

WASTE STREAM	5G24	Winfrith LLW Sources
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SITE Winfrith

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:	1.4.2034 - 31.3.2035			
Total future arisings:	< 0.1			
Total waste volume:	< 0.1			

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

Comment on arising rates: -

Additional information on quantities: A small number of sources maybe disposed of prior to 2034. A full review of remaining sources on site has been carried out. A total of 79 LLW sources remain on site of which 13 are redundant and 66 are still in use. The stream is to be updated to reflect this using the common volume assumption per source of 0.0002m³ per source (10cm x 10cm x 2cm).

Uncertainty factors on volumes: Stock (upper): x 1.10 Arisings (upper): x 1.10
Stock (lower): x 0.90 Arisings (lower): x 0.90

WASTE SOURCE LLW sources arising from operations and experiments on the site.

PHYSICAL CHARACTERISTICS

General description: The sources will be varying sizes, and packaging will vary from plastic sealed/wrapped, concreted into a metal/plastic bin, cardboard box etc.

Changes since waste generated: -

Bulk density (t/m³): ~ 1.0

Comment on density: Density refers to sources on bases only, when they have been stripped of all extraneous materials, which are disposed of as non-active material. Redundant sources will then be encapsulated for disposal as LLW.

CHEMICAL COMPOSITION

General description and components (%wt): Sources (79%), unspecified and ferrous metals (12%), plastics (7%), others (2%). Sources will comprise metal/plastic/ mica holders and source material.

Chemical state: Neutral

Sheet metal proportion / thickness: -

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	~ 10.0	-	
Other ferrous metals.....	~ 65.0	-	
Iron.....	-	-	
Aluminium.....	~ 0.10	-	
Beryllium.....	-	-	
Cobalt.....	-	-	
Copper.....	TR	-	
Lead.....	~ 10.0	-	
Magnox/Magnesium.....	-	-	
Nickel.....	-	-	
Titanium.....	-	-	
Uranium.....	P	-	
Zinc.....	= 0	-	
Zircaloy/Zirconium.....	-	-	
Other metals.....	~ 1.0	Tungsten and Depleted Uranium	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulotics.....	~ 0.90	-	
Paper, cotton.....	~ 0.90	-	
Wood.....	= 0	-	
Halogenated plastics.....	~ 1.0	PVC is expected to be present together with small amounts of PTFE, neoprene and hypalon.	
Total non-halogenated plastics.....	~ 10.0	-	
Condensation polymers.....	NE	-	
Others.....	~ 10.0	-	
Organic ion exchange materials.....	= 0	-	
Total rubber.....	TR	-	
Halogenated rubber.....	TR	neoprene	
Non-halogenated rubber.....	TR	-	
Hydrocarbons.....	-	-	
Oil or grease.....	-	-	
Fuel.....	-	-	
Asphalt/Tarmac (cont.coal tar).....	-	-	
Asphalt/Tarmac (no coal tar).....	-	-	
Bitumen.....	-	-	
Others.....	-	-	
Other organics.....	NE	-	

Other materials (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials.....	-	-	
Inorganic sludges and flocs.....	-	-	
Soil.....	-	-	
Brick/Stone/Rubble.....	-	-	
Cementitious material.....	-	-	
Sand.....	-	-	
Glass/Ceramics.....	~ 0.80	-	
Graphite.....	-	-	
Desiccants/Catalysts.....	-	-	
Asbestos.....	NE	-	
Non/low friable.....	-	-	
Moderately friable.....	-	-	
Highly friable.....	-	-	
Free aqueous liquids.....	NE	-	
Free non-aqueous liquids.....	NE	-	
Powder/Ash.....	NE	-	

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.....	< 0.01	-
Cyanide.....	= 0	-
Carbonate.....	< 0.10	-
Nitrate.....	< 0.10	-
Nitrite.....	< 0.10	-
Phosphate.....	< 0.10	-
Sulphate.....	< 0.10	-
Sulphide.....	< 0.10	-

Materials of interest for waste acceptance criteria:

	(%wt)	Type(s) and comment
Combustible metals.....	~ 2.0	-
Low flash point liquids.....	~ 0.50	-
Explosive materials.....	< 0.01	-
Phosphorus.....	< 0.01	-
Hydrides.....	< 0.01	-
Biological etc. materials.....	< 0.10	-
Biodegradable materials.....	0.01	-
Putrescible wastes.....	< 0.01	-
Non-putrescible wastes.....	-	-
Corrosive materials.....	< 0.01	-
Pyrophoric materials.....	< 0.01	-
Generating toxic gases.....	< 0.01	-
Reacting with water.....	< 0.01	-
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):

No		
	(%wt)	Type(s) and comment
EDTA.....		-
DPTA.....		-
NTA.....		-
Polycarboxylic acids.....		-
Other organic complexants.....		-
Total complexing agents.....		-

Physical components:

	Number	Type(s) and comment
Sources.....	79	-
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		= 100.0
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		

Comments on planned treatments:

Sources will be stripped of all extraneous material and encapsulated in grout in "paint-tin" type containers.

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)	100.0	15.5	18.3	1	-

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	2.4	
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: Sources.

Uncertainty: Radionuclides expected to be present shown in above table.

Measurement of radioactivities: Data taken from source register.

Chemical form of radionuclides:

H-3: -

C-14: Present as labelled organic compounds

Cl-36: -

Se-79: -

Tc-99: -

I-129: -

Ra: -

Th: -

U: Metal or oxide

Np: -

Pu: -

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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		4	5.60E-06	B B 1	Gd 153		4		4
Be 10		4			Ho 163		4		4
C 14		4	2.69E-05	B B 1	Ho 166m		4		4
Na 22		4		4	Tm 170		4		4
Al 26		4		4	Tm 171		4		4
Cl 36		4	5.82E-06	B B 1	Lu 174		4		4
Ar 39		4		4	Lu 176		4	5.00E-05	B B 1
Ar 42		4		4	Hf 178n		4		4
K 40		4		4	Hf 182		4		4
Ca 41		4		4	Pt 193		4		4
Mn 53		4		4	Ti 204		4		4
Mn 54		4		4	Pb 205		4		4
Fe 55		4		4	Pb 210		4		4
Co 60		4	1.61E-05	B B 1	Bi 208		4		4
Ni 59		4		4	Bi 210m		4		4
Ni 63		4		4	Po 210		4		4
Zn 65		4		4	Ra 223		8		4
Se 79		4		4	Ra 225		4		4
Kr 81		4		4	Ra 226		4	6.54E-04	B B 1
Kr 85		4		4	Ra 228		4		4
Rb 87		4		4	Ac 227		8		4
Sr 90	2.59E-08	B B 1	5.14E-06	B B 1	Th 227		8		4
Zr 93		4		4	Th 228		4		4
Nb 91		4		4	Th 229		4		4
Nb 92		4		4	Th 230		4		4
Nb 93m		4		4	Th 232		4		4
Nb 94		4		4	Th 234		4		4
Mo 93		4		4	Pa 231	8.86E-09	B B 1		4
Tc 97		4		4	Pa 233		4		4
Tc 99		4		4	U 232		4		4
Ru 106		4		4	U 233		4		4
Pd 107		4		4	U 234		4		4
Ag 108m		4		4	U 235	1.39E-04	B B 1	1.77E-05	B B 1
Ag 110m		4		4	U 236		4		4
Cd 109		4		4	U 238		4		4
Cd 113m		4		4	Np 237		4		4
Sn 119m		4		4	Pu 236		4		4
Sn 121m		4		4	Pu 238		4		4
Sn 123		4		4	Pu 239		4	6.02E-05	B B 1
Sn 126		4		4	Pu 240		4		4
Sb 125		4		4	Pu 241		4		4
Sb 126		4		4	Pu 242		4		4
Te 125m		4		4	Am 241		4	5.76E-06	B B 1
Te 127m		4		4	Am 242m		4		4
I 129		4		4	Am 243		4	4.98E-06	B B 1
Cs 134		4		4	Cm 242		4		4
Cs 135		4		4	Cm 243		4		4
Cs 137		4	2.22E-03	B B 1	Cm 244		4		4
Ba 133		4		4	Cm 245		4		4
La 137		4		4	Cm 246		4		4
La 138		4		4	Cm 248		4		4
Ce 144		4		4	Cf 249		4		4
Pm 145		4		4	Cf 250		4		4
Pm 147		4		4	Cf 251		4		4
Sm 147		4		4	Cf 252		4		4
Sm 151		4		4	Unsp a				
Eu 152		4	7.49E-02	B B 1	Unsp b/g				
Eu 154		4		4	Total a	1.39E-04	*	7.43E-04	*
Eu 155		4		4	Total b/g	2.59E-08	*	7.72E-02	*

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