



CERTIFICATE OF ANALYSIS

Validated

SDG: 170923-97 Client Reference: 2921-028 COC3-G Report Number: 426773
 Location: Chartered Land - Heuston Order Number: Superseded Report:

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample ¹	Surrogate Corrected
PM001		Preparation of Samples for Metals Analysis		
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material		
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step		
TM018	BS 1377: Part 3 1990	Determination of Loss on Ignition		
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material		
TM061	Method for the Determination of EPH, Massachusetts Dept. of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)		
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC		
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)		
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water		
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser		
TM123	BS 2690: Part 121:1981	The Determination of Total Dissolved Solids in Water		
TM132	In - house Method	ELTRA CS800 Operators Guide		
TM133	BS 1377: Part 3 1990; BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter		
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser		
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS		
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser		
TM168	EPA Method 8082, Polychlorinated Biphenyls by Gas Chromatography	Determination of WHO12 and EC7 Polychlorinated Biphenyl Congeners by GC-MS in Soils		
TM173	Analysis of Petroleum Hydrocarbons in Environmental Media - Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GC-FID		
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES		
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry		
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers		
TM218	Determination of PAH by GCMS Microwave extraction	The determination of PAH in soil samples by microwave extraction and GC-MS		
TM221	Inductively Coupled Plasma - Atomic Emission Spectroscopy. An Atlas of Spectral Information: Winge, Fassel, Peterson and Floyd	Determination of Acid extractable Sulphate in Soils by IRIS Emission Spectrometer		
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:soil) by IRIS Emission Spectrometer		
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES		
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC		

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

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S)



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 Location: Chartered Land - Houston Order Number: Superseded Report:

Test Completion Dates

Lab Sample No(s)	16241281
Customer Sample Ref.	2921-BH1-SS3
AGS Ref.	
Depth	0.60 - 1.30
Type	Soil/Solid (S)

Anions by Kone (w)	29-Sep-2017
Asbestos ID in Solid Samples	03-Oct-2017
Boron Water Soluble	28-Sep-2017
CEN 10:1 Leachate (1 Stage)	27-Sep-2017
CEN Readings	28-Sep-2017
Cyanide Comp/Free/Total/Thiocyanate	29-Sep-2017
Dissolved Metals by ICP-MS	29-Sep-2017
Dissolved Organic/Inorganic Carbon	29-Sep-2017
EPH CWG (Aliphatic) GC (S)	28-Sep-2017
EPH CWG (Aromatic) GC (S)	28-Sep-2017
Fluoride	29-Sep-2017
GRO by GC-FID (S)	30-Sep-2017
Hexavalent Chromium (s)	29-Sep-2017
Loss on Ignition in soils	04-Oct-2017
Mercury Dissolved	29-Sep-2017
Metals by iCap-OES Dissolved (W)	29-Sep-2017
Metals in solid samples by OES	29-Sep-2017
Mineral Oil	29-Sep-2017
PAH by GCMS	28-Sep-2017
PCBs by GCMS	28-Sep-2017
pH	27-Sep-2017
Phenols by HPLC (S)	28-Sep-2017
Phenols by HPLC (W)	29-Sep-2017
Sample description	26-Sep-2017
Total Dissolved Solids	28-Sep-2017
Total Organic Carbon	28-Sep-2017
Total Sulphate	29-Sep-2017
Total Sulphur	28-Sep-2017
TPH CWG GC (S)	30-Sep-2017



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Location: Chartered Land - Heuston Order Number: Superseded Report:

Chromatogram

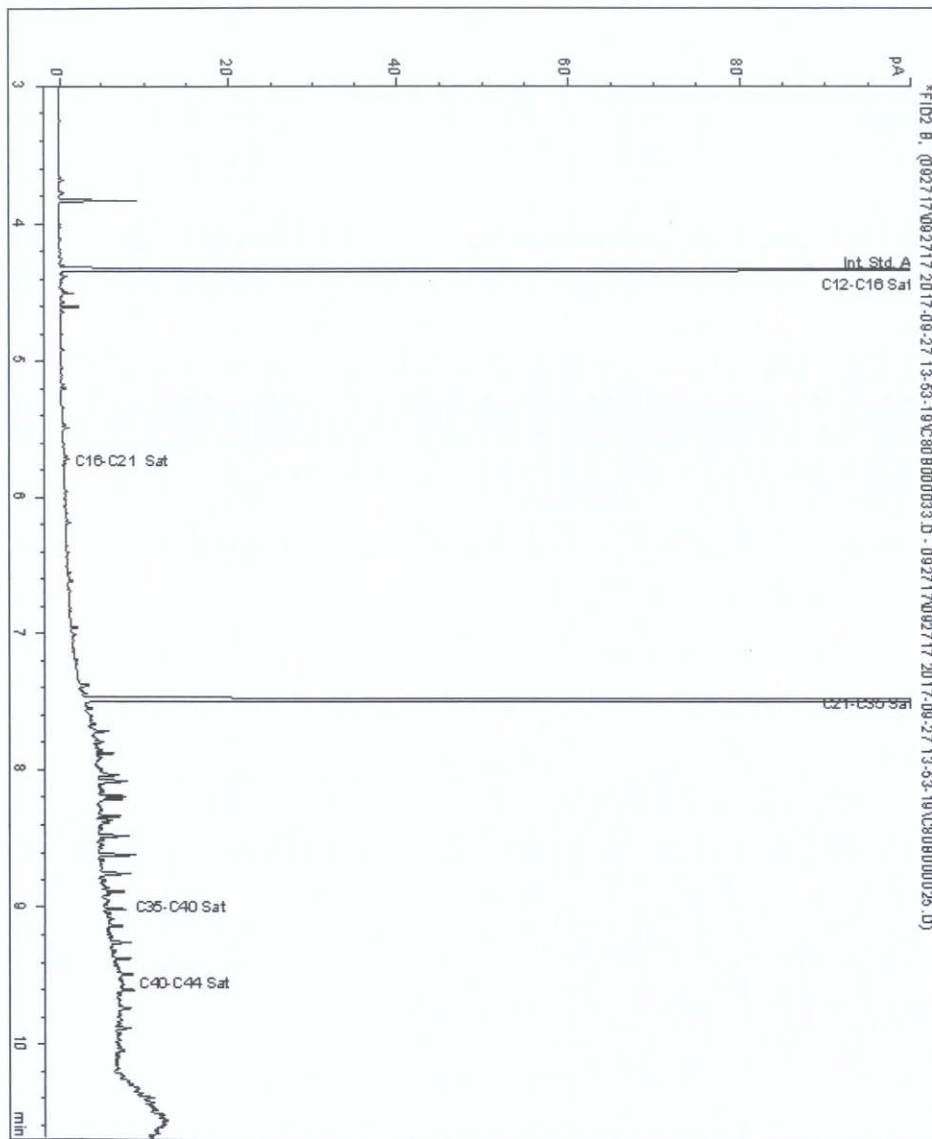
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 16251134
Sample ID : 2921-BH1-SS3

Depth : 0.60 - 1.30

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 15212904-
Date Acquired : 27/09/17 23:50:47
Units : ppb
Dilution :
CF : 1
Multiplier : 1.000





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Chromatogram

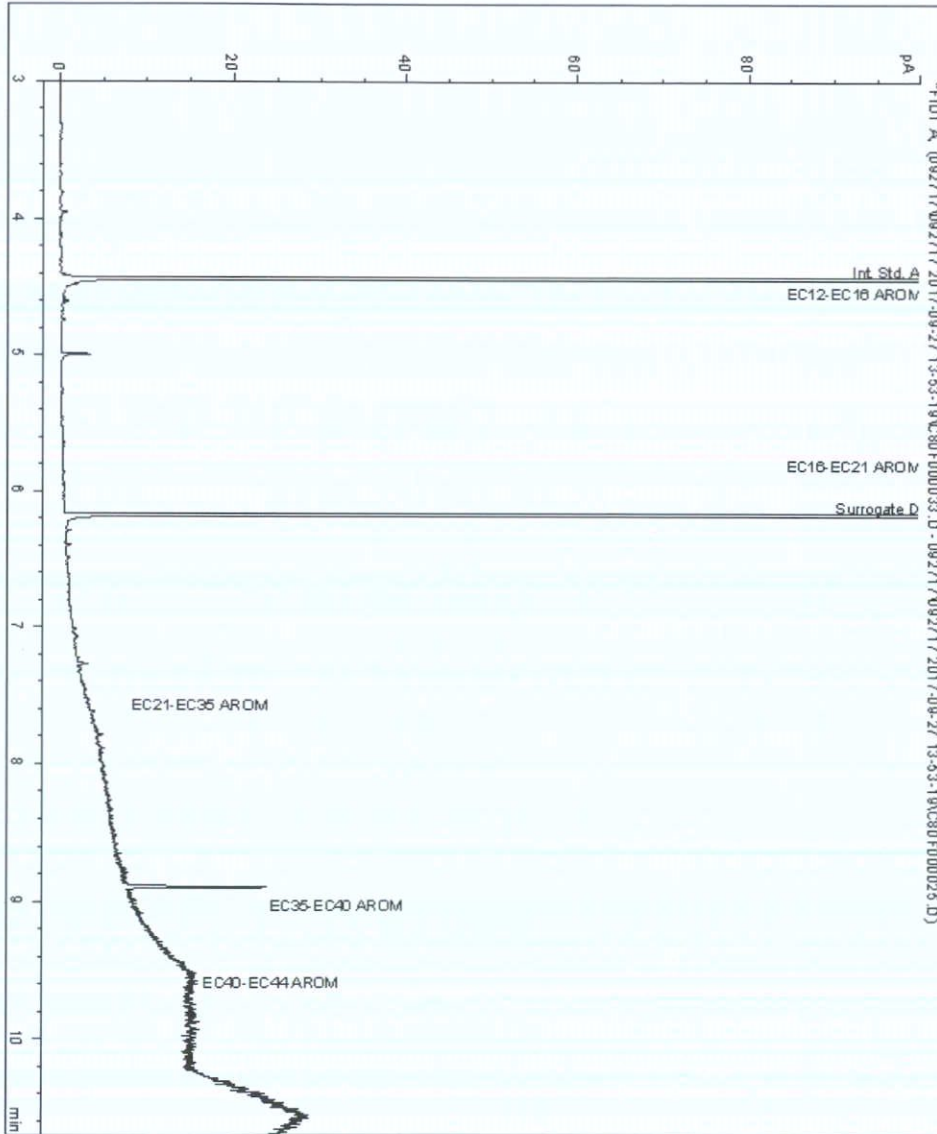
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 16251134
Sample ID : 2921-BH1-SS3

Depth : 0.60 - 1.30

Speciated TPH - AROMS (C12 - C44)

Sample Identity: 15212905-
Date Acquired : 27/09/17 23:50:47
Units : ppb
Dilution :
CF : 1
Multiplier : 1.000





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Location: Chartered Land - Heuston Order Number: Superseded Report:

Chromatogram

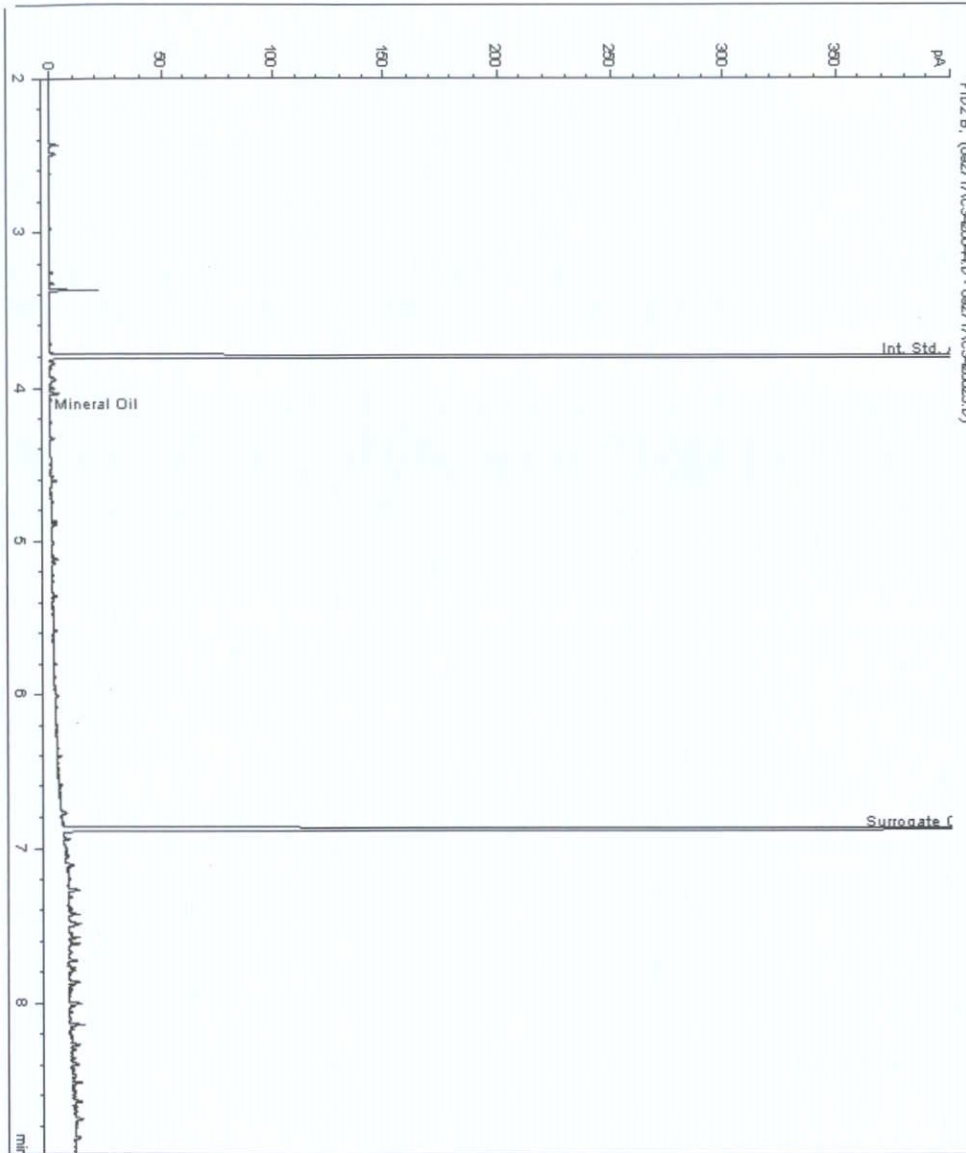
Analysis: Mineral Oil

Sample No : 16258198
Sample ID : 2921-BH1-SS3

Depth : 0.60 - 1.30

Mineral Oil Range Organics (C10 - C40)

Sample Identity : 15212907-
Date Acquired : 28/09/17 17:45:11 PM
Units : mc/kg
Sample Multiplier : 0.000
Dilution :





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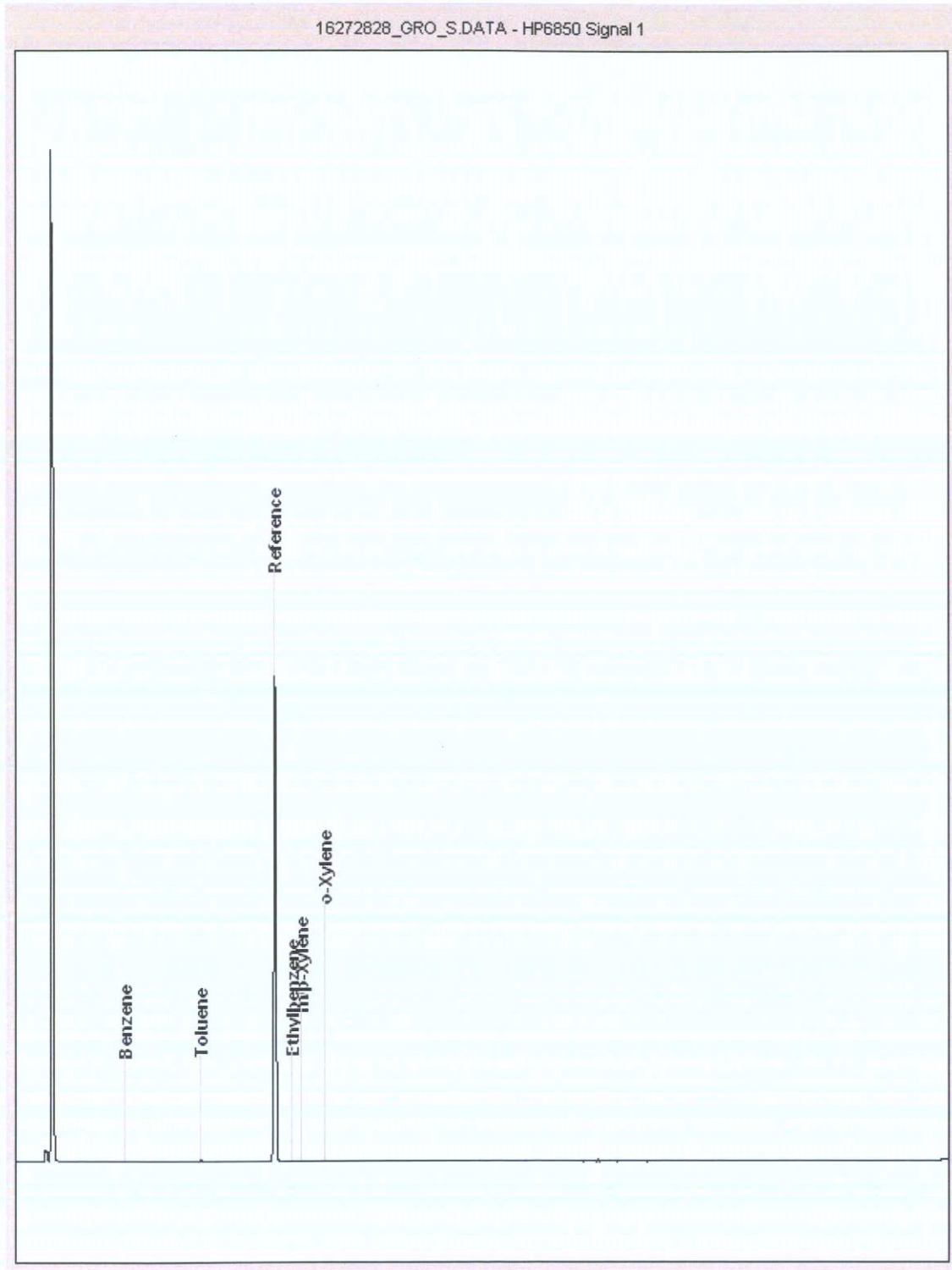
SDG: 170923-97 Client Reference: 2921-028 COC3-G Report Number: 426773
Location: Chartered Land - Houston Order Number: Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 16272828
Sample ID : 2921-BH1-SS3

Depth : 0.60 - 1.30





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 Location: rtered Land - Heuston South Qu Order Number: Superseded Report:

Appendix

General

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. ALS 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.

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

21. 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.

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

If a sample is classed as deviated then the associated results may be compromised.

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 ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central spot 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 ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central spot 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.



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Website: www.alsenvironmental.co.uk

Minerex Environmental
Taney hall
Eglinton Terrace
Dundrum
Dublin
Dublin 14

Attention: Sven Klinkenbergh

CERTIFICATE OF ANALYSIS

Date: 04 October 2017
Customer: D_MINEREX_DUB
Sample Delivery Group (SDG): 170923-92
Your Reference: 2921-028 COC3-H
Location: Chartered Land - Heuston South Quarter
Report No: 426771

We received 1 sample on Saturday September 23, 2017 and 1 of these samples were scheduled for analysis which was completed on Wednesday October 04, 2017. 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 ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

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SDG: 170923-92 Client Reference: 2921-028 COC3-H Report Number: 426771
Location: Chartered Land - Heuston Order Number: Superseded Report:

Received Sample Overview

Table with 5 columns: Lab Sample No(s), Customer Sample Ref., AGS Ref., Depth (m), Sampled Date. Row 1: 16241093, 2921-BH4-SS2, , , 21/09/2017

Maximum Sample/Coolbox Temperature (°C) : 16.4

ISO5667-3 Water quality - Sampling - Part3 - During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

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



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 Location: Chartered Land - Heuston Order Number: Superseded Report:

Results Legend <input checked="" type="checkbox"/> Test <input checked="" type="checkbox"/> No Determination Possible Sample Types - S - Soil/Solid UNS - Unspecified Solid GW - Ground Water SW - Surface Water LE - Land Leachate PL - Prepared Leachate PR - Process Water SA - Saline Water TE - Trade Effluent TS - Treated Sewage US - Untreated Sewage - Recreational Water - Drinking Water Non-regulatory L - Unspecified Liquid SL - Sludge G - Gas OTH - Other	Lab Sample No(s)	16241093		
	Customer Sample Reference	2921-BH4-SS2		
	AGS Reference			
	Depth (m)			
	Container	250g Amber Jar (ALE210)	400g Tub (ALE214)	80g VOC (ALE215)
	Sample Type	S	S	S
	NDPs: 0 Tests: 1			
Anions by Kone (w)	All		X	
Asbestos ID in Solid Samples	All		X	
Boron Water Soluble	All	X		
CEN Readings	All		X	
Cyanide Comp/Free/Total/Thiocyanate	All	X		
Dissolved Metals by ICP-MS	All		X	
Dissolved Organic/Inorganic Carbon	All		X	
EPH CWG (Aliphatic) GC (S)	All	X		
EPH CWG (Aromatic) GC (S)	All	X		
Fluoride	All		X	
GRO by GC-FID (S)	All			X
Hexavalent Chromium (s)	All	X		
Loss on Ignition in soils	All	X		
Mercury Dissolved	All		X	
Metals by iCap-OES Dissolved (W)	All		X	



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Results Legend <input checked="" type="checkbox"/> Test <input type="checkbox"/> No Determination Possible Sample Types - S - Soil/Solid UNS - Unspecified Solid GW - Ground Water SW - Surface Water LE - Land Leachate PL - Prepared Leachate PR - Process Water SA - Saline Water TE - Trade Effluent TS - Treated Sewage US - Untreated Sewage RE - Recreational Water DW - Drinking Water Non-regulatory UNL - Unspecified Liquid SL - Sludge G - Gas OTH - Other	Lab Sample No(s)	16241093		
	Customer Sample Reference	2921-BH4-SS2		
	AGS Reference			
	Depth (m)			
	Container	250g Amber Jar (ALE210)	400g Tub (ALE214)	60g VOC (ALE215)
	Sample Type	S	S	S
Metals in solid samples by OES	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
Mineral Oil	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
PAH by GCMS	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
PCBs by GCMS	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
pH	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
Phenols by HPLC (S)	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
Phenols by HPLC (W)	All	NDPs: 0 Tests: 1		<input checked="" type="checkbox"/>
Sample description	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
Total Dissolved Solids	All	NDPs: 0 Tests: 1		<input checked="" type="checkbox"/>
Total Organic Carbon	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
Total Sulphate	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
Total Sulphur	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
TPH CWG GC (S)	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	



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Location: Chartered Land - Houston Order Number: Superseded Report:

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2			
16241093	2921-BH4-SS2		Grey	Loamy Sand	Stones	Vegetation			

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

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.

er coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.



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Results Legend		Customer Sample Ref.	2921-BH4-SS2				
#	ISO17025 accredited.						
M	mCERTS accredited.						
aq	Aqueous / settled sample.						
diss.filt	Dissolved / filtered sample.						
tot.unfilt	Total / unfiltered sample.						
*	Subcontracted test.						
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery						
(F)	Trigger breach confirmed						
1-5	@	Sample deviation (see appendix)						
		Depth (m)	Soil/Solid (S)				
		Sample Type	21/09/2017				
		Date Sampled					
		Sampled Time	23/09/2017				
		Date Received	170923-92				
		SDG Ref	16241093				
		Lab Sample No.(s)					
		AGS Reference					
Component	LOD/Units	Method					
Moisture Content Ratio (% of as received sample)	%	PM024	17				
Loss on Ignition	<0.7 %	TM018	5.01				
				M			
Mineral oil >C10-C40	<1 mg/kg	TM061	22.8				
Mineral Oil Surrogate % recovery**	%	TM061	87.9				
Phenol	<0.01 mg/kg	TM062 (S)	<0.01				
				M			
Organic Carbon, Total	<0.2 %	TM132	1.12				
				M			
Sulphur, Total	<0.02 %	TM132	0.0565				
Sulphate, Total potential	<0.06 %	TM132	0.17				
pH	1 pH Units	TM133	8.5				
				M			
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6				
				#			
Cyanide, Total	<1 mg/kg	TM153	<1				
				M			
Cyanide, Free	<1 mg/kg	TM153	<1				
				M			
PCB congener 28	<3 µg/kg	TM168	<3				
				M			
PCB congener 52	<3 µg/kg	TM168	<3				
				M			
PCB congener 101	<3 µg/kg	TM168	<3				
				M			
PCB congener 118	<3 µg/kg	TM168	<3				
				M			
PCB congener 138	<3 µg/kg	TM168	<3				
				M			
PCB congener 153	<3 µg/kg	TM168	<3				
				M			
PCB congener 180	<3 µg/kg	TM168	<3				
				M			
Sum of detected PCB 7 Congeners	<21 µg/kg	TM168	<21				
Antimony	<0.6 mg/kg	TM181	1.22				
				#			
Arsenic	<0.6 mg/kg	TM181	10.4				
				M			
Barium	<0.6 mg/kg	TM181	62				
				#			
Cadmium	<0.02 mg/kg	TM181	3.14				
				M			
Chromium	<0.9 mg/kg	TM181	21.3				
				M			
Copper	<1.4 mg/kg	TM181	26.7				
				M			
Iron	<1000 mg/kg	TM181	21200				
				#			
Lead	<0.7 mg/kg	TM181	47.7				
				M			
Manganese	<0.13 mg/kg	TM181	891				
				M			
Mercury	<0.14 mg/kg	TM181	0.594				
				M			
Molybdenum	<0.1 mg/kg	TM181	3.23				
				#			
Nickel	<0.2 mg/kg	TM181	44.8				
				M			



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PAH by GCMS

Results Legend		Customer Sample Ref.	2921-BH4-SS2				
#	ISO17025 accredited.						
M	mCERTS accredited.						
aq	Aqueous / settled sample.						
dis. filt	Dissolved / filtered sample.						
tot. unfilt	Total / unfiltered sample.						
*	Subcontracted test.						
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery						
(F)	Trigger breach confirmed						
1-5@	Sample deviation (see appendix)						
Component	LOD/Units	Method					
Naphthalene-d8 % recovery**	%	TM218	98.3				
Acenaphthene-d10 % recovery**	%	TM218	90.4				
Phenanthrene-d10 % recovery**	%	TM218	86.5				
Chrysene-d12 % recovery**	%	TM218	95.2				
Perylene-d12 % recovery**	%	TM218	92.5				
Naphthalene	<9 µg/kg	TM218	13.5				
				M			
Acenaphthylene	<12 µg/kg	TM218	18				
				M			
Acenaphthene	<8 µg/kg	TM218	<8				
				M			
Fluorene	<10 µg/kg	TM218	<10				
				M			
Phenanthrene	<15 µg/kg	TM218	96.9				
				M			
Anthracene	<16 µg/kg	TM218	<16				
				M			
Fluoranthene	<17 µg/kg	TM218	129				
				M			
Pyrene	<15 µg/kg	TM218	122				
				M			
Benz(a)anthracene	<14 µg/kg	TM218	70.8				
				M			
Chrysene	<10 µg/kg	TM218	70.5				
				M			
Benzo(b)fluoranthene	<15 µg/kg	TM218	85				
				M			
Benzo(k)fluoranthene	<14 µg/kg	TM218	40.2				
				M			
Benzo(a)pyrene	<15 µg/kg	TM218	81.5				
				M			
Indeno(1,2,3-cd)pyrene	<18 µg/kg	TM218	34.8				
				M			
Dibenzo(a,h)anthracene	<23 µg/kg	TM218	<23				
				M			
Benzo(g,h,i)perylene	<24 µg/kg	TM218	51.6				
				M			
Coronene	<200 µg/kg	TM218	<200				
PAH, Total Detected USEPA 16	<118 µg/kg	TM218	814				
PAH, Total Detected USEPA 16 + Coronene	<318 µg/kg	TM218	814				



CERTIFICATE OF ANALYSIS

Validated

SDG: 170923-92 Client Reference: 2921-028 COC3-H Report Number: 426771
 Location: Chartered Land - Houston Order Number:

TPH CWG (S)

Results Legend		Customer Sample Ref.	2921-BH4-SS2					
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sampled Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	Soil/Solid (S) 21/09/2017 23/09/2017 170923-92 16241093					
M	mCERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted test.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-5&*\$@	Sample deviation (see appendix)							
Component	LOD/Units			Method				
GRO Surrogate % recovery**	%	TM089	70					
GRO TOT (Moisture Corrected)	<44 µg/kg	TM089	<44					
Methyl tertiary butyl ether (MTBE)	<5 µg/kg	TM089	<5					
Benzene	<10 µg/kg	TM089	<10					
Toluene	<2 µg/kg	TM089	2.42					
Ethylbenzene	<3 µg/kg	TM089	<3					
Xylene	<6 µg/kg	TM089	<6					
o-Xylene	<3 µg/kg	TM089	<3					
sum of detected mpo xylene by GC	<9 µg/kg	TM089	<9					
sum of detected BTEX by GC	<24 µg/kg	TM089	<24					
Aliphatics >C5-C6	<10 µg/kg	TM089	<10					
Aliphatics >C6-C8	<10 µg/kg	TM089	<10					
Aliphatics >C8-C10	<10 µg/kg	TM089	<10					
Aliphatics >C10-C12	<10 µg/kg	TM089	<10					
Aliphatics >C12-C16	<100 µg/kg	TM173	1630					
Aliphatics >C16-C21	<100 µg/kg	TM173	5540					
Aliphatics >C21-C35	<100 µg/kg	TM173	58100					
Aliphatics >C35-C44	<100 µg/kg	TM173	44100					
I Aliphatics >C12-C44	<100 µg/kg	TM173	109000					
Aromatics >EC5-EC7	<10 µg/kg	TM089	<10					
Aromatics >EC7-EC8	<10 µg/kg	TM089	<10					
Aromatics >EC8-EC10	<10 µg/kg	TM089	<10					
Aromatics >EC10-EC12	<10 µg/kg	TM089	<10					
Aromatics >EC12-EC16	<100 µg/kg	TM173	<100					
Aromatics >EC16-EC21	<100 µg/kg	TM173	3470					
Aromatics >EC21-EC35	<100 µg/kg	TM173	67300					
Aromatics >EC35-EC44	<100 µg/kg	TM173	65400					
Aromatics >EC40-EC44	<100 µg/kg	TM173	29200					
Total Aromatics >EC12-EC44	<100 µg/kg	TM173	136000					
Total Aliphatics & Aromatics >C5-C44	<100 µg/kg	TM173	246000					



CERTIFICATE OF ANALYSIS

Validated

SDG: 170923-92 Client Reference: 2921-028 COC3-H Report Number: 426771
Location: Chartered Land - Heuston Order Number: Superseded Report:

Asbestos Identification - Soil

Table with 12 columns: Cust. Sample Ref., Depth (m), Sample Type, Date Sampled, Date Received, SDG, Original Sample, Method Number, Date of Analysis, Analysed By, Comments, Amosite (Brown) Asbestos, Chrysotile (White) Asbestos, Crocidolite (Blue) Asbestos, Fibrous Actinolite, Fibrous Anthophyllite, Fibrous Tremolite, Non-Asbestos Fibre. Row 1: 2921-BH4-SS2, SOLID, 21/09/2017, 00:00:00, 26/09/2017, 13:24:10, 170923-92, 16241093, TM048, 03/10/17, James Richards, -, Not Detected (#), Not Detected (#), Not Detected (#), Not Detected (#), Not Detected (#), Not Detected (#), Not Detected.



CERTIFICATE OF ANALYSIS

Validated

SDG: 170923-92 Client Reference: 2921-028 COC3-H Report Number: 426771
 Location: Chartered Land - Houston Order Number: Superseded Report:

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		Site Location	Chartered Land - Houston South Q1
Mass Sample taken (kg)	0.109	Natural Moisture Content (%)	20.5
Mass of dry sample (kg)	0.090	Dry Matter Content (%)	83
Particle Size <4mm	>95%		

Case
 SDG 170923-92
 Lab Sample Number(s) 16241093
 Sampled Date 21-Sep-2017
 Customer Sample Ref. 2921-BH4-SS2
 Depth (m)

Landfill Waste Acceptance Criteria Limits

Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
3	5	6
-	-	10
6	-	-
1	-	-
500	-	-
-	-	-
-	>6	-
-	-	-
-	-	-

Solid Waste Analysis	Result
Organic Carbon (%)	1.12
Loss on Ignition (%)	5.01
Sum of BTEX (mg/kg)	<0.024
Sum of 7 PCBs (mg/kg)	<0.021
Mineral Oil (mg/kg)	22.8
PAH Sum of 17 (mg/kg)	-
pH (pH Units)	8.5
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis	C2 Conc ⁿ in 10:1 eluate (mg/l)		A2 10:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00139	<0.0005	0.0139	<0.005	0.5	2	25
Barium	0.00747	<0.0002	0.0747	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	<0.001	<0.001	<0.01	<0.01	0.5	10	70
Copper	0.00194	<0.0003	0.0194	<0.003	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	0.0125	<0.0005	0.125	<0.005	0.5	10	30
Nickel	0.00104	<0.0004	0.0104	<0.004	0.4	10	40
Lead	0.000358	<0.0002	0.00358	<0.002	0.5	10	50
Vanadium	0.000757	<0.0001	0.00757	<0.001	0.06	0.7	5
Zinc	0.00096	<0.0005	0.0096	<0.005	0.1	0.5	7
Zinc	<0.001	<0.001	<0.01	<0.01	4	50	200
Chloride	<2	<2	<20	<20	800	15000	25000
Fluoride	<0.5	<0.5	<5	<5	10	150	500
Sulphate (soluble)	8.9	<2	89	<20	1000	20000	50000
Total Dissolved Solids	86.2	<5	862	<50	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	<3	<3	<30	<30	500	800	1000

Leach Test Information

Date Prepared 27-Sep-2017
 pH (pH Units) 8.79
 Conductivity (µS/cm) 107.00
 Temperature (°C) 15.20
 Volume Leachant (Litres) 0.882

Results are expressed on a dry weight basis, after correction for moisture content where applicable
 Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation
 Mcerts Certification does not apply to leachates

04/10/2017 13:02:00



CERTIFICATE OF ANALYSIS

Validated

SDG: 170923-92 Client Reference: 2921-028 COC3-H Report Number: 426771
 Location: Chartered Land - Heuston Order Number: Superseded Report:

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample ¹	Surrogate Corrected
PM001		Preparation of Samples for Metals Analysis		
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material		
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step		
TM018	BS 1377: Part 3 1990	Determination of Loss on Ignition		
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material		
TM061	Method for the Determination of EPH, Massachusetts Dept. of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)		
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC		
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)		
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water		
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser		
TM123	BS 2690: Part 121:1981	The Determination of Total Dissolved Solids in Water		
TM132	In - house Method	ELTRA CS800 Operators Guide		
TM133	BS 1377: Part 3 1990:BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter		
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser		
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS		
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser		
TM168	EPA Method 8082, Polychlorinated Biphenyls by Gas Chromatography	Determination of WHO12 and EC7 Polychlorinated Biphenyl Congeners by GC-MS in Soils		
TM173	Analysis of Petroleum Hydrocarbons in Environmental Media - Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GC-FID		
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES		
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry		
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers		
TM218	Determination of PAH by GCMS Microwave extraction	The determination of PAH in soil samples by microwave extraction and GC-MS		
TM221	Inductively Coupled Plasma - Atomic Emission Spectroscopy. An Atlas of Spectral Information: Winge, Fassel, Peterson and Floyd	Determination of Acid extractable Sulphate in Soils by IRIS Emission Spectrometer		
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:soil) by IRIS Emission Spectrometer		
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES		
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC		

¹ Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.
 Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).



CERTIFICATE OF ANALYSIS

Validated

SDG: 170923-92 Client Reference: 2921-028 COC3-H Report Number: 426771
 Location: Chartered Land - Heuston Order Number: Superseded Report:

Test Completion Dates

Lab Sample No(s)	16241093
Customer Sample Ref.	2921-BH4-S52
AGS Ref.	
Depth	
Type	Soil/Solid (S)
Anions by Kone (w)	29-Sep-2017
Asbestos ID in Solid Samples	03-Oct-2017
Boron Water Soluble	28-Sep-2017
CEN 10:1 Leachate (1 Stage)	27-Sep-2017
CEN Readings	28-Sep-2017
Cyanide Comp/Free/Total/Thiocyanate	29-Sep-2017
Dissolved Metals by ICP-MS	29-Sep-2017
Dissolved Organic/Inorganic Carbon	29-Sep-2017
EPH CWG (Aliphatic) GC (S)	28-Sep-2017
EPH CWG (Aromatic) GC (S)	28-Sep-2017
Fluoride	29-Sep-2017
GRO by GC-FID (S)	30-Sep-2017
Hexavalent Chromium (s)	29-Sep-2017
Loss on Ignition in soils	04-Oct-2017
Mercury Dissolved	29-Sep-2017
Metals by iCap-OES Dissolved (W)	29-Sep-2017
Metals in solid samples by OES	02-Oct-2017
Mineral Oil	29-Sep-2017
PAH by GCMS	28-Sep-2017
PCBs by GCMS	28-Sep-2017
pH	27-Sep-2017
Phenols by HPLC (S)	29-Sep-2017
Phenols by HPLC (W)	29-Sep-2017
Sample description	26-Sep-2017
Total Dissolved Solids	28-Sep-2017
Total Organic Carbon	28-Sep-2017
Total Sulphate	29-Sep-2017
Total Sulphur	28-Sep-2017
TPH CWG GC (S)	30-Sep-2017



CERTIFICATE OF ANALYSIS

Validated

SDG: 170923-92 Client Reference: 2921-028 COC3-H Report Number: 426771
Location: Chartered Land - Heuston Order Number: Superseded Report:

Chromatogram

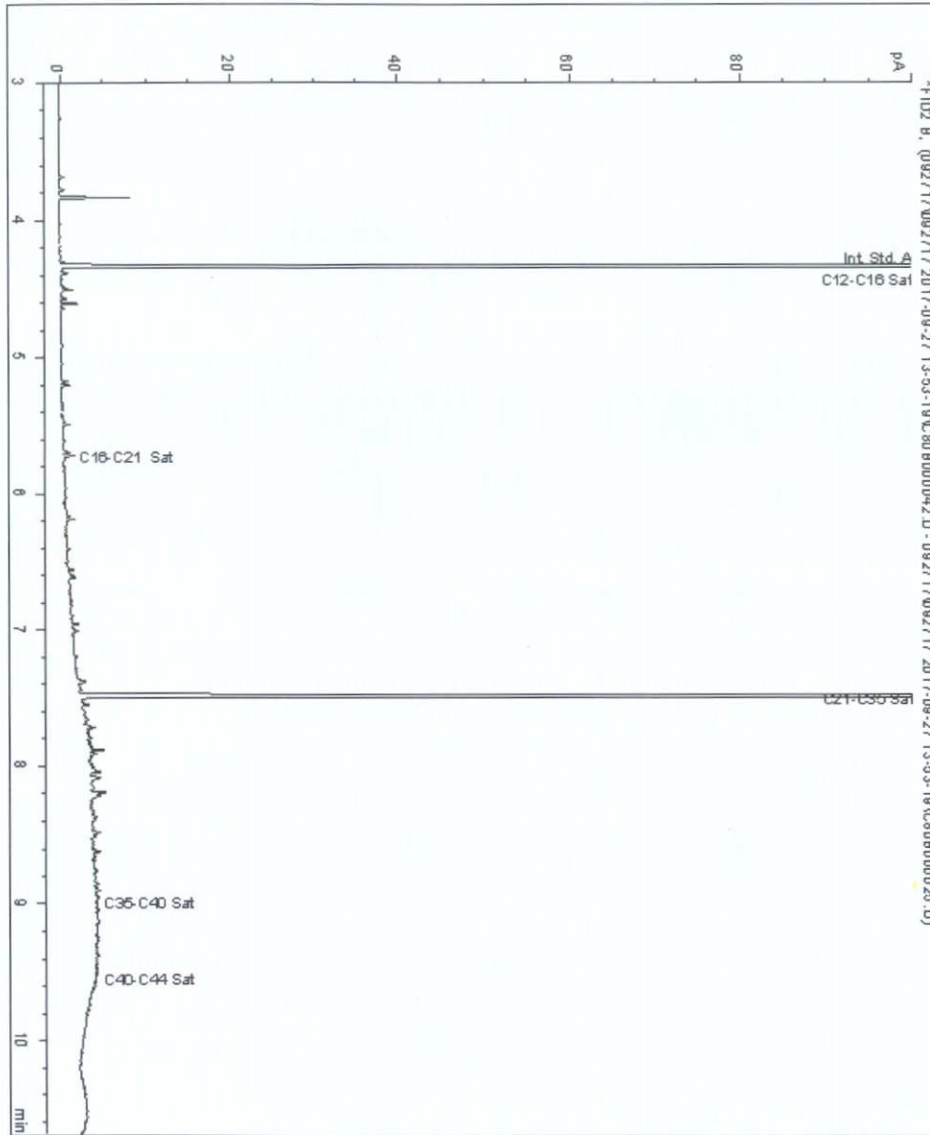
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 16251125
Sample ID : 2921-BH4-SS2

Depth :

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 15212834-
Date Acquired : 26/09/17 02:11:51
Units : ppb
Dilution :
CF : 1
Multiplier : 1.000





CERTIFICATE OF ANALYSIS

Validated

SDG: 170923-92 Client Reference: 2921-028 COC3-H Report Number: 426771
Location: Chartered Land - Houston Order Number: Superseded Report:

Chromatogram

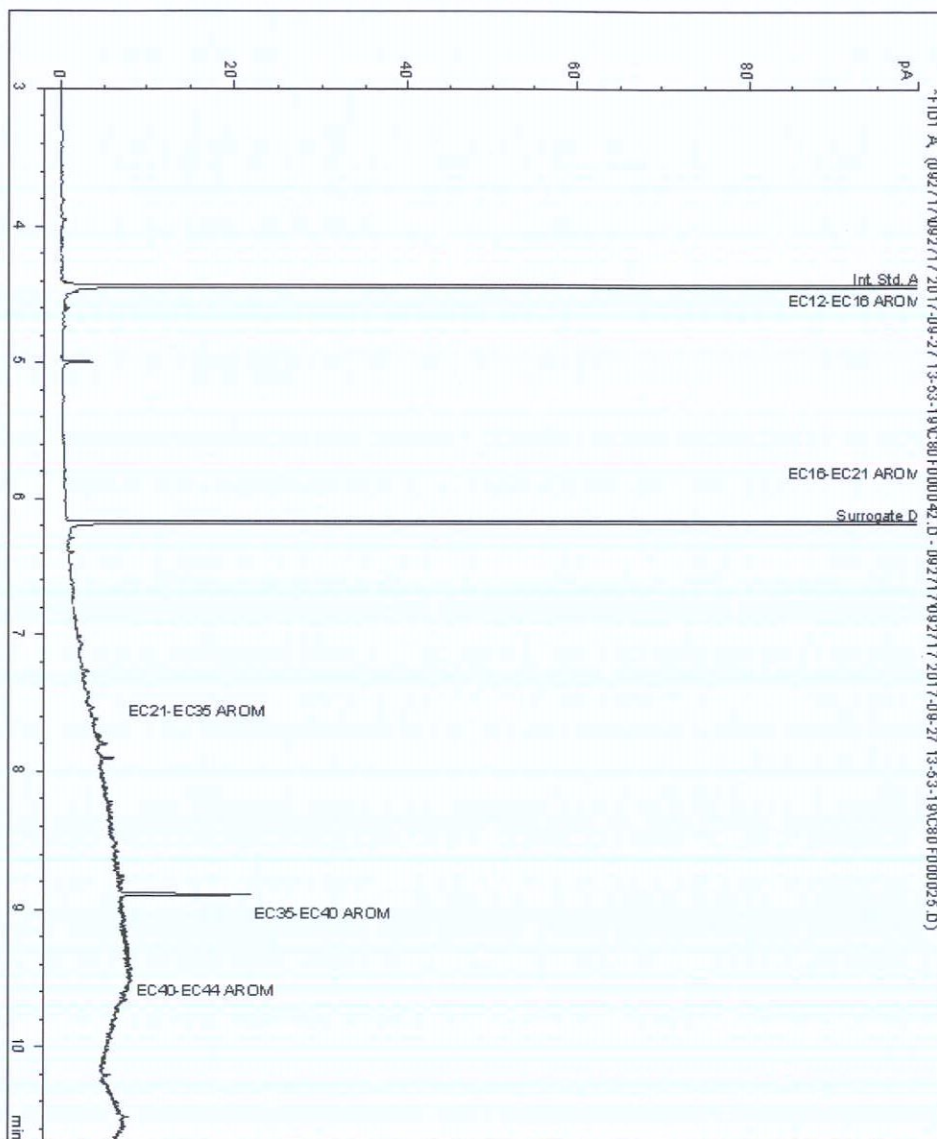
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 16251125
Sample ID : 2921-BH4-SS2

Depth :

Speciated TPH - AROMS (C12 - C44)

Sample Identity: 15212835-
Date Acquired : 28/09/17 02:11:51
Units : ppb
Dilution :
CF : 1
Multiplier : 1.000





CERTIFICATE OF ANALYSIS

Validated

SDG: 170923-92 Client Reference: 2921-028 COC3-H Report Number: 426771
Location: Chartered Land - Heuston Order Number: Superseded Report:

Chromatogram

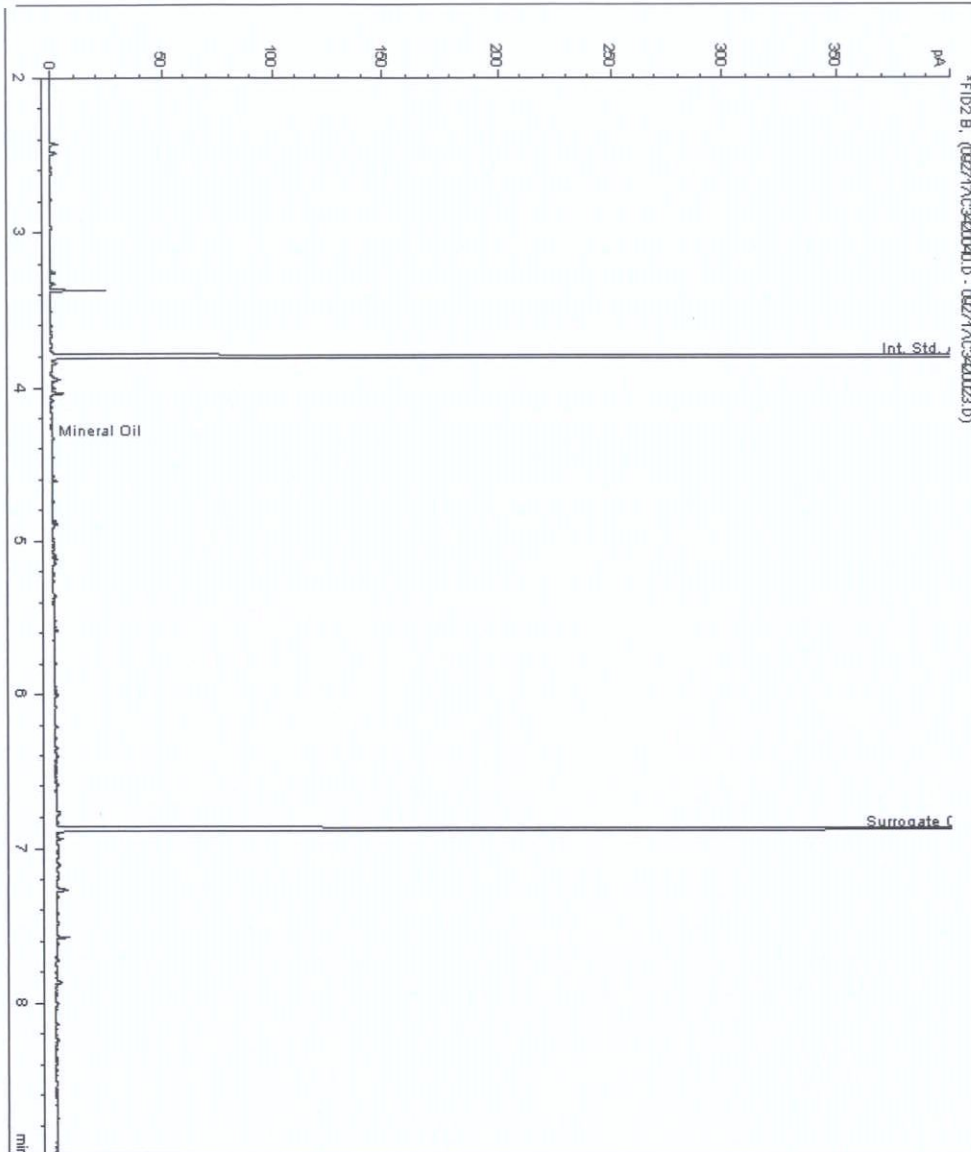
Analysis: Mineral Oil

Sample No : 16256227
Sample ID : 2921-BH4-SS2

Depth :

Mineral Oil Range Organics (C10 - C40)

Sample Identity : 15212837-
Date Acquired : 28/09/17 15:43:07 PM
Units : mcg/kg
Sample Multiplier : 0.000
Dilution :





CERTIFICATE OF ANALYSIS

Validated

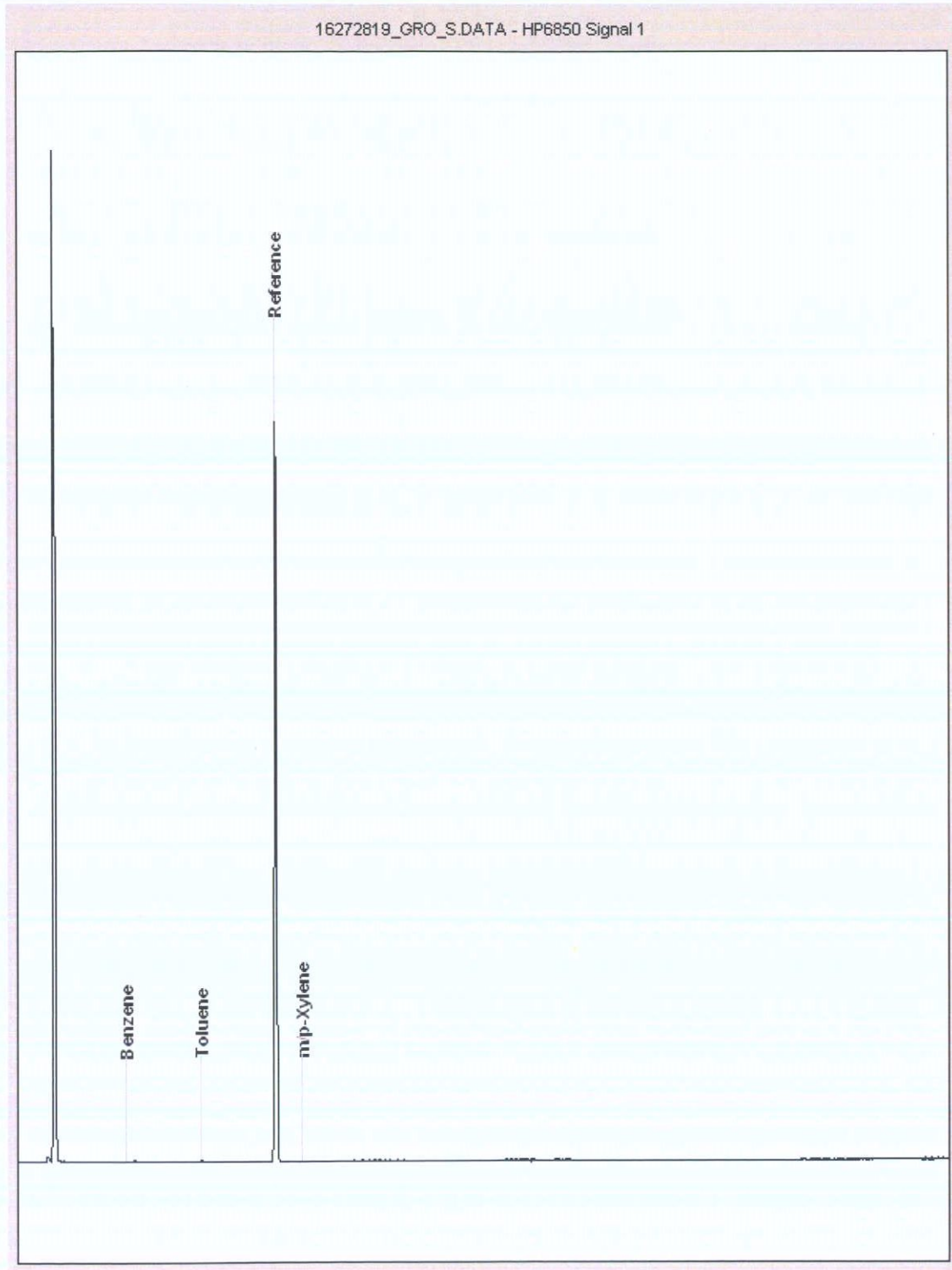
SDG: 170923-92 Client Reference: 2921-028 COC3-H Report Number: 426771
Location: Chartered Land - Houston Order Number: Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 16272819
Sample ID : 2921-BH4-SS2

Depth :





CERTIFICATE OF ANALYSIS

SDG: 170923-92 Client Reference: 2921-028 COC3-H Report Number: 426771
 Location: rtered Land - Heuston South Qu Order Number: Superseded Report:

Appendix

General

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. ALS 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.

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

21. 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.

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

If a sample is classed as deviated then the associated results may be compromised.

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 ALS (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 ALS (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.



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Minerex Environmental
Taney hall
Eglinton Terrace
Dundrum
Dublin
Dublin 14

Attention: Caitriona Keogh

CERTIFICATE OF ANALYSIS

Date: 05 October 2017
Customer: D_MINEREX_DUB
Sample Delivery Group (SDG): 170926-68
Your Reference: 2921-028 COC4-B
Location: CHARTERED LAND - HEUSTON SOUTH QUARTER
Report No: 427005

We received 1 sample on Tuesday September 26, 2017 and 1 of these samples were scheduled for analysis which was completed on Thursday October 05, 2017. 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 ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Approved By:

Sonia McWhan

Operations Manager



1291



CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-68 Client Reference: 2921-028 COC4-B Report Number: 427005
Location: CHARTERED LAND - HEL Order Number: Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
16252119	2921-BH4-COMP-SS9		1.85 - 4.00	21/09/2017

Maximum Sample/Coolbox Temperature (°C) : 13.8

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of

maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

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



CERTIFICATE OF ANALYSIS

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SDG: 170926-68 Client Reference: 2921-028 COC4-B Report Number: 427005
 Location: CHARTERED LAND - HEL Order Number: Superseded Report:

Results Legend <input checked="" type="checkbox"/> Test <input type="checkbox"/> No Determination Possible Sample Types - S - Soil/Solid UNS - Unspecified Solid GW - Ground Water SW - Surface Water LE - Land Leachate PL - Prepared Leachate PR - Process Water SA - Saline Water TE - Trade Effluent TS - Treated Sewage US - Untreated Sewage RW - Recreational Water DW - Drinking Water Non-regulatory LWL - Unspecified Liquid SL - Sludge G - Gas OTH - Other	Lab Sample No(s)	16252119		
	Customer Sample Reference	2921-BH4-COMP-SS 9		
	AGS Reference			
	Depth (m)	1.85 - 4.00		
	Container	250g Amber Jar (ALE210)	400g Tub (ALE214)	60g VOC (ALE215)
	Sample Type	S	S	S
Anions by Kone (w)	All	NDPs: 0 Tests: 1	X	
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 1	X	
Boron Water Soluble	All	NDPs: 0 Tests: 1	X	
CEN Readings	All	NDPs: 0 Tests: 1	X	
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 1	X	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 1	X	
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 1	X	
EPH CWG (Aliphatic) GC (S)	All	NDPs: 0 Tests: 1	X	
EPH CWG (Aromatic) GC (S)	All	NDPs: 0 Tests: 1	X	
Fluoride	All	NDPs: 0 Tests: 1	X	
GRO by GC-FID (S)	All	NDPs: 0 Tests: 1		X
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 1	X	
Loss on Ignition in soils	All	NDPs: 0 Tests: 1	X	
Mercury Dissolved	All	NDPs: 0 Tests: 1	X	
Metals by iCap-OES Dissolved (W)	All	NDPs: 0 Tests: 1	X	



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SDG: 170926-68 Client Reference: 2921-028 COC4-B Report Number: 427005
 Location: CHARTERED LAND - HEL Order Number: Superseded Report:

Results Legend <input checked="" type="checkbox"/> Test <input type="checkbox"/> No Determination Possible Sample Types - S - Soil/Solid UNS - Unspecified Solid GW - Ground Water SW - Surface Water LE - Land Leachate PL - Prepared Leachate PR - Process Water SA - Saline Water TE - Trade Effluent TS - Treated Sewage US - Untreated Sewage RE - Recreational Water DW - Drinking Water Non-regulatory UNL - Unspecified Liquid SL - Sludge G - Gas OTH - Other	Lab Sample No(s)	16252119		
	Customer Sample Reference	2921-BH4-COMP-SS 9		
	AGS Reference			
	Depth (m)	1.85 - 4.00		
	Container	250g Amber Jar (ALEZ10)	4000 Tub (ALEZ14)	60g VOC (ALEZ15)
	Sample Type	S	S	S
Metals in solid samples by OES	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
Mineral Oil	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
PAH by GCMS	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
PCBs by GCMS	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
pH	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
Phenols by HPLC (S)	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
Phenols by HPLC (W)	All	NDPs: 0 Tests: 1		<input checked="" type="checkbox"/>
Sample description	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
Total Dissolved Solids	All	NDPs: 0 Tests: 1		<input checked="" type="checkbox"/>
Total Organic Carbon	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
Total Sulphate	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
Total Sulphur	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
TPH CWG GC (S)	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	



CERTIFICATE OF ANALYSIS

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SDG: 170926-68 Client Reference: 2921-028 COC4-B Report Number: 427005
Location: CHARTERED LAND - HEI Order Number: Superseded Report:

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2			
16252119	2921-BH4-COMP-SS9	1.85 - 4.00	Grey	Stone/Soil	Stones	None			

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

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.

Coarser coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.



CERTIFICATE OF ANALYSIS

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SDG: 170926-68 Client Reference: 2921-028 COC4-B Report Number: 427005
 Location: CHARTERED LAND - HEL Order Number: Superseded Report:

Results Legend		Customer Sample Ref.	2921-BH4-COMP-S				
#	ISO17025 accredited.		S9				
M	mCERTS accredited.						
aq	Aqueous / settled sample.						
dis.filt	Dissolved / filtered sample.	Depth (m)	1.85 - 4.00				
tot.unfilt	Total / unfiltered sample.	Sample Type	Soil/Solid (S)				
*	Subcontracted test.	Date Sampled	21/09/2017				
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery	Sampled Time					
(F)	Trigger breach confirmed	Date Received	26/09/2017				
1-5 	Sample deviation (see appendix)	SDG Ref	170926-68				
		Lab Sample No.(s)	16252119				
		AGS Reference					
Component	LOD/Units	Method					
Moisture Content Ratio (% of as received sample)	%	PM024	12				
Loss on ignition	<0.7 %	TM018	1.37				
Mineral oil >C10-C40	<1 mg/kg	TM061	144				
Mineral Oil Surrogate % recovery**	%	TM061	79.3				
Phenol	<0.01 mg/kg	TM062 (S)	<0.01				
Organic Carbon, Total	<0.2 %	TM132	0.66				
Sulphur, Total	<0.02 %	TM132	0.132				
Sulphate, Total potential	<0.06 %	TM132	0.396				
pH	1 pH Units	TM133	8.82				
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6				
Cyanide, Total	<1 mg/kg	TM153	<1				
Cyanide, Free	<1 mg/kg	TM153	<1				
PCB congener 28	<3 µg/kg	TM168	<3				
PCB congener 52	<3 µg/kg	TM168	<3				
PCB congener 101	<3 µg/kg	TM168	<3				
PCB congener 118	<3 µg/kg	TM168	<3				
PCB congener 138	<3 µg/kg	TM168	<3				
PCB congener 153	<3 µg/kg	TM168	<3				
PCB congener 180	<3 µg/kg	TM168	<3				
Sum of detected PCB 7 Congeners	<21 µg/kg	TM168	<21				
Antimony	<0.6 mg/kg	TM181	0.639				
Arsenic	<0.6 mg/kg	TM181	7.48				
Barium	<0.6 mg/kg	TM181	54.9				
Cadmium	<0.02 mg/kg	TM181	1.15				
Chromium	<0.9 mg/kg	TM181	4.56				
Copper	<1.4 mg/kg	TM181	13.7				
Iron	<1000 mg/kg	TM181	11600				
Lead	<0.7 mg/kg	TM181	30				
Manganese	<0.13 mg/kg	TM181	711				
Mercury	<0.14 mg/kg	TM181	0.417				
Molybdenum	<0.1 mg/kg	TM181	2.14				
Nickel	<0.2 mg/kg	TM181	19.7				



CERTIFICATE OF ANALYSIS

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SDG: 170926-68 Client Reference: 2921-028 COC4-B Report Number: 427005
Location: CHARTERED LAND - HEI Order Number: Superseded Report:

Table with columns: Results Legend, Customer Sample Ref., LOD/Units, Method, and data rows for Selenium, Zinc, Sulphate, and Boron.



CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-68 Client Reference: 2921-028 COC4-B Report Number: 427005
 Location: CHARTERED LAND - HEL Order Number: Superseded Report:

PAH by GCMS

Results Legend		Customer Sample Ref.	2921-BH4-COMP-S				
#	ISO17025 accredited.		S9				
M	mCERTS accredited.						
aq	Aqueous / settled sample.						
diss.filt	Dissolved / filtered sample.	Depth (m)	1.85 - 4.00				
tot.unfilt	Total / unfiltered sample.	Sample Type	Soil/Solid (S)				
*	Subcontracted test.	Date Sampled	21/09/2017				
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery	Sampled Time					
(F)	Trigger breach confirmed	Date Received	26/09/2017				
1-5	@	Sample deviation (see appendix)	SDG Ref	170926-68				
		Lab Sample No.(s)	16252119				
		AGS Reference					
Component	LOD/Units	Method					
Naphthalene-d8 % recovery**	%	TM218	98.8				
Acenaphthene-d10 % recovery**	%	TM218	93.8				
Phenanthrene-d10 % recovery**	%	TM218	91.7				
Chrysene-d12 % recovery**	%	TM218	94.1				
Perylene-d12 % recovery**	%	TM218	96.1				
Naphthalene	<9 µg/kg	TM218	<9				
			#				
Acenaphthylene	<12 µg/kg	TM218	<12				
			#				
Acenaphthene	<8 µg/kg	TM218	<8				
			#				
Fluorene	<10 µg/kg	TM218	<10				
			#				
Phenanthrene	<15 µg/kg	TM218	17.4				
			#				
Anthracene	<16 µg/kg	TM218	<16				
			#				
Fluoranthene	<17 µg/kg	TM218	<17				
			#				
Pyrene	<15 µg/kg	TM218	25				
			#				
Benzo(a)anthracene	<14 µg/kg	TM218	17.9				
			#				
Chrysene	<10 µg/kg	TM218	15.5				
			#				
Benzo(b)fluoranthene	<15 µg/kg	TM218	29.5				
			#				
Benzo(k)fluoranthene	<14 µg/kg	TM218	<14				
			#				
Benzo(a)pyrene	<15 µg/kg	TM218	20.1				
			#				
Indeno(1,2,3-cd)pyrene	<18 µg/kg	TM218	<18				
			#				
Dibenzo(a,h)anthracene	<23 µg/kg	TM218	<23				
			#				
Benzo(g,h,i)perylene	<24 µg/kg	TM218	<24				
			#				
Coronene	<200 µg/kg	TM218	<200				
PAH, Total Detected USEPA 16	<118 µg/kg	TM218	125				
PAH, Total Detected USEPA 16 + Coronene	<318 µg/kg	TM218	<318				



CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-68 Client Reference: 2921-028 COC4-B Report Number: 427005
 Location: CHARTERED LAND - HEL Order Number: Superseded Report:

TPH CWG (S)

Results Legend		Customer Sample Ref.	2921-BH4-COMP-S				
#	ISO17025 accredited.		99				
M	mCERTS accredited.						
AQ	Aqueous / settled sample.						
dis.filt	Dissolved / filtered sample.	Depth (m)	1.85 - 4.00				
tot.unfilt	Total / unfiltered sample.	Sample Type	Soil/Solid (S)				
*	Subcontracted test.	Date Sampled	21/09/2017				
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery	Sampled Time					
(F)	Trigger breach confirmed	Date Received	26/09/2017				
1-5&+9@	Sample deviation (see appendix)	SDG Ref	170926-68				
		Lab Sample No.(s)	16252119				
		AGS Reference					
Component	LOD/Units	Method					
GRO Surrogate % recovery**	%	TM089	65				
GRO TOT (Moisture Corrected)	<44 µg/kg	TM089	2240				
Methyl tertiary butyl ether (MTBE)	<5 µg/kg	TM089	<5	#			
Benzene	<10 µg/kg	TM089	<10	#			
Toluene	<2 µg/kg	TM089	2.26	#			
Ethylbenzene	<3 µg/kg	TM089	<3	#			
Xylene	<6 µg/kg	TM089	<6	#			
o-Xylene	<3 µg/kg	TM089	<3	#			
sum of detected mpo xylene by GC	<9 µg/kg	TM089	<9				
sum of detected BTEX by GC	<24 µg/kg	TM089	<24				
Aliphatics >C5-C6	<10 µg/kg	TM089	15.8				
Aliphatics >C6-C8	<10 µg/kg	TM089	29.4				
Aliphatics >C8-C10	<10 µg/kg	TM089	271				
Aliphatics >C10-C12	<10 µg/kg	TM089	1040				
Aliphatics >C12-C16	<100 µg/kg	TM173	53300				
Aliphatics >C16-C21	<100 µg/kg	TM173	88000				
Aliphatics >C21-C35	<100 µg/kg	TM173	41900				
Aliphatics >C35-C44	<100 µg/kg	TM173	694				
Aliphatics >C12-C44	<100 µg/kg	TM173	184000				
Aromatics >EC5-EC7	<10 µg/kg	TM089	<10				
Aromatics >EC7-EC8	<10 µg/kg	TM089	<10				
Aromatics >EC8-EC10	<10 µg/kg	TM089	181				
Aromatics >EC10-EC12	<10 µg/kg	TM089	695				
Aromatics >EC12-EC16	<100 µg/kg	TM173	12100				
Aromatics >EC16-EC21	<100 µg/kg	TM173	36700				
Aromatics >EC21-EC35	<100 µg/kg	TM173	30100				
Aromatics >EC35-EC44	<100 µg/kg	TM173	6980				
Aromatics >EC40-EC44	<100 µg/kg	TM173	3040				
Total Aromatics >EC12-EC44	<100 µg/kg	TM173	85900				
Total Aliphatics & Aromatics >C5-C44	<100 µg/kg	TM173	272000				



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SDG: 170926-68 Client Reference: 2921-028 COC4-B Report Number: 427005
 Location: CHARTERED LAND - HEL Order Number: Superseded Report:

Asbestos Identification - Soil

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref.	2921-BH4-COMP-SS 9	04/10/17	Eva Guerra	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Depth (m)	1.85 - 4.00										
Sample Type	SOLID										
Date Sampled	21/09/2017										
Date Received	00:00:00										
SDG	27/09/2017										
Original Sample	12:43:36										
Method Number	170926-68 16252119 TM048										



CERTIFICATE OF ANALYSIS

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SDG: 170926-68 Client Reference: 2921-028 COC4-B Report Number: 427005
 Location: CHARTERED LAND - HEI Order Number: Superseded Report:

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		Site Location	CHARTERED LAND - HEUSTON S
Mass Sample taken (kg)	0.103	Natural Moisture Content (%)	13.6
Mass of dry sample (kg)	0.090	Dry Matter Content (%)	88
Particle Size <4mm	>95%		

Case	
SDG	170926-68
Lab Sample Number(s)	16252119
Sampled Date	21-Sep-2017
Customer Sample Ref.	2921-BH4-COMP-SS9
Depth (m)	1.85 - 4.00

Landfill Waste Acceptance Criteria Limits

Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
3	5	6
-	-	10
6	-	-
1	-	-
500	-	-
-	-	-
-	>6	-
-	-	-
-	-	-

Solid Waste Analysis	Result
Organic Carbon (%)	0.66
Loss on Ignition (%)	1.37
Sum of BTEX (mg/kg)	<0.024
Sum of 7 PCBs (mg/kg)	<0.021
Mineral Oil (mg/kg)	144
PAH Sum of 17 (mg/kg)	-
pH (pH Units)	8.82
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis	C2 Conc ⁿ in 10:1 eluate (mg/l)		A2 10:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00246	<0.0005	0.0246	<0.005	0.5	2	25
Barium	0.00717	<0.0002	0.0717	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	<0.001	<0.001	<0.01	<0.01	0.5	10	70
Copper	0.00111	<0.0003	0.0111	<0.003	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	0.00928	<0.0005	0.0928	<0.005	0.5	10	30
Nickel	0.000953	<0.0004	0.00953	<0.004	0.4	10	40
Lead	<0.0002	<0.0002	<0.002	<0.002	0.5	10	50
Vanadium	0.00155	<0.0001	0.0155	<0.001	0.06	0.7	5
Chromium	0.00164	<0.0005	0.0164	<0.005	0.1	0.5	7
Zinc	<0.001	<0.001	<0.01	<0.01	4	50	200
Chloride	2.5	<2	25	<20	800	15000	25000
Fluoride	<0.5	<0.5	<5	<5	10	150	500
Sulphate (soluble)	23.3	<2	233	<20	1000	20000	50000
Total Dissolved Solids	90.6	<5	906	<50	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	<3	<3	<30	<30	500	800	1000

DCC PLAN NO: 4610/22 RECEIVED: 04/08/2022

Leach Test Information

Date Prepared	01-Oct-2017
pH (pH Units)	8.97
Conductivity (µS/cm)	116.00
Temperature (°C)	18.60
Volume Leachant (Litres)	0.888

Results are expressed on a dry weight basis, after correction for moisture content where applicable
 Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation
 Mcerts Certification does not apply to leachates

05/10/2017 13:51:55



CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-68 Client Reference: 2921-028 COC4-B Report Number: 427005
 Location: CHARTERED LAND - HEI Order Number: Superseded Report:

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample ¹	Surrogate Corrected
PM001		Preparation of Samples for Metals Analysis		
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material		
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step		
TM018	BS 1377: Part 3 1990	Determination of Loss on Ignition		
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material		
TM061	Method for the Determination of EPH, Massachusetts Dept. of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)		
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC		
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)		
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water		
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser		
TM123	BS 2690: Part 121:1981	The Determination of Total Dissolved Solids in Water		
TM132	In - house Method	ELTRA CS800 Operators Guide		
TM133	BS 1377: Part 3 1990; BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter		
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser		
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS		
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser		
TM168	EPA Method 8082, Polychlorinated Biphenyls by Gas Chromatography	Determination of WHO12 and EC7 Polychlorinated Biphenyl Congeners by GC-MS in Soils		
TM173	Analysis of Petroleum Hydrocarbons in Environmental Media - Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GC-FID		
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES		
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry		
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers		
TM218	Determination of PAH by GCMS Microwave extraction	The determination of PAH in soil samples by microwave extraction and GC-MS		
TM221	Inductively Coupled Plasma - Atomic Emission Spectroscopy. An Atlas of Spectral Information: Winge, Fassel, Peterson and Floyd	Determination of Acid extractable Sulphate in Soils by IRIS Emission Spectrometer		
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:soil) by IRIS Emission Spectrometer		
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES		
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC		

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

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



CERTIFICATE OF ANALYSIS

Validated

SDG:	170926-68	Client Reference:	2921-028 COC4-B	Report Number:	427005
Location:	CHARTERED LAND - HEI		Order Number:	Superseded Report:	

Test Completion Dates

Lab Sample No(s)	16252119
Customer Sample Ref.	2921-BH4-COMP-S S9
AGS Ref.	
Depth	1.85 - 4.00
Type	Soil/Solid (S)

Anions by Kone (w)	03-Oct-2017
Asbestos ID in Solid Samples	04-Oct-2017
Boron Water Soluble	03-Oct-2017
CEN 10:1 Leachate (1 Stage)	01-Oct-2017
CEN Readings	03-Oct-2017
Cyanide Comp/Free/Total/Thiocyanate	02-Oct-2017
Dissolved Metals by ICP-MS	04-Oct-2017
Dissolved Organic/Inorganic Carbon	03-Oct-2017
EPH CWG (Aliphatic) GC (S)	02-Oct-2017
EPH CWG (Aromatic) GC (S)	02-Oct-2017
Fluoride	04-Oct-2017
GRO by GC-FID (S)	03-Oct-2017
Hexavalent Chromium (s)	02-Oct-2017
Losses on Ignition in soils	05-Oct-2017
Heavy Metals by ICP-OES Dissolved	03-Oct-2017
Metals by ICap-OES Dissolved (W)	04-Oct-2017
Metals in solid samples by OES	04-Oct-2017
Mineral Oil	04-Oct-2017
PAH by GCMS	04-Oct-2017
PCBs by GCMS	03-Oct-2017
pH	27-Sep-2017
Phenols by HPLC (S)	02-Oct-2017
Phenols by HPLC (W)	05-Oct-2017
Sample description	27-Sep-2017
Total Dissolved Solids	02-Oct-2017
Total Organic Carbon	04-Oct-2017
Total Sulphate	03-Oct-2017
Total Sulphur	02-Oct-2017
TPH CWG GC (S)	03-Oct-2017



CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-68 Client Reference: 2921-028 COC4-B Report Number: 427005
Location: CHARTERED LAND - HEL Order Number: Superseded Report:

Chromatogram

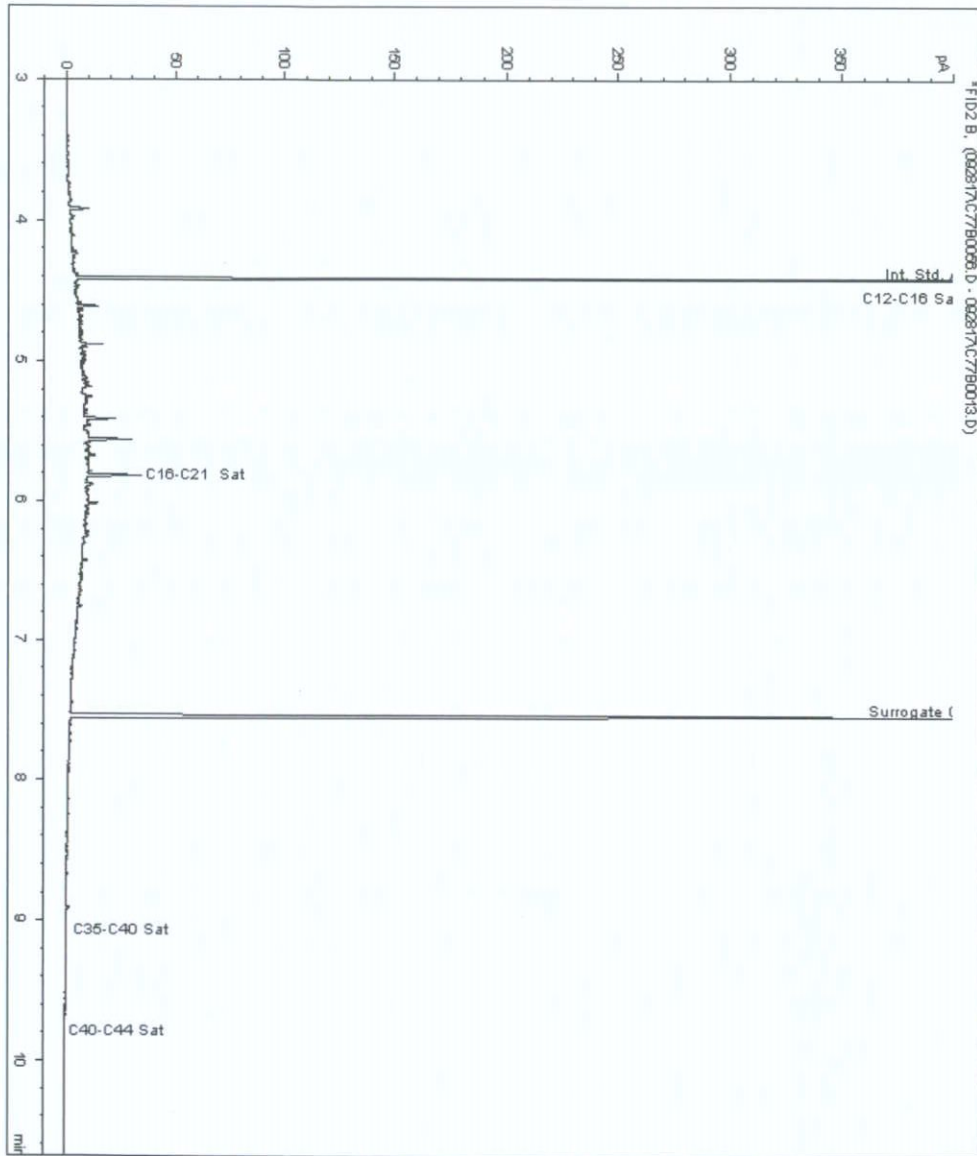
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 16258006
Sample ID : 2921-BH4-COMP-SS9

Depth : 1.85 - 4.00

Speciated TPH - SATS (C12 - C40)

Sample Identity: 15223363-
Date Acquired : 29/09/2017 07:14:39 PM
Units : ppb
Dilution:





CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-68 Client Reference: 2921-028 COC4-B Report Number: 427005
Location: CHARTERED LAND - HEL Order Number: Superseded Report:

Chromatogram

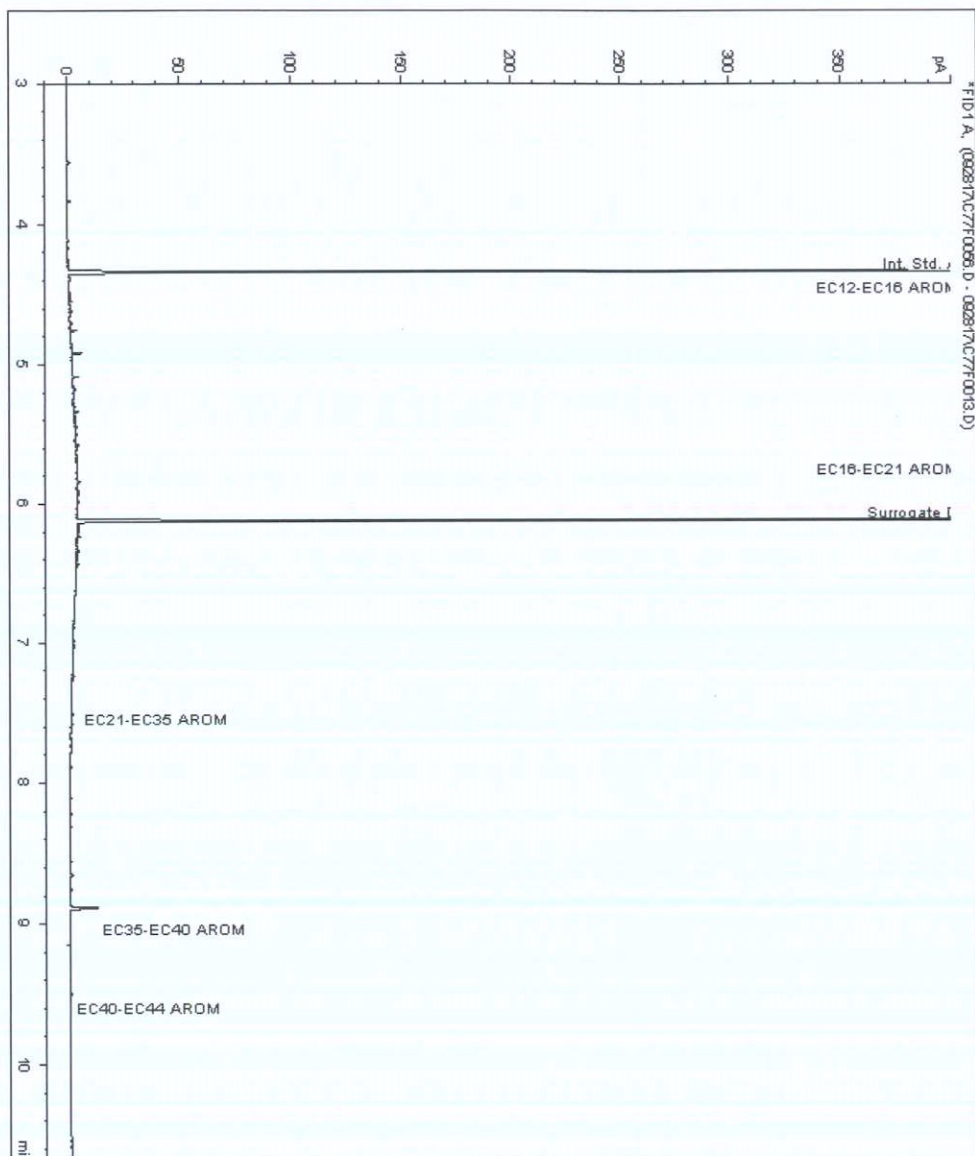
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 16258006
Sample ID : 2921-BH4-COMP-SS9

Depth : 1.85 - 4.00

Speciated TPH - SATS (C12 - C40)

Sample Identity: 15223364-
Date Acquired : 29/09/2017 07:14:39 PM
Units : ppb
Dilution:





CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-68 Client Reference: 2921-028 COC4-B Report Number: 427005
Location: CHARTERED LAND - HEL Order Number: Superseded Report:

Chromatogram

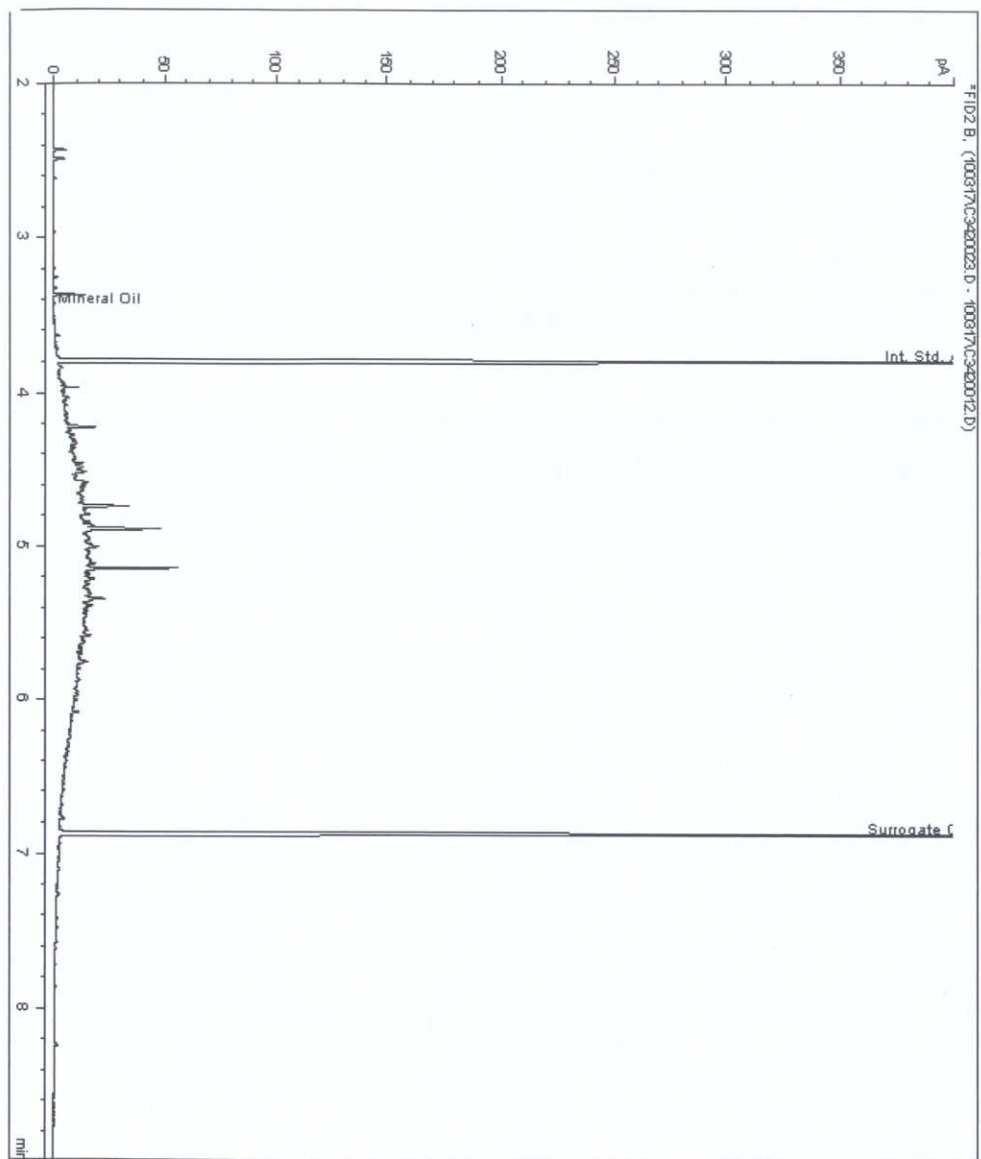
Analysis: Mineral Oil

Sample No : 16268975
Sample ID : 2921-BH4-COMP-SS9

Depth : 1.85 - 4.00

Mineral Oil Range Organics (C10 - C40)

Sample Identity : 15223366-
Date Acquired : 03/10/17 19:23:46 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :





CERTIFICATE OF ANALYSIS

Validated

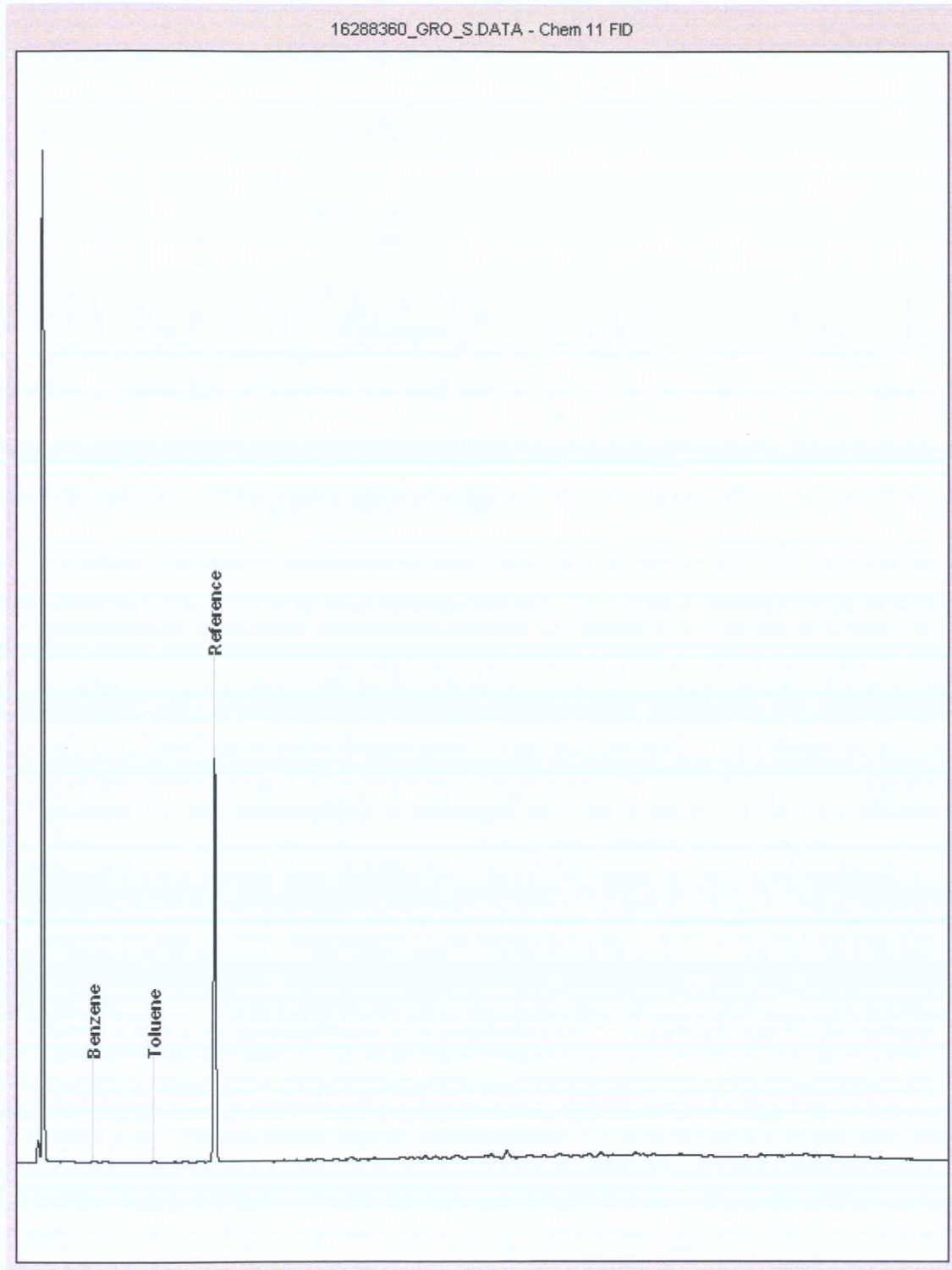
SDG: 170926-68 Client Reference: 2921-028 COC4-B Report Number: 427005
Location: CHARTERED LAND - HEI Order Number: Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 16288360
Sample ID : 2921-BH4-COMP-SS9

Depth : 1.85 - 4.00





CERTIFICATE OF ANALYSIS

SDG: 170926-68 Client Reference: 2921-028 COC4-B Report Number: 427005
 Location: ED LAND - HEUSTON SOUTH Order Number: Superseded Report:

Appendix

General

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. ALS 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.

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

21. 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.

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

If a sample is classed as deviated then the associated results may be compromised.

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 ALS (Hawarden) in-house method of transmitted/polarised light microscopy an 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 ALS (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.



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Website: www.alsenvironmental.co.uk

Minerex Environmental
Taney hall
Eglington Terrace
Dundrum
Dublin
Dublin 14

Attention: Caitriona Keogh

CERTIFICATE OF ANALYSIS

Date: 05 October 2017
Customer: D_MINEREX_DUB
Sample Delivery Group (SDG): 170926-70
Your Reference: 2921-028 COC4-E
Location: CHARTERED LAND - HEUSTON SOUTH QUARTER
Report No: 427006

We received 1 sample on Tuesday September 26, 2017 and 1 of these samples were scheduled for analysis which was completed on Thursday October 05, 2017. 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 ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-70 Client Reference: 2921-028 COC4-E Report Number: 427006
Location: CHARTERED LAND - HEI Order Number: Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
16252184	2921-BH5-COMP-SS6		0.30 - 2.50	21/09/2017

Maximum Sample/Coolbox Temperature (°C) : 13.8

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

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



CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-70 Client Reference: 2921-028 COC4-E Report Number: 427006
 Location: CHARTERED LAND - HE Order Number: Superseded Report:

Results Legend <input checked="" type="checkbox"/> Test <input type="checkbox"/> No Determination Possible Sample Types - S - Soil/Solid UNS - Unspecified Solid GW - Ground Water SW - Surface Water LE - Land Leachate PL - Prepared Leachate PR - Process Water SA - Saline Water TE - Trade Effluent TS - Treated Sewage US - Untreated Sewage RW - Recreational Water DW - Drinking Water Non-regulatory LW - Unspecified Liquid SL - Sludge G - Gas OTH - Other	Lab Sample No(s)	16252184		
	Customer Sample Reference	2921-BHS-COMP-SS 6		
	AGS Reference			
	Depth (m)	0.30 - 2.50		
	Container	250g Amber Jar (ALE210)	400g Tub (ALE214)	60g VOC (ALE215)
	Sample Type	S	S	S
Anions by Kone (w)	All	NDPs: 0 Tests: 1	X	
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 1	X	
Boron Water Soluble	All	NDPs: 0 Tests: 1	X	
CEN Readings	All	NDPs: 0 Tests: 1	X	
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 1	X	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 1	X	
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 1	X	
EPH CWG (Aliphatic) GC (S)	All	NDPs: 0 Tests: 1	X	
EPH CWG (Aromatic) GC (S)	All	NDPs: 0 Tests: 1	X	
Fluoride	All	NDPs: 0 Tests: 1	X	
GRO by GC-FID (S)	All	NDPs: 0 Tests: 1		X
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 1	X	
Loss on Ignition in soils	All	NDPs: 0 Tests: 1	X	
Mercury Dissolved	All	NDPs: 0 Tests: 1	X	
Metals by iCap-OES Dissolved (W)	All	NDPs: 0 Tests: 1	X	



CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-70 Client Reference: 2921-028 COC4-E Report Number: 427006
 Location: CHARTERED LAND - HEI Order Number: Superseded Report:

Results Legend <input checked="" type="checkbox"/> Test <input type="checkbox"/> No Determination Possible Sample Types - S - Soil/Solid UNS - Unspecified Solid GW - Ground Water SW - Surface Water LE - Land Leachate PL - Prepared Leachate PR - Process Water SA - Saline Water TE - Trade Effluent TS - Treated Sewage US - Untreated Sewage RE - Recreational Water DW - Drinking Water Non-regulatory UNL - Unspecified Liquid SL - Sludge G - Gas OTH - Other	Lab Sample No(s)	16252184		
	Customer Sample Reference	2921-BH5-COMP-SS 6		
	AGS Reference			
	Depth (m)	0.30 - 2.50		
	Container	250g Amber Jar (ALE210)	400g Tub (ALE214)	60g VOC (ALE215)
	Sample Type	S	S	S
Metals in solid samples by OES	All	NDPs: 0 Tests: 1	X	
Mineral Oil	All	NDPs: 0 Tests: 1	X	
PAH by GCMS	All	NDPs: 0 Tests: 1	X	
PCBs by GCMS	All	NDPs: 0 Tests: 1	X	
pH	All	NDPs: 0 Tests: 1	X	
Phenols by HPLC (S)	All	NDPs: 0 Tests: 1	X	
Phenols by HPLC (W)	All	NDPs: 0 Tests: 1		X
Sample description	All	NDPs: 0 Tests: 1	X	
Total Dissolved Solids	All	NDPs: 0 Tests: 1		X
Total Organic Carbon	All	NDPs: 0 Tests: 1	X	
Total Sulphate	All	NDPs: 0 Tests: 1	X	
Total Sulphur	All	NDPs: 0 Tests: 1	X	
TPH CWG GC (S)	All	NDPs: 0 Tests: 1	X	



CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-70 Client Reference: 2921-028 COC4-E Report Number: 427006
Location: CHARTERED LAND - HEI Order Number: Superseded Report:

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
-----------	----------	------	-----------------	--------	-------------	--------	------------	-------------	-------

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
16252184	2921-BH5-COMP-SS6	0.30 - 2.50	Grey	Silt Loam	Stones	None

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

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.

er coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.



CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-70 Client Reference: 2921-028 COC4-E Report Number: 427006
 Location: CHARTERED LAND - HEL Order Number: Superseded Report:

Results Legend		Customer Sample Ref.	2921-BH5-COMP-S				
#	ISO17025 accredited.		S6				
M	mCERTS accredited.						
aq	Aqueous / settled sample.	Depth (m)	0.30 - 2.50				
diss.filt	Dissolved / filtered sample.	Sample Type	Soil/Solid (S)				
tot.unfilt	Total / unfiltered sample.	Date Sampled	21/09/2017				
**	Subcontracted test.	Sampled Time					
(F)	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery	Date Received	26/09/2017				
1-5	@	Trigger breach confirmed	SDG Ref	170926-70				
	Sample deviation (see appendix)	Lab Sample No.(s)	16252184				
Component	LOD/Units	Method	AGS Reference				
Moisture Content Ratio (% of as received sample)	%	PM024	12				
Loss on ignition	<0.7 %	TM018	3.22				
Mineral oil >C10-C40	<1 mg/kg	TM061	79.6				
Mineral Oil Surrogate % recovery**	%	TM061	83				
Phenol	<0.01 mg/kg	TM062 (S)	<0.01				
Organic Carbon, Total	<0.2 %	TM132	0.553				
Sulphur, Total	<0.02 %	TM132	0.0454				
Sulphate, Total potential	<0.06 %	TM132	0.136				
pH	1 pH Units	TM133	8.5				
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6				
Cyanide, Total	<1 mg/kg	TM153	<1				
Cyanide, Free	<1 mg/kg	TM153	<1				
PCB congener 28	<3 µg/kg	TM168	<3				
PCB congener 52	<3 µg/kg	TM168	<3				
PCB congener 101	<3 µg/kg	TM168	<3				
PCB congener 118	<3 µg/kg	TM168	<3				
PCB congener 138	<3 µg/kg	TM168	<3				
PCB congener 153	<3 µg/kg	TM168	<3				
PCB congener 180	<3 µg/kg	TM168	<3				
Sum of detected PCB 7 Congeners	<21 µg/kg	TM168	<21				
Antimony	<0.6 mg/kg	TM181	1.16				
Arsenic	<0.6 mg/kg	TM181	9.05				
Barium	<0.6 mg/kg	TM181	38.7				
Cadmium	<0.02 mg/kg	TM181	1.43				
Chromium	<0.9 mg/kg	TM181	4.87				
Copper	<1.4 mg/kg	TM181	18.4				
Iron	<1000 mg/kg	TM181	16200				
Lead	<0.7 mg/kg	TM181	38				
Manganese	<0.13 mg/kg	TM181	593				
Mercury	<0.14 mg/kg	TM181	0.412				
Molybdenum	<0.1 mg/kg	TM181	3.4				
Nickel	<0.2 mg/kg	TM181	33.2				



CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-70 Client Reference: 2921-028 COC4-E Report Number: 427006
Location: CHARTERED LAND - HEI Order Number: Superseded Report:

Table with columns: Results Legend, Customer Sample Ref., Depth (m), Sample Type, Date Sampled, Sampled Time, Date Received, SDG Ref, Lab Sample No. (s), AGS Reference, Component, LOD/Units, Method, and numerical results for Selenium, Zinc, Sulphate, Sulphide, and Boron.



CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-70 Client Reference: 2921-028 COC4-E Report Number: 427006
 Location: CHARTERED LAND - HE Order Number: Superseded Report:

PAH by GCMS

Results Legend		Customer Sample Ref.	2921-BH5-COMP-S				
#	ISO17025 accredited.		S6				
M	mCERTS accredited.						
aq	Aqueous / settled sample.	Depth (m)	0.30 - 2.50				
diss.filt	Dissolved / filtered sample.	Sample Type	Soil/Solid (S)				
tot.unfilt	Total / unfiltered sample.	Date Sampled	21/09/2017				
*	Subcontracted test.	Sampled Time					
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery trigger breach confirmed	Date Received	26/09/2017				
(F)	Trigger breach confirmed	SDG Ref	170926-70				
1-5@	Sample deviation (see appendix)	Lab Sample No.(s)	16252184				
Component	LOD/Units	Method					
Naphthalene-d8 % recovery**	%	TM218	96.5				
Acenaphthene-d10 % recovery**	%	TM218	85.7				
Phenanthrene-d10 % recovery**	%	TM218	80.4				
Chrysene-d12 % recovery**	%	TM218	80				
Perylene-d12 % recovery**	%	TM218	82.5				
Naphthalene	<9 µg/kg	TM218	<9				
				M			
Acenaphthylene	<12 µg/kg	TM218	<12				
				M			
Acenaphthene	<8 µg/kg	TM218	<8				
				M			
Fluorene	<10 µg/kg	TM218	<10				
				M			
Phenanthrene	<15 µg/kg	TM218	35.8				
				M			
Anthracene	<16 µg/kg	TM218	<16				
				M			
Fluoranthene	<17 µg/kg	TM218	46.9				
				M			
Pyrene	<15 µg/kg	TM218	44.1				
				M			
Benzo(a)anthracene	<14 µg/kg	TM218	49.8				
				M			
Chrysene	<10 µg/kg	TM218	28.5				
				M			
Benzo(b)fluoranthene	<15 µg/kg	TM218	50.5				
				M			
Benzo(k)fluoranthene	<14 µg/kg	TM218	17.2				
				M			
Benzo(a)pyrene	<15 µg/kg	TM218	37.1				
				M			
Indeno(1,2,3-cd)pyrene	<18 µg/kg	TM218	<18				
				M			
Dibenzo(a,h)anthracene	<23 µg/kg	TM218	<23				
				M			
Benzo(g,h,i)perylene	<24 µg/kg	TM218	30.6				
				M			
Coronene	<200 µg/kg	TM218	<200				
PAH, Total Detected USEPA 16	<118 µg/kg	TM218	340				
PAH, Total Detected USEPA 16 + Coronene	<318 µg/kg	TM218	340				



CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-70 Client Reference: 2921-028 COC4-E Report Number: 427006
 Location: CHARTERED LAND - HEL Order Number: Superseded Report:

TPH CWG (S)

Results Legend		Customer Sample Ref.	2921-BH5-COMP-S				
#	ISO17025 accredited.		56				
M	mCERTS accredited.						
aq	Aqueous / settled sample.	Depth (m)	0.30 - 2.50				
diss.filt	Dissolved / filtered sample.	Sample Type	Soil/Solid (S)				
tot.unfilt	Total / unfiltered sample.	Date Sampled	21/09/2017				
*	Subcontracted test.	Sampled Time					
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery	Date Received	26/09/2017				
(F)	Trigger breach confirmed	SDG Ref	170926-70				
1-5&*\$@	Sample deviation (see appendix)	Lab Sample No.(s)	16252184				
		AGS Reference					
Component	LOD/Units	Method					
GRO Surrogate % recovery**	%	TM089	68				
GRO TOT (Moisture Corrected)	<44 µg/kg	TM089	1150				
Methyl tertiary butyl ether (MTBE)	<5 µg/kg	TM089	<5	M			
Benzene	<10 µg/kg	TM089	<10	#			
Toluene	<2 µg/kg	TM089	<2	M			
Ethylbenzene	<3 µg/kg	TM089	<3	M			
Xylene	<6 µg/kg	TM089	<6	M			
o-Xylene	<3 µg/kg	TM089	<3	M			
sum of detected mpo xylene by GC	<9 µg/kg	TM089	<9				
sum of detected BTEX by GC	<24 µg/kg	TM089	<24				
Aliphatics >C5-C6	<10 µg/kg	TM089	<10				
Aliphatics >C6-C8	<10 µg/kg	TM089	23.9				
Aliphatics >C8-C10	<10 µg/kg	TM089	131				
Aliphatics >C10-C12	<10 µg/kg	TM089	542				
Aliphatics >C12-C16	<100 µg/kg	TM173	17700				
Aliphatics >C16-C21	<100 µg/kg	TM173	23800				
Aliphatics >C21-C35	<100 µg/kg	TM173	13800				
Aliphatics >C35-C44	<100 µg/kg	TM173	<100				
Aliphatics >C12-C44	<100 µg/kg	TM173	55400				
Aromatics >EC5-EC7	<10 µg/kg	TM089	<10				
Aromatics >EC7-EC8	<10 µg/kg	TM089	<10				
Aromatics >EC8-EC10	<10 µg/kg	TM089	87.8				
Aromatics >EC10-EC12	<10 µg/kg	TM089	361				
Aromatics >EC12-EC16	<100 µg/kg	TM173	5970				
Aromatics >EC16-EC21	<100 µg/kg	TM173	13200				
Aromatics >EC21-EC35	<100 µg/kg	TM173	10400				
Aromatics >EC35-EC44	<100 µg/kg	TM173	2720				
Aromatics >EC40-EC44	<100 µg/kg	TM173	1000				
Total Aromatics >EC12-EC44	<100 µg/kg	TM173	32300				
Total Aliphatics & Aromatics >C5-C44	<100 µg/kg	TM173	88900				



CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-70 Client Reference: 2921-028 COC4-E Report Number: 427006
 Location: CHARTERED LAND - HEI Order Number: Superseded Report:

Asbestos Identification - Soil

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref.	2921-BH5-COMP-SS 6	4/10/17	Neville Mann	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Depth (m)	0.30 - 2.50										
Sample Type	SOLID										
Date Sampled	21/09/2017										
Date Received	00:00:00										
SDG	27/09/2017										
Original Sample	12:40:14										
Method Number	170926-70 16252184 TM048										



CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-70 Client Reference: 2921-028 COC4-E Report Number: 427006
 Location: CHARTERED LAND - HEU Order Number: Superseded Report:

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		Site Location	CHARTERED LAND - HEUSTON S
Mass Sample taken (kg)	0.103	Natural Moisture Content (%)	13.6
Mass of dry sample (kg)	0.090	Dry Matter Content (%)	88
Particle Size <4mm	>95%		

Case	
SDG	170926-70
Lab Sample Number(s)	16252184
Sampled Date	21-Sep-2017
Customer Sample Ref.	2921-BH5-COMP-SS6
Depth (m)	0.30 - 2.50

**Landfill Waste Acceptance
Criteria Limits**

Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
3	5	6
-	-	10
6	-	-
1	-	-
500	-	-
-	-	-
-	>6	-
-	-	-
-	-	-

Solid Waste Analysis	Result
Organic Carbon (%)	0.553
Loss on Ignition (%)	3.22
Sum of BTEX (mg/kg)	<0.024
Sum of 7 PCBs (mg/kg)	<0.021
Mineral Oil (mg/kg)	79.6
PAH Sum of 17 (mg/kg)	-
pH (pH Units)	8.5
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis	C2 Conc ⁿ in 10:1 eluate (mg/l)		A2 10:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.0011	<0.0005	0.011	<0.005	0.5	2	25
Barium	0.0061	<0.0002	0.061	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	<0.001	<0.001	<0.01	<0.01	0.5	10	70
Copper	0.0013	<0.0003	0.013	<0.003	2	50	100
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	0.00495	<0.0005	0.0495	<0.005	0.5	10	30
Nickel	0.000878	<0.0004	0.00878	<0.004	0.4	10	40
Lead	<0.0002	<0.0002	<0.002	<0.002	0.5	10	50
Iron	0.000708	<0.0001	0.00708	<0.001	0.06	0.7	5
Antimony	0.000585	<0.0005	0.00585	<0.005	0.1	0.5	7
Zinc	0.00102	<0.001	0.0102	<0.01	4	50	200
Chloride	6.8	<2	68	<20	800	15000	25000
Fluoride	<0.5	<0.5	<5	<5	10	150	500
Sulphate (soluble)	16	<2	160	<20	1000	20000	50000
Total Dissolved Solids	101	<5	1010	<50	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	<3	<3	<30	<30	500	800	1000

Leach Test Information

Date Prepared	01-Oct-2017
pH (pH Units)	8.63
Conductivity (µS/cm)	139.00
Temperature (°C)	18.10
Volume Leachant (Litres)	0.888

Results are expressed on a dry weight basis, after correction for moisture content where applicable
 Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation
 Mcerts Certification does not apply to leachates

05/10/2017 13:52:55



CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-70 Client Reference: 2921-028 COC4-E Report Number: 427006
 Location: CHARTERED LAND - HEL Order Number: Superseded Report:

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample ¹	Surrogate Corrected
PM001		Preparation of Samples for Metals Analysis		
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material		
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step		
TM018	BS 1377: Part 3 1990	Determination of Loss on Ignition		
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material		
TM061	Method for the Determination of EPH, Massachusetts Dept. of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)		
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC		
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)		
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water		
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser		
TM123	BS 2690: Part 121:1981	The Determination of Total Dissolved Solids in Water		
TM132	In - house Method	ELTRA CS800 Operators Guide		
TM133	BS 1377: Part 3 1990, BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter		
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser		
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS		
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser		
TM168	EPA Method 8082, Polychlorinated Biphenyls by Gas Chromatography	Determination of WHO12 and EC7 Polychlorinated Biphenyl Congeners by GC-MS in Soils		
TM173	Analysis of Petroleum Hydrocarbons in Environmental Media - Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GC-FID		
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES		
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry		
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers		
TM218	Determination of PAH by GCMS Microwave extraction	The determination of PAH in soil samples by microwave extraction and GC-MS		
TM221	Inductively Coupled Plasma - Atomic Emission Spectroscopy. An Atlas of Spectral Information: Winge, Fassel, Peterson and Floyd	Determination of Acid extractable Sulphate in Soils by IRIS Emission Spectrometer		
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:soil) by IRIS Emission Spectrometer		
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES		
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC		

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

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



CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-70 Client Reference: 2921-028 COC4-E Report Number: 427006
 Location: CHARTERED LAND - HE Order Number: Superseded Report:

Test Completion Dates

Lab Sample No(s)	16252184
Customer Sample Ref.	2921-BH5-COMP-S SS
AGS Ref.	
Depth	0.30 - 2.50
Type	Soil/Solid (S)

Anions by Kone (w)	03-Oct-2017
Asbestos ID in Solid Samples	04-Oct-2017
Boron Water Soluble	03-Oct-2017
CEN 10:1 Leachate (1 Stage)	01-Oct-2017
CEN Readings	03-Oct-2017
Cyanide Comp/Free/Total/Thiocyanate	02-Oct-2017
Dissolved Metals by ICP-MS	04-Oct-2017
Dissolved Organic/Inorganic Carbon	03-Oct-2017
EPH CWG (Aliphatic) GC (S)	02-Oct-2017
EPH CWG (Aromatic) GC (S)	02-Oct-2017
Fluoride	04-Oct-2017
GRO by GC-FID (S)	03-Oct-2017
Hexavalent Chromium (s)	02-Oct-2017
Ignition in soils	05-Oct-2017
Mercury Dissolved	03-Oct-2017
Metals by iCap-OES Dissolved (W)	04-Oct-2017
Metals in solid samples by OES	04-Oct-2017
Mineral Oil	04-Oct-2017
PAH by GCMS	04-Oct-2017
PCBs by GCMS	03-Oct-2017
pH	28-Sep-2017
Phenols by HPLC (S)	29-Sep-2017
Phenols by HPLC (W)	05-Oct-2017
Sample description	27-Sep-2017
Total Dissolved Solids	02-Oct-2017
Total Organic Carbon	04-Oct-2017
Total Sulphate	03-Oct-2017
Total Sulphur	02-Oct-2017
TPH CWG GC (S)	03-Oct-2017



CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-70 Client Reference: 2921-028 COC4-E Report Number: 427006
Location: CHARTERED LAND - HEL Order Number: Superseded Report:

Chromatogram

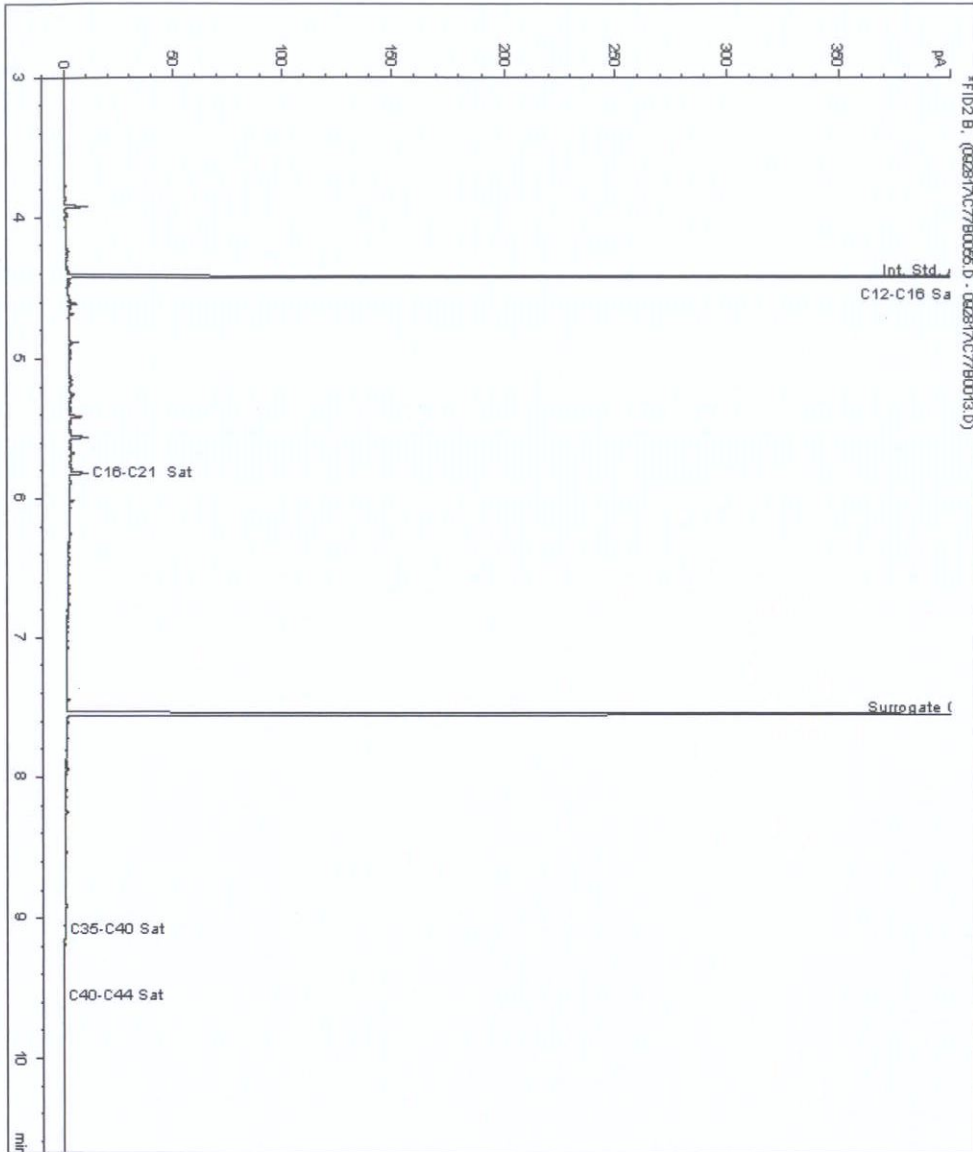
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 16257902
Sample ID : 2921-BH5-COMP-SS6

Depth : 0.30 - 2.50

Speciated TPH - SATS (C12 - C40)

Sample Identity: 15223484-
Date Acquired : 29/09/2017 06:54:20 PM
Units : ppb
Dilution:





CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-70 Client Reference: 2921-028 COC4-E Report Number: 427006
Location: CHARTERED LAND - HEL Order Number: Superseded Report:

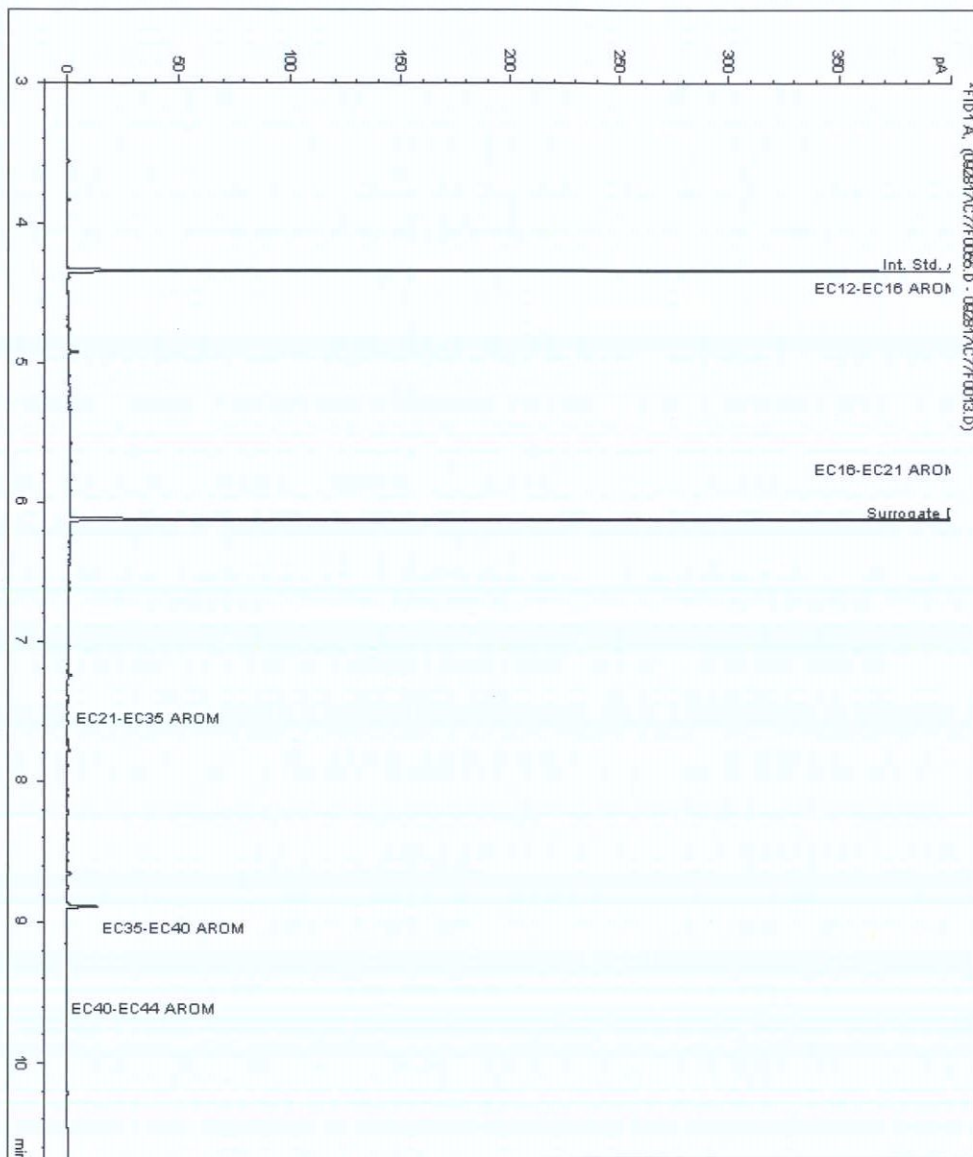
Chromatogram

Analysis: EPH CWG (Aromatic) GC (S)

Sample No: 16257902
Sample ID: 2921-BH5-COMP-SS6

Depth: 0.30 - 2.50

Speciated TPH - SATS (C12 - C40)
Sample Identity: 15223485-
Date Acquired : 29/09/2017 06:54:20 PM
Units : ppb
Dilution:





CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-70 Client Reference: 2921-028 COC4-E Report Number: 427006
Location: CHARTERED LAND - HEL Order Number: Superseded Report:

Chromatogram

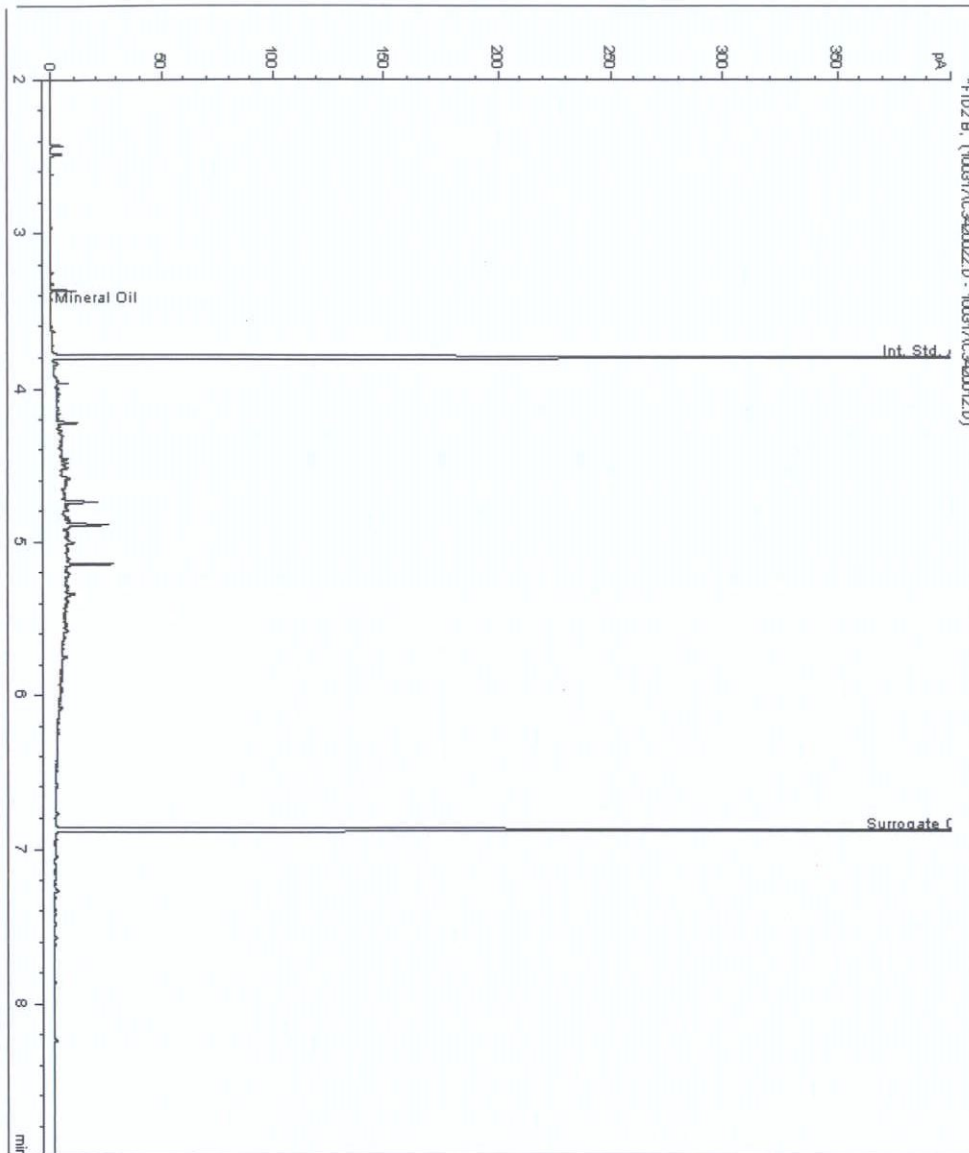
Analysis: Mineral Oil

Sample No : 16268898
Sample ID : 2921-BH5-COMP-SS6

Depth : 0.30 - 2.50

Mineral Oil Range Organics (C10 - C40)

Sample Identity : 15223487-
Date Acquired : 03/10/17 19:01:58 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :





CERTIFICATE OF ANALYSIS

Validated

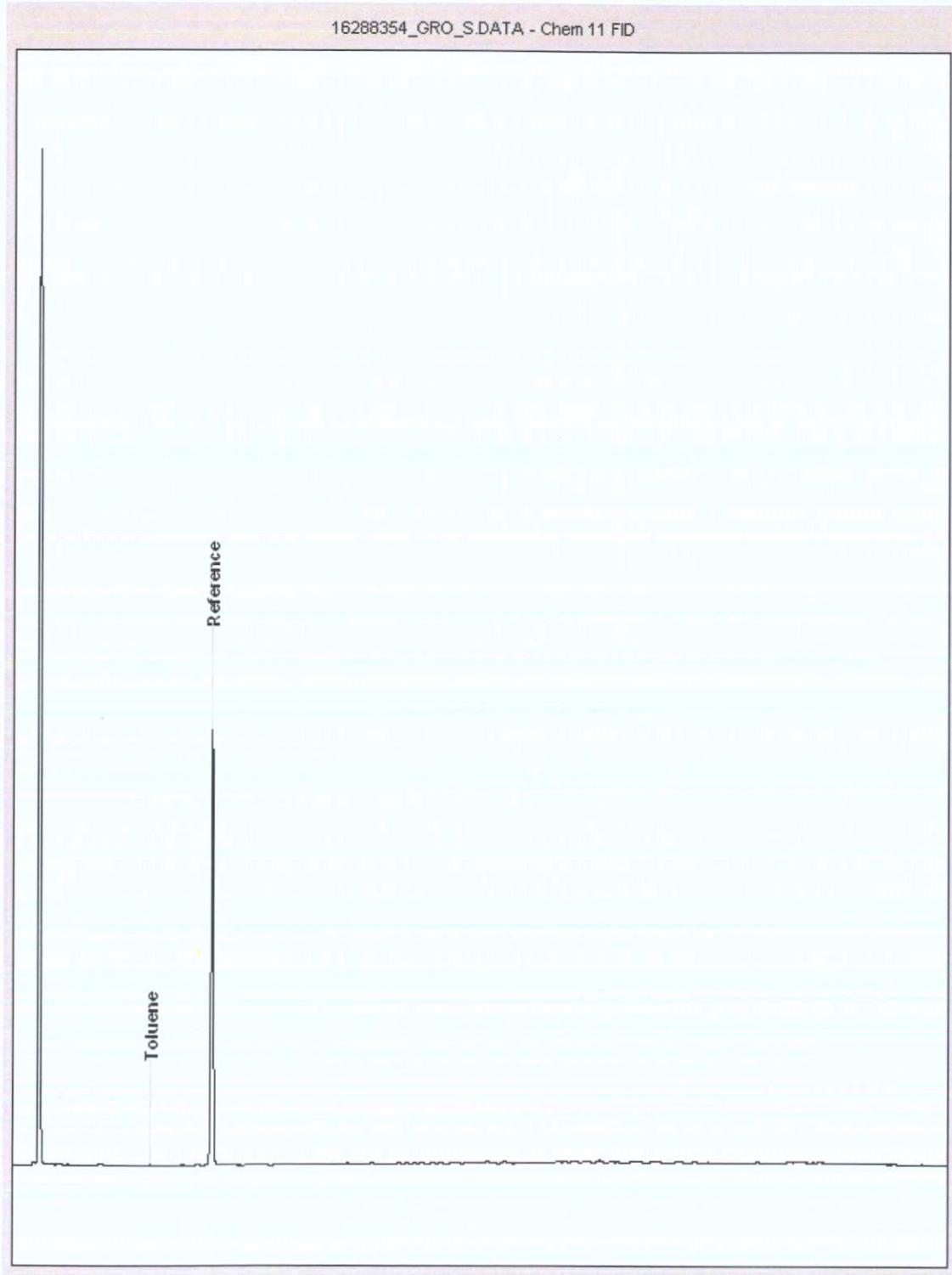
SDG: 170926-70 Client Reference: 2921-028 COC4-E Report Number: 427006
Location: CHARTERED LAND - HE Order Number: Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 16288354
Sample ID : 2921-BH5-COMP-SS6

Depth : 0.30 - 2.50





CERTIFICATE OF ANALYSIS

SDG: 170926-70 Client Reference: 2921-028 COC4-E Report Number: 427006
 Location: ED LAND - HEUSTON SOUTH Order Number: Superseded Report:

Appendix

General

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. ALS 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.

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

21. 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.

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

If a sample is classed as deviated then the associated results may be compromised.

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 ALS (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 ALS (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.



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Website: www.alsenvironmental.co.uk

Minerex Environmental
Taney hall
Eglinton Terrace
Dundrum
Dublin
Dublin 14

Attention: Caitriona Keogh

CERTIFICATE OF ANALYSIS

Date: 05 October 2017
Customer: D_MINEREX_DUB
Sample Delivery Group (SDG): 170926-63
Your Reference: 2921-028 COC4-F
Location: CHARTERED LAND - HEUSTON SOUTH QUARTER
Report No: 427003

We received 1 sample on Tuesday September 26, 2017 and 1 of these samples were scheduled for analysis which was completed on Thursday October 05, 2017. 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 ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-63 Client Reference: 2921-028 COC4-F Report Number: 427003
Location: CHARTERED LAND - HEL Order Number: Superseded Report:

Received Sample Overview

Table with 5 columns: Lab Sample No(s), Customer Sample Ref., AGS Ref., Depth (m), Sampled Date. Row 1: 16251961, 2921-BH5-SS4, 2.60 - 5.90, 21/09/2017

Maximum Sample/Coolbox Temperature (°C) : 13.8

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

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



CERTIFICATE OF ANALYSIS

Validated

SDG:	170926-63	Client Reference:	2921-028 COC4-F
Location:	CHARTERED LAND - HEL	Order Number:	
		Report Number:	427003
		Superseded Report:	

Results Legend <div style="margin-top: 5px;"> X Test </div> <div style="margin-top: 5px;"> N No Determination Possible </div> Sample Types - S - Soil/Solid UNS - Unspecified Solid GW - Ground Water SW - Surface Water LE - Land Leachate PL - Prepared Leachate PR - Process Water SA - Saline Water TE - Trade Effluent TS - Treated Sewage US - Untreated Sewage RW - Recreational Water DW - Drinking Water Non-regulatory L - Unspecified Liquid SL - Sludge G - Gas OTH - Other	Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container	Sample Type	
		16251961	2921-BHS-SS4		2.80 - 5.90	250g Amber Jar (ALE210) 400g Tub (ALE214) 60g VOC (ALE219)	S S S
	Anions by Kone (w)	All				NDPs: 0 Tests: 1	X
	Asbestos ID in Solid Samples	All				NDPs: 0 Tests: 1	X
	Boron Water Soluble	All				NDPs: 0 Tests: 1	X
	CEN Readings	All				NDPs: 0 Tests: 1	X
	Cyanide Comp/Free/Total/Thiocyanate	All				NDPs: 0 Tests: 1	X
Dissolved Metals by ICP-MS	All				NDPs: 0 Tests: 1	X	
Dissolved Organic/Inorganic Carbon	All				NDPs: 0 Tests: 1	X	
EPH CWG (Aliphatic) GC (S)	All				NDPs: 0 Tests: 1	X	
EPH CWG (Aromatic) GC (S)	All				NDPs: 0 Tests: 1	X	
Fluoride	All				NDPs: 0 Tests: 1	X	
GRO by GC-FID (S)	All				NDPs: 0 Tests: 1	X	
Hexavalent Chromium (s)	All				NDPs: 0 Tests: 1	X	
Loss on Ignition in soils	All				NDPs: 0 Tests: 1	X	
Mercury Dissolved	All				NDPs: 0 Tests: 1	X	
Metals by iCap-OES Dissolved (W)	All				NDPs: 0 Tests: 1	X	



CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-63 Client Reference: 2921-028 COC4-F Report Number: 427003
 Location: CHARTERED LAND - HEL Order Number: Superseded Report:

Results Legend <input checked="" type="checkbox"/> Test <input type="checkbox"/> No Determination Possible Sample Types - S - Soil/Solid UNS - Unspecified Solid GW - Ground Water SW - Surface Water LE - Land Leachate PL - Prepared Leachate PR - Process Water SA - Saline Water TE - Trade Effluent TS - Treated Sewage US - Untreated Sewage RE - Recreational Water DW - Drinking Water Non-regulatory UNL - Unspecified Liquid SL - Sludge G - Gas OTH - Other	Lab Sample No(s)		16251961			
	Customer Sample Reference		2921-BH5-SS4			
	AGS Reference					
	Depth (m)		2.60 - 5.90			
	Container		250g Amber Jar (ALE210)	400g Tub (ALE214)	60g VOC (ALE215)	
	Sample Type		S	S	S	
Metals in solid samples by OES	All	NDPs: 0 Tests: 1	X			
Mineral Oil	All	NDPs: 0 Tests: 1	X			
PAH by GCMS	All	NDPs: 0 Tests: 1	X			
PCBs by GCMS	All	NDPs: 0 Tests: 1	X			
pH	All	NDPs: 0 Tests: 1	X			
Phenols by HPLC (S)	All	NDPs: 0 Tests: 1	X			
Phenols by HPLC (W)	All	NDPs: 0 Tests: 1		X		
Sample description	All	NDPs: 0 Tests: 1	X			
Total Dissolved Solids	All	NDPs: 0 Tests: 1		X		
Total Organic Carbon	All	NDPs: 0 Tests: 1	X			
Total Sulphate	All	NDPs: 0 Tests: 1	X			
Total Sulphur	All	NDPs: 0 Tests: 1	X			
TPH CWG GC (S)	All	NDPs: 0 Tests: 1	X			



CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-63

Client Reference: 2921-028 COC4-F

Report Number:

427003

Location: CHARTERED LAND - HE

Order Number:

Superseded Report:

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
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Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
16251961	2921-BH5-SS4	2.60 - 5.90	Dark Brown	Stone/Soil	Stones	Oil/Petroleum

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

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.

Coarser coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.



CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-63 Client Reference: 2921-028 COC4-F Report Number: 427003
 Location: CHARTERED LAND - HE Order Number: Superseded Report:

Results Legend		Customer Sample Ref.	2921-BH5-SS4					
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sampled Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	2.80 - 5.90					
M	mCERTS accredited.		Soil/Solid (S)					
aq	Aqueous / settled sample.		21/09/2017					
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.		26/09/2017					
**	Subcontracted test.		170926-53					
	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery		16251961					
(F)	Trigger breach confirmed							
1-5	@	Sample deviation (see appendix)							
Component	LOD/Units		Method					
Moisture Content Ratio (% of as received sample)	%	PM024	6.2					
Loss on ignition	<0.7 %	TM018	2.58	#				
Mineral oil >C10-C40	<1 mg/kg	TM061	909					
Mineral Oil Surrogate % recovery**	%	TM061	78.5					
Phenol	<0.01 mg/kg	TM062 (S)	<0.01	#				
Organic Carbon, Total	<0.2 %	TM132	0.535	#				
Sulphur, Total	<0.02 %	TM132	0.0847					
Sulphate, Total potential	<0.06 %	TM132	0.254					
pH	1 pH Units	TM133	8.72	#				
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6	#				
Cyanide, Total	<1 mg/kg	TM153	<1	#				
Cyanide, Free	<1 mg/kg	TM153	<1	#				
PCB congener 28	<3 µg/kg	TM168	<3	#				
PCB congener 52	<3 µg/kg	TM168	<3	#				
PCB congener 101	<3 µg/kg	TM168	<3	#				
PCB congener 118	<3 µg/kg	TM168	<3	#				
PCB congener 138	<3 µg/kg	TM168	<3	#				
PCB congener 153	<3 µg/kg	TM168	<3	#				
PCB congener 180	<3 µg/kg	TM168	<3	#				
Sum of detected PCB 7 Congeners	<21 µg/kg	TM168	<21					
Antimony	<0.6 mg/kg	TM181	<0.6	#				
Arsenic	<0.6 mg/kg	TM181	5.59	#				
Barium	<0.6 mg/kg	TM181	16.9	#				
Cadmium	<0.02 mg/kg	TM181	0.576	#				
Chromium	<0.9 mg/kg	TM181	2.87	#				
Copper	<1.4 mg/kg	TM181	5.7	#				
Iron	<1000 mg/kg	TM181	7550	#				
Lead	<0.7 mg/kg	TM181	7.75	#				
Manganese	<0.13 mg/kg	TM181	744	#				
Mercury	<0.14 mg/kg	TM181	0.242	#				
Molybdenum	<0.1 mg/kg	TM181	0.81	#				
Nickel	<0.2 mg/kg	TM181	10.6	#				