

WASTE STREAM	7A24	Operational LLW - Depleted/Natural 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	142.0
1.4.2025 - 31.3.2027	= 72.6
1.4.2028 - 31.3.2030	= 70.6
1.4.2031 - 31.3.2033	= 44.6
1.4.2034 - 31.3.2036	= 17.6
1.4.2037 - 31.3.2039	= 19.6
1.4.2040 - 31.3.2042	= 17.7
1.4.2043 - 31.3.2045	= 14.0
1.4.2046 - 31.3.2048	= 14.0
1.4.2049 - 31.3.2080	= 0

OR

Conditioned (m ³)	Packaged (m ³)

Total future arisings: **270.7**
Total waste volume: **412.7**

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

Comment on arising rates: The stock volume has increased since the 2022 UKRWI. The arising rate has been reviewed and revised with a slight increase in future arisings and is based upon the AWE site liabilities plan.

Additional information on quantities: Stock volumes are recorded on the site waste database (SRWMRS) and are considered to be accurate. The total volume of arisings will be depend on the longevity of the AWE site, with estimates being based on a site closure date of 2080.

Uncertainty factors on volumes: Stock (upper): x 1.00 Arisings (upper): x 3.00
Stock (lower): x 1.00 Arisings (lower): x 0.30

WASTE SOURCE Waste for natural and depleted uranium operations.

PHYSICAL CHARACTERISTICS

General description: The waste stream contains metal, cellulosic material, plastics, rubber, soil, rubble, sand, glass, fibreglass and graphite.

Changes since waste generated: -

Bulk density (t/m³): = 0.41

Comment on density: This figure has been derived using stock data from 2025 (total stream mass divided by the total stream volume).

CHEMICAL COMPOSITION

General description and components (%wt): The waste stream contains metal (73.0467%), cellulosic material (9.85%), plastics (5.42%), rubber (2.39%), rubble/concrete/sand/soil (0.62%) glass (0.26%), graphite (2.25%), WEEE (1.12%), wood (0.72%) and Other (4.32%)

Chemical state: Neutral

Sheet metal proportion / thickness: The majority of the metallic waste in this waste stream arises as mixed metal, which is segregated into ferrous and non-ferrous wherever practicable. The principal containers used are 205 & 210 litre drums and Pactec bags.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	= 36.7	-	Percentage in waste stream by weight is 0%.
Other ferrous metals.....	= 23.2	-	
Iron.....	-	-	
Aluminium.....	= 3.4	-	
Beryllium.....	= 0	-	
Cobalt.....	-	-	
Copper.....	~ 0.79	-	
Lead.....	= 8.3	-	
Magnox/Magnesium.....	-	-	
Nickel.....	-	-	
Titanium.....	-	-	
Uranium.....	-	-	
Zinc.....	-	-	
Zircaloy/Zirconium.....	-	-	
Other metals.....	= 0.79	Galvanised steel 0.17, Brass 0.31, Tin 0.16, Cadmium 0.15 and Mercury <0.01% weight.	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulotics.....	= 9.9	-	Percentage split is unknown in waste stream
Paper, cotton.....	= 9.1	-	
Wood.....	= 0.72	-	
Halogenated plastics.....	= 2.2	PVC	
Total non-halogenated plastics.....	~ 3.2	-	
Condensation polymers.....	-	-	
Others.....	-	-	
Organic ion exchange materials.....	-	-	
Total rubber.....	= 2.4	Nitrile gloves 1.91%	
Halogenated rubber.....	-	-	
Non-halogenated rubber.....	-	-	
Hydrocarbons.....	= 2.1	-	
Oil or grease.....	= 2.1	-	
Fuel.....	-	-	
Asphalt/Tarmac (cont.coal tar).....	-	-	
Asphalt/Tarmac (no coal tar).....	-	-	
Bitumen.....	-	-	
Others.....	-	-	
Other organics.....	< 0.01	Vegetation	

Other materials (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials.....	-	-	Percentage split is unknown in waste stream
Inorganic sludges and flocs.....	-	-	
Soil.....	= 0.32	-	
Brick/Stone/Rubble.....	= 0.30	-	
Cementitious material.....	-	-	
Sand.....	< 0.01	-	
Glass/Ceramics.....	= 0.26	-	
Graphite.....	= 2.3	-	
Desiccants/Catalysts.....	-	-	
Asbestos.....	= 2.2	-	
Non/low friable.....	-	-	
Moderately friable.....	-	-	
Highly friable.....	-	-	
Free aqueous liquids.....	= 1.8	Ultracut 620	
Free non-aqueous liquids.....	~ 0.10	Sodium hydroxide	
Powder/Ash.....	-	-	

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.....	~ 0.10	Lithium carbonate and potassium carbonate (solid)
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.....	< 0.01	Vegetation
Biodegradable materials.....	-	-
Putrescible wastes.....	= 0	-
Non-putrescible wastes.....	-	-
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.....	-	-
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.....	~ 0.10	Sodium hydroxide

Complexing agents (%wt):

No

	(%wt)	Type(s) and comment
EDTA.....	-	-
DPTA.....	-	-
NTA.....	-	-
Polycarboxylic acids.....	-	-
Other organic complexants.....	-	The waste stream does not contain any organic complexing agents.
Total complexing agents.....	-	-

Physical components:

	Number	Type(s) and comment
Sources.....	= 0	-
Electronic & Electrical Equipment (EEE)	-	-
EEE Type 1.....	-	-
EEE Type 2.....	-	-
EEE Type 3.....	NE	~557kg by weight in Waste Stream
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	Off-site	~ 5.0
Supercompaction (HFC)	Off-site	~ 5.0
Incineration	Off-site	~ 25.0
Drying/dewatering/liquid separation		
Tie down/fixatives/strippable coating/painting application		
Decontamination		
Metal treatment	Off-site	~ 60.0
Recycling / reuse		
Thermal treatment, including vitrification		
Encapsulation		
Polymer encapsulation		
Other physical treatment		
Other chemical treatment		
Containerisation		
Treatment not yet determined	Off-site	~ 5.0
None		

Comments on planned treatments:

Supercompaction for waste destined to the LLWR for burial. Low force compaction is for waste destined for LA-LLW Permitted Landfill. Significant amount of metal is estimated to be treated for recycling actual percentage may be lower.

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)	5.0	17.0	18.3	2	-

Range in container waste loading:

Other information on packaging and conditioning:

~5% goes directly to LLWR via supercompaction.

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	~ 5.0	~ 0.41	
Expected to be consigned to a Landfill Facility	~ 10.0	~ 0.41	
Expected to be disposed On-Site			
Expected to be managed by In-Situ Disposal			
Expected to be consigned to an Incineration Facility	~ 25.0	~ 0.41	
Expected to be consigned to a Metal Treatment Facility	~ 60.0	~ 0.41	
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:

16 03 05*, 20 03 01, 17 01 06*, 17 04 10*, 15 02 02*, 15 02 03, 20 01 40

Opportunities for alternative disposal routing: Not yet determined

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

RADIOACTIVITY

Source: Operations involving materials contaminated with depleted uranium. Operations involving natural uranium are less abundant.

Uncertainty: The gross alpha and gross beta/gamma activity is accurate and taken from stock. Radionuclide values are based on disposal and stock data, which are reasonably accurate.

Measurement of radioactivities: This waste stream is principally assayed using high resolution gamma-ray spectroscopy and characterised using robust fingerprints.

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 Waste Stream as oxide form
- Np: Not present in Waste Stream
- Pu: Not present in Waste Stream

WASTE STREAM		7A24		Operational LLW - Depleted/Natural 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	= 1.36E-13	B B 2		
Co 60					Bi 208				
Ni 59					Bi 210m	= 1.36E-13	B B 2		
Ni 63					Po 210	= 1.17E-13	B B 2		
Zn 65					Ra 223	= 3.04E-12	B B 2		
Se 79					Ra 225				
Kr 81					Ra 226	= 1.37E-12	B B 2		
Kr 85					Ra 228	= 1.89E-18	B B 2		
Rb 87					Ac 227	= 3.11E-12	B B 2		
Sr 90					Th 227	= 3.02E-12	B B 2		
Zr 93					Th 228	= 1.09E-18	B B 2		
Nb 91					Th 229				
Nb 92					Th 230	= 6.68E-10	B B 2		
Nb 93m					Th 232	= 5.76E-18	B B 2		
Nb 94					Th 234	= 1.25E-05	B B 2		
Mo 93					Pa 231	= 2.82E-11	B B 2		
Tc 97					Pa 233				
Tc 99					U 232				
Ru 106					U 233				
Pd 107					U 234	= 1.05E-05	B B 2	~ 1.05E-05	C C 2
Ag 108m					U 235	= 2.75E-07	B B 2	~ 4.12E-07	C C 2
Ag 110m					U 236	= 2.42E-08	B B 2	~ 3.63E-08	C C 2
Cd 109					U 238	= 1.25E-05	B B 2	~ 1.88E-05	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	2.33E-05	*	2.97E-05	*
Eu 155					Total b/g	1.25E-05	*	1.88E-11	*

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