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Issue 1	B2.4 Raw & Auxiliary Materials Use	AWE/DSDG/A/RP/2040a
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1.2.1 Facility 1 - Raw and Auxiliary Materials Inventory

The following inventory identifies the raw and auxiliary materials used in the activities undertaken in Facility 1.

Raw or Auxiliary Material	Application	Annual Rate of Use	Fate (by %)				Environmental Hazard Data	Potential Alternative Identified?
			Product	Air	Water	Waste		
Beryllium	Component Manufacture	<1 te	25	<0.05	<0.05	75	Air - EAL _{LT} 0.004 µgm ⁻³ , EAL _{ST} 0.12 µgm ⁻³ Water - PNEC _{LT} 0.015 mg/l ¹ , PNEC _{ST} 0.015 mg/l ¹ Cat 2 Carcinogen (R49)	No
HFE 7100	Cleaning Operations	1000 kg	-	35	-	65	Air - EAL _{LT} 4.1 Years, GWP 280, ODP 0.00, Water EAL <12.	No
Lead and/or lead alloys	Component Manufacture	5 kg	95	<0.05	<0.05	>4	Air - EQS _{ST} 0.5µgm ⁻³ , EQS _{LT} 0.25µgm ⁻³ Water - EAL 4-20µgm ⁻³ (dependent on water hardness)	No
Non-ferrous Metal Alloys Containing Titanium; Aluminium; Brass; Nickel <i>AL 99 to 50/49</i>	Component Manufacture	250 kg	25-95	<0.05	<0.05	75-5	Air - Al - EAL _{ST} 600µgm ⁻³ , EAL _{LT} 20µgm ⁻³ Ni - EAL _{LT} 0.2µgm ⁻³ , EAL _{ST} 6µgm ⁻³ Ti - as Titanium dioxide EAL _{LT} 50µgm ⁻³ , EAL _{ST} 1500µgm ⁻³ Cu - EAL _{LT} 10µgm ⁻³ , EAL _{ST} 200µgm ⁻³ Zn - Unknown Water EAL - Al - 200µg/l Ni - 50µg/l, Ti - Unknown Cu - 1-28µg/l, Zn - 8-125 µg/l (all dependent on water hardness)	No
Ferrous Metals Cast Iron; Stainless Steel; Mild Steel	Component Manufacture	500 kg	25-95	<0.05	<0.05	75-5	Unknown	No
Titanium Hydride powder	VF Brazing Operations	500 g	50	-	-	50	Air (as TiO ₂) - EAL _{ST} 1500 µgm ⁻³ , EAL _{LT} 50 µgm ⁻³	No
Dichloromethane (nominally Microbraz 570 braze cement)	VF Brazing Operations	1 litre	-	100	-	-	Air - EAL _{LT} 700µgm ⁻³ , EAL _{ST} 3000µgm ⁻³	No

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Raw or Auxiliary Material	Application	Annual Rate of Use	Fate (by %)				Environmental Hazard Data	Potential Alternative Identified?
			Product	Air	Water	Waste		
Unknown Ceramic Pigment (nominally Microbraz Green Stop Off)	VF Brazing Operations	1 litre	-	-	-	100	N/A	No
Non-ferrous Metal Alloy Braze Materials (various)	Brazing Operations	1.5 kg	100	-	-	-	N/A	No
Petroleum Distillate/Alcohol based Penetrant Crack Detection fluid	PCD Test	5 litres	-	-	-	100	N/A	No
Silica/Alumina powder based Penetrant Crack Detection Developer	PCD Test	5 litre	-	-	-	100	N/A	No
Epoxy, Polyurethane and Cyanoacrylate based adhesives	Bonding Operations	2 kg	20	-	-	80	N/A	No
Silicone Rubber solution plus Catalyst N9162 (Tetraethyl silicate; ethylsilicate/Dibutyltin Dilaurate)	Push & Glue Operations	25 litres	-	-	-	100	N/A	No
Acetone	Manual Cleaning Operations	1 litre	-	-	-	100	Air: EAL _{LT} 17800µgm ⁻³ , EAL _{ST} 356000µgm ⁻³ Odour: 13900 µgm ⁻³ POCP – 18.2	No
Methyl Ethyl Ketone	Manual Cleaning Operations	0.4 kg	-	-	-	100	Air: EAL _{LT} 6000µgm ⁻³ , EAL _{ST} 90000µgm ⁻³ Odour: 0.5 – 1.29 mgm ⁻³ POCP – 51.1	No
Ethanol	Manual Cleaning Operations	40 litres	-	-	-	100	Air: EAL _{LT} 19000 µgm ⁻³ , EAL _{ST} 570000µgm ⁻³ POCP:44.6 Odour: 93 – 1350 mgm ⁻³	No

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Raw or Auxiliary Material	Application	Annual Rate of Use	Fate (by %)				Environmental Hazard Data	Potential Alternative Identified?
			Product	Air	Water	Waste		
Nitric Acid	Etching	5 Litres	-	-	10	90	Low pH, R8; R35(1): low bio-accumulation potential; forms nitrates in water at neutral pH	No
Sulphuric Acid	Etching	5 Litres	-	-	10	90	Low pH, R35(1); low bio-accumulation potential; dissociates in water to form hydrogen sulphate ions; drinking water limit 0.1 µg/l ¹	No
Perchloric Acid	Etching	1 litre	-	-	10	90	Unknown	No
Phosphoric Acid	Etching	5 litres	-	-	10	90	Low pH, R34(1); dissociation in water into hydrogen phosphate or dihydrogen phosphate; DW 2200 µg/l ¹ (Phosphorus)	No
Hydrofluoric Acid	Etching	1 litre	-	-	10	90	Low pH, R26/27/28 R35(1); low bio-accumulation potential; drinking water & WHO limit 1500 µg/l ¹ (Fluoride)	No
Acetic Acid	Etching	1 litre	-	-	10	90	Low pH, R10; R35(1); low bio-accumulation potential - rapid biodegradation; DW 10 µg/l ¹ (HC Total)	No
Aqueous Alkali Solutions (including KOH; NaOH; NH ₄ F; AgNO ₃ etc.)	Etching	10 litres	-	-	-	100	N/A	No
Aluminium /Silica braze alloy wire	MIG Brazing Operations	4.5 kg	90	<1	-	>4	Air (as TiO ₂) – EAL _{st} 600 µg/m ³ ; EAL _{Lr} 20 µg/m ³	No
Nitrogen Gas	MIG Brazing Operations & Pneumatic lock operation	>9,000 m ³ (at RTP)	-	100	-	-	Inert	No

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Raw or Auxiliary Material	Application	Annual Rate of Use	Fate (by %)				Environmental Hazard Data	Potential Alternative Identified?
			Product	Air	Water	Waste		
Mineral oils (various)	Hydraulic Systems; Pressure Tests	100 litres	-	2	-	98	Unknown	No
Polyphenyl Ether	Diffusion Pump Operation	50 litres	-	-	-	100	Unknown	No
Inert gases (argon; helium)	MIG Brazing Operations; VF Brazing Operations	4000 litres	-	100	-	-	N/A	No
Zeolites	Beryllium Component Storage	50 kg	-	-	-	100	Inert	No
Proprietary cleaning materials	Floor & Wall Cleaning	50 litres	-	-	100	-	Biodegradable	No
R22	Chiller & A/C Units	97.5 kg (Total Charge)	-	-	-	100	Air - ODP of 0.055; GWP of 17001 ¹ ; EAL _{sr} ¹ 1,050,000 µgm ⁻³ ; EAL _{tr} ¹ 35,000 µgm ⁻³	Yes, see Table 1.2.1
R407C	Chiller & A/C Units	0.7 kg (Total Charge)	-	-	-	100	Air - ODP of 0; GWP of 1526 ²	No
R12	Chiller & A/C Units	6.8 kg (Total Charge)	-	-	-	100	N/A	No

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1.3.1 Facility 2 - Raw and Auxiliary Materials Inventory

The following inventory identifies the raw and auxiliary materials used in the activities undertaken in Building G.

Raw or Auxiliary Material	Application	Annual Rate of Use	Fate (by %)				Environmental Hazard Data	Potential Alternative Identified?
			Product	Air	Water	Waste		
Beryllium	Component Manufacture	<1 te	100	-	-	-	Air - EAL _{Lr} 0.004 µgm ⁻³ , EAL _{sr} 0.12 µgm ⁻³ Water - PNEC _{Lr} 0.015 mg/l ¹ , PNEC _{sr} 0.015 mg/l ¹ Cat 2 Carcinogen (R49)	No
Ferrous Metal Alloys (various)	Component Manufacture	1 kg	100	-	-	-	N/A	No
Non-ferrous Metals and Alloys (various)	Component Manufacture	2 kg	100	-	-	-	N/A	No
Mineral Acids (various)	Etching	>1 litre	-	-	-	100	Low pH – potential impact on water quality	No
Titanium Hydride Powder	VGF Brazing Operations	100 g	-	100	-	-	Air (as TiO ₂) – EAL _{sr} 1500 µgm ⁻³ , EAL _{Lr} 50 µgm ⁻³	No
Dichloromethane (nominally Microbraz 510)	VGF Brazing Operations	0.5 litres	-	100	-	-	Air - EAL _{sr} 3000 µgm ⁻³ , EAL _{Lr} 700 µgm ⁻³	No
Copper / Silver Braze Material	VGF Brazing Operations	250 g	100	-	-	-	N/A	No
Unknown Ceramic Pigment (nominally Microbraz Green Stop Off)	VGF Brazing Operations	100 g	-	-	-	100	Unknown	No
Coating Metal	Coating Operations	7 kg	14	<1	-	>85		No
Aluminium / Silica Braze Material	MIG Brazing Operations	4.5 kg	90	<1	-	>9	Air (as TiO ₂) – EAL _{sr} 1500 µgm ⁻³ , EAL _{Lr} 20 µgm ⁻³	No
Argon / Helium Gas	MIG Brazing Operations	20 m ³ (at RTP)	-	100	-	-	Inert	No
Silver Based Braze Material	Torch Brazing Operations	250 g	100	-	-	-	N/A	No

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Raw or Auxiliary Material	Application	Annual Rate of Use	Fate (by %)			Environmental Hazard Data	Potential Alternative Identified?	
			Product	Air	Water			Waste
Alkanes C9-C12 (nominally MS 56)	Cleaning Operations	0.5 litres	-	100	-	-	Air (based on n-Octane) - ODP of 0; EAL _{st} 180,000µgm ⁻³ ; EAL _{Lt} 14,500µgm ⁻³ ; POCP (based on 2-methylcyclohexane) 70.6	No
Ethanol	Cleaning Operations	1 litre	-	100	-	-	Air - ODP of 0; EAL _{st} 570,000µgm ⁻³ ; EAL _{Lt} 19,000µgm ⁻³ ; POCP 44.6	No
Acetone	Cleaning Operations	1 litre	-	100	-	-	Air - ODP of 0; EAL _{st} 356,000 µgm ⁻³ ; EAL _{Lt} 17,800 µgm ⁻³ ; POCP 18.2	No
Trichloroethylene (nominally Triklone-N)	Cleaning Operations	2 litre	-	100	-	-	Air (based on n-Octane) - ODP of 0; EAL _{st} 1,000µgm ⁻³ ; EAL _{Lt} 1,070µgm ⁻³ ; POCP 7.5 Cat 2 Carcinogen (R49)	No
Petroleum Distillate / Alcohol (various) Solution (nominally ZL-60C)	PCD Test	0.1 litres	-	-	100	-	Unknown	No
Amorphous Silica / Aluminium Oxide Powder (nominally ZP-4B)	PCD Test	5 g	-	-	100	-	Unknown	No
Helium Gas	Leak Test	5 litres (at RTP)	-	100	-	-	Inert	No
R22	Chiller Units	11.9 (Total Charge)	-	-	-	100	Air - ODP of 0.055; GWP of 17001 ¹ ; EAL _{st} 1,050,000 µgm ⁻³ ; EAL _{Lt} 35,000 µgm ⁻³	Yes, see Table 1.3.1
R407C	Chiller Units	4.5 kg (Total Charge)	-	-	-	100	Air - ODP of 0; GWP of 1526	No
R413A	Refrigeration Unit	4 kg (Total Charge)	-	-	-	100	Air - ODP of 0; GWP of 1774	No
Alcohol (various) Based Anti Freeze	Chiller Units	100 litres	-	-	-	100	Unknown	No
Nitrogen Gas	Box-lines	Recorded by Gas Plant	-	100	-	-	Inert	No

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Raw or Auxiliary Material	Application	Annual Rate of Use	Fate (by %)				Environmental Hazard Data	Potential Alternative Identified?
			Product	Air	Water	Waste		
Radiographic Developer/Replenisher Part A Solution (hydroquinone, sequestering agent, potassium sulphite, potassium borate, potassium bromide, sodium metaborate)	Radiography	20 litres	-	-	-	100	Hydroquinone – strong reducing agent pH 11.85	No
Radiographic Developer/Replenisher Part B Solution (acetic acid, diethylene glycol, 1-phenyl-3-pyrazolidinone)		2 litres	-	-	-	100	Unknown	No
Radiographic Developer/Replenisher Part C Solution (glutaraldehyde potassium bisulfite)		4 litres	-	-	-	100	pH 2.5	No
Radiographic Fixer/Replenisher Part A Solution (ammonium thiosulphate, sodium acetate, sodium sulphite, boric acid, acetic acid)	Radiography	20 litres	-	-	-	100	pH 5.35	No
Radiographic Fixer/Replenisher Part B Solution (aluminium sulphate, acetic acid, citric acid, sodium acetate)		4 litres	-	-	-	100	pH 2.10	No
Liquid Nitrogen	Diff. Pump Cooling	300 litres	-	100	-	-	Inert	No
Mineral oils (Various Inc. BOC Edwards Mechanical Pump Oil, Ultragrade)	Hydraulic Systems; Pressure Tests	0-35 litres	-	2	-	98	Unknown	No
Dow Corning 704(R) Diff Pump Oil		1-5 litres	-	-	-	100	Unknown	No

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1.4.1 Facility 3 - Raw and Auxiliary Materials Inventory

The following inventory identifies the raw and auxiliary materials used in the activities undertaken in Facility 3.

Raw or Auxiliary Material	Application	Annual Rate of Use	Fate (by %)			Environmental Hazard Data	Potential Alternative Identified?
			Product	Air	Water		
Beryllium	Component Manufacture / Disassembly	25 Kg	99	<0.05	<0.05	Air - EAL _{Lr} 0.004 µgm ⁻³ ; EAL _{sr} 0.12 µgm ⁻³ Water - PNEC _{Lr} 0.015 mg/l ⁻¹ ; PNEC _{sr} 0.015 mg/l ⁻¹ Cat 2 Carcinogen (R49)	No
Gallium	Component Manufacture	500g	100			N/A	No
Ethanol	Machining Operations	110 litres	-	100	-	Air - ODP of 0; EAL _{sr} 570,000 µgm ⁻³ ; EAL _{Lr} 19,000 µgm ⁻³ ; ODP 44.6	Replaces 1,1,2 trichlorotrifluoro-ethane.
Trichloroethylene	Cleaning Operations	300*	-	100	-	Air - EAL _{Lr} 1070 µgm ⁻³ ; EAL _{sr} 1000 µgm ⁻³ POCP of 7.5 relative to ethane; ODP of 0; Cat 2 Carcinogen (R49)	No, see Table 1.4.1
Perchloroethylene	Density Determination Tests	200 litres	-	100	-	Air - EAL _{Lr} 3350 µgm ⁻³ ; EAL _{sr} 5000 µgm ⁻³	No
Graphite	Component Manufacture	132 kg	-	-	-	N/A	N/A
Calcium Fluoride (aqueous suspension)	Casting Operations	25 litres	-	-	-	N/A	No
Mineral Oils	Plant Lubrication & Vacuum Pump Operation	500 litres	-	-	-	N/A	No
Titanium	Mechining Operations	308g	100			Air (as TiO ₂) - EAL _{sr} 1500 µgm ⁻³ ; EAL _{Lr} 50 µgm ⁻³	No
Tantalum ware	Casting & Refining Operations	50 kg	-	-	-	N/A	No

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Raw or Auxiliary Material	Application	Annual Rate of Use	Fate (by %)				Environmental Hazard Data	Potential Alternative Identified?
			Product	Air	Water	Waste		
Tungsten	Electro Refining	5Kg	100				N/A	No
Aluminium silicon filler wire	Brazing Operations	4.25 kg	80	10	-	10	N/A	No
Copper Cladding	Component Pressing Operations	24 kg	-	-	-	100	N/A	No
Calcium metal	Analysis and Research	<1.0 kg	-	-	-	100	N/A	No
Alkali metal chloride salts (Na, K Ca, Mg)	Refining Operations	< 45 kg	-	-	-	100	N/A	No
Bromine based biocide (nominally Drewbrom 1L)	Cooling Water Treatment	500 litres	-	-	100	-	LC ₅₀ (96hrs) 3.8 mg/l, no known significant effects.	Replaces Biosperse 261T
Phosphate based anti-scalant (nominally Enviroplus 1505)	Cooling Water Treatment	2000 litres (75 – 125 ppm)	-	-	100	-	LC ₅₀ (24hrs) 784 mg/l, BOD ₅ 3 mg O ₂ /l, COD 139mg O ₂ /l	Replaces Enviroplus 2506
Maxiguard	Cooling Water Treatment	20000ppm (in a closed system)				100	LC ₅₀ (24hrs) > 1250 mg/l, BOD ₅ 1 mg O ₂ /l, COD 37mg O ₂ /l	No
Drew OL 130 (Ethylene Glycol)	Cooling Water Treatment	15% by volume (in a closed system)				100	N/A	No
R134A	Chiller Unit refrigerant	1200 kg (Total Charge)	-	-	-	100	N/A	No
R502	Refrigerant	3Kg				100	ODF 0.33 GWF 5600	No

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Raw or Auxiliary Material	Application	Annual Rate of Use	Fate (by %)				Environmental Hazard Data	Potential Alternative Identified?
			Product	Air	Water	Waste		
Fluorinert FC3283	Refrigerant	63Kg				100	N/A	No
Stainless Steel	Component Manufacture	200g					N/A	No
Kodak Industrex Developer Replenisher	Film Processing	90L				100	Fish LC ₅₀ : 1-10mg/l, EC ₅₀ : >100mg/l, COD 116g/l, BOD 68g/l	Yes, see Table 1.4.2
Kodak Industrex LO Fixer Replenisher	Film Processing	90L				100	Fish LC ₅₀ : > 100mg/l, EC ₅₀ : >100mg/l, COD 280g/l, BOD 227g/l	Yes, see Table 1.4.2
Miscellaneous organic and inorganic chemicals	Analysis and Research	<100 litres	-	20	-	80	Unknown	No
Yttrium oxide	Anode Casting Operations	800g	25%		-	75	N/A	No

* This is a worse case scenario value and takes into account the Ultrasonic Vapour Degrease Bath; currently not in use.

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