



4251

ANALYSIS OF THE TRACE LANDFILL GAS

AT

Biffa Eye Landfill Site

Eyebury Road
Peterborough
PE6 7YH

Commissioned by: Ben Rigg

Of

Biffa Waste Services Ltd

Rixton Old Hall
Manchester Road
Rixton
Warrington, WA3 6EW

Date of Survey:

19th April 2018

Compiled By:

Yu Shen
Project Manager

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Project Manager
MCerts Level II (TE1, 2, 3 & 4)

Signed:



Dated: 11th May 2018

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1. INTRODUCTION

- 1.1 EnviroDat Limited was commissioned by Ben Rigg, on behalf of Biffa Waste Services Ltd, to measure the trace gas components from landfill gas located at Eye Landfill Site. Sampling was performed on the 19th April 2018.
- 1.2 The sampling was conducted in response to permit requirements (Permit No. BP3537PP). Monitoring was conducted with reference to the Environment Agency document 'Guidance for Monitoring Trace Components in Landfill Gas' (LFTGN 04).

2. PLANT DESCRIPTION

- 2.1 Landfill gas is currently utilised by the engine and flare plant. Samples of the fuel gas were taken from a feed system for trace gas analysis after the gas booster.

3. SAMPLING PROCEDURES

- 3.1 Trace gas sampling was performed from the fuel gas inlet, with analysis for components identified in Table 1.1 of the EA LFTGN04 guidance note. General site information is presented in Appendix A.
- 3.2 Mixed bed, automated thermal desorption (ATD) tubes were used for sampling of the priority volatile organic species prior to analysis by gas chromatography with mass spectrometry (GC/MS), in accordance with EA recommendations and documented EnviroDat protocol, SPTGN04. The results are

presented in Appendix B. The analytical component of the work was conducted at Concept Life Sciences (CLS) Ltd.

- 3.3 The LFTGN04 designated 'priority' carbonyl components (i.e. methanal and ethanal) were sampled onto dinitrophenylhydrazine (DNPH) impregnated, silica gel sorbent tubes prior to analysis by high performance liquid chromatography (HPLC) incorporating an ultraviolet (UV) detection system, in accordance with EA recommendations and SPTGN04. The results are presented in Appendix B. The analytical component of the work was conducted at CLS.
- 3.4 Arsenic was sampled onto an activated charcoal sorbent tube prior to analysis by inductively coupled plasma/optical emission spectrometry (ICP/OES), in accordance with EA recommendations and SPTGN04. The results are presented in Appendix B. The analytical component of the work was conducted at CLS.
- 3.5 Hydrogen sulphide was sampled into a Tedlar bag with analysis by GC/MS (by CLS) in accordance with SPTGN04. The results are presented in Appendix B.

4. RESULTS

- 4.1 Field measurements of the 'bulk gases' are given in Appendix A.
- 4.2 Measured concentrations of the EA 'priority' trace components for the landfill gas are given in Appendix B and are shown graphically in Appendix C.

APPENDIX A

Site Information & Preliminary Gas Measurements

TABLE A: Site Information & Preliminary Gas Measurements

Sample Position Details			
Date	19/04/2018	Site	Biffa Eye
Ambient Temperature	25.5°C	Atmospheric Pressure	1023mbar
Monitoring Organisation (s)	EnviroDat Ltd	Analytical Laboratory	CLS Ltd.
Location of Sampling Point	Inlet Line to Utilisation Plant	Area of Influence of collection system sampled	All capped areas of the site
Type of Sampling Point	Nipple & Tap	Temperature of gas	28.0°C at sample flow meter
Vacuum on Sampling	None, Positive pressure	Type of waste	Domestic, Industrial, Commercial & Hazardous
		Age of Waste	-
Status of Gas System	Fully Operational, Steady State	Other	-
Parameter	Concentration	Units	Comments
Methane*	47.7	%	-
Carbon Dioxide*	34.0	%	-
Oxygen*	0.4	%	-
Nitrogen	17.9	%	Assumed to be balance of gas
Hydrogen Sulphide	-	ppmv	See Appendix B
Carbon Monoxide	-	ppmv	Not required

Notes: *Raw result obtained from client analyser

APPENDIX B

Trace Gas Results

TABLE B: Trace Gas Results

Trace Gases - Test 1							
	Test Duration (min)	Flow Rate (ml/min)	Flowmeter CAL Factor	Volume (l as sampled)	Ambient T (°C)	Barometric P (kPa)	Volume (l @ STP)
Arsenic	60	200	0.9761	11.71	25.5	102.3	10.82
Aldehydes	20	200	0.9761	3.90	25.5	102.3	3.61
VOC	5	50	1.0463	0.26	25.5	102.3	0.24

Compound	Mass of TG (ng)	LoD of TG (ng)	Concentration	Units	Analysis Notes (See below)	Analysis UKAS Accredited (Y/N)
Arsenic (as As)		1000	< 92	µg/m3	-	Y
Acetaldehyde (Ethanal)	1100	100	305	µg/m3	a	Y
Formaldehyde (Methanal)	400	100	111	µg/m3	a	Y
1-pentene	70	10	290	µg/m3	-	Y
1,1-dichloroethane		10	< 41	µg/m3	-	Y
1,1-dichloroethylene		10	< 41	µg/m3	-	Y
1,2-dichloroethane		10	< 41	µg/m3	-	N
1,2-dichloroethylene		30	< 124	µg/m3	-	Y
1,3-butadiene		10	< 41	µg/m3	-	Y
1,4-epoxy-1,3-butadiene (Furan)		10	< 41	µg/m3	-	N
1-propanethiol		10	< 41	µg/m3	b	Y
2-butoxyethanol		10	< 41	µg/m3	-	N
Benzene	90	10	373	µg/m3	-	Y
Butyric acid		10	< 41	µg/m3	-	N
Carbon disulphide		10	< 41	µg/m3	a	N
Carbon tetrachloride		10	< 41	µg/m3	-	Y
Chloroethane		30	< 124	µg/m3	-	N
Dichloromethane		10	< 41	µg/m3	-	N
Dimethyl disulphide		10	< 41	µg/m3	-	N
Dimethyl sulphide	140	10	580	µg/m3	b	Y
Ethyl butyrate		25	< 104	µg/m3	-	N
Ethyl Mercaptan (ethanethiol)		10	< 41	µg/m3	-	N
Methyl Mercaptan (methanethiol)		30	< 124	µg/m3	-	N
N-Butyl Mercaptan		10	< 41	µg/m3	b	Y
Styrene	83	10	344	µg/m3	-	N
Toluene	640	10	2650	µg/m3	-	N
Trichloroethylene		10	< 41	µg/m3	-	Y
Vinyl chloride monomer (chloroethene)		10	< 41	µg/m3	b	Y

Compound	Concentration in ppm	LoD of TG (ppm)	Concentration	Units	Analysis Notes (See below)	Analysis UKAS Accredited (Y/N)
Hydrogen sulphide*	120	10	182143	µg/m3	-	N

*H2S value is equivalent to 120 ppm, values in highlighted box are expressed as ppm and not ng

(a) – Results have been blank corrected
(b) – Outside scope of UKAS accreditation

Reference to UKAS (final column) relates to the accreditation status of the analysis only, sampling is covered under EnviroDat Accreditation scope.

APPENDIX C

Trace Gas Chart

TABLE C: Trace Gas Chart

