PAINT MATERIAL USAGE 2005	WEEK 1/2	WEEK 3/4	TOTAL	VOC Tonnes	WEEK 5/6	WEEK 7/8	TOTAL	VOC Tonnes	WEEK 9/10	WEEK 11/12	TOTAL	VOC Tonnes	WEEK 13/14	WEEK 15/16	TOTAL	VOC Tonnes	WEEK 17/18	WEEK 19/20	TOTAL	VOC Tonnes	W 21/22/23	W 24/25	TOTAL	VOC Tonnes	W 26/27	W 28/29	TOTAL	VOC Tonnes	W30/31/32	W33/34	TOTAL	VOC Tonnes	W 35/36	W37/38	TOTAL	VOC Tonnes	W 39/40	W41/42	TOTAL	VOC Tonnes	W 43/44	W45/46	TOTAL	VOC Tonnes	W47/48	W49/50/51	TOTAL	VOC Tonnes	Total VOC
3608.6 & 3902 WATER BASED PRIMER	850	525	1375	0.092125	850	450	1300	0.0871	600	350	950	0.06365	450	550	1000	0.067	500	550	1050	0.07035	250	0	250	0.01675	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	150	150	0.01005	0.407025
KM30803 BLACK STOVING ACRYLIC	0	40	40	0.02	40	0	40	0.02	40	20	60	0.03	40	0	40	0.02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.09
D831 ETCH PRIMER	9	6	15	0.0096	3	9	12	0.00768	6	3	9	0.00576	3	6	9	0.00576	6	6	12	0.00768	3	0	3	0.00192	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	0.00192	0.04032
D832 CATALYST	12	3	15	0.0123	6	7	13	0.01066	9	9	18	0.01476	6	6	12	0.00984	9	6	15	0.0123	6	0	6	0.00492	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	0.00246	0.06724
5000 5 046 SOLVENT	0	3	3	0.0027	3	0	3	0.0027	3	1.5	4.5	0.00405	1.5	0	1.5	0.00135	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0108
BARNESLY 1028 CLEANING SOLVENT	150	200	350	0.29435	100	150	250	0.21025	150	100	250	0.21025	200	200	400	0.3364	100	150	250	0.21025	100	25	125	0.105125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	50	0.04205	1.408675
TEROLAN 1948 A SEALER (TAXI)	1	0.5	1.5	0.000072	0.5	0.5	1	0.000048	1.5	0.5	2	0.000096	0.5	1.5	2	0.000096	0.5	1	1.5	0.000072	0.5	0.3	0.75	0.000036	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.5	0.000024	0.000444
TEROTEX-8255 M GREY UNDERSEAL (TAXI)	3.5	3	6.5	0.000312	3	3	6	0.000288	3	2.5	5.5	0.000264	2.5	3.5	6	0.000288	4	4	8	0.000384	1.5	0	1.5	0.000072	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.5	1.5	0.000072	0.00168
CR648A Electrocoat Resin	49700			0.007455				0				0				0				0				0				0				0				0				0				0				0	0.007455
Henkel de Watering Oil No 4	375			0.345				0				0				0				0				0				0				0				0				0				0				0	0.345
Tower Chemicals Non Aromatic Solvent Degreaser Boo700	0	0	0	0	0	0	0	0	0	210	210	0.1932	210	0	210	0.1932	0	210	210	0.1932	0	210	210	0.1932	0	0	0	0	0	210	210	0.1932	0	0	0	0	0	210	210	0.1932	0	210	210	0.1932	210	210	420	0.3864	1.7388
White Spirit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	6	0.00465	2	2	4	0.0031	4	4	8	0.0062	2	0	2	0.00155	2	4	6	0.00465	2	0	2	0.00155	0.0217
Propane-2-ol Isopropoanol	10	5	15	0.011775	5	5	10	0.00785	0	5	5	0.003925	10	0	10	0.00785	0	5	5	0.003925	5	5	10	0.00785	5	0	5	0.00393	5	5	10	0.00785	0	10	10	0.00785	10	10	20	0.0157	10	10	20	0.0157	5	15	20	0.0157	0.1099
SUB TOTAL VOC in TONNES				0.783914				0.346576				0.525955				0.641784				0.498161				0.329873				0.00858				0.20415				0.01405				0.21045				0.21355				0.460226	4.237264
Manufacturing Accumulative VOC				0.783914				1.13049				1.656445				2.298229				2.79639				3.126263				3.13484				3.33899				3.35304				3.56349				3.77704				4.237264	Total Isocyante
Prototype Monthly VOC				0.0534				0.0323				0.04082				0.0437				0				0				0				0.0005				0				0				0.0398				0	
Prototype Accumulative VOC Tonnes				0.0534				0.0857				0.12652				0.17022				0.17022				0.17022				0.17022				0.17072				0.17072				0.17072				0.21052				0.21052	
Prototype Monthly Isocyanates kg				4.86				4.05				8.1				4.05				0				0				0				0.0005				0				0				4.05				0	25.1105
Prototype Accumulative Isocyanates kg				4.86				8.91				17.01				21.06				21.06				21.06				21.06				21.0605				21.0605				21.0605				25.1105				25.1105	
Total VOC To Date Manufacturing & Prototype (tonnes).	Total Isocyanates To Date (kg)																																																
4.447784	25.1105																																																

Rattenbury & Associates
Chemical Consultants

STADCO COVENTRY LTD.

Organic Solvent Consumption, Reduction Plan and Management Plan
January to December 2005

Content

Prototype Plant

Combined ED, Sealer Coat & Manufacturing and Prototype Plant

Emission Reduction Plan

Observations and Conclusions

1. Introduction

Given below are details, values etc. of organic solvent consumption, and a Solvent Management Plan for the 12 month period January to December 2005, together with a Solvent Reduction Plan, submitted to Coventry City Council by Stadco Coventry Ltd. as per Permit Reference PPC 058, in compliance with Pollution Prevention Act 1999, Pollution Prevention and Control (England and Wales) Regulations 2000 (as amended) and as per the requirements and definitions as laid out in Process Guidance Note 6/23 (04) "Secretary of State's Guidance for Coating of Metal and Plastic Processes".

Box 1. DEFINITIONS OF SYMBOLS USED.

(I_1); indicates the quantity of organic solvents, including those incorporated in preparations which are used as input into the process.

(I_2); indicates the quantity of organic solvents, including those incorporated in preparation recovered and recycled within the process.

(O_1); indicates emissions in waste gases.

(O_2); indicates organic solvents lost in water.

(O_3); indicates the quantity of organic solvents which remain as contamination or residue in products.

(O_4); indicates uncaptured emissions of organic solvents to air.

(O_5); indicates organic solvents and/or organic compounds lost due to abatement processes.

(O_6); indicates organic solvents contained in collected waste.

(O_7); indicates organic solvents or organic solvents contained in preparations sold to third parties.

(O_8); indicates organic solvents recovered for reuse, but not to be recycled in the processes.

(O_9); indicates organic solvents released in other ways, i.e. spillage, leakage.

$\%^{w}/_{w;}$ indicates a percentage based on a weight to weight ratio (e.g. 5kg per 10kg = 50 $\%^{w}/_{w}$).

March 2006

ED, SEALER COAT & MANUFACTURING

Table 1. LIST OF SUBSTANCES EMPLOYED IN THE ED, SEALER COAT & MANUFACTURING DURING THE PERIOD January – December 2005

Ref.	COATING/PAINT
1	3608.6 & 3902 Water Based Primer
2	KM30 803 Black Stoving Acrylate
3	D831 Etch Primer
7	Terolan 1948A Sealer
8	Terotex-8255 M Grey Underseal
9	CR648A Electrocoat Resin

Ref.	SOLVENTS & THINNERS
4	D832 Etch Primer Catalyst
5	5000 5 046 Solvent
6	Barnesly 1028 Cleaning Solvent
10	Henkel Dewatering Oil No. 4
11	Tower Chemicals Non-Aromatic Solvent
12	White Spirit BS 245
13	2-Propanol

Table 2. ED, SEALER COAT & MANUFACTURING: ORGANIC SOLVENT INPUT & RELEASE
January – December 2005

			A	B	C	D	E	F	G	H
Ref	**COATING/PAINT**		**I_1**	**O_1**	**O_2**	**O_3**	**O_4**	**O_5**	**O_6**	**O_9**
1	**3608.6 & 3902 Water Based Primer**	**% $^{w}/_{w}$**		0	3.0	0.5	2.0	93.0	1.0	0.5
	Quantity	**kg**	407.03	0	12.20	2.04	8.14	378.54	4.07	2.04
2	**KM30 803 Black Stoving Acrylate**	**% $^{w}/_{w}$**		0	0.5	0.5	2.5	95.0	1.0	0.5
	Quantity	**kg**	90.00	0	0.45	0.45	2.25	85.5	0.90	0.45
3	**D831 Etch Primer**	**% $^{w}/_{w}$**		90.5	0.5	0.5	2.0	5.0	1.0	0.5
	Quantity	**kg**	40.32	36.49	0.20	0.20	0.81	2.02	0.40	0.20
7	**Terolan 1948A Sealer**	**% $^{w}/_{w}$**		0.5	1.0	2.5	65.0	25.0	5.5	0.5
	Quantity	**kg**	0.44	0.001	0.004	0.011	0.290	0.110	0.023	0.001
8	**Terotex-8255 M Grey Underseal**	**% $^{w}/_{w}$**		0.5	1.0	1.0	67.5	25.0	4.5	0.5
	Quantity	**kg**	1.68	0.008	0.017	0.017	1.134	0.420	0.076	0.008
9	**CR648A Electrocoat Resin**	**% $^{w}/_{w}$**		0.5	1.0	3.0	65.0	25.0	5.0	0.5
	Quantity	**kg**	6.78	0.034	0.068	0.203	4.407	1.695	0.339	0.034
		TOTALS (kg)	**546.25**	**36.533**	**12.939**	**2.921**	**17.031**	**468.285**	**5.808**	**2.733**

			I	J	K	L	M	N	O	P
Ref	**SOLVENTS/CLEANERS**		**I_1**	**O_1**	**O_2**	**O_3**	**O_4**	**O_5**	**O_6**	**O_9**
4	**D832 Etch Primer Catalyst**	**% $^{w}/_{w}$**		90.5	0.5	0.5	2.0	5.0	1.0	0.5
	Quantity	**kg**	67.24	60.85	0.34	0.34	1.34	3.36	0.67	0.34
5	**5000 5 046 Solvent**	**% $^{w}/_{w}$**		2.0	1.0	0.5	41.0	50.00	5.0	0.5
	Quantity	**kg**	10.80	0.22	0.11	0.05	4.43	5.40	0.54	0.05
6	**Barnesly 1028 Cleaning Solvent**	**% $^{w}/_{w}$**		60.0	30.0	3.0	2.0	0.0	4.5	0.5
	Quantity	**kg**	1408.68	845.21	422.60	42.26	28.17	0.0	63.40	7.04
10	**Henkel Dewatering Oil No. 4**	**% $^{w}/_{w}$**		47.5	29.0	5.0	3.0	0.0	15.0	0.5
	Quantity	**kg**	345.00	163.87	100.05	17.25	10.35	0.0	51.75	1.73
11	**Tower Chemicals Non-aromatic Solvent**	**% $^{w}/_{w}$**		48.0	25.0	6.0	5.0	0.0	15.5	0.5
	Quantity	**kg**	1738.80	834.62	434.70	104.33	86.94	0.0	269.51	8.70
12	**White Spirit bs 245**	**% $^{w}/_{w}$**		48.0	25.0	6.0	5.0	0.0	15.5	0.5
	Quantity	**kg**	21.70	10.42	5.43	1.30	1.08	0.0	3.36	0.11
13	**2-Propanol**	**% $^{w}/_{w}$**		48.0	25.0	6.0	5.0	0.0	15.5	0.5
	Quantity	**kg**	109.90	52.75	27.48	6.59	5.50	0.0	17.03	0.55
		TOTALS (kg)	**3702.12**	**1967.94**	**990.71**	**172.12**	**137.81**	**8.76**	**406.26**	**18.52**

	OVERALL TOTALS	**(Tonnes)**	**4.248**	**2.004**	**1.004**	**0.175**	**0.155**	**0.477**	**0.412**	**0.021**

March 2006

Note: The eventual destinations of the organic solvents following their employment in the process have not been directly measured. Therefore, the values (for O_1, O_2, O_3, O_4, O_5 and O_6), as given in Table.2 above, are estimates based upon considerable empirical knowledge of the process, together with an understanding of the nature and properties of the substances used and relevant plant design.

Table 3. ED & SEALER COAT & MANUFACTURING PAINT, COATING, SOLVENT AND CLEANER USAGE January – December 2005

Ref	PAINTS & COATINGS	A	B	C	D	E	F	G	H	I
	SUBSTANCE	s.g. (kg/l)	O.S. (g/l)	O.S. (% $^{w}/_{w}$)	Solids (g/l)	Solids (% $^{w}/_{w}$)	kg/ 12 month	Litres/ 12 month	Solids kg/12 month	O.S. kg/12 month
1	3608.6 & 3902 Water Based Primer	1.29	67	5.19	645	50	7836.75	6075.00	3918.38	407.03
2	KM30 803 Black Stoving Acrylate	0.97	500	51.55	470	48.45	174.60	180	84.60	90.00
3	D831 Etch Primer	1.10	640	58.18	460	41.82	69.30	63	28.98	40.32
7	Terolan 1948A Sealer	1.40	48	3.43	1362	96.57	12.95	9.25	12.51	0.44
8	Terotex-8255-M Grey Underseal	1.30	48	3.69	1252	96.31	45.5	35	43.82	1.68
9	CR648A Electrocoat Resin	1.1	0.15	0.014	396	36	49700	45182	17892.07	6.78
								Totals	**21980.36**	**546.25**

	SOLVENTS & THINNERS	J	K	L	M
Ref.	**SUBSTANCE**	**Specific Gravity (kg/l)**	**O.S. (g/l)**	**kg/ 12 month**	**Litres/ 12 month**
4	D832 Etch Primer Catalyst	0.80	820	67.24	82
5	5000 5 046 Solvent	0.9	900	10.80	12
6	Barnesly 1028 Cleaning Solvent	0.841	841	1408.68	1675
10	Henkel Dewatering Oil No.4	0.92	920	345.00	375
11	Tower Chemicals Non-Aromatic Solvent	0.92	920	1738.80	1890
12	White Spirit BS 245	0.775	775	21.70	28
13	2-Propanol	0.785	785	109.90	140
	Totals			**3702.12**	**4202**

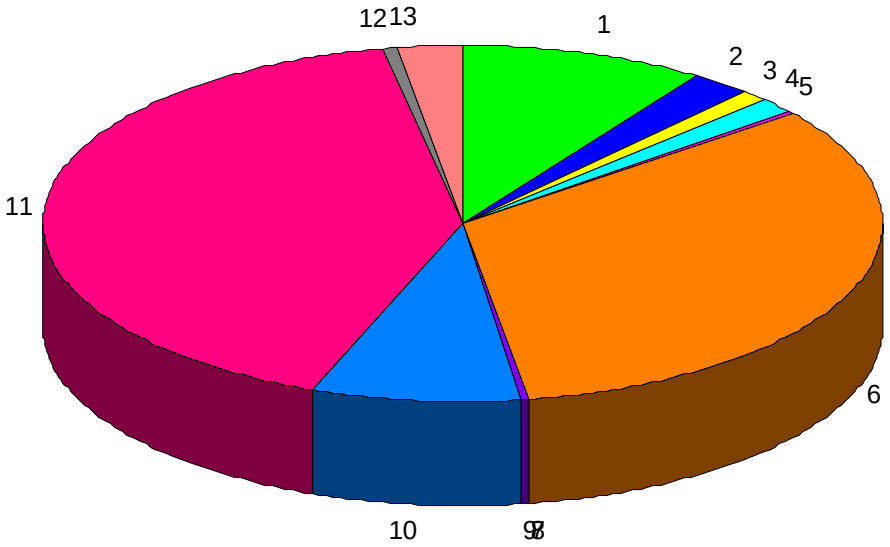
Box 2 SOLVENT MANAGEMENT PLAN: ED, SEALER COAT & MANUFACTURING: January – December 2005

1. No organic solvents that entered the process were recovered, reused or recycled, in any form, within the process or recycled externally by either being reused elsewhere or passed to a third party, within the specified time period. Hence; $I_2 = O_7 = O_8 = 0$

2. Annual Organic Solvents Consumption; (C):	C = I_1 - O_8 = 4.248– 0 = **4.248 tonnes.**	**(**Ref: PG6/23(04) *Figure 5.1* & Table 2 of this Document)
3. Actual Solvent Emissions; (ASE):	ASE = I_1- O_5 - O_6 - O_7 - O_8 = 4.248 –0.477– 0.412 – 0 – 0 = **3.359 tonnes.**	Ref: PG6/23(04) *Figure 5.1* & Table 2 of this Document)
4. Fugitive Emissions; (F):	F = I_1- O_1 – O_5 – O_6 – O_7 - O_8 = 4.248 – 2.004 – 0.477 – 0.412– 0 – 0 = **1.355 tonnes.**	**(**Ref: PG6/23(04) *Figure 5.1* & Table 2 of this Document)
5. Fugitive Emission Value:	F/ [I_1 + I_2] x 100% = [1.355 tonnes/4.248] x 100 = **31.90%.**	Ref: PG6/23(04) *Figure 5.1* & Table 2 of this Document)
6. Total Emissions; (TE):	TE = O_1 + F = 2.004 + 1.356 = **3.359 tonnes.**	Ref: PG6/23(04) *Figure 5.1* & Table 2 of this Document)
7. Target Emissions;	Total mass of solids x 0.9 = 21.980 x 0.9 = **19.782 tonnes.**	(Ref: PG6/23(04) *Table 6* & Table 3, column H of this Document)

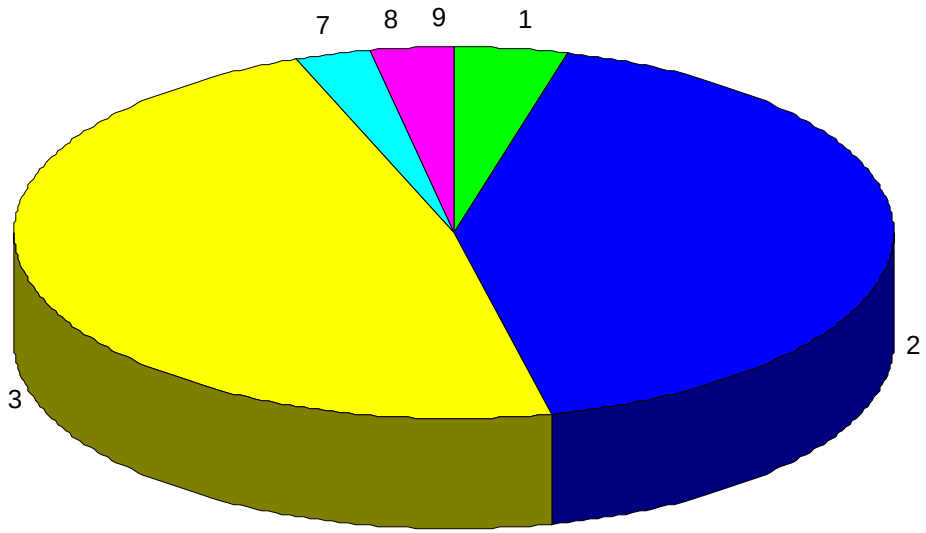
March 2006

Graphs of the Various Values and Parameter Given in Tables 2 & 3 Above



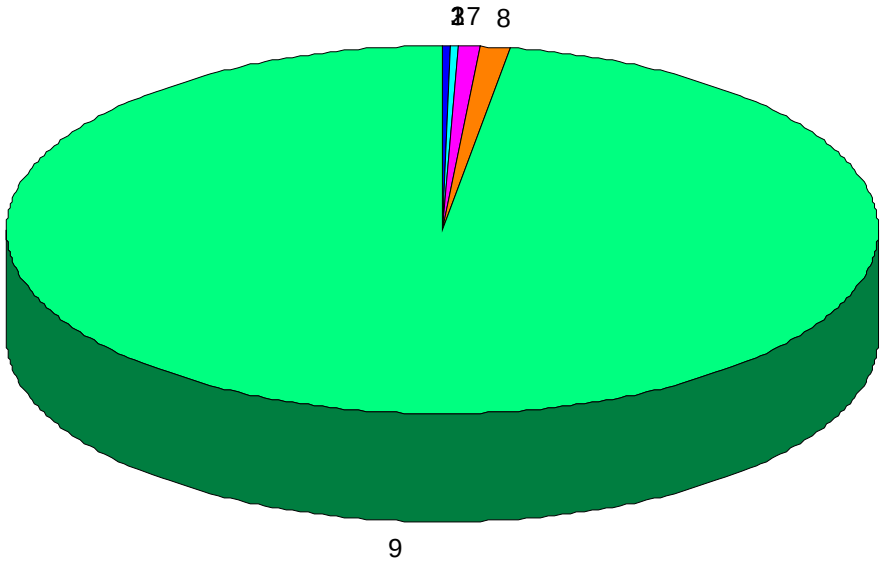
Graph 1.1: Solvent usage for each of the Coatings and Solvents used:

1: 3608.8 & 3902 Water Based Primer; 2: KM30 803 Black Stoving Acrylate;
3: D831 Etch Primer; 4: D832 Etch Primer Catalyst;
5: 5000 5 046 Solvent; 6: Barnesly 1028 Cleaning Solvent;
7: Terolan 1948A Sealer; 8: Terotex-8255 M Grey Underseal;
9: CR648A Electrocoat Resin; 10: Henkel Dewatering Oil No.4;
11: Tower Chemicals Non-Aromatic Solvent; 12: White Spirit bs 245;
13: 2-Propanol.



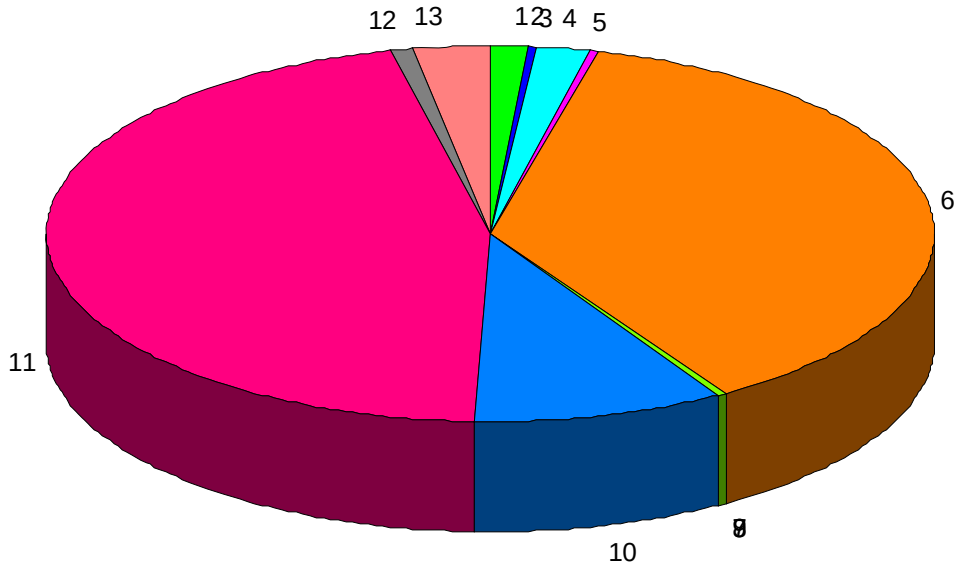
Graph 1. 2: Solvent usage, expressed as a function of each Coating used.

1: 3608.8 & 3902 Water Based Primer;
2: KM30 803 Black Stoving Acrylate;
3: D831 Etch Primer;
7: Terolan 1948A Sealer;
8: Terotex-8255 M Grey Underseal;
9: CR648A Electrocoat Resin.



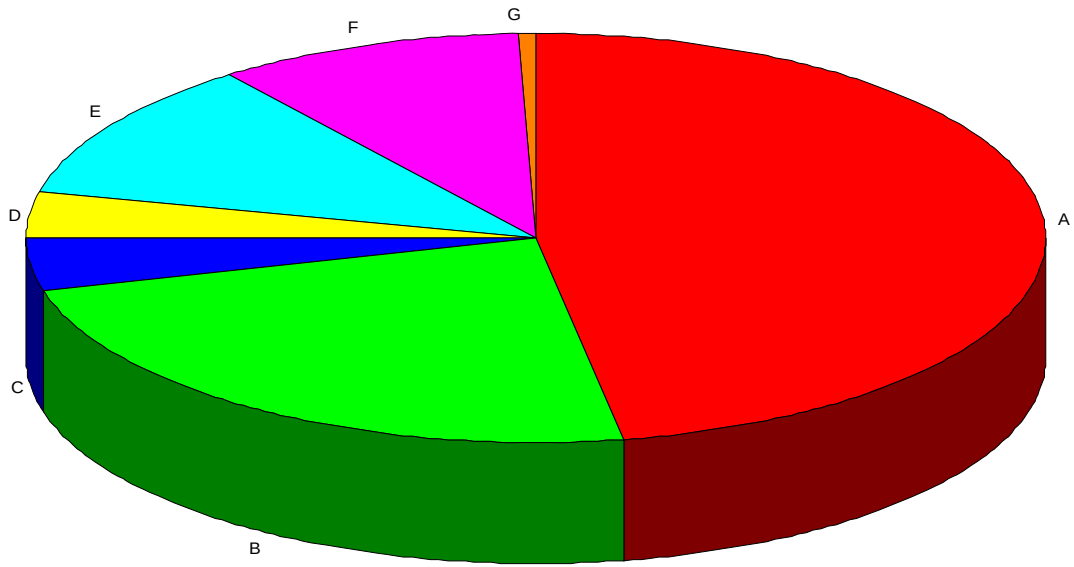
Graph 1.3: The ratio of Solids to Organic Solvent content of each of the Coatings used.

1: 3608.8 & 3902 Water Based Primer; 2: KM30 803 Black Stoving Acrylate;
3: D831 Etch Primer; 7: Terolan 1948A Sealer;
8: Terotex-8255 M Grey Underseal; 9: CR648A Electrocoat Resin.



Graph 1.4: Actual Solvent Emission for each Coating and Solvent used.

1: 3608.8 & 3902 Water Based Primer;
2: KM30 803 Black Stoving Acrylate;
3: D831 Etch Primer;
4: D832 Etch Primer Catalyst;
5: 5000 5 046 Solvent;
6: Barnesly 1028 Cleaning Solvent;
7: Terolan 1948A Sealer;
8: Terotex-8255 M Grey Underseal;
9: CR648A Electrocoat Resin;
10: Henkel Dewatering Oil No.4;
11: Tower Chemicals Non-Aromatic Solvent;
12: White Spirit bs 245;
13: 2-Propanol.



Graph 1.5: Values for the various Emission Outputs.

A: O_1: Emissions in Waste Gases;
B: O_2: Organic Solvents Lost in Water;
C: O_3: The amount of Organic Solvents remaining as Contaminants or Residues in Product;
D: O_4: Uncaptured emissions of Organic Solvents lost to Air;
E: O_5: Organic Solvents and/or Organic Compounds lost due to Abatement Processes (Incineration);
F: O_6: Organic Solvents contained in Collected Waste;
G: O_9: Organic Solvents lost in other ways, e.g. spillage, leakage etc..

PROTOTYPE PLANT

Table 4. LIST OF SUBSTANCES EMPLOYED IN THE PROTOTYPE PLANT DURING THE PERIOD

January – December 2005

Ref.	COATING/PAINT
14	Top Coats
17	Hardener/Activator
18	Primer
19	Lacquer

Ref.	SOLVENTS & THINNERS
15	Standard Thinners
16	Thinners

Table 5. PROTOTYPE PLANT: ORGANIC SOLVENT INPUT & RELEASE
January – December 2005

			A	B	C	D	E	F	G	H
Ref	**COATING/PAINT/SOLVENT/ THINNERS**		**I_1**	**O_1**	**O_2**	**O_3**	**O_4**	**O_5**	**O_6**	**O_9**
14	**Top Coats**	**% $^{w}/_{w}$**		0.0	0.0	1.0	2.0	95.5	1.0	0.5
		kg	21.00	0.000	0.000	0.210	0.420	20.055	0.210	0.105
15	**Standard Thinners**	**% $^{w}/_{w}$**		0.5	0.0	0.5	3.5	94.0	1.0	0.5
		kg	121.5	0.607	0.000	0.607	4.254	114.210	1.215	0.607
16	**Thinners**	**% $^{w}/_{w}$**		0.5	0.0	0.5	3.5	94.0	1.0	0.5
		kg	41.40	0.207	0.000	0.207	1.449	38.916	0.414	0.207
17	**Hardener/Activator**	**% $^{w}/_{w}$**		0.0	0.0	2.5	2.0	90	5.0	0.5
		kg	22.96	0.000	0.000	0.574	0.459	20.664	1.148	0.115
18	**Primer**	**% $^{w}/_{w}$**		0.0	0.0	1.0	2.0	92	4.5	0.5
		kg	28.16	0.000	0.000	0.282	0.563	25.907	1.267	0.141
19	**Lacquer**	**% $^{w}/_{w}$**		0.0	0.0	1.0	2.0	95.5	1.0	0.5
		kg	2.5	0.00	0.00	0.025	0.05	2.387	0.025	0.013
		TOTALS (kg)	**237.52**	**0.814**	**0.000**	**1.905**	**7.195**	**222.139**	**4.279**	**1.188**
		TOTALS (Tonnes)	**0.2375**	**0.0008**	**0.0000**	**0.0019**	**0.0072**	**0.2221**	**0.0043**	**0.0012**

Note: The eventual destinations of the organic solvents following their use have not been directly measured. Therefore, the values (for O_1, O_2, O_3, O_4, O_5 and O_6), as given in Table.2 above, are estimates based upon substantial empirical knowledge of the process, together with an understanding of the nature and properties of the substances used and design of the equipment employed.

Table 6. PROTOTYPE PLANT: PAINT, COATING, SOLVENT AND CLEANERS USAGE. January – December 200

	PAINTS & COATINGS	A	B	C	D	E	F	G	H	I
Ref. No.	SUBSTANCE	Specific gravity. (kg/l)	O.S. (g/l)	Isocyantes (g/l)	Solids (g/l)	kg/ 12 month	Litres/ 12 month	Solids kg/12 month	O.S. kg/12 month	Isocyantes kg/12 month
14	Top Coats	1.10	500	0.0	600	46.20	42	25.20	21.00	0.00
17	Hardener/Activator	1.00	740	810	260	31	31	8.04	22.96	25.11
18	Primer	1.00	640	0	360	44	44	15.84	28.16	40.32
19	Lacquer	1.10	500	0	600	5.5	5	3	2.5	0
					Totals	**126.7**	**122**	**52.08**	**74.62**	**65.43**

	SOLVENTS & THINNERS	J	K	L	M	N
Ref. No.	SUBSTANCE	Specific Gravity. (kg/l)	O.S. (g/l)	kg/ 12 month	Litres/12 month	O.S. kg/ 12 month
15	Standard Thinners	0.9	900	121.5	135	121.5
16	Thinners	0.9	900	41.4	16	41.4
	Totals			**162.9**	**151**	**162.9**

Box 3 SOLVENT MANAGEMENT PLAN: PROTOTYPE PLANT January – December 2005

1. No organic solvents that entered the process were recovered, reused or recycled, in any form, within the process or recycled externally by either being reused elsewhere or passed to a third party, within the specified time period. Hence; $I_2 = O_7 = O_8 = 0$

2. Annual Organic Solvents Consumption; (C): $C = I_1 - O_8 = 237.52 – 0 =$ **237.52 kg. (0.2375 tonnes)** (Ref: PG6/23(04) *Figure 5.1* & Table 5 of this Document)

3. Actual Solvent Emissions; (ASE): $ASE = I_1 - O_5 - O_6 - O_7 - O_8 = 237.52 – 222.14 – 4.28 – 0 – 0 =$ **11.10 kg (0.0111 tonnes)** Ref: PG6/23(04) *Figure 5.1* & Table 5 of this Document)

4. Fugitive Emissions; (F): $F = I_1 - O_1 – O_5 – O_6 – O_7 - O_8 = 237.52 – 0.81 –222.14 – 4.28– 0 – 0 =$ **10.29 kg (0.0103) tonnes)** (Ref: PG6/23(04) *Figure 5.1* & Table 5 of this Document)

5. Fugitive Emission Value: $F/ [I_1 + I_2] \times 100\% = [10.29kg/237.52kg] \times 100 =$ **4.33%.** Ref: PG6/23(04) *Figure 5.1* & Table 5 of this Document)

6. Total Emissions; (TE): $TE = O_1 + F = 0.81kg + 10.29kg =$ **11.10kg (0.0111 tonnes)** Ref: PG6/23(04) *Figure 5.1* & Table 5 of this Document)

7. Target Emissions; Total mass of solids x 0.9 = 52.08kg x 0.9 = **46.87kg (0.0469 tonnes)** (Ref: PG6/23(04) *Table 6* & Table 6, column G of this Document)

COMBINDED ED, SEALER COAT & MANUFACTUERING AND PROTOTYPE PLANT

Table 7. ED, SEALER COAT & MANUFACTURING TOGETHER WITH PROTOTYPE PLANT: ORGANIC SOLVENT INPUT & RELEASE
January – December 2005

			I_1	O_1	O_2	O_3	O_4	O_5	O_6	O_9
	ED, Sealer Coat & Manufacturing	kg	4248.37	2004.47	1003.65	175.04	154.84	477.05	412.07	21.25
	Prototype Plant	kg	237.52	0.814	0.000	1.905	7.195	222.139	4.279	1.188
	TOTAL	kg	4485.89	2005.28	1003.65	176.96	162.04	699.19	416.35	22.44
	TOTAL	tonnes	4.4859	2.0053	1.0037	0.1769	0.1620	0.6992	0.4164	0.0224

Table 8. ED, SEALER COAT & MANUFACTURING TOGETHER WITH PROTOTYPE PLANT: SOLIDS & ORGANIC SOLVENTS
January – December 2005

	Solids kg/12 month	O.S. kg/12 month
ED, Sealer Coat & Manufacturing	21980.36	4248.37
Prototype Plant	52.08	237.52
TOTAL	22032.44 (22.0324 tonnes)	4485.89 (4.4859 tonnes)

Box 4 SOLVENT MANAGEMENT PLAN: ED, SEALER COAT & MANUFACTURING AND PROTOTYPE PLANT
January – December 2005

1. No organic solvents that entered the process were recovered, reused or recycled, in any form, within the process or recycled externally by either being reused elsewhere or passed to a third party, within the specified time period. Hence; $I_2 = O_7 = O_8 = 0$

2. Annual Organic Solvents Consumption; (C): $C = I_1 - O_8 = 4485.89 – 0 =$ **4485.89 kg. (4.4859 tonnes)** (Ref: PG6/23(04) *Figure 5.1* & Table 7 of this Document)

3. Actual Solvent Emissions; (ASE): $ASE = I_1 - O_5 - O_6 - O_7 - O_8 = 4485.89 – 699.19 – 416.35 – 0 – 0 =$ **3370.35 kg (3.3704 tonnes)** Ref: PG6/23(04) *Figure 5.1* & Table 7 of this Document)

4. Fugitive Emissions; (F): $F = I_1 - O_1 – O_5 – O_6 – O_7 - O_8 = 4485.89 – 2005.28 – 699.19 – 416.35 – 0 – 0 =$ **1365.07 kg (1.3651) tonnes)** (Ref: PG6/23(04) *Figure 5.1* & Table 7 of this Document)

5. Fugitive Emission Value: $F/ [I_1 + I_2] \times 100\% = [1.3651 \text{ tonnes}/4.4859 \text{ tonnes}] \times 100 =$ **30.43%.** Ref: PG6/23(04) *Figure 5.1* & Table 7 of this Document)

6. Total Emissions; (TE): $TE = O_1 + F = 2005.29 + 1365.55 =$ **3370.84kg (3.3708 tonnes)** Ref: PG6/23(04) *Figure 5.1* & Table 7 of this Document)

7. Target Emissions; Total mass of solids x 0.9 = 22032.44kg x 0.9 = **19829.20kg (19.8291 tonnes)** (Ref: PG6/23(04) *Table 6* & Table 8 of this Document)

SOLVENT REDUCTION PLAN

Box 5 DETAIL OF SOLVENT REDUCTION PLAN

Presented directly below are two proposed actions, intended to achieve a reduction of the total emissions of organic solvents from the ED, Sealer Coating and Manufacturing Plant, by decreasing the solvent content of the total input and increasing the efficiency of certain solid, thus complying with the requirements of PG6/23 (04) Section 5.5.

Action 1: To replace CR648A Electrocoat Resin (Ref: 9), during the latter part of 2006, with a product with a higher solid to solvent ratio, thereby achieving a marginal increase in the efficiency of the solid use.

Action 2: The introduction of new procedures and a management system, with regards the use of Tower Chemicals Non-Aromatic Solvent (Ref: 11), a system designed to monitor and strictly control the solvent usage. It is hoped the proposed procedure will by identifying areas of excessive usage and restricting use, will have the desired affect of reducing solvent consumption and hence emissions.

OBSERVATION AND CONCLUSIONS

Box 6. OBSERVATIONS AND CONCLUSIONS

A review and survey of the above results and data reveals a number of pertinent facts, as specified below:-

1. From Box 4 (item 3 & 6) it is observed that both the **Actual Solvent Emission** and **Total Emission,** for the ED, Sealer Coat & Manufacturing and the Prototype Plant, has a value of **3.3704 tonnes**, which is well below the **Target Emission Value** of **19.8291tonnes** (Box 4 item 7), as calculated in accordance with PG 6/23(04); Table 6, page 24, using the values given in Table 8, page 20 of this document. It is therefore concluded that the emission criteria as been satisfied and hence compliance with the Reduction Scheme fully achieved (see Section 5.7, page 25 of PG 6/23(04)).

2. The **Annual Organic Solvents Consumption,** of the ED, Sealer Coating & Manufacturing together with the Prototype Plant (Box 4, item 2), for the specified period Jan. to Dec. 2005**,** is given as **4.4859 tonnes**, a value well below the minimum threshold of 5.000 tonnes as specified in The Pollution Prevention and Control (England & Wales) Regulations 2000 (SI 2000/1973); Schedule 1; Section 6.4; Part B(iv). It is also noted that at the bottom of Table 1: entitled "*Coating activities, operating conditions and relevant paragraphs.*" On page 4 of PG 6/23(04) is stated **"Coating processes/activities where the solvent consumption of the installation is < 5 tonnes are not covered by this note".** However, it must be appreciated that if the activities are expanded at some future date, then it is likely that the 5 tonnes threshold value will be achieved and exceeded.

3. **Tower Chemicals Non-Aromatic Solvent** (Ref. 11), with an Organic Solvent input of **1.7388 tonnes**, for the 12 month period, Jan. to Dec 2005 (see Tables 2 & 3 above) constitutes a substantial **38.76 %$^{w}/_{w}$** of the Total Annual Organic Solvent Consumption of **4.4859 tonnes** (Box 4, item 2) for the specified 12 month period. The same material also gave rise, in the same period, to an Actual Solvent Emission of **1.4693 tonnes**, which is equivalent to **43.59 %$^{w}/_{w}$** of the Total Actual Solvent Emission of **3.3704 tonnes** (see Box 4; item 3, Table 2 and Graph 1.4 above). It is hopped that Action 2 of the Solvent Reduction Plan (Box 5) will have the required effect of significantly reducing these values.

4. The combination of high usage and exceedingly low volatile organic compound (VOC) content of CR648A Electrocoat Resin (9), i.e. 49.700 tonnes per annum and 0.15g per litre respectively, to give an organic solvent usage of only 0.0068 tonnes for the relevant 12 month period, acts to a considerably extent in favour of reducing organic solvent use and emission. The replacement of CR648A Electrocoat Resin (9) with a material of higher solid and/or lower organic solvent content, as proposed by Action 1 of the Solvent Reduction Plan (Box 5) is likely to enhance this effect.

Note: The definition of a VOC, is any organic compound that has a vapour pressure equal to or greater than 0.01 kPa (0.075 mmHg) at a temperature of 293.15 K (20 ^{0}C). This definition by the very nature of the physical properties it describes must encompass the vast majority of organic solvents.