Envirocare
CONSULTANCY

caring for the environment and creating safer workplaces

MEGTEC

Envirocare is accredited to BS EN ISO/IEC 17025:2005

Report for the Periodic Monitoring of Emissions to Air From The Print Line Oxidisers

Part 1:	Executive Summary
Permit Number:	N/A
Operator:	Wyndeham Heron
Installation:	Printworks

UKAS TESTING 2522

Monitoring dates:	23 - 24 June 2008
Address:	Wyndeham Heron The Bethnell Complex Colchester Road Maldon Essex
Monitoring Organisation:	Envirocare Technical Consultancy Ltd St Blaise House Vaughan Street Bradford West Yorkshire BD1 2LL
Report Number:	J-3556
Version Number:	1
Date of Report:	1 July 2008
Report Approved By:	Chris G Mann
MCERTS Registration Number:	MM 06 695
Function:	Environmental Consultant
Signed:	

Envirocare Technical Consultancy Ltd, St Blaise House, Vaughan Street, Bradford, West Yorkshire, BD1 2LL
T: 01274 738668 F : 01274 738758 E: info@envirocare.org www.envirocare.org
Registered in England and Wales No. 2942918 VAT NO. 651 7481 28

Envirocare Technical Consultancy Ltd, St. Blaise House, Vaughan Street, Bradford, West Yorkshire, BD1 2LL
T: 01274 738668 F: 01274 738758 E: info@envirocare.org www.envirocare.org
Registered in England & Wales No. 2942918. Company VAT Number: 651 7481 28

Contents

e-mail: info@envirocare.org

Part 1: Executive Summary

1.1 Monitoring Objectives

Wyndeham Heron operate several printing process lines that have the potential to release controlled substances to atmosphere, and are subject to authorisation under the Environmental Protection Act 1990 (EPA). Under the act, Local Authorities regulate the printing processes with guidance from the Process Guidance Note PG6/16(04): Printworks.

In order for Wyndeham Heron to comply with its annual emission limits Megtec requested that Envirocare Technical Consultancy undertake an emissions monitoring exercise on the Rotoman 1 Lower Oxidiser, the results of this monitoring form the basis of this report.

Monitoring was performed between the 23rd and 24th of June 2008. However the monitoring that was performed on the 23rd captured the emissions generated from the printing of a half web product. It was not deemed that this would create a worst case scenario in terms of emissions from the oxidiser.

Therefore monitoring was continued on the 24th June where emissions were captured from a 32-page full web product. It should be noted that the ink coverage on this product was quite low. For the purpose of this report results from both Half Web and Full Web printing have been calculated.

Emission Point Identification

Emission Point Reference	VOC's	Carbon Monoxide	Oxides of Nitrogen
Rotoman 1 Lower Half Web	✓	✓	✓
Rotoman 1 Lower 32 Page Full Web	✓	✓	✓

1.2 Monitoring Results

Emission Point Reference	Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result	Uncertainty	Units	Reference Conditions	Date of Sampling	Start and End Times	Monitoring Method Reference	Accreditation for use of Method	Operating Status
Rotoman 1 Lower Half Web	VOC's	20	**1.9**	5.9	mg/Nm³	273K, 101.3kPa	23/06/08	19:58-22:34	BS EN 13526	MCERTS	Normal
	CO	100	**27.6**	8.0	mg/Nm³	273K, 101.3kPa	23/06/08	19:58-22:34	ISO 12039	ISO	Normal
	NOx	100	**63.0**	7.6	mg/Nm³	273K, 101.3kPa	23/06/08	19:58-22:34	ISO 10849	ISO	Normal
Rotoman 1 Lower Full Web	VOC's	20	**0.4**	5.9	mg/Nm³	273K, 101.3kPa	24/06/08	10:14-10:57	BS EN 13526	MCERTS	Normal
	CO	100	**30.1**	8.1	mg/Nm³	273K, 101.3kPa	24/06/08	10:14-10:57	ISO 12039	ISO	Normal
	NOx	100	**67.5**	7.7	mg/Nm³	273K, 101.3kPa	24/06/08	10:14-10:57	ISO 10849	ISO	Normal

1.3 Operating Information

Emission Point Reference	Date	Process Type	Process Duration	Fuel	Feedstock	Abatement	Load
Rotoman 1 Lower Half Web	23/06/08	Printing	Continuous with exception for paper and press changes	Natural Gas	Paper (density unknown)	Thermal Oxidiser	32,000-42,000cph
Rotoman 1 Lower Full Web	24/06/08	Printing	Continuous with exception for paper and press changes	Natural Gas	40gsm paper	Thermal Oxidiser	46,000cph

1.4 Monitoring Deviations

Emission Point Reference	Substance Deviations	Monitoring Deviations	Other Relevant Issues
Rotoman 1 Lower Half Web	None	None	Printing performed on half web only.
Rotoman 1 Lower Full Web	None	None	None

Part 2: Supporting Information

2.1 Appendix 1: General Information

2.1.1 Monitoring organisation staff details

Mr A. May	MCERTS Level 1 (TE1 & TE4)	MM 05 626
Mr M. Ropka	MCERTS Level 1 (TE1 & TE4)	MM 06 761

2.1.2 Monitoring organisation method details

2.1.2.1 Volatile Organic Compounds (VOCs)

A portable organic vapour analyser (OVA) fitted with a flame ionisation detector (FID) and heated line from duct to analyser (Signal, Type 3030PM, Signal Instrument Company Ltd) was used to make these measurements.

When the instrument had warmed up and allowed to stabilise, it was zeroed electronically by drawing sampled air over a catalyst to remove organic species, and manually adjusting the analyser to read 0.0 ppm. Then the instrument was leak checked using a butane gas source at each of the seals/connections along the sample line whereby a positive response from the analyser demonstrates the presence of a leak. A response check was also undertaken by introducing some of the butane gas into the end of the heated line and noting that the analyser responded by the display rising rapidly.

A certified span gas (19.9ppm propane), traceable to National Standards, was then fed through the heated line to the analyser. The value displayed on the unit was adjusted to read the span value. The instrument response to zero gas and the same span gas was obtained at the end of sampling to ensure no significant baseline or linearity drift had occurred during the monitoring period. Details of the calibrations are incorporated into data tables.

The gaseous emissions were sampled directly from the stack through a stainless steel probe, usually with a sintered end to prevent particulate matter entering the sample line, and along the PTFE lined heated sample line to the instrument. An integral-heated PTFE filter in the input to the instrument removes any fine particulate matter material present in the sample gas.

Readings were recorded on custom Sigems data logging software at approximately 1-minute intervals for downloading later onto a computer.

In all cases, the VOC level was measured as parts per million (ppm) of propane. The data obtained were then converted to express the concentration as mg/Nm^3, with respect to propane, and as carbon content (with respect to propane).

2.1.2.2 Combustion Gases

Combustion gases were monitored using a Horiba Combustion Gas Analyser (Model PG250) that monitors the gaseous emissions by appropriate systems for the gas in question. Carbon Monoxide, CO is assessed by NDIR (pneumatic) and NO_x by chemiluminescence. It has an internal pump to draw a sample of the gas through the analyser at a rate of 0.6litres per minute.

A sample gases were drawn through a Titanium tube, inserted into the stack, connected to a heated line (150°C) containing a heated PTFE filter. The heated line was, in turn, connected to a Testoterm Gas Preparation Unit, GPU, (Model 339) which contained a Peltier Cooler to condition the gas by removing moisture from the sampled gas down to around 1%, to enable a dried gas stream to be presented to the analyser. A Tygon tube connected the output from the GPU to the input connection to the Horiba analyser.

When the instrument had warmed up (60 mins), it was zeroed by passing 100% N_2 through the analyser. This also serves as the leak check; a positive response from the oxygen cell of >0.1% indicates the presence of a leak. The instrument was then calibrated with certified gases corresponding to those of interest for the particular measurement to be under taken. In this case it was calibrated with CO at 79.3ppm and NO at 142.0ppm. Calibrations were carried out along the full sample line. Details of these calibrations are presented in the Appendices at the end of this report.

The analyser was connected to a portable laptop computer running custom EDA2000 data logging software, which enables the future processing of results. Readings were logged at 15-second intervals during calibration and 30-second intervals during monitoring periods.

2.1.2.3 Standard Reference Conditions

There is a requirement under the Environmental Protection Act that all pollutants should be expressed at standard reference conditions of 273 K and 101.3 kPa. Hence the temperatures and local barometric pressure should be measured in order to correct the data and thus to express them at the reference conditions. These parameters were measured as follows:

2.1.2.4 Temperature

The duct and ambient temperatures were monitored via a stainless steel sheathed Type K thermocouple (1.5 mm diameter) coupled to an electronic digital reader.

2.1.2.5 Local Atmospheric Pressure

A digital barometer (Speedtech Model) was used to measure the atmospheric pressure on the day of monitoring.

2.2 Appendix 2: General Results and Discussion

Montioring from the Rotoman 1 Lower oxidiser was performed under two different scenarios. Monitoring which was performed on the 23rd June was done so whilst the press was printing on half web. It was deemed that this data may not have represented a worst case scenario and therefore monitoring was continued on the 24th June whilst the press was on full web.

The results obtained on both scenarios are very similar. The printing on Half Web was moderate to heavy coverage but the printing on Full Web was low coverage.

2.2.1 Rotoman 1 Lower Combustion Gases Half Web

Monitoring was performed between 19:58 and 22:34. The rate of printing varied between 32,000 cph and 42, 000 cph. The average CO and NOx results were 27.6mg/Nm3 and 63.0mg/Nm3 respectively. Details of the sampling whilst on half web can be seen in Table 1 and are represented graphically in Figure 1. Calibration data can be seen in Table 1a and uncertainties can be seen in Table 1b and 1c.

2.2.2 Rotoman 1 Lower VOC's Half Web

Monitoring for VOCs whilst the press was on Half Web was performed simultaneously with the monitoring for combustion gases. The average result was 1.9mg/Nm3. Details of the sampling can be seen in Table 2 and are represented graphically in Figure 2. Uncertainties can be seen in Table 2a.

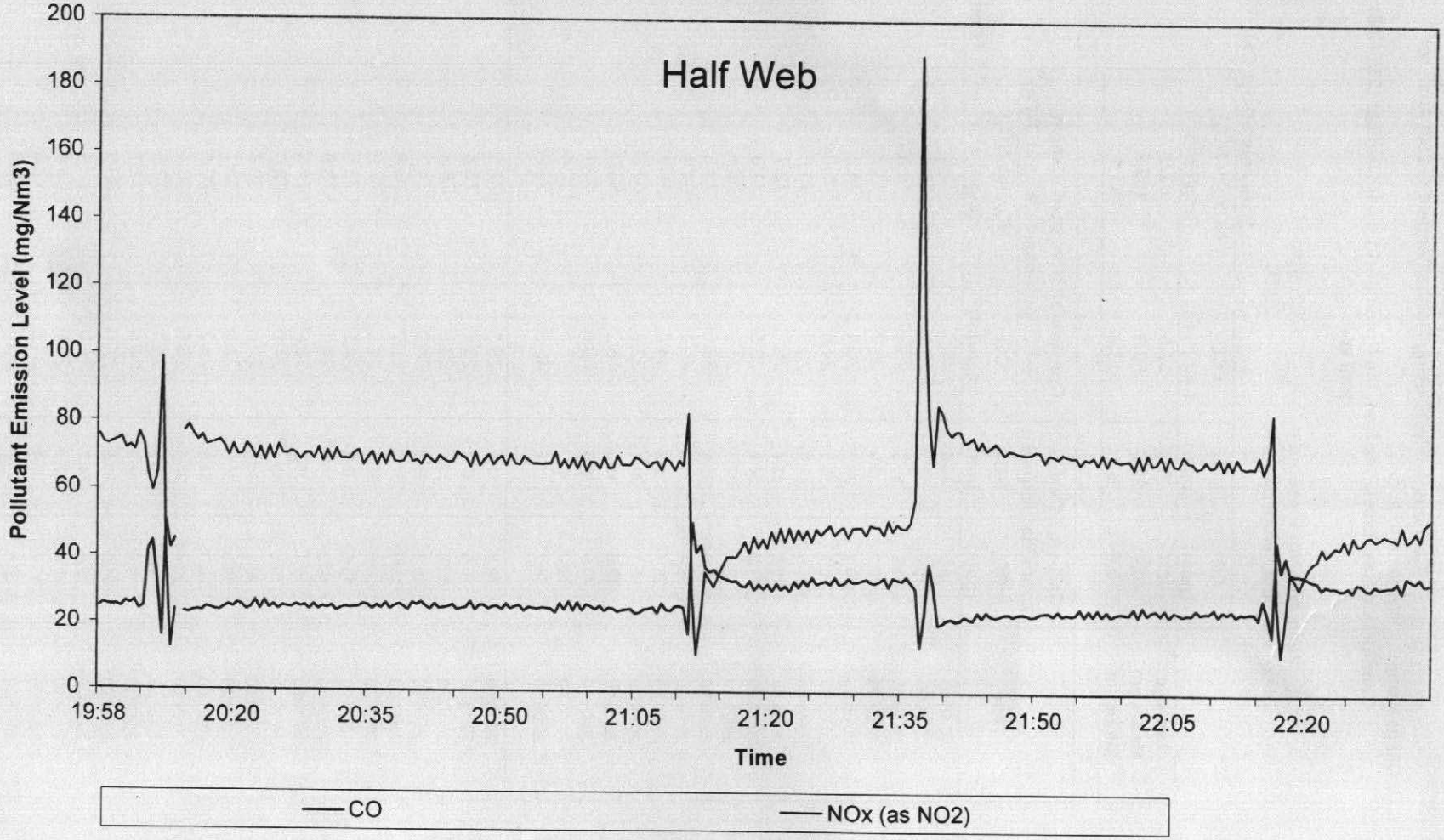
2.2.3 Rotoman 1 Lower Combustion Gases Full Web

Monitoring was performed between 10:14 and 10:57 on the 24th June whilst the press was running on Full Web. During monitoring the press was printing "The New England Journal of Medicine" at 46,000 cph. The average CO and NOx results were 30.1mg/Nm3 and 67.5mg/Nm3 respectively. Details of the sampling can be seen in Table 3 and are represented graphically in Figure 3. Calibration data can be seen in Table 3a and uncertainties can be seen in Tables 3b and 3c.

2.2.4 Rotoman 1 Lower VOC's Full Web

Monitoring for VOC's whilst the press was on Full Web was performed simultaneously with the monitoring for combustion gases. The average result was 0.4mg/Nm3. It possible that this result is lower than the result obtained whilst the press was on Half Web because the ink coverage was very low. Details of the sampling can be seen in Table 4 and are represented graphically in Figure 4. Uncertainties can be seen in Table 4a.

Figure 1
Combustion Gas Emissions from Rotoman 1 Lower Oxidiser
Wyndeham Heron, Maldon (23/06/08)



Tel: 01274 738668
E-mail: technical@envirocare.org
Fax: 01274 738758

TABLE 1

Gaseous Analysis using Horiba (Model PG 250) Analyser

Client Name: Wyndeham Heron

Combustion Gas Emissions from the Rotoman 1 Lower Oxidiser (23/06/08)

Half Web

Mean Ambient Pressure = 1022 **mbar** **Job no:** **3556**

Mean Ambient Temperature = 29 **°C**

Data entered by: CM

	CO (ppm)	NOx (ppm)	CO (mg/Nm³)	NOx (as NO_2) (mg/Nm³)
Average	**22.1**	**30.7**	**27.6**	**63.0**
Maximum	**40.7**	**92.5**	**50.9**	**189.8**
Minimum	**10.9**	**5.4**	**13.6**	**11.1**

Time	Carbon Monoxide CO (ppm)	Oxides of Nitrogen NOx (ppm)	Conversion from ppm to mg/Nm³ at Ref Conditions(273K; 101.3kPa) CO (mg/Nm³)	NOx (as NO_2) (mg/Nm³)	Comments
19:58:00	19.9	36.9	24.9	75.8	
19:58:30	20.7	35.7	25.9	73.4	
19:59:00	20.3	35.6	25.4	73.0	
19:59:30	20.2	35.9	25.3	73.7	
20:00:00	20.3	36.2	25.4	74.3	
20:00:30	19.7	36.5	24.6	75.0	
20:01:00	21.0	34.9	26.3	71.6	
20:01:30	20.6	35.4	25.7	72.7	
20:02:00	21.2	34.7	26.5	71.3	
20:02:30	19.2	37.3	24.0	76.5	
20:03:00	20.0	35.8	25.0	73.5	
20:03:30	33.4	31.3	41.7	64.3	
20:04:00	35.7	28.8	44.6	59.2	
20:04:30	26.1	31.6	32.6	64.8	
20:05:00	12.9	48.2	16.2	98.9	
20:05:30	40.6	19.6	50.8	40.1	
20:06:00	34.0	6.1	42.5	12.4	
20:06:30	36.2	11.7	45.3	23.9	Press Off
20:15:00	18.8	37.6	23.5	77.1	
20:15:30	18.5	38.4	23.1	78.8	
20:16:00	19.0	37.2	23.8	76.3	
20:16:30	19.2	36.2	24.0	74.2	
20:17:00	18.9	37.0	23.7	75.8	
20:17:30	20.0	35.5	24.9	73.0	
20:18:00	19.6	35.8	24.5	73.5	
20:18:30	19.3	36.0	24.1	73.9	
20:19:00	19.1	36.3	23.9	74.5	
20:19:30	19.9	35.4	24.9	72.6	
20:20:00	20.5	34.0	25.6	69.8	
20:20:30	19.9	35.6	24.8	73.1	
20:21:00	20.9	34.1	26.2	70.1	
20:21:30	20.4	34.3	25.5	70.4	
20:22:00	19.3	35.8	24.1	73.5	
20:22:30	19.9	34.9	24.9	71.7	
20:23:00	21.6	33.5	27.0	68.8	
20:23:30	19.4	35.3	24.3	72.4	
20:24:00	21.5	33.3	26.9	68.4	
20:24:30	19.7	35.4	24.6	72.6	
20:25:00	20.6	33.5	25.8	68.8	
20:25:30	19.5	35.7	24.4	73.2	
20:26:00	20.3	34.4	25.4	70.6	
20:26:30	20.1	34.4	25.1	70.6	

Time	Carbon Monoxide CO (ppm)	Oxides of Nitrogen NOx (ppm)	Conversion from ppm to mg/Nm³ at Ref Conditions(273K; 101.3kPa)		Comments
			CO (mg/Nm³)	NOx (as NO_2) (mg/Nm³)	
20:27:00	20.0	34.8	24.9	71.4	
20:27:30	20.6	34.4	25.8	70.6	
20:28:00	20.2	33.5	25.2	68.7	
20:28:30	20.4	34.4	25.5	70.7	
20:29:00	19.5	34.5	24.3	70.8	
20:29:30	20.7	33.7	25.9	69.1	
20:30:00	19.5	35.3	24.4	72.4	
20:30:30	20.2	33.3	25.3	68.3	
20:31:00	19.8	34.9	24.7	71.6	
20:31:30	20.4	33.4	25.5	68.5	
20:32:00	19.1	35.1	23.9	72.0	
20:32:30	19.7	33.7	24.6	69.2	
20:33:00	20.2	33.7	25.2	69.2	
20:33:30	19.9	33.7	24.9	69.1	
20:34:00	20.0	34.5	25.0	70.9	
20:34:30	20.2	34.9	25.2	71.7	
20:35:00	20.8	32.8	26.0	67.3	
20:35:30	20.5	33.8	25.7	69.4	
20:36:00	19.6	34.7	24.5	71.2	
20:36:30	20.5	32.7	25.6	67.1	
20:37:00	19.8	34.3	24.7	70.5	
20:37:30	21.0	32.8	26.3	67.4	
20:38:00	19.6	34.8	24.5	71.5	
20:38:30	20.3	33.3	25.4	68.4	
20:39:00	20.8	33.2	26.0	68.2	
20:39:30	20.2	33.3	25.3	68.4	
20:40:00	19.3	34.7	24.1	71.3	
20:40:30	21.1	33.3	26.4	68.3	
20:41:00	20.6	33.6	25.8	68.9	
20:41:30	21.3	32.9	26.6	67.4	
20:42:00	20.3	34.2	25.4	70.2	
20:42:30	19.5	33.7	24.4	69.2	
20:43:00	20.9	33.0	26.1	67.8	
20:43:30	19.7	34.2	24.7	70.1	
20:44:00	20.0	33.6	25.0	69.0	
20:44:30	20.2	33.2	25.2	68.2	
20:45:00	20.6	33.3	25.8	68.3	
20:45:30	19.4	34.7	24.3	71.3	
20:46:00	19.8	34.1	24.8	70.1	
20:46:30	20.0	33.8	25.0	69.4	
20:47:00	21.5	32.5	26.8	66.7	
20:47:30	19.4	34.7	24.3	71.3	
20:48:00	20.6	32.7	25.8	67.2	
20:48:30	20.6	33.6	25.8	68.9	
20:49:00	19.7	34.4	24.6	70.5	
20:49:30	20.3	32.8	25.4	67.4	
20:50:00	20.3	33.6	25.4	69.0	
20:50:30	19.6	34.1	24.5	70.1	
20:51:00	20.9	32.8	26.1	67.3	
20:51:30	19.7	34.5	24.7	70.8	
20:52:00	20.3	33.1	25.4	68.0	
20:52:30	20.6	32.9	25.7	67.5	
20:53:00	19.2	34.1	24.0	70.1	
20:53:30	20.1	33.6	25.2	68.9	
20:54:00	20.0	33.1	24.9	67.9	
20:54:30	19.8	33.1	24.7	67.9	
20:55:00	20.1	33.0	25.1	67.8	
20:55:30	19.9	33.1	24.9	68.0	

Time	Carbon Monoxide CO (ppm)	Oxides of Nitrogen NOx (ppm)	Conversion from ppm to mg/Nm³ at Ref Conditions(273K; 101.3kPa)		Comments
			CO (mg/Nm³)	NOx (as NO_2) (mg/Nm³)	
20:56:00	19.8	33.1	24.8	68.0	
20:56:30	18.9	34.8	23.6	71.5	
20:57:00	21.2	32.5	26.4	66.7	
20:57:30	19.6	33.7	24.5	69.2	
20:58:00	21.6	32.4	27.0	66.4	
20:58:30	19.4	33.9	24.3	69.6	
20:59:00	21.4	32.4	26.7	66.5	
20:59:30	19.5	34.2	24.3	70.1	
21:00:00	20.9	32.0	26.1	65.7	
21:00:30	20.5	33.4	25.6	68.6	
21:01:00	19.7	33.4	24.6	68.5	
21:01:30	20.6	32.4	25.8	66.4	
21:02:00	19.3	34.2	24.2	70.1	
21:02:30	20.2	32.5	25.2	66.7	
21:03:00	19.9	32.6	24.9	66.9	
21:03:30	19.2	34.4	24.0	70.5	
21:04:00	19.5	33.0	24.4	67.8	
21:04:30	19.8	33.0	24.7	67.7	
21:05:00	19.9	33.0	24.9	67.7	
21:05:30	18.8	34.2	23.5	70.2	
21:06:00	19.0	33.8	23.7	69.4	
21:06:30	19.9	33.1	24.8	68.0	
21:07:00	20.0	32.7	24.9	67.1	
21:07:30	20.4	33.4	25.5	68.5	
21:08:00	18.9	33.5	23.6	68.8	
21:08:30	21.3	32.2	26.6	66.1	
21:09:00	19.7	34.0	24.6	69.8	
21:09:30	19.4	33.5	24.3	68.7	
21:10:00	20.5	32.2	25.6	66.2	
21:10:30	20.6	33.7	25.8	69.2	
21:11:00	20.2	32.9	25.3	67.5	
21:11:30	13.8	40.4	17.3	82.9	
21:12:00	40.7	14.5	50.9	29.8	
21:12:30	33.5	5.4	41.9	11.1	
21:13:00	35.3	10.7	44.1	21.9	
21:13:30	29.9	17.5	37.4	35.9	
21:14:00	28.8	16.5	36.0	33.8	
21:14:30	29.5	15.4	36.8	31.5	
21:15:00	28.1	16.9	35.2	34.8	
21:15:30	27.5	18.4	34.3	37.8	
21:16:00	27.1	19.8	33.9	40.6	
21:16:30	26.7	19.8	33.4	40.5	
21:17:00	26.8	19.7	33.5	40.4	
21:17:30	25.6	20.7	32.0	42.6	
21:18:00	25.4	22.1	31.7	45.3	
21:18:30	26.9	20.3	33.6	41.6	
21:19:00	24.6	22.7	30.7	46.7	
21:19:30	26.0	21.1	32.5	43.3	
21:20:00	24.8	22.4	31.0	45.9	
21:20:30	26.0	21.1	32.5	43.3	
21:21:00	24.4	23.5	30.5	48.3	
21:21:30	26.2	21.8	32.8	44.7	
21:22:00	24.7	24.0	30.9	49.3	
21:22:30	25.6	21.9	32.0	45.0	
21:23:00	24.3	24.1	30.3	49.4	
21:23:30	26.8	22.0	33.5	45.1	
21:24:00	25.2	23.8	31.5	48.9	
21:24:30	27.1	22.4	33.9	46.0	

Time	Carbon Monoxide CO (ppm)	Oxides of Nitrogen NOx (ppm)	Conversion from ppm to mg/Nm³ at Ref Conditions(273K; 101.3kPa)		Comments
			CO (mg/Nm³)	NOx (as NO_2) (mg/Nm³)	
21:25:00	25.7	23.8	32.1	48.8	
21:25:30	27.8	22.0	34.7	45.2	
21:26:00	26.1	24.0	32.6	49.2	
21:26:30	26.6	23.0	33.2	47.3	
21:27:00	26.9	23.8	33.6	48.9	
21:27:30	26.0	24.5	32.5	50.3	
21:28:00	27.8	23.0	34.7	47.2	
21:28:30	26.0	23.8	32.5	48.9	
21:29:00	26.3	24.2	32.8	49.7	
21:29:30	27.5	22.6	34.4	46.5	
21:30:00	26.5	24.1	33.1	49.4	
21:30:30	26.6	24.2	33.2	49.6	
21:31:00	27.0	24.1	33.7	49.5	
21:31:30	27.4	23.0	34.2	47.2	
21:32:00	26.5	24.5	33.1	50.4	
21:32:30	26.3	24.3	32.9	49.8	
21:33:00	26.8	24.3	33.5	49.8	
21:33:30	27.7	23.0	34.6	47.3	
21:34:00	25.3	25.2	31.6	51.7	
21:34:30	27.6	23.6	34.5	48.5	
21:35:00	27.2	24.6	34.0	50.6	
21:35:30	26.8	24.1	33.5	49.5	
21:36:00	27.9	24.0	34.9	49.3	
21:36:30	26.3	24.9	32.9	51.2	
21:37:00	25.0	28.2	31.2	57.9	
21:37:30	10.9	92.5	13.6	189.8	
21:38:00	19.0	53.5	23.8	109.7	
21:38:30	30.9	39.5	38.6	81.0	
21:39:00	25.6	33.2	32.0	68.0	
21:39:30	16.2	41.8	20.2	85.7	
21:40:00	16.7	40.6	20.9	83.3	
21:40:30	17.5	38.4	21.9	78.8	
21:41:00	17.8	37.4	22.2	76.9	
21:41:30	17.2	38.1	21.5	78.1	
21:42:00	17.4	38.1	21.7	78.2	
21:42:30	18.3	36.4	22.8	74.8	
21:43:00	17.7	36.7	22.1	75.4	
21:43:30	17.5	37.2	21.9	76.4	
21:44:00	19.3	35.5	24.1	72.9	
21:44:30	17.9	36.6	22.4	75.2	
21:45:00	19.4	35.4	24.3	72.6	
21:45:30	18.5	35.9	23.1	73.7	
21:46:00	18.2	36.4	22.7	74.7	
21:46:30	18.4	35.7	23.0	73.3	
21:47:00	18.8	34.7	23.5	71.3	
21:47:30	19.0	35.4	23.7	72.6	
21:48:00	18.3	35.3	22.9	72.4	
21:48:30	18.9	35.0	23.6	71.8	
21:49:00	19.0	34.8	23.7	71.5	
21:49:30	18.8	34.8	23.5	71.4	
21:50:00	18.3	34.8	22.9	71.5	
21:50:30	18.4	35.3	23.0	72.4	
21:51:00	19.1	35.2	23.9	72.3	
21:51:30	19.3	33.7	24.1	69.1	
21:52:00	19.3	34.8	24.1	71.4	
21:52:30	18.6	34.6	23.2	71.1	
21:53:00	19.7	34.2	24.7	70.2	
21:53:30	18.6	34.9	23.3	71.7	

Time	Carbon Monoxide CO (ppm)	Oxides of Nitrogen NOx (ppm)	Conversion from ppm to mg/Nm³ at Ref Conditions(273K; 101.3kPa)		Comments
			CO (mg/Nm³)	NOx (as NO_2) (mg/Nm³)	
21:54:00	19.0	34.6	23.7	71.1	
21:54:30	18.8	34.4	23.4	70.6	
21:55:00	18.9	34.4	23.6	70.7	
21:55:30	20.4	33.4	25.4	68.6	
21:56:00	18.4	34.3	23.0	70.4	
21:56:30	20.0	34.0	24.9	69.9	
21:57:00	18.5	34.5	23.1	70.9	
21:57:30	20.2	33.3	25.3	68.4	
21:58:00	18.5	34.9	23.2	71.7	
21:58:30	19.8	33.2	24.7	68.1	
21:59:00	18.4	34.7	23.0	71.3	
21:59:30	19.0	34.0	23.7	69.8	
22:00:00	19.3	33.8	24.1	69.5	
22:00:30	19.1	34.0	23.9	69.7	
22:01:00	18.9	34.0	23.6	69.9	
22:01:30	20.5	32.8	25.6	67.3	
22:02:00	18.3	34.8	22.9	71.4	
22:02:30	20.8	32.9	26.0	67.6	
22:03:00	18.8	35.0	23.5	71.8	
22:03:30	19.7	33.4	24.6	68.7	
22:04:00	19.9	33.6	24.9	68.9	
22:04:30	18.8	34.8	23.5	71.4	
22:05:00	20.2	32.9	25.2	67.4	
22:05:30	18.3	34.8	22.9	71.4	
22:06:00	19.6	33.3	24.6	68.4	
22:06:30	19.3	33.3	24.1	68.3	
22:07:00	18.7	34.8	23.3	71.5	
22:07:30	19.0	33.9	23.8	69.6	
22:08:00	18.9	33.8	23.6	69.4	
22:08:30	20.2	33.0	25.3	67.7	
22:09:00	19.2	33.2	24.0	68.2	
22:09:30	19.5	34.1	24.4	69.9	
22:10:00	19.5	33.2	24.3	68.2	
22:10:30	20.5	33.4	25.6	68.5	
22:11:00	18.6	34.5	23.3	70.9	
22:11:30	19.9	32.8	24.8	67.2	
22:12:00	19.3	34.2	24.1	70.1	
22:12:30	20.0	32.8	25.0	67.3	
22:13:00	18.6	34.5	23.3	70.8	
22:13:30	19.4	33.2	24.3	68.2	
22:14:00	19.2	33.0	24.0	67.8	
22:14:30	19.5	33.1	24.4	68.0	
22:15:00	19.4	33.0	24.3	67.8	
22:15:30	18.0	34.8	22.4	71.4	
22:16:00	22.7	32.3	28.4	66.3	
22:16:30	18.9	34.3	23.6	70.4	
22:17:00	13.8	40.8	17.2	83.6	
22:17:30	36.8	13.1	45.9	27.0	
22:18:00	29.5	5.6	36.8	11.5	
22:18:30	33.0	11.1	41.2	22.8	
22:19:00	29.3	17.9	36.6	36.7	
22:19:30	28.7	16.8	35.9	34.5	
22:20:00	28.8	15.5	35.9	31.9	
22:20:30	28.6	17.1	35.7	35.1	
22:21:00	28.0	18.5	35.0	38.0	
22:21:30	27.4	19.4	34.3	39.8	
22:22:00	27.3	19.7	34.1	40.5	
22:22:30	25.5	21.6	31.8	44.4	

Time	Carbon Monoxide CO (ppm)	Oxides of Nitrogen NOx (ppm)	Conversion from ppm to mg/Nm³ at Ref Conditions(273K; 101.3kPa)		Comments
			CO (mg/Nm³)	NOx (as NO_2) (mg/Nm³)	
22:23:00	26.4	20.4	33.0	41.8	
22:23:30	25.9	21.0	32.4	43.2	
22:24:00	26.0	21.8	32.5	44.8	
22:24:30	25.5	21.5	31.9	44.1	
22:25:00	25.3	22.8	31.7	46.7	
22:25:30	26.1	21.1	32.6	43.3	
22:26:00	24.8	23.3	31.0	47.8	
22:26:30	27.0	22.1	33.7	45.4	
22:27:00	26.6	22.2	33.3	45.6	
22:27:30	25.5	23.2	31.9	47.6	
22:28:00	25.2	23.4	31.6	48.1	
22:28:30	26.5	22.7	33.1	46.6	
22:29:00	25.7	23.0	32.2	47.2	
22:29:30	26.0	23.5	32.5	48.3	
22:30:00	26.2	23.1	32.8	47.5	
22:30:30	26.2	23.0	32.8	47.3	
22:31:00	27.3	22.5	34.2	46.3	
22:31:30	24.7	24.9	30.9	51.0	
22:32:00	28.5	22.6	35.7	46.4	
22:32:30	27.9	23.0	34.9	47.2	
22:33:00	27.3	24.1	34.1	49.4	
22:33:30	28.4	22.6	35.5	46.4	
22:34:00	26.6	25.0	33.3	51.4	
22:34:30	26.8	25.7	33.5	52.7	

TABLE 1a
ANALYSER CALIBRATIONS

Client Name: Wyndeham Heron

Combustion Gas Emissions from the Rotoman 1 Lower Dryer (23/06/08)

Half Web

Job no:

Data entered by: CM

Type of Gas		CO		NO	
Certified Calibration Values		79.3	ppm +/-2%	132.0	ppm +/-2%
Analyser	**Period**				
Horiba PG250	Before	79.9	ppm	132.1	ppm
	After	79.2	ppm	129.7	ppm

Tel: 01274 738668

E-mail:technical@envirocare.org

TABLE 1b

UNCERTAINTY OF CARBON MONOXIDE BY HORIBA

Half Web

Data entered by: CM

Reading =	22.09	ppm
Span Gas Certified Value	79.3	ppm +/-2%

Parameter	Uncertainty criteria	U	U^2
Repeatability	1% of value	0.2208658	0.048781689
Zero Drift/Lower limit of detection	3.0ppm	3	9
Span Drift	2% of value	0.4417315	0.195126757
Linearity	0.82% of valu	0.1811099	0.0328
Setting Gas Divider	0.25% of valu	0.0552164	0.003048856
Interference	2.9% of value	0.6405107	0.410254006
Span Gas	1% of span gas certified value	0.793	0.628849

Sum U^2	10.32	
Total U	3.21	ppm
95% confidence	6.42	ppm
or	**8.0**	**mg/Nm³**

Tel:01274 738668

E-mail:technical@envirocare.org

TABLE 1c

UNCERTAINTY OF OXIDES OF NITROGEN BY HORIBA

Half Web

Data entered by: CM

Reading = 30.69183445 ppm

Span Gas Certified Value 132 ppm

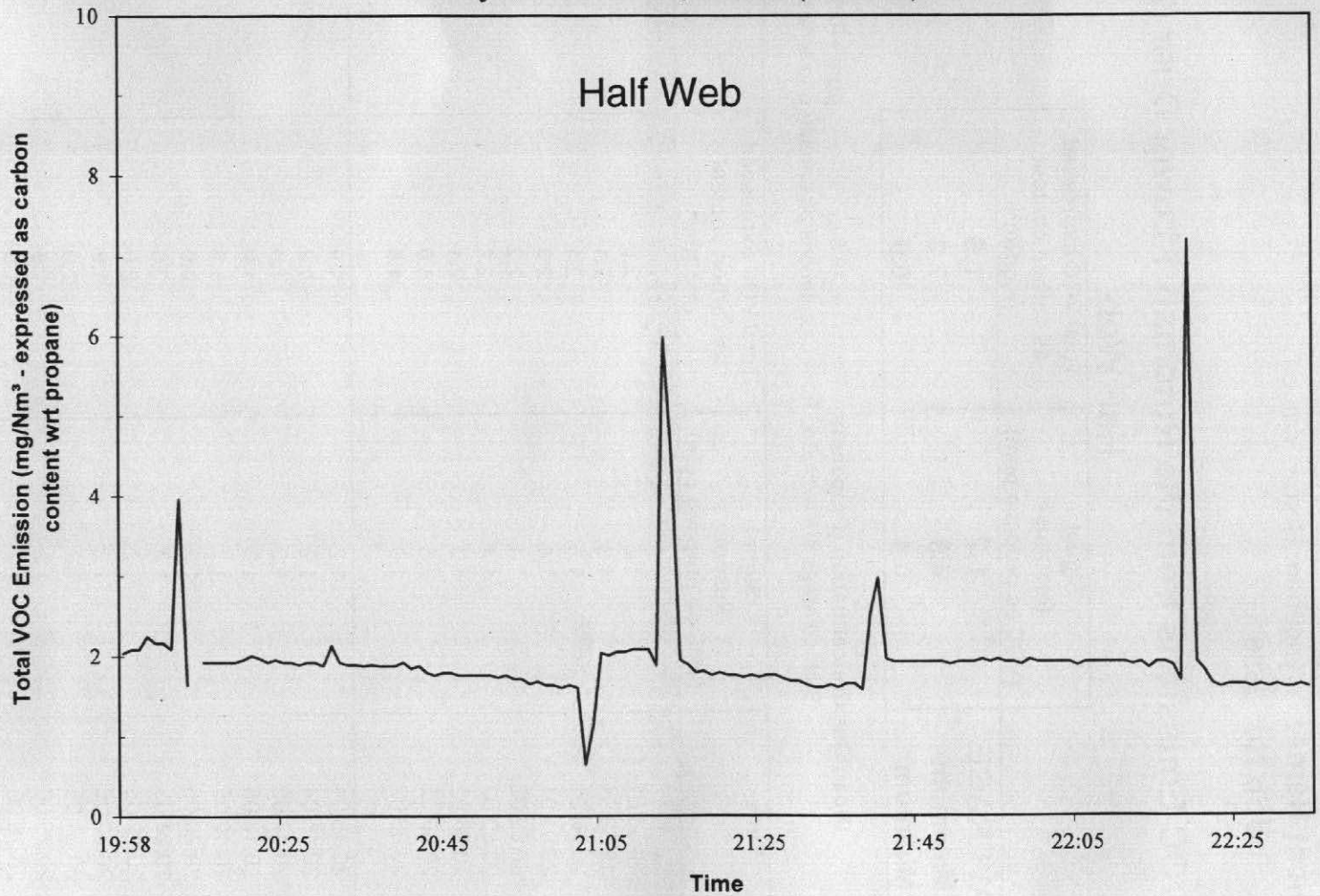
Parameter	Uncertainty criteria	U	U^2
Repeatability	1% of value	0.31	0.09
Zero Drift/Lower limit of detection	1.0ppm	1.00	1.00
Span Drift	1.9% of value	0.58	0.34
Linearity	1.12% of valu	0.34	0.12
Setting Gas Divider	0.25% of valu	0.08	0.01
Interference	1.2% of value	0.37	0.14
Span Gas	1% of span gas certified value	1.32	1.74

Sum U^2	3.4	
Total U	1.9	ppm
95% confidence	3.7	ppm
or	**7.6**	**mg/Nm³**

Tel:01274 738668

E-mail:technical@envirocare.org

Figure 2
Total VOC Emissions From Rotoman 1 Lower Drier
Wyndeham Heron, Maldon (23/06/08)



Tel: 01274 738758

E-mail:technical@envirocare.org

TABLE 2

Total Volatile Organic Compound (VOC) Emissions

Using Signal 3030PM no: Sig 1
and Heated Line no: HL4
Client Name: Wyndeham Heron, Maldon
Job No: 3556

VOC Emissions from the Rotoman 1 Lower Drier (23/06/08)

Half Web

	Signal Response (VOC as propane ppm)	Total VOC expressed as carbon content (mg/Nm³)
AVERAGE	**1.2**	**1.9**
Maximum	**4.5**	**7.2**
Minimum	**0.4**	**0.6**

Span Gas Concentration (Propane)= 19.9 **ppm +/-2%**

Shaded areas are excluded from calculations as unrelated to emissions

Time	Signal Response (VOC as propane ppm)	Total VOC expressed as carbon content (mg/Nm³)	Comments
19:58:01	1.3	**2.0**	
19:59:01	1.3	**2.1**	
20:00:01	1.3	**2.1**	
20:01:01	1.4	**2.3**	
20:02:02	1.4	**2.2**	
20:03:02	1.4	**2.2**	
20:04:02	1.3	**2.1**	
20:05:02	2.5	**4.0**	
20:06:02	1.0	**1.6**	
			Press Off
20:15:04	1.2	**1.9**	
20:16:04	1.2	**1.9**	
20:17:05	1.2	**1.9**	
20:18:05	1.2	**1.9**	
20:19:05	1.2	**1.9**	
20:20:05	1.2	**2.0**	
20:21:05	1.3	**2.0**	
20:22:05	1.2	**2.0**	
20:23:05	1.2	**1.9**	
20:24:05	1.2	**2.0**	
20:25:06	1.2	**1.9**	
20:26:06	1.2	**1.9**	
20:27:06	1.2	**1.9**	
20:28:06	1.2	**1.9**	
20:29:06	1.2	**1.9**	

Tel:01274 738668

E-mail:technical@envirocare.org

Time	Signal Response (VOC as propane ppm)	Total VOC expressed as carbon content (mg/Nm^3)	Comments
20:30:06	1.2	**1.9**	
20:31:06	1.3	**2.1**	
20:32:07	1.2	**1.9**	
20:33:07	1.2	**1.9**	
20:34:07	1.2	**1.9**	
20:35:07	1.2	**1.9**	
20:36:07	1.2	**1.9**	
20:37:07	1.2	**1.9**	
20:38:07	1.2	**1.9**	
20:39:08	1.2	**1.9**	
20:40:08	1.2	**1.9**	
20:41:08	1.2	**1.8**	
20:42:08	1.2	**1.9**	
20:43:08	1.1	**1.8**	
20:44:08	1.1	**1.8**	
20:45:08	1.1	**1.8**	
20:46:09	1.1	**1.8**	
20:47:09	1.1	**1.8**	
20:48:09	1.1	**1.8**	
20:49:09	1.1	**1.8**	
20:50:09	1.1	**1.8**	
20:51:09	1.1	**1.8**	
20:52:09	1.1	**1.7**	
20:53:09	1.1	**1.8**	
20:54:10	1.1	**1.7**	
20:55:10	1.1	**1.7**	
20:56:10	1.0	**1.7**	
20:57:00	1.1	**1.7**	
20:58:00	1.0	**1.6**	
20:59:00	1.0	**1.6**	
21:00:00	1.0	**1.6**	
21:01:01	1.0	**1.6**	
21:02:01	1.0	**1.6**	
21:03:01	0.4	**0.6**	
21:04:01	0.7	**1.2**	
21:05:01	1.3	**2.0**	
21:06:01	1.3	**2.0**	
21:07:01	1.3	**2.1**	
21:08:02	1.3	**2.1**	
21:09:02	1.3	**2.1**	
21:10:02	1.3	**2.1**	
21:11:02	1.3	**2.1**	
21:12:02	1.2	**1.9**	
21:13:02	3.7	**6.0**	
21:14:02	2.8	**4.5**	
21:15:02	1.2	**2.0**	
21:16:03	1.2	**1.9**	
21:17:03	1.1	**1.8**	
21:18:03	1.1	**1.8**	

Tel:01274 738668

E-mail:technical@envirocare.org

Time	Signal Response (VOC as propane ppm)	Total VOC expressed as carbon content (mg/Nm^3)	Comments
21:19:03	1.1	1.8	
21:20:03	1.1	1.8	
21:21:03	1.1	1.8	
21:22:03	1.1	1.8	
21:23:04	1.1	1.7	
21:24:04	1.1	1.8	
21:25:04	1.1	1.7	
21:26:04	1.1	1.8	
21:27:04	1.1	1.8	
21:28:04	1.1	1.7	
21:29:04	1.1	1.7	
21:30:04	1.1	1.7	
21:31:05	1.0	1.6	
21:32:05	1.0	1.6	
21:33:05	1.0	1.6	
21:34:05	1.0	1.6	
21:35:05	1.0	1.6	
21:36:05	1.0	1.7	
21:37:05	1.0	1.7	
21:38:05	1.0	1.6	
21:39:06	1.6	2.5	
21:40:06	1.9	3.0	
21:41:06	1.2	2.0	
21:42:06	1.2	1.9	
21:43:06	1.2	1.9	
21:44:06	1.2	1.9	
21:45:06	1.2	1.9	
21:46:06	1.2	1.9	
21:47:07	1.2	1.9	
21:48:07	1.2	1.9	
21:49:07	1.2	1.9	
21:50:07	1.2	1.9	
21:51:07	1.2	1.9	
21:52:07	1.2	1.9	
21:53:07	1.2	2.0	
21:54:07	1.2	1.9	
21:55:08	1.2	2.0	
21:56:08	1.2	1.9	
21:57:08	1.2	1.9	
21:58:08	1.2	1.9	
21:59:08	1.2	2.0	
22:00:08	1.2	1.9	
22:01:08	1.2	1.9	
22:02:09	1.2	1.9	
22:03:09	1.2	1.9	
22:04:10	1.2	1.9	
22:05:10	1.2	1.9	
22:06:10	1.2	1.9	
22:07:00	1.2	1.9	

Tel:01274 738668

E-mail:technical@envirocare.org

Time	Signal Response (VOC as propane ppm)	Total VOC expressed as carbon content (mg/Nm^3)	Comments
22:08:00	1.2	1.9	
22:09:00	1.2	1.9	
22:10:00	1.2	1.9	
22:11:01	1.2	1.9	
22:12:01	1.2	1.9	
22:13:01	1.2	1.9	
22:14:01	1.2	1.8	
22:15:01	1.2	1.9	
22:16:01	1.2	1.9	
22:17:01	1.2	1.9	
22:18:02	1.1	1.7	
22:19:02	4.5	7.2	
22:20:02	1.2	1.9	
22:21:02	1.1	1.8	
22:22:02	1.0	1.7	
22:23:02	1.0	1.6	
22:24:02	1.0	1.6	
22:25:03	1.0	1.6	
22:26:03	1.0	1.6	
22:27:03	1.0	1.6	
22:28:03	1.0	1.6	
22:29:03	1.0	1.6	
22:30:03	1.0	1.6	
22:31:03	1.0	1.6	
22:32:03	1.0	1.6	
22:33:04	1.0	1.6	
22:34:04	1.0	1.6	

Tel:01274 738668

E-mail:technical@envirocare.org

TABLE 2a

UNCERTAINTY OF VOC BY SIGNAL 1

Client Name: Wyndeham Heron, Maldon
Job No: 3556
VOC Emissions from the Rotoman 1 Lower Drier (23/06/08)
Half Web

Reading = 1.2 ppm as C3H8
Span Gas= 19.9 ppm +/2%

Parameter	Uncertainty criteria	U	U^2
Repeatability	1% of value	0.012	0.000144
Zero Drift/ Detection	1.8ppm	1.8	3.24
Noise	0.1 ppm	0.1	0.01
Linearity	0.8% of value	0.0096	9.22E-05
Setting Gas Divider	3% of value	0.036	0.001296
Temperature Drift	1% of value	0.012	0.000144
Span Gas	2% of Value	0.398	0.158404

Sum U^2	3.41

Total U	1.85	ppm

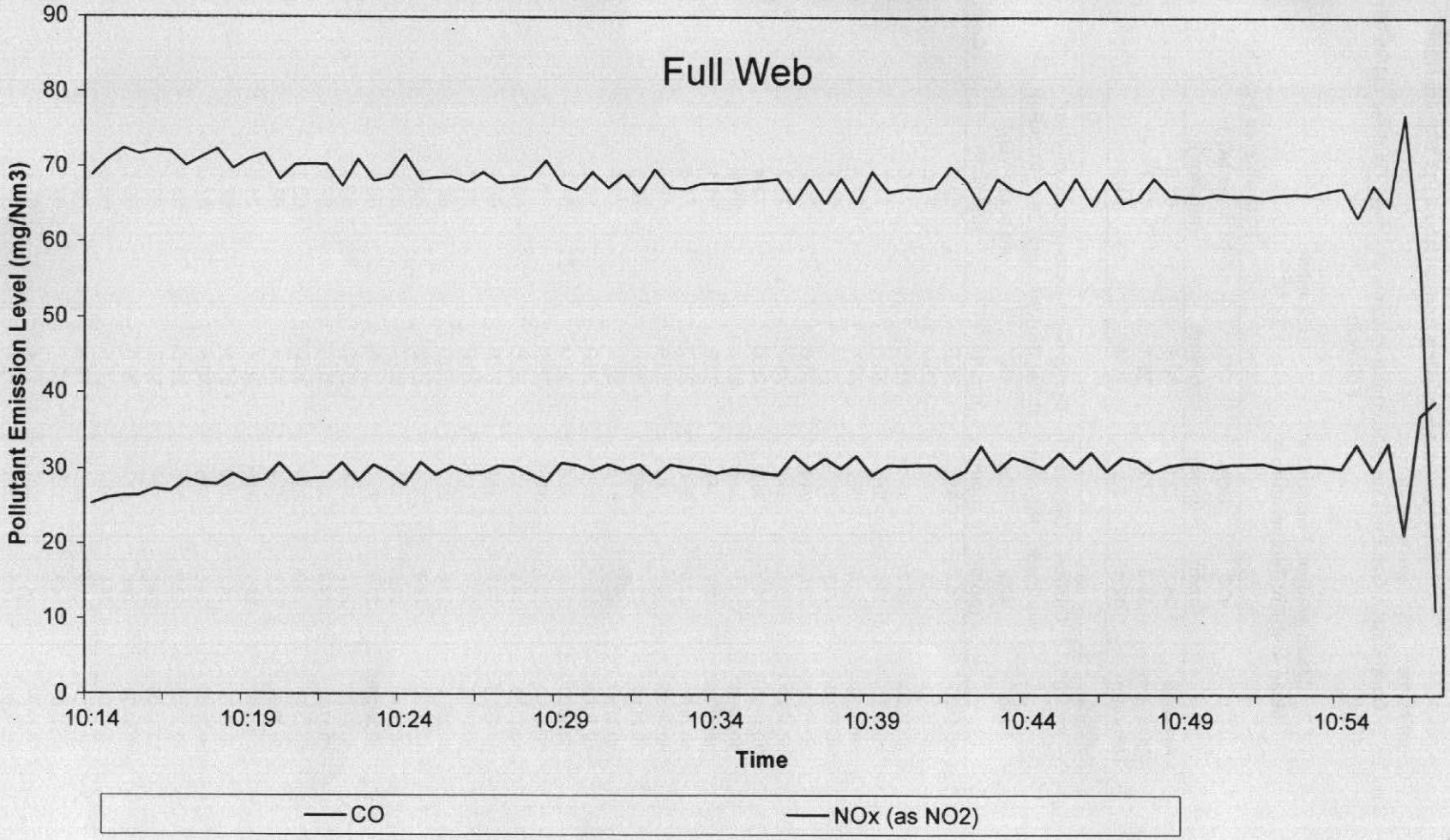
95% confidenc	3.69	ppm as C3H8

or 5.9 mg/Nm³ as carbon

Tel:01274 738668

E-mail:technical@envirocare.org

Figure 3
Combustion Gas Emissions from Rotoman 1 Lower Oxidiser
Wyndeham Heron, Maldon (24/06/08)



Tel: 01274 738668 E-mail: technical@envirocare.org Fax: 01274 738758

TABLE 3

Gaseous Analysis using Horiba (Model PG 250) Analyser

Client Name: Wyndeham Heron

Combustion Gas Emissions from the Rotoman 1 Lower Oxidiser (24/06/08)

Full Web

Mean Ambient Pressure = 1022 **mbar** **Job no:** **3556**

Mean Ambient Temperature = 29 **°C**

Data entered by: CM

	CO (ppm)	NOx (ppm)	CO (mg/Nm³)	NOx (as NO_2) (mg/Nm³)
Average	**24.1**	**32.9**	**30.1**	**67.5**
Maximum	**31.3**	**37.6**	**39.1**	**77.1**
Minimum	**17.1**	**5.5**	**21.4**	**11.2**

Time	Carbon Monoxide CO (ppm)	Oxides of Nitrogen NOx (ppm)	Conversion from ppm to mg/Nm³ at Ref Conditions(273K; 101.3kPa) CO (mg/Nm³)	NOx (as NO_2) (mg/Nm³)	Comments
10:14:30	20.4	33.5	25.5	68.9	
10:15:00	20.9	34.6	26.2	71.0	
10:15:30	21.2	35.3	26.5	72.5	
10:16:00	21.2	34.9	26.5	71.7	
10:16:30	21.9	35.2	27.4	72.3	
10:17:00	21.7	35.1	27.2	72.1	
10:17:30	23.0	34.2	28.8	70.2	
10:18:00	22.5	34.8	28.1	71.3	
10:18:30	22.4	35.3	28.0	72.4	
10:19:00	23.5	34.0	29.4	69.8	
10:19:30	22.7	34.6	28.3	71.1	
10:20:00	22.9	35.0	28.7	71.8	
10:20:30	24.7	33.3	30.9	68.4	
10:21:00	22.9	34.3	28.6	70.3	
10:21:30	23.1	34.3	28.8	70.4	
10:22:00	23.2	34.3	28.9	70.4	
10:22:30	24.7	32.8	30.9	67.4	
10:23:00	22.8	34.6	28.5	71.1	
10:23:30	24.5	33.2	30.6	68.2	
10:24:00	23.6	33.4	29.5	68.6	
10:24:30	22.4	34.9	28.0	71.7	
10:25:00	24.8	33.3	31.0	68.4	
10:25:30	23.4	33.4	29.3	68.6	
10:26:00	24.3	33.5	30.4	68.8	
10:26:30	23.7	33.1	29.6	68.0	
10:27:00	23.7	33.8	29.6	69.3	
10:27:30	24.4	33.1	30.5	67.9	
10:28:00	24.3	33.2	30.3	68.1	
10:28:30	23.5	33.4	29.4	68.5	
10:29:00	22.7	34.6	28.4	71.0	
10:29:30	24.7	33.0	30.9	67.8	
10:30:00	24.5	32.6	30.6	67.0	
10:30:30	23.9	33.8	29.8	69.4	
10:31:00	24.6	32.8	30.7	67.3	
10:31:30	24.0	33.7	30.0	69.1	
10:32:00	24.6	32.4	30.8	66.6	
10:32:30	23.2	34.0	29.0	69.8	
10:33:00	24.5	32.8	30.7	67.3	
10:33:30	24.3	32.7	30.4	67.2	
10:34:00	24.1	33.1	30.1	67.9	
10:34:30	23.7	33.1	29.6	67.9	
10:35:00	24.0	33.1	30.1	67.9	
10:35:30	23.9	33.2	29.9	68.2	

Time	Carbon Monoxide CO (ppm)	Oxides of Nitrogen NOx (ppm)	Conversion from ppm to mg/Nm³ at Ref Conditions(273K; 101.3kPa)		Comments
			CO (mg/Nm³)	NOx (as NO_2) (mg/Nm³)	
10:36:00	23.7	33.3	29.6	68.3	
10:36:30	23.5	33.4	29.4	68.5	
10:37:00	25.6	31.8	32.0	65.2	
10:37:30	24.1	33.4	30.1	68.5	
10:38:00	25.2	31.8	31.5	65.3	
10:38:30	24.1	33.4	30.2	68.6	
10:39:00	25.5	31.8	31.9	65.2	
10:39:30	23.5	33.9	29.3	69.5	
10:40:00	24.5	32.5	30.6	66.8	
10:40:30	24.5	32.7	30.6	67.2	
10:41:00	24.6	32.7	30.7	67.1	
10:41:30	24.6	32.9	30.7	67.4	
10:42:00	23.2	34.2	29.0	70.2	
10:42:30	23.9	33.2	29.9	68.2	
10:43:00	26.6	31.5	33.2	64.7	
10:43:30	23.9	33.4	29.9	68.6	
10:44:00	25.4	32.7	31.7	67.1	
10:44:30	24.8	32.4	31.1	66.5	
10:45:00	24.2	33.3	30.2	68.4	
10:45:30	25.8	31.7	32.3	65.0	
10:46:00	24.2	33.4	30.3	68.7	
10:46:30	25.9	31.7	32.4	65.0	
10:47:00	23.9	33.4	29.9	68.6	
10:47:30	25.4	31.8	31.7	65.4	
10:48:00	25.0	32.2	31.3	66.0	
10:48:30	23.9	33.5	29.9	68.7	
10:49:00	24.5	32.3	30.6	66.4	
10:49:30	24.8	32.3	31.0	66.2	
10:50:00	24.8	32.2	31.0	66.1	
10:50:30	24.4	32.4	30.5	66.5	
10:51:00	24.6	32.3	30.8	66.3	
10:51:30	24.7	32.3	30.8	66.3	
10:52:00	24.8	32.2	30.9	66.1	
10:52:30	24.3	32.4	30.4	66.4	
10:53:00	24.3	32.4	30.4	66.5	
10:53:30	24.5	32.4	30.6	66.5	
10:54:00	24.4	32.6	30.5	67.0	
10:54:30	24.2	32.8	30.2	67.4	
10:55:00	26.8	30.9	33.4	63.4	
10:55:30	23.9	33.0	29.8	67.7	
10:56:00	26.9	31.6	33.6	64.9	
10:56:30	17.1	37.6	21.4	77.1	
10:57:00	29.7	27.6	37.1	56.6	
10:57:30	31.3	5.5	39.1	11.2	

TABLE 3a
ANALYSER CALIBRATIONS

Client Name: Wyndeham Heron

Combustion Gas Emissions from the Rotoman 1 Lower Dryer (24/06/08)

Full Web

Job no:

Data entered by: CM

Type of Gas		CO		NO	
Certified Calibration Values		79.3	ppm +/-2%	132.0	ppm +/-2%
Analyser	**Period**				
Horiba PG250	Before	79.8	ppm	132.4	ppm
	After	79.4	ppm	132.9	ppm

TABLE 3b

UNCERTAINTY OF CARBON MONOXIDE BY HORIBA

Full Web

Data entered by: CM

Reading =	24.07	ppm
Span Gas Certified Value	79.3	ppm +/-2%

Parameter	Uncertainty criteria	U	U^2
Repeatability	1% of value	0.2407261	0.057949033
Zero Drift/Lower limit of detection	3.0ppm	3	9
Span Drift	2% of value	0.4814521	0.231796132
Linearity	0.82% of valu	0.1973954	0.0390
Setting Gas Divider	0.25% of valu	0.0601815	0.003621815
Interference	2.9% of value	0.6981056	0.487351367
Span Gas	1% of span gas certified value	0.793	0.628849

Sum U^2	10.45	
Total U	3.23	ppm
95% confidence	6.46	ppm
or	**8.1**	**mg/Nm³**

Tel:01274 738668

E-mail:technical@envirocare.org

TABLE 3c

UNCERTAINTY OF OXIDES OF NITROGEN BY HORIBA

Full Web

Data entered by: CM

Reading = 32.87471266 ppm

Span Gas Certified Value 132 ppm

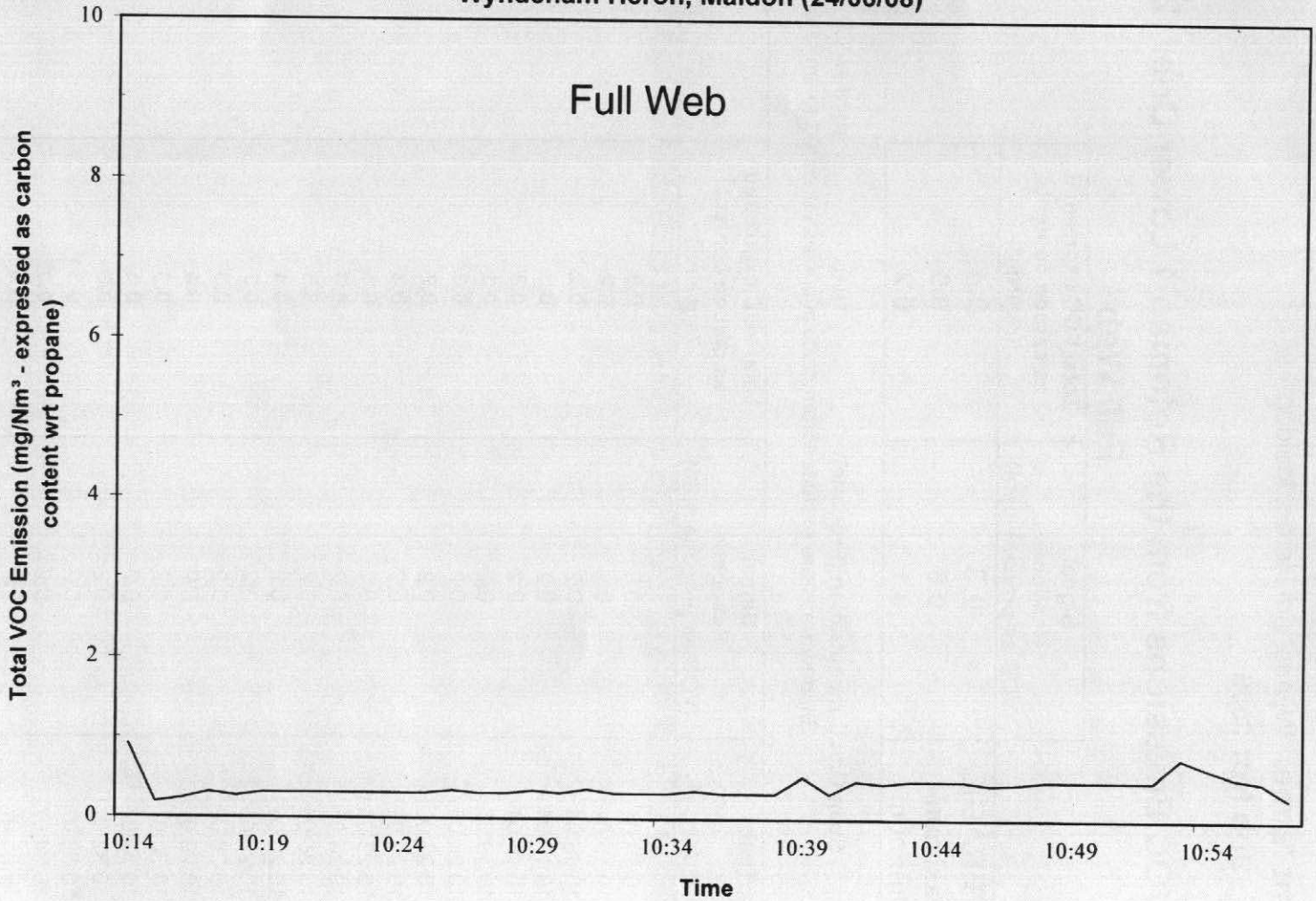
Parameter	Uncertainty criteria	U	U^2
Repeatability	1% of value	0.33	0.11
Zero Drift/Lower limit of detection	1.0ppm	1.00	1.00
Span Drift	1.9% of value	0.62	0.39
Linearity	1.12% of valu	0.37	0.14
Setting Gas Divider	0.25% of valu	0.08	0.01
Interference	1.2% of value	0.39	0.16
Span Gas	1% of span gas certified value	1.32	1.74

Sum U^2	3.5	
Total U	1.9	ppm
95% confidence	3.8	ppm
or	**7.7**	**mg/Nm³**

Tel:01274 738668

E-mail:technical@envirocare.org

Figure 4
Total VOC Emissions From Rotoman 1 Lower Drier
Wyndeham Heron, Maldon (24/06/08)



Tel: 01274 738758

E-mail:technical@envirocare.org

TABLE 4

Total Volatile Organic Compound (VOC) Emissions

Using Signal 3030PM no: Sig 1
and Heated Line no: HL4
Client Name: Wyndeham Heron, Maldon
Job No: 3556

VOC Emissions from the Rotoman 1 Lower Drier (24/06/08)

Full Web

	Signal Response (VOC as propane ppm)	Total VOC expressed as carbon content (mg/Nm³)
AVERAGE	**0.3**	**0.4**
Maximum	**0.6**	**0.9**
Minimum	**0.1**	**0.2**

Span Gas Concentration (Propane)= 19.9 **ppm +/-2%**

Shaded areas are excluded from calculations as unrelated to emissions

Time	Signal Response (VOC as propane ppm)	Total VOC expressed as carbon content (mg/Nm³)	Comments
10:14:04	0.6	**0.9**	
10:15:04	0.1	**0.2**	
10:16:04	0.2	**0.2**	
10:17:04	0.2	**0.3**	
10:18:04	0.2	**0.3**	
10:19:05	0.2	**0.3**	
10:20:05	0.2	**0.3**	
10:21:05	0.2	**0.3**	
10:22:05	0.2	**0.3**	
10:23:05	0.2	**0.3**	
10:24:05	0.2	**0.3**	
10:25:05	0.2	**0.3**	
10:26:06	0.2	**0.4**	
10:27:06	0.2	**0.3**	
10:28:06	0.2	**0.3**	
10:29:07	0.2	**0.4**	
10:30:07	0.2	**0.3**	
10:31:07	0.2	**0.4**	
10:32:07	0.2	**0.3**	
10:33:07	0.2	**0.3**	
10:34:07	0.2	**0.3**	
10:35:08	0.2	**0.4**	
10:36:08	0.2	**0.3**	
10:37:08	0.2	**0.3**	
10:38:08	0.2	**0.3**	

Tel:01274 738668

E-mail:technical@envirocare.org

Time	Signal Response (VOC as propane ppm)	Total VOC expressed as carbon content (mg/Nm^3)	Comments
10:39:08	0.3	**0.5**	
10:40:08	0.2	**0.3**	
10:41:08	0.3	**0.5**	
10:42:09	0.3	**0.5**	
10:43:09	0.3	**0.5**	
10:44:09	0.3	**0.5**	
10:45:09	0.3	**0.5**	
10:46:01	0.3	**0.4**	
10:47:01	0.3	**0.5**	
10:48:01	0.3	**0.5**	
10:49:01	0.3	**0.5**	
10:50:01	0.3	**0.5**	
10:51:01	0.3	**0.5**	
10:52:02	0.3	**0.5**	
10:53:02	0.5	**0.8**	
10:54:02	0.4	**0.6**	
10:55:02	0.3	**0.5**	
10:56:02	0.3	**0.5**	
10:57:02	0.2	**0.3**	

Tel:01274 738668

E-mail:technical@envirocare.org

TABLE 4a

UNCERTAINTY OF VOC BY SIGNAL 1

Client Name: Wyndeham Heron, Maldon
Job No: 3556
VOC Emissions from the Rotoman 1 Lower Drier (24/06/08)
Full Web

Reading = 0.4 ppm as C3H8
Span Gas= 19.9 ppm +/2%

Parameter	Uncertainty criteria	U	U^2
Repeatability	1% of value	0.004	0.000016
Zero Drift/ Detection	1.8ppm	1.8	3.24
Noise	0.1 ppm	0.1	0.01
Linearity	0.8% of value	0.0032	1.02E-05
Setting Gas Divider	3% of value	0.012	0.000144
Temperature Drift	1% of value	0.004	0.000016
Span Gas	2% of Value	0.398	0.158404

Sum U^2	3.41	
Total U	1.85	ppm
95% confidenc	3.69	ppm as C3H8

or 5.9 mg/Nm³ as carbon

Tel:01274 738668

E-mail:technical@envirocare.org