

WASTE STREAM	4B320	Stage 3 Decommissioning: Secondary Wastes LLW
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SITE Hunterston B

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 - 31.3.2109	= 0		
	1.4.2109 - 31.3.2110	= 55.3		
	1.4.2110 - 31.3.2111	= 538.1		
	1.4.2111 - 31.3.2112	= 538.1		
	1.4.2112 - 31.3.2113	= 351.0		
	1.4.2113 - 31.3.2114	= 158.1		
	1.4.2114 - 31.3.2115	= 141.8		
	1.4.2115 - 31.3.2116	= 163.0		
Total future arisings:		1945.4		
Total waste volume:		1945.4		

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 present 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 incenerator ash (~15%). Percentages of constituents are very uncertain.

Chemical state: -

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. Waste will be grouted into containers if necessary. Supercompaction assumes x5 volume reduction. Incineration assumes 99% volume reduction.

Conditioning method:

-

Conditioning plants:

Plant Name	Location

Likely conditioning matrix:

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Further information on the conditioning matrix:

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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: Waste stream volume includes residue from incineration. Loading is representative of the raw waste following 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.

Measurement of radioactivities: Activation/decay calculations based on neutron flux and operating history. No radionuclides other than those listed are expected to be significant. 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.

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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			2.16E-04	C C 2	Gd 153				
Be 10			1.36E-12	C C 2	Ho 163				
C 14			7.89E-05	C C 2	Ho 166m			5.55E-08	C C 2
Na 22				4	Tm 170				
Al 26				4	Tm 171				
Cl 36			8.60E-06	C C 2	Lu 174				
Ar 39					Lu 176				
Ar 42					Hf 178n				
K 40					Hf 182				
Ca 41			1.09E-04	C C 2	Pt 193				
Mn 53				8	Tl 204				
Mn 54					Pb 205				8
Fe 55			5.99E-11	C C 2	Pb 210				
Co 60			2.22E-07	C C 2	Bi 208				
Ni 59			1.51E-06	C C 2	Bi 210m				
Ni 63			8.20E-05	C C 2	Po 210				8
Zn 65				8	Ra 223				
Se 79				8	Ra 225				
Kr 81					Ra 226				8
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90				8	Th 227				
Zr 93				8	Th 228				
Nb 91					Th 229				8
Nb 92					Th 230				8
Nb 93m			5.09E-08	C C 2	Th 232				8
Nb 94			1.54E-07	C C 2	Th 234				
Mo 93			7.11E-07	C C 2	Pa 231				8
Tc 97					Pa 233				
Tc 99			1.51E-07	C C 2	U 232				
Ru 106				8	U 233				8
Pd 107				8	U 234				8
Ag 108m			5.95E-08	C C 2	U 235				8
Ag 110m					U 236				8
Cd 109					U 238				8
Cd 113m					Np 237				8
Sn 119m					Pu 236				
Sn 121m			8.06E-10	C C 2	Pu 238				8
Sn 123					Pu 239				8
Sn 126				8	Pu 240				8
Sb 125					Pu 241				8
Sb 126					Pu 242				8
Te 125m					Am 241				8
Te 127m					Am 242m				8
I 129				8	Am 243				8
Cs 134				5	Cm 242				8
Cs 135				8	Cm 243				8
Cs 137				6	Cm 244				8
Ba 133			9.05E-09	C C 2	Cm 245				8
La 137					Cm 246				8
La 138					Cm 248				
Ce 144				8	Cf 249				
Pm 145			2.18E-08	C C 2	Cf 250				
Pm 147				8	Cf 251				
Sm 147					Cf 252				
Sm 151			1.50E-05	C C 2	Unsp a				8
Eu 152			4.36E-05	C C 2	Unsp b/g				5
Eu 154			1.90E-07	C C 2	Total a	0	*	6.10E-17	*
Eu 155			2.21E-10	C C 2	Total b/g	0	*	5.56E-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