



4251

ANALYSIS OF THE TRACE LANDFILL GAS

AT

Biffa Eye Landfill Site

Eyebury Road
Peterborough
PE6 7YH

Commissioned by: Ben Rigg

Of

Biffa Waste Service Ltd

Rixton Old Hall
Manchester Road
Rixton
Warrington
WA3 6EW

Date of Survey:

6th April 2016

Compiled By:

David Littlewood
Operations Manager

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

Signed:



Dated:

28th April 2016

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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 the Eye Landfill site. Sampling was performed on the 6th April 2016.
- 1.2 The sampling was conducted in response to PPC 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 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 results are

presented in Appendix B. The analytical component of the work was conducted at SAL 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 SAL 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 SAL Ltd.
- 3.5 Hydrogen sulphide was sampled into a Tedlar bag with analysis by GC/MS (by SAL 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 are given in Appendix B.

5. DISCUSSION AND CONCLUSION

- 5.1 The aim of the survey was to measure trace components from the landfill at the Biffa Eye Landfill site.
- 5.2 The levels of trace components within the landfill 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 A

Site Information & Preliminary Gas Measurements

TABLE A: Site Information & Preliminary Gas Measurements

| Sample Position Details | | | |
|------------------------------------|-----------------------------------|-------------------------------------------------------|----------------------------------------------|
| Date | 06/04/16 | Site | Biffa Eye Landfill Site |
| Ambient Temperature | 11°C | Atmospheric Pressure | 1000mbar |
| Monitoring Organisation (s) | EnviroDat Ltd | Analytical Laboratory | 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 | Nipple & Valve | Temperature of gas | n/a, at sample flow meter |
| Vacuum on Sampling | None, Positive pressure (172mbar) | Type of waste | Domestic, Industrial, Commercial & Hazardous |
| | | Age of Waste | - |
| Status of Gas System | Fully Operational, Steady State | Other | - |
| Parameter | Concentration | Units | Comments |
| Methane* | 51.1 | % | - |
| Carbon Dioxide* | 34.5 | % | - |
| Oxygen* | 0.5 | % | - |
| Nitrogen* | 13.9 | % | Assumed to be balance of gas |
| Hydrogen Sulphide* | n/a | ppmv | Not required |
| Carbon Monoxide* | n/a | ppmv | |

Notes: * Raw result obtained from landfill gas analyser

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) |
| VOC | 5 | 60 | 0.9764 | 0.29 | 11 | 100 | 0.28 |
| Aldehydes | 20 | 200 | 0.9733 | 3.89 | 11 | 100 | 3.69 |
| Arsenic | 60 | 200 | 0.9733 | 11.68 | 11 | 100 | 11.08 |
| | | | | | | | |
| Compound | Mass of TG (ng) | LoD of TG (ng) | Concentration | Units | Analysis Notes (See below) | Analysis UKAS Accredited (Y/N) | |
| 1, 1 - dichloroethane | | 10 | < 36 | µg/m3 | - | Y | |
| 1, 2 - dichloroethane | 170 | 10 | 612 | µg/m3 | - | N | |
| 1, 1 - dichloroethene | | 10 | < 36 | µg/m3 | - | Y | |
| 1, 2 - dichloroethene | 130 | 30 | 468 | µg/m3 | - | Y | |
| 1, 3 - butadiene | | 10 | < 36 | µg/m3 | - | Y | |
| 1 - butanethiol | | 10 | < 36 | µg/m3 | - | Y | |
| 1 - pentene | | 10 | < 36 | µg/m3 | - | Y | |
| 1 - propanethiol | | 10 | < 36 | µg/m3 | - | Y | |
| 2 - butoxyl ethanol | 26 | 10 | 94 | µg/m3 | - | N | |
| Arsenic (as As) | | 1000 | < 90 | µg/m3 | - | Y | |
| Benzene | 1100 | 10 | 3958 | µg/m3 | c | Y | |
| Butyric acid | | 10 | < 36 | µg/m3 | - | N | |
| Carbon disulphide | 880 | 10 | 3167 | µg/m3 | a | N | |
| Chloroethane | 120 | 30 | 432 | µg/m3 | - | N | |
| Chloroethene (vinyl chloride) | | 10 | < 36 | µg/m3 | - | Y | |
| Dimethyl disulphide | 33 | 10 | 119 | µg/m3 | - | N | |
| Dimethyl sulphide | 270 | 10 | 972 | µg/m3 | - | Y | |
| Ethanal (acetaldehyde) | | 100 | < 27 | µg/m3 | - | Y | |
| Ethanethiol | | 10 | < 36 | µg/m3 | - | N | |
| Ethyl butyrate | | 25 | < 90 | µg/m3 | - | N | |
| Furan (1,4-epoxy-1,3 butadiene) | 82 | 10 | 295 | µg/m3 | - | N | |
| Hydrogen sulphide (see below)* | 67 | 10 | 101696 | µg/m3 | - | N | |
| Methanal (formaldehyde) | 400 | 100 | 108 | µg/m3 | a | Y | |
| Methanethiol | | 30 | < 108 | µg/m3 | - | N | |
| Styrene | 880 | 10 | 3167 | µg/m3 | c | N | |
| Tetrachloromethane | | 10 | < 36 | µg/m3 | - | Y | |
| Toluene | 4600 | 10 | 16553 | µg/m3 | c | N | |
| Trichloroethene | 95 | 10 | 342 | µg/m3 | - | Y | |

*H2S value is equivalent to 67 ppm, values in heighlighted 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 UKAS Accreditation scope.

APPENDIX C

Trace Gas Chart

TABLE C: Trace Gas Chart

