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PFAS Water Treatment

PRESENTED BY:

John Wilson

SciDev and PFAS

- > 7+ billion litres treated to date
- First company in AUS to treat below the detectable limit of 0.2ng/L
- First company in WA to treat and release in a drinking water catchment area
- 35 PFAS impacted sites treated or remediated
- First PFAS mobile treatment licence granted in NSW
- First company in VIC to continuously discharge to the environment

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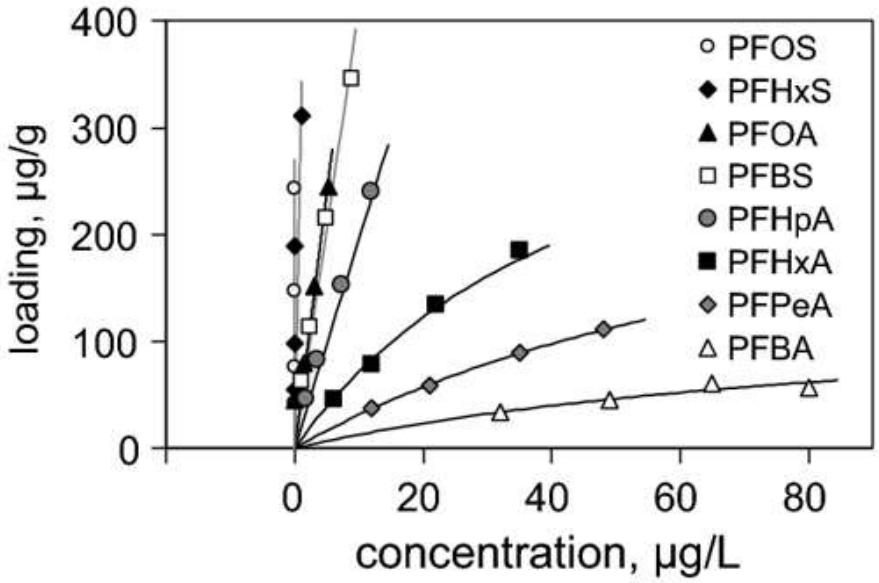
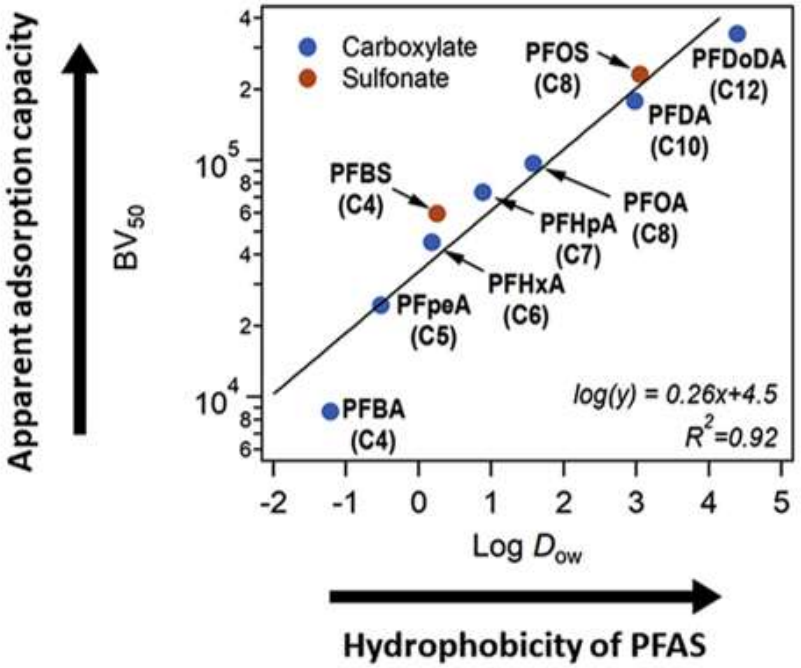
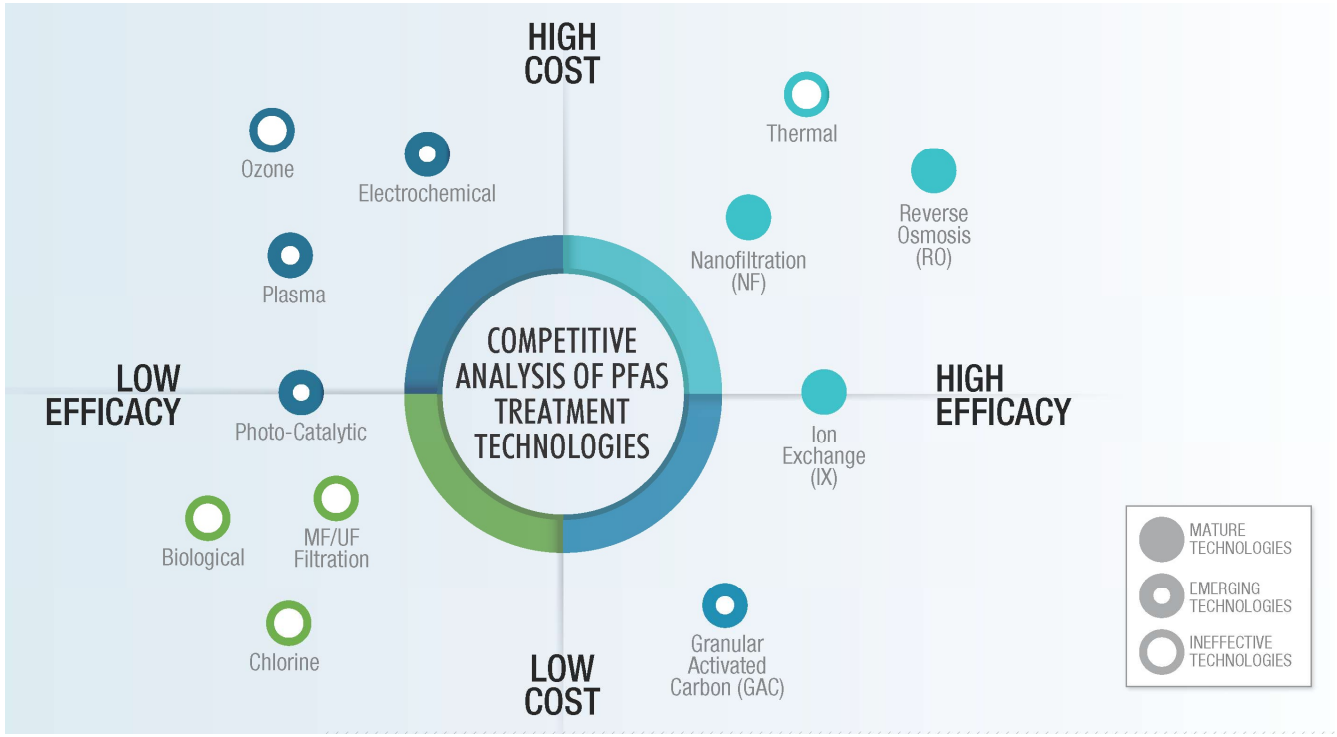
Not all PFAS behave the same



Isotherms of the sorption of different PFAS

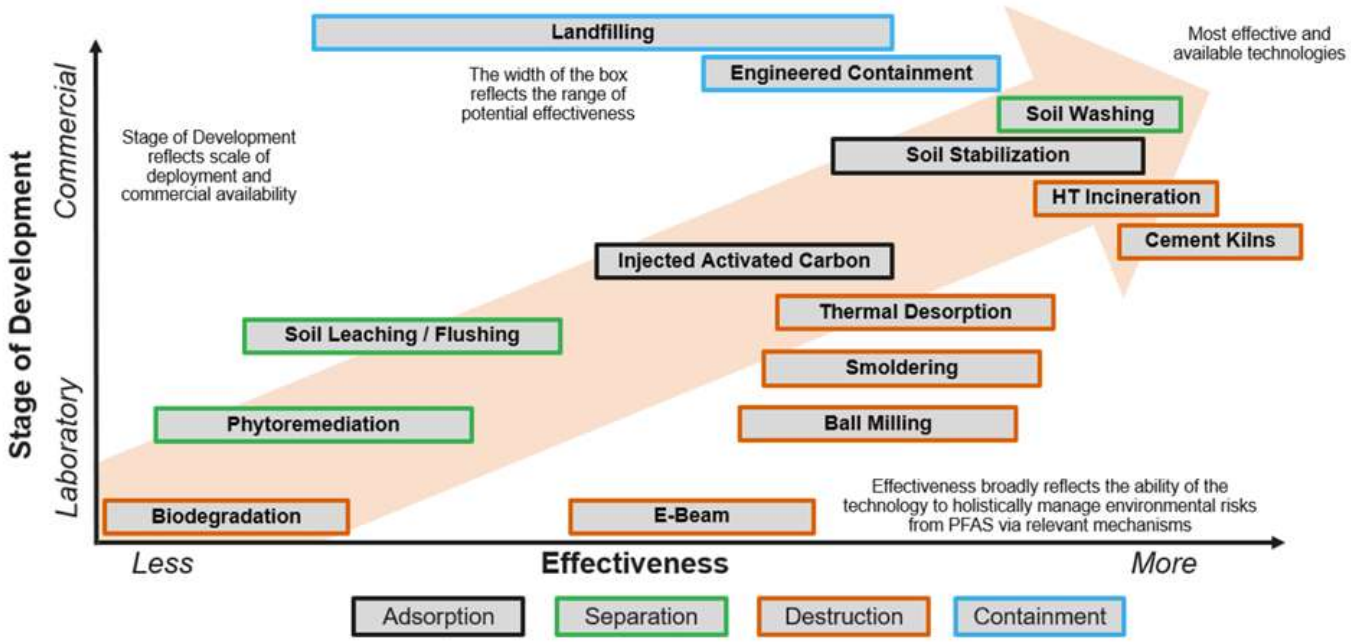


Resources for PFAS Water Technologies

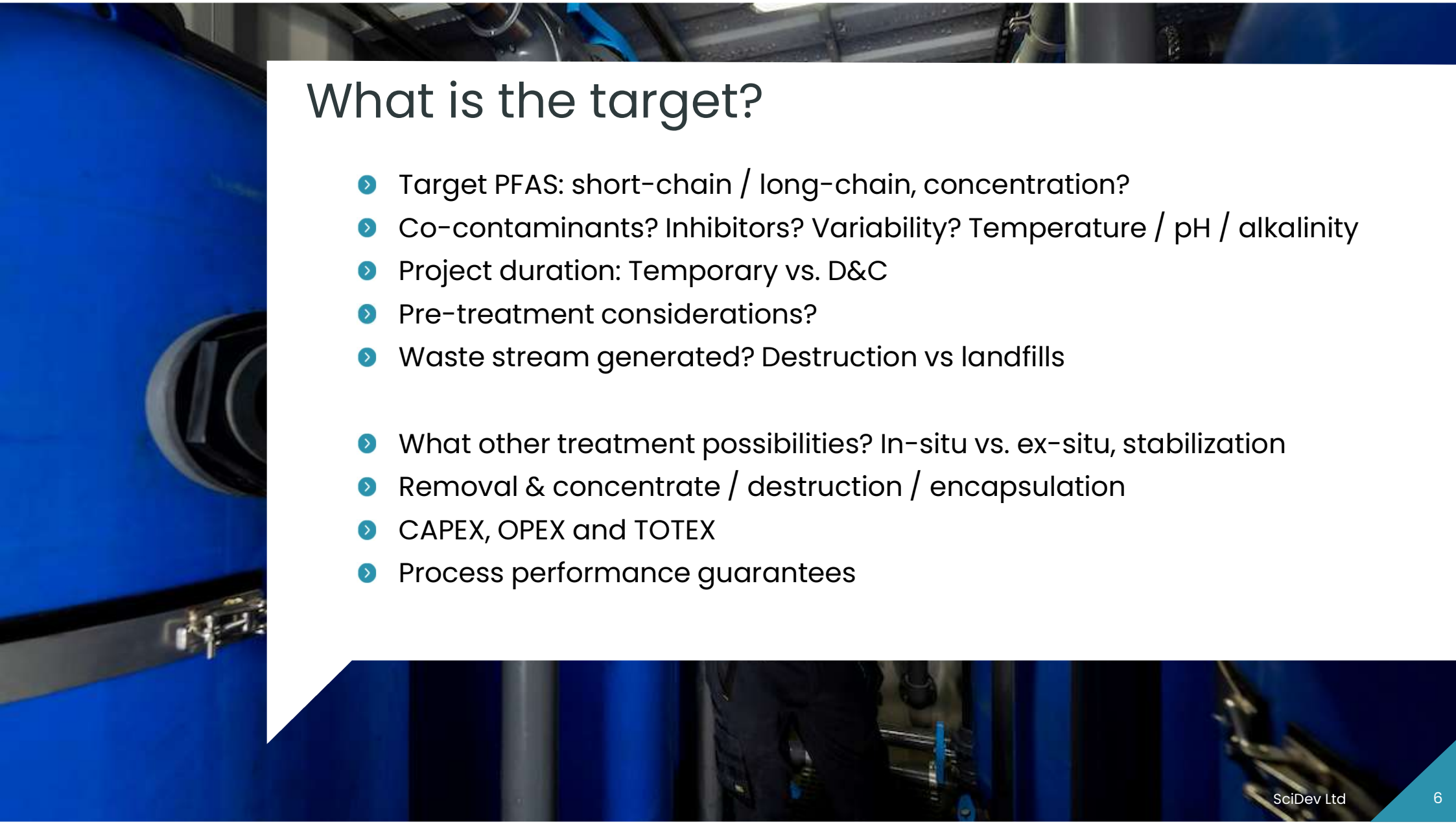


ITRC Table 12.1

Resources for PFAS Soil Technologies



Concawe

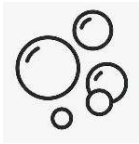


What is the target?

- Target PFAS: short-chain / long-chain, concentration?
- Co-contaminants? Inhibitors? Variability? Temperature / pH / alkalinity
- Project duration: Temporary vs. D&C
- Pre-treatment considerations?
- Waste stream generated? Destruction vs landfills

- What other treatment possibilities? In-situ vs. ex-situ, stabilization
- Removal & concentrate / destruction / encapsulation
- CAPEX, OPEX and TOTEX
- Process performance guarantees

PFAS Water Technologies

	Technology	Long Chain	Short Chain	Cost	Efficacy	Comments
	Granular Activated Carbon (GAC)	Good	Poor	2/10	3/10	Good for temporary applications, easy to install
	Ion Exchange Resin (IX)	Good	Good	6/10	7/10	PFAS specific and higher capacity than GAC (10x)
	Reverse Osmosis / Nanofiltration (RO / NF)	Good	Good	8/10	9/10	Useful as a concentration step High rejection % needs treatment
	Foam Fractionation + additives	Good	Poor	8/10	5/10	Good for complex water / leachate and smaller flow rates

FluorofIX™ Process Overview

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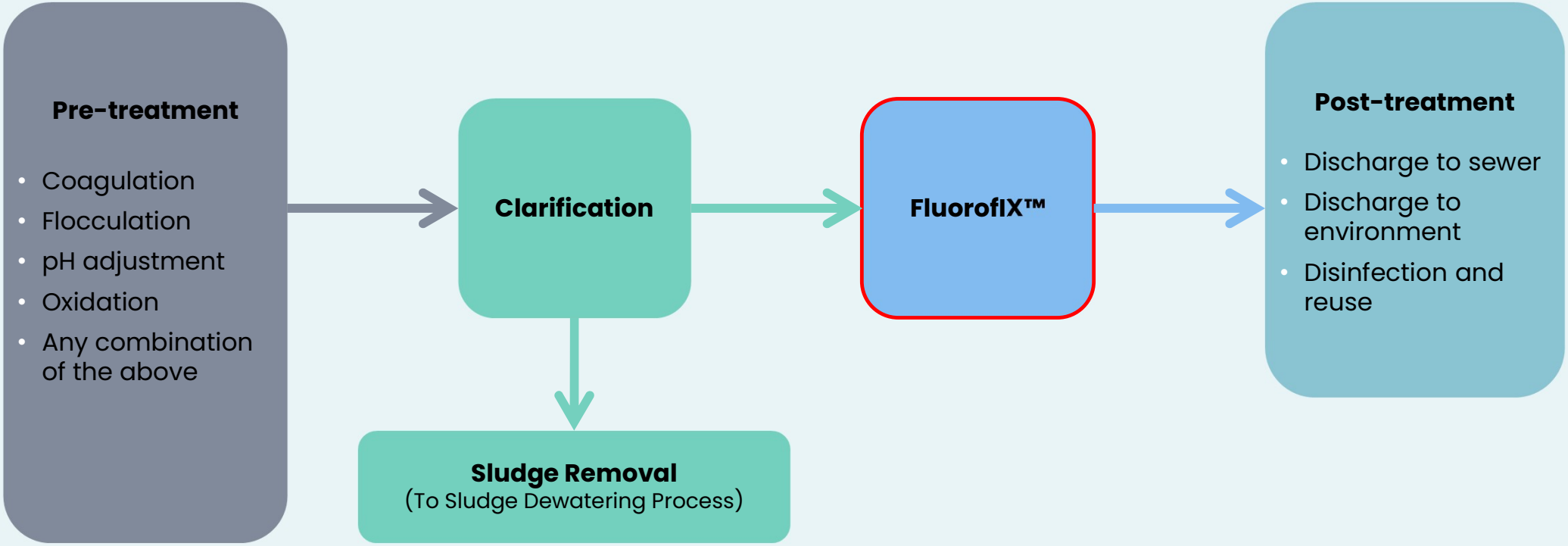
FluorofIX™ Process Overview



PFAS Water Treatment RegenIX™

PROCESS FLOW AND DESCRIPTION

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Regeneration Process – FluorofIX™ and RegenIX™

Regenerant Liquid +
Acid Rinse +
Water Rinse

FluorofIX™ system

Waste Storage Tank

Acid and Water Rinsate is returned to head of system

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Regeneration Process – FluorofIX™ and RegenIX™

Step 1
Application of 2 bed volumes of "solvent-free" regenerant liquid in counter-current flow

Step 2
Application of 2 bed volumes of acid rinse in counter-current flow

Step 3
~10 bed volumes of rinse water to stabilize pH – normal flow

Destruction Technology Applied

Other Liquid Disposal Method

Liquid Returned to Head of System

Direct Discharge or Returned to Head of System

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Ultrashort PFAS Removal + Destruction

FluorofIX™/RegenIX™ SCIDEV

- Non-solvent IX regeneration
- Reduces frequency of IX disposal
- Capability integrated into all SciDev systems
- Produces a PFAS-laden caustic brine

HALT Aquagga

- Hydrothermal Alkaline Treatment
- Validated in field by U.S. EPA and DoD
- Effective full range of PFAS (including TFA)
- Requires addition of caustic for treatment
- Produces caustic effluent with inert salts
- Effluent requires neutralization prior to disposal

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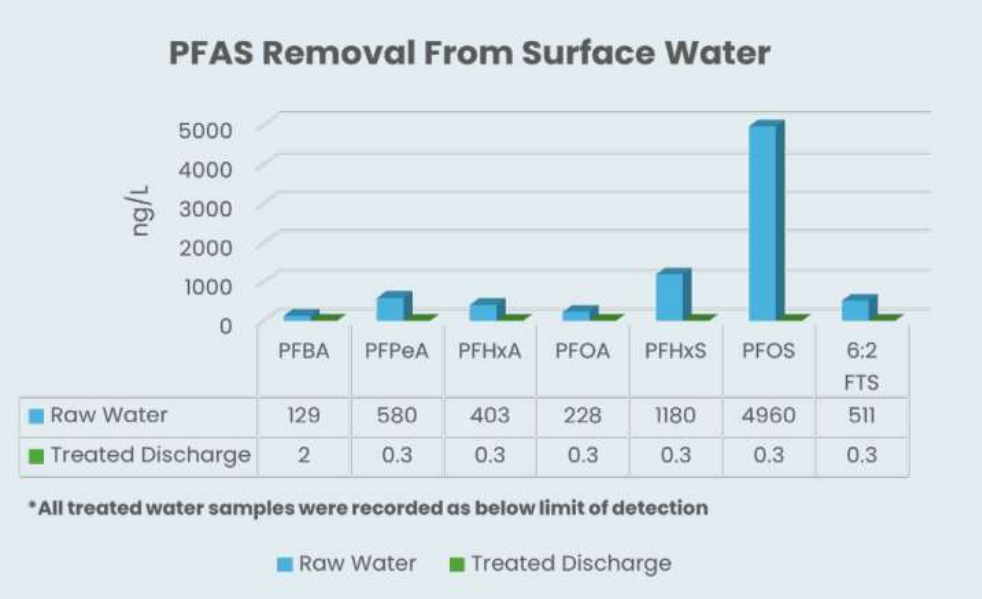
PFAS Case Studies

PFAS Case Study
Airport, Northern Europe

- PFAS contaminated surface water from a civilian airport located in Northern Europe



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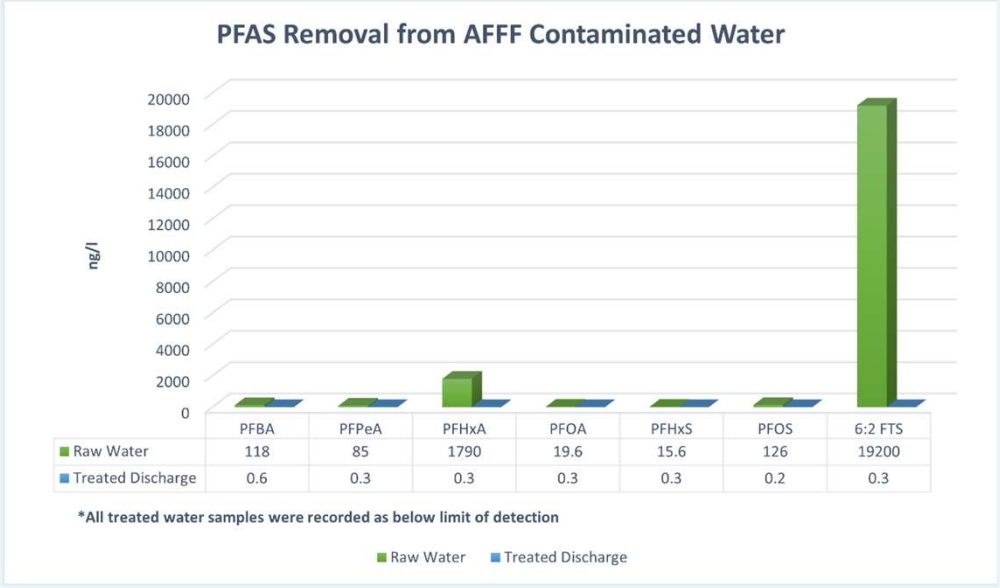
PFAS Case Study
Oil Refinery, Scotland

- AFFF contaminated water from fire suppression system was stored in a disused tank containing crude oil and other contaminants



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Industrial Fire (AFFF) contamination

Oil Refinery, Scotland

Water Treatment: Temporary Water Treatment / PFAS Removal

Volume Treated: ~1.5ML

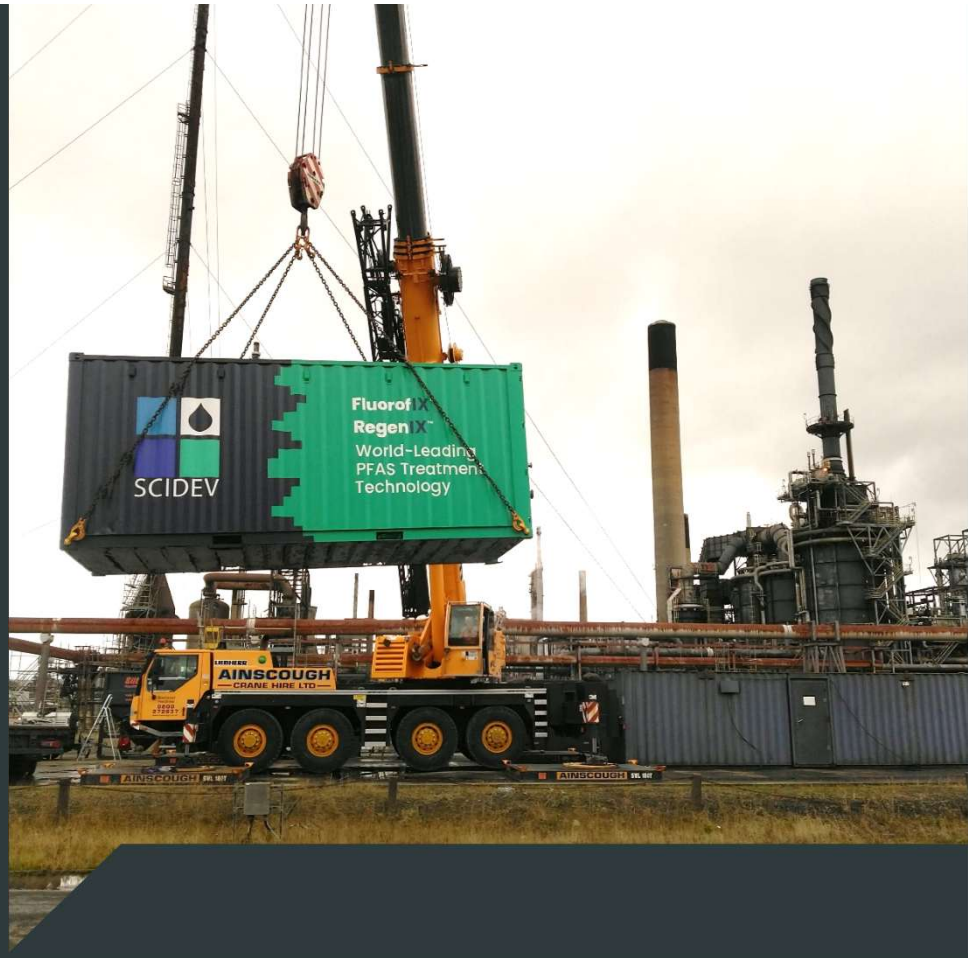
Technology: FluorofIX™ ion exchange

Discharge Requirements: <1ng/L for each PFAS-20

Challenges:

- Multiple co-contaminants Oil, TSS, Metals, Hydrocarbons
- Regulator limits based on 'non-detect'
- Oil refinery site constraints / Explosion Risk

	PFBA	PFHxA	6:2 FTS	Sum PFAS-47
Raw Water	118 ng/L	1790 ng/L	19200 ng/L	**21,200 ng/L (ppt)**
Post Treatment	0.6 ng/L	<0.3 ng/L	<0.3 ng/L	**Non-Detect**



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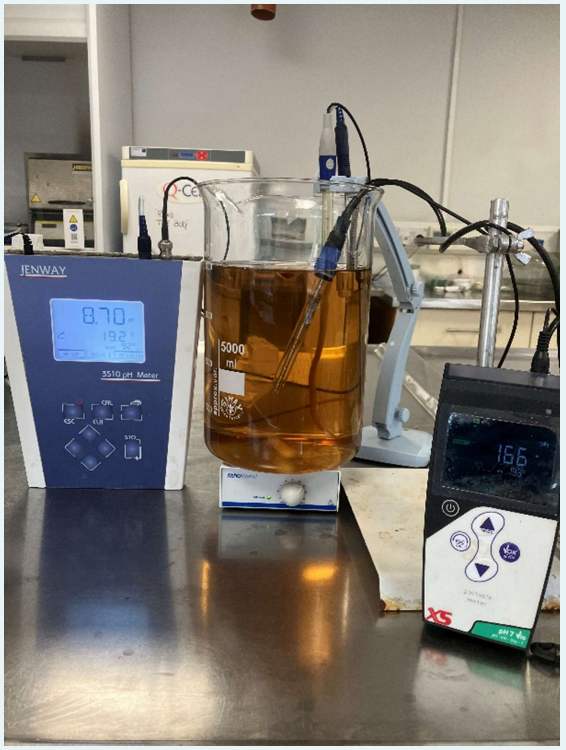
Case Study – Waste Recycling, Sweden

PFAS Treatability Trials

- Waste management facility near to Stockholm
- Bench top treatability tests to verify the optimum form of physical-chemical treatment and provide PFAS removal performance data to inform the on-site pilot phase and full scale project budgeting.
- The bench top testing examined multiple treatment processes including:
  - Barium Hydroxide precipitation
  - Physical filtration with Zeolite
  - FluorofIX IX resin PFAS removal
  - Nano Filtration



	SUM OF PFAS-11
Raw Water	15,000 ng/L
Post Treatment Target	<10ng/l

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Thank You!

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