

WASTE STREAM	2F40	Fuel Support Frames
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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	= 17.7		
Future arisings:				
Total future arisings:		0.0		
Total waste volume:		17.7		

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

Comment on arising rates: Assumes a medium term strategy for decommissioning the Hokkaido Baskets.

Additional information on quantities: The total number of support frames (Hokkaido Baskets) is 6. Baskets currently stored inside Excellox 4 flasks undercover at Sellafield. The volume declared is the volume of the support frames however, it is planned to decontaminate and recycle the metal. If this is successful only small amounts of residues will arise for disposal. A study is currently being carried out to consider options for decommissioning the PNTL (Japanese owned flasks on the Sellafield site) which may influence the overall decommissioning strategy for the support frames.

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

WASTE SOURCE Transport of LWR fuel assemblies from a reactor site in Japan to a reprocessing plant in France.

PHYSICAL CHARACTERISTICS

General description: Open frames used to hold LWR fuel assemblies inside Excellox transport flasks. Frames are large (4.86m long by 0.88m diameter) and heavy (4.4te).

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

Bulk density (t/m³): ~ 1.5

Comment on density: The density is the mass divided by the envelope volume.

CHEMICAL COMPOSITION

General description and components (%wt): Stainless steel (~ 100%), Traffolite (trace). Likely to be 304L Stainless Steel.

Chemical state: Neutral

Sheet metal proportion / thickness: Mostly sheet metal.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	~ 100.0	Likely 304L.	
Other ferrous metals.....	= 0	-	
Iron.....		-	
Aluminium.....		-	
Beryllium.....		-	
Cobalt.....	= 0	-	
Copper.....		-	
Lead.....	= 0	-	
Magnox/Magnesium.....	= 0	-	
Nickel.....		-	
Titanium.....		-	
Uranium.....		-	
Zinc.....	= 0	-	
Zircaloy/Zirconium.....	= 0	-	
Other metals.....	= 0	-	

Organics (%wt):

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

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.....	= 0	-	
Desiccants/Catalysts.....		-	
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.....	= 0	-
Chloride.....	= 0	-
Iodide.....	= 0	-
Cyanide.....	= 0	-
Carbonate.....	= 0	-
Nitrate.....	= 0	-
Nitrite.....	= 0	-
Phosphate.....	= 0	-
Sulphate.....	= 0	-
Sulphide.....	= 0	-

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.....	= 0	-
Reacting with water.....	= 0	-
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):

No		
	(%wt)	Type(s) and comment
EDTA.....	-	-
DPTA.....	-	-
NTA.....	-	-
Polycarboxylic acids.....	-	-
Other organic complexants.....	-	-
Total complexing agents.....	= 0	-

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.....	-	-

TREATMENT, PACKAGING AND DISPOSAL

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

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

Comments on planned treatments:

Treatment will be via size reduction and decontamination, with an anticipated maximum of 5% of the basket assumed to be disposed of to the LLWR as LLW. The remainder is anticipated to be consigned as out of scope metal.

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
	-	-	-	-	-	-

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	~ 5.0	~ 0.15	
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	~ 95.0	~ 2.8	
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 arises from a) corrosion products in the reactor cooling circuit adhering to the fuel and being dislodged and b) contamination from pond water.

Uncertainty: The activity depends on the quality of fuel and the length of time the fuel has been in the frame, and the time since removal of the fuel.

Measurement of radioactivities: Individual nuclide activities have not been determined, but the nuclides listed are based on those present in Multi Element Bottles (MEBs).

Chemical form of radionuclides:

- H-3: -
- C-14: Oxides.
- Cl-36: -
- Se-79: -
- Tc-99: Oxides.
- I-129: -
- Ra: -
- Th: -
- U: Oxides.
- Np: -
- Pu: Oxides.

WASTE STREAM		2F40		Fuel Support Frames												
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	6				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	6				Pb 205											
Fe 55	6				Pb 210											
Co 60	6				Bi 208											
Ni 59	6				Bi 210m											
Ni 63	6				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											
Zr 93					Th 228											
Nb 91					Th 229											
Nb 92					Th 230											
Nb 93m					Th 232											
Nb 94	Th 234															
Mo 93	6				Pa 231											
Tc 97					Pa 233											
Tc 99					U 232											
Ru 106					U 233											
Pd 107					U 234					6						
Ag 108m					U 235											
Ag 110m					U 236					6						
Cd 109					U 238					6						
Cd 113m					Np 237											
Sn 119m					Pu 236											
Sn 121m	Pu 238	6														
Sn 123	Pu 239	6														
Sn 126	Pu 240															
Sb 125	Pu 241	6														
Sb 126	Pu 242															
Te 125m	Am 241	6														
Te 127m	Am 242m															
I 129	6				Am 243											
Cs 134	6				Cm 242											
Cs 135					Cm 243											
Cs 137					Cm 244					6						
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	0	*	0	*							
Eu 155					Total b/g	0	*	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