Case study Spinnerijkaai Kortrijk

Bert Van Goidsenhoven
OVAM

May 16th 2013

This project has received European Regional Development Funding through INTERREG IV B.
INTERREG IVB

TOGETHER WE MAKE TOMORROW MORE BEAUTIFUL

Content

- Site description
- Pilot test
  - EnISSA MIP
  - NAPL FLUTe liner
- Conclusions

Site description

- Site in Kortrijk (Western Flanders) near canal Kortrijk-Bossuit (Leie to Schelde)
- Former spinning and weaving mill, later dye-works and later wholesale retailer, fire in 1961
- Building renovated, used for housing and offices
- Descriptive soil survey 2008-2010

Site description

- Geology

Depth (m-sl)	Stratigraphy	Texture
0 - 2,5	Anthropogenic	Heterogeneous, debris
2,5 – 20	Quaternary	Fine sands
> 20	Formation of Kortrijk	Loamy clay

- Groundwater at 1 m-sl
- Groundwater flow in western direction

Site description

- PAH in soil, related to filling material
- Mineral oil in soil and groundwater
  - No risks, no need to remediate
- BTEX and VOC in soil and groundwater
  - 3 source zones
  - Risk of spreading, need to remediate

Site description

Site description

Site description

- Gaps in descriptive survey
  - Highest concentrations 18-20 m-sl : presence of NAPL?
  - Efficient delineation of groundwater pollution?

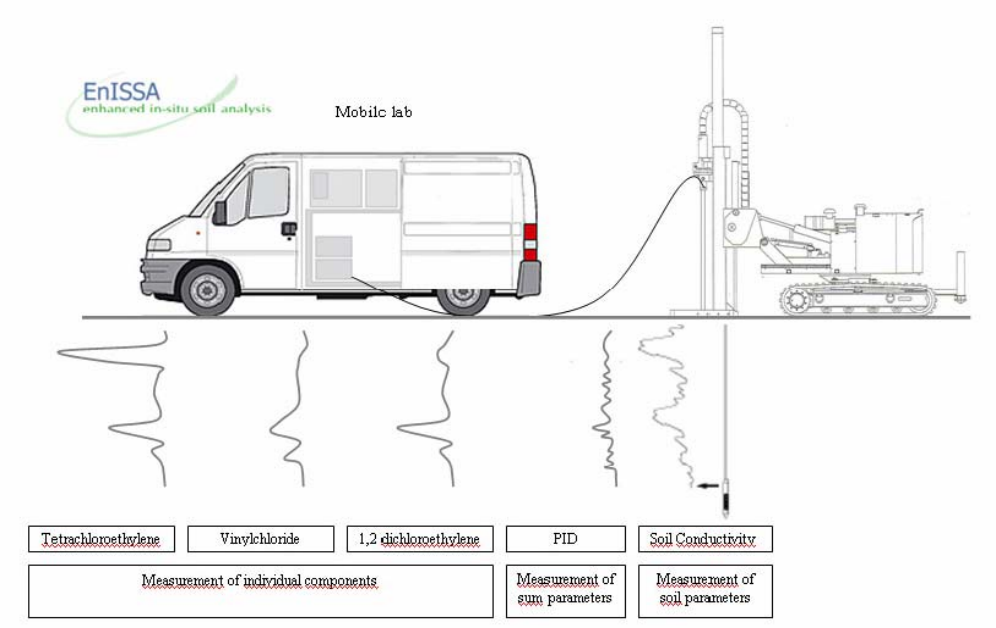
Parameter	Soil (mg/kg dm)	Groundwater (µg/l)
Tetrachloroethene	9420	71.000
Trichloroethene	794	65.000
Cis+trans 1,2-dichloroethene	18,1	100.000
Vinylchloride	-	800
Benzene	-	150
Toluene	47,7	1.900

Pilot test

- Double goal
  - Check the results of the descriptive survey of the Kortrijk site
  - Stimulate use of innovative methods for soil investigation
- Tender launched June 2010
  - 13 offers received of 8 candidates
  - 2 offers selected (based on technique, working plan and price)
    - MAVA - EnISSA MIP
    - URS Belgium – NAPL FLUTe liner

EnISSA MIP

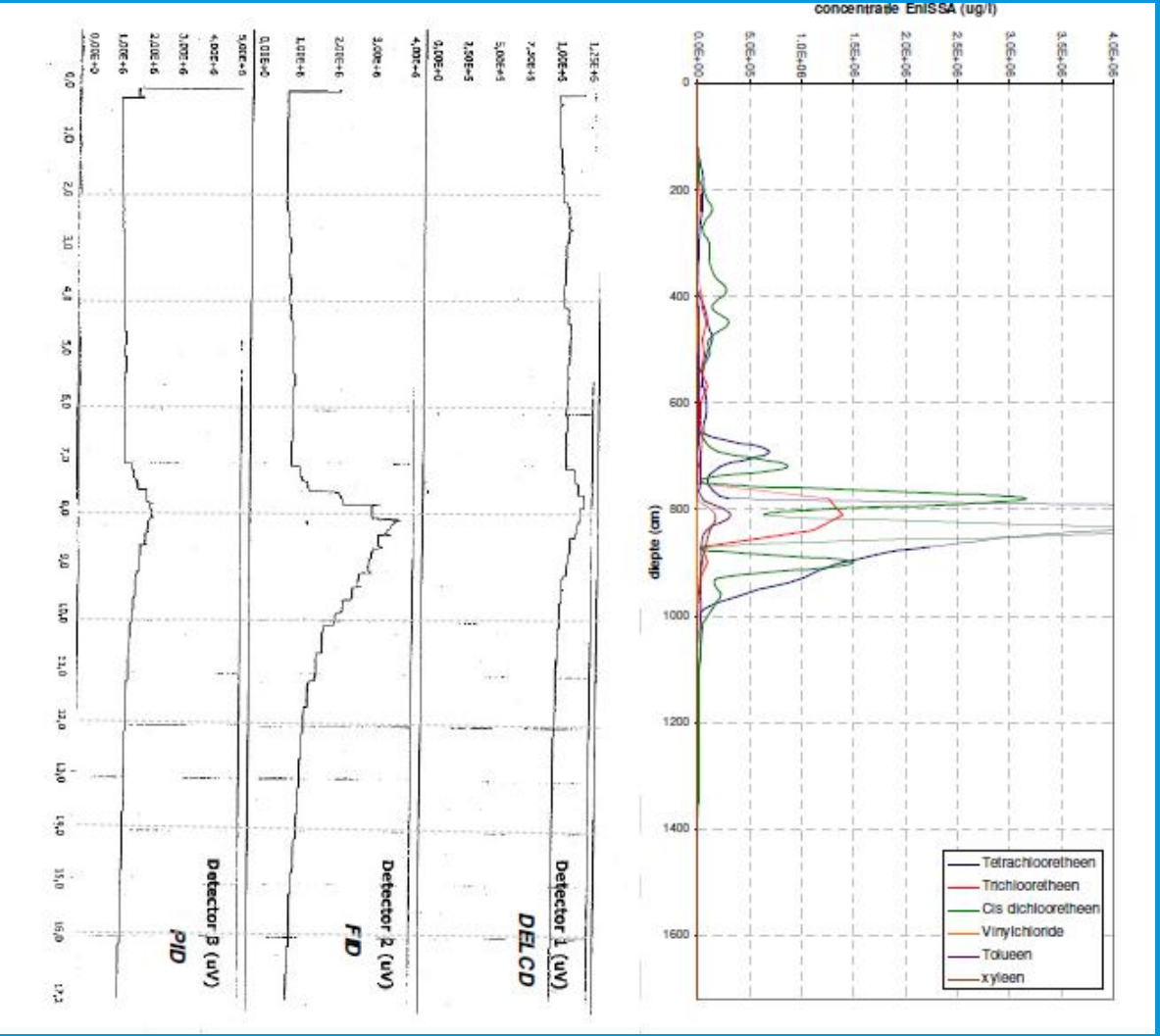
- EnISSA MIP
  - Connection between MIP and GCMS
  - On-site (semi-)quantitative component specific detection



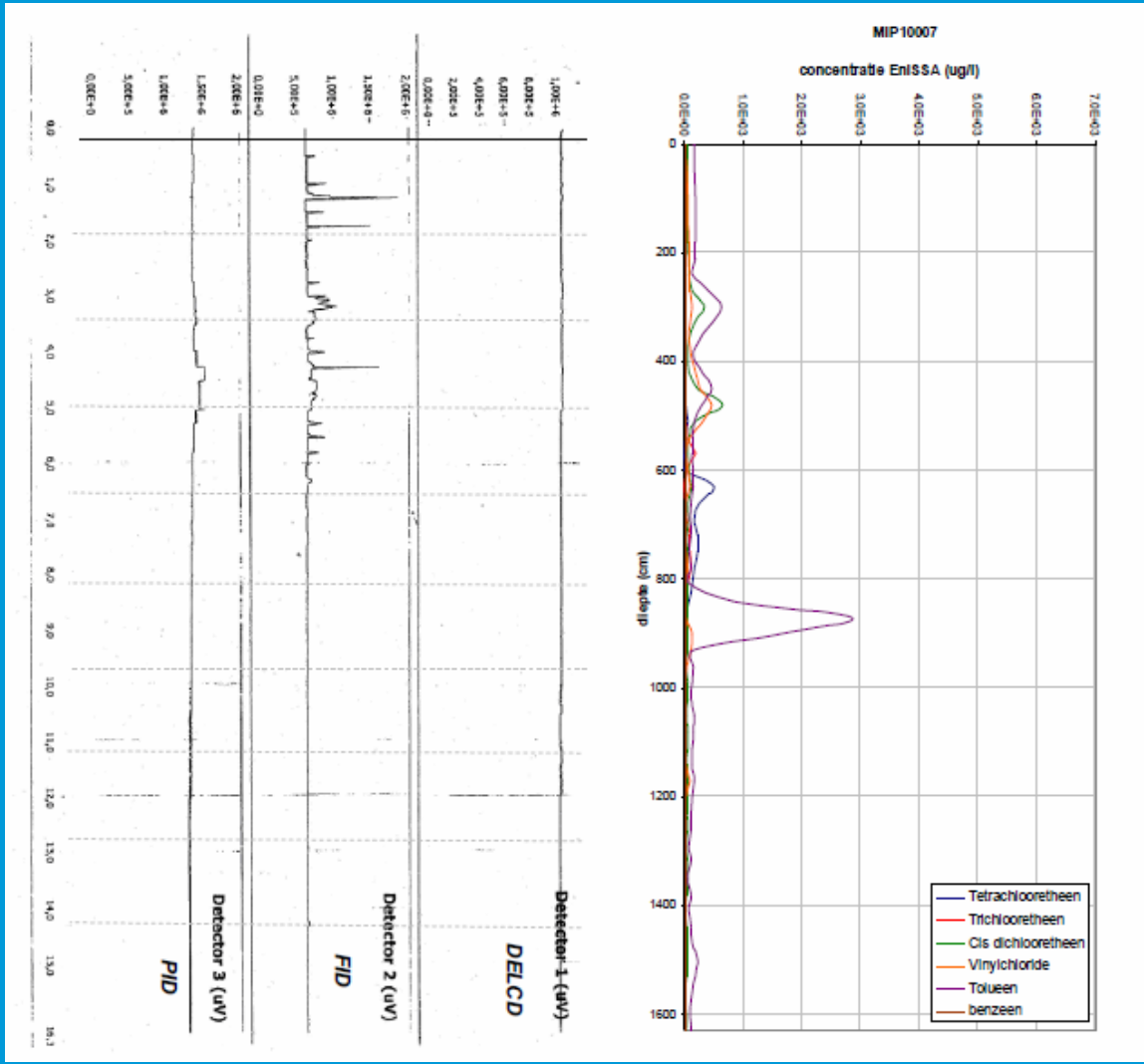
EnISSA MIP

- Pilot project
  - EnISSA MIP applied on 8 locations
    - Zones where DNAPL is suspected
    - Plume area
  - Compared with classic sampling

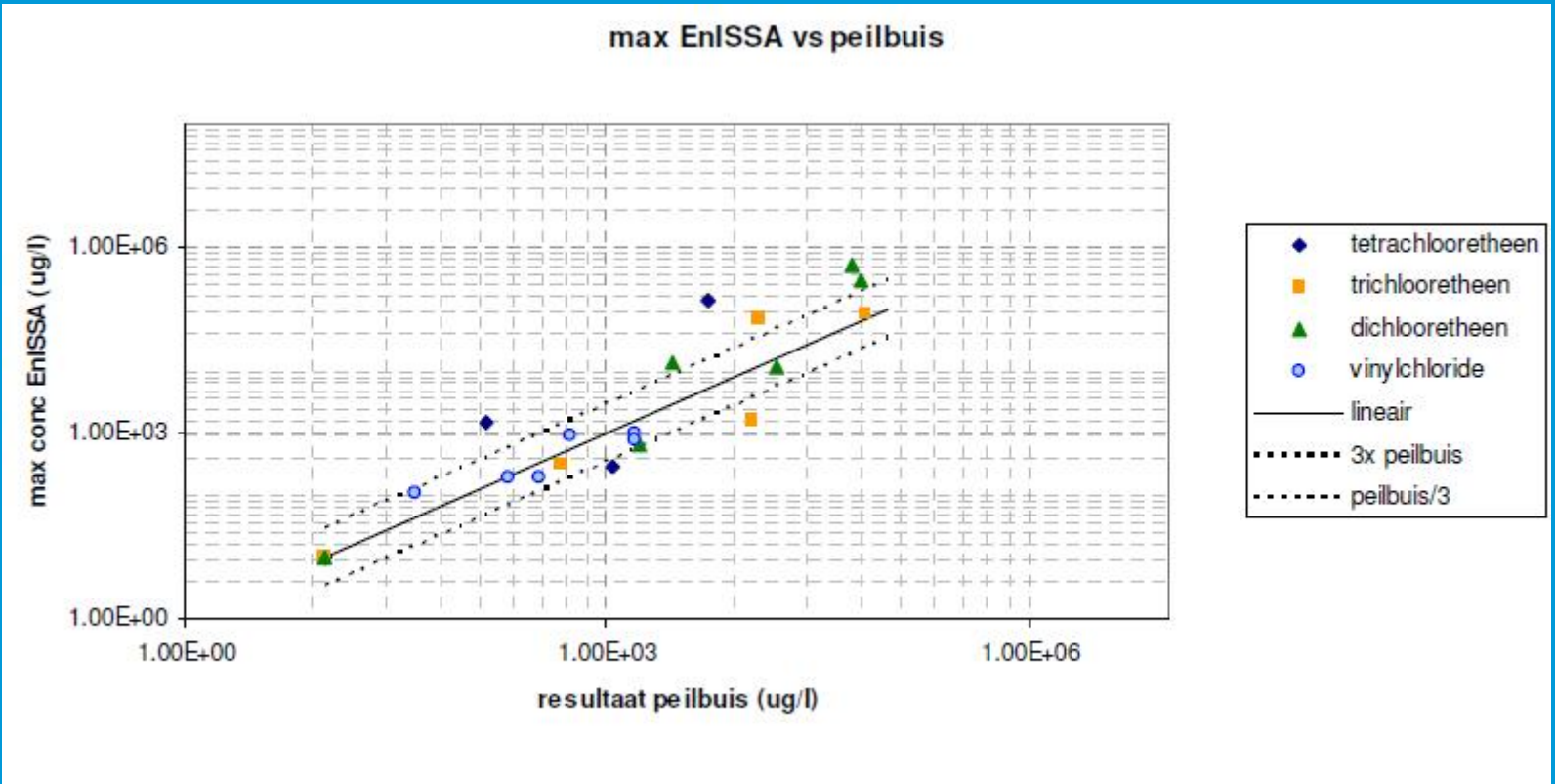
EnISSA MIP


concentratie EnISSA (ug/l)
diepte (cm)
Tetrachlooretheen
Trichlooretheen
Cis dichlooretheen
Vinylchloride
Tolueen
xyleen
Detector 1 (uV)
DELCD
Detector 2 (uV)
FID
Detector 3 (uV)
PID

EnISSA MIP


MIP10007
concentratie EnISSA (ug/l)
0.00E+00
1.0E-03
2.0E-03
3.0E-03
4.0E-03
5.0E-03
6.0E-03
7.0E-03
diepte (cm)
0
200
400
600
800
1000
1200
1400
1600
Tetrachlooretheen
Trichlooretheen
Cis dichlooretheen
Vinylchloride
Tolueen
benzeen
Detector 1 (uV)
DELCD
Detector 2 (uV)
FID
Detector 3 (uV)
PID

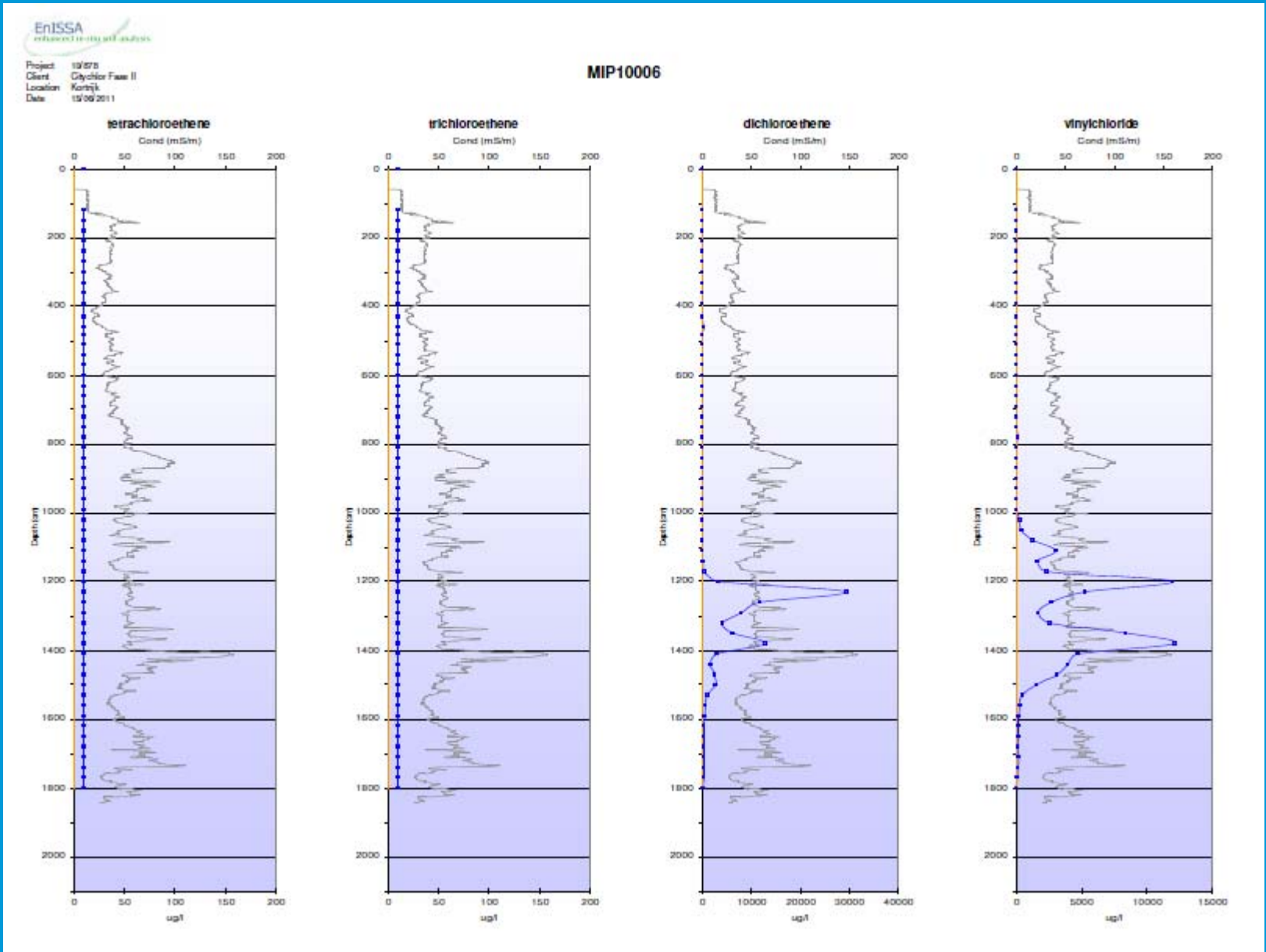
EnISSA MIP


max EnISSA vs peilbuis
max conc EnISSA (ug/l)
1.00E+06
1.00E+03
1.00E+00
1.00E+00
1.00E+03
1.00E+06
resultaat peilbuis (ug/l)
tetrachlooretheen
trichlooretheen
dichlooretheen
vinylchloride
lineair
3x peilbuis
peilbuis/3

EnISSA MIP

- Well P6003

	9,4-10,4 m-sl	19,4-20,4 m-sl
Cis 1,2-dichloroethene	28,2 µg/l	<0,5 µg/l
Vinylchloride	93,3 µg/l	<0,5 µg/l


EnISSA
Project 19/878
Client Glychlor Fase II
Location Kortrijk
Date 15/06/2011
MIP10006
tetrachloroethene
trichloroethene
dichloroethene
vinylchloride
Cond (mS/m)
Depth (cm)
ug/l

EnISSA MIP

- Well P6003

	9,4-10,4 m-sl	19,4-20,4 m-sl
Cis 1,2-dichloroethene	28,2 µg/l	<0,5 µg/l
Vinylchloride	93,3 µg/l	<0,5 µg/l

- Well P9

	12-14 m-sl
Cis 1,2-dichloroethene	30.000 µg/l
Vinylchloride	12.000 µg/l

NAPL FLUTe liner

Movie

NAPL FLUTe liner

- Pilot project
  - Applied on 4 spots with possible NAPL
  - Compared with classic sampling and MIP

NAPL FLUTe liner

- No indications of NAPL on liner
  - Monitoring wells nearby showed (thin) sinking + floating layer ?
  - High MIP readings?
  - Sudan-red test positive ?
- No contact between NAPL and RNS
  - No NAPL near liner ?
  - Smearing of borehole ?
  - Complex mixture?

NAPL FLUTe liner

Component	CAS-nummer	Hitfactor %	Indicatieve concentratie	eenheid
1R-alfa-pinene	007785-70-8	94	<100	µg/l
C3,C4-benzenen			6500	µg/l
Undecaan	001120-21-4	91	270	µg/l
Naftaleen	000091-20-3	91	520	µg/l
Isothiocyanatocyclohexaan	001122-82-3	95	120	µg/l
Methylnaftalenen			200	µg/l
bifenyl	000092-52-4	91	<100	µg/l
acenafteen	000083-32-9	93	180	µg/l
dibenzofuran	000132-64-9	93	120	µg/l
fluoreen	000086-73-7	91	190	µg/l
Tributyl fosfaat	000126-73-8	91	110	µg/l
dibenzothiofeen	000132-65-0	97	<100	µg/l
fenantreen	000085-01-8	93	500	µg/l
fluorantheen	000206-44-0	94	310	µg/l
pyreen	000129-00-0	83	210	µg/l
Niet geïdentificeerde pieken (1)			<100	µg/l

Component	CAS-nummer	Hitfactor %	Indicatieve concentratie	eenheid
cis-1,2-dichlooretheen	000156-59-2	97	92 000	µg/l
1,1,1-trichloorethaan	000071-55-6	90	10 000	µg/l
trichlooretheen	000079-01-6	99	47 000	µg/l
tolueen	000108-88-3	91	21 000	µg/l
tetrachlooretheen	000127-18-4	99	207 000	µg/l
m-xyleen p-xyleen	000108-38-3 000106-42-3	95	29 000	µg/l
KWS-fractie van C9 tot C11 geïdentificeerd als een type whitespirit			1 186 000	µg/l

Conclusions

- Indications of NAPL in source zone
  - complex mixture
  - depths 6-10 m-sl
- Delineation
  - concentrations at 12-14 m-sl !

Conclusions

EnISSA MIP

- On-site (semi-)quantitive component-specific detection
- Allows a high sampling density: minimize the risks of overlooking pollution
- Cost 4250 €/day, 60-100 m/day (30 cm intervals)

NAPL FLUTe liner

- Unambiguous demonstration of NAPL?
- Cost ca. 30 k€ for 60 m (including interpretation)

Conclusions

- Supported the implementation of new techniques
  - Seminar on “Innovative techniques in investigation” (Kortrijk, 17/05/11)
  - Detailed report on the pilots (Dutch + English summary) on the CityChlor website
  - Short movies on technique (Youtube)
- Enthusiastic response of the sector
  - pilot on passive sampling in 2012
  - call for pilot on gas-sites open in 2013