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Attention: Kate Riley

CERTIFICATE OF ANALYSIS

Date of report Generation:	23 February 2019
Customer:	H_NCC_NPT
Sample Delivery Group (SDG):	190215-54
Your Reference:	
Location:	Docksway Landfill Site
Report No:	493897

We received 6 samples on Friday February 15, 2019 and 6 of these samples were scheduled for analysis which was completed on Saturday February 23, 2019. 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 Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.
Incorrect sampling dates and/or sample information will affect the validity of results.

Approved By:

Sonia McWhan
Operations Manager

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

SDG:	190215-54	**Client Reference:**		**Report Number:**	493897
Location:	Docksway Landfill Site	**Order Number:**	700111791	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
19359440	C3_Asb		0.00 - 0.00	14/02/2019
19359412	SW_23		0.00 - 0.00	14/02/2019
19359417	SW_24		0.00 - 0.00	14/02/2019
19359421	SW_25		0.00 - 0.00	14/02/2019
19359427	SW_26		0.00 - 0.00	14/02/2019
19359435	SW_1A		0.00 - 0.00	14/02/2019

Maximum Sample/Coolbox Temperature (°C) : **3.4**

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.

Validated

CERTIFICATE OF ANALYSIS

SDG:	190215-54	**Client Reference:**		**Report Number:**	493897
Location:	Docksway Landfill Site	**Order Number:**	700111791	**Superseded Report:**	

Results Legend

X Test

N 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)			19359440			19359412			19359417			19359421				19359427			19359435	
Customer Sample Reference			C3_Asb			SW_23			SW_24			SW_25				SW_26			SW_1A	
AGS Reference																				
Depth (m)			0.00 - 0.00			0.00 - 0.00			0.00 - 0.00			0.00 - 0.00				0.00 - 0.00			0.00 - 0.00	
Container			250ml BOD (ALE212)	500ml Plastic (ALE208)	H2SO4 (ALE244)	250ml BOD (ALE212)	500ml Plastic (ALE208)	H2SO4 (ALE244)	250ml BOD (ALE212)	500ml Plastic (ALE208)	H2SO4 (ALE244)	250ml BOD (ALE212)	500ml Plastic (ALE208)	DO KIT + DO 250 ml glass	H2SO4 (ALE244)	250ml BOD (ALE212)	500ml Plastic (ALE208)	DO KIT + DO 250 ml glass	H2SO4 (ALE244)	250ml BOD (ALE212)	500ml Plastic (ALE208)
Sample Type			SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 6			X			X			X				X				X		
Anions by Kone (w)	All	NDPs: 0 Tests: 6		X			X			X			X				X				X
BOD True Total	All	NDPs: 0 Tests: 6	X			X			X			X				X				X	
COD Unfiltered	All	NDPs: 0 Tests: 6	X			X			X			X				X				X	
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 6		X			X			X			X				X				X
Dissolved Oxygen by Titration	All	NDPs: 0 Tests: 2												X				X			
pH Value	All	NDPs: 0 Tests: 6		X			X			X			X				X				X
Suspended Solids	All	NDPs: 0 Tests: 2											X				X				

19359435	SW_1A		0.00 - 0.00	H2SO4 (ALE244)	SW
					X

Validated

CERTIFICATE OF ANALYSIS

SDG:	190215-54	**Client Reference:**		**Report Number:**	493897
Location:	Docksway Landfill Site	**Order Number:**	700111791	**Superseded Report:**	

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS 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
1-3+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	C3_Asb	SW_23	SW_24	SW_25	SW_26	SW_1A
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
			Sample Type	Surface Water (SW)	Surface Water (SW)	Surface Water (SW)	Surface Water (SW)	Surface Water (SW)	Surface Water (SW)
			Date Sampled	14/02/2019	14/02/2019	14/02/2019	14/02/2019	14/02/2019	14/02/2019
			Sample Time	.	.	.	.	.	.
			Date Received	15/02/2019	15/02/2019	15/02/2019	15/02/2019	15/02/2019	15/02/2019
			SDG Ref	190215-54	190215-54	190215-54	190215-54	190215-54	190215-54
			Lab Sample No.(s)	19359440	19359412	19359417	19359421	19359427	19359435
			AGS Reference						
Suspended solids, Total	<2 mg/l	TM022					<2 #	14.1 #	
BOD, unfiltered	<1 mg/l	TM045		<1 #	2.05 #	4.34 #	<1 #	3.55 #	<1 #
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099		<0.2 #	16.7 #	<0.2 #	2.63 #	0.989 #	<0.2 #
COD, unfiltered	<7 mg/l	TM107		44.7 #	31.5 #	34.6 #	44.2 #	44.3 #	10.9 #
Conductivity @ 20 deg.C	<0.005 mS/cm	TM120		1.65 #	1.01 #	0.556 #	1.18 #	1.06 #	0.335 #
Chloride	<2 mg/l	TM184		216 #	81.8 #	37.9 #	77.5 #	69 #	17.8 #
Oxygen, dissolved	<0.3 mg/l	TM187					7.88	5.83	
pH	<1 pH Units	TM256		8.43 #	8.23 #	8.49 #	8.2 #	8.49 #	8.01 #

CERTIFICATE OF ANALYSIS

SDG:	190215-54	**Client Reference:**		**Report Number:**	493897
Location:	Docksway Landfill Site	**Order Number:**	700111791	**Superseded Report:**	

Table of Results - Appendix

Method No	Reference	Description
TM022	Method 2540D, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part120 1981;BS EN 872	Determination of total suspended solids in waters
TM045	MEWAM BOD5 2nd Ed.HMSO 1988 / Method 5210B, AWWA/APHA, 20th Ed., 1999; SCA Blue Book 130	Determination of BOD5 (ATU) Filtered by Oxygen Meter on liquids
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM107	ISO 6060-1989	Determination of Chemical Oxygen Demand using COD Dr Lange Kit
TM120	Method 2510B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part 9:1970	Determination of Electrical Conductivity using a Conductivity Meter
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM187	Winkler, L.W, Ber Deutsch. Chem. Ges, 21,2843,1888."	Dissolved Oxygen in Natural and Waste Waters HMSO 1979 ISBN 011 751442
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter

NA = not applicable.

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Validated

CERTIFICATE OF ANALYSIS

SDG:	190215-54	**Client Reference:**		**Report Number:**	493897
Location:	Docksway Landfill Site	**Order Number:**	700111791	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	19359440	19359412	19359417	19359421	19359427	19359435
Customer Sample Ref.	C3_Asb	SW_23	SW_24	SW_25	SW_26	SW_1A
AGS Ref.						
Depth	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
Type	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Ammoniacal Nitrogen	22-Feb-2019	22-Feb-2019	22-Feb-2019	22-Feb-2019	22-Feb-2019	22-Feb-2019
Anions by Kone (w)	23-Feb-2019	23-Feb-2019	23-Feb-2019	23-Feb-2019	23-Feb-2019	23-Feb-2019
BOD True Total	21-Feb-2019	21-Feb-2019	21-Feb-2019	21-Feb-2019	21-Feb-2019	21-Feb-2019
COD Unfiltered	20-Feb-2019	20-Feb-2019	21-Feb-2019	20-Feb-2019	20-Feb-2019	20-Feb-2019
Conductivity (at 20 deg.C)	21-Feb-2019	21-Feb-2019	21-Feb-2019	21-Feb-2019	21-Feb-2019	21-Feb-2019
Dissolved Oxygen by Titration				19-Feb-2019	20-Feb-2019	
pH Value	22-Feb-2019	22-Feb-2019	22-Feb-2019	22-Feb-2019	22-Feb-2019	22-Feb-2019
Suspended Solids				15-Feb-2019	19-Feb-2019	

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35ºC) 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%. 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 Dimethyphenol, 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**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to late arrival of instructions or samples**

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.