

WASTE STREAM	2C100	General Reactor LLW
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SITE Chapelcross

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Nuclear Restoration Services Ltd (NRS)

WASTE TYPE LLW

WASTE VOLUMES

	Reported (m ³)	OR	Conditioned (m ³)	Packaged (m ³)
Stocks:	At 1.4.2025			
Future arisings:	1.4.2039 - 31.3.2055			
Total future arisings:				
Total waste volume:				

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

Comment on arising rates: Deferral is assumed to start in FY 2039. Arising is assumed at a rate of 2 m³ per year.

Additional information on quantities: -

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

WASTE SOURCE Wastes from the general reactor area during the Deferral period.

PHYSICAL CHARACTERISTICS

General description: Principally mixed plastic sheeting and protective clothing all in mild steel drums. Any large items will be cut to fit standard packages.

Changes since waste generated: -

Bulk density (t/m³): = 0.40

Comment on density: -

CHEMICAL COMPOSITION

General description and components (%wt): The waste comprises principally various plastics and cloth, all in mild steel drums. Steel drum approximately 25%wt, percentage breakdown of other components not assessed.

Chemical state: Neutral

Sheet metal proportion / thickness: Bulk and sheet metal are not expected to be present in significant quantities and have not been assessed. Mild steel drums containing the waste will arise at about 10 per year.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	= 0	-	
Other ferrous metals.....	~ 25.0	-	
Iron.....		-	
Aluminium.....	= 0	-	
Beryllium.....		-	
Cobalt.....		-	
Copper.....	= 0	-	
Lead.....	= 0	-	
Magnox/Magnesium.....	= 0	-	
Nickel.....		-	
Titanium.....		-	
Uranium.....		-	
Zinc.....	= 0	-	
Zircaloy/Zirconium.....	= 0	-	
Other metals.....	= 0	Other metals have not been identified and are not expected.	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulotics.....	~ 40.0	-	
Paper, cotton.....	~ 40.0	-	
Wood.....	0	-	
Halogenated plastics.....	0	-	
Total non-halogenated plastics.....	~ 35.0	-	
Condensation polymers.....	0	-	
Others.....	~ 35.0	-	
Organic ion exchange materials.....	0	-	
Total rubber.....	0	-	
Halogenated rubber.....	0	-	
Non-halogenated rubber.....	0	-	
Hydrocarbons.....		-	
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.....		-	
Glass/Ceramics.....	NE	-	
Graphite.....	= 0	-	
Desiccants/Catalysts.....		-	
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.....	= 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:

	(%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.....		-
Corrosive materials.....	= 0	-
Pyrophoric materials.....	= 0	-
Generating toxic gases.....	= 0	-
Reacting with water.....	= 0	-
Higher activity particles.....		-
Soluble solids as bulk chemical compounds.....		-

Hazardous substances / non hazardous pollutants:

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

Complexing agents (%wt):

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

Physical components:

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

Comments on planned treatments:

-

Conditioning method:

-

Conditioning plants:

Plant Name	Location

Likely conditioning matrix:

-

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
	-	-	-	-	-	-

Range in container waste loading: -

Other information on packaging and conditioning: -

Conditioned density (t/m³): -

Conditioned density comment: -

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	= 0.40	2039
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: Activation and contamination of materials.

Uncertainty: The values quoted are indicative of the activities that are expected. Activity values are current best estimates. Specific activity is a function of Station operating history.

Measurement of radioactivities: Estimates have been made from the specific activity of stream 2C920.

Chemical form of radionuclides:

H-3: Tritium present as surface contamination of waste by tritiated liquor.

C-14: Carbon-14 may be in the form of graphite dust.

Cl-36: -

Se-79: The selenium content is insignificant.

Tc-99: The technetium content is insignificant.

I-129: -

Ra: The radium isotope content is insignificant.

Th: The thorium isotope content is insignificant.

U: The uranium isotope content is insignificant.

Np: The neptunium content is insignificant.

Pu: The plutonium isotope content is insignificant.

WASTE STREAM 2C100 General Reactor LLW									
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			3.06E-05	C C 2	Gd 153				8
Be 10				8	Ho 163				8
C 14			6.06E-06	C C 2	Ho 166m				8
Na 22				8	Tm 170				8
Al 26				8	Tm 171				8
Cl 36			4.38E-06	C C 2	Lu 174				8
Ar 39				8	Lu 176				8
Ar 42				8	Hf 178n				8
K 40				8	Hf 182				8
Ca 41				8	Pt 193				8
Mn 53				8	Ti 204				8
Mn 54				8	Pb 205				8
Fe 55			9.65E-07	C C 2	Pb 210				8
Co 60			6.22E-06	C C 2	Bi 208				8
Ni 59				8	Bi 210m				8
Ni 63			4.06E-05	C C 2	Po 210				8
Zn 65				8	Ra 223				8
Se 79				8	Ra 225				8
Kr 81				8	Ra 226				8
Kr 85				8	Ra 228				8
Rb 87				8	Ac 227				8
Sr 90			4.69E-06	C C 2	Th 227				8
Zr 93				8	Th 228			2.60E-09	C C 2
Nb 91				8	Th 229				8
Nb 92				8	Th 230				8
Nb 93m				8	Th 232				8
Nb 94				8	Th 234			6.55E-08	C C 2
Mo 93				8	Pa 231				8
Tc 97				8	Pa 233			5.79E-07	C C 2
Tc 99			7.35E-08	C C 2	U 232			2.53E-09	C C 2
Ru 106				8	U 233				8
Pd 107				8	U 234			8.36E-08	C C 2
Ag 108m				8	U 235			3.08E-09	C C 2
Ag 110m				8	U 236				8
Cd 109				8	U 238			6.55E-08	C C 2
Cd 113m				8	Np 237			5.79E-07	C C 2
Sn 119m				8	Pu 236				8
Sn 121m				8	Pu 238			2.50E-07	C C 2
Sn 123				8	Pu 239			1.87E-07	C C 2
Sn 126				8	Pu 240			2.45E-07	C C 2
Sb 125				8	Pu 241			1.68E-06	C C 2
Sb 126				8	Pu 242			8.40E-09	C C 2
Te 125m				8	Am 241			6.78E-07	C C 2
Te 127m				8	Am 242m				8
I 129				8	Am 243			1.96E-08	C C 2
Cs 134				8	Cm 242				8
Cs 135				8	Cm 243			1.03E-08	C C 2
Cs 137			1.01E-05	C C 2	Cm 244			1.64E-07	C C 2
Ba 133			5.52E-08	C C 2	Cm 245				8
La 137				8	Cm 246				8
La 138				8	Cm 248				8
Ce 144				8	Cf 249				8
Pm 145				8	Cf 250				8
Pm 147				8	Cf 251				8
Sm 147				8	Cf 252				8
Sm 151			1.75E-07	C C 2	Unsp a				
Eu 152			6.27E-08	C C 2	Unsp b/g				
Eu 154			3.24E-08	C C 2	Total a	0	*	2.30E-06	*
Eu 155			3.14E-09	C C 2	Total b/g	0	*	1.06E-04	*

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