STACK EMISSIONS MONITORING REPORT

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Operator & Address:
Enovert Management Limited Port Tennant Landfill Site Fabian Way Port Tennant Swansea SA1 8PA

Permit Reference:
N/A - Investigative Test

Release Point:
Raw Landfill Gas

Sampling Date(s):
08th December 2022

SOCOTEC Job Number:	LSO 221013
Report Date:	11th January 2023
Version:	1
Report By: MCERTS Number: MCERTS Level: Technical Endorsements:	Jonathan Ward MM 07 862 MCERTS Level 2 - Operations Manager 1, 2, 3 & 4
Report Approved By: MCERTS Number: Business Title: Technical Endorsements: Signature:	Mike Davies MM 02 087 MCERTS Level 2 - Business Manager 1, 2, 3 & 4 

UKAS TESTING
1015

CONTENTS

EXECUTIVE SUMMARY

MONITORING OBJECTIVES

Enovert Management Limited operates a utilisation of landfill gas process at Port Tennant Landfill Site

SOCOTEC LTD were commissioned by Graham Ball to carry out stack emissions monitoring to determine the release of prescribed pollutants from the following Plant under normal operating conditions.

Plant

Raw Landfill Gas

Operator

Enovert Management Limited
Port Tennant Landfill Site
Fabian Way
Port Tennant
Swansea
SA1 8PA

Stack Emissions Monitoring Test House

SOCOTEC - Cirencester Laboratory
Units C & D
Bankside Trade Park
Cirencester
GL7 1YT
UKAS and MCERTS Accreditation Number: 1015

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.
MCERTS accredited results will only be claimed where both the sampling and analytical stages are UKAS accredited.

EXECUTIVE SUMMARY

EMISSIONS SUMMARY					
Parameter	**Units**	**Result**	**Calculated Uncertainty +/-**	**Emission Limit Value (ELV)**	**MCERTS accredited result**
Siloxanes	mg/m³	2.46	0.20	-	✗

ND = None Detected,
Results at or below the limit of detection are highlighted by bold italic text.
The above volumetric flow rate is calculated using data from the preliminary survey. Mass emissions for non isokinetic tests are calculated using these values. For all isokinetic testing the mass emission is calculated using test specific flow data and not the above values.
Reference conditions are 273K, 101.3kPa without correction for water vapour

EXECUTIVE SUMMARY

MONITORING TIMES			
Parameter	**Sampling Date(s)**	**Sampling Times**	**Sampling Duration**
Siloxanes Run 1	08 December 2022	11:00 - 11:50	50 minutes

EXECUTIVE SUMMARY

PROCESS DETAILS

Parameter	Process Details
Description of process	Utilisation of landfill gas
Continuous or batch	Continuous
Product Details	Power
Part of batch to be monitored (if applicable)	Any
Normal load, throughput or continuous rating	N/A
Fuel used during monitoring	Landfill Gas (Methane - 33.6%, CO2 - 23.8%, O2 - 1.9%)
Abatement	None
Plume Appearance	N/A

EXECUTIVE SUMMARY

Monitoring Methods

The selection of standard reference / alternative methods employed by SOCOTEC is determined, wherever possible by the hierarchy of method selection outlined in Environment Agency technical Guidance 'Monitoring stack emissions: techniques and standards for periodic monitoring'.

MONITORING METHODS							
Species	**Method** Standard Reference Method / Alternative Method	**SOCOTEC Technical Procedure**	**UKAS Lab Number**	**MCERTS Accredited Method**	**Limit of Detection (LOD)**	**Calculated MU +/- % Result**	**Calculated MU +/- % ELV**
Siloxanes	SRM - PD CEN-TS 13649:2014	AE 118	1015	Yes	0.1 mg/m³	8.1%	N/A - No ELV

EXECUTIVE SUMMARY

Analytical Methods

The following tables list the analytical methods employed together with the custody details. Unless otherwise stated the samples are archived at the analysis lab location.

SAMPLING METHODS WITH SUBSEQUENT ANALYSIS							
Species	Analytical Technique	Analytical Procedure	UKAS Lab Number	UKAS Accredited Lab Analysis	Analysis Lab	Analysis Report number	Archive Period
Siloxanes	ATD-GC-MS	IHM	1252	No	SOCOTEC (Bretby)	ASC56420	8 Weeks

ON-SITE TESTING							
Species	Analytical Technique	Analytical Procedure	UKAS Lab Number	MCERTS Accredited Analysis	Laboratory	Data Archive Location	Archive Period
-	-	-	-	-	-	-	-

EXECUTIVE SUMMARY

SAMPLING PLATFORM	
General Platform Information	
Permanent / Temporary Platform / Ground level / Floor Level / Roof	Ground Level
Inside / Outside	Outside

M1 Platform requirements	
Is there a sufficient working area so work can be performed in a compliant manner	Yes
Platform has 2 levels of handrails (approximately 0.5 m & 1.0 m high)	N/A
Platform has vertical base boards (approximately 0.25 m high)	N/A
Platform has removable chains / self closing gates at the top of ladders	N/A
Handrail / obstructions do not hamper insertion of sampling equipment	N/A
Depth of Platform = >Stack depth / diameter + wall and port thickness + 1.5m	N/A

Sampling Platform Improvement Recommendations (if applicable)

N/A

EXECUTIVE SUMMARY

Sampling & Analytical Method Deviations

In this instance there were no deviations from the sampling and analytical methods employed.

APPENDICES

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APPENDIX 1 - Monitoring Schedule, Calibration Checklist & Monitoring Team

MONITORING SCHEDULE					
Species	**Method** Standard Reference Method / Alternative Method	**SOCOTEC Technical Procedure**	**UKAS Lab Number**	**MCERTS Accredited Method**	**Number of Samples**
Siloxanes	SRM - PD CEN-TS 13649:2014	AE 118	1015	Yes	1

APPENDIX 1 - Monitoring Schedule, Calibration Checklist & Monitoring Team

CALIBRATEABLE EQUIPMENT CHECKLIST

Extractive Sampling		Instrumental Analyser/s		Miscellaneous	
Equipment	**Equipment I.D.**	**Equipment**	**Equipment I.D.**	**Equipment**	**Equipment I.D.**
Control Box DGM	-	Horiba PG-250 Analyser	-	Laboratory Balance	-
Box Thermocouples	-	FT-IR Gasmet	-	Tape Measure	-
Meter In Thermocouple	-	FT-IR Oven Box	-	Stopwatch	P1776
Meter Out Thermocouple	-	Bernath 3006 FID	-	Protractor	-
Control Box Timer	-	Signal 3030 FID	-	Barometer	P2236
Oven Box	-	Servomex	-	Digital Micromanometer	-
Probe	-	JCT Heated Head Filter	-	Digital Temperature Meter	-
Probe Thermocouple	-	Thermo FID	-	Stack Thermocouple	-
Probe	-	Stackmaster	-	Mass Flow Controller	-
Probe Thermocouple	-	FTIR Heater Box for Heated Line	-	MFC Display module	-
S-Pitot	-	Anemometer	-	1m Heated Line (1)	-
L-Pitot	-	Ecophysics NOx Analyser	-	1m Heated Line (2)	-
Site Balance	-	Chiller (JCT/MAK 10)	-	1m Heated Line (3)	-
Last Impinger Arm	-	Heated Line Controller (1)	-	5m Heated Line (1)	-
Dioxins Cond. Thermocouple	-	Heated Line Controller (2)	-	10m Heated Line (1)	-
Callipers	-	Site temperature Logger	-	10m Heated Line (2)	-
Small DGM	-		-	15m Heated Line (1)	-
Heater Controller	-		-	20m Heated Line (1)	-
Inclinometer (Swirl Device)	-		-	20m Heated Line (2)	-

NOTE: If the equipment I.D is represented by a dash (-), then this piece of equipment has not been used for this test.

CALIBRATION GASES

Gas (traceable to ISO 17025)	Cylinder I.D Number	Supplier	ppm	%	Analytical Tolerance +/- %
-	-	-	-	-	-

STACK EMISSIONS MONITORING TEAM

MONITORING TEAM								
Personnel	**MCERTS Number**	**MCERTS**		**TE / H&S Qualifications and Expiry Date**				
		Level	**Expiry**	**TE1**	**TE2**	**TE3**	**TE4**	**H&S**
Jonathan Ward	MM 02 080	MCERTS Level 2	Jun-23	Jun-23	Jun-23	Aug-26	Mar-26	Jun-25
Warren Clark	MM 02 086	MCERTS Level 1	Sep-27	-	-	-	-	Sep-27

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

Siloxanes SUMMARY					
Test	Sampling Times	Concentration mg/m³	LOD mg/m³	ELV mg/m³	Emission Rate g/hr
Run 1	11:00 - 11:50 08 December 2022	2.46	0.10	-	-
Field Blank	-	0.10	-	-	-

Reference conditions are 273K, 101.3kPa without correction for water vapour

Siloxanes RESULTS							
Substance	LOD (ng)	Run 1 (ng)		Run 1 (mg/m^3)			
		Front	Back	Front	Back	Total	
Decamethylcyclopentasiloxane	10	270	10	0.270	0.010	0.28	-
Decamethyltetrasiloxane	10	10	10	0.010	0.010	0.02	-
Dodecamethylcyclohexasiloxane	10	10	10	0.010	0.010	0.02	-
Dodecamethylpentasiloxane	10	10	10	0.010	0.010	0.02	-
Hexamethylcyclotrisiloxane	10	100	10	0.100	0.010	0.11	-
Hexamethyldisiloxane	10	1000	10	1.000	0.010	1.01	#
Octamethylcyclotetrasiloxane	10	900	10	0.900	0.010	0.91	-
Octamethyltrisiloxane	10	40	10	0.040	0.010	0.05	-
Tetramethylsilane	10	10	10	0.010	0.010	0.02	-
Trimethylsilanol	10	10	10	0.010	0.010	0.02	-
Total	**100.0**	**2360**	**100.0**	**2.36**	**0.10**	**2.46**	**-**

 # - These results are over the top calibration standard of 1000ng and therefore have a higher level of uncertainty.

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

Siloxanes RESULTS BLANK			
Substance	LOD (ng)	Blank (ng)	
		(ng)	mg/m^3
Decamethylcyclopentasiloxane	10	10	0.010
Decamethyltetrasiloxane	10	10	0.010
Dodecamethylcyclohexasiloxane	10	10	0.010
Dodecamethylpentasiloxane	10	10	0.010
Hexamethylcyclotrisiloxane	10	10	0.010
Hexamethyldisiloxane	10	10	0.010
Octamethylcyclotetrasiloxane	10	10	0.010
Octamethyltrisiloxane	10	10	0.010
Tetramethylsilane	10	10	0.010
Trimethylsilanol	10	10	0.010
Total	**100.00**	**100.00**	**0.10**

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

Siloxanes QUALITY ASSURANCE

Leak Test Results	Mean Sampling Rate l/min	Pre sampling leak rate l/min	Post sampling leak rate l/min	Acceptable leak rate l/min	Leak Tests Acceptable?
Run 1	0.02	0	0	0.00	Yes

	Type of tube	Max. Tube Temperature °C	Temperature during storage / transit <25°C
Run 1	Tenax ATD	2	Yes

APPENDIX 3 - Measurement Uncertainty Budget Calculations

MEASUREMENT UNCERTAINTY BUDGET - Siloxanes

Standard Uncertainty

Run	Sampled Volume m³	Sampled Gas Temp K	Sampled Gas Pressure kPa	Sampled Gas Humidity % by volume	Oxygen Content % by volume	Limit of Detection % by mass	Leak %	Uncollected Mass mg
MU required	**≤ 2%**	**≤ 2%**	**≤ 1%**	**≤ 1%**	**≤ 10%**	**≤ 5% of ELV**	**≤ 2%**	**≤ 10% of ELV**
Run 1	0.0000	2.0	0.5	1	N/A	0.0001	-	-
as a %	0.0000	0.7273	0.5005	1.0000	N/A	N/A	0.0000	N/A
compliant?	**Yes**	**Yes**	**Yes**	**Yes**	**N/A**	**N/A**	**Yes**	**-**

Run	Volume (STP) m³	Mass of Total VOC mg	O2 Correction -	Leak mg/m³	Uncollected Mass mg	Lab Uncertainty mg	Combined uncertainty
Run 1	0.0010	0.0025	1.000	0.000	0.000006	-	-
MU as mg/m³	0.0000000052	0.100	-	0.000	0.0058	0.0000	**0.100**
MU as %	0.000000211	4.065	-	0.000	0.235	0.0000	-

R1 - Uncertainty expressed at a 95% confidence level (where k = 2)	**0.200**	**mg/m³**	**8.14**	**% Result**	**N/A**	**% ELV**

Reference – SOCOTEC Technical Procedure AE150 Estimation of Uncertainty of Measurement

END OF REPORT

Thank you for choosing SOCOTEC for your environmental monitoring needs. We hope our services have met your requirements and that you are fully satisfied with your experience of working with us, we really do value your custom and would welcome your feedback. We would appreciate it if you could take a moment to complete a short online questionnaire so that we can improve our operations and address any areas that have not met with your expectations, by clicking on the following

https://www.surveymonkey.co.uk/r/CAE_customer_feedback_weblink