

WASTE STREAM	3M01	Pond Ion Exchange Material
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SITE Heysham 2

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	= 2.5		
Future arisings:	1.4.2025 - 31.3.2028	= 0.2		
	1.4.2028 - 31.3.2030	= 0.2		
	1.4.2030 - 31.3.2031	= 0.3		
Total future arisings:		0.7		
Total waste volume:		3.2		

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

Comment on arising rates: Arisings are dependent on station operations.

Additional information on quantities: -

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 Spent Ion Exchange materials. There may be traces of sludge associated with the ion exchange material.

PHYSICAL CHARACTERISTICS

General description: The waste is expected to be polystyrene bead ion exchange material, particle size range 0.3 - 1.2 mm. Small amounts of caesium ion exchange material pellets 3/8" long and 1/16" diameter may also be present. There are no large items that may require special handling.

Changes since waste generated: -

Bulk density (t/m³): = 1.1

Comment on density: -

CHEMICAL COMPOSITION

General description and components (%wt): Proprietary ion exchange materials (~35% bone-dry wt), water (absorbed plus interstitial ~65% wt) and possibly traces of sludge. The proprietary ion exchange material normally used is expected to be an organic bead material (polystyrene cross linked with divinyl benzene). The caesium ion exchange material that would be used in the event of there being leaking fuel in the pond would be an inorganic mineral material. Boron and sodium will be present in the water and on the ion exchange material.

Chemical state: -

Sheet metal proportion / thickness: -

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	NE	-	
Other ferrous metals.....	NE	-	
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.....	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.....	~ 65.0	-	
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.....	= 0	-	

Other materials (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials.....	NE	-	
Inorganic sludges and flocs.....	NE	-	
Soil.....	= 0	-	
Brick/Stone/Rubble.....	= 0	-	
Cementitious material.....	= 0	-	
Sand.....	= 0	-	
Glass/Ceramics.....	-	-	
Graphite.....	= 0	-	
Desiccants/Catalysts.....	= 0	-	
Asbestos.....	= 0	-	
Non/low friable.....	-	-	
Moderately friable.....	-	-	
Highly friable.....	-	-	
Free aqueous liquids.....	~ 35.0	-	
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.....	~ 3.0	-
Nitrate.....	NE	-
Nitrite.....	NE	-
Phosphate.....	NE	-
Sulphate.....	< 1.0	-
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.....	P	May be present
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).....		-
Boron (non-Boral).....		-
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	Possibly in trace quantities
Total complexing agents.....	NE	-

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:

-

Conditioning plants:

Plant Name	Location
Heysham 2 Operational Waste Processing Facility (OWPF)	Heysham 2

Likely conditioning matrix:

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Further information on the conditioning matrix:

A 9:1 BFS/OPC matrix is expected to be used.

Waste Packaging:

Likely container type:	Container	Waste packaged (vol%)	Waste loading (m³)	Payload (m³)	Number of packages	Estimated start date for packaging
	500 l drum	100.0	0.20	0.47	17	-

Range in container waste loading:

Other information on packaging and conditioning: Appropriate plant to be provided at the Station in accordance with EDF Energy strategy.

Conditioned density (t/m³): ~ 1.7
 Conditioned density comment: Density may vary from 1.62 - 1.72 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: Spent Ion Exchange Resins. Contamination by activation products will be a main source of activity.

Uncertainty: Resin accumulated during early years of operation is likely to be of low activity.

Measurement of radioactivities: Radiochemical analysis of samples.

Chemical form of radionuclides:

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

WASTE STREAM		3M01		Pond Ion Exchange Material					
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		8		8	Ho 166m				
Na 22		4		4	Tm 170				
Al 26		4		4	Tm 171				
Cl 36		6		6	Lu 174				
Ar 39					Lu 176				
Ar 42					Hf 178n				
K 40					Hf 182				
Ca 41		8		8	Pt 193				
Mn 53					Tl 204				
Mn 54	5.64E-04	C C 2	9.42E-03	C C 2	Pb 205				
Fe 55	6.44E-03	C C 2	5.28E-02	C C 2	Pb 210		8		8
Co 60	5.44E-02	C C 2	2.05E-01	C C 2	Bi 208				
Ni 59		8		8	Bi 210m				
Ni 63		6		6	Po 210		8		8
Zn 65	1.18E-03	C C 2	2.30E-02	C C 2	Ra 223				
Se 79		8		8	Ra 225				
Kr 81					Ra 226		8		8
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90		8		8	Th 227				
Zr 93		8		8	Th 228				
Nb 91					Th 229		8		8
Nb 92					Th 230		8		8
Nb 93m		8		8	Th 232		8		8
Nb 94		8		8	Th 234				
Mo 93		8		8	Pa 231		8		8
Tc 97					Pa 233				
Tc 99		8		8	U 232				
Ru 106	< 4.29E-04	C 3	< 6.34E-03	C 3	U 233		8		8
Pd 107		8		8	U 234		8		8
Ag 108m	< 2.07E-04	C 3	< 2.07E-04	C 3	U 235		8		8
Ag 110m	< 1.64E-04	C 3	< 3.12E-03	C 3	U 236		8		8
Cd 109					U 238		8		8
Cd 113m					Np 237		8		8
Sn 119m					Pu 236				
Sn 121m		8		8	Pu 238	6.71E-06	C C 2	7.52E-06	C C 2
Sn 123					Pu 239	1.39E-05	C C 2	1.39E-05	C C 2
Sn 126		8		8	Pu 240	5.57E-06	C C 2	5.57E-06	C C 2
Sb 125	< 5.87E-05	C 3	< 3.86E-04	C 3	Pu 241	5.59E-04	C C 2	1.03E-03	C C 2
Sb 126					Pu 242		8		8
Te 125m					Am 241	5.56E-04	C C 2	5.56E-04	C C 2
Te 127m					Am 242m		8		8
I 129		8		8	Am 243		8		8
Cs 134	3.84E-04	C C 2	3.29E-03	C C 2	Cm 242	4.04E-08	C C 2	9.52E-07	C C 2
Cs 135		8		8	Cm 243	1.88E-08	C C 2	2.59E-08	C C 2
Cs 137	1.84E-02	C C 2	2.52E-02	C C 2	Cm 244	5.85E-07	C C 2	9.65E-07	C C 2
Ba 133	3.36E-04	C C 2	7.45E-04	C C 2	Cm 245		8		8
La 137					Cm 246		8		8
La 138					Cm 248				
Ce 144	6.84E-05	C C 2	1.21E-03	C C 2	Cf 249				
Pm 145					Cf 250				
Pm 147		8		8	Cf 251				
Sm 147					Cf 252				
Sm 151		8		8	Unsp a	< 1.00E-09	8	< 1.00E-09	8
Eu 152	< 1.10E-04	C 3	< 2.10E-04	C 3	Unsp b/g	5.94E-07	C C 2	5.94E-07	C C 2
Eu 154	2.24E-04	C C 2	5.71E-04	C C 2	Total a	5.83E-04	*	5.85E-04	*
Eu 155	< 1.70E-04	C 3	< 6.95E-04	C 3	Total b/g	8.37E-02	*	3.33E-01	*

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