

WASTE STREAM	7A117	Decommissioning Waste Uranium Contaminated ILW
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SITE AWE Aldermaston

SITE OWNER Ministry of Defence

WASTE CUSTODIAN AWE plc

WASTE TYPE ILW

WASTE VOLUMES

	Reported
Stocks: At 1.4.2019.....	0 m ³
Future arisings - 1.4.2019 - 31.3.2027.....	0 m ³
1.4.2027 - 31.3.2031.....	264.0 m ³
1.4.2031 - 31.3.2034.....	234.0 m ³
1.4.2034 - 31.3.2037.....	168.0 m ³
1.4.2037 - 31.3.2040.....	35.0 m ³
1.4.2040 - 31.3.2042.....	24.0 m ³
1.4.2042 - 31.3.2080.....	0 m ³
Total future arisings:	725.0 m ³
Total waste volume:	725.0 m ³

Comment on volumes: Future arisings are estimated based on the decommissioning plans for facilities on site, which have been recently reviewed. Stock volumes are considered to be accurate. The total volume of arisings will depend on the longevity of the AWE site, estimates have been made based on a site closure date of 2080.

Uncertainty factors on volumes: Stock (upper): x Arisings (upper) x 4.0
 Stock (lower): x Arisings (lower) x 0.5

WASTE SOURCE Manufacture of fuel items, disposal of legacy wastes and facility maintenance.

PHYSICAL CHARACTERISTICS

General description: The waste will consist of solids arising from decommissioning operations.

Physical components (%wt): As there is no stock of this waste type, and no disposals have been made in the last 6 years, physical components are assumed to be unchanged from 2016. Metallic waste (74%), plastics and rubber (22%), cellulose (3.8%), glass (0.3%) and asbestos (<0.1%).

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): 0.45

Comment on density: Density based on 2013 UK RWI.

CHEMICAL COMPOSITION

General description and components (%wt): Metallic waste (74%), plastics and rubber (22%), cellulose (3.8%), glass (0.3%) and asbestos (<0.1%).

Chemical state: Neutral

Chemical form of radionuclides: U: Oxide form.

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

Stainless steel.....	8.6
Other ferrous metals.....	56.0
Iron.....	NE
Aluminium.....	5.8
Beryllium.....	0.10
Cobalt.....	
Copper.....	2.8
Lead.....	0.40

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	Magnox/Magnesium.....		
	Nickel.....		
	Titanium.....		
	Uranium.....		
	Zinc.....		
	Zircaloy/Zirconium.....		
	Other metals.....		
Organics (%wt):	-		
	Total cellulose.....	3.8	
	Paper, cotton.....	3.2	
	Wood.....	0.60	
	Halogenated plastics	12.9	PVC.
	Total non-halogenated plastics.....	6.1	
	Condensation polymers.....	6.1	Perspex.
	Others.....		
	Organic ion exchange materials....		
	Total rubber.....	3.1	
	Halogenated rubber	3.1	Neoprene.
	Non-halogenated rubber.....		
	Hydrocarbons.....		
	Oil or grease		
	Fuel.....		
	Asphalt/Tarmac (cont.coal tar)...		
	Asphalt/Tarmac (no coal tar)....		
	Bitumen.....		
	Others.....		
	Other organics.....		
Other materials (%wt):	-		
	Inorganic ion exchange materials.		
	Inorganic sludges and flocs.....		
	Soil.....		
	Brick/Stone/Rubble.....		
	Cementitious material.....		
	Sand.....		
	Glass/Ceramics.....	0.30	
	Graphite.....		
	Desiccants/Catalysts.....		
	Asbestos.....	<0.10	
	Non/low friable.....	<0.10	
	Moderately friable.....		
	Highly friable.....		
	Free aqueous liquids.....		
	Free non-aqueous liquids.....		

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Inorganic anions (%wt):

Powder/Ash.....

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Fluoride.....

Chloride.....

Iodide.....

Cyanide.....

Carbonate.....

Nitrate.....

Nitrite.....

Phosphate.....

Sulphate.....

Sulphide.....

Materials of interest for waste acceptance criteria:

-

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

Corrosive materials..... 0

Pyrophoric materials..... 0

Generating toxic gases..... 0

Reacting with water..... 0

Active particles..... 0

Soluble solids as bulk chemical compounds..... 0

Wood / paper.

Hazardous substances / non hazardous pollutants:

Lead (0.4%wt) and asbestos (<0.1%wt).

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

PVC present.

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Barium..... 0
 Boron..... NE
 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.....
 EEE Type 2.....
 EEE Type 3.....
 EEE Type 4.....
 EEE Type 5.....

Complexing agents (%wt): No
 EDTA.....
 DPTA.....
 NTA.....
 Polycarboxylic acids.....
 Other organic complexants.....
 Total complexing agents.....

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: Unknown.

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	725

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

Range in container waste volume: A maximum of 5 pucks will be packed into a 500 litre drum.

Other information on containers: Not specified.

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: -

Opportunities for alternative disposal routing: Not yet determined

Treatment	Stream volume (%)	Comment
-	-	-

RADIOACTIVITY

Source: Enriched uranium.

Uncertainty: Declared activity of waste arisings has limited accuracy as this waste has not been produced before.

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 well understood for this material type, these are used alongside low resolution gamma spectrometry to assay the waste arisings.

Other information: Decay nuclides with a half life of less than 3 months have been omitted.

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Nuclide	Mean radioactivity, TBq/m ³				Nuclide	Mean radioactivity, TBq/m ³			
	Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code		Waste at 1.4.2019	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				5
Co 60					Bi 208				
Ni 59					Bi 210m				
Ni 63					Po 210				5
Zn 65					Ra 223				5
Se 79					Ra 225				5
Kr 81					Ra 226				5
Kr 85					Ra 228				5
Rb 87					Ac 227				5
Sr 90					Th 227				5
Zr 93					Th 228				5
Nb 91					Th 229				5
Nb 92					Th 230				5
Nb 93m					Th 232				5
Nb 94					Th 234				5
Mo 93					Pa 231				5
Tc 97					Pa 233				5
Tc 99					U 232				
Ru 106					U 233				5
Pd 107					U 234		3.87E-04	DD	2
Ag 108m					U 235		1.22E-05	DD	2
Ag 110m					U 236		1.60E-06	DD	2
Cd 109					U 238		7.28E-06	DD	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					Other a				
Eu 152					Other b/g				
Eu 154					Total a	0	4.08E-04	DD	2
Eu 155					Total b/g	0	0		

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