

WASTE STREAM	2X51	Disposal of LLW from the Thorp Feed Pond area
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SITE Sellafield

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Sellafield Ltd

WASTE TYPE LLW

WASTE VOLUMES

	Reported (m ³)	OR	Conditioned (m ³)	Packaged (m ³)
Stocks:	At 1.4.2025	= 0		
Future arisings:	1.4.2025 - 31.3.2026	= 8.7		
	1.4.2026 - 31.3.2027	= 8.7		
	1.4.2027 - 31.3.2028	= 8.7		
	1.4.2028 - 31.3.2029	= 8.7		
	1.4.2029 - 31.3.2030	= 8.7		
	1.4.2030 - 31.3.2031	= 8.7		
	1.4.2031 - 31.3.2032	= 8.7		
Total future arisings:		61.0		
Total waste volume:		61.0		

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

Comment on arising rates: Arisings are based on 5 years of forecasts, with the final year extrapolated to the end of the lifetime of the waste stream.

Additional information on quantities: Uncertainty information is notional.

Uncertainty factors on volumes: Stock (upper): x - Arisings (upper): x 1.50
Stock (lower): x - Arisings (lower): x 0.50

WASTE SOURCE The waste arises as a result of routine operations and maintenance within the pond.

PHYSICAL CHARACTERISTICS

General description: The waste is mostly metallic waste associated with redundant plant items, and secondary wastes. There may also be small quantities of oil associated with some plant items.

Changes since waste generated: The waste has not undergone any change since it was generated.

Bulk density (t/m³): = 0.59

Comment on density: The total bulk density has been calculated based on the 5 year forecast and relevant waste characterisation document.

CHEMICAL COMPOSITION

General description and components (%wt): Metals (48.8%), Wood (4%), Rubber (1%), Halogenated Plastics (22.8%), Non-Halogenated Plastics (9.8%), Hydrocarbons (6.5%), Other Organics (3.2%), Asbestos (2.6%) and Other (1.3%).

Chemical state: Neutral

Sheet metal proportion / thickness: Metal thickness not specified

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	= 22.8	-	
Other ferrous metals.....	= 13.0	-	
Iron.....	= 2.0	-	
Aluminium.....	= 2.0	-	
Beryllium.....		-	
Cobalt.....		-	
Copper.....	= 0.33	-	
Lead.....	= 3.3	-	
Magnox/Magnesium.....		-	
Nickel.....		-	
Titanium.....		-	
Uranium.....		-	
Zinc.....	= 0.10	-	
Zircaloy/Zirconium.....		-	
Other metals.....	= 5.4	-	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	= 4.0	-	
Paper, cotton.....		-	
Wood.....	= 4.0	-	
Halogenated plastics.....	= 22.8	-	
Total non-halogenated plastics.....	= 9.8	-	
Condensation polymers.....		-	
Others.....		-	
Organic ion exchange materials.....		-	
Total rubber.....	= 1.0	-	
Halogenated rubber.....		-	
Non-halogenated rubber.....		-	
Hydrocarbons.....	= 6.5	-	
Oil or grease.....	= 6.5	-	
Fuel.....		-	
Asphalt/Tarmac (cont.coal tar).....		-	
Asphalt/Tarmac (no coal tar).....		-	
Bitumen.....		-	
Others.....		-	
Other organics.....	= 3.2	-	

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.....	= 1.3	-	
Graphite.....		-	
Desiccants/Catalysts.....		-	
Asbestos.....	= 2.6	-	
Non/low friable.....	= 0.33	-	
Moderately friable.....	= 0.65	-	
Highly friable.....	= 1.6	-	
Free aqueous liquids.....		-	
Free non-aqueous liquids.....		-	
Powder/Ash.....		-	

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

Inorganic anions (%wt):

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

Materials of interest for waste acceptance criteria:

	(%wt)	Type(s) and comment
Combustible metals.....		-
Low flash point liquids.....		-
Explosive materials.....		-
Phosphorus.....		-
Hydrides.....		-
Biological etc. materials.....		-
Biodegradable materials.....	= 3.0	-
Putrescible wastes.....		-
Non-putrescible wastes.....	= 3.0	-
Corrosive materials.....		-
Pyrophoric materials.....		-
Generating toxic gases.....		-
Reacting with water.....	= 2.1	-
Higher activity particles.....		-
Soluble solids as bulk chemical compounds.....		-

Hazardous substances / non hazardous pollutants:

-

	(%wt)	Type(s) and comment
Acrylamide.....	= 0.20	-
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.....	< 0.01	-
DPTA.....		-
NTA.....		-
Polycarboxylic acids.....		-
Other organic complexants.....		-
Total complexing agents.....	< 0.01	-

Physical components:

	Number	Type(s) and comment
Sources.....	= 0	-
Electronic & Electrical Equipment (EEE)		-
EEE Type 1.....		50 items every 5 years
EEE Type 2.....		40 items every 5 years
EEE Type 3.....		50 items every 5 years
EEE Type 4.....		200 items every 5 years
EEE Type 5.....		20 items every 5 years

TREATMENT, PACKAGING AND DISPOSAL

Planned on-site / off-site treatment(s):

Treatment	On-site / Off-site	Stream volume %
Size reduction	On-site	= 3.7
Decay storage		
Low force compaction		
Supercompaction (HFC)		
Incineration		
Drying/dewatering/liquid separation	Off-site	= 55.9
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		
		= 38.9

Comments on planned treatments:

For Inventory purposes, it is assumed that supercompaction will continue after the closure of WAMAC in 2028. Incineration and metal treatment will take place off-site. Waste not requiring treatment is mostly 'out of scope' metal, VLLW and LLW for direct disposal.

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)	28.7	10.0	18.3	2	-
	1/2 Height WAMAC IP-2 ISO (TC08)	3.7	59.3	18.8	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)			
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	= 32.4	= 1.1	2025
Expected to be consigned to a Landfill Facility			
Expected to be disposed On-Site	= 0.4	= 1.5	2025
Expected to be managed by In-Situ Disposal			
Expected to be consigned to an Incineration Facility	= 55.9	= 0.14	2025
Expected to be consigned to a Metal Treatment Facility	= 1.5	= 1.4	2025
Expected to be Out of Scope	= 9.8	= 1.4	2025
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: The activity originates from spent fuel stored in the pond. The waste is contaminated as a result of routine operations and maintenance.

Uncertainty: The uncertainty associated with the fingerprinting analysis is likely to be low, however the volumes and total activity information (and possibly some other assumptions) are likely to be more notional and thus more uncertain.

Measurement of radioactivities: Specific activity data is based on data in the corresponding WCH, which in turn maps an estimated total activity to an analytically derived radionuclide fingerprint.

Chemical form of radionuclides:

- H-3: -
- C-14: -
- Cl-36: -
- Se-79: -
- Tc-99: -
- I-129: -
- Ra: -
- Th: -
- U: -
- 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			=	1.40E-06	C C 2	Gd 153																																																									
Be 10																																																															
C 14																																																															
Na 22																																																															
Al 26																																																															
Cl 36																																																															
Ar 39																																																															
Ar 42																																																															
K 40																																																															
Ca 41																																																															
Mn 53																																																															
Mn 54																																																															
Fe 55													=	4.88E-06	C C 2	Pb 210																																															
Co 60													=	7.49E-06	C C 2	Bi 208																																															
Ni 59																																																															
Ni 63																										=	3.97E-06	C C 2	Po 210																																		
Zn 65																																																															
Se 79																																																															
Kr 81																																																															
Kr 85																																																															
Rb 87																																																															
Sr 90																																																															
Zr 93																	=	5.04E-07	C C 2																																								Th 227				
Nb 91																																																															
Nb 92																																																															
Nb 93m																																																															
Nb 94																										=	2.88E-08	C C 2	Th 229																																		
Mo 93																																																															
Tc 97																																																															
Tc 99																																																															
Ru 106	=	2.14E-10					C C 2	Th 230																																																							
Pd 107																																																															
Ag 108m																																																															
Ag 110m																																																															
Cd 109																																																															
Cd 113m																																																															
Sn 119m																																																															
Sn 121m																																																															
Sn 123																																																															
Sn 126																																																															
Sb 125																																																															
Sb 126																																																															
Te 125m																																																															
Te 127m																																																															
I 129																																																															
Cs 134																														=	1.73E-08	C C 2																											Th 232				
Cs 135																																																															
Cs 137																										=	4.68E-06	C C 2	Th 234																																		
Ba 133																																																															
La 137																																																															
La 138																																																															
Ce 144																																																															
Pm 145																																																															
Pm 147																																																															
Sm 147													=	3.57E-07	C C 2	Pa 231																																															
Sm 151																																																															
Eu 152																																																															
Eu 154																																				=	4.89E-08	C C 2																									Pa 233
Eu 155																																																															
																																							=	6.33E-08	C C 2	U 232																					
									=																														2.59E-08	C C 2	U 233																						

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