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EmConSoil
a Multi-stakeholder Network
for Emerging Soil Contaminants

Pilot and full-scale treatment of PFAS-contaminated ground water by means of different types of (innovative) adsorbents

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PFAS removal in Doetinchem

Ground water treatment
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Programme

1. Background Doetinchem
2. Pilot Voltastraat:
    1. Adsorbents
    2. Research set-up
    3. Results
3. Full-scale Iseldoks
4. Conclusion

1. Background Voltatraat

- Rutgers Milieu BV, fire extinguisher recycling
- Aqueous Film Forming Foam (AFFF)
- 1300 IBC’s in 10 years

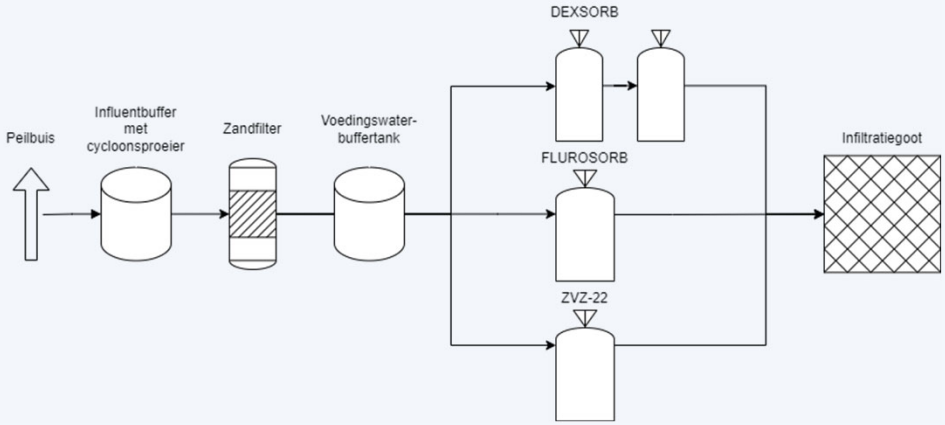





2.1 Adsorbents

	Producer	Capacity	Single use
Activated carbon	Norit	+	X
DEXSORB	Cyclopure	++	
FLUOROSORB	Cetco	+++	X
ZVZ-22	Viritec	++	X

2.2 Research set-up Voltastraat

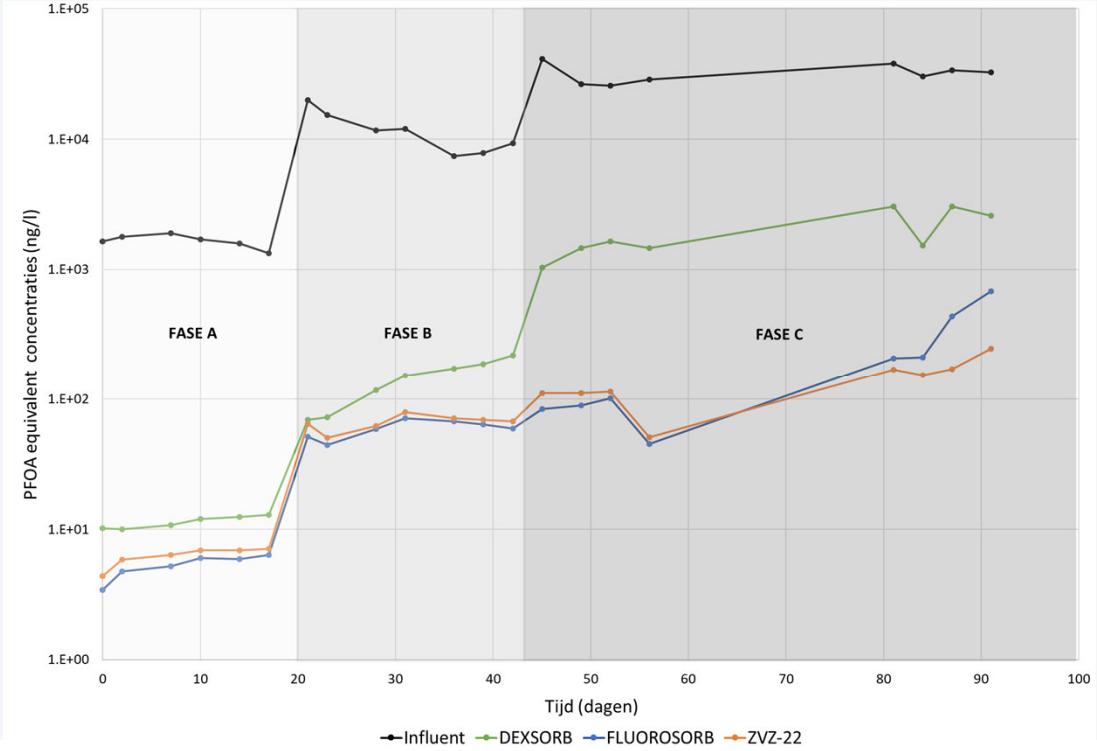


- Difference in medium capacity
- 3 phases of 3 weeks
- Each phase a different extraction location with a higher PFAS concentration

2.2 Incoming concentrations per phase

PFAS	Unit	Phase A (low)	Phase B (medium)	Phase C (high)
PFOA total	ng/l	123	719	3100
PFOS total	ng/l	580	2500	5700
6:2 FTS	ng/l	247	7076	34250
PFBA	ng/l	59	419	2750
PFPeA	ng/l	178	1886	4500
PFHxA	ng/l	168	2143	13000
PFHpA	ng/l	75	549	2650
PFNA	ng/l	1	2	17
4:2 FTS	ng/l	1	36	155

2.3 Results PFAS-concentrations



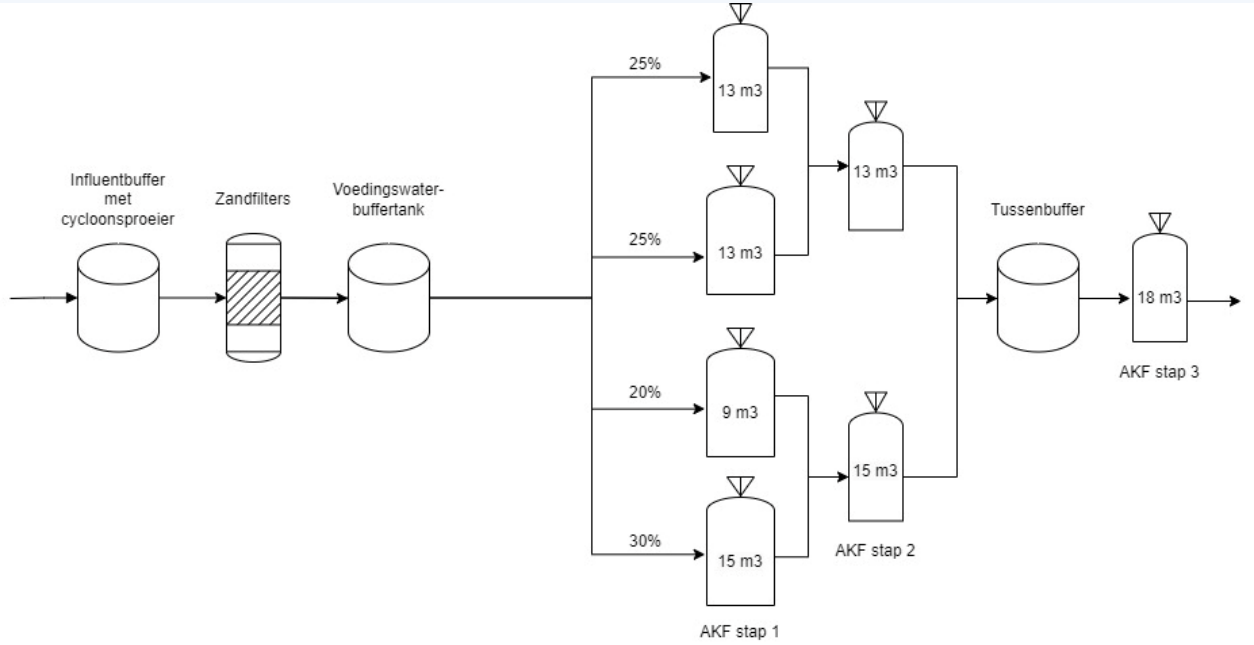
3.1 Background Iseldoks

- Former fire station contaminated groundwater with PFAS
- Construction site → groundwater drainage from construction pits
- PFAS removal from drainage water before discharge in river

3.2 Project dimensions

	DOK2	DOK5	DOK1 (ongoing)
Drainage duration	2 weeks	5 months	5 months
Drainage flow (m^3/h)	50	100	240
Treatment flow (m^3/h)	50	100	100

3.3 Treatment set-up

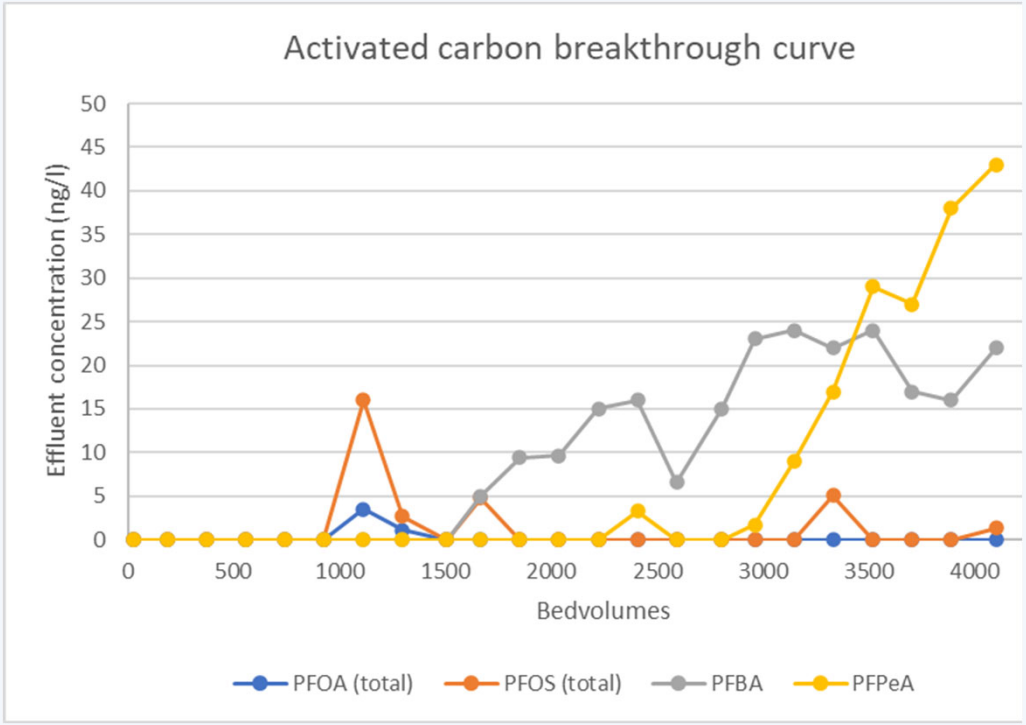


3.4 Incoming concentrations (DOK5)

PFAS	Unit	Min	Average	Max
PFOA total	ng/l	4,5	32,9	138
PFOS total	ng/l	6,3	173,7	840
6:2 FTS	ng/l	1,3	76,1	440
PFBA	ng/l	4,8	21,5	73
PFPeA	ng/l	2	73,7	380
PFHxA	ng/l	2,5	52,2	250
PFHpA	ng/l	1,6	17,7	71
PFNA	ng/l	<0,50	-	2,4
4:2 FTS	ng/l	<0,50	-	<2,8
Total*	ng/l	24	448	2194

3.5 Results

- Activated carbon filtration has proven to be suitable for the removal of PFAS
- Breakthrough of short chain PFAS up to 3 times faster than long chain PFAS



4. Conclusions

1. Successful removal of PFAS with different types of adsorbents
2. Short chain PFAS removal is limited
3. Combination of different adsorbents could be cost efficient
4. Technique and material selection depends on project specifications

Questions?

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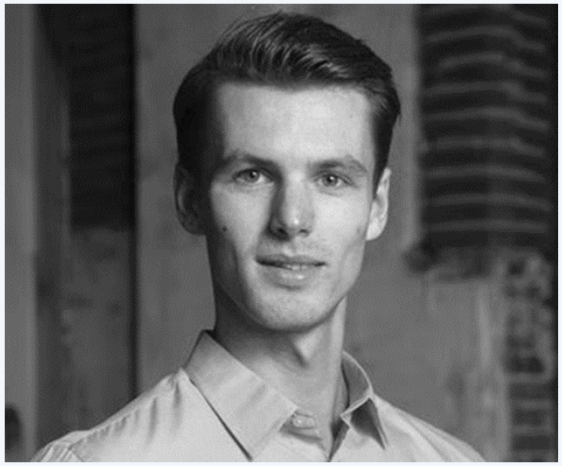

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