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Stack Emissions Testing Report Commissioned by
Gywnedd Council

Installation Name & Address
Gywnedd Council
Ffidd Rasus Landfill Site
Harlech
LL46 2UW

PPC Permit: GP333OBY, Variation Notice: QP3134LY

Stack Reference
Raw Landfill Gas Supply

Dates of the Monitoring Campaign
24th March 2016

Job Reference Number
CAT-2599

Report Written by
Ian Baggley Team Leader MCERTS Level 2 MM 05 653 TE1 TE2 TE3 TE4

Report Approved by
Robert Haworth Team Leader MCERTS Level 2 MM 07 797 TE1 TE2 TE3 TE4

Report Date
21st April 2016

Version
Version 1

Signature of Report Approver


CONTENTS

Opinions and interpretations expressed herein are outside the scope of Exova Catalyst's ISO 17025 accreditation.

Executive Summary

MONITORING OBJECTIVES

Gywnedd Council, Ffidd Rasus Landfill Site
Raw Landfill Gas Supply
24th March 2016

Overall Aim of the Monitoring Campaign

Exova Catalyst were commissioned by Gywnedd Council to carry out stack emissions testing on the Raw Landfill Gas Supply at Ffidd Rasus Landfill Site.

The aim of the monitoring campaign was to perform testing, as requested by the customer, for a number of prescribed pollutants. There are no emission limits set for any of the pollutants at this time.

Special Requirements

There were no special requirements.

Target Parameters

Methanal, Ethanal, Arsenic, Trace Compounds, Bulk Gases

Executive Summary

MONITORING RESULTS

Gywnedd Council, Ffidd Rasus Landfill Site
Raw Landfill Gas Supply
24th March 2016

where MU = Measurement Uncertainty associated with the Result

		Concentration		
Parameter	**Units**	**Result**	**MU +/-**	**Limit**
Methanal [1]	mg/m³	0.06	0.01	-
Ethanal [1]	mg/m³	0.06	0.01	-
Arsenic [1]	mg/m³	0.82	0.16	-
Hexamethyldisiloxane [1]	mg/m³	1.0	0.21	-
Hexamethylcyclotrisiloxane [1]	mg/m³	0.51	0.10	-
Octamethylcyclotetrasiloxane [1]	mg/m³	3.1	0.62	-
Decamethylcyclopentasiloxane [1]	mg/m³	4.4	0.87	-
Dodecamethylcyclohexasiloxane [1]	mg/m³	0.51	0.10	-
Trimethylsilanol [1]	mg/m³	5.1	1.0	-
Octamethyltrisiloxane [1]	mg/m³	0.51	0.10	-
Decamethyltetrasiloxane [1]	mg/m³	0.51	0.10	-
1 Pentene [1]	mg/m³	0.36	0.09	-
1,1-Dichloroethane [1]	mg/m³	0.02	0.004	-
1,1-Dichloroethylene [1]	mg/m³	0.02	0.004	-
1,2-Dichloroethane [1]	mg/m³	0.08	0.02	-
1,2-Dichloroethylene [1]	mg/m³	0.06	0.01	-
1,3-Butadiene [1]	mg/m³	0.02	0.004	-
1,4 epoxy 1,3-butadiene [1]	mg/m³	0.02	0.004	-
1-Propanethiol [1]	mg/m³	0.02	0.004	-
2-butoxyethanol [1]	mg/m³	0.02	0.004	-
Benzene [1]	mg/m³	0.57	0.14	-
Butyric acid [1]	mg/m³	0.02	0.004	-
Carbon disulphide [1]	mg/m³	0.21	0.05	-
Carbon tetrachloride [1]	mg/m³	0.02	0.004	-
Chloroethane [1]	mg/m³	0.14	0.03	-
Dichloromethane [1]	mg/m³	0.02	0.005	-
Dimethyl disulphide [1]	mg/m³	0.02	0.004	-
Dimethyl sulphide [1]	mg/m³	0.06	0.01	-
Ethyl butyrate [1]	mg/m³	0.04	0.01	-
Ethyl Mercaptan [1]	mg/m³	0.02	0.004	-
Hydrogen Sulphide [1]	mg/m³	0.58	0.14	-
Methyl Mercaptan [1]	mg/m³	0.05	0.01	-
N-Butyl Mercaptan [1]	mg/m³	0.02	0.004	-
Styrene [1]	mg/m³	0.10	0.02	-
Toluene [1]	mg/m³	2.2	0.52	-
Trichloroethylene [1]	mg/m³	0.02	0.005	-
Vinyl Chloride [1]	mg/m³	0.02	0.004	-
Hydrogen Sulphide [1]	ppm	< 10.0	-	-
Carbon Dioxide [1]	% v/v	22.0	-	-
Carbon Monoxide [1]	% v/v	< 0.01	-	-
Ethane [1]	% v/v	< 0.02	-	-
Ethene [1]	% v/v	< 0.02	-	-
Hydrogen [1]	% v/v	< 0.01	-	-
Methane [1]	% v/v	38.0	-	-
Nitrogen [1]	% v/v	38.0	-	-
Oxygen [1]	% v/v	1.3	-	-
Organic Fluorine [1]	mg/m³	0.18	0.04	-
Organic Chlorine [1]	mg/m³	0.18	0.04	-
Total Sulphur [1]	mg/m³	0.53	0.11	-

[1] Reference Conditions (REF) are: 273K, 101.3kPa, without correction for water vapour content.

Executive Summary

MONITORING DATE(S) & TIMES

Gywnedd Council, Ffidd Rasus Landfill Site
Raw Landfill Gas Supply
24th March 2016

Parameter		Units	Concentration		Sampling Date(s)	Sampling Times	Duration mins
Methanal	R1	mg/m³	0.06		24/03/2016	12:22 - 12:34	10
Ethanal	R1	mg/m³	0.06		24/03/2016	12:22 - 12:34	10
Arsenic	R1	mg/m³	0.82		24/03/2016	11:24 - 11:34	20
Hexamethyldisiloxane	R1	mg/m³	1.0		24/03/2016	10:35 - 11:05	5
Hexamethylcyclotrisiloxane	R1	mg/m³	0.51		24/03/2016	10:35 - 11:05	5
Octamethylcyclotetrasiloxane	R1	mg/m³	3.1		24/03/2016	10:35 - 11:05	5
Decamethylcyclopentasiloxane	R1	mg/m³	4.4		24/03/2016	10:35 - 11:05	5
Dodecamethylcyclohexasiloxane	R1	mg/m³	0.51		24/03/2016	10:35 - 11:05	5
Trimethylsilanol	R1	mg/m³	5.1		24/03/2016	10:35 - 11:05	5
Octamethyltrisiloxane	R1	mg/m³	0.51		24/03/2016	10:35 - 11:05	5
Decamethyltetrasiloxane	R1	mg/m³	0.51		24/03/2016	10:35 - 11:05	5
1 Pentene	R1	mg/m³	0.36		23/03/2016	11:54 - 12:04	10
1,1-Dichloroethane	R1	mg/m³	0.02		23/03/2016	11:54 - 12:04	10
1,1-Dichloroethylene	R1	mg/m³	0.02		23/03/2016	11:54 - 12:04	10
1,2-Dichloroethane	R1	mg/m³	0.08		23/03/2016	11:54 - 12:04	10
1,2-Dichloroethylene	R1	mg/m³	0.06		23/03/2016	11:54 - 12:04	10
1,3-Butadiene	R1	mg/m³	0.02		23/03/2016	11:54 - 12:04	10
1,4 epoxy 1,3-butadiene	R1	mg/m³	0.02		23/03/2016	11:54 - 12:04	10
1-Propanethiol	R1	mg/m³	0.02		23/03/2016	11:54 - 12:04	10
2-butoxyethanol	R1	mg/m³	0.02		23/03/2016	11:54 - 12:04	10
Benzene	R1	mg/m³	0.57		23/03/2016	11:54 - 12:04	10
Butyric acid	R1	mg/m³	0.02		23/03/2016	11:54 - 12:04	10
Carbon disulphide	R1	mg/m³	0.21		23/03/2016	11:54 - 12:04	10
Carbon tetrachloride	R1	mg/m³	0.02		23/03/2016	11:54 - 12:04	10
Chloroethane	R1	mg/m³	0.14		23/03/2016	11:54 - 12:04	10
Dichloromethane	R1	mg/m³	0.02		23/03/2016	11:54 - 12:04	10
Dimethyl disulphide	R1	mg/m³	0.02		23/03/2016	11:54 - 12:04	10
Dimethyl sulphide	R1	mg/m³	0.06		23/03/2016	11:54 - 12:04	10
Ethyl butyrate	R1	mg/m³	0.04		23/03/2016	11:54 - 12:04	10
Ethyl Mercaptan	R1	mg/m³	0.02		23/03/2016	11:54 - 12:04	10
Hydrogen Sulphide	R1	mg/m³	0.58		23/03/2016	11:54 - 12:04	10
Methyl Mercaptan	R1	mg/m³	0.05		23/03/2016	11:54 - 12:04	10
N-Butyl Mercaptan	R1	mg/m³	0.02		23/03/2016	11:54 - 12:04	10
Styrene	R1	mg/m³	0.10		23/03/2016	11:54 - 12:04	10
Toluene	R1	mg/m³	2.2		23/03/2016	11:54 - 12:04	10
Trichloroethylene	R1	mg/m³	0.02		23/03/2016	11:54 - 12:04	10
Vinyl Chloride	R1	mg/m³	0.02		23/03/2016	11:54 - 12:04	10
Hydrogen Sulphide	R1	(ppm)	< 10.0		23/03/2016	12:50 - 13:00	10
Carbon Dioxide	R1	% v/v	22.0		23/03/2016	12:50 - 13:00	10
Carbon Monoxide	R1	% v/v	< 0.01		23/03/2016	12:50 - 13:00	10
Ethane	R1	% v/v	< 0.02		23/03/2016	12:50 - 13:00	10
Ethene	R1	% v/v	< 0.02		23/03/2016	12:50 - 13:00	10
Hydrogen	R1	% v/v	< 0.01		23/03/2016	12:50 - 13:00	10
Methane	R1	% v/v	38.0		23/03/2016	12:50 - 13:00	10
Nitrogen	R1	% v/v	38.0		23/03/2016	12:50 - 13:00	10
Oxygen	R1	% v/v	1.3		23/03/2016	12:50 - 13:00	10
Organic Fluorine	R1	mg/m³	0.18		23/03/2016	11:39 - 11:49	10
Organic Chlorine	R1	mg/m³	0.18		23/03/2016	11:39 - 11:49	10
Total Sulphur	R1	mg/m³	0.53		23/03/2016	10:35 - 11:05	30

All results are expressed at the respective reference conditions.

PROCESS DETAILS

Gywnedd Council, Ffidd Rasus Landfill Site
Raw Landfill Gas Supply
24th March 2016

Standard Operating Conditions

Parameter	Value
Process Status	Normal Operation
Capacity (of 100%) and Tonnes / Hour	N/A - Raw Gas Feed to Flare Stack
Continuous or Batch Process	Continuous
Feedstock (if applicable)	Landfill Gas
Abatement System	N/A
Abatement System Running Status	N/A
Fuel	N/A
Plume Appearance	N/A

Site Specific Operating Conditions

Parameter	Status
LFG meter	Methane 43.1% / Oxygen 0.3% / Carbon Dioxide 29.5%

Executive Summary

MONITORING & ANALYTICAL METHODS

Gywnedd Council, Ffidd Rasus Landfill Site
Raw Landfill Gas Supply
24th March 2016

	Monitoring				Analysis					
Parameter	**Standard**	**Technical Procedure**	**ISO 17025 Testing**	**Testing Lab**	**Analytical Procedure**	**Analytical Technique**	**ISO 17025 Analysis**	**Analysis Lab**	**MCERTS Testing**	**LOD (Average)**
Methanal	CEN/TS 13649	CAT-TP-16	Yes	CAT	SOP	HPLC	Yes	SAL	Yes	0.06 mg/m³
Ethanal	CEN/TS 13649	CAT-TP-16	Yes	CAT	SOP	HPLC	Yes	SAL	Yes	0.06 mg/m³
Arsenic	CEN/TS 13649	CAT-TP-16	Yes	CAT	In House	ICP/OES	Yes	SAL	Yes	0.82 mg/m³
Hexamethyldisiloxane	CEN/TS 13649	CAT-TP-16	Yes	CAT	In House	GC/MS	Yes	SAL	Yes	0.51 mg/m³
Hexamethylcyclotrisiloxane	CEN/TS 13649	CAT-TP-16	Yes	CAT	In House	GC/MS	Yes	SAL	Yes	0.51 mg/m³
Octamethylcyclotetrasiloxane	CEN/TS 13649	CAT-TP-16	Yes	CAT	In House	GC/MS	Yes	SAL	Yes	0.51 mg/m³
Decamethylcyclopentasiloxane	CEN/TS 13649	CAT-TP-16	Yes	CAT	In House	GC/MS	Yes	SAL	Yes	0.51 mg/m³
Dodecamethylcyclohexasiloxane	CEN/TS 13649	CAT-TP-16	Yes	CAT	In House	GC/MS	No	SAL	No	0.51 mg/m³
Trimethylsilanol	CEN/TS 13649	CAT-TP-16	Yes	CAT	In House	GC/MS	No	SAL	No	5.1 mg/m³
Octamethyltrisiloxane	CEN/TS 13649	CAT-TP-16	Yes	CAT	In House	GC/MS	Yes	SAL	Yes	0.51 mg/m³
Decamethyltetrasiloxane	CEN/TS 13649	CAT-TP-16	Yes	CAT	In House	GC/MS	Yes	SAL	Yes	0.51 mg/m³
1 Pentene	CEN/TS 13649	CAT-TP-16	SELECT	CAT	SOP	GC/MS - TD	Yes	SAL	No	0.02 mg/m³
1,1-Dichloroethane	CEN/TS 13649	CAT-TP-16	SELECT	CAT	SOP	GC/MS - TD	Yes	SAL	No	0.02 mg/m³
1,1-Dichloroethylene	CEN/TS 13649	CAT-TP-16	SELECT	CAT	SOP	GC/MS - TD	Yes	SAL	No	0.02 mg/m³
1,2-Dichloroethane	CEN/TS 13649	CAT-TP-16	SELECT	CAT	SOP	GC/MS - TD	No	SAL	No	0.02 mg/m³
1,2-Dichloroethylene	CEN/TS 13649	CAT-TP-16	SELECT	CAT	SOP	GC/MS - TD	Yes	SAL	No	0.05 mg/m³
1,3-Butadiene	CEN/TS 13649	CAT-TP-16	SELECT	CAT	SOP	GC/MS - TD	Yes	SAL	No	0.02 mg/m³
1,4 epoxy 1,3-butadiene	CEN/TS 13649	CAT-TP-16	SELECT	CAT	SOP	GC/MS - TD	No	SAL	No	0.02 mg/m³
1-Propanethiol	CEN/TS 13649	CAT-TP-16	SELECT	CAT	SOP	GC/MS - TD	Yes	SAL	No	0.02 mg/m³
2-butoxyethanol	CEN/TS 13649	CAT-TP-16	SELECT	CAT	SOP	GC/MS - TD	No	SAL	No	0.02 mg/m³
Benzene	CEN/TS 13649	CAT-TP-16	SELECT	CAT	SOP	GC/MS - TD	Yes	SAL	No	0.02 mg/m³
Butyric acid	CEN/TS 13649	CAT-TP-16	SELECT	CAT	SOP	GC/MS - TD	No	SAL	No	0.02 mg/m³
Carbon disulphide	CEN/TS 13649	CAT-TP-16	SELECT	CAT	SOP	GC/MS - TD	No	SAL	No	0.02 mg/m³
Carbon tetrachloride	CEN/TS 13649	CAT-TP-16	SELECT	CAT	SOP	GC/MS - TD	Yes	SAL	No	0.02 mg/m³
Chloroethane	CEN/TS 13649	CAT-TP-16	SELECT	CAT	SOP	GC/MS - TD	No	SAL	No	0.05 mg/m³
Dichloromethane	CEN/TS 13649	CAT-TP-16	SELECT	CAT	SOP	GC/MS - TD	No	SAL	No	0.02 mg/m³
Dimethyl disulphide	CEN/TS 13649	CAT-TP-16	SELECT	CAT	SOP	GC/MS - TD	No	SAL	No	0.02 mg/m³
Dimethyl sulphide	CEN/TS 13649	CAT-TP-16	SELECT	CAT	SOP	GC/MS - TD	Yes	SAL	No	0.04 mg/m³
Ethyl butyrate	CEN/TS 13649	CAT-TP-16	SELECT	CAT	SOP	GC/MS - TD	No	SAL	No	0.02 mg/m³
Ethyl Mercaptan	CEN/TS 13649	CAT-TP-16	SELECT	CAT	SOP	GC/MS - TD	No	SAL	No	0.02 mg/m³
Hydrogen Sulphide	CEN/TS 13649	CAT-TP-16	SELECT	CAT	SOP	GC/MS - TD	No	SAL	No	0.05 mg/m³
Methyl Mercaptan	CEN/TS 13649	CAT-TP-16	SELECT	CAT	SOP	GC/MS - TD	No	SAL	No	0.02 mg/m³
N-Butyl Mercaptan	CEN/TS 13649	CAT-TP-16	SELECT	CAT	SOP	GC/MS - TD	Yes	SAL	No	0.02 mg/m³
Styrene	CEN/TS 13649	CAT-TP-16	SELECT	CAT	SOP	GC/MS - TD	No	SAL	No	0.02 mg/m³
Toluene	CEN/TS 13649	CAT-TP-16	SELECT	CAT	SOP	GC/MS - TD	No	SAL	No	0.02 mg/m³
Trichloroethylene	CEN/TS 13649	CAT-TP-16	SELECT	CAT	SOP	GC/MS - TD	Yes	SAL	No	0.02 mg/m³
Vinyl Chloride	CEN/TS 13649	CAT-TP-16	SELECT	CAT	SOP	GC/MS - TD	Yes	SAL	No	0.02 mg/m³
Carbon Dioxide	In-House	CAT-TP-27	Yes	CAT	In House	GC/MS (DI)	No	SAL	No	-
Carbon Monoxide	In-House	CAT-TP-27	Yes	CAT	In House	GC/TDC	No	SAL	No	-
Ethane	In-House	CAT-TP-27	Yes	CAT	In House	GC/TDC	No	SAL	No	-
Ethene	In-House	CAT-TP-27	Yes	CAT	In House	GC/TDC	No	SAL	No	-
Hydrogen	In-House	CAT-TP-27	Yes	CAT	In House	GC/TDC	No	SAL	No	-
Methane	In-House	CAT-TP-27	Yes	CAT	In House	GC/TDC	No	SAL	No	-
Nitrogen	In-House	CAT-TP-27	Yes	CAT	In House	GC/TDC	No	SAL	No	-
Oxygen	In-House	CAT-TP-27	Yes	CAT	In House	GC/TDC	No	SAL	No	-
Organic Fluorine	CEN/TS 13649	CAT-TP-16	SELECT	CAT	SOP	GC/MS - TD	No	SAL	No	-
Organic Chlorine	CEN/TS 13649	CAT-TP-16	SELECT	CAT	SOP	GC/MS - TD	No	SAL	No	-
Total Sulphur	CEN/TS 13649	CAT-TP-16	SELECT	CAT	In House	ICP-OES	No	SAL	No	-

ANALYSIS LABORATORIES

(with short name reference as appears in the table above)

Exova Catalyst (CAT)	ISO 17025 Accreditation Number: 4279
Scientific Analysis Laboratories Ltd (SAL)	ISO 17025 Accreditation Number: 1549

SUMMARY OF SAMPLING DEVIATIONS

Parameter	Run	Deviation
Trace Gases	1	The absorption efficiency for all of the individual Trace Gases was not met, however it should be noted the results were of an extremely low order.

SUITABILITY OF SAMPLING LOCATION

Duct Characteristics

Parameter	Units	Value
Type	-	Circular
Depth	m	0.10
Width	m	-
Area	m^2	0.01
Port Depth	cm	12
Orientation of Duct	-	Horizontal
Sample Port Size	-	6mm tap

Location of Sampling Platform

General Platform Information	Value
Permanent / Temporary Platform	On Ground
Inside / Outside	Inside

Platform Details

EA Technical Guidance Note M1 / EN 15259 Platform Requirements	Value
Sufficient working area to manipulate probe and operate the measuring instruments	Yes
Platform has 2 levels of handrails (approx. 0.5m & 1.0m high)	N/A
Platform has vertical base boards (approx. 0.25m high)	N/A
Platform has chains / self closing gates at top of ladders	N/A
There are no obstructions present which hamper insertion of sampling equipment	Yes
Safe Access Available	Yes
Easy Access Available	Yes

Sampling Location / Platform Improvement Recommendations

The sampling location meets all the requirements specified in EA Guidance Note M1 and EN 15259, and therefore there are no improvement recommendations.

EN 15259 Homogeneity Test Requirements

There is no requirement to perform a EN 15259 Homogeneity Test on this Stack.

Executive Summary

PLANT PHOTOS

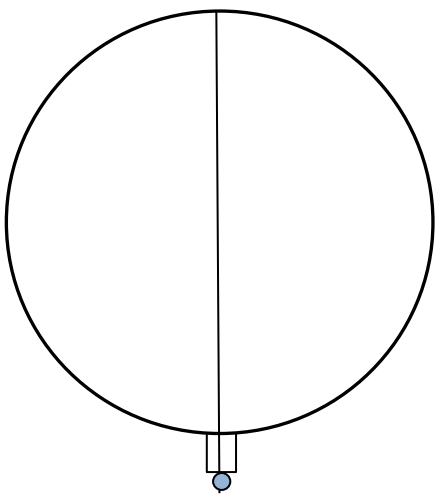
Photo 1

Photo 2

Photo 3

Photo 4

SAMPLE POINTS



where
○ = isokinetic point sampled at
● = isokinetic point not sampled at
● = combustion gases sample point
● = non-isokinetic sample point

APPENDIX CONTENTS

STACK EMISSIONS MONITORING PERSONNEL

Position	Name	MCERTS Accreditation	MCERTS Number	Technical Endorsements
Team Leader	Ian Baggley	MCERTS Level 2	MM 05 653	TE1 TE2 TE3 TE4
Trainee	Joe Cartmell	MCERTS Trainee	MM 15 1355	None

LIST OF EQUIPMENT

Extractive Sampling	
Equipment Type	**Equipment I.D.**
Control Box DGM (1)	-
Control Box DGM (2)	-
Box Thermocouples (1)	-
Box Thermocouples (2)	-
Umbilical (1)	-
Umbilical (2)	-
Oven Box (1)	-
Oven Box (2)	-
Heated Probe (1)	-
Heated Probe (2)	-
Heated Probe (3)	-
S-Pitot (1)	-
S-Pitot (2)	-
L-Pitot	-
500g Check Weight	-
1Kg Check Weight	-
Last Impinger Arm	-
Callipers	-
Tubes Kit Thermocouple	CAT 4.442

Instrumental Analysers	
Equipment Type	**Equipment I.D.**
Horiba PG-250	-
Horiba PG-350E	-
Servomex 4900	-
Eco Physics CLD 822Mh	-
ABB AO2020-URAS26	-
Servomex 5200MP	-
JCT JCC P1 Cooler	-
Gasmet DX4000	-
Gasmet Sampling System	-
Bernath 3006 FID	-
M&C PSS	-
Mass Flow Controller (1)	-
Mass Flow Controller (2)	-
Mass View (1)	-
Mass View (2)	CAT 25.2
Easylogger EN-EL-12 Bit	-
Hioki 5043 (V)	-
Bioaerosols Temperature Logger	-
Electronic Refrigerator	-

Miscellaneous Items	
Equipment Type	**Equipment I.D.**
Digital Manometer (1)	CAT 3.125
Digital Manometer (2)	-
Digital Temperature Meter	CAT 3.125
Stopwatch	CAT 14.92
Barometer	CAT 13.29
Stack Thermocouple (1)	CAT 4.660
Stack Thermocouple (2)	-
Stack Thermocouple (3)	-
1m Heated Line (1)	-
1m Heated Line (2)	-
1m Heated Line (3)	-
5m Heated Line (1)	-
15m Heated Line (1)	-
20m Heated Line (1)	-
20m Heated Line (2)	-
Dual Channel Heater Controller	-
Single Channel Heater Controller	-
Laboratory Balance	-
Tape Measure	-

METHODS & TECHNICAL PROCEDURES USED

Parameter	Standard	Technical Procedure
Methanal	CEN/TS 13649	CAT-TP-16
Ethanal	CEN/TS 13649	CAT-TP-16
Arsenic	CEN/TS 13649	CAT-TP-16
Hexamethyldisiloxane	CEN/TS 13649	CAT-TP-16
Hexamethylcyclotrisiloxane	CEN/TS 13649	CAT-TP-16
Octamethylcyclotetrasiloxane	CEN/TS 13649	CAT-TP-16
Decamethylcyclopentasiloxane	CEN/TS 13649	CAT-TP-16
Dodecamethylcyclohexasiloxane	CEN/TS 13649	CAT-TP-16
Trimethylsilanol	CEN/TS 13649	CAT-TP-16
Octamethyltrisiloxane	CEN/TS 13649	CAT-TP-16
Decamethyltetrasiloxane	CEN/TS 13649	CAT-TP-16
1 Pentene	CEN/TS 13649	CAT-TP-16
1,1-Dichloroethane	CEN/TS 13649	CAT-TP-16
1,1-Dichloroethylene	CEN/TS 13649	CAT-TP-16
1,2-Dichloroethane	CEN/TS 13649	CAT-TP-16
1,2-Dichloroethylene	CEN/TS 13649	CAT-TP-16
1,3-Butadiene	CEN/TS 13649	CAT-TP-16
1,4 epoxy 1,3-butadiene	CEN/TS 13649	CAT-TP-16
1-Propanethiol	CEN/TS 13649	CAT-TP-16
2-butoxyethanol	CEN/TS 13649	CAT-TP-16
Benzene	CEN/TS 13649	CAT-TP-16
Butyric acid	CEN/TS 13649	CAT-TP-16
Carbon disulphide	CEN/TS 13649	CAT-TP-16
Carbon tetrachloride	CEN/TS 13649	CAT-TP-16
Chloroethane	CEN/TS 13649	CAT-TP-16
Dichloromethane	CEN/TS 13649	CAT-TP-16
Dimethyl disulphide	CEN/TS 13649	CAT-TP-16
Dimethyl sulphide	CEN/TS 13649	CAT-TP-16
Ethyl butyrate	CEN/TS 13649	CAT-TP-16
Ethyl Mercaptan	CEN/TS 13649	CAT-TP-16
Hydrogen Sulphide	CEN/TS 13649	CAT-TP-16
Methyl Mercaptan	CEN/TS 13649	CAT-TP-16
N-Butyl Mercaptan	CEN/TS 13649	CAT-TP-16
Styrene	CEN/TS 13649	CAT-TP-16
Toluene	CEN/TS 13649	CAT-TP-16
Trichloroethylene	CEN/TS 13649	CAT-TP-16
Vinyl Chloride	CEN/TS 13649	CAT-TP-16
Carbon Dioxide	In-House	CAT-TP-27
Carbon Monoxide	In-House	CAT-TP-27
Ethane	In-House	CAT-TP-27
Ethene	In-House	CAT-TP-27
Hydrogen	In-House	CAT-TP-27
Methane	In-House	CAT-TP-27
Nitrogen	In-House	CAT-TP-27
Oxygen	In-House	CAT-TP-27
Organic Fluorine	CEN/TS 13649	CAT-TP-16
Organic Chlorine	CEN/TS 13649	CAT-TP-16
Total Sulphur	CEN/TS 13649	CAT-TP-16

METHANAL / ETHANAL : RESULTS SUMMARY

Gywnedd Council, Ffidd Rasus Landfill Site

Raw Landfill Gas Supply

Sample Runs

Parameter	Units	Run 1		Mean
Methanal	mg/m³	0.06		0.06
Ethanal	mg/m³	0.06		0.06

General Sampling Information

Parameter	Value	
Standard	CEN/TS 13649	
Technical Procedure	CAT-TP-16	
Name of Analytical Laboratory	SAL	
Analytical Laboratory's Procedure	SOP	
ISO 17025 Accredited Analysis?	See Executive Summary	
Date of Sample Analysis	18/04/2016	
Probe Material	Stainless Steel	
Sample Tube Type	DNPH Coated Silica Gel	
Dynamic Dilution Employed	No	
Number of Sampling Lines Used	1 / 1	FORMAT: Number Used / Number Required
Number of Sampling Points Used	1 / 1	FORMAT: Number Used / Number Required
Sample Point I.D.'s	Tap	

Reference Conditions

Reference Conditions are: 273K, 101.3kPa, without correction for water vapour content.

METHANAL / ETHANAL : SAMPLING DETAILS

RUN 1

Parameter	Units	Value
Sampling Times	-	12:22 - 12:34
Sampling Dates	-	24/03/2016
Sampling Device	-	MV
Duration	mins	10
N_2 to Stack Gas Dilution Ratio	: 1	0
Volume Sampled (REF)	m^3	0.0032

Where: MV stands for Mass View (Mass Flow Controller Technology)

Parameter	Lab Result (Front) µg	Lab Result (Back) µg	Lab Result (Total) µg	LOD (Front) µg	LOD (Back) µg	LOD (Total) µg	Concentration mg/m³	Reported Concentration (Blank Reviewed) mg/m³	Reported LOD mg/m³	Adsorption Efficiency %
Methanal	< 0.10	< 0.10	0.20	0.10	0.10	0.20	< 0.06	0.06	0.06	100.0
Ethanal	< 0.10	< 0.10	0.20	0.10	0.10	0.20	< 0.06	0.06	0.06	100.0

Reference Conditions

Reference Conditions are: 273K, 101.3kPa, without correction for water vapour content.

METHANAL / ETHANAL : QUALITY ASSURANCE

Sample Runs

Leak Test Results	Units	Run 1	
Mean Sampling Rate	l/min	0.200	
Pre-Sampling Leak Rate	l/min	0.000	
Post-Sampling Leak Rate	l/min	0.000	
Allowable Leak Rate	l/min	0.010	
Leak Test Acceptable	-	Yes	

Adsorption Efficiency	Units	Run 1	
Methanal	%	100.0	
Ethanal	%	100.0	
Allowable Adsorption Efficiency	%	95.0	
Adsorption Efficiency Acceptable	-	Yes	

Temperature at Sample Tubes	Units	Run 1	
Temperature	°C	9	
Allowable Temperature	°C	40	
Temperature Acceptable	-	Yes	

Test Conditions	Units	Run 1	
Ambient Temperature Recorded?	-	Yes	

METHANAL / ETHANAL : MEASUREMENT UNCERTAINTY CALCULATIONS

	Value			Standard uncertainty			
Measured Quantities	**Symbol**	**Run 1**		**Symbol**	**Units**	**Run 1**	
Sampled Volume (STP)	V_m	0.003		uV_m	m^3	0.0001	
Leak	L	0.00		uL	%	-	
Laboratory Result	L_r	10.0		uL_r	%	-	

	Uncertainty as a Percentage			
Measured Quantities	**Units**	**Run 1**		**Requirement of Standard**
Sampled Volume (STP)	%	2.00		≤2%
Leak	%	0.00		≤5%
Laboratory Result	%	10.0		No Requirement

	Uncertainty in Measurement Units				Sensitivity Coefficient	
Measured Quantities	**Symbol**	**Units**	**Run 1**		**Run 1**	
Sampled Volume (STP)	V_m	m^3	0.003		39.2	
Leak	L	mg/m^3	0.000		1.00	
Laboratory Result	L_r	mg/m^3	0.012		1.00	

	Uncertainty in Result		
Measured Quantities	**Units**	**Run 1**	
Sampled Volume (STP)	mg/m^3	0.002	
Leak	mg/m^3	0.000	
Laboratory Result	mg/m^3	0.012	

	Oxygen Correction Part of MU Budget		
Measured Quantities	**Units**	**Run 1**	
O_2 Correction Factor	-	N/A	
Stack Gas O_2 Content	% v/v	N/A	
MU for O_2 Correction	-	N/A	
Overall MU For O_2 Measurement	%	N/A	

Parameter	**Units**	**Run 1**	
Combined uncertainty	mg/m^3	0.01	
Expanded uncertainty (95% confidence), without Oxygen Correction	mg/m^3	0.02	
Expanded uncertainty (95% confidence), with Oxygen Correction	mg/m^3	N/A	
Expanded uncertainty (95% confidence), estimated with Method Deviations	mg/m^3	0.02	
Reported Uncertainty	mg/m^3	0.02	
Expanded uncertainty (95% confidence), without Oxygen Correction	%	20.0	
Expanded uncertainty (95% confidence), with Oxygen Correction	%	N/A	
Expanded uncertainty (95% confidence), estimated with Method Deviations	%	20.0	
Reported Uncertainty	%	20.0	

NOTE: Uncertainties reported in mg/m ³ are based upon the summation of all Speciated VOCs Measured.

ARSENIC : RESULTS SUMMARY

Gywnedd Council, Ffidd Rasus Landfill Site

Raw Landfill Gas Supply

Sample Runs

Parameter	Units	Run 1		Mean
Arsenic	mg/m³	0.82		0.82

General Sampling Information

Parameter	Value	
Standard	CEN/TS 13649	
Technical Procedure	CAT-TP-16	
Name of Analytical Laboratory	SAL	
Analytical Laboratory's Procedure	In House	
ISO 17025 Accredited Analysis?	See Executive Summary	
Date of Sample Analysis	18/04/2016	
Probe Material	Stainless Steel	
Sample Tube Type	Coconut Shell Charcoal 226-09	
Dynamic Dilution Employed	No	
Number of Sampling Lines Used	1 / 1	FORMAT: Number Used / Number Required
Number of Sampling Points Used	1 / 1	FORMAT: Number Used / Number Required
Sample Point I.D.'s	Tap	

Reference Conditions

Reference Conditions are: 273K, 101.3kPa, without correction for water vapour content.

ARSENIC : SAMPLING DETAILS

RUN 1

Parameter	Units	Value
Sampling Times	-	11:24 - 11:34
Sampling Dates	-	24/03/2016
Sampling Device	-	MV
Duration	mins	20
N_2 to Stack Gas Dilution Ratio	: 1	0
Volume Sampled (REF)	m^3	0.0024

Where: MV stands for Mass View (Mass Flow Controller Technology)

Parameter	Lab Result (Front) µg	Lab Result (Back) µg	Lab Result (Total) µg	LOD (Front) µg	LOD (Back) µg	LOD (Total) µg	Concentration mg/m³	Reported Concentration (Blank Reviewed) mg/m³	Reported LOD mg/m³	Adsorption Efficiency %
Arsenic	< 1.0	< 1.0	2.0	1.0	1.0	2.0	< 0.82	0.82	0.82	100.0

Reference Conditions

Reference Conditions are: 273K, 101.3kPa, without correction for water vapour content.

ARSENIC : QUALITY ASSURANCE

Sample Runs

Leak Test Results	Units	Run 1	
Mean Sampling Rate	l/min	0.200	
Pre-Sampling Leak Rate	l/min	0.000	
Post-Sampling Leak Rate	l/min	0.000	
Allowable Leak Rate	l/min	0.010	
Leak Test Acceptable	-	Yes	

Adsorption Efficiency	Units	Run 1	
Arsenic	%	100.0	
Allowable Adsorption Efficiency	%	95.0	
Adsorption Efficiency Acceptable	-	Yes	

Temperature at Sample Tubes	Units	Run 1	
Temperature	°C	12	
Allowable Temperature	°C	40	
Temperature Acceptable	-	Yes	

Test Conditions	Units	Run 1	
Ambient Temperature Recorded?	-	Yes	

ARSENIC : MEASUREMENT UNCERTAINTY CALCULATIONS

	Value			Standard uncertainty			
Measured Quantities	**Symbol**	**Run 1**		**Symbol**	**Units**	**Run 1**	
Sampled Volume (STP)	V_m	0.002		uV_m	m³	0.00005	
Leak	L	0.000		uL	%	-	
Laboratory Result	L_r	10.0		uL_r	%	-	

	Uncertainty as a Percentage			
Measured Quantities	**Units**	**Run 1**		**Requirement of Standard**
Sampled Volume (STP)	%	2.00		≤2%
Leak	%	0.00		≤5%
Laboratory Result	%	10.0		No Requirement

	Uncertainty in Measurement Units				Sensitivity Coefficient	
Measured Quantities	**Symbol**	**Units**	**Run 1**		**Run 1**	
Sampled Volume (STP)	V_m	m³	0.002		340	
Leak	L	mg/m³	0.000		1.00	
Laboratory Result	L_r	mg/m³	0.082		1.00	

	Uncertainty in Result		
Measured Quantities	**Units**	**Run 1**	
Sampled Volume (STP)	mg/m³	0.02	
Leak	mg/m³	0.00	
Laboratory Result	mg/m³	0.08	

	Oxygen Correction Part of MU Budget		
Measured Quantities	**Units**	**Run 1**	
O_2 Correction Factor	-	N/A	
Stack Gas O_2 Content	% v/v	N/A	
MU for O_2 Correction	-	N/A	
Overall MU For O_2 Measurement	%	N/A	

Parameter	**Units**	**Run 1**	
Combined uncertainty	mg/m³	0.08	
Expanded uncertainty (95% confidence), without Oxygen Correction	mg/m³	0.16	
Expanded uncertainty (95% confidence), with Oxygen Correction	mg/m³	N/A	
Expanded uncertainty (95% confidence), estimated with Method Deviations	mg/m³	0.16	
Reported Uncertainty	mg/m³	0.16	
Expanded uncertainty (95% confidence), without Oxygen Correction	%	20.0	
Expanded uncertainty (95% confidence), with Oxygen Correction	%	N/A	
Expanded uncertainty (95% confidence), estimated with Method Deviations	%	20.0	
Reported Uncertainty	%	20.0	

NOTE: Uncertainties reported in mg/m ³ are based upon the summation of all Speciated VOCs Measured.

APPENDIX 2

SILOXANES : RESULTS SUMMARY

Gywnedd Council, Ffidd Rasus Landfill Site

Raw Landfill Gas Supply

Sample Runs

Parameter	Units	Run 1		Mean
Hexamethyldisiloxane	mg/m³	1.0		1.0
Hexamethylcyclotrisiloxane	mg/m³	0.51		0.51
Octamethylcyclotetrasiloxane	mg/m³	3.1		3.1
Decamethylcyclopentasiloxane	mg/m³	4.4		4.4
Dodecamethylcyclohexasiloxane	mg/m³	0.51		0.51
Trimethylsilanol	mg/m³	5.1		5.1
Octamethyltrisiloxane	mg/m³	0.51		0.51
Decamethyltetrasiloxane	mg/m³	0.51		0.51

General Sampling Information

Parameter	Value	
Standard	CEN/TS 13649	
Technical Procedure	CAT-TP-16	
Name of Analytical Laboratory	SAL	
Analytical Laboratory's Procedure	In House	
ISO 17025 Accredited Analysis?	See Executive Summary	
Date of Sample Analysis	18/04/2016	
Probe Material	Stainless Steel	
Sample Tube Type	Coconut Shell Charcoal 226-09	
Dynamic Dilution Employed	No	
Number of Sampling Lines Used	1 / 1	FORMAT: Number Used / Number Required
Number of Sampling Points Used	1 / 1	FORMAT: Number Used / Number Required
Sample Point I.D.'s	Tap	

Reference Conditions

Reference Conditions are: 273K, 101.3kPa, without correction for water vapour content.

SILOXANES : SAMPLING DETAILS

RUN 1

Parameter	Units	Value
Sampling Times	-	10:35 - 11:05
Sampling Dates	-	24/03/2016
Sampling Device	-	MV
Duration	mins	5
N_2 to Stack Gas Dilution Ratio	: 1	0
Volume Sampled (REF)	m^3	0.0039

Where: MV stands for Mass View (Mass Flow Controller Technology)

Parameter	Lab Result (Front) µg	Lab Result (Back) µg	Lab Result (Total) µg	LOD (Front) µg	LOD (Back) µg	LOD (Total) µg	Concentration mg/m³	Reported Concentration (Blank Reviewed) mg/m³	Reported LOD mg/m³	Adsorption Efficiency %
Hexamethyldisiloxane	3.0	< 1.0	4.0	1.0	1.0	2.0	1.0	1.0	0.51	100.0
Hexamethylcyclotrisiloxane	< 1.0	< 1.0	2.0	1.0	1.0	2.0	< 0.51	0.51	0.51	100.0
Octamethylcyclotetrasiloxane	11.0	< 1.0	12.0	1.0	1.0	2.0	3.1	3.1	0.51	100.0
Decamethylcyclopentasiloxane	16.0	< 1.0	17.0	1.0	1.0	2.0	4.4	4.4	0.51	100.0
Dodecamethylcyclohexasiloxane	< 1.0	< 1.0	2.0	1.0	1.0	2.0	< 0.51	0.51	0.51	100.0
Trimethylsilanol	< 10.0	< 10.0	20.0	10.0	10.0	20.0	< 5.1	5.1	5.1	100.0
Octamethyltrisiloxane	< 1.0	< 1.0	2.0	1.0	1.0	2.0	< 0.51	0.51	0.51	100.0
Decamethyltetrasiloxane	1.0	< 1.0	2.0	1.0	1.0	2.0	0.51	0.51	0.51	100.0

Reference Conditions

Reference Conditions are: 273K, 101.3kPa, without correction for water vapour content.

SILOXANES : QUALITY ASSURANCE

Sample Runs

Leak Test Results	Units	Run 1	
Mean Sampling Rate	l/min	0.100	
Pre-Sampling Leak Rate	l/min	0.000	
Post-Sampling Leak Rate	l/min	0.000	
Allowable Leak Rate	l/min	0.005	
Leak Test Acceptable	-	Yes	

Adsorption Efficiency	Units	Run 1	
Hexamethyldisiloxane	%	100.0	
Hexamethylcyclotrisiloxane	%	100.0	
Octamethylcyclotetrasiloxane	%	100.0	
Decamethylcyclopentasiloxane	%	100.0	
Dodecamethylcyclohexasiloxane	%	100.0	
Trimethylsilanol	%	100.0	
Octamethyltrisiloxane	%	100.0	
Decamethyltetrasiloxane	%	100.0	
Allowable Adsorption Efficiency	%	95.0	
Adsorption Efficiency Acceptable	-	Yes	

Temperature at Sample Tubes	Units	Run 1	
Temperature	°C	9	
Allowable Temperature	°C	40	
Temperature Acceptable	-	Yes	

Test Conditions	Units	Run 1	
Ambient Temperature Recorded?	-	Yes	

SILOXANES : MEASUREMENT UNCERTAINTY CALCULATIONS

	Value			Standard uncertainty			
Measured Quantities	**Symbol**	**Run 1**		**Symbol**	**Units**	**Run 1**	
Sampled Volume (STP)	V_m	0.004		uV_m	m^3	0.00008	
Leak	L	0.000		uL	%	-	
Laboratory Result	L_r	10.0		uL_r	%	-	

	Uncertainty as a Percentage			
Measured Quantities	**Units**	**Run 1**		**Requirement of Standard**
Sampled Volume (STP)	%	2.00		≤2%
Leak	%	0.00		≤5%
Laboratory Result	%	10.0		No Requirement

	Uncertainty in Measurement Units				Sensitivity Coefficient	
Measured Quantities	**Symbol**	**Units**	**Run 1**		**Run 1**	
Sampled Volume (STP)	V_m	m^3	0.004		4102	
Leak	L	mg/m^3	0.000		1.00	
Laboratory Result	L_r	mg/m^3	1.57		1.00	

	Uncertainty in Result		
Measured Quantities	**Units**	**Run 1**	
Sampled Volume (STP)	mg/m^3	0.31	
Leak	mg/m^3	0.00	
Laboratory Result	mg/m^3	1.57	

	Oxygen Correction Part of MU Budget		
Measured Quantities	**Units**	**Run 1**	
O_2 Correction Factor	-	N/A	
Stack Gas O_2 Content	% v/v	N/A	
MU for O_2 Correction	-	N/A	
Overall MU For O_2 Measurement	%	N/A	

Parameter	**Units**	**Run 1**	
Combined uncertainty	mg/m^3	1.6	
Expanded uncertainty (95% confidence), without Oxygen Correction	mg/m^3	3.1	
Expanded uncertainty (95% confidence), with Oxygen Correction	mg/m^3	N/A	
Expanded uncertainty (95% confidence), estimated with Method Deviations	mg/m^3	3.1	
Reported Uncertainty	mg/m^3	3.1	
Expanded uncertainty (95% confidence), without Oxygen Correction	%	20.0	
Expanded uncertainty (95% confidence), with Oxygen Correction	%	N/A	
Expanded uncertainty (95% confidence), estimated with Method Deviations	%	20.0	
Reported Uncertainty	%	20.0	

NOTE: Uncertainties reported in mg/m^3 are based upon the summation of all Speciated VOCs Measured.

APPENDIX 2

TRACE GASES : RESULTS SUMMARY

Gywnedd Council, Ffidd Rasus Landfill Site

Raw Landfill Gas Supply

Sample Runs

Parameter	Units	Run 1		Mean
1 Pentene	mg/m³	0.36		0.36
1,1-Dichloroethane	mg/m³	0.02		0.02
1,1-Dichloroethylene	mg/m³	0.02		0.02
1,2-Dichloroethane	mg/m³	0.08		0.08
1,2-Dichloroethylene	mg/m³	0.06		0.06
1,3-Butadiene	mg/m³	0.02		0.02
1,4 epoxy 1,3-butadiene	mg/m³	0.02		0.02
1-Propanethiol	mg/m³	0.02		0.02
2-butoxyethanol	mg/m³	0.02		0.02
Benzene	mg/m³	0.57		0.57
Butyric acid	mg/m³	0.02		0.02
Carbon disulphide	mg/m³	0.21		0.21
Carbon tetrachloride	mg/m³	0.02		0.02
Chloroethane	mg/m³	0.14		0.14
Dichloromethane	mg/m³	0.02		0.02
Dimethyl disulphide	mg/m³	0.02		0.02
Dimethyl sulphide	mg/m³	0.06		0.06
Ethyl butyrate	mg/m³	0.04		0.04
Ethyl Mercaptan	mg/m³	0.02		0.02
Hydrogen Sulphide	mg/m³	0.58		0.58
Methyl Mercaptan	mg/m³	0.05		0.05
N-Butyl Mercaptan	mg/m³	0.02		0.02
Styrene	mg/m³	0.10		0.10
Toluene	mg/m³	2.2		2.2
Trichloroethylene	mg/m³	0.02		0.02
Vinyl Chloride	mg/m³	0.02		0.02

General Sampling Information

Parameter	Value	
Standard	CEN/TS 13649	
Technical Procedure	CAT-TP-16	
Name of Analytical Laboratory	SAL	
Analytical Laboratory's Procedure	SOP	
ISO 17025 Accredited Analysis?	See Executive Summary	
Date of Sample Analysis	18/04/2016	
Probe Material	Stainless Steel	
Sample Tube Type	ATD	
Dynamic Dilution Employed	No	
Number of Sampling Lines Used	1 / 1	FORMAT: Number Used / Number Required
Number of Sampling Points Used	1 / 1	FORMAT: Number Used / Number Required
Sample Point I.D.'s	Tap	

Reference Conditions

Reference Conditions are: 273K, 101.3kPa, without correction for water vapour content.

TRACE GASES : SAMPLING DETAILS

RUN 1

Parameter	Units	Value
Sampling Times	-	11:54 - 12:04
Sampling Dates	-	23/03/2016
Sampling Device	-	MV
Duration	mins	10
N_2 to Stack Gas Dilution Ratio	: 1	0
Volume Sampled (REF)	m^3	0.0013

Where: MV stands for Mass View (Mass Flow Controller Technology)

Parameter	Lab Result (Front) µg	Lab Result (Back) µg	Lab Result (Total) µg	LOD (Front) µg	LOD (Back) µg	LOD (Total) µg	Concentration mg/m³	Reported Concentration (Blank Reviewed) mg/m³	Reported LOD mg/m³	Adsorption Efficiency %
1 Pentene	0.44	< 0.01	0.45	0.01	0.01	0.02	0.36	0.36	0.02	100.0
1,1-Dichloroethane	< 0.01	< 0.01	0.02	0.01	0.01	0.02	< 0.02	0.02	0.02	100.0
1,1-Dichloroethylene	< 0.01	< 0.01	0.02	0.01	0.01	0.02	< 0.02	0.02	0.02	100.0
1,2-Dichloroethane	0.09	< 0.01	0.10	0.01	0.01	0.02	0.08	0.08	0.02	100.0
1,2-Dichloroethylene	0.04	< 0.03	0.07	0.03	0.03	0.06	0.06	0.06	0.05	100.0
1,3-Butadiene	< 0.01	< 0.01	0.02	0.01	0.01	0.02	< 0.02	0.02	0.02	100.0
1,4 epoxy 1,3-butadiene	< 0.01	< 0.01	0.02	0.01	0.01	0.02	< 0.02	0.02	0.02	100.0
1-Propanethiol	< 0.01	< 0.01	0.02	0.01	0.01	0.02	< 0.02	0.02	0.02	100.0
2-butoxyethanol	< 0.01	< 0.01	0.02	0.01	0.01	0.02	< 0.02	0.02	0.02	100.0
Benzene	0.70	< 0.01	0.71	0.01	0.01	0.02	0.57	0.57	0.02	100.0
Butyric acid	< 0.01	< 0.01	0.02	0.01	0.01	0.02	< 0.02	0.02	0.02	100.0
Carbon disulphide	0.13	0.13	0.26	0.01	0.01	0.02	0.21	0.21	0.02	50.0
Carbon tetrachloride	< 0.01	< 0.01	0.02	0.01	0.01	0.02	< 0.02	0.02	0.02	100.0
Chloroethane	0.14	< 0.03	0.17	0.03	0.03	0.06	0.14	0.14	0.05	100.0
Dichloromethane	0.02	< 0.01	0.03	0.01	0.01	0.02	0.02	0.02	0.02	100.0
Dimethyl disulphide	< 0.01	< 0.01	0.02	0.01	0.01	0.02	< 0.02	0.02	0.02	100.0
Dimethyl sulphide	0.06	< 0.01	0.07	0.03	0.03	0.05	0.06	0.06	0.04	100.0
Ethyl butyrate	< 0.03	< 0.03	0.05	0.01	0.01	0.02	< 0.04	0.04	0.02	100.0
Ethyl Mercaptan	< 0.01	< 0.01	0.02	0.01	0.01	0.02	< 0.02	0.02	0.02	100.0
Hydrogen Sulphide	0.54	0.19	0.73	0.03	0.03	0.06	0.58	0.58	0.05	74.0
Methyl Mercaptan	< 0.03	< 0.03	0.06	0.01	0.01	0.02	< 0.05	0.05	0.02	100.0
N-Butyl Mercaptan	< 0.01	< 0.01	0.02	0.01	0.01	0.02	< 0.02	0.02	0.02	100.0
Styrene	0.11	< 0.01	0.12	0.01	0.01	0.02	0.10	0.10	0.02	100.0
Toluene	2.70	< 0.01	2.71	0.01	0.01	0.02	2.17	2.17	0.02	100.0
Trichloroethylene	0.02	< 0.01	0.03	0.01	0.01	0.02	0.02	0.02	0.02	100.0
Vinyl Chloride	< 0.01	< 0.01	0.02	0.01	0.01	0.02	< 0.02	0.02	0.02	100.0

Reference Conditions

Reference Conditions are: 273K, 101.3kPa, without correction for water vapour content.

TRACE GASES : QUALITY ASSURANCE

Sample Runs

Leak Test Results	Units	Run 1	
Mean Sampling Rate	l/min	0.100	
Pre-Sampling Leak Rate	l/min	0.000	
Post-Sampling Leak Rate	l/min	0.000	
Allowable Leak Rate	l/min	0.005	
Leak Test Acceptable	-	Yes	

Adsorption Efficiency	Units	Run 1	
1 Pentene	%	100.0	
1,1-Dichloroethane	%	100.0	
1,1-Dichloroethylene	%	100.0	
1,2-Dichloroethane	%	100.0	
1,2-Dichloroethylene	%	100.0	
1,3-Butadiene	%	100.0	
1,4 epoxy 1,3-butadiene	%	100.0	
1-Propanethiol	%	100.0	
2-butoxyethanol	%	100.0	
Benzene	%	100.0	
Butyric acid	%	100.0	
Carbon disulphide	%	50.0	
Carbon tetrachloride	%	100.0	
Chloroethane	%	100.0	
Dichloromethane	%	100.0	
Dimethyl disulphide	%	100.0	
Dimethyl sulphide	%	100.0	
Ethyl butyrate	%	100.0	
Ethyl Mercaptan	%	100.0	
Hydrogen Sulphide	%	74.0	
Methyl Mercaptan	%	100.0	
N-Butyl Mercaptan	%	100.0	
Styrene	%	100.0	
Toluene	%	100.0	
Trichloroethylene	%	100.0	
Vinyl Chloride	%	100.0	
Allowable Adsorption Efficiency	%	95.0	
Adsorption Efficiency Acceptable	-	No	

Temperature at Sample Tubes	Units	Run 1	
Temperature	°C	9	
Allowable Temperature	°C	40	
Temperature Acceptable	-	Yes	

Test Conditions	Units	Run 1	
Ambient Temperature Recorded?	-	Yes	