



Ministry of Infrastructure and the
Environment

Monitored Natural Attenuation: implementation and acceptance

Co Molenaar

November 7, 2011



Risk based approach

Overall goal:

Unacceptable risks for human or the environment must be managed/controlled or remediated



Competent authority in The Netherlands:

- Accepted technology in combination with source remediation
- Representative monitoring plan with moments of calibration in time
- If needed: remediation plan will be changed
- Periodic consultation between contractor and competent authority
- If impression that the situation is stable than verification
- Real stable situation NA: remediation will be finished
- Expertise is needed and than enforcement is possible



Common asked questions

- How is NA different from the “do nothing” approach?
- How can you tell if NA may work at a site?
- Can NA achieve site cleanup goals?
- What sites are best suited for NA?
- What are potential advantages and limitations?
- Can NA processes be enhanced to speed up the cleanup process?
- What as NA doesn't work at a site?

(source FFRRO: brochure august 2010)



Goals of Monitoring plan

- Verification to achieve the remediation goals
- Check of the plume is extending
- Vulnerable objects are protected
- The prediction of NA and check of decomposition products
- Changing circumstances for NA

Process monitoring and compliance monitoring



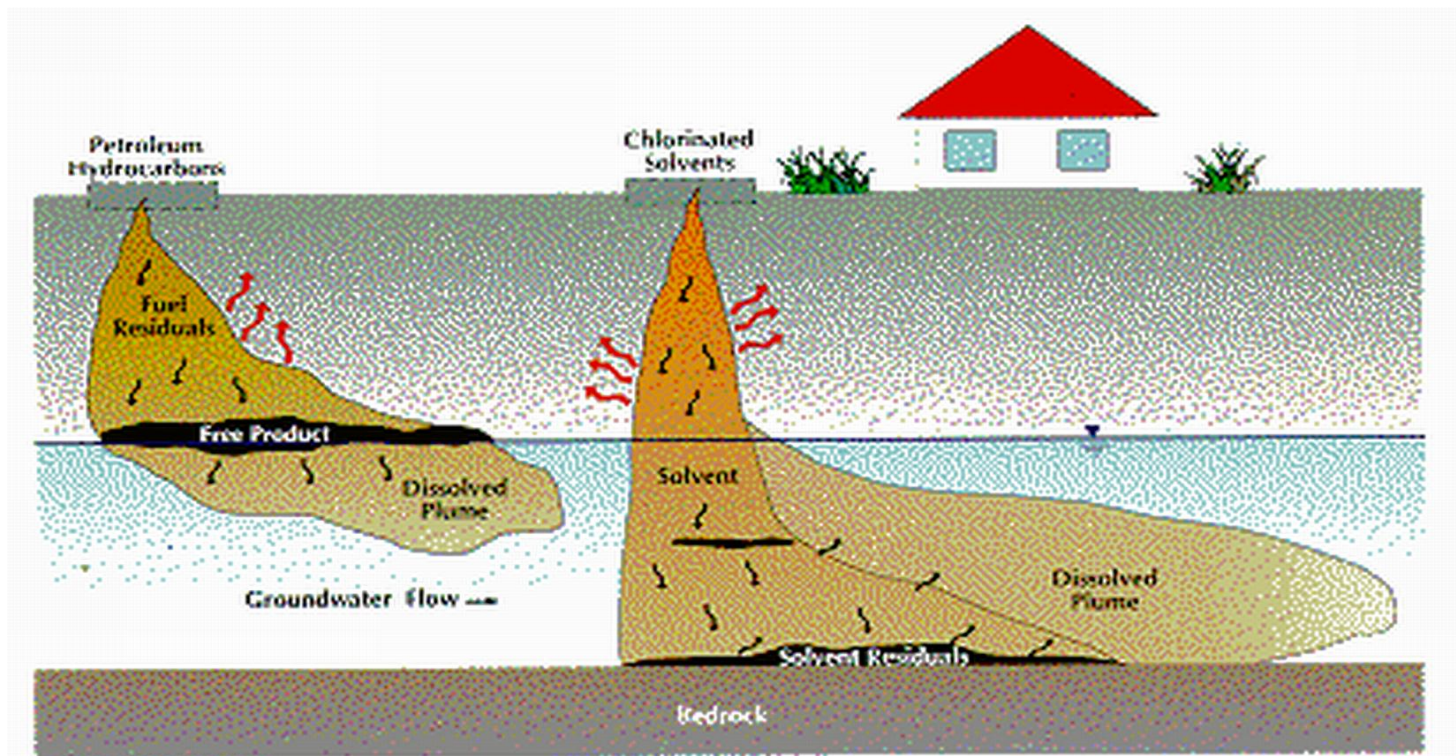
Monitoring plan:

Program for sampling and analyses:

- The location of piezometers
- Frequency and period of the program
- Parameters to be analyzed
- Interpretation of the monitoring results
(clearly, consequences, range of the results)
- Fall-backscenario
- Moments of calibration for adaption the plan



Conceptual site model





Summary

- MNA always in combination with source remediation
- Time and space in relation to vulnerable functions
- Good monitoring plan is essential (fall-back scenario)
- Trust between involved partners
- Communicate transparent about the risks and progress (CSM)
- If applied well it is a preferable method and must be accepted by competent authority (legislation)
- Stimulating NA:
 - do we know enough about side or after effects?
 - when approved?



In well applied situations:

