

WASTE STREAM	2X26	Disposal of waste from SIXEP
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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	= 40.8		
	1.4.2026 - 31.3.2027	= 40.8		
	1.4.2027 - 31.3.2028	= 40.8		
	1.4.2028 - 31.3.2029	= 40.8		
	1.4.2029 - 31.3.2030	= 40.8		
	1.4.2030 - 31.3.2031	= 40.8		
	1.4.2031 - 31.3.2032	= 40.8		
	1.4.2032 - 31.3.2033	= 40.8		
	1.4.2033 - 31.3.2034	= 40.8		
	1.4.2034 - 31.3.2035	= 40.8		
	1.4.2035 - 31.3.2036	= 40.8		
	1.4.2036 - 31.3.2037	= 40.8		
	1.4.2037 - 31.3.2038	= 40.8		
	1.4.2038 - 31.3.2039	= 40.8		
	1.4.2039 - 31.3.2040	= 40.8		
	1.4.2040 - 31.3.2041	= 40.8		
	1.4.2041 - 31.3.2042	= 40.8		
	1.4.2042 - 31.3.2043	= 40.8		
	1.4.2043 - 31.3.2044	= 40.8		
	1.4.2044 - 31.3.2045	= 40.8		
	1.4.2045 - 31.3.2046	= 40.8		
	1.4.2046 - 31.3.2047	= 40.8		
	1.4.2047 - 31.3.2048	= 40.8		
	1.4.2048 - 31.3.2049	= 40.8		
	1.4.2049 - 31.3.2050	= 40.8		
	1.4.2050 - 31.3.2051	= 40.8		
	1.4.2051 - 31.3.2052	= 40.8		
	1.4.2052 - 31.3.2053	= 40.8		
	1.4.2053 - 31.3.2054	= 40.8		
	1.4.2054 - 31.3.2055	= 40.8		
	1.4.2055 - 31.3.2056	= 40.8		
	1.4.2056 - 31.3.2057	= 40.8		
	1.4.2057 - 31.3.2058	= 40.8		
	1.4.2058 - 31.3.2059	= 40.8		
	1.4.2059 - 31.3.2060	= 40.8		
Total future arisings:		1429.6		
Total waste volume:		1429.6		

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 Low level waste will arise from the Site Ion Exchange Plant (SIXEP) as a result of routine operations, general decontamination activities and maintenance.

PHYSICAL CHARACTERISTICS

General description: The waste is mostly metallic waste associated with redundant plant items. Most of the remaining waste is compactable secondary waste.

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

Bulk density (t/m³): = 0.63

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 (54.9%), Wood (4%), Rubber (4%), Halogenated Plastics (9.9%), Non-Halogenated Plastics (9.9%), Hydrocarbons (3.4%), Other Organics (12.1%), Asbestos (0.3%) and Other (1.5%).

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.....	= 10.3	-	
Other ferrous metals.....	= 27.9	-	
Iron.....	= 8.6	-	
Aluminium.....	= 2.1	-	
Beryllium.....		-	
Cobalt.....		-	
Copper.....	= 1.1	-	
Lead.....	= 1.3	-	
Magnox/Magnesium.....		-	
Nickel.....		-	
Titanium.....		-	
Uranium.....		-	
Zinc.....	= 1.1	-	
Zircaloy/Zirconium.....		-	
Other metals.....	= 2.5	-	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulotics.....	= 4.0	-	
Paper, cotton.....		-	
Wood.....	= 4.0	-	
Halogenated plastics.....	= 9.9	-	
Total non-halogenated plastics.....	= 9.9	-	
Condensation polymers.....		-	
Others.....		-	
Organic ion exchange materials.....		-	
Total rubber.....	= 4.0	-	
Halogenated rubber.....		-	
Non-halogenated rubber.....		-	
Hydrocarbons.....	= 3.4	-	
Oil or grease.....	= 1.7	-	
Fuel.....		-	
Asphalt/Tarmac (cont.coal tar).....		-	
Asphalt/Tarmac (no coal tar).....		-	
Bitumen.....	= 1.7	-	
Others.....		-	
Other organics.....	= 12.1	-	

Other materials (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials.....	= 0.86	-	
Inorganic sludges and flocs.....		-	
Soil.....		-	
Brick/Stone/Rubble.....		-	
Cementitious material.....		-	
Sand.....		-	
Glass/Ceramics.....	= 0.64	-	
Graphite.....		-	
Desiccants/Catalysts.....		-	
Asbestos.....	= 0.26	-	
Non/low friable.....	= 0.09	-	
Moderately friable.....	= 0.09	-	
Highly friable.....	= 0.09	-	
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.....	= 11.0	-
Putrescible wastes.....	-	-
Non-putrescible wastes.....	= 11.0	-
Corrosive materials.....	-	-
Pyrophoric materials.....	-	-
Generating toxic gases.....	-	-
Reacting with water.....	= 3.2	-
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.....	= 0.43	-
Vanadium.....	-	-
Mercury compounds.....	-	-
Others.....	-	-

Complexing agents (%wt):

Yes		
	(%wt)	Type(s) and comment
EDTA.....	< 0.01	-
DPTA.....	0	-
NTA.....	0	-
Polycarboxylic acids.....	0	-
Other organic complexants.....	0	-
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.....	50 items every 5 years	-
EEE Type 3.....	10 items every 5 years	-
EEE Type 4.....	10 items every 5 years	-
EEE Type 5.....	10 items every 5 years	-

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)	On-site	= 3.6
Incineration	Off-site	= 54.4
Drying/dewatering/liquid separation		
Tie down/fixatives/strippable coating/painting application		
Decontamination		
Metal treatment	Off-site	= 8.7
Recycling / reuse		
Thermal treatment, including vitrification		
Encapsulation		
Polymer encapsulation		
Other physical treatment		
Other chemical treatment		
Containerisation		
Treatment not yet determined		
None		= 33.2

Comments on planned treatments:

For inventory purposes, it is assumed that super-compaction will continue after 2028. Metal treatment will take place off site, incineration will take place off site. Waste not requiring treatment is mostly 'out of scope' metal, VLLW and LLW for direct disposal to 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)	20.4	10.0	18.3	30	-
1/2 Height WAMAC IP-2 ISO (TC08)	3.6	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	= 24.0	= 1.0	2025
Expected to be consigned to a Landfill Facility	= 2.6	= 1.5	2025
Expected to be disposed On-Site	= 1.5	= 1.5	2025
Expected to be managed by In-Situ Disposal			
Expected to be consigned to an Incineration Facility	= 54.4	= 0.14	2025
Expected to be consigned to a Metal Treatment Facility	= 8.7	= 1.4	2025
Expected to be Out of Scope	= 8.7	= 1.4	2025
Expected to be recycled / reused			
Disposal route not known			

Classification codes for waste expected to be consigned to a landfill facility:

17 01 01, 17 03 01*, 17 05 03*, 17 05 04, 17 09 04, 20 02 01, 17 09 03*

Opportunities for alternative disposal routing: No

Baseline Management Route	Opportunity Management Route	Stream volume (%)	Opportunity Confidence	Comment
-	-	-	-	-

RADIOACTIVITY

Source: The activity is associated with wastes that are contaminated as a result of operations to treat liquid effluents. The effluents themselves originate from various spent fuel storage and handling facilities at Sellafield.

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: -

WASTE STREAM		2X26		Disposal of waste from SIXEP																
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			=	5.25E-06	C C 2	Gd 153														
Be 10																				
C 14													=	2.76E-06	C C 2	Ho 163				
Na 22																				
Al 26																				Tm 170
Cl 36																				Tm 171
Ar 39																				Lu 174
Ar 42																				Lu 176
K 40																				Hf 178n
Ca 41																				Hf 182
Mn 53																				Pt 193
Mn 54																				Tl 204
Fe 55																				Pb 205
Co 60																				Pb 210
Ni 59																				Bi 208
Ni 63																				Bi 210m
Zn 65																				Po 210
Se 79																				Ra 223
Kr 81																				Ra 225
Kr 85																				Ra 226
Rb 87	Ra 228																			
Sr 90	Ac 227																			
Zr 93	=	2.93E-04	C C 2	Th 227																
Nb 91																				
Nb 92								Th 228												
Nb 93m								Th 229												
Nb 94								Th 230												
Mo 93								Th 232												
Tc 97								Th 234												
Tc 99								Pa 231												
Ru 106								Pa 233												
Pd 107								U 232												
Ag 108m								U 233												
Ag 110m								U 234												
Cd 109								U 235												
Cd 113m								U 236												
Sn 119m								U 238												
Sn 121m								Np 237												
Sn 123								Pu 236												
Sn 126								Pu 238												
Sb 125								Pu 239												
Sb 126								Pu 240												
Te 125m								Pu 241												
Te 127m	Pu 242																			
I 129	Am 241																			
Cs 134	Am 242m																			
Cs 135	Am 243																			
Cs 137	=	6.03E-07	C C 2	Cm 242																
Ba 133	=	1.18E-04	C C 2	Cm 243																
La 137																				
La 138								Cm 244												
Ce 144								Cm 245												
Pm 145								Cm 246												
Pm 147								Cm 248												
Sm 147								Cf 249												
Sm 151								Cf 250												
Eu 152								Cf 251												
Eu 154								Cf 252												
Eu 155								Unsp a												
								Unsp b/g												
								Total a	0	*	4.62E-05	*								
								Total b/g	0	*	8.15E-04	*								

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