



RPS Consultants Ltd
2420 The Quadrant
Aztec West
Almondsbury
Bristol
BS32 4AQ

Attention: Adam Parker

CERTIFICATE OF ANALYSIS

Date: 01 November 2016
Customer: H_RPS_ADB
Sample Delivery Group (SDG): 161022-26
Your Reference: JCD0170
Location: Neal Soils
Report No: 384579

We received 2 samples on Saturday October 22, 2016 and 2 of these samples were scheduled for analysis which was completed on Tuesday November 01, 2016. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALcontrol Laboratories Hawarden (Method codes TM) or ALcontrol Laboratories Aberdeen (Method codes S).

Approved By:

Sonia McWhan
Operations Manager





SDG: 161022-26
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Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
14382865	OF			19/10/2016
14382864	SW9			19/10/2016

Only received samples which have had analysis scheduled will be shown on the following pages.



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LIQUID Results Legend	Lab Sample No(s)	14382865	14382864																		
				Customer Sample Reference		AGS Reference		Depth (m)		Container											
X Test N No Determination Possible				OF	SW9																
Ammonium Low	All	NDPs: 0 Tests: 2																			
Anions by Kone (w)	All	NDPs: 0 Tests: 2																			
BOD True Total	All	NDPs: 0 Tests: 2																			
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 2																			
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 2																			
Dissolved Oxygen by Probe	All	NDPs: 0 Tests: 2																			
EPH (DRO) (C10-C40) Aqueous (W)	All	NDPs: 0 Tests: 2																			
GRO by GC-FID (W)	All	NDPs: 0 Tests: 2																			
Metals by iCap-OES Unfiltered (W)	All	NDPs: 0 Tests: 2																			
Nitrite by Kone (w)	All	NDPs: 0 Tests: 2																			
pH Value	All	NDPs: 0 Tests: 2																			
Suspended Solids	All	NDPs: 0 Tests: 2																			
Total Metals by ICP-MS	All	NDPs: 0 Tests: 2																			



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Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample ¹	Surrogate Corrected
TM022	Method 2540D, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part120 1981;BS EN 872	Determination of total suspended solids in waters		
TM045	MEWAM BOD5 2nd Ed.HMSO 1988 / Method 5210B, AWWA/APHA, 20th Ed., 1999; SCA Blue Book 130	Determination of BOD5 (ATU) Filtered by Oxygen Meter on liquids		
TM046	Method 4500G, AWWA/APHA, 20th Ed., 1999	Measurement of Dissolved Oxygen by Oxygen Meter		
TM061	Method for the Determination of EPH,Massachusetts Dept.of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)		
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser		
TM120	Method 2510B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part 9:1970	Determination of Electrical Conductivity using a Conductivity Meter		
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS		
TM172	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	EPH in Waters		
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers		
TM191	Standard Methods for the examination of waters and wastewaters 16th Edition, ALPHA, Washington DC, USA. ISBN 0-87553-131-8.	Determination of Unfiltered Metals in Water Matrices by ICP-MS		
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES		
TM245	By GC-FID	Determination of GRO by Headspace in waters		
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter		

¹ Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

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Test Completion Dates

Lab Sample No(s)	14382865	14382864
Customer Sample Ref.	OF	SW9
AGS Ref.		
Depth		
Type	LIQUID	LIQUID
Ammonium Low	31-Oct-2016	31-Oct-2016
Anions by Kone (w)	01-Nov-2016	01-Nov-2016
BOD True Total	27-Oct-2016	27-Oct-2016
Conductivity (at 20 deg.C)	27-Oct-2016	27-Oct-2016
Dissolved Metals by ICP-MS	31-Oct-2016	31-Oct-2016
Dissolved Oxygen by Probe	23-Oct-2016	23-Oct-2016
EPH (DRO) (C10-C40) Aqueous (W)	01-Nov-2016	01-Nov-2016
GRO by GC-FID (W)	01-Nov-2016	01-Nov-2016
Metals by iCap-OES Unfiltered (W)	01-Nov-2016	01-Nov-2016
Nitrite by Kone (w)	24-Oct-2016	26-Oct-2016
pH Value	01-Nov-2016	01-Nov-2016
Suspended Solids	01-Nov-2016	01-Nov-2016
Total Metals by ICP-MS	01-Nov-2016	01-Nov-2016



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ASSOCIATED AQC DATA

Ammonium Low

Component	Method Code	QC 1460	QC 1405
Ammoniacal Nitrogen as N	TM099	101.6 93.43 : 111.07	100.4 93.43 : 111.07

Anions by Kone (w)

Component	Method Code	QC 1458	QC 1425	QC 1438
Chloride	TM184	94.23 : 107.50	94.23 : 107.50	103.0 92.93 : 115.43
Phosphate (Ortho as PO4)	TM184	103.6 96.41 : 109.80	103.2 96.41 : 109.80	96.40 : 108.40
Sulphate (soluble)	TM184	94.38 : 108.93	94.38 : 108.93	98.8 90.53 : 113.03
TON as NO3	TM184	93.93 : 110.49	93.93 : 110.49	102.5 90.25 : 110.05

BOD True Total

Component	Method Code	QC 1469	QC 1457
BOD	TM045	109.18 78.81 : 128.32	106.76 79.43 : 129.60

Conductivity (at 20 deg.C)

Component	Method Code	QC 1477
Conductivity (at 20 deg.C)	TM120	103.01 98.35 : 107.28

Dissolved Metals by ICP-MS

Component	Method Code	QC 1439
Aluminium	TM152	102.67 0.00 : 0.00
Antimony	TM152	107.17 0.00 : 0.00
Arsenic	TM152	108.17 0.00 : 0.00
Barium	TM152	108.0 0.00 : 0.00
Beryllium	TM152	104.5 0.00 : 0.00
Borate	TM152	104.94 0.00 : 0.00



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Dissolved Metals by ICP-MS

		QC 1439
Boron	TM152	104.67 0.00 : 0.00
Cadmium	TM152	108.67 0.00 : 0.00
Chromium	TM152	109.83 0.00 : 0.00
Cobalt	TM152	107.17 0.00 : 0.00
Copper	TM152	109.5 0.00 : 0.00
Lead	TM152	109.0 0.00 : 0.00
Lithium	TM152	104.17 0.00 : 0.00
Manganese	TM152	108.67 0.00 : 0.00
Molybdenum	TM152	107.67 0.00 : 0.00
Nickel	TM152	109.5 0.00 : 0.00
Phosphorus	TM152	108.83 0.00 : 0.00
Selenium	TM152	108.67 0.00 : 0.00
Strontium	TM152	110.67 0.00 : 0.00
Tellurium	TM152	107.5 0.00 : 0.00
Thallium	TM152	104.5 0.00 : 0.00
Titanium	TM152	104.33 0.00 : 0.00
Uranium	TM152	110.17 0.00 : 0.00
Vanadium	TM152	101.0 0.00 : 0.00
Zinc	TM152	109.0 0.00 : 0.00

EPH (DRO) (C10-C40) Aqueous (W)

Component	Method Code	QC 1428
EPH (DRO) (C10-C40)	TM172	84.0 64.21 : 111.56

GRO by GC-FID (W)



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GRO by GC-FID (W)

Component	Method Code	QC 1462
Benzene by GC	TM245	110.0 76.72 : 118.62
Ethylbenzene by GC	TM245	106.0 74.74 : 116.76
m & p Xylene by GC	TM245	104.0 76.93 : 119.20
MTBE GC-FID	TM245	113.0 80.00 : 121.03
o Xylene by GC	TM245	105.5 70.00 : 130.00
QC	TM245	95.86 69.19 : 113.44
Toluene by GC	TM245	109.0 79.35 : 119.27

Metals by iCap-OES Unfiltered (W)

Component	Method Code	QC 1497
Calcium	TM228	102.0 87.76 : 113.44
Iron	TM228	98.0 74.40 : 117.60
Magnesium	TM228	100.0 79.96 : 116.32
Potassium	TM228	104.0 97.18 : 117.60
Sodium	TM228	106.0 99.24 : 117.21

pH Value

Component	Method Code	QC 1458
pH	TM256	101.08 99.41 : 102.03

Suspended Solids

Component	Method Code	QC 1455
Total Suspended Solids	TM022	98.14 94.26 : 101.34

Total Metals by ICP-MS



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Total Metals by ICP-MS

Component	Method Code	QC 1497
Aluminium	TM191	106.67 85.31 : 118.86
Antimony	TM191	111.87 85.00 : 115.00
Arsenic	TM191	88.4 76.05 : 118.04
Barium	TM191	105.73 85.72 : 115.74
Beryllium	TM191	89.2 87.46 : 121.09
Bismuth	TM191	101.73 84.93 : 113.43
Boron	TM191	85.33 73.14 : 120.60
Cadmium	TM191	97.07 80.26 : 114.77
Chromium	TM191	103.6 85.83 : 115.43
Cobalt	TM191	104.0 84.48 : 114.14
Copper	TM191	91.47 84.12 : 117.32
Lead	TM191	96.53 86.59 : 115.97
Lithium	TM191	94.67 84.72 : 121.14
Manganese	TM191	104.93 87.21 : 116.47
Molybdenum	TM191	95.87 83.74 : 115.04
Nickel	TM191	92.93 83.97 : 115.21
Phosphorus	TM191	106.93 82.43 : 127.53
Selenium	TM191	96.27 78.01 : 111.41
Strontium	TM191	108.27 86.43 : 116.33
Thallium	TM191	101.07 82.18 : 109.80
Tin	TM191	110.53 -82.99 : 227.73
Titanium	TM191	93.6 76.79 : 115.20
Vanadium	TM191	111.6 85.77 : 116.34
Zinc	TM191	92.4 78.78 : 116.26



CERTIFICATE OF ANALYSIS

Validated

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The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis .
The figure detailed is the percentage recovery result for the AQC .
The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control .



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Chromatogram

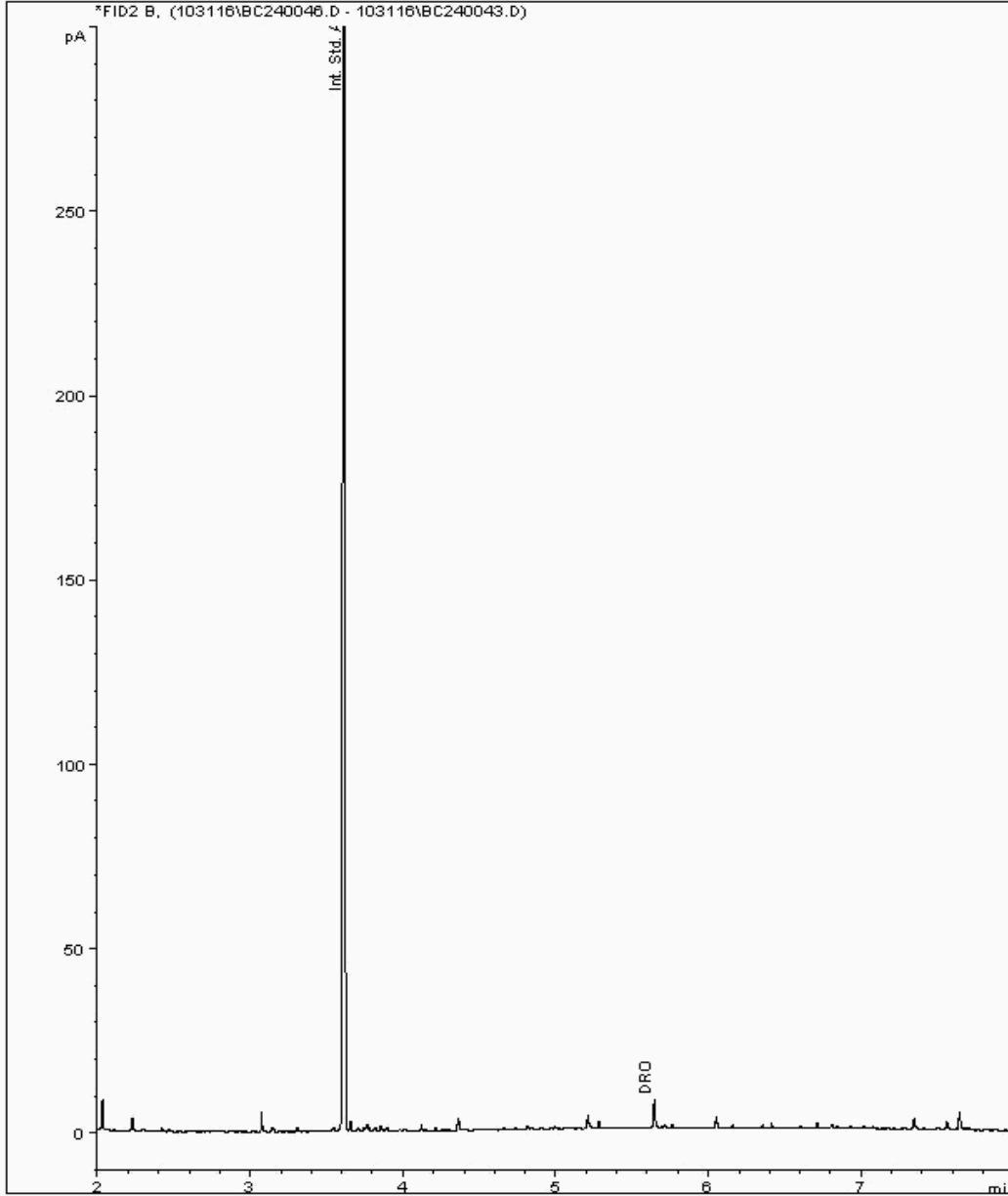
Analysis: EPH (DRO) (C10-C40) Aqueous (W)

Sample No : 14384807
Sample ID : OF

Depth :

Alcontrol/Geochem Analytical Services
EPH Range Organics (C10 - C40)

Sample Identity: 13503956-
Date Acquired : 01/11/2016 08:57:06 PM
Units : mg/l





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Chromatogram

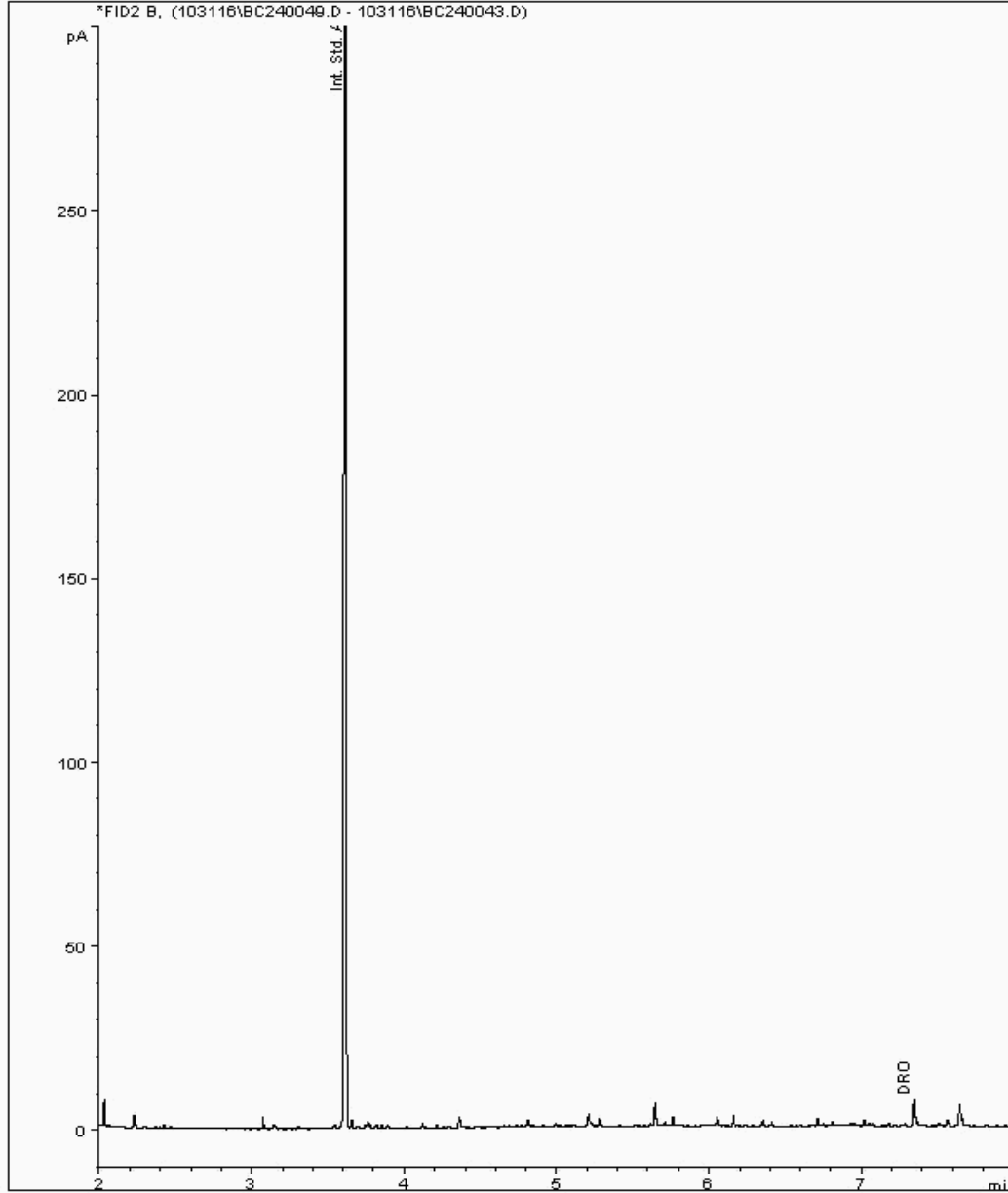
Analysis: EPH (DRO) (C10-C40) Aqueous (W)

Sample No : 14384850
Sample ID : SW9

Depth :

Alcontrol/Geochem Analytical Services
EPH Range Organics (C10 - C40)

Sample Identity: 13503941-
Date Acquired : 01/11/2016 10:03:18 PM
Units : mg/l





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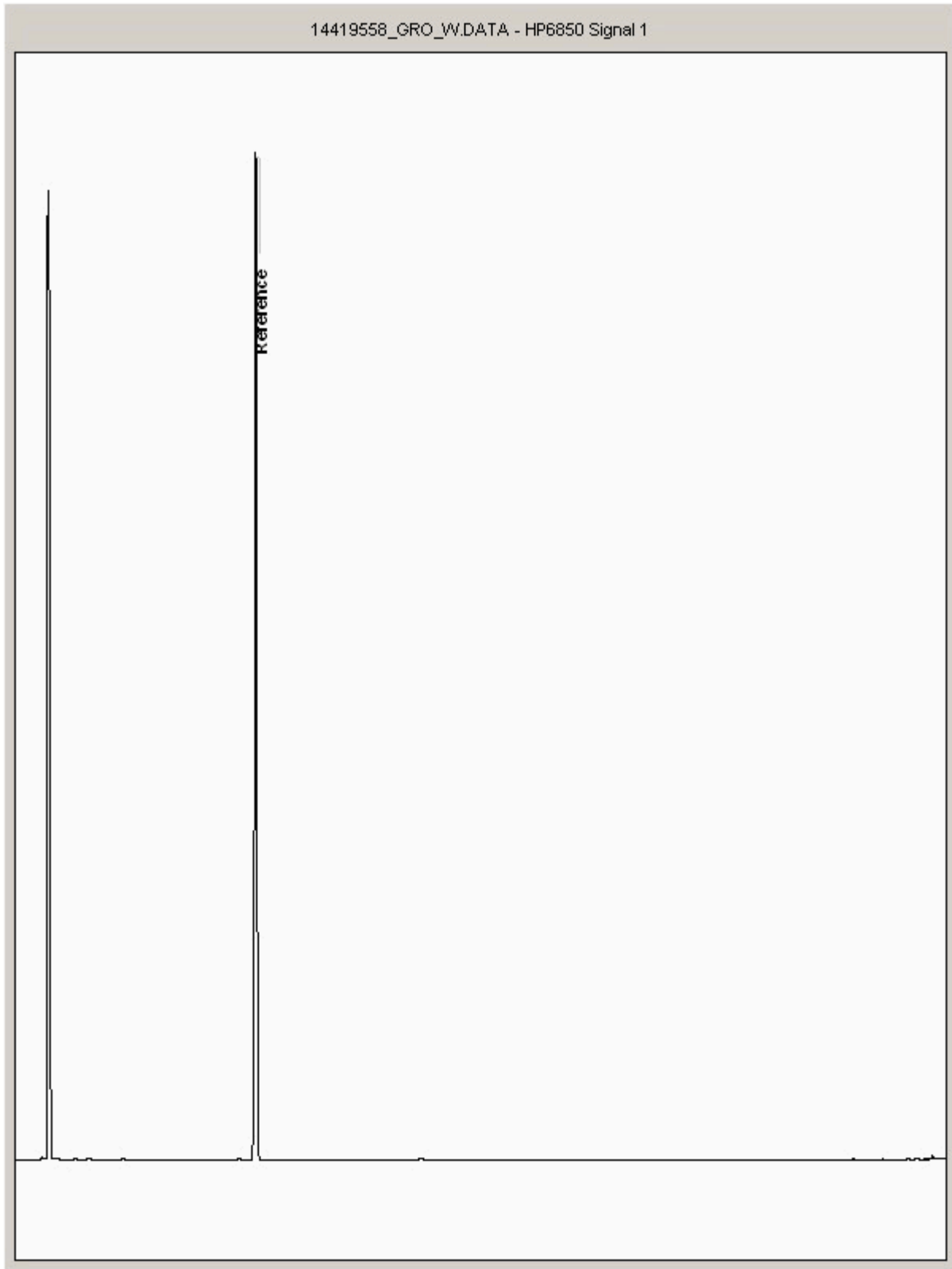
Order Number: P016-901
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Chromatogram

Analysis: GRO by GC-FID (W)

Sample No : 14419558
Sample ID : OF

Depth :





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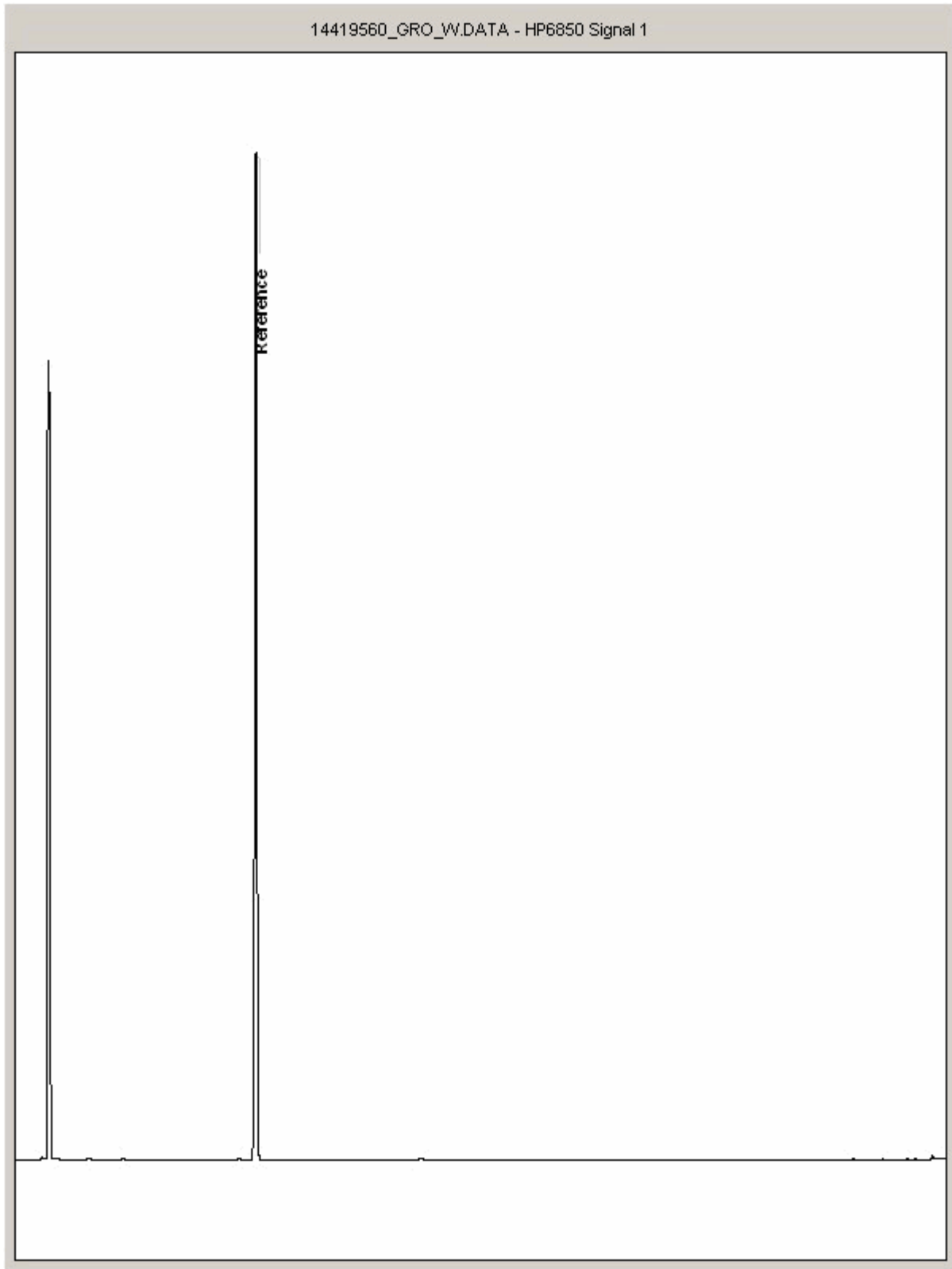
Order Number: P016-901
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Chromatogram

Analysis: GRO by GC-FID (W)

Sample No : 14419560
Sample ID : SW9

Depth :





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Appendix

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALcontrol Laboratories reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP - No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

12. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%, they are generally wider for volatiles analysis, 50-150%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethylphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

General

20. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

21. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

24. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

Sample Deviations

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Holding time exceeded before sample received
5	Samples exceeded holding time before preservation was performed
§	Sampled on date not provided
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to sampled on date
&	Sample Holding Time exceeded - Late arrival of instructions.

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.