WASTE STREAM 7A111 Decommissioning Waste PCM ILW

SITE AWE Aldermaston

SITE OWNER Ministry of Defence

WASTE CUSTODIAN AWE plc

WASTE TYPE ILW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	2380.0 m³
Future arisings -	1.4.2019 - 31.3.2022.....	128.0 m³
	1.4.2022 - 31.3.2025.....	288.0 m³
	1.4.2025 - 31.3.2028.....	359.0 m³
	1.4.2028 - 31.3.2038.....	610.0 m³
	1.4.2038 - 31.3.2062.....	0 m³
	1.4.2062 - 31.3.2074.....	1597.0 m³
	1.4.2074 - 31.3.2080.....	0 m³
Total future arisings:		2982.0 m³
Total waste volume:		5362.0 m³

Comment on volumes: There is a significant decrease in the stock, due to transferral of waste to 7A21, due to recategorization to 'operational' waste. Future arisings are based on recent decommissioning volume estimates. 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 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: Metal, plastics, rubber, glass, etc. arising from dismantling of contaminated gloveboxes and process equipment.

Physical components (%wt): Metals (73.2%) , plastics / rubber (23%), cellulosics (4%). The composition is based on the 2010 RWI, but was reviewed by sampling for the 2013 RWI and found to be broadly consistent. Likewise, consistent in 2019.

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): 0.37

Comment on density: Revised for the 2019 UK RWI based on wastes in stock.

CHEMICAL COMPOSITION

General description and components (%wt): Metals (73.2%) , plastics / rubber (23%), cellulosics (4%).

Chemical state: Neutral

Chemical form of radionuclides: U: Oxide form.
Pu: 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.....	56.5
Iron.....	
Aluminium.....	5.8
Beryllium.....	<0.10
Cobalt.....	
Copper.....	1.8

WASTE STREAM 7A111 Decommissioning Waste PCM ILW

	Lead	0.40	
	Magnox/Magnesium		
	Nickel		
	Titanium		
	Uranium	NE	Present as a contaminant.
	Zinc		
	Zircaloy/Zirconium		
	Other metals		
Organics (%wt):	Non-halogenated plastic is present as perspex, halogenated rubber as neoprene.		
	Total cellulosics	3.8	
	Paper, cotton	3.2	
	Wood	0.60	
	Halogenated plastics	13.2	
	Total non-halogenated plastics	6.3	
	Condensation polymers	6.3	
	Others		
	Organic ion exchange materials		
	Total rubber	3.1	
	Halogenated rubber	3.1	
	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		
	Moderately friable		
	Highly friable		

WASTE STREAM 7A111 Decommissioning Waste PCM ILW

	Free aqueous liquids.....		
	Free non-aqueous liquids.....		
	Powder/Ash.....		
Inorganic anions (%wt):	-		
	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	Paper, cotton and wood present.
	Corrosive materials.....	0	
	Pyrophoric materials.....	0	
	Generating toxic gases.....	0	
	Reacting with water.....	0	
	Active particles.....	0	
	Soluble solids as bulk chemical compounds.....	0	
Hazardous substances / non hazardous pollutants:	The waste contains lead (0.4%wt), asbestos (<0.1%wt) and beryllium (0.1%).		
	Acrylamide.....	0	
	Benzene.....	NE	
	Chlorinated solvents.....	0	
	Formaldehyde.....	0	
	Organometallics.....	0	
	Phenol.....	NE	
	Styrene.....	0	
	Tri-butyl phosphate.....	NE	
	Other organophosphates.....	0	

WASTE STREAM 7A111 Decommissioning Waste PCM ILW

Vinyl chloride	P	PVC will be present.
Arsenic	NE	
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):	Yes	
EDTA		
DPTA		
NTA		
Polycarboxylic acids	TR	
Other organic complexants	TR	Complexing agents are likely to be present because of their use as decontaminants.
Total complexing agents	TR	

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 (m^3/y incoming waste):	-
Target start date for packaging this stream:	-
Throughput for this stream (m^3/y incoming waste):	-
Other information:	-

WASTE STREAM 7A111 Decommissioning Waste PCM ILW

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	5362

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:	Not specified
Other information:	-
Conditioned density (t/m^3):	~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

Treatment	Stream volume (%)	Comment
-	-	-

RADIOACTIVITY

Source:	Plutonium and uranium (natural, depleted and enriched).
Uncertainty:	The gross alpha and gross beta activities of the in-stock wastes are accurate, the radionuclide breakdown has been estimated. The future arisings have been projected from the in-stock data.
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 gloveboxes 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 3 months have been omitted.

WASTE STREAM 7A111 Decommissioning Waste PCM ILW

Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code	Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code
H 3		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		
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	4.47E-06	B B 2	7.90E-07	C C 2
Ag 108m					U 235	1.76E-07	B B 2	3.07E-08	C C 2
Ag 110m					U 236	2.91E-08	B B 2	7.09E-09	C C 2
Cd 109					U 238	2.02E-07	B B 2	1.90E-07	C C 2
Cd 113m					Np 237		5		
Sn 119m					Pu 236				
Sn 121m					Pu 238	1.33E-03	B B 2	1.04E-03	C C 2
Sn 123					Pu 239	2.5E-02	B B 2	3.08E-02	C C 2
Sn 126					Pu 240	7.40E-03	B B 2	7.54E-03	C C 2
Sb 125					Pu 241	1.62E-02	B B 2	1.62E-02	C C 2
Sb 126					Pu 242	1.68E-06	B B 2	8.41E-07	C C 2
Te 125m					Am 241	1.12E-02	B B 2	5.58E-03	C C 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**	**4.49E-02**	**B B 2**	**4.49E-02**	**C C 2**
Eu 155					**Total b/g**	**1.62E-02**	**B B 2**	**1.62E-02**	**C C 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