

WASTE STREAM	7A114	Decommissioning LLW - Enriched Uranium
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SITE AWE Aldermaston

SITE OWNER Ministry of Defence (MOD)

WASTE CUSTODIAN AWE plc

WASTE TYPE LLW

WASTE VOLUMES

Stocks:
Future arisings:

	Reported (m ³)
At 1.4.2025	= 0
1.4.2026 - 31.3.2028	= 145.0
1.4.2029 - 31.3.2030	= 134.0
1.4.2031 - 31.3.2033	= 230.0
1.4.2034 - 31.3.2036	= 230.0
1.4.2037 - 31.3.2039	= 216.0
1.4.2040 - 31.3.2042	= 415.0
1.4.2043 - 31.3.2048	= 2661.0
1.4.2072 - 31.3.2075	= 75.0

OR

Conditioned (m ³)	Packaged (m ³)

Total future arisings: **4106.0**
Total waste volume: **4106.0**

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

Comment on arising rates: Future arisings are estimated and based on the programme to decommission facilities on-site. The decommissioning plans form part of the site liabilities plan that has been recently reviewed.

Additional information on quantities: The total volume of waste will depend on the longevity of the AWE site, which at present is based on a site closure date of 2080.

Uncertainty factors on volumes: Stock (upper): x - Arisings (upper): x 5.00
Stock (lower): x - Arisings (lower): x 0.20

WASTE SOURCE Waste arising from enriched uranium decommissioning operations.

PHYSICAL CHARACTERISTICS

General description: The waste stream contain metal, rubble and plastics.

Changes since waste generated: -

Bulk density (t/m³): ~ 0.51

Comment on density: This figure has been derived using the 7A112 disposal data as no stock currently exists (total stream mass divided by the total stream volume). Reviewed and revised in 2022. Similar to density figure quoted in the 2019 UKRWI.

CHEMICAL COMPOSITION

General description and components (%wt): Metal (43.74%), rubble (43.16%), NH plastics/plastic/rubber (6.73%), cellulose (6.28%), graphite (0.02%) and asbestos (0.07%)

Chemical state: Neutral

Sheet metal proportion / thickness: The majority of decommissioning metal is sheets and pipes typically 4mm thickness.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	= 0	-	
Other ferrous metals.....	= 43.5	-	
Iron.....	= 0	-	
Aluminium.....	= 0	-	
Beryllium.....	= 0	-	
Cobalt.....	= 0	-	
Copper.....		See 'Other Metals'	
Lead.....	= 0	-	
Magnox/Magnesium.....	= 0	-	
Nickel.....	= 0	-	
Titanium.....	= 0	-	
Uranium.....	= 0	-	
Zinc.....	= 0	-	
Zircaloy/Zirconium.....	= 0	-	
Other metals.....	= 0.23	Tin, brass and copper (unknown % weights)	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	= 6.3	-	
Paper, cotton.....	= 0.21	-	
Wood.....	= 6.1	-	
Halogenated plastics.....	= 4.6	-	
Total non-halogenated plastics.....	= 1.9	-	
Condensation polymers.....	= 1.9	-	
Others.....	= 0	-	
Organic ion exchange materials.....	= 0	-	
Total rubber.....	= 0.27	-	
Halogenated rubber.....	= 0.27	-	
Non-halogenated rubber.....	= 0	-	
Hydrocarbons.....	= 0	-	
Oil or grease.....	= 0	-	
Fuel.....	= 0	-	
Asphalt/Tarmac (cont.coal tar).....	= 0	-	
Asphalt/Tarmac (no coal tar).....	= 0	-	
Bitumen.....	= 0	-	
Others.....	= 0	-	
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.....	= 43.2	-	
Cementitious material.....	= 0	-	
Sand.....	= 0	-	
Glass/Ceramics.....	= 0	-	
Graphite.....	= 0.02	-	
Desiccants/Catalysts.....	= 0	-	
Asbestos.....	= 0.07	Form of asbestos is likely to be moderate / highly friable.	
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.....	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.....	P	-
Putrescible wastes.....	= 0	-
Non-putrescible wastes.....	P	Wood, paper and cotton
Corrosive materials.....	= 0	-
Pyrophoric materials.....	= 0	-
Generating toxic gases.....	= 0	-
Reacting with water.....	= 0	-
Higher activity particles.....	= 0	-
Soluble solids as bulk chemical compounds.....	= 0	-

Hazardous substances / non hazardous pollutants:

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

Complexing agents (%wt):

No		
	(%wt)	Type(s) and comment
EDTA.....	~ 0	-
DPTA.....	~ 0	-
NTA.....	~ 0	-
Polycarboxylic acids.....	~ 0	-
Other organic complexants.....	~ 0	Complexing agents are unlikely to be present in this Waste Stream as the waste has yet to be generated.
Total complexing agents.....	~ 0	-

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	= 43.7
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	Off-site	= 56.3
Treatment not yet determined		
None		

Comments on planned treatments:

Waste treatments have been estimated from Waste Stream 7A112 and 7A26. This Waste Stream will have quite a high fissile mass and wastes that cannot go to Permitted landfill will not meet the current WAC for supercompaction, so will be shipped to LLWR for repository burial.

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)	28.1	17.0	18.3	68	-

Range in container waste loading:

Other information on packaging and conditioning: It is assumed that the waste has not been supercompacted.

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	~ 28.1	< 0.51	
Expected to be consigned to a Landfill Facility	~ 28.1	< 0.51	
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	~ 43.7	> 0.51	
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 06 01*, 17 06 04, 17 04 09*, 17 05 03*, 17 02 01, 17 02 03, 17 01 06*, 17 01 07

Opportunities for alternative disposal routing: Not yet determined

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

RADIOACTIVITY

Source: U-234, U-235, U-236 and U-238 contaminated material.

Uncertainty: It is difficult to predict the likely specific activities for this waste stream as it has not been produced before.

Measurement of radioactivities: The fingerprints (varied enrichment) for these wastes are determined by the materials that have contaminated them. Both low and high resolution gamma-ray spectroscopy have been used as a method of assay.

Chemical form of radionuclides:

- H-3: Not present in Waste Stream
- C-14: Not present in Waste Stream
- Cl-36: Not present in Waste Stream
- Se-79: Not present in Waste Stream
- Tc-99: Not present in Waste Stream
- I-129: Not present in Waste Stream
- Ra: Only daughter products present from uranium in this waste stream. Oxide form
- Th: Only daughter products present from uranium in this waste stream. Oxide form
- U: Present in this waste stream. Oxide form
- Np: Not present in Waste Stream
- Pu: Not present in Waste Stream

WASTE STREAM		7A114		Decommissioning LLW - Enriched Uranium					
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					Gd 153				
Be 10					Ho 163				
C 14					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					Tl 204				
Mn 54					Pb 205				
Fe 55					Pb 210			= 2.31E-11	C C 2
Co 60					Bi 208				
Ni 59					Bi 210m				
Ni 63					Po 210			= 5.97E-09	C C 2
Zn 65					Ra 223			~ 3.60E-39	C C 2
Se 79					Ra 225				
Kr 81					Ra 226			= 7.41E-11	C C 2
Kr 85					Ra 228			~ 9.47E-17	C C 2
Rb 87					Ac 227			= 2.39E-10	C C 2
Sr 90					Th 227			~ 6.20E-28	C C 2
Zr 93					Th 228			~ 4.25E-17	C C 2
Nb 91					Th 229				
Nb 92					Th 230			= 7.48E-09	C C 2
Nb 93m					Th 232			= 1.66E-16	C C 2
Nb 94					Th 234			~ 1.11E-23	C C 2
Mo 93					Pa 231			= 5.54E-10	C C 2
Tc 97					Pa 233				
Tc 99					U 232				
Ru 106					U 233				
Pd 107					U 234			= 1.77E-05	C C 2
Ag 108m					U 235			= 5.69E-07	C C 2
Ag 110m					U 236			= 7.32E-08	C C 2
Cd 109					U 238			= 6.46E-08	C C 2
Cd 113m					Np 237				
Sn 119m					Pu 236				
Sn 121m					Pu 238				
Sn 123					Pu 239				
Sn 126					Pu 240				
Sb 125					Pu 241				
Sb 126					Pu 242				
Te 125m					Am 241				
Te 127m					Am 242m				
I 129					Am 243				
Cs 134					Cm 242				
Cs 135					Cm 243				
Cs 137					Cm 244				
Ba 133					Cm 245				
La 137					Cm 246				
La 138					Cm 248				
Ce 144					Cf 249				
Pm 145					Cf 250				
Pm 147					Cf 251				
Sm 147					Cf 252				
Sm 151					Unsp a				
Eu 152					Unsp b/g				
Eu 154					Total a	0	*	1.84E-05	*
Eu 155					Total b/g	0	*	2.59E-10	*

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