

**Attachment J3 (A)**

**Contents**

Groundwater monitoring results for Atlas site.

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*Attachment J3 (A)*

(Sheet 1 of 2) Monitoring Point<sup>1</sup>/ Grid Reference:

Parameter	Results (mg/l)		Sampling method (composite etc.)	Normal Analytical Range	Analysis method / technique
	Date	Date			
Ph	14/03/01 6.39-7.52	29/08/02 6.24-7.44	Grab	Ph 0-14	Ph & Temp meter
Temperature	9.2-11.6 °C	12-13.2 °C	Grab	Temp 0-100°C	Ph & Temp meter
Electrical conductivity EC	389-926 (µS/cm)	584-920 (µS/cm)	Grab	0.0-1999 µS/cm	Conductivity meter
Ammoniacal nitrogen NH <sub>4</sub> -N	N/a	N/a			
Dissolved oxygen DO	N/a	N/a			
Residue on evaporation (180°C)	N/a	N/a			
Calcium Ca	N/a	N/a			
Cadmium Cd	Not Detected	N/a	Grab	<0.4 ppb method detection limit	ICP-USN
Chromium Cr	Not Detected	N/a	Grab	<1.0 ppb method detection limit	ICP-USN
Chloride Cl	N/a	N/a			
Copper Cu	Not Detected	N/a	Grab	<5.0 ppb method detection limit	ICP-USN
Cyanide Cn, total	N/a	N/a			



GROUNDWATER QUALITY (SHEET 2 OF 2)

Parameter	Results (mg/l)			Sampling method (composite, dipper etc.)	Normal Analytical Range	Analysis method / technique
	14/03/01	29/08/02	Date			
Phosphate PO <sub>4</sub>	Not Detected	N/a		Grab	<0.8 ppm method detection limit	SPECTRO
Sulphate SO <sub>4</sub>	Not Detected	N/a		Grab	<3.0 ppm method detection limit	SPECTRO
Zinc Zn	0.05-0.12	N/a		Grab	<5.0 ppb method detection limit	ICP-USN
Total alkalinity (as CaCO <sub>3</sub> )	N/a	N/a				
Total organic carbon TOC	N/a	N/a				
Total oxidised nitrogen TON	N/a	N/a				
Arsenic As	N/a	N/a				
Barium Ba	0.06-0.26	N/a		Grab	<0.5 ppm method detection limit	ICP
Boron B	N/a	N/a				
Fluoride F	N/a	N/a				
Phenol	N/a	N/a				
Phosphorus P	N/a	N/a				
Selenium Se	N/a	N/a				
Silver Ag	N/a	N/a				

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Nitrite NO <sub>2</sub>	N/a	N/a							
Nitrate NO <sub>3</sub>	N/a	N/a							
Faecal coliforms (/100mls)	N/a	N/a							
Total coliforms (/100mls)	N/a	N/a							
Water level (m OD)	N/A	2.8-3.6 (mSD)							

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URS

Our Ref: 46605-005-447/JA

3 December 2002

Atlas Ireland  
Clonminam Industrial Estate  
Portlaoise  
Co. Laois

Attention: Mr Gareth Kelly

Dear Gareth

## GROUNDWATER MONITORING REPORT, 2002 FOR ATLAS IRELAND, PORTLAOISE

### 1.0 INTRODUCTION

#### 1.1 INTRODUCTION

This report presents the findings of groundwater monitoring performed at the Atlas Ireland facility, in Portlaoise, Co. Laois. Also included in this report is a site map illustrating the inferred piezometric contours and groundwater flow direction (Figure 1).

The work was carried out according to URS proposal, reference PRP 1148, dated 29<sup>th</sup> August, 2002, which was authorised by Atlas Ireland on 08<sup>th</sup> October 2002 by purchase order number 14541.

#### 1.2 PROJECT OBJECTIVES AND SCOPE OF WORK

The primary objectives of the works undertaken were to assist Atlas Ireland in responding to questions raised by the EPA following submission of a soil and groundwater report for the site dated July 2001. The objectives of the investigation, in line with EPA requirements, were:

- To re-survey top of well casing elevations relative to a local datum point;
- Measure depth to groundwater from the top of well casing to enable a reassessment of groundwater flow direction and hydraulic gradient across the site;
- Collect water samples from the four existing wells for DRO/Mineral Oil analysis and for PAH analysis (16 USEPA priority compounds);
- Preparation of a letter report summarising the work completed.

### 1.3 SCOPE OF INVESTIGATIVE WORKS

The following methods were used to fulfil the project objectives and scope of works outlined above.

#### 1.3.1 Water Level Monitoring

Depth to water from the top of each well casing was measured with an electronic water level indicator. The tops of casing elevations were re-surveyed with reference to an arbitrary site datum. The water level at each well was plotted on a site map; this enabled an assessment of the groundwater flow direction and gradient at the site to be completed.

#### 1.3.2 Groundwater Sampling

Samples were collected using the dedicated Waterra™ inertial lift system of tubing and foot-valves. This equipment had been left in place from the previous monitoring round. As the system is dedicated to each borehole individually the risk of cross-contamination between wells is greatly minimised. To further reduce the risk of contamination, sampling gloves were changed between sampling events.

Prior to sample collection, the four monitoring wells were purged of between 3 - 5 well volumes to remove stagnant water in the well and surrounding filter pack and so representative groundwater samples were obtained. Samples were collected into clean laboratory supplied containers, which were preserved and filtered as appropriate. All samples were stored in portable, chilled cool-boxes on site and were transferred on the same day by courier to the chosen laboratory of Alcontrol Geochem in Dublin. A strict chain of custody procedure was adhered to.

During purging and sampling of the four monitoring wells, field measurements were taken, including groundwater level, pH and electrical conductivity, and visual and olfactory indications of contamination were recorded. Full details are given in Table 1.

## 2.0 RESULTS

### 2.1 FIELD MEASUREMENTS

An oily sheen was noted in monitoring wells BH101, BH103 and BH104 during purging and sampling. A hydrogen sulphide-type odour was noted in BH102 and a slight solvent-type odour was noted in BH104.

No sheen or odours were noted in any of the monitoring wells during the March 2001 monitoring round.

Water levels within the monitoring wells were relatively unchanged compared with water levels recorded during the March 2001 monitoring round. The groundwater flow direction inferred from water levels in the four monitoring wells was generally towards the east-south-east. This was consistent with the inferred groundwater flow direction from the March 2001 monitoring round. The hydraulic gradient was slightly steeper for the October 2002 monitoring round (see Figure 2).

### 2.2 ANALYTICAL RESULTS

Water samples were taken from each of the four monitoring wells and were analysed for DRO and PAHs. Full details are given in the sample inventory (Table 2).

#### 2.2.1 DRO and Mineral Oil in Water

DRO concentrations in October 2002 ranged from below detection in BH102 to 1.02 mg/L in BH104 (refer to Table 3). During the previous monitoring round in March 2001, DRO concentrations were found to range from 0.13 mg/L to 0.23 mg/L.

Mineral oil concentrations ranged from below the method detection limit, again in BH102, to 0.665 mg/L in BH104 (refer to Table 3). The concentration of mineral oil in BH104 exceeded the Dutch Intervention Value of 0.6 mg/L. During the previous monitoring round in March 2001, mineral oil concentrations were found to range from 0.05 mg/L to 0.08 mg/L.

A car yard is situated adjacent to the Atlas property, south of BH104, and it may have contributed to the increase in DRO and mineral oil from the previous monitoring round, as it has only recently received a surface covering and interceptor.

#### 2.2.2 PAH in Water

PAH compounds were not detected in excess of their respective Dutch Intervention Values in any of the four wells. Total PAH concentrations (sum of 10 compounds on the



Dutch list) were below the method detection limit in BH101, BH102 and BH103, and a total PAH concentration of 2.07 µg/L was recorded in BH104 (refer to Table 4).

In March 2001, the monitoring well with the highest total PAH concentration was BH103 (3.3 µg/L). This well is located up-gradient of the tank farm. The monitoring well with the lowest concentration was BH104 at 0.3 µg/L. This well is located close to the southern site boundary and across-gradient from the key potential source areas at the facility.

### 3.0 SUMMARY AND CONCLUSIONS

~~A groundwater monitoring round was performed at the facility on 10 October 2002.~~

The groundwater flow direction inferred from water levels in the four monitoring wells was generally towards the east-south-east. This was consistent with the groundwater flow direction inferred from water levels measured during the March 2001 monitoring round.

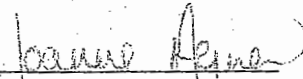
Laboratory analysis of the groundwater samples found mineral oil concentrations below the Dutch Intervention Value (DIV) of 0.6 mg/L in three of the four wells. In BH104, the result slightly exceeded the DIV at 0.665 mg/L. These results were generally higher than those recorded during the March 2001 monitoring round.

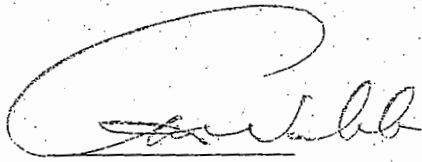
PAH compounds were not detected above their respective Dutch Intervention Values in any of the four monitoring wells. These results were generally lower than those recorded during the March 2001 monitoring round.

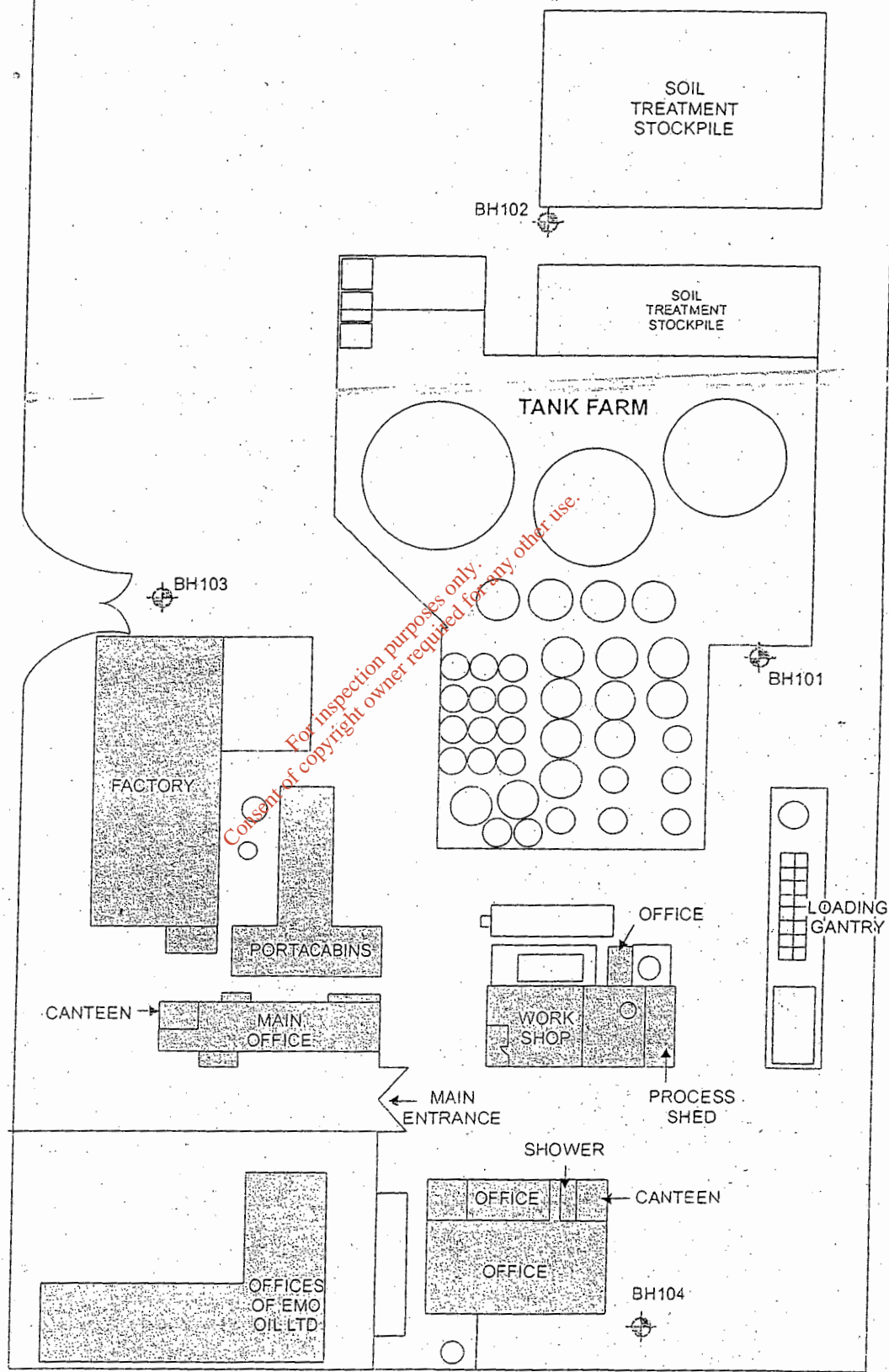
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We trust this report is in accordance with your current requirements. Should you have any questions, please do not hesitate to contact the undersigned.

Yours sincerely  
for URS IRELAND.

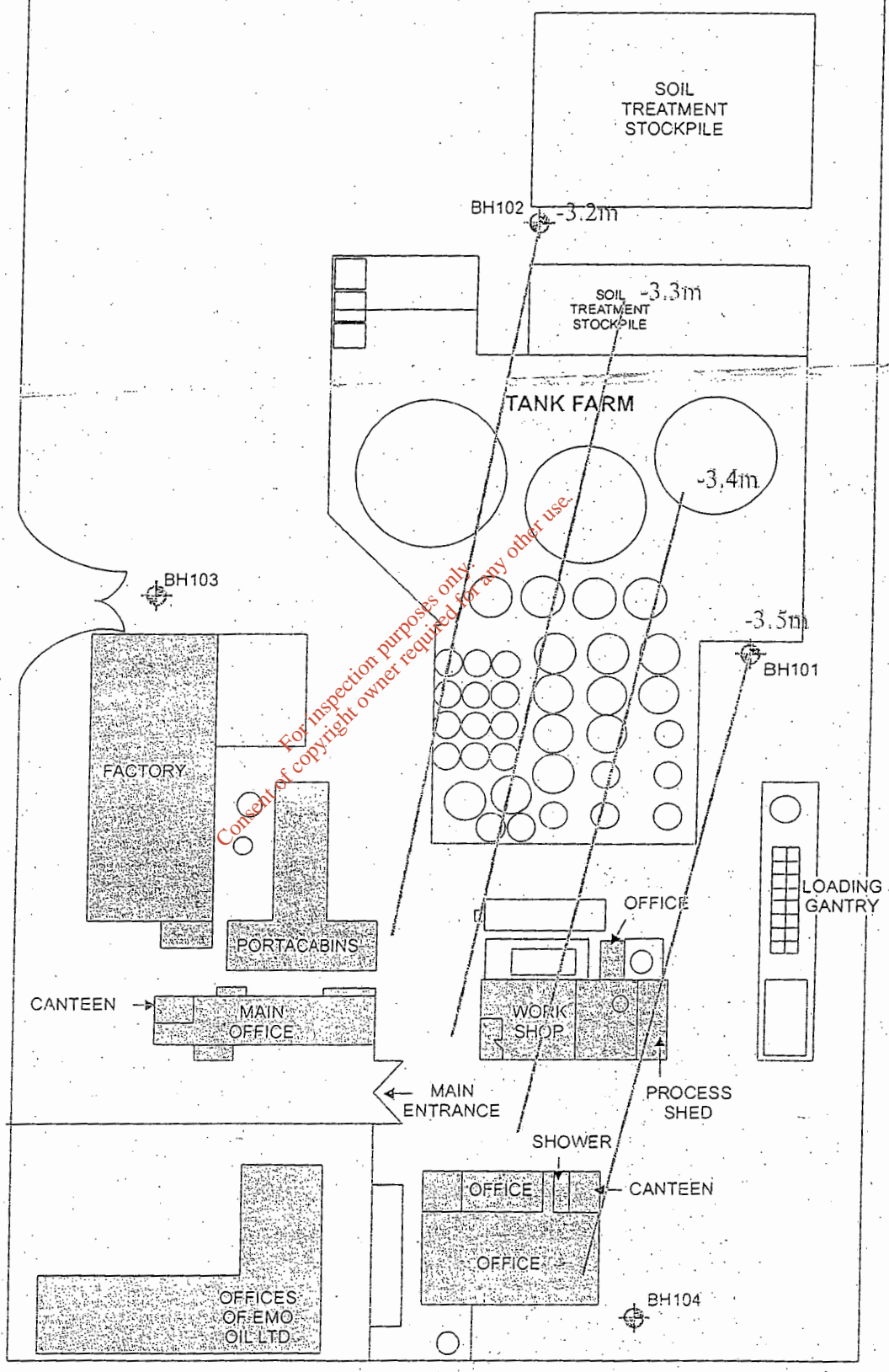
  
Joanne Agnew  
Hydrogeologist

  
Graham Webb  
Manager, Soil & Groundwater Services.



Title	Borehole Location Plan
Project	Annual Groundwater Monitoring
Location	Clonminam Industrial Estate.
Client	Atlas Ireland

App'd	Reference	Date
TI App'd	Job No.	Scale
DB	46605-005-447	NTS
		<b>FIGURE 1</b>
Dames & Moore 8-9 Harcourt Road Dublin 2 Ireland Tel: +353 (0) 1 41 55 100 Fax: +353 (0) 1 41 55 101 www.dames.com		



Title	Inferred Piezometric Contours
Project	Annual Groundwater Monitoring
Location	Clonminam Industrial Estate
Client	Atlas Ireland

App'd	Reference	JA/DUB	Date	Nov. 2002
TI App'd	Job No.	46605-005-447	Scale	NTS
		<small>Damer &amp; Moore          Iveagh Court, 4th Floor          6-8 Veepour Road          Dublin 2          Ireland          Tel: + 353 (0) 1 41 55 100          Fax: + 353 (0) 1 41 55 101          www.urscorp.com</small>		<b>FIGURE 2</b>
<small>Damer &amp; Moore          O'Brien Kreisberg          Thurston Colquhoun</small>				

TABLE 1  
Groundwater Field Measurements  
Atlas Ireland, Portlaoise

Field I.D.	BH101	BH102	BH103	BH104
Sample Type	Groundwater	Groundwater	Groundwater	Groundwater
Data Source	Atlas Ireland Investigation			

Measurement				
SWL (m bct*)	3.99	3.2	1.5	2.29
SWL (m SD**)	3.5	3.2	2.8	3.6
Purged Volume (L)	15.45	20.64	18.93	20.64
pH	7.44	6.57	6.24	6.59
Temperature (°C)	12.4	13	13.2	12
Electrical Conductivity (mS/cm)	738	920	706	584
Observations	Brown moderately silty water, slight sheen, no odour.	Initial 3 L brown silty water, H <sub>2</sub> S odour, remaining purged water light brown to grey, silty no sheen.	Light brown moderately silty water, slight sheen, no odour	Silty murky water, high sheen, slight solvent odour

m bct\* Metres below casing top  
m SD\*\* Metres below site datum.

**TABLE 2**  
**Sample Inventory**  
**Atlas Ireland, Portlaoise**

Field I.D.	BH101	BH102	BH103	BH104
Sample Type	Groundwater	Groundwater	Groundwater	Groundwater
Data Source	Atlas Ireland Investigation			

Analysis	10/10/02	10/10/02	10/10/02	10/10/02
DRO and Mineral Oil	x	x	x	x
PAH Compounds	x	x	x	x

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**TABLE 3**  
**Groundwater Analytical Results - Diesel Range Organics**  
**Atlas Ireland, Portlaoise**

Field I.D.		BH102		BH103		BH104	
Sample Type		Groundwater		Groundwater		Groundwater	
Data Source		Atlas Ireland Investigation					
Chemical	Dutch I Values	MRL <sup>1</sup>	Units				
Hydrocarbon Compounds							
Diesel Range Hydrocarbons		1	mg/L				
Mineral Oil	0.6	1	mg/L	0.356	0.289	1.023	
				0.231	0.188	0.665	

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MRL<sup>1</sup> Method Reporting Limit  
 - Indicates result below MRL

TABLE 4  
Groundwater Analytical Results - PAH Compounds  
Atlas Ireland, Portlaoise

Field I.D.
Sample Type
Data source

BH101	BH102	BH103	BH104
Groundwater	Groundwater	Groundwater	Groundwater
Atlas Ireland Investigation			

Chemical	Dutch I Values	MRL <sup>1</sup>	Units				
PAH Compounds							
Naphthalene	70	0.01	ug/L	-	-	-	0.61
Acenaphthylene	-	0.01	ug/L	-	-	-	0.083
Acenaphthene	-	0.01	ug/L	-	-	-	0.201
Fluorene	-	0.01	ug/L	-	-	-	0.599
Phenanthrene	5	0.01	ug/L	-	-	-	0.506
Anthracene	5	0.01	ug/L	-	-	-	0.068
Fluoranthene	1	0.01	ug/L	-	-	-	-
Pyrene	-	0.01	ug/L	-	-	-	-
Benzo(a)anthracene	0.5	0.01	ug/L	-	-	-	-
Chrysene	0.05	0.01	ug/L	-	-	-	-
Benzo(b)fluoranthene	-	0.01	ug/L	-	-	-	-
Benzo(k)fluoranthene	0.05	0.01	ug/L	-	-	-	-
Benzo(a)pyrene	0.05	0.01	ug/L	-	-	-	-
Indeno(1,2,3-cd)pyrene	0.05	0.01	ug/L	-	-	-	-
Dibenz(a,h)anthracene	-	0.01	ug/L	-	-	-	-
Benzo(g,h,i)perylene	0.05	0.01	ug/L	-	-	-	-
Total 10 Dutch PAHs	-	-	ug/L	-	-	-	2.07

MRL<sup>1</sup> Method Reporting limit  
- Indicates result below MRL