

APPENDIX 2

LABORATORY TEST RESULTS

INDEX PROPERTIES AND WATER CONTENTS

BS 1377 : Part 2 : 1990

Report Ref	17/10910/A/KJC	Contract	Sidmouth Drive, Ruislip
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BH/TP No.	Sample		Water Content W %	Liquid Limit W _L %	Plastic Limit W _p %	Plasticity Index IP %	% Passing 425 Micron Sieve	Corrected Plasticity Index IP _c %	Clay Fraction %	Colloidal Activity A	Soil Classification	Remarks
	Depth m	Description										
WS4	1.00	Brown/grey silty clay	31.4	72	21	51	98	50			CV	
	2.00	Brown/grey silty clay	24.6									
WS5	1.00	Orange-brown/grey silty clay	31.4									
	2.00	Brown/grey sandy clay	23.5	47	19	28	100	28			CI	
WS6	1.00	Brown silty clay	32.1									
	2.00	Brown/grey sandy clay	22.1	43	16	27	100	27			CI	
WS7	1.00	Orange-brown silty clay	30.4	72	21	51	100	51			CV	
	2.00	Brown very sandy clay with occasional rounded gravel	23.3									
WS8A	1.00	Brown silty clay	29.5									
	2.00	Brown/grey sandy clay	24.8	57	20	37	99	37			CH	
KEY: Soil Type: C - Clay M - Silt O - Organic NP - Non Plastic Plasticity: L - Low I - Intermediate H - High V - Very High E - Extremely High												



ALBURY S.I. LTD Miltons Yard, Petworth Road, Witley, Surrey GU8 5LH

INDEX PROPERTIES AND WATER CONTENTS

BS 1377 : Part 2 : 1990

Report Ref	17/10910/A/KJC	Contract	Sidmouth Drive, Ruislip	<i>Continuation Sheet</i>	1
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ALBURY S.I. LTD Miltons Yard, Petworth Road, Witley, Surrey GU8 5LH

INDEX PROPERTIES & TRIAXIAL COMPRESSION TESTS

BS 1377 : Parts 2 & 7 : 1990

Report Ref	17/10910/A/KJC	Contract	Sidmouth Drive, Ruislip
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BH No.	Sample		INDEX PROPERTIES						TRIAxIAL COMPRESSION							Remarks
	Depth m	Description	Liquid Limit %	Plastic Limit %	Plasticity Index %	% Passing 425micron Sieve	Corrected Plasticity Index IP %	Soil Plasticity	Code	Lateral Pressure kPa	Compressive Strength kPa	Cohesion kPa	Angle of Friction °	Bulk Density kg/cu.m	Water Content % dry wt	
BH1	1.00-1.50	Brown silty clay													31.8	
	2.00-2.50	Brown/grey silty clay	54	20	34	100	34	CH	U38	150 300 450	200 150 195	90	0	1950 1935 1950	24.3 25.1 25.0	
	3.00-3.50	Brown/grey silty clay with occasional rounded gravel													28.1	
	4.50-5.00	Multicoloured silty clay							U38	150 300 450	150 160 200	85	0	1900 1775 1890	28.8 28.7 28.7	
	7.50-8.00	Multicoloured silty clay							U38	150 300 450	250 400 310	160	0	2040 2090 2065	21.0 19.9 20.5	
	10.50-11.00	Multicoloured silty clay							U38	150 300 450	600 590 700	315	0	2065 2020 2055	20.4 20.4 20.2	
	1.00-1.50	Brown silty clay with occasional rounded gravel	73	24	49	97	48	CV							31.8	
	2.00-2.50	Brown sandy clay	53	21	32	100	32	CH	U38	150 300 450	240 225 205	110	0	1970 1985 1995	21.9 22.5 22.7	
BH2	3.00-3.50	Brown sandy clay with rounded gravel	53	19	34	76	26	CH							22.0	
	4.50-5.00	Brown very sandy clay							U38	150 300 450	90 95 110	50	0	1960 1985 1970	23.3 22.6 23.3	
	KEY: <i>Code:</i> 38 - 38mm nominal diameter specimen 100 - 100mm nominal diameter specimen R - Remoulded F - Functional LV - Laboratory Vane															
	<i>Soil Type:</i> C - Clay M - Silt O - Organic NP - Non Plastic															
<i>Plasticity:</i> L - Low I - Intermediate H - High V - Very High E - Extremely High																

INDEX PROPERTIES & TRIAXIAL COMPRESSION TESTS

BS 1377 : Parts 2 & 7 : 1990

Report Ref	17/10910/A/KJC	Contract	Sidmouth Drive, Ruislip	Continuation Sheet	1
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BH No.	Sample		INDEX PROPERTIES						TRIAXIAL COMPRESSION							Remarks						
	Depth m	Description	Liquid Limit %	Plastic Limit %	Plasticity Index %	% Passing 425micron Sieve	Corrected Plasticity Index IP %	Soil Plasticity	Code	Lateral Pressure kPa	Compression Strength kPa	Cohesion kPa	Angle of Friction °	Bulk Density kg/cu.m	Water Content % dry wt							
BH2	7.50- 8.00	Multicoloured silty clay							U38	150	200	110	0	2100	17.5							
										300	200			2170	17.9							
										450	245			2135	17.6							
	10.50- 11.00	Multicoloured silty clay							U38	150	205	2065	15.8									
										300	250	125	0	2145	14.9							
										450	280	2100	16.7									
13.50- 14.00	Multicoloured silty clay	U100							150	205	130	0	2235	17.6								
									300	260												
									450	310												
BH3	2.00- 2.50	Brown silty clay with rounded gravel							57	20	37	72	27	CH								20.6
	3.00- 3.50	Brown silty clay with rounded gravel							39	17	22	86	19	CI								22.8
	4.50- 5.00	Multicoloured silty clay							U38	150	220	130	0	2020	22.2							
										300	270			2030	21.6							
										450	300			2090	18.7							
	7.50- 8.00	Multicoloured silty clay							U38	150	300	175	0	2135	17.9							
										300	325			2125	18.1							
										450	410			2135	17.6							
	10.50- 11.00	Multicoloured silty clay							U38	150	135	70	0	2030	22.0							
			300	130	2040	22.8																
			450	150	2055	22.1																
	13.50- 14.00	Multicoloured silty clay	U38	150	260	145	0	2145	15.1													
300				275	2145			15.1														
450				345	2145			14.9														
KEY:	Code:	38 - 38mm nominal diameter specimen		100 - 100mm nominal diameter specimen				R - Remoulded				F - Functional			LV - Laboratory Vane							
		U - Undrained		CD - Consolidated Drained				CU - Consolidated Undrained				M - Multi Stage			S - Single Stage							
	Soil Type:	C - Clay		M - Silt				O - Organic				NP - Non Plastic										
	Plasticity:	L - Low		I - Intermediate				H - High				V - Very High			E - Extremely High							



DETERMINATION OF ONE DIMENSIONAL CONSOLIDATION PROPERTIES

In accordance with BS1377:1990 Part 5 Clause 3

Report Ref	17/10910/A/KJC	Contract	Sidmouth Drive, Ruislip
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BH/TP No.	Sample		Specimen Dimensions mm		Initial moisture content %	Initial bulk density mg/m³	Initial dry density mg/m³	Particle density mg/m³ <i>Assumed Measured</i>	Initial voids ratio e_0	% Sat S_o	Load increment kPa		Void ratio at end of increment e	Coefficient of volume compressibility m_v m²/MN	Coefficient of consolidation c_v m²/year	Comments
	Depth m	Description	Height	Diameter							From	To				
BH2	2.00-2.50	Brown sandy clay	19.31	79.56	25.2	2.084	1.665	2.70	0.62	109.5	0	50	0.606	0.199	13.712	
											50	100	0.591	0.184	1.563	
											100	200	0.563	0.177	0.934	
											200	400	0.527	0.115	1.058	
											400	800	0.483	0.072	1.426	



SUMMARY OF CHEMICAL ANALYSES

BS 1377 : Part 3 : 1990. Clauses 3, 5 and 9

Determination of Soluble Sulphate Contents of Soil and Groundwater, Organic Matter Content and pH Value

Report Ref	17/10910/A/KJC	Contract	Sidmouth Drive, Ruislip
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BH No.	Sample		Concentration of Sulphates expressed as SO ₄		pH Value	Organic Content %
	Depth m	Soil Type	2:1 Water:Soil Extract g/l	Groundwater g/l		
BH1	2.00-2.45	Clay	<0.25		8.1	
	7.50-8.00	Clay	1.92		7.7	
	14.55-15.00	Sandy clay	<0.25		8.9	
BH2	1.00-1.45	Clay	<0.25		8.0	
	4.50-5.00	Clay	2.00		7.8	
	10.50-11.00	Clay	<0.25		8.9	
BH3	2.00-2.50	Clay	<0.25		8.2	
	4.50-5.00	Clay	<0.25		8.2	
	7.50-8.00	Clay	<0.25		8.8	
	13.50-14.00	Sandy clay	<0.25		9.0	
WS6	0.95	Water		0.70	7.6	
WS8	1.90	Water		<0.08	7.9	





2183

Final Report

Report No.: 17-04315-1

Initial Date of Issue: 27-Feb-2017

Client Albury SI

Client Address: Miltons Yard
Petworth Road
Witley
Surrey
GU8 5LH

Contact(s): George Owens

Project 17/10910/KJC Ruislip High School

Quotation No.: Q16-07234 **Date Received:** 22-Feb-2017

Order No.: 12156 **Date Instructed:** 22-Feb-2017

No. of Samples: 6

Turnaround (Wkdays): 3 **Results Due:** 24-Feb-2017

Date Approved: 27-Feb-2017

Approved By:



Details: Keith Jones, Technical Manager

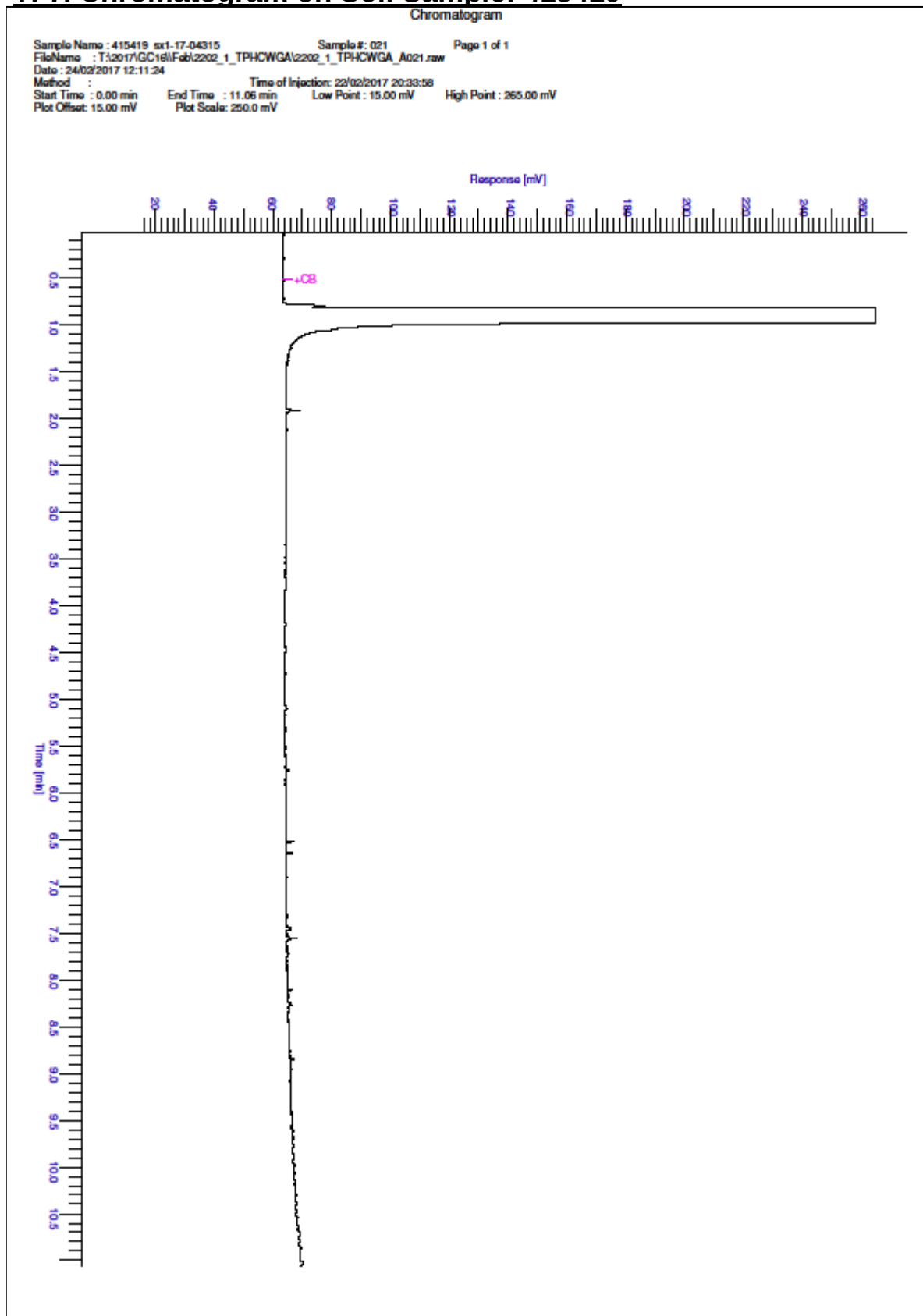
Results - Soil

Client: Albury SI	Chemtest Job No.: 17-04315					17-04315	17-04315	17-04315	17-04315	17-04315	17-04315
Quotation No.: Q16-07234	Chemtest Sample ID.: 415419					415419	415420	415421	415422	415423	415424
Order No.: 12156	Client Sample Ref.:					BH4	BH5	BH6	BH7	BH8	BH9
	Sample Type:					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):					0.10	0.10	0.10	0.10	0.10	0.10
	Date Sampled:					14-Feb-2017	14-Feb-2017	14-Feb-2017	14-Feb-2017	14-Feb-2017	14-Feb-2017
	Asbestos Lab:					COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD							
ACM Type	U	2192		N/A	-	-	-	-	-	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	14	21	14	18	17	22	
Chromatogram (TPH)	N			N/A	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached
pH	U	2010		N/A	9.3	8.1	8.8	7.8	7.9	7.7	
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	0.41	0.43	< 0.40	< 0.40	< 0.40	0.74	
Sulphate (2:1 Water Soluble) as SO ₄	U	2120	g/l	0.010	0.12	0.010	< 0.010	< 0.010	0.014	0.011	
Sulphur (Elemental)	U	2180	mg/kg	1.0	27	3.6	< 1.0	< 1.0	< 1.0	< 1.0	
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Sulphide (Easily Liberatable)	U	2325	mg/kg	0.50	14	10	14	5.7	6.1	5.2	
Sulphate (Total)	U	2430	%	0.010	0.18	0.082	0.065	0.037	0.052	0.053	
Arsenic	U	2450	mg/kg	1.0	26	13	33	16	16	24	
Beryllium	U	2450	mg/kg	1.0	1.4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Cadmium	U	2450	mg/kg	0.10	1.8	0.20	0.25	0.25	0.21	0.36	
Chromium	U	2450	mg/kg	1.0	32	27	31	26	28	31	
Copper	U	2450	mg/kg	0.50	83	23	23	21	22	27	
Mercury	U	2450	mg/kg	0.10	0.84	0.24	0.22	0.21	0.19	0.28	
Nickel	U	2450	mg/kg	0.50	39	17	26	18	20	26	
Lead	U	2450	mg/kg	0.50	210	64	59	47	41	57	
Selenium	U	2450	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	
Vanadium	U	2450	mg/kg	5.0	51	46	53	49	46	63	
Zinc	U	2450	mg/kg	0.50	200	70	61	56	57	75	
Chromium (Trivalent)	N	2490	mg/kg	5.0	32	27	31	26	28	31	
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Total Organic Carbon	U	2625	%	0.20	2.5	2.2	3.5	1.5	1.4	2.2	
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	

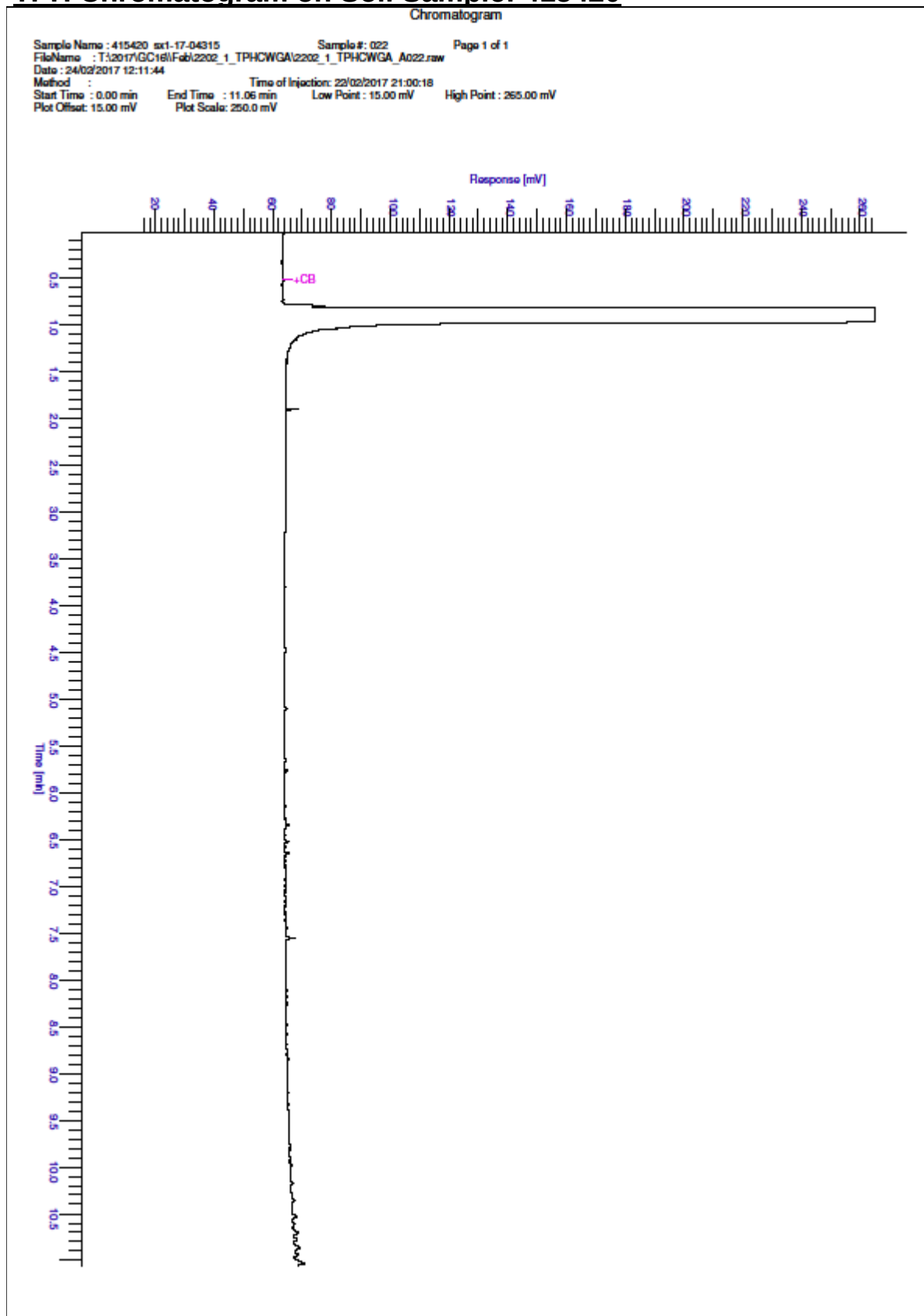
Results - Soil

Client: Albury SI	Chemtest Job No.: 17-04315					17-04315	17-04315	17-04315	17-04315	17-04315
Quotation No.: Q16-07234	Chemtest Sample ID.: 415419					415419	415420	415421	415422	415423
Order No.: 12156	Client Sample Ref.:					BH4	BH5	BH6	BH7	BH8
	Sample Type:					SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):					0.10	0.10	0.10	0.10	0.10
	Date Sampled:					14-Feb-2017	14-Feb-2017	14-Feb-2017	14-Feb-2017	14-Feb-2017
	Asbestos Lab:					COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD						
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	15	12	6.7	< 1.0	1.4	< 1.0
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0	32	6.4	7.2	< 1.0	3.7	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	49	18	14	< 5.0	5.1	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	49	18	14	< 10	< 10	< 10
Naphthalene	U	2700	mg/kg	0.10	0.12	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	2700	mg/kg	0.10	0.22	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	2700	mg/kg	0.10	0.16	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2700	mg/kg	0.10	0.21	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2700	mg/kg	0.10	1.9	0.39	0.43	0.16	2.2	0.15
Anthracene	U	2700	mg/kg	0.10	0.73	< 0.10	< 0.10	< 0.10	0.64	< 0.10
Fluoranthene	U	2700	mg/kg	0.10	5.4	0.83	0.94	0.37	2.1	1.7
Pyrene	U	2700	mg/kg	0.10	5.5	0.88	1.2	0.44	2.0	0.44
Benzo[a]anthracene	U	2700	mg/kg	0.10	3.6	0.22	0.31	< 0.10	0.54	0.16
Chrysene	U	2700	mg/kg	0.10	3.8	0.40	0.41	< 0.10	0.58	0.20
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	5.5	0.70	0.76	< 0.10	0.89	0.32
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	2.2	0.32	0.43	< 0.10	0.41	0.13
Benzo[a]pyrene	U	2700	mg/kg	0.10	4.0	0.48	0.56	< 0.10	0.67	0.32
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	2.6	0.34	0.26	< 0.10	0.40	0.19
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	0.59	< 0.10	< 0.10	< 0.10	< 0.10	0.15
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	3.1	0.59	0.96	< 0.10	0.46	0.23
Total Of 16 PAH's	U	2700	mg/kg	2.0	40	5.2	6.3	< 2.0	11	4.0
Total Phenols	U	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

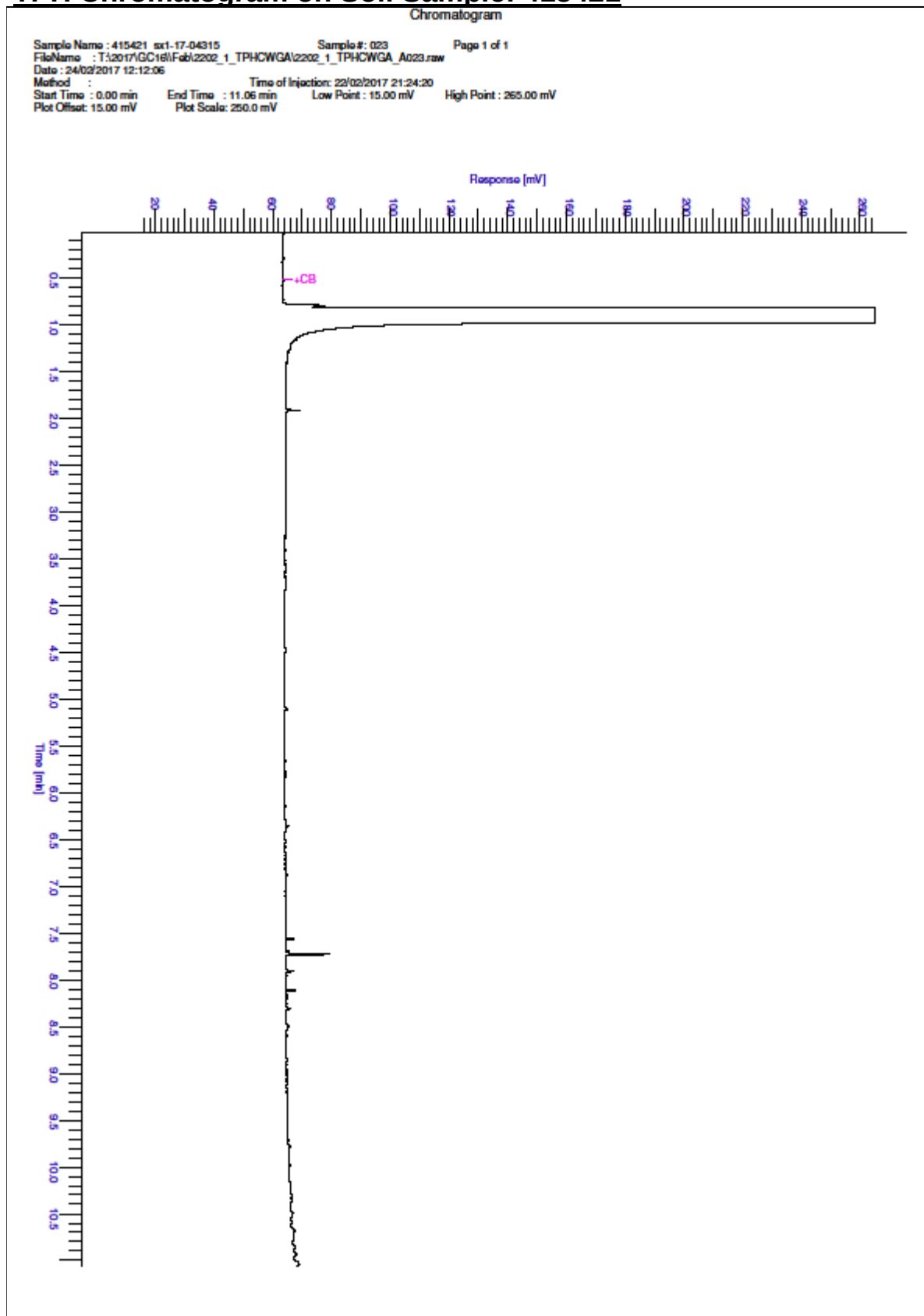
TPH Chromatogram on Soil Sample: 415419



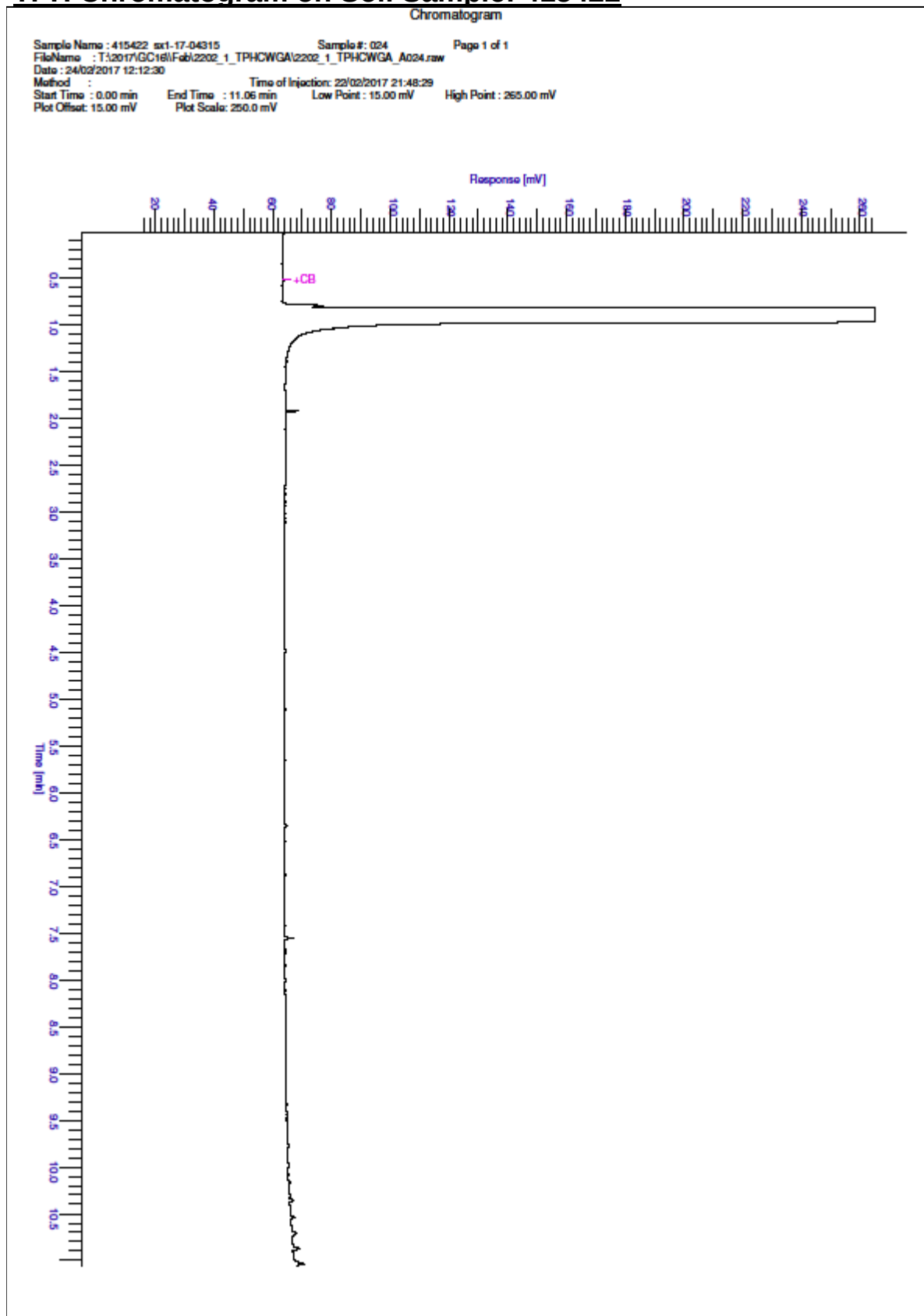
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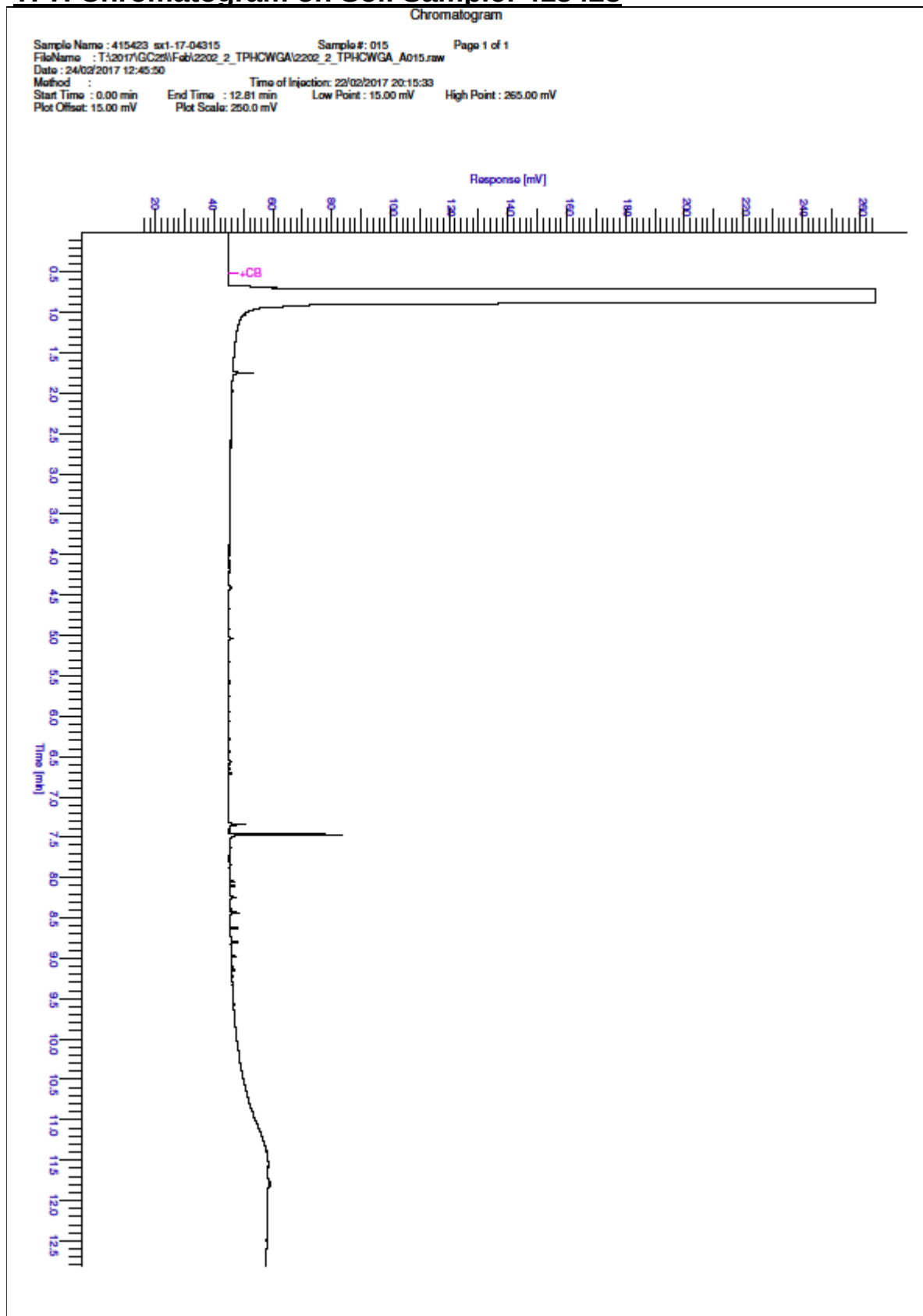
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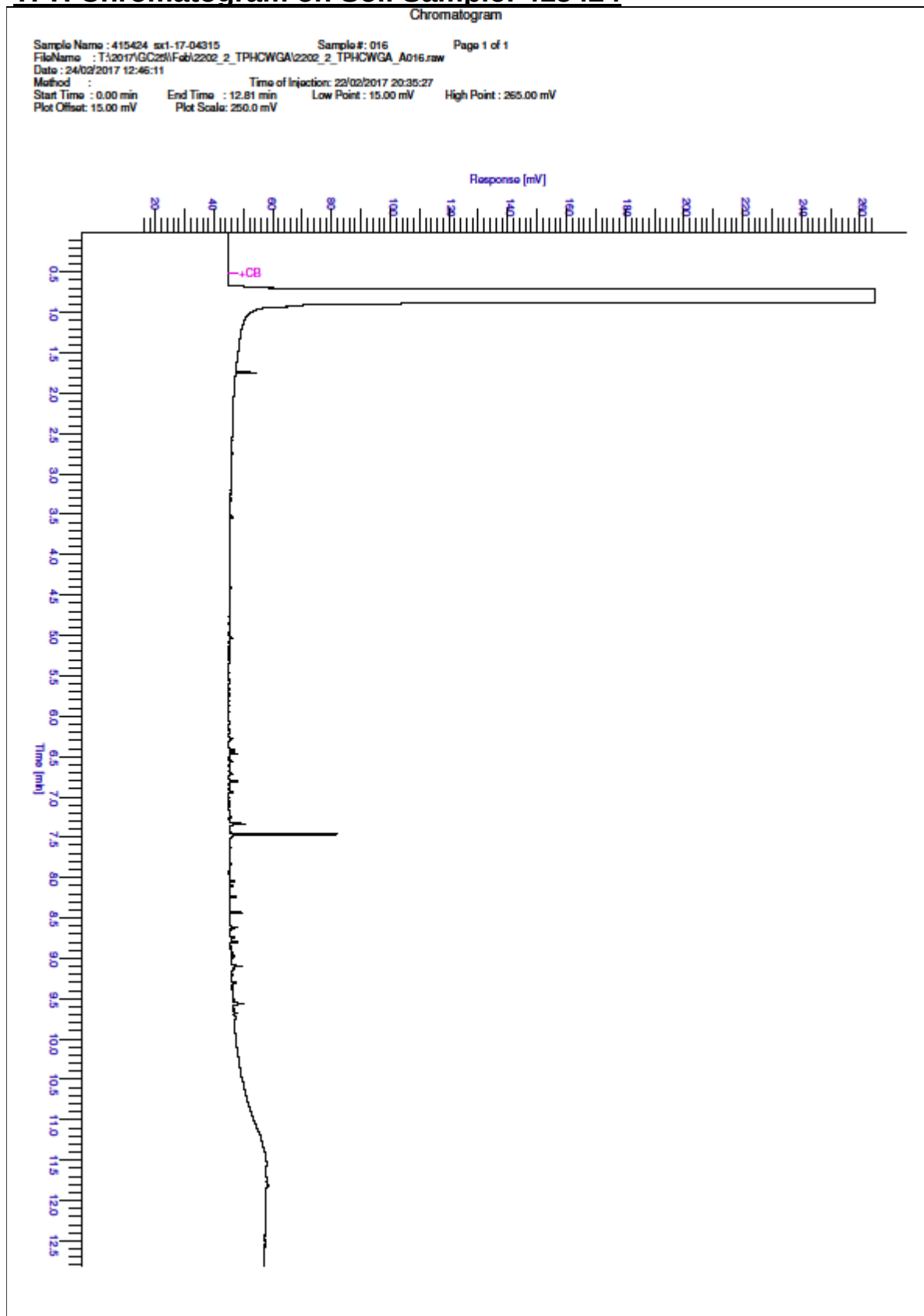
TPH Chromatogram on Soil Sample: 415422



TPH Chromatogram on Soil Sample: 415423



TPH Chromatogram on Soil Sample: 415424



SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N-dimethyl-p-phenylenediamine.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenzo[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Key

- U UKAS accredited
- M MCERTS and UKAS accredited
- N Unaccredited
- S This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
- SN This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
- T This analysis has been subcontracted to an unaccredited laboratory
- I/S Insufficient Sample
- U/S Unsuitable Sample
- N/E not evaluated
- < "less than"
- > "greater than"

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.co.uk

APPENDIX 3

DESICCATION

DESICCATION

Classification

The removal of moisture from a soil as a result of external influences with a constant stress regime, results in shrinkage or settlement of the soil. The magnitude of shrinkage is dependent upon the geological stress history of the soil, its clay content and the composition of the clay minerals. Under normal climatic conditions, there is a seasonal cyclic variation in soil moisture and, hence, volume change, which extends to depths of approximately 1m. When the soil moisture deficit attains a critical value, the shrinkage of the soil can become significant. In these circumstances, the soil can be regarded as being present in a desiccated state.

Causes

A common cause of desiccation consists of the reduction in soil moisture by tree root action. In the absence of a water table at shallow depth, root action of trees will reduce the soil moisture level in order to maintain growth. In general terms, the increase in rainfall which occurs during winter periods will allow for some replacement of the moisture content of the soil, particularly where isolated or immature trees are concerned.

However, when drought summer conditions or limited winter rainfall occurs, desiccated zones will develop within the zone of influence of tree roots. In woodland, desiccation develops as it is not possible for rainfall to overcome the soil moisture deficit. Other causes of desiccation, which have created problems to structures, include incorrectly installed and insulated heating pipes or ducts and industrial processes, ie furnaces or brick kilns.

Effects

The development of desiccation in clay soils will result in an increase in strength of the material. In addition, negative pore water pressure or soil suction will develop. Any foundation system located within soil which is subject to a reduction in soil moisture can experience structural distress, which results from the loss in volume or shrinkage of the ground. Also, if the source of the desiccation is removed, there will be heave of the soils as a result of an increase in equilibrium water content

It is evident, therefore, that foundation systems founded in soils which are actively experiencing an increase or decrease in soil moisture, will be subject to either heave or settlement, which can induce stresses within the structure. It should also be appreciated that a desiccated soil, which is experiencing an increase in equilibrium water content, will attempt to increase its volume in a horizontal as well as vertical plane. It is important, therefore, to ensure that horizontal movements do not apply differential stresses to structural elements, by incorporating collapsible membranes within remedial works.

Identification

A soil in a state of equilibrium is present in a semi-solid state. At the onset of desiccation, the condition of the soil moves towards the boundary between a solid and semi-solid state, this boundary being defined as the plastic limit of the soil. It follows, therefore, that when the natural water content of a soil lies close to, or falls below, the value of the plastic limit, the soil can be considered to be desiccated.

An alternative proposal was made by Driscoll (1983), who related the soil suction induced by desiccation to a function of the liquid limit of the soil. In general terms, desiccation is assumed to be present when the moisture content falls below a level of 40% liquid limit. The arbitrary factor of 0.4 relates to a soil suction value proposed by Croney (1977) and may vary with the composition and mineralogy of different soil types. This approach is only considered to be valid over a limited depth range as the overburden effect will result in a natural reduction in soil moisture and result in the development of negative pore pressures.

A further approach, which considers the shear strength of the clay, Pugh et al (1995), recognises the fact that a reduction in soil moisture will result in an increase in undrained shear strength as well as the development of negative pore pressures. Whilst this approach has a considerable amount of merit, care is required in establishing the value of the soil's in situ shear strength, particularly if it is not possible to obtain representative "undisturbed" samples from cable percussion boreholes. The proposal made in the Pugh paper that the simple pocket penetrometer will provide accurate consistent results should be treated with care, as the pocket penetrometer can take no account of the effects of disturbance and remoulding that are inevitable when completing a trial pit with a mechanical excavator. It is for this reason that this Company attempts to establish the shear strength of clay soils by using the Geonor Field Vane. With this test equipment the appropriate-sized vane is pushed into the side of the pit, through the thin disturbed zone which is caused by the teeth of the bucket during excavation. Furthermore, by use of the 'blank' probe, it is possible to take account of any skin friction which builds up on the shaft of the vane and thus provide a more accurate assessment of the shear strength of the soils.

Hence, a combination of the methods discussed above should be considered in order to confirm whether the development of soil moisture reduction to achieve a desiccated state has occurred within a particular site. The data for affected areas should, where possible, be compared with soils which lie outside the influence of tree root bulbs and may, therefore, be considered to be present in a stable and equilibrium state.

References

- | | |
|--|---|
| Croney D (1977) | The Design and Performance of Road Pavements
London HMSO pp 674 |
| Driscoll R (1983) | The Influence of Vegetation on the Swelling and Shrinking of Clay Soils in Britain
Geotechnique 33.4 pp 93-105 |
| Pugh RS, Parnell PG
and Parks RD (1995) | A rapid and reliable on site method of assessing desiccation in clay soils
Geotechnical Engineering 13 Jan 1995 pp 25—30 |

APPENDIX 4

WASTE

WASTE CLASSIFICATION

The European Waste Framework Directive is implemented in the UK by the 2002 Landfill Regulations, together with a number of other acts and regulations. A key part of this process is to establish the hazardous properties of potential waste. The classification and definition of hazardous waste is interpreted within the Environment Agency guidance WM3 and all wastes require classifying in accordance with the European Waste Catalogue [EWC]. The EWC is a detailed list of typical industry waste types and each has a 6 digit code. Typically the appropriate EWC codes for excavated soil being disposed off site are:

- 17 05 03* soil and stones containing dangerous substances, or
- 17 05 04 soil and stones other than those mentioned in 17 05 03

If excavated soils are to be discarded or exported from site then they would be considered controlled waste and require classification. However, if soils can be re-used on site then they are not considered to be controlled waste. A Desk Study, soil descriptions, laboratory chemical analysis and risk assessment can all contribute to basic waste characterisation. Depending upon the chemical composition or levels of contaminants in the waste (e.g. metals, TPH, asbestos), soil and stones can either be hazardous or non-hazardous. Waste Acceptance Criteria [WAC] test results are used to determine the suitability of the waste intended for disposal against the acceptance criteria for a particular class of landfill site. WAC tests are not used for the classification of waste soils and are only required for inert or hazardous excavated material which is destined for landfill.

Wastes containing asbestos with a concentration of >0.10% weight/weight (w/w) are generally considered to be hazardous. While waste with <0.10% w/w of asbestos are considered non-hazardous. Where free fibres or fibrous asbestos is present at concentrations of >0.001% then these are considered to pose a risk to human health and are deemed hazardous waste. These waste materials also require a suitably licensed company to handle them.

Waste Treatment

It is a requirement of the 2002 Landfill Regulations that all wastes must undergo some form of pre-treatment prior to disposal at an appropriately licensed landfill. Treatment is defined using a 'three-point test' and can include physical, chemical, biological or thermal processes, which must change the characteristics of the waste in order to:

- reduce its volume, or
- reduce its hazardous nature, or
- facilitate its handling, or
- enhance its recovery.

The exceptions to this are:

- inert waste for which treatment is not technically feasible.
- it is waste other than inert waste and treatment would not reduce its quantity or its hazards to human health or the environment.

The waste producer should either treat their own waste or ensure that the waste will be treated by a subsequent handler. The waste producer should record the type and amount of pre-treatment undertaken prior to disposal.

Examples of treatment include mechanical segregation or sorting, composting, soil treatment hubs and incineration. This can include physical sorting of waste soil types into separate stockpiles at the producer site, e.g. topsoil, made ground and natural clay, sand or gravels.

Site Name	Ruislip High School
Location	Sidmouth Drive, Ruislip
Site ID	
Job Number	17/10910/A/KJC
Date	15/03/2017
User Name	alburyasi@gmail.com
Company Name	Albury S.I Ltd

[illegible]

Site Name	Ruislip High School
Location	Sidmouth Drive, Ruislip
Site ID	
Job Number	17/10910/A/KJC
Date	15/03/2017
User Name	alburysi@gmail.com
Company Name	Albury S.I Ltd

Hole ID	Sample Depth	Contaminant	Contaminant Concentration (%)	Hazardous Waste Y/N	Hazard Property	Individual Hazard Statements Exceeded	Cumulative Hazard Statements Exceeded	Additional Hazard Statements (see notes section)
BH4	0.10	pH	0.00000	N				
BH4	0.10	Naphthalene	0.00001	N				H228 test
BH4	0.10	Acenaphthylene	0.00002	N				
BH4	0.10	Acenaphthene	0.00002	N				
BH4	0.10	Fluorene	0.00002	N				
BH4	0.10	Phenanthrene	0.00019	N				
BH4	0.10	Anthracene	0.00007	N				
BH4	0.10	Fluoranthene	0.00054	N				
BH4	0.10	Pyrene	0.00055	N				
BH4	0.10	Benzo(a)anthracene	0.00036	N				
BH4	0.10	Chrysene	0.00038	N				
BH4	0.10	Benzo(b)fluoranthene	0.00055	N				
BH4	0.10	Benzo(k)fluoranthene	0.00022	N				
BH4	0.10	Benzo(a)pyrene	0.00040	N				
BH4	0.10	Indeno(1,2,3-cd)pyrene	0.00026	N				
BH4	0.10	Di-benz(a,h)anthracene	0.00006	N				
BH4	0.10	Benzo(g,h,i)perylene	0.00031	N				
BH4	0.10	Phenol	0.00000	N				
BH4	0.10	hydrocarbon/oil with marker	0.00490	N				H225 test
BH4	0.10	Arsenic	0.00399	N				
BH4	0.10	Boron	0.00095	N				
BH4	0.10	Cadmium	0.00033	N				
BH4	0.10	Hexavalent Chromium	0.00000	N				
BH4	0.10	Chromium (Total)	0.00468	N				
BH4	0.10	Copper	0.02085	N				
BH4	0.10	Lead	0.00000	N				
BH4	0.10	Leadx	0.02100	N				
BH4	0.10	Mercury	0.00008	N				
BH4	0.10	Nickel	0.01028	N				
BH4	0.10	Selenium	0.00000	N				
BH4	0.10	Zinc	0.00000	N				
BH4	0.10	Zincx	0.04938	N				
BH4	0.10	Vanadium	0.00911	N				
BH5	0.10	pH	0.00000	N				
BH5	0.10	Naphthalene	0.00000	N				H228 test
BH5	0.10	Acenaphthylene	0.00000	N				
BH5	0.10	Acenaphthene	0.00000	N				
BH5	0.10	Fluorene	0.00000	N				
BH5	0.10	Phenanthrene	0.00004	N				
BH5	0.10	Anthracene	0.00000	N				
BH5	0.10	Fluoranthene	0.00008	N				
BH5	0.10	Pyrene	0.00009	N				
BH5	0.10	Benzo(a)anthracene	0.00002	N				
BH5	0.10	Chrysene	0.00004	N				
BH5	0.10	Benzo(b)fluoranthene	0.00007	N				
BH5	0.10	Benzo(k)fluoranthene	0.00003	N				
BH5	0.10	Benzo(a)pyrene	0.00005	N				
BH5	0.10	Indeno(1,2,3-cd)pyrene	0.00003	N				
BH5	0.10	Di-benz(a,h)anthracene	0.00000	N				

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Hole ID	Sample Depth	Contaminant	Contaminant Concentration (%)	Hazardous Waste Y/N	Hazard Property	Individual Hazard Statements Exceeded	Cumulative Hazard Statements Exceeded	Additional Hazard Statements (see notes section)
BH5	0.10	Benzo(g,h,i)perylene	0.00006	N				
BH5	0.10	Phenol	0.00000	N				
BH5	0.10	hydrocarbon/oil with marker	0.00180	N				H225 test
BH5	0.10	Arsenic	0.00199	N				
BH5	0.10	Boron	0.00100	N				
BH5	0.10	Cadmium	0.00004	N				
BH5	0.10	Hexavalent Chromium	0.00000	N				
BH5	0.10	Chromium (Total)	0.00395	N				
BH5	0.10	Copper	0.00578	N				
BH5	0.10	Lead	0.00640	N				
BH5	0.10	Mercury	0.00002	N				
BH5	0.10	Nickel	0.00448	N				
BH5	0.10	Selenium	0.00000	N				
BH5	0.10	Zinc	0.00000	N				
BH5	0.10	Zincx	0.01728	N				
BH5	0.10	Vanadium	0.00821	N				
BH6	0.10	pH	0.00000	N				
BH6	0.10	Naphthalene	0.00000	N				H228 test
BH6	0.10	Acenaphthylene	0.00000	N				
BH6	0.10	Acenaphthene	0.00000	N				
BH6	0.10	Fluorene	0.00000	N				
BH6	0.10	Phenanthrene	0.00004	N				
BH6	0.10	Anthracene	0.00000	N				
BH6	0.10	Fluoranthene	0.00009	N				
BH6	0.10	Pyrene	0.00012	N				
BH6	0.10	Benzo(a)anthracene	0.00003	N				
BH6	0.10	Chrysene	0.00004	N				
BH6	0.10	Benzo(b)fluoranthene	0.00008	N				
BH6	0.10	Benzo(k)fluoranthene	0.00004	N				
BH6	0.10	Benzo(a)pyrene	0.00006	N				
BH6	0.10	Indeno(1,2,3-cd)pyrene	0.00003	N				
BH6	0.10	Di-benz(a,h)anthracene	0.00000	N				
BH6	0.10	Benzo(g,h,i)perylene	0.00010	N				
BH6	0.10	Phenol	0.00000	N				
BH6	0.10	hydrocarbon/oil with marker	0.00140	N				H225 test
BH6	0.10	Arsenic	0.00506	N				
BH6	0.10	Boron	0.00000	N				
BH6	0.10	Cadmium	0.00005	N				
BH6	0.10	Hexavalent Chromium	0.00000	N				
BH6	0.10	Chromium (Total)	0.00453	N				
BH6	0.10	Copper	0.00578	N				
BH6	0.10	Lead	0.00590	N				
BH6	0.10	Mercury	0.00002	N				
BH6	0.10	Nickel	0.00685	N				
BH6	0.10	Selenium	0.00000	N				
BH6	0.10	Zinc	0.00000	N				
BH6	0.10	Zincx	0.01506	N				
BH6	0.10	Vanadium	0.00946	N				
BH7	0.10	pH	0.00000	N				

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User Name	alburysi@gmail.com
Company Name	Albury S.I Ltd

Hole ID	Sample Depth	Contaminant	Contaminant Concentration (%)	Hazardous Waste Y/N	Hazard Property	Individual Hazard Statements Exceeded	Cumulative Hazard Statements Exceeded	Additional Hazard Statements (see notes section)
BH7	0.10	Naphthalene	0.00000	N				H228 test
BH7	0.10	Acenaphthylene	0.00000	N				
BH7	0.10	Acenaphthene	0.00000	N				
BH7	0.10	Fluorene	0.00000	N				
BH7	0.10	Phenanthrene	0.00002	N				
BH7	0.10	Anthracene	0.00000	N				
BH7	0.10	Fluoranthene	0.00004	N				
BH7	0.10	Pyrene	0.00004	N				
BH7	0.10	Benzo(a)anthracene	0.00000	N				
BH7	0.10	Chrysene	0.00000	N				
BH7	0.10	Benzo(b)fluoranthene	0.00000	N				
BH7	0.10	Benzo(k)fluoranthene	0.00000	N				
BH7	0.10	Benzo(a)pyrene	0.00000	N				
BH7	0.10	Indeno(1,2,3-cd)pyrene	0.00000	N				
BH7	0.10	Di-benz(a,h)anthracene	0.00000	N				
BH7	0.10	Benzo(g,h,i)perylene	0.00000	N				
BH7	0.10	Phenol	0.00000	N				
BH7	0.10	hydrocarbon/oil with marker	0.00000	N				H225 test
BH7	0.10	Arsenic	0.00245	N				
BH7	0.10	Boron	0.00000	N				
BH7	0.10	Cadmium	0.00005	N				
BH7	0.10	Hexavalent Chromium	0.00000	N				
BH7	0.10	Chromium (Total)	0.00380	N				
BH7	0.10	Copper	0.00528	N				
BH7	0.10	Lead	0.00470	N				
BH7	0.10	Mercury	0.00002	N				
BH7	0.10	Nickel	0.00475	N				
BH7	0.10	Selenium	0.00000	N				
BH7	0.10	Zinc	0.00000	N				
BH7	0.10	Zincx	0.01383	N				
BH7	0.10	Vanadium	0.00875	N				
BH8	0.10	pH	0.00000	N				
BH8	0.10	Naphthalene	0.00000	N				H228 test
BH8	0.10	Acenaphthylene	0.00000	N				
BH8	0.10	Acenaphthene	0.00000	N				
BH8	0.10	Fluorene	0.00000	N				
BH8	0.10	Phenanthrene	0.00022	N				
BH8	0.10	Anthracene	0.00006	N				
BH8	0.10	Fluoranthene	0.00021	N				
BH8	0.10	Pyrene	0.00020	N				
BH8	0.10	Benzo(a)anthracene	0.00005	N				
BH8	0.10	Chrysene	0.00006	N				
BH8	0.10	Benzo(b)fluoranthene	0.00009	N				
BH8	0.10	Benzo(k)fluoranthene	0.00004	N				
BH8	0.10	Benzo(a)pyrene	0.00007	N				
BH8	0.10	Indeno(1,2,3-cd)pyrene	0.00004	N				
BH8	0.10	Di-benz(a,h)anthracene	0.00000	N				
BH8	0.10	Benzo(g,h,i)perylene	0.00005	N				
BH8	0.10	Phenol	0.00000	N				

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Hole ID	Sample Depth	Contaminant	Contaminant Concentration (%)	Hazardous Waste Y/N	Hazard Property	Individual Hazard Statements Exceeded	Cumulative Hazard Statements Exceeded	Additional Hazard Statements (see notes section)
BH8	0.10	hydrocarbon/oil with marker	0.00000	N				H225 test
BH8	0.10	Arsenic	0.00245	N				
BH8	0.10	Boron	0.00000	N				
BH8	0.10	Cadmium	0.00004	N				
BH8	0.10	Hexavalent Chromium	0.00000	N				
BH8	0.10	Chromium (Total)	0.00409	N				
BH8	0.10	Copper	0.00553	N				
BH8	0.10	Lead	0.00410	N				
BH8	0.10	Mercury	0.00002	N				
BH8	0.10	Nickel	0.00527	N				
BH8	0.10	Selenium	0.00000	N				
BH8	0.10	Zinc	0.00000	N				
BH8	0.10	Zincx	0.01407	N				
BH8	0.10	Vanadium	0.00821	N				
BH9	0.10	pH	0.00000	N				
BH9	0.10	Naphthalene	0.00000	N				H228 test
BH9	0.10	Acenaphthylene	0.00000	N				
BH9	0.10	Acenaphthene	0.00000	N				
BH9	0.10	Fluorene	0.00000	N				
BH9	0.10	Phenanthrene	0.00002	N				
BH9	0.10	Anthracene	0.00000	N				
BH9	0.10	Fluoranthene	0.00017	N				
BH9	0.10	Pyrene	0.00004	N				
BH9	0.10	Benzo(a)anthracene	0.00002	N				
BH9	0.10	Chrysene	0.00002	N				
BH9	0.10	Benzo(b)fluoranthene	0.00003	N				
BH9	0.10	Benzo(k)fluoranthene	0.00001	N				
BH9	0.10	Benzo(a)pyrene	0.00003	N				
BH9	0.10	Indeno(1,2,3-cd)pyrene	0.00002	N				
BH9	0.10	Di-benz(a,h)anthracene	0.00002	N				
BH9	0.10	Benzo(g,h,i)perylene	0.00002	N				
BH9	0.10	Phenol	0.00000	N				
BH9	0.10	hydrocarbon/oil with marker	0.00000	N				H225 test
BH9	0.10	Arsenic	0.00368	N				
BH9	0.10	Boron	0.00171	N				
BH9	0.10	Cadmium	0.00007	N				
BH9	0.10	Hexavalent Chromium	0.00000	N				
BH9	0.10	Chromium (Total)	0.00453	N				
BH9	0.10	Copper	0.00678	N				
BH9	0.10	Lead	0.00570	N				
BH9	0.10	Mercury	0.00003	N				
BH9	0.10	Nickel	0.00685	N				
BH9	0.10	Selenium	0.00000	N				
BH9	0.10	Zinc	0.00000	N				
BH9	0.10	Zincx	0.01852	N				
BH9	0.10	Vanadium	0.01125	N				

Notes - Additional Information on Hazard Properties

Hazardous Property	Description	Hazard Statement	Note
HP1	Explosive	H200, H201, H202, H203, H204, H240 and H241	A waste is assessed for HP1 via test methods, rather than a concentration limit. If you have substances or a mixture containing explosive properties the waste should be tested in accordance with the European Chemical Agency's guidance on the application of the CLP Criteria.
HP2	Oxidising	H270, H271, H272	A waste is assessed for HP2 via test methods, rather than a concentration limit. If you have substances or a mixture containing oxidising properties the waste should be tested in accordance with the European Chemical Agency's guidance on the application of the CLP Criteria.
HP3	Flammable	H220 to H226, H228, H242, H250, H251m H252, H260, H261	A waste is assessed for HP3 via test methods, rather than a concentration limit. If you have substances or a mixture containing flammable properties the waste should be tested in accordance with the European Chemical Agency's guidance on the application of the CLP Criteria. If a waste contains either H220, H221, H260 or H261 a calculation can be performed to identify the minimum amount of that substance that will trigger HP3.
HP5	Specific Target Organ Toxicity (STOT)	H304	Should a waste contain two or more compounds displaying H304 (Asp. Tox 1) and equal or exceed its specific concentration limit of 10%, then a waste will be hazardous by HP5 if its kinematic viscosity exceeds 20.5 mm ² /s. Guidance should be sought from the CLP Criteria.
HP9	Infectious	N/A	A waste is assessed for HP9 via further testing, rather than a concentration limit. In cases where there is the potential for toxins to be present, further testing will be required. For healthcare waste reference should be made to the Department of health guidance: Safe management of healthcare waste.
HP12	Release of acute toxic gas	EUH029, EUH031, EUH032, H260 or H261	A waste is assessed for HP12 via test methods, rather than a concentration limit. If you have substances or a mixture that may release acute toxic gas the waste should be tested in accordance with the European Chemical Agency's guidance on the application of the CLP Criteria.
HP15	Explosive or explosive properties	H205, EUH001, EUH019 or EUH044	A waste is assessed for HP15 via test methods, rather than a concentration limit. If you have substances or a mixture that may exhibit explosive or explosive properties the waste should be tested in accordance with the European Chemical Agency's guidance on the application of the CLP Criteria.
HP16	Persistent organic pollutants	N/A	A waste is considered hazardous if the concentration of one or more compound (persistent organic pollutant) as listed in Appendix C of Environment Agency guidance WM3 is above its assigned concentration limit. For reference for dioxins and furans, this assessment incorporates the use of specific toxicity equivalent factors.