

WASTE STREAM	2D12	MBGW in PFSP																
SITE	Sellafield																	
SITE OWNER	Nuclear Decommissioning Authority																	
WASTE CUSTODIAN	Sellafield Ltd																	
WASTE TYPE	ILW																	
WASTE VOLUMES	<table border="1"> <thead> <tr> <th>Reported (m³)</th> <th>OR</th> <th>Conditioned (m³)</th> <th>Packaged (m³)</th> </tr> </thead> <tbody> <tr> <td>At 1.4.2025 ~ 241.8</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total future arisings: 0.0</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total waste volume: 241.8</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		Reported (m ³)	OR	Conditioned (m ³)	Packaged (m ³)	At 1.4.2025 ~ 241.8				Total future arisings: 0.0				Total waste volume: 241.8			
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At 1.4.2025 ~ 241.8																		
Total future arisings: 0.0																		
Total waste volume: 241.8																		
Stocks:																		
Future arisings:																		
Total future arisings:	0.0																	
Total waste volume:	241.8																	
Number of waste packages in stock:	At 1.4.2025..... - packages																	
Comment on arising rates:	-																	
Additional information on quantities:	Volumes of the major components of this stream are estimated by assessing the number of skips containing them, the average percentage utilisation of a skip and the approximate voidage from video surveys. Other components have been evaluated by applying an estimated voidage to the volume of individual components and the number of each component type. Pond and Bay furniture has been estimated from drawings when available. Since November 2020, 24 baskets of debris comprising of swarf, calder support struts etc have been exported to WEP for entombment.																	
Uncertainty factors on volumes:	<table border="0"> <tr> <td>Stock (upper):</td> <td>x 1.20</td> <td>Arisings (upper):</td> <td>x -</td> </tr> <tr> <td>Stock (lower):</td> <td>x 0.80</td> <td>Arisings (lower):</td> <td>x -</td> </tr> </table>		Stock (upper):	x 1.20	Arisings (upper):	x -	Stock (lower):	x 0.80	Arisings (lower):	x -								
Stock (upper):	x 1.20	Arisings (upper):	x -															
Stock (lower):	x 0.80	Arisings (lower):	x -															
WASTE SOURCE	Isotope and spent fuel handling operations, general production waste (including scrap equipment), some items from clean up/initial decommissioning of Windscale Piles. This stream now includes all the pond and bay furniture such as trollies, bogies, tables, tanks and decanner equipment.																	
PHYSICAL CHARACTERISTICS																		
General description:	This stream is solid waste which includes isotope cartridges, reactor holding down weights and reactivity control cartridges, mops, buckets, clothing, scaffolding, wire, assorted scrap metal, boxes and baskets. These wastes arise from early site operations and the clean up of the Windscale Piles. Some items will need to be reduced in size before packaging, particularly in-pond storage boxes and redundant equipment. Also includes pond and bay furniture.																	
Changes since waste generated:	The waste has not undergone any change since it was generated.																	
Bulk density (t/m ³):	~ 1.9																	
Comment on density:	Weights and volumes for each component of this stream have been estimated from skip contents and tele/video surveys, and using drawings/data sheets of the individual items. Density quoted is gross weight divided by gross volume of the whole stream. Bulk density will vary substantially between different components.																	
CHEMICAL COMPOSITION																		
General description and components (%wt):	Mild steel, stainless steel, aluminium, Magnox, nickel/chrome and nickel/aluminium (wire), cobalt, graphite, bismuth oxide, lead, lithium/magnesium alloy, aluminium nitride. Cellulosic material may be present.																	
Chemical state:	Neutral																	
Sheet metal proportion / thickness:	Approximately 35% as bulk metal/sheet items, including 2 large sheets (1m by 2m) and various boxes, baskets and redundant plant items. Boxes typically 22x9x13 inches, baskets 10x15x44 inches. Large items of plant equipment in bays.																	

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	= 19.4	-	Antimony, beryllium, lithium/magnesium alloy, nickel/chrome and nickel/aluminium. Weights not available, but all present individually in small quantities. Volumes of materials are difficult to quantify.
Other ferrous metals.....	= 46.7	-	
Iron.....	-	-	
Aluminium.....	= 1.2	-	
Beryllium.....	P	-	
Cobalt.....	= 0	-	
Copper.....	NE	-	
Lead.....	= 0.06	-	
Magnox/Magnesium.....	= 17.9	-	
Nickel.....	-	-	
Titanium.....	0	-	
Uranium.....	P	-	
Zinc.....	P	-	
Zircaloy/Zirconium.....	NE	-	
Other metals.....	P	-	

Organics (%wt):

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

Other materials (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials.....	= 0	-	
Inorganic sludges and flocs.....	= 0	-	
Soil.....	= 0	-	
Brick/Stone/Rubble.....	= 0	-	
Cementitious material.....	= 0	-	
Sand.....	-	-	
Glass/Ceramics.....	-	-	
Graphite.....	= 4.2	-	
Desiccants/Catalysts.....	-	-	
Asbestos.....	NE	-	
Non/low friable.....	-	-	
Moderately friable.....	-	-	
Highly friable.....	-	-	
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.....	NE	-
Chloride.....	TR	-
Iodide.....	NE	-
Cyanide.....	= 0	-
Carbonate.....	TR	-
Nitrate.....	NE	-
Nitrite.....	NE	-
Phosphate.....	NE	-
Sulphate.....	NE	-
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.....	-	-
Reacting with water.....	-	-
Higher activity particles.....	= 0	-
Soluble solids as bulk chemical compounds.....	= 0	-

Hazardous substances / non hazardous pollutants:

	(%wt)	Type(s) and comment
Acrylamide.....	-	-
Benzene.....	= 0	-
Chlorinated solvents.....	-	-
Formaldehyde.....	-	-
Organometallics.....	-	-
Phenol.....	= 0	-
Styrene.....	-	-
Tri-butyl phosphate.....	= 0	-
Other organophosphates.....	-	-
Vinyl chloride.....	P	Trace in inventory.
Arsenic.....	= 0	-
Barium.....	-	-
Boron.....	= 0	-
Boron (in Boral).....	-	-
Boron (non-Boral).....	-	-
Cadmium.....	= 0	-
Caesium.....	-	-
Selenium.....	= 0	-
Chromium.....	= 0	-
Molybdenum.....	= 0	-
Thallium.....	-	-
Tin.....	= 0	-
Vanadium.....	= 0	-
Mercury compounds.....	-	-
Others.....	= 0	-

Complexing agents (%wt):

Not yet determined		
	(%wt)	Type(s) and comment
EDTA.....	-	-
DPTA.....	-	-
NTA.....	-	-
Polycarboxylic acids.....	0	-
Other organic complexants.....	0	-
Total complexing agents.....	NE	-

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.....	-	-

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

Treatment	On-site / Off-site	Stream volume %
Size reduction	On-site	= 100.0
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	On-site	P
Encapsulation		
Polymer encapsulation		
Other physical treatment		
Other chemical treatment		
Containerisation		
Treatment not yet determined		
None		

The waste will be pretreated (drip-drying/draining, Other Physical Treatment (size reduction, incompatible waste segregation, fixative application)) to conform to WEP/MBGWS/LLWR conditions for acceptance or off-site processing.

The ILW acceleration project has opened up routes to waste treatment facilities that already exist on site before BEP is operational e.g. WEP or MBGWS. Some wastes which are not compliant with WEP/MBGWS CFA may be stored within the Pond until the BUFT is available.□

Plant Name	Location
Wastes Encapsulation Plant (WEP)	Sellafield
Final ILW Encapsulation Plant	Sellafield

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Likely container type:

Container	Waste packaged (vol%)	Waste loading (m³)	Payload (m³)	Number of packages	Estimated start date for packaging
500 l drum	57.0	0.25	0.47	552	-
MRGWS box	23.0	1.0	3.5	56	-

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NE
-

Disposal Route	Stream volume %	Raw density t/m ³	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			

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Opportunities for alternative disposal routing: Yes

Baseline Management Route	Opportunity Management Route	Stream volume (%)	Opportunity Confidence	Comment
GDF	Metal treatment facility	30.0	AMBER	Assume that up to 30% may be routed to LLWR
GDF	Recycled / reused	~ 40.0	-	Significant amounts of bay steelwork are being decontaminated or size reduced to allow disposal as LLW or onward processing to allow free release.

RADIOACTIVITY

Source: Activity originates from Cobalt and other isotope cartridges irradiated in Piles 1 and 2 and Calder reactors, activated fuel stringer and reactor control components. Also components such as bay pond furniture contaminated by fuel and pond water activity. Magnox swarf is now included in this stream.

Uncertainty: -

Measurement of radioactivities: -

Chemical form of radionuclides:

- H-3: -
- C-14: -
- Cl-36: -
- Se-79: -
- Tc-99: -
- I-129: -
- Ra: Present as metal.
- Th: No characterisation data available
- U: Present as metal.
- Np: -
- Pu: Present as metal.

WASTE STREAM		2D12		MBGW in PFSP					
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	5.16E-07	E C 2			Gd 153				
Be 10	2.84E-10	B B 2			Ho 163				
C 14	2.12E-06	E B 2			Ho 166m				
Na 22					Tm 170				
Al 26					Tm 171				
Cl 36	3.93E-08	C B 2			Lu 174				
Ar 39					Lu 176				
Ar 42					Hf 178n				
K 40					Hf 182				
Ca 41	2.65E-08	B B 2			Pt 193				
Mn 53					Tl 204				
Mn 54					Pb 205				
Fe 55	1.86E-07	C B 2			Pb 210	8.50E-14	B B 2		
Co 60	1.21E-01	B B 2			Bi 208				
Ni 59	9.98E-05	C B 2			Bi 210m				
Ni 63	7.61E-03	C B 2			Po 210	8.13E-14	B A 2		
Zn 65					Ra 223	1.37E-12	B A 2		
Se 79	9.29E-10	C B 2			Ra 225	1.17E-15	B A 2		
Kr 81					Ra 226	3.10E-13	B A 2		
Kr 85	2.88E-06	B B 2			Ra 228	1.81E-18			
Rb 87					Ac 227	1.37E-12	B A 2		
Sr 90	3.11E-04	B B 2			Th 227	1.35E-12	B A 2		
Zr 93	3.41E-08	B B 2			Th 228	2.23E-11	B A 2		
Nb 91					Th 229	1.18E-15	B A 2		
Nb 92					Th 230	3.66E-11	B A 2		
Nb 93m	2.31E-08	B B 2			Th 232	6.32E-18	B A 8		
Nb 94	2.29E-11	B B 2			Th 234	6.44E-08	B A 2		
Mo 93					Pa 231	3.00E-12	B A 2		
Tc 97					Pa 233	2.11E-09	B A 2		
Tc 99	2.66E-07	B B 2			U 232	2.17E-11	B A 2		
Ru 106					U 233	6.25E-13	B A 2		
Pd 107					U 234	5.99E-08	B A 2		
Ag 108m					U 235	1.93E-09	B A 2		
Ag 110m					U 236	5.14E-09	B A 2		
Cd 109					U 238	6.44E-08	B A 2		
Cd 113m	1.07E-09	B B 2			Np 237	2.11E-09	B A 2		
Sn 119m					Pu 236				
Sn 121m	2.73E-10	B B 2			Pu 238	2.74E-06	B A 2		
Sn 123					Pu 239	1.93E-05	B A 2		
Sn 126	5.17E-09	B B 2			Pu 240	1.58E-05	B A 2		
Sb 125	1.68E-11	B B 2			Pu 241	5.89E-05	B A 2		
Sb 126	7.24E-10	B B 2			Pu 242	4.43E-09	B A 2		
Te 125m	4.22E-12	B B 2			Am 241	3.64E-05	B A 2		
Te 127m					Am 242m	3.82E-08	B A 2		
I 129	4.63E-10	B B 2			Am 243	6.43E-09	B A 2		
Cs 134	3.46E-13	B B 2			Cm 242	3.15E-08	B A 2		
Cs 135	1.53E-08	B B 2			Cm 243	1.84E-09	B A 2		
Cs 137	4.27E-04	B B 2			Cm 244	8.68E-09	B A 2		
Ba 133					Cm 245	1.16E-12	B A 2		
La 137					Cm 246				
La 138					Cm 248				
Ce 144					Cf 249				
Pm 145					Cf 250				
Pm 147	3.15E-10	B B 2			Cf 251				
Sm 147	4.00E-18	B B 2			Cf 252				
Sm 151	4.67E-06	B B 2			Unsp a	5.58E-11	B A 2		
Eu 152	2.47E-08	B B 2			Unsp b/g	1.03E-04	B A 2		
Eu 154	1.69E-07	B B 2			Total a	7.44E-05	*	0	*
Eu 155	1.22E-08	B B 2			Total b/g	1.30E-01	*	0	*

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