (2017); Barry et al. (2013); Fenton et al. (2009); and White et al. (2011) apud Emerging chemical risks in Europe — 'PFAS'[1].

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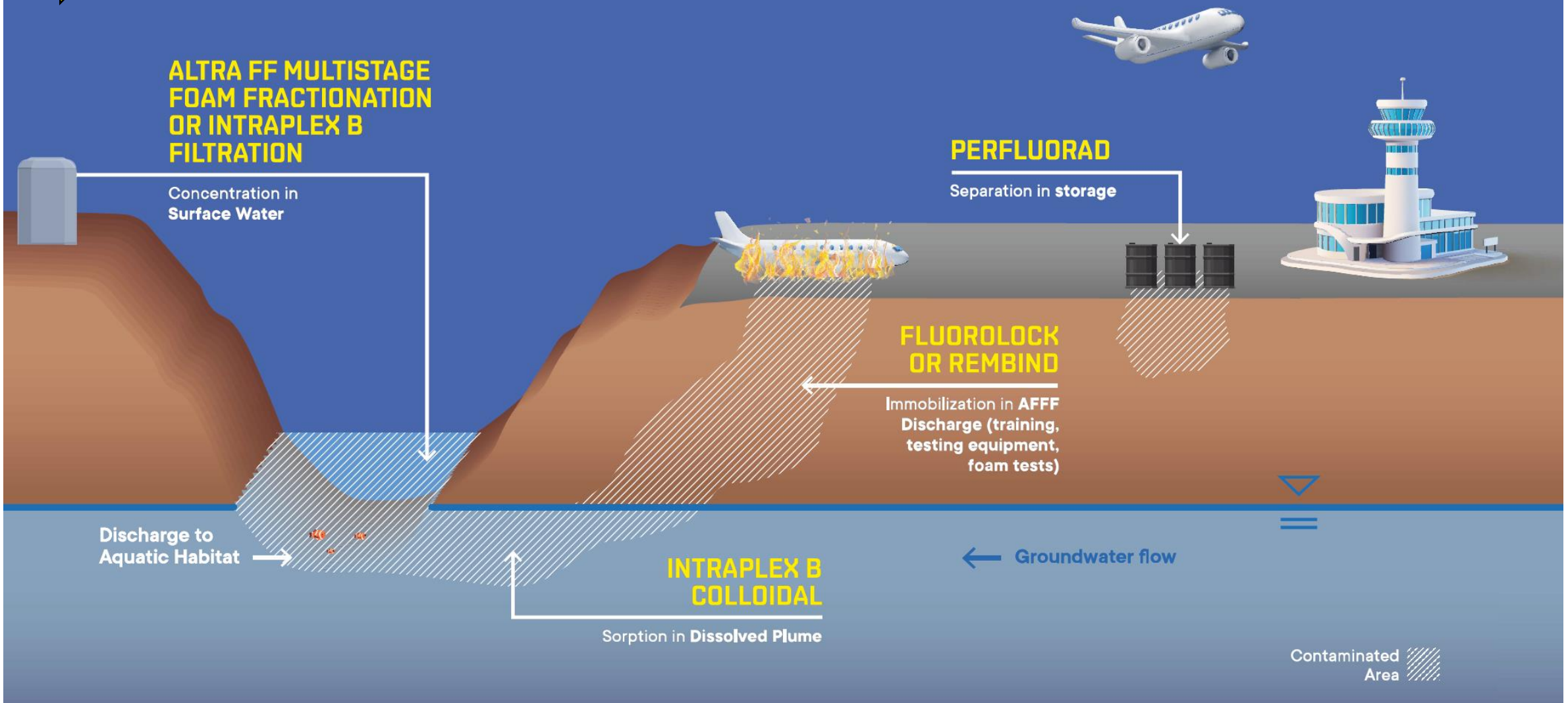
SOURCES, PATHWAYS & RECEPTORS

PFAS Innovative Treatment
Traitement innovant

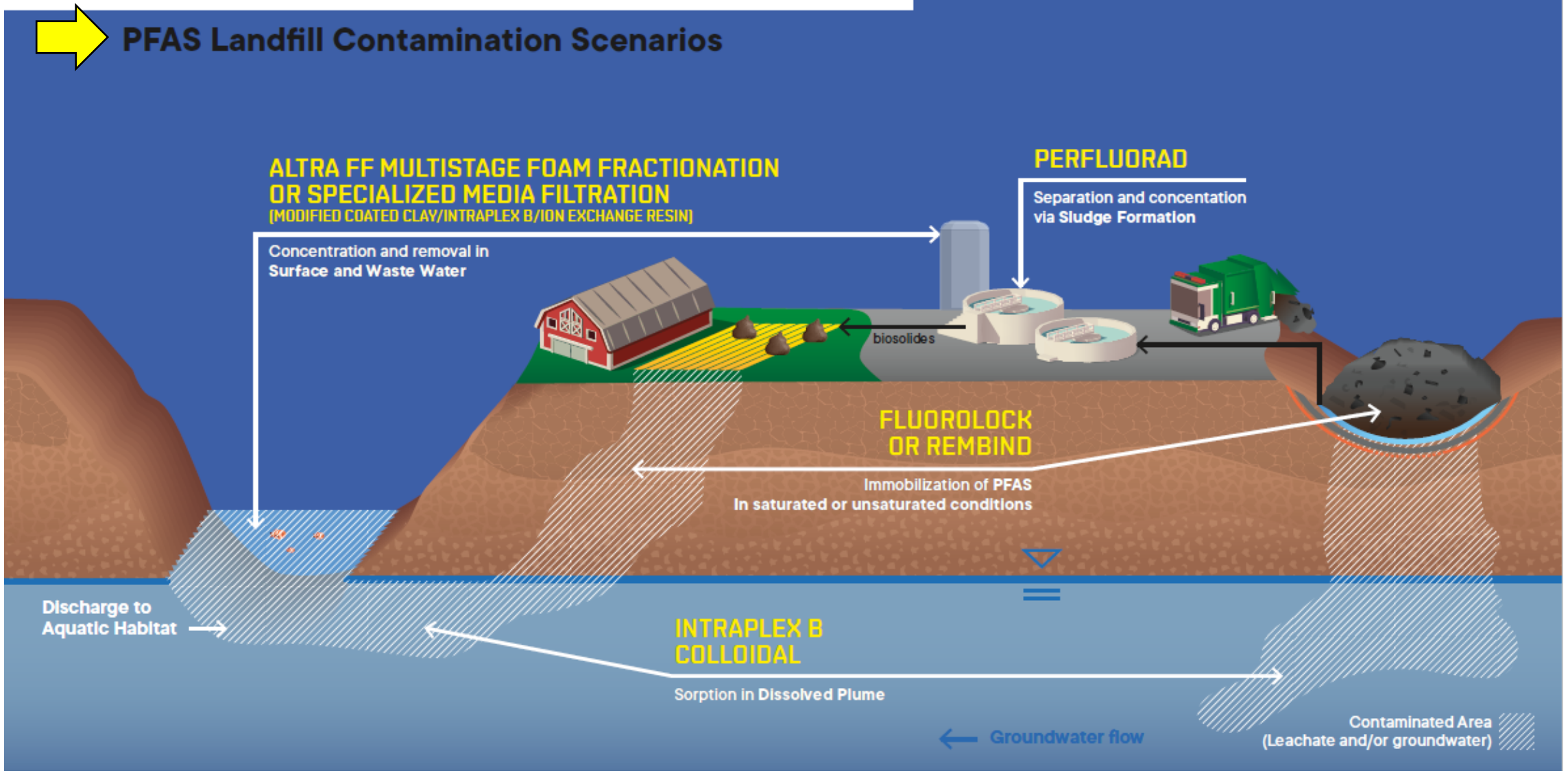
PFAS Airport Firefighting Contamination Scenarios



SOURCES, PATHWAYS & RECEPTORS

PFAS Innovative Treatment
Traitement innovant

PFAS Landfill Contamination Scenarios



Non Destructive PFAS Treatment Technology vs. concentration and location

CANADIAN LEADER IN ENVIRONMENTAL SOLUTIONS

Matrix	Treatment mechanism (applicability range)	Ex situ	In situ
Water	Adsorption *(from 10 – 10 000 ng/L)*	Activated Carbon (GAC) OR Modified Coated Clay: – Fluorolock Granular – Intraplex B Granular	Colloidal Activated Carbon (CAC): – Intraplex B (Saturated zone)
	Physico-chemical Separation/Concentration *From 10 000 000 000 ng/L (10%) to 100 000 ng/L* *From >100 000 ng/L to >1 000 ng/L)*	Flocculation: – PerfluorAd – Specialized coagulant Foam Fractionation (FF): – ALTRA Foam Fractionation	
Soil	Stabilization/Immobilization via adsorption *From 1.5 mg/kg to 0.001 mg/kg*	Granular Activated Carbon (GAC) OR Modified Coated Clay: – Fluorolock Granular – Intraplex B Granular – Rembind	Colloidal Activated Carbon (CAC): – Fluorolock (Vadose zone) – Intraplex B (Saturated zone)

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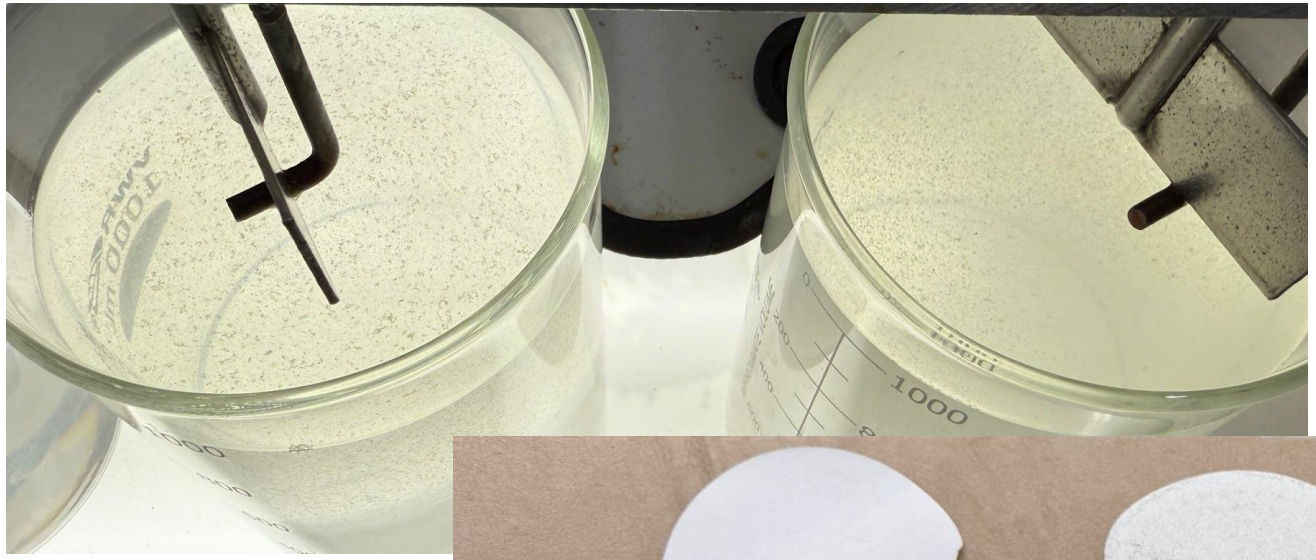
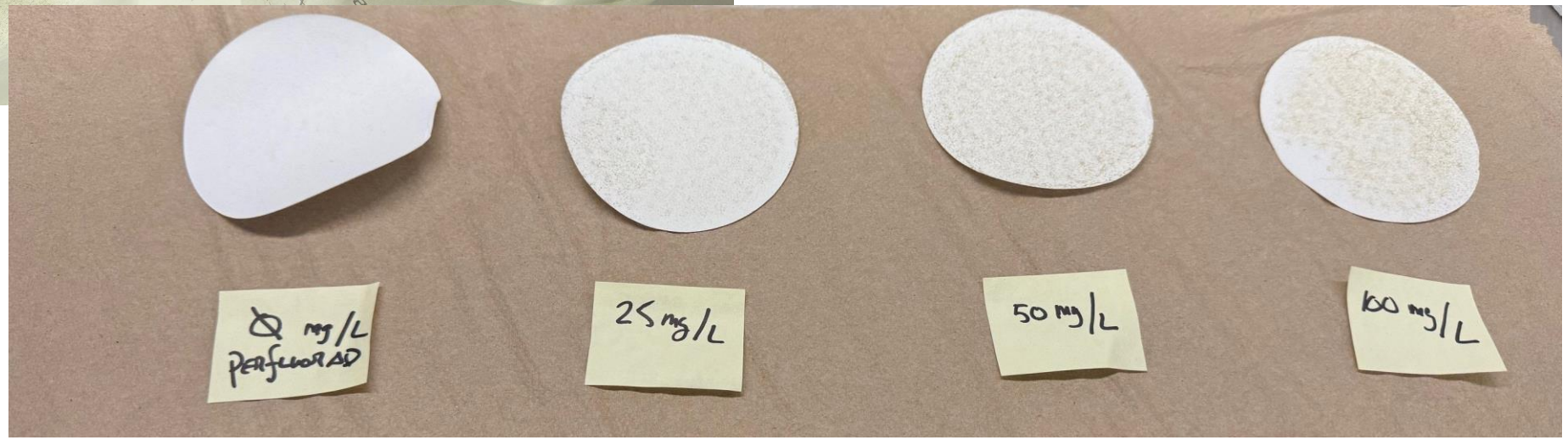
Concentration via coagulation

PerfluorAd Specialized PFAS Coagulant

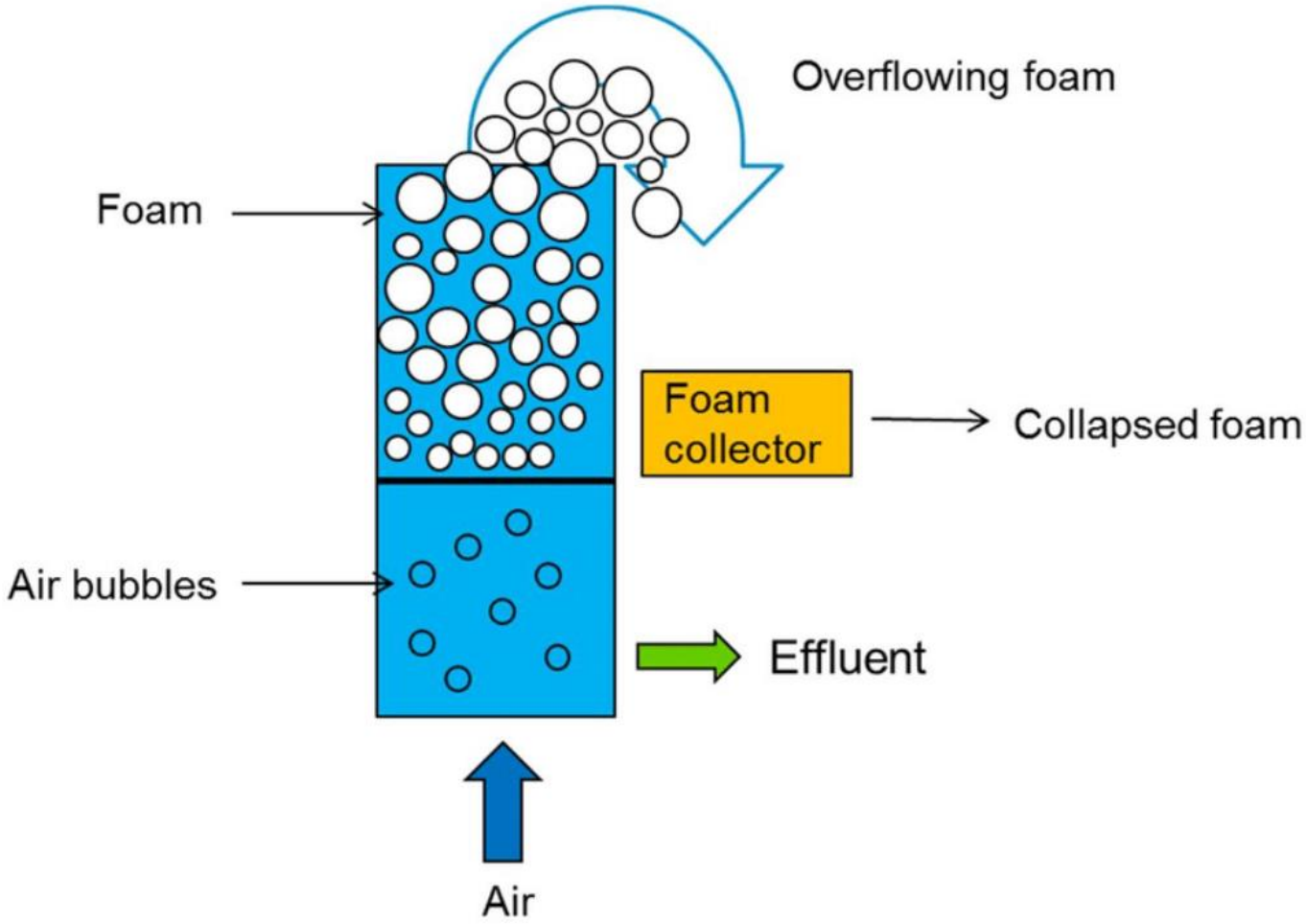
- Concentration of PFAS impacted water for large volume or flowrate





Concentration via foaming

Foam Fractionation



Source: Annika Ketola
VTT Technical Research Centre of Finland

Sorption

Conventional Approaches to Treat Pfas in Liquids (Water)

Adsorption on granular activated carbon (GAC)

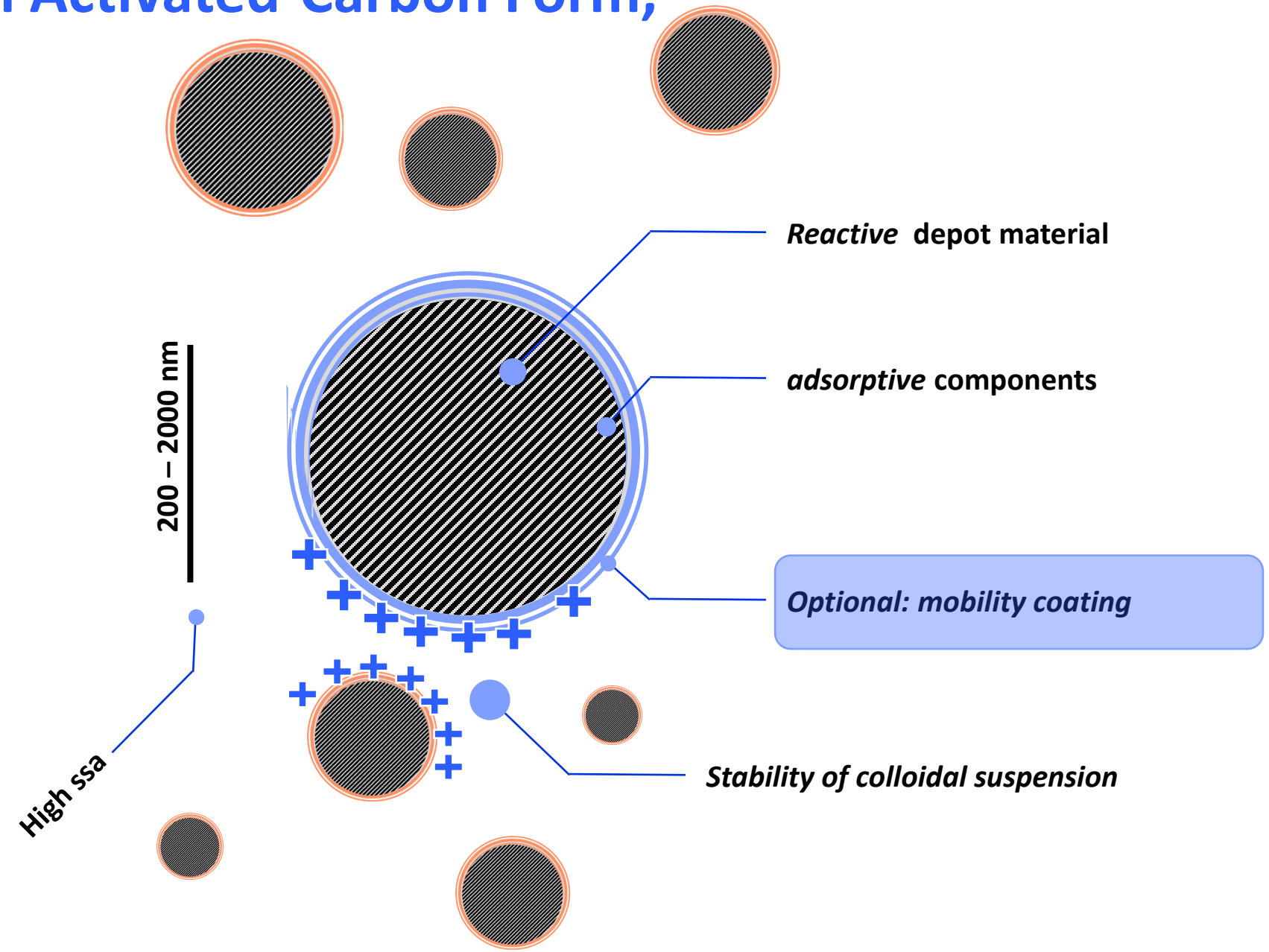
Ion exchange resins (IER)

Membrane technologies (NF, nanofiltration and RO, reverse osmosis)

Modified Organo Clay Media (MCM)

ALTRA
PFAS TREATMENT SOLUTIONS

Colloidal Activated Carbon Form,



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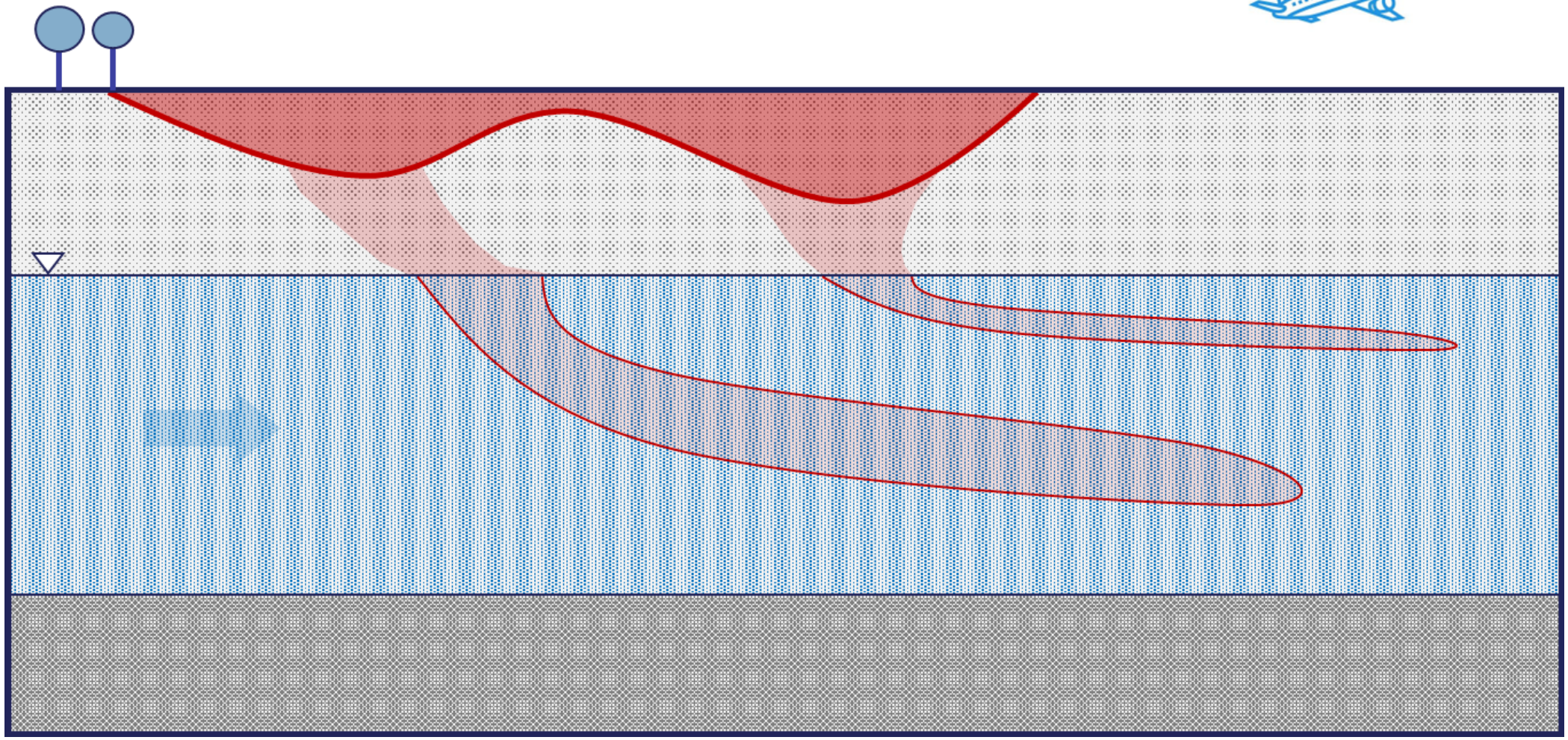
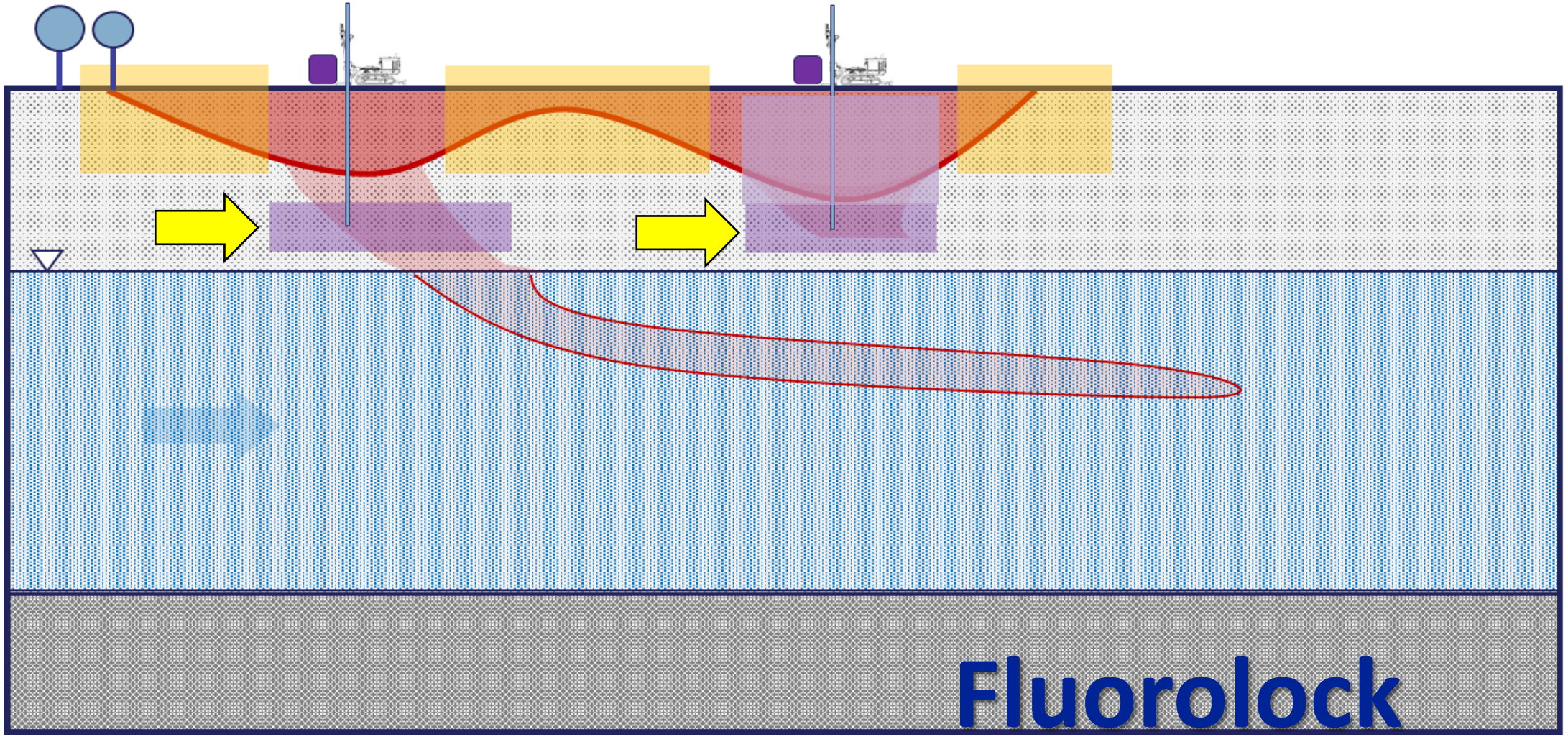
Intrapore® : Product line for PFAS

- **Modular & Adaptable**
  - **Fluorolock** - Against GW Infiltration
  - **Intraplex B** - Against plumes migration

Your typical PFAS site…




Fluorolock

Fluorolock

- Microsized Colloidal suspension clay adsorber for the in situ immobilization of PFAS in unsaturated conditions. Injectable with common direct push systems
- results in long-term confinement of the adsorbed PFAS in soils due to robustness of Fluorolock® to periodic drying and re-wetting,
- PFAS Source Zone Control Technology
- SSA ~100 m^2 / g

Effective at high PFAS concentrations

  - PFOS: 175 mg / g @ 0.45 mg L
  - PFBS: 4.5 mg / g @ 3.6 mg / L
  - PFOA: 12.4 mg / g @ 2.5 mg /L

- Made in Germany

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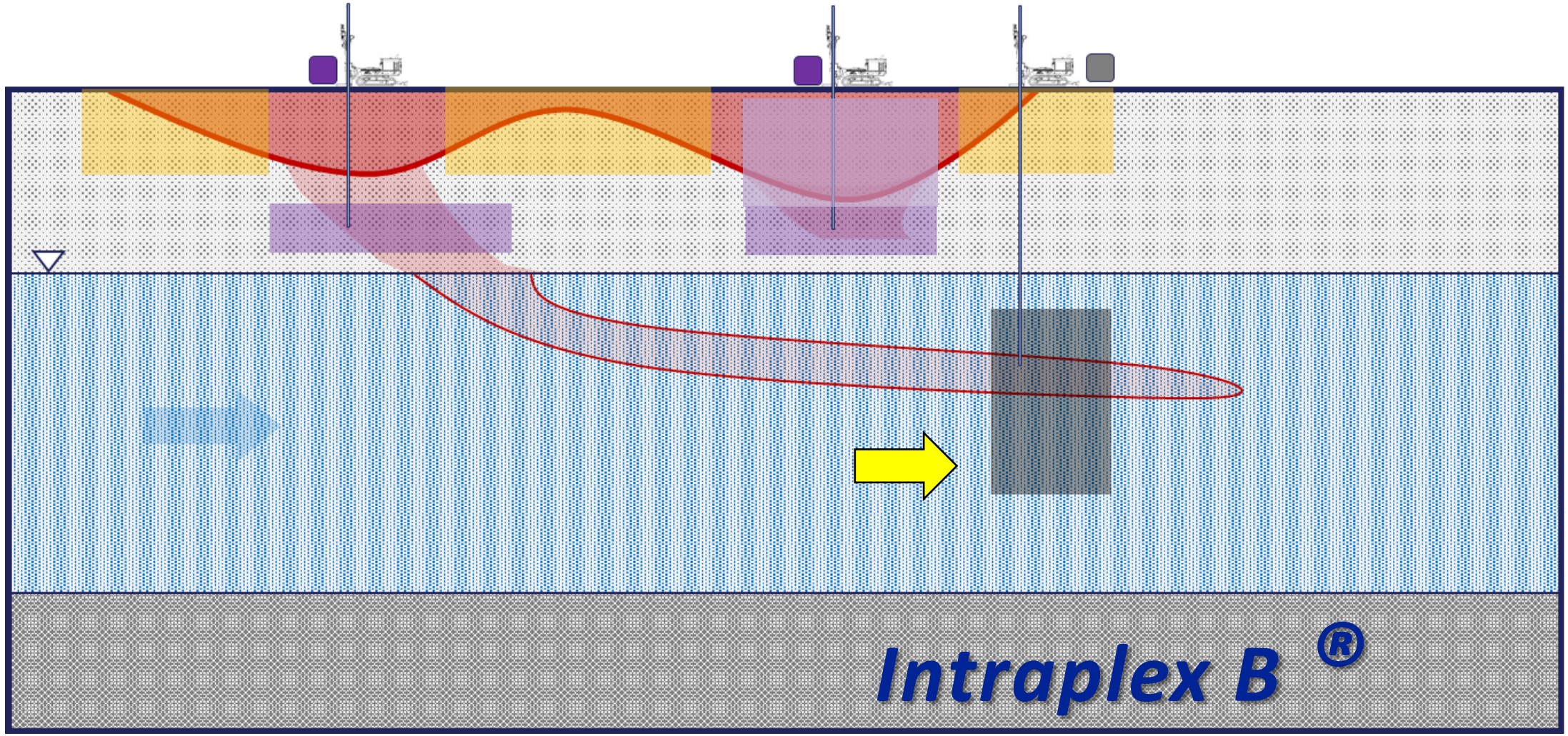

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Intraplex

- Microsized **surface modified activated colloidal carbon** based adsorber optimized for immobilization of PFAS
- PFAS **Diffuse GW Plume Control** Technology (adsorption barrier)

  High affinities for adsorption of PFAS molecules at low ambient concentrations **(short chains and long chains)**

  Lower affinities for other organic compounds
- Drinking Water Quality
- Field tested and highly effective
- Made in Germany

UFZ HELMHOLTZ Centre for Environmental Research

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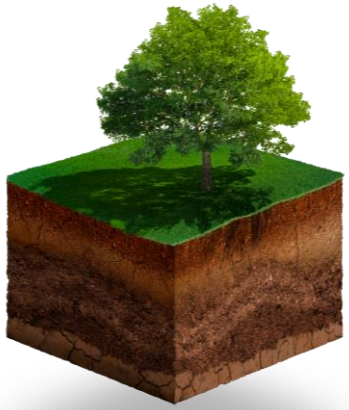
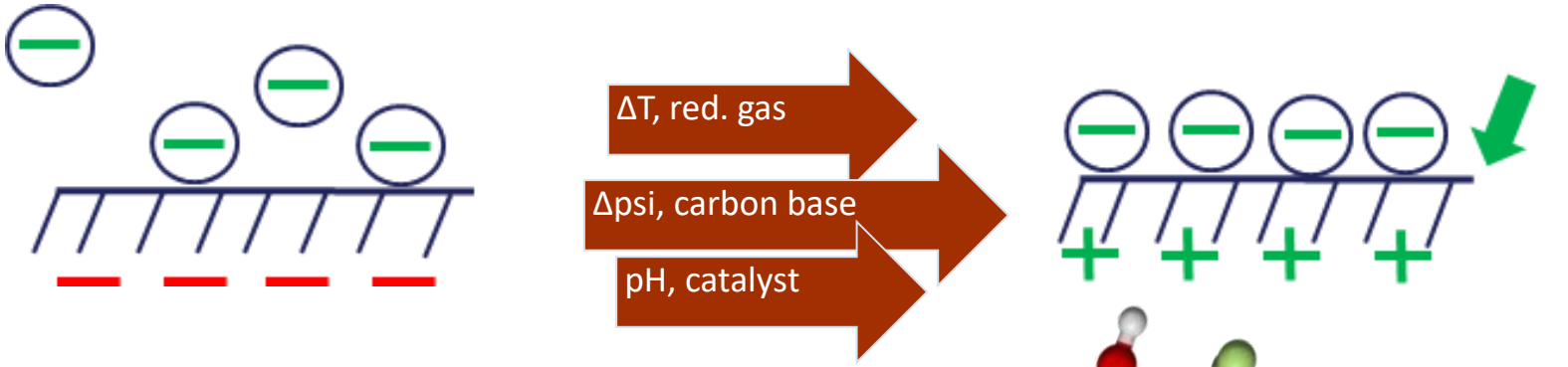
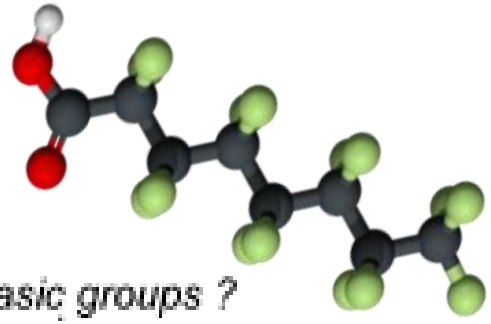
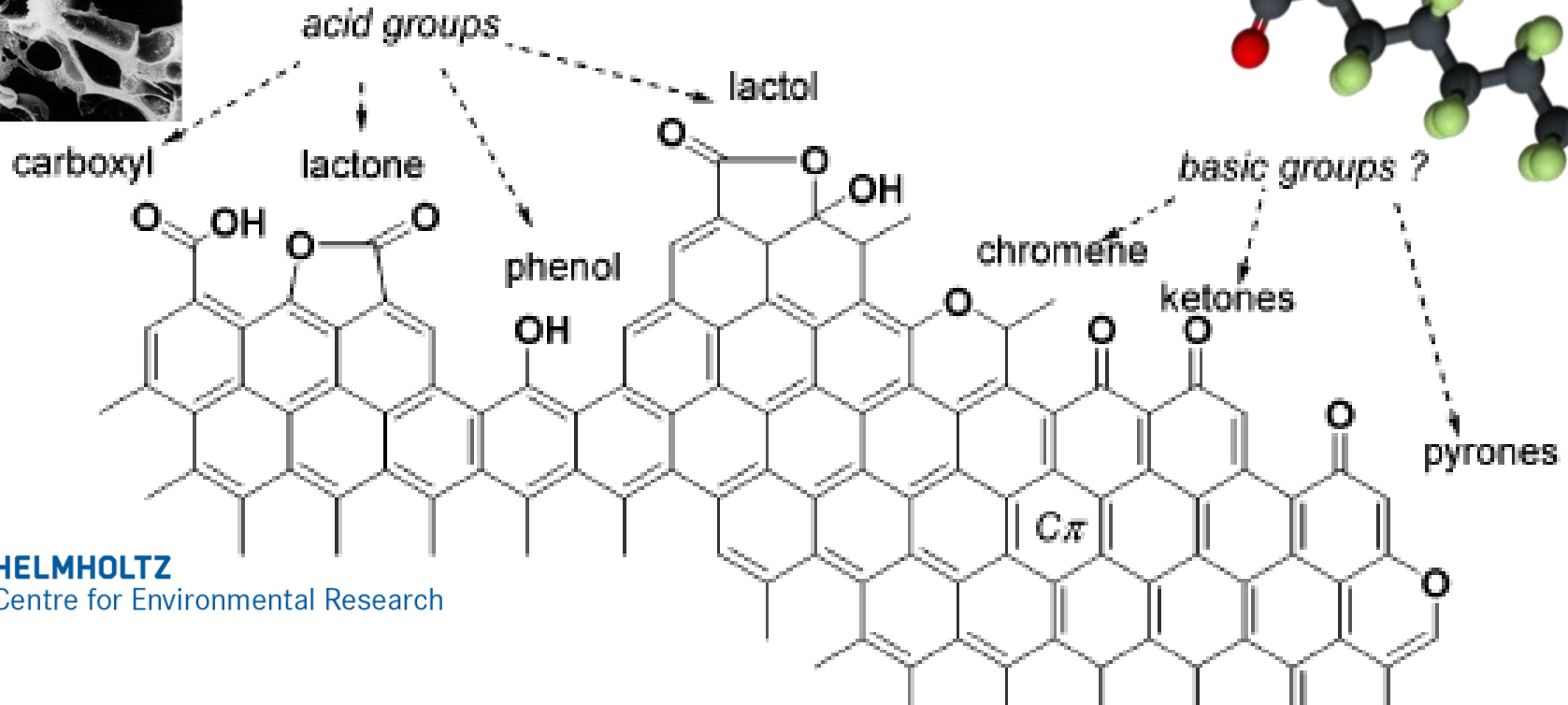
Key Development - Activated Carbon Structure and Surface modification for enhanced PFAS Capture









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Intraplex B®- Independent scientific comparison:

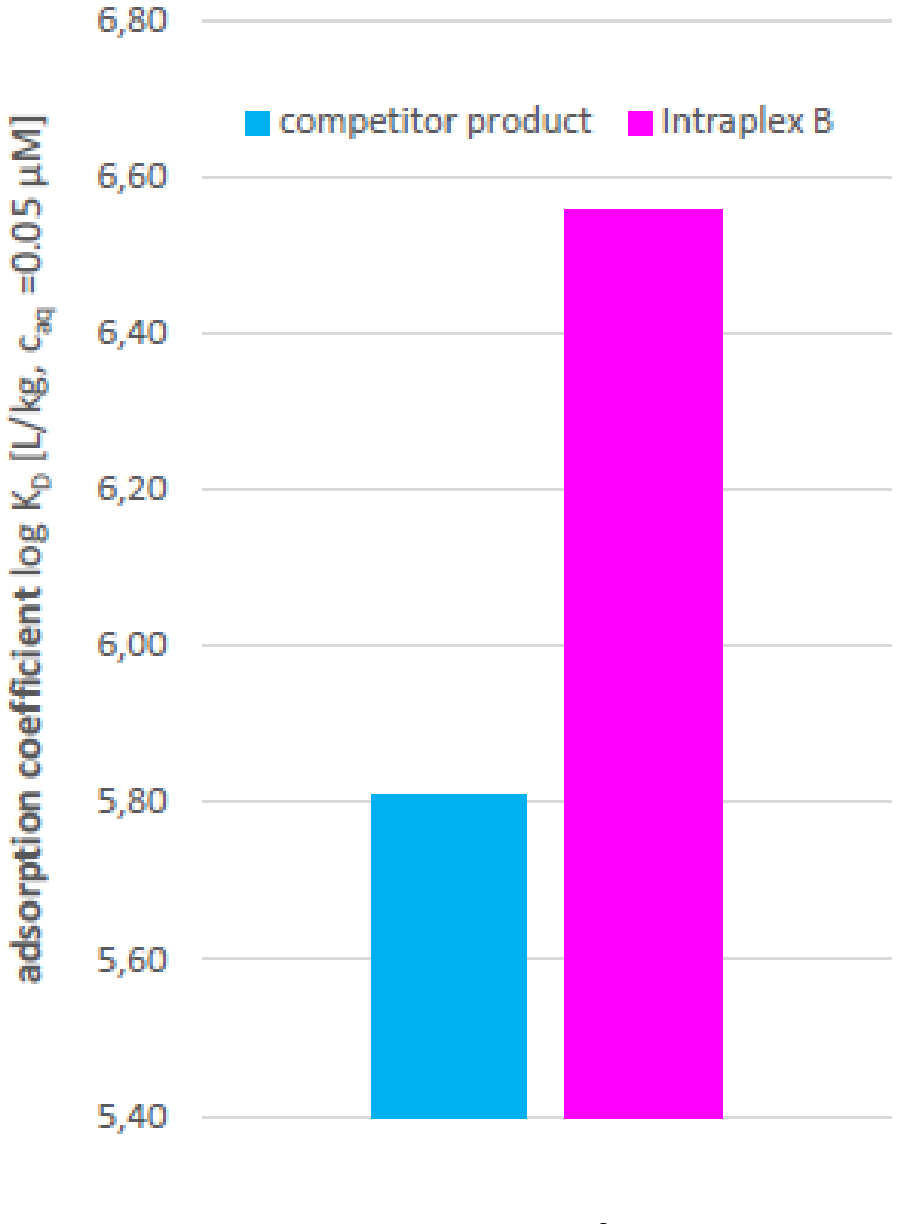
PFAS adsorption capacity

Adsorption coefficient, which is a measure of the quality of the adsorption,

is 5 times higher with **Intraplex B**

This implies that to ensure a barrier lifetime of 10 years for PFOS, 5 times less Intraplex carbon is needed.

For less adsorbing substances like PFBA, this advantage of Intraplex B is assumed to be even more substantial and be in the range of up to 2–3 orders of magnitude.

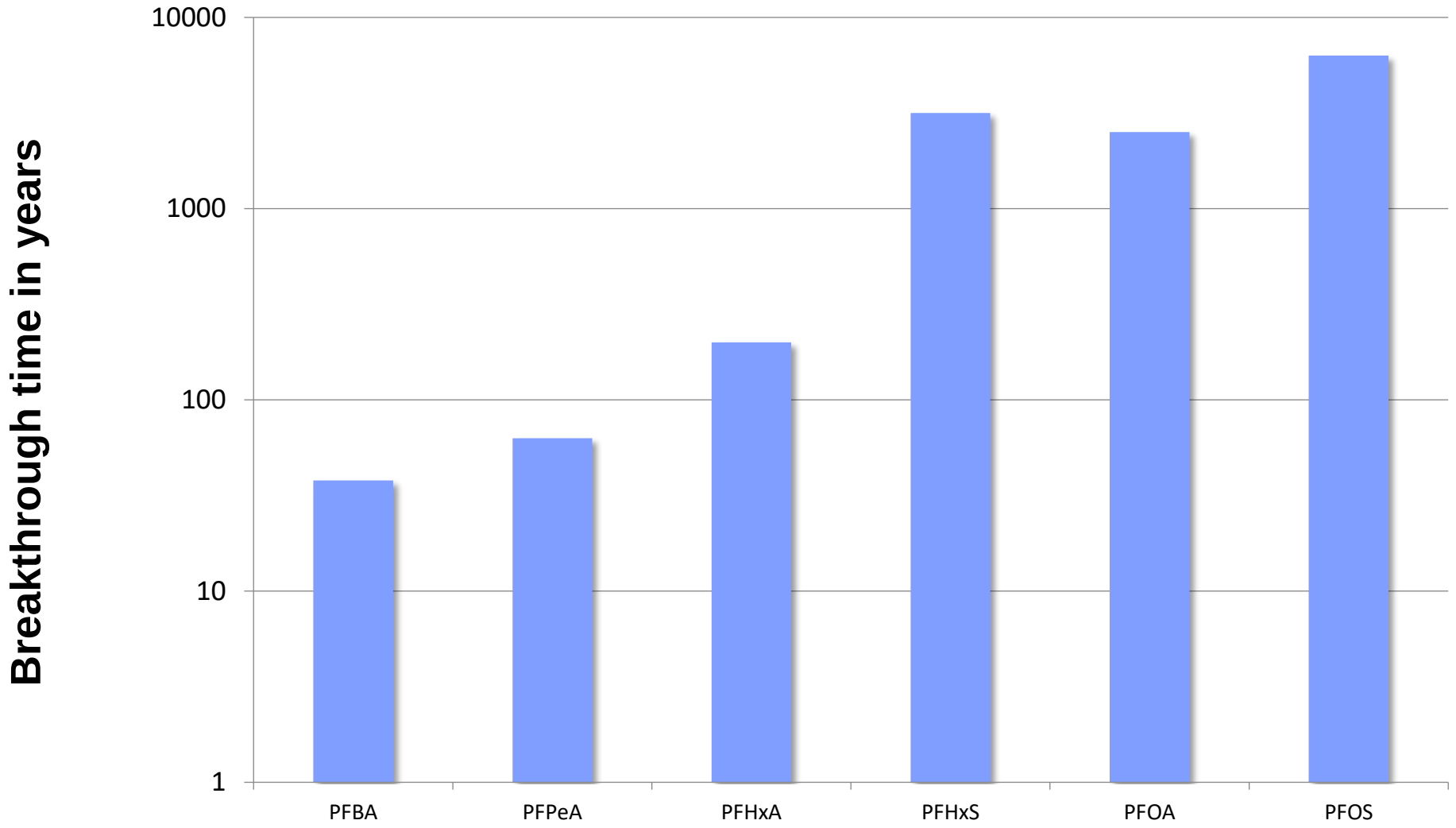


Source

Mole R, Lowry G, et al. (2023) Groundwater solutes influence the adsorption of perfluoroalkyl substances (PFAS) to colloidal activated carbon and impact performance for in situ groundwater remediation – submitted

Carey et al. (2022) Longevity of colloidal activated carbon for in situ PFAS remediation at AFFF-contaminated airport sites. Remediation (33) 2 - 23

Estimate operation time of in-situ AC barriers



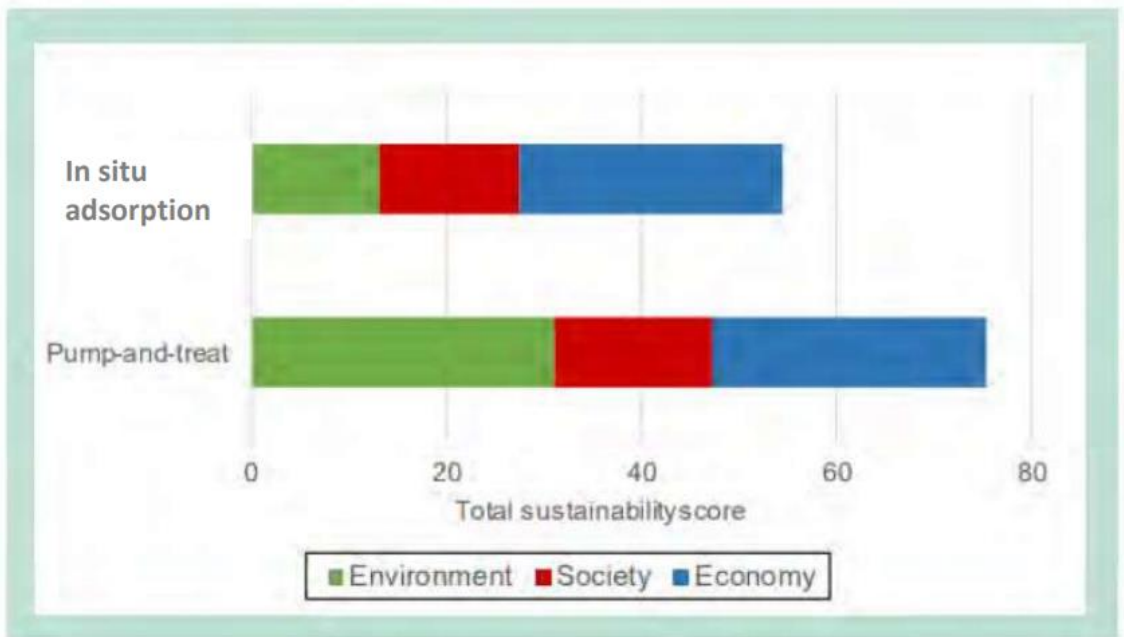
Sustainability

- Studies of the Copenhagen metropolitan area: In-situ remediation is generally significantly more sustainable than pump-and-treat measures.*
- Similar results: Presentation by Sensatec, ITVA 03/2024.
- The costs for in-situ remediation are generally around 40% lower than the costs of pump-and-treat measures over comparable periods of 20%:
  - No electricity or maintenance costs
  - No soil disposal costs
- In the case of PFAS plume remediation, the costs can be reduced by a factor of 10 with in-situ measures.

*Nina Tuxen, Region Copenhagen. Innovative remediation of contaminant plumes as a sustainable alternative to traditional pump and treat. Nordrocs conference, Oslo, September 6th 2022.

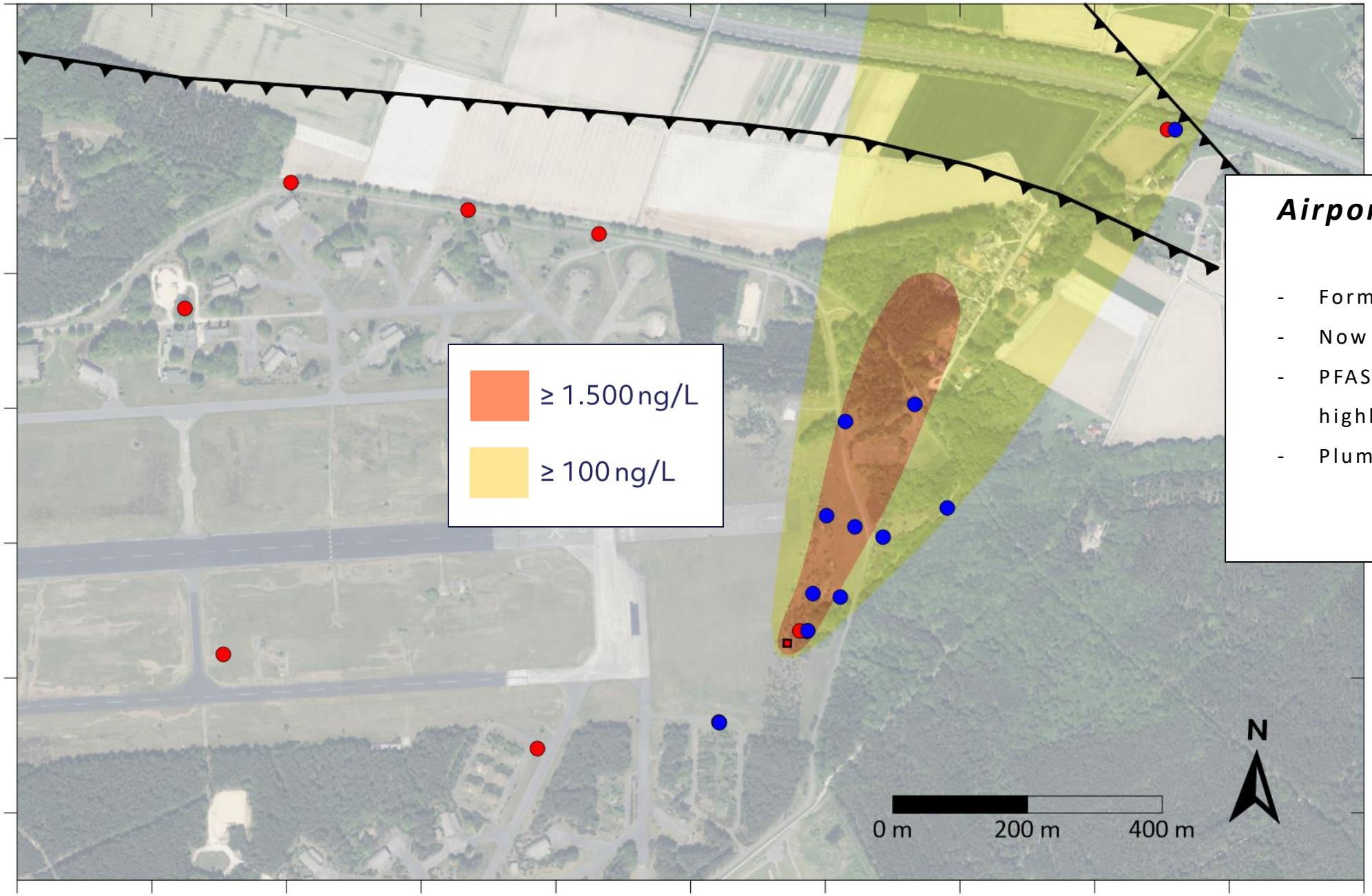
Assessment of the PRB with sorption and degradation done with the SURE model

- A multicriteria analysis of indicator for sustainability (environment, society and economy)



RAMBØLL

Intraplex B Case Study 1



Airport reference site

- Former NATO airport
- Now under federal management
- PFAS fire fighting training area highly contaminated
- Plume needed containment

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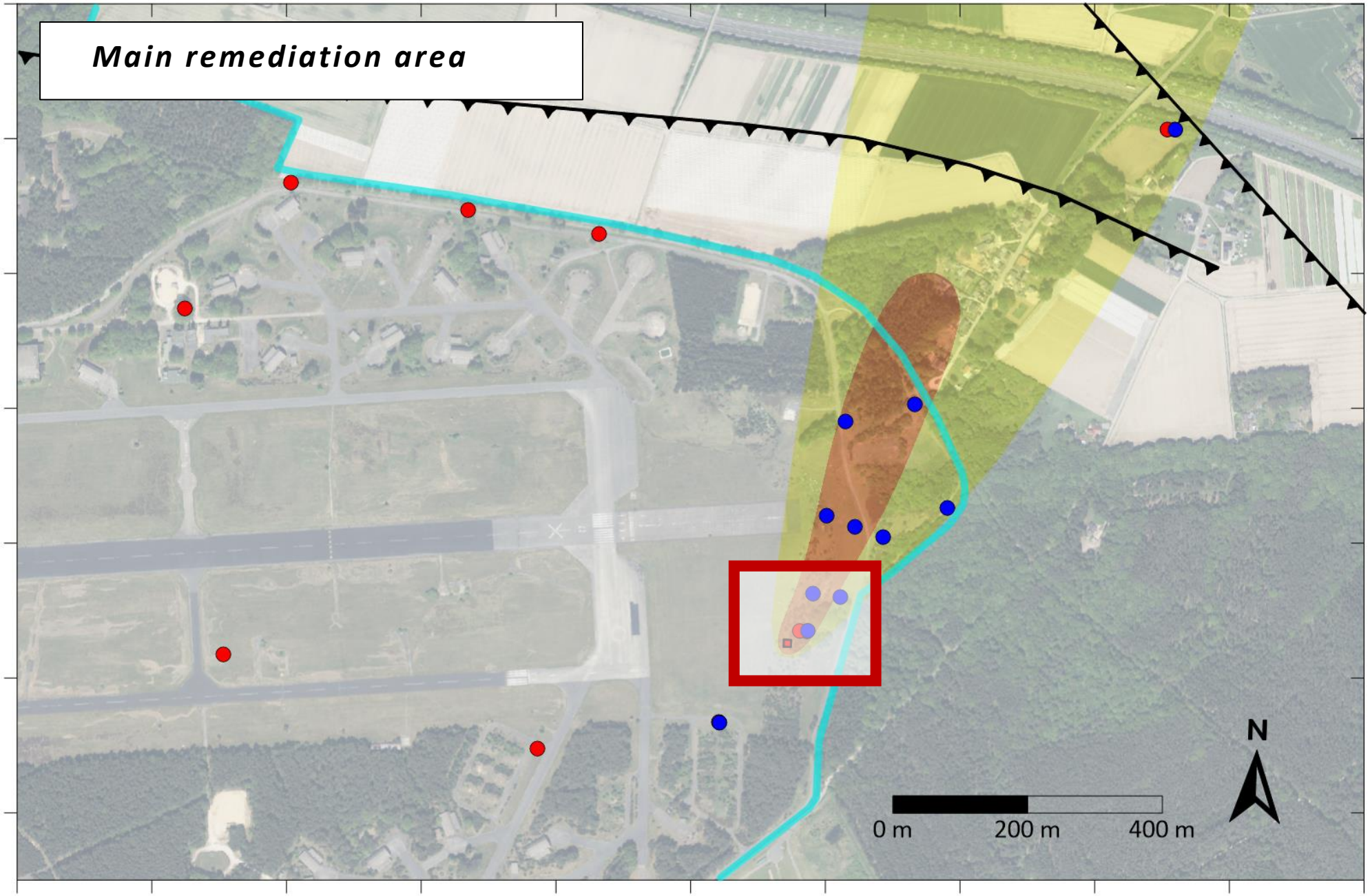
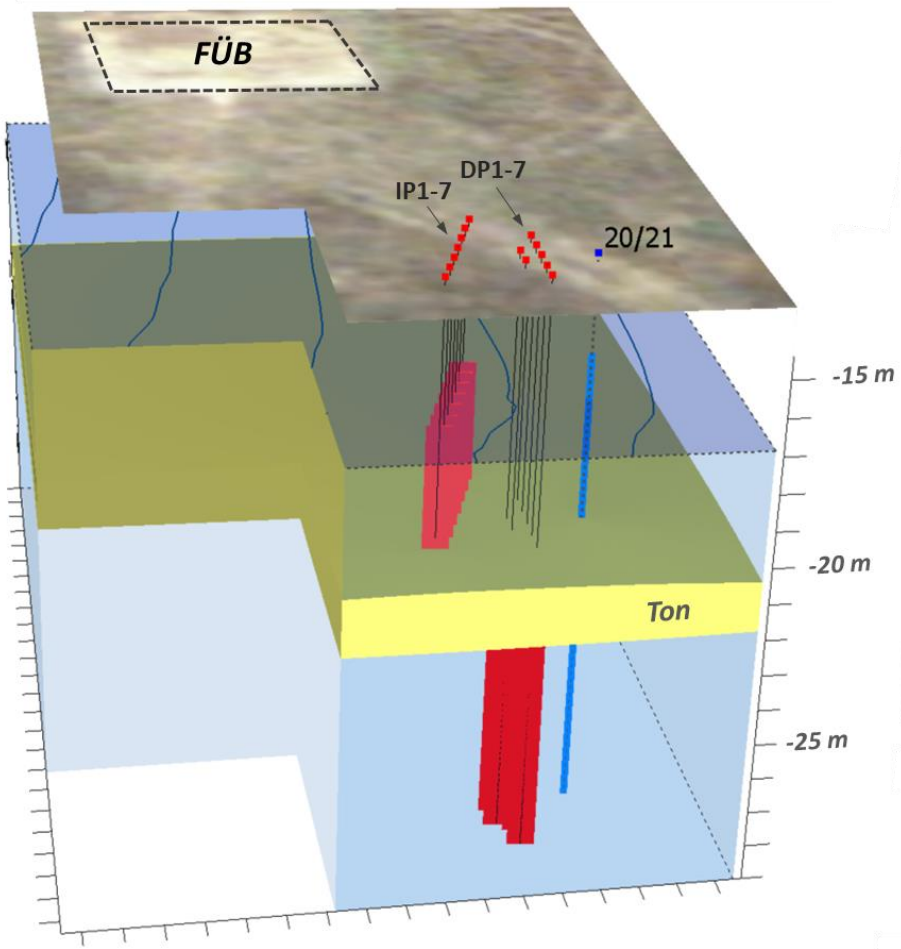

Main remediation area
N
0 m
200 m
400 m

oGWL

uGWL



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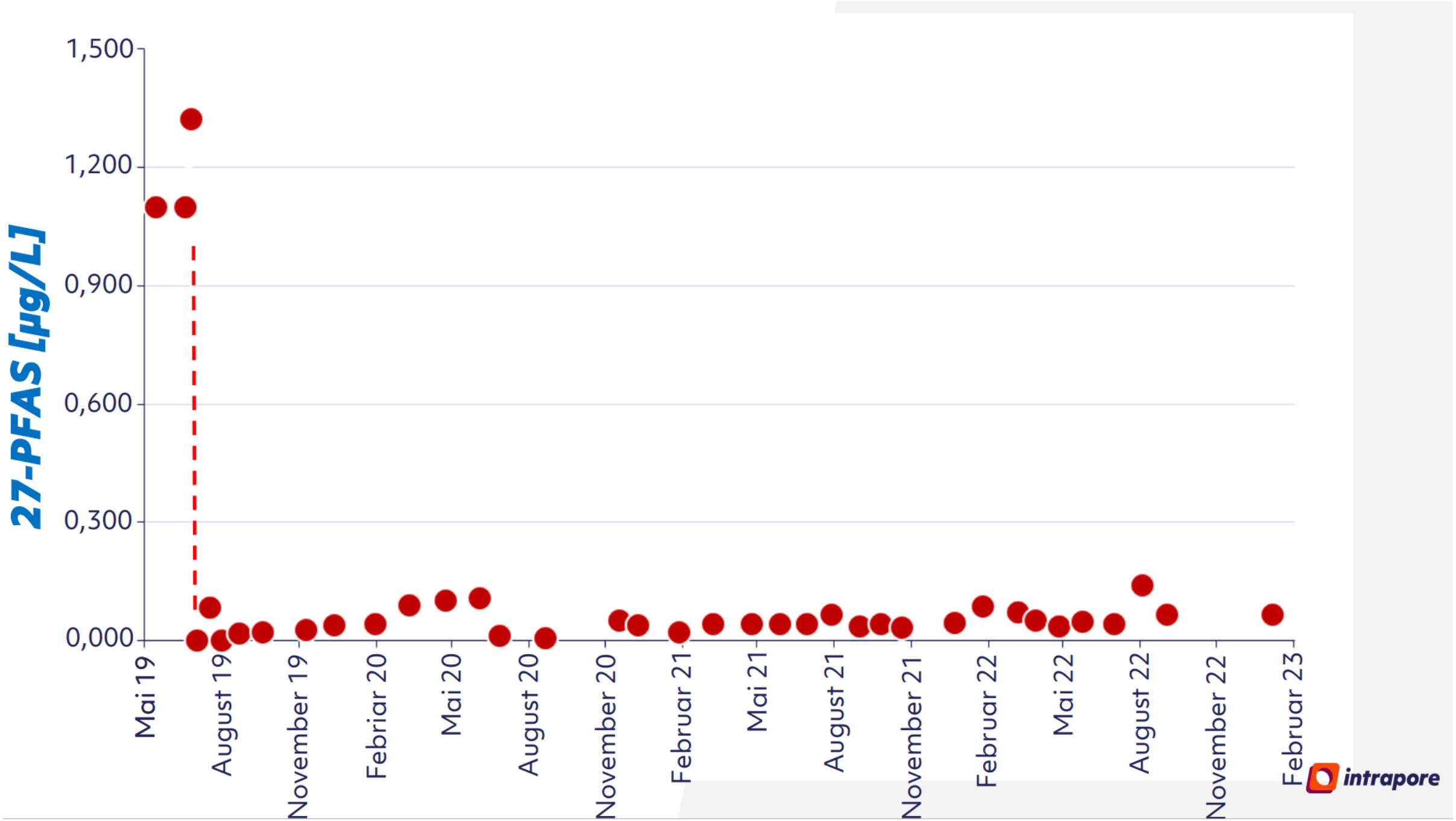
27-PFAS [µg/L]
1,500
1,200
0,900
0,600
0,300
0,000
Mai 19
August 19
November 19
Februar 20
Mai 20
August 20
November 20
Februar 21
Mai 21
August 21
November 21
Februar 22
Mai 22
August 22
November 22
Februar 23
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Intraplex B Case Study 2

Site Map


SAINT-LOUIS-DE-BAGOT
Eucher Trail - Starting point
Croix du centenaire
372
70
170
Canadian Forces Base Bagotville
Rue Victoria
372
LA-BAIE
170
170
Théâtre du Palais municipal
170
PORT-ALFRED
Camping in the Garden of My Father
381
LE FER-À-CHEVAL
L'ÉBOULIS
Musée du Fjord (Fjord Museum)
GRANDE-BAIE
Rio Tinto Alcan
Rte-du-Petit-Parc
Centre plein air Bec-Scie

Utilization Economic
Reducing above ground system cost for POETS

Above ground treatment vessel Option

Design Parameter

3 potable water wells
12 000 litre/min total flow

Total Bid Amount 11 400 000 $CAN

Treatment objective

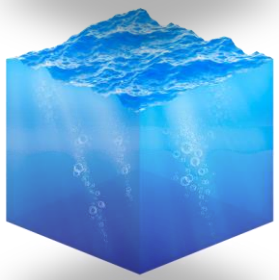
95 % PFAS Removal (18 compounds) AND lower than 30 ng/l at all time

Technology

Ion Exchange Resin Media

Bid requirement:

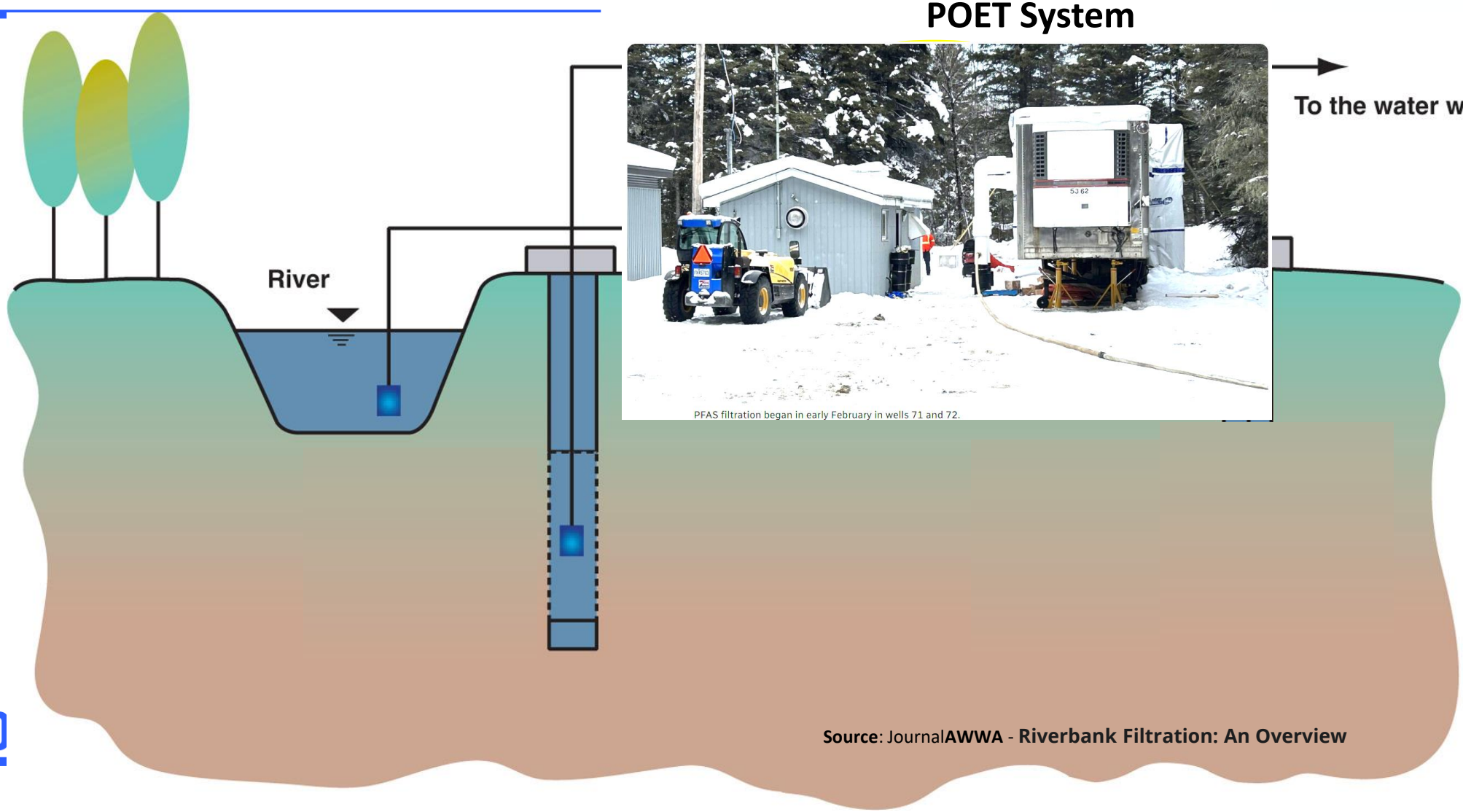
3 separate above ground facility plus vessels and supply media for 4 years



Reducing above ground system cost for Point of Entry Treatment Installation and maintenance

POET System

PFAS filtration began in early February in wells 71 and 72.



Source: Journal**AWWA** - **Riverbank Filtration: An Overview**

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Site History

Radio-Canada
https://ici.radio-canada.ca › nouve · Translate this page

PFAS in La Baie: an $11.4 million contract for the rental and...

Sep 28, 2023 — The contract with the Quebec firm Mabarex is for a period of four years, with a two-year option.

Radio-Canada
https://ici.radio-canada.ca › nouve · Translate this page

Bay water now free of PFAS

Mar 6, 2024 — The filters installed in February on wells 71 and 72, in the borough of La Baie, appear to be effective since no trace of compounds...

Le Quotidien
https://www.lequotidien.com › pfa... · Translate this page

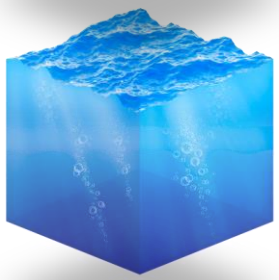
PFAS in La Baie: Four times more filters needed to treat...

Oct 16, 2024 — Water filters temporarily installed in La Baie must be changed every three months instead of the originally planned twelve months. A de...

Le Quotidien
https://www.lequotidien.com › pfa... · Translate this page

PFAS in La Baie: More economical absorbents tested

Jul 24, 2025 — **No PFAS have been detected since the installation of filters at La Baie** . Now, we're looking into whether there might be a more economical absorbent. (Maxime Picard/Archives La Tribun…



Intraplex B® - Utilization Schematic – BANK FILTRATION – Reducing above ground system cost for Point of Entry Treatment

POET System ($$$)

PFAS filtration began in early Febr...

To the water works

River

Intraplex B – Sorption Permeable Barrier

Bank filtration

Infiltration

Source: Journal**AWWA** - **Riverbank Filtration: An Overview**

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Intraplex B® - Utilization Economic
Reducing above ground system cost for POETS

In Situ Permeable Sorption Barrier Option

Design Parameter

3 potable water wells
12 000 litre/min total flow

Treatment objective

95 % PFAS Removal (18 compounds)
AND lower than 30 ng/l at all time

Technology

In situ permeable sorption barrier (PRZ)
using INTRAPLEX B Colloidal Carbon

BANK FILTRATION or INFILTRATION PRZ Scenario

In Situ PRZ barriers
75 m long x 2 m thick x 5 m height EACH

750 m3 @ 30 % porosity (sandy aquifer) = 225 m3

8 000 kg of Intraplex B to be injected
giving **20 year of sorption capacity**

15x dilution rate = 120 m3 of injectant

Total product + emplacement Amount:

1 100 000 $CAN

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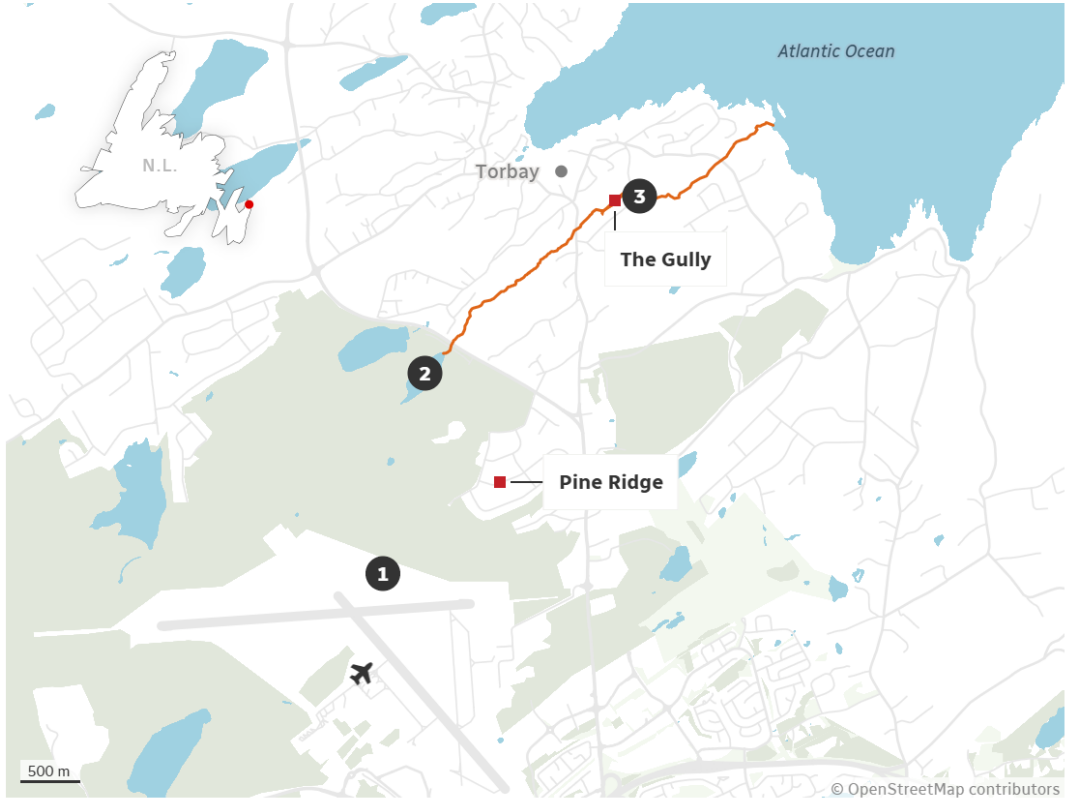
Until the next one ...

CBC
https://www.cbc.ca › pfas-torbay-spread-1.7630010

These residents didn't know their water was contaminated ...

Sep 11, 2025 — In one case, PFAS contaminated wells in La Baie, Que., that were 10 kilometres from the source — a military base. To verify Jobst's analysis ...

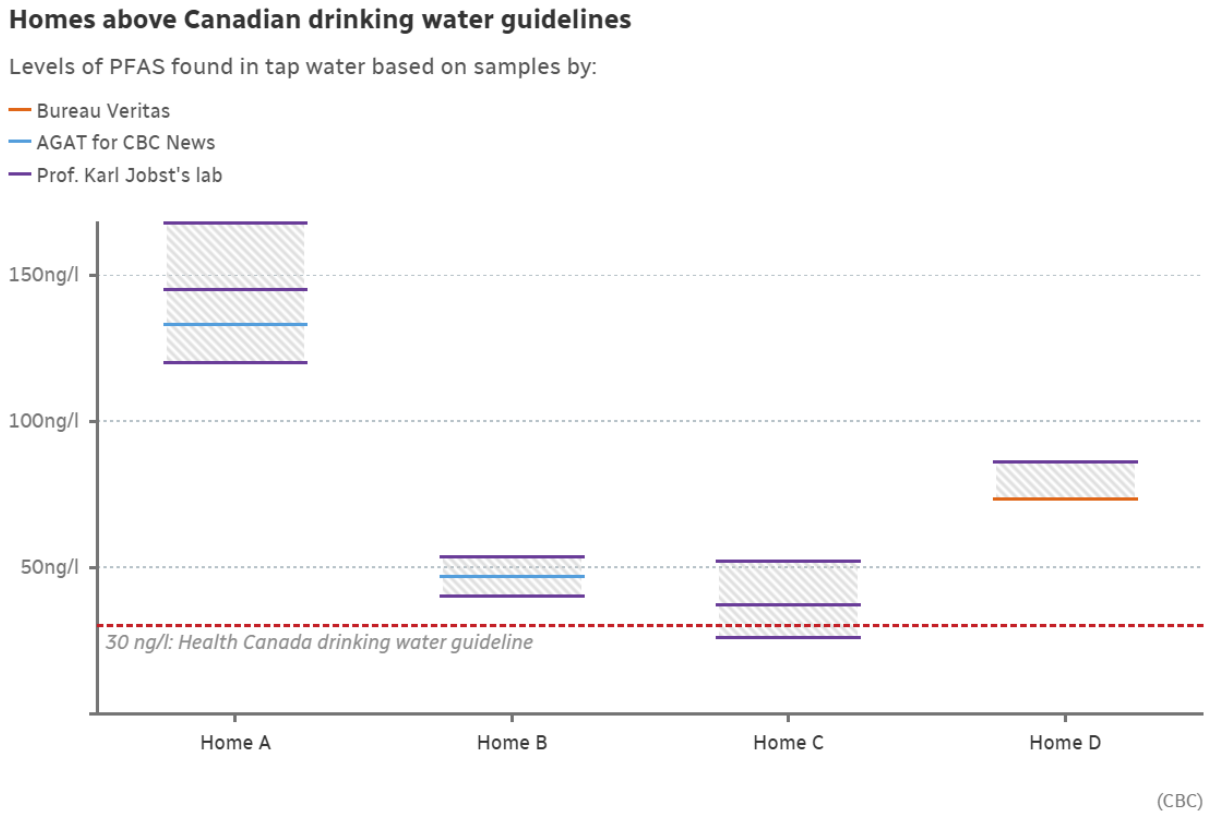


1 **Site contaminated with PFAS**
Contaminated site at decommissioned firefighting training area, St. John's International Airport

2 **South Pond**
695 ng/l - 2,302 ng/l range of total PFAS detected in water by Karl Jobst's lab

3 **Creek**
460 ng/l total PFAS detected in creek by Karl Jobst's lab at The Gully, within a range of 1,480 ng/l farther upstream and 318 ng/l downstream.

779 ng/l total PFAS levels detected in creek by AGAT labs at The Gully



(CBC)

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CANADIAN LEADER IN ENVIRONMENTAL SOLUTIONS

Thank you for your attention !!

Questions ?!?

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