

**MEASUREMENT OF ENVIRONMENTAL EMISSIONS**  
**DURING**  
**SURFACE TREATMENT OF METAL**

**at**

**DUNLOP AEROSPACE BRAKING SYSTEMS**  
**HOLBROOK LANE**  
**COVENTRY**  
**WARWICKSHIRE**  
**CV6 4AA**

<b>REPORT NO:</b>	OEH/31942/STAK/SD77	<b>CLIENT REF:</b>	Order No: DABS/13104030
<b>DATE OF VISIT:</b>	5 <sup>th</sup> February 2004	<b>CONTACT ON SITE:</b>	Mr Pat Cullen
<b>DATE OF REPORT:</b>	26 February 2004	<b>DISK REFERENCE:</b>	N:\GenAdmin\$\CT\Stak- Reports\OEH31942.doc 26/02/2004 16:03

DATA PROTECTION ACT REGISTRATION NO: B0479 03 4

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## EXECUTIVE SUMMARY

### Date Of Test & Test Areas

Emissions sampling for Oxides of Nitrogen, Nitric Acid Mist and Hydrogen Fluoride from the Metal Treatment processes stack conducted on 3<sup>rd</sup> February 2004.

### Test Conditions

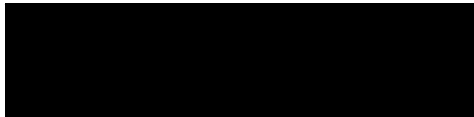
All processes were being operated under normal conditions throughout the sampling periods.

### Compliance

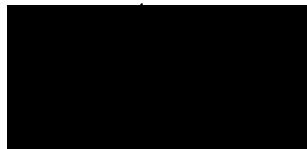
Full compliance with the authorisation was achieved during this survey.

Surveyed and Reported by:

Verified by:



Bill Roberts  
Environmental Technician



Andy Barnes *BSc (Hons)*  
Environmental Scientist

**for and on behalf of OEH Group Limited**

*If you have any queries or comments regarding this report, please contact Customer Services, OEH Group Ltd. Tel: 0121 359 5361.*

## **1 INTRODUCTION**

### **1.1 Purpose of Survey**

The aim of the survey described in this report was to verify compliance with the requirements of the Local Authority Authorisation and the relevant Process Guidance Note, PG4/1(95) – Processes for the surface treatment of metals.

### **1.2 Terms of Reference**

Dunlop Aerospace Braking Systems, Holbrook Lane, Coventry, Warwickshire, CV6 4AA, has commissioned OEH Group Limited to carry out the work described in this report. Monitoring was carried out on 3<sup>rd</sup> February 2004, by Bill Roberts, at the request of Mr Pat Cullen.

The work was carried out in accordance with OEH Proposal ref: EFH-10471, dated 28<sup>th</sup> November 2003, and the client's instructions as set out in Purchase Order DABS/13104030.

OEH Group is accredited under ISO-9002 for the provision of health, safety and environmental consultancy services. The work described in this report was carried out in accordance with our ISO-9000 Standard Operating Procedures and Level III: Consultancy Work Instructions.

The field sampling and interpretations made in this report are not covered by the scope of OEH's accreditation under UKAS.

### **1.3 Plant conditions**

Production schedules on the dates of the survey were described as normal. Thus, the data reported herein must be considered typical and representative of the environmental levels experienced during normal daily workloads on this site.

## **2 PROCESS DESCRIPTION**

Dunlop Aerospace Braking Systems carry out surface preparation and treatment of aluminium, stainless steel and titanium aviation components at their site in Holbrook Lane, Coventry. The process is prescribed by virtue of the use of nitric and hydrofluoric acids for passivation and surface etching, including de-smutting of metals.

The processes are described in detail in previous OEH Reports.

## **3 METHODS**

### **3.1 Stack Sampling**

#### **3.1.1 Stack Velocity & Temperature Measurements**

Stack velocity was investigated using an ellipsoidal nosed pitot tube coupled to an electronic manometer. Temperature measurements were taken using a K-type thermocouple connected to an electronic thermometer. The procedure is designed to fulfil the main procedural requirements of BS EN 13284: 2002 & BS EN9096: 2001 for the preliminary flow and temperature traverse and for the calculation of volumetric flow rate. The manometer and thermometer are subject to regular calibration by a UKAS accredited test house using NPL traceable standards.

### 3.1.2 Oxides of Nitrogen

Periodic extractive sampling for the oxides of nitrogen (NO, NO<sub>2</sub> & NO<sub>3</sub>) was carried out to the main procedural requirements of EPA 7A, using a pre-calibrated portable pump connected to an impinger containing a solution of sulphuric acid/ hydrogen peroxide. Analysis is by Ion Chromatography.

### 3.1.3 Nitric Acid Mist

Periodic extractive sampling for nitric acid (NO<sub>3</sub>) mist was carried out to the main procedural requirements of EPA 7A, using a pre-calibrated portable pump connected to a silica gel adsorption tube. Analysis is by Ion Chromatography.

### 3.1.4 Fluorides

Periodic extractive sampling for fluorides was conducted using a calibrated pump connected to an impinger sampling train containing solutions of 0.1N Sulphuric acid (H<sub>2</sub>SO<sub>4</sub>) and 0.1N Sodium Hydroxide (NaOH). The method is based on, and intended to satisfy the main procedural requirements of USEPA 26. Analysis is by Ion Chromatography.

## 3.2 Analysis

### 3.2.1 Techniques & Detection Limits

Analyte	Analysis Technique	Detection Limit	Analytical Precision, %	Method Reference
Oxides of Nitrogen	Colorimetry	1 µg	10	EPA 7
Nitric Acid Mist	Colorimetry	1 µg	10	EPA 7
Halogens & Halides	Ion Chromatography	1 µg	10	USEPA 26

### 3.2.2 Accreditation

Service Category	ISO-9002	UKAS <sup>1</sup>
Consultancy	Yes	No
Analysis		
- Anions; Based on Various MDHS, NIOSH, EPA & internal methods	Yes	No
<sup>1</sup> UKAS lab number 1821		
<i>Stack sampling team is a member of the Source Testing Association</i>		

#### 4 PRESENTATION OF RESULTS

The following table gives summary details of the mean emission concentrations measured for all parameters.

Sampling Position	Mean Total NO <sub>x</sub> Emission (mg.m <sup>-3</sup> )	Mean Nitric Acid Mist Emission (mg.m <sup>-3</sup> )	Mean HF Emission (mg.m <sup>-3</sup> )
Metal Treatment Stack	38.95	38.05	0.46

Results reported at Standard Conditions of 273K and 101.3kPa, no correction for water vapour content.

Appendix I of this report lists in tabular form details of the results for all parameters. For ease of interpretation, the data are classified under the following columns.

- Location of sampling and activity monitored.
- Time of sampling.
- Analyte monitored.
- Release limits, in milligrammes per cubic metre.
- Stack release concentrations, in milligrammes per cubic metre. Release data were corrected for standard temperature (273K), and pressure (101.3kPa).

Stack Parameters; Mean air velocity (m/sec), mean volume flow rate (Nm<sup>3</sup>/hr), mean temperature (°C), cross sectional area (m<sup>2</sup>).

#### 5 DISCUSSION

The processes monitored are covered, a Local Authority Authorisation and by the Secretary of States Guidance Note PG4/1(95) – Processes for the surface treatment of metals. The following emission limits apply:

Parameter	Emissions Limit
Oxides of Nitrogen	400 mg.m <sup>-3</sup> (1 hour mean)
Hydrogen Fluoride	10 mg.m <sup>-3</sup> (1 hour mean)

##### 5.1 Oxides of Nitrogen

Emission levels of total oxides of nitrogen from the stack, at an average of 38.95 mg.m<sup>-3</sup>, were significantly below the 400mg.m<sup>-3</sup> limit.

##### 5.2 Nitric Acid Mist

Emission levels of nitric acid from the stack averaged 38.05mg.m<sup>-3</sup>, and made up the major part of the total NO<sub>x</sub> emission.

##### 5.3 Hydrogen Fluoride

Emission levels from the stack, at an average of 0.46mg.m<sup>-3</sup>, were significantly below the 10 mg.m<sup>-3</sup> limit.

**6 CONCLUSIONS**

From the data reported it can be seen that the processes demonstrate compliance with the authorisation and Process Guidance Note under normal and typical workloads.

**7 APPENDICES**

Appendix I: Detailed Results Table

**APPENDIX I**  
**DETAILED RESULTS TABLE**



**RELEASE DATA FOR DUNLOP AEROSPACE BRAKING SYSTEMS**

<b>ENVIRONMENTAL RELEASE LEVELS<sup>1</sup></b>		
<b>STACK REFERENCE AND ACTIVITY MONITORED</b>	<b>Metal Treatment Stack</b>	
<b>TIME OF SAMPLING</b>	10:15 – 11:15      11:30 – 12:30	
<b>DATE OF SAMPLING</b>	3 <sup>rd</sup> February 2004	
<b>ANALYTE(S)</b>	<b>UNITS</b>	<b>RELEASE LIMIT</b>
Total Oxides of Nitrogen	mg.m <sup>-3</sup>	400
Nitric Acid Mist	mg.m <sup>-3</sup>	n/a
Hydrogen Fluoride	mg.m <sup>-3</sup>	10
<b>STACK PHYSICAL PARAMETERS</b>		
Mean Air Velocity	m/sec	± 10%      5.5
Mean Volume Flow Rate	Nm <sup>3</sup> /hr	± 10%      27799
Mean Temperature	°C	± 1%      26
Cross Sectional Area	m <sup>2</sup>	± 1%      1.540

<sup>1</sup> Release data and stack flow parameters have been corrected for standard temperature (273°K) and pressure (101.3kPa) but no correction has been made for water vapour.