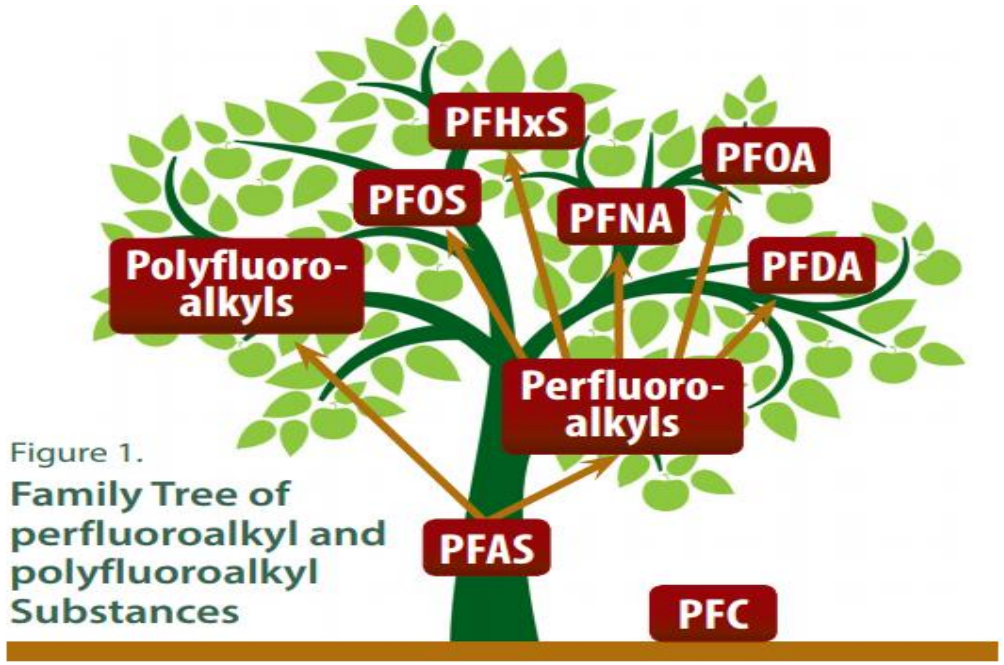


Figure 1.
Family Tree of perfluoroalkyl and polyfluoroalkyl Substances

Source: Agency for Toxic Substances and Disease Registry (ATSDR)

Rijkswaterstaat
Ministry of Infrastructure and Water Management

PFAS: a stress test for excavated soils in The Netherlands

Temporary operational framework

Co Molenaar
Margot de Cleen
Michiel Gadella

ICCL Peru, 23 October 2019

Soil policy in the Netherlands

Source: https://rwsenvironment.eu/publish/pages/126603/**into_dutch_soils**.pdf

A three-way approach for PFAS:

- Prevention
  - Convention of Stockholm, Rotterdam and Basel: Persistent Organic Pollutants
  - EU directives REACH, EU priority substances Water Framework Directive
  - phase out of the sources
  - permits
- Management
  - Excess of excavated soils by area development
  - Circular Economy: balance between environmental protection and re-use of soils
  - Policy: clean areas should stay clean
- Risk based remediation
  Point sources

Evaluation of excavated soils policy: lessons learned

Policy

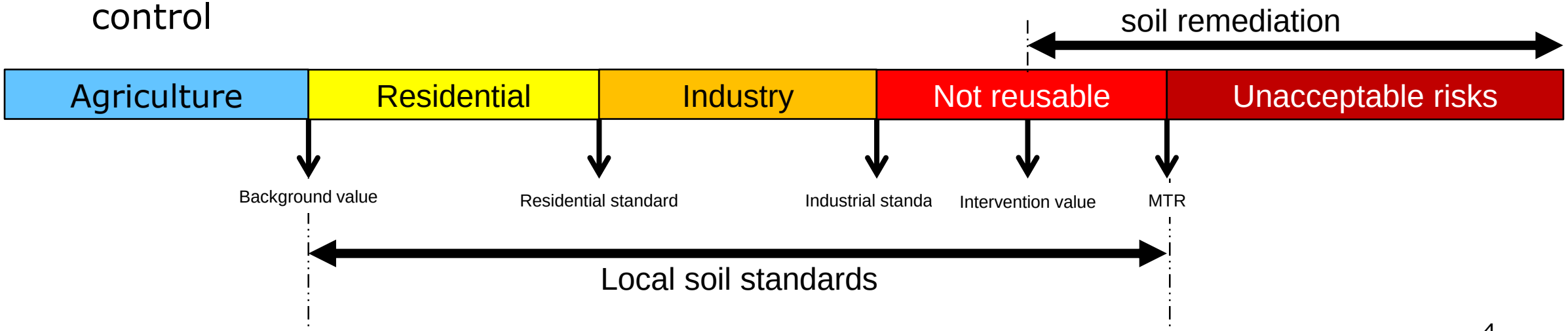
- In the Netherlands contaminated soil and sediment are ‘under control’
- In 25 years a balance in soil protection and need for reuse achieved
- Stand still and fit for use are firmly implemented principles
- Decentralised operation: guided implementation on a local level because soil management is a local/regional market

Market

- Creating a market for reusable soils takes time (soil banks)
- Public acceptance is critical: the quality of reusable soils should be trusted
- A good functioning system of self-regulation, sufficient and focussed environmental control and professional public contracting are essential
- The government can set the right example

Sustainable soil management in the Netherlands

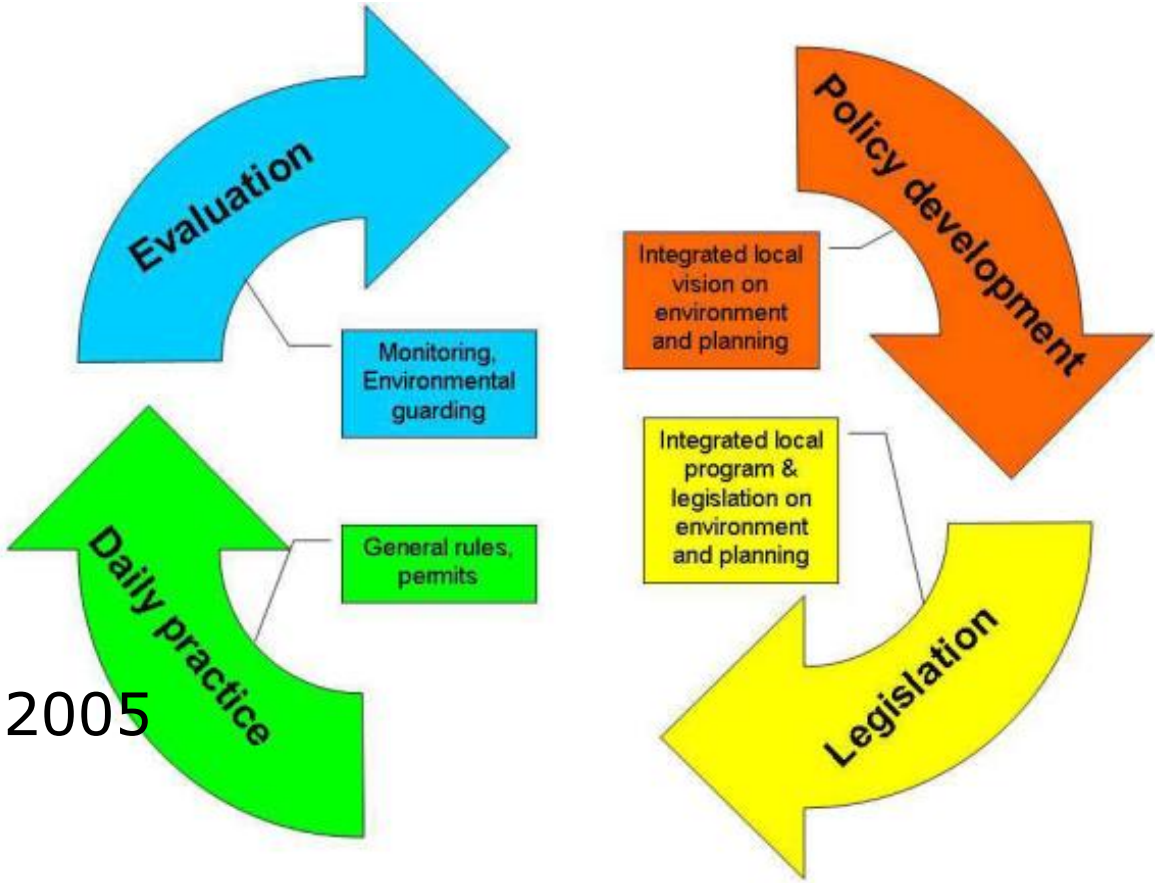
- Useful application
- **Fit for use**: soil standards for different functions
- **Stand-still**: no deterioration in the quality (classes)
- Decentralised operation: general (national) policy or tailor-made local soil policy
- Mandatory report of application to competent authority
- Mandatory Declaration of performance (quality of soil)
- System of quality assurance (mandatory certification) and public environmental control



Political agenda (1)

In general:

environmental policy is made by incidents



PFAS incidents in the Netherlands:

- Fire and casualties at Schiphol airport in 2005
- Diffuse pollution by a production plant
- De-icing airplanes and military areas

Diffuse pollution to air, water and land

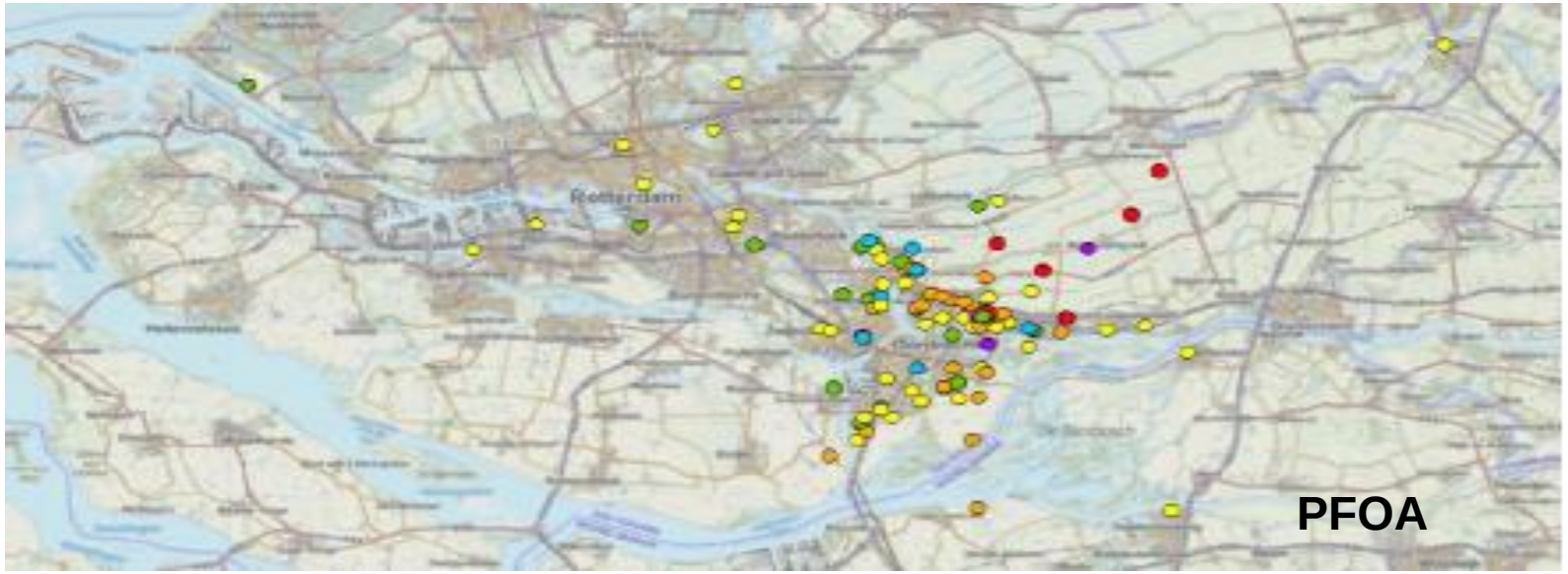
Excavation of soils

How to handle?

Political agenda (2)

- System excavated soils designed for known contaminants: HM, PAH, mineral oil
- No (legislative) soil screening values for PFAS
- PFAS > Detection limit
- Substances of high concern: persistent, accumulation, mobile, carcinogenic, many applications,
- High risks for groundwater
- If PFAS is detected no reuse, no treatment, no disposal → **showstopper**
  - Building projects stopped
  - Dredging of canals stopped
  - Disposal/treatment facilities no permit
  - High impact for nature and (ground)water
- "Handelingskader": operating framework for management of excavated soils

PFAS in soils
Rotterdam Area



- < dl. (0,1 µg/kg ds.)
- 0,1 – 1 µg/kg ds.
- 1 – 5 µg/kg ds.
- 5 – 10 µg/kg ds.
- 10 – 50 µg/kg ds.
- 50 – 100 µg/kg ds.
- > 100 µg/kg ds.

Temporary operational framework PFAS

- Approach of “sources” and “end of pipe”

- Sources:
  - Inventory of sources
  - Check on permits & BAT (or BAT+ additional requirements)
  - Inventory of the produced products and waste products
  - Monitoring strategy– picture of spreading PFAS in the Netherlands
  - Data collection and analysing

Application of excavated soils: screening values (µg/kg d.m.)

Function class	**PFOS**	**PFOA**	**GenX**	**Other PFAS**
Agriculture/Nature (=background value)	0,1	0,1	0,1	0,1
Agriculture/Nature, if background value is > 0,1	Actual measured background value, with a maximum of 3,0	Actual measured background value, with a maximum of 7,0	Actual measured background value, with a maximum of 3,0	Actual measured background value, with a maximum of 3,0
Housing	3,0	7,0	3,0	3,0
Industry	3,0	7,0	3,0	3,0

Landfilling and treatment

- Licensing authority is at stake
- Landfilling: unto 3-7-3 (up to licensing authority)
- Treatment: unto 3-7-3 no restrictions for application
- Above 3-7-3: provisions to prevent dispersion/leaching to water phase
- Clay soils above 3-7-3: not treatable
- Sandy soils above 3-7-3: (potentially) treatable

Temporary framework: practical issues

- Availability of (certified) laboratories
- Implementation of temporary framework (acceptance policy for industry and local authorities)
- Application in surface water: screening value is very tight! (0,65 ng/l)

Implementation temporary framework PFAS

- Helpdesk Soil+
- Website Soil+ with FAQ's https://www.bodemplus.nl/onderwerpen/wet-regelgeving/bbk/grond-bagger/handelingskader-pfas/tijdelijk/
- Meetings with branches
- Education and advisory meetings
- Maximum use of existing instruments:
  - Soil quality maps
  - Local soil policy (standstill principle)
  - Application on land (not in water)

The way forward to a final framework

- Collaboration with associations and branches (e.g. remediation techniques)

- Research by RIVM
  - Behaviour of PFAS-substances in soil and groundwater
  - Background values
  - Long term effects for humans
  - Bioaccumulation in fish

- Research by Rijkswaterstaat/Deltares
  - Suspended matter in surface water
  - Sediments in riverbeds

- Research by water authorities
  - Quality of dredged material

- Databank : pfas@rivm.nl

Further information

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