

WASTE STREAM	1A08	Decay Stored Waste
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SITE Amersham

SITE OWNER GE Healthcare Limited

WASTE CUSTODIAN GE Healthcare Limited

WASTE TYPE ILW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	~15.1 m ³
Total future arisings:		0 m ³
Total waste volume:		15.1 m ³

Comment on volumes: Manufacturing now ceased at The Grove Centre no future waste predicted. Stock volume well understood, no future volume due to cessation of manufacturing.

Uncertainty factors on volumes: Stock (upper): x 1.5 Arisings (upper) x
 Stock (lower): x 0.5 Arisings (lower) x

WASTE SOURCE General laboratory process waste that was generated as a result of manufacturing radioactive pharmaceutical products.

PHYSICAL CHARACTERISTICS

General description: The waste generated is typically small laboratory items that are packed into 5 litre metal cans. The waste consists of solid wastes within steel cans as primary containment, all contained in sealed PVC bags. Solids include glassware, rubber gloves, paper tissue and small items of redundant laboratory equipment such as hotplates, retort stands, etc. Waste undergoes decay storage.

Physical components (%wt): Glass 40%, Cellulosics 20%, Plastics/Rubber 35%, Metal 5%,

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): ~0.5

Comment on density: -

CHEMICAL COMPOSITION

General description and components (%wt): Glass 40%, Cellulosics 20%, Plastics/Rubber 35%, Metal 5%.

Chemical state: Neutral

Chemical form of radionuclides: H-3: Organic

Metals and alloys (%wt): Approximately 50% of metal will be present as sheet with a thickness of about 1mm. All other metal will be bulk items typical size 100mm long.

Stainless steel.....	TR	
Other ferrous metals.....	~5.0	Mild steel cans
Iron.....	0	
Aluminium.....	TR	
Beryllium.....	0	
Cobalt.....	0	
Copper.....	0	
Lead.....	0	
Magnox/Magnesium.....	0	
Nickel.....	0	
Titanium.....	0	
Uranium.....	0	
Zinc.....	0	

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	Zircaloy/Zirconium.....	0	
	Other metals.....	0	Not present
Organics (%wt):	PVC and neoprene present.		
	Total cellulose.....	~~20.0	
	Paper, cotton.....	~~20.0	
	Wood.....	TR	
	Halogenated plastics	~~20.0	PVC sheeting / gaitors
	Total non-halogenated plastics.....	~~5.0	Polyethylene
	Condensation polymers.....	TR	
	Others.....	~~5.0	
	Organic ion exchange materials....	0	
	Total rubber.....	~~10.0	
	Halogenated rubber	~~10.0	Hypalon/neoprene gloves/gaitors
	Non-halogenated rubber.....	TR	
	Hydrocarbons.....	0	
	Oil or grease		
	Fuel.....		
	Asphalt/Tarmac (cont.coal tar)...		
	Asphalt/Tarmac (no coal tar).....		
	Bitumen.....		
	Others.....		
	Other organics.....	TR	
Other materials (%wt):	Glass lab equipment.		
	Inorganic ion exchange materials.	0	
	Inorganic sludges and flocs.....	0	
	Soil.....	0	
	Brick/Stone/Rubble.....	0	
	Cementitious material.....	0	
	Sand.....	0	
	Glass/Ceramics.....	~~40.0	
	Graphite.....	0	
	Desiccants/Catalysts.....	0	
	Asbestos.....	0	
	Non/low friable.....		
	Moderately friable.....		
	Highly friable.....		
	Free aqueous liquids.....	0	
	Free non-aqueous liquids.....	0	
	Powder/Ash.....	TR	
Inorganic anions (%wt):	Inorganic anions present only as surface contamination. No details available at present.		

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Fluoride.....	TR
Chloride.....	TR
Iodide.....	TR
Cyanide.....	0
Carbonate.....	TR
Nitrate.....	TR
Nitrite.....	0
Phosphate.....	TR
Sulphate.....	TR
Sulphide.....	TR

Materials of interest for waste acceptance criteria:

The waste contains no hazardous materials.

Combustible metals.....	0
Low flash point liquids.....	0
Explosive materials.....	0
Phosphorus.....	0
Hydrides.....	0
Biological etc. materials.....	0
Biodegradable materials.....	20.0
Putrescible wastes.....	0
Non-putrescible wastes.....	~20.0
Corrosive materials.....	0
Pyrophoric materials.....	0
Generating toxic gases.....	0
Reacting with water.....	0
Active particles.....	0
Soluble solids as bulk chemical compounds.....	0

paper / cotton.

Hazardous substances / non hazardous pollutants:

-	
Acrylamide.....	0
Benzene.....	0
Chlorinated solvents.....	0
Formaldehyde.....	0
Organometallics.....	0
Phenol.....	0
Styrene.....	0
Tri-butyl phosphate.....	0
Other organophosphates.....	0
Vinyl chloride.....	~20.0
Arsenic.....	0
Barium.....	0
Boron.....	0

PVC

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Cadmium.....	0	
Caesium.....	0	
Selenium.....	0	
Chromium.....	P	Trace
Molybdenum.....	P	Trace
Thallium.....	0	
Tin.....	0	
Vanadium.....	0	
Mercury compounds.....	0	
Others.....	0	
Electronic Electrical Equipment (EEE)		
EEE Type 1.....	0	
EEE Type 2.....	0	
EEE Type 3.....	0	
EEE Type 4.....	0	
EEE Type 5.....	0	

Complexing agents (%wt):	No
EDTA.....	
DPTA.....	
NTA.....	
Polycarboxylic acids.....	
Other organic complexants.....	
Total complexing agents.....	0

LAW TREATMENT, PACKAGING AND DISPOSAL

Waste that is currently ILW: This waste is decay stored until it meets the LLW limits (typically 5 years). Typically within a 5 year period.

Planned on-site / off-site treatments(s):

Treatment	On-site / Off site	Stream volume %
Low force compaction		
Supercompaction (HFC)		
Incineration		
Solidification		
Decontamination		
Metal treatment		
Size reduction		
Decay storage		100.0
Recycling / reuse		
Other / various		
None		

Comment on planned treatments:

Waste decay stored then enters a LLW/LALLW stream (1A01/1A02)

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Disposal Routes:

Disposal Route	Stream volume %	
Expected to be consigned to the LLW Repository	90.0	
Expected to be consigned to a Landfill Facility		
Expected to be consigned to an On-Site Disposal Facility		
Expected to be consigned to an Incineration Facility		10.0
Expected to be consigned to a Metal Treatment Facility		
Expected to be consigned as Out of Scope		
Expected to be recycled / reused		
Disposal route not known		

Upcoming (2019/20-2021/22) waste routing (if expected to change from above)

Disposal Route	Stream volume %		
	2019/20	2020/21	2021/22
Expected to be consigned to the LLW Repository Expected to be consigned to a Landfill Facility Expected to be consigned to an On-Site Disposal Facility Expected to be consigned to an Incineration Facility Expected to be consigned to a Metal Treatment Facility Expected to be consigned as Out of Scope Expected to be recycled / reused Disposal route not known			

Waste Packaging for Disposal:

Container	Stream volume %	Waste loading m ³	Number of packages
1/3 Height IP-1 ISO 2/3 Height IP-2 ISO 1/2 Height WAMAC IP-2 ISO 1/2 Height IP-2 Disposal/Re-usable ISO 2m box (no shielding) 4m box (no shielding) Other (200L drums)	90.0	NE	

Other information: Disposed of as LALLW via LLWR Framework

Waste Consigned to the LLW Repository:

Container voidage: -

Waste Characterisation Form (WCH): -

Waste consigned for disposal to LLWR in year of generation: -

Potential for the waste to contain discrete items: -

Non-Containerised Waste for In-Vault Grouting: (Not applicable to this waste stream)

Stream volume (%): -

Waste stream variation: -

Bounding cuboidal volume:

Inaccessible voidage: -

Other information: -

RADIOACTIVITY

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Source:	The waste has been generated as a result of manufacturing radio-pharmaceutical and bio-science products.
Uncertainty:	There are no alpha nuclides present in this waste stream.
Definition of total alpha and total beta/gamma:	Where totals are shown on the table of radionuclide activities they are the sums of the listed alpha or beta/gamma emitting radionuclides plus 'other alpha' or 'other beta/gamma'.
Measurement of radioactivities:	The radioactive content of the waste is derived from direct measurement.
Other information:	The nuclide breakdown of this stream is short half-life nuclides that are not individually quoted on the activity sheet, the main contributor being Se-75.

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Nuclide	Mean radioactivity, TBq/m ³			Nuclide	Mean radioactivity, TBq/m ³		
	Waste at 1.4.2019	Bands and Code	Future arisings		Waste at 1.4.2019	Bands and Code	Future arisings
H 3	4.29E-05	AA 1		Gd 153			
Be 10				Ho 163			
C 14				Ho 166m			
Na 22				Tm 170			
Al 26				Tm 171			
Cl 36				Lu 174			
Ar 39				Lu 176			
Ar 42				Hf 178n			
K 40				Hf 182			
Ca 41				Pt 193			
Mn 53				Tl 204			
Mn 54				Pb 205			
Fe 55				Pb 210			
Co 60	9.97E-07	AA 1		Bi 208			
Ni 59				Bi 210m			
Ni 63				Po 210			
Zn 65	1.70E-13	AA 1		Ra 223			
Se 79				Ra 225			
Kr 81				Ra 226			
Kr 85				Ra 228			
Rb 87				Ac 227			
Sr 90				Th 227			
Zr 93				Th 228			
Nb 91				Th 229			
Nb 92				Th 230			
Nb 93m				Th 232			
Nb 94				Th 234			
Mo 93				Pa 231			
Tc 97				Pa 233			
Tc 99				U 232			
Ru 106				U 233			
Pd 107				U 234			
Ag 108m				U 235			
Ag 110m				U 236			
Cd 109				U 238			
Cd 113m				Np 237			
Sn 119m				Pu 236			
Sn 121m				Pu 238			
Sn 123				Pu 239			
Sn 126				Pu 240			
Sb 125				Pu 241			
Sb 126				Pu 242			
Te 125m				Am 241			
Te 127m				Am 242m			
I 129				Am 243			
Cs 134				Cm 242			
Cs 135				Cm 243			
Cs 137	1.8E-10	AA 1		Cm 244			
Ba 133				Cm 245			
La 137				Cm 246			
La 138				Cm 248			
Ce 144				Cf 249			
Pm 145				Cf 250			
Pm 147	9.67E-10	AA 1		Cf 251			
Sm 147				Cf 252			
Sm 151				Other a			
Eu 152				Other b/g	3.95E-03	AA 1	
Eu 154				Total a	0		0
Eu 155				Total b/g	3.99E-03	AA 1	0

Bands (Upper and Lower)

- A a factor of 1.5
- B a factor of 3
- C a factor of 10
- D a factor of 100
- E a factor of 1000

Note: Bands quantify uncertainty in mean radioactivity.

Code

- 1 Measured activity
- 2 Derived activity (best estimate)
- 3 Derived activity (upper limit)
- 4 Not present
- 5 Present but not significant
- 6 Likely to be present but not assessed
- 7 Present in significant quantities but not determined
- 8 Not expected to be present in significant quantity