

Site Investigations



Geologists



Environmental &
Geotechnical
Engineers



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FAO: Brian Carlton

Date: 6th April 2018

SCCE Ltd

CONTAMINATION SAMPLING & TESTING

Proposed cold store extension, Fujifilm

S180324

Dear Brian,

Solmek were commissioned to undertake contamination sampling in the area of a proposed extension of an existing cold store building at Fujifilm, Billingham.

The field works consisted of three machine excavated trial pits and sampling. Two samples (TP1 0.00-0.30m and TP3 0.00-0.30m) were sent for analysis to determine the nature and extent of any shallow contamination across the site, whilst a third sample (TP3 0.50-0.60) was taken to provide a Waste Acceptance Criteria (WAC) classification of the materials on-site.

The samples were scheduled for a suite of metals, semi-metals, non-metals and inorganic determinants. The sample locations and test results are presented at the back of this letter report.

Given the proposed commercial nature of the development, the test results have been compared to a series of Land Quality Management (LQM) Suitable for Use Levels (S4UL) based on a commercial land use. These are the most up to date thresholds published in December 2014.

SUMMARY OF INORGANIC CONTAMINATION TESTING RESULTS

Determinand	Units	Number of Samples above Level of Detection	Minimum Level	Maximum Level	Commercial Value	Number of Results Exceeding Threshold Value
Metals						
Cadmium	mg/kg	1	<0.2	0.3	190	0
Chromium	mg/kg	2	82	192	8600	0
Copper	mg/kg	2	7.8	158	68000	0
Lead	mg/kg	2	13	77	2300*	0
Mercury	mg/kg	1	<0.5	3.5	1100	0
Nickel	mg/kg	2	10	55	980	0
Zinc	mg/kg	2	34	168	730000	0
Semi metals and non metals						
Arsenic	mg/kg	2	2.2	17	640**	0
Boron	mg/kg	2	0.6	0.8	240000	0
Selenium	mg/kg	2	0.8	3.3	12000	0
Inorganic chemicals						
Cyanide	mg/kg	0	<1	-	1580**	0
W.S. Sulphate	mg/l	2	77	227	2000^	0
Other						
pH	pH	-	8.4	8.7	5.5^	0
* Category 4 Screening Levels, March 2014						
** CLEA Software Version 1.06 (pH7 and 1%SOM)						
^ EA Threshold Values						

Metals, Semi Metals and Non Metals

The levels of metals, semi metals and non metals do not exceed any of the relevant thresholds, based on the two samples tested.

Inorganic Chemicals

Soluble sulphates (potentially aggressive to foundation concrete) were recorded as 77 and 227mg/l. None of the samples were elevated above levels affecting human health or the BRE Special Digest 1 500mg/l limit for the sulphate classification of concrete.

The results of the pH testing were 8.4 and 8.7, which is consistent with alkaline conditions.

Organic Chemicals

The organic thresholds vary depending on the levels of soil organic matter (SOM).

The average SOM recorded across the site was 1.87% therefore a SOM of 2.5% has been used to determine the S4UL thresholds. Table 2, below, summarises the results.

Determinand	Units	Number of Samples above Level of Detection	Minimum Level	Maximum Level	Commercial Value at 2.5% SOM	Number of Results Exceeding Threshold Value
TPH Aliphatic Fractions						
Aliphatic (C5-C6)	mg/kg	0	<0.01	-	5900	0
Aliphatic (C6-C8)	mg/kg	0	<0.01	-	17000	0
Aliphatic (C8-C10)	mg/kg	0	<0.01	-	4800	0
Aliphatic (C10-C12)	mg/kg	0	<4	-	23000	0
Aliphatic (C12-C16)	mg/kg	0	<4	4	82000	0
Aliphatic (C16-C35)	mg/kg	2	15	88	1700000	0
TPH Aromatic Fractions						
Aromatic (C5-C7)	mg/kg	0	<0.1	-	46000	0
Aromatic (C7-C8)	mg/kg	0	<0.1	-	110000	0
Aromatic (C8-C10)	mg/kg	0	<0.1	-	8100	0
Aromatic (C10-C12)	mg/kg	0	<1	-	28000	0
Aromatic (C12-C16)	mg/kg	0	<1	-	37000	0
Aromatic (C16-C21)	mg/kg	1	<1	2	28000	0
Aromatic (C21-C35)	mg/kg	1	1	3	28000	0
Speciated PAH						
Naphthalene	mg/kg	1	<0.01	0.02	460	0
Acenaphthylene	mg/kg	0	<0.01	-	97000	0
Acenaphthene	mg/kg	0	<0.01	-	97000	0
Fluorene	mg/kg	0	<0.01	-	68000	0
Phenanthrene	mg/kg	2	0.14	0.27	22000	0
Anthracene	mg/kg	2	0.06	0.11	540000	0
Fluoranthene	mg/kg	2	0.38	1.04	23000	0
Pyrene	mg/kg	2	0.34	0.89	54000	0
Benzo(a)anthracene	mg/kg	2	0.19	0.61	170	0
Chrysene	mg/kg	2	0.18	0.48	350	0
Benzo(b)fluoranthene	mg/kg	2	0.23	0.52	44	0
Benzo(k)fluoranthene	mg/kg	2	0.11	0.24	1200	0
Benzo(a)pyrene	mg/kg	2	0.2	0.47	35	0
Indeno(123cd)pyrene	mg/kg	2	0.15	0.29	510	0
Dibenz(ah)anthracene	mg/kg	2	0.04	0.1	3.6	0
Benzo(ghi)perylene	mg/kg	2	0.17	0.31	4000	0
PAH	mg/kg	2	2.21	5.34	1000*	0
Phenols	mg/kg	0	<0.5	-	1500	0
* EA Threshold Values						

The levels of organic chemicals do not exceed any of the relevant thresholds, based on the two samples tested.

Asbestos

From the two samples tested for asbestos, no asbestos fibres were detected.

WAC Testing

One sample was subjected to WAC testing in order to provide an indication of the waste classification of materials on the site.

The determinants tested largely fall within the Inert Waste classification, however the concentrations for Fluoride fall within the Non-reactive Hazardous Waste category.



May we take this opportunity to thank you for using Solmek.

Yours sincerely,

A handwritten signature in black ink, appearing to read "R. Woods".

Richard Woods
On behalf of Solmek Ltd



Title	Site Location Plan
Project	Fujifilm, Billingham
Client	SCCE Ltd
Date	April 2018
Fig No.	Figure 1
Scale	On map
Key	 Approx. Site Boundary
	 N

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Figure 2: View of Trial Pit 1



Figure 3: View of Trial Pit 1

Title	Date
Figures 2 & 3	April 2018
Project	
Fujifilm, Billingham	
Client	
SCCE Ltd	

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Figure 4: View of Trial Pit 3



Figure 4: Trial Pit 3 Spoil

Title	Date
Figures 3 & 4	April 2018
Project	
Fujifilm, Billingham	
Client	
SCCE Ltd	

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Trial Pit Log

TrialPit No
 TP1
 Sheet 1 of 1

Project Name: Fujifilm, Billingham Project No. S180324 Co-ords: E - N Level: Date 22/03/2018

Plant Used: 360 Mini digger Dimensions (m): Scale 1:25

Client: SCCE Ltd Depth 0.50 Logged LC

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.00 - 0.30	ES					MADE GROUND: Grey sandy GRAVEL. Gravel is angular to sub angular fine to coarse of concrete, dolomite and brick.
	0.30 - 0.50	ES		0.30			MADE GROUND: Greyish yellow gravelly SAND. Gravel is angular to sub angular fine to coarse of concrete, dolomite and brick.
				0.50			MADE GROUND: Grey concrete- pit terminated. End of Pit at 0.50m

Remarks: No groundwater encountered.

Stability: Pit walls stable



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
Trial Pit Log

TrialPit No
 TP2
 Sheet 1 of 1

Project Name: Fujifilm, Billingham Project No. S180324 Co-ords: E - N Level: Date 22/03/2018

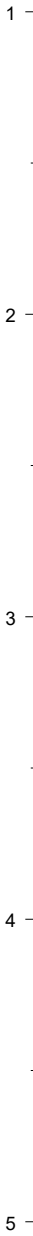
Plant Used: 360 Mini digger Dimensions (m): Scale 1:25

Client: SCCE Ltd Depth 0.25 Logged LC

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.00 - 0.25	ES		0.25			MADE GROUND: Grey sandy GRAVEL. Gravel is angular to sub angular fine to coarse of concrete, dolomite and brick. MADE GROUND: Grey concrete- pit terminated. End of Pit at 0.25m

Remarks: No groundwater encountered.

Stability: Pit walls stable





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Trial Pit Log

TrialPit No
 TP3
 Sheet 1 of 1

Project Name: Fujifilm, Billingham Project No. S180324 Co-ords: E - N Level: Date 22/03/2018

Plant Used: 360 Mini digger Dimensions (m): Scale 1:25

Client: SCCE Ltd Depth 0.60 Logged LC

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.30	ES		0.30			MADE GROUND: Grey sandy GRAVEL. Gravel is angular to sub angular fine to coarse of concrete, dolomite and brick.
	0.30 - 0.60	ES		0.50			MADE GROUND: Grey concrete.
				0.60			MADE GROUND: Stiff consistency blackish grey sandy gravelly CLAY. Gravel is angular to sub angular fine to coarse of concrete, dolomite and brick. End of Pit at 0.60m

Remarks: No groundwater encountered.

Stability: Pit walls stable



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ANALYTICAL TEST REPORT

Contract no: 70869
Contract name: Fuji
Client reference: S180324
Clients name: Solmek
Clients address: 12 Yarm Road
Stockton-on-Tees
TS18 3NA

Samples received: 26 March 2018

Analysis started: 26 March 2018

Analysis completed 04 April 2018

Report issued: 04 April 2018

Notes: Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, without prior written approval.
Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

Key: U UKAS accredited test
M MCERTS & UKAS accredited test
\$ Test carried out by an approved subcontractor
I/S Insufficient sample to carry out test
N/S Sample not suitable for testing
NAD No Asbestos Detected

Approved by:

James Spittle
Customer Services Team Leader

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.

Analytical results are inclusive of stones.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
70869-1	TP1	0.00-0.30	Clayey Sand with Gravel	-	-	13.6
70869-2	TP3	0.00-0.30	Sandy Clay with Gravel	-	-	18.2
70869-3	TP3	0.50-0.60	Sandy Clay with Gravel	-	-	19.3

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SOILS

Lab number			70869-1	70869-2
Sample id			TP1	TP3
Depth (m)			0.00-0.30	0.00-0.30
Date sampled			22/03/2018	22/03/2018
Test	Method	Units		
Arsenic (total)	CE127 ^M	mg/kg As	2.2	17
Boron (water soluble)	CE063 ^M	mg/kg B	0.6	0.8
Cadmium (total)	CE127 ^M	mg/kg Cd	<0.2	0.3
Chromium (total)	CE127 ^M	mg/kg Cr	82	192
Copper (total)	CE127 ^M	mg/kg Cu	7.8	158
Lead (total)	CE127 ^M	mg/kg Pb	13	77
Mercury (total)	CE127 ^M	mg/kg Hg	<0.5	3.5
Nickel (total)	CE127 ^M	mg/kg Ni	10	55
Selenium (total)	CE127 ^M	mg/kg Se	0.8	3.3
Zinc (total)	CE127 ^M	mg/kg Zn	34	168
pH	CE004 ^M	units	8.7	8.4
Sulphate (2:1 water soluble)	CE061 ^M	mg/l SO ₄	227	77
Cyanide (total)	CE077	mg/kg CN	<1	<1
Phenols (total)	CE078	mg/kg PhOH	<0.5	<0.5
Total Organic Carbon (TOC)	CE072 ^M	% w/w C	0.15	2.02
Estimate of OMC (calculated from TOC)	CE072 ^M	% w/w	0.26	3.48
PAH				
Naphthalene	CE087 ^M	mg/kg	0.02	<0.01
Acenaphthylene	CE087 ^M	mg/kg	<0.01	<0.01
Acenaphthene	CE087 ^M	mg/kg	<0.01	<0.01
Fluorene	CE087 ^U	mg/kg	<0.01	<0.01
Phenanthrene	CE087 ^M	mg/kg	0.14	0.27
Anthracene	CE087 ^U	mg/kg	0.06	0.11
Fluoranthene	CE087 ^M	mg/kg	0.38	1.04
Pyrene	CE087 ^M	mg/kg	0.34	0.89
Benzo(a)anthracene	CE087 ^U	mg/kg	0.19	0.61
Chrysene	CE087 ^M	mg/kg	0.18	0.48
Benzo(b)fluoranthene	CE087 ^M	mg/kg	0.23	0.52
Benzo(k)fluoranthene	CE087 ^M	mg/kg	0.11	0.24
Benzo(a)pyrene	CE087 ^U	mg/kg	0.20	0.47
Indeno(123cd)pyrene	CE087 ^M	mg/kg	0.15	0.29
Dibenz(ah)anthracene	CE087 ^M	mg/kg	0.04	0.10
Benzo(ghi)perylene	CE087 ^M	mg/kg	0.17	0.31
PAH (total of USEPA 16)	CE087	mg/kg	2.21	5.34
TPH				
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	<0.01	<0.01
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	<0.01	<0.01
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	<0.01	<0.01
EPH Aromatic (>EC10-EC12)	CE068	mg/kg	<1	<1
EPH Aromatic (>EC12-EC16)	CE068	mg/kg	<1	<1
EPH Aromatic (>EC16-EC21)	CE068	mg/kg	<1	2

Chemtech Environmental Limited

SOILS

Lab number			70869-1	70869-2
Sample id			TP1	TP3
Depth (m)			0.00-0.30	0.00-0.30
Date sampled			22/03/2018	22/03/2018
Test	Method	Units		
EPH Aromatic (>EC21-EC35)	CE068	mg/kg	1	3
VPH Aliphatic (>C5-C6)	CE067	mg/kg	<0.1	<0.1
VPH Aliphatic (>C6-C8)	CE067	mg/kg	<0.1	<0.1
VPH Aliphatic (>C8-C10)	CE067	mg/kg	<0.1	<0.1
EPH Aliphatic (>C10-C12)	CE068	mg/kg	<4	<4
EPH Aliphatic (>C12-C16)	CE068	mg/kg	<4	4
EPH Aliphatic (>C16-C35)	CE068	mg/kg	15	88
Subcontracted analysis				
Asbestos (qualitative)	\$	-	NAD	NAD

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE127	Arsenic (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg As
CE063	Boron (water soluble)	Hot water extract, ICP-OES	Dry	M	0.5	mg/kg B
CE127	Cadmium (total)	Aqua regia digest, ICP-MS	Dry	M	0.2	mg/kg Cd
CE127	Chromium (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cr
CE127	Copper (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cu
CE127	Lead (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Pb
CE127	Mercury (total)	Aqua regia digest, ICP-MS	Dry	M	0.5	mg/kg Hg
CE127	Nickel (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Ni
CE127	Selenium (total)	Aqua regia digest, ICP-MS	Dry	M	0.3	mg/kg Se
CE127	Zinc (total)	Aqua regia digest, ICP-MS	Dry	M	5	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	Wet	M	-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	M	10	mg/l SO ₄
CE077	Cyanide (total)	Extraction, Continuous Flow Colorimetry	Wet	M	1	mg/kg CN
CE078	Phenols (total)	Extraction, Continuous Flow Colorimetry	Wet		0.5	mg/kg PhOH
CE072	Total Organic Carbon (TOC)	Removal of IC by acidification, Carbon Analyser	Dry	M	0.1	% w/w C
CE072	Estimate of OMC (calculated from TOC)	Calculation from Total Organic Carbon	Dry	M	0.1	% w/w
CE087	Naphthalene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Acenaphthylene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Acenaphthene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Fluorene	Solvent extraction, GC-MS	Wet	U	0.01	mg/kg
CE087	Phenanthrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Anthracene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Pyrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(a)anthracene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Chrysene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Benzo(b)fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(k)fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(a)pyrene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Indeno(123cd)pyrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Dibenz(ah)anthracene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(ghi)perylene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	PAH (total of USEPA 16)	Solvent extraction, GC-MS	Wet		0.27	mg/kg
CE067	VPH Aromatic (>EC5-EC7)	Headspace GC-FID	Wet		0.01	mg/kg
CE067	VPH Aromatic (>EC7-EC8)	Headspace GC-FID	Wet		0.01	mg/kg
CE067	VPH Aromatic (>EC8-EC10)	Headspace GC-FID	Wet		0.01	mg/kg
CE068	EPH Aromatic (>EC10-EC12)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC12-EC16)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC16-EC21)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE067	VPH Aliphatic (>C5-C6)	Headspace GC-FID	Wet		0.1	mg/kg
CE067	VPH Aliphatic (>C6-C8)	Headspace GC-FID	Wet		0.1	mg/kg
CE067	VPH Aliphatic (>C8-C10)	Headspace GC-FID	Wet		0.1	mg/kg
CE068	EPH Aliphatic (>C10-C12)	Solvent extraction, GC-FID	Wet		4	mg/kg

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE068	EPH Aliphatic (>C12-C16)	Solvent extraction, GC-FID	Wet		4	mg/kg
\$	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.

For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.

Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
IT	Sample not cooled
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
70869-1	TP1	0.00-0.30	N	
70869-2	TP3	0.00-0.30	N	
70869-3	TP3	0.50-0.60	N	

Waste Acceptance Criteria Testing
BS EN 12457-Part 3, 2 Stage Process



Sample Details

Contract Name Fuji
Lab Number 70869-3
Sample ID TP3 0.50m-0.60m
Date Sampled 22 March 2018
Date Received 26 March 2018
Particle Size (<4mm) -
Method of size reduction N/A
Non-crushable matter N/A

Test Values

Mass of Raw Test Portion (MW) kg 0.217
Mass of Dried Test Portion (MD) kg 0.175
Moisture Content Ratio (MC) % 23.93
Dry Matter Content Ratio (DR) % 80.69
Leachant Volume (1) (L2) Litre 0.308
Leachant Volume (2) (L8) Litre 1.400
Eluate Volume (1) (VE1) Litre 0.230
Eluate Volume (2) (VE2) Litre 1.280

Eluate Analysis	Conc in Eluate	
	2:1	8:1
Liquid : Waste Ratio	2:1	8:1
pH (units)	7.8	7.8
Temperature (°C)	20	20
Conductivity (µS/cm)	352	257
Antimony (µg/l Sb)	5.4	3.5
Arsenic (µg/l As)	3.37	1.81
Barium (µg/l Ba)	44.4	65.7
Cadmium (µg/l Cd)	<0.07	<0.07
Chromium (µg/l Cr)	<0.2	<0.2
Copper (µg/l Cu)	5.1	2.9
Lead (µg/l Pb)	1.1	0.2
Mercury (µg/l Hg)	0.145	0.018
Molybdenum (µg/l Mo)	76.6	19.7
Nickel (µg/l Ni)	2.1	1.3
Selenium (µg/l Se)	1.24	0.70
Zinc (µg/l Zn)	4	<1
Chloride (mg/l Cl)	18.1	3.1
Fluoride (mg/l F)	3.1	1.5
Sulphate (mg/l SO ₄)	43	50
Total Dissolved Solids (mg/l TDS)	270	195
Phenol Index (µg/l PhOH)	<10	<10
Dissolved Organic Carbon (mg/l C)	22	9.9

Amount Leached		BS EN 12457-3 Limit Values mg/kg at L:S 10:1		
2:1 mg/kg	10:1 mg/kg	Inert Waste	Non-reactive Hazardous Waste	Hazardous Waste
0.011	0.037	0.06	0.7	5
0.007	0.020	0.5	2	25
0.089	0.629	20	100	300
<0.0002	<0.0007	0.04	1	5
<0.0004	<0.002	0.5	10	70
0.010	0.032	2	50	100
0.0022	0.003	0.5	10	50
0.00029	0.00035	0.01	0.2	2
0.153	0.272	0.5	10	30
0.004	0.014	0.4	10	40
0.002	0.008	0.1	0.5	7
0.008	<0.014	4	50	200
36	50	800	15000	25000
6.2	17	10	150	500
86	489	1000	20000	50000
540	2049	4000	60000	100000
<0.02	<0.1	1		
44	115	500	800	1000

Waste Analysis	Units	Result			
Total Organic Carbon	% w/w	1.9	3%	5%	6%
Loss on Ignition	% w/w	6.0			10%
BTEX	mg/kg	<0.06	6		
PCBs (7 congeners)	mg/kg	<0.045	1		
TPH (C10 - C40)	mg/kg	231	500		
PAH (total)	mg/kg	1.04	100		
pH	pH units	8.7		>6	
Acid Neutralisation Capacity (pH4)	mol/kg	0.19		To be evaluated	
Acid Neutralisation Capacity (pH7)	mol/kg	0.07		To be evaluated	

Disclaimer : The Landfill Waste Acceptance Criteria limits in this report are provided for guidance only.
Chemtech Environmental Ltd does not take responsibility for any errors or omissions. Data is correct as of 01/09/2005.
Samples will be disposed of 6 weeks from initial receipt unless written instructions are received and further storage is agreed.
Waste Acceptance Criteria testing is outside the scope of the laboratory's UKAS accreditation.

Comments

Authorised by:

J. Campbell

Name:

John Campbell

Report date:

4 April 2018

Position:

Director

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UK BACKGROUND

Environmental Protection Act 1990: Part 2A Revised Statutory Guidance (April 2012)

This revised document explains how the Local Authority should decide if land, based on a legal interpretation, is contaminated. The document replaces the previous guidance given in Annex 3 of DEFRA Circular 01/2006, issued in accordance with section 78YA of the 1990 Environmental Protection Act.

The main objectives of the Part 2A regime are to *“identify and remove unacceptable risks to human health and the environment”* and to *“seek to ensure that contaminated land is made suitable for its current use”*.

Part 2A uses a risk based approach to defining contaminated land whereby the “risk” is interpreted as *“the likelihood that harm, or pollution of water, will occur as a result of contaminants in, on or under the land”* and by *“the scale and seriousness of such harm or pollution if it did occur”*.

For a relevant risk to exist a contaminant, pathway and receptor linkage must be present before the land can be considered to be contaminated. The document explains that *“for a risk to exist there must be contaminants present in, on or under the land in a form and quantity that poses a hazard, and one or more pathways by which they might significantly harm people, the environment, or property; or significantly pollute controlled waters.”*

A conceptual model is used to develop and communicate the risks associated with a particular site.

To determine if land is contaminated the local authority use various categories from 1 to 4. Categories 1 and 2 include *“land which is capable of being determined as contaminated land on grounds of significant possibility of significant harm to human health.”*

Categories 3 and 4 *“encompass land which is not capable of being determined on such grounds”*.

PRELIMINARY CONCEPTUAL MODEL

Preliminary Conceptual Models are undertaken in accordance with CIRIA C552. The Preliminary Conceptual Model assesses the consequence and the likelihood of a risk being realised to provide a risk classification, using the tables detailed below.

CONSEQUENCE OF RISK BEING REALISED (Based on C552 CIRIA, 2001)

Classification	Definition	Example
Severe	Short-term (acute) risk to human health, the environment, an element of the development or other aspect with is likely to result in <i>significant harm</i> , damage or both.	High concentrations of cyanide on the surface of an informal recreational area. Major spills of contaminants from site into controlled water. High concentrations of explosive gas in the subsurface environment that have a clear unobstructed pathway into buildings.
Moderate	Chronic damage to human health, a plausible chance that an event will occur, although the timeline is not immediate to be in the short-term.	Appreciable concentration of contamination that over the longer-term will cause significant harm i.e. high lead concentration in topsoil. Shallow mine workings that are potentially unstable but may remain in a satisfactory or stable conditions for a number of years.
Mild	Low level pollution of non-sensitive water, a feasible hazardous scenario although the timeline of such occurring can probably be considered in 10's of years.	The effect of high sulphate concentrations on structural concrete. Pollution of non-classified groundwater.
Minor	Harm, although not necessarily significant to human health, or with respect to other aspects of the development, which are considered implausible in terms of occurrence, or will have little consequential impact.	The presence of contaminants at such low concentrations that protective equipment is required during site works. Any damage to structures is minimal and will not be structural in characteristics.

PROBABILITY OF RISK BEING REALISED (C552 CIRIA, 2001)

Classification	Definition
High Likelihood	There is a viable pollutant linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence that the receptor has been harmed or polluted.
Likely	There is a viable pollutant linkage and all elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low Likelihood	There is a viable pollutant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	There is a viable pollutant linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

RISK CLASSIFICATION MATRIX (C552 CIRIA, 2001)

Risk = Probability x Consequence		Consequence			
		Severe	Medium	Mild	Minor
Probability	High likelihood	Very high risk	High risk	Moderate risk	Moderate/low risk
	Likely	High risk	Moderate risk	Moderate/low risk	Low risk
	Low likelihood	Moderate risk	Moderate/low risk	Low risk	Very low risk
	Unlikely	Moderate/low risk	Low risk	Very low risk	Very low risk

HUMAN RECEPTORS

Human exposure to contaminants present in soils can occur via several pathways. Direct exposure pathways include dermal absorption after contact with contaminated ground, inhalation of soil or dust, inhalation of volatilised compounds, and inadvertent soil ingestion (or deliberate soil ingestion in the case of some children). Other indirect pathways include human ingestion of plants grown in contaminated soil or contaminated ground or surface water. Contaminants associated with wind blown dust can affect humans on surrounding sites.

VEGETATION

Plants can be affected by soil contamination in a number of ways resulting in growth inhibition, nutrient deficiencies and yellowing of leaves. Contaminants are taken up by plants through the roots and through foliage. Contaminants identified as being highly phytotoxic include boron, cadmium, copper, lead, nickel, and zinc.

To establish if the levels of contaminants present on a site may pose a risk to vegetation the results of the contamination testing are compared to a series of threshold values published in 'Code of Good Agricultural Practice for the Protection of Soil'.

GROUNDWATER AND SURFACE WATER RECEPTORS

The principal pathway by which soil contamination may reach the water environment is through a slow seepage or leaching to groundwater or surface water. The potential for contaminants to migrate along such pathways is dependent on the chemical and physical characteristics of the contaminants and the local hydrogeology. Surface watercourses may also accumulate contamination as contaminated sediments are deposited within the water body.

Where the site investigated overlies major/principal aquifers (and in some cases minor/secondary aquifers depending on certain conditions), groundwater Source Protection Zones and areas in close proximity to groundwater abstractions, contamination test results have been compared with the Water Supply (Water Quality) Regulations 1989 and The Water Supply (Water Quality) Regulations 2000.

Should a surface water receptor, such as a fresh water environment (river, canal, stream, lake etc), or marine environment be considered sensitive in relation to a site, then test results are compared with DEFRA & SEPA Environmental Quality Standards (2004). Many of the Environmental Quality Standards are hardness (CaCO₃) depended. Where no hardness values are available, Solmek assume conservative values (of between 0 and 50mg/l).

In the absence of vulnerable ground and surface water environments, Solmek may compare any test results with the Environment Agency Leachate Quality Threshold Values.

DETAILED QUANTITATIVE RISK ASSESSMENT (DQRA)

In line with CLR 11- Model Procedures, a DQRA for groundwater/human health may be required following a Phase 2 investigation and before the preparation of a Phase 3 Remediation Strategy. For human health DQRA, a site specific assessment criteria is undertaken using CLEA Software Version 1.06. For groundwater DQRA, the Environment Agency Remedial Targets Worksheet Version 3.1 is used.

WASTE ACCEPTANCE CRITERIA

The WAC testing relates to materials that are to be exported from a site/development to landfill, and do not directly relate to human health specifically. The WAC test categorises materials as either inert waste, non-reactive hazardous waste, and hazardous waste.

The testing results are generally presented as certificates which can be used by site owners/contractors etc, which should be presented to the accepting waste facility or waste contractor.

CONSTRUCTION MATERIALS

Materials at risk from possible soil contaminants include inorganic matrices such as cement and concrete and also organic material such as plastics and rubbers. Acid ground conditions and high levels of sulphates can accelerate the corrosion of building materials. Where pH and soluble sulphate analysis has been undertaken, Solmek compare the test results with the guidelines presented within BRE Special Digest 1, 2005 (3rd Edition) 'Concrete in Aggressive Ground'. Plastics and rubbers are generally used for piping and service ducts and are potentially attacked by a range of chemicals, most of which are organic, particularly petroleum based substances. Drinking water supplies can be tainted by substances that can penetrate piping and water companies enforce stringent threshold values.

The levels of potential contaminants should be compared to thresholds supplied in the UK Water Industry Research (UKWIR) publication "Guidance for the selection of Water Supply Pipes to be used in Brownfield Sites" (January 2011). A Brownfield Site is defined in the document as "Land or premises that have not previously been used or developed that may be vacant or derelict". It should be noted that Brownfield sites may not be contaminated. The guidance does not apply to Greenfield Sites however water companies may have their own assessment criteria which should be checked by the developer. The table below outlines the pipe material selection threshold concentrations.

Parameter group	Pipe Material (Threshold concentrations in mg/kg)					
	PE	PVC	Barrier pipe (PE-AL-PE)	Wrapped Steel	Wrapped Ductile Iron	Copper
Extended VOC suite by purge and trap or head space and GC-MS with TIC	0.5	0.125	Pass	Pass	Pass	Pass
+ BTEX + MTBE	0.1	0.03	Pass	Pass	Pass	Pass
SVOCs TIC by purge and trap or head space and GC-MS with TIC (aliphatic and aromatic C5-C10)	2	1.4	Pass	Pass	Pass	Pass
+ Phenols	2	0.4	Pass	Pass	Pass	Pass
+ Cresols and chlorinated phenols	2	0.04	Pass	Pass	Pass	Pass
Mineral oil C11-C20	10	Pass	Pass	Pass	Pass	Pass
Mineral oil C21-C40	500	Pass	Pass	Pass	Pass	Pass
Corrosive (Conductivity, Redox and pH)	Pass	Pass	Pass	Corrosive if pH <7 and conductivity >400µS/cm	Corrosive if pH <5, Eh not neutral and conductivity >400µS/cm	Corrosive if pH <5 or >8 and Eh positive
Specific suite identified as relevant following site investigation						
Ethers	0.5	1	Pass	Pass	Pass	Pass
Nitrobenzene	0.5	0.4	Pass	Pass	Pass	Pass
Ketones	0.5	0.02	Pass	Pass	Pass	Pass
Aldehydes	0.5	0.02	Pass	Pass	Pass	Pass
Amines	Fail	Pass	Pass	Pass	Pass	Pass

REQUIREMENTS OF PARTIES WITHIN THE DEVELOPMENT PROCESS

Interested parties involved in the development process may use the data in different ways and there may be varying views and interpretation of the factual data. Local Authority staff may have a view on contamination and human health and the wider environment. The Environment Agency are concerned principally with the protection of Controlled waters. Building insurers, funders and purchasers may be primarily concerned with issues of potential commercial blight. Purchasers are also not always fully informed, and perceptions on issues associated with risk can affect the decision to purchase. Developers and construction organisations will focus on financial aspects of dealing with the contamination in the context of the development and construction programme.

RISKS & LIABILITIES FROM CONTAMINATION

In simple terms, risks associated with contamination may be considered in terms of 1) statutory risks and 2) development related risks. If contamination is severe or forms a potential hazard based on its potential to affect groundwater, surface water or human health, a statutory risk may be present, and as such, if the risk is not reduced, criminal proceedings may be instigated by a government body or local authority.

If the contamination is less severe or not considered to be mobile, it may be considered a commercial liability which could, in theory remain untreated, but which may at a later date affect the value of the property, or, with changing legislation, become a statutory risk. Commercial liabilities could give rise to civil proceedings by third parties if there are grounds for action.

♣Solmek conditions of offer, notes on limitations & basis for contract (ref: version1/2018)

These conditions accompany our tender and supercede any previous conditions issued. Solmek will prepare a report solely for the use of the Client (the party invoiced) and its agent(s). No reliance should be placed on the contents of this report, in whole or in part by 3rd parties. The report, its content and format and associated data are copyright, and the property of Solmek. Photocopying of part or all of the contents, transfer or reproduction of any kind is forbidden without written permission from Solmek. A charge may be levied against such approval, the same to be made at the discretion of Solmek. Solmek was a trading name of Hymas Geoenvironmental Ltd.

Solmek cannot be held liable and do not warrant, or otherwise guarantee the validity of information provided by third parties and subsequently used in our reports. Solmek are not responsible for the action negligent of otherwise of subcontractors or third parties.

Site investigation is a process of sampling. The scope and size of an investigation may be considered proportional to levels of confidence regarding the ground and groundwater conditions. The exploratory holes undertaken investigate only a small volume of the ground in relation to the overall size of the site, and can only provide a general indication of site conditions. The opinions provided and recommendations given in this report are based on the ground conditions as encountered within each of the exploratory holes. There may be different ground conditions elsewhere on the site which have not been identified by this investigation and which therefore have not been taken into account in this report. Reports are generally subject to the comments of the local authority and Environment Agency. The comments made on groundwater conditions are based on observations made at the time that site work was carried out. It should be noted that mobile contamination, ground gas levels and groundwater levels may vary owing to seasonal, tidal and/or weather related effects. Solmek cannot be held liable for any unrecorded or unforeseen obstructions between exploratory boreholes and trial pits. This includes instances where previous structures on the site (buried man made structures) or the presence of boulder clay (cobbles and/or boulder obstructions) have been anticipated. All types of piling operations should make allowance for obstructions within the construction budget to accommodate this. Unrecorded ancient mining may occur anywhere where seams that have been worked and influence the rock and soil above. Dissolution cavities can occur where gypsum or chalk is present. Rotary drilling is the recommended technique to prove the integrity of the rock.

Where the scope of the investigation is limited via access to information, time constraints, equipment limitations, testing, interpretation or by the client or his agents budgetary constraints, elements not set out in the proposal and excluded from the report are deemed to be omitted from the scope of the investigation.

Desk studies are generally prepared in accordance with RICS guidelines. Environmental site investigations are generally undertaken as 'exploratory investigations' in accordance with the definitions provided in paragraph 5.4 of BS 10175:2001 in order to confirm the conceptual assumptions. You are advised to familiarize yourself with the typical scope of such an investigation. No pumping of water will be undertaken unless a licence or facilities/equipment have been arranged by others.

Where the type, number or/and depth of exploratory hole is specified by others, Solmek cannot and will not be responsible for any subsequent shortfall or inadequacy in data, and any consequent shortfall in interpretation of environmental and geotechnical aspects which may be required at a later date in order to facilitate the design of permanent or temporary works.

All information acquired by Solmek in the course of investigation is the property of Solmek, and, only also becomes the joint property of the Client only on the complete settlement of all invoices relating to the project. Solmek reserve the right to use the information in commercial tendering and marketing, unless the Client expressly wishes otherwise in writing. The quoted rates do not include VAT, and payment terms are 30 days from dispatch of invoice from our offices. Quotes are subject to a site visit.

We have allowed for 1 mobilisation and normal working hours unless otherwise stated. The scope of the investigation may be reviewed following the desk study and/or fieldwork. The presence or otherwise of Japanese Knotweed or other invasive plants can be difficult to identify especially during winter months. If Japanese Knotweed or other invasive species are suspect, it should be confirmed by an ecologist. We have not allowed for acquiring services information, and cannot be responsible for damage to underground services or pipes not shown to us or not clearly shown on plans. Costs incurred will be passed on to you, and in commissioning Solmek you understand and accept that you/your agent have a contractual relationship with Solmek & you accept this. Our rates assume unobstructed, reasonably level and firm access to the exploratory positions and adequate clear working areas and headroom. We have priced on the basis that you or your client have the necessary permissions, wayleaves and approvals to access land. All boreholes and pits are backfilled with arisings except where gas monitoring pipes are installed with stopcock covers. Solmek are not responsible for any uneven surfaces as a result of siteworks and rutting and backfilled excavations may require re-levelling and/or making good by others after fieldwork is complete, and Solmek has not allowed for this. No price has been provided or requested for a return visit to remove pipework and covers. Hourly rates apply to consultancy only and do not include expenses unless otherwise shown. If warranties are required, legal costs incurred will be passed on to you assuming Solmek agree to complete such warranties, modified or otherwise and you understand and agree to pay all costs.

We reserve the right to pursue full payment of the invoice prior to release of any information including reports. We advise you/your client that we may elect to pursue our statutory rights under late payment legislation, and will apply 8% to the base rate for unreasonably late payments. Solmek are exempt from the CIS Scheme. Solmek offer to undertake work only in strict accordance with conditions covered by our current insurances, which are available for inspection. Solmek are not responsible for acts, negligent or otherwise of subcontractors and as a matter of policy cannot indemnify any other parties. Professional indemnity Insurance is limited to ten times the invoice net total except where stated otherwise by Solmek. Solmek give notice that consequential loss as a direct or indirect result of Solmek's activities or omission of the same are excluded.