

WASTE STREAM	5C309	Minor Facilities Decommissioning LLW
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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	= 62.1		
Future arisings:	1.4.2025 - 31.3.2027	85.9		
Total future arisings:		85.9		
Total waste volume:		148.0		

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

Comment on arising rates: -

Additional information on quantities: Volumes updated for 2016 RWI to reflect SMART Inventory Review

Uncertainty factors on volumes:

Stock (upper):	x 1.05	Arisings (upper):	x 1.30
Stock (lower):	x 0.95	Arisings (lower):	x 0.70

WASTE SOURCE Decommissioning waste from redundant facilities.

PHYSICAL CHARACTERISTICS

General description: Hard metallic waste from decommissioning of cells, gloveboxes, ventilation systems and pipework in facilities. The waste also includes concrete and building rubble. The waste will contain large items.

Changes since waste generated: -

Bulk density (t/m³): ~ 2.0

Comment on density: Average density based on material types.

CHEMICAL COMPOSITION

General description and components (%wt): Metal (49%), concrete and building rubble (50%), cellulose, plastics and rubber (1%).

Chemical state: Neutral

Sheet metal proportion / thickness: -

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	P	-	
Other ferrous metals.....	~ 47.0	-	
Iron.....		-	
Aluminium.....	~ 0.50	-	
Beryllium.....	= 0	-	
Cobalt.....		-	
Copper.....	P	-	
Lead.....	~ 1.5	-	
Magnox/Magnesium.....	= 0	-	
Nickel.....		-	
Titanium.....		-	
Uranium.....	TR	-	
Zinc.....	NE	-	
Zircaloy/Zirconium.....	= 0	-	
Other metals.....	NE	Other metals includes antimony.	

Organics (%wt):

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

Other materials (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials.....	NE	-	
Inorganic sludges and flocs.....	NE	-	
Soil.....	= 0	-	
Brick/Stone/Rubble.....	= 0	-	
Cementitious material.....	= 50.0	-	
Sand.....		-	
Glass/Ceramics.....	= 0	-	
Graphite.....	= 0	-	
Desiccants/Catalysts.....		-	
Asbestos.....	NE	-	
Non/low friable.....		-	
Moderately friable.....		-	
Highly friable.....		-	
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.....	NE	-
Chloride.....	NE	-
Iodide.....	NE	-
Cyanide.....	NE	-
Carbonate.....	P	-
Nitrate.....	NE	-
Nitrite.....	NE	-
Phosphate.....	NE	-
Sulphate.....	NE	-
Sulphide.....	NE	-

Materials of interest for waste acceptance criteria:

	(%wt)	Type(s) and comment
Combustible metals.....	TR	-
Low flash point liquids.....	= 0	-
Explosive materials.....	= 0	-
Phosphorus.....	= 0	-
Hydrides.....	= 0	-
Biological etc. materials.....	= 0	-
Biodegradable materials.....	0	-
Putrescible wastes.....	= 0	-
Non-putrescible wastes.....		-
Corrosive materials.....	= 0	-
Pyrophoric materials.....	= 0	-
Generating toxic gases.....	= 0	-
Reacting with water.....	= 0	-
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):

Yes		
	(%wt)	Type(s) and comment
EDTA.....	TR	-
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	Off-site	~ 3.0
Decay storage		
Low force compaction		
Supercompaction (HFC)		
Incineration	On-site	~ 32.0
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		~ 65.0

Comments on planned treatments:

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			
Expected to be consigned to a Landfill Facility	= 65.0	2.0	2025
Expected to be disposed On-Site			
Expected to be managed by In-Situ Disposal			
Expected to be consigned to an Incineration Facility	= 3.0	0.40	2025
Expected to be consigned to a Metal Treatment Facility			
Expected to be Out of Scope	= 32.0	2.0	2025
Expected to be recycled / reused			
Disposal route not known			

Classification codes for waste expected to be consigned to a landfill facility: 17 04 07, 17 01 01

Opportunities for alternative disposal routing: No

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

RADIOACTIVITY

Source: Activity will principally be due to contamination from a wide range of sources.

Uncertainty: The quantity of 'other beta/gamma' radionuclides in future arisings will be present in insignificant activities.

Measurement of radioactivities: -

Chemical form of radionuclides:

H-3: -

C-14: -

Cl-36: -

Se-79: -

Tc-99: -

I-129: -

Ra: -

Th: -

U: Form of uranium is not known, but probably comprises mainly oxide and metal plus small amounts of nitrates.

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		8		8	Gd 153		8		8
Be 10		8		8	Ho 163		8		8
C 14		8		8	Ho 166m		8		8
Na 22		8		8	Tm 170		8		8
Al 26		8		8	Tm 171		8		8
Cl 36		8		8	Lu 174		8		8
Ar 39		8		8	Lu 176		8		8
Ar 42		8		8	Hf 178n		8		8
K 40		8		8	Hf 182		8		8
Ca 41		8		8	Pt 193		8		8
Mn 53		8		8	Ti 204		8		8
Mn 54		8		8	Pb 205		8		8
Fe 55		8		8	Pb 210	5.14E-06	B B 2	5.14E-06	B B 2
Co 60	3.55E-07	B B 2	3.55E-07	B B 2	Bi 208		8		8
Ni 59		8		8	Bi 210m		8		8
Ni 63		8		8	Po 210	4.99E-06	B B 2	4.99E-06	B B 2
Zn 65		8		8	Ra 223		8		8
Se 79		8		8	Ra 225		8		8
Kr 81		8		8	Ra 226	1.40E-05	B B 2	1.40E-05	B B 2
Kr 85		8		8	Ra 228	4.68E-07	B B 2	4.68E-07	B B 2
Rb 87		8		8	Ac 227		8		8
Sr 90	2.21E-06	B B 2	2.21E-06	B B 2	Th 227		8		8
Zr 93		8		8	Th 228	4.23E-07	B B 2	4.23E-07	B B 2
Nb 91		8		8	Th 229		8		8
Nb 92		8		8	Th 230		8		8
Nb 93m		8		8	Th 232	5.60E-07	B B 2	5.60E-07	B B 2
Nb 94		8		8	Th 234	2.40E-06	B B 2	2.40E-06	B B 2
Mo 93		8		8	Pa 231		8		8
Tc 97		8		8	Pa 233	3.00E-08	B B 2	3.00E-08	B B 2
Tc 99		8		8	U 232		8		8
Ru 106		8		8	U 233		8		8
Pd 107		8		8	U 234	1.20E-06	B B 2	1.20E-06	B B 2
Ag 108m		8		8	U 235	4.50E-06	B B 2	4.50E-06	B B 2
Ag 110m		8		8	U 236		8		8
Cd 109		8		8	U 238	2.40E-06	B B 2	2.40E-06	B B 2
Cd 113m		8		8	Np 237	3.00E-08	B B 2	3.00E-08	B B 2
Sn 119m		8		8	Pu 236		8		8
Sn 121m		8		8	Pu 238	2.00E-07	B B 2	2.00E-07	B B 2
Sn 123		8		8	Pu 239	3.90E-07	B B 2	3.90E-07	B B 2
Sn 126		8		8	Pu 240	2.30E-07	B B 2	2.30E-07	B B 2
Sb 125	1.42E-09	B B 2	1.42E-09	B B 2	Pu 241	5.49E-06	B B 2	5.49E-06	B B 2
Sb 126		8		8	Pu 242		8		8
Te 125m		8		8	Am 241	5.10E-06	B B 2	5.10E-06	B B 2
Te 127m		8		8	Am 242m		8		8
I 129	6.80E-08	B B 2	6.80E-08	B B 2	Am 243		8		8
Cs 134		8		8	Cm 242		8		8
Cs 135		8		8	Cm 243		8		8
Cs 137	7.93E-06	B B 2	7.93E-06	B B 2	Cm 244	1.80E-08	B B 2	1.80E-08	B B 2
Ba 133		8		8	Cm 245		8		8
La 137		8		8	Cm 246		8		8
La 138		8		8	Cm 248		8		8
Ce 144		8		8	Cf 249		8		8
Pm 145		8		8	Cf 250		8		8
Pm 147		8		8	Cf 251		8		8
Sm 147		8		8	Cf 252		8		8
Sm 151		8		8	Unsp a				
Eu 152	9.60E-09	B B 2	9.60E-09	B B 2	Unsp b/g				
Eu 154	2.20E-08	B B 2	2.20E-08	B B 2	Total a	3.40E-05	*	3.40E-05	*
Eu 155	4.23E-09	B B 2	4.23E-09	B B 2	Total b/g	2.41E-05	*	2.41E-05	*

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