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Report Date: 23rd January 2005
Report Ref: FTA 4382

UKAS TESTING
1709 Group

BROOKHOUSE PAXFORD LTD

Report on Air Emission Monitoring at

Brookhouse Paxford Ltd

Huntingdon

December 2004

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1.0 INTRODUCTION

At the request of Mr M. Hodson of Brookhouse Paxford Ltd, RPS Health, Safety and Environment conducted air emission monitoring at the Redwongs Way site, Huntingdon in December 2004.

The purpose of the monitoring programme was to provide data on emissions to atmosphere for comparison with the limits specified in the air emission criteria for this site.

1.1 Emission Criteria

Information provided by Brookhouse Paxford Ltd personnel regarding the air emission limits for this site has been included in Appendix A, Table 1 for reference purposes. It is understood that the air emission concentration limits are specified in *Huntingdonshire District Council Authorisation No. 01/02.*

All results have been referenced to conditions of 273K, 101.3kPa, without correction for moisture content.

1.2 Emission Points

During the works undertaken in December 2004 the following release points were included in the monitoring programme:

- Large Spraybake Exhaust
- Medium Spraybake Exhaust
- Small Spraybake Exhaust

2.0 MONITORING PROCEDURES

2.1 Emission Parameters

The following emission parameters were monitored during the programme of works: -

- gas flows;
- gas temperatures;
- HDI (as total NCO group excluding particulate matter);
- total particulate matter;
- total organic compounds (as total organic carbon excluding particulate matter).

2.2 Monitoring Procedures

The monitoring was carried out using the following United Kingdom Accreditation Service (UKAS) approved procedures unless otherwise stated: -

- **gas flows** were measured using a pitot tube and manometer based on the requirements of **BS 3405:1983** *Measurement of particulate emission including grit and dust (simplified method)*. (RPSCE/1/2).

- **gas temperatures** were measured using a "k" type thermocouple and temperature sensor based on the requirements of **BS 3405:1983** *Measurement of particulate emission including grit and dust (simplified method)*. (RPSCE/1/2).

- **HDI (as total NCO group excluding particulate matter)** were collected into 1-(2-methoxy phenyl piperazine) based on the requirements of **ISO 16702**. *Workplace Air Quality- Determination of total isocyanate groups in air using 1-(2-methooxyphenyl) piperazine reagent and liquid chromatography*. Analysis was by HPLC. (RPSCE/1/18).

- **total particulate matter** was measured using an Analex BNF sampling train based on the requirements of **BS 3405:1983** *Measurement of particulate emission including grit and dust (simplified method)*. Analysis was by gravimetric techniques. (RPSCE/1/6a).

- **total organic compounds (as total organic carbon excluding particulate matter)** were measured using a Flame Ionisation Detector (FID) based on the requirements of **US EPA Method 25a** (US CFR- Protection of the Environment, 40, Part 60 Appendix A *Determination of total gaseous organic concentration using a flame ionisation analyser*). (RPSCE/1/4c).

Sampling was undertaken during what was reported by Brookhouse Paxford Ltd personnel to be normal operating conditions for the Small and Medium Spraybake Processes. Due to the lack of production, sampling was carried out on the Large Spraybake Process during simulated spraying/baking conditions.

Exhaust gases were conditioned as required prior to their introduction into direct reading analysers and extractive gas sampling trains.

All analyses were undertaken by RPS Laboratories, Manchester, which is a UKAS accredited laboratory.

3.0 RESULTS

A summary table of results is displayed in Appendix A, Table 1.

Full, tabulated data from the monitoring period is displayed in Appendix B, Tables 2 to 4.

Graphical profiles of the results of volatile organic compounds can be viewed in Appendix C, Figures 1 to 3.

It is RPS Health, Safety and Environment procedure to include half of any 'less than' figure when determining a mean result.

APPENDIX A

Summary Table

Table 1

Summary Table of Emissions to Atmosphere Measured from the Specified Process Exhausts at Brookhouse Paxford Ltd, Huntingdon in December 2004

Emission Parameter	Units	Large Spraybake Exhaust	Medium Spraybake Exhaust	Small Spraybake Exhaust	Concentration Limit *
Total Particulate Matter	mg/m^3	3.0	4.1	3.2	50
TOCs (as total organic carbon excluding particulate matter)	mg/m^3	54	43	162	50 (150) #
HDI (as total NCO^- group excluding particulate matter)	mg/m^3	<0.0040	0.018	<0.0020	0.10

Notes:
Reference conditions expressed as 273 K, 101.3 kPa, without correction for moisture content.
 # 50mg/m3 applies where organic solvent consumption is > 15t / annum. 150mg/m3 applies where consumption is >5t <15t / annum.
** As expressed in Huntingdonshire District Council Authorisation No. 01/02. These limits don't apply where the coatings used comply with condition 9 of the Authorisation or where < 1t / annum of VOCs are used in any 12 month period.*

APPENDIX B

Tables of Results

Table 2

Results of Total Particulate Matter and General Emission Parameters Measured from the Specified Process Exhausts at Brookhouse Paxford Ltd, Huntingdon in December 2004

Emission Parameter	Units	Large Spraybake Exhaust	Medium Spraybake Exhaust	Small Spraybake Exhaust
Sample Date	-	22-Dec-04	21-Dec-04	22-Dec-04
Sample Period	-	14:43 – 15:28	14:05 – 15:34	11:35 – 13:04
Mean Barometric pressure	kPa	101.5	102.9	101.5
Internal area of duct	m^2	0.50	0.48	0.27
Mean Stack Temperature	°C	19	27	27
Mean Gas Velocity (as measured at sampling plane)	m/sec	11	8.1 #	9.9
Mean Volumetric Flowrate (as measured)	m^3/sec	5.4	3.9	2.7
Mean Volumetric Flowrate (at reference conditions)	m^3/sec*	5.1	3.6	2.5
Mean Total Particulate Matter Mass Emission	kg/hr	0.055	0.053	0.029
Mean Total Particulate Matter Concentration	mg/m^3*	3.0	4.1	3.2

Notes:

* *Reference conditions expressed as 273 K, 101.3 kPa, without correction for moisture content. Due to limited production only single sample runs were performed as part of the monitoring exercise. This is not in accordance with the requirements of BS 3405 : 1983.*

\# *The ratio of highest to lowest velocity flow across the duct was > 3 : 1. This is not in accordance with the requirements of BS 3405 : 1983*

Table 3

Results of HDI (as total NCO^- group excluding particulate matter) Concentrations Measured from the Specified Process Exhausts at Brookhouse Paxford Ltd, Huntingdon in December 2004

Emission Parameter	Units	Large Spraybake Exhaust
Sample Date	-	22-Dec-04
Sample Period	-	14:43 – 15:30
Mean Emission Concentration	mg/m^3	<0.0040

Emission Parameter	Units	Medium Spraybake Exhaust
Sample Date	-	21-Dec-04
Sample Period	-	14:04 – 15:34
Mean Emission Concentration	mg/m^3	0.018

Emission Parameter	Units	Small Spraybake Exhaust
Sample Date	-	22-Dec-04
Sample Period	-	11:35 – 13:04
Mean Emission Concentration	mg/m^3	<0.0020

Notes:
Reference conditions expressed as 273 K, 101.3 kPa, without correction for moisture content.
Sampling conducted during spraying and baking periods
Run duration dictated by production.

Table 4

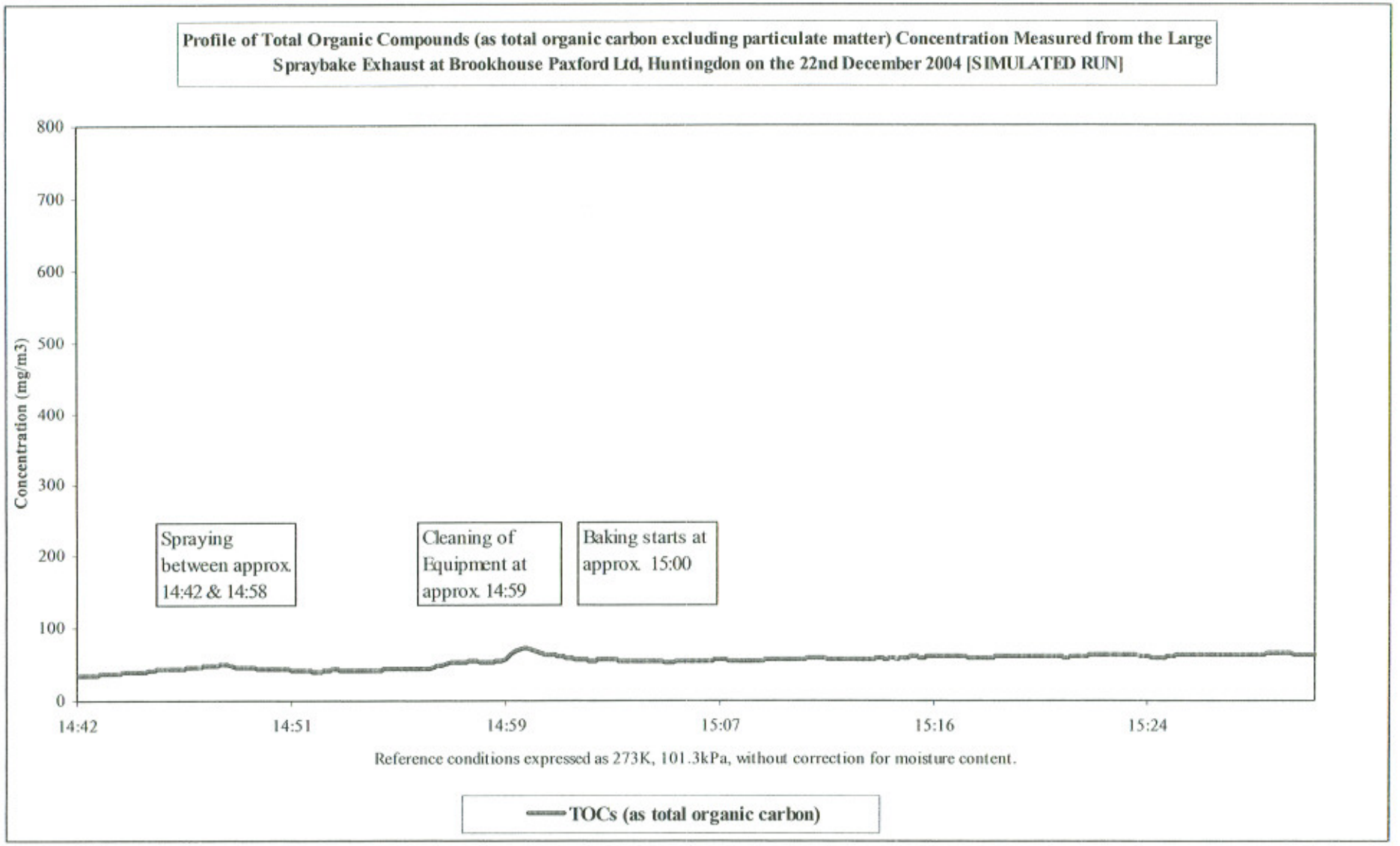
Results of Total Organic Compounds (expressed as total organic carbon excluding particulate matter) Concentration Measured from the Specified Process Exhausts at Brookhouse Paxford Ltd, Huntingdon in December 2004

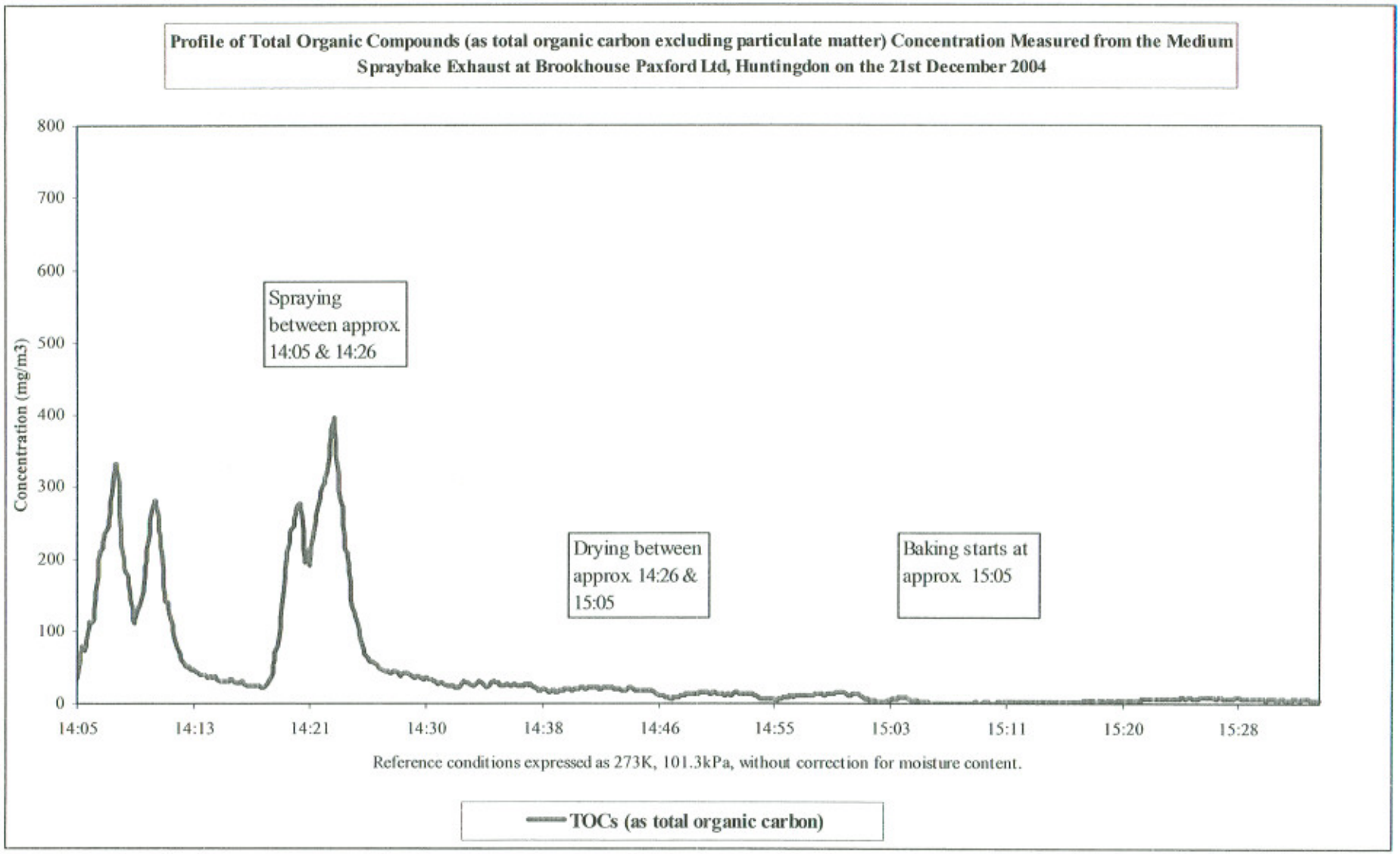
Emission Reference	Sample Date	Sample Period	Units	TOCs concentration (as total organic carbon excluding particulate matter)	
Large Spraybake Exhaust	22-Dec-04	14:42 – 15:30	mg/m^3	Maximum	73
				Mean	**54**
Medium Spraybake Exhaust	21-Dec-04	14:05 – 15:34	mg/m^3	Maximum	396
				Mean	**43**
Small Spraybake Exhaust	22-Dec-04	11:35 – 13:04	mg/m^3	Maximum	589
				Mean	**162**

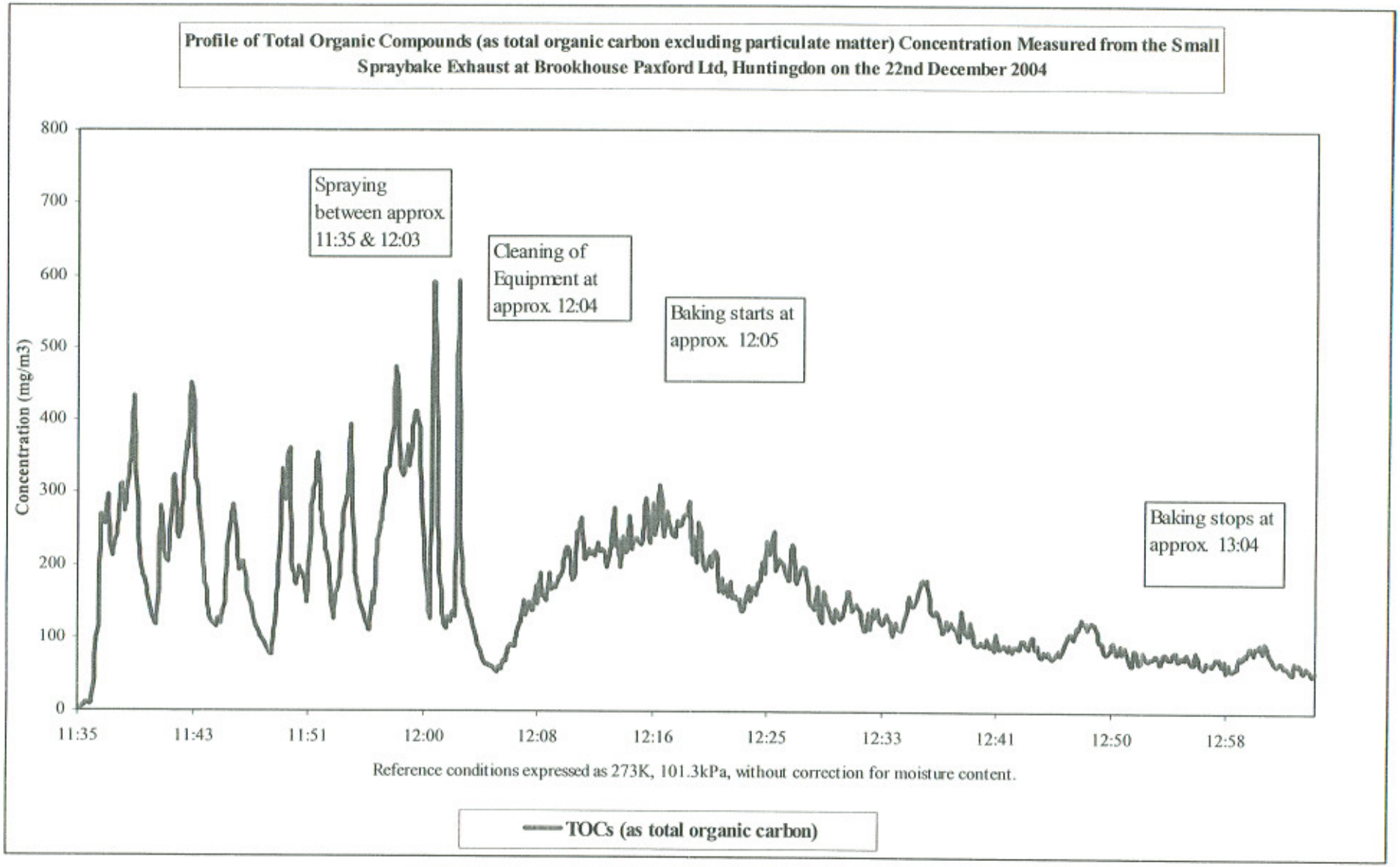
Notes:
Reference conditions expressed as 273 K, 101.3 kPa, without correction for moisture content.
Sampling conducted during spraying and baking periods.

APPENDIX C

Emission Profiles


Profile of Total Organic Compounds (as total organic carbon excluding particulate matter) Concentration Measured from the Large Spraybake Exhaust at Brookhouse Paxford Ltd, Huntingdon on the 22nd December 2004 [SIMULATED RUN]
Concentration (mg/m3)
800
700
600
500
400
300
200
100
0
Spraying between approx. 14:42 & 14:58
Cleaning of Equipment at approx. 14:59
Baking starts at approx. 15:00
14:42
14:51
14:59
15:07
15:16
15:24
Reference conditions expressed as 273K, 101.3kPa, without correction for moisture content.
TOCs (as total organic carbon)


Profile of Total Organic Compounds (as total organic carbon excluding particulate matter) Concentration Measured from the Medium Spraybake Exhaust at Brookhouse Paxford Ltd, Huntingdon on the 21st December 2004
Concentration (mg/m3)
800
700
600
500
400
300
200
100
0
Spraying between approx. 14:05 & 14:26
Drying between approx. 14:26 & 15:05
Baking starts at approx. 15:05
14:05
14:13
14:21
14:30
14:38
14:46
14:55
15:03
15:11
15:20
15:28
Reference conditions expressed as 273K, 101.3kPa, without correction for moisture content.
TOCs (as total organic carbon)


Profile of Total Organic Compounds (as total organic carbon excluding particulate matter) Concentration Measured from the Small Spraybake Exhaust at Brookhouse Paxford Ltd, Huntingdon on the 22nd December 2004
Concentration (mg/m3)
800
700
600
500
400
300
200
100
0
Spraying between approx. 11:35 & 12:03
Cleaning of Equipment at approx. 12:04
Baking starts at approx. 12:05
Baking stops at approx. 13:04
11:35
11:43
11:51
12:00
12:08
12:16
12:25
12:33
12:41
12:50
12:58
Reference conditions expressed as 273K, 101.3kPa, without correction for moisture content.
TOCs (as total organic carbon)