

Dealing with PFAS in the Netherlands and Belgium



Flanders
State of
the Art

- ▶ Herman Teirlinck Building, Brussels
- ▶ 18/19 november 2018

EXPERTISECENTRUM
PFAS 

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 **ARCADIS** | Design & Consultancy
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OVAM

Introduction speaker

- Jonas Rabaey
 - Witteveen+Bos Belgium NV (formerly known as MAVA AES NV) since 2012
 - Projectmanager for the OVAM project “PFAS in the Flanders region”
- Tessa Pancras
 - Arcadis Nederland B.V. & Expertisecentrum PFAS
 - In-situ remediation specialist since 2001
 - PFAS since 2011
 - Main author of the Concauwe document and Knowledge Document PFAS NL

Presentation content

1. Two projects
 1. PFAS in the Netherlands
 2. OVAM Project on PFAS
2. Introduction on PFAS
3. Sampling campaign B/NL
4. Points of interests on sampling
5. Results sampling campaign B/NL
6. General conclusions

Why these projects?

- 2015: PFAS issue in the environment in the Netherlands and Belgium ?
- 2015: Centre of Expertise on PFAS
 - Witteveen+bos RI
 - Arcadis
 - TTE consultants
- 2016-2018: Project; A framework for dealing with PFAS in the Netherlands
- 2017-2018: Project; PFAS in the Flanders region

PFAS in the Netherlands

- Several PFAS projects in collaboration with:
 - National Institute for Public Health and the Environment (RIVM)
 - Numerous government authorities (municipalities, provinces)
- Specific project commissioned by the municipality of Dordrecht and the ministry of infrastructure and water
 - Knowledge document
 - Toxicity of PFAS – RIVM
 - Policy evaluation
 - Site sampling
 - Sampling at suspected sites
 - Gathering all available data about presence of PFAS in the Netherlands in groundwater, surface water, drinking water and soil

OVAM project on PFAS

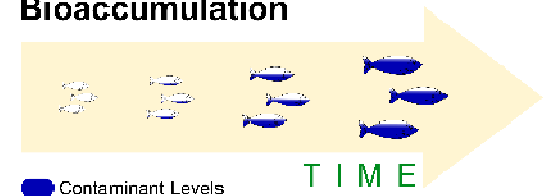
- Exploratory study
- 2017
- Consortium of Arcadis Belgium NV and Witteveen+bos Belgium NV and support of the Dutch colleagues from the Center of Expertise
- Focus on presence of PFAS in soil, groundwater and sediments in Flanders
 - Literature study
 - types of PFAS
 - production
 - behavior and toxicity
 - Sample collection on risk locations



Introduction PFAS

- PFAS = poly- and perfluoroalkyl substances → “umbrella term”
 - PFAS group contain more than 6000 individual substances
 - PFOA, PFOS best known
- Anthropogenic, very stable and persistent
 - C-F bonds are very strong
 - Good stability under heat and chemical stress
→ Bioaccumulation!
- Soluble in water
- Easily bind to variety of materials (hydrophobic/lipophobic – hydrophilic)

Bioaccumulation

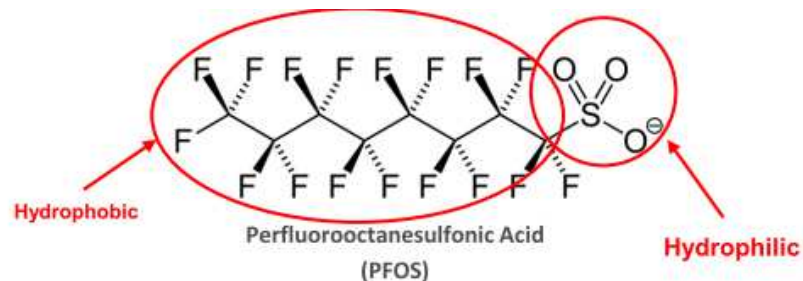


Contaminant Levels



Contaminant Levels

Biomagnification



Introduction PFAS

- Used in wide variety of products
 - Firefighting foams (AFFF)
 - Fabrics (ea Carpets, jackets, waterproofsprays...)
 - Food packaging (Pizza boxes, food wraps, aluminum foil...)
 - Kitchenware (pans (PTFE), plastic cutlery,...)
 - Health care products, insect repellents,...
 - Metal industry (reduce surface tension during chromium plating)
- In use since approx. 1960
 - likely ubiquitous in soil, groundwater and sludge
- only limited data available in Belgium and the Netherlands
 - additional research efforts necessary

Sampling campaigns B/NL

- Risk location selection for sample taking
 - fire training areas
 - Industrial
 - Provincial training centers
 - Local
 - Calamity zones (fire)
 - Metal industry
 - Waste deposit sites
 - Sites around a PTFE production location
- In total 24 sites were sampled in Flanders and 29 in the Netherlands
- the large amount of surveyed sites concerned firefighters training areas
- Results were anonymous

points of interest sampling

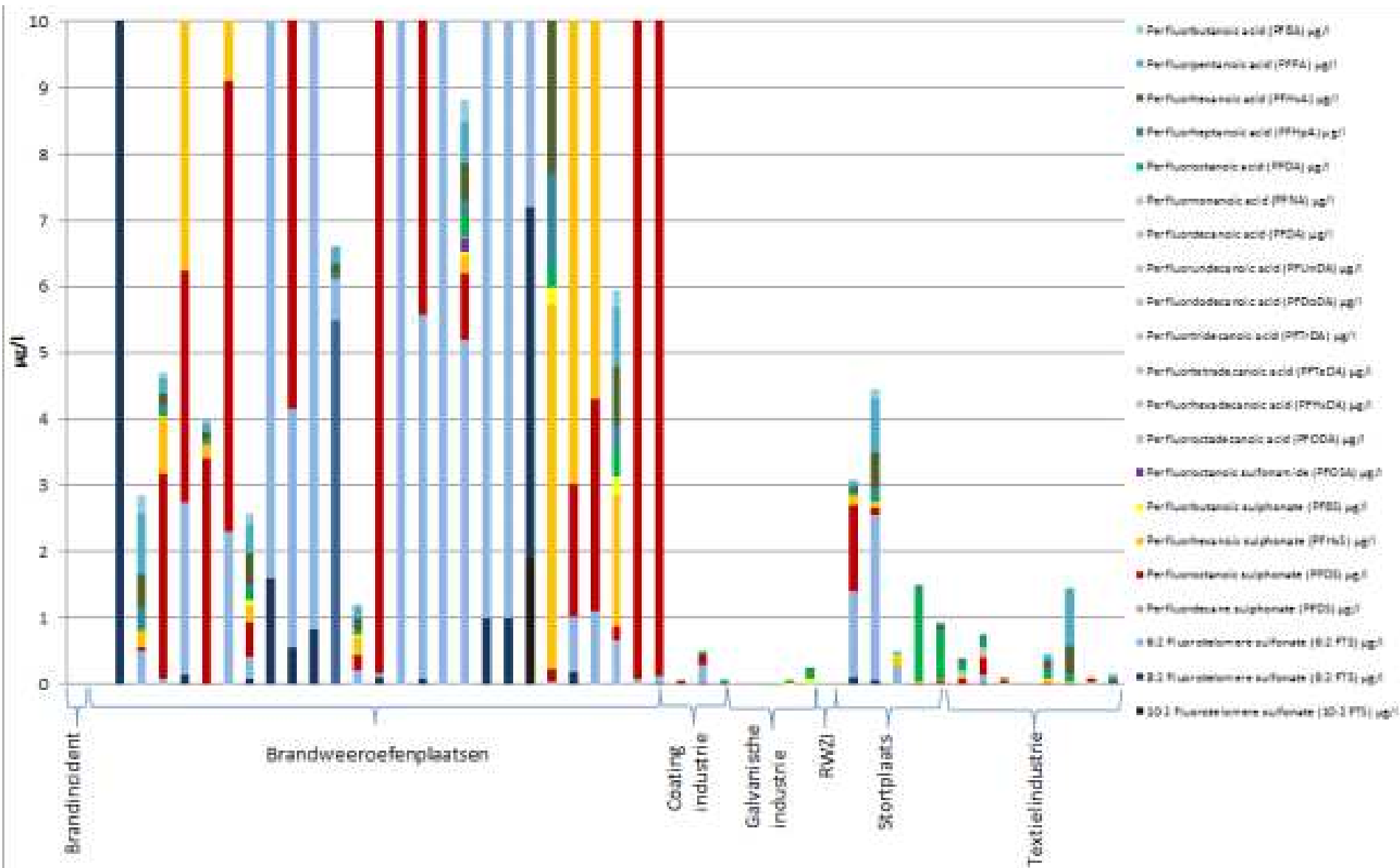


Results sampling campaign BE

- PFAS (sum of all PFAS components measured by the laboratory in a sample) occur in elevated concentrations in groundwater
 - 71% higher than 100 x reporting limit (0,5 µg/l)
 - 42% higher than 1000 x reporting limit (> 5 µg/l)
 - Also other compounds
 - 6:2-FTS → is a precursor, can degrade to persistent perfluorocompounds
 - Shorter chains
 - Mainly carbon acids
 - more mobile

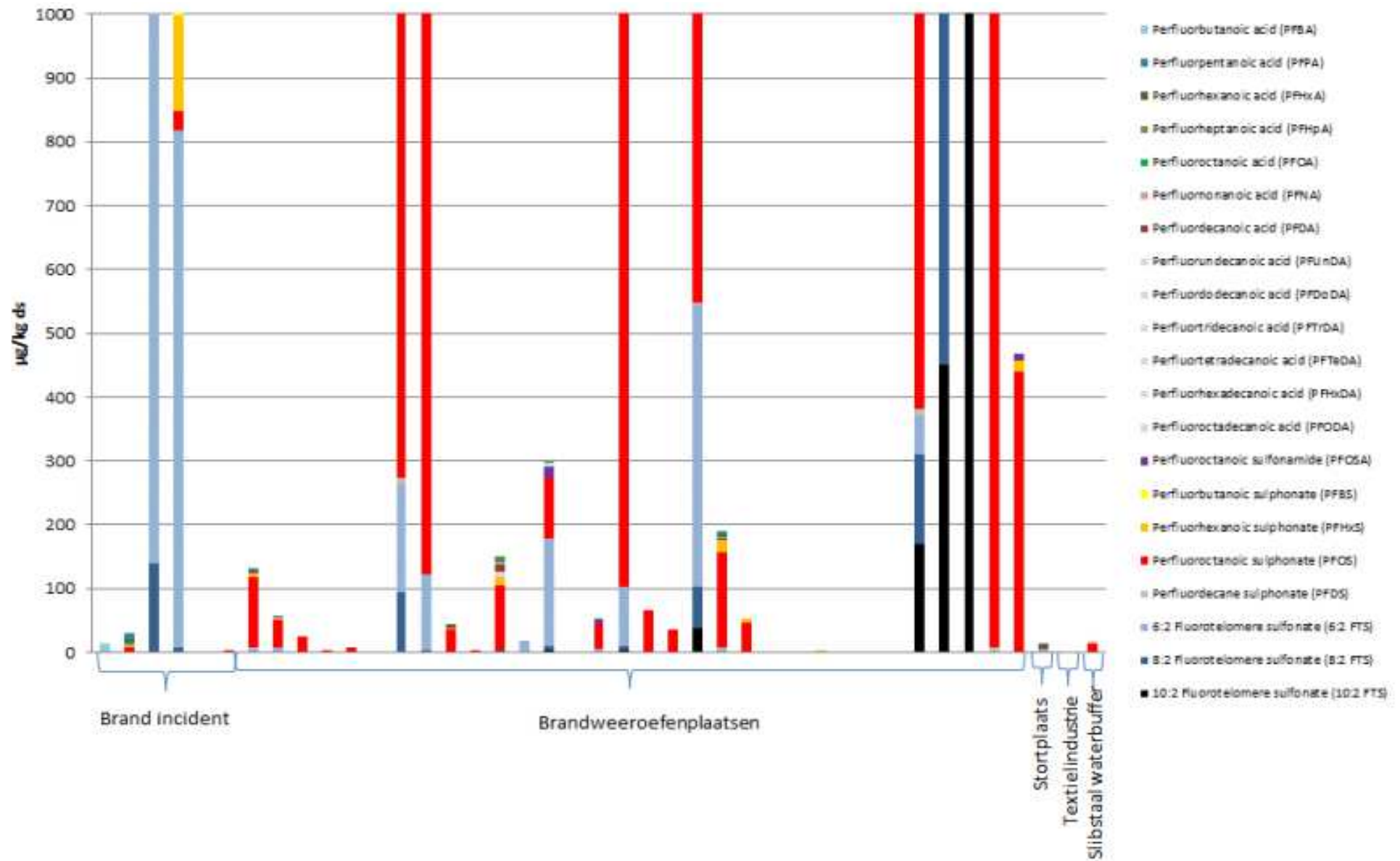
Results sampling campaign BE

- soil
 - Concentrations on firefighters training areas many times higher
 - Highest concentrations in top samples
 - Mainly perfluorosulfonates
 - Also precursors found (FTS)
- PFAS (sum of all PFAS components measured by the laboratory in a sample) occur in elevated concentrations in soil
 - 66% higher than 10 x rapportagegrens (>10 µg/kg ds)
 - 24% higher than 1000 x rapportagegrens (>1.000 µg/kg ds)



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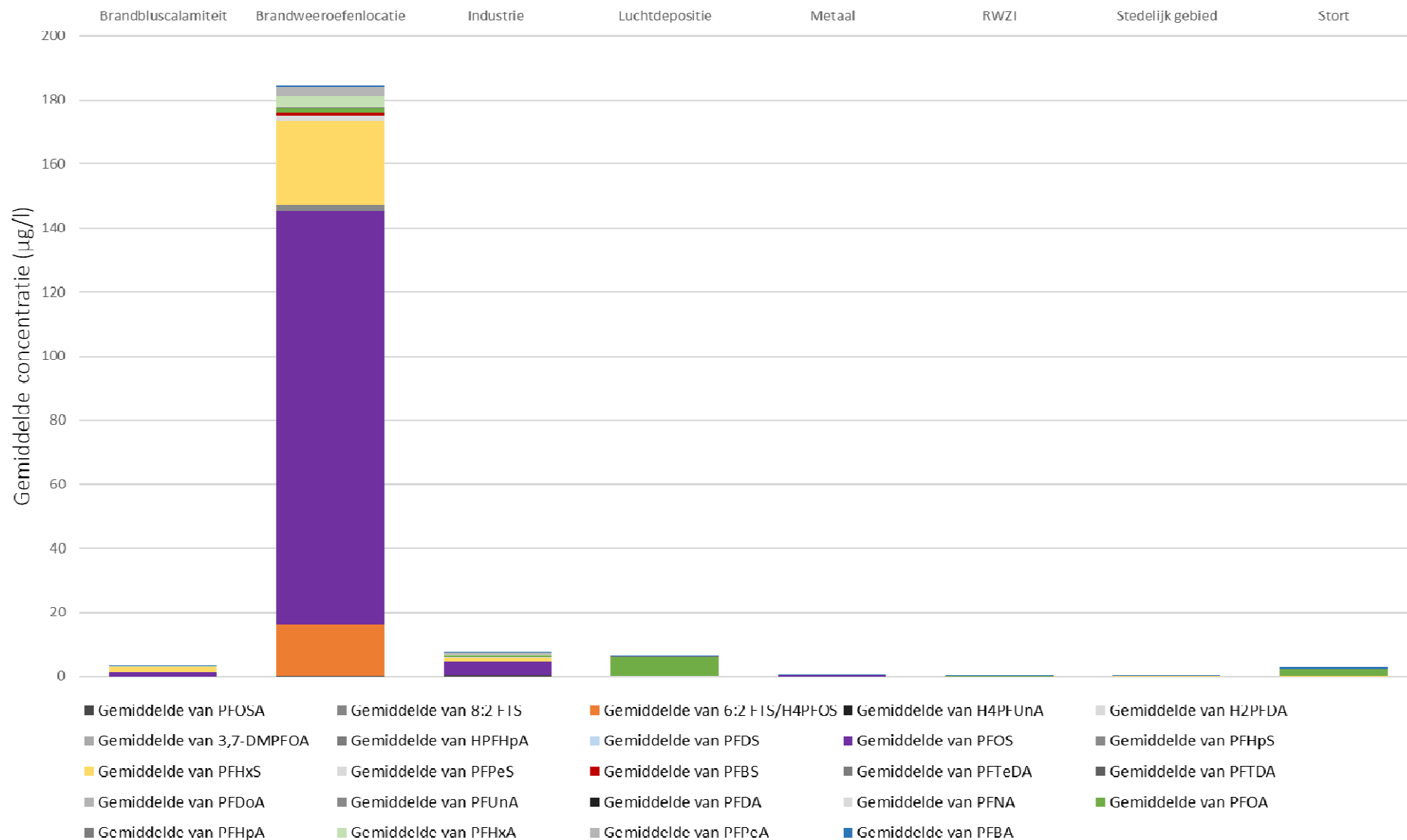
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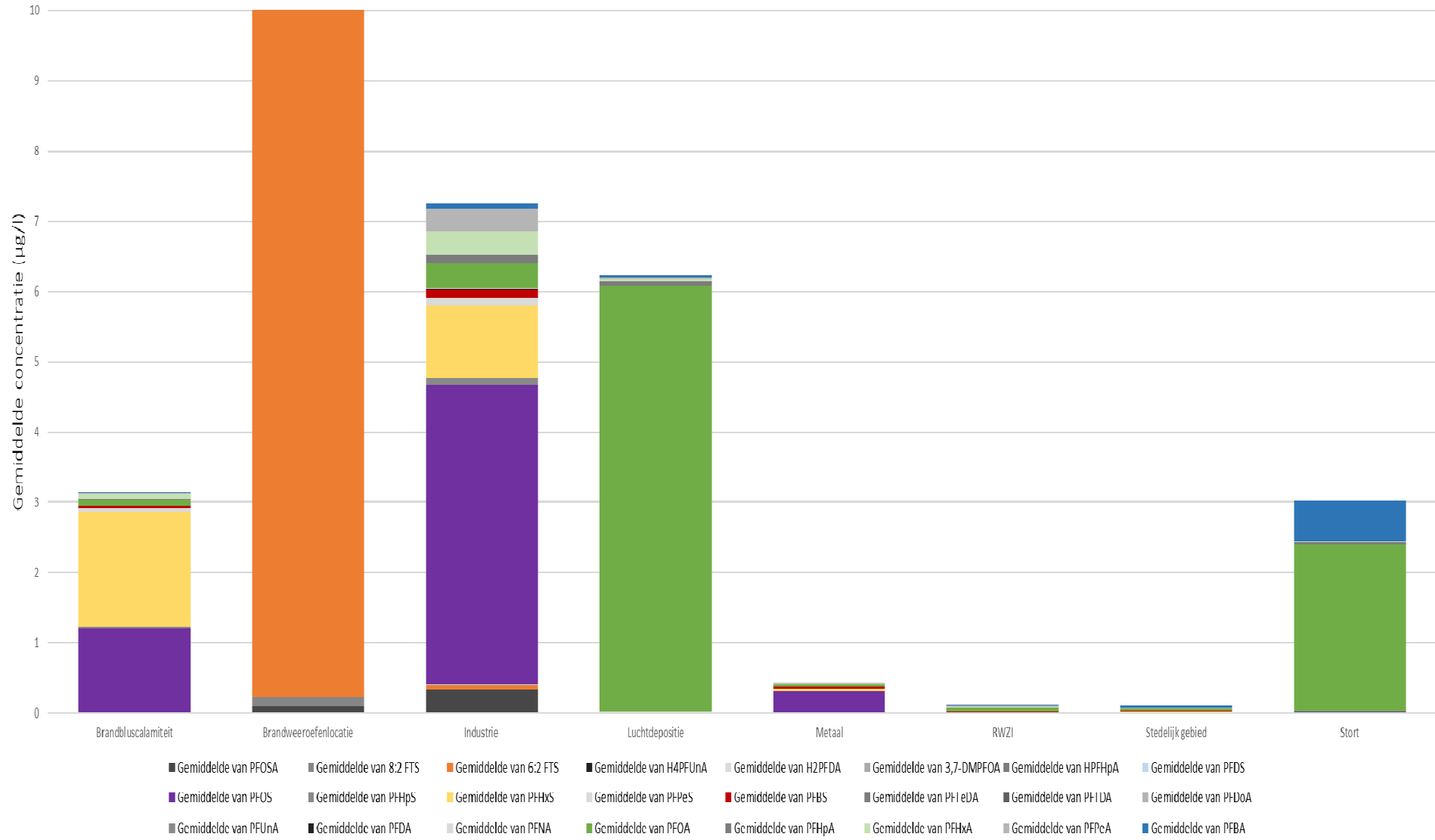
Gemiddelde concentraties per type locatie



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Gemiddelde concentraties per type locatie



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PFAS at unsuspected locations – groundwater

PFOS



PFOA

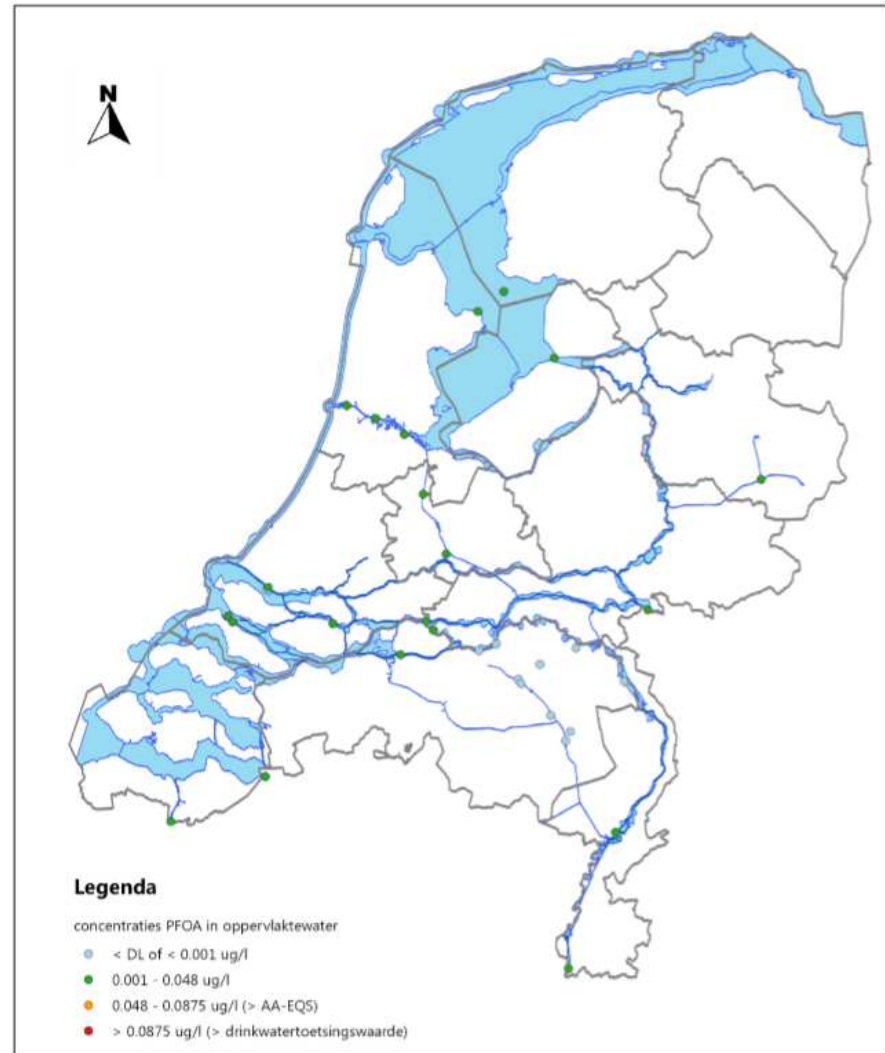


PFAS at unsuspected locations – surface water

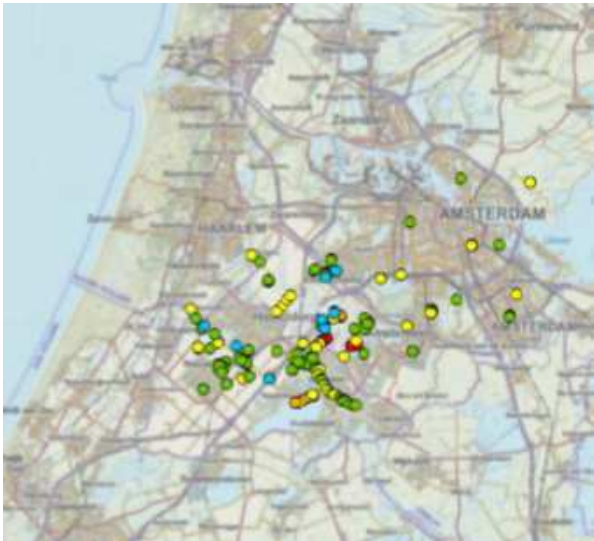
PFOS



PFOA

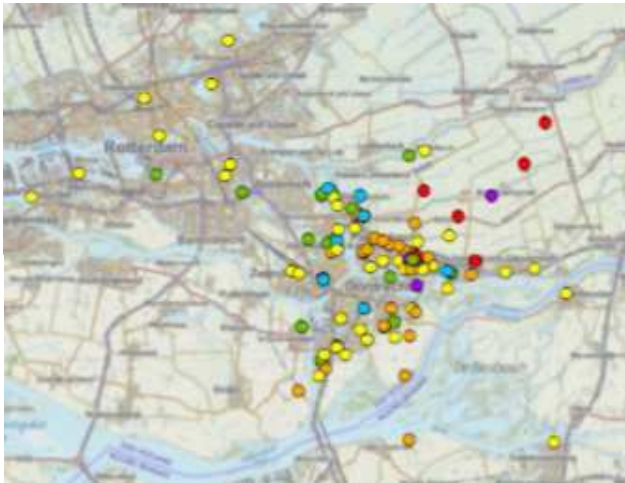
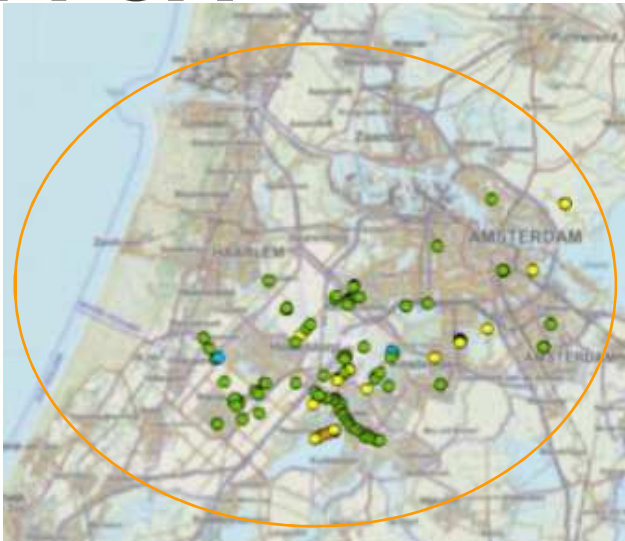


PFAS at unsuspected locations – soil PFOS

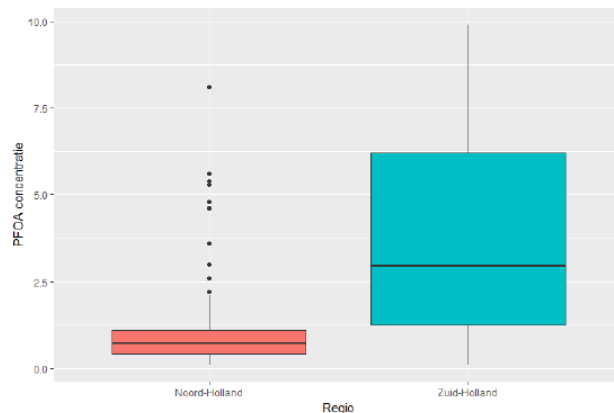
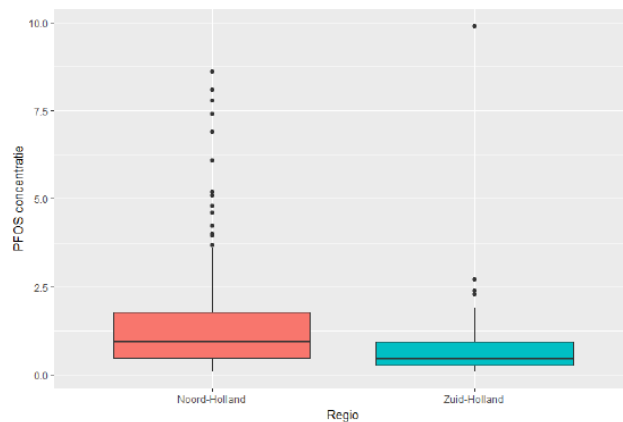


- < detectiegrens (0,1 µg/kg)
- 0,1 - 1,0 µg/kg
- 1,0 - 5,0 µg/kg
- 5,0 - 10 µg/kg
- 10 - 50 µg/kg
- 50 - 100 µg/kg
- >100 µg/kg

PFOA



- ▶ Data from Haarlemmermeer was used for data evaluation of PFOA
- ▶ Data from Drechtsteden was used for data evaluation of PFOS



Region	PFOS	PFOA
Haarlemmer- meer	# data points	195
	# > 10 µg/kg	13 (7%)
	90% percentile (µg/kg d.s.)	3,4
	95% percentile (µg/kg d.s.)	4,9
Drechtsteden	# data points	111
	# > 10 µg/kg	0
	90% percentile (µg/kg d.s.)	1,6
	95% percentile (µg/kg d.s.)	1,9

Increased background concentration:

- 2 µg/kg PFOS
- 2.5 µg/kg PFOA

Summary unsuspected locations in the Netherlands

- Groundwater;
 - 1-4% of the wells contains PFAS
 - High detection limits
 - PFOA > PFOS
- Surface water;
 - Average concentrations PFOS / PFOA 10 ng/l
 - > 50% of the datapoints > AA-EQS PFOS
 - Surface water used for drinking water contains PFAS (99% of the sampling points)
- Soil;
 - 2-2.5 µg/kg 95% interval

Soil

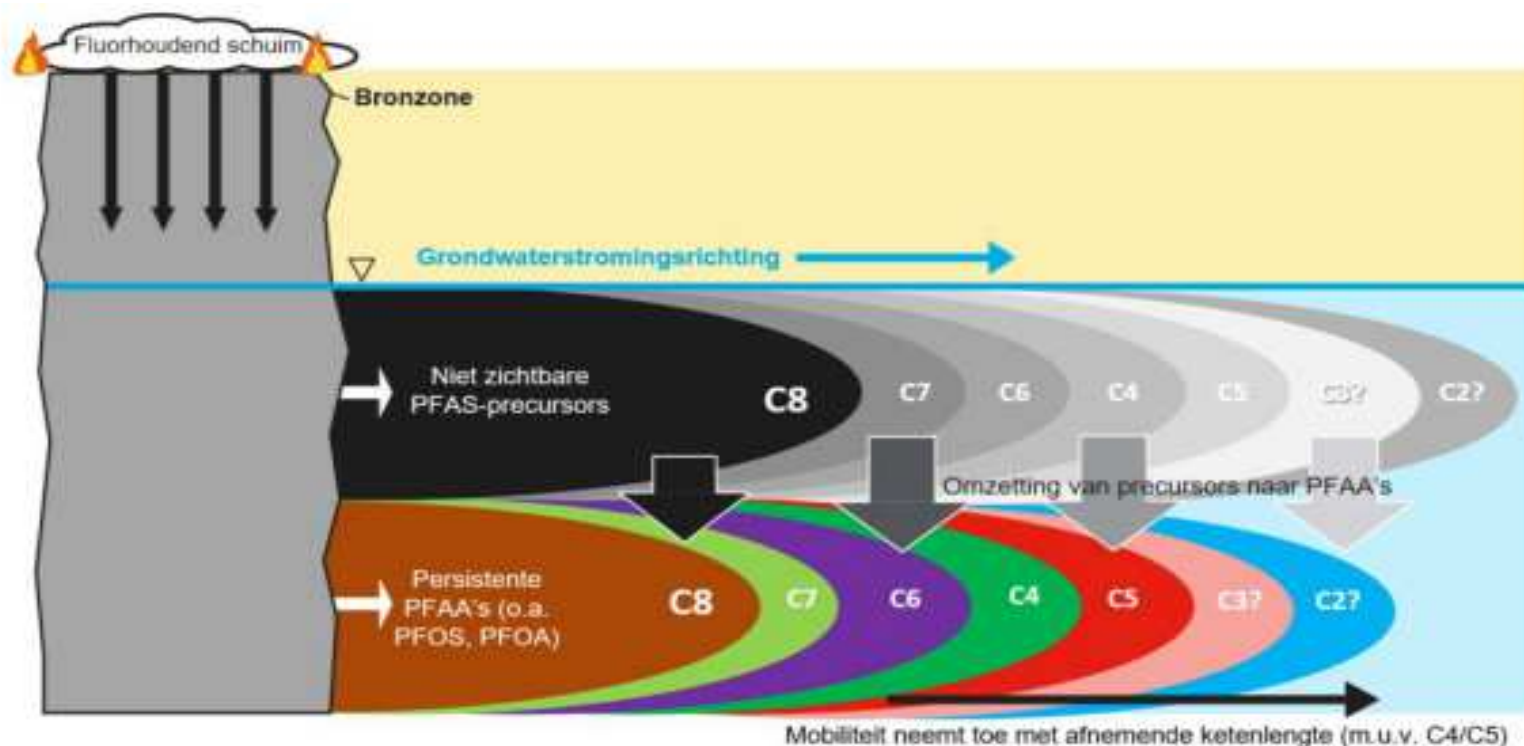
- Stand-still principle in the Netherlands
- Emerging contaminants → no contamination > DL allowed
- Delays site development

- Results show that PFAS are present at most locations at 2-2.5 µg/kg
- Numbers used as a basis for soil policy
- Separate policy for Dordrecht area (higher concentrations PFOA – 10 µg/kg)



General conclusions

- PFAS analysis contain 20 different substances for the moment → inadequate → since presence of precursors
- TOP analysis (Total Oxidizable Precursor) can be solution



General conclusions

- Guideline values for soil, groundwater and sediment are not available in Belgium
- Guideline values for soil and groundwater are present in the Netherlands, but an update is expected (EFSA/PFOS)
- Still evolving
- Some data present on background values
 - PFAS are anthropogenic → no presence in environment
 - More data is being gathered

General conclusions

- 2de fase of OVAM project
- Background values VITO
- Several projects in the Netherlands (atmospheric deposition around plants in Dordrecht, Helmond, background values in soil, treatment)
- Results are published on the OVAM site and on the site of the PFAS Center of Expertise:
 - www.ovam.be/rapport-onderzoek-naar-aanwezigheid-van-pfas-in-Vlaanderen
 - www.expertisecentrumpfas.nl

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