Management of Groundwater Quality in the Netherlands

Criteria for protection, the management and restoration of groundwater

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   1. Restoration
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SOME RIVM FACTS

- Since 1909
- Clients: Ministry of Public Health (owner of RIVM), Ministry of Infrastructure and the Environment
- Others: EU, other Ministries, Provinces, Municipalities, Water Boards
- Operates at central government level
- Independent research, policy advice and support clients

Diagram:

- Centre for Infectious Diseases Control
- Public Health and Health Services Division
- Environment and Safety Division
- Centre for Sustainability, Environment and Health
Low level of radon in groundwater and drinking water in The Netherlands

29 April 2016

The determination of radon in a number of groundwater and finished drinking water samples from the Dutch provinces Overijssel and Limburg show a low level of radon. A comparison of the data with an earlier campaign in 1995 shows that radon-222 activity concentrations in water samples in the Netherlands are at a constant and low level.
Policy on groundwater quality
Three cornerstones

1. **Prevention** of new contamination or deterioration;
2. **Management:** the consideration of groundwater quality as part of a broad assessment of the quality of the environment in relation to functions;
3. **Sustainable and effectively manage remaining historical contamination**
‘Urgent’ locations due to the risk of unacceptable risk of contaminant transport

- Alleen Verspreiding
- Verspreiding en Ecologie
Management of historical contamination

Sustainable and effectively manage cases of serious groundwater contamination

● Effective management means a smart prioritization of the ‘workload’
  – From a workload of thousands cases of contaminated groundwater to top priority locations.

● Principle: Management (control) of risks (health, environment and contaminant transport)

● Selection criteria based on risk criteria (health, ecosystem, and transport of contaminants)
Analyses

Prioritization according regulation and supported by DSS tool

Conclusions

Tier 1
Polluted location

Serious contamination?

No

Yes

Remediation not obliged

Tier 2
Land use specific risk assessment

Sanscrit model

Human health risk (CSOIL model)

Ground water risk

Ecological risk

Risk unacceptable?

No

Soil management (remediation in the future)

No

Yes

Urgent remediation

Tier 3
Site specific risk assessment

Sanscrit model

Human health risk (CSOIL model)

Ground water risk

Ecological risk

Risk unacceptable?

No

Soil management (remediation in the future)

No

Yes

Urgent remediation

Site specific information

Risk unacceptable?

Site investigations

Standard information

Prioritization according regulation and supported by DSS tool

www.sanscrit.nl
First criterion: Exceeding Risk-based standards?
According the Circular on Soil Remediation (2013)

Remarks: Generic standards provide only general information
- Clean – Polluted
- Presence of Acceptable Risks or Unacceptable Risks
- No direct connection to function or use of groundwater

- C-groundwater in µg/dm³

TV

<table>
<thead>
<tr>
<th>clean</th>
<th>polluted</th>
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Acceptable risk

Unacceptable risk
For contaminated groundwater:
Ref. RIVM report

DSS for priority setting and assessment (Tiered approach)

Tier 0
First characterization
- problem definition
- global characterization
- vulnerable objects
- volume > 6000 m³

Risk unacceptable
Soil remediation measures

Risk not unacceptable

Presence of LNAPL, DNAPL, vulnerable objects

Unacceptable contaminant migration Volume > criterion

A case of serious groundwater contamination

Management measures

Risk unacceptable

Tier 0
Figure 2.1 Conceptual model of the migration of contamination in a groundwater body. The blue arrows indicate the direction of groundwater flow. Due to the migrating plume (red) the well near the river is at risk. [1]
Criteria for prioritization

1. Presence of a Light Non Aqueous Phase Liquid (LNAPL)
2. The presence of a Dense Non Aqueous Phase Liquid (DNAPL) which could be moved by activities and processes in the soil, which would result in the contamination spreading;
3. The presence of vulnerable objects (e.g. drinking water wells)
4. Spreading contamination has resulted in major groundwater contamination (> 6000 m³)
5. The contamination continues to spread (>1000 m³/year).

6. Option of adopting an area-specific quality objective for groundwater within the framework of area wide management
IF REMEDIATION IS NOT FEASIBLE:
intermingled plumes, costly, time-consuming,..

Area-Wide groundwater management = A comprehensive approach for the management of groundwater

– Keypoints
  › A defined area.
  › Protection of clean groundwater outside the area
  › Functions of groundwater and soil use are leading for groundwater quality objectives
  › Separation of source zone and plume
  › Removal of source areas
  › Protection of vulnerable functions
  › Integration with other issues
Design of area wide groundwater management in cities
Remarks, Questions?