

**Second additional Phase II
soil & groundwater investigation
Ter Aar, The Netherlands**

July 2nd, 2010

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Responsibility

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Colophon

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Appendices

1 Introduction

At the request of Desch HC (Desch), Tauw bv (Tauw) carried out a second additional Phase II Soil & Groundwater investigation of a production site of plastic plant pots (E-PLA). The site is located at the Oude Kerkpad 4e in Ter Aar, the Netherlands. The soil and groundwater investigation was carried out in the framework of the contemplated acquisition of the site by Desch.

The site produces plastic plant pots and containers by extrusion and injection moulding. The total surface area of the site is estimated at 3.5 ha, of which 2.5 ha are grasslands. These are two plots respectively west (1.5 ha) and east (1 ha) of the actual production unit which measures about 1 ha.

The present investigation was set up in addition to:

1. The Phase II soil and groundwater investigation of the site reported April 8th, 2010 (refer to Tauw report R001-4707529BKT-beb-V02-NL)
2. The additional Phase II soil and groundwater investigation of the site reported April 28th, 2010 (refer to Tauw report R002-4707529LKX-los-V01-NL)

In the first investigation, a concentration level of naphthalene above the T-value (Intermediate value indicating moderate pollution) was measured in the groundwater of monitoring well 73.

The additional investigation focussed on verification of the extent of this contamination. The analytical results from this additional investigation showed that there is no contamination with naphthalene or mineral oil under the building at the Oils and lubricants store. Overall there seemed to be no relation between the naphthalene levels measured in the groundwater and the Oils and lubricants store as pollution source, as naphthalene levels appeared to increase further away from the store to concentration levels above the Intervention value (I-value; strongly contaminated) near the middle of the front yard (monitoring well 79). Another striking aspect of the groundwater quality was the very high pH level at the front area, specifically at monitoring well 73 (pH 11.5) and monitoring well 79 (pH 12.4).

Current investigation

The reason and objective for the current (second) additional investigation is the need to determine the size and severity of the contamination detected in the additional investigation, and to assess the related potential liabilities to Desch.

Also, new information became available from site management indicating that tar coated wooden planks (from a former demolished shed) buried in the soil underneath the front area in the past (some 40 years ago) are to be considered the likely source of contamination. Supposedly the burial of these planks here was done to improve the stability and bearing capacity of the soft peaty soils. This would mean that this contamination does NOT fall under the duty-of-care principle as applicable to recent pollution (defined as originating from 1987 onwards), which would require immediate and total clean-up in line with the Soil Protection Act.

This report gives an overview of second additional investigation of the soil and groundwater quality at and around monitoring well 73. Chapter 2 describes the fieldwork activities. The analytical results of the chemical analyses are discussed in Chapter 3. Chapter 4 presents the summary and conclusions of the investigation.

2 Fieldwork activities

The fieldwork for this second additional investigation was conducted on May 12th and 20th and June 2nd and 10th, 2010. The sampling locations are presented on the maps in appendix 1.

The aim of this second additional investigation is to delineate the naphthalene contamination, to see if other tar components (PAH) are present in soil and groundwater and to get a further insight into the cause of the very high pH levels measured.

Three lines of investigation can be distinguished:

- Review of historic aerial photographs to possibly locate the former wooden shed or barn
- Installation of seven additional monitoring wells in a zone around monitoring wells 73 and 79 to determine the pH, naphthalene (and other PAH) and mineral oil concentrations at the front yard area
- Delineate and map the naphthalene and possible other related pollutants, such as PAH and mineral oil, also in downward direction in the groundwater

Seven groundwater samples were collected one week after installation of the seven monitoring wells (91 through 97).

During the fieldwork, the samples collected were kept refrigerated. After the fieldwork, the samples were transported under a cold chain to NEN-EN-ISO/IEC 17025 accredited Laboratory of AL-West (Deventer, Netherlands) for analyses on aromatic compounds, naphthalene, PAH and mineral oil (TPH).

The table below presents an overview of the number of auger borings and analyses performed.

Table 2.1 Overview fieldwork and laboratory analyses

Time of installation	Boring to 2,5m bgl	Monitoring well installation	Analyses soil	Analyses groundwater
monitoring wells 12 and 20 May	1	6	12 (TPH, PAH)	7 (BTEX, PAH, TPH)
monitoring wells 2 and 20 June		7	12 (TPH, PAH)	7 (BTEX, PAH, TPH)

BTEX: Benzene, Toluene, Ethylbenzene, Xylene

TPH: Total Petroleum Hydrocarbons, i.e. Mineral oil (C10-C14)

PAH: Poly Aromatic Hydrocarbons, including Naphthalene

Auger boring depth is approximately 2.5 m bgl (including diamond drilling through hard standing)

Prior to the execution of the fieldwork, a so-called 'Klic-melding' was done, i.e. a check with the authorities and underground infrastructure owners to verify the exact locations of underground infrastructure such as electricity cables, gas pipes and sewerage. For each auger boring near underground infrastructure, careful manual excavation was performed to ensure no underground infrastructure would accidentally be hit.

The field and analysis activities were carried out following the Dutch BRL SIKB 2000 Protocol including the underlying relevant protocols for fieldwork in the context of environmental soil investigations.



The chemical analyses were performed according to the KWALIBO Guidelines in conformance with the Protocol AS3000 by the NEN-EN-ISO/IEC 17025 accredited laboratory of AL-West.

3 Results

3.1 Study of historic aerial photographs

At the Land Register in Zwolle, Netherlands, stereo-sets of aerial photographs (approximate scale 1 to 18,000) were studied from specific dates in the following years: 1938, 1944, 1956, 1967, 1977, 1981, 1983, 1986, 1989, 1992 and 2002. Aerial photographs were studied using a stereoscope with flexible magnifier (to 15x). Specific attention was paid to possible evidence of soil pollution at the front yard of the plastic pots production plant, near the entrance of the main building and in the present garden of the residential house opposite the main building.

The study of the aerial photographs gives rise to following conclusions: The southernmost stretch of land of the property has always been grassland until the plant's extension between 1992 and 2002. The northern stretch of land was all glass warehouses in the past. The last glass warehouses, located on the western part of this stretch of land, were removed between 1992 and 2002. On the aerial photographs of 1967 a small roundabout and parking lot was spotted at the location of the present garden of the residential house.

None of the aerial photographs showed any indication of polluting activities in the area of the front yard of the production plant and the garden. No evidence was found of alleged activities in the past to improve the stability and bearing capacity of the (soft peaty) soils in this area, by adding building materials such as old, tarred (creosoted) wooden planks from demolished sheds located nearby, and building rubble, et cetera.

3.2 Testing Framework

The analytical results were evaluated against the different limit values defined in the formal Dutch Circular on Soil Remediation 2009 (*Circulaire bodemsanering 2009*), and the Decree on Soil Quality (*Besluit bodemkwaliteit*) of July 1st, 2008.

This so called 'STI evaluation frame' distinguishes between Reference values (**S**treefwaarden) and Intervention values (**I**nterventiewaarden) for groundwater. The Testing values (**T**ussenwaarden) are defined as $T = \frac{1}{2} (S + I)$.

The used indications for the soil and groundwater assessment in the following sections are:

Table 3.1 STI evaluation frame

Concentration level	Indication	Meaning
< AW / S value (or < detection limit)	-	Not contaminated
> AW / S value < T value	+	Slightly contaminated
> T value < I value	++	Moderately contaminated
> I value	+++	Strongly contaminated

In the Dutch regulatory framework a so called 'Case of serious contamination' (*Geval van ernstige bodemverontreiniging*) is determined by the severity and volume of contamination as follows:

- For soil: if the volume of Intervention value exceedance for a contaminant or parameter, is more than 25 m³ of soil
- For groundwater: if the volume of Intervention value exceedance for a contaminant or parameter, is more than 100 m³ of groundwater (by soil volume)

An identified case of serious contamination requires remediation because of possible risks involved (risk to humans on site and off site, risk to flora and fauna (ecological risk) and risk of spreading). To this end a quantitative risk assessment needs to be performed determining the urgency (*spoedeisend karakter*) of the remediation.

For soil contamination caused after 1 January 1987 the above framework is not applicable. Contamination of this category, often the result of accidental spills, fall under the general duty-of-care principle and need clean-up irrespective of contaminant levels or volumes. The STI values for the groundwater are presented in appendix 3.

3.3 Fieldwork results

Fieldwork in May 2010

During monitoring well installation, a tar smell was noted at auger hole 83. A slight petrol smell was noted in auger hole 88. In auger holes 83 to 90, a one meter thick concrete and asphalt hard standing was present, locally with rubble, metal pieces, glass and plastic underneath as stabilisation layer.

During sampling of the groundwater it was noted that the groundwater from monitoring well 83 had a tar smell.

Fieldwork in June 2010

During monitoring well installation, auger holes 93 and 95 were visually identified as contaminated (darker soil, rubble), and a moderate tar smell was noted. A slight petrol smell was noted in auger hole 97. In auger holes 91, 92, 93, 95, 96 and 97 a one meter thick concrete and asphalt hard standing was present, locally with rubble, wood and plastic fragments as stabilisation layer.

During sampling of the groundwater no smell was noted.

3.4 Results chemical analyses soil

In tables below (3.2 to 3.6) an overview is given of the soil analyses results with corresponding interpretation. The analytical certificates of the soil samples are presented in appendix 4.

Table 3.2 Analysis results and interpretation soil (mg/kg)

Auger hole	83	83	84	85	85					
Depth (m bgl)	(1-1.5)	(2-2.5)	(1-1.25)	(1-1.5)	(1.5-1.75)					
Clay (%)	5	1	5,4	5	5					
Organic matter (%)	25	75	23,6	25	25					
POLYCYCLIC AROMATIC HYDROCARBONS										
PAH (sum 10) #	15	+	1,3	-	10	+	7	+	1600	+++
TPH										
TPH (C10-C40)	93	-	< 100	-	66	-	180	-	3900	+
Individual PAH										
naphtalene	0,43	< 0,05	0,66	0,21	35					
fenanthrene	3,8	0,25	3,3	0,89	540					
anthracene	0,62	< 0,01	0,49	0,23	54					
fluoranthene	4	0,38	3,1	2	520					
chrysene	1,2	0,12	0,66	0,68	150					
benzo(a)anthracene	1,3	0,11	0,68	0,7	5,9					
benzo(a)pyrene	1	0,16	0,42	0,65	87					
benzo(k)fluoranthene	0,57	< 0,01	0,27	0,37	69					
indeno(1,2,3-c,d)pyrene	1	0,069	0,44	0,51	17					
benzo(g,h,i)perylene	0,81	0,25	0,31	0,72	91					

#: individual PAH cannot be evaluated against the STI-framework

Table 3.3 Analysis results and interpretation soil (mg/kg)

Augr hole	85	87	87	88	88					
Depth (m bgl)	(2.5-3)	(1.5-2)	(2.5-3)	(1.4-1.9)	(2-2.5)					
Clay (%)	3	5	1	5	1					
Organic matter (%)	50	25	75	25	75					
POLYCYCLIC AROMATIC HYDROCARBONS										
PAH (10) #	13	+	24	+	0,99	-	500	+++	1,2	-
TPH										
TPH (C10-C40)	< 100	-	360	-	< 100	-	1100	+	< 100	-
Individual PAH										
naphtalene	0,46	2,3	< 0,05	44	< 0,01					
fenanthrene	4,5	6,4	0,23	150	0,33					
anthracene	0,68	0,78	< 0,01	20	< 0,01					
fluoranthene	3,4	9,1	0,27	160	0,44					
chrysene	1	2	< 0,01	37	0,13					
benzo(a)anthracene	0,88	0,078	< 0,01	1,8	0,18					
benzo(a)pyrene	1,1	1,3	< 0,01	30	0,082					
benzo(k)fluoranthene	0,4	0,78	< 0,01	17	< 0,01					
indeno(1,2,3-c,d)pyrene	0,54	< 0,01	< 0,01	23	< 0,01					
benzo(g,h,i)perylene	0,48	1	0,49	19	< 0,01					

#: individual PAH cannot be evaluated against the STI-framework

Table 3.4 Analysis results and interpretation soil (mg/kg)

Auger hole	89	89	91	92	93	
Depth (m bgl)	(1-1.5)	(1.5-1.7)	(1-1.5)	(1-1.5)	(1-1.3)	
Clay (%)	3	3	3	3	1	
Organic matter (%)	50	50	50	50	9	
POLYCYCLIC AROMATIC HYDROCARBONS						
PAH (10) #	2,2	- 1,8	- 2,4	- 6,3	+ 88	+++
TPH						
TPH (C10-C40)	310	- 370	- 100	- 86	- 500	+
Individual PAH						
naphtalene	< 0,01	< 0,01	0,16	0,17	3,7	
fenanthrene	0,23	0,57	0,29	0,95	22	
anthracene	0,056	0,064	0,047	0,19	3,5	
fluoranthene	0,62	0,41	0,58	1,8	24	
chrysene	0,31	0,17	0,26	0,7	6,5	
benzo(a)anthracene	0,26	0,16	0,26	0,54	7,6	
benzo(a)pyrene	0,23	0,12	0,24	0,54	5,6	
benzo(k)fluoranthene	0,13	0,076	0,13	0,31	3,5	
indeno(1,2,3-c,d)pyrene	0,19	0,14	0,19	0,6	6,1	
benzo(g,h,i)perylene	0,22	0,12	0,22	0,51	5	

#: individual PAH cannot be evaluated against the STI-framework

Table 3.5 Analysis results and interpretation soil (mg/kg)

Auger hole	93	94	95	95	95					
Depth (m bgl)	(1.8-2)	(0.7-1)	(1-1.2)	(1.5-2)	(2.5-2.7)					
Clay (%)	3	1	1	3	6,8					
Organic matter (%)	50	9	3,1	50	83,5					
POLYCYCLIC AROMATIC HYDROCARBONS										
PAH (10) #	0,22	-	1	-	24	++	13	+	1,3	-
TPH										
TPH (C10-C40)	220	-	67	-	270	+	680	+	< 20	-
Individual PAH										
naphtalene	< 0,1	0,099	0,91	< 0,2	0,12					
fenanthrene	0,22	0,23	5,6	1,4	0,22					
anthracene	< 0,05	0,015	0,92	0,13	< 0,05					
fluoranthene	< 1	0,21	6,4	3,9	0,35					
chrysene	< 0,05	0,11	2,1	1,7	0,14					
benzo(a)anthracene	< 0,05	0,11	2,4	1,3	0,13					
benzo(a)pyrene	< 0,05	0,11	1,8	1,2	0,12					
benzo(k)fluoranthene	< 0,05	0,062	0,99	0,83	< 0,05					
indeno(1,2,3-c,d)pyrene	< 0,05	< 0,01	1,2	1	0,1					
benzo(g,h,i)perylene	< 0,2	0,09	1,5	1,9	0,077					

: individual PAH cannot be evaluated against the STI-framework

Table 3.6 Analysis results and interpretation soil (mg/kg)

Auger hole	96	96	97	97				
Depth (m bgl)	(0.7-1)	(2.5-2.8)	(0.6-1)	(1.5-2)				
Clay (%)	1	1	1	3				
Organic matter (%)	10	75	10	50				
POLYCYCLIC AROMATIC HYDROCARBONS								
PAH (10) #	13	+	n.a.	-	18	+	1,2	-
TPH								
TPH (C10-C40)	67	-	< 100	-	150	-	< 20	-
Individual PAH								
naphtalene	0,96	< 0,1	1,5	< 0,1				
fenanthrene	1,9	< 0,1	6,2	0,58				
anthracene	0,42	< 0,05	< 1	< 0,1				
fluoranthene	3	< 0,05	4,7	0,47				
chrysene	1,2	< 0,05	1,3	< 0,1				
benzo(a)anthracene	1,3	< 0,05	1,5	< 0,1				
benzo(a)pyrene	1,2	< 0,05	1	0,13				
benzo(k)fluoranthene	0,59	< 0,05	0,59	< 0,1				
indeno(1,2,3-c,d)pyrene	0,92	< 0,1	0,74	< 0,1				
benzo(g,h,i)perylene	1,1	< 0,5	0,91	< 0,05				

: individual PAH cannot be evaluated against the STI-framework

In almost all borings the PAH and TPH levels are elevated. Moderate to strong contamination (exceeding the T-values or I-values) has been identified in the following sample locations:

- Auger hole 85: In the sample taken at 1.5-1.75 m bgl, the I-value is exceeded for PAH, and the Reference value is exceeded for TPH. This is related to the observation of rubble, metal, glass and an oil film in the soil. This 0.25 m thick layer has been clearly delineated, as the soil layer directly above (sample 1- 1.5 m bgl) indicated only a Reference value exceedance for PAH
- Auger hole 88: In the sample taken at 1.4-1.9 m bgl, the I-value is exceeded for PAH, and the Reference value is exceeded for TPH. Again, this is related to the observation of rubble, plastic, metal, glass and an oil film in the soil. The 0.5 m thick layer has been clearly delineated, as in the soil layer beneath (sample 2- 2.5 m bgl) PAH and TPH values are below the Reference values
- Auger hole 93: In the sample taken at 1-1.3 m bgl, the I-value is exceeded for PAH, and the Reference value is exceeded for TPH. Again, this is related to the observation of rubble, pieces that had a tar like appearance, an oil film and a petrol smell in the soil. The 0.25 m thick layer has been clearly delineated, as in the soil layer beneath (sample 1.8- 2.0 m bgl) PAH and TPH values are below the Reference values
- Auger hole 95: In the sample taken at 1.0-1.2 m bgl, the T-value is exceeded for PAH, and the Reference value is exceeded for TPH. Again, this is related to the observation of rubble, wood, an oil film and an aromatic smell. The 0.5 m thick layer has been delineated sufficiently, as in the soil layer beneath (sample 1.5-2.0 m bgl) PAH and TPH values are above the Reference values but below the T-values for PAH and TPH

3.5 Results chemical analyses groundwater

In tables below (3.7 to 3.9) an overview is given of the groundwater analyses results with corresponding interpretation. The analytical certificates of the groundwater samples are presented in appendix 5.

Table 3.7 Analysis results and interpretation groundwater (µg/l)

Monitoring well Filter depth (m bgl)	Pb 84 (1.5-2.5)	Pb 85 (1.5-2.5)	Pb 86 (1.5-2.5)	Pb 87 (2.5-3.5)	Pb 88 (1.5-2.5)
AROMATIC COMPOUNDS					
Benzene	< 0,6	- 0,87	+ < 0,2	- < 0,6	- < 0,6
Ethylbenzene	< 0,6	- 0,68	- < 0,3	- < 0,6	- < 0,6
Toluene	< 0,6	- 1,8	- < 0,3	- < 0,6	- < 0,6
Xylene (sum)	n.a.	- 3,9	+ n.a.	- n.a.	- n.a.
Individual PAH					
naphtalene	5	+ 38	++ < 0,1	- 34	+ 23
fenanthrene	1,4	+ 4	++ < 0,1	- 3,5	++ 4,3
anthracene	0,18	+ 0,46	+ < 0,1	- 0,38	+ 0,49
fluoranthene	0,41	+ 0,86	++ < 0,1	- 1,1	+++ 0,95
chrysene	0,045	+ < 0,1	- < 0,1	- 0,11	++ < 0,1
benzo(a)anthracene	< 0,1	- < 0,1	- < 0,1	- 0,1	- < 0,1
benzo(a)pyrene	< 0,1	- < 0,1	- < 0,1	- < 0,1	- < 0,1
benzo(k)fluoranthene	< 0,1	- < 0,1	- < 0,1	- < 0,1	- < 0,1
indeno(1,2,3-c,d)pyrene	< 0,1	- < 0,1	- < 0,1	- < 0,1	- < 0,1
benzo(g,h,i)perylene	< 0,1	- < 0,1	- < 0,1	- < 0,1	- < 0,1
TPH					
TPH (C10-C40)	< 100	- 170	+ < 100	- 110	+ 130
pH (-)	6,98	7,3	6,99	9,79	7,77
EC (µS/cm)	3120	2152	1240	878	2303
#:	PAH (sum 10) cannot be evaluated against the STI-framework				
n.a.:	Not detected				

Table 3.8 Analysis results and interpretation groundwater (µg/l)

Monitoring well Filter depth (m bgl)	Pb 89 (0.7-1.7)		Pb 90 (1.5-2.5)		Pb 91 (1.5-2.5)		Pb 92 (1.5-2.5)		Pb 93 (1.5-2.5)	
AROMATIC COMPOUNDS										
Benzene	< 0,6	-	< 0,6	-	< 0,2	-	< 0,2	-	< 0,2	-
Ethylbenzene	< 0,6	-	< 0,6	-	< 0,3	-	< 0,3	-	< 0,3	-
Toluene	< 0,6	-	< 0,6	-	< 0,3	-	< 0,3	-	< 0,3	-
Xylene (sum)	n.a.	-	n.a.	-	n.a.	-	n.a.	-	n.a.	-
Individual PAH										
naphtalene	1,7	+	0,57	+	< 0,05	-	< 0,05	-	0,57	+
fenanthrene	0,67	+	0,66	+	< 0,01	-	< 0,01	-	3,5	++
anthracene	0,073	+	0,083	+	< 0,01	-	< 0,01	-	0,36	+
fluoranthene	0,15	+	0,29	+	< 0,02	-	< 0,02	-	0,59	++
chrysene	0,022	+	0,026	+	< 0,02	-	< 0,02	-	0,035	+
benzo(a)anthracene	< 0,02	-	0,022	+	< 0,02	-	< 0,02	-	0,031	+
benzo(a)pyrene	< 0,02	-	< 0,02	-	< 0,02	-	< 0,02	-	< 0,02	-
benzo(k)fluoranthene	< 0,01	-	< 0,01	-	< 0,01	-	< 0,01	-	< 0,01	-
indeno(1,2,3-c,d)pyrene	< 0,02	-	< 0,02	-	< 0,02	-	< 0,02	-	< 0,02	-
benzo(g,h,i)perylene	< 0,05	-	< 0,05	-	< 0,05	-	< 0,05	-	< 0,05	-
TPH										
TPH (C10-C40)	< 100	-	< 100	-	< 100	-	< 100	-	260	+
pH (-)	0		8,51		6,69		6,72		8,37	
EC (µS/cm)	0		1790		1057		1103		1823	
#:	PAH (sum 10) cannot be evaluated against the STI-framework									
n.a.:	Not detected									

Table 3.9 Analysis results and interpretation groundwater (µg/l)

Monitoring well Filter depth (m bgl)	Pb 94 (1.5-2.5)		Pb 95 (1.7-2.7)		Pb 96 (1.8-2.8)		Pb 97 (1.7-2.7)	
AROMATIC COMPOUNDS								
Benzene	< 0,6	-	0,71	+	< 0,2	-	< 0,6	-
Ethylbenzene	< 0,6	-	< 0,6	-	< 0,3	-	< 0,6	-
Toluene	< 0,6	-	< 0,6	-	< 0,3	-	< 0,6	-
Xylene (sum)	n.a.	-	n.a.	-	n.a.	-	n.a.	-
Individual PAH								
naphtalene	0,08	+	< 0,05	-	0,12	+	0,34	+
fenanthrene	0,051	+	0,83	+	0,06	+	0,81	+
anthracene	< 0,01	-	0,14	+	0,012	+	0,09	+
fluoranthene	< 0,02	-	0,47	+	0,02	+	0,2	+
chrysene	< 0,02	-	0,061	+	< 0,02	-	< 0,02	-
benzo(a)anthracene	< 0,02	-	0,051	+	< 0,02	-	< 0,02	-
benzo(a)pyrene	< 0,02	-	0,026	++	< 0,02	-	< 0,02	-
benzo(k)fluoranthene	< 0,01	-	0,012	+	< 0,01	-	< 0,01	-
indeno(1,2,3-c,d)pyrene	< 0,02	-	< 0,02	-	< 0,02	-	< 0,02	-
benzo(g,h,i)perylene	< 0,05	-	< 0,05	-	< 0,05	-	< 0,05	-

Monitoring well Filter depth (m bgl)	Pb 94 (1.5-2.5)	Pb 95 (1.7-2.7)	Pb 96 (1.8-2.8)	Pb 97 (1.7-2.7)
TPH				
TPH (C10-C40)	< 100 -	< 100 -	< 100 -	< 100 -
pH (-)	7,03	7,89	6,72	7,24
EC (µS/cm)	845	1404	1398	1552
#:	PAH (sum 10) cannot be evaluated against the STI-framework			
n.a.:	Not detected			

Moderate to strong groundwater contamination (exceeding the T-values or I-values) has been encountered in the following monitoring wells:

- Monitoring well 85: The T-value is exceeded for naphthalene and two individual PAH, and in addition the Reference values for benzene, xylene and TPH are exceeded
- Monitoring well 87: The I-value for one individual PAH is exceeded, and the T-values for two other individual PAHs, and TPH are exceeded
- Monitoring well 88: The T-values for two individual PAHs, and TPH are exceeded
- Monitoring well 93: The T-values for two individual PAHs, and TPH are exceeded
- Monitoring well 95: The T-values for one individual PAH is exceeded. In addition, the Reference value for benzene is exceeded

The pH of monitoring well 87 is very high (pH of 9.8), whereas the pHs of monitoring wells 90 (pH of 8,5) and 93 (pH of 8,4) are fairly high. In the previous investigations very high pH values have been measured in monitoring wells 73 (pH of 11.5) and 79 (pH of 12.4).

The electrical conductivity (EC) of the groundwater substantially differs between monitoring wells (in this second additional investigation EC ranges between 845 and 3,120 µS/cm), suggesting low flow groundwater velocity and/or heterogeneous presence of soluble salts.

3.6 Interpretation of the results of the soil and groundwater analyses

Considering all Phase II investigations done, the following picture emerges as to the contamination of soil and groundwater at the site of E-PLA, the contaminants of concern being PAH (among which Naphthalene, but also other PAH), TPH (mineral oil) and BTEX (aromatic compounds).

PAH

It can be concluded that the soil contamination present concerns mainly PAH and is concentrated around auger borings 85, 88, 93, 95, all located within a distance of 10 m from each other.

Moderate to strong contamination (above the T-value or I-value) is seated in a distinct 0.25 to 0.5 m thick layer between 1.0-1.9 m bgl containing rubble, wood and locally glass and/or plastic fragments. A notable smell has been observed from contaminated samples, which has been described as aromatic or petrol like.

In general moderate to strong groundwater contamination with PAH (above the T-value or I-value) has been encountered in monitoring wells where PAH contamination of the soil proper is also exceeding the T- or I-values. In other words, the groundwater contamination with PAH is very much related to the soil contamination. The groundwater contamination with PAH generally does not extend outside of the zone with soil contamination. An exception is the groundwater at monitoring wells 87, 79 and 73 located 10 to 15 meters south of the zone with identified moderate to strong soil contamination with PAH. In this area the soil is not or only slightly contaminated, whereas the groundwater is moderately or strongly contaminated. The figures below serve to illustrate the PAH contamination situation, showing the contour of T-value exceedance in red for PAH in soil (figure 3.1) and groundwater (figure 3.2).

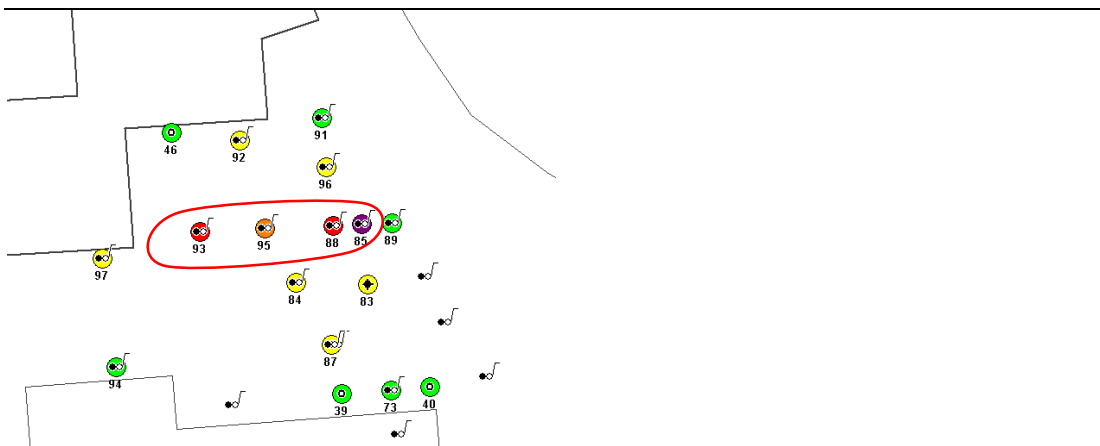


Figure 3.1 PAH contamination contour in soil (>T-value). Concentrations in individual borings exceeding Reference values are given in yellow, T-values in orange, I-Values in red, and 10X I-value in purple

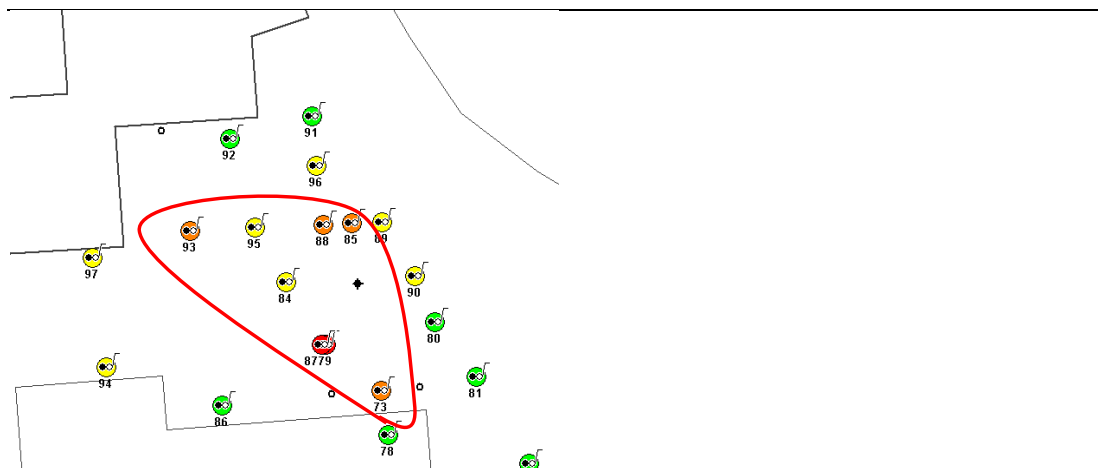


Figure 3.2 PAH contamination contour in groundwater (>T-value). Concentrations in individual monitoring wells exceeding Reference values are given in yellow, T-values in orange, and I-Values in red

TPH and BTEX

The soil is only slightly contaminated with TPH (only Reference value exceedances). Below (in red) the contour is given of the area in which the Reference value for TPH in soil is exceeded (figure 3.3) and for TPH and/or BTEX in groundwater (figure 3.4). No strong contamination has been measured in the groundwater, moderate contamination (TPH) was only measured in monitoring well 79. The groundwater in the monitoring wells around well 79 is not or only slightly contaminated. The monitoring well 79 also falls within the zone with moderate or strong groundwater contamination with PAH (see figure 3.2).

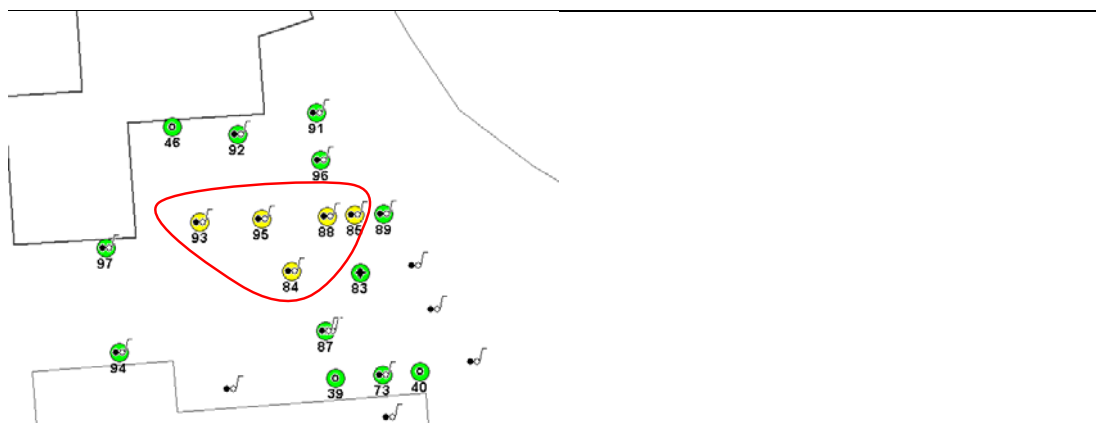


Figure 3.3 TPH contamination contour in soil exceeding the Reference value. Concentrations in individual borings exceeding Reference values are given in yellow

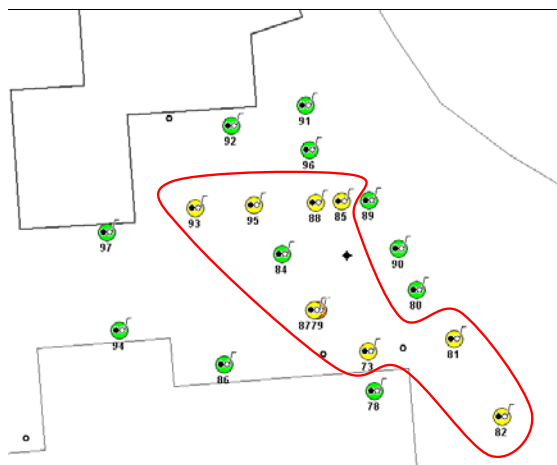


Figure 3.4 TPH and/or BTEX contamination contour in groundwater exceeding the Reference value. Concentrations in individual borings exceeding Reference values are given in yellow

The contamination case

When studying figures 3.1 to 3.4, it can be concluded that the contaminant areas for TPH, BTEX, and PAH more or less overlap. The groundwater contamination extends slightly more southward as the soil contamination, suggesting an overall southerly groundwater flow direction. In general the extent of the plume with contaminated groundwater is very limited. This can be explained by the low flow velocity of the groundwater as demonstrated in the earlier Phase II investigations by Tauw, and also because of the specific contaminant adsorbing qualities of the peaty soil (high retardation). Peat is well known for its high capacity to contain contamination (i.e. to keep contamination in place) thus preventing lateral and downward migration.

In the investigations done at the site only PAH exceeds the I-value. The strongly contaminated zone (i.e. with PAH >I-value) has been delineated and mapped in sufficient detail in relation to the purpose of the Phase II investigations. The area of soil that is PAH contaminated above the I-value is estimated at 60 - 80m². As the contaminated layer has a total thickness of about 0.5 m, the contaminated volume is estimated at around 35m³. In the groundwater the I-value for PAH is only exceeded in the area at monitoring wells 79 and 87. The volume of Intervention value exceedance in the groundwater is estimated to be very limited, i.e. much less than 100 m³. This implies that, in the Dutch regulatory framework, the identified contaminated zone qualifies as a so called 'Case of serious contamination' (*Geval van ernstige bodemverontreiniging*) based on the volume of Intervention value exceedance of PAH being more than 25 m³ of soil.

Risk assessment

A detailed risk assessment is presented in appendix 6. An interpretation of these results is given below.

The possible risks involved in the identified Case of serious soil contamination (i.e. risk to humans on site and off site, risk to flora and fauna (ecological risk) and risk of spreading) are assessed as being low.

This is mainly because of the fact that the contaminated layer is located at depth, sealed at the surface by concrete and asphalt hard standing. Hence no exposure is possible via volatilization. In addition, migration risks of contaminated groundwater are estimated low because of the specific contaminant adsorbing capacities of the peaty soil and the slow groundwater flow. This is further illustrated by the largely overlapping soil and groundwater contamination as demonstrated in this investigation.

Therefore, it can be stated that there is no question of 'legal' urgency (*spoedeisend karakter*) for remediation or clean up of the contamination.

The cause of the contamination

The cause of the contamination should be seen as related to the presence of added materials (rubble, et cetera.) to the soil. These materials have probably been used in the past to raise the land and improve the stability and bearing capacity of the soft peaty soil. Besides the rubble and other materials used, tar coated wooden planks appear to have been used from a demolished shed or barn that presumably was located near the location of the present front yard. When the shed was demolished the wooden planks were left on the land. According to site management this happened some 40 years ago. The hypothesis is that the planks decayed over the years releasing the mobile fraction of the tar coating.

As the contamination was caused some 40 years ago, it does NOT fall under the duty-of-care principle as applicable to recent pollution (defined as originating from 1987 onwards), which would require immediate and total clean-up in line with the Soil Protection Act.

Remediation

Base on the risk assessment remediation of the contamination is not urgently required by any applicable legislation or regulation. However in case of future building construction activities at the front yard, prior soil clean-up would be required. In that case remediation of the contamination can best be done by means of excavation. Table 3.1 presents a cost breakdown based on realistic assumptions from Tauw's experience in similar remediation projects. In the cost estimate we have assumed that the stability of the buildings around the front yard will not be affected by the excavation and the temporary groundwater pumping related to this excavation.

Should the eventual local contractor judge that buildings may be affected costs may be higher as excavation will need to be done without pre-drainage (i.e. wet) or with special precautions so as to avoid damage to buildings. In that case it is estimated that costs will be some 20 % higher.

Table 3.1 Estimation of remediation cost

Activity	Units	Price per unit (€)	Total cost (€)	Totals
Checking for discharge regulations and permits at the Municipality			1,000,-	
Drafting remediation plan			1,500,-	
Groundwater pumping (drainage)	1 week	10,000	10,000,-	
Environmental supervision	1 week	12,000	12,000,-	
Treatment of pumped groundwater	1 week	20,000	20,000,-	
Excavation of 6x15x2m=200m ³ or 340 tons)	3 days	5,000	5,000,-	
Transport	340	10 euro/ton	3,400,-	
Disposal of 280 tons of moderately contaminated soil	280	30 euro/ ton	8,400,-	
Disposal of 60 tons of moderately contaminated soil	60	60 euro/ ton	3,600,-	
Purchase of 320 tons of clean soil	320	17 euro/ ton	5,440,-	
Transport	320	10 euro/ton	3,200,-	
Reinstalling concrete/asphalt	90	90 euro/m2	8,100,-	
			Total	€ 81,640,-
			10 % unforeseen +	
			10 % management	
Total				€ 97,968,-
Order of magnitude				€ 100,000,-
Excavation in wet conditions and geotechnical study and control	1	20,000	20,000	
Grand total				€ 120,000,-

4 Summary and conclusions

At the request of Desch HC (Desch), Tauw bv (Tauw) carried out a second additional Phase II Soil & Groundwater investigation of a production site of plastic plant pots (E-PLA). The site is located at the Oude Kerkpad 4e in Ter Aar, the Netherlands. The soil and groundwater investigation was carried out in the framework of the contemplated acquisition of the site by Desch.

The present investigation was set up in addition to:

- The Phase II soil and groundwater investigation of the site reported April 8th, 2010 (refer to Tauw report R001-4707529BKT-beb-V02-NL)
- The additional Phase II soil and groundwater investigation of the site reported April 28th, 2010 (refer to Tauw report R002-4707529LKX-los-V01-NL)

The reason and objective for the current (second) additional investigation is the need to determine the size and severity of the contamination detected in the above earlier Phase II investigations. This contamination concerns PAH (Poly Aromatic Hydrocarbons, among which Naphthalene) and to a lesser extent TPH (mineral oil) and BTEX (aromatic compounds). The contamination is located in the subsurface of the front yard of the site near the entrance of the main production building. Furthermore the current investigation aims at assessing the related potential liabilities to Desch.

Soil contamination

This second additional study confirms that the soil contamination present mainly concerns PAH (Poly Aromatic Hydrocarbons, among which Naphthalene) and is concentrated around auger borings 85, 88, 93, 95, all located at the front yard and within a distance of 10m from each other. Moderate to strong contamination (above the T-value or I-value) is seated in a distinct 0.25 to 0.5 m thick layer between 1.0-1.9 m bgl containing rubble, wood and locally glass and/or plastic fragments. A notable smell has been observed from contaminated samples, which has been described as aromatic or petrol like.

Groundwater contamination

Strong contamination (above the I-Value) is only present in the area of monitoring wells 79 and 87, located at the front yard. This contamination concerns PAH. Levels of TPH are only moderately raised here.

The physical parameters of the groundwater are unusual. High pH values have been observed both in this Phase II investigation (up to a pH of 9.8), as well as in the previous Phase II investigations (up to a pH of 12.4). The cause for these unusual pH values is still unknown.

The electrical conductivity (EC) of the groundwater substantially differs between monitoring wells (in this second additional investigation EC ranges between 845 and 3,120 $\mu\text{S}/\text{cm}$), suggesting low flow groundwater velocity and/or heterogeneous presence of soluble salts.

The contamination case

In the investigations done at the site only PAH exceeds the I-value. The strongly contaminated zone (i.e. with PAH > I-value) has been delineated and mapped in sufficient detail in relation to the purpose of Phase II investigations. The soil area that is PAH contaminated above the I-value is estimated at 60-80 m^2 . As the contaminated layer has a total thickness of about 0.5 m, the contaminated volume is estimated at around 35 m^3 . In the groundwater the I-value for PAH is only exceeded in the area at monitoring wells 79 and 87. The volume of Intervention value exceedance in the groundwater is estimated to be very limited, i.e. much less than 100 m^3 . This implies that, in the Dutch regulatory framework, the identified contaminated zone qualifies as a so called 'Case of serious contamination' (*Geval van ernstige bodemverontreiniging*) based on the volume of Intervention value exceedance of the PAH contaminant being more than 25 m^3 in the soil.

Risk assessment

The possible risks involved in the identified Case of serious soil contamination (i.e. risk to humans on site and off site, risk to flora and fauna (ecological risk) and risk of spreading) are assessed as being low. Therefore, it can be stated that there is no question of 'legal' urgency (*spoedeisend karakter*) for remediation or clean up of the contamination.

The cause of the contamination

The cause of the contamination should be seen as related to the presence of added materials (rubble, etc.) to the soil. These materials have probably been used in the past to raise the land and improve the stability and bearing capacity of the soft peaty soil. Besides the rubble and other materials used, tar coated wooden planks appear to have been used from a demolished shed or barn that presumably was located near the location of the present front yard. When the shed was demolished the wooden planks were left on the land. According to site management this happened some 40 years ago. The hypothesis is that the planks decayed over the years releasing the mobile fraction of the tar coating.

As the contamination was caused in the past, it does NOT fall under the duty-of-care principle as applicable to recent pollution (defined as originating from 1987 onwards), which would require immediate and total clean-up in line with the Soil Protection Act.

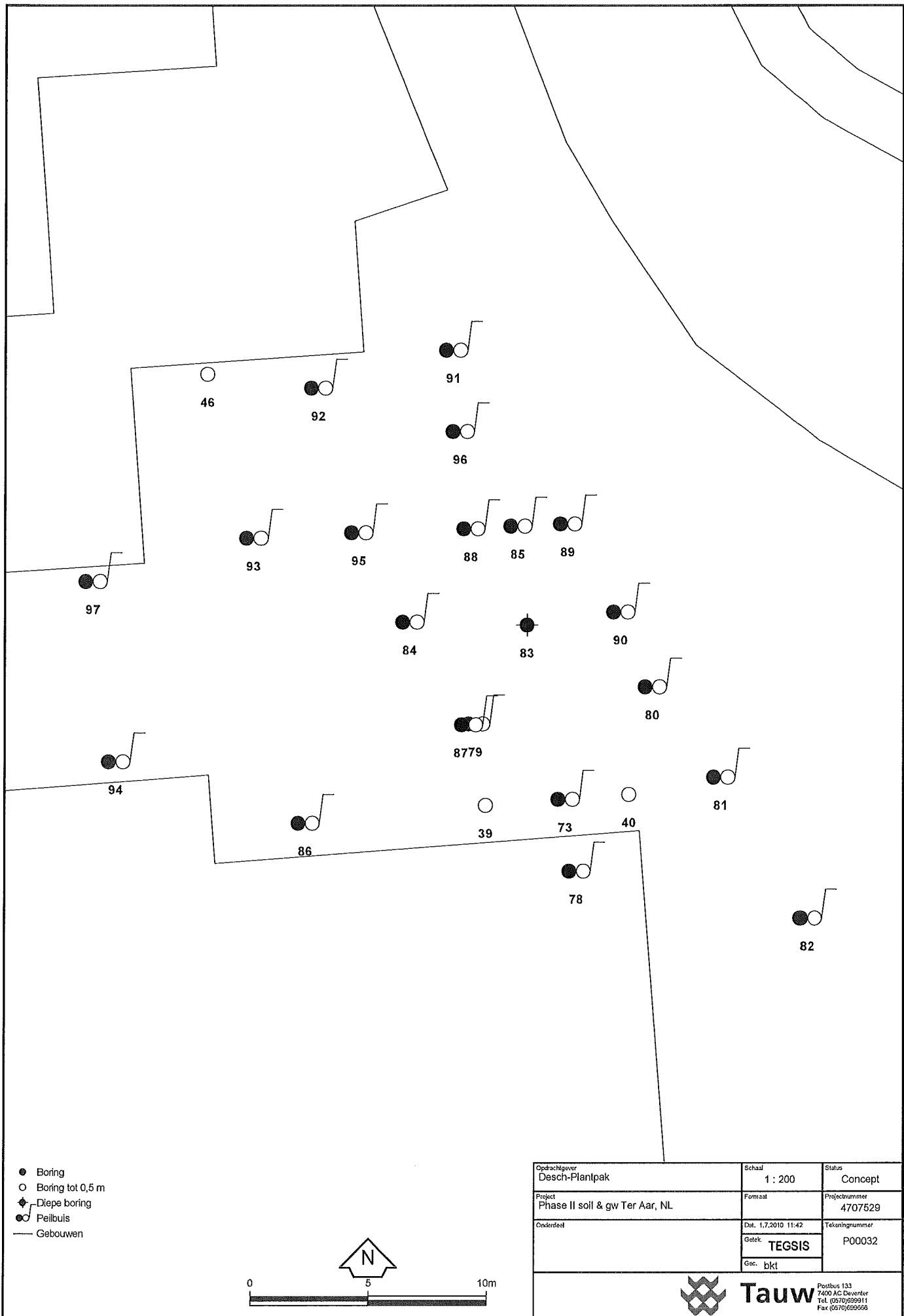
Remediation and costing

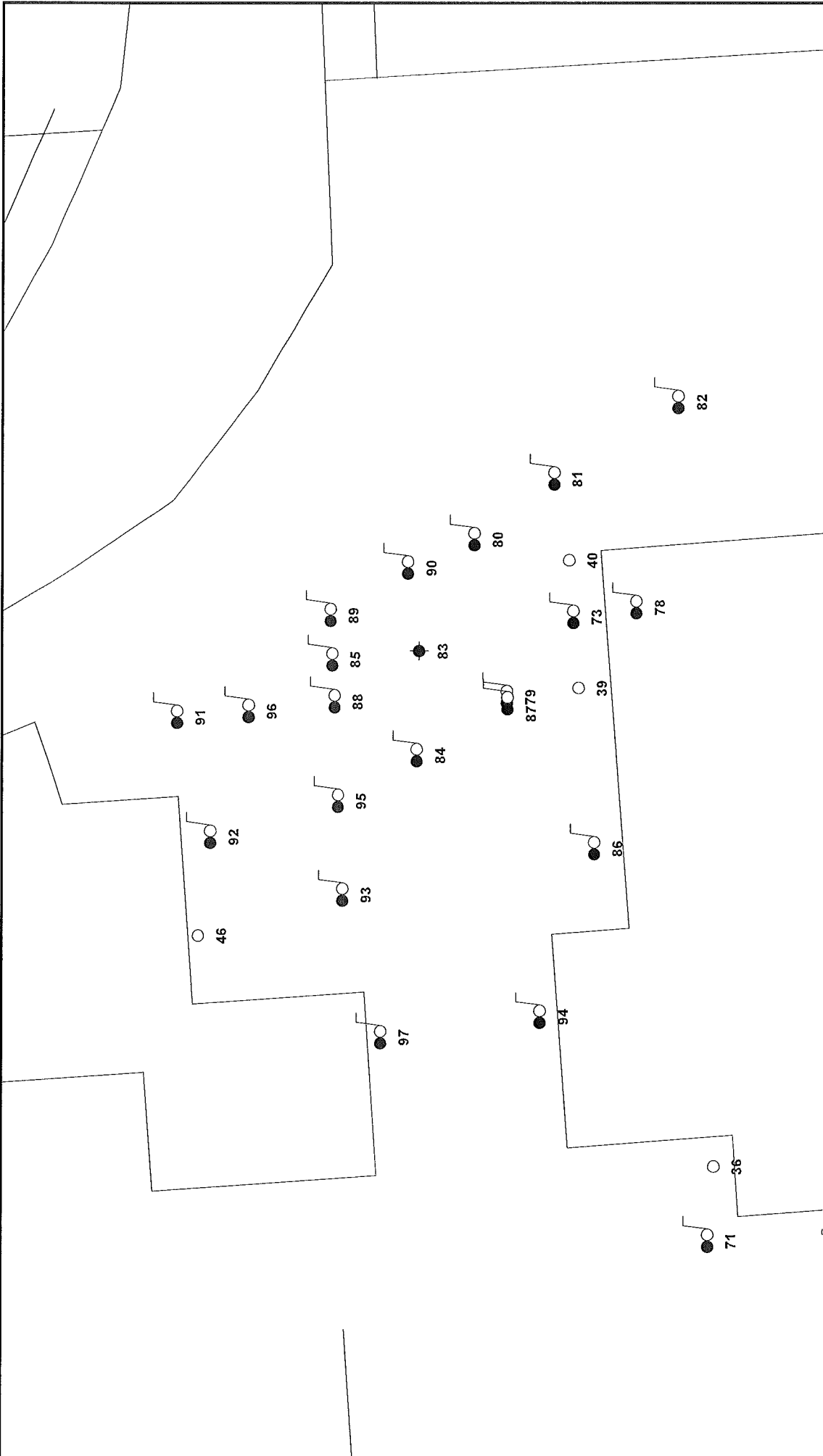
Based on the risk assessment remediation of the contamination is not urgently required by any applicable legislation or regulation. However in case of future building construction activities or other activities involving excavation at the front yard, prior soil clean-up would be required. In that case remediation of the contamination can best be done by means of excavation of the contaminated soil. Remediation costs are estimated at EUR 120,000.

Appendix

1

Map with locations of sampling points





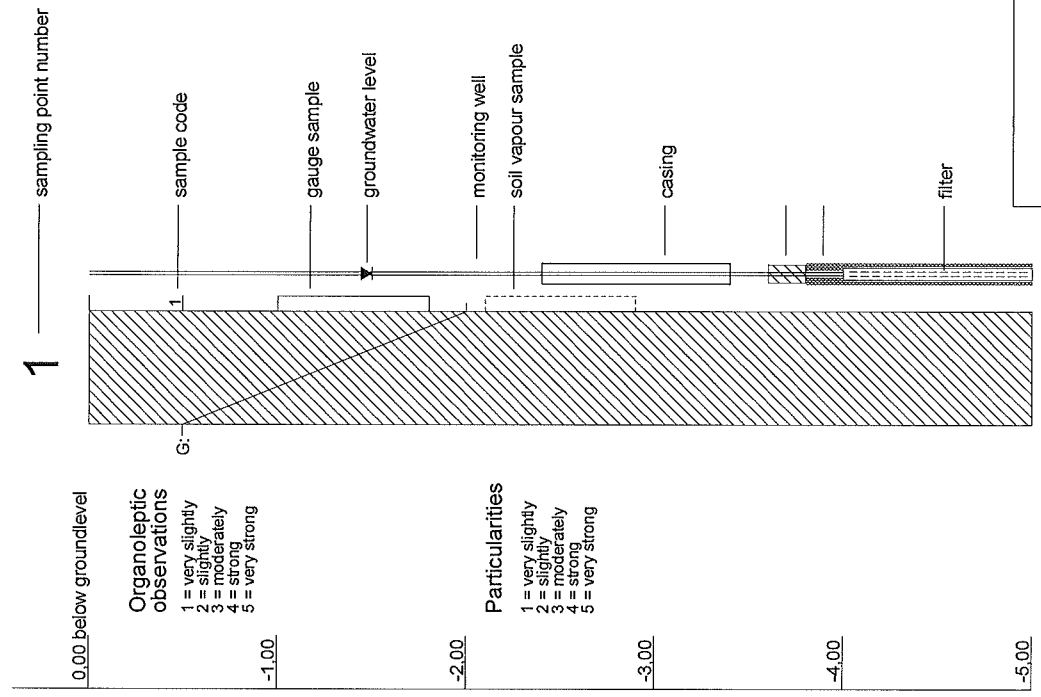
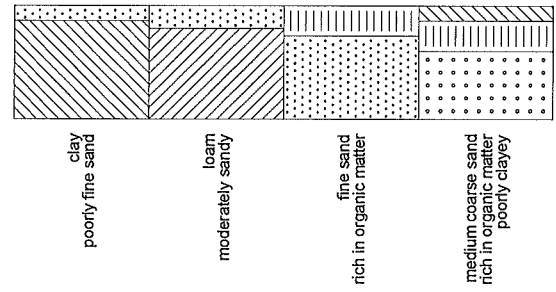
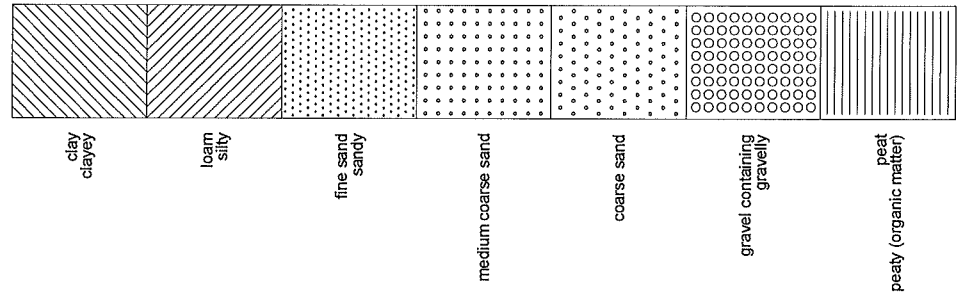
Opdrachtgever Desch-Plantpak	Schaal	1 : 250	Status	Concept
	Formaat	A4 210x297 mm	Projectnummer	4707529
	Project	Phase II soil & gw Ter Aar, NL	Tekeningnummer	P00031
	Ontwerper		Geok.	TEGSI
			Geoc.	bkt

**Tauw**
Postbus 133
3720 AA Dordrecht
Tel. (0512) 666611
Fax (0512) 666606

2 Appendix

Bore logs

Legend boreholes



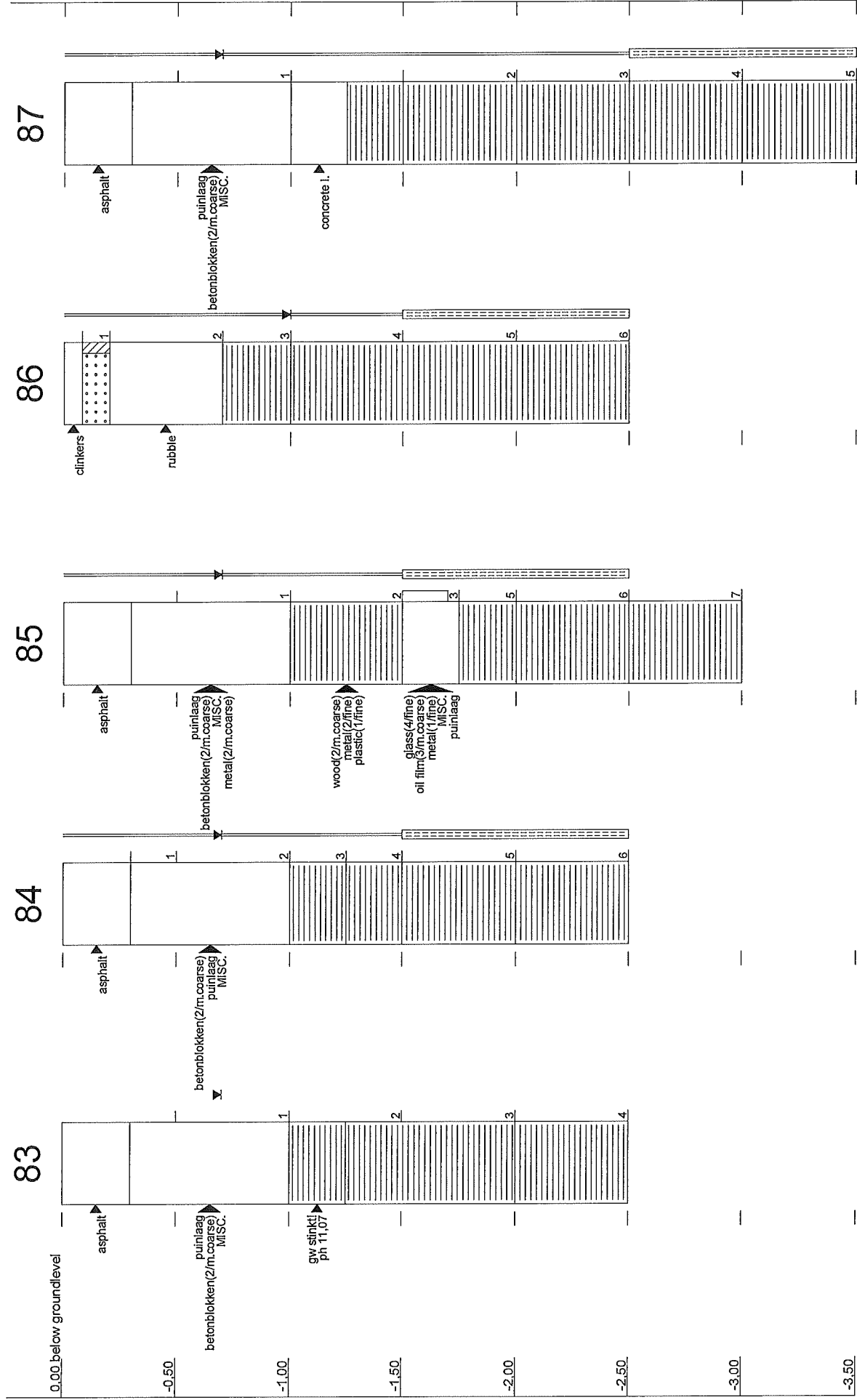
Organoleptic observations

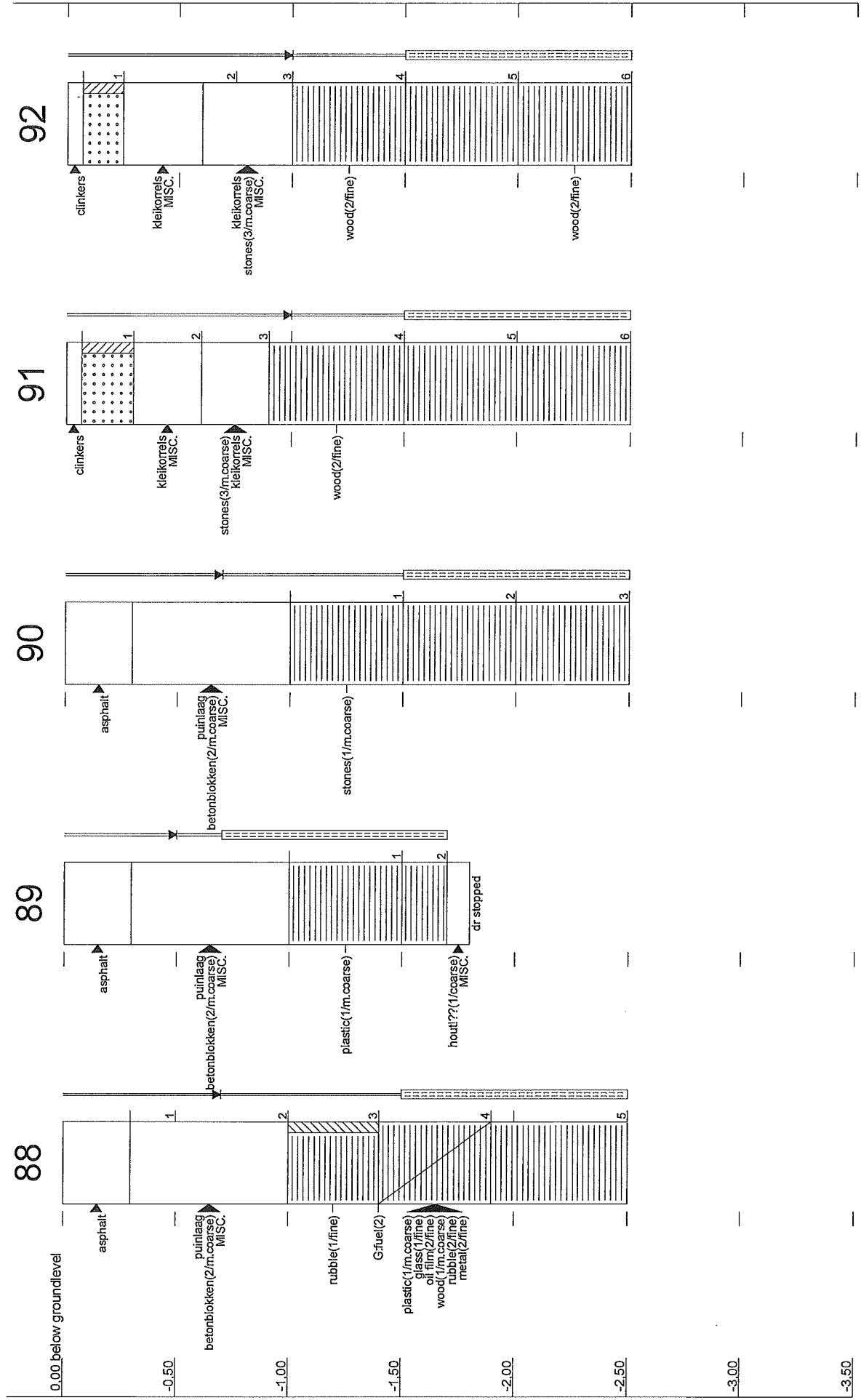
1 = very slightly
2 = slightly
3 = moderately
4 = strong
5 = very strong

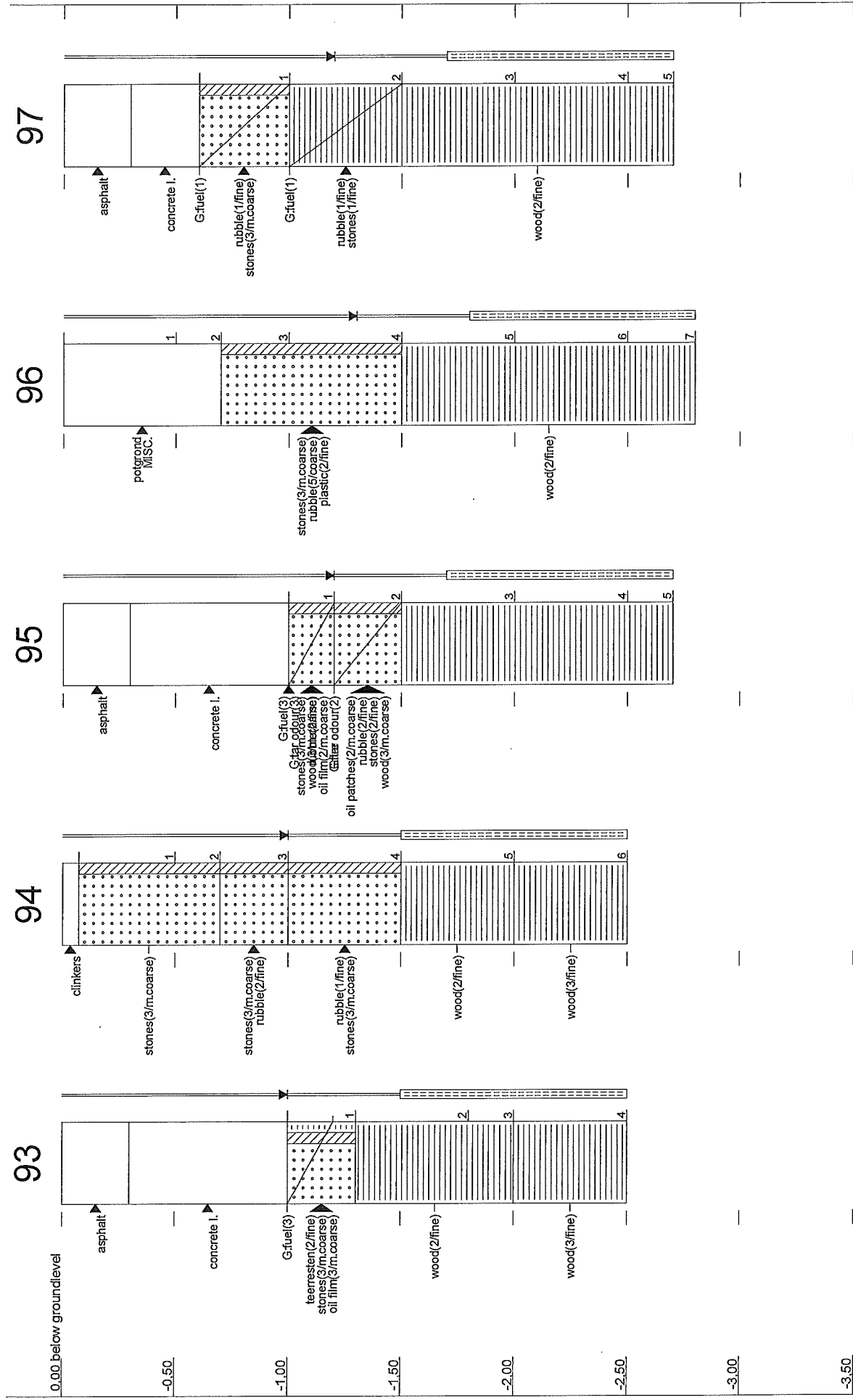
Particularities

1 = very slightly
2 = slightly
3 = moderately
4 = strong
5 = very strong









Appendix

3

Dutch STI values

TTT - Dutch STI framework- SOIL

Date: 22 June 2010

Clay	3%		
Org. matter	50%		
Labsample(s):	93 (1.8-2)		
	95 (1.5-2)		
	97 (1.5-2)		
	91 (1-1.5)		
	92 (1-1.5)		
	85 (2.5-3)		
	89 (1-1.5)		
	89 (1.5-1.7)		
	gAW	T	I

POLYCYCLIC AROMATIC HYDROCARBONS

PAH (10)	4,5	62	120
----------	-----	----	-----

TPH

TPH (C10-C40)	570	7785	15000
---------------	-----	------	-------

Clay	1%		
Org. matter	9%		
Labsample(s):	94 (0.7-1)		
	93 (1-1.3)		
	gAW	T	I

POLYCYCLIC AROMATIC HYDROCARBONS

PAH (10)	1,5	21	40
----------	-----	----	----

TPH

TPH (C10-C40)	171	2336	4500
---------------	-----	------	------

Clay	1%		
Org. matter	3,1%		
Labsample(s):	95 (1-1.2)		
	gAW	T	I

POLYCYCLIC AROMATIC HYDROCARBONS

PAH (10)	1,5	21	40
----------	-----	----	----

TPH

TPH (C10-C40)	59	804	1550
---------------	----	-----	------

Clay	1%		
Org. matter	10%		
Labsample(s):	96 (0.7-1)		
	97 (0.6-1)		
	gAW	T	I

POLYCYCLIC AROMATIC HYDROCARBONS			
PAH (10)	1,5	21	40

TPH			
TPH (C10-C40)	190	2595	5000

Clay	1%		
Org. matter	75%		
Labsample(s):	96 (2.5-2.8)		
	83 (2-2.5)		
	87 (2.5-3)		
	88 (2-2.5)		
	gAW	T	I

POLYCYCLIC AROMATIC HYDROCARBONS			
PAH (10)	4,5	62	120

TPH			
TPH (C10-C40)	570	7785	15000

Clay	6,8%		
Org. matter	83,5%		
Labsample(s):	95 (2.5-2.7)		
	gAW	T	I

POLYCYCLIC AROMATIC HYDROCARBONS			
PAH (10)	4,5	62	120

TPH			
TPH (C10-C40)	570	7785	15000

Clay	5%		
Org. matter	25%		
Labsample(s):	83 (1-1.5)		
	85 (1-1.5)		
	85 (1.5-1.75)		
	87 (1.5-2)		
	88 (1.4-1.9)		
	gAW	T	I

POLYCYCLIC AROMATIC HYDROCARBONS

PAH (10)	3,8	52	100
----------	-----	----	-----

TPH

TPH (C10-C40)	475	6488	12500
---------------	-----	------	-------

Clay	5,4%		
Org. matter	23,6%		
Labsample(s):	84 (1-1.25)		
	gAW	T	I

POLYCYCLIC AROMATIC HYDROCARBONS

PAH (10)	3,5	49	94
----------	-----	----	----

TPH

TPH (C10-C40)	448	6124	11800
---------------	-----	------	-------

gAW: Reference values soil [mg/kg ds]
T: Intermediate values soil [mg/kg ds]
I: Intervention values soil [mg/kg ds]

Source:

"Streefwaarden grondwater en Interventiewaarden bodemsanering uit de Circulaire Bodemsanering 2009 (Staatscourant 17 april 2009, 67)""

"Achtergrondwaarden uit Toepassen van grond en baggerspecie in oppervlaktewater conform Staatscourant 2007, 247"

TTT - Dutch STI framework - GROUNDWATER

Date: 24 jun 2010

	So	To	lo
METALS			
barium (Ba)	50	338	625
cadmium (Cd)	0,40	3,2	6,0
cobalt (Co)	20	60	100
copper (Cu)	15	45	75
mercury (Hg)	0,050	0,18	0,30
lead (Pb)	15	45	75
molybdenum (Mo)	5,0	153	300
nickel (Ni)	15	45	75
zinc (Zn)	65	433	800
AROMATISCHE VERBINDINGEN			
benzene	0,20	15	30
ethylbenzene	4,0	77	150
toluene	7,0	504	1000
xylenes (sum)	0,20	35	70
styrene	6,0	153	300
POLYCYCLIC AROMATIC HYDROCARBONS			
naftaene	0,010	35	70
fenanthrene	0,0030	2,5	5,0
anthracene	0,00070	2,5	5,0
fluoranthene	0,0030	0,50	1,0
chrysene	0,0030	0,10	0,20
benzo(a)anthracene	0,00010	0,25	0,50
benzo(a)pyrene	0,00050	0,025	0,050
benzo(k)fluoranthene	0,00040	0,025	0,050
indeno(1,2,3-c,d)pyrene	0,00040	0,025	0,050
benzo(g,h,i)perylene	0,00030	0,025	0,050
TPH			
TPH (C10-C40)	50	325	600

So: Reference values groundwater [ug/l]
 To: Intermediate values groundwater [ug/l]
 lo: Intervention values groundwater [ug/l]

Source:

Streefwaarden grondwater en Interventiewaarden bodemsanering uit de Circulaire Bodemsanering 2009 (Staatscourant 17 april 2009, 67)

Achtergrondwaarden uit Toepassen van grond en baggerspecie in oppervlaktewater conform Staatscourant 2007, 247

Appendix

4

Analytical results soil



TAUW DEVENTER
Marian Langevoort
POSTBUS 133
7400 AC DEVENTER

Datum 01.06.2010
Relatienr 35003840
Opdrachtnr. 187809
Blad 1 van 3

ANALYSERAPPORT

Opdracht 187809 Bodem / Eluaat

Opdrachtgever 35003840 TAUW DEVENTER
Referentie 4707529 Phase II soil & gw Ter Aar, NL
Opdrachtacceptatie 20.05.10
Monsternemer Opdrachtgever

Geachte heer, mevrouw,

Hierbij zenden wij U de resultaten van het door u aangevraagde laboratoriumonderzoek.
De analyses zijn, tenzij anders vermeld, uitgevoerd overeenkomstig onze erkenning voor de werkzaamheid
"Analyse voor milieuhygiënisch bodemonderzoek" van het Besluit Bodemkwaliteit.

Indien u gegevens wenst over de meetonzekerheden van een methode, kunnen wij u deze op verzoek verstrekken.

Dit rapport mag alleen in zijn geheel worden gereproduceerd. Eventuele bijlagen zijn onderdeel van het rapport.

Indien u nog vragen heeft of aanvullende informatie wenst, verzoeken wij u om contact op te nemen met
Klantenservice.

Wij vertrouwen U met de toegezonden informatie van dienst te zijn.

Met vriendelijke groet,

AL-West B.V. Dhr. Jan Godlieb, Tel. +31/570699760
Klantenservice

**AL-West B.V.**

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e-Mail: info@al-west.nl, www.al-west.nl

Blad 2 van 3

Opdracht 187809 Bodem / Eluaat

Monsternr.	Monstername	Monsteromschrijving
61514	20.05.2010	89 (1-1.5)
61515	20.05.2010	89 (1.5-1.7)

Eenheid**61514**
89 (1-1.5)**61515**
89 (1.5-1.7)**Algemene monstervoorbehandeling**

Voorbehandeling conform AS3000		++	++
Droge stof (Ds)	%	39,0	43,5

PAK

Anthraceen	mg/kg Ds	0,056	0,064
Benzo(a)anthraceen	mg/kg Ds	0,26	0,16
Benzo(a)pyreen	mg/kg Ds	0,23	0,12
Benzo(ghi)perylene	mg/kg Ds	0,22	0,12
Benzo(k)fluorantheen	mg/kg Ds	0,13	0,076
Chryseen	mg/kg Ds	0,31	0,17
Fenanthreen	mg/kg Ds	0,23	0,57
Fluorantheen	mg/kg Ds	0,62	0,41
Indeno-(1,2,3-c,d)pyreen	mg/kg Ds	0,19	0,14
Naftaleen	mg/kg Ds	<0,010	<0,010
Som PAK (VROM)	mg/kg Ds	2,2 ^{x)}	1,8 ^{x)}
Som PAK (VROM) (Factor 0,7)	mg/kg Ds	2,3 ^{#)}	1,8 ^{#)}

Minerale olie

Koolwaterstof fractie C10-C40	mg/kg Ds	310	370
Koolwaterstof fractie C10-C12	mg/kg Ds	<8,0 ^{ts)}	25
Koolwaterstof fractie C12-C16	mg/kg Ds	<8,0 ^{ts)}	39
Koolwaterstof fractie C16-C20	mg/kg Ds	44	57
Koolwaterstof fractie C20-C24	mg/kg Ds	110	60
Koolwaterstof fractie C24-C28	mg/kg Ds	74	78
Koolwaterstof fractie C28-C32	mg/kg Ds	51	57
Koolwaterstof fractie C32-C36	mg/kg Ds	25	46
Koolwaterstof fractie C36-C40	mg/kg Ds	9,5	16

Verklaring: "<" of na betekent dat het gehalte van de component lager is dan de rapportagegrens.

de daadwerkelijke rapportagegrens kan in sommige gevallen afwijken van de standaard waarde voor de betreffende analyse door bijvoorbeeld matrixeffecten of te weinig monstermateriaal.

x) Gehaltes beneden de rapportagegrens zijn niet mee inbegrepen.

#) Bij deze som zijn resultaten "<rapportagegrens" vermenigvuldigd met 0,7; indien een som is berekend uit minimaal één verhoogde rapportagegrens, dan dient voor het resultaat "<" gelezen te worden.

ts) De bepalingsgrens is verhoogd vanwege het lage droge stofgehalte.

De onderzoeksresultaten hebben alleen betrekking op het aangeleverde monstermateriaal. De onderzoekstijd omvat de periode tussen acceptatie van de opdracht en rapportage. Monsters met onbekende herkomst, kunnen slechts beperkt gecontroleerd worden op plausibiliteit.

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Blad 3 van 3

Opdracht 187809 Bodem / Eluaat

Toegepaste methoden

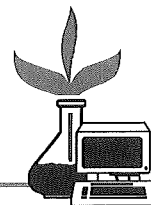
Grond

conform AS 3000: Koolwaterstoffractie C10-C40 Som PAK (VROM) Som PAK (VROM) (Factor 0,7)

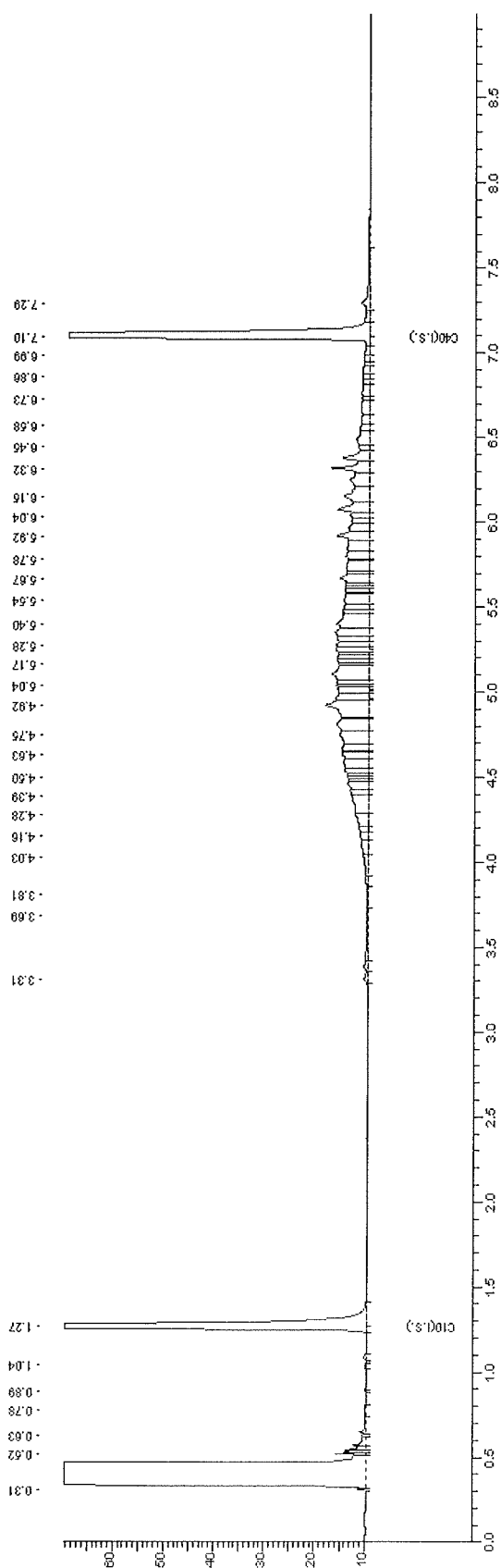
conform AS 3000: n) Koolwaterstoffractie C10-C12 Koolwaterstoffractie C12-C16 Koolwaterstoffractie C16-C20 Koolwaterstoffractie C20-C24
Koolwaterstoffractie C24-C28 Koolwaterstoffractie C28-C32 Koolwaterstoffractie C32-C36 Koolwaterstoffractie C36-C40

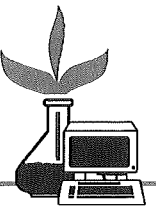
conform AS 3000: Voorbehandeling conform AS3000 Droge stof (Ds)

n) Niet geaccrediteerd

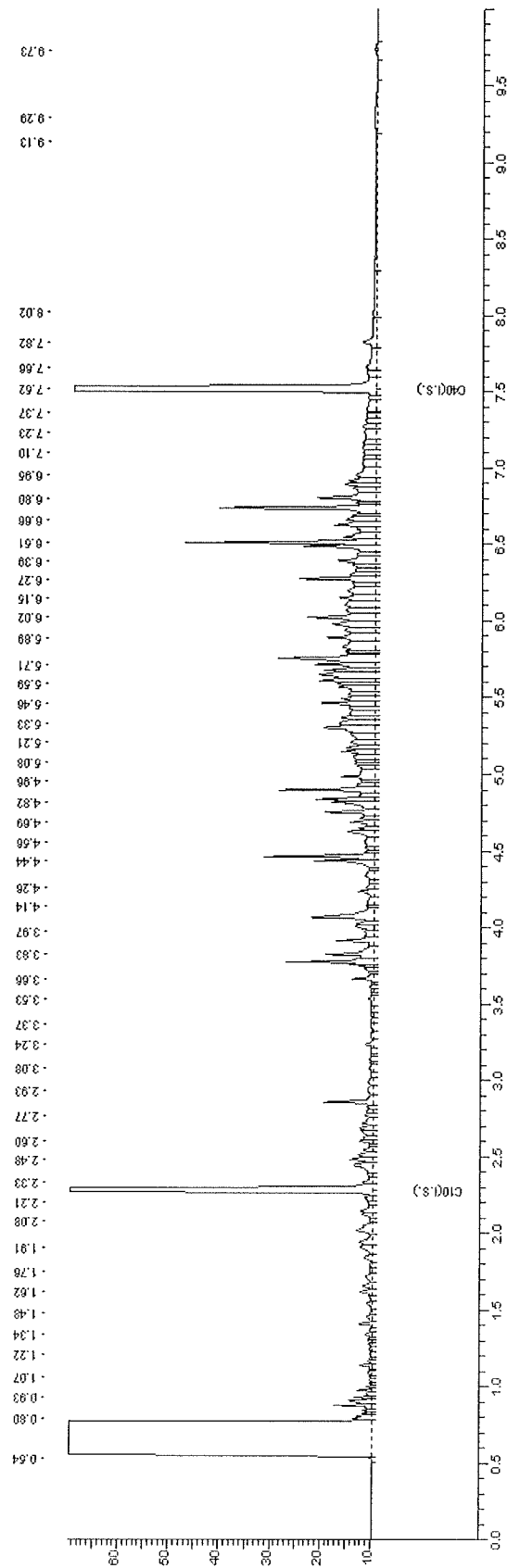


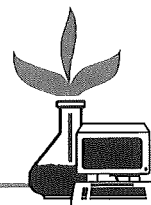
Chromatogram for Order No. 187809, Analysis No. 61514, created at 27.05.2010 22:37:06





Chromatogram for Order No. 187809, Analysis No. 61515, created at 31.05.2010 05:47:08





TAUW DEVENTER
Karen de Roo
POSTBUS 133
7400 AC DEVENTER

Datum 26.05.2010
Relatienr 35003840
Opdrachtnr. 186818
Blad 1 van 4

ANALYSERAPPORT

Opdracht 186818 Bodem / Eluaat

Opdrachtgever 35003840 TAUW DEVENTER
Referentie 4707529 Phase II soil & gw Ter Aar, NL
Opdrachtacceptatie 12.05.10
Monsternemer Opdrachtgever

Geachte heer, mevrouw,

Hierbij zenden wij U de resultaten van het door u aangevraagde laboratoriumonderzoek.
De analyses zijn, tenzij anders vermeld, uitgevoerd overeenkomstig onze erkenning voor de werkzaamheid
"Analyse voor milieuhygiënisch bodemonderzoek" van het Besluit Bodemkwaliteit.

Indien u gegevens wenst over de meetonzekerheden van een methode, kunnen wij u deze op verzoek verstrekken.

Dit rapport mag alleen in zijn geheel worden gereproduceerd. Eventuele bijlagen zijn onderdeel van het rapport.

Indien u nog vragen heeft of aanvullende informatie wenst, verzoeken wij u om contact op te nemen met
Klantenservice.

Wij vertrouwen U met de toegezonden informatie van dienst te zijn.

Met vriendelijke groet,

AL-West B.V. Dhr. Jan Godlieb, Tel. +31/570699760
Klantenservice



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Opdracht 186818 Bodem / Eluaat

Blad 2 van 4

Monsternr.	Monstername	Monsteromschrijving
56533	12.05.2010	83 (1-1.5)
56534	12.05.2010	83 (2-2.5)
56535	12.05.2010	84 (1-1.25)
56536	12.05.2010	85 (1-1.5)
56537	12.05.2010	85 (1.5-1.75)

Eenheid	56533 83 (1-1.5)	56534 83 (2-2.5)	56535 84 (1-1.25)	56536 85 (1-1.5)	56537 85 (1.5-1.75)
---------	---------------------	---------------------	----------------------	---------------------	------------------------

Algemene monstervoorbehandeling

Voorbehandeling conform AS3000		++	++	++	++	++
Droge stof (Ds)	%	58,0	17,3	54,6	42,9	54,0
IJzer (Fe ₂ O ₃)	% Ds	--	--	<5,0	--	--

Klassiek Chemische Analyses

Organische stof	% Ds	--	--	23,6 ^{xj}	--	--
Carbonaten dmv asrest (AS3000)	% Ds	--	--	1,3	--	--

Fracties (sedigraaf)

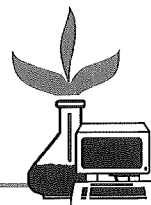
Fractie < 2 µm	% Ds	--	--	5,4	--	--
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PAK

Anthraceen	mg/kg Ds	0,62	<0,010	0,49	0,23	54
Benzo(a)anthraceen	mg/kg Ds	1,3	0,11	0,68	0,70	5,9
Benzo(a)pyreen	mg/kg Ds	1,0	0,16	0,42	0,65	87
Benzo(ghi)perylene	mg/kg Ds	0,81	0,25	0,31	0,72	91
Benzo(k)fluorantheen	mg/kg Ds	0,57	<0,010	0,27	0,37	69
Chryseen	mg/kg Ds	1,2	0,12	0,66	0,68	150
Fenanthreen	mg/kg Ds	3,8	0,25	3,3	0,89	540
Fluorantheen	mg/kg Ds	4,0	0,38	3,1	2,0	520
Indeno-(1,2,3-c,d)pyreen	mg/kg Ds	1,0	0,069	0,44	0,51	17
Naftaleen	mg/kg Ds	0,43	<0,050 ^{mj}	0,66	0,21	35
Som PAK (VROM)	mg/kg Ds	15	1,3 ^{xj}	10	7,0	1600
Som PAK (VROM) (Factor 0,7)	mg/kg Ds	15	1,4 ^{#j}	10	7,0	1600

Minerale olie

Koolwaterstoffractie C10-C40	mg/kg Ds	93	<100 ^{tsj}	66	180	3900
Koolwaterstoffractie C10-C12	mg/kg Ds	<4,0	<20 ^{tsj}	<4,0	<8,0	96
Koolwaterstoffractie C12-C16	mg/kg Ds	<4,0	<20 ^{tsj}	<4,0	<8,0	1100
Koolwaterstoffractie C16-C20	mg/kg Ds	9,5	<10 ^{tsj}	5,1	14	1100
Koolwaterstoffractie C20-C24	mg/kg Ds	14	<10 ^{tsj}	7,3	23	740
Koolwaterstoffractie C24-C28	mg/kg Ds	16	21	10	33	310
Koolwaterstoffractie C28-C32	mg/kg Ds	19	21	15	49	220
Koolwaterstoffractie C32-C36	mg/kg Ds	24	29	17	37	140
Koolwaterstoffractie C36-C40	mg/kg Ds	7,6	15	9,2	20	93


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Blad 3 van 4

Opdracht 186818 Bodem / Eluaat

Monsternr.	Monstername	Monsteromschrijving
56538	12.05.2010	85 (2.5-3)
56539	12.05.2010	87 (1.5-2)
56540	12.05.2010	87 (2.5-3)
56541	12.05.2010	88 (1.4-1.9)
56542	12.05.2010	88 (2-2.5)

Eenheid	56538 85 (2.5-3)	56539 87 (1.5-2)	56540 87 (2.5-3)	56541 88 (1.4-1.9)	56542 88 (2-2.5)
---------	---------------------	---------------------	---------------------	-----------------------	---------------------

Algemene monstervoorbehandeling

Voorbehandeling conform AS3000		++	++	++	++	++
Droge stof (Ds)	%	14,7	21,9	15,2	42,8	15,8
IJzer (Fe2O3)	% Ds	--	--	<5,0	--	--

Klassiek Chemische Analyses

Organische stof	% Ds	--	--	75,0 ^{x)}	--	--
Carbonaten dmv asrest (AS3000)	% Ds	--	--	2,5	--	--

Fracties (sedigraaf)

Fractie < 2 µm	% Ds	--	--	<1,0	--	--
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PAK

Anthraceen	mg/kg Ds	0,68	0,78	<0,010	20	<0,010
Benzo(a)anthraceen	mg/kg Ds	0,88	0,078	<0,010	1,8	0,18
Benzo(a)pyreen	mg/kg Ds	1,1	1,3	<0,010	30	0,082
Benzo(ghi)perylene	mg/kg Ds	0,48	1,0	0,49	19	<0,010
Benzo(k)fluorantheen	mg/kg Ds	0,40	0,78	<0,010	17	<0,010
Chryseen	mg/kg Ds	1,0	2,0	<0,010	37	0,13
Fenanthreen	mg/kg Ds	4,5	6,4	0,23	150	0,33
Fluorantheen	mg/kg Ds	3,4	9,1	0,27	160	0,44
Indeno-(1,2,3-c,d)pyreen	mg/kg Ds	0,54	<0,010	<0,010	23	<0,010
Naftaleen	mg/kg Ds	0,46	2,3	<0,050 ^{m)}	44	<0,010
Som PAK (VROM)	mg/kg Ds	13	24 ^{x)}	0,99 ^{x)}	500	1,2 ^{x)}
Som PAK (VROM) (Factor 0,7)	mg/kg Ds	13	24 ^{#)}	1,1 ^{#)}	500	1,2 ^{#)}

Minerale olie

Koolwaterstoffractie C10-C40	mg/kg Ds	<100 ^{ts)}	360	<100 ^{ts)}	1100	<100 ^{ts)}
Koolwaterstoffractie C10-C12	mg/kg Ds	<20 ^{ts)}	<16 ^{ts)}	<20 ^{ts)}	<8,0 ^{ts)}	<20 ^{ts)}
Koolwaterstoffractie C12-C16	mg/kg Ds	<20 ^{ts)}	30	<20 ^{ts)}	230	<20 ^{ts)}
Koolwaterstoffractie C16-C20	mg/kg Ds	21	59	<10 ^{ts)}	330	<10 ^{ts)}
Koolwaterstoffractie C20-C24	mg/kg Ds	<10 ^{ts)}	78	<10 ^{ts)}	170	18
Koolwaterstoffractie C24-C28	mg/kg Ds	18	55	<2,0	75	22
Koolwaterstoffractie C28-C32	mg/kg Ds	<2,0	55	18	93	20
Koolwaterstoffractie C32-C36	mg/kg Ds	<2,0	59	26	84	19
Koolwaterstoffractie C36-C40	mg/kg Ds	17	18	<10 ^{ts)}	84	<10 ^{ts)}

Verklaring: "<" of na betekent dat het gehalte van de component lager is dan de rapportagegrens.

de daadwerkelijke rapportagegrens kan in sommige gevallen afwijken van de standaard waarde voor de betreffende analyse door bijvoorbeeld matrixeffecten of te weinig monstermateriaal.

x) Gehaltes beneden de rapportagegrens zijn niet mee inbegrepen.

#) Bij deze som zijn resultaten "<rapportagegrens" vermenigvuldigd met 0,7; indien een som is berekend uit minimaal één verhoogde rapportagegrens, dan dient voor het resultaat "<" gelezen te worden.

m) De bepalingsgrens is verhoogd, omdat door matrixeffecten, resp. co-elutie een kwantificering bemoeilijkt wordt.



**AL-West B.V.**

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Blad 4 van 4

Opdracht 186818 Bodem / Eluaat

ts) De bepalingsgrens is verhoogd vanwege het lage droge stofgehalte.

Het organische stof gehalte wordt gecorrigeerd voor het lutum gehalte, als geen lutum bepaald is wordt gecorrigeerd als ware het lutum gehalte 5,4%

De onderzoeksresultaten hebben alleen betrekking op het aangeleverde monstermateriaal. De onderzoekstijd omvat de periode tussen acceptatie van de opdracht en rapportage. Monsters met onbekende herkomst, kunnen slechts beperkt gecontroleerd worden op plausibiliteit.

AL-West B.V. Dhr. Jan Godlieb, Tel. +31/570699760
Klantenservice

Toegepaste methoden**Grond**

conform AS 3000: Koolwaterstoffractie C10-C40 Som PAK (VROM) Som PAK (VROM) (Factor 0,7)

conform AS 3000: n) Carbonaten dmv asrest (AS3000) Koolwaterstoffractie C10-C12 Koolwaterstoffractie C12-C16

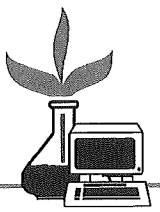
Koolwaterstoffractie C16-C20 Koolwaterstoffractie C20-C24 Koolwaterstoffractie C24-C28 Koolwaterstoffractie C28-C32

Koolwaterstoffractie C32-C36 Koolwaterstoffractie C36-C40

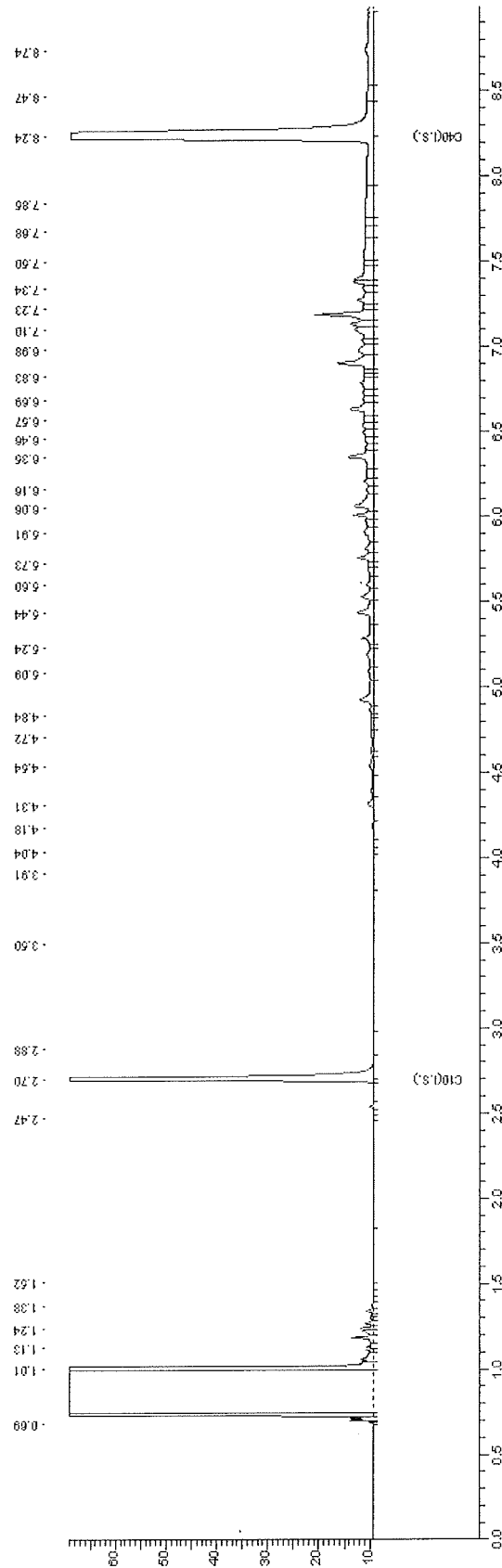
conform AS 3000: Voorbehandeling conform AS3000 Droge stof (Ds) IJzer (Fe2O3) Fractie < 2 µm

conform AS 3000 en NEN 5754: Organische stof

n) Niet geaccrediteerd

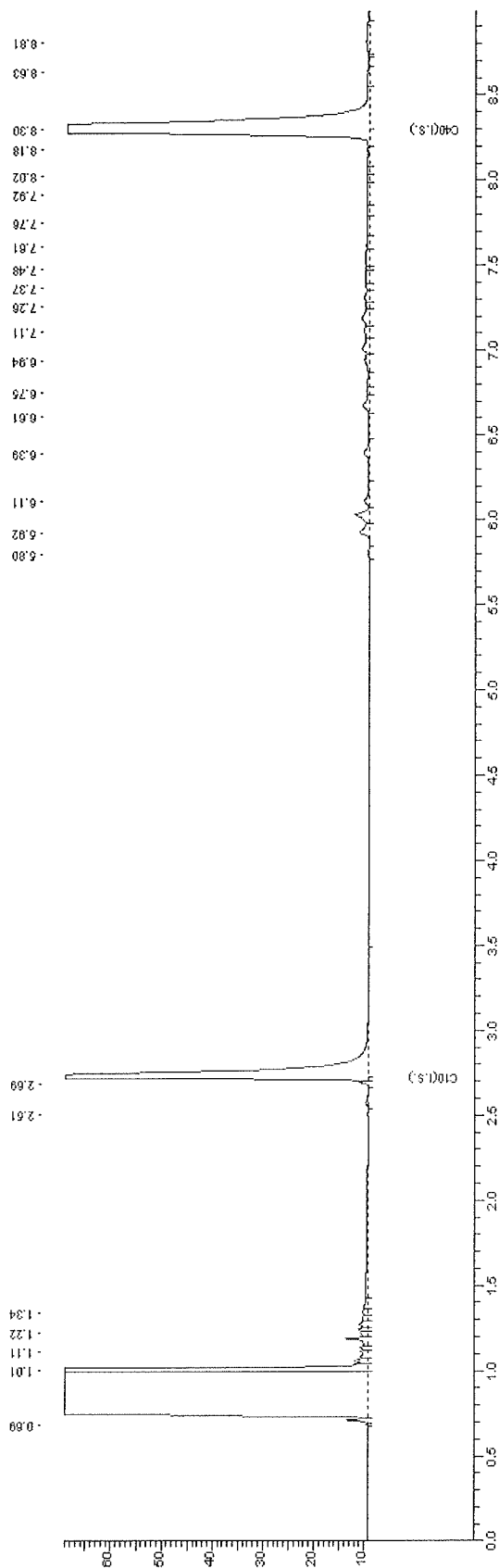


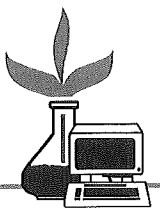
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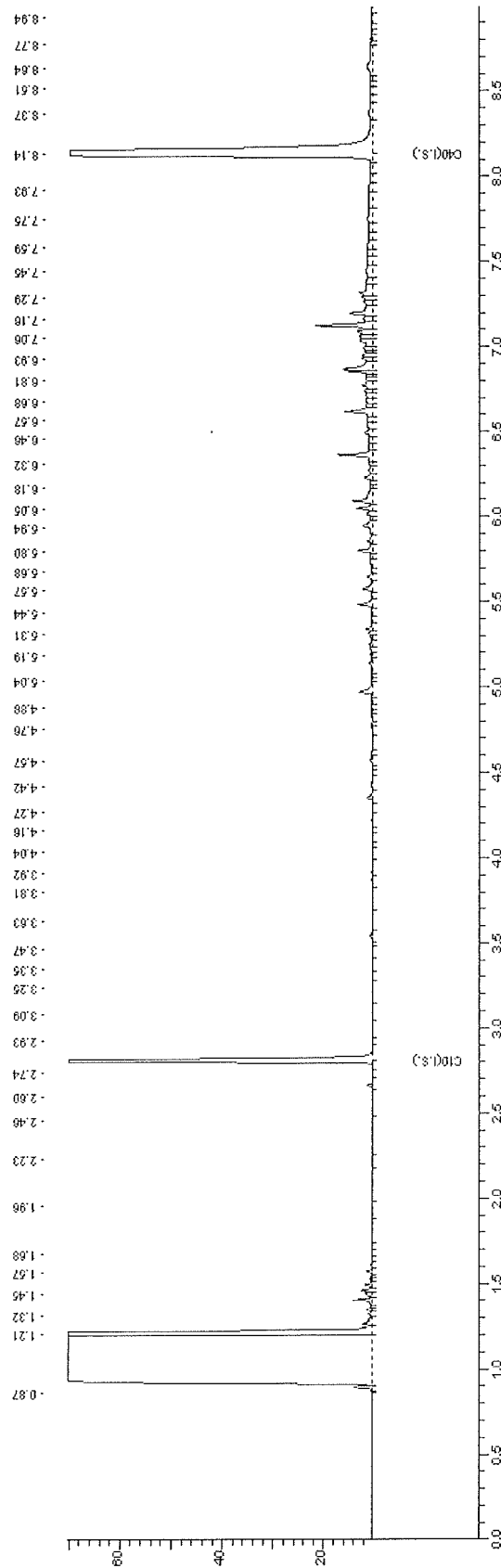


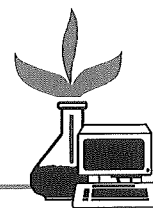
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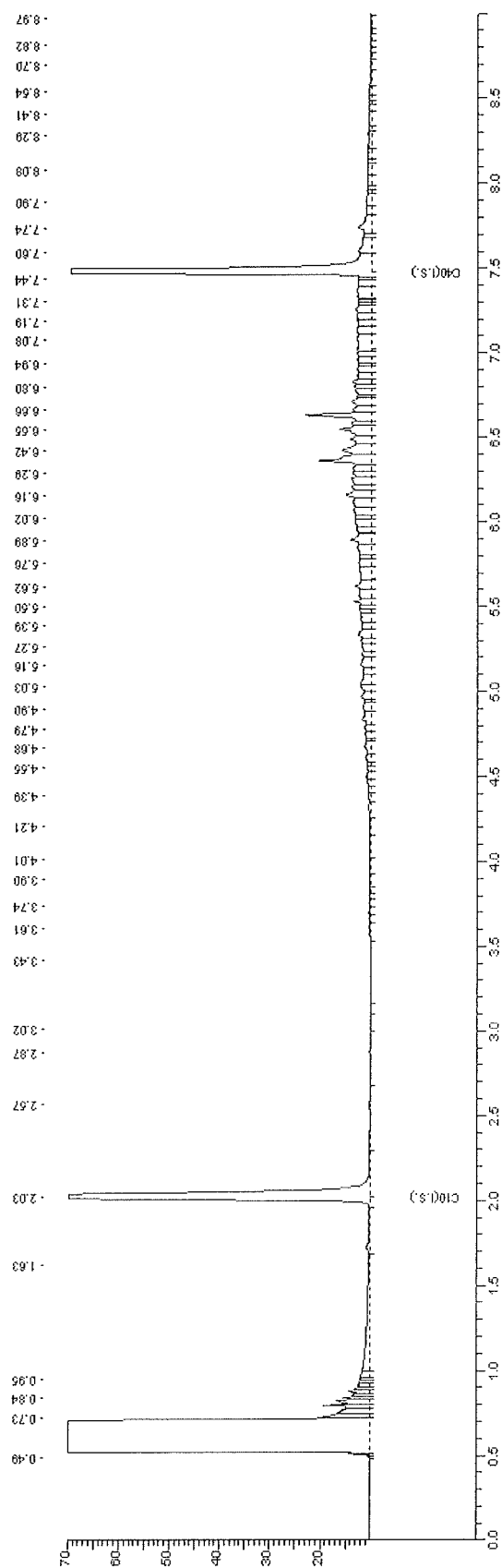


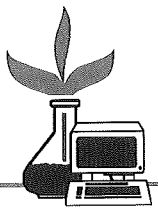
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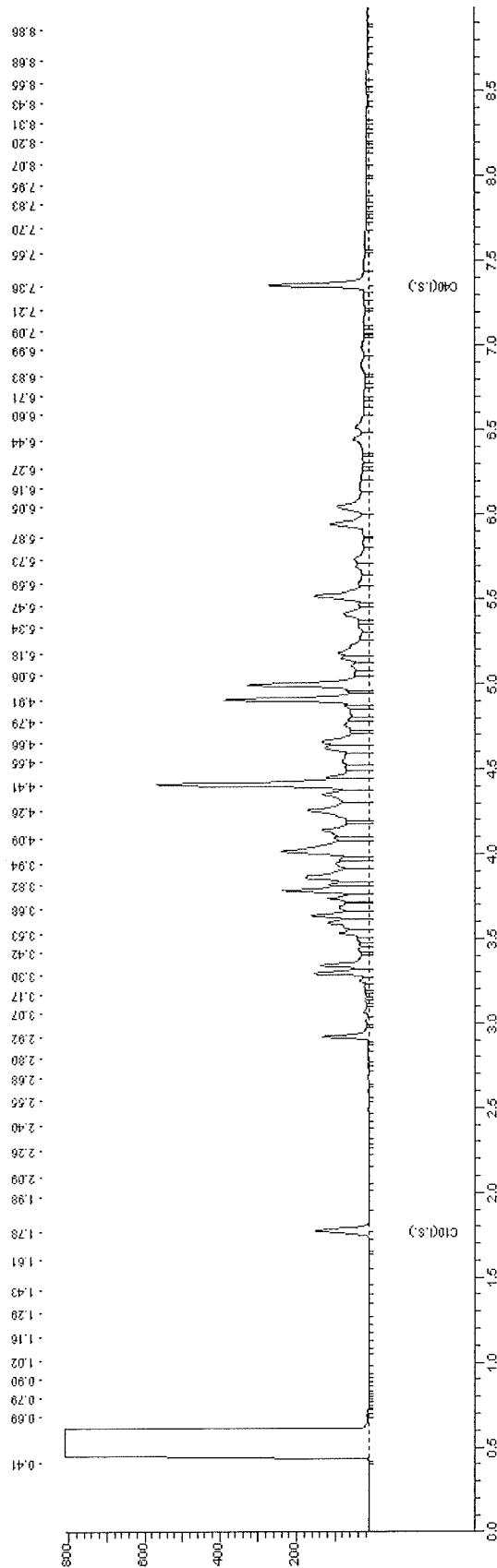


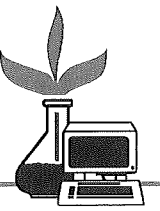
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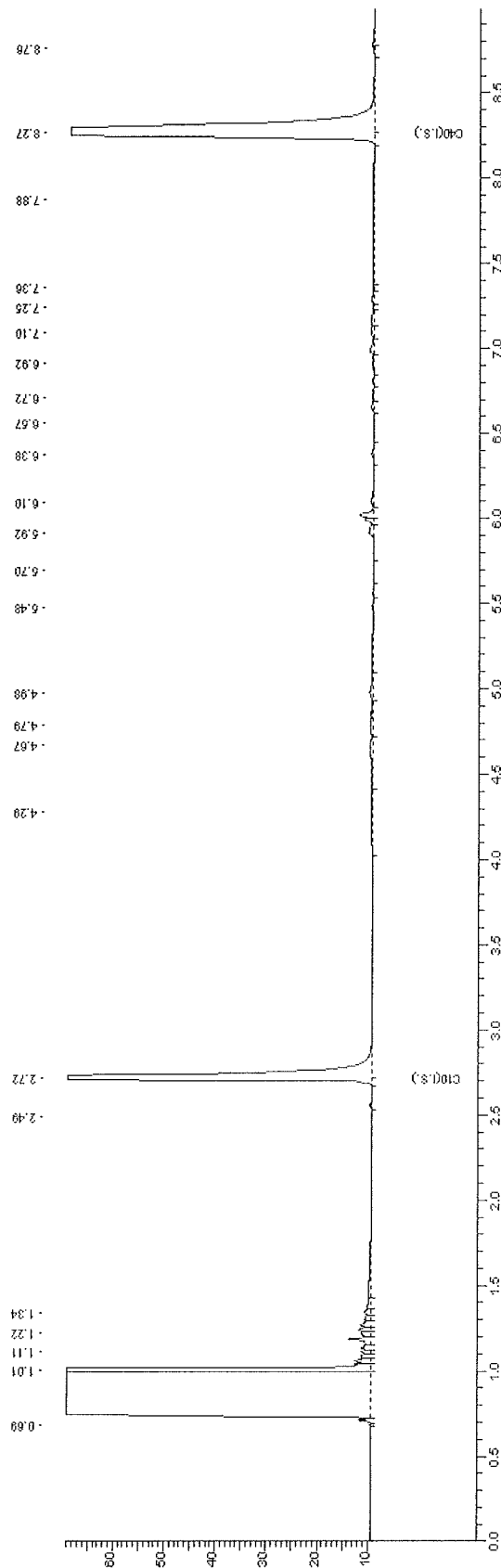


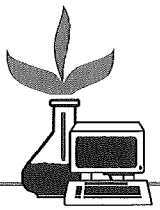
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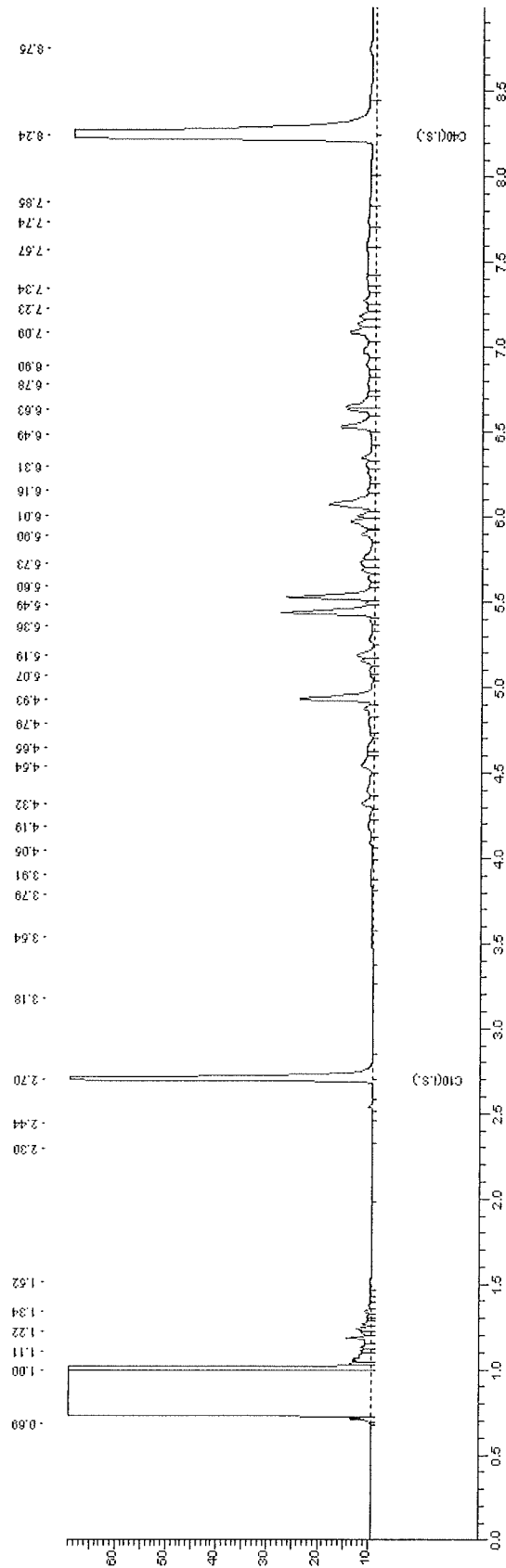


Chromatogram for Order No. 186818, Analysis No. 56538, created at 20.05.2010 19:12:06



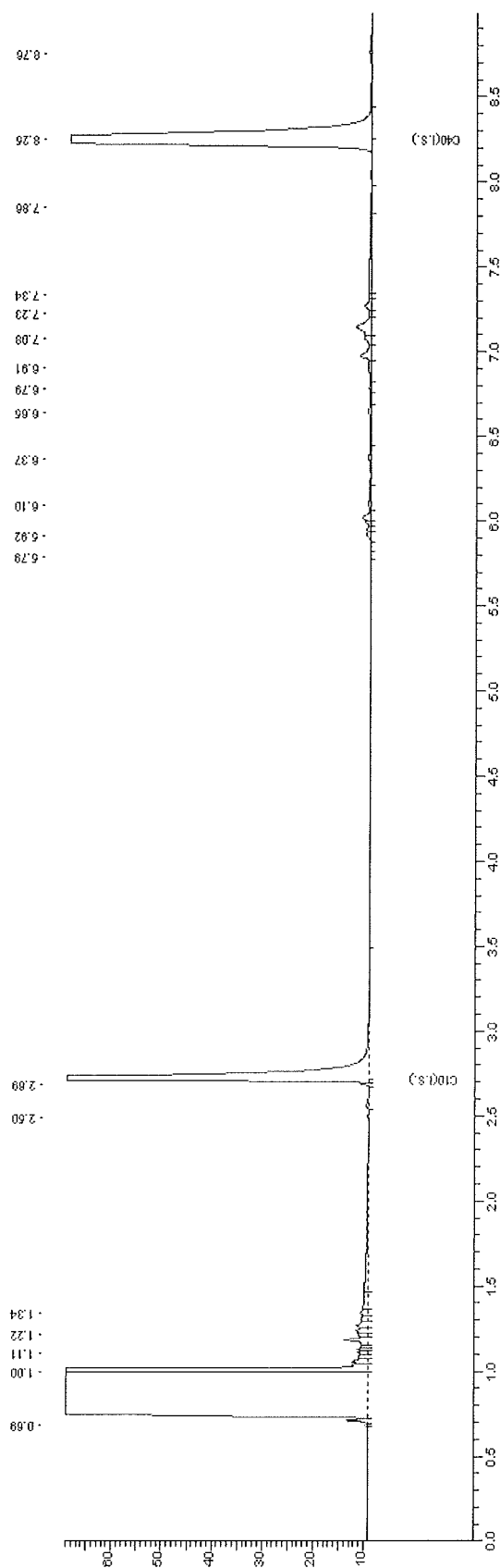


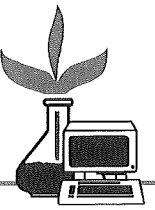
Chromatogram for Order No. 186818, Analysis No. 56539, created at 20.05.2010 16:27:06



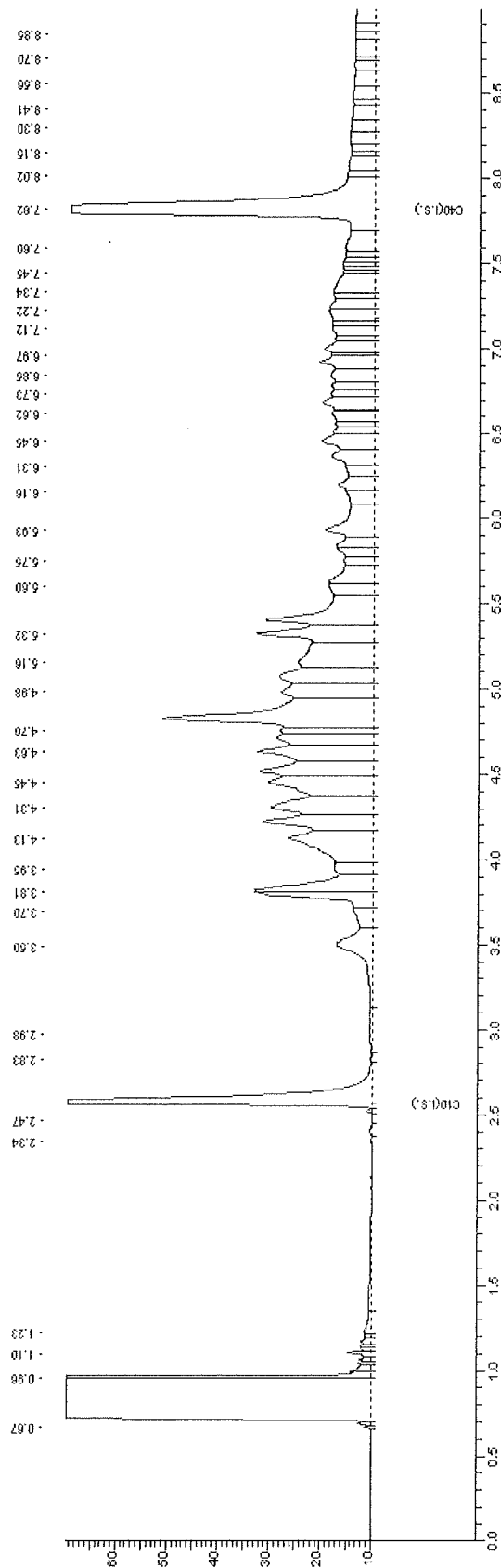


Chromatogram for Order No. 186818, Analysis No. 56540, created at 20.05.2010 19:32:08



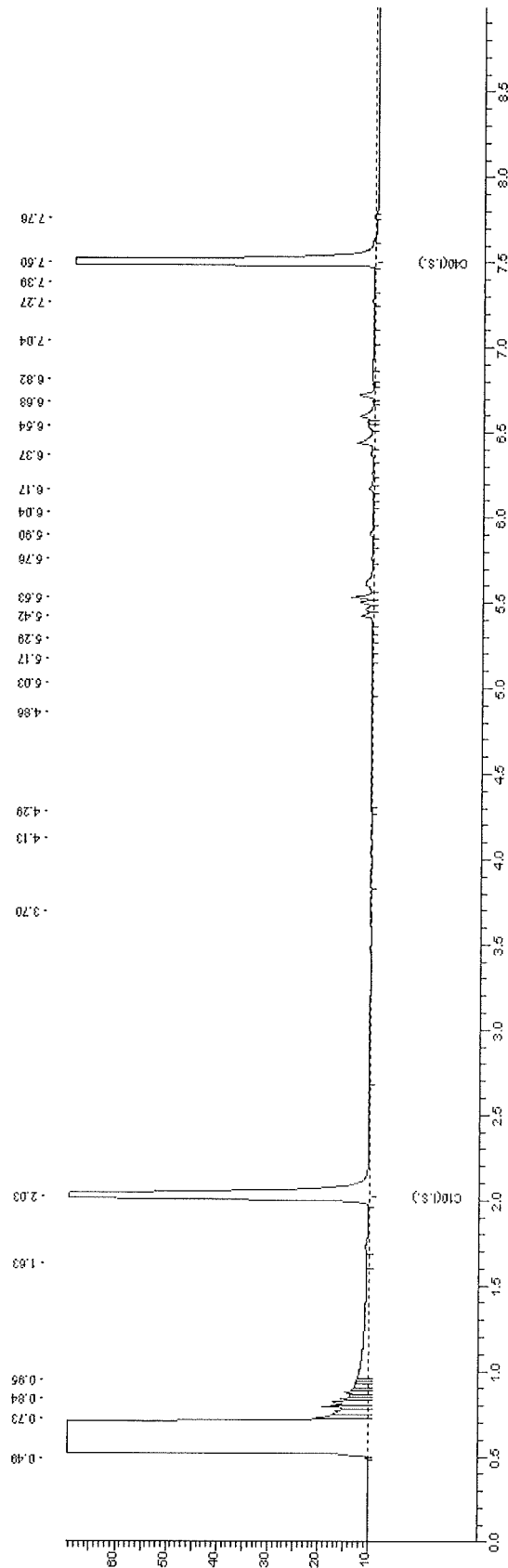


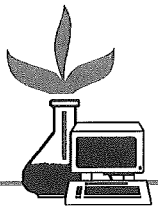
Chromatogram for Order No. 186818, Analysis No. 56541, created at 20.05.2010 01:37:08





Chromatogram for Order No. 186818, Analysis No. 56542, created at 20.05.2010 12:52:12





TAUW DEVENTER
Matthijs Bouwknecht
POSTBUS 133
7400 AC DEVENTER

Datum 11.06.2010
Relatienr 35003840
Opdrachtnr. 190096
Blad 1 van 5

ANALYSERAPPORT

Opdracht 190096 Bodem / Eluaat

Opdrachtgever 35003840 TAUW DEVENTER
Referentie 4707529 Phase II soil & gw Ter Aar, NL
Opdrachtacceptatie 03.06.10
Monsternemer Opdrachtgever

Geachte heer, mevrouw,

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De analyses zijn, tenzij anders vermeld, uitgevoerd overeenkomstig onze erkenning voor de werkzaamheid
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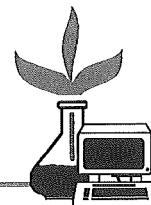
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Klantenservice.

Wij vertrouwen U met de toegezonden informatie van dienst te zijn.

Met vriendelijke groet,

AL-West B.V. Dhr. Jan Godlieb, Tel. +31/570699760
Klantenservice


Opdracht 190096 Bodem / Eluaat

Monsternr.	Monstername	Monsteromschrijving
74855	02.06.2010	91 (1-1.5)
74856	02.06.2010	92 (1-1.5)
74857	02.06.2010	93 (1-1.3)
74858	02.06.2010	93 (1.8-2)
74859	02.06.2010	94 (0.7-1)

Eenheid	74855 91 (1-1.5)	74856 92 (1-1.5)	74857 93 (1-1.3)	74858 93 (1.8-2)	74859 94 (0.7-1)
---------	---------------------	---------------------	---------------------	---------------------	---------------------

Algemene monstervoorbehandeling

Voorbehandeling conform AS3000		++	++	++	++
Droge stof (Ds)	%	37,9	31,5	53,7	16,6
IJzer (Fe2O3)	% Ds	--	--	8,7	--

Klassiek Chemische Analyses

Organische stof	% Ds	--	--	9,0 ^{x)}	--
Carbonaten dmv asrest (AS3000)	% Ds	--	--	10	--

Fracties (sedigraaf)

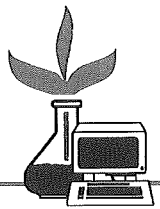
Fractie < 2 µm	% Ds	--	--	<1,0	--
----------------	------	----	----	------	----

PAK

Anthraceen	mg/kg Ds	0,047	0,19	3,5	<0,050 ^{m)}	0,015
Benzo(a)anthraceen	mg/kg Ds	0,26	0,54	7,6	<0,050 ^{m)}	0,11
Benzo(a)pyreen	mg/kg Ds	0,24	0,54	5,6	<0,050 ^{m)}	0,11
Benzo(ghi)perylene	mg/kg Ds	0,22	0,51	5,0	<0,20 ^{m)}	0,090
Benzo(k)fluorantheen	mg/kg Ds	0,13	0,31	3,5	<0,050 ^{m)}	0,062
Chryseen	mg/kg Ds	0,26	0,70	6,5	<0,050 ^{m)}	0,11
Fenanthreen	mg/kg Ds	0,29	0,95	22	0,22	0,23
Fluorantheen	mg/kg Ds	0,58	1,8	24	<1,0 ^{m)}	0,21
Indeno-(1,2,3-c,d)pyreen	mg/kg Ds	0,19	0,60	6,1	<0,050 ^{m)}	<0,010
Naftaleen	mg/kg Ds	0,16	0,17	3,7	<0,10 ^{m)}	0,099
Som PAK (VROM)	mg/kg Ds	2,4	6,3	88	0,22 ^{x)}	1,0 ^{x)}
Som PAK (VROM) (Factor 0,7)	mg/kg Ds	2,4	6,3	88	1,3 ^{#)}	1,0 ^{#)}

Minerale olie

Koolwaterstoffractie C10-C40	mg/kg Ds	100	86	500	220	67
Koolwaterstoffractie C10-C12	mg/kg Ds	20	<12 ^{ts)}	<4,0	<20 ^{ts)}	<4,0
Koolwaterstoffractie C12-C16	mg/kg Ds	11	<12 ^{ts)}	48	<20 ^{ts)}	<4,0
Koolwaterstoffractie C16-C20	mg/kg Ds	<2,0	8,3	80	18	4,1
Koolwaterstoffractie C20-C24	mg/kg Ds	6,3	11	97	39	7,7
Koolwaterstoffractie C24-C28	mg/kg Ds	12	17	89	78	12
Koolwaterstoffractie C28-C32	mg/kg Ds	13	24	88	31	15
Koolwaterstoffractie C32-C36	mg/kg Ds	20	11	61	43	14
Koolwaterstoffractie C36-C40	mg/kg Ds	14	<6,0 ^{ts)}	43	<10 ^{ts)}	11



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Blad 3 van 5

Opdracht 190096 Bodem / Eluaat

Monsternr.	Monstername	Monsteromschrijving
74860	02.06.2010	95 (1-1.2)
74861	02.06.2010	95 (1.5-2)
74862	02.06.2010	95 (2.5-2.7)
74863	02.06.2010	96 (0.7-1)
74864	02.06.2010	96 (2.5-2.8)

Eenheid	74860 95 (1-1.2)	74861 95 (1.5-2)	74862 95 (2.5-2.7)	74863 96 (0.7-1)	74864 96 (2.5-2.8)
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Algemene monstervoorbehandeling

Voorbehandeling conform AS3000		++	++	++	++
Droge stof (Ds)	%	77,9	41,1	18,1	73,1
IJzer (Fe ₂ O ₃)	% Ds	7,3	--	<5,0	--

Klassiek Chemische Analyses

Organische stof	% Ds	3,1 ^{xj}	--	83,5 ^{xj}	--
Carbonaten dmv asrest (AS3000)	% Ds	2,9	--	2,0	--

Fracties (sedigraaf)

Fractie < 2 µm	% Ds	<1,0	--	6,8	--
----------------	------	------	----	-----	----

PAK

Anthraceen	mg/kg Ds	0,92	0,13	<0,050 ^{mj}	0,42	<0,050 ^{mj}
Benzo(a)anthraceen	mg/kg Ds	2,4	1,3	0,13	1,3	<0,050 ^{mj}
Benzo(a)pyreen	mg/kg Ds	1,8	1,2	0,12	1,2	<0,050 ^{mj}
Benzo(ghi)perylene	mg/kg Ds	1,5	1,9	0,077	1,1	<0,50 ^{mj}
Benzo(k)fluorantheen	mg/kg Ds	0,99	0,83	<0,050 ^{mj}	0,59	<0,050 ^{mj}
Chryseen	mg/kg Ds	2,1	1,7	0,14	1,2	<0,050 ^{mj}
Fenanthreen	mg/kg Ds	5,6	1,4	0,22	1,9	<0,10 ^{mj}
Fluorantheen	mg/kg Ds	6,4	3,9	0,35	3,0	<0,050 ^{mj}
Indeno-(1,2,3-c,d)pyreen	mg/kg Ds	1,2	1,0	0,10	0,92	<0,10 ^{mj}
Naftaleen	mg/kg Ds	0,91	<0,20 ^{mj}	0,12	0,96	<0,10 ^{mj}
Som PAK (VROM)	mg/kg Ds	24	13 ^{xj}	1,3 ^{xj}	13	n.a.
Som PAK (VROM) (Factor 0,7)	mg/kg Ds	24	14 ^{#j}	1,3 ^{#j}	13	0,77 ^{#j}

Minerale olie

Koolwaterstof fractie C10-C40	mg/kg Ds	270	680	<20	67	<100 ^{tsj}
Koolwaterstof fractie C10-C12	mg/kg Ds	<4,0	<4,0	<16 ^{tsj}	<4,0	<20 ^{tsj}
Koolwaterstof fractie C12-C16	mg/kg Ds	12	23	<16 ^{tsj}	<4,0	<20 ^{tsj}
Koolwaterstof fractie C16-C20	mg/kg Ds	23	95	<2,0	5,7	<10 ^{tsj}
Koolwaterstof fractie C20-C24	mg/kg Ds	28	100	13	10	<10 ^{tsj}
Koolwaterstof fractie C24-C28	mg/kg Ds	36	110	17	13	<10 ^{tsj}
Koolwaterstof fractie C28-C32	mg/kg Ds	65	150	19	15	<10 ^{tsj}
Koolwaterstof fractie C32-C36	mg/kg Ds	56	120	20	10	<10 ^{tsj}
Koolwaterstof fractie C36-C40	mg/kg Ds	47	73	12	7,5	<10 ^{tsj}

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Blad 4 van 5

Opdracht 190096 Bodem / Eluaat

Monsternr.	Monstername	Monsteromschrijving
74865	02.06.2010	97 (0.6-1)
74866	02.06.2010	97 (1.5-2)

Eenheid**74865**
97 (0.6-1)**74866**
97 (1.5-2)**Algemene monstervoorbehandeling**

Voorbehandeling conform AS3000		++	++
Droge stof (Ds)	%	66,1	17,3
IJzer (Fe2O3)	% Ds	--	--

Klassiek Chemische Analyses

Organische stof	% Ds	--	--
Carbonaten dmv asrest (AS3000)	% Ds	--	--

Fracties (sedigraaf)

Fractie < 2 µm	% Ds	--	--
----------------	------	----	----

PAK

Anthraceen	mg/kg Ds	<1,0 ^{m)}	<0,10 ^{m)}
Benzo(a)anthraceen	mg/kg Ds	1,5	<0,10 ^{m)}
Benzo(a)pyreen	mg/kg Ds	1,0	0,13
Benzo(ghi)perylene	mg/kg Ds	0,91	<0,050 ^{m)}
Benzo(k)fluorantheen	mg/kg Ds	0,59	<0,10 ^{m)}
Chryseen	mg/kg Ds	1,3	<0,10 ^{m)}
Fenanthreen	mg/kg Ds	6,2	0,58
Fluorantheen	mg/kg Ds	4,7	0,47
Indeno-(1,2,3-c,d)pyreen	mg/kg Ds	0,74	<0,10 ^{m)}
Naftaleen	mg/kg Ds	1,5	<0,10 ^{m)}
Som PAK (VROM)	mg/kg Ds	18 ^{x)}	1,2 ^{x)}
Som PAK (VROM) (Factor 0,7)	mg/kg Ds	19 ^{#)}	1,6 ^{#)}

Minerale olie

Koolwaterstof fractie C10-C40	mg/kg Ds	150	<20
Koolwaterstof fractie C10-C12	mg/kg Ds	<4,0	<16 ^(ts)
Koolwaterstof fractie C12-C16	mg/kg Ds	14	<16 ^(ts)
Koolwaterstof fractie C16-C20	mg/kg Ds	21	<8,0 ^(ts)
Koolwaterstof fractie C20-C24	mg/kg Ds	29	13
Koolwaterstof fractie C24-C28	mg/kg Ds	30	15
Koolwaterstof fractie C28-C32	mg/kg Ds	29	40
Koolwaterstof fractie C32-C36	mg/kg Ds	20	20
Koolwaterstof fractie C36-C40	mg/kg Ds	10	<8,0 ^(ts)

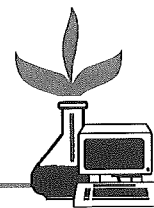
Verklaring: "<" of na betekent dat het gehalte van de component lager is dan de rapportagegrens.

de daadwerkelijke rapportagegrens kan in sommige gevallen afwijken van de standaard waarde voor de betreffende analyse door bijvoorbeeld matrixeffecten of te weinig monstermateriaal.

x) Gehaltes beneden de rapportagegrens zijn niet mee inbegrepen.

#) Bij deze som zijn resultaten "<rapportagegrens" vermenigvuldigd met 0,7; indien een som is berekend uit minimaal één verhoogde rapportagegrens, dan dient voor het resultaat "<" gelezen te worden.

m) De bepalingsgrens is verhoogd, omdat door matrixeffecten, resp. co-elutie een kwantificering bemoeilijkt wordt.

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Blad 5 van 5

Opdracht 190096 Bodem / Eluaat

ts) De bepalingsgrens is verhoogd vanwege het lage droge stofgehalte.

Het organische stof gehalte wordt gecorrigeerd voor het lutum gehalte, als geen lutum bepaald is wordt gecorrigeerd als ware het lutum gehalte 5,4%

De onderzoeksresultaten hebben alleen betrekking op het aangeleverde monstermateriaal. De onderzoekstijd omvat de periode tussen acceptatie van de opdracht en rapportage. Monsters met onbekende herkomst, kunnen slechts beperkt gecontroleerd worden op plausibiliteit.

AL-West B.V. Dhr. Jan Godlieb, Tel. +31/570699760**Klantenservice****Toegepaste methoden****Grond**

conform AS 3000: Koolwaterstoffractie C10-C40 Som PAK (VROM) Som PAK (VROM) (Factor 0,7)

conform AS 3000: n) Carbonaten dmv asrest (AS3000) Koolwaterstoffractie C10-C12 Koolwaterstoffractie C12-C16

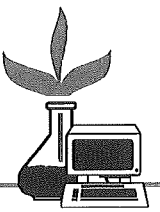
Koolwaterstoffractie C16-C20 Koolwaterstoffractie C20-C24 Koolwaterstoffractie C24-C28 Koolwaterstoffractie C28-C32

Koolwaterstoffractie C32-C36 Koolwaterstoffractie C36-C40

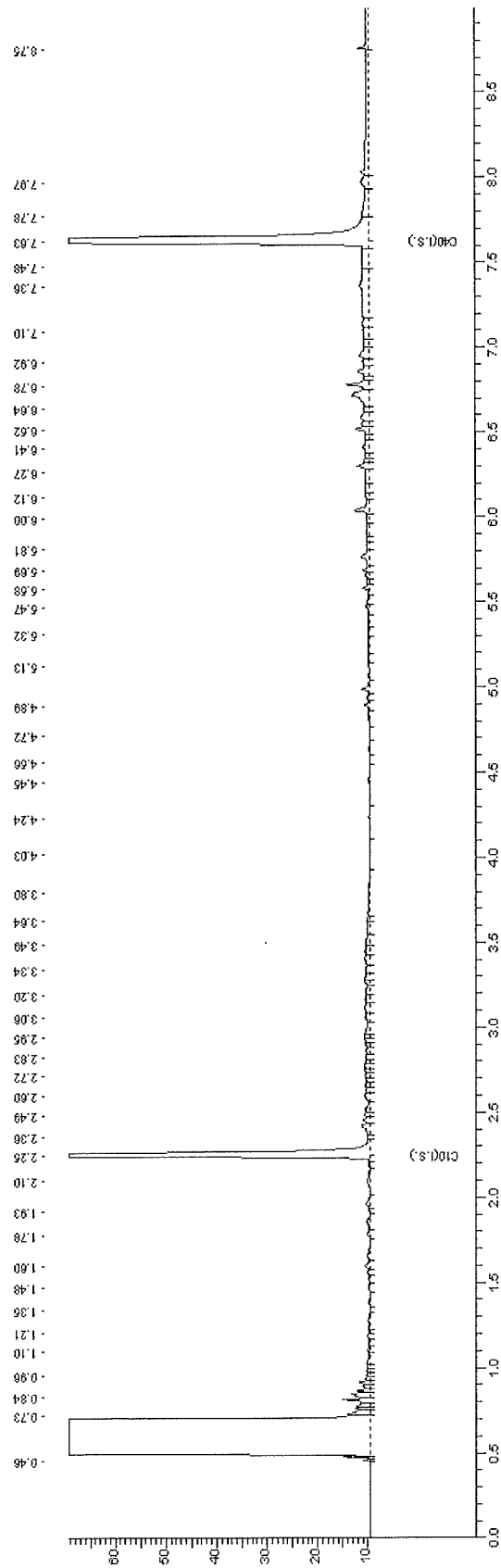
conform AS 3000: Voorbehandeling conform AS3000 Droge stof (Ds) IJzer (Fe2O3) Fractie < 2 µm

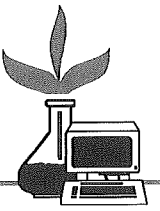
conform AS 3000 en NEN 5754: Organische stof

n) Niet geaccrediteerd

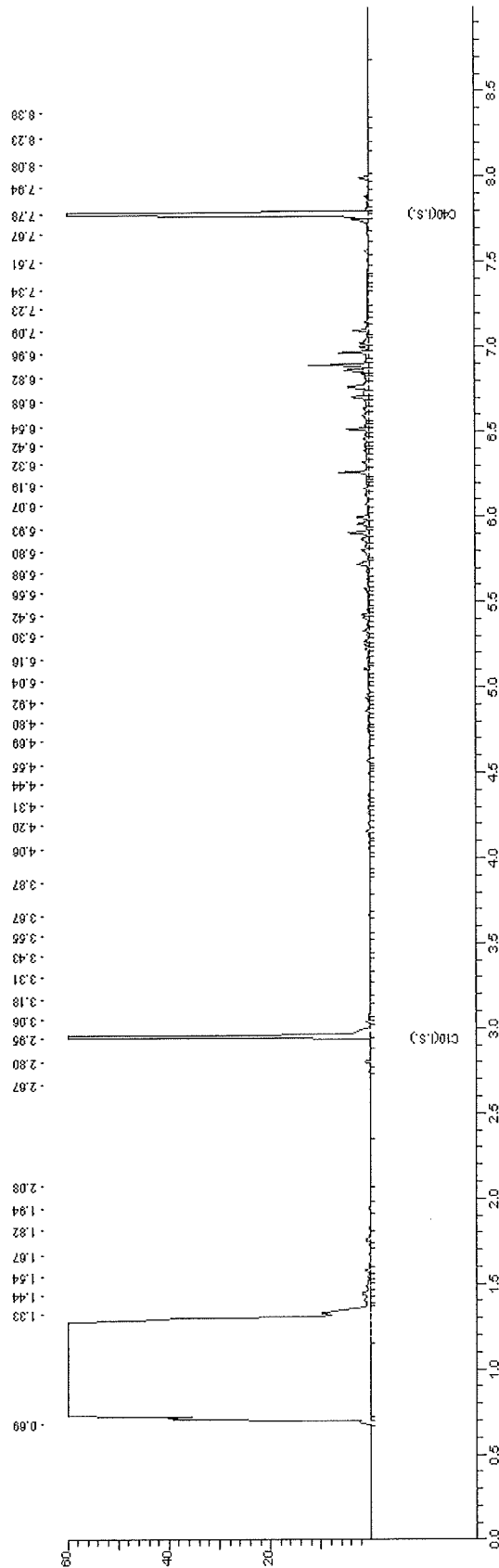


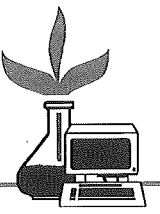
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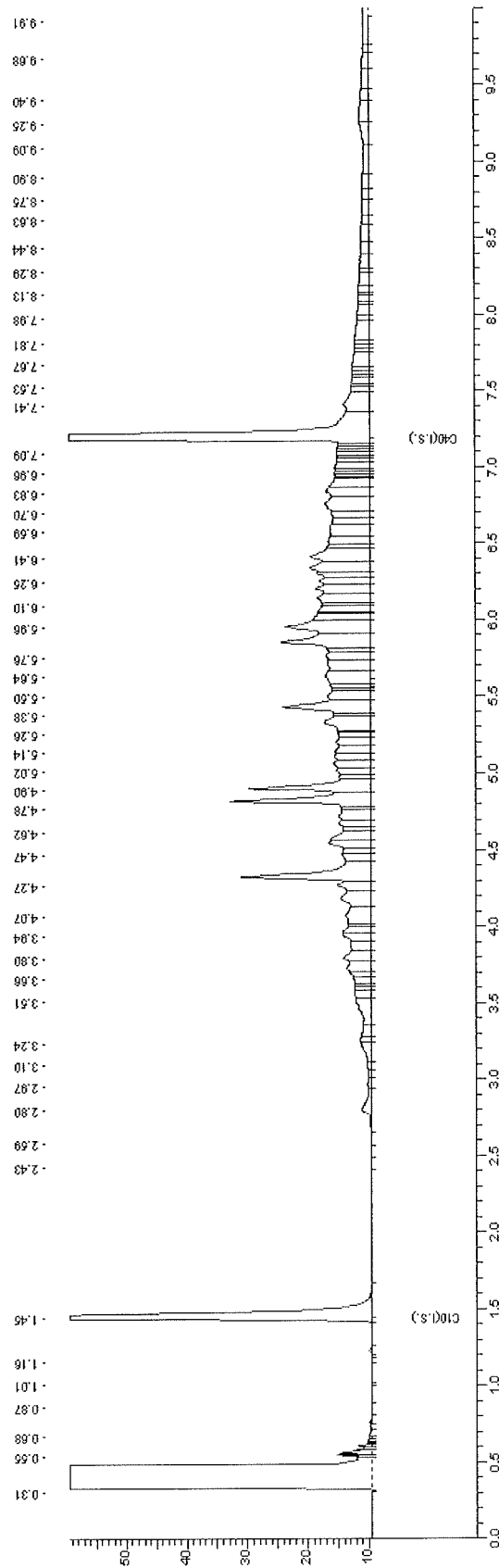


Chromatogram for Order No. 190096, Analysis No. 74856, created at 08.06.2010 00:07:02



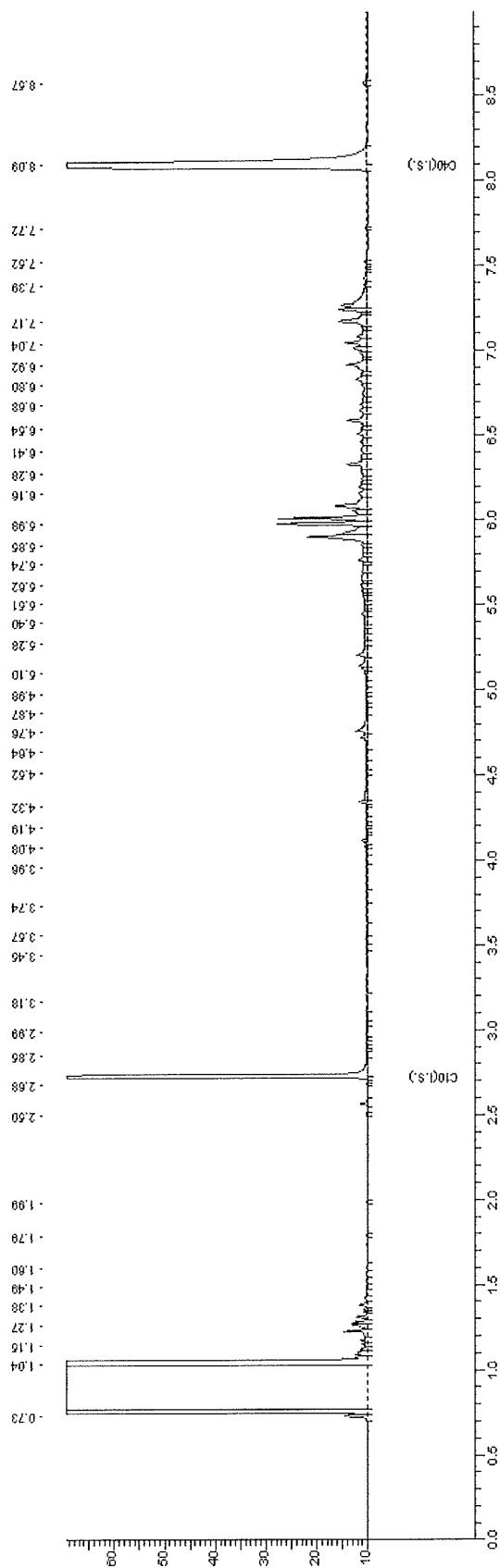


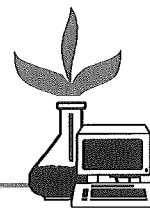
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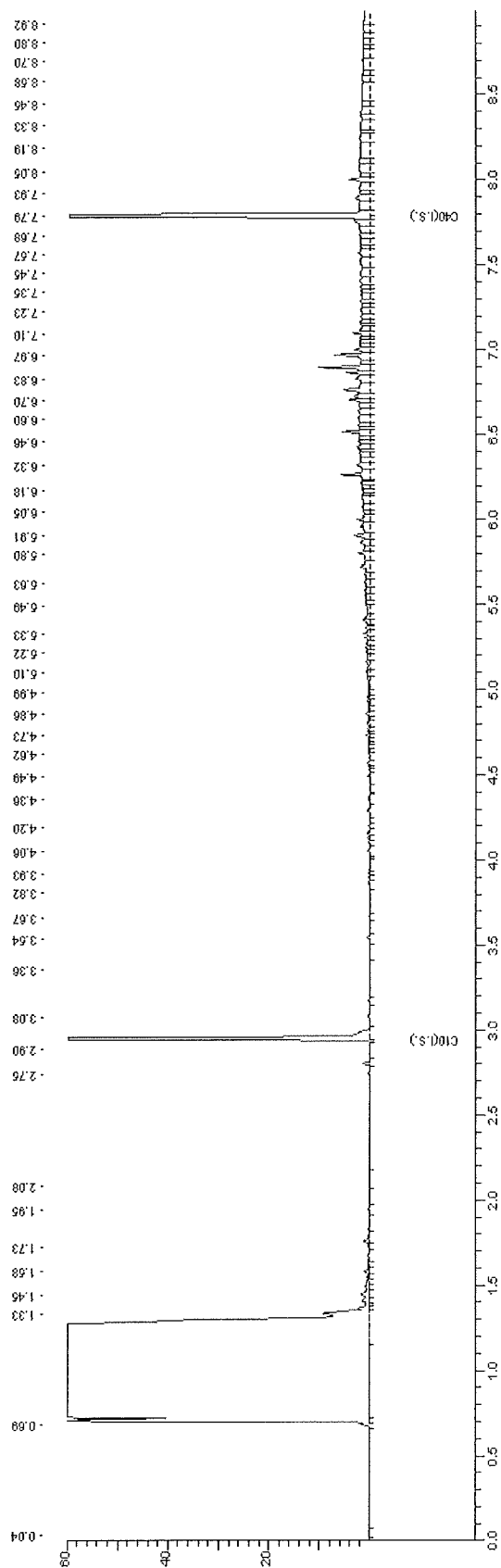


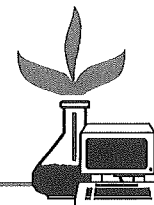
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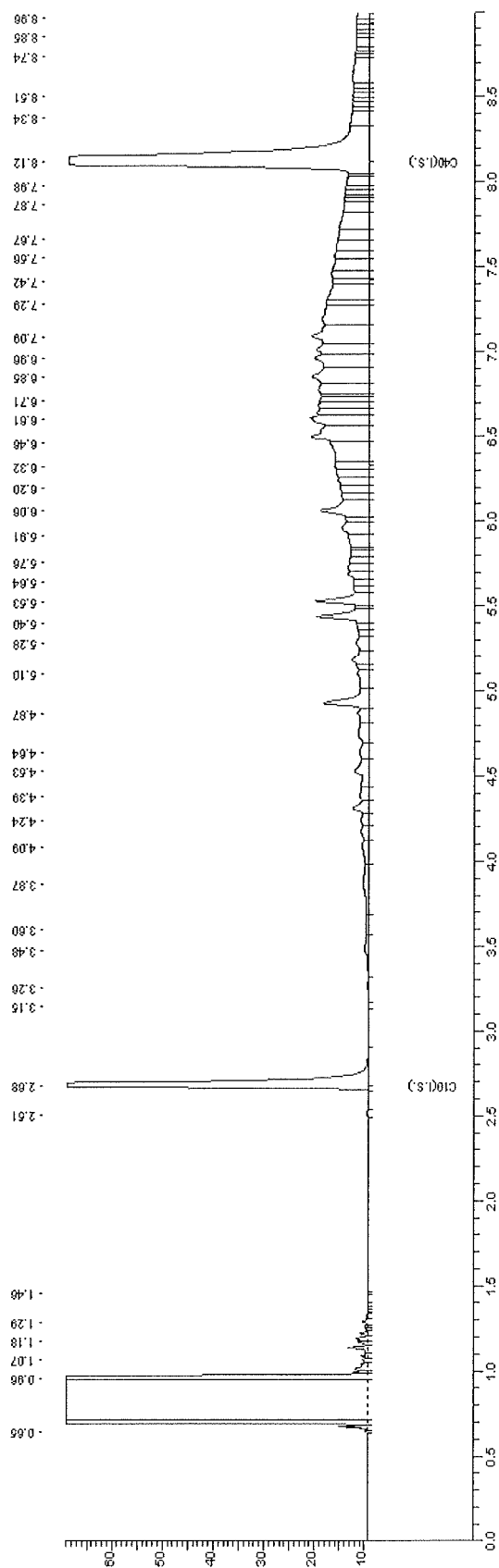


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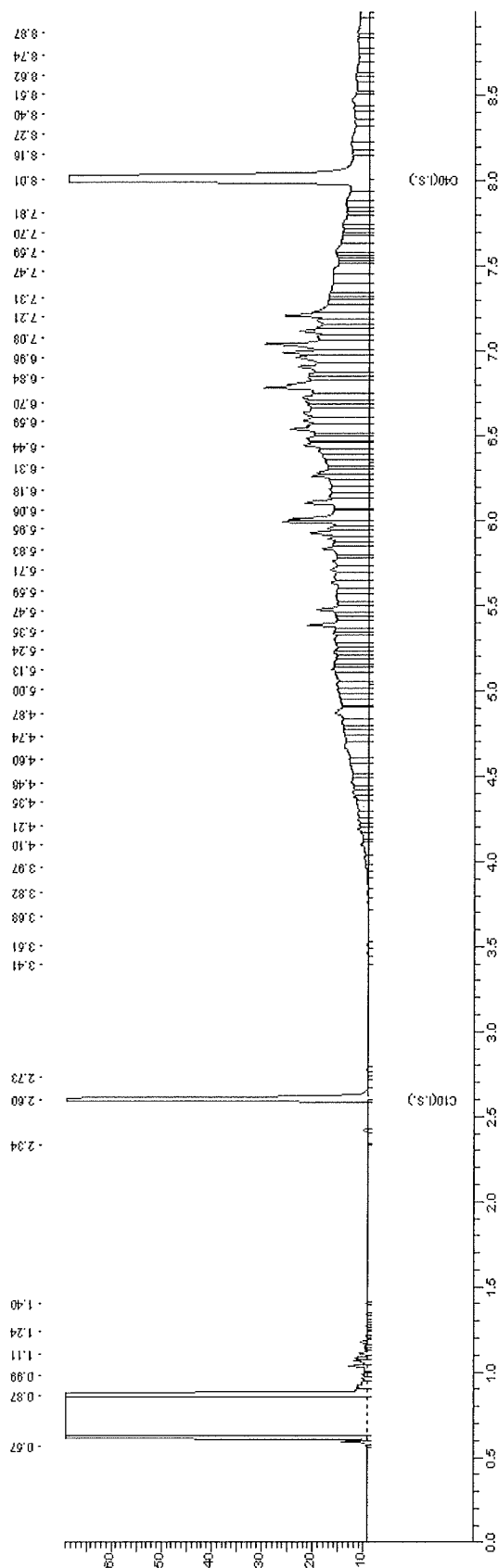


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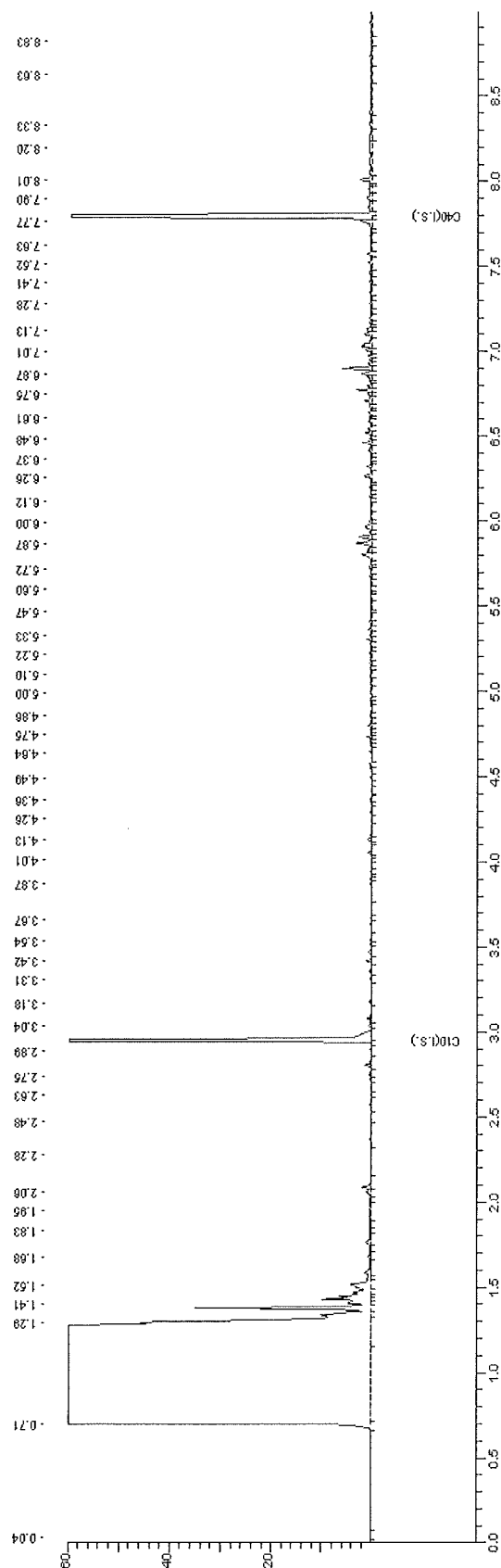


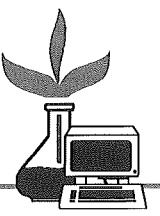
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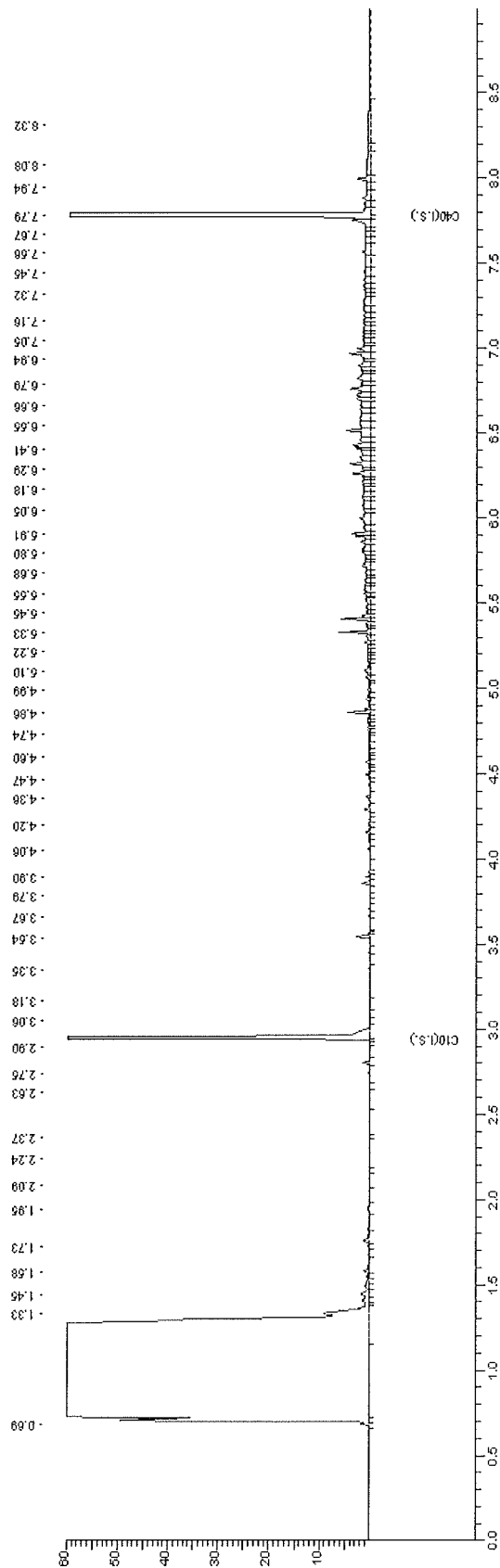


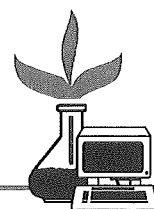
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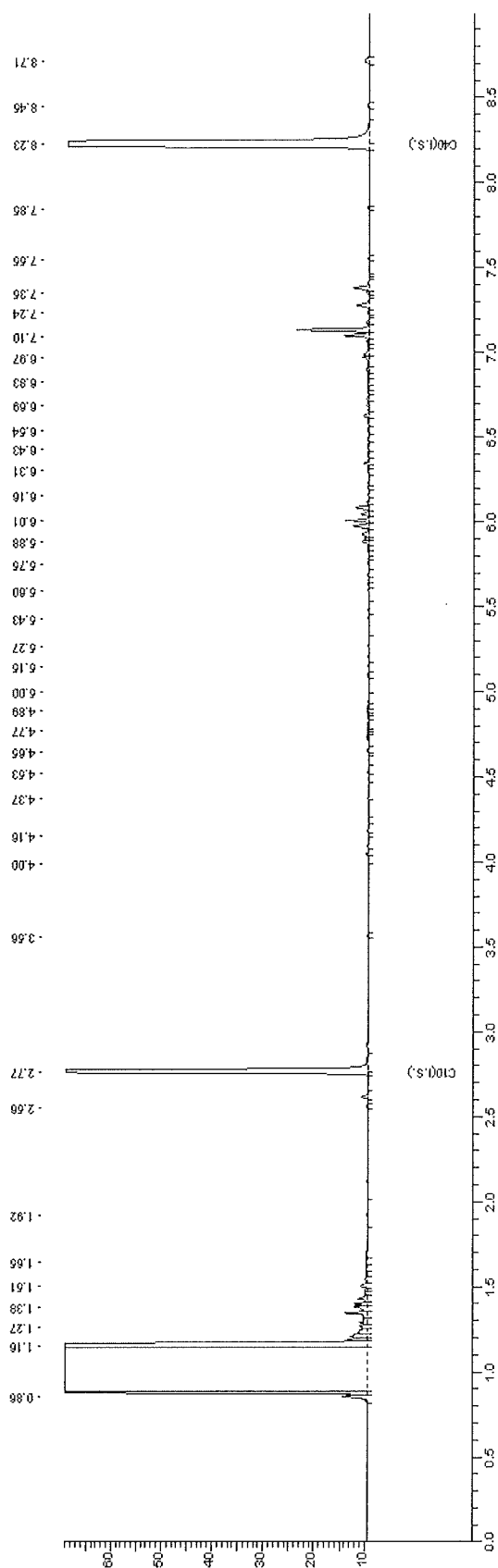


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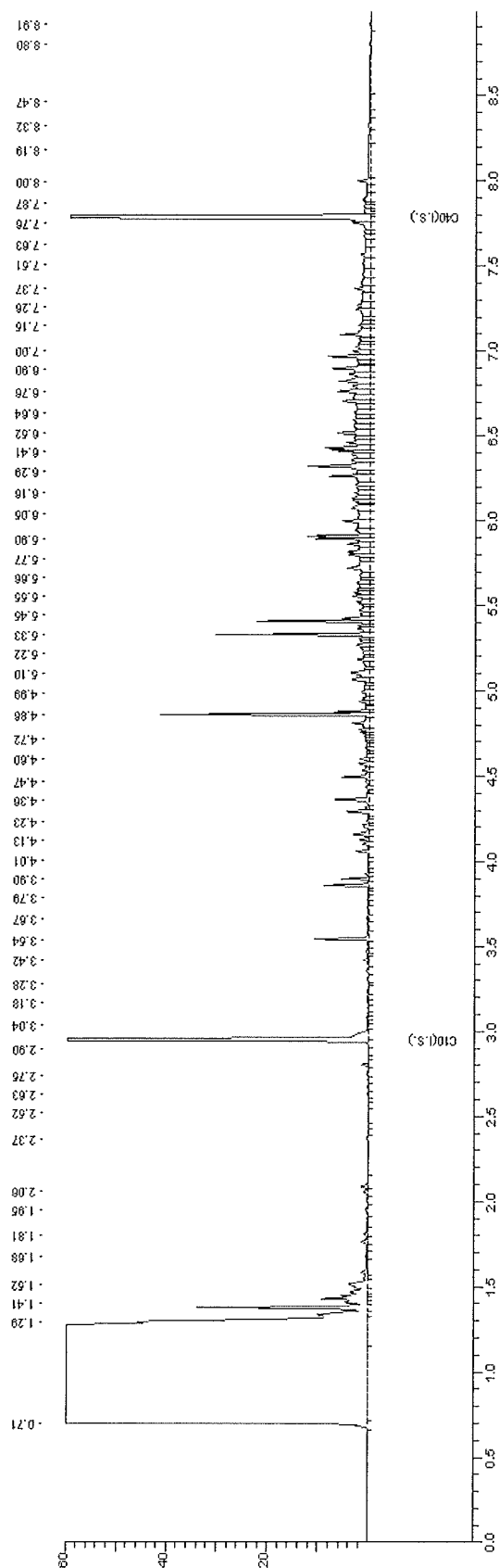


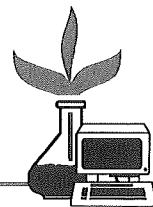
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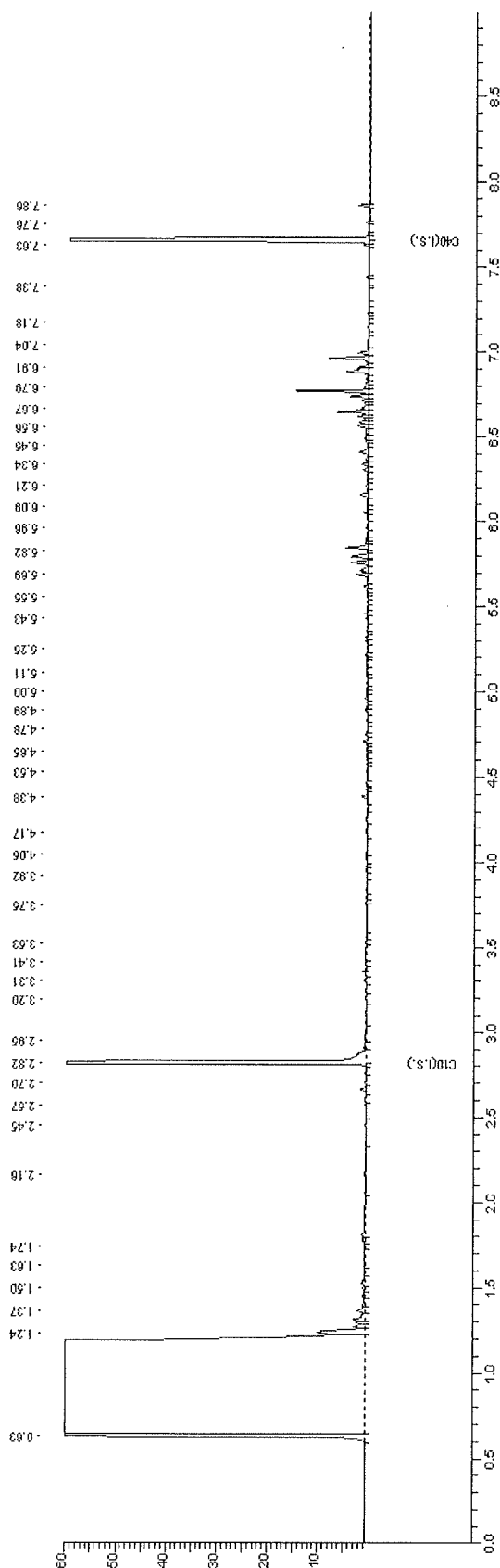


Chromatogram for Order No. 190096, Analysis No. 74865, created at 07.06.2010 16:47:03





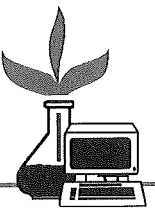
Chromatogram for Order No. 190096, Analysis No. 74866, created at 08.06.2010 11:32:05



Appendix

5

Analytical results groundwater

**AL-West B.V.**

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TAUW DEVENTER
Marian Langevoort
POSTBUS 133
7400 AC DEVENTER

Datum 28.05.2010
Relatienr 35003840
Opdrachtnr. 187811
Blad 1 van 3

ANALYSERAPPORT**Opdracht 187811 Water**

Opdrachtgever 35003840 TAUW DEVENTER
Referentie 4707529 Phase II soil & gw Ter Aar, NL
Opdrachtacceptatie 20.05.10
Monsternemer Opdrachtgever

Geachte heer, mevrouw,

Hierbij zenden wij U de resultaten van het door u aangevraagde laboratoriumonderzoek.
De analyses zijn, tenzij anders vermeld, uitgevoerd overeenkomstig onze erkenning voor de werkzaamheid
"Analyse voor milieuhygiënisch bodemonderzoek" van het Besluit Bodemkwaliteit.

Indien u gegevens wenst over de meetonzekerheden van een methode, kunnen wij u deze op verzoek verstrekken.

Dit rapport mag alleen in zijn geheel worden gereproduceerd. Eventuele bijlagen zijn onderdeel van het rapport.

Indien u nog vragen heeft of aanvullende informatie wenst, verzoeken wij u om contact op te nemen met
Klantenservice.

Wij vertrouwen U met de toegezonden informatie van dienst te zijn.

Met vriendelijke groet,

AL-West B.V. Dhr. Jan Godlieb, Tel. +31/570699760
Klantenservice

**AL-West B.V.**

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Opdracht 187811 Water

Monsternr.	Monsteromschrijving	Monstername	Monsternamepunt
61527	Pb 89 F(0.7-1.7)	20.05.2010	

Eenheid**61527**
Pb 89 F(0.7-1.7)**PAK**

Anthraceen	µg/l	0,073
Benzo(a)anthraceen	µg/l	<0,020
Benzo(a)pyreen	µg/l	<0,020
Benzo(ghi)perylene	µg/l	<0,050
Benzo(k)fluorantheen	µg/l	<0,010
Chryseen	µg/l	0,022
Fenanthreen	µg/l	0,67
Fluorantheen	µg/l	0,15
Indeno-(1,2,3-c,d)pyreen	µg/l	<0,020
Naftaleen	µg/l	1,7
Som PAK (VROM)	µg/l	2,6 ^{x)}
Som PAK (VROM) (Factor 0,7)	µg/l	2,7 ^{#)}

Aromaten

Benzeen	µg/l	<0,60 ^{m)}
Tolueen	µg/l	<0,60 ^{m)}
Ethylbenzeen	µg/l	<0,60 ^{m)}
m,p-Xyleen	µg/l	<0,60 ^{m)}
o-Xyleen	µg/l	<0,60 ^{m)}
Som Xylenen	µg/l	n.a.
Som Xylenen (Factor 0,7)	µg/l	0,84 ^{#)}
Naftaleen	µg/l	2,2

Minerale olie

Koolwaterstof fractie C10-C40	µg/l	<100
Koolwaterstof fractie C10-C12	µg/l	<20
Koolwaterstof fractie C12-C16	µg/l	<20
Koolwaterstof fractie C16-C20	µg/l	<10
Koolwaterstof fractie C20-C24	µg/l	<10
Koolwaterstof fractie C24-C28	µg/l	<10
Koolwaterstof fractie C28-C32	µg/l	<10
Koolwaterstof fractie C32-C36	µg/l	<10
Koolwaterstof fractie C36-C40	µg/l	<10

Verklaring: "<" of na betekent dat het gehalte van de component lager is dan de rapportagegrens.

de daadwerkelijke rapportagegrens kan in sommige gevallen afwijken van de standaard waarde voor de betreffende analyse door bijvoorbeeld matrixeffecten of te weinig monstermateriaal.

x) Gehaltes beneden de rapportagegrens zijn niet mee inbegrepen.

#) Bij deze som zijn resultaten "<rapportagegrens" vermenigvuldigd met 0,7; indien een som is berekend uit minimaal één verhoogde rapportagegrens, dan dient voor het resultaat "<" gelezen te worden.

m) De bepalingsgrens is verhoogd, omdat door matrixeffecten, resp. co-elutie een kwantificering bemoeilijkt wordt.

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Blad 3 van 3

Opdracht 187811 Water

De onderzoeksresultaten hebben alleen betrekking op het aangeleverde monstermateriaal. De onderzoekstijd omvat de periode tussen acceptatie van de opdracht en rapportage. Monsters met onbekende herkomst, kunnen slechts beperkt gecontroleerd worden op plausibiliteit.

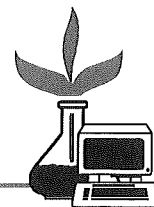
AL-West B.V. Dhr. Jan Godlieb, Tel. +31/570699760**Klantenservice****Toegepaste methoden**

conform AS 3000: Som PAK (VROM) Benzeen Tolueen Ethylbenzeen Som Xylenen Naftaleen Koolwaterstoffractie C10-C40

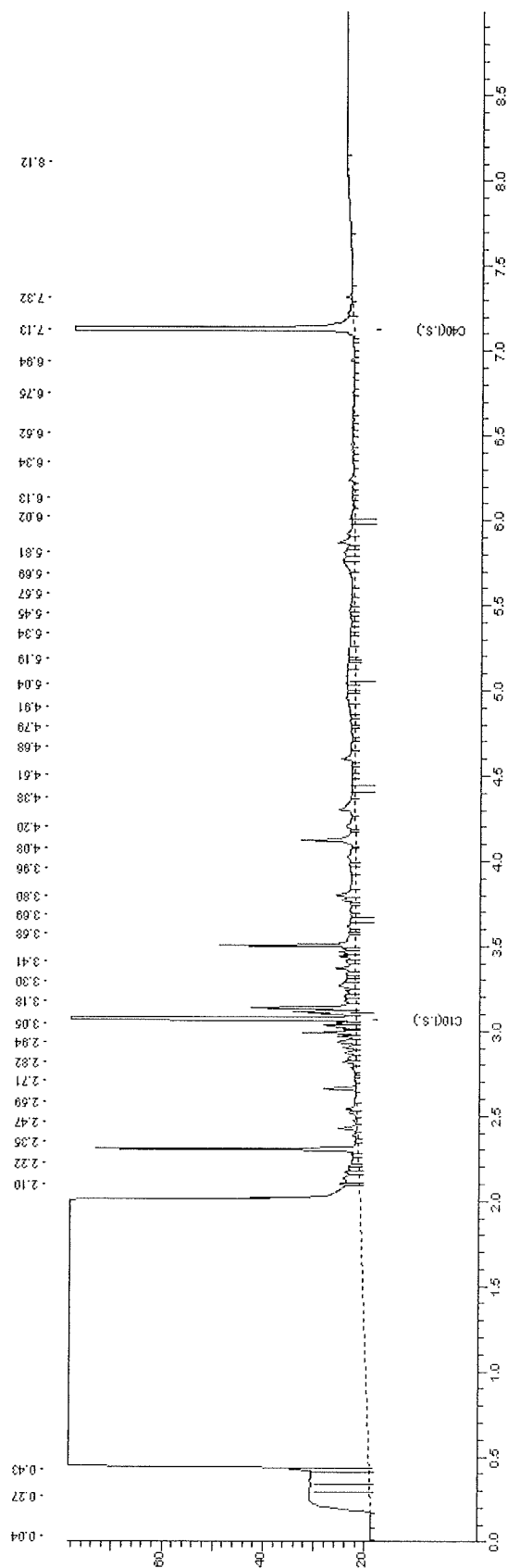
conform AS 3000: n) Koolwaterstoffractie C10-C12 Koolwaterstoffractie C12-C16 Koolwaterstoffractie C16-C20 Koolwaterstoffractie C20-C24
Koolwaterstoffractie C24-C28 Koolwaterstoffractie C28-C32 Koolwaterstoffractie C32-C36 Koolwaterstoffractie C36-C40

conform AS 3000: Som PAK (VROM) (Factor 0,7) Som Xylenen (Factor 0,7)

n) Niet geaccrediteerd



Chromatogram for Order No. 187811, Analysis No. 61527, created at 22.05.2010 01:42:06





TAUW DEVENTER
Marian Langevoort
POSTBUS 133
7400 AC DEVENTER

Datum 28.05.2010
Relatienr 35003840
Opdrachtnr. 187813
Blad 1 van 4

ANALYSERAPPORT

Opdracht 187813 Water

Opdrachtgever 35003840 TAUW DEVENTER
Referentie 4707529 Phase II soil & gw Ter Aar, NL
Opdrachtacceptatie 20.05.10
Monsternemer Opdrachtgever

Geachte heer, mevrouw,

Hierbij zenden wij U de resultaten van het door u aangevraagde laboratoriumonderzoek.
De analyses zijn, tenzij anders vermeld, uitgevoerd overeenkomstig onze erkenning voor de werkzaamheid
"Analyse voor milieuhygiënisch bodemonderzoek" van het Besluit Bodemkwaliteit.

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Klantenservice.

Wij vertrouwen U met de toegezonden informatie van dienst te zijn.

Met vriendelijke groet,

AL-West B.V. Dhr. Jan Godlieb, Tel. +31/570699760
Klantenservice


AL-West B.V.

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Blad 2 van 4

Opdracht 187813 Water

Monsternr.	Monsteromschrijving	Monstername	Monsternamepunt
61570	Pb 84 F(1.5-2.5)	20.05.2010	
61571	Pb 85 F(1.5-2.5)	20.05.2010	
61572	Pb 86 F(1.5-2.5)	20.05.2010	
61573	Pb 87 F(2.5-3.5)	20.05.2010	
61574	Pb 88 F(1.5-2.5)	20.05.2010	

Eenheid
61570
Pb 84 F(1.5-2.5)

61571
Pb 85 F(1.5-2.5)

61572
Pb 86 F(1.5-2.5)

61573
Pb 87 F(2.5-3.5)

61574
Pb 88 F(1.5-2.5)

PAK

	µg/l	0,18	0,46	<0,10 ^{m)}	0,38	0,49
Anthraceen	µg/l	<0,10 ^{m)}	<0,10 ^{m)}	<0,10 ^{m)}	0,10	<0,10 ^{m)}
Benzo(a)anthraceen	µg/l	<0,10 ^{m)}	<0,10 ^{m)}	<0,10 ^{m)}	<0,10 ^{m)}	<0,10 ^{m)}
Benzo(a)pyreen	µg/l	<0,10 ^{m)}	<0,10 ^{m)}	<0,10 ^{m)}	<0,10 ^{m)}	<0,10 ^{m)}
Benzo(ghi)perylene	µg/l	<0,10 ^{m)}	<0,10 ^{m)}	<0,10 ^{m)}	<0,10 ^{m)}	<0,10 ^{m)}
Benzo(k)fluorantheen	µg/l	<0,10 ^{m)}	<0,10 ^{m)}	<0,10 ^{m)}	<0,10 ^{m)}	<0,10 ^{m)}
Chryseen	µg/l	0,045	<0,10 ^{m)}	<0,10 ^{m)}	0,11	<0,10 ^{m)}
Fenanthreen	µg/l	1,4	4,0	<0,10 ^{m)}	3,5	4,3
Fluorantheen	µg/l	0,41	0,86	<0,10 ^{m)}	1,1	0,95
Indeno-(1,2,3-c,d)pyreen	µg/l	<0,10 ^{m)}	<0,10 ^{m)}	<0,10 ^{m)}	<0,10 ^{m)}	<0,10 ^{m)}
Naftaleen	µg/l	5,0	38	<0,10 ^{m)}	34	23
Som PAK (VROM)	µg/l	7,0 ^{x)}	43 ^{x)}	n.a.	39 ^{x)}	29 ^{x)}
Som PAK (VROM) (Factor 0,7)	µg/l	7,4 ^{#)}	44 ^{#)}	0,70 ^{#)}	39 ^{#)}	29 ^{#)}

Aromaten

Benzeen	µg/l	<0,60 ^{m)}	0,87	<0,20	<0,60 ^{m)}	<0,60 ^{m)}
Tolueen	µg/l	<0,60 ^{m)}	1,8	<0,30	<0,60 ^{m)}	<0,60 ^{m)}
Ethylbenzeen	µg/l	<0,60 ^{m)}	0,68	<0,30	<0,60 ^{m)}	<0,60 ^{m)}
m,p-Xyleen	µg/l	<0,60 ^{m)}	2,1	<0,20	<0,60 ^{m)}	<0,60 ^{m)}
o-Xyleen	µg/l	<0,60 ^{m)}	1,8	<0,10	<0,60 ^{m)}	<0,60 ^{m)}
Som Xylenen	µg/l	n.a.	3,9	n.a.	n.a.	n.a.
Som Xylenen (Factor 0,7)	µg/l	0,84 ^{#)}	3,9	0,21 ^{#)}	0,84 ^{#)}	0,84 ^{#)}
Naftaleen	µg/l	6,6	65	<0,20 ^{m)}	45	26

Minerale olie

Koolwaterstoffractie C10-C40	µg/l	<100	170	<100	110	130
Koolwaterstoffractie C10-C12	µg/l	<20	78	<20	57	55
Koolwaterstoffractie C12-C16	µg/l	<20	63	<20	32	54
Koolwaterstoffractie C16-C20	µg/l	<10	17	<10	<10	10
Koolwaterstoffractie C20-C24	µg/l	<10	<10	<10	<10	<10
Koolwaterstoffractie C24-C28	µg/l	<10	<10	<10	<10	<10
Koolwaterstoffractie C28-C32	µg/l	<10	<10	<10	<10	<10
Koolwaterstoffractie C32-C36	µg/l	<10	<10	<10	<10	<10
Koolwaterstoffractie C36-C40	µg/l	<10	<10	<10	<10	<10

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Opdracht 187813 Water

Monsternr.	Monsteromschrijving	Monsternr.	Monsternamepunt
61575	Pb 90 F(1.5-2.5)	20.05.2010	

Eenheid**61575**
Pb 90 F(1.5-2.5)**PAK**

Anthraceen	µg/l	0,083
Benzo(a)anthraceen	µg/l	0,022
Benzo(a)pyreen	µg/l	<0,020
Benzo(ghi)perylene	µg/l	<0,050
Benzo(k)fluorantheen	µg/l	<0,010
Chryseen	µg/l	0,026
Fenanthreen	µg/l	0,66
Fluorantheen	µg/l	0,29
Indeno-(1,2,3-c,d)pyreen	µg/l	<0,020
Naftaleen	µg/l	0,57
Som PAK (VROM)	µg/l	1,7 ^{x)}
Som PAK (VROM) (Factor 0,7)	µg/l	1,7 ^{#)}

Aromaten

Benzeen	µg/l	<0,60 ^{m)}
Tolueen	µg/l	<0,60 ^{m)}
Ethylbenzeen	µg/l	<0,60 ^{m)}
m,p-Xyleen	µg/l	<0,60 ^{m)}
o-Xyleen	µg/l	<0,60 ^{m)}
Som Xylenen	µg/l	n.a.
Som Xylenen (Factor 0,7)	µg/l	0,84 ^{#)}
Naftaleen	µg/l	1,2

Minerale olie

Koolwaterstof fractie C10-C40	µg/l	<100
Koolwaterstof fractie C10-C12	µg/l	<20
Koolwaterstof fractie C12-C16	µg/l	<20
Koolwaterstof fractie C16-C20	µg/l	<10
Koolwaterstof fractie C20-C24	µg/l	<10
Koolwaterstof fractie C24-C28	µg/l	<10
Koolwaterstof fractie C28-C32	µg/l	<10
Koolwaterstof fractie C32-C36	µg/l	<10
Koolwaterstof fractie C36-C40	µg/l	<10

Verklaring: "<" of na betekent dat het gehalte van de component lager is dan de rapportagegrens.

de daadwerkelijke rapportagegrens kan in sommige gevallen afwijken van de standaard waarde voor de betreffende analyse door bijvoorbeeld matrixeffecten of te weinig monstermateriaal.

x) Gehaltes beneden de rapportagegrens zijn niet mee inbegrepen.

#) Bij deze som zijn resultaten "<rapportagegrens" vermenigvuldigd met 0,7; indien een som is berekend uit minimaal één verhoogde rapportagegrens, dan dient voor het resultaat "<" gelezen te worden.

m) De bepalingsgrens is verhoogd, omdat door matrixeffecten, resp. co-elutie een kwantificering bemoeilijkt wordt.



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Blad 4 van 4

Opdracht 187813 Water

De onderzoeksresultaten hebben alleen betrekking op het aangeleverde monstermateriaal. De onderzoekstijd omvat de periode tussen acceptatie van de opdracht en rapportage. Monsters met onbekende herkomst, kunnen slechts beperkt gecontroleerd worden op plausibiliteit.

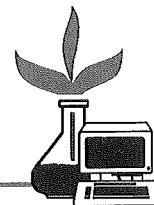
AL-West B.V. Dhr. Jan Godlieb, Tel. +31/570699760**Klantenservice****Toegepaste methoden**

conform AS 3000: Som PAK (VROM) Benzeen Tolueen Ethylbenzeen Som Xylenen Naftaleen Koolwaterstoffractie C10-C40

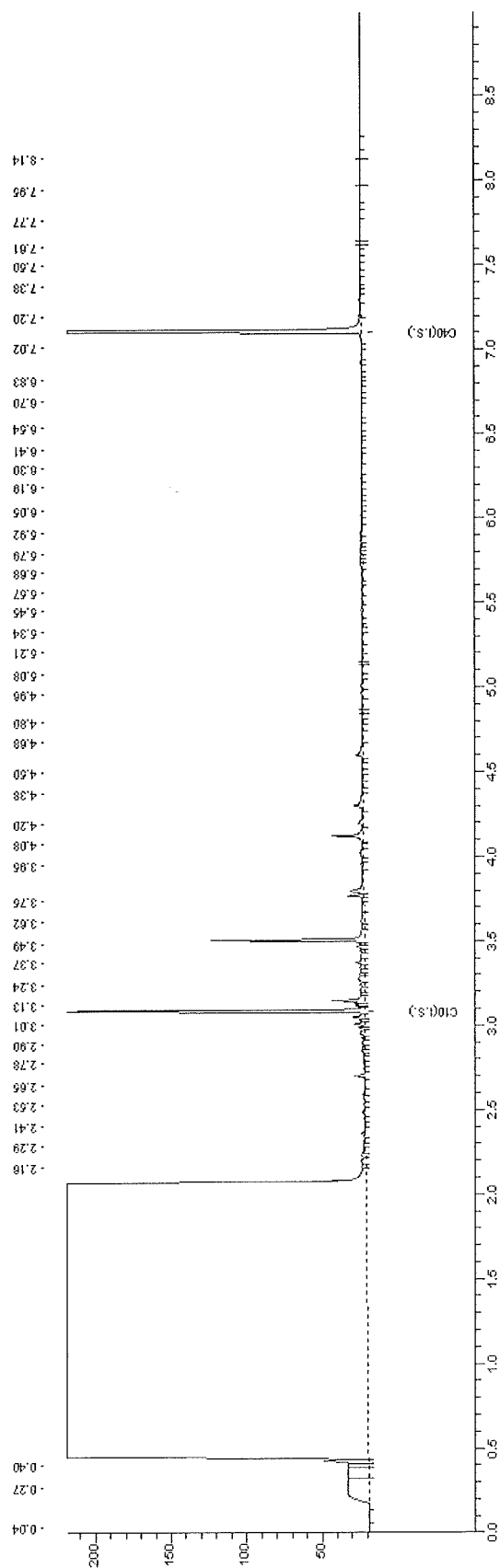
conform AS 3000: n) Koolwaterstoffractie C10-C12 Koolwaterstoffractie C12-C16 Koolwaterstoffractie C16-C20 Koolwaterstoffractie C20-C24
Koolwaterstoffractie C24-C28 Koolwaterstoffractie C28-C32 Koolwaterstoffractie C32-C36 Koolwaterstoffractie C36-C40

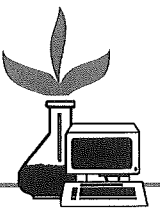
conform AS 3000: Som PAK (VROM) (Factor 0,7) Som Xylenen (Factor 0,7)

n) Niet geaccrediteerd

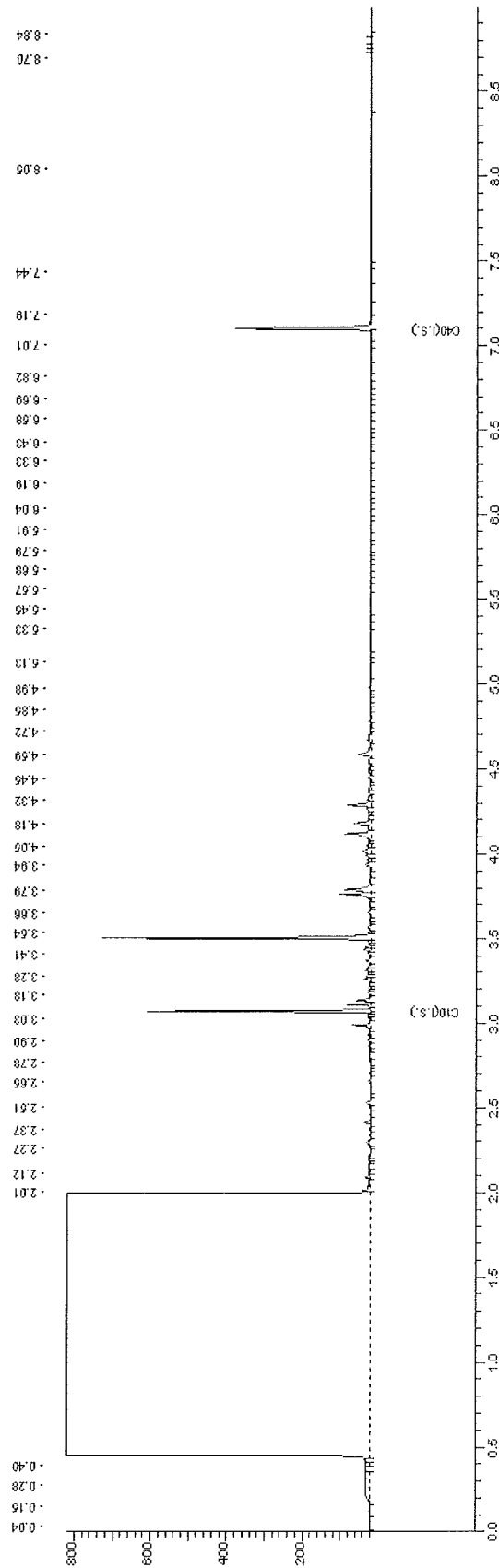


Chromatogram for Order No. 187813, Analysis No. 61570, created at 22.05.2010 22:17:06



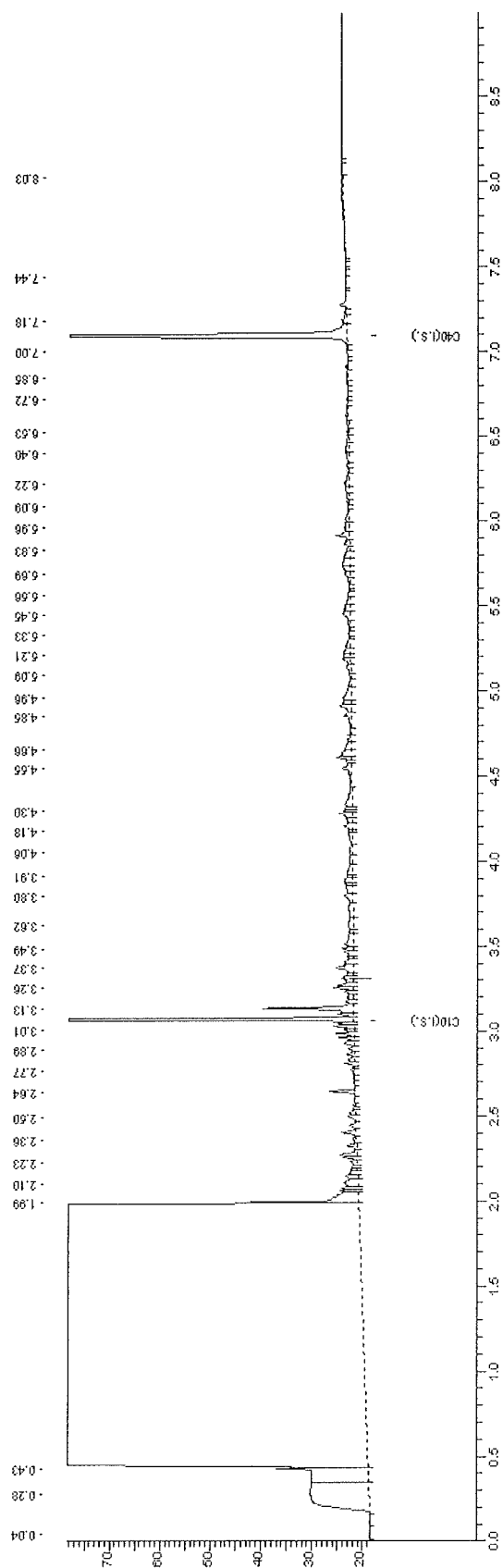


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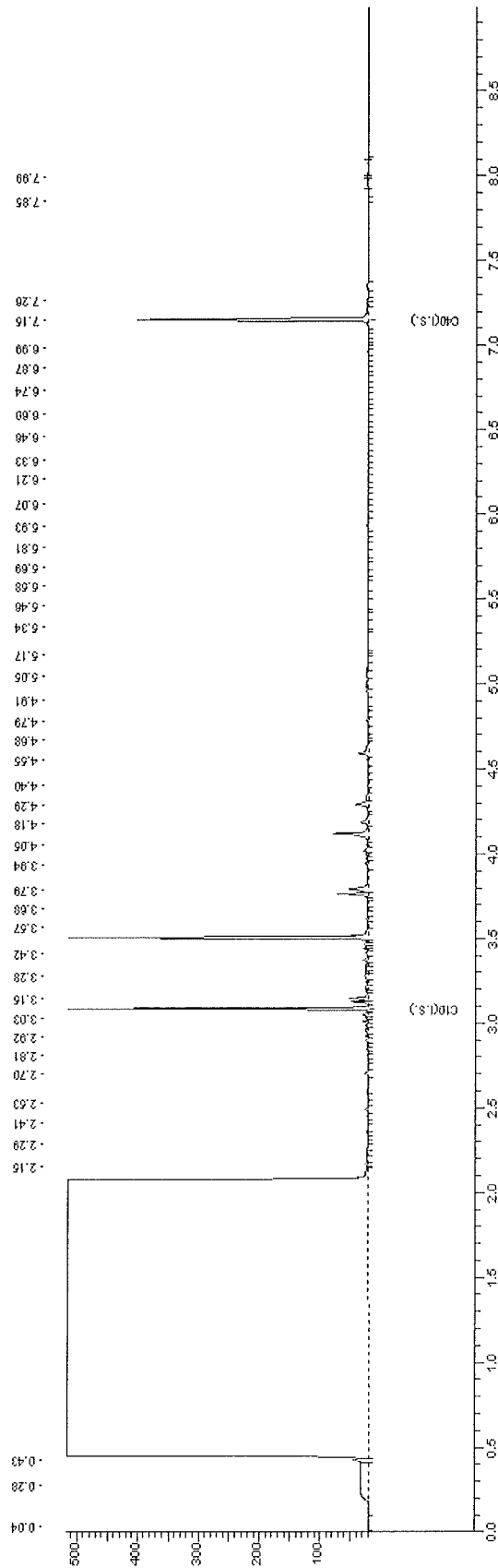


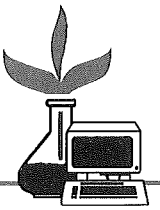
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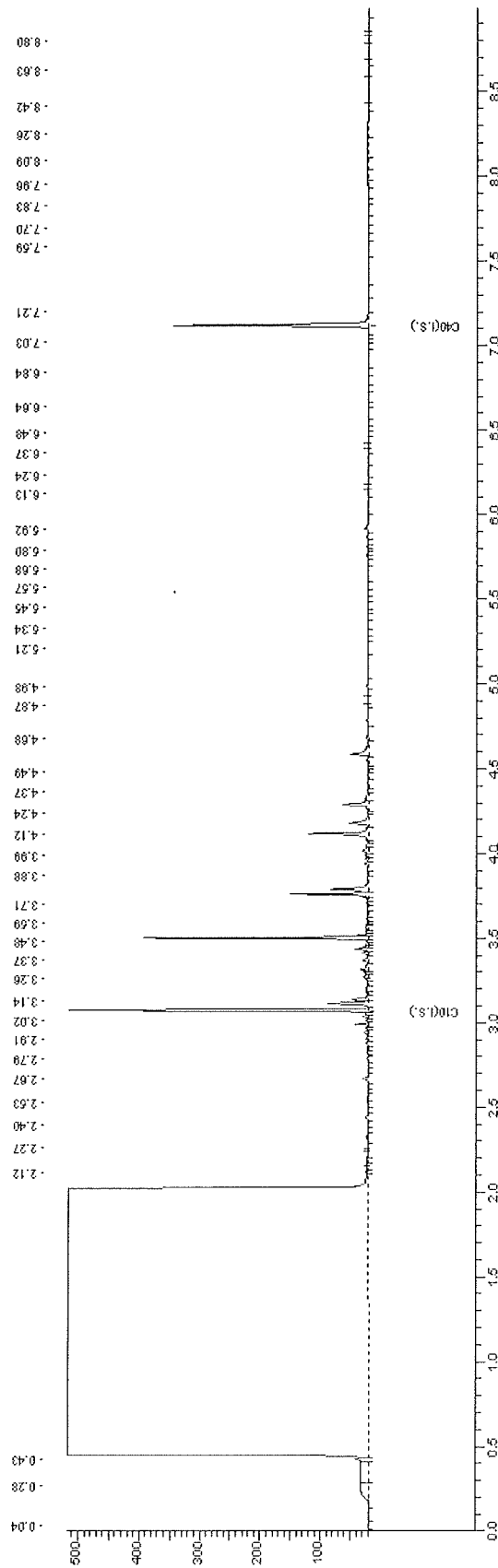


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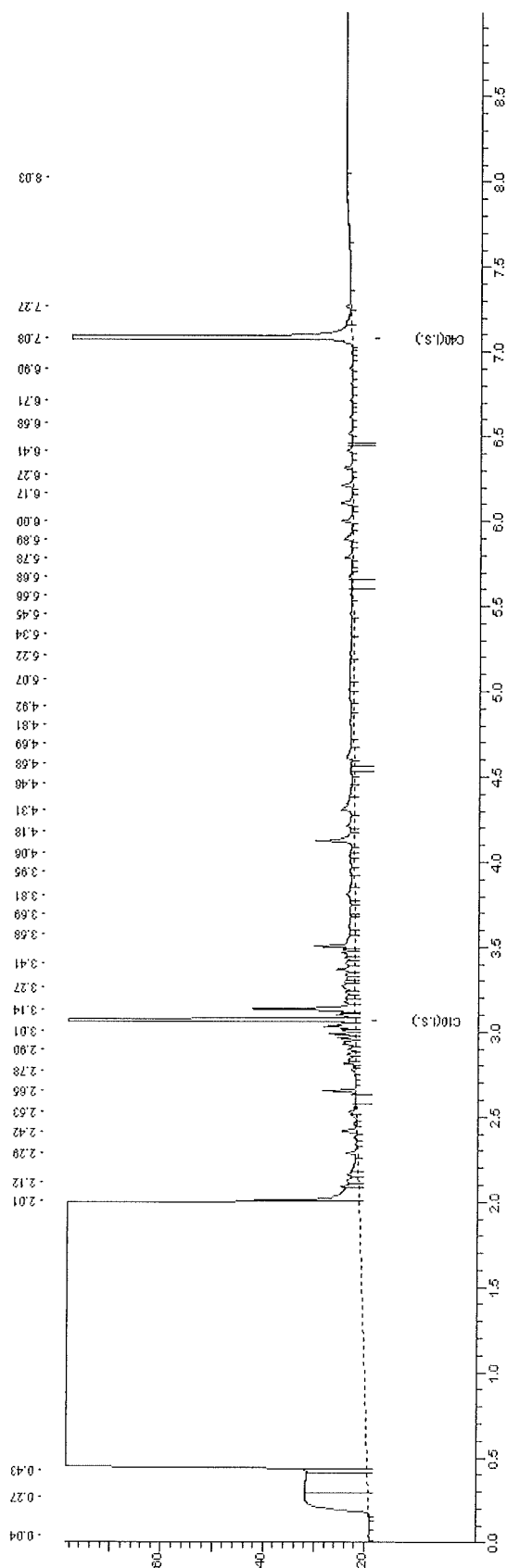


Chromatogram for Order No. 187813, Analysis No. 61574, created at 22.05.2010 09:57:07





Chromatogram for Order No. 187813, Analysis No. 61575, created at 22.05.2010 06:17:07





TAUW DEVENTER
Matthijs Bouwknecht
POSTBUS 133
7400 AC DEVENTER

Datum 21.06.2010
Relatienr 35003840
Opdrachtnr. 191686
Blad 1 van 4

ANALYSERAPPORT

Opdracht 191686 Water

Opdrachtgever 35003840 TAUW DEVENTER
Referentie 4707529 Phase II soil & gw Ter Aar, NL
Opdrachtacceptatie 11.06.10
Monsternemer Opdrachtgever

Geachte heer, mevrouw,

Hierbij zenden wij U de resultaten van het door u aangevraagde laboratoriumonderzoek.
De analyses zijn, tenzij anders vermeld, uitgevoerd overeenkomstig onze erkenning voor de werkzaamheid
"Analyse voor milieuhygiënisch bodemonderzoek" van het Besluit Bodemkwaliteit.

Indien u gegevens wenst over de meetonzekerheden van een methode, kunnen wij u deze op verzoek verstrekken.

Dit rapport mag alleen in zijn geheel worden gereproduceerd. Eventuele bijlagen zijn onderdeel van het rapport.

Indien u nog vragen heeft of aanvullende informatie wenst, verzoeken wij u om contact op te nemen met
Klantenservice.

Wij vertrouwen U met de toegezonden informatie van dienst te zijn.

Met vriendelijke groet,

AL-West B.V. Dhr. Jan Godlieb, Tel. +31/570699760
Klantenservice


AL-West B.V.

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Opdracht 191686 Water

Monsternr.	Monsteromschrijving	Monstername	Monsternamepunt
85236	Pb 91 F(1.5-2.5)	10.06.2010	
85237	Pb 92 F(1.5-2.5)	10.06.2010	
85238	Pb 93 F(1.5-2.5)	10.06.2010	
85239	Pb 94 F(1.5-2.5)	10.06.2010	
85240	Pb 95 F(1.7-2.7)	10.06.2010	

	Eenheid	85236 Pb 91 F(1.5-2.5)	85237 Pb 92 F(1.5-2.5)	85238 Pb 93 F(1.5-2.5)	85239 Pb 94 F(1.5-2.5)	85240 Pb 95 F(1.7-2.7)
PAK						
Anthraceen	µg/l	<0,010	<0,010	0,36	<0,010	0,14
Benzo(a)anthraceen	µg/l	<0,020	<0,020	0,031	<0,020	0,051
Benzo(a)pyreen	µg/l	<0,020	<0,020	<0,020	<0,020	0,026
Benzo(ghi)peryleen	µg/l	<0,050	<0,050	<0,050	<0,050	<0,050
Benzo(k)fluorantheen	µg/l	<0,010	<0,010	<0,010	<0,010	0,012
Chryseen	µg/l	<0,020	<0,020	0,035	<0,020	0,061
Fenanthreen	µg/l	<0,010	<0,010	3,5	0,051	0,83
Fluorantheen	µg/l	<0,020	<0,020	0,59	<0,020	0,47
Indeno-(1,2,3-c,d)pyreen	µg/l	<0,020	<0,020	<0,020	<0,020	<0,020
Naftaleen	µg/l	<0,050	<0,050	0,57	0,080	<0,050
Som PAK (VROM)	µg/l	n.a.	n.a.	5,1 ^{xj}	0,13 ^{xj}	1,6 ^{xj}
Som PAK (VROM) (Factor 0,7)	µg/l	0,16 ^{#j}	0,16 ^{#j}	5,2 ^{#j}	0,25 ^{#j}	1,7 ^{#j}
Aromaten						
Benzeen	µg/l	<0,20	<0,20	<0,20	<0,60 ^{mj}	0,71
Tolueen	µg/l	<0,30	<0,30	<0,30	<0,60 ^{mj}	<0,60 ^{mj}
Ethylbenzeen	µg/l	<0,30	<0,30	<0,30	<0,60 ^{mj}	<0,60 ^{mj}
m,p-Xyleen	µg/l	<0,20	<0,20	<0,20	<0,60 ^{mj}	<0,60 ^{mj}
o-Xyleen	µg/l	<0,10	<0,10	<0,10	<0,60 ^{mj}	<0,60 ^{mj}
Som Xylenen	µg/l	n.a.	n.a.	n.a.	n.a.	n.a.
Som Xylenen (Factor 0,7)	µg/l	0,21 ^{#j}	0,21 ^{#j}	0,21 ^{#j}	0,84 ^{#j}	0,84 ^{#j}
Naftaleen	µg/l	<0,050	<0,050	1,6	<0,60 ^{mj}	2,0
Minerale olie						
Koolwaterstof fractie C10-C40	µg/l	<100	<100	260	<100	<100
Koolwaterstof fractie C10-C12	µg/l	<20	<20	35	<20	<20
Koolwaterstof fractie C12-C16	µg/l	<20	<20	120	<20	<20
Koolwaterstof fractie C16-C20	µg/l	<10	<10	60	<10	<10
Koolwaterstof fractie C20-C24	µg/l	<10	<10	23	<10	<10
Koolwaterstof fractie C24-C28	µg/l	<10	<10	11	<10	<10
Koolwaterstof fractie C28-C32	µg/l	<10	<10	<10	<10	<10
Koolwaterstof fractie C32-C36	µg/l	<10	<10	<10	<10	<10
Koolwaterstof fractie C36-C40	µg/l	<10	<10	<10	<10	<10



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Opdracht 191686 Water

Monsternr.	Monsteromschrijving	Monstername	Monsternamepunt
85241	Pb 96 F(1.8-2.8)	10.06.2010	
85242	Pb 97 F(1.7-2.7)	10.06.2010	

Eenheid**85241****85242**

Pb 96 F(1.8-2.8)

Pb 97 F(1.7-2.7)

PAK

Anthraceen	µg/l	0,012	0,090
Benzo(a)anthraceen	µg/l	<0,020	<0,020
Benzo(a)pyreen	µg/l	<0,020	<0,020
Benzo(ghi)peryleen	µg/l	<0,050	<0,050
Benzo(k)fluorantheen	µg/l	<0,010	<0,010
Chryseene	µg/l	<0,020	<0,020
Fenanthreen	µg/l	0,060	0,81
Fluorantheen	µg/l	0,020	0,20
Indeno-(1,2,3-c,d)pyreen	µg/l	<0,020	<0,020
Naftaleen	µg/l	0,12	0,34
Som PAK (VROM)	µg/l	0,21 ^{x)}	1,4 ^{x)}
Som PAK (VROM) (Factor 0,7)	µg/l	0,31 ^{#)}	1,5 ^{#)}

Aromaten

Benzeen	µg/l	<0,20	<0,60 ^{m)}
Tolueen	µg/l	<0,30	<0,60 ^{m)}
Ethylbenzeen	µg/l	<0,30	<0,60 ^{m)}
m,p-Xyleen	µg/l	<0,20	<0,60 ^{m)}
o-Xyleen	µg/l	<0,10	<0,60 ^{m)}
Som Xylenen	µg/l	n.a.	n.a.
Som Xylenen (Factor 0,7)	µg/l	0,21 ^{#)}	0,84 ^{#)}
Naftaleen	µg/l	<0,050	1,3

Minerale olie

Koolwaterstoffractie C10-C40	µg/l	<100	<100
Koolwaterstoffractie C10-C12	µg/l	<20	<20
Koolwaterstoffractie C12-C16	µg/l	<20	<20
Koolwaterstoffractie C16-C20	µg/l	<10	<10
Koolwaterstoffractie C20-C24	µg/l	<10	<10
Koolwaterstoffractie C24-C28	µg/l	<10	<10
Koolwaterstoffractie C28-C32	µg/l	<10	<10
Koolwaterstoffractie C32-C36	µg/l	<10	<10
Koolwaterstoffractie C36-C40	µg/l	<10	<10

Verklaring: "<" of na betekent dat het gehalte van de component lager is dan de rapportagegrens.

de daadwerkelijke rapportagegrens kan in sommige gevallen afwijken van de standaard waarde voor de betreffende analyse door bijvoorbeeld matrixeffecten of te weinig monstermateriaal.

x) Gehaltes beneden de rapportagegrens zijn niet mee inbegrepen.

#) Bij deze som zijn resultaten "<rapportagegrens" vermenigvuldigd met 0,7; indien een som is berekend uit minimaal één verhoogde rapportagegrens, dan dient voor het resultaat "<" gelezen te worden.

m) De bepalingsgrens is verhoogd, omdat door matrixeffecten, resp. co-elutie een kwantificering bemoeilijkt wordt.

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Blad 4 van 4

Opdracht 191686 Water

De onderzoeksresultaten hebben alleen betrekking op het aangeleverde monstermateriaal. De onderzoekstijd omvat de periode tussen acceptatie van de opdracht en rapportage. Monsters met onbekende herkomst, kunnen slechts beperkt gecontroleerd worden op plausibiliteit.

AL-West B.V. Dhr. Jan Godlieb, Tel. +31/570699760**Klantenservice****Toegepaste methoden**

conform AS 3000: Som PAK (VROM) Benzeen Tolueen Ethylbenzeen Som Xylenen Naftaleen Koolwaterstof fractie C10-C40

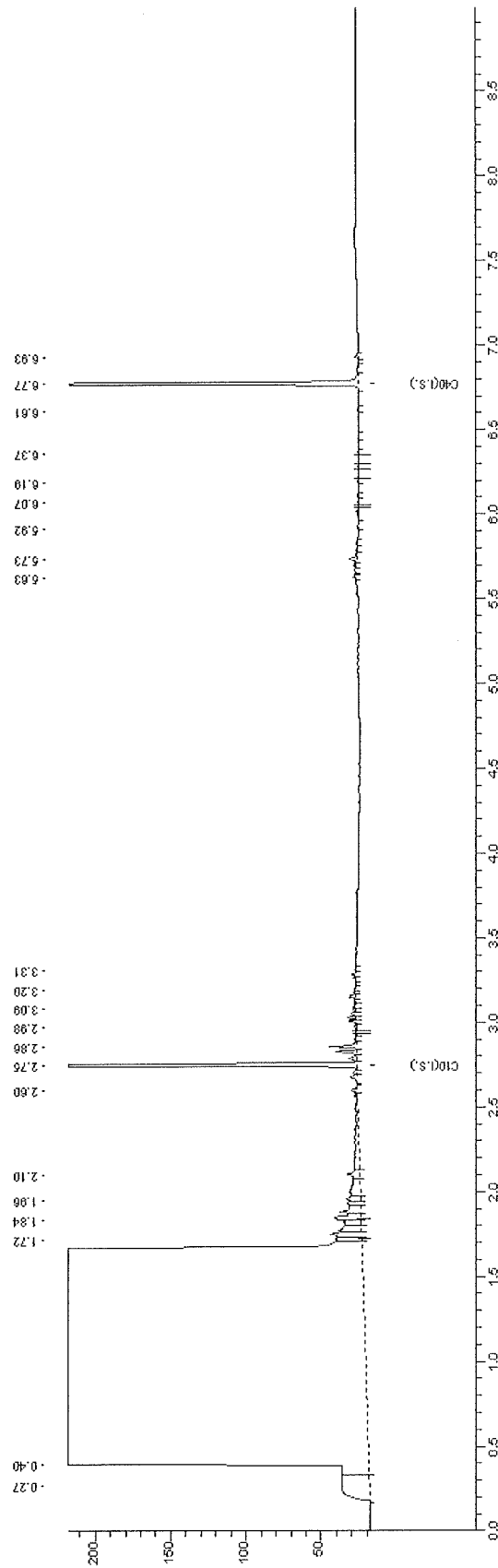
conform AS 3000: n) Koolwaterstof fractie C10-C12 Koolwaterstof fractie C12-C16 Koolwaterstof fractie C16-C20 Koolwaterstof fractie C20-C24
Koolwaterstof fractie C24-C28 Koolwaterstof fractie C28-C32 Koolwaterstof fractie C32-C36 Koolwaterstof fractie C36-C40

conform AS 3000: Som PAK (VROM) (Factor 0,7) Som Xylenen (Factor 0,7)

n) Niet geaccrediteerd

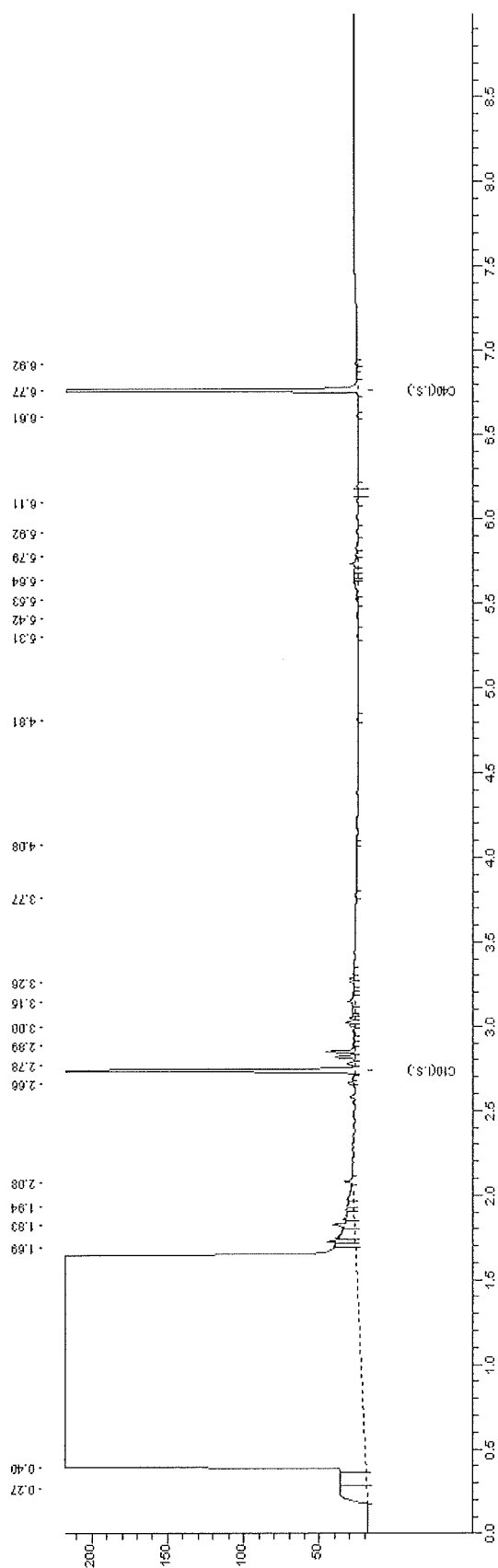


Chromatogram for Order No. 191686, Analysis No. 85236, created at 16.06.2010 06:37:59



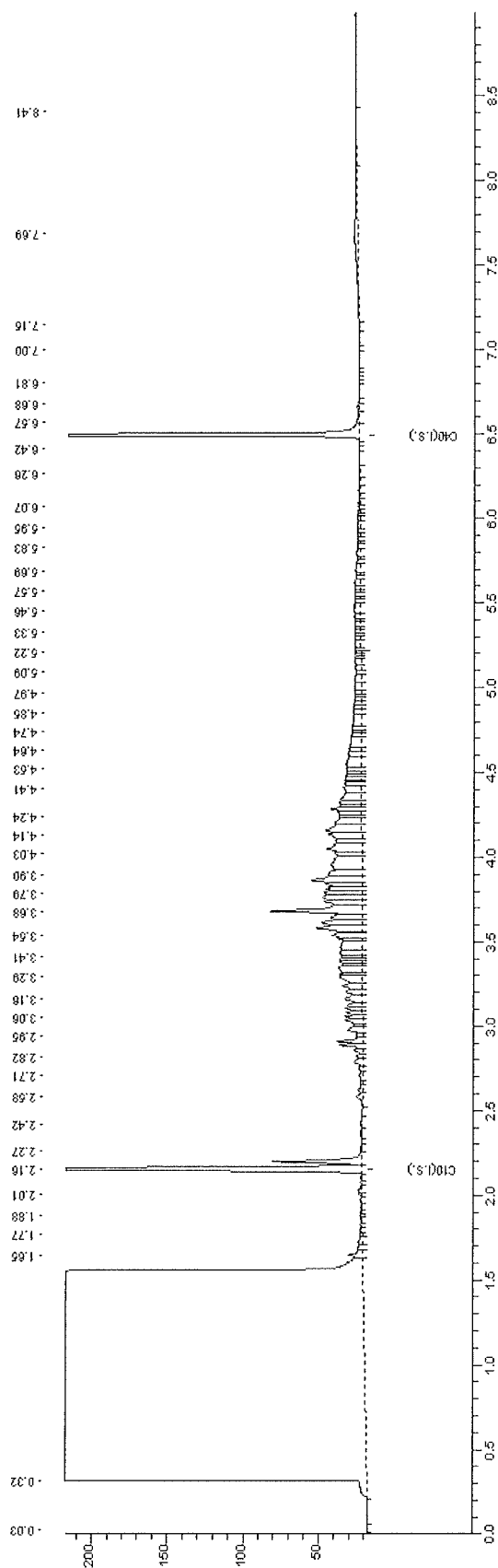


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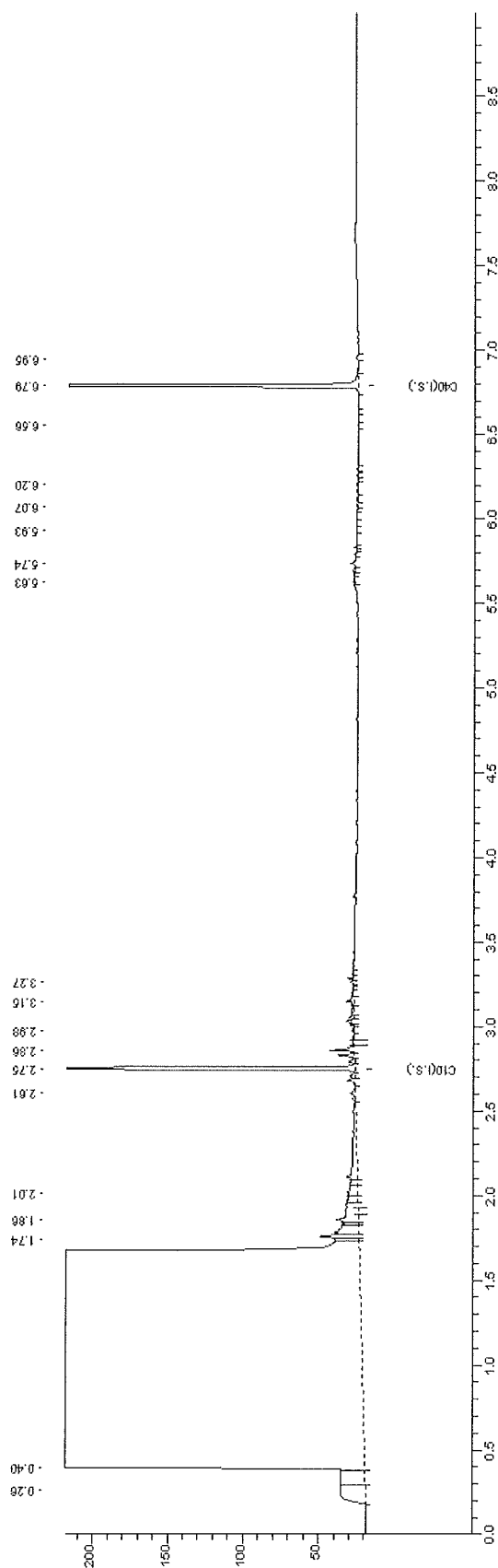


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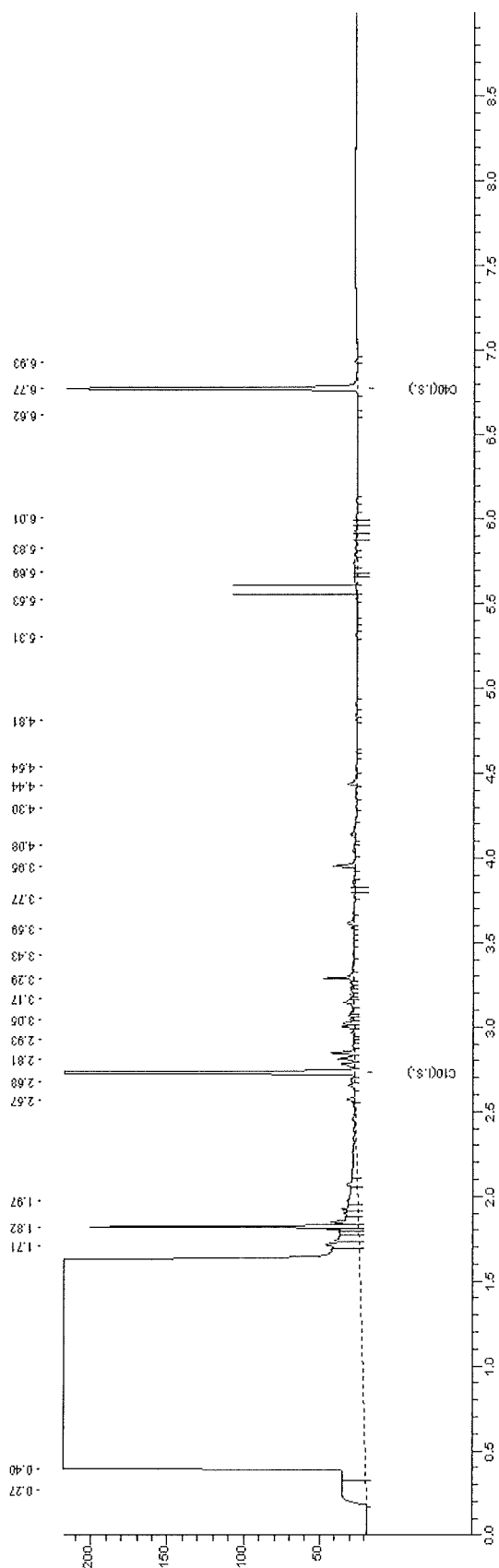


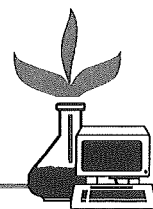
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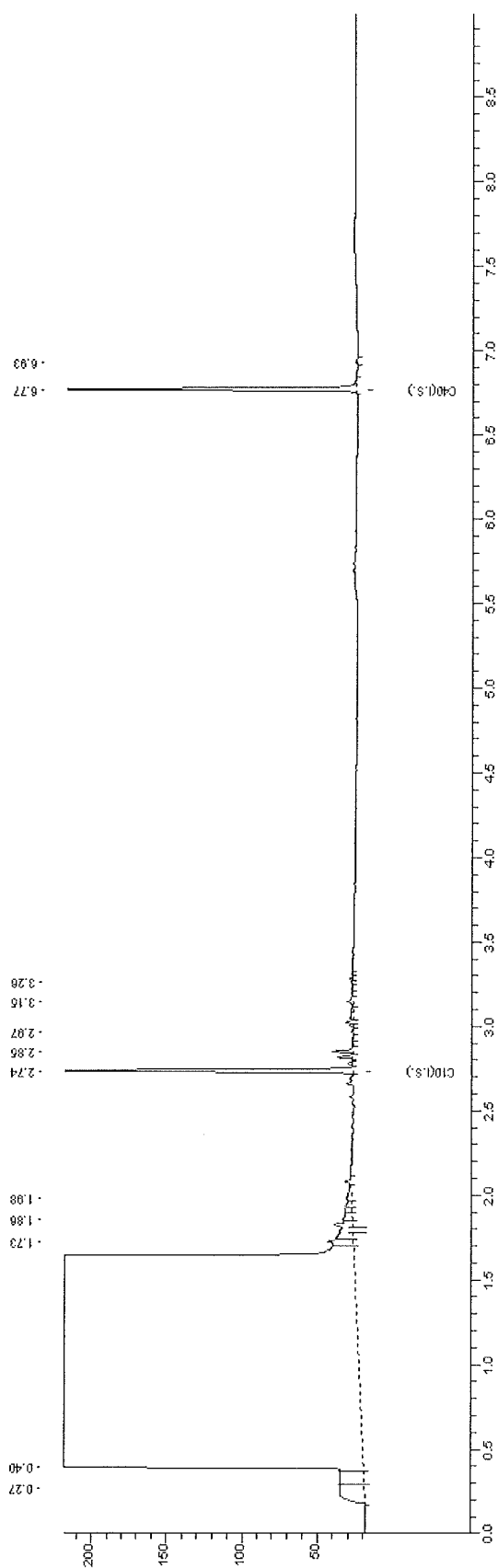


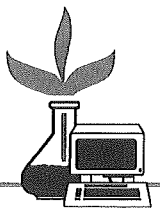
Chromatogram for Order No. 191686, Analysis No. 85240, created at 16.06.2010 06:38:44



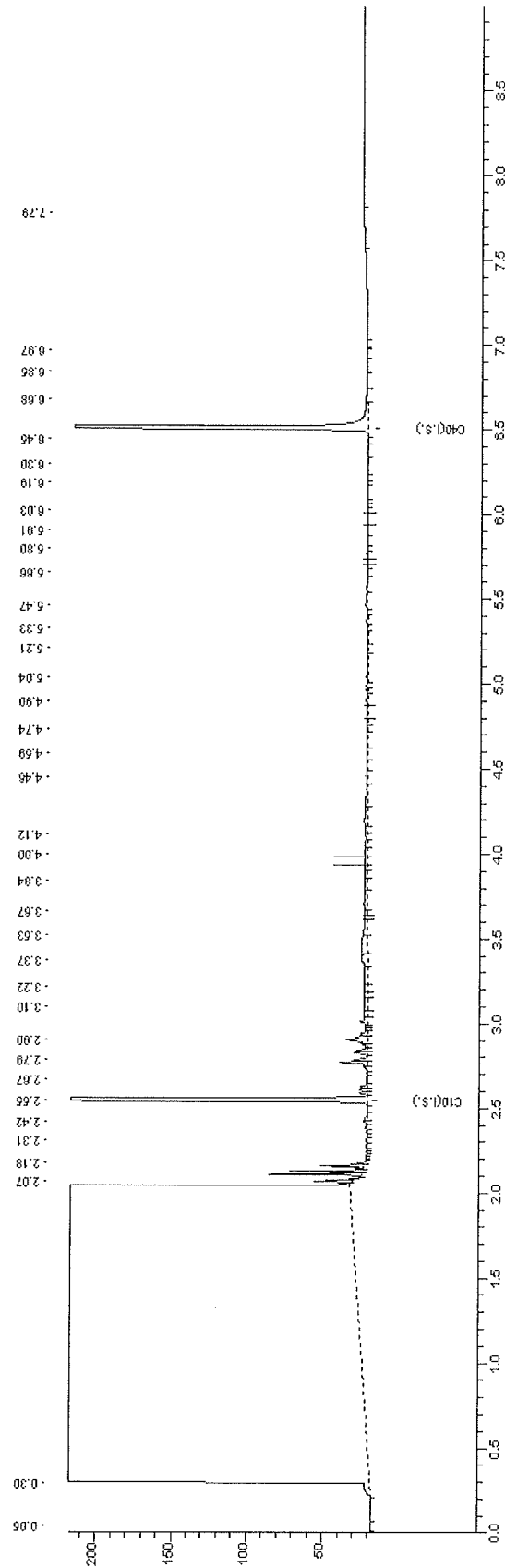


Chromatogram for Order No. 191686, Analysis No. 85241, created at 16.06.2010 06:38:39





Chromatogram for Order No. 191686, Analysis No. 85242, created at 21.06.2010 12:07:04



Appendix

6

Detailed risk assessment

Appendix 6 Detailed risk assessment

1.1 Risk assessment

For cases of serious soil contamination according to Dutch Soil Protection Legislation, a risk assessment needs to be performed assessing risks for human health, the ecosystem and risks of contaminant migration. A case of serious oil contamination according to Dutch legislation is defined as a contamination of more than 25 m³ soil with concentrations of one or more substances above intervention value or (in the saturated zone) a volume of more than 100 m³ with concentrations in the groundwater higher than the intervention value. The contents of PAH including naphthalene are higher than intervention value in about 35 m³. In one groundwater well the intervention value of phenanthrene is exceeded. Based on the current data, possibly the extent of the contamination is so small that the contamination is not a case of serious soil contamination in the sense of Dutch legislation. However, in order to get insight into possible liabilities, a risk assessment is performed according to current Dutch methodology.

Since April 2009 the Circular Soil Remediation 2009 is in force. Conform current methodology risk assessments for cases of serious soil contamination are performed using the online version of the model Sanscrit (www.risicotoolbox.nl, version 2.0.12.1, RIVM, 2009). The current methodology is focused on the reduction of unacceptable risks. If unacceptable risks are predicted after a standard risk assessment with Sanscrit, the case can either be regarded as requiring immediate remedial action, or an expert risk assessment can be performed in order to find out whether the case really poses unacceptable risks. If no unacceptable risks are predicted, it is not necessary to determine a due date for remediation measures.

1.2 Results risk assessment

Detailed results are given in the following pages (model output Sanscrit).

1.2.1 Human health risks

For the current land use scenario no unacceptable risks are predicted for human health.

1.2.2 Risks for the ecosystem

As the contamination is not present in the contact zone for the ecosystem (top 0.5 m), an assessment of risks for the ecosystem is not necessary according to current methodology.

1.2.3 Risks of migration

The extent of the contamination in groundwater is a lot smaller than 6.000 m³. The contamination is present underneath a layer of concrete, which will further reduce potential leaching with percolating rain water. According to current methodology no unacceptable risks of contaminant migration are predicted.

1.3 Determination of due date for remediation measures

According to the methodology it is not necessary to determine a due date until when remediation measures need to be taken. If the contamination represents a case of serious soil contamination, registration and administration are sufficient. In case of digging activities in the contaminated area, a health and safety plan might be needed. If the land use changes to more sensitive forms of land use (e.g. residential use), a new risk assessment is required.

General information

Location: Ter Aar
Code: 4707529
Risk assessor: daniela.lud@tauw.de
Date model output: 28 th june 2010
Type soil use: Current soil use

Assessments performed:

Step1: Extent and degree of contamination:

It is a case of serious soil contamination in the sense of Dutch Regulations:

- **Case of serious soil contamination**

	Step2: Standard assessment	Step 3: Detailed assessment
Human health	✓	X
Ecological	✓	—
Migration	✓	—
✓ = completed	X = not performed	— = not applicable based on step 2

Remarks:

About Sanscrit

Sanscrit 2.0 is an online tool to calculate the remediation criterion (saneringscriterium). The remediation criterion is defined in the Dutch Circular Soil Remediation 2009 in force since 1st April 2009. The application Sanscrit was developed commissioned by the Dutch ministry of VROM.

The remediation criterion determines whether the soil or groundwater contamination causes unacceptable risks to human health, the ecosystem or unacceptable risks of contaminant migration. Depending on the risks which were calculated, it is determined, whether remediation measures are necessary on short term.

Prerequisites

Remediation measures need to be taken on the short term, unless a risk assessment has shown, that the remediation does not need to be performed on a short term.

The remediation criterion applies to:

- a case of serious soil contamination;
- soil contaminations from before 1987, for other contaminations article 13 of the Dutch Soil Protection Legislation applies;
- current and future landuse;
- soil and groundwater. For soil under surface water a separate approach was developed;
- all substances for which there is a Dutch intervention value apart from asbestos. For asbestos the protocol asbestos of the Dutch Soil Remediation Circular applies.

Final conclusion

It is a case of serious soil contamination, remediation measures are not necessary on short term.

Human health risk assessment calculation results

Per substance

Substance	Dosis [mg/kg bw/d]	MTR [mg/kg bw/d]	Hazard-Index
Public green, built surface, infra structure & industrial/commercial use			
Indeno(123cd)pyrene	5,55e-6	5,00e-3	0,00
Anthracene	3,07e-5	4,00e-2	0,00
Benzo(a)anthracene	1,94e-6	5,00e-3	0,00
Benzo(a)pyrene	2,85e-5	5,00e-4	0,06
Chrysene	4,93e-5	5,00e-2	0,00
Fluoranthene	1,79e-4	5,00e-2	0,00
Phenanthrene	3,37e-4	4,00e-2	0,01
Naphthalene	2,35e-4	4,00e-2	0,01
Benzo(ghi)perylene	2,97e-5	3,00e-2	0,00
Benzo(k)fluoranthene	2,25e-5	5,00e-3	0,00

Combined effects

Group of substances	Hazard-Index
Public green, built surface, ... & industrial/commercial use	
Carcinogenic PAH	0,07
Non-carcinogenic PAH	0,02

Nuisance – comparison odour threshold

Substance	Conc. Indoor air [ug/m3]	odour threshold [ug/m3]
Public green, built surface, ...& industrial/commercial use		
Naphthalene	2,19	8,00e2

Nuisance – skin contact

Soil use	skin contact possible?
Public green, built surface,... & industrial/commercial	No

Remarks:

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Detailed results exposure

Exposure route	Relative contribution
Public green, built surface... & industrial/commercial use	
Anthracene	
Consumption vegetables own garden	0.00
Dermal uptake indoors	0.62
Dermal uptake outdoors	13.13
Dermal uptake bathing	34.85
Ingestion soil	43.04
Inhalation vapours showering	0.11
Inhalation indoor air	3.36
Inhalation outdoor air	0.00
Inhalation soil particles	0.48
Permeation drinking water pipes	4.41
Benzo(a)anthracene	
Consumption vegetables own garden	0.00
Dermal uptake indoors	1.07
Dermal uptake outdoors	22.74
Dermal uptake bathing	0.71
Ingestion soil	74.55
Inhalation vapours showering	0.00
Inhalation indoor air	0.00
Inhalation outdoor air	0.00
Inhalation soil particles	0.83
Permeation drinking water pipes	0.10
Benzo(a)pyrene	
Consumption vegetables own garden	0.00
Dermal uptake indoors	1.08
Dermal uptake outdoors	22.80
Dermal uptake bathing	0.45
Ingestion soil	74.76
Inhalation vapours showering	0.00
Inhalation indoor air	0.00
Inhalation outdoor air	0.00
Inhalation soil particles	0.83
Permeation drinking water pipes	0.09
Benzo(ghi)perylene	
Consumption vegetables own garden	0.00
Dermal uptake indoors	1.08
Dermal uptake outdoors	22.90
Dermal uptake bathing	0.07
Ingestion soil	75.10
Inhalation vapours showering	0.00
Inhalation indoor air	0.00
Inhalation outdoor air	0.00
Inhalation soil particles	0.84
Permeation drinking water pipes	0.02
Benzo(k)fluoranthene	
Consumption vegetables own garden	0.00
Dermal uptake indoors	1.08
Dermal uptake outdoors	22.87
Dermal uptake bathing	0.18
Ingestion soil particles	74.99
Inhalation vapours showering	0.00
Inhalation indoor air	0.00
Inhalation outdoor air	0.00
Inhalation soil particles	0.84

Permeation drinking water pipes	0.04
Chrysene	
Consumption vegetables own garden	0.00
Dermal uptake indoors	1.07
Dermal uptake outdoors	22.72
Dermal uptake bathing	0.79
Ingestion soil	74.49
Inhalation vapours showering	0.00
Inhalation indoor air	0.00
Inhalation outdoor air	0.00
Inhalation soil particles	0.83
Permeation drinking water pipes	0.11
Phenanthrene	
Consumption vegetables own garden	0.00
Dermal uptake indoors	0.56
Dermal uptake outdoors	11.97
Dermal uptake bathing	37.99
Ingestion soil	39.26
Inhalation vapours showering	0.15
Inhalation indoor air	4.90
Inhalation outdoor air	0.00
Inhalation soil particles	0.44
Permeation drinking water pipes	4.72
Fluoranthene	
Consumption vegetables own garden	0.00
Dermal uptake indoors	1.02
Dermal uptake outdoors	21.73
Dermal uptake bathing	3.60
Ingestion soil	71.25
Inhalation vapours showering	0.01
Inhalation indoor air	1.20
Inhalation outdoor air	0.00
Inhalation soil particles	0.79
Permeation drinking water pipes	0.38
Indeno(123cd)pyrene	
Consumption vegetables own garden	0.00
Dermal uptake indoors	1.08
Dermal uptake outdoors	22.86
Dermal uptake bathing	0.21
Ingestion soil	74.96
Inhalation vapours showering	0.00
Inhalation indoor air	0.00
Inhalation outdoor air	0.00
Inhalation soil particles	0.84
Permeation drinking water pipes	0.06
Naphthalene	
Consumption vegetables own garden	0.00
Dermal uptake indoors	0.05
Dermal uptake outdoors	1.11
Dermal uptake bathing	15.18
Ingestion soil	3.65
Inhalation vapours showering	1.02
Inhalation indoor air	71.12
Inhalation outdoor air	0.03
Inhalation soil particles	0.04
Permeation drinking water pipes	7.80

Human health risks – input parameters

Substance	C-total [mg/kg]			C-groundwater [ug/l]	
	Total	Built	Non built	Built	Non-built
Public green, built surface, infrastructure, industrial/commercial use					
Naphthalene	35,00				
Anthracene	54,00				
Benzo(a)anthracene	5,90				
Benzo(a)pyrene	87,00				
Chrysene	150,00				
Fluoranthene	520,00				
Phenanthrene	540,00				
Benzo(ghi)perylene	91,00				
Benzo(k)fluoranthene	69,00				
Indeno(123cd)pyrene	17,00				

Parameters

Soil use	Calculation exposure lead:	Depth contamination [m]		
		OS [%]	to crawlspace	To ground surface
Public green, built surface, infra structure...	For child	25,00	0,50	1,00

Ecological risk assessment - standard

The contamination is not (total or in part) present in the top 0.5 meter of the non-paved/asphalted soil. There are no plants which have roots deeper than 0.5 meter. This means that an ecological risk assessment is not necessary.

Risk assessment migration - standard

Element	Result
Are there sensitive objects within the intervention value contour or will this be the case in a couple of years?	No
Is there an LNAPL, from which contaminant migration can take place?	No
Is there a DNAPL from which cotaminant migration can take place?	No
Is the volume of the contamination in groundwater (contour of intervention value) more than 6.000 m3 ?	No

Remark:

Extent of contamination in groundwater is small (Intervention value only exceeded in 1 groundwater well)