



## Certificates of Analysis



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Dublin 14

**Attention:** Sven Klinkenbergh

## CERTIFICATE OF ANALYSIS

**Date:** 03 October 2017  
**Customer:** D\_MINEREX\_DUB  
**Sample Delivery Group (SDG):** 170923-22  
**Your Reference:** 2921-028 COC1-A  
**Location:** Chartered Land - Heuston South Quarter  
**Report No:** 426617

We received 1 sample on Friday September 22, 2017 and 1 of these samples were scheduled for analysis which was completed on Tuesday October 03, 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: 170923-22 Client Reference: 2921-028 COC1-A Report Number: 426617  
Location: Chartered Land - Heuston Order Number: Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
16234821	2921-BH1-Comp-SS6		0.30 - 1.70	20/09/2017

Maximum Sample/Coolbox Temperature (°C) : 14.2

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: 170923-22 Client Reference: 2921-028 COC1-A Report Number: 426617  
 Location: Chartered Land - Heuston Order Number: Superseded Report:

<b>Results Legend</b> <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 UIS - Untreated Sewage - Recreational Water - Drinking Water Non-regulatory UNL - Unspecified Liquid SL - Sludge G - Gas OTH - Other	Lab Sample No(s)		16234821		
	Customer Sample Reference		2921-BH1-Comp-SS 6		
	AGS Reference				
	Depth (m)		0.30 - 1.70		
	Container		250g Amber Jar (ALE210) 400g Tub (ALE214) 60g VOC (ALE216)		
	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: 170923-22 Client Reference: 2921-028 COC1-A Report Number: 426617  
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<b>Results Legend</b> <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)	16234821			
	Customer Sample Reference	2921-BH1-Comp-SS 6			
	AGS Reference				
	Depth (m)	0.30 - 1.70			
	Container	250g Amber Jar (ALEZ10)	60g VOC (ALEZ15)	400g Tub (ALEZ14)	
	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

Validated

SDG: 170923-22 Client Reference: 2921-028 COC1-A Report Number: 426617  
 Location: Chartered Land - Heuston 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
16234821	2921-BH1-Comp-SS6	0.30 - 1.70	Dark Brown	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.

Coarser 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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SDG: 170923-22 Client Reference: 2921-028 COC1-A Report Number: 426617  
 Location: Chartered Land - Heuston Order Number: Superseded Report:

Results Legend		Customer Sample Ref.	2921-BH1-Comp-S				
#	ISO17025 accredited.		S6				
M	mCERTS accredited.						
aq	Aqueous / settled sample.						
dis.filt	Dissolved / filtered sample.	Depth (m)	0.30 - 1.70				
tot.unfilt	Total / unfiltered sample.	Sample Type	Unspecified Solid (UNS)				
-	Subcontracted test.	Date Sampled	20/09/2017				
**	% 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	22/09/2017				
1-5&#9@	Sample deviation (see appendix)	SDG Ref	170923-22				
		Lab Sample No.(s)	16234821				
		AGS Reference					
Component	LOD/Units	Method					
Moisture Content Ratio (% of as received sample)	%	PM024	11				
Loss on ignition	<0.7 %	TM018	4.61				
Mineral oil >C10-C40	<1 mg/kg	TM061	137				
Mineral Oil Surrogate % recovery**	%	TM061	95.2				
Phenol	<0.01 mg/kg	TM062 (S)	<0.01				
Organic Carbon, Total	<0.2 %	TM132	1.43				
Sulphur, Total	<0.02 %	TM132	0.152				
Sulphate, Total potential	<0.06 %	TM132	0.456				
pH	1 pH Units	TM133	8.89				
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	9.45				
Barium	<0.6 mg/kg	TM181	61.6				
Cadmium	<0.02 mg/kg	TM181	0.886				
Chromium	<0.9 mg/kg	TM181	8.13				
Copper	<1.4 mg/kg	TM181	18.2				
Iron	<1000 mg/kg	TM181	17800				
Lead	<0.7 mg/kg	TM181	16.2				
Manganese	<0.13 mg/kg	TM181	588				
Mercury	<0.14 mg/kg	TM181	0.547				
Molybdenum	<0.1 mg/kg	TM181	2.15				
Nickel	<0.2 mg/kg	TM181	26.1				









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SDG: 170923-22 Client Reference: 2921-028 COC1-A Report Number: 426617  
 Location: Chartered Land - Heuston Order Number: Superseded Report:

**TPH CWG (S)**

Results Legend		Customer Sample Ref.	2921-BH1-Comp-S				
#	ISO17025 accredited.		S6				
M	mCERTS accredited.						
aq	Aqueous / settled sample.						
diss.filt	Dissolved / filtered sample.	Depth (m)	0.30 - 1.70				
tot.unfilt	Total / unfiltered sample.	Sample Type	Unspecified Solid (UNS)				
*	Subcontracted test.	Date Sampled	20/09/2017				
**	% 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	22/09/2017				
1-5&+5@	Sample deviation (see appendix)	SDG Ref	170923-22				
		Lab Sample No.(s)	16234821				
		AGS Reference					
Component	LOD/Units	Method					
GRO Surrogate % recovery**	%	TM089	12				
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				
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	717				
Aliphatics >C16-C21	<100 µg/kg	TM173	1880				
Aliphatics >C21-C35	<100 µg/kg	TM173	40800				
Aliphatics >C35-C44	<100 µg/kg	TM173	40700				
Aliphatics >C12-C44	<100 µg/kg	TM173	84100				
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	1640				
Aromatics >EC21-EC35	<100 µg/kg	TM173	44400				
Aromatics >EC35-EC44	<100 µg/kg	TM173	66100				
Aromatics >EC40-EC44	<100 µg/kg	TM173	39800				
Total Aromatics >EC12-EC44	<100 µg/kg	TM173	112000				
Total Aliphatics & Aromatics >C5-C44	<100 µg/kg	TM173	196000				



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SDG: 170923-22 Client Reference: 2921-028 COC1-A Report Number: 426617
Location: Chartered Land - Heuston Order Number: Superseded Report:

Asbestos Identification - Soil

Table with 11 columns: 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: 02/10/17, Eva Guerra, -, Not Detected (#), Not Detected (#), Not Detected (#), Not Detected (#), Not Detected (#), Not Detected (#), Not Detected (#).



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SDG: 170923-22 Client Reference: 2921-028 COC1-A Report Number: 426617  
 Location: Chartered Land - Heuston Order Number: Superseded Report:

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference: 170923-22 Site Location: Chartered Land - Heuston South Q  
 Mass Sample taken (kg): 0.101 Natural Moisture Content (%): 12.4  
 Mass of dry sample (kg): 0.090 Dry Matter Content (%): 89  
 Particle Size <4mm: >95%

Case: 170923-22  
 SDG: 170923-22  
 Lab Sample Number(s): 16234821  
 Sampled Date: 20-Sep-2017  
 Customer Sample Ref.: 2921-BH1-Comp-SS6  
 Depth (m): 0.30 - 1.70

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 (%)	1.43
Loss on Ignition (%)	4.61
Sum of BTEX (mg/kg)	<0.024
Sum of 7 PCBs (mg/kg)	<0.021
Mineral Oil (mg/kg)	137
PAH Sum of 17 (mg/kg)	-
pH (pH Units)	8.89
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis	C2 Conc <sup>n</sup> in 10:1 eluate (mg/l)		A2 10:1 conc <sup>n</sup> 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	0.00192	<0.0005	0.0192	<0.005	0.5	2	25
Barium	0.00462	<0.0002	0.0462	<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	0.0012	<0.0003	0.012	<0.003	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	0.00994	<0.0005	0.0994	<0.005	0.5	10	30
Nickel	0.00074	<0.0004	0.0074	<0.004	0.4	10	40
Lead	0.0151	<0.0002	0.151	<0.002	0.5	10	50
Lead nony	0.00108	<0.0001	0.0108	<0.001	0.06	0.7	5
Mercurium	0.00332	<0.0005	0.0332	<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)	21.2	<2	212	<20	1000	20000	50000
Total Dissolved Solids	70.6	<5	706	<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: 26-Sep-2017  
 pH (pH Units): 9.51  
 Conductivity (µS/cm): 87.40  
 Temperature (°C): 18.00  
 Volume Leachant (Litres): 0.889

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

03/10/2017 13:03:04



# CERTIFICATE OF ANALYSIS

Validated

SDG: 170923-22 Client Reference: 2921-028 COC1-A Report Number: 426617  
 Location: Chartered Land - Heuston Order Number: Superseded Report:

## Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample <sup>1</sup>	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		

<sup>1</sup> 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

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SDG: 170923-22 Client Reference: 2921-028 COC1-A Report Number: 426617  
 Location: Chartered Land - Heuston Order Number: Superseded Report:

Test Completion Dates

Lab Sample No(s)	16234821
Customer Sample Ref.	2921-BH1-Comp-S SS
AGS Ref.	
Depth	0.30 - 1.70
Type	Unspecified So

Anions by Kone (w)	28-Sep-2017
Asbestos ID in Solid Samples	02-Oct-2017
Boron Water Soluble	28-Sep-2017
CEN 10:1 Leachate (1 Stage)	26-Sep-2017
CEN Readings	27-Sep-2017
Cyanide Comp/Free/Total/Thiocyanate	28-Sep-2017
Dissolved Metals by ICP-MS	28-Sep-2017
Dissolved Organic/Inorganic Carbon	28-Sep-2017
EPH CWG (Aliphatic) GC (S)	27-Sep-2017
EPH CWG (Aromatic) GC (S)	27-Sep-2017
Fluoride	27-Sep-2017
GRO by GC-FID (S)	29-Sep-2017
Hexavalent Chromium (s)	27-Sep-2017
Ignition in soils	03-Oct-2017
Heavy Metals by ICP-OES Dissolved (W)	28-Sep-2017
Metals in solid samples by OES	28-Sep-2017
Mineral Oil	28-Sep-2017
PAH by GCMS	27-Sep-2017
PCBs by GCMS	28-Sep-2017
pH	26-Sep-2017
Phenols by HPLC (S)	28-Sep-2017
Phenols by HPLC (W)	28-Sep-2017
Sample description	25-Sep-2017
Total Dissolved Solids	28-Sep-2017
Total Organic Carbon	28-Sep-2017
Total Sulphate	28-Sep-2017
Total Sulphur	28-Sep-2017
TPH CWG GC (S)	29-Sep-2017



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SDG: 170923-22 Client Reference: 2921-028 COC1-A Report Number: 426617  
Location: Chartered Land - Heuston Order Number: Superseded Report:

## Chromatogram

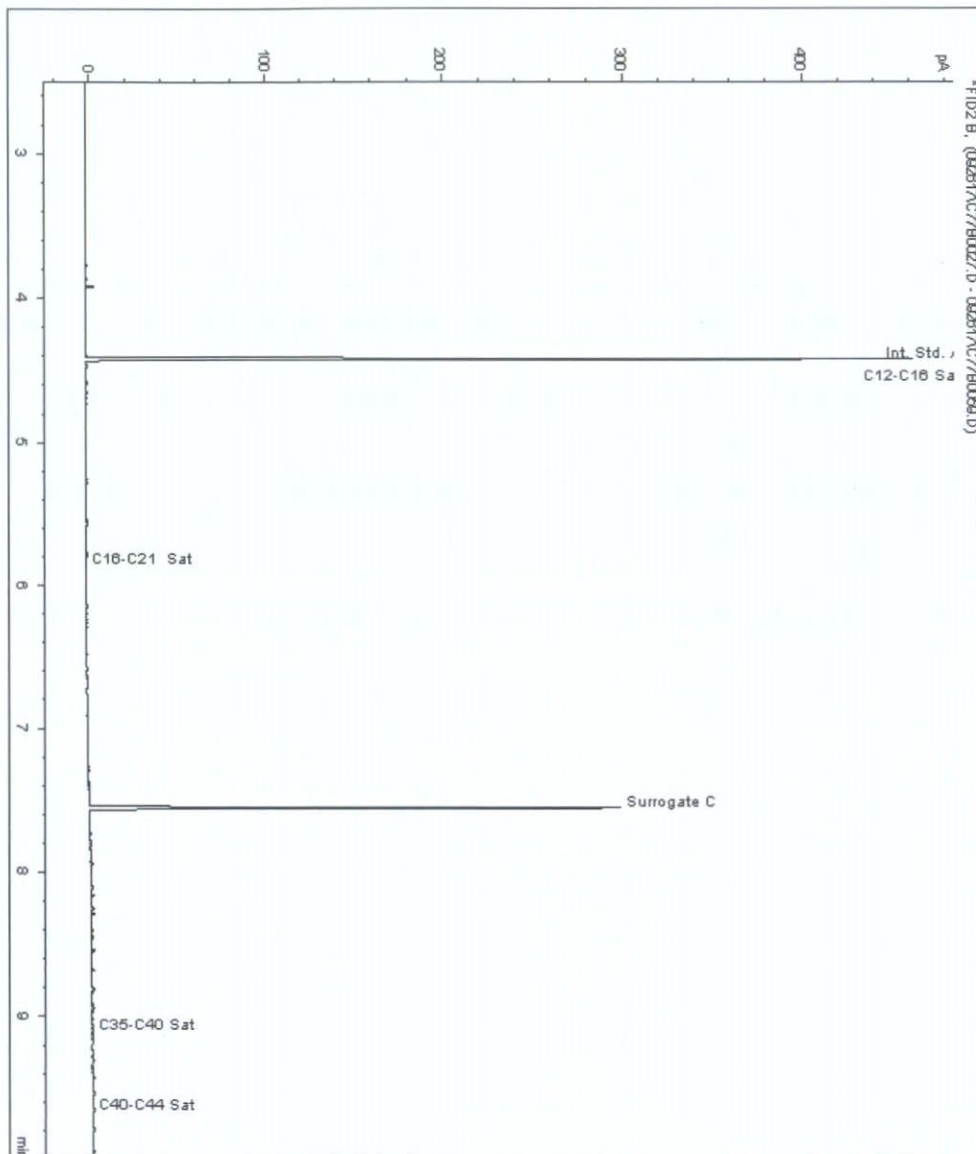
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No: 16246318  
Sample ID: 2921-BH1-Comp-SS6

Depth: 0.30 - 1.70

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

Sample Identity: 15209236-  
Date Acquired : 9/26/2017 6:59:41 PM  
Units : ppb  
Dilution :  
CF : 1  
Multiplier : 0.990







# CERTIFICATE OF ANALYSIS

Validated

SDG: 170923-22 Client Reference: 2921-028 COC1-A Report Number: 426617  
Location: Chartered Land - Houston Order Number: Superseded Report:

## Chromatogram

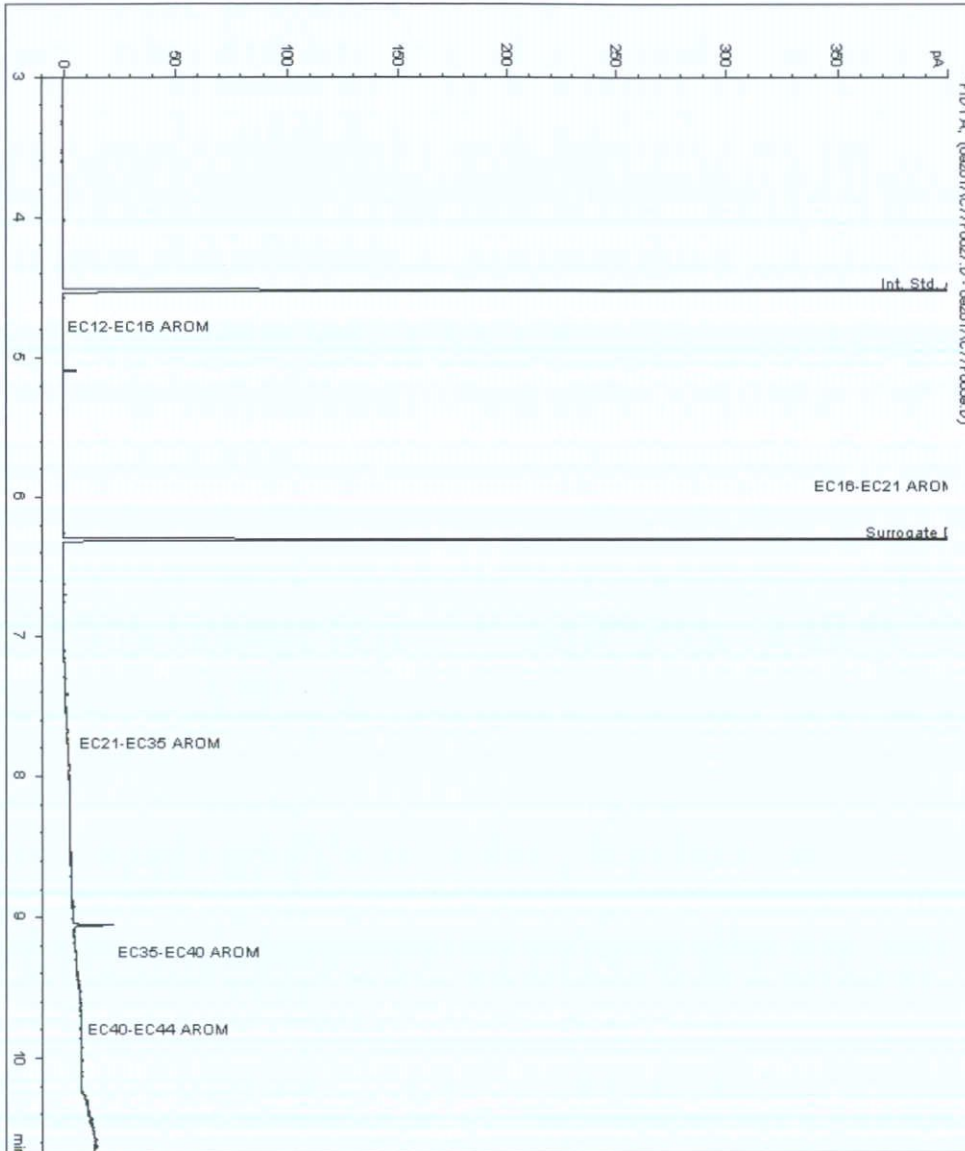
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 16246318  
Sample ID : 2921-BH1-Comp-SS6

Depth : 0.30 - 1.70

Speciated TPH - AROM ( C12 - C40 )

Sample Identity: 15209237-  
Date Acquired : 9/26/2017 6:59:41 PM  
Units : ppb  
Dilution:





CERTIFICATE OF ANALYSIS

Validated

SDG: 170923-22 Client Reference: 2921-028 COC1-A Report Number: 426617  
Location: Chartered Land - Houston Order Number: Superseded Report:

Chromatogram

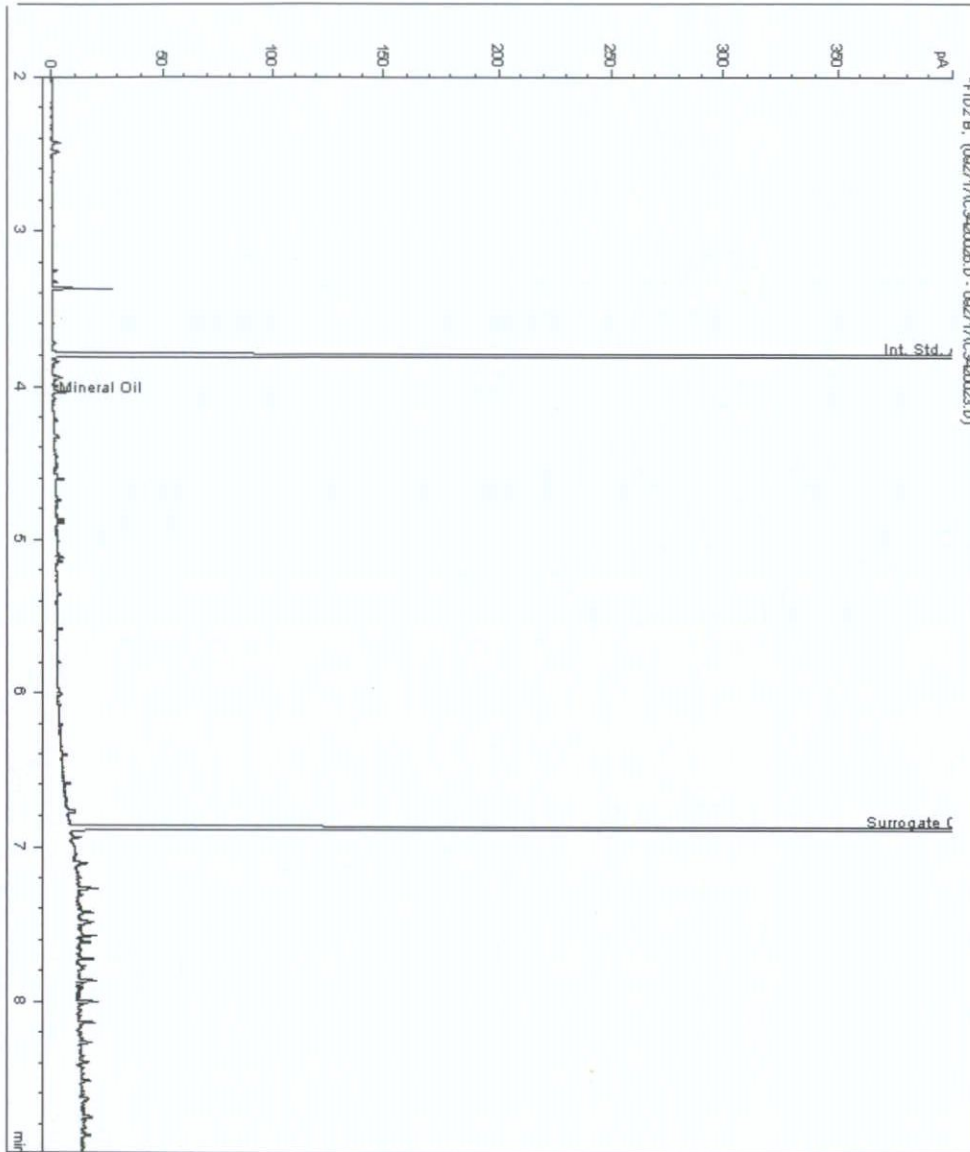
Analysis: Mineral Oil

Sample No : 16251042  
Sample ID : 2921-BH1-Comp-SS6

Depth : 0.30 - 1.70

Mineral Oil Range Organics ( C10 - C40 )

Sample Identity : 15209239-  
Date Acquired : 28/09/17 11:00:09 PM  
Units : mg/kg  
Sample Multiplier : 0.000  
Dilution :





# CERTIFICATE OF ANALYSIS

Validated

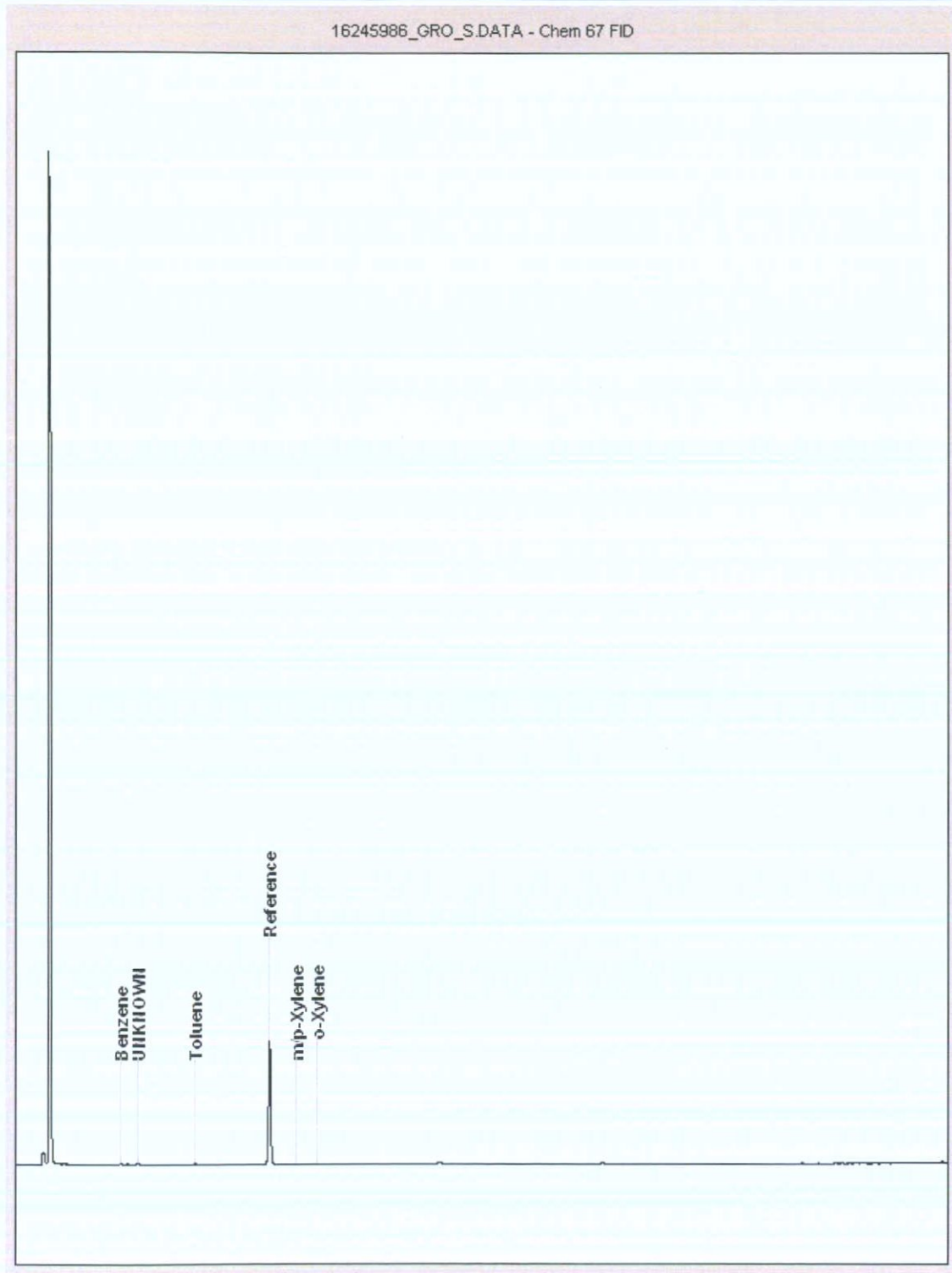
SDG: 170923-22 Client Reference: 2921-028 COC1-A Report Number: 426617  
Location: Chartered Land - Houston Order Number: Superseded Report:

## Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 16245986  
Sample ID : 2921-BH1-Comp-SS6

Depth : 0.30 - 1.70





# CERTIFICATE OF ANALYSIS

SDG: 170923-22 Client Reference: 2921-028 COC1-A Report Number: 426617  
 Location: rtered Land - Heuston South Qur 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.



Unit 7-8 Hawarden Business Park  
Manor Road (off Manor Lane)

Hawarden

Deeside

CH5 3US

Tel: (01244) 528700

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Website: www.alsenvironmental.co.uk

Minerex Environmental  
Taney hall  
Eglington Terrace  
Dundrum  
Dublin  
Dublin 14

Attention: Sven Klinkenbergh

## CERTIFICATE OF ANALYSIS

<b>Date:</b>	03 October 2017
<b>Customer:</b>	D_MINEREX_DUB
<b>Sample Delivery Group (SDG):</b>	170922-108
<b>Your Reference:</b>	2921-028 COC1-B
<b>Location:</b>	Chartered Land
<b>Report No:</b>	426616

We received 1 sample on Friday September 22, 2017 and 1 of these samples were scheduled for analysis which was completed on Tuesday October 03, 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: 170922-108 Client Reference: 2921-028 COC1-B Report Number: 426616  
Location: Chartered Land Order Number: Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
16234820	2921-BH1-SS4		1.70 - 4.00	20/09/2017

Maximum Sample/Coolbox Temperature (°C) : 14.2

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: 170922-108 Client Reference: 2921-028 COC1-B Report Number: 426616  
 Location: Chartered Land Order Number: Superseded Report:

<b>Results Legend</b> <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 UWS - Untreated Sewage - Recreational Water - Drinking Water Non-regulatory UNL - Unspecified Liquid SL - Sludge G - Gas OTH - Other	Lab Sample No(s)	16234620			
	Customer Sample Reference	2921-BH1-SS4			
	AGS Reference				
	Depth (m)	1.70 - 4.00			
	Container	250g Amber Jar (ALE210)	60g VOC (ALE216)	400g Tub (ALE214)	
	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		



**CERTIFICATE OF ANALYSIS**

Validated

SDG: 170922-108 Client Reference: 2921-028 COC1-B Report Number: 426616  
 Location: Chartered Land 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)	16234820		
	Customer Sample Reference	2921-BH1-SS4		
	AGS Reference			
	Depth (m)	1.70 - 4.00		
	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"/>	





# CERTIFICATE OF ANALYSIS

Validated

SDG: 170922-108 Client Reference: 2921-028 COC1-B Report Number: 426616  
Location: Chartered Land 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			
16234820	2921-BH1-SS4	1.70 - 4.00	Black	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.



# CERTIFICATE OF ANALYSIS

Validated

<b>SDG:</b> 170922-108	<b>Client Reference:</b> 2921-028 COC1-B	<b>Report Number:</b> 426616
<b>Location:</b> Chartered Land	<b>Order Number:</b>	<b>Superseded Report:</b>

Results Legend		Customer Sample Ref.	2921-BH1-SS4				
# ISO17025 accredited.							
M mCERTS accredited.							
aq Aqueous / settled sample.		Depth (m)	1.70 - 4.00				
diss.filt Dissolved / filtered sample.		Sample Type	Unspecified Solid (UNS)				
tot.unfilt Total / unfiltered sample.		Date Sampled	20/09/2017				
* 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	22/09/2017				
(F) Trigger breach confirmed		SDG Ref	170922-108				
1-5&#9@ Sample deviation (see appendix)		Lab Sample No.(s)	16234820				
AGS Reference							
Component	LOD/Units	Method					
Moisture Content Ratio (% of as received sample)	%	PM024	9.3				
Loss on ignition	<0.7 %	TM018	1.7				
Mineral oil >C10-C40	<1 mg/kg	TM061	33.1				
Mineral Oil Surrogate % recovery**	%	TM061	88.2				
Phenol	<0.01 mg/kg	TM062 (S)	<0.01				
Organic Carbon, Total	<0.2 %	TM132	0.291				
Sulphur, Total	<0.02 %	TM132	0.254				
Sulphate, Total potential	<0.06 %	TM132	0.762				
pH	1 pH Units	TM133	8.71				
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	7.44				
Barium	<0.6 mg/kg	TM181	59.2				
Cadmium	<0.02 mg/kg	TM181	1.13				
Chromium	<0.9 mg/kg	TM181	7.29				
Copper	<1.4 mg/kg	TM181	13.4				
Iron	<1000 mg/kg	TM181	13800				
Lead	<0.7 mg/kg	TM181	14.5				
Manganese	<0.13 mg/kg	TM181	882				
Mercury	<0.14 mg/kg	TM181	0.39				
Molybdenum	<0.1 mg/kg	TM181	1.68				
Nickel	<0.2 mg/kg	TM181	23.6				







# CERTIFICATE OF ANALYSIS

Validated

<b>SDG:</b> 170922-108	<b>Client Reference:</b> 2921-028 COC1-B	<b>Report Number:</b> 426616
<b>Location:</b> Chartered Land	<b>Order Number:</b>	<b>Superseded Report:</b>

## TPH CWG (S)

Component	LOD/Units	Method	Customer Sample Ref.	2921-BH1-SS4						
<table style="width: 100%; font-size: small;"> <tr> <td style="width: 25%; vertical-align: top;"> <b>Results Legend</b>            # 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&amp;#9@ Sample deviation (see appendix)         </td> <td style="width: 25%; vertical-align: top;"> <b>Customer Sample Ref.</b>            2921-BH1-SS4             Depth (m) 1.70 - 4.00            Sample Type Unspecified Solid (UNS)            Date Sampled 20/09/2017            Sampled Time            Date Received 22/09/2017            SDG Ref 170922-108            Lab Sample No.(s) 16234820            AGS Reference         </td> <td style="width: 50%;"></td> </tr> </table>								<b>Results Legend</b> # 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&#9@ Sample deviation (see appendix)	<b>Customer Sample Ref.</b> 2921-BH1-SS4  Depth (m) 1.70 - 4.00 Sample Type Unspecified Solid (UNS) Date Sampled 20/09/2017 Sampled Time Date Received 22/09/2017 SDG Ref 170922-108 Lab Sample No.(s) 16234820 AGS Reference	
<b>Results Legend</b> # 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&#9@ Sample deviation (see appendix)	<b>Customer Sample Ref.</b> 2921-BH1-SS4  Depth (m) 1.70 - 4.00 Sample Type Unspecified Solid (UNS) Date Sampled 20/09/2017 Sampled Time Date Received 22/09/2017 SDG Ref 170922-108 Lab Sample No.(s) 16234820 AGS Reference									
GRO Surrogate % recovery**	%	TM089	22							
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	2.2							
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	<100							
Aliphatics >C16-C21	<100 µg/kg	TM173	<100							
Aliphatics >C21-C35	<100 µg/kg	TM173	<100							
Aliphatics >C35-C44	<100 µg/kg	TM173	<100							
Aliphatics >C12-C44	<100 µg/kg	TM173	<100							
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	<100							
Aromatics >EC21-EC35	<100 µg/kg	TM173	<100							
Aromatics >EC35-EC44	<100 µg/kg	TM173	<100							
Aromatics >EC40-EC44	<100 µg/kg	TM173	<100							
Total Aromatics >EC12-EC44	<100 µg/kg	TM173	<100							
Total Aliphatics & Aromatics >C5-C44	<100 µg/kg	TM173	<100							



**CERTIFICATE OF ANALYSIS**

Validated

SDG: 170922-108      Client Reference: 2921-028 COC1-B      Report Number: 426616  
 Location: Chartered Land      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-BH1-SS4	02/10/17	Eva Guerra	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Depth (m)	1.70 - 4.00										
Sample Type	MISC_SOLID										
Date Sampled	20/09/2017										
Date Received	00:00:00										
SDG	25/09/2017										
Original Sample	13:10:29										
Method Number	170922-108										
	16234820										
	TM048										



CERTIFICATE OF ANALYSIS

Validated

SDG: 170922-108 Client Reference: 2921-028 COC1-B Report Number: 426616  
 Location: Chartered Land 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  
 Mass Sample taken (kg) 0.100 Natural Moisture Content (%) 10.3  
 Mass of dry sample (kg) 0.090 Dry Matter Content (%) 90.7  
 Particle Size <4mm >95%

Case  
 SDG 170922-108  
 Lab Sample Number(s) 16234820  
 Sampled Date 20-Sep-2017  
 Customer Sample Ref. 2921-BH1-SS4  
 Depth (m) 1.70 - 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 (%)	0.291
Loss on Ignition (%)	1.7
Sum of BTEX (mg/kg)	<0.024
Sum of 7 PCBs (mg/kg)	<0.021
Mineral Oil (mg/kg)	33.1
PAH Sum of 17 (mg/kg)	-
pH (pH Units)	8.71
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

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

Eluate Analysis	C2 Conc <sup>n</sup> in 10:1 eluate (mg/l)		A2 10:1 conc <sup>n</sup> 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	0.000517	<0.0005	0.00517	<0.005	0.5	2	25
Barium	0.034	<0.0002	0.34	<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	0.000432	<0.0003	0.00432	<0.003	2	50	100
Mercury Dissolved (CVAF)	0.000036	<0.00001	0.00036	<0.0001	0.01	0.2	2
Molybdenum	0.00765	<0.0005	0.0765	<0.005	0.5	10	30
Nickel	<0.0004	<0.0004	<0.004	<0.004	0.4	10	40
Lead	0.00024	<0.0002	0.0024	<0.002	0.5	10	50
Iron	0.000681	<0.0001	0.00681	<0.001	0.06	0.7	5
Chromium	0.00493	<0.0005	0.0493	<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)	21.2	<2	212	<20	1000	20000	50000
Total Dissolved Solids	82.8	<5	828	<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 26-Sep-2017  
 pH (pH Units) 8.99  
 Conductivity (µS/cm) 98.00  
 Temperature (°C) 14.60  
 Volume Leachant (Litres) 0.891

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

03/10/2017 13:01:42



# CERTIFICATE OF ANALYSIS

Validated

<b>SDG:</b> 170922-108	<b>Client Reference:</b> 2921-028 COC1-B	<b>Report Number:</b> 426616
<b>Location:</b> Chartered Land	<b>Order Number:</b>	<b>Superseded Report:</b>

## Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample <sup>1</sup>	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		

<sup>1</sup> 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: 170922-108 Client Reference: 2921-028 COC1-B Report Number: 426616  
 Location: Chartered Land Order Number: Superseded Report:

**Test Completion Dates**

Lab Sample No(s) 16234820  
 Customer Sample Ref. 2921-BH1-SS4  
 AGS Ref.  
 Depth 1.70 - 4.00  
 Type Unspecified So

Anions by Kone (w)	28-Sep-2017
Asbestos ID in Solid Samples	02-Oct-2017
Boron Water Soluble	28-Sep-2017
CEN 10:1 Leachate (1 Stage)	28-Sep-2017
CEN Readings	27-Sep-2017
Cyanide Comp/Free/Total/Thiocyanate	28-Sep-2017
Dissolved Metals by ICP-MS	28-Sep-2017
Dissolved Organic/Inorganic Carbon	28-Sep-2017
EPH CWG (Aliphatic) GC (S)	27-Sep-2017
EPH CWG (Aromatic) GC (S)	27-Sep-2017
Fluoride	27-Sep-2017
GRO by GC-FID (S)	29-Sep-2017
Hexavalent Chromium (s)	27-Sep-2017
Ignition in soils	03-Oct-2017
Heavy Metals by ICP-OES Dissolved	28-Sep-2017
Metals by ICap-OES Dissolved (W)	28-Sep-2017
Metals in solid samples by OES	28-Sep-2017
Mineral Oil	28-Sep-2017
PAH by GCMS	27-Sep-2017
PCBs by GCMS	28-Sep-2017
pH	26-Sep-2017
Phenols by HPLC (S)	27-Sep-2017
Phenols by HPLC (W)	28-Sep-2017
Sample description	25-Sep-2017
Total Dissolved Solids	28-Sep-2017
Total Organic Carbon	28-Sep-2017
Total Sulphate	28-Sep-2017
Total Sulphur	28-Sep-2017
TPH CWG GC (S)	29-Sep-2017



CERTIFICATE OF ANALYSIS

Validated

SDG: 170922-108 Client Reference: 2921-028 COC1-B Report Number: 426616  
Location: Chartered Land Order Number: Superseded Report:

Chromatogram

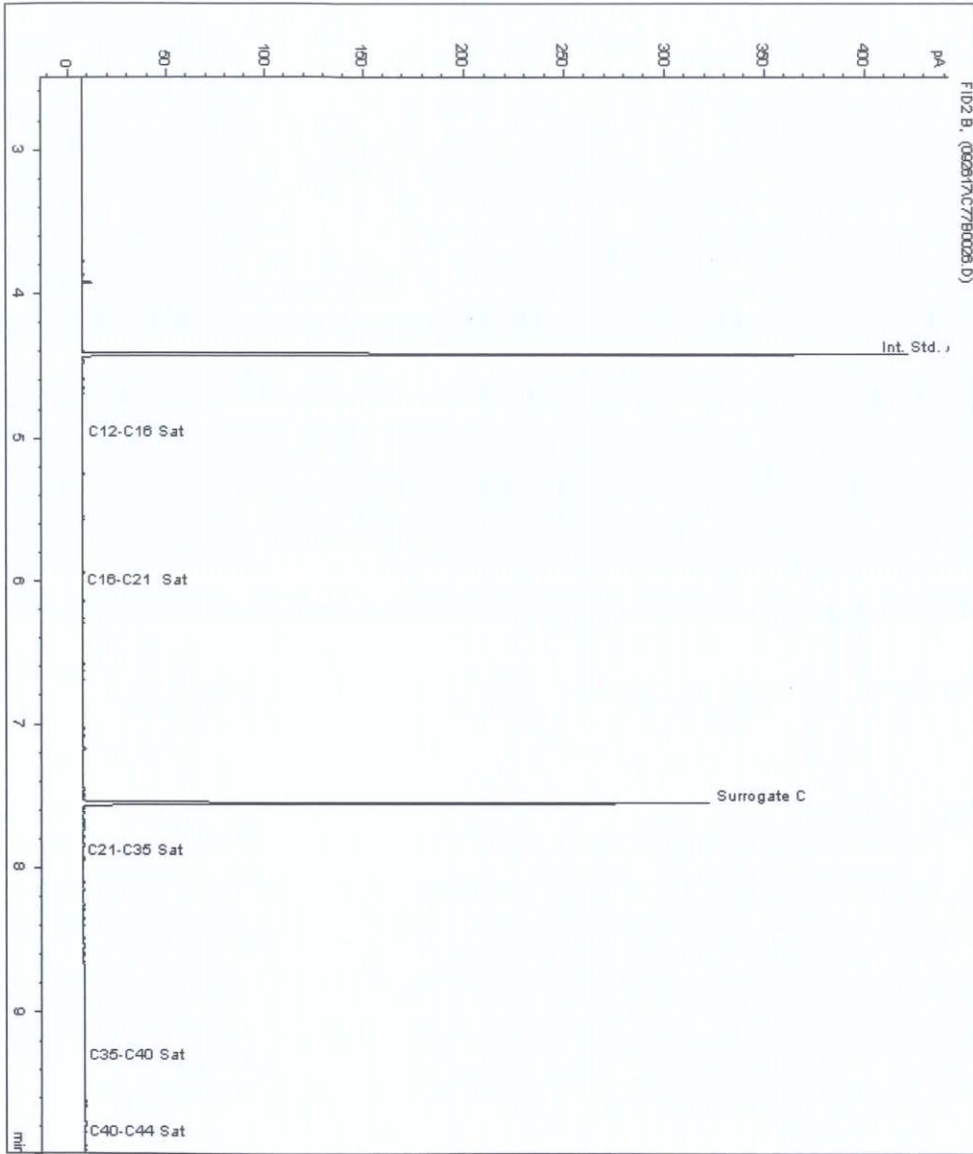
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 16246183  
Sample ID : 2921-BH1-SS4

Depth : 1.70 - 4.00

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

Sample Identity: 15209170-  
Date Acquired : 9/26/2017 6:39:33 PM  
Units : ppb  
Dilution :  
CF : 1  
Multiplier : 1.010





# CERTIFICATE OF ANALYSIS

Validated

SDG: 170922-108      Client Reference: 2921-028 COC1-B      Report Number: 426616  
Location: Chartered Land      Order Number:      Superseded Report:

## Chromatogram

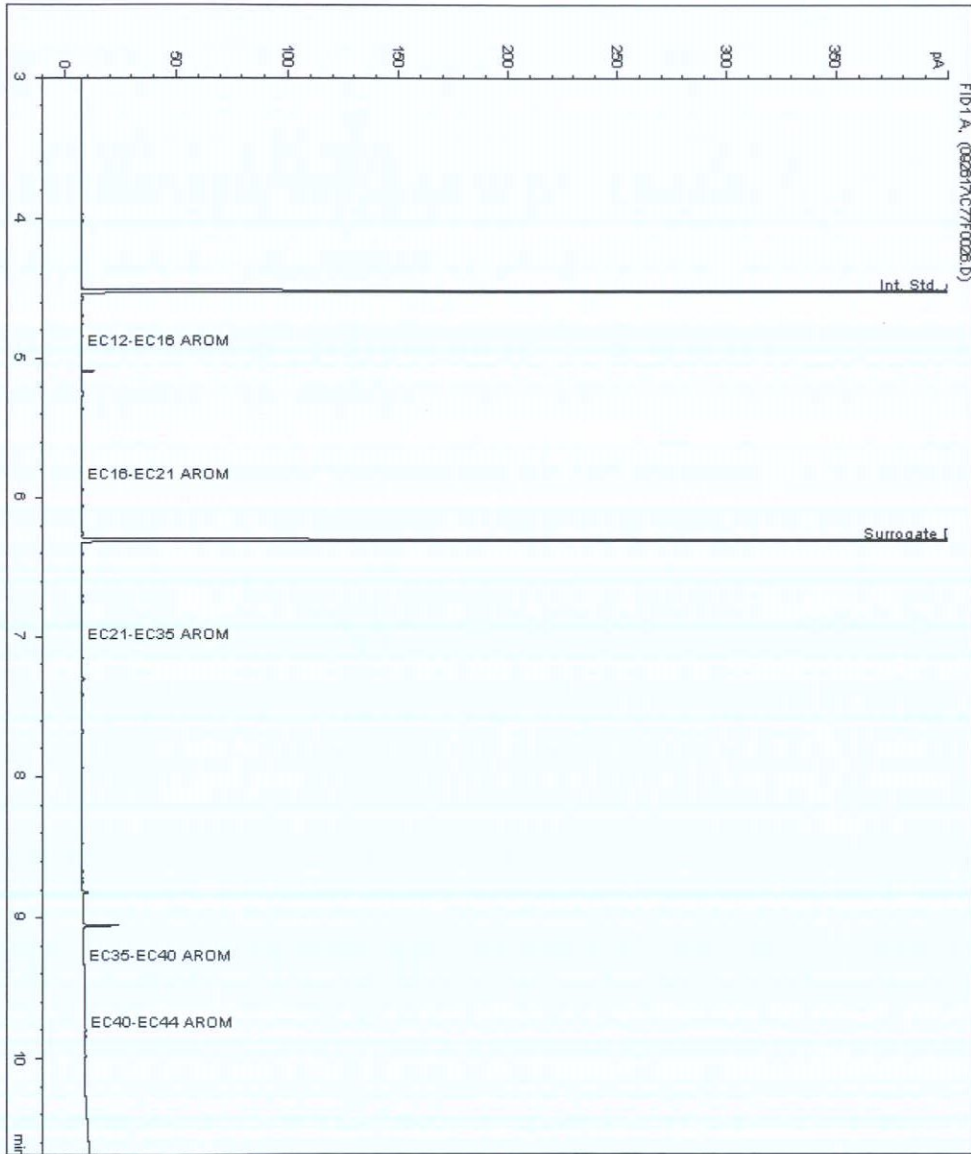
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 16246183  
Sample ID : 2921-BH1-SS4

Depth : 1.70 - 4.00

Speciated TPH - AROM ( C12 - C40 )

Sample Identity: 15209171-  
Date Acquired : 9/26/2017 6:39:33 PM  
Units : ppb  
Dilution:





# CERTIFICATE OF ANALYSIS

Validated

SDG: 170922-108 Client Reference: 2921-028 COC1-B Report Number: 426616  
Location: Chartered Land Order Number: Superseded Report:

## Chromatogram

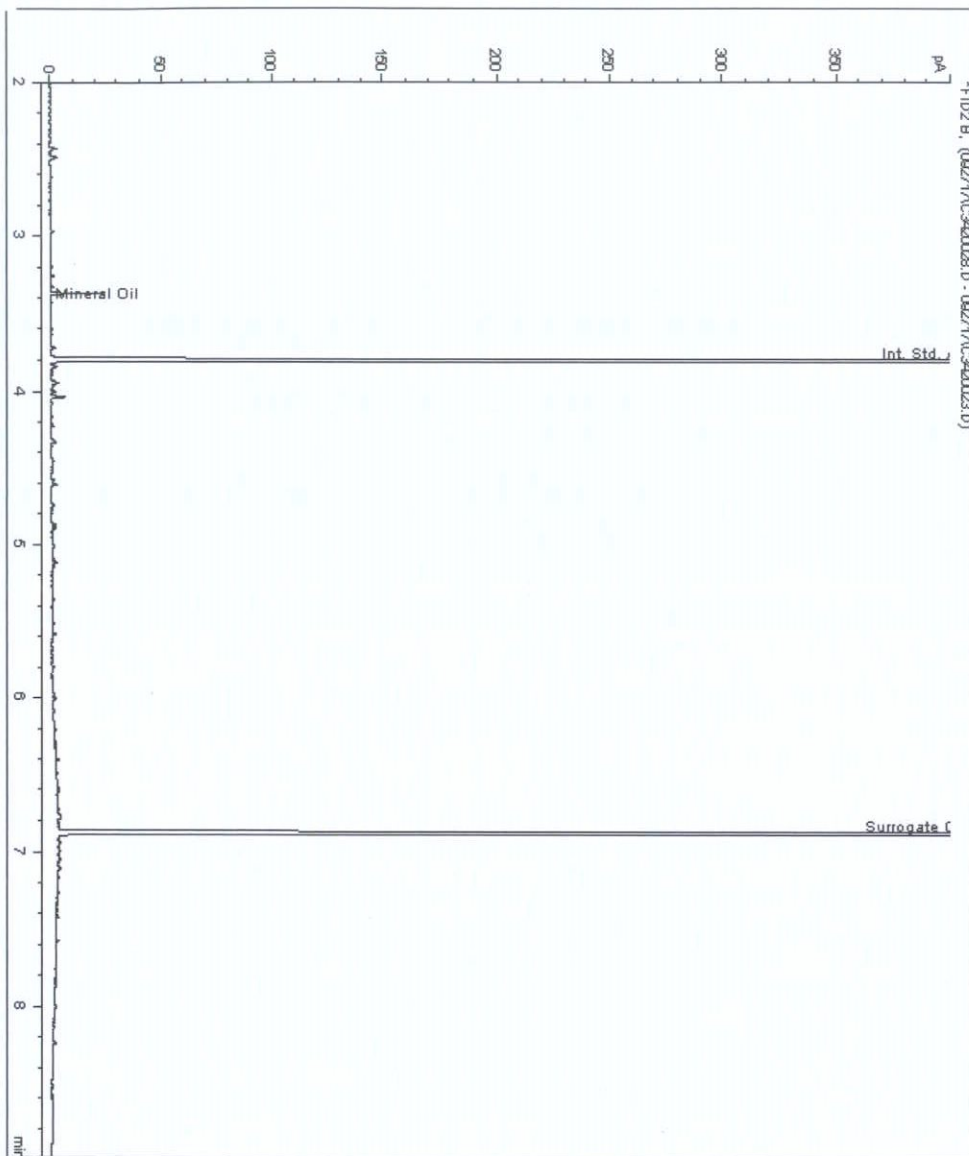
Analysis: Mineral Oil

Sample No : 16251485  
Sample ID : 2921-BH1-SS4

Depth : 1.70 - 4.00

### Mineral Oil Range Organics ( C10 - C40 )

Sample Identity : 15209173-  
Date Acquired : 28/09/17 11:34:31 PM  
Units : mg/kg  
Sample Multiplier : 0.000  
Dilution :





# CERTIFICATE OF ANALYSIS

Validated

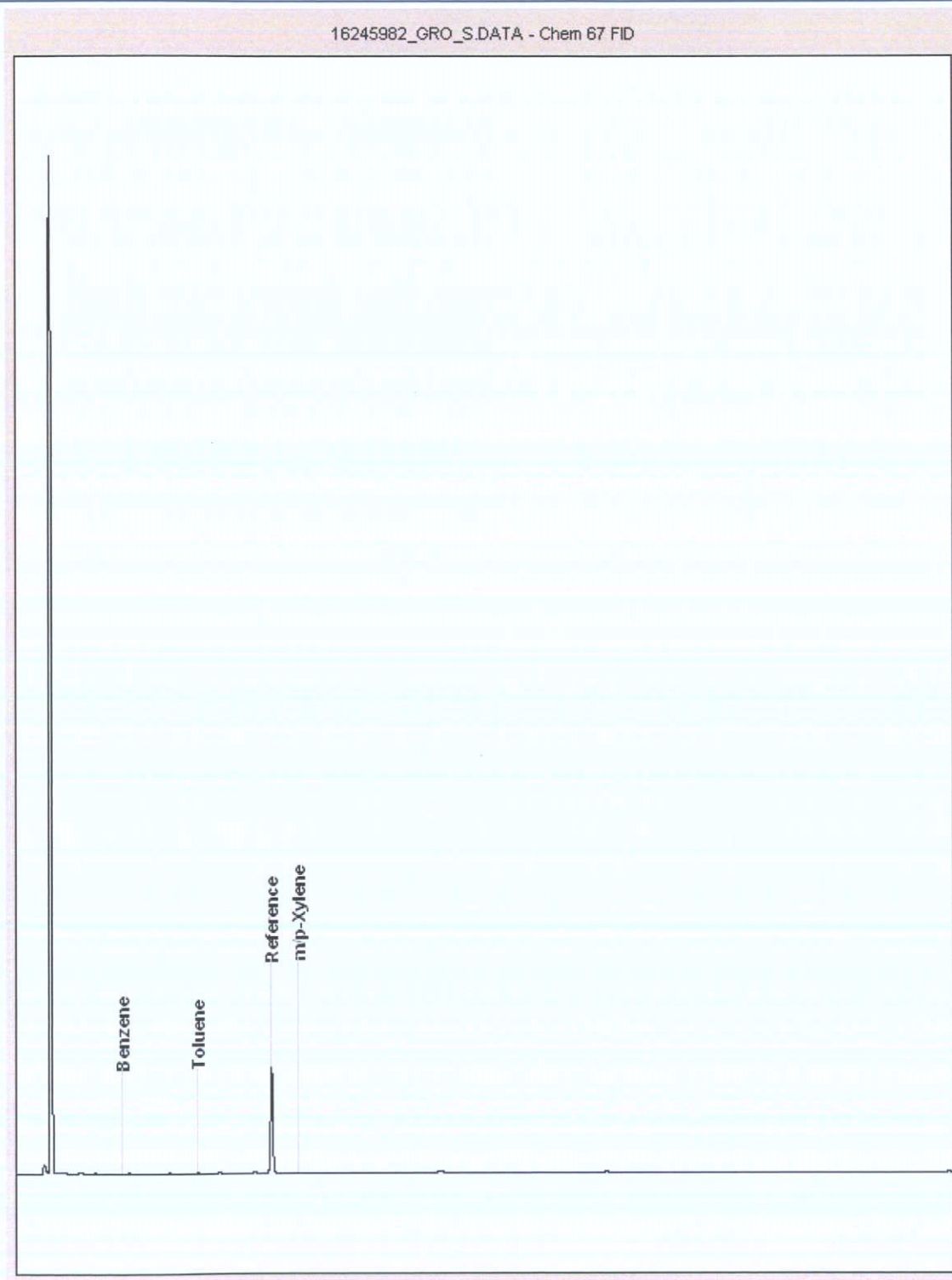
SDG:	170922-108	Client Reference:	2921-028 COC1-B	Report Number:	426616
Location:	Chartered Land	Order Number:		Superseded Report:	

## Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 16245982  
Sample ID : 2921-BH1-SS4

Depth : 1.70 - 4.00





# CERTIFICATE OF ANALYSIS

SDG: 170922-108 Client Reference: 2921-028 COC1-B Report Number: 426616  
 Location: Chartered Land 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 NH<sub>4</sub> 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 TMO48 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  
Eglington Terrace  
Dundrum  
Dublin  
Dublin 14

Attention: Sven Klinkenbergh

## CERTIFICATE OF ANALYSIS

**Date:** 04 October 2017  
**Customer:** D\_MINEREX\_DUB  
**Sample Delivery Group (SDG):** 170923-68  
**Your Reference:** 2921-028 COC3-A  
**Location:** Chartered Land - Heuston South Quarter  
**Report No:** 426768

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



ALS Environmental is part of ALS Life Sciences Limited. ALS Life Sciences Limited registered Office: Units 7 & 8 Hawarden Business Park, Manor Road, Hawarden, Deeside, CH5 3US. Registered in England and Wales No. 4057291.



CERTIFICATE OF ANALYSIS

Validated

SDG: 170923-68 Client Reference: 2921-028 COC3-A Report Number: 426768
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: 16240404, 2921-BH2-SS2, 0.30 - 1.50, 20/09/2017

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.





CERTIFICATE OF ANALYSIS

Validated

SDG: 170923-68 Client Reference: 2921-028 COC3-A Report Number: 426768  
 Location: Chartered Land - Houston 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 - Recreational Water - Drinking Water Non-regulatory U/L - Unspecified Liquid SL - Sludge G - Gas OTH - Other	Lab Sample No(s)			
	Customer Sample Reference			
	AGS Reference			
	Depth (m)	0.30 - 1.50		
	Container	250g Amber Jar (ALE210)	400g Tub (ALE214)	80g VOC (ALE215)
	Sample Type	S	S	S
Anions by Kone (w)	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
Boron Water Soluble	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
CEN Readings	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
EPH CWG (Aliphatic) GC (S)	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
EPH CWG (Aromatic) GC (S)	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
Fluoride	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
GRO by GC-FID (S)	All	NDPs: 0 Tests: 1		<input checked="" type="checkbox"/>
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
Loss on Ignition in soils	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
Mercury Dissolved	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	
Metals by iCap-OES Dissolved (W)	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>	



# CERTIFICATE OF ANALYSIS

Validated

<b>SDG:</b> 170923-68	<b>Client Reference:</b> 2921-028 COC3-A	<b>Report Number:</b> 426768
<b>Location:</b> Chartered Land - Heuston	<b>Order Number:</b>	

<b>Results Legend</b> <div style="display: flex; flex-direction: column; gap: 5px;"> <div style="display: flex; align-items: center;"><span style="background-color: yellow; border: 1px solid black; padding: 2px;">X</span> Test</div> <div style="display: flex; align-items: center;"><span style="background-color: red; color: white; border: 1px solid black; padding: 2px;">N</span> No Determination Possible</div> </div> <b>Sample Types -</b> 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)	16240404	Customer Sample Reference	2921-BH2-SS2	AGS Reference		Depth (m)	0.30 - 1.50	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: 170923-68 Client Reference: 2921-028 COC3-A Report Number: 426768  
Location: Chartered Land - Heuston 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
16240404	2921-BH2-SS2	0.30 - 1.50	Dark Brown	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.

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: 170923-68 Client Reference: 2921-028 COC3-A Report Number: 426768  
 Location: Chartered Land - Heuston Order Number: Superseded Report:

Results Legend		Customer Sample Ref.	2921-BH2-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						
1-55+5@	Sample deviation (see appendix)						
Component	LOD/Units	Method	Depth (m)	Sample Type	Date Sampled	Sampled Time	Date Received
Moisture Content Ratio (% of as received sample)	%	PM024	0.30 - 1.50	Soil/Solid (S)	20/09/2017		23/09/2017
Loss on ignition	<0.7 %	TM018					170923-68
Mineral oil >C10-C40	<1 mg/kg	TM061					16240404
Mineral Oil Surrogate % recovery**	%	TM061					
Phenol	<0.01 mg/kg	TM062 (S)					
Organic Carbon, Total	<0.2 %	TM132					
Sulphur, Total	<0.02 %	TM132					
Sulphate, Total potential	<0.06 %	TM132					
pH	1 pH Units	TM133					
Chromium, Hexavalent	<0.6 mg/kg	TM151					
Cyanide, Total	<1 mg/kg	TM153					
Cyanide, Free	<1 mg/kg	TM153					
PCB congener 28	<3 µg/kg	TM168					
PCB congener 52	<3 µg/kg	TM168					
PCB congener 101	<3 µg/kg	TM168					
PCB congener 118	<3 µg/kg	TM168					
PCB congener 138	<3 µg/kg	TM168					
PCB congener 153	<3 µg/kg	TM168					
PCB congener 180	<3 µg/kg	TM168					
Sum of detected PCB 7 Congeners	<21 µg/kg	TM168					
Antimony	<0.6 mg/kg	TM181					
Arsenic	<0.6 mg/kg	TM181					
Barium	<0.6 mg/kg	TM181					
Cadmium	<0.02 mg/kg	TM181					
Chromium	<0.9 mg/kg	TM181					
Copper	<1.4 mg/kg	TM181					
Iron	<1000 mg/kg	TM181					
Lead	<0.7 mg/kg	TM181					
Manganese	<0.13 mg/kg	TM181					
Mercury	<0.14 mg/kg	TM181					
Molybdenum	<0.1 mg/kg	TM181					
Nickel	<0.2 mg/kg	TM181					



CERTIFICATE OF ANALYSIS

Validated

SDG: 170923-68 Client Reference: 2921-028 COC3-A Report Number: 426768
Location: Chartered Land - Heuston 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: 170923-68 Client Reference: 2921-028 COC3-A Report Number: 426768  
 Location: Chartered Land - Heuston Order Number: Superseded Report:

PAH by GCMS

Results Legend		Customer Sample Ref.				
#	ISO17025 accredited.	2921-BH2-SS2				
#	mCERTS accredited.					
aq	Aqueous / settled sample.	Depth (m)	0.30 - 1.50			
diss.filt	Dissolved / filtered sample.	Sample Type	Soil/Solid (S)			
tot.unfilt	Total / unfiltered sample.	Date Sampled	20/09/2017			
*	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	23/09/2017			
(F)	Trigger breach confirmed	SDG Ref	170923-68			
1-5&#@	Sample deviation (see appendix)	Lab Sample No.(s)	16240404			
		AGS Reference				
Component	LOD/Units	Method				
Naphthalene-d8 % recovery**	%	TM218	101			
Acenaphthene-d10 % recovery**	%	TM218	98.4			
Phenanthrene-d10 % recovery**	%	TM218	97			
Chrysene-d12 % recovery**	%	TM218	99.9			
Perylene-d12 % recovery**	%	TM218	107			
Naphthalene	<9 µg/kg	TM218	37.6	#		
Acenaphthylene	<12 µg/kg	TM218	56.4	#		
Acenaphthene	<8 µg/kg	TM218	37.6	#		
Fluorene	<10 µg/kg	TM218	53.7	#		
Phenanthrene	<15 µg/kg	TM218	919	#		
Anthracene	<16 µg/kg	TM218	381	#		
Fluoranthene	<17 µg/kg	TM218	3250	#		
Pyrene	<15 µg/kg	TM218	2530	#		
Benzo(a)anthracene	<14 µg/kg	TM218	1560	#		
Chrysene	<10 µg/kg	TM218	1170	#		
Benzo(b)fluoranthene	<15 µg/kg	TM218	1790	#		
Benzo(k)fluoranthene	<14 µg/kg	TM218	751	#		
Benzo(a)pyrene	<15 µg/kg	TM218	1390	#		
Indeno(1,2,3-cd)pyrene	<18 µg/kg	TM218	722	#		
Dibenzo(a,h)anthracene	<23 µg/kg	TM218	204	#		
Benzo(g,h,i)perylene	<24 µg/kg	TM218	754	#		
Coronene	<200 µg/kg	TM218	<200			
PAH, Total Detected USEPA 16	<118 µg/kg	TM218	15600			
PAH, Total Detected USEPA 16 + Coronene	<318 µg/kg	TM218	15600			



**CERTIFICATE OF ANALYSIS**

Validated

SDG: 170923-68 Client Reference: 2921-028 COC3-A Report Number: 426768  
 Location: Chartered Land - Heuston Order Number: Superseded Report:

**TPH CWG (S)**

Results Legend		Customer Sample Ref.				
#	ISO17025 accredited.	2921-BH2-SS2				
M	mCERTS accredited.					
aq	Aqueous / settled sample.	Depth (m)	0.30 - 1.50			
diss.filt	Dissolved / filtered sample.	Sample Type	Soil/Solid (S)			
tot.unfilt	Total / unfiltered sample.	Date Sampled	20/09/2017			
*	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	23/09/2017			
(F)	Trigger breach confirmed	SDG Ref	170923-68			
1-5&#9@	Sample deviation (see appendix)	Lab Sample No.(s)	16240404			
		AGS Reference				
Component	LOD/Units	Method				
GRO Surrogate % recovery**	%	TM089	46			
GRO TOT (Moisture Corrected)	<44 µg/kg	TM089	86.7			
Methyl tertiary butyl ether (MTBE)	<5 µg/kg	TM089	<5			
Benzene	<10 µg/kg	TM089	<10			
Toluene	<2 µg/kg	TM089	3.25			
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	15.2			
Aliphatics >C8-C10	<10 µg/kg	TM089	16.3			
Aliphatics >C10-C12	<10 µg/kg	TM089	16.3			
Aliphatics >C12-C16	<100 µg/kg	TM173	2940			
Aliphatics >C16-C21	<100 µg/kg	TM173	12000			
Aliphatics >C21-C35	<100 µg/kg	TM173	196000			
Aliphatics >C35-C44	<100 µg/kg	TM173	172000			
Aliphatics >C12-C44	<100 µg/kg	TM173	383000			
Aromatics >EC5-EC7	<10 µg/kg	TM089	<10			
Aromatics >EC7-EC8	<10 µg/kg	TM089	<10			
Aromatics >EC8-EC10	<10 µg/kg	TM089	17.3			
Aromatics >EC10-EC12	<10 µg/kg	TM089	10.8			
Aromatics >EC12-EC16	<100 µg/kg	TM173	1590			
Aromatics >EC16-EC21	<100 µg/kg	TM173	9700			
Aromatics >EC21-EC35	<100 µg/kg	TM173	205000			
Aromatics >EC35-EC44	<100 µg/kg	TM173	232000			
Aromatics >EC40-EC44	<100 µg/kg	TM173	106000			
Total Aromatics >EC12-EC44	<100 µg/kg	TM173	448000			
Total Aliphatics & Aromatics >C5-C44	<100 µg/kg	TM173	832000			



**CERTIFICATE OF ANALYSIS**

Validated

SDG: 170923-68 Client Reference: 2921-028 COC3-A Report Number: 426768  
 Location: Chartered Land - Heuston 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-BH2-SS2	03/10/17	Eva Guerra	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Depth (m)	0.30 - 1.50										
Sample Type	SOLID										
Date Sampled	20/09/2017										
Date Received	00:00:00										
SDG	27/09/2017										
Original Sample	10:04:09										
Method Number	170923-68										
	16240404										
	TM048										





CERTIFICATE OF ANALYSIS

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SDG: 170923-68 Client Reference: 2921-028 COC3-A Report Number: 426768  
 Location: Chartered Land - Heuston 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 South Q1  
 Mass Sample taken (kg) 0.097 Natural Moisture Content (%) 8.34  
 Mass of dry sample (kg) 0.090 Dry Matter Content (%) 92.3  
 Particle Size <4mm >95%

Case  
 SDG 170923-68  
 Lab Sample Number(s) 16240404  
 Sampled Date 20-Sep-2017  
 Customer Sample Ref. 2921-BH2-SS2  
 Depth (m) 0.30 - 1.50

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 (%)	1.26
Loss on Ignition (%)	5.18
Sum of BTEX (mg/kg)	<0.024
Sum of 7 PCBs (mg/kg)	<0.021
Mineral Oil (mg/kg)	158
PAH Sum of 17 (mg/kg)	-
pH (pH Units)	11.4
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis	C2 Conc <sup>n</sup> in 10:1 eluate (mg/l)		A2 10:1 conc <sup>n</sup> 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	0.000766	<0.0005	0.00766	<0.005	0.5	2	25
Barium	0.025	<0.0002	0.25	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	0.00677	<0.001	0.0677	<0.01	0.5	10	70
Copper	0.00615	<0.0003	0.0615	<0.003	2	50	100
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	0.0023	<0.0005	0.023	<0.005	0.5	10	30
Nickel	0.00176	<0.0004	0.0176	<0.004	0.4	10	40
Lead	<0.0002	<0.0002	<0.002	<0.002	0.5	10	50
Iron	0.00179	<0.0001	0.0179	<0.001	0.06	0.7	5
Vanadium	0.00146	<0.0005	0.0146	<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)	62.1	<2	621	<20	1000	20000	50000
Total Dissolved Solids	410	<5	4100	<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) 11.47  
 Conductivity (µS/cm) 614.00  
 Temperature (°C) 19.90  
 Volume Leachant (Litres) 0.892

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 12:58:25



# CERTIFICATE OF ANALYSIS

Validated

SDG: 170923-68 Client Reference: 2921-028 COC3-A Report Number: 426768  
 Location: Chartered Land - Heuston Order Number: Superseded Report:

## Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample <sup>1</sup>	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		

<sup>1</sup> 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: 170923-68 Client Reference: 2921-028 COC3-A Report Number: 426768  
 Location: Chartered Land - Heuston Order Number: Superseded Report:

Test Completion Dates

Lab Sample No(s)	16240404
Customer Sample Ref.	2921-BH2-SS2
AGS Ref.	
Depth	0.30 - 1.50
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)	27-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	28-Sep-2017
Mineral Oil	29-Sep-2017
PAH by GCMS	29-Sep-2017
PCBs by GCMS	28-Sep-2017
pH	26-Sep-2017
Phenols by HPLC (S)	27-Sep-2017
Phenols by HPLC (W)	29-Sep-2017
Sample description	25-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)	28-Sep-2017



# CERTIFICATE OF ANALYSIS

Validated

SDG: 170923-68 Client Reference: 2921-028 COC3-A Report Number: 426768  
Location: Chartered Land - Heuston Order Number: Superseded Report:

## Chromatogram

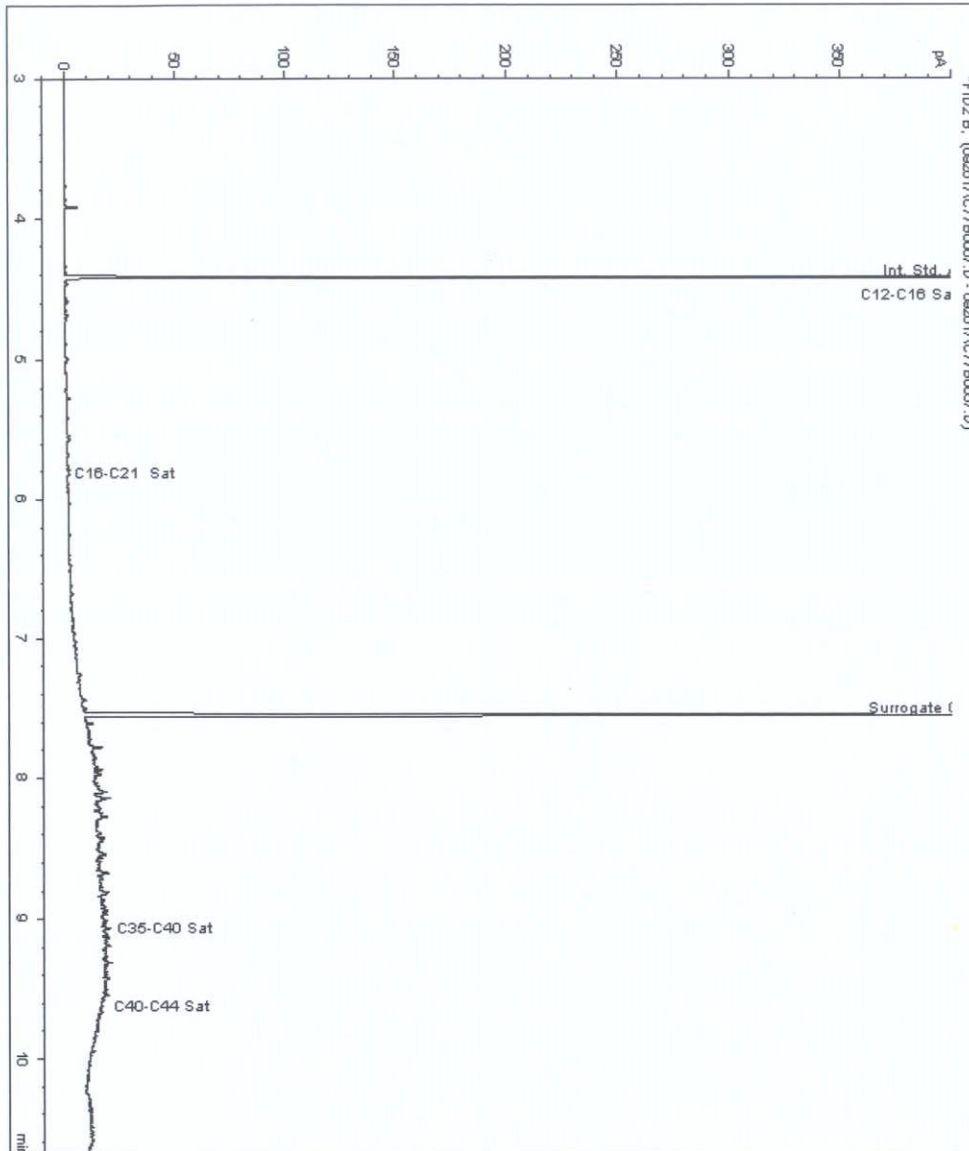
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 16247224  
Sample ID : 2921-BH2-SS2

Depth : 0.30 - 1.50

Speciated TPH - SATS ( C12 - C40 )

Sample Identity: 15211896-  
Date Acquired : 27/09/2017 19:08:45 PM  
Units : ppb  
Dilution:





# CERTIFICATE OF ANALYSIS

Validated

SDG: 170923-68 Client Reference: 2921-028 COC3-A Report Number: 426768  
Location: Chartered Land - Heuston Order Number: Superseded Report:

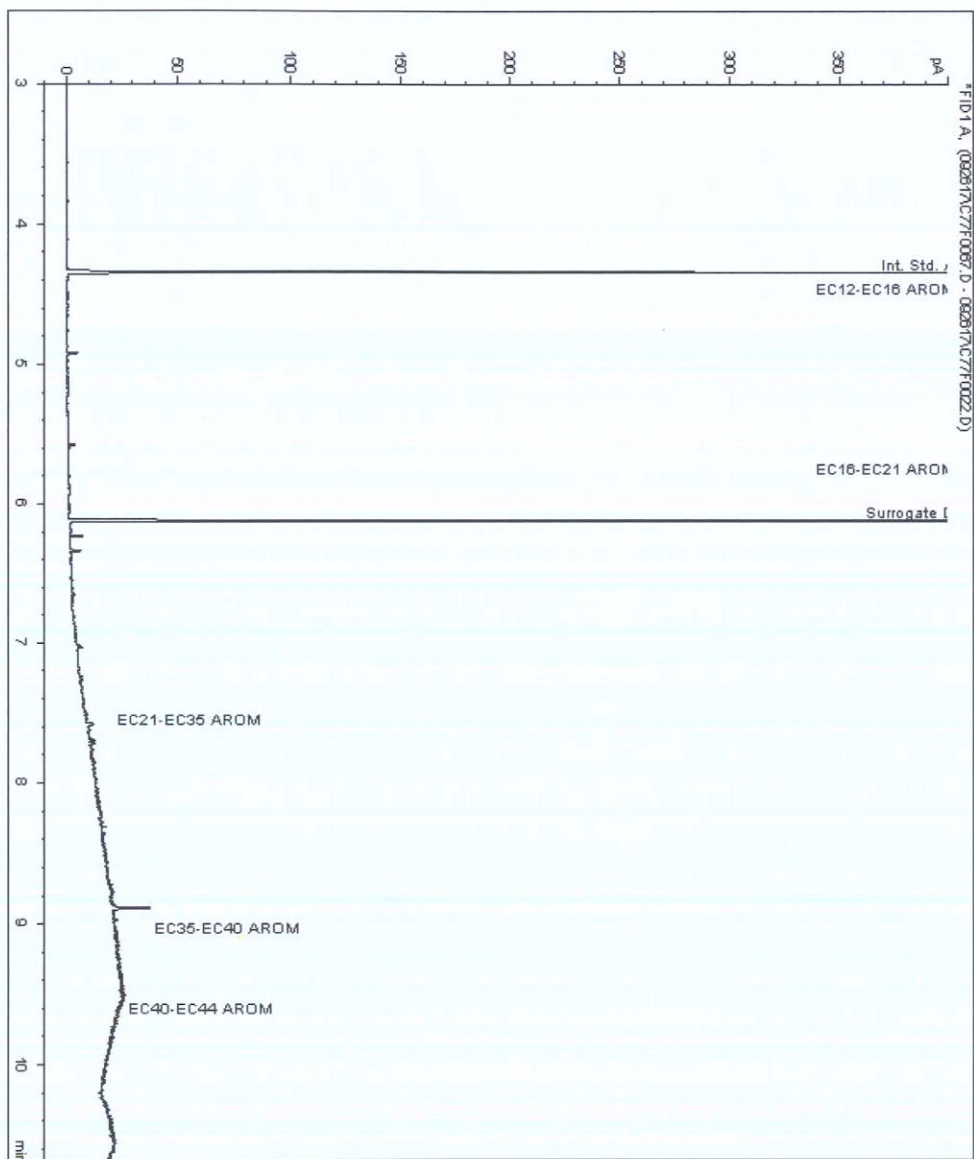
## Chromatogram

Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 16247224  
Sample ID : 2921-BH2-SS2

Depth : 0.30 - 1.50

Speciated TPH - SATS ( C12 - C40 )  
Sample Identity: 15211897-  
Date Acquired : 27/09/2017 19:08:45 PM  
Units : ppb  
Dilution:





# CERTIFICATE OF ANALYSIS

Validated

SDG: 170923-68 Client Reference: 2921-028 COC3-A Report Number: 426768  
Location: Chartered Land - Heuston Order Number: Superseded Report:

## Chromatogram

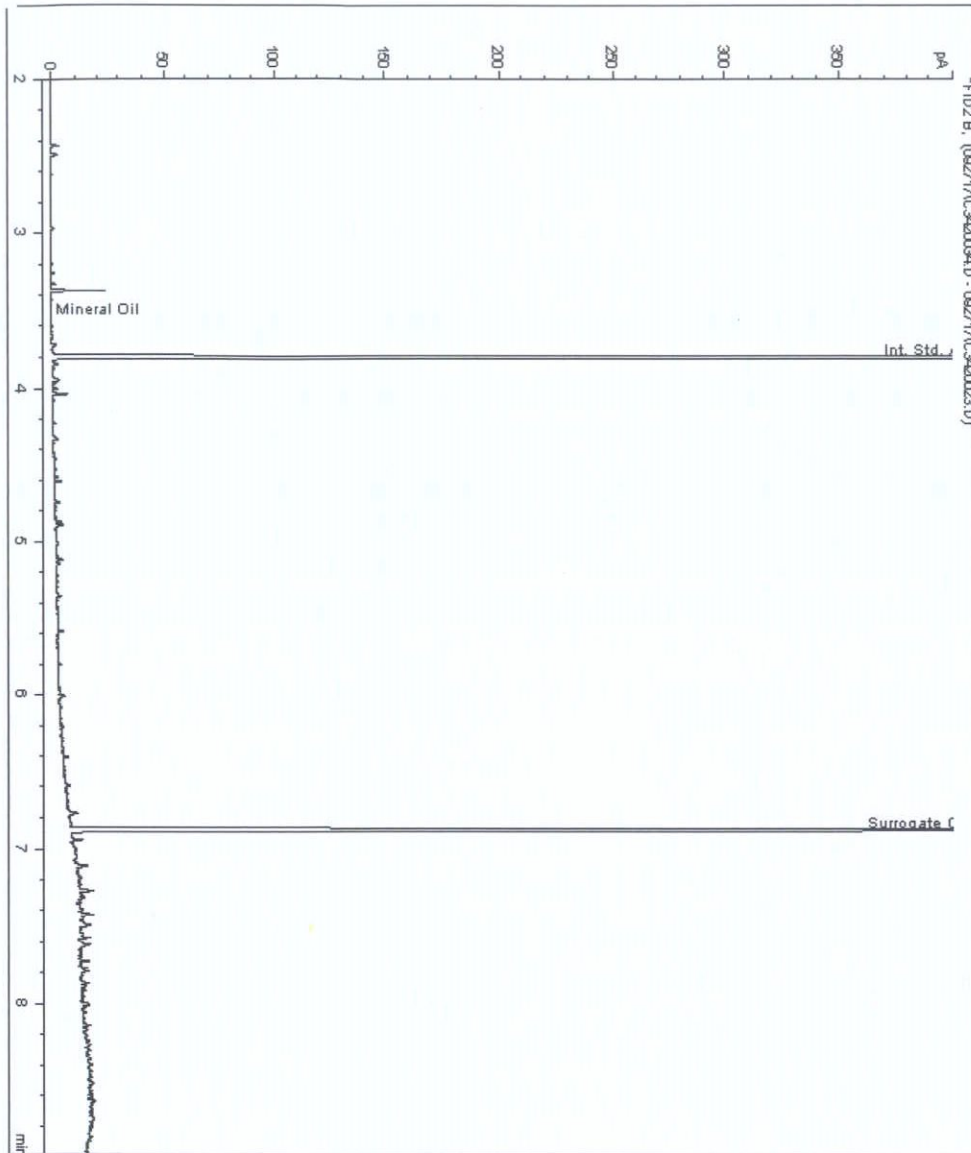
Analysis: Mineral Oil

Sample No : 16251605  
Sample ID : 2921-BH2-SS2

Depth : 0.30 - 1.50

### Mineral Oil Range Organics ( C10 - C40 )

Sample Identity : 15211899-  
Date Acquired : 28/09/17 13:37:27 PM  
Units : mg/kg  
Sample Multiplier : 0.000  
Dilution :





# CERTIFICATE OF ANALYSIS

Validated

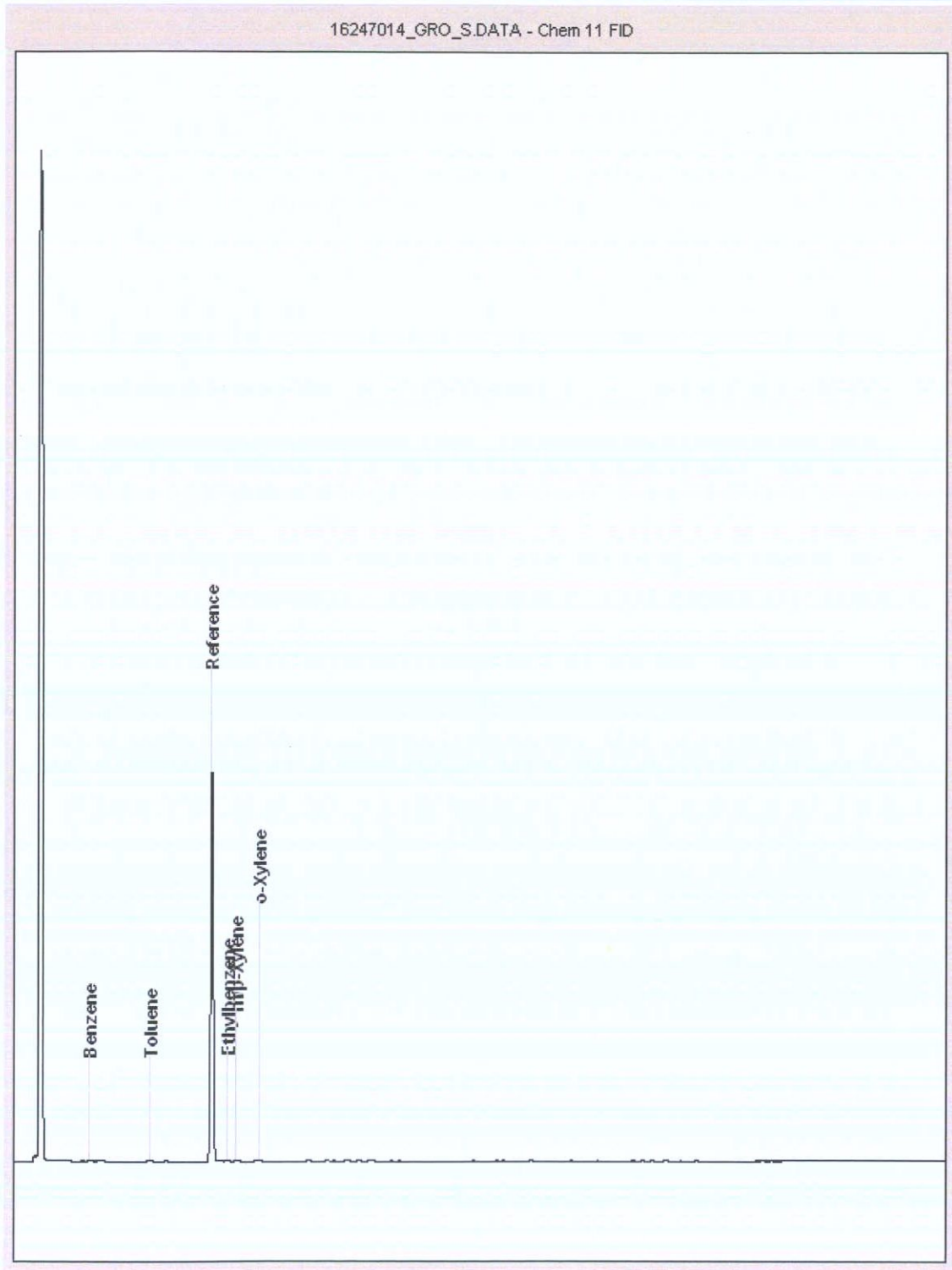
SDG: 170923-68 Client Reference: 2921-028 COC3-A Report Number: 426768  
Location: Chartered Land - Heuston Order Number: Superseded Report:

## Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 16247014  
Sample ID : 2921-BH2-SS2

Depth : 0.30 - 1.50





# CERTIFICATE OF ANALYSIS

SDG: 170923-68 Client Reference: 2921-028 COC3-A Report Number: 426768  
 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 presevation 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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Taney hall  
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Dundrum  
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Dublin 14

Attention: Sven Klinkenbergh

## CERTIFICATE OF ANALYSIS

**Date:** 04 October 2017  
**Customer:** D\_MINEREX\_DUB  
**Sample Delivery Group (SDG):** 170923-73  
**Your Reference:** 2921-028 COC3-B  
**Location:** Chartered Land - Heuston South Quarter  
**Report No:** 426770

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

Validated

SDG: 170923-73 Client Reference: 2921-028 COC3-B Report Number: 426770  
Location: Chartered Land - Heuston Order Number: Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
16240556	2921-BH2-Comp-SS6		0.30 - 2.00	20/09/2017

Maximum Sample/Coolbox Temperature (°C) : 16.0

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: 170923-73 Client Reference: 2921-028 COC3-B Report Number: 426770  
 Location: Chartered Land - Heuston Order Number: Superseded Report:

<b>Results Legend</b> <input checked="" type="checkbox"/> <b>X</b> Test <input type="checkbox"/> <b>N</b> 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)		16240556			
	Customer Sample Reference		2921-BH2-Comp-SS 6			
	AGS Reference					
	Depth (m)		0.30 - 2.00			
	Container		250g Amber Jar (ALE210)	400g Tub (ALE214)	60g VOC (ALE216)	
	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: 170923-73      Client Reference: 2921-028 COC3-B      Report Number: 426770  
 Location: Chartered Land - Heuston      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)	16240556		
	Customer Sample Reference	2921-BH2-Comp-SS 6		
	AGS Reference			
	Depth (m)	0.30 - 2.00		
	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"/>	



# CERTIFICATE OF ANALYSIS

Validated

SDG: 170923-73 Client Reference: 2921-028 COC3-B Report Number: 426770  
Location: Chartered Land - Heuston 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			
16240556	2921-BH2-Comp-SS6	0.30 - 2.00	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

Validated

<b>SDG:</b>	170923-73	<b>Client Reference:</b>	2921-028 COC3-B
<b>Location:</b>	Chartered Land - Houston	<b>Order Number:</b>	
		<b>Report Number:</b>	426770
		<b>Superseded Report:</b>	

Results Legend		Customer Sample Ref.	2921-BH2-Comp-S				
#	ISO17025 accredited.		56				
M	mCERTS accredited.						
AQ	Aqueous / settled sample.						
dis.filt	Dissolved / filtered sample.	Depth (m)	0.30 - 2.00				
tot.unfilt	Total / unfiltered sample.	Sample Type	Soil/Solid (S)				
*	Subcontracted test.	Date Sampled	20/09/2017				
**	% 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	23/09/2017				
1-5&+@	Sample deviation (see appendix)	SDG Ref	170923-73				
		Lab Sample No.(s)	16240556				
		AGS Reference					
Component	LOD/Units	Method					
Moisture Content Ratio (% of as received sample)	%	PM024	7.7				
Loss on ignition	<0.7 %	TM018	2.27				
				#			
Mineral oil >C10-C40	<1 mg/kg	TM061	66.5				
Mineral Oil Surrogate % recovery**	%	TM061	84.8				
Phenol	<0.01 mg/kg	TM062 (S)	<0.01				
				#			
Organic Carbon, Total	<0.2 %	TM132	0.386				
				#			
Sulphur, Total	<0.02 %	TM132	0.124				
Sulphate, Total potential	<0.06 %	TM132	0.372				
pH	1 pH Units	TM133	11.5				
				#			
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	<0.6				
				#			
Arsenic	<0.6 mg/kg	TM181	4.98				
				#			
Barium	<0.6 mg/kg	TM181	38.8				
				#			
Cadmium	<0.02 mg/kg	TM181	0.552				
				#			
Chromium	<0.9 mg/kg	TM181	6.26				
				#			
Copper	<1.4 mg/kg	TM181	9.2				
				#			
Iron	<1000 mg/kg	TM181	5970				
				#			
Lead	<0.7 mg/kg	TM181	15				
				#			
Manganese	<0.13 mg/kg	TM181	482				
				#			
Mercury	<0.14 mg/kg	TM181	0.451				
				#			
Molybdenum	<0.1 mg/kg	TM181	0.811				
				#			
Nickel	<0.2 mg/kg	TM181	12.4				
				#			



# CERTIFICATE OF ANALYSIS

Validated

SDG: 170923-73 Client Reference: 2921-028 COC3-B Report Number: 426770  
 Location: Chartered Land - Heuston Order Number: Superseded Report:

Results Legend		Customer Sample Ref.	2921-BH2-Comp-S				
#	ISO17025 accredited.		56				
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&#9@	Sample deviation (see appendix)						
		Depth (m)	0.30 - 2.00				
		Sample Type	Sol/Solid (S)				
		Date Sampled	20/09/2017				
		Sampled Time					
		Date Received	23/09/2017				
		SDG Ref	170923-73				
		Lab Sample No.(s)	16240556				
		AGS Reference					
Component	LOD/Units	Method					
Selenium	<1 mg/kg	TM181	<1				
				#			
Zinc	<1.9 mg/kg	TM181	43.7				
				#			
Sulphate, Total	<48 mg/kg	TM221	1130				
				#			
Sulphide, Oxidisable	<0.03 %	TM221	0.259				
				#			
Boron, water soluble	<1 mg/kg	TM222	<1				
				#			



# CERTIFICATE OF ANALYSIS

Validated

SDG: 170923-73 Client Reference: 2921-028 COC3-B Report Number: 426770  
 Location: Chartered Land - Heuston Order Number: Superseded Report:

### PAH by GCMS

Results Legend		Customer Sample Ref.	2921-BH2-Comp-S				
#	ISO17025 accredited.		S6				
M	mCERTS accredited.						
aq	Aqueous / settled sample.	Depth (m)	0.30 - 2.00				
dis.fit	Dissolved / filtered sample.	Sample Type	Soil/Solid (S)				
tot.unfit	Total / unfiltered sample.	Date Sampled	20/09/2017				
*	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	23/09/2017				
(F)	Trigger breach confirmed	SDG Ref	170923-73				
1-5&#x26;	Sample deviation (see appendix)	Lab Sample No.(s)	16240556				
		AGS Reference					
Component	LOD/Units	Method					
Naphthalene-d8 % recovery**	%	TM218	99.2				
Acenaphthene-d10 % recovery**	%	TM218	97.1				
Phenanthrene-d10 % recovery**	%	TM218	89.6				
Chrysene-d12 % recovery**	%	TM218	95.9				
Perylene-d12 % recovery**	%	TM218	103				
Naphthalene	<9 µg/kg	TM218	<9	#			
Acenaphthylene	<12 µg/kg	TM218	<12	#			
Acenaphthene	<8 µg/kg	TM218	18.1	#			
Fluorene	<10 µg/kg	TM218	<10	#			
Phenanthrene	<15 µg/kg	TM218	187	#			
Anthracene	<16 µg/kg	TM218	58.4	#			
Fluoranthene	<17 µg/kg	TM218	367	#			
Pyrene	<15 µg/kg	TM218	368	#			
Benz(a)anthracene	<14 µg/kg	TM218	295	#			
Chrysene	<10 µg/kg	TM218	241	#			
Benzo(b)fluoranthene	<15 µg/kg	TM218	479	#			
Benzo(k)fluoranthene	<14 µg/kg	TM218	166	#			
Benzo(a)pyrene	<15 µg/kg	TM218	332	#			
Indeno(1,2,3-cd)pyrene	<18 µg/kg	TM218	147	#			
Dibenzo(a,h)anthracene	<23 µg/kg	TM218	43.1	#			
Benzo(g,h,i)perylene	<24 µg/kg	TM218	217	#			
Coronene	<200 µg/kg	TM218	<200				
PAH, Total Detected USEPA 16	<118 µg/kg	TM218	2920				
PAH, Total Detected USEPA 16 + Coronene	<318 µg/kg	TM218	2920				





**CERTIFICATE OF ANALYSIS**

Validated

SDG: 170923-73      Client Reference: 2921-028 COC3-B      Report Number: 426770  
 Location: Chartered Land - Heuston      Order Number:

**TPH CWG (S)**

Results Legend		Customer Sample Ref.					
#	ISO17025 accredited.	2921-BH2-Comp-S					
M	mCERTS accredited.	S6					
aq	Aqueous / settled sample.	Depth (m)	0.30 - 2.00				
dis.filt	Dissolved / filtered sample.	Sample Type	Soil/Solid (S)				
tot.unfilt	Total / unfiltered sample.	Date Sampled	20/09/2017				
*	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	23/09/2017				
(F)	Trigger breach confirmed	SDG Ref	170923-73				
1-55+5@	Sample deviation (see appendix)	Lab Sample No.(s)	16240556				
		AGS Reference					
Component	LOD/Units	Method					
GRO Surrogate % recovery**	%	TM089	51				
GRO TOT (Moisture Corrected)	<44 µg/kg	TM089	103				
Methyl tertiary butyl ether (MTBE)	<5 µg/kg	TM089	<5	#			
Benzene	<10 µg/kg	TM089	<10	#			
Toluene	<2 µg/kg	TM089	3.25	#			
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	17.3				
Aliphatics >C8-C10	<10 µg/kg	TM089	18.4				
Aliphatics >C10-C12	<10 µg/kg	TM089	21.7				
Aliphatics >C12-C16	<100 µg/kg	TM173	3160				
Aliphatics >C16-C21	<100 µg/kg	TM173	6860				
Aliphatics >C21-C35	<100 µg/kg	TM173	66200				
Aliphatics >C35-C44	<100 µg/kg	TM173	82200				
! Aliphatics >C12-C44	<100 µg/kg	TM173	158000				
Aromatics >EC5-EC7	<10 µg/kg	TM089	<10				
Aromatics >EC7-EC8	<10 µg/kg	TM089	<10				
Aromatics >EC8-EC10	<10 µg/kg	TM089	18.4				
Aromatics >EC10-EC12	<10 µg/kg	TM089	15.2				
Aromatics >EC12-EC16	<100 µg/kg	TM173	941				
Aromatics >EC16-EC21	<100 µg/kg	TM173	5850				
Aromatics >EC21-EC35	<100 µg/kg	TM173	73300				
Aromatics >EC35-EC44	<100 µg/kg	TM173	125000				
Aromatics >EC40-EC44	<100 µg/kg	TM173	62600				
Total Aromatics >EC12-EC44	<100 µg/kg	TM173	205000				
Total Aliphatics & Aromatics >C5-C44	<100 µg/kg	TM173	363000				



**CERTIFICATE OF ANALYSIS**

Validated

SDG: 170923-73      Client Reference: 2921-028 COC3-B      Report Number: 426770  
 Location: Chartered Land - Heuston      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-BH2-Comp-SS 6	03/10/17	James Richards	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Depth (m)	0.30 - 2.00										
Sample Type	SOLID										
Date Sampled	20/09/2017										
Date Received	00:00:00										
SDG	26/09/2017										
Original Sample	13:21:29										
Method Number	170923-73 16240556 TM048										