



4251

ANALYSIS OF THE TRACE LANDFILL GAS

AT

Standard Landfill Site

Spencer Industrial Estate
Buckley
Flintshire, CH7 3LY

Commissioned by: Paul Murphy

Of

Waste Management Service

Flintshire County Council
Alltami Depot
Mold Road - Alltami
Flintshire, CH7 6LG

Date of Survey:

4th April 2017

Compiled By:

Bruce Kester
Technical Manager

(Report Version 2)

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Technical Manager
Mcerts Level II (TE1, 2, 3 & 4)

Signed:



Dated:

18th April 2017

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1. INTRODUCTION

- 1.1 EnviroDat Limited was commissioned by Paul Murphy, on behalf of Flintshire County Council, to measure the trace gas components from landfill gas located at Standard Landfill Site. Sampling was performed on the 4th April 2017.
- 1.2 The sampling was conducted in response to permit requirements (Permit No. BV7273 Var. YP3835MJ). 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 CHP 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 analytical

component of the work was conducted at Concept Life Sciences Ltd (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 Ltd.
- 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 Ltd.
- 3.5 Hydrogen sulphide was sampled into a Tedlar bag with analysis by GC/MS (by CLS Ltd) 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.

APPENDIX A

Site Information & Preliminary Gas Measurements

TABLE A: Site Information & Preliminary Gas Measurements

Sample Position Details			
Date	04/04/2017	Site	Flintshire County Council Brookhill LFS
Ambient Temperature	14.5°C	Atmospheric Pressure	1008mbar
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	14.5°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*	40.7	%	-
Carbon Dioxide*	29.0	%	-
Oxygen*	1.9	%	-
Nitrogen*	28.4	%	Assumed to be balance of gas
Hydrogen Sulphide*	-	ppmv	Not required
Carbon Monoxide*	-	ppmv	

Notes: * Raw result obtained from Envirodat Mcerts analyser (GA5000)

APPENDIX B

Trace Gas Results

TABLE B: Trace Gas Results

Trace Gases - Test 1							
	Test Duration	Flow Rate	Flowmeter	Volume	Ambient T	Barometric P	Volume
	(min)	(ml/min)	CAL Factor	(l as sampled)	(°C)	(kPa)	(l @ STP)
Arsenic	60	200	1.0532	12.64	15	100.8	11.92
Aldehydes	20	200	1.0532	4.21	15	100.8	3.97
VOC	5	50	1.0463	0.26	15	100.8	0.25

Compound	Mass of TG (ng)	LoD of TG (ng)	Concentration	Units	Analysis Notes (See below)	Analysis UKAS Accredited (Y/N)
Arsenic (as As)		1000	< 84	µg/m3	-	Y
Acetaldehyde (Ethanal)	400	100	101	µg/m3	a	Y
Formaldehyde (Methanal)		100	< 25	µg/m3	-	Y
1-pentene	61	10	247	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	160	30	649	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	-	Y
2-butoxyethanol		10	< 41	µg/m3	-	N
Benzene		10	< 41	µg/m3	-	Y
Butyric acid		10	< 41	µg/m3	-	N
Carbon disulphide	14	10	57	µg/m3	a	N
Carbon tetrachloride		10	< 41	µg/m3	-	Y
Chloroethane	36	30	146	µg/m3	-	N
Dichloromethane		10	< 41	µg/m3	-	N
Dimethyl disulphide		10	< 41	µg/m3	-	N
Dimethyl sulphide	62	10	251	µg/m3	-	Y
Ethyl butyrate		25	< 101	µg/m3	-	N
Ethyl Mercaptan (ethanethiol)	48	10	195	µg/m3	-	N
Methyl Mercaptan (methanethiol)		30	< 122	µg/m3	-	N
N-Butyl Mercaptan		10	< 41	µg/m3	-	Y
Styrene	35	10	142	µg/m3	-	N
Toluene	1100	10	4459	µg/m3	c	N
Trichloroethylene		10	< 41	µg/m3	-	Y
Vinyl chloride monomer (chloroethene)		10	< 41	µg/m3	-	Y

Compound	Concentration in ppm	LOD of TG (ppm)	Concentration	Units	Analysis Notes (See below)	Analysis UKAS Accredited (Y/N)
Hydrogen sulphide	40	10	60714	µg/m3	-	N

*H2S value is equivalent to 40 ppm, values in highlighted box are expressed as ppm and not ng

(a) – Results have been blank corrected
(b) – Results should be considered a minimum due to detector saturation
(c) – Results should be viewed with caution due to being outside of the instrument calibration range

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

Priority Trace Components - Standard Landfill Site, April 2017

NON DETECTED DATA PRESENTED AS BLANKS - HYDROGEN SULPHIDE RESULTS NOT SHOWN DUE TO RELATIVELY HIGH VALUES

