

WASTE STREAM	2X02	Disposal of Solid LLW from Plutonium Finishing & Stores (PF&S), Magnox
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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	= 24.6		
	1.4.2026 - 31.3.2027	= 24.7		
	1.4.2027 - 31.3.2028	= 24.7		
	1.4.2028 - 31.3.2029	= 24.7		
	1.4.2029 - 31.3.2030	= 24.7		
	1.4.2030 - 31.3.2031	= 24.7		
	1.4.2031 - 31.3.2032	= 24.7		
	1.4.2032 - 31.3.2033	= 24.7		
	1.4.2033 - 31.3.2034	= 24.7		
	1.4.2034 - 31.3.2035	= 24.7		
	1.4.2035 - 31.3.2036	= 24.7		
Total future arisings:		271.5		
Total waste volume:		271.5		

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 Waste arises as a result of POCO and maintenance at the facility.

PHYSICAL CHARACTERISTICS

General description: Thwe waste is predominantly metallic waste and secondary waste, plus waste from the building fabric and excavations.

Changes since waste generated: The waste has not undergone any changes 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 (44.1%), Concrete/Rubble (4%), Soil (1%), Wood (1%), Rubber (1%), Halogenated Plastics (34.1%), Non-Halogenated Plastics (9.7%), Hydrocarbons (2.6%), Other Organics (0.7%), Asbestos (1.6%) and Other (0.2%).

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.....	= 16.9	-	
Other ferrous metals.....	= 1.3	-	
Iron.....	= 14.0	-	
Aluminium.....	= 1.1	-	
Beryllium.....	-	-	
Cobalt.....	-	-	
Copper.....	= 1.6	-	
Lead.....	= 8.1	-	
Magnox/Magnesium.....	-	-	
Nickel.....	-	-	
Titanium.....	-	-	
Uranium.....	-	-	
Zinc.....	= 0.39	-	
Zircaloy/Zirconium.....	-	-	
Other metals.....	= 0.68	-	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulotics.....	= 1.0	-	
Paper, cotton.....	-	-	
Wood.....	= 1.0	-	
Halogenated plastics.....	= 34.1	-	
Total non-halogenated plastics.....	= 9.7	-	
Condensation polymers.....	-	-	
Others.....	-	-	
Organic ion exchange materials.....	-	-	
Total rubber.....	= 1.0	-	
Halogenated rubber.....	-	-	
Non-halogenated rubber.....	-	-	
Hydrocarbons.....	= 2.6	-	
Oil or grease.....	= 0.12	-	
Fuel.....	-	-	
Asphalt/Tarmac (cont.coal tar).....	= 1.6	-	
Asphalt/Tarmac (no coal tar).....	= 0.81	-	
Bitumen.....	= 0.03	-	
Others.....	-	-	
Other organics.....	= 0.68	-	

Other materials (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials.....	-	-	
Inorganic sludges and flocs.....	-	-	
Soil.....	= 1.0	-	
Brick/Stone/Rubble.....	= 4.0	-	
Cementitious material.....	-	-	
Sand.....	-	-	
Glass/Ceramics.....	= 0.21	-	
Graphite.....	-	-	
Desiccants/Catalysts.....	-	-	
Asbestos.....	= 1.6	-	
Non/low friable.....	= 0.78	-	
Moderately friable.....	= 0.52	-	
Highly friable.....	= 0.28	-	
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.....	= 1.0	-
Putrescible wastes.....	= 1.0	-
Non-putrescible wastes.....	-	-
Corrosive materials.....	-	-
Pyrophoric materials.....	-	-
Generating toxic gases.....	-	-
Reacting with water.....	= 1.5	Aluminium and Zinc
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.....	-	-
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.....	300 items every 5 years	
EEE Type 2.....	100 items every 5 years	
EEE Type 3.....	200 items every 5 years	
EEE Type 4.....	50 items every 5 years	
EEE Type 5.....	50 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	= 60.0
Decay storage		
Low force compaction		
Supercompaction (HFC)		
Incineration		
Drying/dewatering/liquid separation	Off-site	= 13.0
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		= 27.0
None		

Comments on planned treatments:

For inventory purposes, it is assumed that super-compaction will continue after the closure of WAMAC in 2028. Metal treatment will take place off site. Waste not requiring treatment is LLW for direct disposal to the LLWR.

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)	27.0	10.0	18.3	8	-
1/2 Height WAMAC IP-2 ISO (TC08)	60.0	59.3	18.8	3	-

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)	= 87.0	= 0.47	2025
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	= 13.0	= 1.4	2025
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: The activity originates from operations to convert the chemical form of plutonium plus the storage of plutonium oxide. The facility is now undergoing POCO.

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			=	9.45E-13	C C 2	Gd 153			
Be 10						Ho 163			
C 14						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						Tl 204			
Mn 54						Pb 205			
Fe 55						Pb 210			
Co 60						Bi 208			
Ni 59						Bi 210m			
Ni 63						Po 210			
Zn 65						Ra 223			
Se 79						Ra 225			
Kr 81						Ra 226			
Kr 85						Ra 228			
Rb 87	Ac 227								
Sr 90	Th 227	=	1.46E-11	C C 2					
Zr 93	Th 228								
Nb 91	Th 229								
Nb 92	Th 230								
Nb 93m	Th 232								
Nb 94	Th 234								
Mo 93	Pa 231								
Tc 97	Pa 233								
Tc 99	U 232								
Ru 106	U 233								
Pd 107	U 234								
Ag 108m	U 235								
Ag 110m	U 236								
Cd 109	U 238								
Cd 113m	Np 237								
Sn 119m	Pu 236								
Sn 121m	Pu 238								
Sn 123	Pu 239								
Sn 126	Pu 240								
Sb 125	Pu 241								
Sb 126	Pu 242								
Te 125m	Am 241								
Te 127m	Am 242m								
I 129	Am 243	=	3.29E-13	C C 2					
Cs 134	Cm 242								
Cs 135	Cm 243								
Cs 137	Cm 244								
Ba 133	Cm 245								
La 137	Cm 246								
La 138	Cm 248								
Ce 144	Cf 249								
Pm 145	Cf 250								
Pm 147	Cf 251								
Sm 147	Cf 252								
Sm 151	Unsp a								
Eu 152	Unsp b/g								
Eu 154	Total a								
Eu 155	Total b/g								
	0								
	*								
	1.25E-05								
	*								
	3.70E-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