

WASTE STREAM	7A110	Decommissioning Waste Tritium Bearing ILW
---------------------	--------------	--------------------------------------------------

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.....	7.2 m ³
Future arisings -	1.4.2022 - 31.3.2041.....	0 m ³
	1.4.2042 - 31.3.2043.....	4.0 m ³
	1.4.2044 - 31.3.2080.....	0 m ³
Total future arisings:		4.0 m ³
Total waste volume:		11.2 m ³

Comment on volumes: Future arisings are estimated based on the site decommissioning plan for facilities on site. The amount of ILW waste from the decommissioning of tritium facilities has been revised in 2022 and been slightly reduced. Stock volumes are recorded and considered to be accurate. The total volume of arisings will depend on the amount of ILW/LLW produced in the decommissioning of AWE's principal tritium buildings and on any delays encountered in the decommissioning plan.

Uncertainty factors on volumes: Stock (upper): x 1.0 Arisings (upper) x 3.0
 Stock (lower): x 1.0 Arisings (lower) x 0.3

WASTE SOURCE Decommissioning of tritiated box-lines.

PHYSICAL CHARACTERISTICS

General description: Redundant plant, glove boxes and primary containment from tritium gas handling systems (stainless steel pipework and valves) and items of the glove-box structure from a decommissioned tritium rig glove-box.

Physical components (%wt): Metal (90.5%), plastics (8.5%), wood (0.8%) and rubber (0.2%). Reviewed in 2022 and no change from data in the 2019 UKRWI.

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): 0.52

Comment on density: The average material density of the waste is 0.52 t/m³. Differs slightly to 2019 UKRWI owing to rounding.

CHEMICAL COMPOSITION

General description and components (%wt): Metal (90.5%), plastics (8.5%), wood (0.8%) and rubber (0.2%).

Chemical state: Neutral

Chemical form of radionuclides: H-3: HT and HTO diffused present in waste stream. Small amount of organically bound tritium may be present in solid form.
 C-14: Not present in the waste stream
 Cl-36: Not present in the waste stream
 Se-79: Not present in the waste stream
 Tc-99: Not present in the waste stream
 I-129: Not present in the waste stream
 Ra: Not present in the waste stream
 Th: Not present in the waste stream
 U: Not present in the waste stream
 Np: Not present in the waste stream
 Pu: Not present in the waste stream

Metals and alloys (%wt): The metallic waste items are partly present in sheet-form and tools (pipework and valves from dismantled primary containment systems). 50% of sheet metal by weight approximately 4-5mm in thickness.

WASTE STREAM	7A110	Decommissioning Waste Tritium Bearing ILW
---------------------	--------------	--------------------------------------------------

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	52.9	Contains tin (3.48%) and molybdenum (0.58%) - alloy	
Other ferrous metals.....	33.4		
Iron.....	0		
Aluminium.....	0.20		
Beryllium.....	0		
Cobalt.....	0		
Copper.....	2.6		
Lead.....	0		
Magnox/Magnesium.....	0		
Nickel.....	0		
Titanium.....	0		
Uranium.....	0		
Zinc.....	0		
Zircaloy/Zirconium.....	0		
Other metals.....	1.4	Filters	
Organics (%wt):	-		
	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	0.80		
Paper, cotton.....	0		
Wood.....	0.80		
Halogenated plastics	0.50	PVC	
Total non-halogenated plastics.....	8.0	Polythene and perspex	
Condensation polymers.....	8.0		
Others.....	0		
Organic ion exchange materials....	0		
Total rubber.....	0.20		
Halogenated rubber	~0.10	Neoprene	
Non-halogenated rubber.....	~0.10	Isoprene	
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.....	TR		
Other materials (%wt):	-		

WASTE STREAM	7A110	Decommissioning Waste Tritium Bearing ILW
---------------------	--------------	--------------------------------------------------

	(%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.....	TR		
Non/low friable.....	NE		
Moderately friable.....	NE		
Highly friable.....	NE		
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: -

	(%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	
Non-putrescible wastes.....	P	Wood

WASTE STREAM	7A110	Decommissioning Waste Tritium Bearing ILW
---------------------	--------------	--------------------------------------------------

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:

	(%wt)	Type(s) and comment
Acrylamide.....	0	
Benzene.....	NE	
Chlorinated solvents.....	0	
Formaldehyde.....	0	
Organometallics.....	0	
Phenol.....	NE	
Styrene.....	0	
Tri-butyl phosphate.....	P	
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.....	0.58	Mixed in with stainless steel
Thallium.....	0	
Tin.....	3.5	Mixed in with stainless steel
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	

WASTE STREAM	7A110	Decommissioning Waste Tritium Bearing ILW
---------------------	--------------	--------------------------------------------------

Complexing agents (%wt): No

	(%wt)	Type(s) and comment
EDTA.....	0	
DPTA.....	0	
NTA.....	0	
Polycarboxylic acids.....	0	
Other organic complexants.....	0	No complexing agents are present
Total complexing agents.....	0	

Potential for the waste to contain discrete items: No.

PACKAGING AND CONDITIONING

Conditioning method: A conditioning and packaging regime has yet to be determined, development work continues. It may be possible to supercompact the drums and grout them, but tritiated wastes have not been included in the submitted LoC, so no LoC exists for this waste stream.

Plant Name: -
 Location: Unknown
 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	12

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

WASTE STREAM**7A110****Decommissioning Waste Tritium Bearing ILW**

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

RADIOACTIVITY

Source:	Tritium is the major source of activity. Specific activities are gauged from current stock.
Uncertainty:	In-stock activity is accurate. The future arising activities for this waste stream are extremely difficult to predict, as very little of this waste has been produced in the past. The activity for the future arisings is a pragmatic estimate, so will be less accurate than the in-stock figures, but at the same time not considered overly inaccurate.
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:	Tritium is assayed using calorimetry of individual items or the head space analysis of drummed waste.
Other information:	-

WASTE STREAM 7A110 Decommissioning Waste Tritium Bearing ILW

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	7.39E-01	BB 2	7.39E-01	DD 2	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				
Ag 108m					U 235				
Ag 110m					U 236				
Cd 109					U 238				
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		0	
Eu 155					Total b/g	7.39E-01	BB 2	7.39E-01	DD 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