Envirocare
CONSULTANCY

Report for the Periodic Monitoring of Emissions to Air

Part 1: Executive Summary

Permit Number: Unknown

Operator: Wyndeham Heron

Installation: Printworks

2522

Monitoring dates: 1st – 2nd September

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The Bethnal Complex
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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 they have requested that Envirocare Technical Consultancy undertake a monitoring exercise on all of the thermal oxidiser abatement units and from the waste transport system compactor. The methodologies and results obtained form the basis of this report.

The 2 Rotoman presses have two print lines that run simultaneously and are located one above the other, each press has its own dryer, each with a duct exiting the dryer and emitting vertically alongside one another. The two Lithomans, each have a dedicated dryer.

Emission Point Identification

Substances to Be Monitored	Rotoman 2		Rotoman 3		Lithoman 1	Lithoman 2	Compactor
	Lower	Upper	Lower	Upper			
CO	✓	✓	✓	✓	✓	✓	
NOx	✓	✓	✓	✓	✓	✓	
SO_2	✓	✓	✓	✓	✓	✓	
VOCs	✓	✓	✓	✓	✓	✓	
Particulates							✓

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 2 Lower	CO	100	47.6	5.48	mg/Nm³	273 K, 101.3 kPa	01/09/09	15:21 – 16:41	BS EN 15058	MCERTS	Normal
	NOx	100	45.5	9.39	mg/Nm³	273 K, 101.3 kPa			BS EN 14792	MCERTS	Normal
	SO_2	N/A	8.4	11.25	mg/Nm³	273 K, 101.3 kPa			EA TGN M 21	MCERTS	Normal
	VOCs	20	6.5	0.80	mg/Nm³	273 K, 101.3 kPa			BS EN 12619	MCERTS	Normal
Rotoman 2 Upper	CO	100	54.4	5.81	mg/Nm³	273 K, 101.3 kPa		17:29 – 18:51	BS EN 15058	MCERTS	Normal
	NOx	100	58.1	9.55	mg/Nm³	273 K, 101.3 kPa			BS EN 14792	MCERTS	Normal
	SO_2	N/A	8.1	11.25	mg/Nm³	273 K, 101.3 kPa			EA TGN M 21	MCERTS	Normal
	VOCs	20	5.4	0.79	mg/Nm³	273 K, 101.3 kPa			BS EN 12619	MCERTS	Normal

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 3 Lower	CO	100	**77.8**	7.10	mg/Nm³	273 K, 101.3 kPa	02/09/09	10:04 – 11:01	BS EN 15058	MCERTS	Normal
	NOx	100	**56.9**	9.53	mg/Nm³	273 K, 101.3 kPa			BS EN 14792	MCERTS	Normal
	SO_2	N/A	**7.7**	11.25	mg/Nm³	273 K, 101.3 kPa			EA TGN M 21	MCERTS	Normal
	VOCs	20	**1.9**	0.77	mg/Nm³	273 K, 101.3 kPa			BS EN 12619	MCERTS	Normal
Rotoman 3 Upper	CO	100	**39.2**	5.11	mg/Nm³	273 K, 101.3 kPa		11:43 – 16:02	BS EN 15058	MCERTS	Normal
	NOx	100	**65.2**	9.66	mg/Nm³	273 K, 101.3 kPa			BS EN 14792	MCERTS	Normal
	SO_2	N/A	**5.4**	11.24	mg/Nm³	273 K, 101.3 kPa			EA TGN M 21	MCERTS	Normal
	VOCs	20	**1.3**	.76	mg/Nm³	273 K, 101.3 kPa			BS EN 12619	MCERTS	Normal

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
Lithoman 1	CO	100	**78.5**	6.80	mg/Nm^3	273 K, 101.3 kPa	01/09/09	15:48 – 17:50	BS EN 15058	MCERTS	Normal
	NOx	100	**69.9**	5.06	mg/Nm^3	273 K, 101.3 kPa			BS EN 14792	MCERTS	Normal
	SO_2	N/A	**5.2**	19.8	mg/Nm^3	273 K, 101.3 kPa			EA TGN M 21	MCERTS	Normal
	VOCs	20	**1.3**	0.76	mg/Nm^3	273 K, 101.3 kPa			BS EN 12619	MCERTS	Normal
Lithoman 2	CO	100	**74.9**	6.58	mg/Nm^3	273 K, 101.3 kPa	02/09/09	15:33 – 17:38	BS EN 15058	MCERTS	Normal
	NOx	100	**74.4**	5.21	mg/Nm^3	273 K, 101.3 kPa			BS EN 14792	MCERTS	Normal
	SO_2	N/A	**4.7**	19.8	mg/Nm^3	273 K, 101.3 kPa			EA TGN M 21	MCERTS	Normal
	VOCs	20	**4.6**	0.78	mg/Nm^3	273 K, 101.3 kPa			BS EN 12619	MCERTS	Normal
Compactor	Particulates	N/A	**2.05**	N/A	mg/Nm^3	273 K, 101.3 kPa	02/09/09	12:29 – 15:38	MDHS 14/3	None	Normal

1.3 Operating Information

Emission Point Reference	Date	Process Type	Process Duration	Fuel	Feedstock	Abatement	Load
Rotoman 2 Lower	01/09/09	Drying Unit	Continuous with exceptions for paper and press changes	Natural Gas	N/A	MEGTEC Summit II	Trail Magazine 45,000 cph
Rotoman 2 Upper	01/09/09	Drying Unit	Continuous with exceptions for paper and press changes	Natural Gas	N/A	MEGTEC Summit II	Travel Magazine 43,000 cph
Rotoman 3 Lower	02/09/09	Drying Unit	Continuous with exceptions for paper and press changes	Natural Gas	N/A	MEGTEC Summit II	Champions League Magazine 40,000 cph
Rotoman 3 Upper	02/09/09	Drying Unit	Continuous with exceptions for paper and press changes	Natural Gas	N/A	MEGTEC Summit II	Champions League Magazine 40,000 cph
Lithoman 1	01/09/09	Drying Unit	Continuous with exceptions for paper and press changes	Natural Gas	N/A	MEGTEC DuelDry TNV	Yachting Magazine 60,000 cph
Lithoman 2	02/09/09	Drying Unit	Continuous with exceptions for paper and press changes	Natural Gas	N/A	MEGTEC DuelDry TNV	The Spectator Unknown speed
Compactor	02/09/09	Compactor	When required	N/A	Waste paper	Bag Filter	N/A

1.4 Monitoring Deviations

Emission Point Reference		Substance Deviations	Monitoring Deviations	Other Relevant Issues
Rotoman 2	Lower	N/A	N/A	N/A
	Upper	N/A	N/A	N/A
Rotoman 3	Lower	N/A	N/A	N/A
	Upper	N/A	N/A	N/A
Lithoman 1		N/A	N/A	N/A
Lithoman 2		N/A	N/A	N/A
Compactor		N/A	N/A	N/A

Part 2: Supporting Information

2.1 Appendix 1: General Information

2.1.1 Monitoring organisation staff details

Mr Chris Mann	MCERTS Level 2 (TE1, TE2, TE3, TE4)	MM06 695
Mr David Fisher	MCERTS Level 1	MM08 963

2.1.2 Monitoring organisation method details

2.1.2.1 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 and Sulphur Dioxide, SO2 are assessed by NDIR (pneumatic) and NOx by chemiluminescence. It has an internal pump to draw a sample of the gas through the analyser at a rate of 0.4litres per minute.

Sample gases were drawn through a stainless steel 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 PTFE tube connected the output from the GPU to the input connection to the Horiba analyser.

When the instrument had warmed up (60 mins), each pollutant was zeroed by passing 100% N2 directly to the analyser. The analyser was then calibrated for each target pollutant with an appropriate calibration gas. Nitrogen was then passed directly to analyser again to ensure no zero drift. Nitrogen was then passed through the whole sampling system to ensure there were no leaks in the system (an Oxygen reading of greater than 0.1% would indicate the presence of a leak). Each calibration gas was then passed down the entire system to ensure there is no loss or absorption of the target pollutants. The measured value must be within ±2% of the calibration gas value. At the end of the test nitrogen was passed down the entire system to check the zero values and then each calibration gas was passed down to the system to check for drift. If the post test calibration value is within 2% of the calibration gas value no action is required. If the obtained value is between 2-5% of the calibration gas value the drift must be compensated for. If the drift is greater than 5% the test is invalid.

The analyser was connected to a portable laptop computer running custom EDA 2000 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. The conversion of the logged data in ppm to mg/m^3 and correction to standard conditions (273K & 101.3 kPa) was subsequently carried out for each Table. The average, maximum, and minimum values over the whole monitoring period are displayed for each parameter.

2.1.2.2 Volatile Organic Compounds (VOCs)

All emissions were monitored for total VOCs utilising a portable organic vapour analyser fitted with a flame ionisation detector (Signal 3030PM). Gases were fed into the analysers along 5 and 15 metre heated lines.

a) Calibration

When the instrument had warmed up and stabilised, it was zeroed electronically by drawing sampled air over a catalyst to remove organic species, and (if required) adjusting the analyser to read 0.0 ppm. The "CAL" button on the analyser was then pressed to set the analyser to this value.

A certified span gas, traceable to National Standards, was then fed directly to the analyser through the SPAN port. If required the value displayed on the unit was adjusted to read the certified value. The "CAL" button was then pressed to set this value. The calibration gas was then sampled down the entire sampling system to ensure no leaks, absorption or loss of pollutant. It is required that the value obtained whilst sampling down the entire system is within ±2% of the value obtained when sampling directly to the analyser.

At the end of the sampling period calibration gas was sampled down the entire system again to ensure the analyser hadn't drifted.

b) Sampling
The gaseous emissions were sampled directly from the stack, using the sampling hole in each duct, through a stainless steel probe 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.

c) Data collection
Data was collected by custom-designed Sigems data logging software (V1.8 or V1.0) at approximately 30-second intervals directly onto a laptop 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.

2.1.2.3 Particulate Monitoring

Ideally, particulate monitoring would follow the methodology described in BS EN 13284 or BS ISO 9096. However, due to the construction of the duct, specifically the absence of suitable place to locate a sampling plane, sampling of particulate matter from the waste paper compactor extract followed the requirements of MDHS 14.

Four 25mm glass fibre filters were attached to the wire mesh fastened across the duct face directly in the airstream. Each filter had been previously weighed. It was then inserted into a carrier head and attached to a sampling pump. The pump was calibrated at 2 litres per minute and then checked at the end of the test. On returning to base the filters were reweighed and the results inputted into the relevant spreadsheet in order to calculate the concentration of particulate and the mass emission rate.

2.1.2.4 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:

2.1.2.5 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.

2.1.2.6 Local Atmospheric Pressure

An aneroid barometer (Luft Model) was used to measure the atmospheric pressure on each day of monitoring.

2.2 Appendix 2 : Results and Discussion

2.2.1 Rotoman 2, Lower

Monitoring on the Lower Drier was carried out on the 1st September at 15:21 – 16:41. The average concentration of CO emitted during this time was shown to be 47.6 mg/Nm³; well below the emission limit value of 100mg/Nm³. The average concentration of NOx emitted during this time was shown to be 45.5 mg/Nm³; also well below the emission limit value of 100mg/Nm³. The average concentration of SO_2 emitted during this time was shown to be 8.4 mg/Nm³; the permit does not include an emission limit value for SO_2. The average concentration of VOCs emitted during this time was shown to be 6.5 mg/Nm³; well below the emission limit value of 20mg/Nm³.

The data collected is graphically represented in Figure 1, with further monitoring details found in Tables 1a – 1d.

2.2.2 Rotoman 2, Upper

Monitoring on the Upper Drier was carried out on the 1st September at 17:29 – 18:51. The average concentration of CO emitted during this time was shown to be 54.4 mg/Nm³; well below the emission limit value of 100mg/Nm³. The average concentration of NOx emitted during this time was shown to be 58.1 mg/Nm³; also well below the emission limit value of 100mg/Nm³. The average concentration of SO_2 emitted during this time was shown to be 8.1 mg/Nm³; as previously stated, the permit does not include an emission limit value for SO_2. The average concentration of VOCs emitted during this time was shown to be 5.4 mg/Nm³; well below the emission limit value of 20mg/Nm³.

The data collected is graphically represented in Figure 2, with further monitoring details found in Tables 1a, 1b, 2a & 2b.

2.2.3 Rotman 3, Lower

Monitoring on the Lower Drier was carried out on the 2nd September at 10:04 – 11:01. The average concentration of CO emitted during this time was shown to be 77.8 mg/Nm³; below the emission limit value of 100mg/Nm³. The average concentration of NOx emitted during this time was shown to be 56.9 mg/Nm³; comfortably below the emission limit value of 100mg/Nm³. The average concentration of SO_2 emitted during this time was shown to be 7.7 mg/Nm³. The average concentration of VOCs emitted during this time was shown to be 1.9 mg/Nm³; well below the emission limit value of 20mg/Nm³.

The data collected is graphically represented in Figure 3, with further monitoring details found in Tables 3a – 3d.

2.2.4 Rotoman 3, Upper

Monitoring on the Upper Drier was carried out on the 2nd September at 11:43 – 16:02. The average concentration of CO emitted during this time was shown to be 39.2 mg/Nm³; well below the emission limit value of 100mg/Nm³. The average concentration of NOx emitted during this time was shown to be 65.2 mg/Nm³; also well below the emission limit value of 100mg/Nm³. The average concentration of SO_2 emitted during this time was shown to be 5.4 mg/Nm³. The average concentration of VOCs emitted during this time was shown to be 1.3 mg/Nm³; well below the emission limit value of 20mg/Nm³.

The data collected is graphically represented in Figure 4, with further monitoring details found in Tables 3a, 3b, 4a & 4b.

2.2.5 Lithoman 1

Monitoring on Lithoman 1 was carried out on the 1st September at 15:48 – 17:50. The average concentration of CO emitted during this time was shown to be 78.5 mg/Nm³; below the emission limit value of 100mg/Nm³. The average concentration of NOx emitted during

this time was shown to be 69.9 mg/Nm³; also below the emission limit value of 100mg/Nm³. The average concentration of SO_2 emitted during this time was shown to be 5.2 mg/Nm³. The average concentration of VOCs emitted during this time was shown to be 1.3 mg/Nm³; well below the emission limit value of 20mg/Nm³.
The data collected is graphically represented in Figure 5, with further monitoring details found in Tables 5a – 5d.

2.2.6 Lithoman 2

Monitoring on Lithoman 2 was carried out on the 2nd September at 15:33 – 17:38. The average concentration of CO emitted during this time was shown to be 74.9 mg/Nm³; below the emission limit value of 100mg/Nm³. The average concentration of NOx emitted during this time was shown to be 74.4 mg/Nm³; also below the emission limit value of 100mg/Nm³. The average concentration of SO_2 emitted during this time was shown to be 4.7 mg/Nm³. The average concentration of VOCs emitted during this time was shown to be 4.6 mg/Nm³; well below the emission limit value of 20mg/Nm³.
The data collected is graphically represented in Figure 6, with further monitoring details found in Tables 6a – 6d.

2.2.7 Compactor

Monitoring on the Compactor was carried out for just over 3 hours on the 2nd September at 12:29 – 15:38. From the 4 tests carried out an average emission concentration of 2.05 mg/Nm³ was obtained. This low level is in line with those found in previous years. Details of this monitoring can be seen in Table 7.