

WASTE STREAM	3L320	Stage 3 Decommissioning: Secondary Wastes LLW
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SITE Heysham 1

SITE OWNER EDF Energy Nuclear Generation Ltd (EDFE NGL)

WASTE CUSTODIAN EDF Energy Nuclear Generation Ltd (EDFE NGL)

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 - 31.3.2115 = 0			
	1.4.2115 - 31.3.2116 = 481.1			
	1.4.2116 - 31.3.2117 = 527.9			
	1.4.2117 - 31.3.2118 = 473.0			
	1.4.2118 - 31.3.2119 = 142.7			
	1.4.2119 - 31.3.2120 = 300.7			
Total future arisings:	1925.3			
Total waste volume:	1925.3			

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

Comment on arising rates: Waste volumes will be variable depending on station operating conditions.

Additional information on quantities: Volumes based on Back to Bio Shield strategy. Work is ongoing looking at optimising the strategy which could lead to a change in volume and timings of arisings across Final Site Clearance wastes (300s) and Pre C&M wastes (100s), in future submissions.

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

WASTE SOURCE Wastes arising from contamination control procedures during plant dismantling.

PHYSICAL CHARACTERISTICS

General description: A variety of combustible and non combustible materials. No large items are expected in the waste.

Changes since waste generated: -

Bulk density (t/m³): ~ 1.0

Comment on density: The density is likely to lie between 0.5 and 1.5 t/m³.

CHEMICAL COMPOSITION

General description and components (%wt): The waste is expected to contain metallic items (~80% vol), plastic items (~4%vol), cloth items (<1% vol). Other organics include incinerator ash (~15%). Percentages of constituents are very uncertain.

Chemical state: Neutral

Sheet metal proportion / thickness: Metal thicknesses will probably be typically 1-3 mm.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	~ 5.0	-	
Other ferrous metals.....	~ 70.0	-	
Iron.....	NE	-	
Aluminium.....	NE	-	
Beryllium.....	NE	-	
Cobalt.....	NE	-	
Copper.....	NE	-	
Lead.....	NE	-	
Magnox/Magnesium.....	NE	-	
Nickel.....	NE	-	
Titanium.....	NE	-	
Uranium.....	NE	-	
Zinc.....	NE	-	
Zircaloy/Zirconium.....	NE	-	
Other metals.....	~ 5.0	Miscellaneous metals with composition not assessed.	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose...	< 1.0	-	
Paper, cotton...	< 1.0	-	
Wood...	NE	-	
Halogenated plastics...	~ 4.0	-	
Total non-halogenated plastics...	NE	-	
Condensation polymers...	NE	-	
Others...	NE	-	
Organic ion exchange materials...	NE	-	
Total rubber...	NE	-	
Halogenated rubber...	NE	-	
Non-halogenated rubber...	NE	-	
Hydrocarbons...	NE	-	
Oil or grease...	-	-	
Fuel...	-	-	
Asphalt/Tarmac (cont.coal tar)...	-	-	
Asphalt/Tarmac (no coal tar)...	-	-	
Bitumen...	-	-	
Others...	-	-	
Other organics...	~ 15.0	-	

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...	= 0	-	
Glass/Ceramics...	= 0	-	
Graphite...	= 0	-	
Desiccants/Catalysts...	= 0	-	
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...	NE	-
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...	= 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...	= 0	Not expected.
Soluble solids as bulk chemical compounds...	= 0	-

Hazardous substances / non hazardous pollutants:

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

Complexing agents (%wt):

Not yet determined		
	(%wt)	Type(s) and comment
EDTA.....	NE	-
DPTA.....	NE	-
NTA.....	NE	-
Polycarboxylic acids.....	NE	-
Other organic complexants.....	NE	Only trace quantities, if any.
Total complexing agents.....	NE	-

Physical components:

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

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)	Off-site	~ 15.0
Incineration	Off-site	~ 5.0
Drying/dewatering/liquid separation		
Tie down/fixatives/strippable coating/painting application		
Decontamination		
Metal treatment	Off-site	~ 64.0
Recycling / reuse		
Thermal treatment, including vitrification		
Encapsulation		
Polymer encapsulation		
Other physical treatment		
Other chemical treatment		
Containerisation		
Treatment not yet determined		
None		~ 16.0

Comments on planned treatments:

Incinerator ash will be supercompacted. Approximately 80% of the metal waste is assumed to be recyclable with 95% suitable for re-use. Supercompaction assumes x5 volume reduction. Incineration assumes 99% volume reduction.

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)	34.3	22.7	18.3	30	-

Range in container waste loading:

Other information on packaging and conditioning: Stream volume includes incineration residues. Waste loading is representative of the raw waste following further planned treatments.

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)	~ 34.0	NE	
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	NE	
Expected to be consigned to a Landfill Facility			
Expected to be disposed On-Site			
Expected to be managed by In-Situ Disposal	~ 61.0	NE	
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: Contamination by activation products from the reactor structure.

Uncertainty: Only very approximate estimates have been made of the total specific activities. Based on decay corrected operational wastestream data.

Measurement of radioactivities: Activation/decay calculations based on operational waste streams and projected operating history. The activities quoted are for the time at which this waste will arise (i.e. ~85 years after end of generation). There may be some contamination by Cs137.

Chemical form of radionuclides: H-3: Diffused into materials
C-14: There may be some surface contamination as graphite
Cl-36: Not determined
Se-79: Selenium content not expected to be significant
Tc-99: Not determined
I-129: Not determined
Ra: Radium content is insignificant
Th: Thorium content is insignificant
U: Not determined
Np: The neptunium content is insignificant
Pu: Not determined

WASTE STREAM		3L320		Stage 3 Decommissioning: Secondary Wastes LLW					
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			1.35E-07	C C 2	Gd 153				
Be 10				8	Ho 163				
C 14			6.46E-06	C C 2	Ho 166m				
Na 22				4	Tm 170				
Al 26				4	Tm 171				
Cl 36			9.19E-05	C C 2	Lu 174				
Ar 39					Lu 176				
Ar 42					Hf 178n				
K 40					Hf 182				
Ca 41				6	Pt 193				
Mn 53					Tl 204				
Mn 54				5	Pb 205				
Fe 55				5	Pb 210				8
Co 60			1.07E-11	C C 2	Bi 208				
Ni 59				6	Bi 210m				
Ni 63			1.63E-05	C C 2	Po 210				8
Zn 65				5	Ra 223				
Se 79				8	Ra 225				
Kr 81					Ra 226				8
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90			4.90E-08	C C 2	Th 227				
Zr 93				8	Th 228				
Nb 91					Th 229				8
Nb 92					Th 230				8
Nb 93m				6	Th 232				6
Nb 94			8.92E-08	C C 2	Th 234				
Mo 93				6	Pa 231				8
Tc 97					Pa 233				
Tc 99				6	U 232				
Ru 106				5	U 233				8
Pd 107				8	U 234			1.49E-10	C C 2
Ag 108m			1.08E-07	C C 2	U 235			2.37E-12	C C 2
Ag 110m				5	U 236			3.81E-11	C C 2
Cd 109					U 238			4.42E-11	C C 2
Cd 113m					Np 237				8
Sn 119m					Pu 236				
Sn 121m				6	Pu 238			1.21E-07	C C 2
Sn 123					Pu 239			7.03E-08	C C 2
Sn 126				8	Pu 240			1.65E-07	C C 2
Sb 125				5	Pu 241			8.50E-08	C C 2
Sb 126					Pu 242				8
Te 125m					Am 241			6.07E-07	C C 2
Te 127m					Am 242m				8
I 129			3.44E-12	C C 2	Am 243				8
Cs 134				5	Cm 242				5
Cs 135				8	Cm 243			1.59E-11	C C 2
Cs 137			7.29E-07	C C 2	Cm 244			1.64E-10	C C 2
Ba 133			1.84E-11	C C 2	Cm 245				8
La 137					Cm 246				8
La 138					Cm 248				
Ce 144				5	Cf 249				
Pm 145					Cf 250				
Pm 147				5	Cf 251				
Sm 147					Cf 252				
Sm 151				6	Unsp a				8
Eu 152			4.26E-10	C C 2	Unsp b/g				5
Eu 154			1.98E-11	C C 2	Total a	0	*	9.64E-07	*
Eu 155			1.97E-14	C C 2	Total b/g	0	*	1.16E-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