ANNUAL ENVIRONMENTAL REPORT

2008

SHANNON AEROSPACE LIMITED

IPPC LICENCE NO. P0069-02

LIST OF TABLES

		Page No.
Table 1	Emission Point Reference No. S-1	8
Table 2	S1 Effluent Pump	9
Table 3	Flow Rate Compliance	9
Table 4	Organic Solvents Emission in Effluent at S-1	10
Table 5	Oils, Fats & Greases Emissions in Effluent at S-1	10
Table 6	Toxicity	10
Table 7	S-1 Non-Conformances Summary 2008	10
Table 8	SW-1 Surface Water Culvert 2008	12
Table 9	SW-1 Non-Conformances Summary	13
Table 10	Emissions to Atmosphere – Particulates	14
Table 11	Emissions to Atmosphere – TOC	14
Table 12	Emissions to Atmosphere – Chromium (VI)	15
Table 13	Air Emissions Non-Conformances Summary 2008	15
Table 14	Waste Disposal/Recovery Contract Licensing Status	17
Table 15	Wastes Arising 2008	19
Table 16	Wastes Produced 2008	22
Table 17	Waste Recovery as a Percentage	22
Table 18	Waste Management Indicators	23
Table 19	Energy and Water Consumption	25
Table 20	Environmental Incidents	26
Table 21	Complaint Type	27
Table 22	Schedule of Objectives & Targets	28

LIST OF FIGURES

Figure 1	Effluent Emission at S-1	10
Figure 2	Particulate Emissions	14
Figure 3	TOC Emissions	15
Figure 4	Waste Recovery as a Percentage	23
Figure 5	Waste Minimisation Indicators	24
Figure 6	Electricity, Gas and Kerosene Consumption	25
Figure 7	Total Energy Consumption (GJ)	25

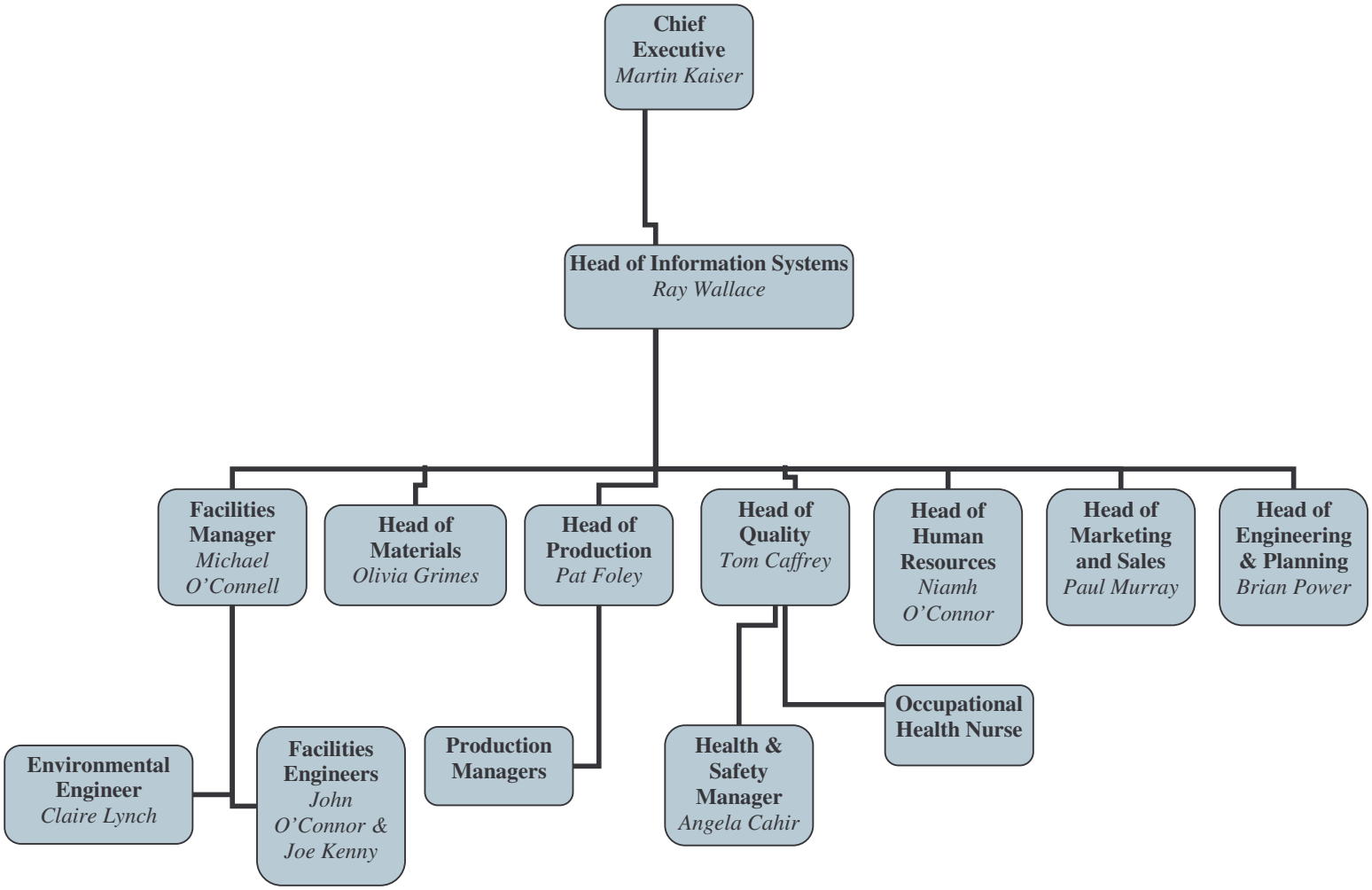
1.3 The current text of Shannon Aerospace Limited's Environmental Policy is set out below.

ENVIRONMENTAL POLICY

Shannon Aerospace Limited, providers of aircraft maintenance services, are committed to the protection and enhancement of the environment by:

- Undertaking process and production operations, which will minimise any risk to the environment and prevent pollution as far as is practically possible.
- Adhering to all relevant environmental, legislative and regulation requirements.
- Seeking to reduce waste and conserve resources through the responsible use of energy and materials.
- Seeking to reduce emissions to atmosphere and water through environmental objectives and targets.
- Promoting environmental awareness and undertaking education programmes with all employees to develop a responsibility for environmental performance.
- Communicating the policy to all interested parties and making it publicly available.

The organisational chart below outlines the environmental responsibility and reporting structure within Shannon Aerospace Limited.



August (v)	6.43	153	118	13	0.01
September	6.34	210	161	51	0.01
September (ii)	6.39	92			
September (iii)	6.65	260	126	17.3	0.07
September (iv)	6.60	128			
October	6.90	105	53	4	0.02
October (ii)	6.60	352			
October (iii)	7.53	750			
October (iv)	6.98	230			
October (v)	6.48	67			
November	6.30	515	252	29.3	<0.01
November (ii)	6.55	480			
November (iii)	7.44	148	90	12.4	0.01
November (iv)	6.96	180			
December	6.86	86	49	8	0.01
December (ii)	6.76	99	56	10.4	0.01
December (iii)	6.57	275			
December (iv)	6.65	79			

Table 2: Reference no. S-1 Effluent Pump

Parameter	Licensed Mass Emissions (Kg)	Mass Emissions 2004 (Kg)	Mass Emissions 2006 (Kg)	Mass Emissions 2007 (Kg)	Mass Emissions 2008 (Kg)	% of compliant Samples 2008
pH	---	---	---	---	---	100%
COD	65,700	8,939	10,513	11,658	9,036	94%
BOD	35,040	2,462	2,444	3,479	2,325	100%
Susp. Solids	17,520	1,081	743	754	500	100%
Ammonia (as N)	876	56	75	4	55	96%
Oils, Fats & Greases	NA	294	60	52	81	NA
Flow Rate	43,800m^3	18,415 m^3	17,754m^3	18,715m^3	21,937m^3	See Table 3

Table 3: Flow Rate Compliance

Flow Rate	2005	2006	2007	2008	% Compliance with flow rate limits 2008
1. Daily	18,415 m^3	17,754m^3	18,715 m^3	21,937 m^3	100%
2. Hourly	18,415 m^3	17,754m^3	18,715 m^3	21,937 m^3	100%

*regarding days and hours for which flow rate logger was not operational as non-conformances.

Table 7: S-1 Non-Conformances Summary 2008

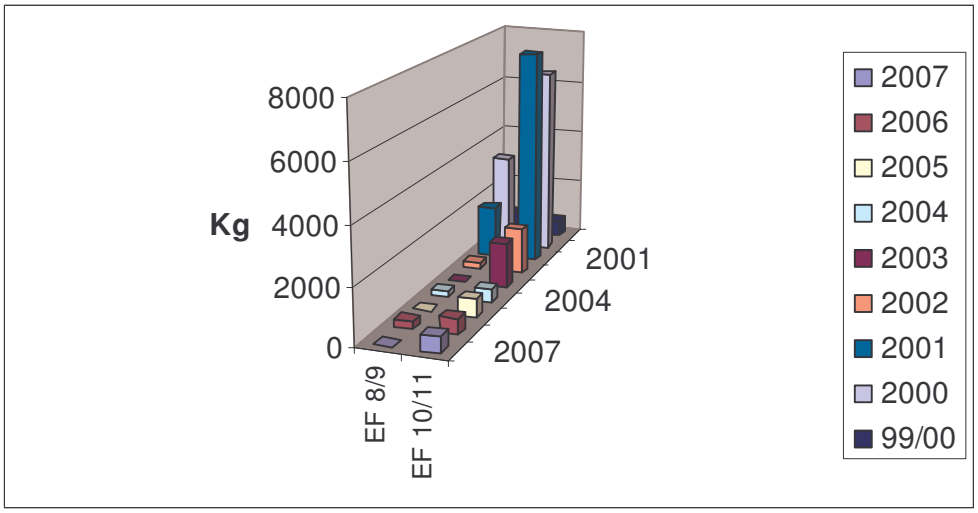
Date	Non Compliance	Cause	Corrective Action
13/02/08	COD level 1,800mg/l vs. 1,500mg/l	Cause is unknown	Drains on maintenance lines were cleaned out.
11-12/03/08	Hourly flow rate 28.32m^3/hr vs. 15m^3/hr on 11th March 2008. Hourly flow rate 15.8m^3/hr vs. 15m^3/hr on 12th March 2008.	A problem with the pump was detected on the 11-12th March 2008. During servicing of the pump, the built-up water was released altogether once power was restored.	The pump has been serviced and is now working correctly.
12/03/08	COD level 2,400mg/l vs. 1,500mg/l	Cause is unknown	As a precautionary measure, all the drains and interceptors on-site have been pumped out and thoroughly cleaned on the 7-8th April 2008.
12/03/08	Ammonia level 78.9mg/l vs. 20mg/l	Cause is unknown	
19/03/08	COD level 3,100mg/l vs. 1,500mg/l	Cause is unknown	
5/06/08	Hourly flow rate (5 of 24). Maximum exc. 39.922m^3/hr vs. 15m^3/hr Daily flow rate 247.33m^3/hr vs. 120m^3/hr.	A pump defect occurred on the 5th June 2008. This resulted in the back-up of water. During servicing of the pump, the built-up water was released altogether once power was restored.	The pump has been serviced and is now working correctly.
6/06/08	Hourly flow rate (11 of 24). Maximum exc. 41.24m^3/hr vs. 15m^3/hr. Daily flow rate 448.45m^3/hr vs. 120m^3/hr.		
7/06/08	Hourly flow rate (1 out of 24). Maximum exceedance 22.18m^3/hr vs. 15m^3/hr.		
10/10/08	Hourly flow rate (1 out of 24). Maximum exceedance 19.68m^3/hr vs. 15m^3/hr.	The pump is operated by a float-switch which became clogged. This affected the pumping of water. Once the switch was cleaned, the water that had built up over the few hours was released altogether and hence caused the hourly flow-rate exceedance.	The float-switch was cleaned and is now working correctly.

Table 9: SW-1 Non-conformances Summary*

Date	Non-compliance	Cause	Corrective Action

*Although no limits exist in Shannon Aerospace's IPPC licence, trigger levels of >100mg/l COD and for pH outside the range 6-8 are used, above which an investigation is carried out.

Figure 3: TOC Emissions



Of the air monitoring successfully carried out during January 2008 to end December 2008, the following tables summarise the non-compliances indicated.

Table 12: Emission to atmosphere – Chromium (VI)

Reference Point	Mass Emissions 2007 (Kg)	Mass Emissions 2008 (Kg)	% Compliance 2008
EF 8/9	0	0	100%
EF 10/11	0.022	0.031	100%

Table 13: Air Emissions Non-Conformances Summary 2008

Date	Non-Compliance	Cause	Corrective Action

Table 14: Waste Disposal/Recovery Contractors Licensing Status

Waste Disposal/ Recovery Contractor	Waste Permit or Waste Licence Number	Licensing Authority	Waste Type Collected
Irish Lamp Recycling	WCP/LK/057/02b	Limerick County Council*	Fluorescent lamps WEEE
Atlas Waste Oil now trading as Enva	Waste Licence 184-1 WCP/LK/052/02b	EPA Limerick County Council*	Waste oil Oil filters Cooking Oil
Shannon Environmental Services now trading as Enva	WCP/LK/026/2b Waste Licence 41-1	Limerick County Council* EPA	Hazardous Waste Waste Stripper Solvent Waste Wash-water All other hazardous waste
Returnbatt	WCP/LK/060/02b Waste Licence 105-1	Limerick County Council* EPA	Lead-acid batteries Ni-Cd Batteries Primary Household Batteries
Rilta Environmental Ltd.	WCP/LK/018/08(d) Waste Licence W0192-02	Limerick County Council* EPA	Hazardous waste
Minchem Environmental Services	WCP/LK/028/02b W0186-01	Limerick County Council* EPA	Aerosols
Transafe Limited (RD & Associates)	WCP/LK/0007/02b	Limerick County Council*	Clinical Waste from on-site medical clinic
Shred-it	WCP/LK/021/026	Limerick County Council*	Confidential paper documents
Hegarty Hammond Ltd	WCP/LK/027/02b WP WR01-2001	Limerick County Council*	Waste metal
Mr. Binman	WCP/LK/069/02b Waste Licence 61-2	Limerick County Council* EPA	General refuse Canteen waste Timber Waste Paper/cardboard
Recycling Appeal – Concern.			Laser Printer Cartridges
Aer Rianta	Regulated by the Dept. of Agriculture for the disposal of aircraft food waste	N/A	Aircraft Food Waste

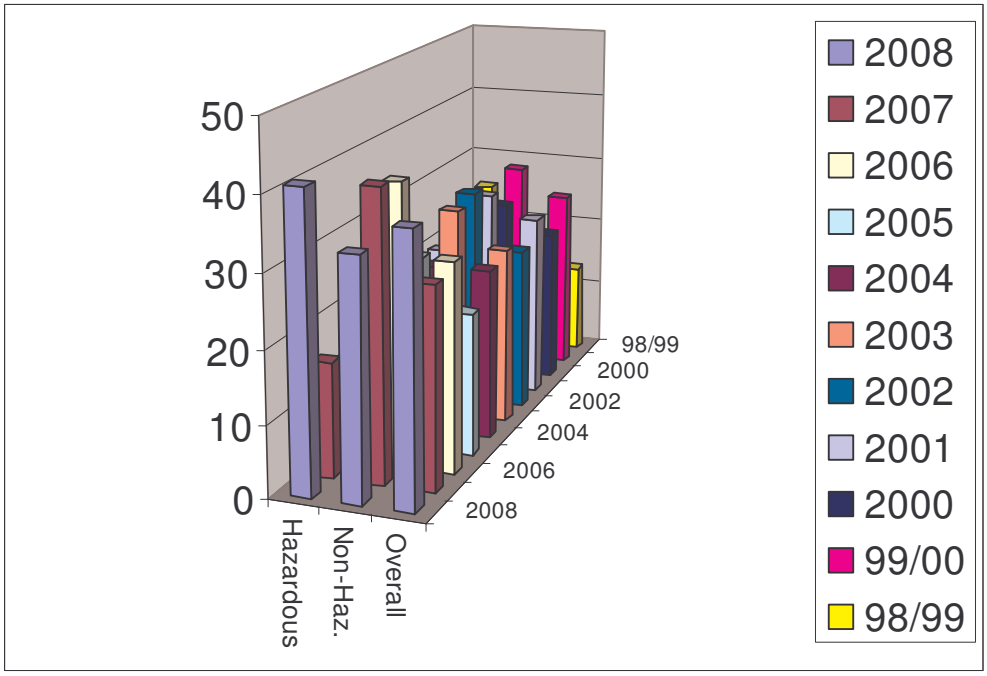
*Permitting Authorities for the purpose of the Waste Management (Collection Permit) Regulations 2001

Table 15: WASTE ARISING 2008

EWC Code								Haz Y/N	Description of waste	Quantity (Tonnes/annum)	Method of Disposal/ Recovery	Location of Disposal/Recovery	Name of Waste Disposal/Recovery Contractor (if applicable)
0	6	0	1	9	9			N	Waste Alochrome – chromium solution diluted with water	3.05	D9	b) Shannon, Co. Clare	SES
0	8	0	4	0	9			Y	Adhesives/Hardeners – out of date materials	0.407	R1	c) Lindenschmidt KG, Germany	SES
0	8	0	4	9	9			N	Dinitrol	0.55	R1	c) Lindenschmidt KG, Germany	SES
0	8	0	1	1	1			Y	Solvents/Thinners (10.4) Paint Related Material (1.358)	11.758	R2 R1	c) Lindenschmidt KG, Germany b) Shannon, Co. Clare	Soltec SES
0	8	0	1	1	3			Y	Waste stripper from aircraft strip	14.324	R1	c) Lindenschmidt KG, Germany	SES
0	8	0	1	1	9			Y	Wash Water	140	D9	b) Shannon, Co. Clare	SES
0	8	0	3	9	9			N	Laser Printer Cartridges	0.105	R5	c) Ashbourne, Co. Meath	Recycling Appeal
0	9	0	1	0	1			Y	Developer	0.2	D9	b) Shannon, Co. Clare	SES
0	9	0	1	0	4			Y	Fixer	0.2	R1	c) Lindenschmidt KG, Germany	SES
1	2	0	1	9	9			N	Sanding Dust (0.523)	0.548	R1	c) Lindenschmidt KG,	SES

EWC Code								Haz Y/N	Description of waste	Quantity (Tonnes/annum)	Method of Disposal/ Recovery	Location of Disposal/Recovery	Name of Waste Disposal/Recovery Contractor (if applicable)
1	6	0	6	0	4			N	Primary (Household) batteries	1.147	R4	b) Co. Kildare	Returnbatt Ltd.
1	8	0	1	0	1			N	Clinical Waste	0.072	D8	b) KTK Landfill, Kilcullen, Co. Kildare	RD & Associates (Transafe Limited)
0	8	0	1	2	1			Y	Unused Turco stripper	0.2		b)	
2	0	0	1	0	1			N	Paper/cardboard	47.366	R3	b) Co. Limerick	Limerick Waste Recycling Ltd. Mr. Binman
2	0	0	1	2	1			Y	Lamps and bulbs of varying length taken from aircraft when expired	0.609	R4/R5	b) Athy, Co. Kildare.	Irish Lamp Recycling Ltd.
2	0	0	1	3	5			Y	Electrical Equipment e.g. computer monitors, printers etc.	1.001	R4/R5	b) Athy, Co. Kildare.	Irish Lamp Recycling Co. Ltd.
2	0	0	1	3	8			N	Timber Waste	42.81	R5	b) Scariff, Co. Clare	Mr. Binman
2	0	0	1	4	0			N	Steel/Aluminium	23.94	R4	b) Co. Limerick	Hegarty Hammond Ltd.
2	0	0	3	0	1			N	General Refuse	234.69	D1	b) Gortnadromma Landfill, Co. Limerick b)Ballybeg, Inagh, Co. Clare	Mr. Binman

Figure 4: Waste Recovery as a Percentage



Waste Management Indicators

In previous AER's a "Gross Waste Management Indicator" (GWMI) and a "Nett Waste Management Indicator" (NWMI) based on the number of aircraft processed each year were developed. These indicators are comparable on a year by year basis and in both cases a decreasing trend is desirable.

The indicators are calculated as follows:

Gross Waste Management Indicator = $\frac{\text{Waste produced}}{\text{Number of aircraft serviced}}$

Nett Waste Management Indicator = $\frac{\text{Waste produced – waste recovered}}{\text{Number of aircraft serviced}}$

Table 18: Waste Management Indicators

	99/00	2000	2001	2002	2003	2004	2005	2006	2007	2008
Gross WMI	12.5	11.7	7.8	18.2	21.1	24.1	8.6	10.5	12.1	7.8
Nett WMI	9.2	9.2	5.7	14	15.9	17.7	6.9	7.5	8.8	4.9

3.3 Energy and Water Consumption

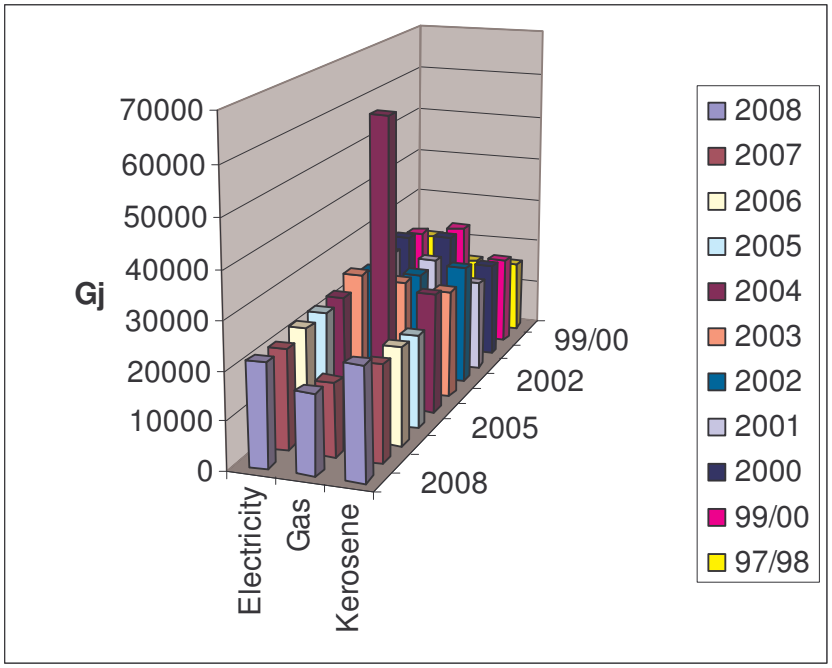
The table below outlines the consumption of energy and water resources at Shannon Aerospace.

Table 19: Energy and Water Consumption

	Electricity kWh	LPG m^3	Natural Gas m^3	Kerosene Litres	Water Supply* m^3
2007	5,995,290	88,246	24,121	556,372	21,937
Equivalent Gj	21,584	16,656	24	23,534	

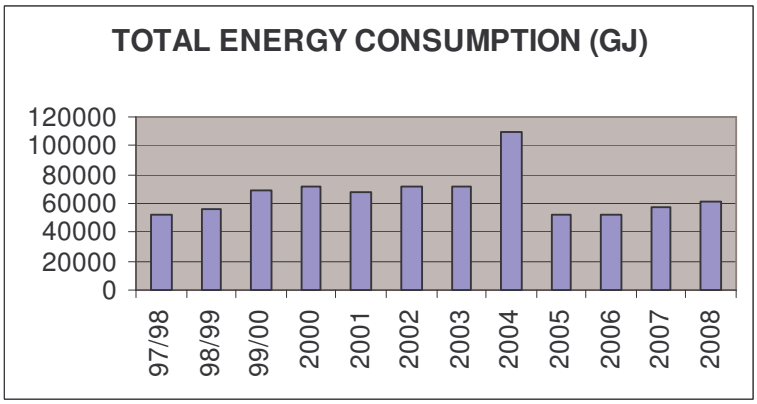
*All water in Shannon Aerospace is supplied from a municipal water source

Figure 6: Electricity, Gas and Kerosene Consumption



* Gas shows LPG and Natural Gas combined

Figure 7: Energy Consumption (Gj)



* Building no. 2 became operational during 99/00.

		pumping of water. Once the switch was cleaned, the water that had built up over the few hours was released altogether and hence caused the hourly flow-rate exceedance.	

3.4.2 Environmental Complaints

Table 21: Complaint Type

Complaint Class IPPC P0069-02	Noise	Odour	Water	Dust	Procedural	Misc.	Total
Total	1	0	0	0	0	0	1

There was 1 environmental complaint, as defined in Condition 6.11.2 of the IPPC licence, during 2008.

The complaint was received on the 10th April 2008 in relation to noise. The complainant stated that an engine run-up had taken place on the 2nd April 2008 during night-hours.

However, no engine run-ups had taken place in Shannon Aerospace on the 2nd April 2008. In fact no engine run-ups, or even aircraft arrivals or departures had taken place for the previous day or two. It is therefore believed that the noise heard by the complainant was caused by some activity occurring at Shannon Airport and not related to Shannon Aerospace activities.
Therefore, no breach of IPPC licence conditions occurred.

3.5 Summary Information

The summary information in relation to E-PRT, Annual Environmental Reports etc. has been submitted via the EPA's new web-based data reporting system. The AER/PRTR Emissions Data information is attached to this AER report as Appendix Five.

August 2006. The next review of the ELRA is due in 2009. It is planned for this review to be carried out in early 2009.

OBJECTIVE 2.5 OVERALL STATUS **Completed**
90% Completed
Timeframe 2006 - 2009

OBJECTIVE 3.11 Review BAT Note

Shannon Aerospace did not achieve compliance with the EU Solvents Directive 2007 target ratio of <2.33. Therefore the route of using "Best Available Techniques" must be followed. Shannon Aerospace, Lufthansa Technik Painting Shannon, SR Technik worked together with Akzo Nobel to produce an Irish BAT note in relation to aircraft painting processes. A review of this BAT note was carried out in 2008. It was determined that Shannon Aerospace is still in compliance with the requirements of the BAT note.

OBJECTIVE 3.11 OVERALL STATUS **Achieved**
100% complete
Timeframe 2008

OBJECTIVE 4.6 Improve control on solvents

A review of the procedures and use of solvents in the cleaning bay and in production was carried out in 2008. A number of processes and technologies were evaluated as a means to reduce solvent use and improve safety of flammable materials.

A 6S event was carried out in the Cleaning Bay in May 2008. As a result of this 6S event, a number of alterations were carried out to the layout, operations etc. A table was installed to drain white spirits while cleaning – thus reducing the amount of white spirits entering the drain. A ramp was installed to the bunded area where white spirits are kept making it much easier to place barrels on the bund. Also, a different type of pump was purchased for use with white spirits – thus reducing the risk of spillages etc. All these alterations seem to have reduced the amount of solvents used in the cleaning bay.

The use of solvents on production lines was also altered to increase the safe use of solvent, minimise health & safety risks etc. In the past, cans of solvent were distributed as needed to production staff. In the new system, solvent cans have been replaced by plunger cans – these should reduce solvent use and VOC emissions, improve fire safety etc. Also, only trained material staff fill the plunger cans. Central dispensing points have been put in place for distribution of solvents. These distribution points each have a location to leave empty plunger cans and to collect filled cans, all contained within a flammable cabinet.

OBJECTIVE 4.6 OVERALL STATUS **Achieved**
100% complete
Timeframe 2008

airframe manufacturers. Due to potential contamination and damage to aircraft structures and systems, unapproved products cannot be used on the aircraft.

Shannon Aerospace is a small non-research based organisation when viewed in the context of the global Aerospace maintenance industry, and in any case the relevant aircraft manufacturers carry out development of new products. Therefore SAL's most effective contribution is to identify and purchase those products with the lowest VOC content available, as appropriate, thereby helping to increase market demand for the development of lower VOC products.

The changeover to new products is a slow process, which involves getting manufacturers approval e.g. Boeing and Airbus. The primary development topics by aircraft and paint manufacturers at present are in water-based technologies for structural primers and lower VOC products in several special use coating applications.

In an effort to reduce costs and improve efficiency, SAL decided to implement the LEAN process. As part of this process, all processes and work activities have been identified as per LEAN methodology. This involved the mapping of all the steps involved in every process, from the initial ordering of parts to disposal of materials etc. Most of the mapping out of the steps took place in late 2005. Once this work was done, rapid improvement events (RIE's) were then carried out on different processes. A number of RIE's have been carried out in 2006 and 2007. This is still an on-going process with RIE's taking place in 2008.

OBJECTIVE 9.5 OVERALL STATUS **On-target**
67% complete
Timeframe 2010

OBJECTIVE 9.6 Prepare for implementation of the E-PRTR Regulations

The E-PRTR was established by Regulation (EC) No. 166/2006 concerning the establishment of a European Pollutant Release and Transfer Register came into force on 24th February 2006. This now requires information on pollutant emissions and waste transfers annually. On-site MSDS were evaluated to determine if any of the 91 listed pollutants were used on-site. Releases to air, water and land were then quantified. All transfers of hazardous and non-hazardous waste in 2008 have been quantified. In Mid-March 2008, the EPA launched a new web-based date reporting system for reporting E-PRTR and AER information. All AER/PRTR information for 2008 has been electronically submitted to the EPA. See Appendix Five for details of the AER/PRTR Emissions Data.

OBJECTIVE 9.6 OVERALL STATUS **Achieved**
100% complete
Timeframe 2007-2008

APPENDIX I

ENVIRONMENTAL MANAGEMENT PROGRAMME PROPOSAL FOR 2009

SECTION 2.0 ENVIRONMENTAL MANAGEMENT SYSTEMS

OBJECTIVE # 2.5
Carry out an Environmental Liabilities Risk Assessment.

REASON
Condition 12.3.2 requires that a comprehensive and fully costed Environmental Liabilities Risk Assessment (ELRA) be carried out by an independent and appropriately qualified consultant.

PROJECT METHOD

STEP	METHOD	PERSON RESPONSIBLE	DEADLINE
1	Carry out ELRA	Facilities Manager/ Environmental Engineer	JULY 2006 **DONE**
2	Submit ELRA to the EPA	Environmental Engineer	JULY 2006 **DONE**
2	Review ELRA if necessary and three years after initial agreement	Facilities Manager/ Environmental Engineer	JULY 2009

Overall responsibility for objective #2.5 Facilities Manager

Overall target date for achievement of objective #2.5 July 2009

Associated Targets		**Responsibility**	**Date**
2.5.1	Carry out ELRA	Environmental Engineer	JULY 2006 **DONE**
2.5.2	Carry out review of ELRA	Environmental Engineer	JULY 2009

SECTION 5.0 WASTE MANAGEMENT

OBJECTIVE 5.7
Waste management at Shannon Aerospace to be consistent with Irish National Targets for waste management where equivalent comparisons can be made.

REASON
This is in line with the Irish National Targets for waste management.

PROJECT METHOD

STEP	METHOD	PERSON RESPONSIBLE	DEADLINE
1	Categorise all types of waste being landfilled. [By carrying out analysis of landfilled waste etc]	Environmental Engineer	July 2009
2	Identify alternative routes and/or changes in waste management practices for the most significant contributors to landfilled waste.	Environmental Engineer	August 2009
3	Implement the necessary changes to waste management on site.	Environmental Engineer	December 2009
4	Repeat steps 1 to 3 each year until this objective has been achieved.	Environmental Engineer	2013

Overall responsibility for objective 5.7 Environmental Engineer

Overall target date for achievement of objective 5.7 Dec 2013

Associated Targets		Responsibility	Date
5.7.1	Reduce waste going to landfill by 50% over 15 years from 1998 figures	Environmental Engineer	Dec 2013
5.7.2	Reduce biodegradable wastes consigned to landfill by 65% over 15 years from 1998 figures	Environmental Engineer	Dec 2013

SECTION 5.0 WASTE MANAGEMENT

OBJECTIVE 5.12dr
Evaluate options for reducing/recycling solvent waste

REASON
To reduce the amount of solvent waste being sent off-site and also to try to set up a closed loop recycling system!

PROJECT METHOD

STEP	METHOD	PERSON RESPONSIBLE	DEADLINE
1	Evaluate current solvent waste stream	Environmental Engineer	APR 2009
2	Evaluate other solvent waste recycling/reuse options e.g. in-house recycling of solvent waste	Environmental Engineer	DEC 2009

Overall responsibility for objective 5.10.1 Environmental Engineer

Overall target date for achievement of objective 5.10.1 December 2009

Associated Targets		**Responsibility**	**Date**
5.12.1	Evaluate solvent waste stream	Environmental Engineer	DEC 2009
5.12.2	Evaluate other reuse/recycling options	Environmental Engineer	DEC 2009

SECTION 9.0 RESOURCE MINIMISATION

OBJECTIVE 9.5
Assess efficiency of use of raw materials in all processes.

REASON
Undertake an assessment of the efficiency of use of raw materials in all processes, having particular regard to the reduction in waste generated. The assessment should take account of best international practice. Shannon Aerospace is currently reviewing all processes (via LEAN methodology) in an effort to reduce raw material usage, costs, waste production etc.

PROJECT METHOD

STEP	METHOD	PERSON RESPONSIBLE	DEADLINE
1	Evaluate all processes and work activity as per LEAN methodology	LEAN Team	OCT 2005 **DONE**
1	Identify steps in the process which produce a product or service	LEAN Team	OCT 2005 **DONE**
3	Carry out value stream mapping of different processes	LEAN Team	OCT 2005 **DONE**
2	Carry out Rapid Improvement Events (RIE's)on different processes	LEAN Team/RIE Team/	DEC 2005 **DONE**
3	Carry out changes to work practices	LEAN Team/RIE Team/	DEC 2010
4	Reductions in raw material usage, if any, shall be incorporated into the Environmental Management Programme	Environmental Engineer	DEC 2010

Overall responsibility for objective 9.5 Environmental Engineer

Overall target date for achievement of objective 9.5 DEC 2010

Associated Targets		**Responsibility**	**Date**
9.5.1	Carry out Value Stream Mapping of different processes	LEAN team	DEC 2005 **DONE**
9.5.2	Carry out Rapid Improvement Events (RIE) on process areas	LEAN team/RIE teams	FEB 2006 **DONE**
9.5.3	Carry out changes to work practices	LEAN Team	DEC 2010

APPENDIX II

SOLVENT MANAGEMENT PROGRAMME 2008

CONTENTS

		Page
1.	**SUMMARY**	**46**
2.	**INTRODUCTION**	**47**
2.1	Introduction	47
2.2	Summary of achievements to date	47
3.	**COMPLIANCE WITH THE EU SOLVENTS DIRECTIVE**	**49**
3.1	Requirements for Compliance	49
3.2	Recycle and Re-use Opportunities	50
3.3	Demonstration of Compliance for SAL until 2009	51
4.	**QUANTIFYING REDUCTION IN VOC**	**53**
4.1	Evaluating VOC Reduction	53
4.2	Methodology Used and Approximations Made	53
4.3	Sources of VOC Use and Emission in 2008	54
5.	**VOC REDUCTIONS ACHIEVED**	**57**
5.1	Observed Reduction in VOC	57
5.2	The Impact of High Solids Painting Systems on VOC	58
5.3	The Impact of Low VOC Stripper	58
5.4	The Impact of High Transfer Efficiency Spray Guns	59
5.5	Future Developments in Paint Manufacture	60
6.	**FUTURE TARGETS AND OPTIONS, FOR VOC REDUCTION**	**60**
6.1	Calculation of Options for Achieving VOC Reductions by 2009	60

APPENDIX I VOC/SOLIDS RESULTS
BIBLIOGRAPHY

LIST OF TABLES

Table 1	VOC Emitted/Paint Solids used at Shannon Aerospace
Table 2	Verification of Compliance, as per Annex III of the Solvents Directive
Table 3	Comparison of Current Situation and Best Scenario for 2009
Table 4	VOC Reduction over Time
Table 5	Options for Achieving VOC Reductions by 2009

LIST OF FIGURES

Figure 1	Sources of VOC Use
Figure 2	Aircraft Repainting Process and VOC Use based on all 29 aircraft projects studied
Figure 3	VOC Reduction over Time

1. The development of new low-VOC products and technologies that satisfy manufacturer's approvals, Aviation Authority and Customer Requirements.
2. Improving General Work Practices in the Painting Department, including Minimization of, and Improved Management of, Waste Solvent and Paint
3. Substitution with lower VOC paint strippers.

Shannon Aerospace was unable to meet the 2007 targets but is still in compliance with EU legislation because it is using Best Available Technique (BAT) with regards to VOC management. Shannon Aerospace, Lufthansa Aircraft Painting Shannon and FLS Aerospace have worked in association with Akzo Nobel to produce a BAT guidance note for the Irish aerospace industry.

2. INTRODUCTION

2.1 Introduction

This solvent management plan is prepared in accordance with Condition 6.13.2 of IPPC licence no. 737 (now P0069-02). The format of this Solvent Management Plan follows the format of the solvent management plans submitted to the EPA on 5/12/2003 as part of a joint Irish Aerospace submission in relation to VOC limits etc.

2.2 Summary of achievements to date

In addition to the advances made to date, this coatings sector is undergoing rapid technological developments. The entire technology of surface preparation and finishes has undergone and will continue to undergo marked changes.

The result has been the displacement of higher hazard materials with lower hazard substitutes. The following details some of the major changes to date.

2.2.1 Strippers

A chemical stripper (Turco 5873 - containing methylene chloride) was used as the main stripper in Shannon Aerospace. In-house restrictions meant that over the past few years this stripper was used in progressively smaller quantities (approx. 10 litres) when for technical reasons alternatives wouldn't work. This compares with previous practice when such paint strippers were used in quantities of approximately 500litres per paint stripping event.

This stripper has recently been banned in Shannon Aerospace as part of a Lufthansa Group Policy on chlorinated solvents. This means that a further VOC reduction has been achieved.

The main chemical stripper now in use (Turco 6776 LO) is known as an "environmentally advantaged" product as it is less harmful to the environment than previous stripper types. This is a standard paint stripper used in European aircraft paint stripping operations.

Over the past year Shannon Aerospace has been trialling another paint stripper; Cee-Bee E-1004J. This stripper removes the paint faster at the higher

3. COMPLIANCE WITH THE EU SOLVENTS DIRECTIVE

3.1 Requirements for Compliance

The EU Solvent directive (1999/13/EC) responds to concerns surrounding the emission of VOC to the environment particularly the production of ground level photochemical pollution which can be harmful to public health and to vegetation when concentrations are high enough. (This might indeed be a relevant concern in the vicinity of Shannon airport considering the photochemical pollution from aircraft taking off and landing, and the operations of Shannon Aerospace and others).

Shannon Aerospace carried out an Air Dispersion Modelling Study in 2002 (11) to assess VOC emissions from the two paint stacks. The aim of this study was to assess maximum ground level concentrations (GLC) under different emission concentration scenarios from the stacks. The GLCs were compared with derived ambient air quality guidelines to assess the significance of each emission scenario in comparison to environmental quality objectives. The modelling study was carried out using the United States Environmental Protection Agency approved ISC3 model. The ISC3 model was selected for this project for it suitability in modelling all types of releases and the model has had widespread regulatory application throughout Europe. The study indicated that ground level concentrations of VOC were within applied environmental assessment levels (based on occupational exposure limits and German TA Luft "S" values for Class I, II and III VOCs for use in stack height determinations).

The directive gives three possibilities for an operator to achieve compliance:

3.1.1 Compliance with Emission Limit Values

The directive states that compliance with emission limit values is not the primary method of achieving VOC reduction with regards to the painting of aircraft, See Annex IIA, and article 5(3)(b).

As will be seen from the initial process description the majority of the solvent lost in stripping and painting is total loss, hence the exemption from containment. Therefore it is not clear on what percentage the reference fugitive emission should be based. Referring to Annex IIA of the Solvents Directive the reference to 20% fugitive emissions is equally covered by the exemption under footnote 4 and is not applicable in a like manner to the emission limit values. Therefore the basis of our calculations is that all solvent used in the stripping and painting process is 100% loss. Notwithstanding that fact, the industry does employ as part of a BAT approach the following general housekeeping measures to reduce other fugitive/incidental emissions:

- Close containers after use
- Use of lidded bins for wipe rags
- Only mix correct amount of paint and mix immediately prior to use
- Enclosed gun cleaning where ever practical
- Barrel stripper waste as soon as reasonably practicable after stripping has taken place.

determined however due to uncertainty surrounding quantities of VOC recycled or treated per project. Also, the VOC value for each project will depend on types of paint used etc. In order to account for this variability a pessimistic value of 200 kg VOC contained is used, which would be the worst-case scenario in relation to VOC contained.

3.3 Demonstration of Compliance for SAL until 2009

Table 2 displays the results of the 160 painting projects studied in 2002 - 2008. The categories 'O1', 'I1' etc. are those given in Annex III of the Directive. A worst possible scenario where only 200Kg of VOC is contained (recycled or incinerated offsite) per project and the rest is emitted as 'waste gas emissions' has been assumed. This means that the value for VOC emitted/ Solids used is in all likelihood lower than what is shown below.

A best possible scenario for 2009 is also given.

Shannon Aerospace is still in compliance with EU legislation because it is using Best Available Technique (BAT) with regards to VOC management. Shannon Aerospace, Lufthansa Aircraft Painting Shannon and FLS Aerospace have worked in association with Akzo Nobel to produce a BAT guidance note for the Irish aerospace industry.

Refer to Appendix II for more detailed mass balances of aircraft repainting in 2008.

Table 2 Verification of Compliance, as per Annex III of the Directive

	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**Best Scenario for 2009**
E/Solids for SAL	2.8	2.8	2.7	2.4	1.98	2.79	2.67	2.67
E/Solids Target for the Aerospace Coatings sector (As per Annex Iib)	3.5 (2005 Target)	3.5 (2005 Target)	3.5 (2005 target)	3.5 (2005 target)	2.33 (2007 target)	2.33 (2007 target)	N/A	N/A

Table 3 Comparison of Current Situation (based on 2008 figures) and Best Scenario for 2009

Values as defined in Annex III	**Current Situation**		**Best Scenario for 2009**	
	Kg	**% of Total**	**Kg**	**% of Total**
E = O1 + O2 + O3 + O4 + O9	902	82	902	82
Solids	338	-	338	-
I1 (total use)	1102	-	1102	-
I2 (internally reused/recycled)	Negligible opportunities (see section 3.1)		Negligible opportunities (see section 3.1)	

4. QUANTIFYING REDUCTION IN VOC

Based on a review of paint jobs carried out to date, it is clear that there are a large number of variables which can affect the indicators. For example, when aircraft stripping is required it can significantly increase the VOC usage purely through the requirement for the stripping product. In addition, it has been found that a number of aircraft are extremely difficult to strip due to factors such as the age of the paint job, type of paint applied, climatic conditions which can affect the VOC usage even further. Similarly an aircraft requiring a simple paint scheme (basic white) will require significantly less paint than a complex paint scheme.

4.1 Evaluating VOC Reduction

When evaluating reduction in VOC there are many possible choices of indicator. The indicator used is this report is *Mass of VOC emitted/ Mass of Solids used.* This indicator is of particular importance because it is the indicator used in the EU Solvents directive for the setting of VOC reduction targets (see Annex 1ib). It takes application method and site specific factors into account. A significant proportion of VOC used for painting is contained, and then sent off-site for recycling and treatment. The difficulty in trying to take this important consideration into account is actually in getting reliable values for the amount of Solvent/Paint VOC contained per project. A pessimistic estimate of 200kg of VOC contained per project is used, based on average estimate of yearly production of Paint/Solvent Waste.

4.2 Methodology Used and Approximations Made

The main method used to investigate the use of VOC was the analysis of 'Material Consumption Reports' for each aircraft-painting project. Some short interviews with staff in the materials and painting department were also carried out.

4.2.1 Material Consumption Reports.

Materials Consumption Reports for each project were obtained. VOC containing materials were then identified and data gathered on their VOC and Solids content from the MSDS sheets or on request from the manufacturers. The products were then assigned to process steps e.g. solvent cleaning, priming, tech wash etc. Products not used in the cleaning bay, paint shop or paint hangar were omitted (see below for reasons for this). The data was then summarized in table format for each project. All of these tables were then collated in one Excel sheet and the results were processed to extract the relevant results presented in Section 6 (VOC Reductions Achieved).

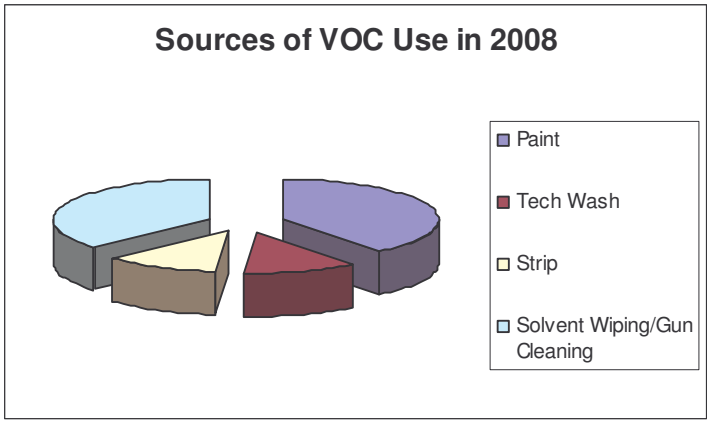
4.2.2 Approximations Made

From the initial projects studied all materials considered likely to contain ***any*** amount of VOC were included in the analysis of VOC use. Then the data was manipulated to give the following:

1. VOC use versus Product Type for each aircraft

The results showed that a large number of products had a very small VOC content (oils, sealant, resins, adhesives and fillers etc.) and that these products when combined only accounted for 0.3% of Total VOC use, or 5Kg per aircraft.

2. VOC use versus Work Location for each aircraft


Sources of VOC Use in 2008
Paint
Tech Wash
Strip
Solvent Wiping/Gun Cleaning

5. VOC REDUCTIONS ACHIEVED

5.1 Observed Reduction in VOC

Table 4 illustrates the reduction in VOC use over time at Shannon Aerospace.

An estimate of 200Kg of VOC recovered/recycled is used. In reality a greater amount of VOC would have been contained, but a conservative estimate has been used in order to err on the safe side.

Table 4 VOC Reduction over time

	Kg of VOC Emitted/Kg of Paint Solids Used (Estimates based on 200 Kg of VOC contained per project)
Baseline Situation: 1995* (estimate based on use of Turco 5873)	4.6
Situation 2: 1998 – 2001 (based on thirteen pre 2002 projects studied)	3.4
Situation 3: 2002* (based on twelve 2002 projects studied)	2.8
Situation 4: 2003* (based on ten 2003 projects studied)	2.8
Situation 4: 2004 (based on twenty-three 2004 projects studied)	2.7
Situation 4: 2005 (based on twenty-four 2005 projects studied)	2.4
Situation 5: 2006 (based on twenty-two 2006 projects studied)	1.98
Situation 5: 2007 (based on eighteen 2007 projects studied)	2.79
Situation 6: 2008 (based on twenty-nine 2009 projects studied)	2.67
EU Target for 2005	3.5
EU Target for 2007	2.33

*The figures for the baseline situation 1995 are based on estimates.

Figure 2 shows the actual VOC used /Solids used values for the individual projects studied. The wide variation between projects is due to factors such as aircraft size, whether or not a

In the past few years this stripper was used only occasionally, and in small strictly controlled quantities, and only when absolutely necessary. These restrictions were due to its negative health, safety and environmental impacts.

Since May 2003 a ban has been placed on the use of Turco 5873, due to a Lufthansa Group Policy on the use of chlorinated strippers. This switch of stripper means that a very significant VOC reduction has been achieved since a base line year of 1995.

5.3.3 Turco 6776 LO

This Stripper has a low VOC content (395 grammes per litre). Most of the VOC content is benzyl alcohol, which is only moderately volatile. It has a vapor pressure of 0.013 Kpascals at 293 K, while the EU Solvents directive defines a VOC as anything with a vapour pressure of greater than 0.01Kpascals at 293 K. Due to its moderate volatility, this compound is not necessarily all evaporated to the atmosphere if measures are put in place to contain the VOC in stripper waste. The manufacturer of this product (Henkel Surface Technologies) has indicated that the organic compounds present comprise of both highly volatile and less volatile components. It is likely that around 35-40% of the organic compounds present could be readily lost to evaporation during use, while the balance is more likely to end up incorporated into the paint waste.

The VOC content of Turco 6776 has now been reduced slightly to 21.6%.

5.3.4 Cee-Bee E-1004J

During 2008, a new paint stripper Cee-Bee E-1004J has been trialled on a number of aircraft. This paint stripper is believed to work faster at the higher temperatures required for paint stripping; this should reduce energy consumption requirements during paint stripping operations.

5.4 The Impact of High Transfer Efficiency Spray Guns

Shannon Aerospace has favoured the use of high transfer efficiency electrostatic spraying systems in the paint hangar since the commencement of operations. The electrostatic spray guns cannot be used for application of certain primers e.g. chromates and water-based paints.

The use of electrostatic spray guns minimizes over-spray (wastage of paint) and therefore reduces VOC emissions. Obviously no VOC reduction can be observed seeing as how Shannon Aerospace has never used less efficient technology, but the US EPA CTG document reports that reductions of between 10 and 50% in paint VOC have been achieved by various facilities when they switched from less efficient equipment to this technology (3).

According to an UK Guidance Note reductions of up to 38% in paint consumption are possible with high efficiency spray guns compared to conventional spray guns (9).

According to spray gun manufacturers Graco, air spray can go from 30% to 65% transfer efficiency with the use of electrostatics (13).

Some of the benefits of using electrostatic spray guns are:

- Lower material consumption
- Lower emissions and smaller amounts of paint sludge.
- Smaller air consumption – therefore lower energy demand (4).

Ability Weighting	Based upon an estimation of Shannon Aerospace's ability to achieve improvements by 2009. In some cases the ability weighting is given as a range of values in order to express uncertainty about Shannon Aerospace's ability to achieve a VOC reduction. For the purposes of this analysis: No reduction possible = 0 and 100% elimination possible = 6. The possibility of new industry developments such as the development of new products before 2009 is not considered when expressing these values. (In reality there may be developments and this would bring an added VOC reduction over that considered here.)
Option Rating	The ability weighting is multiplied by the quantity weighting to give an Option Rating for each factor. The higher the option rating, the more attractive that option is for action by SAL.

The result of the option evaluation is that two main options stand out as giving the best opportunity for achieving a reduction in VOC, (mainly in emission) and these are:

1 The development of new low-VOC products and technologies that satisfy manufacturers approvals, Aviation Authority and Customer Requirements

2 Improving General Work Practices in the Painting Department, including minimisation of, and Improved Management of, Waste Solvent and Paint.

A third Option also presents the possibility of a moderate reduction and this is:

3 Substitution with lower VOC paint strippers.

Table 5 then shows the impact of implementing these options on the VOC emitted/Solids used ratio. The aircraft maintenance business is a highly regulated business, in which aircraft manufacturers (e.g. Boeing and Approval) have to approve all products, which means that changes in products are slow to happen. The main technological advance in the past few years has been the change to high solids paints. It is highly unlikely that any significant changes to the aircraft painting process can be made by 2009-2010. The best possible short-term scenario based that some reductions in the VOC used for paint stripping. The worst imaginable scenario is that no improvements can be made and the VOC emitted/Solids used value remains at 2.67 (as per 2008 figures). However, in any given year, the VOC emitted/Solids used value is dependent on a number of factors e.g. numbers and type of aircraft, whether a chemical strip or sanding was carried out etc.

Table 5 Options for achieving VOC Reductions in 2009 and future years

4. Improving the Management of Stripper Waste If stripper Waste could be sealed into airtight containers as soon as possible after stripping, a slight reduction on the stripper related VOC emitted could be achieved.	0 – 5	0 – 0.1	Low 0 – 0.5
5. Substitution with Lower VOC/High Solids Paint Materials This factor has already been addressed by SAL, see section 6.2. Future improvements of paint materials will depend on the continued development of lower VOC Paint Materials by Suppliers. There have been problems with certain paint types but in future years, and with more research and development by paint manufacturers these problems should be resolved. The primary paint manufacturers PPG Aerospace and Akzo Nobel have indicated that no significant improvement will be made prior to 2009. Also, Shannon Aerospace is also restricted by customer requirements in relation to paint type used.	7	0 – 0.2	**Moderate** **0 – 1.4**
6. Improving General Work Practices in the Painting Department, including Minimization of, and Improved Management of Paint and Solvent Waste Nearly all the VOC is used in the Painting Department. Small improvements in work practices could therefore lead to significant VOC reductions. Therefore it is appropriate that improvements be identified and implemented with the direct input of the painting staff. This should include training and raising of awareness of the VOC issue in the painting department. This would form a part of the General BAT requirements. Adherence to already existing procedures (such as keeping solvent containers capped at all possible times) would be one immediately apparent issue. Approximately 200 Kg of waste paint and solvent VOC is produced per project and some room for improvement in the management of this waste exists. For example, the large waste solvent drums are usually not kept airtight until they are full. If the solvent drums are open and evaporating until full, then a large quantity of VOC, perhaps as much as 100kg, is being needlessly evaporated per project. A system should be agreed with the painters so that the drums are actually kept sealed in practice at all possible times. Examining work practices might reduce the production of paint waste and gun-cleaning solvent. In general the addressing of these factors would form a part of the general BAT requirements.	17	0 – 1	**Low – Medium** **0 – 17**
7. Substitution of Lower VOC Gun Cleaning/ Solvent Wipe			Low

APPENDIX I VOC/SOLIDS RESULTS

Project Number	Date	Paint VOC Used / Paint Solids Used	Total VOC Used/ Paint Solids Used	Total VOC Emitted/Paint Solids Used*	Average Total/VOC Emitted/Paint Solids Used*
Jan-08	1427	574	1210	**1.98**	
Jan-08	1432	407	883	**1.74**	
Jan-08	1440	412	896	**1.80**	
Feb-08	1438	211	694	**5.06**	
Feb-08	1442	396	843	**1.43**	
Feb-08	1447	326	817	**1.81**	
Mar-08	1443	59	308	**0.35**	
Apr-08	1448	463	985	**0.63**	
Apr-08	1439	181	745	**1.20**	
May-08	1465	396	1365	**1.26**	2.67
May-08	1466	405	1008	**0.81**	
May-08	1471	39	212	**0.27**	
Jun-08	1470	80	252	**1.13**	
Jun-08	1486	0.588	153	**-3.69**	
Jun-08	1488	885	1498	**7.5**	
Jul-08	1485	154	875	**2.97**	
Jul-08	1491	297	823	**2.53**	Average VOC Emitted/Paint Solids Used for 2008
Jul-08	1492	258	1283	**2.33**	
Jul-08	1500	4.	40	**-13.3648**	
Aug-08	1496	197	778	**3.71**	
Aug-08	1499	2554	3545	**7.37**	
Aug-08	1501	224	919	**2.64**	
Sep-08	1495	134	677	**3.18**	
Sep-08	1504	57	354	**3.32**	
Sep-08	1505	996	2209	**8.25**	
Sep-08	1509	179	1748	**8.01**	
Oct-08	1510	1177	2163	**4.81**	
Oct-08	1521	1159	1851	**4.23**	
Nov-08	1530	106	1003	**4.28**	

*Assuming that Total VOC emitted = Total VOC used – VOC contained in waste (sent off-site).

It is assumed that VOC contained in waste = 200kg per aircraft.

APPENDIX III

NOISE SURVEY AND ASSESSMENT 2008

Report Content

1.0	**Executive Summary**	.....	**3**
2.0	**Introduction**	.....	**4**
3.0	**Methods Employed**	.....	**5**
4.0	**Monitoring Locations**	.....	**6**
5.0	**Daytime Noise Measurements**	.....	**9**
6.0	**Night time Noise Measurements**	.....	**10**
7.0	**Conclusions**	.....	**11**
	Appendix I	**Tonal Noise Measurements**	
	Appendix II	**Broadband and Tonal Noise Graphs**	
	Appendix III	**Location Map**	

2.0 Introduction

As part of compliance monitoring at Shannon Aerospace Limited, noise monitoring is carried out at a number of boundary and 1 noise sensitive location in the vicinity of the installation. In agreement with the Agency, only one of the three listed noise sensitive locations are monitored annually. Condition 6.11 of the licence is documented as follows:

2.1 Condition 6:

6.11.1 The licensee shall carry out a noise survey of the site operations annually. The survey programme shall be undertaken in accordance with the methodology specified in the 'Environmental Noise Survey Guidance Document' as published by the Agency.

6.11.2 Engine testing shall not be carried out during night time.

2.2 Summary of Noise Monitoring Requirements

Location [Note 1]	***Daytime*** Note 2	***Night Time*** Note 2	***Frequency***
SB1 – Northern Boundary	L_{Aeq} 30 minutes	L_{Aeq} 15 minutes	Annual
SB2 – Entrance to the site	L_{Aeq} 30 minutes	L_{Aeq} 15 minutes	Annual
SB3 – South eastern Boundary	L_{Aeq} 30 minutes	L_{Aeq} 15 minutes	Annual
SB4 – South Western Boundary	L_{Aeq} 30 minutes	L_{Aeq} 15 minutes	Annual
SB5 – North Western Boundary	L_{Aeq} 30 minutes	L_{Aeq} 15 minutes	Annual
NSL B – Noise Sensitive Location	L_{Aeq} 30 minutes	L_{Aeq} 15 minutes	Annual

Note 1: Or at any other locations specified by the Agency.
Note 2: "International Standards Organisation. ISO 1996. Acoustics - description and Measurement of Environmental noise, Parts 1, 2 and 3."

4.0 Monitoring Locations

4.1 NSLB

This monitoring point was located to the north east of the installation. It was estimated from ordinance survey maps that this site was located approximately 250 metres from the site entrance. This residential dwelling is newly built and was not yet occupied. It should be noted that there was no noise audible from SAL activities during either the day or night time survey. The main sources of noise in order of magnitude are listed as follows:

- Traffic movements on the N18 and local access routes;
- Birds chirping throughout the survey;
- Slight breeze through high deciduous trees;
- Background Agricultural activities in the area (tractor and animal noise);
- Impulsive hammering for a period in a neighbouring dwelling.

4.1.1 Night Time Survey

Again there was no noise attributed to SAL. The following sources were noted during the survey:

- Loud gun shots (5) in nearby lands;
- Traffic movements on the N18 – Shannon By Pass;
- Traffic movements on the local access roads;
- Dogs barking in nearby residence;
- Birds chirping throughout the survey.

4.2 SB1

This monitoring point was located to the rear of the waterfall, in front of the entrance doors to the installation. This point is a boundary measurement and not subject to limits as outlined in the guidance document. It was noted that this point was well within this specified limit of 55dB(A). The waterfall was not in operation during the monitoring period. The following source was recorded in order of magnitude:

- Compressor Room Noise;
- Mr Binman Waste collection service;
- Traffic movements on the adjacent local access;
- Birds Chirping;
- Car movements in the SAL carpark.

4.2.2 Night Time Survey

The main sources of noise recorded during the night survey are listed as follows:

- Compressor Room;
- Boilers operating;
- Operatives on cigarette break conversing.

4.5.1 Night Time Survey

Noise recorded during the night survey was attributed to the following sources:

- Traffic movements on the Shannon by pass (N18);
- Compressor on other side of building;
- Occasional car doors opening and closing in the car park.

4.6 SB5

This monitoring point was located at the North West boundary of the plant. The monitoring position is in very long grass which acts as a habitat for a range of birds. The main sources of noise at this position were recorded as follows:

- Noise from the compressor room;
- Air Traffic;
- Noise from birds in the area;
- Noise from the boilers;
- Background traffic movements on local access routes;
- Some sheep/ lambs in the adjacent fields.

4.6.1 Night Time Survey

The most prominent sources of noise during the night survey were:

- Noise from the compressor room;
- Noise from the boilers.

6.0 Summary of Night Time Noise Measurements

Point	Night time Limit dB(A)	Date	Time	L_{eq}	L_{10}	L_{90}	Comment
SB1	**-**	12-06-2008	23:24 – 23:39	44	45	41	The main sources of noise were from the compressor room; boilers in operation; Operatives on cigarette break conversing.
SB2	**-**	12-06-2008	23:44 – 23:59	44	44	35	The main source of noise was background traffic movements on local routes and the N18. No significant noise from SAL except traffic leaving the site after shift.
SB3	**-**	12-06-2008	22:23 – 22:38	39	41	35	Traffic movements on the Shannon by pass (N18);Dogs barking; Composite sampler in operation for a period; Compressor on other side of building; Radio barely audible from inside building; Occasional car doors opening and closing in the car park.
SB4	**-**	12-06-2008	22:42 – 22:57	42	45	35	Traffic movements on the Shannon by pass (N18); Compressor on other side of building; Occasional car doors opening and closing in the car park.
SB5	**-**	12-06-2008	23:02 – 23:17	42	42	38	The only noise audible at this location was that from the compressor room; and also some noise from the boilers.
NSLB	**45**	12-06-2008	22:00 – 22:15	38	38	31	Loud gun shots (5) in nearby lands; Traffic movements on the N18 – Shannon By Pass; Traffic movements on the local access roads; Dogs barking in nearby residence; Birds chirping throughout the survey. No noise from SAL audible at all during the survey.

***Noise limit from the EPA Guidance Document – There were no limits applied in the licence P0069-02.**

Appendix I

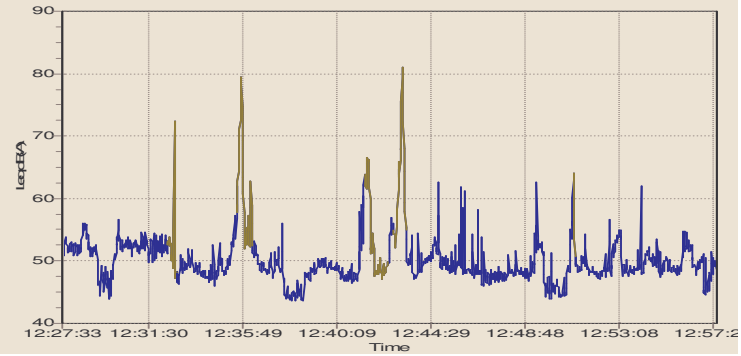
Daytime Tonal Noise

Frequency Hertz	*SB1*	*SB2*	*SB3*	*SB4*	*SB5*	*NSLB*
31.5	23	19	17	28	27	19
40	27	25	23	33	21	23
50	31	32	27	36	25	24
63	32	41	29	39	26	31
80	29	41	30	40	27	29
100	32	40	32	38	27	31
125	35	40	28	34	22	39
160	39	36	27	33	28	37
200	39	36	27	35	31	37
250	39	35	27	35	32	40
315	38	37	29	37	35	42
400	38	36	32	40	42	42
500	38	40	34	42	44	44
630	38	40	37	44	44	46
800	40	43	39	45	40	49
1000	39	44	38	46	37	51
1250	40	42	38	47	40	50
1600	41	40	38	50	38	47
52000	40	38	38	46	35	44
2500	38	36	36	45	36	41
3150	36	35	34	44	35	38
4000	33	42	32	39	34	35
5000	31	44	30	37	39	33
6300	31	43	30	35	34	32
8000	33	38	31	32	32	32
10000	32	32	31	32	32	31
12500	32	32	33	33	33	32
16000	34	35	35	34	34	34
20000	35	35	34	34	34	37

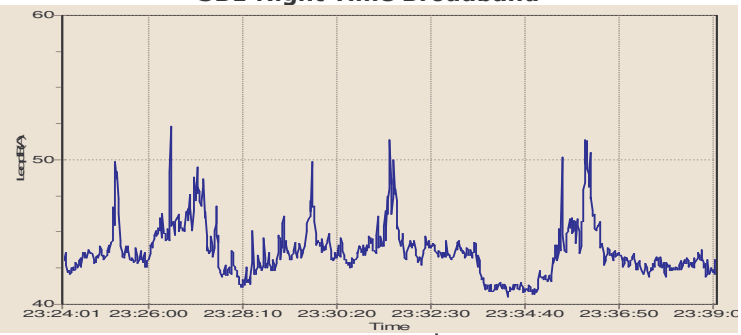
Appendix II

Broadband and Tonal Graphs

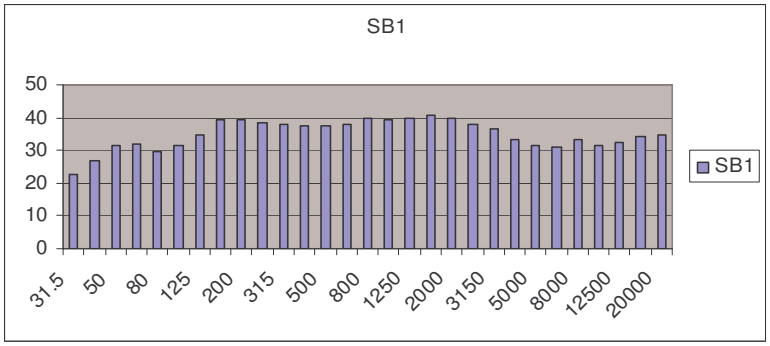
SB1 Daytime Broadband



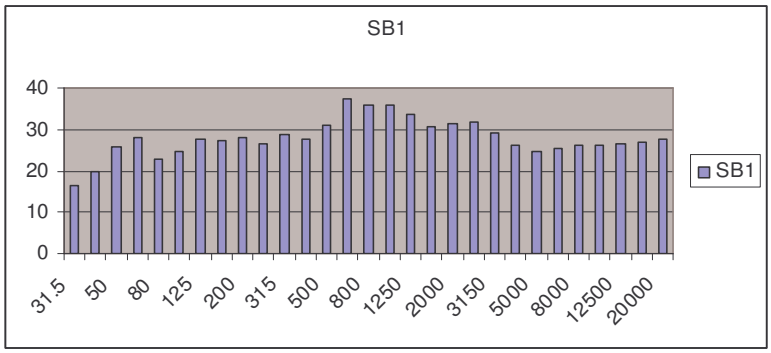
SB1 Night Time Broadband



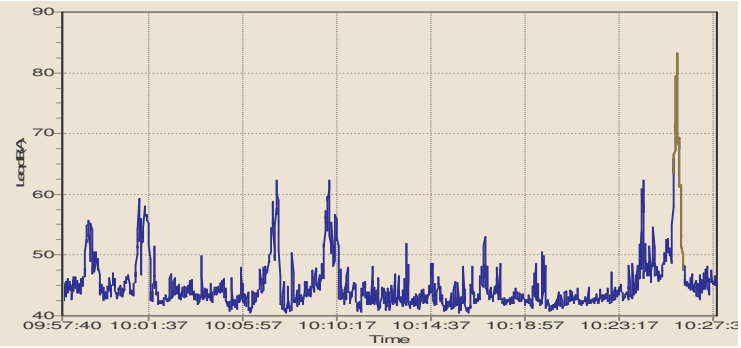
SB1 Daytime 1/3rd Octave



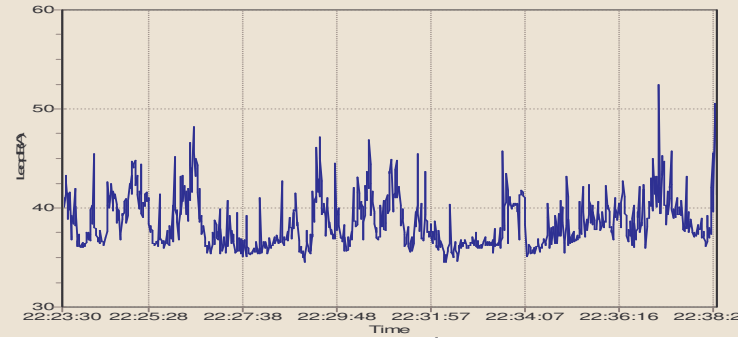
SB1 Night Time 1/3rd Octave



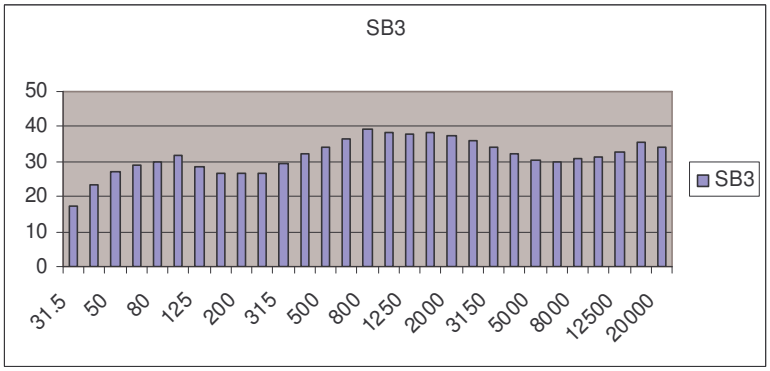
SB2 Daytime Broadband



SB3 Night Time Broadband



SB3 Daytime 1/3rd Octave



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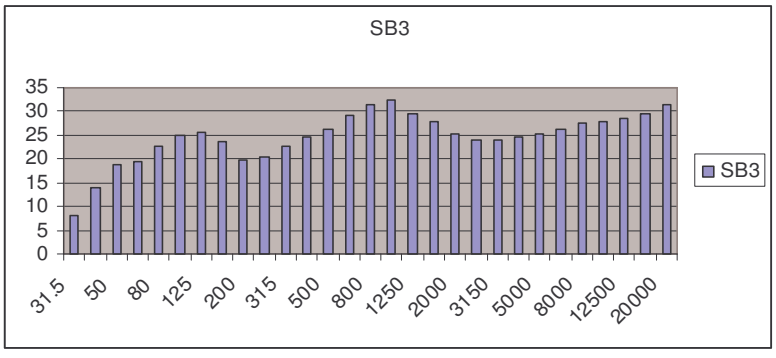
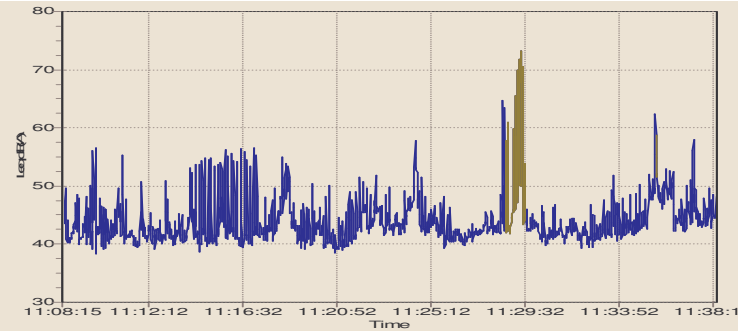
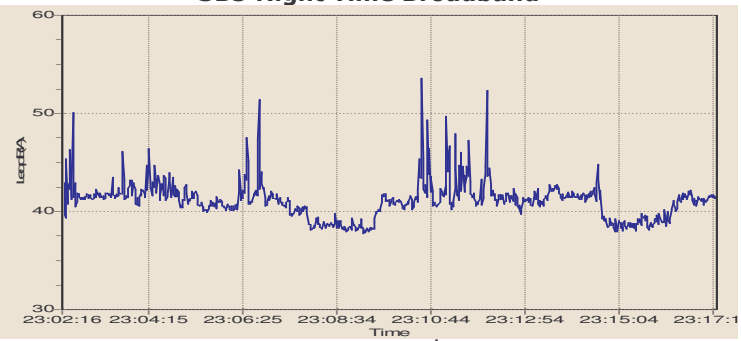


SB4 Daytime Broadband



SB5 Night Time Broadband



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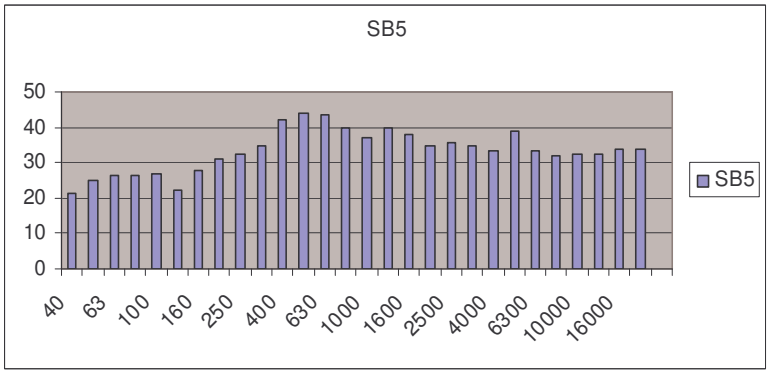

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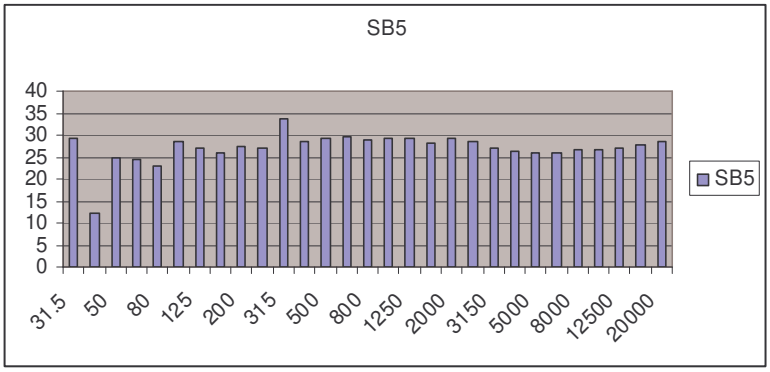
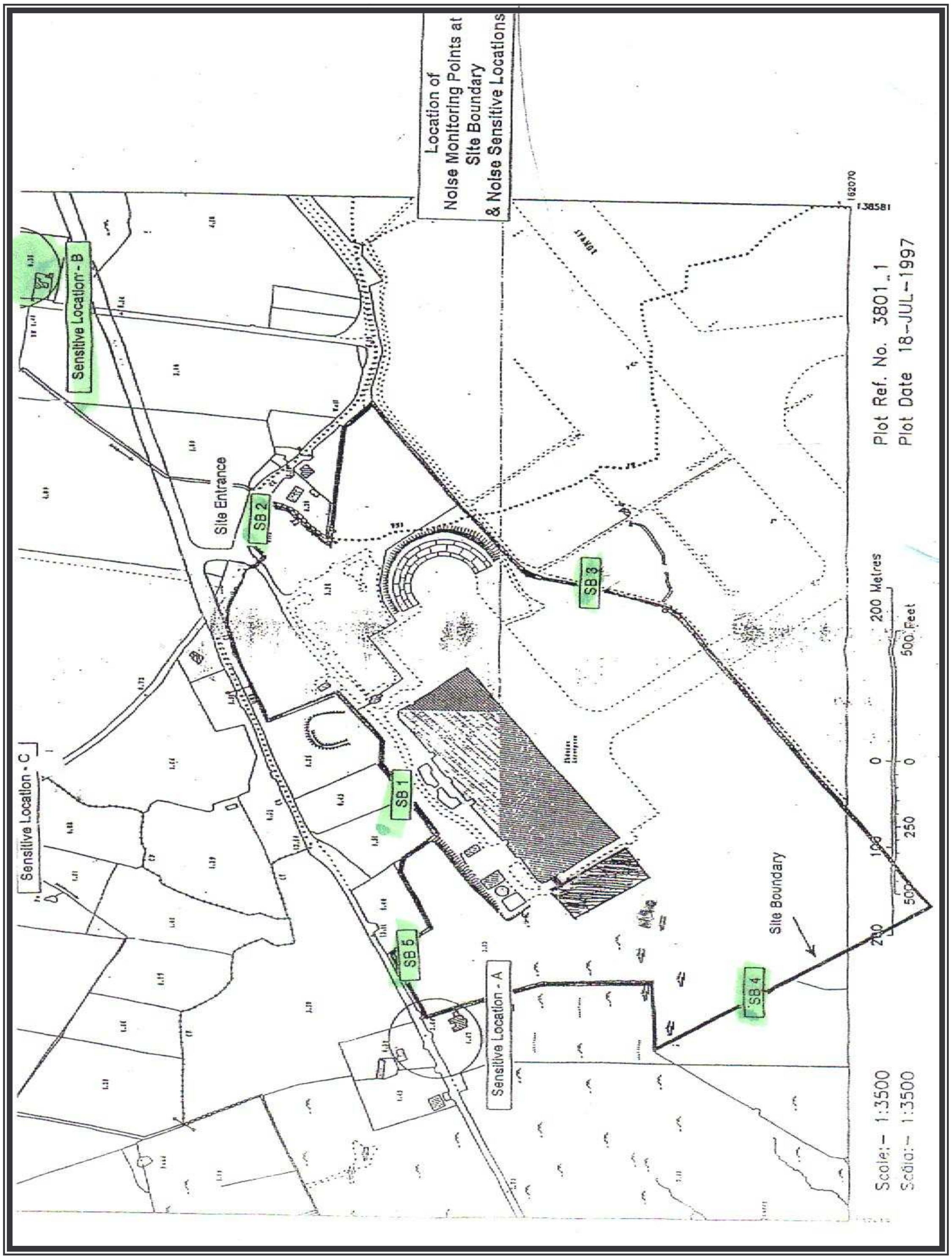


NSLB Daytime Broadband


Location of
Noise Monitoring Points at
Site Boundary
& Noise Sensitive Locations
Sensitive Location - B
Sensitive Location - C
Sensitive Location - A
Site Entrance
SB 1
SB 2
SB 3
SB 4
SB 5
Site Boundary
200 Metres
500 Feet
Plot Ref. No. 3801_1
Plot Date 18-JUL-1997
Scale:- 1:3500
Scala:- 1:3500

RESIDUALS MANAGEMENT PLAN

1.0 Introduction

Shannon Aerospace Limited is required to maintain, to the satisfaction of the Agency, a fully detailed and costed plan for the decommissioning or closure of the site or part thereof, in accordance with condition 10.2.1 and 10.2.2 of its Integrated Pollution Prevention Control Licence (Licence number P0069-02).

The risk classification tool was used and the site was found to be a medium risk category. A site evaluation was carried out and the main closure considerations were found to relate to waste disposal or recovery.

The scope of work for this Residuals Management Plan was principally defined by Condition 10.2.1 and 10.2.2 of the facility's IPPC Licence, which states that:

The licensee shall maintain, to the satisfaction of the Agency, a fully detailed and costed plan for the decommissioning or closure of the site or part thereof. This plan shall be submitted to the Agency for agreement.

The plan shall be reviewed annually and proposed amendments thereto notified to the Agency for agreement as part of the AER. No amendments may be implemented without the agreement of the Agency.

The plan shall apply to the soils, subsoils, buildings, plant, equipment, waste and materials on the site.

The programme set out below will be enacted upon termination or planned cessation of activities of all or part of the site and shall be carried out prior to handover of the site to the owners of the site.

1. The EPA Guidance Document and Assessment Tools on Environmental Liabilities Risk Assessment and Residuals Management Plans Incorporating Financial Provision Assessment (EPA Contract OEE-04-03) issued in May 2005 has been used as a point of reference.

INITIAL RISK ASSESSMENT

An initial risk assessment was carried out in order to classify the plant according to Low, Medium or High risk.

This involved the use of three key elements: Complexity, Environmental Sensitivity and Pollution Record.

Complexity
A complexity band, G1 to G5 exists for all classes of activities. Shannon Aerospace has been classed in section 12, Surface Coatings.

Table 1 Environmental Sensitivity Sub-Matrix

Environmental Attribute	Environmental Attribute Score	
Human Occupation	**Scoring System**	**Plant Score**
<50m	5	<50m = 5
50-250m	3	
250-1000m	1	
>1km	0	
Groundwater Protection		
Regionally important aquifer	2	
Locally important aquifer	1	No data available
Poor Aquifer	0	
+	+	
Vulnerability Rating-Extreme	3	
Vulnerability Rating-High	2	
Vulnerability Rating-Moderate	1	———
Vulnerability Rating-Low	0	
Sensitivity of Receiving Waters		
Class A	3	
Class B	2	
Class C	1	
Class D	0	
Designated Coastal & Estuarine Waters:	2	0
Potentially Eutrophic Coastal & Estuarine Waters:	1	
Air Quality and Topography		
Complex Terrain	2	
Intermediate Terrain	1	
Simple Terrain	0	0
Protected Ecological Sites		
Within or directly bordering protected site	2	
<1km to protected site	1	0
>1km to protected site	0	
Sensitive Agricultural Receptors		
Fruit, vegetable or dairy farming <50m from site boundary	2	2
Fruit, vegetable or dairy farming 50-150m from site boundary	1	
Fruit, vegetable or dairy farming >150m from site boundary	0	
Total Environmental Attribute Score:		**7**

2. Site Evaluation

2.1 Site Location and General Context:

Shannon Aerospace is owned by Lufthansa Technik and has been in operation since 1992. It is located in the townland of Ballycally, adjacent to the main runway (runway 06/24) at Shannon Airport, Co. Clare. Shannon town centre is situated 2 miles from the facility. The site is approximately 25 hectares in size, which was developed from a green-field site in 1990.

The main complex incorporates a general overhaul and maintenance hangar, a painting hangar, office and workshop complex, and flammable liquids store. The external area is comprised of a taxi-way, apron and engine run-up areas making up 24,000 square meters of concrete surface.

2.2 Site Environmental Sensitivity Evaluation:

Shannon Aerospace is situated on a 25-hectare site (Grid Reference 137900 162392) at the northeast of Shannon Airport close to the N18 Limerick to Galway National Primary Road (The site is located approximately 3km west of Shannon Town, Co. Clare. It is bounded by Shannon Airport to the south and agricultural areas to the north and west. It is located approximately 3km north of the Shannon Estuary and approximately 2.5km east of the Fergus Estuary. A small stream drains into the Fergus Estuary approximately 250m north of the site. The site is part of a topographical flatland area that includes Shannon Airport, Shannon Town and Shannon Industrial Estate.

The Lower River Shannon, which encompasses both the Shannon and Fergus Estuaries, is classified as a candidate Special Area of Conservation (cSAC) by the National Parks and Wildlife Service. SACs are prime wildlife conservation areas in the country, considered to be important on a European as well as Irish level. The Lower River Shannon is a candidate SAC selected for lagoons and alluvial wet woodlands, both habitats listed on Annex I of the E.U. Habitats Directive.

The EU Birds Directive came into force in 1979 and it requires each member state to designate "Special Protection Areas" (SPA) for birds. The area of the Shannon and Fergus Estuaries is designated a SPA. According to the National Parks and Wildlife Service website (www.npws.ie) the area is the most important coastal wetland site in the country and regularly supports in excess of 50,000 wintering waterfowl (mean of 59,183 for the 4 seasons 1996-97 to 1999/00), a concentration easily of international importance. The basic designation for wildlife is the Natural Heritage Area (NHA). The area of the Shannon and Fergus Estuaries is also a proposed NHA.

2.3 Site History

Shannon Aerospace Limited was established in 1990 in conjunction with GPA Group Plc., Lufthansa German Airlines and Swiss Air Transport Company (Swissair). In 1995, GPA decided to relinquish its shareholding and the shareholding was divided equally by Lufthansa Technik (a subsidiary of Lufthansa Group) and SR Technics. In 2002 Lufthansa Technik took full control of Shannon Aerospace.

In order to detect any stress, strain or corrosion in the aircraft inspections such as eddy currents, ultrasonic rays and x-rays are used. Scrapers, power tools and chemical methods are used to remove corrosion. The non-destructive testing (NDT) department are responsible for carrying out these inspections.
Riveting of components is carried out in the workshops or on the aircraft itself. Sand bags are used as damping material to minimise noise levels. The tools used are powered with compressed air.
Throughout operations, the aircraft is earthed to ensure the build up of electrostatic charge does not occur while power tools are being used.

Painting Process

Paint Stripping -

The aircraft is either stripped chemically and/or by sanding or sanding only. Craft paper, masking tape, aluminium foil and polythene sheeting are used to cover composite areas before chemical stripper is applied, as these areas must be sanded only. Polythene sheeting is also laid out under the aircraft in order to collect paint and stripper.
A comprehensive ventilation and filtration system is in operation. Solvent emissions are extracted via under-floor exhaust ducts/drains to exhaust nozzles, which provide a continuous downwards airflow past the work-surfaces.
Stripper pumps are used to spray the areas requiring stripper starting from the tail, to the fuselage and then to the wings. However, the wings are usually sanded. The formic acid-based stripper is allowed to soak through and the application is repeated if required. Stripper and paint flakes fall from the aircraft or are removed with rubber squeegees and collected in the polythene sheets.
Liquid waste is disposed of in 200L open-top drums and the plastic is compacted in 200L barrels during clean up of the hangar.
Detergent, Turco Jet Clean C, is then applied on the stripped surfaces and the aircraft is power washed.
Hand-held, pneumatic, rotary tools with water attachments are used during a subsequent “wet wash”. “Scotch bright” pads are attached and water trickles through the devices.
Ventilation is switched off at this point.

C28/15 (solvent) is used to clean the pumps, lances and associated hoses. The waste solvent is fed into a closed drum.

Sanding -

Composite areas and the wings are sanded. This is done with the use of hand held portable sanders with in line vacuum. Subsequently, the aircraft is power washed with high-pressure water nozzles.

Post-stripping Treatment -

A Teflon scraper is used to remove old sealer, damaged by the stripper, from the joints of the aircraft. A cleaning solvent such as C28/15 is applied to the joints to prepare them for new sealer. A pneumatic gun is used to apply the new sealer. Sealer is supplied in tubes in which the components are mixed directly before use.

The aircraft is then moved back into the maintenance hangar for overhaul. Occasionally, the aircraft is painted directly after the stripping process.

Surface Preparation (painting) -

After overhaul, the aircraft is returned to the painting hangar for cleaning and painting. The fuselage is re-washed with detergents and/or solvents after maintenance, if needed. Areas to be protected from paint are covered with plastic and masking tape.
Rust inhibitors such as Alochrome 1200 or Turco Metal Glo 6 etc. are applied by hand, using brushes, on certain areas of the aircraft or where necessary.
Solvent is applied using rags to clean the entire aircraft before painting.

adhesive, under heat and vacuum. Sealants are used to seal the area surrounding the repair.
- Fibrous Composites: Repair patches of glass fibre, carbon fibre or Kevlar are laminated using an epoxy resin and film adhesives. This work is carried out under heat and vacuum.

Mechanical Workshop -

Parts are manufactured and sent to stores with certified internal work orders or a repaired part is returned to the line and certified paperwork is given to appropriate work support.

Non-Destructive Testing -

Stress, strain and corrosion are tested by means of NDT processes such as eddy currents, x-rays and ultrasonic rays. These tests are carried out on the fuselage, removable components and other sections of the aircraft. The NDT department is responsible for the efficiency and safety of these processes.

Equipment Room and Paint Mixing Room -

These rooms are located inside the main hangar building with shallow bunds integrated into the floor and ramped access. The equipment room has a containment capacity of 12,200L and the paint mixing room has a spill capacity of 4,300L. Neither of the two rooms is used for the storage of chemical materials. The paint mixing room is used for paint mixing only.

Instrumentation & Control Room

The facility does not have a calibration system in place. A Building Management System (BMS), which employs software to control energy consuming plant and equipment, is used instead. Filters and ventilation systems sound alarms when filters need replacing etc. The Facilities Department is responsible for the repair and maintenance of all abatement systems. The Facilities Engineer supervises the maintenance of equipment by a team of qualified electricians and fitters. Daily checks are carried out and tracked with job-cards. After 5pm all printouts and alarms etc. are switched from the BMS to Security. All members of security have received BMS training and an on-call system is in place to call members of the Facilities Department as required.

2.5 Site Investigations and information regarding environmental performance:

A baseline hydrogeological investigation was carried out at the site in April 2006. Three boreholes were drilled as part of the investigation. Water samples were taken and a full suite of parameters were analysed for. This report concluded that groundwater quality in the monitoring wells was generally good, with no contamination linked to potential sources from on-site activities.

Soil samples were taken from a number of areas on site in 2002 to determine if there was any contamination on-site. TPH, xylene, toluene and organics monitoring was carried out, no contamination was found.

There have been no known spills or leaks on-site leading to environmental contamination.

2.6 Details of the layout

The main building on-site is 240 x 90 meters. This houses the following units:
- 4 maintenance bays
- 2 paint bays
- Workshops

2.9 Waste Shipments

All solid process wastes which are disposed of off-site are fully documented and controlled, using licensed waste contractors, in full compliance with the appropriate regulations

Hazardous Waste -
Hazardous waste is taken off-site for recycling, treatment etc. using licenced waste contractors. The destination of the waste is dependant upon the waste category as follows:

(1) Mixed Hazardous Waste – (Sealants, contaminated wipes etc.) are sent to Shannon Environmental Services. It is then sent to Lindenschmidt KG, Germany for incineration and heat recovery.
(2) Waste solvents (acetone/toluene, thinners and cleaning solvents) are sent to Shannon Environmental Services or Soltec for recycling. Recycled solvent is then re-used for spray gun-cleaning purposes etc.
(3) Stripper waste (waste plastic sheeting, paint flakes etc.) is sent to Shannon Environmental Services. It is then sent to Lindenschmidt KG for further treatment.
(4) Wash-water is sent to Shannon Environmental Services. It is treated in Shannon Environmental Services Treatment Plant, with the resultant sludge being sent to landfill.
(5) Fluorescent lamps are sent to Irish Lamps Recycling Ltd, Athy, Co. Kildare.
(6) Empty Aerosols are sent to Rilta. These are sent to Germany for incineration.
(7) Electrical equipment is sent to Irish Lamps Recycling Ltd, Athy, Co. Kildare for recycling.
(8) Other hazardous waste types which arise from time to time (e.g. adhesives, silicones etc.) are sent to Shannon Environmental Services for disposal.

Non-hazardous Waste:

(1) Municipal waste is consigned to Mr. Binman Ltd. The waste is landfilled either in Gortnadromma Landfill, Co. Limerick or in Ballyduff Beg Landfill, Co. Clare.
(2) Scrap Metal is sent to Hegarty Metal Recycling.
(3) Paper/Cardboard waste is sent to Mr. Binman Ltd. for recycling.
(4) Timber waste is collected by Mr. Binman Ltd. This material is sent on to Finsa for recycling.

Waste Hauliers -
In all cases the waste contractors mentioned above provide their own transport or use approved & appropriately licenced waste transport companies for the removal of waste off-site.

3 Closure Considerations

3.1 Clean Closure Declaration -
Based on the use of the Initial Screening Risk Assessment the site is considered to be low risk. There are no long-term issues arising on site (e.g. groundwater contamination) so there is no restoration and aftercare management plan required.

3.2 Plant or Equipment Decontamination Requirements
The equipment used on-site does not present any potential for environmental pollution.

All general refuse shall be removed from site. This includes all contents of bins, compactors and skips. €4,000

Timber -
All timber waste shall be removed from site. This includes all pallets, wooden boxes, dummy floorboards used on aircraft etc. €1,000

Paper/cardboard -
All paper recycling bins on-site shall be emptied. This includes all boxes etc. used in Stores area. €1,000

Batteries -
All batteries (lead/acid, Ni/Cd and primary household batteries) shall be sent off- site for recycling to a licenced waste contractor i.e. Returnbatt.

All waste materials shall be removed from site for disposal or recovery through an approved licenced waste contractor. This includes all contents of bins, compactors and skips, all hazardous and non-hazardous waste and any uncontained refuse on the site. €20,000

4 Criteria for Successful Closure

The main criteria against successful closure will be measured are as follows:

Materials shall be treated in such a manner that equipment will be sent back to vendor, resold, recycled or disposed of.
All waste shall be removed from site and recycled or disposed of by licenced hazardous waste contractors.

5 Closure Plan Costing

5.1 Decontamination Costs –
The equipment used on-site does not present any potential for environmental pollution. Also, there is no contaminated soil, groundwater etc. on site which would need remedial work. Therefore decontamination costs are €0.

5.2 Plant and Waste Disposal Costs –

Item	Disposal Route	Associated Costs
Plant:		
Forklifts	Returned to plant-hire company	0
Company Vehicles	Put up for sale	0
Docking	Sold. Recycled.	0
Raw Materials	Returned to vendor, sold. Sent off-site as hazardous waste	2,000
Electrical Equipment	Returned to lease-hire company. Small number either donated to charity or recycled.	2,000

APPENDIX I

Hazardous Material Store #1

Paint Strippers:

14	Turco 6776	200lt
2	Ardrox 2814	200lt
1	Turco 5873	125lt
3	Turco 1270-5	200lt
1	T9071	200lt
4	Turco 9090	200lt

Cleaners:

5	Superbee 10	200lt
12	Ardrox 1900	200lt
1	Turco 6783	25lt
2	Aerokleen CD1	200lt
2	Avia Wash 5000	200lt
2	Jet Clean C	200lt

Solvents:

4	Acetone/Toluene	200lt
1	Methyl ethyl ketone	200lt
6	Methyl ethyl ketone	5lt
9	Methyl ethyl ketone	25lt
26	C28/15	25lt

Oils /Greases:

3	Mobil Jet Oil II	200lt
6	Mobil Jet Oil II	22lt
1	Aqua Quench 641 Oil	200lt
2	Aeroshell Compound 05	3kg
2	Aeroshell Grease 7	35kg
4	Aeroshell Grease 7	3kg
22	BP Turbine Oil 2197	22lt
10	BP Turbine Oil 2380	22lt
19	Mobil Oil 254	22lt
1	Risella Oil	25lt
3	WD40 Liquid25lt	25lt
1	Honing Oil	25lt
1	Coating Solution	25lt
10	Skydrol B-4	18.9lt
7	Exxon Hyjet IV-A	3.79lt
1	Dinitrol AV8	25lt
4	Castrol Aero 3	18.9lt
10	Nyco Grease	1kg
4	Aeroshell Grease 33	50kg
2	Turmogrease Liazr	2kg
5	Nyco FHGAW Oil	20lt
2	Dinitrol AV25	25lt
3	Dinitrol AV30	25lt
6	Skydrol LD-4	22lt
2	Skydrol 500	22lt
7	Turbine Aeroshell 500	12lt
7	Aeroshell Fluid 41	20lt

Paints:

43	Alexit Hardener	2.5lt
41	Alexit Topcoat	5lt
60	Alexit Thinner	2.5lt

Other:

6	Aluminium Oxide Powder	25kg
6	Pig Absorbent Material	bags

APPENDIX III

Typical quantities of hazardous materials stored in Store Number 3 are shown below.

Hazardous Material Store #3

49	Aviox Topcoat	5lt
1	Alexit 404-12	10lt
40	Alexit 404-12	1lt
10	Aerodex Matt	1lt
13	Aeroflex Finish	5lt
17	Aviox Finish	5lt
13	Hardener 92133	5lt
15	Thinner SRSL	5lt
31	Aerodur CF Primer 37047	5lt
4	Aerodex Water Based 9000 Guncleaner	5lt
28	Aerodex Finish Semi-gloss	1lt
17	Aerodex Finish Nonslip	1lt
14	Hardener S66/14	5lt
25	Metaflex FCR Hardener	5lt
2	Metaflex FCR Primer	5lt
1	Ardrox 306N	25lt
7	Thinner 98064	5lt
6	10P4-2 Primer	5lt
4	Thinner TL52	5lt
18	Aerodur Finish C21/100	5lt
24	Hardener 90075	5lt
14	Hardener 90075 for Aviox	5lt
2	Alexit 404-15	5lt
11	S66/22R	5lt
14	Aerodex Finish Matt	5lt
3	High Heat Resistant Paint S2118	1lt
24	Alexit 404-12	10kg
6	Lufthansa 451216030	10kg
11	Thinner 451901200	5lt
	2	**Quantity**
2	Lufthansa Cleaner	10lt
6	Lufthansa 451214888	25kg
20	CA8000	5lt
64	Aviox Finish	5lt
30	C25/90	5lt
40	Eclipse Topcoat	5lt
4	CA8311 Thinner	5lt

APPENDIX V

AER/PRTR EMISSIONS DATA 2008

AER Returns Contact Position	Head of Information Systems
AER Returns Contact Telephone Number	061-370000
AER Returns Contact Mobile Phone Number	
AER Returns Contact Fax Number	061-361100
Production Volume	0.0
Production Volume Units	
Number of Installations	0
Number of Operating Hours in Year	0
Number of Employees	0
User Feedback/Comments	
Web Address	

2. PRTR CLASS ACTIVITIES

Activity Number	Activity Name

3. SOLVENTS REGULATIONS (S.I. No. 543 of 2002)

Is it applicable?	Yes
Have you been granted an exemption ?	Yes
If applicable which activity class applies (as per Schedule 2 of the regulations) ?	No. 8 Other Coating, including metal, plastic, textile, fabric, film and paper coating
Is the reduction scheme compliance route being used ?	No, BAT

Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	Emission Point 2	Emission Point 3	Emission Point 4	Emission Point 5
206	Benzene & toluene & xylene (combined)	C	MAB	Mass Balance	458.6655	0.0	0.0	0.0	0.0
237	Volatile organic compounds (as TOC)	M	PER	FID Monitoring	1725.0331	0.0	0.0	0.0	0.0
244	Total Particulates	M	PER	EN 13284-1	62.6535	0.0	156.94895	201.965	105.05

4.3 RELEASES TO WASTEWATER OR SEWER

SECTION A : PRTR POLLUTANTS

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER				
POLLUTANT		METHOD		
			Method Used	
No. Annex II	Name	M/C/E	Method Code	Designation or Desc
06	Ammonia (NH3)	M	PER	APHA 4500 - NH3 -

ADD NEW ROW | DELETE ROW *

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION B : REMAINING POLLUTANT EMISSIONS (as required in your Licence)

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER				
POLLUTANT		METHOD		
			Method Used	
Pollutant No.	Name	M/C/E	Method Code	Designation or Desc

5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE

Transfer Destination	European Waste Code	Hazardous	Quantity T/Year	Description of Waste	Waste Treatment Operation	Method Used		Location of Treatment	Name and Licence / Permit No. of Recoverer / Disposer / Broker
						M/C/E	Method Used		
Within the Country	06 01 99	No	3.05	Waste Alochrome	D9	M	Weighed	Offsite in Ireland	Enva, W041-1, WCP/LK/052/05c
To Other Countries	08 04 09	Yes	0.407	Adhesives/Hardeners	R1	M	Weighed	Abroad	Enva, W041-1, WCP/LK/052/05c
To Other Countries	08 04 99	No	0.55	Dinitrol	R1	M	Weighed	Abroad	Enva, W041-1, WCP/LK/052/05c
Within the Country	08 01 11	Yes	10.4	Solvents/Thinners	R2	M	Weighed	Offsite in Ireland	Soltec, W115-1, WCP/LK/202/07c

To Other Countries	12 01 99	No	0.523	Sanding Dust	R1	M	Weighed	Abroad	Enva, W041-1, WCP/LK/052/05c
Within the Country	12 01 99	No	0.025	Zok 27	D9	M	Weighed	Offsite in Ireland	Enva, W041-1, WCP/LK/052/05c
Within the Country	13 07 03	Yes	1.0	Skydrol	R1	M	Weighed	Offsite in Ireland	Enva/Atlas Waste Oil, W041-01, WCP/LK/052/05c
Within the Country	13 08 99	Yes	52.55	Engine Oil & aviation fuel & oil filters	R9	M	Volume Calculation	Offsite in Ireland	Enva/Atlas Waste Oil, W041-01, WCP/LK/052/05c
Within the Country	13 08 99	Yes	4.088	Sludge from cleaning out of drains, Oils	R1	M	Weighed	Offsite in Ireland	Enva, W041-1, WCP/LK/052/05c
To Other Countries	13 08 99	Yes	0.01	Cee Bee Cleaner Alko	D9	M	Weighed	Abroad	Enva, W041-1, WCP/LK/052/05c
Within the Country	13 08 99	Yes	0.025	Coolant	D9	M	Weighed	Offsite in Ireland	Enva, W041-1, WCP/LK/052/05c

Within the Country	18 01 01	No	0.072	Clinical Waste	D8	M	Weighed	Offsite in Ireland	Transafe Ltd/SRCL, Waste Licence 54-1, WCP/LK/007/02b
Within the Country	20 01 01	No	47.366	Paper/Cardboard	R3	M	Weighed	Offsite in Ireland	Mr. Binman Ltd, Waste Licence 61-2, WCP/LK/069/02b
Within the Country	20 01 21	Yes	0.609	Lamps & bulbs	R4	M	Weighed	Offsite in Ireland	Irish Lamp Recycling Ltd, WCP/LK/057/02b
Within the Country	20 01 35	Yes	1.001	Electrical Equipment	R4	M	Weighed	Offsite in Ireland	Irish Lamp Recycling Ltd, WCP/LK/057/02b
Within the Country	20 01 38	No	42.81	Timber Waste	R5	M	Weighed	Offsite in Ireland	Mr. Binman Ltd, Waste Licence 61-2, WCP/LK/069/02b
Within the Country	20 01 40	No	23.94	Steel/Aluminium	R4	M	Weighed	Offsite in Ireland	Hegarty Hammond Ltd, WCP/LK/02/02b, WP WR01-2001
Within the Country	20 03 01	No	234.69	General Refuse	D1	M	Weighed	Offsite in Ireland	Mr. Binman Ltd, Waste Licence 61-2, WCP/LK/069/02b