

WASTE STREAM	5C56	Harwell LLW Sources
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SITE Harwell

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Nuclear Restoration Services Ltd (NRS)

WASTE TYPE LLW

WASTE VOLUMES

	Reported (m ³)	OR	Conditioned (m ³)	Packaged (m ³)
Stocks:	At 1.4.2025	= 2.0		
Future arisings:				
Total future arisings:		0.0		
Total waste volume:		2.0		

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

Comment on arising rates: -

Additional information on quantities: -

Uncertainty factors on volumes: Stock (upper): x 1.10 Arisings (upper): x -
Stock (lower): x 0.90 Arisings (lower): x -

WASTE SOURCE LLW sources arising from operations and experiments on the site.

PHYSICAL CHARACTERISTICS

General description: The sources will be varying sizes, and packaging will vary from plastic sealed/wrapped, concreted into a metal/plastic bin, cardboard box etc.

Changes since waste generated: -

Bulk density (t/m³): ~ 2.0

Comment on density: -

CHEMICAL COMPOSITION

General description and components (%wt): Sources (79%), unspecified and ferrous metals (12%), plastics (7%), others (2%). Sources will comprise metal/plastic/ mica holders and source material.

Chemical state: Neutral

Sheet metal proportion / thickness: -

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	~ 10.0	-	
Other ferrous metals.....	~ 65.0	-	
Iron.....		-	
Aluminium.....	~ 0.10	-	
Beryllium.....		-	
Cobalt.....		-	
Copper.....	TR	-	
Lead.....	~ 10.0	-	
Magnox/Magnesium.....		-	
Nickel.....		-	
Titanium.....		-	
Uranium.....	P	-	
Zinc.....	= 0	-	
Zircaloy/Zirconium.....		-	
Other metals.....	~ 1.0	Tungsten and Depleted Uranium	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	~ 0.90	-	
Paper, cotton.....	~ 0.90	-	
Wood.....	= 0	-	
Halogenated plastics.....	~ 1.0	PVC, PTFE	
Total non-halogenated plastics.....	~ 10.0	-	
Condensation polymers.....	-	-	
Others.....	~ 10.0	-	
Organic ion exchange materials.....	= 0	-	
Total rubber.....	TR	-	
Halogenated rubber.....	TR	neoprene and hypalon	
Non-halogenated rubber.....	TR	-	
Hydrocarbons.....	-	-	
Oil or grease.....	-	-	
Fuel.....	-	-	
Asphalt/Tarmac (cont.coal tar).....	-	-	
Asphalt/Tarmac (no coal tar).....	-	-	
Bitumen.....	-	-	
Others.....	-	-	
Other organics.....	NE	-	

Other materials (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials.....	-	-	
Inorganic sludges and flocs.....	-	-	
Soil.....	-	-	
Brick/Stone/Rubble.....	-	-	
Cementitious material.....	-	-	
Sand.....	-	-	
Glass/Ceramics.....	~ 0.80	-	
Graphite.....	-	-	
Desiccants/Catalysts.....	-	-	
Asbestos.....	NE	-	
Non/low friable.....	-	-	
Moderately friable.....	-	-	
Highly friable.....	-	-	
Free aqueous liquids.....	NE	-	
Free non-aqueous liquids.....	NE	-	
Powder/Ash.....	NE	-	

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

Inorganic anions (%wt):

	(%wt)	Type(s) and comment
Fluoride.....	< 0.01	-
Chloride.....	< 0.01	-
Iodide.....	< 0.01	-
Cyanide.....	= 0	-
Carbonate.....	< 0.10	-
Nitrate.....	< 0.10	-
Nitrite.....	< 0.10	-
Phosphate.....	< 0.10	-
Sulphate.....	< 0.10	-
Sulphide.....	< 0.10	-

Materials of interest for waste acceptance criteria:

	(%wt)	Type(s) and comment
Combustible metals.....	~ 2.0	-
Low flash point liquids.....	~ 0.50	-
Explosive materials.....	< 0.01	-
Phosphorus.....	< 0.01	-
Hydrides.....	< 0.01	-
Biological etc. materials.....	< 0.10	-
Biodegradable materials.....	0.01	-
Putrescible wastes.....	< 0.01	-
Non-putrescible wastes.....	-	-
Corrosive materials.....	< 0.01	-
Pyrophoric materials.....	< 0.01	-
Generating toxic gases.....	< 0.01	-
Reacting with water.....	< 0.01	-
Higher activity particles.....	-	-
Soluble solids as bulk chemical compounds.....	-	-

Hazardous substances / non hazardous pollutants:

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

Complexing agents (%wt):

No		
	(%wt)	Type(s) and comment
EDTA.....		-
DPTA.....		-
NTA.....		-
Polycarboxylic acids.....		-
Other organic complexants.....		-
Total complexing agents.....		-

Physical components:

	Number	Type(s) and comment
Sources.....		-
Electronic & Electrical Equipment (EEE)		-
EEE Type 1.....		-
EEE Type 2.....		-
EEE Type 3.....		-
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		= 100.0
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		

Comments on planned treatments:

Sources will be stripped of all extraneous material and encapsulated in grout in "paint-tin" type containers.

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
	1/2 Height IP-2 Disposal/Re-usable ISO (TC01/TC02)	100.0	15.5	18.3	1	-

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)	= 100.0	2.4	
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			
Expected to be consigned to a Landfill Facility			
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: Redundant sealed sources used for a variety of purposes.

Uncertainty: Radionuclides expected to be present shown in above table. Awaiting characterisation to determine activity values.

Measurement of radioactivities: -

Chemical form of radionuclides:

- H-3: -
- C-14: Present as labelled organic compounds
- Cl-36: -
- Se-79: -
- Tc-99: -
- I-129: -
- Ra: -
- Th: -
- U: Metal or oxide
- Np: -
- Pu: -

WASTE STREAM 5C56 Harwell LLW Sources									
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		8			Gd 153		8		
Be 10		8			Ho 163		8		
C 14		8			Ho 166m		8		
Na 22		8			Tm 170		8		
Al 26		8			Tm 171		8		
Cl 36		6			Lu 174		8		
Ar 39		8			Lu 176		8		
Ar 42		8			Hf 178n		8		
K 40		6			Hf 182		8		
Ca 41		8			Pt 193		8		
Mn 53		8			Tl 204		8		
Mn 54		8			Pb 205		8		
Fe 55		6			Pb 210		8		
Co 60		6			Bi 208		8		
Ni 59		8			Bi 210m		8		
Ni 63		6			Po 210		8		
Zn 65		8			Ra 223		8		
Se 79		8			Ra 225		8		
Kr 81		8			Ra 226		6		
Kr 85		8			Ra 228		8		
Rb 87		8			Ac 227		8		
Sr 90		6			Th 227		8		
Zr 93		8			Th 228		6		
Nb 91		8			Th 229		8		
Nb 92		8			Th 230		6		
Nb 93m		8			Th 232		6		
Nb 94		8			Th 234		8		
Mo 93		8			Pa 231		8		
Tc 97		8			Pa 233		8		
Tc 99		6			U 232		8		
Ru 106		8			U 233		6		
Pd 107		8			U 234		6		
Ag 108m		8			U 235		6		
Ag 110m		8			U 236		8		
Cd 109		8			U 238		6		
Cd 113m		8			Np 237		6		
Sn 119m		8			Pu 236		8		
Sn 121m		8			Pu 238		6		
Sn 123		8			Pu 239		6		
Sn 126		8			Pu 240		6		
Sb 125		8			Pu 241		8		
Sb 126		8			Pu 242		8		
Te 125m		8			Am 241		6		
Te 127m		8			Am 242m		8		
I 129		6			Am 243		6		
Cs 134		8			Cm 242		8		
Cs 135		8			Cm 243		8		
Cs 137		8			Cm 244		6		
Ba 133		6			Cm 245		8		
La 137		8			Cm 246		8		
La 138		8			Cm 248		8		
Ce 144		8			Cf 249		8		
Pm 145		8			Cf 250		6		
Pm 147		6			Cf 251		8		
Sm 147		8			Cf 252		6		
Sm 151		8			Unsp a				
Eu 152		6			Unsp b/g				
Eu 154		6			Total a	0	*	0	*
Eu 155		6			Total b/g	0	*	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 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