

WASTE STREAM	5B344	Other Facilities Decommissioning ILW
--------------	-------	--------------------------------------

SITE Dounreay

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Nuclear Restoration Services Ltd (NRS)

WASTE TYPE ILW

WASTE VOLUMES

	Reported (m ³)	OR	Conditioned (m ³)	Packaged (m ³)
Stocks:	At 1.4.2025	= 12.0		
Future arisings:	1.4.2028 - 31.3.2029	= 7.4		
	1.4.2029 - 31.3.2030	= 8.1		
	1.4.2045 - 31.3.2046	= 1.4		
	1.4.2046 - 31.3.2047	< 0.1		
	1.4.2047 - 31.3.2048	< 0.1		
	1.4.2064 - 31.3.2065	< 0.1		
	1.4.2065 - 31.3.2066	< 0.1		
	1.4.2066 - 31.3.2067	< 0.1		
	1.4.2067 - 31.3.2068	< 0.1		
	1.4.2068 - 31.3.2069	< 0.1		
	1.4.2069 - 31.3.2070	< 0.1		
Total future arisings:		17.0		
Total waste volume:		29.0		

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

Comment on arising rates: Programme data is based on Life Time Plan 2024 dataset generated in December 2023.

Additional information on quantities: -

Uncertainty factors on volumes: Stock (upper): x 1.02 Arisings (upper): x 1.20
Stock (lower): x 0.98 Arisings (lower): x 0.80

WASTE SOURCE This waste arose from the decommissioning of a fuel fabrication plant (consists mainly of contaminated concrete and rubble) and from the future decommissioning of other facilities.

PHYSICAL CHARACTERISTICS

General description: The waste is assumed to be concrete / rubble. With some steel work not listed in other decommissioning waste streams. Also contains sources held in areas of site not listed in other decommissioning waste streams.

Changes since waste generated: -

Bulk density (t/m³): = 0.47

Comment on density: Based on actuals data from Dounreay's waste consignment system. Data considered acceptable for 2025 submission.

CHEMICAL COMPOSITION

General description and components (%wt): Cementitious material (e.g. concrete) (91.10%), Mild Steel (8.45%), Organic ion exchange materials (e.g. IX Resin) (0.19%), Sources (0.25%).

Chemical state: Neutral

Sheet metal proportion / thickness: -

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	= 0	-	
Other ferrous metals.....	= 8.5	Mild steel	
Iron.....	= 0	-	
Aluminium.....	= 0	-	
Beryllium.....	= 0	-	
Cobalt.....	= 0	-	
Copper.....	= 0	-	
Lead.....	= 0	-	
Magnox/Magnesium.....	= 0	-	
Nickel.....	= 0	-	
Titanium.....	= 0	-	
Uranium.....	= 0	-	
Zinc.....	= 0	-	
Zircaloy/Zirconium.....	= 0	-	
Other metals.....	= 0.25	Sources 0.25%	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulotics.....	= 0	-	
Paper, cotton.....	= 0	-	
Wood.....	= 0	-	
Halogenated plastics.....	= 0	-	
Total non-halogenated plastics.....	= 0	-	
Condensation polymers.....	NE	-	
Others.....	NE	-	
Organic ion exchange materials.....	= 0.19	-	
Total rubber.....	= 0	-	
Halogenated rubber.....	NE	-	
Non-halogenated rubber.....	NE	-	
Hydrocarbons.....	= 0	-	
Oil or grease.....	= 0	-	
Fuel.....	NE	-	
Asphalt/Tarmac (cont.coal tar).....	= 0	-	
Asphalt/Tarmac (no coal tar).....	= 0	-	
Bitumen.....	= 0	-	
Others.....	NE	-	
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.....	= 91.1	-	
Sand.....	= 0	-	
Glass/Ceramics.....	= 0	-	
Graphite.....	= 0	-	
Desiccants/Catalysts.....	= 0	-	
Asbestos.....	= 0	-	
Non/low friable.....	NE	-	
Moderately friable.....	NE	-	
Highly friable.....	NE	-	
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.....	= 0	-
Chloride.....	NE	-
Iodide.....	NE	-
Cyanide.....	= 0	-
Carbonate.....	NE	-
Nitrate.....	NE	-
Nitrite.....	NE	-
Phosphate.....	= 0	-
Sulphate.....	= 0	-
Sulphide.....	NE	-

Materials of interest for waste acceptance criteria:

	(%wt)	Type(s) and comment
Combustible metals.....	NE	-
Low flash point liquids.....	NE	-
Explosive materials.....	NE	-
Phosphorus.....	NE	-
Hydrides.....	NE	-
Biological etc. materials.....	NE	-
Biodegradable materials.....	= 0	-
Putrescible wastes.....	NE	-
Non-putrescible wastes.....	NE	-
Corrosive materials.....	NE	-
Pyrophoric materials.....	NE	-
Generating toxic gases.....	NE	-
Reacting with water.....	= 0	-
Higher activity particles.....	NE	-
Soluble solids as bulk chemical compounds.....	NE	-

Hazardous substances / non hazardous pollutants:

-

	(%wt)	Type(s) and comment
Acrylamide.....	NE	-
Benzene.....	= 0	-
Chlorinated solvents.....	NE	-
Formaldehyde.....	NE	-
Organometallics.....	NE	-
Phenol.....	NE	-
Styrene.....	NE	-
Tri-butyl phosphate.....	NE	-
Other organophosphates.....	NE	-
Vinyl chloride.....	NE	-
Arsenic.....	= 0	-
Barium.....	NE	-
Boron.....	= 0	-
Boron (in Boral).....	NE	-
Boron (non-Boral).....	NE	-
Cadmium.....	= 0	-
Caesium.....	NE	-
Selenium.....	= 0	-
Chromium.....	= 0	-
Molybdenum.....	= 0	-
Thallium.....	NE	-
Tin.....	= 0	-
Vanadium.....	= 0	-
Mercury compounds.....	= 0	-
Others.....	NE	-

Complexing agents (%wt):

No

	(%wt)	Type(s) and comment
EDTA.....	NE	-
DPTA.....	NE	-
NTA.....	NE	-
Polycarboxylic acids.....	NE	-
Other organic complexants.....	NE	-
Total complexing agents.....	= 0	-

Physical components:

	Number	Type(s) and comment
Sources.....	= 26	7 Liquid / 19 Solid
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:

Stocks and Arisings waste will be conditioned using a grout matrix into 500L drums. This waste will be processed through a dedicated ILW repackaging facility which will produce 500 L drums.

Conditioning method:

Waste will be conditioned using grout matrix into 500L Drums. This will be done through dedicated ILW repackaging facility, which will handle both RHILW and CHILW 200L drums. This facility will produce conditioned 500L drums.

Conditioning plants:

Plant Name	Location
Combined ILW Repackaging Facility	Dounreay

Likely conditioning matrix:

Non-standard

Further information on the conditioning matrix:

42% Water, Dounreay uses 1:3 OPC:PFA

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 (basket for waste)	60.7	0.18	0.40	97	-
500 l drum (pucks)	39.3	0.95	0.40	12	-

Range in container waste loading:

It is estimated that between 2 and 8 CHILW pucks will be placed into each 500l drum with the average being 5 drums per 500L drum. A small percentage of drums may not be suitable for supercompaction and will be directly immobilised into the 500l drum. Assume 3:2 Z6033 to 500L drum ratio.

Other information on packaging and conditioning:

-

Conditioned density (t/m³):

~ 2.5

Conditioned density comment:

The density is likely to be around 2 - 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: Not yet determined

Baseline Management Route	Opportunity Management Route	Stream volume (%)	Opportunity Confidence	Comment
Non-NSDF HAW	Dounreay LLWDV	NE	RED	There is potential for LLW to be diverted out of this stream during repackaging of ILW into 500L drums. However, details of this will be confirmed through the design process of the repackaging facility.

RADIOACTIVITY

Source: Contamination of operating facilities.

Uncertainty: Stocks and arisings data is taken from a mixture of consignors estimates and LoCs based on originating facility. Silo LoC is used as the originating building is indirectly associated with that wastestream. Factor of 10 uncertainty is assumed.

Measurement of radioactivities: From LoC data and consignment data.

Chemical form of radionuclides:

- H-3: -
- C-14: -
- Cl-36: Not likely to be present.
- Se-79: -
- Tc-99: -
- I-129: Not likely to be present.
- Ra: -
- Th: -
- U: Likely to be present as dried nitrate solution.
- Np: -
- Pu: -

WASTE STREAM			5B344			Other Facilities Decommissioning ILW					
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	= 7.31E-05	C C 2	= 7.31E-05	C C 2	Gd 153						
Be 10					Ho 163						
C 14	= 3.66E-05	C C 2	= 3.66E-05	C C 2	Ho 166m						
Na 22					Tm 170						
Al 26					Tm 171						
Cl 36					Lu 174						
Ar 39					Lu 176						
Ar 42					Hf 178n						
K 40					Hf 182						
Ca 41					Pt 193						
Mn 53					Ti 204						
Mn 54					Pb 205						
Fe 55					Pb 210	= 1.42E-12	C C 2	= 1.42E-12	C C 2		
Co 60	= 9.69E-02	C C 2	= 9.69E-02	C C 2	Bi 208						
Ni 59	= 9.03E-03	C C 2	= 9.03E-03	C C 2	Bi 210m						
Ni 63	= 2.58E-01	C C 2	= 2.58E-01	C C 2	Po 210	= 1.34E-12	C C 2	= 1.34E-12	C C 2		
Zn 65					Ra 223	= 2.10E-09	C C 2	= 2.10E-09	C C 2		
Se 79	= 2.41E-07	C C 2	= 2.41E-07	C C 2	Ra 225	= 5.26E-10	C C 2	= 5.26E-10	C C 2		
Kr 81					Ra 226	= 6.39E-12	C C 2	= 6.39E-12	C C 2		
Kr 85					Ra 228	= 2.56E-16	C C 2	= 2.56E-16	C C 2		
Rb 87					Ac 227	= 2.11E-09	C C 2	= 2.11E-09	C C 2		
Sr 90	= 3.26E-02	C C 2	= 3.26E-02	C C 2	Th 227	= 2.07E-09	C C 2	= 2.07E-09	C C 2		
Zr 93	= 2.35E-06	C C 2	= 2.35E-06	C C 2	Th 228	= 2.93E-10	C C 2	= 2.93E-10	C C 2		
Nb 91					Th 229	= 5.27E-10	C C 2	= 5.27E-10	C C 2		
Nb 92					Th 230	= 1.15E-09	C C 2	= 1.15E-09	C C 2		
Nb 93m	= 1.60E-06	C C 2	= 1.60E-06	C C 2	Th 232	= 3.68E-16	C C 2	= 3.68E-16	C C 2		
Nb 94	= 9.90E-03	C C 2	= 9.90E-03	C C 2	Th 234	= 2.26E-06	C C 2	= 2.26E-06	C C 2		
Mo 93					Pa 231	= 4.35E-09	C C 2	= 4.35E-09	C C 2		
Tc 97					Pa 233	= 7.69E-08	C C 2	= 7.69E-08	C C 2		
Tc 99	= 1.11E-03	C C 2	= 1.11E-03	C C 2	U 232	= 2.85E-10	C C 2	= 2.85E-10	C C 2		
Ru 106	= 6.88E-11	C C 2	= 6.88E-11	C C 2	U 233	= 2.15E-07	C C 2	= 2.15E-07	C C 2		
Pd 107	= 1.91E-07	C C 2	= 1.91E-07	C C 2	U 234	= 4.90E-06	C C 2	= 4.90E-06	C C 2		
Ag 108m	= 3.21E-23	C C 2	= 3.21E-23	C C 2	U 235	= 8.16E-07	C C 2	= 8.16E-07	C C 2		
Ag 110m					U 236	= 2.88E-07	C C 2	= 2.88E-07	C C 2		
Cd 109					U 238	= 2.26E-06	C C 2	= 2.26E-06	C C 2		
Cd 113m	= 1.93E-06	C C 2	= 1.93E-06	C C 2	Np 237	= 7.71E-08	C C 2	= 7.71E-08	C C 2		
Sn 119m					Pu 236						
Sn 121m	= 3.85E-05	C C 2	= 3.85E-05	C C 2	Pu 238	= 2.06E-03	C C 2	= 2.06E-03	C C 2		
Sn 123					Pu 239	= 1.47E-02	C C 2	= 1.47E-02	C C 2		
Sn 126	= 8.80E-07	C C 2	= 8.80E-07	C C 2	Pu 240	= 6.88E-03	C C 2	= 6.88E-03	C C 2		
Sb 125	= 2.21E-06	C C 2	= 2.21E-06	C C 2	Pu 241	= 4.07E-02	C C 2	= 4.07E-02	C C 2		
Sb 126	= 8.80E-07	C C 2	= 8.80E-07	C C 2	Pu 242	= 2.17E-06	C C 2	= 2.17E-06	C C 2		
Te 125m	= 5.23E-07	C C 2	= 5.23E-07	C C 2	Am 241	= 4.90E-03	C C 2	= 4.90E-03	C C 2		
Te 127m					Am 242m						
I 129	= 4.55E-08	C C 2	= 4.55E-08	C C 2	Am 243	= 6.34E-06	C C 2	= 6.34E-06	C C 2		
Cs 134	= 4.05E-07	C C 2	= 4.05E-07	C C 2	Cm 242	= 7.50E-33	C C 2	= 7.50E-33	C C 2		
Cs 135	= 1.99E-06	C C 2	= 1.99E-06	C C 2	Cm 243	= 1.81E-05	C C 2	= 1.81E-05	C C 2		
Cs 137	= 4.18E-02	C C 2	= 4.18E-02	C C 2	Cm 244	= 1.36E-04	C C 2	= 1.36E-04	C C 2		
Ba 133					Cm 245	= 2.38E-08	C C 2	= 2.38E-08	C C 2		
La 137					Cm 246	= 1.14E-09	C C 2	= 1.14E-09	C C 2		
La 138					Cm 248	= 2.39E-22		= 2.39E-22	C C 2		
Ce 144					Cf 249	= 5.58E-14		= 5.58E-14	C C 2		
Pm 145					Cf 250	= 1.85E-18		= 1.85E-18	C C 2		
Pm 147	= 1.92E-05	C C 2	= 1.92E-05	C C 2	Cf 251	= 1.20E-17		= 1.20E-17	C C 2		
Sm 147	= 4.57E-13	C C 2	= 4.57E-13	C C 2	Cf 252	= 3.49E-20		= 3.49E-20	C C 2		
Sm 151	= 2.56E-03	C C 2	= 2.56E-03	C C 2	Unsp a						
Eu 152	= 1.15E-07	C C 2	= 1.15E-07	C C 2	Unsp b/g						
Eu 154	= 1.56E-04	C C 2	= 1.56E-04	C C 2	Total a	2.87E-02	*	2.87E-02	*		
Eu 155	= 6.52E-05	C C 2	= 6.52E-05	C C 2	Total b/g	4.93E-01	*	4.93E-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