

WASTE STREAM	3S12/C	CVCS Resins and Spent Resins (ILW) - Conditioned waste
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SITE Sizewell B

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		= 27.0	79.5
Future arisings:	1.4.2025 - 31.3.2026		= 12.0	35.3
	1.4.2026 - 31.3.2027		= 0	0.0
	1.4.2027 - 31.3.2028		= 0	0.0
	1.4.2028 - 31.3.2041		= 0	0.0
	1.4.2041 - 31.3.2042		= 54.2	159.8
Total future arisings:			66.2	195.1
Total waste volume:			93.2	274.6

Number of waste packages in stock: At 1.4.2025..... 55 packages

Comment on arising rates: Volumes are for conditioned waste. Waste arisings dependant on station operations and on planned conditioning campaigns. Campaign 2 (~2025/6) will process ~12m³ into 24 unshielded Mosaik casks and Campaign 3 (~2041) will process the remaining waste.

Additional information on quantities: An unshielded Mosaik cask has been assumed to hold 0.5m³, however in practice the actual volume is circa 490 litres of waste. The overall volume of a Mosaik cask is 1.32m³.

Uncertainty factors on volumes: Stock (upper): x 1.05 Arisings (upper): x 1.25
Stock (lower): x 0.95 Arisings (lower): x 0.75

WASTE SOURCE The spent resins arise from operational de-mineralisers, whose primary function is reactor coolant purification and chemistry control.

PHYSICAL CHARACTERISTICS

General description: Spent resin waste contained in Ductile Cast Iron Casks. Waste is spent organic ion exchange resin comprising mixed anion and cation bead resin based on a styrene divinylbenzene co-polymer (DVB-styrene), in approximately a 50:50 (anion:cation) mix.

Changes since waste generated: -

Bulk density (t/m³): ~ 4.6

Comment on density: Density includes cast iron cask.

CHEMICAL COMPOSITION

General description and components (%wt): Proprietary ion exchange resins, water in ductile cast iron casks. Some fine particulate corrosion products (activated) and insoluble particulate fission products in the waste. No other constituent is anticipated. Mixture of resins (including polystyrene bead resin) with both acidic functional groups in the lithium form and basic functional groups in the borate form. Exhausted sites rendered neutral.

Chemical state: Neutral

Sheet metal proportion / thickness: Not expected to be present.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	TR	-	
Other ferrous metals.....	~ 94.4	Ductile Cast iron.	
Iron.....	NE	-	
Aluminium.....	-	-	
Beryllium.....	= 0	-	
Cobalt.....	TR	-	
Copper.....	-	-	
Lead.....	= 0	-	
Magnox/Magnesium.....	= 0	-	
Nickel.....	-	-	
Titanium.....	NE	-	
Uranium.....	= 0	-	
Zinc.....	= 0	-	
Zircaloy/Zirconium.....	= 0	-	
Other metals.....	TR	-	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	= 0	-	100.0
Paper, cotton.....	= 0	-	
Wood.....	= 0	-	
Halogenated plastics.....	= 0	-	
Total non-halogenated plastics.....	= 0	-	
Condensation polymers.....	= 0	-	
Others.....	= 0	-	
Organic ion exchange materials.....	~ 5.6	Spent organic ion exchange resin comprising mixed anion and cation bead resin based on a styrene divinylbenzene co-polymer (DVB-styrene), in approximately a 50:50 (anion:cation) mix.	
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.....	TR	-	

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.....	NE	-	
Graphite.....	= 0	-	
Desiccants/Catalysts.....	= 0	-	
Asbestos.....	= 0	-	
Non/low friable.....	-	-	
Moderately friable.....	-	-	
Highly friable.....	-	-	
Free aqueous liquids.....	< 0.01	-	
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.....	< 0.01	-
Chloride.....	< 0.01	-
Iodide.....	NE	-
Cyanide.....	NE	-
Carbonate.....	NE	-
Nitrate.....	NE	-
Nitrite.....	NE	-
Phosphate.....	NE	-
Sulphate.....	< 0.01	-
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).....	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	Complexing agents 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:

FAFNIR V & NEWA mobile processing plants condition the resin by dewatering and drying.

Conditioning method:

The waste is dry drained and contained in MOSAIK casks.

Conditioning plants:

Plant Name	Location

Likely conditioning matrix:

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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
	500 I RS drum (0mm Pb)	72.0	0.47	0.47	145	-
	500 I RS drum (20mm Pb)	28.0	0.41	0.41	64	-

Range in container waste loading: Campaign 1 used regular unshielded MOSAIK casks (Cast Iron) as will Campaign 2 (Sept 2025). The use of lead shielding is under review by GDF. Campaign 3 may use MOSAIK casks with either 20mm or 40mm lead lining. Payload & waste loading will vary between campaign 1/2 and campaign 3. Use of 40mm lead lined casks for Campaign 3 will reduce payload to 0.382m³. A total of approximately 160 casks are estimated throughout the entire disposal campaign.

Other information on packaging and conditioning: -

Conditioned density (t/m³): ~ 4.6

Conditioned density comment: Density based on drained wasteform with 27% interstitial voidage in 1.32m³ casks.

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: Yes

Baseline Management Route	Opportunity Management Route	Stream volume (%)	Opportunity Confidence	Comment
GDF	LLWR	-	AMBER	There is an opportunity to review waste before consignment as a proportion may become LLW.

RADIOACTIVITY

Source: Spent ion exchange resin arising from the treatment of liquids. Contamination will be by fission and activation products, and trace quantities of actinides.

Uncertainty: The activity values quoted for existing waste is based on characterisation results. Activity of future arisings based on possible future contamination of resins with fission products. Waste that is processed during campaign 3 will be of higher activity than the previous campaigns.

Measurement of radioactivities: Theoretical assessment. Some activity data comes from limited tank sampling activities.

Chemical form of radionuclides: H-3: In interstitial water between the resin beads.
C-14: Not determined.
Cl-36: Not expected to be present in any measurable quantity.
Se-79: Not expected to be present in any measurable quantity.
Tc-99: Not expected to be present in any measurable quantity.
I-129: Not determined.
Ra: Not expected to be present in any measurable quantity.
Th: Not determined.
U: Trace quantities on the resin beads.
Np: Not expected to be present in any measurable quantity.
Pu: Trace quantities on the resin beads.

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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	1.96E-03	C C 2	1.58E-02	C C 2	Gd 153			2.20E-06	C C 2		
Be 10			3.01E-09	C C 2	Ho 163			1.07E-07	C C 2		
C 14	4.24E-02	C C 2	3.69E-02	C C 2	Ho 166m			1.57E-05	C C 2		
Na 22		4		4	Tm 170			5.78E-06	C C 2		
Al 26		4		4	Tm 171			5.05E-04	C C 2		
Cl 36			7.92E-08	C C 2	Lu 174			8.19E-07	C C 2		
Ar 39			3.28E-05	C C 2	Lu 176			1.02E-13	C C 2		
Ar 42			1.88E-10	C C 2	Hf 178n			1.81E-05	C C 2		
K 40			4.81E-11	C C 2	Hf 182			1.99E-10	C C 2		
Ca 41			9.04E-08	C C 2	Pt 193			3.57E-07	C C 2		
Mn 53			1.01E-12	C C 2	Tl 204			1.15E-04	C C 2		
Mn 54	7.57E-05	C C 2	3.49E-02	C C 2	Pb 205			2.39E-12	C C 2		
Fe 55	2.35E-02	C C 2	2.32E-01	C C 2	Pb 210			5.30E-10	C C 2		
Co 60	4.27E-02	C C 2	4.28E-01	C C 2	Bi 208			1.21E-11	C C 2		
Ni 59			6.17E-07	C C 2	Bi 210m			1.66E-12	C C 2		
Ni 63	3.10E-01	C C 2	2.53E-01	C C 2	Po 210			1.54E-09	C C 2		
Zn 65	< 2.11E-08	C 3	1.47E-03	C C 2	Ra 223			1.57E-10	C C 2		
Se 79			3.27E-08	C C 2	Ra 225			2.40E-07	C C 2		
Kr 81			1.01E-07	C C 2	Ra 226			1.83E-09	C C 2		
Kr 85	< 1.82E-06	C 3	9.53E-03	C C 2	Ra 228			2.31E-07	C C 2		
Rb 87			1.14E-10	C C 2	Ac 227			1.57E-10	C C 2		
Sr 90	1.04E-03	C C 2	8.91E-03	C C 2	Th 227			1.54E-10	C C 2		
Zr 93			9.09E-06	C C 2	Th 228	< 5.61E-07	C 3	4.38E-07	C C 2		
Nb 91			5.92E-09	C C 2	Th 229	< 2.81E-07	C 3	2.40E-07	C C 2		
Nb 92			6.25E-12	C C 2	Th 230	< 2.81E-07	C 3	2.40E-07	C C 2		
Nb 93m			4.02E-04	C C 2	Th 232	< 3.51E-07	C 3	3.01E-07	C C 2		
Nb 94			7.07E-06	C C 2	Th 234			6.91E-07	C C 2		
Mo 93			1.57E-07	C C 2	Pa 231			3.87E-10	C C 2		
Tc 97			5.88E-13	C C 2	Pa 233			1.72E-06	C C 2		
Tc 99			6.69E-05	C C 2	U 232	< 2.81E-07	C 3	2.09E-07	C C 2		
Ru 106	< 5.12E-05	C 3	7.35E-03	C C 2	U 233	9.12E-07	C C 2	5.74E-10	C C 2		
Pd 107			7.14E-07	C C 2	U 234			1.14E-06	C C 2		
Ag 108m			4.28E-07	C C 2	U 235			3.60E-08	C C 2		
Ag 110m			7.07E-04	C C 2	U 236	< 5.61E-07	C 3	4.74E-07	C C 2		
Cd 109	< 7.72E-08	C 3	1.31E-05	C C 2	U 238	< 7.72E-07	C 3	6.91E-07	C C 2		
Cd 113m	< 3.51E-05	C 3	7.32E-05	C C 2	Np 237			1.72E-06	C C 2		
Sn 119m			1.25E-06	C C 2	Pu 236			1.18E-08	C C 2		
Sn 121m			1.20E-04	C C 2	Pu 238	8.98E-06	C C 2	9.28E-05	C C 2		
Sn 123			3.49E-06	C C 2	Pu 239		6	3.64E-05	C C 2		
Sn 126			1.06E-06	C C 2	Pu 240	< 6.32E-07	C 3	3.65E-05	C C 2		
Sb 125	< 4.21E-08	C 3	3.13E-02	C C 2	Pu 241	< 5.26E-05	C 3	5.52E-03	C C 2		
Sb 126			3.41E-07	C C 2	Pu 242	< 3.16E-07	C 3	3.83E-07	C C 2		
Te 125m			7.84E-03	C C 2	Am 241	< 4.91E-07	C 3	1.76E-04	C C 2		
Te 127m			2.06E-05	C C 2	Am 242m	< 6.32E-08	C 3	6.37E-07	C C 2		
I 129	< 1.75E-07	C 3	2.32E-07	C C 2	Am 243	< 4.91E-08	C 3	2.28E-06	C C 2		
Cs 134	1.48E-02	C C 2	2.95E-02	C C 2	Cm 242	< 4.91E-08	C 3	1.92E-06	C C 2		
Cs 135			2.55E-06	C C 2	Cm 243			1.07E-07	C C 2		
Cs 137	3.25E-01	C C 2	3.87E-01	C C 2	Cm 244	< 1.40E-08	C 3	1.40E-05	C C 2		
Ba 133			1.35E-05	C C 2	Cm 245			3.63E-06	C C 2		
La 137			1.54E-08	C C 2	Cm 246	< 7.02E-09	C 3	1.02E-06	C C 2		
La 138			2.25E-14	C C 2	Cm 248			4.74E-11	C C 2		
Ce 144	< 2.81E-08	C 3	3.61E-03	C C 2	Cf 249			4.97E-10	C C 2		
Pm 145			5.15E-08	C C 2	Cf 250			3.05E-09	C C 2		
Pm 147	< 1.05E-05	C 2	3.02E-02	C C 2	Cf 251			4.71E-11	C C 2		
Sm 147			1.59E-11	C C 2	Cf 252			1.28E-09	C C 2		
Sm 151			1.46E-03	C C 2	Unsp a		8		8		
Eu 152			1.51E-06	C C 2	Unsp b/g	< 7.02E-04	C 3		6		
Eu 154	< 3.51E-08	C 3	1.26E-02	C C 2	Total a	1.45E-05	*	3.71E-04	*		
Eu 155	< 1.40E-08	C 3	3.10E-03	C C 2	Total b/g	7.62E-01	*	1.54E+00	*		

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