

WASTE STREAM	9J948	Reactor and Auxiliary Building LLW
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SITE Hunterston A

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 = 10.0			
Future arisings:	1.4.2025 - 31.3.2026 6.2			
	1.4.2026 - 31.3.2027 7.3			
	1.4.2027 - 31.3.2028 18.3			
	1.4.2028 - 31.3.2029 8.3			
	1.4.2029 - 31.3.2030 24.8			
Total future arisings:	64.9			
Total waste volume:	74.9			

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

Comment on arising rates: -

Additional information on quantities: Waste volumes include a proportion of secondary waste arisings.

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

WASTE SOURCE This waste stream consists of waste arisings from areas associated with the Hunterston A site reactor buildings and auxiliary buildings.

PHYSICAL CHARACTERISTICS

General description: This waste stream consists of waste arising's from areas associated with the Reactor buildings and the auxiliary buildings. The waste is described as general waste, mostly comprising of metals including miscellaneous plant items and concrete. Additionally it includes secondary LLW wastes including those associated with SAWBR waste processing.

Changes since waste generated: -

Bulk density (t/m³): ~ 0.89

Comment on density: The average waste density is approximately 0.89 t/m3.

CHEMICAL COMPOSITION

General description and components (%wt): Metal (73% wt), Concrete/rubble (3%wt), Soil (4% wt), Biodegradable- non putrescibles (5% wt), Plastics (non-halogenated) (3.95% wt), Wood (3% wt), Others (6% wt)

Chemical state: Neutral

Sheet metal proportion / thickness: This waste stream will contain waste of various sizes and thicknesses.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....		-	
Other ferrous metals.....	= 71.4	Steel fittings, RSJs, etc.	
Iron.....		-	
Aluminium.....	= 0.44	Items e.g framework and shelving etc.	
Beryllium.....	0	-	
Cobalt.....		-	
Copper.....	= 0.23	Items e.g pipework and fittings	
Lead.....	= 0.87	Items e.g pipework and flashings	
Magnox/Magnesium.....	= 0	-	
Nickel.....		-	
Titanium.....		-	
Uranium.....		-	
Zinc.....	= 0	-	
Zircaloy/Zirconium.....	= 0	-	
Other metals.....	NE	"Other" metals have not been estimated.	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	~ 3.0	-	
Paper, cotton.....		-	
Wood.....	~ 3.0	-	
Halogenated plastics.....	= 0	-	
Total non-halogenated plastics.....	~ 4.0	-	
Condensation polymers.....	= 0	-	
Others.....	~ 4.0	Soft wastes, and items e.g. fittings & brackets	
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.....		-	

Other materials (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials.....	= 0	-	
Inorganic sludges and flocs.....	= 0	-	
Soil.....	~ 4.0	-	
Brick/Stone/Rubble.....	~ 3.0	-	
Cementitious material.....	= 0	-	
Sand.....		-	
Glass/Ceramics.....	= 0	-	
Graphite.....	= 0	-	
Desiccants/Catalysts.....		-	
Asbestos.....	= 5.9	-	
Non/low friable.....	= 4.5	chrysotile (white)	
Moderately friable.....	= 1.4	chrysotile (white)	
Highly friable.....	= 0	-	
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.....	NE	-
Chloride.....	NE	-
Iodide.....	NE	-
Cyanide.....	= 0	-
Carbonate.....	NE	-
Nitrate.....	NE	-
Nitrite.....	NE	-
Phosphate.....	NE	-
Sulphate.....	NE	-
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.....	5.0	-
Putrescible wastes.....	= 0	-
Non-putrescible wastes.....	= 5.0	-
Corrosive materials.....	= 0	-
Pyrophoric materials.....	= 0	-
Generating toxic gases.....	= 0	-
Reacting with water.....	P	surface area of Aluminium 1500000cm2.
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):

Not yet determined		
	(%wt)	Type(s) and comment
EDTA.....	NE	-
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	Off-site	= 5.0
Decay storage		
Low force compaction		
Supercompaction (HFC)		
Incineration		
Drying/dewatering/liquid separation	Off-site	= 39.8
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		= 55.2
Treatment not yet determined		
None		

Comments on planned treatments:

24.88% to landfill as VLLW.

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
	1/2 Height IP-2 Disposal/Re-usable ISO (TC01/TC02)	30.3	10.0	18.3	3	-

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)			
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	= 30.3	0.89	
Expected to be consigned to a Landfill Facility	= 24.9	0.40	
Expected to be disposed On-Site			
Expected to be managed by In-Situ Disposal			
Expected to be consigned to an Incineration Facility	= 5.0	0.40	
Expected to be consigned to a Metal Treatment Facility	= 39.8	1.4	
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: 17 04 05, 17 04 07, 17 06 01*

Opportunities for alternative disposal routing: No

Baseline Management Route	Opportunity Management Route	Stream volume (%)	Opportunity Confidence	Comment
-	-	-	-	-

RADIOACTIVITY

Source: -

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

Measurement of radioactivities: The specific activities have been estimated from the waste stream fingerprint.

Chemical form of radionuclides:

H-3: Tritium may be present as tritiated water.

C-14: The chemical form of carbon 14 may be graphite.

Cl-36: The chemical form of chlorine 36 has not been determined.

Se-79: The chemical form of selenium has not been determined.

Tc-99: The chemical form of technetium has not been determined.

I-129: -

Ra: The radium isotope content is insignificant.

Th: The thorium isotope content is insignificant.

U: The uranium isotope content is insignificant.

Np: Neptunium isotope content is expected to be insignificant.

Pu: The chemical form of plutonium isotopes has not been determined but may be plutonium oxides.

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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	7.47E-06	C C 2	7.47E-06	C C 2	Gd 153		8		8
Be 10		8		8	Ho 163		8		8
C 14	2.53E-07	C C 2	2.53E-07	C C 2	Ho 166m		8		8
Na 22		8		8	Tm 170		8		8
Al 26		8		8	Tm 171		8		8
Cl 36	3.61E-06	C C 2	3.61E-06	C C 2	Lu 174		8		8
Ar 39		8		8	Lu 176		8		8
Ar 42		8		8	Hf 178n		8		8
K 40		8		8	Hf 182		8		8
Ca 41		8		8	Pt 193		8		8
Mn 53		8		8	Tl 204		8		8
Mn 54		8		8	Pb 205		8		8
Fe 55	1.94E-08	C C 2	1.94E-08	C C 2	Pb 210		8		8
Co 60	8.38E-08	C C 2	8.38E-08	C C 2	Bi 208		8		8
Ni 59		8		8	Bi 210m		8		8
Ni 63	2.64E-07	C C 2	2.64E-07	C C 2	Po 210		8		8
Zn 65		8		8	Ra 223		8		8
Se 79		8		8	Ra 225		8		8
Kr 81		8		8	Ra 226		8		8
Kr 85		8		8	Ra 228		8		8
Rb 87		8		8	Ac 227		8		8
Sr 90	8.40E-08	C C 2	8.40E-08	C C 2	Th 227		8		8
Zr 93		8		8	Th 228		8		8
Nb 91		8		8	Th 229		8		8
Nb 92		8		8	Th 230		8		8
Nb 93m		8		8	Th 232		8		8
Nb 94	5.29E-09	C C 2	5.29E-09	C C 2	Th 234		8		8
Mo 93		8		8	Pa 231		8		8
Tc 97		8		8	Pa 233		8		8
Tc 99	9.44E-09	C C 2	9.44E-09	C C 2	U 232		8		8
Ru 106		8		8	U 233		8		8
Pd 107		8		8	U 234		8		8
Ag 108m	4.75E-09	C C 2	4.75E-09	C C 2	U 235		8		8
Ag 110m		8		8	U 236		8		8
Cd 109		8		8	U 238		8		8
Cd 113m		8		8	Np 237		8		8
Sn 119m		8		8	Pu 236		8		8
Sn 121m		8		8	Pu 238	1.12E-09	C C 2	1.12E-09	C C 2
Sn 123		8		8	Pu 239	1.24E-09	C C 2	1.24E-09	C C 2
Sn 126		8		8	Pu 240	1.24E-09	C C 2	1.24E-09	C C 2
Sb 125	1.95E-09	C C 2	1.95E-09	C C 2	Pu 241	7.02E-08	C C 2	7.02E-08	C C 2
Sb 126		8		8	Pu 242		8		8
Te 125m		8		8	Am 241	1.13E-08	C C 2	1.13E-08	C C 2
Te 127m		8		8	Am 242m		8		8
I 129	5.91E-09	C C 2	5.91E-09	C C 2	Am 243		8		8
Cs 134		8		8	Cm 242		8		8
Cs 135		8		8	Cm 243		8		8
Cs 137	2.77E-08	C C 2	2.77E-08	C C 2	Cm 244		8		8
Ba 133	5.82E-09	C C 2	5.82E-09	C C 2	Cm 245		8		8
La 137		8		8	Cm 246		8		8
La 138		8		8	Cm 248		8		8
Ce 144		8		8	Cf 249		8		8
Pm 145		8		8	Cf 250		8		8
Pm 147	6.54E-09	C C 2	6.54E-09	C C 2	Cf 251		8		8
Sm 147		8		8	Cf 252		8		8
Sm 151	2.02E-07	C C 2	2.02E-07	C C 2	Unsp a				
Eu 152	7.20E-08	C C 2	7.20E-08	C C 2	Unsp b/g				
Eu 154	1.42E-08	C C 2	1.42E-08	C C 2	Total a	1.49E-08	*	1.49E-08	*
Eu 155	1.40E-09	C C 2	1.40E-09	C C 2	Total b/g	1.22E-05	*	1.22E-05	*

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