enviroDAT
AIR QUALITY & ENVIRONMENTAL CONSULTANTS

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Project Reference R13156TG

UKAS TESTING
4251

TRACE GAS ANALYSIS OF THE LANDFILL GAS

AT

Hafod Quarry Landfill Site

Bangor Road
Johnstown
Wrexham
LL14 6ET

Commissioned by: Steve Conry

Of

Cory Environmental (Central) Ltd

Date of Survey:	19th September 2013
Compiled By:	Bruce Kester *Operations Manager*

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Signed:	B.M Kester
Dated:	3rd October 2013

CONTENTS

1. INTRODUCTION

1.1 EnviroDat Limited was commissioned by Mr S Conry, on behalf of Cory Environmental (Central) Ltd, to measure the trace gas components from the landfill gas located at Hafod Quarry Landfill Site. Sampling was performed on the 19th September 2013.

1.2 The sampling was conducted in response to permit requirements (EPR/PP3139GB/V004). 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 fed to a landfill gas engine compound. 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.

3.2 Priority volatile organic species were sampled direct to tedlar bag prior to analysis by gas chromatography with mass spectrometry (GC/MS), in accordance with EA recommendations and documented EnviroDat protocol, SPTGN04. . A sample flow rate of 50ml/min was employed for

a period of 5 minutes to nominally provide a 0.3 litre sample; the sampled volume was standardised to 273K and 101.325 kPa – to compensate for the effects of ambient temperature and pressure. The analytical component of the work was conducted at FFC Environment Ltd, Kempston.

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. Sample flow rates of 100ml/min was employed for a period of 15 minutes to provide a nominal 1.5 litre sample volume; correction for temperature and pressure effects was applied to this volume. The analytical component of the work was conducted at SAL Ltd.

3.4 Arsenic was sampled onto activated charcoal sorbent tubes prior to analysis by inductively coupled plasma mass spectrometry (ICP/MS), in accordance with EA recommendations and SPTGN04. Sample flow rates of 100ml/min was employed for a period of 90 minutes to provide a nominal 9 litre sample, which was corrected thereafter to standard temperature and pressure. The analytical component of the work was conducted at SAL Ltd.

3.5 Hydrogen sulphide was sampled into a Tedlar bag with analysis by GC/MS (by SAL Ltd) in accordance with SPTGN04.

4. RESULTS

4.1 Field measurements of the 'bulk gases' are given in Appendix I.

4.2 Measured concentrations of the EA 'priority' trace components for the landfill gas are also given in Appendix I.

5. DISCUSSION AND CONCLUSION

5.1 The aim of the survey was to measure trace components from the landfill gas at Hafod Quarry Landfill Site.

5.2 The levels of trace components within the landfill gas are of a range and magnitude not dissimilar to what would be expected and can be regarded as comparable with biogenic gas of this nature from other sources.

APPENDIX I

TRACE GAS ANALYSIS DATA

A. Site Information
B. Preliminary Checks and Field Measurements
C. Laboratory Analysis Results

Hafod Quarry Landfill Site

A. Site Information

Sample Point Details		Sample Point Details	
Date	19/09/2013	**Site**	Hafod Quarry Landfill Site
Ambient Temperature	15.1°C	**Atmospheric Pressure**	987mbar
Monitoring Organisation (s)	EnviroDat Ltd	**Analytical Laboratory**	FCC & SAL 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	Teflon Nipple	**Temperature of gas**	-
Vacuum on Sampling	180 mbar	**Type of waste**	Domestic, Industrial, Commercial & Hazardous
		Age of Waste	-
Status of Gas System	Fully Operational, Steady State	**Other**	-

B. Preliminary Checks and Field Measurements

Parameter	Concentration	Units	Comments
Methane	47.5	%	-
Carbon Dioxide	37.7	%	-
Oxygen	1.1	%	-
Nitrogen	13.6	%	Assumed to be balance of gas

Data supplied by site analyser

Laboratory Analysis Results

Trace Component	CAS Number	Concentration in landfill gas sample	Units	Recommended Method (Y/N)	UKAS (Y/N)
1, 1 – dichloroethane	75-34-3	92	µg/m^3	Y	Y
1, 2 – dichloroethane	107-06-2	917	µg/m^3	Y	Y
1, 1 – dichloroethene	75-35-4	39	µg/m^3	Y	Y
1, 2 – dichloroethene	540-59-0	333	µg/m^3	Y	Y
1, 3 – butadiene	106-99-0	<21	µg/m^3	Y	Y
1 – butanethiol	109-79-5	200	µg/m^3	Y	Y
1 – pentene	109-67-1	350	µg/m^3	Y	Y
1 – propanethiol	107-03-9	417	µg/m^3	Y	Y
2 – butoxyl ethanol	111-76-2	171	µg/m^3	Y	Y
Arsenic (as As)	7440-38-2	349	µg/m^3	Y	N
Benzene	71-43-2	5,237	µg/m^3	Y	N*
Butyric acid	107-95-6	231	µg/m^3	Y	Y
Carbon disulphide	75-15-0	8,489	µg/m^3	Y	N*
Chloroethane	75-00-3	691	µg/m^3	Y	Y
Chloroethene (vinyl chloride)	75-01-4	295	µg/m^3	Y	Y
Dimethyl disulphide	624-92-0	3,441	µg/m^3	Y	N*
Dimethyl sulphide	75-18-3	7,360	µg/m^3	Y	N*
Ethanal (acetaldehyde)	75-07-0	361	µg/m^3	Y	N
Ethanethiol	75-08-1	<41	µg/m^3	Y	Y
Ethyl butyrate	105-54-4	1,712	µg/m^3	Y	N*
Furan (1,4-epoxy-1,3 butadiene)	110-00-9	1,043	µg/m^3	Y	N*
Hydrogen Sulphide*	7783-06-4	166,980	µg/m^3	Y	Y
Methanal (formaldehyde)	50-00-0	<72	µg/m^3	Y	N
Methanethiol	74-93-1	<41	µg/m^3	Y	Y
Styrene	100-42-5	1,237	µg/m^3	Y	N*
Tetrachloromethane	56-23-5	255	µg/m^3	Y	Y
Toluene	108-88-3	10,131	µg/m^3	Y	N*
Trichloroethene	79-01-6	228	µg/m^3	Y	Y

*H_2S value is equivalent to 110ppm

Reference to UKAS (final column) relates to the accreditation status of the analysis only.
N*, UKAS Accreditation could not be applied as the results exceeded the calibration range of the method
Sampling is covered under UKAS Accreditation.