

WASTE STREAM	2D115	Miscellaneous Plants Initial/Interim Decommissioning: Ponds
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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	= 0		
Future arisings:	1.4.2025 - 31.3.2028	= 0		
	1.4.2030 - 31.3.2032	= 2.1		
	1.4.2032 - 31.3.2033	= 0.5		
	1.4.2033 - 31.3.2035	= 0.6		
	1.4.2036 - 31.3.2038	= 0.9		
	1.4.2040 - 31.3.2042	= 0.8		
	1.4.2042 - 31.3.2043	= 3.2		
	1.4.2044 - 31.3.2047	= 10.7		
	1.4.2047 - 31.3.2052	= 46.1		
	1.4.2052 - 31.3.2055	= 19.7		
	1.4.2055 - 31.3.2056	= 7.5		
	1.4.2056 - 31.3.2058	= 31.7		
	1.4.2058 - 31.3.2066	= 231.3		
	1.4.2094 - 31.3.2106	= 30.0		
Total future arisings:		385.1		
Total waste volume:		385.1		

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

Comment on arising rates: Arisings are in line with current decommissioning programmes and strategy.

Additional information on quantities: Waste within this waste stream is generated from a number of decommissioning projects which will commence at a future date. As a result of this, minimal characterisation of waste volumes and fingerprints has been carried out and hence there is a large uncertainty in the potential arisings. Preliminary assessments indicate that the volumes may vary from -30% to +200% for ILW.

Uncertainty factors on volumes: Stock (upper): x - Arisings (upper): x 3.00
Stock (lower): x - Arisings (lower): x 0.70

WASTE SOURCE Dismantling of spent fuel storage ponds and associated facilities.

PHYSICAL CHARACTERISTICS

General description: Plant and equipment, internal building fabric and soft waste ie. rubber/PVC/paper. Most items size reduced in-situ. Some large items may be present.

Changes since waste generated: -

Bulk density (t/m³): ~ 0.50

Comment on density: Density stated is average for ILW.

CHEMICAL COMPOSITION

General description and components (%wt): Stainless steel (38%), mild steel (49%), copper (1%), aluminium (1%), plastic (7%), rubber (2%), cellulose (1%), glass (1%). Percentages are by volume.

Chemical state: Neutral

Sheet metal proportion / thickness: Some sheet metal present (~30%), bulk metal (70%).

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	= 38.0	The most commonly used stainless steel is 304L.	
Other ferrous metals.....	= 49.0	-	
Iron.....	P	Cast iron may be present but the quantity is dependent on Plant POCO not yet started.	
Aluminium.....	= 1.0	-	
Beryllium.....	= 0	-	
Cobalt.....	= 0	-	
Copper.....	= 1.0	-	
Lead.....	TR	-	
Magnox/Magnesium.....	= 0	-	
Nickel.....	= 0	-	
Titanium.....	-	-	
Uranium.....	P	-	
Zinc.....	= 0	-	
Zircaloy/Zirconium.....	= 0	-	
Other metals.....	= 0	-	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulotics.....	= 1.0	-	
Paper, cotton.....	TR	-	
Wood.....	~ 1.0	-	
Halogenated plastics.....	= 5.0	-	
Total non-halogenated plastics.....	= 2.0	-	
Condensation polymers.....	= 1.0	-	
Others.....	= 1.0	-	
Organic ion exchange materials.....	= 0	-	
Total rubber.....	= 2.0	-	
Halogenated rubber.....	P	-	
Non-halogenated rubber.....	P	-	
Hydrocarbons.....	-	-	
Oil or grease.....	-	-	
Fuel.....	-	-	
Asphalt/Tarmac (cont.coal tar).....	-	-	
Asphalt/Tarmac (no coal tar).....	-	-	
Bitumen.....	-	-	
Others.....	-	-	
Other organics.....	= 0	-	

Other materials (%wt):

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

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.....	NE	-
Soluble solids as bulk chemical compounds.....	= 0	-

Hazardous substances / non hazardous pollutants:

	(%wt)	Type(s) and comment
Acrylamide.....	-	-
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):

	(%wt)	Type(s) and comment
EDTA.....	-	-
DPTA.....	-	-
NTA.....	-	-
Polycarboxylic acids.....	-	-
Other organic complexants.....	-	-
Total complexing agents.....	= 0	-

Physical components:

	Number	Type(s) and comment
Sources.....	0	-
Electronic & Electrical Equipment (EEE)		
EEE Type 1.....	P	-
EEE Type 2.....	P	-
EEE Type 3.....	P	-
EEE Type 4.....	0	-
EEE Type 5.....	TR	-

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:

-

Conditioning method:

Conditioning routes used in this waste stream are vibro-encapsulation in a 500 l Drum and Flood grouting in either a Sellafield 3m³ Box or DCC.

Conditioning plants:

Plant Name	Location
Magnox Encapsulation Plant (MEP)	Sellafield
Box Encapsulation Plant (BEP)	Sellafield
Decommissioning Encapsulation Plants (DEP)	Sellafield

Likely conditioning matrix:

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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
500 l drum (pre-cast annular)	23.9	0.11	0.40	845	-
Sellafield 3 m³ box	15.7	0.52	2.2	116	-
DCC	60.4	0.37	1.5	638	-

Range in container waste loading: The volume of raw waste in a container can vary from 5% to 65% by volume (Note a full container of dry sharp sand would be 50% by volume).

Other information on packaging and conditioning:

-

Conditioned density (t/m³):

~ 1.0

Conditioned density comment:

Conditioned waste density varies depending on waste loading.

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: Yes

Baseline Management Route	Opportunity Management Route	Stream volume (%)	Opportunity Confidence	Comment
GDF	LLWR	~ 30.0	AMBER	There is potential for up to 30% of the waste to be diverted as LLW to LLWR. Note diverted waste will be classed as 2D108.

RADIOACTIVITY

Source: The main sources of activity are actinides and fission products.

Uncertainty: Waste within this waste stream is generated from a number of decommissioning projects which will commence at a future date. The uncertainties quoted for each nuclide represent both the uncertainty in quantification without detailed sampling and the likely variation of nuclides in different buildings consigned wastes under this waste stream. It is exceptionally unlikely that all the waste included in this waste stream will have the same variation in nuclide fingerprint. Also activity levels will depend on degree of decontamination achieved.

Measurement of radioactivities: -

Chemical form of radionuclides: H-3: -
C-14: -
Cl-36: Not expected to be present in significant quantity.
Se-79: Not expected to be present in significant quantity.
Tc-99: Not expected to be present in significant quantity.
I-129: Not expected to be present in significant quantity.
Ra: Not expected to be present in significant quantity.
Th: Not expected to be present in significant quantity.
U: Not expected to be present in significant quantity.
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			~ 3.00E-07	C C 2	Gd 153						
Be 10				8	Ho 163						
C 14			~ 2.12E-05	C C 2	Ho 166m						
Na 22					Tm 170						
Al 26					Tm 171						
Cl 36				8	Lu 174						
Ar 39					Lu 176						
Ar 42					Hf 178n						
K 40					Hf 182						
Ca 41				8	Pt 193						
Mn 53					Tl 204						
Mn 54				8	Pb 205						
Fe 55				8	Pb 210					8	
Co 60			~ 6.67E-04	C C 2	Bi 208						
Ni 59				8	Bi 210m						
Ni 63				8	Po 210					8	
Zn 65				8	Ra 223						
Se 79				8	Ra 225						
Kr 81					Ra 226					8	
Kr 85					Ra 228						
Rb 87					Ac 227						
Sr 90			~ 1.66E-01	C C 2	Th 227						
Zr 93				8	Th 228						
Nb 91					Th 229					8	
Nb 92					Th 230					8	
Nb 93m				8	Th 232					8	
Nb 94				8	Th 234						
Mo 93				8	Pa 231					8	
Tc 97					Pa 233						
Tc 99				8	U 232						
Ru 106			~ 1.28E-02	C C 2	U 233					8	
Pd 107				8	U 234					8	
Ag 108m				8	U 235					8	
Ag 110m					U 236					8	
Cd 109					U 238					8	
Cd 113m					Np 237					~ 8.77E-06	C C 2
Sn 119m					Pu 236						
Sn 121m				8	Pu 238					~ 2.38E-05	C C 2
Sn 123					Pu 239					~ 7.78E-04	C C 2
Sn 126				8	Pu 240					~ 2.35E-04	C C 2
Sb 125			Pu 241	~ 3.19E-03	C C 2						
Sb 126			Pu 242	8							
Te 125m			Am 241	~ 5.46E-04	C C 2						
Te 127m			Am 242m	8							
I 129		8	Am 243	8							
Cs 134	~ 6.91E-04	C C 2	Cm 242	8							
Cs 135		8	Cm 243	8							
Cs 137	~ 4.10E-01	C C 2	Cm 244	8							
Ba 133			Cm 245	8							
La 137			Cm 246	8							
La 138			Cm 248								
Ce 144	~ 6.88E-03	C C 2	Cf 249								
Pm 145			Cf 250								
Pm 147		8	Cf 251								
Sm 147			Cf 252								
Sm 151		8	Unsp a	8							
Eu 152	~ 1.92E-06	C C 2	Unsp b/g	~ 2.00E-02	C C 2						
Eu 154	~ 1.47E-05	C C 2	Total a	1.59E-03	*						
Eu 155	~ 7.24E-06	C C 2	Total b/g	0	*	6.20E-01	*				

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