WASTE STREAM 7A40 Experimental Metallic Vessels

SITE AWE Aldermaston

SITE OWNER Ministry of Defence

WASTE CUSTODIAN AWE plc

WASTE TYPE ILW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	9.0 m³
Future arisings -	1.4.2019 - 31.3.2023.....	2.0 m³
	1.4.2023 - 31.3.2080.....	0 m³
Total future arisings:		2.0 m³
Total waste volume:		11.0 m³

Comment on volumes: Operational requirements at AWE are dependant on Strategic Defence Reviews and are subject to change over time. Future arisings are estimated based on the programmed forecast, the number has reduced from the 2016 RWI. Stock volumes are recorded in a maintained database, and are accurate. The total volume of arisings from AWE is dependant on programme.

Uncertainty factors on volumes:

Stock (upper):	x 1.0	Arisings (upper)	x 3.0
Stock (lower):	x 1.0	Arisings (lower)	x 0.5

WASTE SOURCE Processes involved with the production, maintenance and decommissioning of the UK's nuclear deterrent.

PHYSICAL CHARACTERISTICS

General description: Metallic vessels.

Physical components (%wt): Metal (77.0%), glass (2.86%), other materials (2.5%) and graphite (17.64%). Reviewed during the 2019 UK RWI exercise.

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): 1.9

Comment on density: Revised for 2019 UK RWI.

CHEMICAL COMPOSITION

General description and components (%wt): Metal (77.0%), glass (2.86%), other materials (2.5%) and graphite (17.64%). Note that the precise breakdown by weight is not available for publication due to the classification of certain materials.

Chemical state: Neutral

Chemical form of radionuclides: U: Oxide, fluoride and hydride.
Pu: Hydride.

Metals and alloys (%wt): -

Stainless steel.....		
Other ferrous metals.....	76.9	Mild steel.
Iron.....		
Aluminium.....	0.05	
Beryllium.....	<0.01	
Cobalt.....		
Copper.....	0.05	
Lead.....		
Magnox/Magnesium.....		
Nickel.....		
Titanium.....		
Uranium.....		

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	Zinc.....		
	Zircaloy/Zirconium.....		
	Other metals.....		
Organics (%wt):	This waste contains PVC.		
	Total cellulosics.....	0.81	
	Paper, cotton.....		
	Wood.....	0.81	
	Halogenated plastics		
	Total non-halogenated plastics.....	0.01	
	Condensation polymers.....	0.01	
	Others.....		
	Organic ion exchange materials....		
	Total rubber.....		
	Halogenated rubber		
	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.....	0.31	Absorbent material.
	Cementitious material.....	1.4	
	Sand.....		
	Glass/Ceramics.....	2.9	
	Graphite.....	17.6	
	Desiccants/Catalysts.....		
	Asbestos.....		
	Non/low friable.....		
	Moderately friable.....		
	Highly friable.....		
	Free aqueous liquids.....		
	Free non-aqueous liquids.....		
	Powder/Ash.....		
Inorganic anions (%wt):	Metal hydrides, fluorides and nitrides are present.		

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Fluoride	NE
Chloride	
Iodide	
Cyanide	
Carbonate	
Nitrate	
Nitrite	
Phosphate	
Sulphate	
Sulphide	

Materials of interest for waste acceptance criteria: -

Combustible metals	NE
Low flash point liquids	NE
Explosive materials	NE
Phosphorus	NE
Hydrides	NE
Biological etc. materials	NE
Biodegradable materials	NE
Putrescible wastes	NE
Non-putrescible wastes	NE
Corrosive materials	NE
Pyrophoric materials	NE
Generating toxic gases	NE
Reacting with water	NE
Active particles	NE
Soluble solids as bulk chemical compounds	NE

Hazardous substances / non hazardous pollutants: -

Acrylamide	0
Benzene	NE
Chlorinated solvents	0
Formaldehyde	0
Organometallics	0
Phenol	NE
Styrene	0
Tri-butyl phosphate	NE
Other organophosphates	0
Vinyl chloride	NE
Arsenic	NE
Barium	0
Boron	NE

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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): Not yet determined

EDTA.....

DPTA.....

NTA.....

Polycarboxylic acids……

Other organic complexants.....

Total complexing agents..... NE

PACKAGING AND CONDITIONING

Conditioning method: The vessels will be encapsulated in 3m3 boxes.

Plant Name: -

Location: Seallfield, Seascale, Cumbria.

Plant startup date: -

Total capacity (m^3/y incoming waste): -

Target start date for packaging this stream: -

Throughput for this stream (m^3/y incoming waste): -

Other information: -

Likely container type:

Container	Waste packaged (%vol)	Waste loading (m^3)	Payload (m^3)	Number of packages
Sellafield 3m^3 box	100.0	NE	NE	NE

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Likely container type comment:	-
Range in container waste volume:	-
Other information on containers:	Not specified.
Likely conditioning matrix:	Not specified
Other information:	-
Conditioned density (t/m³):	NE
Conditioned density comment:	-
Other information on conditioning:	-
Opportunities for alternative disposal routing:	No

Treatment	Stream volume (%)	Comment
-	-	-

RADIOACTIVITY

Source:	Uranium, plutonium and americium.
Uncertainty:	The accuracy for stocks has been calculated by looking at the variances in waste received since 1960. The activity of future arisings is not estimated. A decay calculation has not occurred.
Definition of total alpha and total beta/gamma:	The total stock alpha and beta/gamma specific activity is calculated from the volume and activity of waste in stock; the fingerprint is not included. Total alpha and beta/gamma specific activity for future arisings is not estimated.
Measurement of radioactivities:	Mass balance used.
Other information:	Uranium isotopes are present mixed with plutonium. The specific activity of future arisings is not estimated.

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Nuclide	Mean radioactivity, TBq/m³				Nuclide	Mean radioactivity, TBq/m³			
	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				
Co 60					Bi 208				
Ni 59					Bi 210m				
Ni 63					Po 210				
Zn 65					Ra 223				
Se 79					Ra 225				
Kr 81					Ra 226				
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90					Th 227				
Zr 93					Th 228				
Nb 91					Th 229				
Nb 92					Th 230				
Nb 93m					Th 232				
Nb 94					Th 234				
Mo 93					Pa 231				
Tc 97					Pa 233				
Tc 99					U 232				
Ru 106					U 233				
Pd 107					U 234		6		
Ag 108m					U 235		6		
Ag 110m					U 236		6		
Cd 109					U 238		6		
Cd 113m					Np 237				
Sn 119m					Pu 236				
Sn 121m					Pu 238		6		6
Sn 123					Pu 239		6		6
Sn 126					Pu 240	3.30E+00	6		6
Sb 125					Pu 241	4.24E-01	6		6
Sb 126					Pu 242		6		6
Te 125m					Am 241		6		6
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**	**3.30E+00**	**C C 2**	**NE**	
Eu 155					**Total b/g**	**4.24E-01**	**C C 2**	**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