



Brownfields in the Netherlands

Development of a soil policy

Nätverket Renare Mark - 1 & 2 april 2003
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Topics:

- Introduction
- Soil policy in the Netherlands: past & present
- Brownfields
- Case: Armada



Nice to meet you: Dura Vermeer Group

- Turnover: € 1 billion (2002)
- Divisions: Construction & Property
Infrastructure
Consulting engineering
Services
- 4.000 employees
- Active all over the Netherlands

www.duravermeer.nl

A comparison.....



Soil policy in the Netherlands

- 1980: The tip of the iceberg discovered.....
- 1983: Soil Clean-up Interim Act:
multifunctional clean-up
- 1987: Soil Protection Act
- 1989: € 23 billion in 25 year ??
- 1996: Proposal for a new policy
- 1997: New perspective:
towards a risk based approach



1980: Lekkerkerk - West



Soil policy in the Netherlands

- “Old contaminants” < 1987:

Risk based approach (functional clean-up)

- “New contaminants” > 1987:

Multifunctional clean-up



Brownfields

Legacies from an industrial past

- Landfills
- Gasworks
- Other industrial sites / areas



Brownfields

Spatial Planning Act and supplements (2002):

- “Save the greenfields”
- “Fill up the brownfields”

Clean-up related to the intended use of land:

- Risk-based
- Integrated with re-development



Armada - Zaandam (the Netherlands)



History

- Industrial area for centuries
- Paint factory



Plan

- Housing area
- Indoor parking
- Public park



Problem definition:

- Unique location: banks of the river Zaan, city-center
- Redevelopment from ‘industry’ into ‘housing’
- Serious contaminations
- Sigma Coatings wanted to sell for a fixed-price



Solution

- Intention-agreement Sigma - Dura Vermeer
- Dura Vermeer: all disciplines intercompany
- Dynamical model:
Integrated soil clean-up and development



Solution

- Indoor parking half deep:
- Less apartments
 - Less clean-up costs



- Roof garden as public park:
- Indoor parking under the whole building
 - No total clean-up under the park



Solution

Excavation:

- Mobile spots
- Foundations and indoor parking



Extraction:

- Groundwater (5 to 6 m.)

Rest contaminants:

- Mobile: volatile aromatics, mineral oil
- Immobile: heavy metals



Solution

Buying off: Dura Vermeer \Rightarrow municipality:

- After care: drainage system/monitoring (30 years)
- Responsibility
- Risks



Renare mark ??

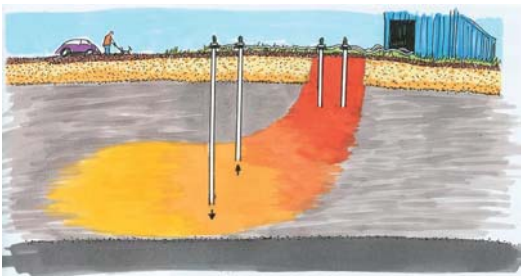
Source Treatment with Six-Phase Heating™

Content

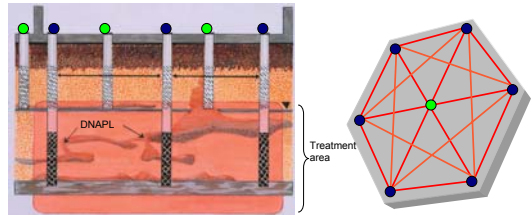
- Scope
- Technology
- Cases
- Interest and Cost
- Tomado site



Scope



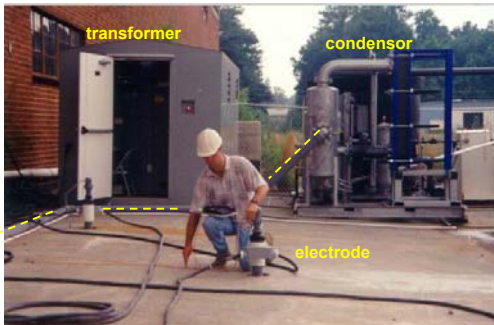
Technology (1)



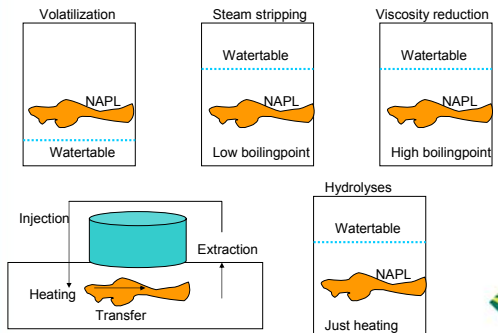
- Extraction well
- Electrode



Technology (2)



Cases



Interest and Cost

- Source treatment ↑ effective NA
- Heterogeneity/Low Permeable ↑ technical possible
- Fast (weeks/months)
 - due diligence
 - property transfer
 - plant management
 - real estate developments
- Risk management
- Flexible
- € 30-200/m³
 - scale
 - soil type & contaminant
 - provisions



Tomado (1)

- Metallurgic factory
- Multifunctional clean-up in 1984
- Housing area 1986
- Investigations from 1990: VOH, heavy metals, oil
- Human risks: 29 houses bought by authorities
- Tender: multifunctional clean-up!



Tomado (2)



Tomado (3)



Tomado (4)



Tomado (5)



Tomado (6)



Tomado (7)

