

WASTE STREAM	1A03	LLW Non-Compactable Non-Drummable
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SITE Amersham

SITE OWNER GE Healthcare

WASTE CUSTODIAN GE Healthcare Limited

WASTE TYPE LLW

WASTE VOLUMES

	Reported (m ³)	OR	Conditioned (m ³)	Packaged (m ³)
Stocks:	At 1.4.2025 = 9.5			
Future arisings:	1.4.2025 - 31.3.2030 ~ 533.0			
Total future arisings:	533.0			
Total waste volume:	542.5			

Number of waste packages in stock: At 1.4.2025..... - packages

Comment on arising rates: Rate of arising varies due to waste being produced as a result of various decommissioning programmes.

Additional information on quantities: Future arising predictions based on project forecast of waste from decommissioning programmes used for the WCH for stream 1A03. Waste will be streamed where possible to LALLW and Out of Scope.

Uncertainty factors on volumes: Stock (upper): x 1.50 Arisings (upper): x 1.50
Stock (lower): x 0.50 Arisings (lower): x 0.50

WASTE SOURCE The waste is generated as a result of the site decommissioning programme to remove redundant buildings and facilities that have been used to manufacture a variety of industrial, pharmaceutical and life science products. Radioactivity is present as contamination and activation and includes a wide mixture of nuclides.

PHYSICAL CHARACTERISTICS

General description: The waste consists of redundant steel and fibreglass enclosures and associated ductwork wrapped in PVC layflat. Solids are of variable density and compressibility.

Changes since waste generated: None

Bulk density (t/m³): ~ 1.2

Comment on density: The waste has a density range of 0.1-2.0 t/m³ as stored. The mean density is not weighted.

CHEMICAL COMPOSITION

General description and components (%wt): Metals (74 wt%), plastics (22 wt%), cellulose (2 wt%), rubber (1%wt) others (<1 wt%).

Chemical state: Neutral

Sheet metal proportion / thickness: Sheet metal: 65% typical thickness 2 to 3 mm. Bulk items: 35%.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	= 6.0	-	
Other ferrous metals.....	= 63.0	mild steel	
Iron.....	= 2.0	cyclotron components (pole tips)	
Aluminium.....	< 0.10	-	
Beryllium.....	= 0	-	
Cobalt.....	= 0	-	
Copper.....	< 0.10	-	
Lead.....	= 1.3	Shielding	
Magnox/Magnesium.....	= 0	-	
Nickel.....	= 0	-	
Titanium.....	< 0.10	size reduced Cs-137 boxes	
Uranium.....	= 0	-	
Zinc.....	< 1.3	-	
Zircaloy/Zirconium.....	= 0	-	
Other metals.....	= 0.10	Chromium	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	= 2.0	-	
Paper, cotton.....	~ 1.0	-	
Wood.....	~ 1.0	-	
Halogenated plastics.....	= 3.0	PVC, perspex	
Total non-halogenated plastics.....	= 19.0	-	
Condensation polymers.....	= 18.0	fibreglass reinforced polyester	
Others.....	< 0.90	Polyethylene	
Organic ion exchange materials.....	= 0	-	
Total rubber.....	< 1.0	-	
Halogenated rubber.....	< 1.0	-	
Non-halogenated rubber.....	< 1.0	-	
Hydrocarbons.....	-	-	
Oil or grease.....	-	-	
Fuel.....	-	-	
Asphalt/Tarmac (cont.coal tar).....	-	-	
Asphalt/Tarmac (no coal tar).....	-	-	
Bitumen.....	-	-	
Others.....	-	-	
Other organics.....	< 0.90	-	

Other materials (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials.....	= 0	-	
Inorganic sludges and flocs.....	= 0	-	
Soil.....	= 0	-	
Brick/Stone/Rubble.....	= 0	-	
Cementitious material.....	= 0	-	
Sand.....	= 0	-	
Glass/Ceramics.....	-	-	
Graphite.....	= 0	-	
Desiccants/Catalysts.....	= 0	-	
Asbestos.....	< 0.10	-	
Non/low friable.....	< 0.05	-	
Moderately friable.....	< 0.05	-	
Highly friable.....	< 0.01	-	
Free aqueous liquids.....	= 0	-	
Free non-aqueous liquids.....	= 0	-	
Powder/Ash.....	= 0	-	

COMPONENTS OF MATERIALS, WASTE PROPERTIES, MATERIALS NOT CONTRIBUTING TO MASS

Inorganic anions (%wt):

	(%wt)	Type(s) and comment
Fluoride.....	< 0.10	-
Chloride.....	< 0.10	-
Iodide.....	< 0.10	-
Cyanide.....	= 0	-
Carbonate.....	< 0.10	-
Nitrate.....	< 0.10	-
Nitrite.....	= 0	-
Phosphate.....	< 0.10	-
Sulphate.....	< 0.10	-
Sulphide.....	< 0.10	-

Materials of interest for waste acceptance criteria:

	(%wt)	Type(s) and comment
Combustible metals.....	= 0	-
Low flash point liquids.....	= 0	-
Explosive materials.....	= 0	-
Phosphorus.....	= 0	-
Hydrides.....	= 0	-
Biological etc. materials.....	= 0	-
Biodegradable materials.....	= 5.0	-
Putrescible wastes.....	= 0	-
Non-putrescible wastes.....	= 5.0	paper cotton, wood.
Corrosive materials.....	= 0	-
Pyrophoric materials.....	= 0	-
Generating toxic gases.....	= 0	-
Reacting with water.....	= 0	-
Higher activity particles.....	= 0	-
Soluble solids as bulk chemical compounds.....	= 0	-

Hazardous substances / non hazardous pollutants:

	(%wt)	Type(s) and comment
Acrylamide.....	= 0	-
Benzene.....	= 0	-
Chlorinated solvents.....	= 0	-
Formaldehyde.....	= 0	-
Organometallics.....	= 0	-
Phenol.....	= 0	-
Styrene.....	= 0	-
Tri-butyl phosphate.....	= 0	-
Other organophosphates.....	= 0	-
Vinyl chloride.....	= 5.0	PVC
Arsenic.....	= 0	-
Barium.....	= 0	-
Boron.....	= 0	-
Boron (in Boral).....		-
Boron (non-Boral).....		-
Cadmium.....	= 0	-
Caesium.....	= 0	-
Selenium.....	= 0	-
Chromium.....	= 0	-
Molybdenum.....	= 0	-
Thallium.....	= 0	-
Tin.....	= 0	-
Vanadium.....	= 0	-
Mercury compounds.....	= 0	-
Others.....	= 0	-

Complexing agents (%wt):

No		
	(%wt)	Type(s) and comment
EDTA.....		-
DPTA.....		-
NTA.....		-
Polycarboxylic acids.....		-
Other organic complexants.....		The waste contains no complexing agents.
Total complexing agents.....	= 0	-

Physical components:

	Number	Type(s) and comment
Sources.....		-
Electronic & Electrical Equipment (EEE)		-
EEE Type 1.....	< 100	<100 stripped down circuit boards
EEE Type 2.....	< 100	<100 transformers/plant items (motors)
EEE Type 3.....	< 100	<100 hand tools (batteries removed)
EEE Type 4.....		-
EEE Type 5.....		-

TREATMENT, PACKAGING AND DISPOSAL

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

Treatment	On-site / Off-site	Stream volume %
Size reduction		
Decay storage		
Low force compaction		
Supercompaction (HFC)		
Incineration		
Drying/dewatering/liquid separation		
Tie down/fixatives/strippable coating/painting application		
Decontamination		
Metal treatment		
Recycling / reuse		
Thermal treatment, including vitrification		
Encapsulation		
Polymer encapsulation		
Other physical treatment		
Other chemical treatment		
Containerisation		
Treatment not yet determined		
None		= 100.0

Comments on planned treatments:

None

Conditioning method:

-

Conditioning plants:

Plant Name	Location

Likely conditioning matrix:

-

Further information on the conditioning matrix:

-

Waste Packaging:

Likely container type:	Container	Waste packaged (vol%)	Waste loading (m³)	Payload (m³)	Number of packages	Estimated start date for packaging
	-	-	-	-	-	-

Range in container waste loading:

Other information on packaging and conditioning: -

Conditioned density (t/m³): -

Conditioned density comment: -

Management Routes:

Disposal Route	Stream volume %	Raw density t/m³	Start date
Expected to be consigned to a Near Site, Near Surface Disposal Facility (Scotland)			
Expected to be Non-NSD HAW managed under Scottish Government's policy			
Expected to be disposed to LLW Vaults NRS Dounreay			
Expected to be consigned to the Geological Disposal Facility			
Expected to be consigned to a Near Surface Disposal Facility			
Expected to be consigned to the LLW Repository	= 25.0	~ 1.2	
Expected to be consigned to a Landfill Facility	= 75.0	~ 1.2	
Expected to be disposed On-Site			
Expected to be managed by In-Situ Disposal			
Expected to be consigned to an Incineration Facility			
Expected to be consigned to a Metal Treatment Facility			
Expected to be Out of Scope			
Expected to be recycled / reused			
Disposal route not known			

Classification codes for waste expected to be consigned to a landfill facility:

Opportunities for alternative disposal routing: No

Baseline Management Route	Opportunity Management Route	Stream volume (%)	Opportunity Confidence	Comment
-	-	-	-	-

RADIOACTIVITY

Source: This waste is generated as a result of decommissioning of facilities for manufacturing radio-pharmaceuticals and bio-science products. Radioactivity is present as low level contamination of general laboratory refuse and exists as a wide mixture of nuclides. The business mixture has changed and as a consequence fewer long lived nuclides are being generated.

Uncertainty: Stock well understood - items measured and assessed.

Measurement of radioactivities: Radioactivity in waste is assessed by either direct measurement or from processing records, or in the case of activated components from samples and derived fingerprints aligned to dose with microshield modelling.

Chemical form of radionuclides:

- H-3: -
- C-14: -
- Cl-36: -
- Se-79: -
- Tc-99: -
- I-129: -
- Ra: Small amounts of radium are present as radium sulphate
- Th: -
- U: -
- Np: -
- Pu: -

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Nuclide	Mean radioactivity, TBq/m³				Nuclide	Mean radioactivity, TBq/m³			
	Waste at 1.4.2025	Bands and Code	Future Arisings	Bands and Code		Waste at 1.4.2025	Bands and Code	Future Arisings	Bands and Code
H 3	= 4.55E-07	A A 1	~ 5.63E-06	A A 2	Gd 153				
Be 10					Ho 163				
C 14	= 1.06E-05	A A 1	~ 2.35E-05	A A 2	Ho 166m				
Na 22	= 4.36E-06	A A 1	~ 9.38E-09	A A 2	Tm 170				
Al 26			~ 9.38E-09	A A 2	Tm 171				
Cl 36	= 7.14E-06	A A 1	~ 3.75E-05	A A 2	Lu 174				
Ar 39					Lu 176				
Ar 42					Hf 178n				
K 40					Hf 182				
Ca 41					Pt 193				
Mn 53					Tl 204				
Mn 54	= 2.34E-08	A A 1	~ 9.38E-09	A A 2	Pb 205				
Fe 55	= 5.40E-04	A A 1	~ 1.88E-06	A A 2	Pb 210		~ 1.00E-06	A A 2	
Co 60	= 1.90E-04	A A 1	~ 1.41E-05	A A 2	Bi 208				
Ni 59					Bi 210m				
Ni 63	= 5.38E-04	A A 1	~ 9.38E-08	A A 2	Po 210		~ 1.00E-06	A A 2	
Zn 65	= 2.00E-09	A A 1	~ 1.88E-07	A A 2	Ra 223				
Se 79					Ra 225				
Kr 81					Ra 226		~ 1.18E-06	A A 2	
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90	= 5.04E-05	A A 1	~ 1.88E-05	A A 2	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			~ 9.38E-09	A A 2	U 232				
Ru 106					U 233				
Pd 107					U 234				
Ag 108m	= 1.56E-06	A A 1	~ 9.38E-09	A A 2	U 235				
Ag 110m			~ 9.38E-09	A A 2	U 236				
Cd 109	= 4.52E-07	A A 1	~ 9.38E-09	A A 2	U 238				
Cd 113m					Np 237				
Sn 119m					Pu 236				
Sn 121m					Pu 238		~ 5.63E-08	A A 2	
Sn 123					Pu 239				
Sn 126					Pu 240				
Sb 125	= 9.49E-06	A A 1	~ 7.50E-07	A A 2	Pu 241				
Sb 126					Pu 242				
Te 125m					Am 241	= 8.74E-06	A A 1	~ 9.38E-06	A A 2
Te 127m					Am 242m				
I 129					Am 243				
Cs 134			~ 9.38E-09	A A 2	Cm 242				
Cs 135					Cm 243		~ 3.75E-09	A A 2	
Cs 137	= 4.77E-04	A A 1	~ 1.91E-03	A A 2	Cm 244		~ 7.50E-06	A A 2	
Ba 133	= 3.89E-07	A A 1	~ 9.38E-09	A A 2	Cm 245		~ 2.06E-06	A A 2	
La 137					Cm 246				
La 138					Cm 248				
Ce 144					Cf 249				
Pm 145					Cf 250				
Pm 147			~ 9.38E-09	A A 2	Cf 251				
Sm 147					Cf 252				
Sm 151					Unsp a				
Eu 152	= 8.74E-08	A A 1	~ 9.38E-08	A A 2	Unsp b/g	= 7.91E-07	A A 1	~ 1.97E-07	A A 2
Eu 154			~ 9.39E-09	A A 2	Total a	8.74E-06	*	2.12E-05	*
Eu 155					Total b/g	1.83E-03	*	2.01E-03	*

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 the 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
* Total calculated from the 114 declared radionuclides