



**SourceStop-Liquid Pilot Barrier
Application
Completion Document**

Tromsø Airport GBS

Project Quality Assurance
Information Sheet

Site Name: Tromsø Airport

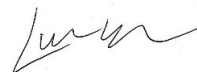
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1 Project Directory

1.1 Client

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2 Introduction

The following report is a factual record of the pilot groundwater remediation works undertaken by REGENESIS at Tromsø Airport old fire station GBS.

2.1 Background

REGENESIS was contacted by Norconsult to assess remediation options for Per- and Polyfluoroalkyl Substances (PFAS) contamination in groundwater at Tromsø Airport GBS (see Figure 1, Appendix A for location map). This project targeted the PFAS contamination in groundwater within the shallow anthropogenic fill and sand aquifer migrating from the historic fire training ground (and current de-icing facility), offsite to the fjord to the west.

2.2 Summary of Contamination

The source of the dissolved phase PFAS plume is understood to be in and around the location of the former GBS fire training ground, where PFAS-containing Aqueous Film-Forming Foam (AFFF) has historically been used for fire-fighting practice. PFAS-contaminated groundwater is migrating west from this location, and discharging into the fjord to the west.

The recorded maximum groundwater PFAS concentrations exceed 1,000 ng/L, of which PFOS is the dominant compound.

3 Remediation Strategy

The groundwater remediation strategy was outlined in the 'JiF80546 –Appendix B Supplier's Description' Tender document issued by REGENESIS on the 24th July 2025. The strategy comprised the pilot-scale application of SourceStop® Liquid (SourceStop) (Colloidal Activated Carbon (CAC)) technology in an in situ, permeable barrier configuration perpendicular to the central section of the PFAS plume emanating from the airport's fire training area.

The following target treatment zone (TTZ) was agreed with the project group:

- 10m length (perpendicular to flow)
- 4.0m vertical depth
- Approx. 4m width (parallel to flow)
- Aquifer: Saturated anthropogenic fill and shell sand horizon

The injected SourceStop dose was calculated based on information collected from the TTZ by the project group, including groundwater velocity, soil type, and PFAS concentration.

The barrier design consisted of 12 dilute SourceStop injection points spaced 1.5m apart, split into two rows (Row 1 = 5 points, Row 2 = 7 points) spaced 2m apart.

3.1 Remedial Targets

The intention of the pilot SourceStop treatment was to provide a significant reduction in PFAS egress from the upgradient historic fire-training source area, as measured in new and existing validation wells.

This pilot-scale barrier application is being used to assess the efficacy of SourceStop as a remedial option for PFAS at the Tromsø Airport site, including demonstration of achievable PFAS plume reductions and evaluation of the optimal injection volumes, pressure and Radius of Influence (ROI). As such, no remedial targets have been set.

The pilot trial will also be used to identify project and site practicalities & constraints so that, in the event of full-scale works being undertaken, these can be accurately priced and programmed.

3.2 Well Installations

As part of the SourceStop pilot barrier application works, 3no. groundwater monitoring wells were installed by REGENESIS. A summary is provided in Table 1, and borehole logs provided in Appendix B.

Monitoring Well ID	Total Depth (mBGL)	Screened Depth (mBGL)	Purpose
REG-01	6	3.0 – 6.0	In-barrier performance monitoring well
REG-02	6	3.0 – 6.0	Up-gradient monitoring well to assess incoming groundwater PFAS concentrations
REG-03	6	3.0 – 6.0	Cross-gradient monitoring well to assess the impact, if any, of the operational Pump & Treat pilot installation on groundwater flow.

The locations of monitoring wells are provided on Figure 2, Appendix A.

3.3 Treatment Technology

Based on the contamination reported to be present at the site, REGENESIS recommended the application of SourceStop to provide in situ sorption of PFAS.

SourceStop

To remediate PFAS contamination in groundwater plumes emanating from source areas, REGENESIS has developed SourceStop™. The technology comprises very fine particles of colloidal-scale activated carbon (CAC, 1-2µm) suspended in water through our unique organic polymer dispersion chemistry. The product was applied through low-pressure direct push injection.

Once introduced into the subsurface, the product coats the aquifer in a thin layer of activated carbon to create a subsurface filter that provides rapid and long-term removal of contaminants from groundwater, allowing enhanced attenuation of the downgradient plume.

For further information on the technology used, please refer to Appendix D.

3.4 Injection Design

The detailed injection design can be found in the 'JiF80546-Appendix B Supplier's Description' Tender document issued by REGENESIS on the 24th July 2025. The

injection design comprised a 10m barrier containing 2 rows (2m apart) of injection points (5 points and 7 points) spaced 1.5m apart.

The barrier was designed in a semi-circular shape around the BR12 downgradient monitoring well, so that variations in groundwater flow direction do not result in untreated groundwater reaching the well by circumnavigating the barrier.

The SourceStop injection design is provided in Table 2.

Table 2 SourceStop Injection Design Summary

Item	Unit	Quantity
Barrier Length	m	10
Rows	#	2
Treatment Horizon	mBGL	2.5 – 6.5
Vertical Treatment Thickness	m	4.0
Number of Injection Points	#	12
Dilute SourceStop Injection Volume	litres/pt	2,950

4 SourceStop Barrier Injection Works

The timeframe of application and operation of the SourceStop barrier is split into two phases: Installation Phase and Operational Phase. These are summarised in Table 3 below.

Table 3- Summary of SourceStop barrier phases

Phase	Dates		Description
	Start	End	
Installation	25/11/2025	04/12/2025	SourceStop application.
Operational	05/12/2025 - ongoing		After the installation phase, the barrier will enter the long-term operational phase. Ongoing groundwater monitoring will be completed during this phase by Norconsult.

4.1 Site Set Up

The SourceStop injection points were marked out using wooden stakes (See Appendix A, Figure 2 for approximate barrier location). No surveying of individual injection points was undertaken by REGENESIS.

The concentrated SourceStop product was delivered directly to the fire training ground and unloaded with a telehandler in advance of REGENESIS' arrival to site. The SourceStop was stored within heated containers throughout the duration of the works to protect it from freezing.

4.2 Adaptations due to Weather Conditions

Throughout the duration of the works, REGENESIS ensured that product was stored appropriately and was not at risk of freezing. Product mixing, drilling and injection works were adapted to optimise the application process throughout the duration of the works, so that programme and installation was not impacted by negative temperatures and heavy snow.

4.3 Product Mixing and Equipment

Product mixing, drilling and injection work was undertaken by REGENESIS and subcontracted drillers, who supplied the drilling rig and mixing/ injection equipment. REGENESIS provided mixing and injection oversight, monitoring well borehole logging, Placement Validation (PV) sampling and technical guidance.

4.4 Direct Push Injection

The injection works were completed via direct push using a single rotary drilling rig capable of percussive drilling and direct push injection. A 500mm retractable injection screen was used to ensure maximum distribution of remediation products into the target intervals. The injection intervals/volumes are displayed in Table 4 and in the injection logs provided in Appendix B.

Injection Intervals

Table 4- Injection Intervals for SourceStop

Injection Interval (mBGL)	SourceStop Volume (Litres)
2.5 – 3.0	370
3.0 – 3.5	370
3.5 – 4.0	370
4.0 – 4.5	370
4.5 – 5.0	370
5.0 – 5.5	370
5.5 – 6.0	370
6.0 – 6.5	370
Total (Approx.)	2,950

Once the injection screen had been driven to the target depth, the injection pump was started to allow a small amount of pressure to be applied to the injection screen, preventing any ingress of sediment while the screen was opened. The screen was then opened fully and the injection started.

An in-line flow meter and pressure gauge were monitored throughout the injection to ensure the allocated volume of remediation product was injected at the correct interval.

For the majority of the injection works, depending on the injection tip used, pressure was kept typically lower than 5 bar. This was to reduce the likelihood of product daylighting and creating preferential pathways in the sub-surface.

Once the target volume had been injected into an interval, the rods were pulled up to the next interval and the injection process continued. The flow rate and pressure was measured at the end of each injection interval - reported in the injection logs in Appendix B. Once all the allocated volume had been injected, the rods and injection screen were raised out of the ground and cleaned, and the location was reinstated using bentonite pellets.

4.5 Injectate Surfacing (Daylighting)

There are many potential causes of daylighting (injectate and groundwater returning to the surface), including the flow rate and pressure of injection; saturation of the ground surrounding the injection location, and non-homogenous geology.

Some daylighting is expected as part of the injection process and was encountered on this site. Overall, daylighting was minimal and was managed through the means described below.

To minimise daylighting, a number of precautions and measures were used. Post-completion of every injection point, holes were filled with bentonite to help counter immediate daylighting through the injection point due to the locally pressurized groundwater. This also helps to prevent product from daylighting through the previous point when injecting the next point.

When daylighting occurred, the pressure and flow rate of injection was reduced. Table 5 below provides a summary of locations where daylighting occurred.

Full details of daylighting are provided on the injection point logs in Appendix B.

Table 5 - Summary of injection points where daylighting occurred

IP	Daylighting / How was the Issue Resolved
08	Daylighting occurred on the 3.0 - 3.5mBGL injection interval. Pressure of injection was reduced from 5 to 4 bar (and subsequently flow rate also reduced from 14L/min to 5L/min.

4.6 Injection Commentary

A total of 5,442kg of SourceStop concentrate was diluted with water and injected into 12 No. injection locations during the Installation Phase.

A plan showing all injection locations can be found on Figure 2, Appendix A, and the full injection logs can be found in Appendix B.

5 Placement Validation Testing during Application

Placement validation (PV) describes the work undertaken by REGENESIS to confirm the correct in situ placement of SourceStop within the subsurface, both vertically and laterally. For the Tromsø Pilot barrier, PV work comprised groundwater sampling from 4no. piezometer wells installed at specific locations within the barrier. PV locations included:

- The designed radius of influence (ROI);
- The mid-points in-between injection points; and
- At 0.75m and 1m downgradient of the SourceStop barrier.

Wells were installed by drilling down to 6mBGL using an auger, and installing a slotted pipe surrounded by a gravel filter pack from 3 – 6mBGL, and sealed near the surface with plain pipe surrounded by bentonite (from 0 – 3mBGL). Plain pipe extended a minimum of 1 m Above Ground Level (m AGL). No headworks were required, and no coordinates of wells were taken; their approximate locations are shown in Appendix A, Figure 3.

A semi-quantitative field test kit was used to give an indication of the carbon content of groundwater samples taken from piezometer wells. The test is based on a colorimetric comparison of groundwater samples to a sample containing a known concentration of SourceStop. The results of the test allows assessment of whether the desired radius of influence from an injection location has been achieved i.e. to confirm overlap of adjacent injections to provide a continuous barrier.

Groundwater samples were collected from the PV wells and installed monitoring wells using a low-flow peristaltic pump.

PV sampling locations were chosen strategically to provide as much information as possible about the distribution of SourceStop in the subsurface. A total of 12 samples were taken from the piezometer locations detailed in Table 6, as follows:

- Confirmation of ROI overlap between points, evidenced by 8 tests (relevant PV wells: PV1, PV3 and REG-01);
- Distribution of SourceStop within the barrier zone, evidenced by 8 tests (relevant PV wells: PV01, PV03 and REG-01); and
- No excessive SourceStop transport beyond the barrier footprint, evidenced by 4 tests (relevant PV wells: PV02 and PV04);

A carbon concentration of around approximately 70% of the injectate in groundwater samples soon after injection is used confirm the ROI overlap between points and distribution of SourceStop within the barrier zone. This is expected to reduce in subsequent groundwater samples as the SourceStop adheres to the aquifer matrix.

PV sampling was completed throughout the application programme and showed that the barrier has been applied as designed.

Table 6 -ROI & Placement Validation Wells

Piezometer/ Well Name	Location	Installation Details	Reason
PV01	Midpoint IP1 - IP2	Slotted 3.0 -6.0 mBGL	Assess SS-L concentration and designed ROI
PV02	1m DG of IP2	Slotted 3.0 -6.0 mBGL	Assess downgradient transport
PV03	Midpoint IP8 - IP5	Slotted 3.0 -6.0 mBGL	Assess SS-L concentration and designed ROI
PV04	0.75m DG of IP5	Slotted 3.0 -6.0 mBGL	Assess downgradient transport
REG-1	In-barrier monitoring well	Slotted 3.0 -6.0 mBGL	Assess SS-L concentration and designed ROI

PV test locations in relation to the SourceStop barrier are provided on Figure 3, in Appendix A.

6 FluxTracer

Prior to the mobilisation of REGENESIS to site, REGENESIS FluxTracers were deployed in 4no. monitoring wells: BR7 & MB3 (upgradient) and BR11 & BR12 (downgradient), all at depths within the saturated horizon. The FluxTracer report is provided in Appendix E. Table 7 summarises the findings;

Table 7: FluxTracer Results

Well ID	Darcy Velocity Range (cm/d)	Max Flux Peak ($\mu\text{g}/\text{m}^2/\text{d}$) for Principal PFAS Compound
BR7	5.0	PFOS: 420
MB3	3.9 – 5.4	PFOS: 26
BR11	No interpretation – see Report for details	
BR12	4.2 – 7.9	PFOS: 82

The FluxTracer data indicated that the findings are within the seepage velocity range used to inform the applied pilot barrier design (197- 206m/year), increasing the confidence of our performance forecast.

7 Validation Monitoring

Future groundwater monitoring will be undertaken by Norconsult AB and, as such, does not form part of this report. However, comment on groundwater data will be provided by REGENESIS upon request.

8 Summary

REGENESIS was appointed by Avinor AS to undertake remediation works at Tromsø Airport. The site is impacted with PFAS contamination and remediation is required to reduce off-site migration of contamination within the groundwater downgradient of the historic fire training area.

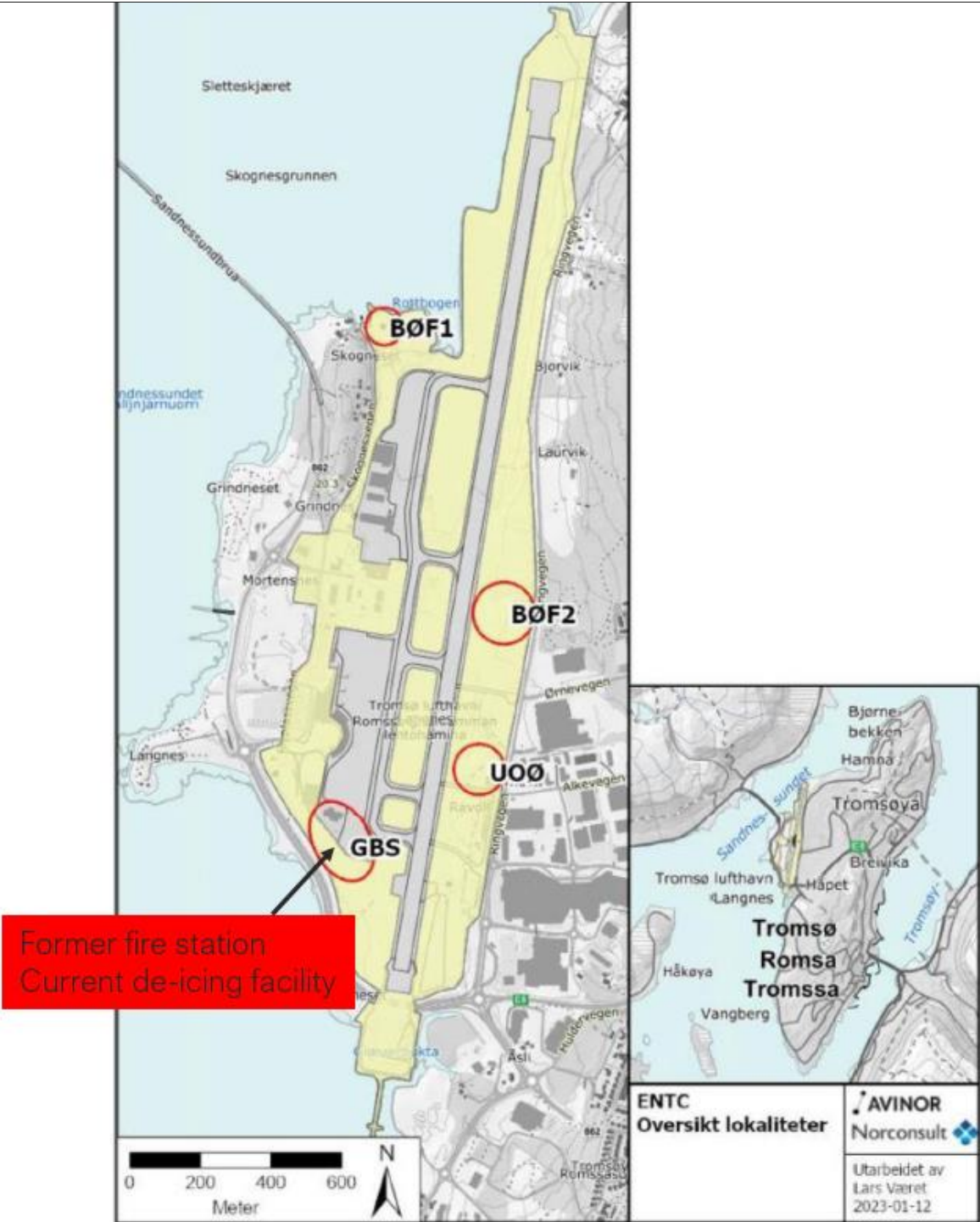
The treatment approach comprised injection of a pilot-scale SourceStop barrier via direct push injection, perpendicular to groundwater flow.

Injection works were completed over a 2-week period from the 25th November 2025 to the 4th December 2025.

The works were completed in a safe and methodical manner, producing no increased risk to the workforce, other contractors working on the site, or the environment.

APPENDIX A –

A.1 Site Location Plan



2025-03-05 Tromsø airport – PFAS remediation.



REGENESIS

DRAWING
Figure 1: Site Location Plan

DRAWING NO
1 OF 3

PROJECT TITLE
JiF80546 – Tromsø Pilot Barrier

CLIENT
Avinor

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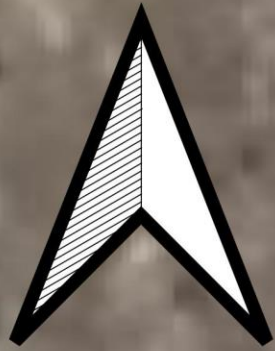
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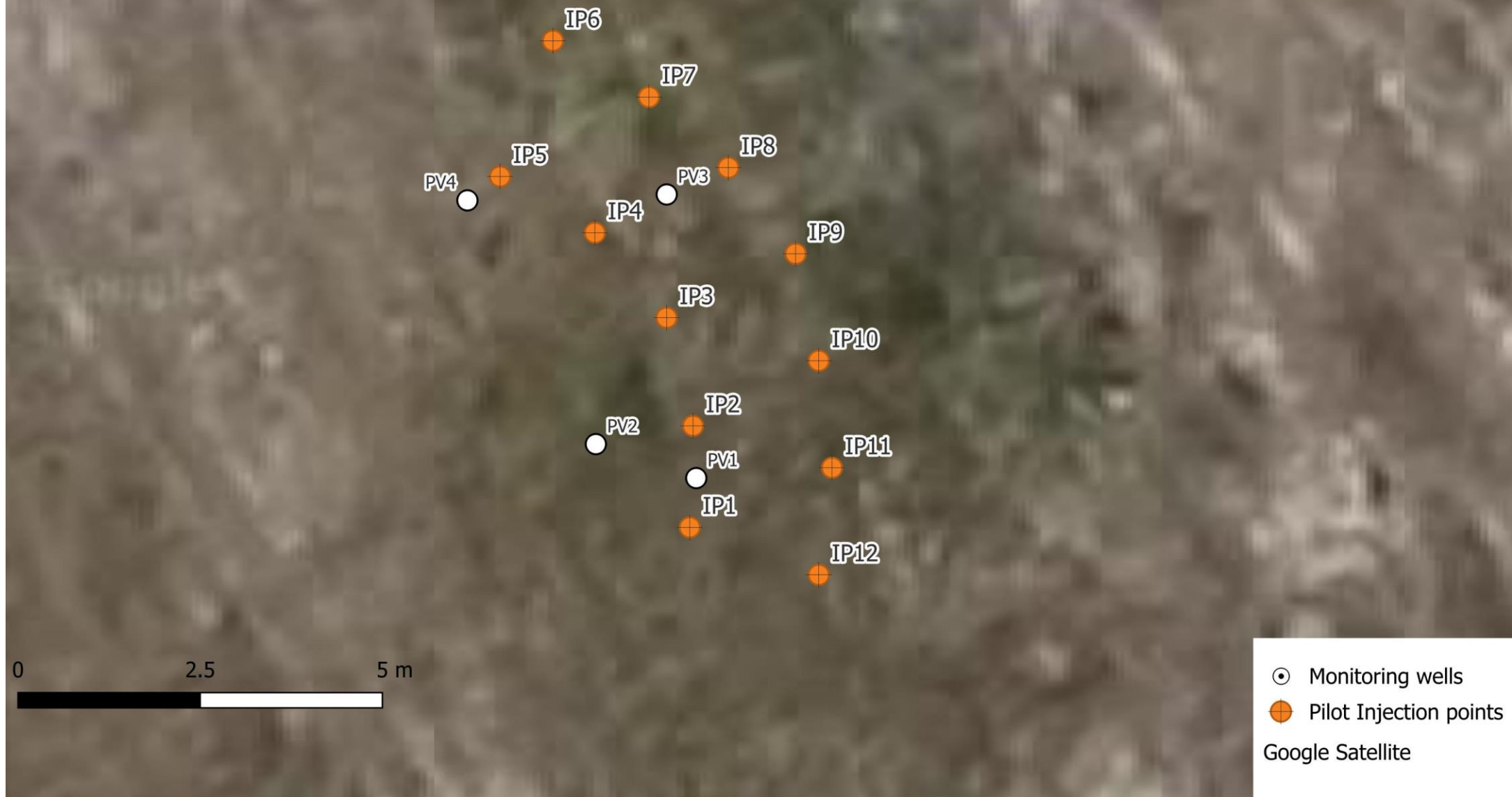
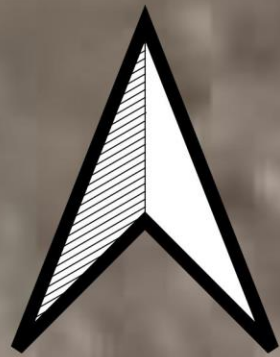
NOTES
Drawing replicated courtesy of Norconsult (March 2025)

A.2 As-Built Barrier Location Plan



 REGENESIS			DRAWING Figure 2: As-Built Barrier Location Plan		PROJECT TITLE JiF80546 – Tromsø Pilot Barrier
			DRAWING NO 2 OF 3		CLIENT Avinor
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A.3 Placement Validation Testing Locations



DRAWING
Figure 3: Placement Validation Testing Locations

PROJECT TITLE
JiF80546 - Tromsø Pilot Barrier

DRAWING NO
3 OF 3

CLIENT
Avinor

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DATE
15/12/25

NOTES

APPENDIX B – SourceStop Injection Logs and Well Installation Logs

Tromsø Injection and Borehole Logs

<i>point</i>	<i>dat</i>	<i>deep(m)</i>	<i>volume(l)</i>	<i>pressure(bar)</i>	<i>method</i>	<i>flow l</i>	<i>timme</i>	<i>special</i>
1	26/11/2025							
		2.5	375	5	tip	10-12	18.00	
		3	375	5	tip			
		3.5	375	5	tip			
		4	375	5	tip			
		4.5	375	5	tip			
		5	375	5	tip			
		5.5	375	5	tip			
		6	375	5	tip			
		6.5					13.00	
total			3000					

<i>point</i>	<i>dat</i>	<i>deep(m)</i>	<i>volume(l)</i>	<i>pressure(bar)</i>	<i>method</i>	<i>flow l</i>	<i>timme</i>	<i>special</i>
2	27/11/2025							
		2.5	375	5	tip	12	14.00	
		3	375	5	tip	12		
		3.5	375	5	tip	12		
		4	375	5	tip	12		
		4.5	375	5	tip	12		
		5	375	5	tip	12		
		5.5	375	5	tip	12		
		6	375	5	tip	12	08.00	
		6.5						
total			3000					

<i>point</i>	<i>dat</i>	<i>deep(m)</i>	<i>volume(l)</i>	<i>pressure(bar)</i>	<i>method</i>	<i>flow l</i>	<i>timme</i>	<i>special</i>
3								
		2.5	375	5	tip	12	10.00	
		3	375	5	tip	12		
	28/11/2025	3.5	375	5	tip	12	08.00	
		4	375	5	tip	12	16.30	
		4.5	375	5	tip	12		
		5	375	5	tip	12		
		5.5	375	5	tip	12		
		6	375	5	tip	12		
	27/11/2025	6.5					14.00	
total			3000					

<i>point</i>	<i>dat</i>	<i>deep(m)</i>	<i>volume(l)</i>	<i>pressure(bar)</i>	<i>method</i>	<i>flow l</i>	<i>timme</i>	<i>special</i>
4	28/11/2025							
		2.5	375	5	tip	12	16.00	
		3	375	5	tip	12		
		3.5	375	5	tip	12		
		4	375	5	tip	12		
		4.5	375	5	tip	12		
		5	375	5	tip	12		
		5.5	375	5	tip	12		
		6	375	5	tip	12		
		6.5					10.00	
total			3000					

<i>point</i>	<i>dat</i>	<i>deep(m)</i>	<i>volume(l)</i>	<i>pressure(bar)</i>	<i>method</i>	<i>flow l</i>	<i>timme</i>	<i>special</i>
5	29/11/2025							
		2.5	375	4	tip	10	18.00	
		3	375	4	tip	10		
		3.5	375	5	tip	14		
		4	375	5	tip	14		
		4.5	375	5	tip	14		
		5	375	5	tip	14		
		5.5	375	5	tip	14		
		6	375	4	tip	5		
		6.5					13.30	
total			3000					

<i>point</i>	<i>dat</i>	<i>deep(m)</i>	<i>volume(l)</i>	<i>pressure(bar)</i>	<i>method</i>	<i>flow l</i>	<i>timme</i>	<i>special</i>
6								
		2.5	375	5	tip	8	10.00	
		3	375	5	tip	10		
	02/12/2025	3.5	375	5	tip	15	07.30	
		4	375	5	tip	15		
		4.5	375	5	tip	15		
		5	375	5	tip	15		
		5.5	375	5	tip	15		
		6	375	5	tip	15		
	01/12/2025	6.5					11.00	
total			3000					

<i>point</i>	<i>dat</i>	<i>deep(m)</i>	<i>volume(l)</i>	<i>pressure(bar)</i>	<i>method</i>	<i>flow l</i>	<i>timme</i>	<i>special</i>
7								

<i>point</i>	<i>dat</i>	<i>deep(m)</i>	<i>volume(l)</i>	<i>pressure(bar)</i>	<i>method</i>	<i>flow l</i>	<i>timme</i>	<i>special</i>
8								

		2.5		5	tip			
	02/12/2025	3		5	tip		08.00	
	01/12/2025	3.5	375	5	tip	15	18.00	
		4	375	5	tip	15		
		4.5	375	5	tip	15		
		5	375	5	tip	15		
		5.5	375	5	tip	15		
		6	375	5	tip	10	14.30	
		6.5						
total			2250					

		2.5	375	4	tip	4	13.00	dl
		3	375	4	tip	5		dl
		3.5	375	5	tip	14		
		4	375	5	tip	14		
		4.5	375	5	tip	14		
	29/11/2025	5	375	5	tip	14	08.00	
		5.5	375	5	tip	10	18.00	
		6	375	5	tip	10		
	28/11/2025	6.5					16.30	
total			3000					

point	dat	deep(m)	volume(l)	pressure(bar)	method	flow l	timme	special
9	01/12/2025							
		2.5	375	5	tip	7	14.00	
		3	375	5	tip	7		
		3.5	375	5	tip	15		
		4	375	5	tip	15		
		4.5	375	5	tip	15		
		5	375	5	tip	15		
		5.5	375	5	tip	15		
		6	375	5	tip	10	08.00	
		6.5						
total			3000					

point	dat	deep(m)	volume(l)	pressure(bar)	method	flow l	timme	special
10	03/12/2025							
		2.5	375	5	tip	12	17.00	
		3	375	5	tip	12		
		3.5	375	5	tip	14		
		4	375	5	tip	14		
		4.5	375	5	tip	14		
		5	375	5	tip	14		
		5.5	375	5	tip	14		
		6	375	5	tip	14	09.00	
		6.5						
total			3000					

point	dat	deep(m)	volume(l)	pressure(bar)	method	flow l	timme	special
11	02/12/2025							
		2.5	375	5	tip	8		
		3	375	5	tip	10		
		3.5	375	5	tip	14		
		4	375	5	tip	14		
		4.5	375	5	tip	14		
		5	375	5	tip	14		
		5.5	375	5	tip	14		
		6	375	5	tip	14		
		6.5						
total			3000					

point	dat	deep(m)	volume(l)	pressure(bar)	method	flow l	timme	special
12	30/11/2025							
		2.5	375	5	tip	8	18.00	
		3	375	5	tip	10		
		3.5	375	5	tip	12		
		4	375	5	tip	12		
		4.5	375	5	tip	12		
		5	375	5	tip	12		
		5.5	375	5	tip	12		
		6	375	5	tip	12	11.00	
		6.5						hy pip
total			3000					leking

32mm wells			
PV1 7m 3m filter RT 1m	PV2 7m 3mfilter RT 1m	PV3 7m 3m fiter RT 1m	PV4 7m 3m filter RT 1m

50mm wells

REG1	REG2	REG3
7 m	7 m	7 m
3 m filter	3 m filter	3 m filter
RT 1m	RT 1m	RT 1m

REG1				
deep m		mat		coler
0-1,5	F/?	sa Gy	shell	
1,5-2,0	F/?	Th		
2,0-2,5	F/?	Sa		
2,5-3,0		Sa th		
3,0-4,0		Sa Ti		
4,0-4,4		si Sa		
4,4-4,5		Th		
4,5-5,0		Sa shell		
5,0-5,7		Shell sa		
5,7-7,5		Le shell		MN

REG2				
deep m		mat		coler
0-1,5	F/	Sa	st	
1,5-2,3		Th		
2,3-2,7		shell Sa		
2,7-2,9		Sa		
2,9-3,6		si Sa		
3,6-3,7		wood		
3,7-4,0		shell Sa		
4,0-4,7		sa Shell	th	
4,7,5,0		Th shell Sa		
5,0-6,0		Sa shell		
6,0-7,5		Le (shell)		MN

REG3				
deep m		mat		coler
0-1,5	F/	si Sa		gray-brown
1,5-2,0		si Sa organik	wood	brown
2,0-2,9		si Sa	org lins	gray
2,9-4,0		gr si Sa	shell	gray white
4,0-4,9		sa Shell		white
4,9-6,0		shell Sa		gray white
CS				
Gwt 4.68 m RT				

Key:		
hy pip leaking	=	Hydraulic pipr leaking
RT	=	Top of wells above ground level
Gr	=	Gravel
Sa	=	Sand
Si	=	Silt
Le	=	Clay
Gy	=	Mud
Th		Highly disfigured mud

Appendix C - FluxTracer Report

FluxTracer® Results: Darcy Velocity, Mass Flux, and Contaminant Concentrations

November 17, 2025

TO: Lars Været/Bettina Knudsen
Avinor
Oslo, Oslo 6A 0191
Norway

FROM: Juan Rincon-Rodriguez, Regenesis
Jim Forde, Regenesis
Jack Shore, Regenesis

RE: Flux Tracer Results for Tromso Airport

Scope of Work

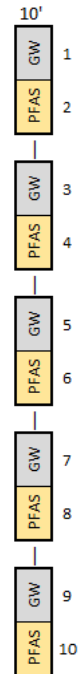
FluxTracer® (FT) testing was conducted to assess groundwater velocity and contaminant mass flux within existing monitoring wells, aiding in site characterization and remedial design. REGENESIS received three 10' PFAS FTs, and one 5' PFAS FT from Avinor and performed analysis to determine Darcy velocity, and mass flux. The quantitative FluxTracer test measures the amount of alcohol tracers that desorbed from the activated carbon due to groundwater passively flowing through the cylinder cannisters. Concurrently, contaminants present in the plume will adsorb to a sorptive media ideally suited for PFAS during the deployed period after which they will be extracted from the adsorbent to quantify mass flux and flux derived contaminant concentration.

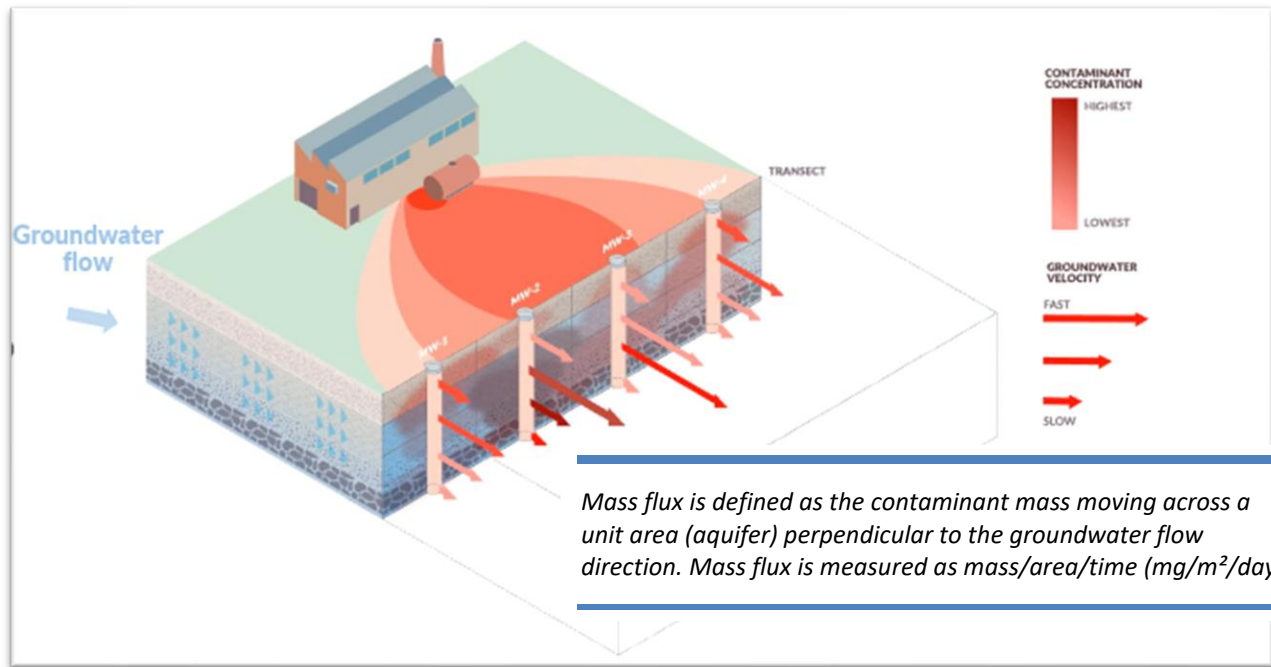
Note. The Chain of custody (COC) of this project is included in the report - Appendix A.

How We Collect PFAS and Groundwater Velocity Data

FluxTracer PFAS devices are measured interchangeably, every other foot with groundwater velocity. For example, in a 10' device, 5 intervals are sampled for PFAS and 5' intervals are samples for groundwater velocity. This strategic sampling method produces a staggered mass flux and groundwater velocity chart that depicts the fluxes of each respective parameter.

10-foot FluxTracer Device:
GW Velocity: 5
PFAS Mass Flux: 5





Conceptual site modeling overlaying hydraulic conductivity, groundwater velocity, and contaminant concentrations.

What is Mass Flux?

Mass flux refers to the movement of contaminant mass from one location to another, measured in units of mass per unit of time and area. Contaminant mass flux data is used in environmental remediation to identify the pathways through which contaminants are moving through the aquifer. This can involve the use of monitoring wells and various technologies to collect data on the flow of water and contaminants through the soil and rock formations. This information can help determine the locations of plumes and the direction of contaminant movement which is important for identifying the sources of contamination and designing remediation strategies.

Contaminant mass flux data can also be used to assess the potential risks to human and ecosystem health. By understanding the rate at which contaminants are moving through the groundwater and the concentrations at which they are present, it is possible to evaluate the potential impacts of environmental hazards on human and ecological receptors. Mass flux data can be used to prioritize remediation efforts and to develop risk management plans. For example, the use of permeable reactive barriers or in-situ bioremediation techniques may be more effective in certain locations based on contaminant mass flux data (ITRC, 2010). Contaminant mass flux data is an important tool in environmental remediation as it helps to understand and predict the movement of contaminants in the environment, assess potential risks to humans and ecosystems, and design effective remediation strategies.

ITRC. (2010). Use and Measurement of Mass Flux and Mass Discharge. www.itrcweb.org.

Results

BR7

- BR7 data were collected from 18.5 to 20.5 ft. below top of casing (BTC), resulting in a total of one data point for Darcy velocity, and two for PFAS mass flux.
- PFOS was the most abundant PFAS, resulting in a maximum mass flux peak of $\sim 420 \mu\text{g}/\text{m}^2/\text{d}$ at a depth of 21.5 ft. BTC, aligned with the maxima peaks of most detected PFAS.

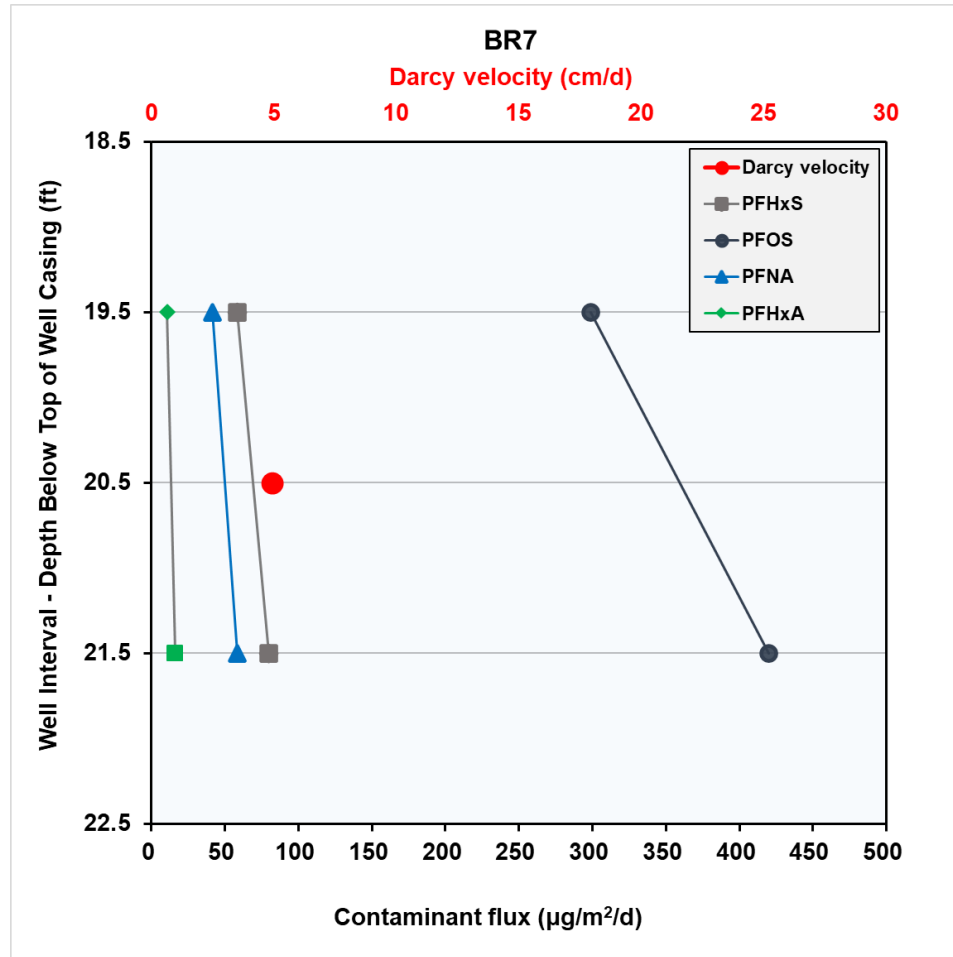


Figure 1. BR7 Contaminant flux ($\mu\text{g}/\text{m}^2/\text{d}$), Darcy velocity (cm/d), and depth below casing.

Table 1. BR7 Darcy velocity and mass flux data

	Well Interval - Depth Below Top of Well Casing (ft)		
	19.5	20.5	21.5
	Mass Flux ($\mu\text{g}/\text{m}^2/\text{d}$)	20.5	21.5
Darcy velocity (cm/d)	5.0	N/A	
PFOS	299.12	419.89	
PFHxS	58.22	80.02	
PFNA	41.51	58.44	
PFHxA	10.67	16.07	
PFOA	7.56	10.73	
PFPeS	6.91	10.15	
PFBS	4.99	7.94	
PFHpS	5.10	6.90	
PFPeA	2.45	3.79	
PFHpA	1.93	3.05	
PFBA	1.44	2.29	
PFDA	1.14	1.43	
PFNS	0.43	0.50	
PFOSA	0.22	0.29	
PFUnA	0.21	0.27	
6:2 FTS	0.16	0.18	
PFDS	ND	0.03	
PFDoA	ND	ND	
PFTTrDA	ND	ND	
PFTeA	ND	ND	
4:2 FTS	ND	ND	

 ($\mu\text{g}/\text{m}^2/\text{d}$)

Table 2. BR7 Flux-derived concentrations

	Well Interval - Depth Below Top of Well Casing (ft)		
	19.5	20.5	21.5
Concentration (ng/L)	19.5	20.5	21.5
PFOS	5,982	8,398	
PFHxS	1,164	1,600	
PFNA	830	1,169	
PFHxA	213	321	
PFOA	151	215	
PFPeS	138	203	
PFBS	100	159	
PFHpS	102	138	
PFPeA	49	76	
PFHpA	39	61	
PFBA	29	46	
PFDA	23	29	
PFNS	9	10	
PFOSA	4	6	
PFUnA	4	5	
6:2 FTS	3	4	
PFDS	N/A	1	
PFDoA	N/A	N/A	
PFTTrDA	N/A	N/A	
PFTeA	N/A	N/A	
4:2 FTS	N/A	N/A	

(ng/L)

BR12

- BR12 data were collected from 15.4 to 21.4 ft. below top of casing (BTC), resulting in a total of three data points for Darcy velocity, and three for PFAS mass flux.
- Darcy velocity posed a standard deviation of 1.9 cm/d, ranging from 4.2 cm/day (located in the bottom section of the device at depth of 20.4 ft. BTC) up to a maximum of 7.9 cm/d at a depth of 16.4 ft. BTC.
- PFOS was the most abundant PFAS, with mass flux measurements up to 82 $\mu\text{g}/\text{m}^2/\text{d}$.

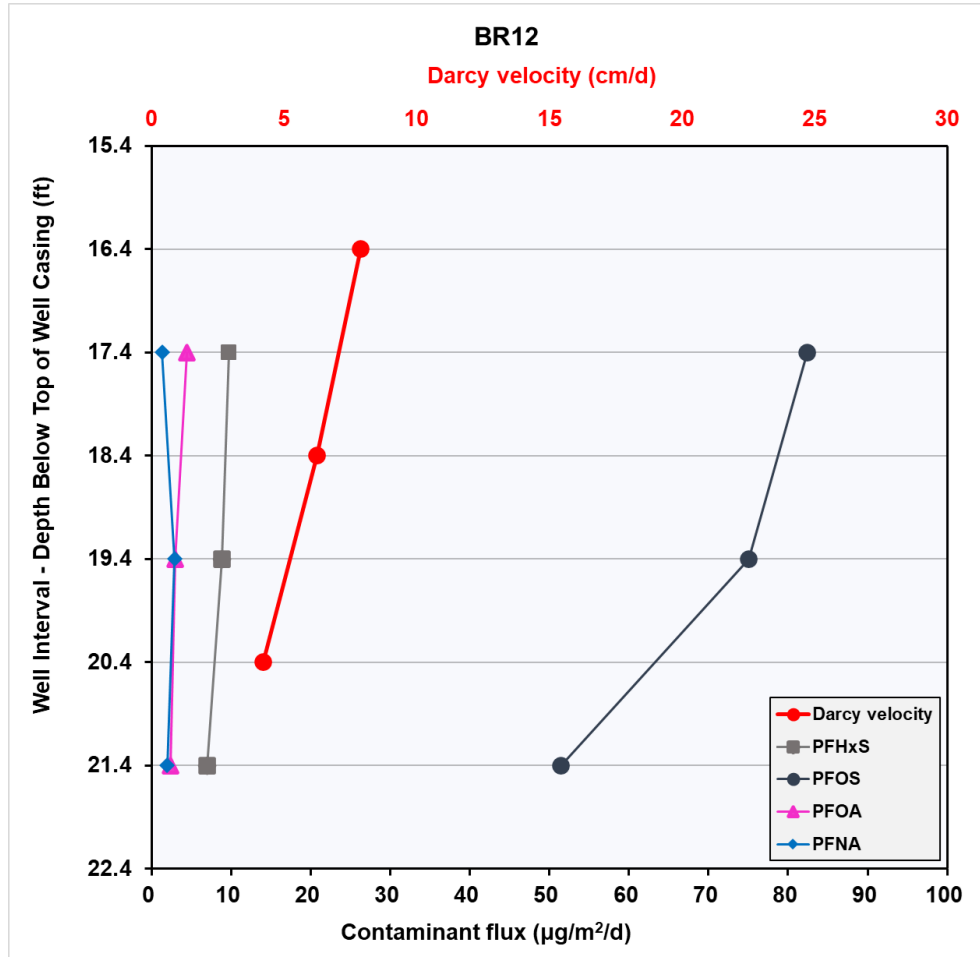


Figure 2. BR12 Contaminant flux ($\mu\text{g}/\text{m}^2/\text{d}$), Darcy velocity (cm/d), and depth below casing.

Table 3. BR12 Darcy velocity and mass flux data

	Well Interval - Depth Below Top of Well Casing (ft)					
Mass Flux ($\mu\text{g}/\text{m}^2/\text{d}$)	16.4	17.4	18.4	19.4	20.4	21.4
Darcy velocity (cm/d)	7.9		6.3		4.2	
PFOS	82.00		75.00		51.00	
PFHxS	9.72		8.82		7.02	
PFOA	4.48		2.97		2.37	
PFNA	1.32		2.89		1.95	
PFPeA	6.35		2.74		2.03	
PFHxA	4.97		2.34		1.95	
PFHpS	1.22		1.41		0.93	
PFHpA	2.70		1.12		0.90	
PFUnA	0.85		0.92		0.70	
PFPeS	0.82		0.83		0.73	
6:2 FTS	2.24		0.81		0.61	
PFBA	2.16		0.76		0.61	
5:3 FTCA	1.58		0.52		0.34	
PFOSA	0.38		0.53		0.32	
PFBS	0.36		0.47		0.37	
PFNS	0.13		0.20		0.14	
PFDS	0.23		0.15		0.12	
PFTrDA	0.21		0.12		0.13	
N-MeFOSAA	0.08		0.11		0.06	
3:3 FTCA	ND		0.08		ND	
PFDA	0.03		0.04		0.03	

Table 4. BR12 Flux-derived concentrations

	Well Interval - Depth Below Top of Well Casing (ft)					
Concentration (ng/L)	16.4	17.4	18.4	19.4	20.4	21.4
PFOS	1,038		1,191		1,214	
PFHxS	123		140		167	
PFOA	57		47		56	
PFNA	17		46		46	
PFPeA	80		44		48	
PFHxA	63		37		46	
PFHpS	15		22		22	
PFHpA	34		18		21	
PFUnA	11		15		17	
PFPeS	10		13		17	
6:2 FTS	28		13		15	
PFBA	27		12		15	
5:3 FTCA	20		8		8	
PFOSA	5		8		8	
PFBS	5		8		9	
PFNS	2		3		3	
PFDS	3		2		3	
PFTrDA	3		2		3	
N-MeFOSAA	1		2		1	
3:3 FTCA	N/A		1		N/A	
PFDA	0.4		1		1	

MB3

- MB3 data were collected from 11.0 to 19.0 ft. below top of casing (BTC), resulting in a total of four data points for Darcy velocity, and four for PFAS mass flux
- Darcy velocity posed a standard deviation of 0.6 cm/d, ranging from 3.9 cm/day (located in the bottom section of the device at depth of 18.0 ft. BTC) up to a maximum of 5.4 cm/d at a depth of 12 ft. BTC.
- PFOS was the most abundant PFAS with a maximum mass flux peak of 26 $\mu\text{g}/\text{m}^2/\text{d}$ at a depth of 17.0 BTC.

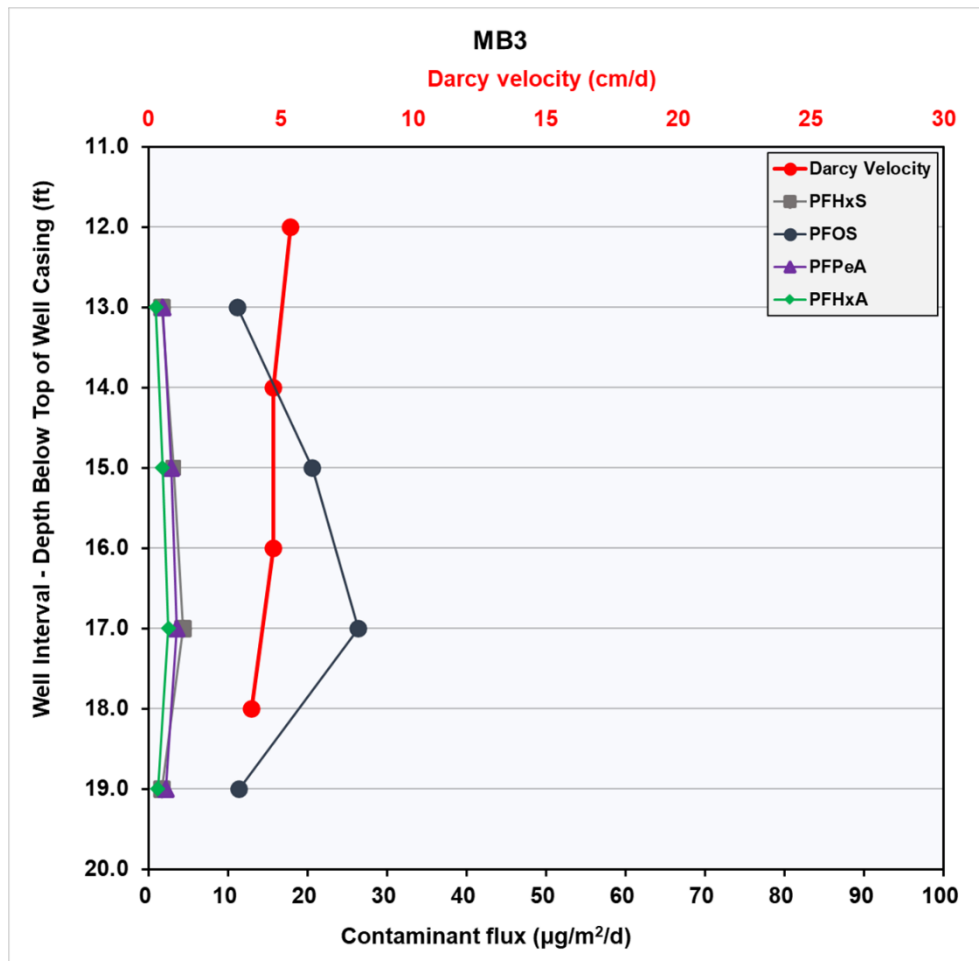


Figure 3. MB3 Contaminant flux ($\mu\text{g}/\text{m}^2/\text{d}$), Darcy velocity (cm/d), and depth below casing.

Table 5. MB3 Darcy velocity and mass flux data

	Well Interval - Depth Below Top of Well Casing (ft)						
	12.0	13.0	14.0	15.0	16.0	17.0	18.0 19.0
Darcy velocity (cm/d)	5.4		4.8		4.8		3.9
PFOS	11.00		21.00		26.00		11.00
PFHxS	1.75		3.19		4.35		1.70
PFPeA	1.85		2.87		3.54		2.23
PFHxA	0.97		1.79		2.54		1.20
PFOA	0.75		1.52		1.96		0.93
PFHpA	0.44		0.67		0.96		0.42
PFBA	0.45		0.66		0.79		0.41
6:2 FTS	0.16		0.57		0.72		0.30
PFNA	0.57		0.36		0.46		0.20
PFPeS	0.11		0.28		0.39		0.15
PFHpS	0.15		0.15		0.22		0.04
PFBS	0.06		0.10		0.15		0.03
PFUnA	0.03		0.06		0.09		0.05
PFOSA	0.04		0.06		0.08		0.03
PFNS	ND		0.06		0.07		ND
PFDA	ND		0.04		0.05		ND
3:3 FTCA	ND		0.08		ND		ND
PFDoA	ND		ND		ND		ND
PFTTrDA	ND		ND		ND		ND
PFTeA	ND		ND		ND		ND
PFDS	ND		ND		ND		ND

 (µg/m²/d)

Table 6. MB3 Flux-derived concentrations

	Well Interval - Depth Below Top of Well Casing (ft)						
	12.0	13.0	14.0	15.0	16.0	17.0	18.0 19.0
Concentration (ng/L)							
PFOS	204		438		542		282
PFHxS	32		67		91		44
PFPeA	34		60		74		57
PFHxA	18		37		53		31
PFOA	14		32		41		24
PFHpA	8		14		20		11
PFBA	8		14		17		11
6:2 FTS	3		12		15		8
PFNA	11		8		10		5
PFPeS	2		6		8		4
PFHpS	3		3		5		1
PFBS	1		2		3		1
PFUnA	1		1		2		1
PFOSA	1		1		2		1
PFNS	N/A		1		2		N/A
PFDA	N/A		1		1		N/A
3:3 FTCA	N/A		2		N/A		N/A
PFDoA	N/A		N/A		N/A		N/A
PFTTrDA	N/A		N/A		N/A		N/A
PFTeA	N/A		N/A		N/A		N/A
PFDS	N/A		N/A		N/A		N/A

(ng/L)

BR11

- There was one sample submerged in this well, located from 12.9 to 13.9 ft. below the top of casing (BTC), resulting in one single point of PFAS mass flux. Note. The cost of this device was removed.
- PFOS was the most abundant PFAS, with a maximum mass flux peak of $310 \mu\text{g}/\text{m}^2/\text{d}$ at a depth of 13.9 ft. BTC.

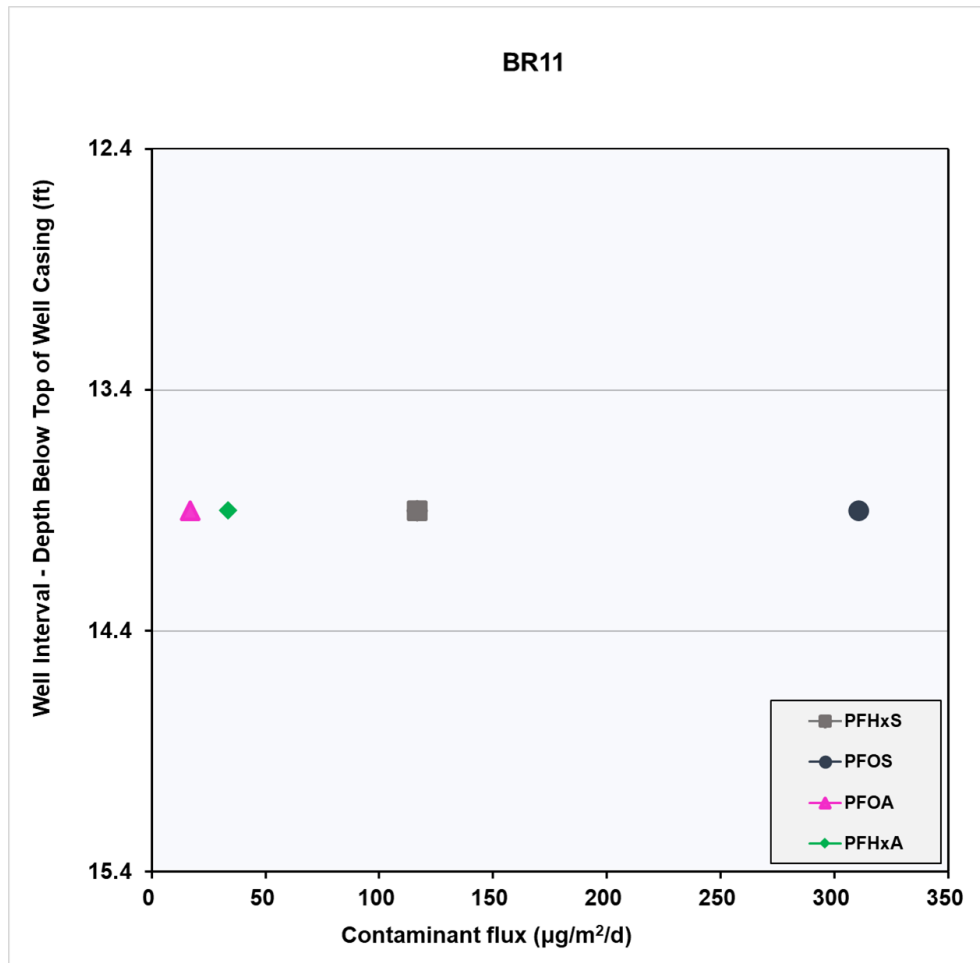


Figure 4. BR11 Contaminant flux ($\mu\text{g}/\text{m}^2/\text{d}$), Darcy velocity (cm/d), and depth below casing.

Table 7. BR11 Darcy velocity and mass flux data

	Well Interval - Depth Below Top of Well Casing (ft)
Mass Flux ($\mu\text{g}/\text{m}^2/\text{d}$)	13.9
PFOS	310.00
PFHxS	120.00
PFHxA	34.00
PFOA	17.00
PFPeS	9.35
PFNA	8.24
PFPeA	8.07
PFUnA	6.38
PFHpS	5.67
PFBS	5.24
PFHpA	3.47
6:2 FTS	2.83
PFOSA	2.46
PFBA	2.31
PFNS	1.27
PFDS	0.87
N-MeFOSAA	0.42
PFDA	0.25
8:2 FTS	0.13
5:3 FTCA	0.07
PFDoA	ND

($\mu\text{g}/\text{m}^2/\text{d}$)

Interpretation of Results:

The PFAS FluxTracer test provides contaminant flux and Darcy velocity, alternating between each measurement type in 1-foot intervals.

The reporting and detection limits for mass flux and Darcy velocity are the following:

Variable	Reporting limit
Darcy velocity	2 cm/day
	Detection limit
PFAS mass flux	0.01 $\mu\text{g}/\text{m}^2/\text{day}$

Flux derived concentration can be derived using the following equation:

$$GW \text{ concentration } (ng/L) = \frac{\text{Mass flux } (\mu\text{g}/\text{m}^2/\text{d})}{\text{Darcy}(cm/d) * 10} * 1000$$

Note. The Darcy velocity values implemented for the equations were extracted from the closest measured interval.

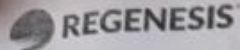
A non-applicable (N/A) is applied to the intervals where either the Darcy velocity, contaminant of concern, or both is less than the reporting limit.

A value of ND indicates that the analyte of concern is NOT detected above the method detection limit (MDL).

Description of Experimental Methods

A batch reactor is filled with 10 grams of sample from each 1-foot interval and is extracted for alcohol tracers using isobutanol followed by extraction of contaminants of concern. Batch reactors are then placed on a shaker for 24 hours. A 1 ml extract from each batch reactor is transferred to a liquid gas chromatography vial and each sample is analyzed by a GC-FID for alcohol tracers. The analytical method used to analyze contaminants of concern varies by the analyte of interest. Mass flux is determined by quantitatively extracting off and analyzing the captured PFAS from the specialized media and combining with data on the device dimensions and length of time it was deployed.

APPENDIX A – Chain of Custody (COC)



Well Evaluation Form



Site Information

Site Name
Tromsø Airport

Site Address
Flyplassvegen 31, 9016 Tromsø, Norway

Primary Contaminants of Concern
PFAS

Customer Name and Company
Avinor

Lead Regulatory Agency
Norwegian Environment Agency

Project Manager
Luke Walsh

Phone
[Blank]

Email
lwalsh@regenesisc.com

Deployment Date
[Blank]

Receiving Address
To be confirmed
Regenesisc FluxTracer Unit 3
Newbridge Trading Estate
Bristol BS4 4AX United Kingdom

Wells Targeted for FluxTracer Installation
Using the included guidelines, fill in the table below:

Well ID	Contaminant Concentrations	Device Length (ft)	1 Total Depth (ft)	2 Depth to Water Table (ft)	3 Depth to Top of Screen (ft)	4 Start of Target Interval (ft)
BR7	CVOCs < 50µg/L PFAS < 50ng/L	5 feet	21.9	15.7	11.4	16.3
BR9	CVOCs < 50µg/L PFAS < 50ng/L	10 feet	19.2	7.4	9.4	9.4
BR12	CVOCs < 50µg/L PFAS < 50ng/L	10 feet	24.6	12.5	11.5	11.4
BR13	CVOCs < 50µg/L PFAS < 50ng/L	10 feet	24.9	11.1	8.5	11.6
	CVOCs < 50µg/L PFAS < 50ng/L	-				

Installation and Retrieval

Well ID	Installation Date/Time	Retrieval Date/Time
BR7	09-26-25 11:52am	10-13-25 6:30AM
BR9 → MB3	09-27-25 08:11AM	10-13-25 7:40AM
BR12	09-26-25 11:27AM	10-13-25 07:00AM
BR13 → BR11	09-29-25 11:00am	10-13-25 07:15AM

Important Information

- I have reviewed the Measurement Guidelines and Example Installation
- I confirm the target well(s) total depth has been measured within the past 3 months and is not obstructed to this reported depth.
- I acknowledge that REGENESIS is not responsible for devices that become stuck due to improperly reported well depths, materials, or dimensions.

Initials: [Signature] Form not complete without initials

Chain of Custody
Please fill out this section before returning FluxTracer devices to REGENESIS:

Relinquished By	Date/Time	Received By	Date/Time
[Signature]	10-13-25 10:00 AM	[Signature]	10-25-25 11:50

Please submit completed form to lab@REGENESIS.com
For additional questions please contact (949) 366-8000

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Appendix D - Technical Information

SourceStop

SourceStop Technical Specification

SourceStop SDS

Stopping PFAS at the Source

Focused PFAS Source Zone Treatment Service Featuring SourceStop



Stopping PFAS at the Source

Focused PFAS Source Zone Treatments Featuring SourceStop

REGENESIS offers the most advanced technology and soil fixation processes to immobilize PFAS (i.e., Per- and polyfluoroalkyl substances) at the source, effectively halting their movement in groundwater away from source zones to prevent PFAS exposure risk.



REGENESIS' source zone treatments for PFAS incorporate SourceStop[™], a proprietary technology comprised of micron-scale (<2 µm) colloidal activated carbon (CAC) applied to PFAS source zones in liquid form. Developed by REGENESIS' team of Research and Development scientists, SourceStop uniformly coats and permeates soils, resulting in substantially reduced PFAS leaching compared to other sorption materials used in direct mixing applications.



REGENESIS' PFAS source treatments are designed and applied by REGENESIS Remediation Services (RRS). RRS brings more than a decade of soil remediation expertise to immobilize PFAS quickly and effectively at their source and prevent future exposure risk.





Background

Treating PFAS Sources to Reduce Exposure Risk

The identification of PFAS-impacted groundwater plumes and source zones continues with increased frequency. In many cases, these 'forever chemical' source zones contain a high concentration of PFAS in shallow soils, which contribute to the development of groundwater plumes and create PFAS exposure risk to potential receptors.

PFAS-impacted soils are expensive to dispose of or incinerate, and acceptance of either approach decreases as certain PFAS become regulated as hazardous substances by the US EPA. Groundwater contamination emanating from these source zones is difficult and costly to treat. Due to PFAS' persistence, mobility, and actionable clean-up levels in the parts per trillion, these soil source areas can sustain PFAS groundwater plumes for many decades.

REGENESIS PFAS source zone treatments are applied to vadose soils at the source to prevent PFAS plume formation resulting from precipitation infiltration and soil leaching. They may also be applied to the capillary fringe and upper saturated zone to facilitate a stable or declining plume condition, a sought-after element for managing a PFAS plume under a Monitored Natural Attenuation (MNA) remedial strategy. These PFAS source treatments, featuring SourceStop, reduce contaminant flux into groundwater and are synergistically combined with PlumeStop® barriers downgradient of the source to halt plume migration and minimize PFAS exposure risk.

PFAS Source Zone Remedial Applications

Flexible Treatment Options Tailored for Each Site

REGENESIS' source treatments provide a targeted and holistic approach to the different media of concern within a PFAS source zone and the different elements of a PFAS plume risk mitigation strategy.



Mitigating PFAS Source-Zones is Key to Minimizing PFAS Exposure Risk

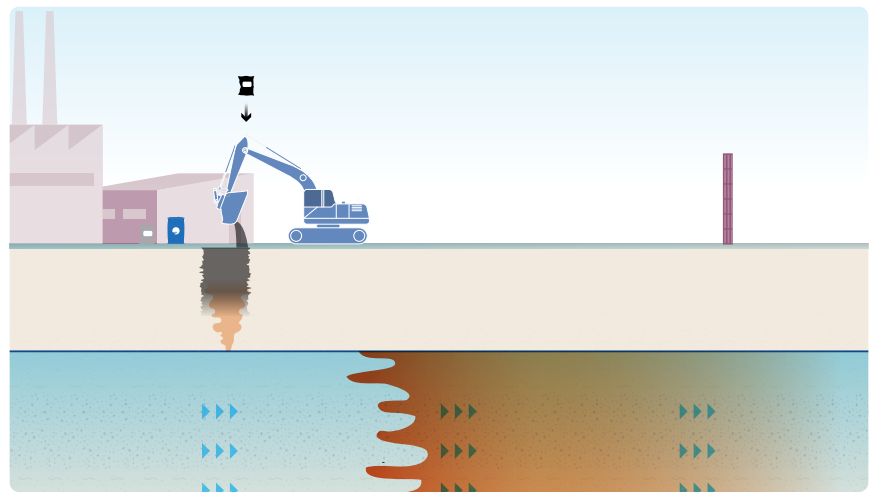
PFAS has been used in manufacturing and firefighting efforts for decades, resulting in potentially hundreds of thousands of PFAS release areas worldwide, where high levels of PFAS in soil and groundwater reside as long-term sources of groundwater contamination. These source areas include aqueous film-forming foams (i.e., AFFF) fire training sites, PFAS bulk chemical spill locations, Class B Firefighting System testing pads, oil and gas development sites, and metal-fume-suppression stations, to name a few. When left untreated, they can lead to extensive and persistent PFAS-contaminated groundwater plumes, posing unacceptable risks to human health and the environment.

PFAS' persistence and mobility allow them to travel far and wide in groundwater, resulting in plumes extending over long distances (i.e., miles/kilometers) and persisting over long timeframes (i.e., decades) if left untreated. Where possible, identifying PFAS source areas and quickly remediating them is essential for mitigating and effectively reducing long-term PFAS exposure risks and liabilities.

Soil Source Treatment

REGENESIS provides *in situ* sequestration and stabilization of PFAS impacted soils in the source area. This is completed by mixing a site-specific blend of amendments into the target soils, dramatically reducing the leachability of PFAS attached to the soils and minimizing precipitation infiltration while preventing further vertical migration.

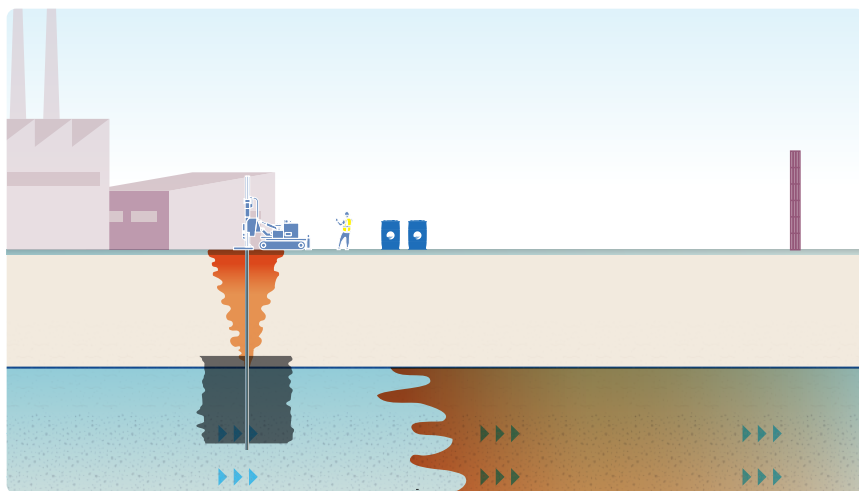
In addition to the blend of amendments used, SourceStop™ colloidal activated carbon (CAC) is applied to penetrate into the underlying soils and coat vertical flow paths to capture any residual contamination. The innovative treatment enhances the natural attenuation (ENA) of the plume and avoids impact on downgradient receptors. The treatment is a sustainable, passive solution safely and easily applied requiring no ongoing operational costs, and generating no waste.



In situ mixing of amendments in the vadose zone soils with SourceStop applied to base.

Groundwater Source Treatment

SourceStop is injected under low pressure into the groundwater and capillary fringe at the PFAS source zone, converting treated aquifer materials into an *in situ* purifying filter and rapidly removing high levels of PFAS from the groundwater.



In situ injection of SourceStop in the groundwater and capillary fringe.

Combining Source Zone Treatments with Downgradient Plume Treatments



Site objectives often require groundwater remedial targets to be met in a short timeframe and with added protections against PFAS exposure and liability risk. PFAS source treatment remedies can be combined with PlumeStop barriers installed downgradient of the source to quickly achieve these objectives. PlumeStop® barriers are backed by a PlumeShield™ warranty program to provide certainty and peace of mind.

Completing a PFAS Source Zone Treatment on your Site

Working with REGENESIS



Step 1 - Analysis

A soil sample is taken and tested in the REGENESIS laboratory using a blend of amendments, including powdered activated carbon, soil binding agents (e.g., Portland cement), and SourceStop.



Step 2 - Design

Upon receiving site data, REGENESIS will develop a soil fixation process design to ensure optimized permeability reduction and PFAS fixation within the target source zone. Site-specific soil sampling and amendment optimization performed by the REGENESIS laboratory may be included. The resulting design will specify the volume and optimum placement of SourceStop and the amount and type of fixation additives to be mixed into source zone soils.



Step 3 - Application

Implementation of the source zone treatment is conducted by RRS under the direction of REGENESIS' soil mixing experts.



Step 4 - Performance

Following treatment, the source area contamination is immobilized, and the PFAS groundwater plume, if present, attenuates.

Benefits

Complete, Rapid, and Sustainable Results Delivered Cost-Effectively

SourceStop, a high-concentration, micron-scale colloidal activated carbon, is utilized on REGENESIS' PFAS source zone treatments, benefitting your project in numerous ways.



Immediate, Cost-Effective and Long-Lasting Treatments

Immediately reduces PFAS leaching potential from source zone soils and groundwater. Sustained treatment minimizes PFAS exposure risk over the long term. SourceStop is significantly more effective at reducing PFAS leaching than other direct-mixing sorptive materials.



Substantial Cost Savings

Remedies can be implemented at a fraction of the cost of alternatives like soil excavation and removal, resulting in dramatic project cost savings.



Highly Flexible

Flexible approaches are employed to provide the most cost-effective solution tailored for each site. Materials are applied using a range of direct mixing or injection methods.



Sustainable with No Hazardous Waste Streams Generated

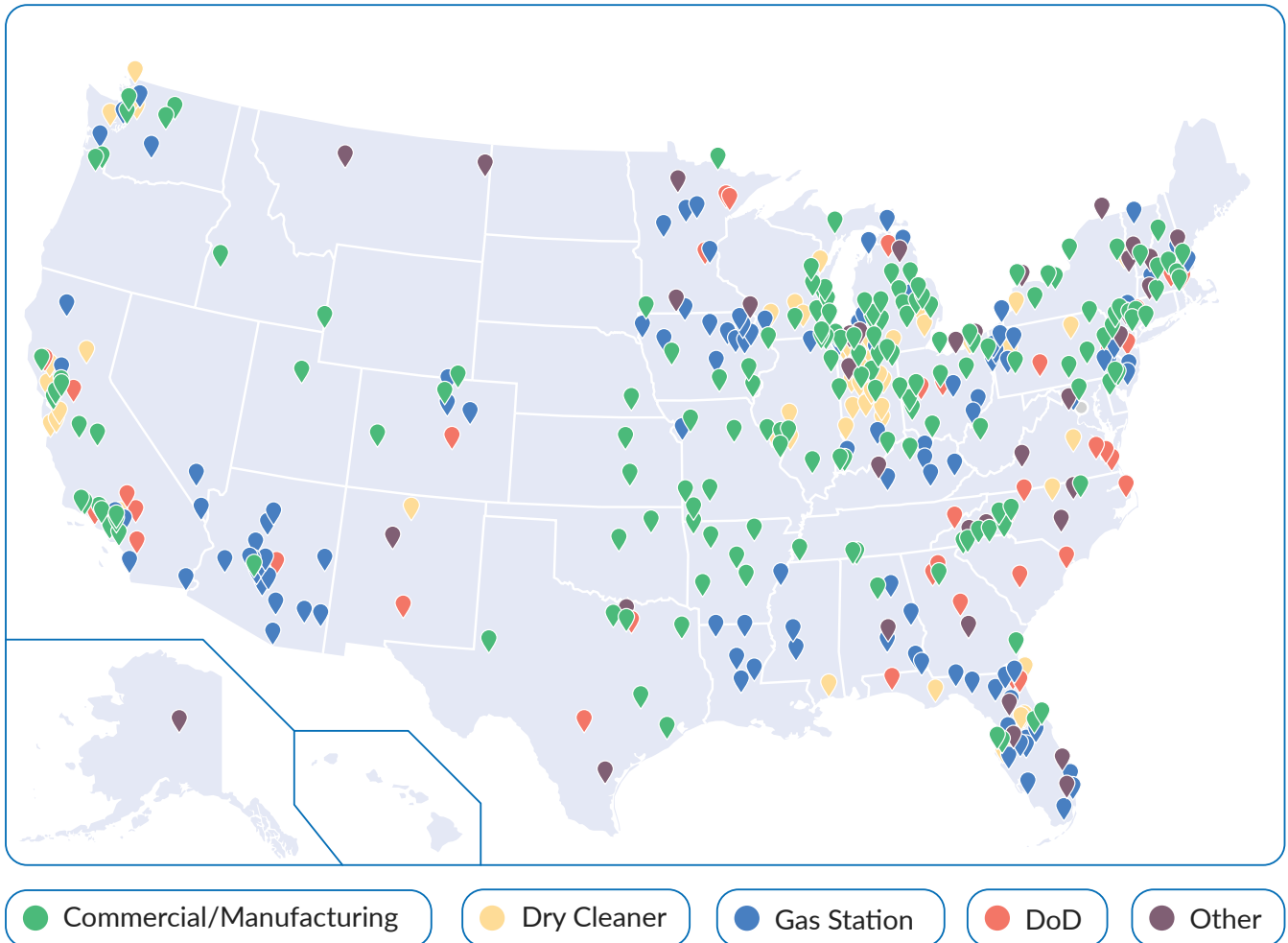
REGENESIS PFAS source zone treatments are sustainable, avoiding the generation of hazardous waste streams, energy consumption, and emissions.



Combine with PlumeStop Plume Treatments backed by PlumeShield

REGENESIS PFAS source zone remedies can be combined with PlumeStop permeable reactive barriers to cut off the plume and provide rapid offsite risk removal. Treatment performance warranty options are available through the PlumeShield warranty program.

RRS Has Completed a Wide Range of Remediation Works at Hundreds of Sites Across the Country



800+

Applications Completed

100+

Applications Per Year

13 Million+

Gallons Applied

-5° F

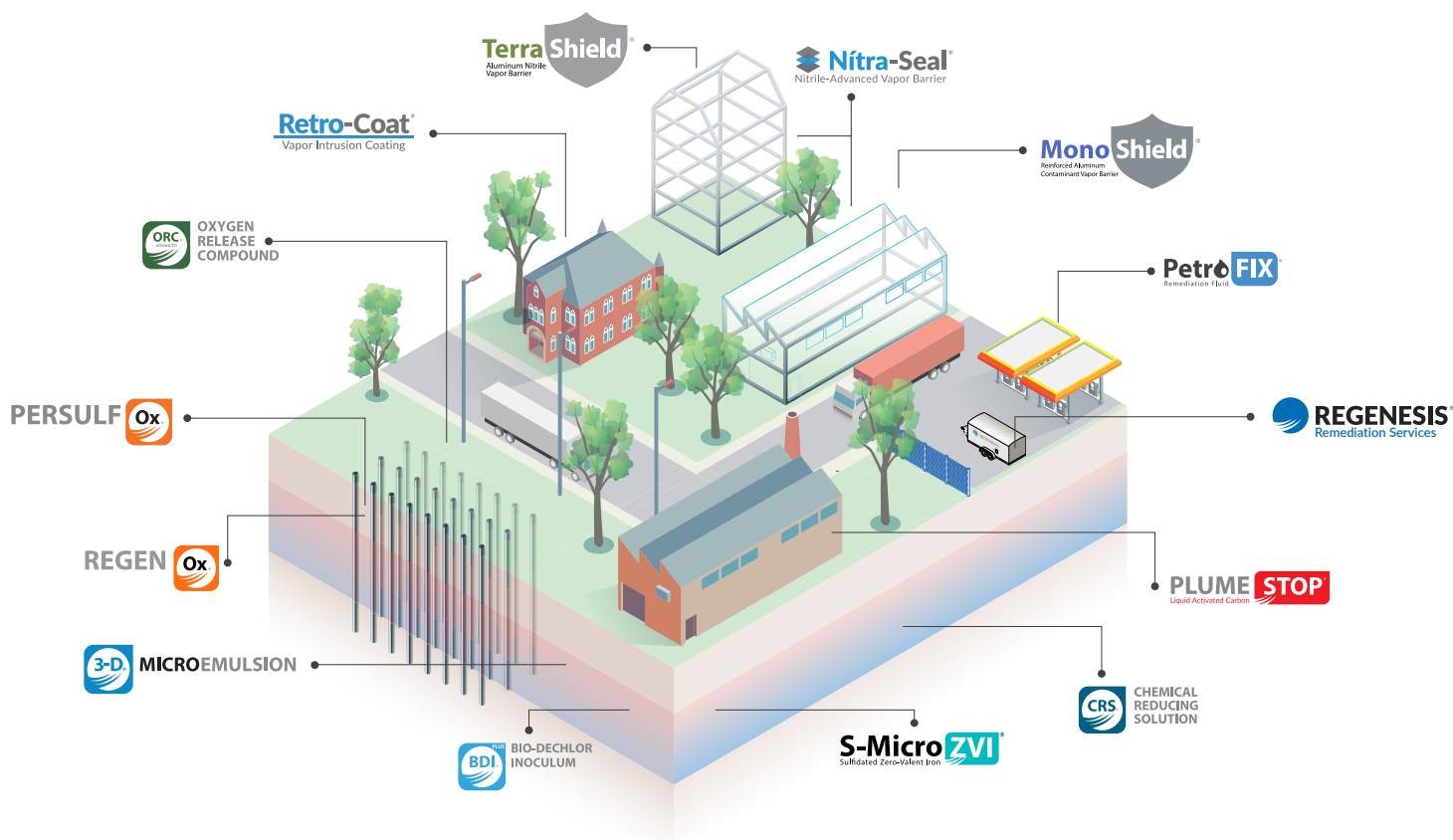
Lowest Project Temperature

15 Million+

Pounds Applied

123° F

Highest Project Temperature



About REGENESIS

At REGENESIS we value innovation, technology, expertise and people which together form the unique framework we operate in as an organization. We see innovation and technology as inseparably linked with one being born out of the other.

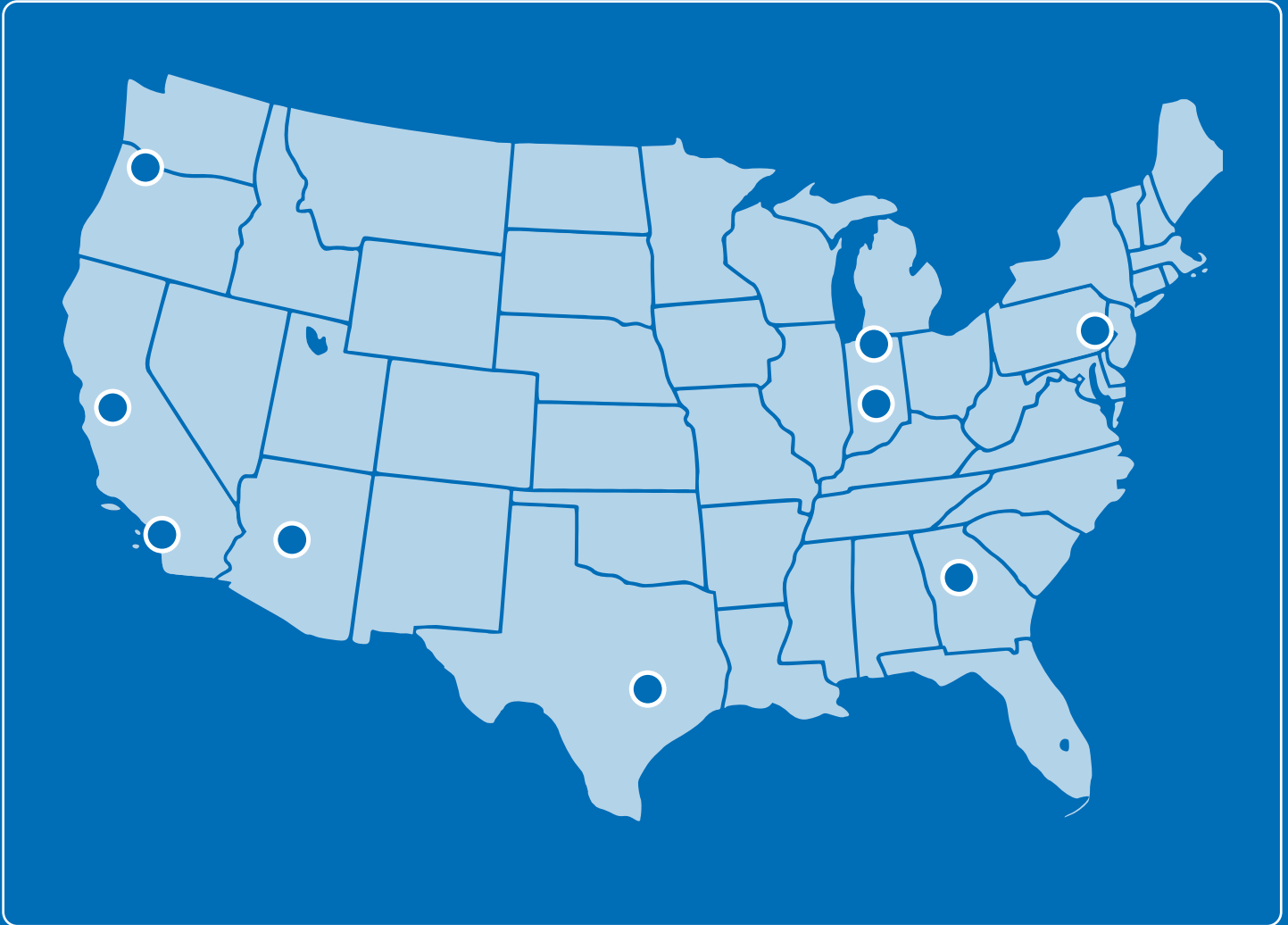
Inherently, innovation imparts new and better ways of thinking and doing. For us this means delivering expert environmental solutions in the form of the most advanced and effective technologies and services available today.

We value expertise, both our customers' and our own. We find that when our experienced staff collaborates directly with customers on complex problems there is a high potential for success including savings in time, resources and cost.

At REGENESIS we are driven by a strong sense of responsibility to the people charged with managing the complex environmental problems we encounter and to the people involved in developing and implementing our technology-based solutions. We are committed to investing in lasting relationships by taking time to understand the people we work with and their circumstances. We believe this is a key factor in achieving successful project outcomes.

We believe that by acting under this set of values, we can work with our customers to achieve a cleaner, healthier, and more prosperous world.

We're Ready to Help You Find the Right Solution For Your Site



Global Headquarters

1011 Calle Sombra
San Clemente, CA 92673 USA

Ph: (949) 366-8000
Fax: (949) 366-8090

Locations

San Clemente, CA
Sacramento, CA
Phoenix, AZ
Austin, TX
South Bend, IN

Indianapolis, IN
Philadelphia, PA
Atlanta, GA
Vancouver, WA



SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Trade name or designation of the mixture SourceStop®

Registration number -

Synonyms None.

Issue date 25-May-2022

Version number 01

Revision date -

Supersedes date -

1.2. Relevant identified uses of the substance or mixture and uses advised against

Identified uses Soil and Groundwater Remediation.

Uses advised against None known.

1.3. Details of the supplier of the safety data sheet

Company name REGENESIS
Address Cambridge House
 Henry Street
 Bath, Somerset
 BA1 1BT
 United Kingdom

General information +44 (0) 1225 618161

E-mail CustomerService@regenesisc.com

1.4. Emergency telephone number

National Health Service (NHS) 111 (Available 24 hours a day). SDS/Product information may not be available for the Emergency Service.)

CHEMTREC For Dangerous Goods Incidents ONLY (spill, leak, fire, exposure or accident), call CHEMTREC 24/7 at:

International +1 703-741-5970

USA, Canada (+)1-800-424-9300

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

The mixture has been assessed and/or tested for its physical, health and environmental hazards and the following classification applies.

Classification according to Regulation (EC) No 1272/2008 as amended

This mixture does not meet the criteria for classification according to Regulation (EC) 1272/2008 as amended.

2.2. Label elements

Label according to Regulation (EC) No. 1272/2008 as amended

Contains: Activated Carbon, Proprietary Additives, Sodium bisulphite.

Hazard pictograms None.

Signal word None.

Hazard statements The mixture does not meet the criteria for classification.

Precautionary statements

Prevention Observe good industrial hygiene practices.

Response Wash hands after handling.

Storage Store away from incompatible materials.

Disposal Dispose of waste and residues in accordance with local authority requirements.

Supplemental information on the label EUH031 - Contact with acids liberates toxic gas.

2.3. Other hazards

This mixture does not contain substances assessed to be vPvB / PBT according to Regulation (EC) No 1907/2006, Annex XIII.

SECTION 3: Composition/information on ingredients

3.2. Mixtures

General information

Chemical name	%	CAS-No. / EC No.	REACH Registration No.	Index No.	Notes
Activated Carbon <10 µm	30 - 40	7440-44-0 231-153-3	-	-	#
Classification: -					
Proprietary Additives	≤ 4	- -	-	-	
Classification: Eye Irrit. 2;H319					
Sodium bisulphite	≤ 2	7631-90-5 231-548-0	-	016-064-00-8	#
Classification: Acute Tox. 4;H302					

List of abbreviations and symbols that may be used above

#: This substance has workplace exposure limit(s).

Composition comments

All concentrations are in percent by weight unless otherwise indicated.
Components not listed are either non-hazardous or are below reportable limits.
The specific identities of some of the components of this product are being withheld as trade secrets. However, all pertinent hazards are addressed in this SDS.

SECTION 4: First aid measures

General information

Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance.

4.1. Description of first aid measures

Inhalation	Move to fresh air. Call a physician if symptoms develop or persist.
Skin contact	Wash off with soap and water. Get medical attention if irritation develops and persists.
Eye contact	Rinse with water. Get medical attention if irritation develops and persists.
Ingestion	Rinse mouth. Get medical attention if symptoms occur.

4.2. Most important symptoms and effects, both acute and delayed

Direct contact with eyes may cause temporary irritation.

4.3. Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

SECTION 5: Firefighting measures

General fire hazards

This material will not burn until the water has evaporated. Residue can burn.

5.1. Extinguishing media

Suitable extinguishing media	Use fire-extinguishing media appropriate for surrounding materials.
Unsuitable extinguishing media	None known.

5.2. Special hazards arising from the substance or mixture

During fire, gases hazardous to health may be formed. Combustion products may include: carbon oxides, sulfur oxides. Dust accumulation from dried product may form combustible dust concentrations in air.

5.3. Advice for firefighters

Special protective equipment for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Special fire fighting procedures	Move containers from fire area if you can do so without risk.

Specific methods

Use standard firefighting procedures and consider the hazards of other involved materials.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

For non-emergency personnel	Wear appropriate personal protective equipment.
For emergency responders	Keep unnecessary personnel away. Use personal protection recommended in Section 8 of the SDS.

6.2. Environmental precautions	Avoid discharge into drains, water courses or onto the ground.
6.3. Methods and material for containment and cleaning up	Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water. Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use.
6.4. Reference to other sections	For personal protection, see section 8 of the SDS. For waste disposal, see section 13 of the SDS.

SECTION 7: Handling and storage

7.1. Precautions for safe handling	Avoid prolonged exposure. Observe good industrial hygiene practices.
7.2. Conditions for safe storage, including any incompatibilities	Store in original tightly closed container. Store away from incompatible materials (see section 10 of the SDS).
7.3. Specific end use(s)	Remediation of contaminants in soil and groundwater.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits

UK. EH40 Workplace Exposure Limits (WELs)

Components	Type	Value	Form
Activated Carbon <10 µm (CAS 7440-44-0)	TWA	4 mg/m3	Respirable dust.
		10 mg/m3	Inhalable dust.
Sodium bisulphite (CAS 7631-90-5)	TWA	5 mg/m3	

Biological limit values No biological exposure limits noted for the ingredient(s).

Recommended monitoring procedures Follow standard monitoring procedures.

Derived no effect levels (DNELs) Not available.

Predicted no effect concentrations (PNECs) Not available.

8.2. Exposure controls

Appropriate engineering controls Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Individual protection measures, such as personal protective equipment

General information Personal protection equipment should be chosen according to the CEN standards and in discussion with the supplier of the personal protective equipment.

Eye/face protection Wear safety glasses with side shields (or goggles).

Skin protection

- Hand protection Wear appropriate chemical resistant gloves. Wear suitable gloves tested to EN374. Suitable gloves can be recommended by the glove supplier. Glove material: Rubber or vinyl-coated. Use gloves with breakthrough time of >480 minutes. Minimum glove thickness >0.11 mm.

- Other Wear suitable protective clothing.

Respiratory protection In case of insufficient ventilation, wear suitable respiratory equipment.

Thermal hazards Wear appropriate thermal protective clothing, when necessary.

Hygiene measures Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

Environmental exposure controls Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. Fume scrubbers, filters or engineering modifications to the process equipment may be necessary to reduce emissions to acceptable levels.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance

Physical state	Liquid.
Form	Aqueous suspension.
Colour	Black.
Odour	Odourless.
Odour threshold	Property has not been measured.
pH	7 - 9
Melting point/freezing point	Property has not been measured.
Initial boiling point and boiling range	Property has not been measured.
Flash point	Property has not been measured.
Evaporation rate	Property has not been measured.
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Explosive limit - lower (%)	Property has not been measured.
Explosive limit – upper (%)	Property has not been measured.
Vapour pressure	Property has not been measured.
Vapour density	Property has not been measured.
Relative density	Property has not been measured.
Solubility(ies)	
Solubility (water)	Miscible
Partition coefficient (n-octanol/water)	Property has not been measured.
Auto-ignition temperature	Property has not been measured.
Decomposition temperature	Property has not been measured.
Viscosity	Property has not been measured.
Explosive properties	Not explosive.
Oxidising properties	Not oxidising.
9.2. Other information	
Kinematic viscosity	Property has not been measured.

SECTION 10: Stability and reactivity

10.1. Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
10.2. Chemical stability	Material is stable under normal conditions.
10.3. Possibility of hazardous reactions	Contact with acids liberates toxic gas.
10.4. Conditions to avoid	Contact with incompatible materials.
10.5. Incompatible materials	Acids. Chlorine. Strong oxidising agents.
10.6. Hazardous decomposition products	No hazardous decomposition products are known.

SECTION 11: Toxicological information

General information	Occupational exposure to the substance or mixture may cause adverse effects.
Information on likely routes of exposure	
Inhalation	Spray mist may irritate the respiratory system. For dry material: Dust may irritate respiratory system.
Skin contact	Prolonged or repeated exposure may cause minor irritation.
Eye contact	Direct contact with eyes may cause temporary irritation.
Ingestion	May cause discomfort if swallowed.
Symptoms	Direct contact with eyes may cause temporary irritation.
11.1. Information on toxicological effects	
Acute toxicity	Not expected to be acutely toxic.

Components	Species	Test Results
Activated Carbon <10 µm (CAS 7440-44-0)		
<u>Acute</u>		
Oral		
LD50	Rat	> 10000 mg/kg
Skin corrosion/irritation	Based on available data, the classification criteria are not met.	
Serious eye damage/eye irritation	Based on available data, the classification criteria are not met.	
Respiratory sensitisation	Based on available data, the classification criteria are not met.	
Skin sensitisation	Based on available data, the classification criteria are not met.	
Germ cell mutagenicity	Based on available data, the classification criteria are not met.	
Carcinogenicity	Based on available data, the classification criteria are not met.	
IARC Monographs. Overall Evaluation of Carcinogenicity		
Sodium bisulphite (CAS 7631-90-5)		3 Not classifiable as to carcinogenicity to humans.
Reproductive toxicity	Based on available data, the classification criteria are not met.	
Specific target organ toxicity - single exposure	Based on available data, the classification criteria are not met.	
Specific target organ toxicity - repeated exposure	Based on available data, the classification criteria are not met.	
Aspiration hazard	Based on available data, the classification criteria are not met.	
Mixture versus substance information	No information available.	
Other information	Contains an ingredient known to produce adverse effects in a small percentage of hypersensitive individuals exhibited as respiratory distress and allergic skin reactions.	

SECTION 12: Ecological information

12.1. Toxicity	The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.
12.2. Persistence and degradability	No data is available on the degradability of any ingredients in the mixture.
12.3. Bioaccumulative potential	No data available.
Partition coefficient n-octanol/water (log Kow)	Not available.
Bioconcentration factor (BCF)	Not available.
12.4. Mobility in soil	The product is miscible with water. May spread in water systems.
12.5. Results of PBT and vPvB assessment	This mixture does not contain substances assessed to be vPvB / PBT according to Regulation (EC) No 1907/2006, Annex XIII.
12.6. Other adverse effects	No data available.

SECTION 13: Disposal considerations

13.1. Waste treatment methods	
Residual waste	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner.
Contaminated packaging	Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.
EU waste code	The Waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Disposal methods/information	Collect and reclaim or dispose in sealed containers at licensed waste disposal site.
Special precautions	Dispose in accordance with all applicable regulations.

SECTION 14: Transport information

ADR	
14.1. - 14.6.: Not regulated as dangerous goods.	
RID	
14.1. - 14.6.: Not regulated as dangerous goods.	
ADN	
14.1. - 14.6.: Not regulated as dangerous goods.	

IATA

14.1. - 14.6.: Not regulated as dangerous goods.

IMDG

14.1. - 14.6.: Not regulated as dangerous goods.

14.7. Transport in bulk Not established.
according to Annex II of
MARPOL 73/78 and the IBC
Code

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Retained direct EU regulations

Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex I and II, as amended

Not listed.

Regulation (EU) 2019/1021 On persistent organic pollutants (recast), as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 1 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 2 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 3 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex V as amended

Not listed.

Regulation (EC) No. 166/2006 Annex II Pollutant Release and Transfer Registry, as amended

Not listed.

Regulation (EC) No. 1907/2006, REACH Article 59(10) Candidate List as currently published by ECHA

Not listed.

Authorisations

Regulation (EC) No. 1907/2006, REACH Annex XIV Substances subject to authorization, as amended

Not listed.

Restrictions on use

Regulation (EC) No. 1907/2006, REACH Annex XVII Substances subject to restriction on marketing and use as amended

Not listed.

Other EU regulations

Directive 2012/18/EU on major accident hazards involving dangerous substances, as amended

Not listed.

Other regulations

This product is classified and labelled in accordance with the retained CLP Regulation (EC) No 1272/2008, as amended for Great Britain. This Safety Data Sheet is compiled in accordance with REACH Regulation (EC) No 1907/2006, as amended by UK REACH Regulations SI 2019/758.

Follow the requirements of the Control of Substances Hazardous to Health Regulations 2002 [SI 2002/2677], as amended, when using this material.

15.2. Chemical safety assessment No Chemical Safety Assessment has been carried out.

SECTION 16: Other information

List of abbreviations

ADN: European Agreement Concerning the International Carriage of Dangerous Goods by Inland Waterways.
ADR: European Agreement Concerning the International Carriage of Dangerous Goods by Road.
CAS: Chemical Abstract Service.
CEN: European Committee for Standardization (Comité Européen de Normalisation).
IATA: International Air Transport Association.
IBC Code: International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk.
IMDG Code: International Maritime Dangerous Goods Code.
MARPOL: International Convention for the Prevention of Pollution from Ships.
PBT: Persistent, bioaccumulative, toxic.
RID: Regulations concerning the International Carriage of Dangerous Goods by Rail.
STEL: Short-Term Exposure Limit.

References**Information on evaluation method leading to the classification of mixture****Full text of any statements, which are not written out in full under sections 2 to 15****Training information****Disclaimer**

TWA : Time Weighed Average Value.

vPvB: very Persistent, very Bioaccumulative.

ECHA: European Chemical Agency.

The classification for health and environmental hazards is derived by a combination of calculation methods and test data, if available.

H302 Harmful if swallowed.

H319 Causes serious eye irritation.

Follow training instructions when handling this material.

Regenesis cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.