

WASTE STREAM	7A29	Uranium Contaminated Operations ILW
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SITE AWE Aldermaston

SITE OWNER Ministry of Defence

WASTE CUSTODIAN AWE plc

WASTE TYPE ILW

Is the waste subject to Scottish Policy: No

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2022.....	75.3 m ³
Future arisings -	1.4.2022 - 31.3.2024.....	3.0 m ³
	1.4.2025 - 31.3.2027.....	3.0 m ³
	1.4.2028 - 31.3.2030.....	1.0 m ³
	1.4.2031 - 31.3.2033.....	8.0 m ³
	1.4.2034 - 31.3.2036.....	0 m ³
	1.4.2037 - 31.3.2039.....	2.0 m ³
	1.4.2040 - 31.3.2042.....	3.0 m ³
	1.4.2043 - 31.3.2045.....	3.0 m ³
	1.4.2046 - 31.3.2048.....	3.0 m ³
	1.4.2049 - 31.3.2051.....	3.0 m ³
	1.4.2052 - 31.3.2054.....	3.0 m ³
	1.4.2055 - 31.3.2057.....	3.0 m ³
	1.4.2058 - 31.3.2060.....	9.0 m ³
	1.4.2061 - 31.3.2063.....	8.0 m ³
	1.4.2064 - 31.3.2080.....	0 m ³
Total future arisings:		52.0 m ³
Total waste volume:		127.3 m ³

Comment on volumes: Stock waste has increased owing to waste database administration. Future arisings have slightly increased based on predicted waste of a single facility during POCO, which is on the site Decommissioning Liabilities Plan. Stock volumes are different to the 2019 submission but are considered to be accurate. Predicted volumes could vary depending on how much waste is produced prior to decommissioning.

Uncertainty factors on volumes: Stock (upper): x 1.0 Arisings (upper) x 5.0
 Stock (lower): x 1.0 Arisings (lower) x 0.5

WASTE SOURCE Organic and inorganic solids arising from operations with highly enriched uranium and some wastes containing very large quantities of DU.

PHYSICAL CHARACTERISTICS

General description: The waste consists of solids arising from operations with highly enriched uranium and historical wastes containing very large quantities of DU. These wastes include tools, filters, glove-boxes components, discarded equipment.

Physical components (%wt): Halogenated plastics (27.5%), non-halogenated plastics (14.5%), rubber (2%), cellulose (40%), stainless steel (2%), other ferrous metal (4%), aluminium (2%), copper (2.4%), lead (1%), brass (1%), glass (1.6%), graphite (1%) and asbestos (1%).

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): 0.2

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): Halogenated plastics (27.5%), non-halogenated plastics (14.5%), rubber (2%), cellulose (40%), stainless steel (2%), other ferrous metal (4%), aluminium (2%), copper (2.4%), lead (1%), brass (1%), glass (1.6%), graphite (1%) and asbestos (1%).

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Chemical state: Neutral

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

Metals and alloys (%wt): Steel in the form of box fittings, tools and fixtures. Lead in the form of shielding panels.

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	2.0		
Other ferrous metals.....	4.0		
Iron.....	0		
Aluminium.....	2.0		
Beryllium.....	0		
Cobalt.....	0		
Copper.....	2.4		
Lead.....	1.0		
Magnox/Magnesium.....	0		
Nickel.....	0		
Titanium.....	0		
Uranium.....	0		
Zinc.....	0		
Zircaloy/Zirconium.....	0		
Other metals.....	1.0	Brass	

Organics (%wt): -

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	40.0		
Paper, cotton.....	32.5		
Wood.....	7.5		
Halogenated plastics	27.5	PVC and perspex	
Total non-halogenated plastics.....	14.5		
Condensation polymers.....	14.5		
Others.....	0		
Organic ion exchange materials....	0		
Total rubber.....	2.0		
Halogenated rubber	1.0		
Non-halogenated rubber.....	1.0		
Hydrocarbons.....	0		
Oil or grease	0		
Fuel.....	0		
Asphalt/Tarmac (cont.coal tar)...	0		

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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		
Cementitious material.....	0		
Sand.....	0		
Glass/Ceramics.....	1.6		
Graphite.....	1.0		
Desiccants/Catalysts.....	0		
Asbestos.....	1.0		
Non/low friable.....	<1.0		
Moderately friable.....	<1.0		
Highly friable.....	<1.0		
Free aqueous liquids.....	0		
Free non-aqueous liquids.....	0		
Powder/Ash.....	0		

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: Asbestos and lead are present in this waste stream.

	(%wt)	Type(s) and comment
Combustible metals.....	0	
Low flash point liquids.....	0	
Explosive materials.....	0	
Phosphorus.....	0	

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Hydrides.....	0	
Biological etc. materials.....	0	
Biodegradable materials.....	P	
Putrescible wastes.....	0	
Non-putrescible wastes.....	P	Paper, cotton and wood are present
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: Asbestos and lead are present in this waste stream.

	(%wt)	Type(s) and comment
Acrylamide.....	0	
Benzene.....	0	
Chlorinated solvents.....	0	
Formaldehyde.....	0	
Organometallics.....	0	
Phenol.....	0	
Styrene.....	0	
Tri-butyl phosphate.....	0	
Other organophosphates.....	0	
Vinyl chloride.....	NE	PVC present
Arsenic.....	0	
Barium.....	0	
Boron.....	0	
Boron (in Boral).....	0	
Boron (non-Boral).....	0	
Cadmium.....	0	
Caesium.....	0	
Selenium.....	0	
Chromium.....	0	
Molybdenum.....	0	
Thallium.....	0	
Tin.....	0	
Vanadium.....	0	
Mercury compounds.....	0	
Others.....	0	
Electronic Electrical Equipment (EEE)		
EEE Type 1.....	0	
EEE Type 2.....	0	

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EEE Type 3..... 0
 EEE Type 4..... 0
 EEE Type 5..... 0

Complexing agents (%wt): No

	(%wt)	Type(s) and comment
EDTA.....	0	
DPTA.....	0	
NTA.....	0	
Polycarboxylic acids.....	0	
Other organic complexants.....	0	
Total complexing agents.....	0	

Potential for the waste to contain discrete items: No.

PACKAGING AND CONDITIONING

Conditioning method: It is planned that the 205 litre drums will be supercompacted at Sellafield WTC1a subject to further amendment of their conditions for acceptance. The pucks will be loaded into a 500 litre drum and grouted with cement.

Plant Name: -

Location: Sellafield, Seascale, Cumbria.

Plant startup date: 1998

Total capacity (m³/y incoming waste): -

Target start date for packaging this stream: -

Throughput for this stream (m³/y incoming waste): -

Other information: -

Likely container type:	Container	Waste packaged (%vol)	Waste loading (m ³)	Payload (m ³)	Number of packages
	500 l drum	100.0	~1	~0.5	128

Likely container type comment: The proposed supercompaction at Sellafield will allow 5 pucks to be packed into a 500 litre drum.

Range in container waste volume: The loading is an estimate based on experience with similar waste at Sellafield and learning from the early part of the AWE / Sellafield Transfer Programme.

Other information on containers: -

Likely conditioning matrix: Not Specified

Other information: -

Conditioned density (t/m³): ~2.0

Conditioned density comment: The conditioned density is an estimate which is subject to change.

Other information on conditioning: Waste is expected to be treated and packaged under the Sellafield WTC1a Final LoC.

Opportunities for alternative disposal routing: -

Baseline Management Route	Opportunity Management Route	Stream volume (%)	Estimated Date that Opportunity will be realised	Opportunity Confidence	Comment
-	-	-	-	-	-

RADIOACTIVITY

Source:	Operations and processes involving the use of uranium.
Uncertainty:	The radionuclide data for stored wastes taken from the database. Alpha and Beta activities are taken from stock data.
Definition of total alpha and total beta/gamma:	It is not possible to include radionuclide activities for future arisings because the fingerprint would be classified.
Measurement of radioactivities:	Fingerprints used with non-destructive assay techniques, i.e. low resolution gamma-ray spectroscopy. Decay nuclides with a half-life of less than 3 months have been omitted.
Other information:	-

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Nuclide	Mean radioactivity, TBq/m ³				Nuclide	Mean radioactivity, TBq/m ³			
	Waste at 1.4.2022	Bands and Code	Future arisings	Bands and Code		Waste at 1.4.2022	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		6		
Co 60					Bi 208				
Ni 59					Bi 210m				
Ni 63					Po 210		6		
Zn 65					Ra 223		6		
Se 79					Ra 225				
Kr 81					Ra 226		6		
Kr 85					Ra 228		6		
Rb 87					Ac 227		6		
Sr 90					Th 227		6		
Zr 93					Th 228		6		
Nb 91					Th 229				
Nb 92					Th 230		6		
Nb 93m					Th 232		6		
Nb 94					Th 234		6		
Mo 93					Pa 231		6		
Tc 97					Pa 233				
Tc 99					U 232				
Ru 106					U 233		6		6
Pd 107					U 234	8E-04	BB 2		7
Ag 108m					U 235	2.56E-05	BB 2		7
Ag 110m					U 236	3.29E-06	BB 2		7
Cd 109					U 238	1.34E-05	BB 2		7
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					Other a				
Eu 152					Other b/g				
Eu 154					Total a	8.42E-04	BB 2		NE
Eu 155					Total b/g	NE			NE

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 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