

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		= 9824.4	11935.6
Future arisings:	1.4.2025 - 31.3.2026		= 59.1	71.8
	1.4.2026 - 31.3.2027		= 160.0	194.4
	1.4.2027 - 31.3.2028		= 160.0	194.4
	1.4.2028 - 31.3.2029		= 160.0	194.4
	1.4.2029 - 31.3.2030		= 148.5	180.4
	1.4.2030 - 31.3.2031		= 158.7	192.8
	1.4.2031 - 31.3.2032		= 158.7	192.8
	1.4.2032 - 31.3.2033		= 158.7	192.8
	1.4.2033 - 31.3.2034		= 158.7	192.8
	1.4.2034 - 31.3.2035		= 158.7	192.8
	1.4.2035 - 31.3.2036		= 158.7	192.8
	1.4.2036 - 31.3.2037		= 23.4	28.4
	1.4.2037 - 31.3.2038		= 23.4	28.4
	1.4.2038 - 31.3.2039		= 23.4	28.4
	1.4.2039 - 31.3.2040		= 52.5	63.8
	1.4.2040 - 31.3.2041		= 52.5	63.8
	1.4.2041 - 31.3.2042		= 52.5	63.8
	1.4.2042 - 31.3.2043		= 52.5	63.8
	1.4.2043 - 31.3.2044		= 52.5	63.8
	1.4.2044 - 31.3.2045		= 52.5	63.8
	1.4.2045 - 31.3.2046		= 52.5	63.8
	1.4.2046 - 31.3.2047		= 52.5	63.8
	1.4.2047 - 31.3.2048		= 52.5	63.8
	1.4.2048 - 31.3.2049		= 52.5	63.8
	1.4.2049 - 31.3.2050		= 52.5	63.8
	1.4.2050 - 31.3.2051		= 52.5	63.8
	1.4.2051 - 31.3.2052		= 52.5	63.8
	1.4.2052 - 31.3.2053		= 52.5	63.8
Total future arisings:			2444.6	2969.9
Total waste volume:			12269.0	14905.5

Number of waste packages in stock:	At 1.4.2025.....		20425 packages
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Comment on arising rates: Arisings subject to volumetric challenge to EARP Bulks, and EARP Concentrates.

Additional information on quantities: Arisings subject to volumetric challenge and current effluent strategy. It is assumed waste arisings from other facilities would be processed via a different waste route.

Uncertainty factors on volumes:	Stock (upper): x 1.00	Arisings (upper): x 1.10	
	Stock (lower): x 1.00	Arisings (lower): x 0.50	

WASTE SOURCE	Treatment of liquid effluents (or floc in the case of retrieved material) in EARP followed by encapsulation of floc in cement matrix.
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PHYSICAL CHARACTERISTICS	
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General description:	Precipitated alpha-rich ferric hydroxide floc or alumino-ferric hydroxide floc in the case of retrieved floc. There are no large discrete items.
Changes since waste generated:	Waste has not undergone any changes since it was generated.
Bulk density (t/m³):	= 1.4
Comment on density:	-

CHEMICAL COMPOSITION	
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General description and components (%wt):	Ferric and alumino-ferric hydroxide floc, with adsorbed actinide ions (70%), Lime/PFA/OPC cement (30%) up until 2023. Ferric and alumino-ferric hydroxide floc, with adsorbed actinide ions (82%), Lime/ OPC cement (18%) from 2023.
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Chemical state:	Alkali
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Sheet metal proportion / thickness: The waste contains no sheet or bulk metal.

Metals and alloys (%wt):

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

Organics (%wt):

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

Other materials (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials.....	0	-	
Inorganic sludges and flocs.....	= 82.0	Includes small amounts of organic material (<1%).	
Soil.....	= 0	-	
Brick/Stone/Rubble.....	= 0	-	
Cementitious material.....	= 18.0	-	
Sand.....	= 0	-	
Glass/Ceramics.....	= 0	-	
Graphite.....	= 0	-	
Desiccants/Catalysts.....	= 0	-	
Asbestos.....	= 0	-	
Non/low friable.....	= 0	-	
Moderately friable.....	= 0	-	
Highly friable.....	= 0	-	
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.....	TR	-
Chloride.....	TR	-
Iodide.....	TR	-
Cyanide.....	TR	-
Carbonate.....	= 0	-
Nitrate.....	< 1.0	-
Nitrite.....	TR	-
Phosphate.....	< 0.10	-
Sulphate.....	< 0.10	-
Sulphide.....	TR	-

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.....	= 0	-
Putrescible wastes.....	= 0	-
Non-putrescible wastes.....	= 0	-
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.....		-
Benzene.....		-
Chlorinated solvents.....		-
Formaldehyde.....		-
Organometallics.....		-
Phenol.....		-
Styrene.....		-
Tri-butyl phosphate.....	P	Trace.
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.....	= 0	-
DPTA.....	= 0	-
NTA.....	= 0	-
Polycarboxylic acids.....	= 0	-
Other organic complexants.....	TR	TBP, DBP, TPPBr and citrate may be present in trace amounts.
Total complexing agents.....	TR	-

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 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	On-site	= 100.0

Comments on planned treatments:

Treatment via an existing waste treatment route.

Conditioning method:

Encapsulation.

Conditioning plants:

Plant Name	Location
Waste Packaging and Encapsulation Plant (WPEP)	Sellafield

Likely conditioning matrix:

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Further information on the conditioning matrix:

Lime

Waste Packaging:

Likely container type:

Container	Waste packaged (vol%)	Waste loading (m³)	Payload (m³)	Number of packages	Estimated start date for packaging
500 l drum	100.0	0.41	0.47	29925	-

Range in container waste loading: The amount of floc per drum varies between 0.35 - 0.354 m³.

Other information on packaging and conditioning:

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Conditioned density (t/m³):

= 1.4

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 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	100.0		

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: The main sources of activity will be actinide radionuclides, with some mixed fission products. Medium active aqueous liquors arise from reprocessing in Magnox and Thorp and form the main feed for Bulks, SEC and MAC. Retrieved floc is an existing floc which arose from previous fuel reprocessing operations.

Uncertainty: Best estimates. This waste stream contains waste from several different sources via EARP and hence can contain different ratios of all radioactive species.

Measurement of radioactivities: The various feeds (SEC, MAC, MAL, Bulks and retrieved floc) are sampled prior to treatment in EARP. The samples are analysed for the quoted species. The permeate from the floc due to dewatering is sampled and analysed. The amount in the floc is calculated from the difference between the feed and permeate inventories. I129 values updated.

Chemical form of radionuclides: H-3: -
C-14: -
Cl-36: -
Se-79: -
Tc-99: Technetium is present as technetate.
I-129: -
Ra: -
Th: -
U: Uranium is present as sodium diuranate.
Np: -
Pu: -

WASTE STREAM 2D27/C Encapsulated Floc from Effluent Treatment									
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	2.72E-03	C C 1	5.04E-03	C C 2	Gd 153				
Be 10					Ho 163				
C 14	3.14E-04	A C 1	3.14E-04	A C 2	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					Ti 204				
Mn 54					Pb 205				
Fe 55					Pb 210	2.88E-15	C C 1		
Co 60	1.79E-04	C C 1	6.42E-04	C C 2	Bi 208				
Ni 59					Bi 210m				
Ni 63					Po 210	2.55E-15	C C 1		
Zn 65					Ra 223	1.04E-14	C C 1		
Se 79					Ra 225	1.32E-10	C C 1		
Kr 81					Ra 226	2.44E-14	C C 1		
Kr 85					Ra 228				
Rb 87					Ac 227	1.05E-14	C C 1		
Sr 90	7.66E-02	C C 1	1.01E-01	C C 2	Th 227	1.03E-14	C C 1		
Zr 93					Th 228				
Nb 91					Th 229	1.33E-10	C C 1		
Nb 92					Th 230	1.03E-11	C C 1		
Nb 93m					Th 232				
Nb 94					Th 234				
Mo 93					Pa 231	4.38E-14	C C 1		
Tc 97					Pa 233	3.78E-03	C C 1		
Tc 99	5.60E-02	C C 1	8.59E-02	C C 2	U 232				
Ru 106	1.54E-03	C C 1	4.58E-02	C C 2	U 233	1.92E-07	C C 1		
Pd 107					U 234	1.49E-07	C C 1		
Ag 108m					U 235	2.49E-10	C C 1		
Ag 110m					U 236				
Cd 109					U 238				
Cd 113m					Np 237	9.94E-04	B B 1	9.94E-04	C C 2
Sn 119m					Pu 236				
Sn 121m					Pu 238	4.27E-03	C C 1	4.69E-03	C C 2
Sn 123					Pu 239	2.11E-02	C C 1	2.11E-02	C C 2
Sn 126					Pu 240				
Sb 125					Pu 241	4.20E-01	C C 1	7.18E-01	C C 2
Sb 126					Pu 242				
Te 125m					Am 241	2.49E-02	C C 1	1.54E-02	C C 2
Te 127m					Am 242m				
I 129	1.04E-04	C C 1	1.04E-04	C C 2	Am 243				
Cs 134	2.41E-04	C C 1	2.62E-03	C C 2	Cm 242				
Cs 135					Cm 243				
Cs 137	1.70E-01	C C 1	2.22E-01	C C 2	Cm 244				
Ba 133					Cm 245				
La 137					Cm 246				
La 138					Cm 248				
Ce 144	4.01E-05	C C 1	1.73E-03	C C 2	Cf 249				
Pm 145					Cf 250				
Pm 147	3.48E-03	C C 1	2.77E-02	C C 2	Cf 251				
Sm 147	5.99E-13	C C 1			Cf 252				
Sm 151					Unsp a				
Eu 152	1.00E-04	C C 1	1.78E-04	C C 2	Unsp b/g	1.58E-02	C C 1	1.58E-02	C C 2
Eu 154	7.09E-04	C C 1	1.66E-03	C C 2	Total a	5.13E-02	*	4.22E-02	*
Eu 155	3.98E-04	C C 1	1.54E-03	C C 2	Total b/g	7.52E-01	*	1.23E+00	*

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