WASTE STREAM 4C03 Pond Water Filtration Resin

SITE	Torness
SITE OWNER	EDFE NGL
WASTE CUSTODIAN	EDFE NGL
WASTE TYPE	ILW; SPD1
Is the waste subject to Scottish Policy:	Yes

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2022.....	6.4 m³
Future arisings -	1.4.2022 - 31.3.2028.....	1.8 m³
	1.4.2028 - 31.3.2030.....	1.2 m³
	1.4.2030 - 31.3.2031.....	0.7 m³
Total future arisings:		3.7 m³
Total waste volume:		10.1 m³

Comment on volumes:	Waste volumes will be variable depending on station operating conditions.			
Uncertainty factors on volumes:	Stock (upper):	x 1.25	Arisings (upper)	x 1.5
	Stock (lower):	x 0.75	Arisings (lower)	x 0.5

WASTE SOURCE Waste arises from spent (chemically exhausted) ion exchange resins.

PHYSICAL CHARACTERISTICS

General description:	The waste consists of spent ion exchange resins in the form of granular resin beads (of small diameter) stored under water. There are no large items associated with the waste.
Physical components (%vol):	Ion exchange resins (100%).
Sealed sources:	The waste does not contain sealed sources.
Bulk density (t/m³):	~1
Comment on density:	Estimated value.

CHEMICAL COMPOSITION

General description and components (%wt):	Proprietary organic resin (IRN150). This is a mixture of 60% anionic and 40% cationic resin.
Chemical state:	Neutral
Chemical form of radionuclides:	-
Metals and alloys (%wt):	-

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	0		
Other ferrous metals.....	0		
Iron.....	0		
Aluminium.....	0		
Beryllium.....	0		
Cobalt.....	0		
Copper.....	0		
Lead.....	0		
Magnox/Magnesium.....	0		
Nickel.....	0		
Titanium.....	0		

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Uranium	0
Zinc	0
Zircaloy/Zirconium	0
Other metals	0

Organics (%wt): Organic material will be present as anionic and cationic ion exchange resin. Waste is not expected to contain any halogenated plastics or rubbers.

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulosics	0		
Paper, cotton	0		
Wood	0		
Halogenated plastics	0		
Total non-halogenated plastics	0		
Condensation polymers	0		
Others	0		
Organic ion exchange materials	100.0		
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	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		

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Free non-aqueous liquids.....	0
Powder/Ash.....	0

Inorganic anions (%wt): Waste contains spent ion exchange anions the individual components of which have not yet been determined.

	(%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: There are no hazardous materials present.

	(%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: The waste will not contain any listed substances.

	(%wt)	Type(s) and comment
Acrylamide.....	NE	
Benzene.....	NE	
Chlorinated solvents.....	NE	
Formaldehyde.....	NE	
Organometallics.....	NE	

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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
Electronic Electrical Equipment (EEE)	
EEE Type 1	0
EEE Type 2	0
EEE Type 3	0
EEE Type 4	0
EEE Type 5	0

Complexing agents (%wt): No

	(%wt)	Type(s) and comment
EDTA	NE	
DPTA	NE	
NTA	NE	
Polycarboxylic acids	NE	
Other organic complexants	NE	No known complexing agents are present.
Total complexing agents	0	

Potential for the waste to contain discrete items: Yes.

PACKAGING AND CONDITIONING

Conditioning method: Resin will be dewatered prior to encapsulation in cement. Supercompaction will not be used.

Plant Name: None.

Location: Torness Power Station.

Plant startup date: Between 2035 and 2038.

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Total capacity (m³/y incoming waste): -

Target start date for packaging this stream: -

Throughput for this stream (m³/y incoming waste): -

Other information: Conditioning strategy not assessed.

Likely container type:

Container	Waste packaged (%vol)	Waste loading (m³)	Payload (m³)	Number of packages
500 l drum	100.0	~0.2	0.466	51

Likely container type comment: -

Range in container waste volume: -

Other information on containers: Stainless Steel

Likely conditioning matrix: BFS/OPC

Other information: A cement blend of BFS/OPC has been considered.

Conditioned density (t/m³): ~1.7

Conditioned density comment: Conditioned density is expected to be between 1.5t/m³ and 1.8t/m³

Other information on conditioning: -

Opportunities for alternative disposal routing: No

Baseline Management Route	Opportunity Management Route	Stream volume (%)	Estimated Date that Opportunity will be realised	Opportunity Confidence	Comment
-	-	-	-	-	-

RADIOACTIVITY

Source: Activity is primarily activation products with small amounts of fission products.

Uncertainty: The range of uncertainty is wide, as much of the resin collected during early station operation is likely to be of low activity. Estimates of activity are based on theoretical assessments which assume higher levels of activity.

Definition of total alpha and total beta/gamma: Where totals are shown on the table of radionuclide activities they are the sums of the listed alpha or beta/gamma emitting radionuclides plus 'other alpha' or 'other beta/gamma'.

Measurement of radioactivities: -

Other information: -

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Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2022	Bands and Code	Future arisings	Bands and Code	Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2022	Bands and Code	Future arisings	Bands and Code
H 3					Gd 153				
Be 10					Ho 163				
C 14					Ho 166m				
Na 22				4	Tm 170				
Al 26				4	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	8.93E-02	C C 2	8.93E-02	C C 2	Pb 205				
Fe 55					Pb 210				
Co 60	2.36E-01	C C 2	2.36E-01	C C 2	Bi 208				
Ni 59					Bi 210m				
Ni 63					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					Pa 231				
Tc 97					Pa 233				
Tc 99					U 232				
Ru 106					U 233				
Pd 107					U 234				
Ag 108m					U 235				
Ag 110m					U 236				
Cd 109					U 238				
Cd 113m					Np 237				
Sn 119m					Pu 236				
Sn 121m					Pu 238				
Sn 123					Pu 239				
Sn 126					Pu 240				
Sb 125					Pu 241				
Sb 126					Pu 242				
Te 125m					Am 241				
Te 127m					Am 242m				
I 129					Am 243				
Cs 134	1.79E-03	C C 2	1.79E-03	C C 2	Cm 242				
Cs 135					Cm 243				
Cs 137	4.82E-02	C C 2	4.82E-02	C C 2	Cm 244				
Ba 133	1.98E-03	C C 2	1.98E-03	C C 2	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					Other a		8		8
Eu 152					Other b/g	2.77E-03	C C 2	2.77E-03	C C 2
Eu 154					**Total a**	**NE**	**8**	**NE**	**8**
Eu 155					**Total b/g**	**3.81E-01**	**C C 2**	**3.81E-01**	**C C 2**

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 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