

WASTE STREAM	7A111	Decommissioning Waste PCM 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.....	2376.2 m ³
Future arisings -	1.4.2022 - 31.3.2024.....	93.0 m ³
	1.4.2025 - 31.3.2027.....	335.0 m ³
	1.4.2028 - 31.3.2030.....	384.0 m ³
	1.4.2031 - 31.3.2033.....	317.0 m ³
	1.4.2034 - 31.3.2036.....	170.0 m ³
	1.4.2037 - 31.3.2039.....	38.0 m ³
	1.4.2040 - 31.3.2062.....	0 m ³
	1.4.2063 - 31.3.2065.....	318.0 m ³
	1.4.2066 - 31.3.2068.....	318.0 m ³
	1.4.2069 - 31.3.2071.....	239.0 m ³
	1.4.2072 - 31.3.2074.....	68.0 m ³
	1.4.2075 - 31.3.2080.....	0 m ³
Total future arisings:		2280.0 m ³
Total waste volume:		4656.2 m ³

Comment on volumes: Stock volumes are considered to be accurate and have decreased since 2019 owing to the shipment of ILW drums in 2021. Future arisings are based on the recent decommissioning volume estimates from the Site Liabilities Plan. The stock volumes supplied are considered to be accurate. The total volume of arisings will depend on the longevity of the AWE site. Estimates are based upon a site closure date of 2080.

Uncertainty factors on volumes: Stock (upper): x 1.0 Arisings (upper) x 5.0
 Stock (lower): x 1.0 Arisings (lower) x 0.3

WASTE SOURCE Decommissioning and size reduction of redundant plant equipment such as glove-boxes, machine tools and legacy wastes.

PHYSICAL CHARACTERISTICS

General description: The 7A111 Waste Stream contains metals, plastic, glass, etc that arises from contaminated glove-boxes and process equipment.

Physical components (%wt): Metals (58.04%), plastics (39.60%) and cellulose (2.36%). The physical components have been re-sampled and reviewed in 2022, with the component composition changing since the 2019 UKRWI.

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): 0.36

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): Metals (58.04%), plastics (39.60%) and cellulose (2.36%).

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: Daughters are likely to be present in waste stream. Oxide form

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Th: Daughters are likely to be present in waste stream. Oxide form
 U: Present as oxide form in waste stream
 Np: Np-237 daughter is likely to be present in waste stream. Oxide form
 Pu: Present as oxide form in waste stream

Metals and alloys (%wt): Sheet metal of approximately 4mm in thickness will be present arising from glove boxes and sheet metal arising from ductwork that is maybe as thick as 6mm. The average thickness of a box 'base plate' is approximately 25mm.

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	6.1		
Other ferrous metals.....	37.8		
Iron.....	0		
Aluminium.....	5.2		
Beryllium.....	0		
Cobalt.....	0		
Copper.....	2.4		
Lead.....	1.9		
Magnox/Magnesium.....	0		
Nickel.....	0		
Titanium.....	0		
Uranium.....	0		
Zinc.....	0		
Zircaloy/Zirconium.....	0		
Other metals.....	4.7	Includes tin and brass.	

Organics (%wt): Non-halogenated plastic is present as perspex, halogenated rubber and neoprene.

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	2.4		
Paper, cotton.....	0.65		
Wood.....	1.7		
Halogenated plastics	24.9		
Total non-halogenated plastics.....	3.0		
Condensation polymers.....	3.0		
Others.....	0		
Organic ion exchange materials....	0		
Total rubber.....	11.6		
Halogenated rubber	11.6		
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		

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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.....	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			

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: Lead is present in the waste stream (1.92% wt)

	(%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	

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Non-putrescible wastes.....	P	Paper, cotton and wood 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: This waste stream contains lead (1.92% wt)

	(%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).....	0	
Cadmium.....	NE	
Caesium.....	0	
Selenium.....	NE	
Chromium.....	NE	
Molybdenum.....	NE	
Thallium.....	0	
Tin.....	NE	
Vanadium.....	NE	
Mercury compounds.....	0	
Others.....	NE	
Electronic Electrical Equipment (EEE)		
EEE Type 1.....	0	
EEE Type 2.....	0	
EEE Type 3.....	0	
EEE Type 4.....	0	
EEE Type 5.....	0	

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Complexing agents (%wt): Yes

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

Potential for the waste to contain discrete items: No.

PACKAGING AND CONDITIONING

Conditioning method: The proposal is to supercompact the 200 litre drums and load the pucks into a 500 litre drum and grout 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 (m³)	Payload (m³)	Number of packages
	500 l drum	100.0	~1	~0.5	4657

Likely container type comment: The loading is an estimate based on experience with similar waste at Sellafield.

Range in container waste volume: Five pucks will be packed into a 500 litre drum.

Other information on containers: Not specified.

Likely conditioning matrix:

Other information: Not specified

Conditioned density (t/m³): ~2.0

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

Other information on conditioning: There are no detailed conditioning plans.

Opportunities for alternative disposal routing: No

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

RADIOACTIVITY

Source:	Plutonium and uranium (blended with depleted, natural, low enriched and high enriched).
Uncertainty:	The gross alpha and gross beta activities of the in-stock wastes are accurate. The radionuclide breakdown has been estimated from an average fingerprint of the associated facilities.
Definition of total alpha and total beta/gamma:	Where totals are shown on the table of radionuclide activities they are the sums of the listed alpha or beta/gamma emitting radionuclides plus 'other alpha' or 'other beta/gamma'.
Measurement of radioactivities:	Fingerprints are generated by assaying whole gloveboes non-destructively prior to commencing decommissioning. The fingerprint is used with PNCC assay to generate an activity for each drum of waste.
Other information:	Decay nuclides with a half-life of less than three months have been omitted.

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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		5		5	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		5		5
Co 60					Bi 208				
Ni 59					Bi 210m				
Ni 63					Po 210		5		5
Zn 65					Ra 223		5		5
Se 79					Ra 225		5		5
Kr 81					Ra 226		5		5
Kr 85					Ra 228		5		5
Rb 87					Ac 227		5		5
Sr 90					Th 227		5		5
Zr 93					Th 228		5		5
Nb 91					Th 229		5		5
Nb 92					Th 230		5		5
Nb 93m					Th 232		5		5
Nb 94					Th 234		5		5
Mo 93					Pa 231		5		5
Tc 97					Pa 233		5		5
Tc 99					U 232				
Ru 106					U 233		5		5
Pd 107					U 234	2.22E-06	BB 2	2.44E-06	CC 2
Ag 108m					U 235	8.08E-08	BB 2	8.26E-08	CC 2
Ag 110m					U 236	1.13E-08	BB 2	2.35E-08	CC 2
Cd 109					U 238	4.59E-07	BB 2	4.59E-07	CC 2
Cd 113m					Np 237		5		5
Sn 119m					Pu 236				
Sn 121m					Pu 238	3.4E-03	BB 2	2.79E-03	CC 2
Sn 123					Pu 239	7.09E-02	BB 2	7.09E-02	CC 2
Sn 126					Pu 240	1.65E-02	BB 2	1.65E-02	CC 2
Sb 125					Pu 241	1.61E-02	BB 2	4.83E-03	CC 2
Sb 126					Pu 242	1.46E-06	BB 2	1.46E-06	CC 2
Te 125m					Am 241	1.97E-02	BB 2	1.93E-02	CC 2
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	1.11E-01	BB 2	1.09E-01	CC 2
Eu 155					Total b/g	1.61E-02	BB 2	4.83E-03	CC 2

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