

Our Ref: EFS/205821 (Ver. 1)

Your Ref:

March 31, 2020



Environmental Chemistry

SOCOTEC UK Limited

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[REDACTED]
Shetland Islands Council
C/O Energy Recovery Plant
Greenhead
Lerwick
Shetland
United Kingdom
ZE1 0PY

For the attention of [REDACTED]

Dear [REDACTED]

Sample Analysis - March Residue Analysis 2020

Samples from the above site have been analysed in accordance with the schedule supplied.

The sample details and the results of analyses for these samples are given in the appended report.

An invoice for this work will follow under a separate cover.

Where appropriate the samples will be kept until 22/04/20 when they will be discarded. Please call 01283 554400 for an extension of this date.

Please be aware that our policy for the retention of paper based laboratory records and analysis reports is 6 years.

The work was carried out in accordance with SOCOTEC UK Limited (Multi-Sector Services) Standard Terms and Conditions of Contract.

If I can be of any further assistance please do not hesitate to contact me.

Yours sincerely

for SOCOTEC UK Limited

[REDACTED]
01283 554400

TEST REPORT



Report No. EFS/205821 (Ver. 1)

Shetland Islands Council
Shetland Islands Council
C/O Energy Recovery Plant
Greenhead
Lerwick
Shetland
United Kingdom
ZE1 0PY

Site: March Residue Analysis 2020

The 4 samples described in this report were registered for analysis by SOCOTEC UK Limited on 11-Mar-2020. This report supersedes any versions previously issued by the laboratory.

The analysis was completed by: 31-Mar-2020

Tests where the accreditation is set to N or No, and any individual data items marked with a * are not UKAS accredited. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

The following tables are contained in this report:

Table 1 Main Analysis Results (Pages 2 to 4)
Table of WAC Analysis Results (Pages 5 to 8)
Subcontracted Analysis Reports (Pages 9 to 18)
The accreditation status of subcontracted analysis is displayed on the appended subcontracted analysis reports.
Analytical and Deviating Sample Overview (Page 19)
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On behalf of
SOCOTEC UK Limited
Becky Batham

Energy & Waste Services

Date of Issue: 31-Mar-2020

Tests marked '^' have been subcontracted to another laboratory.

Where samples have been flagged as deviant on the Analytical and Deviating Sample Overview, for any reason, the data may not be representative of the sample at the point of sampling and the validity of the data may be affected.

SOCOTEC UK Limited accepts no responsibility for any sampling not carried out by our personnel.

[illegible]

WASTE ACCEPTANCE CRITERIA TESTING BSEN 12457/2

Client	Shetland Islands Council				Leaching Data	
					Weight of sample (kg)	0.105
Contact					Moisture content @ 105°C (% of Wet Weight)	11.5
					Equivalent Weight based on drying at 105°C (kg)	0.090
Site	March Residue Analysis 2020				Volume of water required to carry out 10:1 stage (litres)	0.885
					Fraction of sample above 4 mm %	0.000
Sample Description			Report No	Sample No	Issue Date	Fraction of non-crushable material %
ESP			s20_5821	CL/2086682	31-Mar-20	

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
U	WSLM59	Total Organic Carbon (% M/M)	0.38	3	5	6
N	LOI450	Loss on Ignition (%)	3.2			10
	BTEXHSA	Sum of BTEX (mg/kg)		6		
	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)		1		
	TPHFIDUS	Mineral Oil (mg/kg)		500		
	PAHMSUS	PAH Sum of 17 (mg/kg)		100		
	PHSOIL	pH (pH units)			>6	
	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7			To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ L/S 10 litre kg-1		
			mg/l except ^{oo}	mg/kg (dry weight)	mg/kg (dry weight)		
U	WSLM3	pH (pH units) ^{oo}	12.8	Calculated data not UKAS Accredited			
U	WSLM2	Conductivity (µs/cm) ^{oo}	48600				
U	ICPMSW	Arsenic	<0.01	<0.1	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.1	20	100	300
U	ICPMSW	Cadmium	0.00366	0.0366	0.04	1	5
U	ICPMSW	Chromium	<0.01	<0.1	0.5	10	70
U	ICPMSW	Copper	0.04	0.4	2	50	100
U	ICPMSW	Mercury	<0.0003	<0.003	0.01	0.2	2
U	ICPMSW	Molybdenum	0.198	1.98	0.5	10	30
U	ICPMSW	Nickel	0.016	0.16	0.4	10	40
U	ICPMSW	Lead	13.19	131.9	0.5	10	50
U	ICPMSW	Antimony	<0.01	<0.1	0.06	0.7	5
U	ICPMSW	Selenium	0.021	0.21	0.1	0.5	7
U	ICPMSW	Zinc	1.013	10.13	4	50	200
U	KONENS	Chloride	11900	119000	800	15000	25000
U	ISEF	Fluoride	3.5	35	10	150	500
U	ICPWATVAR	Sulphate as SO4	4270	42700	1000	20000	50000
N	WSLM27	Total Dissolved Solids	37900	379000	4000	60000	100000
U	SFAP1	Phenol Index	0.3	3	1		
N	WSLM13	Dissolved Organic Carbon	2	20	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

WASTE ACCEPTANCE CRITERIA TESTING BSEN 12457/2

Client	Shetland Islands Council			Leaching Data	
				Weight of sample (kg)	0.123
Contact				Moisture content @ 105°C (% of Wet Weight)	39.5
				Equivalent Weight based on drying at 105°C (kg)	0.090
Site	March Residue Analysis 2020			Volume of water required to carry out 10:1 stage (litres)	0.867
				Fraction of sample above 4 mm %	0.000
	Sample Description	Report No	Sample No	Issue Date	Fraction of non-crushable material %
	Filterpass	s20_5821	CL/2086683	31-Mar-20	0.000

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
	WSLM59	Total Organic Carbon (% M/M)		3	5	6
	LOI450	Loss on Ignition (%)				10
	BTEXHSA	Sum of BTEX (mg/kg)		6		
	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)		1		
	TPHFIDUS	Mineral Oil (mg/kg)		500		
	PAHMSUS	PAH Sum of 17 (mg/kg)		100		
	PHSOIL	pH (pH units)			>6	
	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7			To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ L/S 10 litre kg-1		
			mg/l except ^{oo}	mg/kg (dry weight)			
U	WSLM3	pH (pH units) ^{oo}	7.9	Calculated data not UKAS Accredited			
U	WSLM2	Conductivity (µs/cm) ^{oo}	3360				
U	ICPMSW	Arsenic	<0.001	<0.01	0.5	2	25
U	ICPWATVAR	Barium	0.02	0.2	20	100	300
U	ICPMSW	Cadmium	0.00024	0.0024	0.04	1	5
U	ICPMSW	Chromium	<0.001	<0.01	0.5	10	70
U	ICPMSW	Copper	<0.001	<0.01	2	50	100
U	ICPMSW	Mercury	<0.00003	<0.0003	0.01	0.2	2
U	ICPMSW	Molybdenum	0.036	0.36	0.5	10	30
U	ICPMSW	Nickel	0.129	1.29	0.4	10	40
U	ICPMSW	Lead	<0.001	<0.01	0.5	10	50
U	ICPMSW	Antimony	0.036	0.36	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	0.238	2.38	4	50	200
U	KONENS	Chloride	409	4090	800	15000	25000
U	ISEF	Fluoride	4.3	43	10	150	500
U	ICPWATVAR	Sulphate as SO4	1780	17800	1000	20000	50000
N	WSLM27	Total Dissolved Solids	2620	26200	4000	60000	100000
U	SFAP1	Phenol Index	<0.05	<0.5	1		
N	WSLM13	Dissolved Organic Carbon	1.2	12	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

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WASTE ACCEPTANCE CRITERIA TESTING

BSEN 12457/2

Client	Shetland Islands Council				Leaching Data	
Contact	[REDACTED]				Weight of sample (kg)	0.091
					Moisture content @ 105°C (% of Wet Weight)	15.2
					Equivalent Weight based on drying at 105°C (kg)	0.090
Site	March Residue Analysis 2020				Volume of water required to carry out 10:1 stage (litres)	0.899
					Fraction of sample above 4 mm %	0.000
Sample Description		Report No	Sample No	Issue Date	Fraction of non-crushable material %	0.000
Baghouse Filter		s20_5821	CL/2086684	31-Mar-20		

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
U	WSLM59	Total Organic Carbon (% M/M)	0.59	3	5	6
N	LOI450	Loss on Ignition (%)	1.2			10
	BTEXHSA	Sum of BTEX (mg/kg)		6		
	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)		1		
	TPHFIDUS	Mineral Oil (mg/kg)		500		
	PAHMSUS	PAH Sum of 17 (mg/kg)		100		
	PHSOIL	pH (pH units)			>6	
	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7			To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ L/S 10 litre kg-1		
			mg/l except °°	mg/kg (dry weight)			
U	WSLM3	pH (pH units) °°	12.7	Calculated data not UKAS Accredited			
U	WSLM2	Conductivity (µs/cm) °°	13400				
U	ICPMSW	Arsenic	<0.001	<0.01	0.5	2	25
U	ICPWATVAR	Barium	0.86	8.6	20	100	300
U	ICPMSW	Cadmium	0.00059	0.0059	0.04	1	5
U	ICPMSW	Chromium	<0.001	<0.01	0.5	10	70
U	ICPMSW	Copper	0.001	0.01	2	50	100
U	ICPMSW	Mercury	<0.00003	<0.0003	0.01	0.2	2
U	ICPMSW	Molybdenum	0.044	0.44	0.5	10	30
U	ICPMSW	Nickel	<0.001	<0.01	0.4	10	40
U	ICPMSW	Lead	0.323	3.23	0.5	10	50
U	ICPMSW	Antimony	<0.001	<0.01	0.06	0.7	5
U	ICPMSW	Selenium	0.017	0.17	0.1	0.5	7
U	ICPMSW	Zinc	0.683	6.83	4	50	200
U	KONENS	Chloride	1000	10000	800	15000	25000
U	ISEF	Fluoride	0.6	6	10	150	500
U	ICPWATVAR	Sulphate as SO4	2020	20200	1000	20000	50000
N	WSLM27	Total Dissolved Solids	10500	105000	4000	60000	100000
U	SFAPI	Phenol Index	<0.05	<0.5	1		
N	WSLM13	Dissolved Organic Carbon	4.3	43	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

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WASTE ACCEPTANCE CRITERIA TESTING BSEN 12457/2

Client	Shetland Islands Council			Leaching Data	
				Weight of sample (kg)	0.105
Contact				Moisture content @ 105°C (% of Wet Weight)	1.6
				Equivalent Weight based on drying at 105°C (kg)	0.090
Site	March Residue Analysis 2020			Volume of water required to carry out 10:1 stage (litres)	0.885
				Fraction of sample above 4 mm %	41.700
	Sample Description	Report No	Sample No	Issue Date	Fraction of non-crushable material %
	Bottom Ash	s20_5821	CL/2086685	31-Mar-20	0.000

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
N	WSLM59	Total Organic Carbon (% M/M)	22.45§	3	5	6
N	LOI450	Loss on Ignition (%)	14.5			10
	BTEXHSA	Sum of BTEX (mg/kg)		6		
	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)		1		
	TPHFIDUS	Mineral Oil (mg/kg)		500		
	PAHMSUS	PAH Sum of 17 (mg/kg)		100		
	PHSOIL	pH (pH units)			>6	
	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7			To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ L/S 10 litre kg-1		
			mg/l except °°	mg/kg (dry weight)			
U	WSLM3	pH (pH units) °°	12.7	Calculated data not UKAS Accredited			
U	WSLM2	Conductivity (µs/cm) °°	8810				
U	ICPMSW	Arsenic	<0.001	<0.01	0.5	2	25
U	ICPWATVAR	Barium	0.59	5.9	20	100	300
U	ICPMSW	Cadmium	0.00035	0.0035	0.04	1	5
U	ICPMSW	Chromium	0.008	0.08	0.5	10	70
U	ICPMSW	Copper	1.225	12.25	2	50	100
U	ICPMSW	Mercury	<0.00003	<0.0003	0.01	0.2	2
U	ICPMSW	Molybdenum	0.06	0.6	0.5	10	30
U	ICPMSW	Nickel	0.001	0.01	0.4	10	40
U	ICPMSW	Lead	2.742	27.42	0.5	10	50
U	ICPMSW	Antimony	<0.001	<0.01	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	2.076	20.76	4	50	200
U	KONENS	Chloride	262	2620	800	15000	25000
U	ISEF	Fluoride	0.4	4	10	150	500
U	ICPWATVAR	Sulphate as SO4	393	3930	1000	20000	50000
N	WSLM27	Total Dissolved Solids	6870	68700	4000	60000	100000
U	SFAP1	Phenol Index	<0.05	<0.5	1		
N	WSLM13	Dissolved Organic Carbon	9.1	91	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

UKAS accredited testing laboratory No. 1668

Name of Client : Socotec UK Ltd Environmental Chemistry
Address : PO Box 100, Burton upon Trent, Staffordshire, DE15 0XD

Test Certificate No: 44725

ANALYSIS OF PCDDs and PCDFs

Job Reference: S205821
Sample Identifier : S2086682 ESP 03/03/2020 00:00
Sample No: 44725
Order No: B161266BEC
Sample Type: Ash
Sample Condition : conforming
Instrument : Thermo DFS
GC Column : DB5
Calibration File : 110320

Date of Receipt : 13/03/20
Date of Analysis : 21/03/20
Date of Report : 23/03/20

Test Method : 2002a
Blank : 160320
Sample size: 1

expressed as ng /kg

Congener	Conc	DL	Rec %	Congener	Conc	DL	Rec %
2378-TCDF	*	0.331	58	2378-TCDD	*	0.139	65
12378-PCDF	4.68	0.707	51	12378-PCDD	1.78	0.568	40
23478-PCDF	6.9	0.703	43	123478-HxCDD	2.15	0.689	61
123478-HxCDF	14.3	0.903	68	123678-HxCDD	7.9	0.693	58
123678-HxCDF	18.6	0.884	65	123789-HxCDD	5.13	0.695	
234678-HxCDF	43.5	0.853	67	1234678-HpCDD	117	0.726	54
123789-HxCDF	1.58	0.952	67	OCDD	641	0.673	48
1234678-HpCDF	184	0.629	58				
1234789-HpCDF	50	0.682	60				
OCDF	581	0.396					
Total 2,3,7,8-Furans	904			Total 2,3,7,8-Dioxins	775		
TEQ (Nato)	TEQ ¹ 18.8	TEQ ² 18.6		TEQ (WHO)- Mammals	TEQ ¹ 17.4	TEQ ² 17.2	
				TEQ (WHO)- Fish	17.2	17	
				TEQ (WHO)- Birds	20.7	20.2	

* Isomer Not detected
TEQ Toxic Equivalent Value
TEF Toxic Equivalent Factor
Conc Concentration
DL Detection Value
REC Recovery

TEQ¹ Concentration of Non Detected
Congeners at Detection Limit
TEQ² Concentration of Non Detected
Congeners at Zero

Reported by
Position

Sign



1668

UKAS accredited testing laboratory No. 1668

Name of Client : Socotec UK Ltd Environmental Chemistry
Address : PO Box 100, Burton upon Trent, Staffordshire, DE15 0XD

Test Certificate No: 44725

ANALYSIS OF PCBs

Job Reference: S205821
Sample Identifier : S2086682 ESP 03/03/2020 00:00
Sample No: 44725
Order No: B161266BEC
Sample Type: Ash
Sample Condition : conforming
Instrument : Micromass Ultima NT
GC Column : DB5
Calibration File : 200320

Date of Receipt : 13/03/20
Date of Analysis : 20/03/20
Date of Report : 23/03/20

Test Method : 2002
Blank : 160320
Sample size: 1

expressed as ng /kg

Congener	Conc	DL	Rec %
PCB-81	1.48	0.1198	63
PCB-77	4.6	0.1405	60
PCB-123	*	1.2840	125
PCB-118	4.78	1.3112	121
PCB-114	*	1.2228	141
PCB-105	6.31	1.2289	136
PCB-126	2.07	0.6767	74
PCB-167	0.854	0.6406	102
PCB-156	0.984	0.7238	104
PCB-157	*	0.7381	103
PCB-169	0.605	0.0924	66
PCB-189	2.6	0.8900	113
Total-PCBs	24.283		
		TEQ1	TEQ2
TEQ (WHO)- Mammals		0.227	0.227
TEQ (WHO)- Fish		0.0117	0.0117
TEQ (WHO)- Birds		0.587	0.587

* Isomer Not detected
TEQ Toxic Equivalent Value
TEF Toxic Equivalent Factor
Conc Concentration
DL Detection Value
REC Recovery

TEQ¹ Concentration of Non Detected
Congeners at Detection Limit
TEQ² Concentration of Non Detected
Congeners at Zero

Reported by
Position

Signature :



1668

UKAS accredited testing laboratory No. 1668

Name of Client : Socotec UK Ltd Environmental Chemistry
Address : PO Box 100, Burton upon Trent, Staffordshire, DE15 0XD

Test Certificate No: 44726

ANALYSIS OF PCDDs and PCDFs

Job Reference: S205821
Sample Identifier : S2086683 Filterpass 03/03/2020 00:00
Sample No: 44726
Order No: B161266BEC
Sample Type: Ash
Sample Condition : conforming
Instrument : Thermo DFS
GC Column : DB5
Calibration File : 110320

Date of Receipt : 13/03/20
Date of Analysis : 21/03/20
Date of Report : 23/03/20

Test Method : 2002a
Blank : 160320
Sample size: 1

expressed as ng /kg

Congener	Conc	DL	Rec %	Congener	Conc	DL	Rec %
2378-TCDF	*	0.221	59	2378-TCDD	*	0.091	66
12378-PCDF	*	0.503	49	12378-PCDD	*	0.433	45
23478-PCDF	*	0.406	51	123478-HxCDD	*	0.563	61
123478-HxCDF	9.06	1.219	64	123678-HxCDD	2.67	0.620	61
123678-HxCDF	10.6	1.183	65	123789-HxCDD	*	0.622	
234678-HxCDF	50.7	1.092	64	1234678-HpCDD	104	1.127	51
123789-HxCDF	2.57	1.254	68	OCDD	999	1.292	39
1234678-HpCDF	246	1.487	54				
1234789-HpCDF	120	1.741	54				
OCDF	1640	0.812					
Total 2,3,7,8-Furans	2080			Total 2,3,7,8-Dioxins	1110		
TEQ (Nato)	TEQ ¹ 15.6	TEQ ² 14.9		TEQ (WHO)- Mammals	TEQ ¹ 13.8	TEQ ² 13	
				TEQ (WHO)- Fish	12.4	11.3	
				TEQ (WHO)- Birds	12.6	11.3	

* Isomer Not detected
TEQ Toxic Equivalent Value
TEF Toxic Equivalent Factor
Conc Concentration
DL Detection Value
REC Recovery

TEQ¹ Concentration of Non Detected
Congeners at Detection Limit
TEQ² Concentration of Non Detected
Congeners at Zero

Reported by
Position

Signature



1668

UKAS accredited testing laboratory No. 1668

Name of Client : Socotec UK Ltd Environmental Chemistry
Address : PO Box 100, Burton upon Trent, Staffordshire, DE15 0XD

Test Certificate No: 44726

ANALYSIS OF PCBs

Job Reference: S205821
Sample Identifier : S2086683 Filterpass 03/03/2020 00:00
Sample No: 44726
Order No: B161266BEC
Sample Type: Ash
Sample Condition : conforming
Instrument : Micromass Ultima NT
GC Column : DB5
Calibration File : 200320

Date of Receipt : 13/03/20
Date of Analysis : 20/03/20
Date of Report : 23/03/20

Test Method : 2002
Blank : 160320
Sample size: 1

expressed as ng /kg

Congener	Conc	DL	Rec %
PCB-81	*	0.1364	61
PCB-77	0.803	0.1571	60
PCB-123	*	0.4295	123
PCB-118	5.25	0.4344	119
PCB-114	*	0.3890	140
PCB-105	3.59	0.4170	127
PCB-126	*	0.7668	73
PCB-167	*	0.4585	105
PCB-156	*	0.5596	103
PCB-157	*	0.5988	99
PCB-169	*	0.0546	67
PCB-189	1.16	0.7469	109
Total-PCBs	10.803		
	TEQ1	TEQ2	
TEQ (WHO)- Mammals	0.0788	0.00038	
TEQ (WHO)- Fish	0.00405	0.00013	
TEQ (WHO)- Birds	0.131	0.0406	

* Isomer Not detected
TEQ Toxic Equivalent Value
TEF Toxic Equivalent Factor
Conc Concentration
DL Detection Value
REC Recovery

TEQ¹ Concentration of Non Detected
Congeners at Detection Limit
TEQ² Concentration of Non Detected
Congeners at Zero

Reported by
Position

Sign



1668

UKAS accredited testing laboratory No. 1668

Name of Client : Socotec UK Ltd Environmental Chemistry
Address : PO Box 100, Burton upon Trent, Staffordshire, DE15 0XD

Test Certificate No: 44727

ANALYSIS OF PCDDs and PCDFs

Job Reference: S205821
Sample Identifier : S2086684 Baghouse Filter 03/03/2020 00:00
Sample No: 44727
Order No: B161266BEC
Sample Type: Ash
Sample Condition : conforming
Instrument : Thermo DFS
GC Column : DB5
Calibration File : 110320

Date of Receipt : 13/03/20
Date of Analysis : 21/03/20
Date of Report : 23/03/20

Test Method : 2002a
Blank : 160320
Sample size: 1

expressed as ng /kg

Congener	Conc	DL	Rec %	Congener	Conc	DL	Rec %
2378-TCDF	0.952	0.317	86	2378-TCDD	*	0.103	94
12378-PCDF	2.87	0.460	81	12378-PCDD	0.589	0.247	68
23478-PCDF	15.5	0.445	71	123478-HxCDD	1.12	0.311	94
123478-HxCDF	15.8	0.485	101	123678-HxCDD	3.56	0.318	88
123678-HxCDF	20.7	0.474	97	123789-HxCDD	2.52	0.319	
234678-HxCDF	42.2	0.411	102	1234678-HpCDD	37	0.201	85
123789-HxCDF	2.25	0.471	103	OCDD	112	0.207	85
1234678-HpCDF	121	0.264	91				
1234789-HpCDF	26.7	0.277	98				
OCDF	124	0.183					
Total 2,3,7,8-Furans	372			Total 2,3,7,8-Dioxins	157		
TEQ (Nato)	TEQ ¹ 19.3	TEQ ² 19.2		TEQ (WHO)- Mammals	TEQ ¹ 16.2	TEQ ² 16.1	
				TEQ (WHO)- Fish	18.9	18.8	
				TEQ (WHO)- Birds	27.4	27.2	

* Isomer Not detected
TEQ Toxic Equivalent Value
TEF Toxic Equivalent Factor
Conc Concentration
DL Detection Value
REC Recovery

TEQ¹ Concentration of Non Detected
Congeners at Detection Limit
TEQ² Concentration of Non Detected
Congeners at Zero

Reported by
Positio

Signature



1668

UKAS accredited testing laboratory No. 1668

Name of Client : Socotec UK Ltd Environmental Chemistry
Address : PO Box 100, Burton upon Trent, Staffordshire, DE15 0XD

Test Certificate No: 44727

ANALYSIS OF PCBs

Job Reference: S205821
Sample Identifier : S2086684 Baghouse Filter 03/03/2020 00:00
Sample No: 44727
Order No: B161266BEC
Sample Type: Ash
Sample Condition : conforming
Instrument : Micromass Ultima NT
GC Column : DB5
Calibration File : 200320

Date of Receipt : 13/03/20
Date of Analysis : 20/03/20
Date of Report : 23/03/20

Test Method : 2002
Blank : 160320
Sample size: 1

expressed as ng /kg

Congener	Conc	DL	Rec %
PCB-81	0.845	0.0954	97
PCB-77	4.35	0.1151	93
PCB-123	*	0.4259	100
PCB-118	9.16	0.4618	91
PCB-114	*	0.4110	111
PCB-105	3.96	0.4508	96
PCB-126	2.22	0.3887	115
PCB-167	0.482	0.3855	115
PCB-156	2.07	0.4748	106
PCB-157	0.77	0.5213	100
PCB-169	*	0.0618	101
PCB-189	1.94	0.7329	102
Total-PCBs	25.797		
		TEQ1	TEQ2
TEQ (WHO)- Mammals		0.225	0.223
TEQ (WHO)- Fish		0.0121	0.0121
TEQ (WHO)- Birds		0.525	0.525

* Isomer Not detected
TEQ Toxic Equivalent Value
TEF Toxic Equivalent Factor
Conc Concentration
DL Detection Value
REC Recovery

TEQ¹ Concentration of Non Detected
Congeners at Detection Limit
TEQ² Concentration of Non Detected
Congeners at Zero

**Reported by
Position**

Signature :



1668

UKAS accredited testing laboratory No. 1668

Name of Client : Socotec UK Ltd Environmental Chemistry
Address : PO Box 100, Burton upon Trent, Staffordshire, DE15 0XD

Test Certificate No: 44728

ANALYSIS OF PCDDs and PCDFs

Job Reference: S205821
Sample Identifier : S2086685 Bottom Ash 03/03/2020 00:00
Sample No: 44728
Order No: B161266BEC
Sample Type: Ash
Sample Condition : conforming
Instrument : Thermo DFS
GC Column : DB5
Calibration File : 110320

Date of Receipt : 13/03/20
Date of Analysis : 21/03/20
Date of Report : 23/03/20

Test Method : 2002a
Blank : 160320
Sample size: 1

expressed as ng /kg

Congener	Conc	DL	Rec %	Congener	Conc	DL	Rec %
2378-TCDF	450	3.474	91	2378-TCDD	116	1.803	100
12378-PCDF	1390	6.361	83	12378-PCDD	446	2.799	67
23478-PCDF	4590	5.845	75	123478-HxCDD	466	2.052	92
123478-HxCDF	4240	4.435	109	123678-HxCDD	844	2.265	89
123678-HxCDF	5390	4.476	101	123789-HxCDD	504	2.272	
234678-HxCDF	9670	4.069	103	1234678-HpCDD	4150	2.058	88
123789-HxCDF	2260	4.625	106	OCDD	4180	0.904	77
1234678-HpCDF	17800	2.425	101				
1234789-HpCDF	3950	2.957	99				
OCDF	9820	1.071					
Total 2,3,7,8-Furans 59600				Total 2,3,7,8-Dioxins 10700			
TEQ (Nato)		TEQ ¹ 5360	TEQ ² 5360	TEQ (WHO)- Mammals		TEQ ¹ 4630	TEQ ² 4630
				TEQ (WHO)- Fish		5570	5570
				TEQ (WHO)- Birds		8200	8200

* Isomer Not detected
TEQ Toxic Equivalent Value
TEF Toxic Equivalent Factor
Conc Concentration
DL Detection Value
REC Recovery

TEQ¹ Concentration of Non Detected
Congeners at Detection Limit
TEQ² Concentration of Non Detected
Congeners at Zero

Reported by :
Position :

Signature



1668

UKAS accredited testing laboratory No. 1668

Name of Client : Socotec UK Ltd Environmental Chemistry
Address : PO Box 100, Burton upon Trent, Staffordshire, DE15 0XD

Test Certificate No: 44728

ANALYSIS OF PCBs

Job Reference: S205821
Sample Identifier : S2086685 Bottom Ash 03/03/2020 00:00
Sample No: 44728
Order No: B161266BEC
Sample Type: Ash
Sample Condition : conforming
Instrument : Micromass Ultima NT
GC Column : DB5
Calibration File : 200320

Date of Receipt : 13/03/20
Date of Analysis : 20/03/20
Date of Report : 23/03/20

Test Method : 2002
Blank : 160320
Sample size: 1

expressed as ng /kg

Congener	Conc	DL	Rec %
PCB-81	219	0.8960	92
PCB-77	603	1.0041	91
PCB-123	77	5.3998	122
PCB-118	212	5.5538	125
PCB-114	121	5.2264	140
PCB-105	478	5.2354	136
PCB-126	809	1.4110	117
PCB-167	226	2.9392	99
PCB-156	655	3.3994	100
PCB-157	466	3.6268	97
PCB-169	367	1.8724	102
PCB-189	744	3.2020	117
Total-PCBs	4977		
		TEQ1	TEQ2
TEQ (WHO)- Mammals		92.1	92.1
TEQ (WHO)- Fish		4.25	4.25
TEQ (WHO)- Birds		133	133

* Isomer Not detected
TEQ Toxic Equivalent Value
TEF Toxic Equivalent Factor
Conc Concentration
DL Detection Value
REC Recovery

TEQ¹ Concentration of Non Detected
Congeners at Detection Limit
TEQ² Concentration of Non Detected
Congeners at Zero

Reported by
Position

Signature



1668

KIRTON CONCRETE SERVICES LTD.

INDEPENDENT TESTING LABORATORY

Manor House, Station Road, Hibaldstow, Brigg, North Lincolnshire, DN20 9EB, England
Telephone: (01652) 656931 Fax: (01652) 651082 E-mail Kirtonlab@aol.com

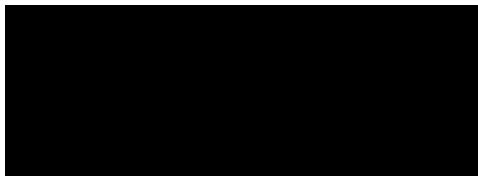
PFA TEST RESULTS to EN 450 :2012

Client	:-	SOCOTEC	
Our reference	:-	SOCOTEC	41
Your reference	:-	ESP	
Order	:-	S2086682	
Date received	:-	13-Mar-20	
Purchase Order Number	:-	S2086682	
Date of tests	:-	13-Mar-20	to 16-Mar-20

RESULTS

Free Calcium oxide 3.88 %

Signed



KIRTON CONCRETE SERVICES LTD.

INDEPENDENT TESTING LABORATORY

Manor House, Station Road, Hibaldstow, Brigg, North Lincolnshire, DN20 9EB, England
Telephone: (01652) 656931 Fax: (01652) 651082 E-mail Kirtonlab@aol.com

PFA TEST RESULTS to EN 450 :2012

Client	:-	SOCOTEC
Our reference	:-	SOCOTEC 42
Your reference	:-	BAGHOUSE FILLER
Order	:-	S2086684
Date received	:-	13-Mar-20
Purchase Order Number	:-	S2086684
Date of tests	:-	13-Mar-20 to 16-Mar-20

RESULTS

Free Calcium oxide 25.16 %

Signed.....

Consignment No S92155
Date Logged 11-Mar-2020
In-House Report Due 01-Apr-2020

Please note the results for any subcontracted analysis (identified with a 'N') is likely to take up to an additional five working days.

WSLM59	Total Organic Carbon		✓				
TMSS	Tot.Moisture @ 105C		✓				
Sub051	^Free Lime Content						
Sub030	^Dioxins like PCBs						
	^Dioxins & Furans MW						
PAHMSUS	PAH (16) by GCMS		✓	E	E	E	E
LO(%MM)	L.O.I. % @ 450C						
	Thallium (MS)		✓				
	Nickel (MS)		✓				
	Mercury (MS)		✓				
	Manganese (MS)		✓				
	Lead (MS)		✓				
	Copper (MS)		✓				
	Cobalt (MS)		✓				
	Chromium (MS)		✓				
	Cadmium (MS)		✓				
	Arsenic (MS)		✓				
ICPMSS	Antimony (MS)		✓				
CustServ	Report C						
CEN Leachate	CEN Leac(P)C						
MethodID	Sampled			03/03/20			
Description				ESP			
				Filterpass			
				Baghouse Filter			
				Bottom Ash			
ID Number			CL/2086682				
			CL/2086683				
			CL/2086684				
			CL/2086685				

Note: We will endeavour to prioritise samples to complete analysis within holding time; however any delay could result in samples becoming deviant whilst being processed in the laboratory.

If sampling dates are missing or matrices unclassified then results will not be ISO 17025 accredited. Please contact us as soon as possible to provide missing information in order to reinstate accreditation.

Deviating Sample Key

- A The sample was received in an inappropriate container for this analysis
 B The sample was received without the correct preservation for this analysis
 C Headspace present in the sample container
 D The sampling date was not supplied so holding time may be compromised - applicable to all analysis
 E Sample processing did not commence within the appropriate holding time
 F Sample processing did not commence within the appropriate handling time

Requested Analysis Key

- | | | |
|---|---|--|
| | Analysis Required | |
| | Analysis dependant upon trigger result - Note: due date may be affected if triggered | |
| | No analysis scheduled | |
| A | Analysis Subcontracted - Note: due date may vary | |

Where individual results are flagged see report notes for status.

Additional Report Notes

Method Code	Sample ID	The following information should be taken into consideration when using the data contained within this report
PAHMSUS	CL2086682-CL2086685	The Primary process control data associated with this Test has not wholly met the requirements of the Laboratory Quality Management System QMS with one or more target analytes falling outside acceptable limits. However the remaining data gives the Laboratory confidence that the test has performed satisfactorily and that the validity of the data may not have been significantly affected. However in line with our QMS policy we have removed accreditation, where applicable, from the affected analytes (Benzo[g,h,i]perylene) . These circumstances should be taken into consideration when utilising the data.
PAHMSUS	CL2086682-CL2086685	The Secondary process control data associated with this Test has not wholly met the requirements of the Laboratory Quality Management System QMS with one or more target analytes falling outside acceptable limits. However the remaining data gives the Laboratory confidence that the test has performed satisfactorily (including the Primary Process Control) and that the validity of the data may not have been significantly affected. However in line with our QMS policy we have removed accreditation , where applicable, from the affected analytes (Pyrene) . These circumstances should be taken into consideration when utilising the data.
PAHMSUS	CL2086682-CL2086685	Due to matrix interference, the Surrogate recovery for this Test is below the required QMS specification. All other Laboratory Process Controls meet the requirements of the QMS unless otherwise stated. These circumstances should be taken into consideration when utilising the data.

Method Descriptions

Matrix	MethodID	Analysis Basis	Method Description
Soil	ICPMSS	Oven Dried @ < 35°C	Determination of Metals in Marine Sediments and Soil samples by aqua regia digestion followed by ICPMS detection
Soil	LOI(%MM)	Oven Dried @ < 35°C	Determination of loss on ignition for soil samples at specified temperature by gravimetry
Soil	PAHMSUS	As Received	Determination of Polycyclic Aromatic Hydrocarbons (PAH) by hexane/acetone extraction followed by GCMS detection
Soil	SubCon*	*	Contact Laboratory for details of the methodology used by the sub-contractor.
Soil	TMSS	As Received	Determination of the Total Moisture content at 105°C by loss on oven drying gravimetric analysis (% based upon wet weight)
Soil	WSLM59	Oven Dried @ < 35°C	Determination of Organic Carbon in soil using sulphurous Acid digestion followed by high temperature combustion and IR detection
Water	ICPMSW	As Received	Direct quantitative determination of Metals in water samples using ICPMS
Water	ICPWATVAR	As Received	Direct determination of Metals and Sulphate in water samples using ICPOES
Water	ISEF	As Received	Determination of Fluoride in water samples by Ion Selective Electrode (ISE)
Water	KONENS	As Received	Direct analysis using discrete colorimetric analysis
Water	SFAPI	As Received	Segmented flow analysis with colorimetric detection
Water	WSLM13	As Received	Instrumental analysis using acid/persulphate digestion and non-dispersive IR detection
Water	WSLM2	As Received	Determination of the Electrical Conductivity (µS/cm) by electrical conductivity probe.
Water	WSLM27	As Received	Gravimetric Determination
Water	WSLM3	As Received	Determination of the pH of water samples by pH probe

Where individual results are flagged see report notes for status.

Report Notes

Generic Notes

Soil/Solid Analysis

Unless stated otherwise,

- Results expressed as mg/kg have been calculated on the basis indicated in the Method Description table.
- All results on MCERTS reports are reported on a 105°C dry weight basis with the exception of pH and conductivity.
- Sulphate analysis not conducted in accordance with BS1377
- Water Soluble Sulphate is on a 2:1 water:soil extract

Waters Analysis

Unless stated otherwise results are expressed as mg/l

Nil: Where "Nil" has been entered against Total Alkalinity or Total Acidity this indicates that a measurement was not required due to the inherent pH of the sample.

Oil analysis specific

Unless stated otherwise,

- Results are expressed as mg/kg
- SG is expressed as g/cm³ @ 15°C

Gas (Tedlar bag) Analysis

Unless stated otherwise, results are expressed as ug/l

Asbestos Analysis

CH Denotes Chrysotile	TR Denotes Tremolite
CR Denotes Crocidolite	AC Denotes Actinolite
AM Denotes Amosite	AN Denotes Anthophyllite
NAIS No Asbestos Identified in Sample	
NADIS No Asbestos Detected In Sample	

Symbol Reference

^ Sub-contracted analysis.

\$\$ Unable to analyse due to the nature of the sample

¶ Samples submitted for this analyte were not preserved on site in accordance with laboratory protocols.

This may have resulted in deterioration of the sample(s) during transit to the laboratory.

Consequently the reported data may not represent the concentration of the target analyte present in the sample at the time of sampling

¥ Results for guidance only due to possible interference

& Blank corrected result

I.S Insufficient sample to complete requested analysis

I.S(g) Insufficient sample to re-analyse, results for guidance only

Intf Unable to analyse due to interferences

N.D Not determined

N.Det Not detected

N.F No Flow

NS Information Not Supplied

Req Analysis requested, see attached sheets for results

p Raised detection limit due to nature of the sample

* All accreditation has been removed by the laboratory for this result

‡ MCERTS accreditation has been removed for this result

§ accreditation has been removed for this result as it is a non-accredited matrix

Note: The Laboratory may only claim that data is accredited when all of the requirements of our Quality System have been met. Where these requirements have not been met the laboratory may elect to include the data in its final report and remove the accreditation from individual data items if it believes that the validity of the data has not been affected. If further details are required of the circumstances which have led to the removal of accreditation then please do not hesitate to contact the laboratory.

Sample Descriptions

Client : Shetland Islands Council
Site : March Residue Analysis 2020
Report Number : S20_5821

Note: major constituent in upper case