

WASTE STREAM	3L20	Miscellaneous Activated Components - Debris Vault 3
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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 ILW

WASTE VOLUMES

	Reported (m ³)	OR	Conditioned (m ³)	Packaged (m ³)
Stocks:	At 1.4.2025 = 0.1			
Future arisings:	1.4.2025 - 31.3.2030 3.3			
Total future arisings:	3.3			
Total waste volume:	3.4			

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

Comment on arising rates: Stock volume maintained at 0.1 following station assessment. Waste volumes will be variable depending on station operating conditions. Current stocks have remained the same since 2022. Future arisings estimated at 3.3 m3 until end of defueling in 2030

Additional information on quantities: Change in decommissioning strategy is now to leave Control rods in Reactor pressure vessel until Stage 3 decommissioning rather than consign to DV3 and end of defuelling and retrieve later.

Uncertainty factors on volumes: Stock (upper): x 1.25 Arisings (upper): x 1.50
Stock (lower): x 0.75 Arisings (lower): x 0.50

WASTE SOURCE Irradiated reactor control rods, control rod chains and graphite specimen assemblies.

PHYSICAL CHARACTERISTICS

General description: Redundant or defective components such as control rods, control rod chains and graphite specimen assemblies. The possibility of large items which may need special handling is not assessed.

Changes since waste generated: -

Bulk density (t/m³): = 1.0

Comment on density: -

CHEMICAL COMPOSITION

General description and components (%wt): Irradiated components principally steel removed from the reactor. Other materials not assessed.

Chemical state: Neutral

Sheet metal proportion / thickness: -

Metals and alloys (%wt):

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

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.....	= 0	-	
Condensation polymers.....	= 0	-	
Others.....	= 0	-	
Organic ion exchange materials.....	= 0	-	
Total rubber.....	= 0	-	
Halogenated rubber.....	= 0	-	
Non-halogenated rubber.....	= 0	-	
Hydrocarbons.....	= 0	-	
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.....	= 0	-	
Glass/Ceramics.....	= 0	-	
Graphite.....	NE	-	
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.....	TR	-
Chloride.....	TR	-
Iodide.....	TR	-
Cyanide.....	NE	-
Carbonate.....	TR	-
Nitrate.....	TR	-
Nitrite.....	NE	-
Phosphate.....	TR	-
Sulphate.....	TR	-
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.....	= 0	-
Reacting with water.....	= 0	-
Higher activity particles.....	P	-
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):

Yes		
	(%wt)	Type(s) and comment
EDTA.....	NE	-
DPTA.....	NE	-
NTA.....	NE	-
Polycarboxylic acids.....	NE	-
Other organic complexants.....	NE	May be present in trace quantities.
Total complexing agents.....	TR	-

Physical components:

	Number	Type(s) and comment
Sources.....	= 0	-
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 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	On-site	= 100.0

Comments on planned treatments:

-

Conditioning method: "The waste will be conditioned to satisfy the disposal requirements which are effective at the time of retrieval/conditioning. It is currently assumed that the waste will be placed in 'baskets' in the waste packages and will be encapsulated."

Conditioning plants:

Plant Name	Location
Heysham 1 Waste Management Centre	Heysham 1

Likely conditioning matrix:

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Further information on the conditioning matrix: Conditioning matrix will be BFS/OPC. Mix ratios are yet to be established

Waste Packaging:

Likely container type:	Container	Waste packaged (vol%)	Waste loading (m³)	Payload (m³)	Number of packages	Estimated start date for packaging
	4 m box (100 mm concrete shielding)	100.0	12.2	14.3	1	-

Range in container waste loading:

Other information on packaging and conditioning: Waste will be retained on site pending Final Site Clearance, to let nuclides such as Co-60 undergo considerable radioactive decay. Baskets of different Final Site Clearance ILW wastes may be in the same waste package.

Conditioned density (t/m³): ~ 3.0
 Conditioned density comment: The density of the encapsulated waste is expected to be approximately 3 t/m³.

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)	= 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			

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: Irradiated components removed from the reactor. Activated material removed from the reactor core is likely to be of high specific activity.

Uncertainty: Specific activity is a function of station operating history. The values quoted are indicative of the activities that might be expected.

Measurement of radioactivities: Estimates are based upon theoretical assessments. Other beta/gamma nuclides of arisings (in TBq/m³) include Cr51 (4E+2), Co58 (1E+2), Nb95 (3E-1) and Ru103 (2E-4). Other beta/gamma nuclides also include Fe59.

Chemical form of radionuclides: H-3: Diffused into material
 C-14: Activated graphite
 Cl-36: Incorporated into steel
 Se-79: Not expected to be significant
 Tc-99: Not expected to be significant
 I-129: Not expected to be significant
 Ra: Not expected to be significant
 Th: Not expected to be significant
 U: Not expected to be significant
 Np: Not expected to be significant
 Pu: Not expected to be significant

WASTE STREAM		3L20		Miscellaneous Activated Components - Debris Vault 3						
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		6	Gd 153				
Be 10			8		8	Ho 163				
C 14	5.00E-02	C C 2	5.00E-02	C C 2	5.00E-02	Ho 166m				
Na 22			4		4	Tm 170				
Al 26			4		4	Tm 171				
Cl 36			6			Lu 174				
Ar 39						Lu 176				
Ar 42						Hf 178n				
K 40						Hf 182				
Ca 41		8				Pt 193				
Mn 53						Tl 204				
Mn 54	4.00E+00	C C 2	1.00E+01	C C 2	1.00E+01	Pb 205				
Fe 55	2.00E+02	C C 2	3.00E+02	C C 2	3.00E+02	Pb 210		8		
Co 60	8.00E+01	C C 2	1.00E+02	C C 2	1.00E+02	Bi 208				
Ni 59	2.00E-01	C C 2	2.00E-01	C C 2	2.00E-01	Bi 210m				
Ni 63	1.00E+01	C C 2	1.00E+01	C C 2	1.00E+01	Po 210		8		
Zn 65	9.00E-06	C C 2	3.00E-05	C C 2	3.00E-05	Ra 223				
Se 79		8		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	5.00E-05	C C 2	5.00E-05	C C 2	5.00E-05	Th 232		8		
Nb 94	1.00E-03	C C 2	1.00E-03	C C 2	1.00E-03	Th 234				
Mo 93	5.00E-04	C C 2	5.00E-04	C C 2	5.00E-04	Pa 231		8		
Tc 97						Pa 233				
Tc 99		8				U 232				
Ru 106		8				U 233		8		
Pd 107		8				U 234		8		
Ag 108m	4.00E-03	C C 2	4.00E-03	C C 2	4.00E-03	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		8		Pu 238		8		
Sn 123						Pu 239		8		
Sn 126		8		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		8		Am 243		8		
Cs 134		6		6		Cm 242		8		
Cs 135		8		8		Cm 243		8		
Cs 137		6		6		Cm 244		8		
Ba 133						Cm 245		8		
La 137						Cm 246		8		
La 138						Cm 248				
Ce 144		8		8		Cf 249				
Pm 145						Cf 250				
Pm 147		8		8		Cf 251				
Sm 147						Cf 252				
Sm 151		8		8		Unsp a		8		8
Eu 152		8		8		Unsp b/g	5.00E+02	C C 2	5.00E+02	C C 2
Eu 154		8		8		Total a	0	*	0	*
Eu 155		8		8		Total b/g	7.94E+02	*	9.20E+02	*

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