

WASTE STREAM	2D500	MSS Compartment 10 - Retrieved
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SITE Sellafield

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Sellafield Ltd

WASTE TYPE ILW

WASTE VOLUMES

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

Total future arisings: 0.0

Total waste volume: 33.3

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

Comment on arising rates: There are no future arisings to this stream.

Additional information on quantities: Waste volume is miscellaneous beta/gamma waste.

Uncertainty factors on volumes: Stock (upper): x 1.00 Arisings (upper): x -
Stock (lower): x 1.00 Arisings (lower): x -

WASTE SOURCE Miscellaneous beta/gamma mainly from Windscale, some from other sites.

PHYSICAL CHARACTERISTICS

General description: Some miscellaneous beta/gamma wastes (MBGW) are also present: these include tins/cans, filters, tools, pipework, pumps, valves, plastic items. The waste also includes some uranium most of which has corroded to oxides of uranium.

Changes since waste generated: Some degradation of miscellaneous components waste will have occurred.

Bulk density (t/m³): = 1.1

Comment on density: -

CHEMICAL COMPOSITION

General description and components (%wt): 100% MBGW (scrap, filters, cans, etc.).

Chemical state: Neutral

Sheet metal proportion / thickness: No significant quantities of sheet metal, although small quantities of fabricated items are present, e.g. paint tins, HEPA filters. Small pieces of Magnox metal present.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	~ 30.6	-	
Other ferrous metals.....	~ 32.3	-	
Iron.....	P	-	
Aluminium.....	~ 2.4	-	
Beryllium.....	NE	-	
Cobalt.....	P	-	
Copper.....	TR	-	
Lead.....	TR	-	
Magnox/Magnesium.....	~ 0.92	Predominantly Magnox.	
Nickel.....	TR	-	
Titanium.....	NE	-	
Uranium.....	~ 0.08	-	
Zinc.....	TR	-	
Zircaloy/Zirconium.....	= 0	-	
Other metals.....	= 0	-	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	~ 3.4	-	
Paper, cotton.....		-	
Wood.....		-	
Halogenated plastics.....	~ 0.93	-	
Total non-halogenated plastics.....	~ 0.93	-	
Condensation polymers.....		-	
Others.....		-	
Organic ion exchange materials.....	NE	-	
Total rubber.....	NE	-	
Halogenated rubber.....		-	
Non-halogenated rubber.....		-	
Hydrocarbons.....		-	
Oil or grease.....	~ 0.01	-	
Fuel.....	NE	-	
Asphalt/Tarmac (cont.coal tar).....	NE	-	
Asphalt/Tarmac (no coal tar).....	NE	-	
Bitumen.....	NE	-	
Others.....	NE	-	
Other organics.....	~ 0.18	-	

Other materials (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials.....	NE	-	
Inorganic sludges and flocs.....	= 0	-	
Soil.....	NE	-	
Brick/Stone/Rubble.....	= 0	-	
Cementitious material.....	NE	-	
Sand.....	NE	-	
Glass/Ceramics.....	= 0	-	
Graphite.....	~ 9.4	-	
Desiccants/Catalysts.....	NE	-	
Asbestos.....	NE	-	
Non/low friable.....		-	
Moderately friable.....		-	
Highly friable.....		-	
Free aqueous liquids.....	= 0	-	
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.....	NE	-
Chloride.....	NE	-
Iodide.....	NE	-
Cyanide.....	NE	-
Carbonate.....	NE	-
Nitrate.....	NE	-
Nitrite.....	NE	-
Phosphate.....	NE	-
Sulphate.....	NE	-
Sulphide.....	NE	-

Materials of interest for waste acceptance criteria:

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

Hazardous substances / non hazardous pollutants:

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

-

Conditioning method:

The waste has been retrieved from MSSS and stored in an unconditioned state for a period of 70 years. Following the period of storage, it will be retrieved (from storage) and conditioned for ultimate disposal to the GDF.

Conditioning plants:

Plant Name	Location
Magnox Swarf Storage Silo (MSSS) Final Conditioning Plant	Sellafield

Likely conditioning matrix:

Non-standard

Further information on the conditioning matrix:

MSSS wastes will be conditioned using an appropriate matrix

Waste Packaging:

Likely container type:	Container	Waste packaged (vol%)	Waste loading (m³)	Payload (m³)	Number of packages	Estimated start date for packaging
	Sellafield 3 m³ box	100.0	0.67	2.2	50	-

Range in container waste loading: The total number of retrieved packages is 50. There are no residuals for this stream.

Other information on packaging and conditioning: Waste matrix (as retrieved) will be in-filled with grout. A second pour of capping grout will be added. Void spaces between Skip wall and Box wall will be filled with grout.

Conditioned density (t/m³): -
Conditioned density comment: Density of conditioned waste will be fairly uniform.

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		
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: Irradiated fuel, fuel components, reactor components and miscellaneous items contaminated with fuel residues.

Uncertainty: Accuracy is generally good for fuel based residues, based on decanning records arisings and fuel carry over evaluations. For miscellaneous waste items, where records are incomplete, the accuracy is worse.

Measurement of radioactivities: Isotopic specific activity (TBq/m³) is derived by dividing the estimated total activity of the isotope by the total volume of the waste.

Chemical form of radionuclides:

- H-3: Present in elemental and reacted forms.
- C-14: Present in elemental and reacted forms.
- Cl-36: Present in elemental and reacted forms.
- Se-79: Present in elemental and reacted forms.
- Tc-99: Present in elemental and reacted forms.
- I-129: Present in elemental and reacted forms.
- Ra: Ra isotopes are present in less than trace amounts in fuel.
- Th: Present in elemental and reacted forms.
- U: Present in metallic and reacted forms (oxides and possibly hydride).
- Np: Present in elemental and reacted forms.
- Pu: Present in metallic and mixed oxide forms.

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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	6.49E-01	A B 2			Gd 153	2.66E-27	A A 2		
Be 10	1.05E-07	A A 2			Ho 163	6.23E-13	A A 2		
C 14	2.09E-01	A B 2			Ho 166m	2.47E-08	A A 2		
Na 22					Tm 170	2.79E-50	A A 2		
Al 26					Tm 171	8.73E-14			
Cl 36	4.20E-06	A B 2			Lu 174				
Ar 39	4.97E-04	A B 2			Lu 176				
Ar 42					Hf 178n				
K 40	3.26E-09	A B 2			Hf 182	2.14E-17	A A 2		
Ca 41	3.47E-05	A B 2			Pt 193				
Mn 53	1.68E-09	A B 2			Tl 204	1.61E-05	A A 2		
Mn 54					Pb 205	5.69E-11	A A 2		
Fe 55	3.59E-03	A A 2			Pb 210	9.30E-12	A A 2		
Co 60	6.03E-01	A A 2			Bi 208				
Ni 59	8.49E-01	A A 2			Bi 210m	3.91E-15	A A 2		
Ni 63	7.63E+01	A A 2			Po 210	9.05E-12	A A 2		
Zn 65					Ra 223	7.76E-10	A A 2		
Se 79	7.70E-07	A A 2			Ra 225	4.60E-11	A A 2		
Kr 81					Ra 226	2.46E-11	A A 2		
Kr 85	5.15E-03	A A 2			Ra 228				
Rb 87	8.61E-10	A A 2			Ac 227	3.05E-10	A A 2		
Sr 90	3.12E-01	A A 2			Th 227	3.00E-10	A A 2		
Zr 93	2.48E-05	A A 2			Th 228	4.87E-08	A A 2		
Nb 91					Th 229	4.61E-11	A A 2		
Nb 92	7.06E-17	A A 2			Th 230	2.24E-09	A A 2		
Nb 93m	3.86E-03	A A 2			Th 232	4.19E-12	A A 2		
Nb 94	4.69E-03	A A 2			Th 234	9.84E-06	A A 2		
Mo 93	4.48E-03	A A 2			Pa 231	5.45E-10	A A 2		
Tc 97					Pa 233	1.86E-06	A A 2		
Tc 99	2.78E-04	A B 2			U 232	4.73E-08	A A 2		
Ru 106	4.97E-15	A A 2			U 233	9.55E-09	A A 2		
Pd 107	1.11E-06	A A 2			U 234	5.22E-06	A A 2		
Ag 108m	1.51E-10	A A 2			U 235	4.13E-07	A A 2		
Ag 110m	1.66E-24	A A 2			U 236	3.67E-06	A A 2		
Cd 109	7.95E-17	A A 2			U 238	1.01E-05	A A 2		
Cd 113m	5.90E-04				Np 237	1.86E-06	A A 2		
Sn 119m					Pu 236	8.23E-12	A A 2		
Sn 121m	1.78E-05	A A 2			Pu 238	8.25E-03	A A 2		
Sn 123					Pu 239	4.35E-03	A A 2		
Sn 126	8.79E-06	A A 2			Pu 240	8.44E-03	A A 2		
Sb 125	5.33E-07	A A 2			Pu 241	9.31E-02	A A 2		
Sb 126	1.23E-06	A A 2			Pu 242	1.49E-05	A A 2		
Te 125m	1.30E-07	A A 2			Am 241	3.11E-02	A A 2		
Te 127m					Am 242m	3.99E-05	A A 2		
I 129	3.92E-07	A B 2			Am 243	7.68E-05	A A 2		
Cs 134	4.60E-08	A A 2			Cm 242	3.29E-05	A A 2		
Cs 135	7.50E-06	A A 2			Cm 243	2.27E-05	A A 2		
Cs 137	4.26E-01	A B 2			Cm 244	7.83E-04	A A 2		
Ba 133	9.53E-07	A A 2			Cm 245	2.82E-07	A A 2		
La 137					Cm 246	4.07E-08	A A 2		
La 138	1.91E-15	A A 2			Cm 248				
Ce 144	5.29E-19	A A 2			Cf 249	3.52E-13	A A 2		
Pm 145					Cf 250	1.58E-13	A A 2		
Pm 147	4.74E-06	A A 2			Cf 251	8.84E-15	A A 2		
Sm 147					Cf 252	2.91E-18	A A 2		
Sm 151	2.76E-03	A A 2			Unsp a	4.34E-03			
Eu 152	6.56E-06	A A 2			Unsp b/g	7.12E-01			
Eu 154	1.28E-03	A A 2			Total a	5.74E-02	*	0	*
Eu 155	2.05E-05	A A 2			Total b/g	8.02E+01	*	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