

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

SITE AWE Aldermaston

SITE OWNER Ministry of Defence (MOD)

WASTE CUSTODIAN AWE plc

WASTE TYPE ILW

WASTE VOLUMES

	Reported (m ³)	OR	Conditioned (m ³)	Packaged (m ³)
Stocks:	At 1.4.2025 = 7.2			
Future arisings:	1.4.2025 - 31.3.2060 = 0			
	1.4.2061 - 31.3.2071 = 4.0			
	1.4.2071 - 31.3.2080 = 0			
Total future arisings:	4.0			
Total waste volume:	11.2			

Number of waste packages in stock: At 1.4.2025..... - packages

Comment on arising rates: Future arisings are estimated based on the site decommissioning plan for facilities on site.

Additional information on quantities: 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 1.00 Arisings (upper): x 3.00
Stock (lower): x 1.00 Arisings (lower): x 0.30

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.

Changes since waste generated: -

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

Sheet metal proportion / thickness: 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.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(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):

	(%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	-	

COMPONENTS OF MATERIALS, WASTE PROPERTIES, MATERIALS NOT CONTRIBUTING TO MASS

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
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	-

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	-

Physical components:

	Number	Type(s) and comment
Sources.....		-
Electronic & Electrical Equipment (EEE)		-
EEE Type 1.....		-
EEE Type 2.....		-
EEE Type 3.....		-
EEE Type 4.....		-
EEE Type 5.....		-

TREATMENT, PACKAGING AND DISPOSAL

Planned on-site / off-site treatment(s):

Treatment	On-site / Off-site	Stream volume %
Size reduction	Off-site	~ 50.0
Decay storage		
Low force compaction		
Supercompaction (HFC)		
Incineration		
Drying/dewatering/liquid separation		
Tie down/fixatives/strippable coating/painting application		
Decontamination		
Metal treatment		
Recycling / reuse		
Thermal treatment, including vitrification		
Encapsulation		
Polymer encapsulation		
Other physical treatment		
Other chemical treatment		
Containerisation	Off-site	~ 50.0
Treatment not yet determined		
None		

Comments on planned treatments:

It is probable, that a significant amount of the Tritiated waste would have decayed to LLW by the time AWE begin disposal options.

Conditioning method:

-

Conditioning plants:

Plant Name	Location

Likely conditioning matrix:

-

Further information on the conditioning matrix:

-

Waste Packaging:

Likely container type:	Container	Waste packaged (vol%)	Waste loading (m³)	Payload (m³)	Number of packages	Estimated start date for packaging
	500 l drum	100.0	1.0	0.50	12	-

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

Other information on packaging and conditioning: -

Conditioned density (t/m³): ~ 2.0

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

Management Routes:

Disposal Route	Stream volume %	Raw density t/m³	Start date
Expected to be consigned to a Near Site, Near Surface Disposal Facility (Scotland)	= 100.0		
Expected to be Non-NSD HAW managed under Scottish Government's policy			
Expected to be disposed to LLW Vaults NRS Dounreay			
Expected to be consigned to the Geological Disposal Facility			
Expected to be consigned to a Near Surface Disposal Facility			
Expected to be consigned to the LLW Repository			
Expected to be consigned to a Landfill Facility			
Expected to be disposed On-Site			
Expected to be managed by In-Situ Disposal			
Expected to be consigned to an Incineration Facility			
Expected to be consigned to a Metal Treatment Facility			
Expected to be Out of Scope			
Expected to be recycled / reused			
Disposal route not known			

Classification codes for waste expected to be consigned to a landfill facility:

Opportunities for alternative disposal routing: Not yet determined

Baseline Management Route	Opportunity Management Route	Stream volume (%)	Opportunity Confidence	Comment
-	-	-	-	-

RADIOACTIVITY

Source: Tritium is the major source of activity. Specific activities are gauged from current stock.

Uncertainty: The in stock activity has been decayed from the assay/date the 35 waste records were generated.

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.

Measurement of radioactivities: Tritium is assayed using calorimetry of individual items or the head space analysis of drummed waste.

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

WASTE STREAM		7A110		Decommissioning Waste Tritium Bearing ILW					
Nuclide	Mean radioactivity, TBq/m³				Nuclide	Mean radioactivity, TBq/m³			
	Waste at 1.4.2025	Bands and Code	Future Arisings	Bands and Code		Waste at 1.4.2025	Bands and Code	Future Arisings	Bands and Code
H 3	= 1.00E+00	B B 2	= 7.39E-01	D D 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					Unsp a				
Eu 152					Unsp b/g				
Eu 154					Total a	0	*	0	*
Eu 155					Total b/g	1.00E+00	*	7.39E-01	*

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 the 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
* Total calculated from the 114 declared radionuclides