WASTE STREAM	2D77/C	Encapsulated Retrieved Miscellaneous Beta/Gamma Waste

SITE Sellafield

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Sellafield Ltd

WASTE TYPE ILW

WASTE VOLUMES

	Reported (m^3)
Stocks:	At 1.4.2025
Future arisings:	
Total future arisings:	
Total waste volume:	

OR

Conditioned (m^3)	Packaged (m^3)
= 0.5	0.6
	0.0
	0.0
0.0	**0.0**
0.5	**0.6**

Number of waste packages in stock: At 1.4.2025…… 1 packages

Comment on arising rates: Single trial drum completed. No further arisings - WEP not selected as the waste disposal route.

Additional information on quantities: Only 1 drum in store.

Uncertainty factors on volumes:
Stock (upper): x 1.00 Arisings (upper): x -
Stock (lower): x 1.00 Arisings (lower): x -

WASTE SOURCE Waste metal items removed from storage pond, consigned to WEP in a scrap basket, which is subsequently grouted in a 500 litre drum.

PHYSICAL CHARACTERISTICS

General description: It will be metallic waste mainly comprising of mild steel and stainless steel items. These items will fit into a standard scrap bucket and will fit into a 500 litre drum for grouting operations.

Changes since waste generated: This will be final product, therefore no changes expected.

Bulk density (t/m³): = 2.6

Comment on density: Density of conditioned waste . Raw waste ~1.6t/m³.

CHEMICAL COMPOSITION

General description and components (%wt): Grout 76%, Stainless steel 12%, Mild Steel 11%, Others 1% (eg phosphor bronze).

Chemical state: Alkali

Sheet metal proportion / thickness: Not expected in sheet form, ususally in variable sized pieces.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel……	= 12.0	316L, 304.	
Other ferrous metals……	= 11.0	Mild steel, carbon steel.	
Iron……		-	
Aluminium……	NE	-	
Beryllium……	TR	-	
Cobalt……	NE	-	
Copper……	NE	-	
Lead……		-	
Magnox/Magnesium……	NE	-	
Nickel……	NE	-	
Titanium……	NE	-	
Uranium……	< 0.01	-	
Zinc……	NE	-	
Zircaloy/Zirconium……	NE	-	
Other metals……	= 0.99	Phosphorbronze. Niobium and molybdenum may be present in trace amounts.	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulosics	NE	-	
Paper, cotton	NE	-	
Wood	NE	-	
Halogenated plastics	TR	-	
Total non-halogenated plastics	TR	-	
Condensation polymers	TR	-	
Others	NE	-	
Organic ion exchange materials	NE	-	
Total rubber	TR	-	
Halogenated rubber	TR	-	
Non-halogenated rubber	TR	-	
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	NE	-	
Inorganic sludges and flocs	NE	-	
Soil	NE	-	
Brick/Stone/Rubble	NE	-	
Cementitious material	= 76.0	-	
Sand	= 0	No sand present in encapsulation grout.	
Glass/Ceramics	NE	-	
Graphite	TR	-	
Desiccants/Catalysts	NE	-	
Asbestos	= 0	-	
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	NE	-
Iodide	NE	-
Cyanide	NE	-
Carbonate	NE	-
Nitrate	NE	-
Nitrite	NE	-
Phosphate	TR	-
Sulphate	NE	-
Sulphide	NE	-

Materials of interest for waste acceptance criteria:

	(%wt)	Type(s) and comment
Combustible metals	= 0	-
Low flash point liquids	= 0	-
Explosive materials	= 0	-
Phosphorus		-
Hydrides	= 0	-
Biological etc. materials	= 0	-
Biodegradable materials	= 0	-
Putrescible wastes	= 0	-
Non-putrescible wastes	NE	-
Corrosive materials	P	Alakine grout.
Pyrophoric materials	= 0	-
Generating toxic gases	= 0	-
Reacting with water	= 0	-
Higher activity particles	P	Small fraction will be present.
Soluble solids as bulk chemical compounds	P	Soluble sodium and magnesium compounds.

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	= 0	-
Arsenic	= 0	-
Barium		-
Boron	= 0	-
Boron (in Boral)		-
Boron (non-Boral)		-
Cadmium	= 0	-
Caesium		-
Selenium	= 0	-
Chromium	= 0	-
Molybdenum	= 0	-
Thallium		-
Tin	P	Trace from cement in grout.
Vanadium	= 0	-
Mercury compounds		-
Others	NE	-

Complexing agents (%wt): Not yet determined

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

Physical components:

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

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	On-site	= 100.0
Polymer encapsulation		
Other physical treatment		
Other chemical treatment		
Containerisation		
Treatment not yet determined		
None		

Comments on planned treatments: Encapsulation in grout at Wastes Encapsulation Plant

Conditioning method: Encapsulation at Wastes Encapsulation Plant

Conditioning plants:

Plant Name	Location
Wastes Encapsulation Plant (WEP)	Sellafield

Likely conditioning matrix: Non-standard

Further information on the conditioning matrix: Cement 4.5:1 (0.35% water solids ratio)

Waste Packaging:

Likely container type:

Container	Waste packaged (vol%)	Waste loading (m^3)	Payload (m^3)	Number of packages	Estimated start date for packaging
500 l drum	100.0	0.50	0.50	1	-

Range in container waste loading:

Other information on packaging and conditioning: -

Conditioned density (t/m^3): = 2.6
Conditioned density comment: Density of conditioned waste. Raw waste density $1.6t/m^3$.

Management Routes:

Disposal Route	Stream volume %	Raw density t/m^3	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	= 100.0		2077
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: Not yet determined

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

RADIOACTIVITY

Source: Activity associated with waste, is from pond sludges and heavy metals that have contaminated and irradiated the material during long term storage.

Uncertainty: These specific activities are based on sampling results prior to trial drum being processed.

Measurement of radioactivities: -

Chemical form of radionuclides:

H-3: Not estimated.
C-14: Not estimated.
Cl-36: Present in trace amounts as clathrate compounds of metallic salts readilty lost to aqueous solution.

Se-79: Not estimated.
Tc-99: Not estimated.
I-129: Present in trace amounts as clathrate compounds of metallic salts readilty lost to aqueous solution.

Ra: Not estimated.
Th: Not estimated.
U: Not estimated.
Np: Not estimated.
Pu: Not estimated.

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Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2025	Bands and Code	Future Arisings	Bands and Code	Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2025	Bands and Code	Future Arisings	Bands and Code
H 3					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	1.47E-07	B B 2			Pb 205				
Fe 55					Pb 210	4.25E-18			
Co 60	8.33E-07	B B 2			Bi 208				
Ni 59					Bi 210m				
Ni 63					Po 210	2.60E-18			
Zn 65					Ra 223	8.37E-21			
Se 79					Ra 225	3.76E-21			
Kr 81					Ra 226	1.42E-16			
Kr 85					Ra 228	3.75E-20			
Rb 87					Ac 227	9.69E-21			
Sr 90	2.68E-03	B B 2			Th 227	8.61E-21			
Zr 93					Th 228	1.08E-20			
Nb 91					Th 229	4.10E-21			
Nb 92					Th 230	2.19E-13			
Nb 93m					Th 232	2.34E-19			
Nb 94					Th 234	7.92E-09			
Mo 93					Pa 231	3.13E-19			
Tc 97					Pa 233	7.19E-12			
Tc 99					U 232				
Ru 106	1.83E-07	B B 2			U 233	4.50E-17			
Pd 107					U 234	7.95E-09	B B 2		
Ag 108m					U 235	9.87E-15			
Ag 110m					U 236	1.58E-09	B B 2		
Cd 109					U 238	7.92E-09	B B 2		
Cd 113m					Np 237	7.45E-12			
Sn 119m					Pu 236				
Sn 121m					Pu 238	1.16E-06	B B 2		
Sn 123					Pu 239	3.34E-06	B B 2		
Sn 126					Pu 240	3.59E-06	B B 2		
Sb 125	4.63E-06	B B 2			Pu 241	5.96E-05	B B 2		
Sb 126					Pu 242	1.58E-09	B B 2		
Te 125m	1.16E-06				Am 241	7.80E-06	B B 2		
Te 127m					Am 242m				
I 129					Am 243				
Cs 134	1.45E-05	B B 2			Cm 242				
Cs 135					Cm 243				
Cs 137	1.02E-02	B B 2			Cm 244				
Ba 133					Cm 245				
La 137					Cm 246				
La 138					Cm 248				
Ce 144	3.20E-08	B B 2			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	2.39E-05	B B 2			**Total a**	**1.59E-05**	*	**0**	*
Eu 155	1.50E-05	B B 2			**Total b/g**	**1.30E-02**	*	**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