

WASTE STREAM	7A116	Decommissioning LLW - Miscellaneous
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SITE AWE Aldermaston

SITE OWNER Ministry of Defence (MOD)

WASTE CUSTODIAN AWE plc

WASTE TYPE LLW

WASTE VOLUMES

	Reported (m ³)	OR	Conditioned (m ³)	Packaged (m ³)
Stocks:	At 1.4.2025 = 18.6			
Future arisings:	1.4.2025 - 31.3.2027 = 0			
	1.4.2028 - 31.3.2030 = 23.9			
	1.4.2031 - 31.3.2033 = 0			
	1.4.2034 - 31.3.2036 = 0			
	1.4.2037 - 31.3.2039 = 0			
	1.4.2040 - 31.3.2042 = 56.0			
	1.4.2043 - 31.3.2045 84.0			
	1.4.2046 - 31.3.2048 169.7			
	1.4.2049 - 31.3.2051 141.7			
	1.4.2052 - 31.3.2054 119.3			
	1.4.2055 - 31.3.2057 39.8			
	1.4.2058 - 31.3.2080 0			
Total future arisings:	634.4			
Total waste volume:	653.0			

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

Comment on arising rates: Future arisings are estimated based on the decommissioning for facilities on site, which have been reviewed within the past 3 years.

Additional information on quantities: Stock volumes are considered to be accurate. The total volume of waste arisings will depend on the longevity of the AWE site with estimates being based on the estimated end of life of facilities circa 2080 or potentially beyond.

Uncertainty factors on volumes:

Stock (upper):	x 1.00	Arisings (upper):	x 5.00
Stock (lower):	x 1.00	Arisings (lower):	x 0.30

WASTE SOURCE Decommissioning of reactor containing buildings and other small facilities handling miscellaneous radionuclides.

PHYSICAL CHARACTERISTICS

General description: The waste contains metal (43.27%), cement (48.26%), concrete (7.62%), vermiculite (0.48%) and plastic (0.37%).

Changes since waste generated: -

Bulk density (t/m³): = 1.7

Comment on density: This figure has been derived using stock data from 2022 (total stream mass divided by the total stream volume).

CHEMICAL COMPOSITION

General description and components (%wt): The waste contains cementitious material (55.88%), metal (43.27%), vermiculite (0.48%) and plastic (0.37%) .

Chemical state: Neutral

Sheet metal proportion / thickness: A number of drums contain aluminum mixed with grout, with other metal contained within drums. Therefore, not considered to be bulk.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	= 18.9	-	
Other ferrous metals.....	= 6.4	-	
Iron.....	= 0	-	
Aluminium.....	= 10.2	-	
Beryllium.....	= 0	-	
Cobalt.....	= 0	-	
Copper.....	= 1.2	-	
Lead.....	= 6.6	-	
Magnox/Magnesium.....	= 0	-	
Nickel.....	= 0	-	
Titanium.....	= 0	-	
Uranium.....	= 0	-	
Zinc.....	= 0	-	
Zircaloy/Zirconium.....	= 0	-	
Other metals.....	< 0.01	Cadmium (<0.01%)	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulotics.....	= 0	-	
Paper, cotton.....	= 0	-	
Wood.....	= 0	-	
Halogenated plastics.....	= 0.16	PVC	
Total non-halogenated plastics.....	= 0.21	-	
Condensation polymers.....	= 0.21	-	
Others.....	= 0	-	
Organic ion exchange materials.....	= 0	-	
Total rubber.....	= 0	-	
Halogenated rubber.....	= 0	-	
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.....	= 0.48	Vermiculite (0.24%) and Fuller's Earth (0.24%)	
Cementitious material.....	= 55.9	SP/F4 Grout (48.26%) and concrete (7.62%)	
Sand.....	= 0	-	
Glass/Ceramics.....	= 0	-	
Graphite.....	= 0	-	
Desiccants/Catalysts.....	= 0	-	
Asbestos.....	= 0	-	
Non/low friable.....	= 0	-	
Moderately friable.....	= 0	-	
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.....	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.....	0	-
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.....	= 0	-
Other organophosphates.....	= 0	-
Vinyl chloride.....	P	PVC
Arsenic.....	NE	-
Barium.....	= 0	-
Boron.....	NE	-
Boron (in Boral).....	NE	-
Boron (non-Boral).....	= 0	-
Cadmium.....	NE	-
Caesium.....	TR	-
Selenium.....	NE	-
Chromium.....	NE	-
Molybdenum.....	NE	-
Thallium.....	= 0	-
Tin.....	NE	-
Vanadium.....	NE	-
Mercury compounds.....	= 0	-
Others.....	NE	-

Complexing agents (%wt):

Yes

	(%wt)	Type(s) and comment
EDTA.....	= 0	-
DPTA.....	= 0	-
NTA.....	= 0	-
Polycarboxylic acids.....	TR	Traces of complexing agents will be present because of their use as decontaminants.
Other organic complexants.....	TR	-
Total complexing agents.....	TR	-

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)	Off-site	~ 29.0
Incineration	Off-site	~ 28.0
Drying/dewatering/liquid separation		
Tie down/fixatives/strippable coating/painting application		
Decontamination		
Metal treatment	Off-site	~ 23.0
Recycling / reuse		
Thermal treatment, including vitrification		
Encapsulation		
Polymer encapsulation		
Other physical treatment		
Other chemical treatment		
Containerisation		
Treatment not yet determined		
None	Off-site	~ 20.0

Comments on planned treatments:

Waste treatment percentages have been estimated based on predicted waste volumes and the current Corporate BAT. Disposal routes may change by the time new waste arise in this specific stream.

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)	29.0	17.0	18.3	12	-

Range in container waste loading:

Other information on packaging and conditioning:

Wastes going to the LLWR are expected to be supercompacted, this may not be the case.

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	~ 29.0	> 1.7	
Expected to be consigned to a Landfill Facility	~ 20.0	> 1.7	
Expected to be disposed On-Site			
Expected to be managed by In-Situ Disposal			
Expected to be consigned to an Incineration Facility	~ 28.0	< 1.7	
Expected to be consigned to a Metal Treatment Facility	~ 23.0	< 1.7	
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 01 06*, 17 01 07, 17 02 01, 17 02 02, 17 02 03, 17 04 09*

Opportunities for alternative disposal routing: Not yet determined

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

RADIOACTIVITY

Source: Uranium, plutonium, fission products and activation products.

Uncertainty: The specific activities for the stock waste is accurate and has been decay corrected for the UK RWI of 2025. The future arising activities have been determined using information from in-stock data and predictive modelling.

Measurement of radioactivities: Activity is determined by a variety of analytical techniques that include radiochemical analysis, high and low resolution gamma-ray spectroscopy, passive neutron coincidence counting and liquid scintillation counting.

Chemical form of radionuclides: H-3: Likely to be present in future waste stream arisings in the following species: HTO, HT and organically-bound H-3.

C-14: Likely to be present in future arisings as chemically bound in solid.

Cl-36: Not present

Se-79: Not present

Tc-99: Not present

I-129: Not present

Ra: Likely to be daughter products present from uranium in this waste stream. Oxide form

Th: Likely to be daughter products present from uranium in this waste stream. Oxide form

U: Likely to be present in future waste arisings in oxide form

Np: Likely to be daughter products present from uranium in this waste stream. Oxide form

Pu: Likely to be present in future waste arisings in oxide form

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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			= 1.20E-04	C C 2	Gd 153				
Be 10					Ho 163				
C 14				5	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				5
Mn 54					Pb 205				
Fe 55	= 7.47E-05	B B 2	= 2.83E-05	C C 2	Pb 210	= 3.46E-20	B B 2		5
Co 60			= 3.27E-04	C C 2	Bi 208				
Ni 59				5	Bi 210m				
Ni 63			= 1.81E-04	C C 2	Po 210	= 2.80E-20	B B 2		5
Zn 65					Ra 223	= 7.20E-19	B B 2		5
Se 79					Ra 225	= 2.12E-20	B B 2		5
Kr 81					Ra 226	= 4.74E-19	B B 2		5
Kr 85					Ra 228	= 3.66E-23	B B 2		5
Rb 87					Ac 227	= 7.45E-19	B B 2		5
Sr 90				5	Th 227	= 7.19E-19	B B 2		5
Zr 93					Th 228				5
Nb 91					Th 229	= 2.15E-20	B B 2		5
Nb 92					Th 230	= 3.27E-16	B B 2		5
Nb 93m					Th 232	= 1.22E-22	B B 2		5
Nb 94	~ 2.52E-08	B B 2		5	Th 234	= 3.02E-19	B B 2		5
Mo 93					Pa 231	= 7.59E-18	B B 2		5
Tc 97					Pa 233	= 3.16E-12	B B 2		5
Tc 99					U 232			= 7.28E-11	C C 2
Ru 106				5	U 233	= 6.79E-17	B B 2		
Pd 107					U 234	= 7.02E-12	B B 2		5
Ag 108m	~ 7.81E-09	B B 2			U 235	= 7.18E-14	B B 2		5
Ag 110m				5	U 236	= 4.93E-13	B B 2		5
Cd 109					U 238	= 3.05E-19	B B 2		5
Cd 113m					Np 237	= 3.20E-12	B B 2		5
Sn 119m					Pu 236				
Sn 121m					Pu 238	= 2.39E-07	B B 2		5
Sn 123					Pu 239	= 7.28E-06	B B 2	= 1.23E-07	C C 2
Sn 126					Pu 240	= 1.67E-06	B B 2		5
Sb 125					Pu 241	= 6.26E-06	B B 2		5
Sb 126					Pu 242	= 1.96E-10	B B 2	= 1.05E-10	C C 2
Te 125m					Am 241	= 1.03E-06	B B 2	= 5.41E-09	C C 2
Te 127m					Am 242m				
I 129					Am 243				
Cs 134					Cm 242				
Cs 135					Cm 243				
Cs 137	= 1.68E-07	B B 2	= 3.53E-05	C C 2	Cm 244				
Ba 133					Cm 245				
La 137					Cm 246				
La 138					Cm 248				
Ce 144				5	Cf 249				
Pm 145					Cf 250				
Pm 147				5	Cf 251				
Sm 147					Cf 252				
Sm 151					Unsp a				
Eu 152					Unsp b/g				
Eu 154					Total a	1.02E-05	*	1.29E-07	*
Eu 155					Total b/g	8.12E-05	*	6.92E-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