

WASTE STREAM	7A32	Sealed and Unsealed Sources
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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	= 0		
Future arisings:	1.4.2025 - 31.3.2080	= 82.5		
Total future arisings:		82.5		
Total waste volume:		82.5		

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

Comment on arising rates: AWE ceased cementation of redundant sources back in 2005 and now transports sources to a treatment/transfer facility (via an expert contract partner), as the current BAT option. Future arising volumes are based on previous disposal volumes projected until 2080, i.e. 1.5 m3 per year. This new prediction figure is similar to that predicted in previous UKRWI exercises.

Additional information on quantities: Stock volumes when declared as waste, are recorded in the AWE site waste management database. The total volume of waste arisings will depend on the longevity of the AWE site with estimates being based on the estimated end of life of facilities circa 2080 or potentially beyond.

Uncertainty factors on volumes: Stock (upper): x - Arisings (upper): x 10.00
Stock (lower): x - Arisings (lower): x 0.10

WASTE SOURCE This waste stream comprises of miscellaneous ILW redundant sources that have been used for calibration of radiological equipment, assay/characterisation processes, and experiments and research.

PHYSICAL CHARACTERISTICS

General description: The redundant sources contain solids and/or liquids with no gas inners.

Changes since waste generated: -

Bulk density (t/m³): = 0.28

Comment on density: The density was reviewed for the 2022 UKRWI. This remains unchanged.

CHEMICAL COMPOSITION

General description and components (%wt): Other ferrous metals (30.36%), aluminium (14.65%), copper (1.40%), uranium (16.67%), non-halogenated plastics (25.33%), PVC (6.10%), glass (5.49%).

Chemical state: Neutral

Sheet metal proportion / thickness: Not applicable.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	= 0	-	
Other ferrous metals.....	= 30.4	-	
Iron.....	= 0	-	
Aluminium.....	= 14.7	-	
Beryllium.....	= 0	-	
Cobalt.....	= 0	-	
Copper.....	= 1.4	-	
Lead.....	= 0	-	
Magnox/Magnesium.....	= 0	-	
Nickel.....	= 0	-	
Titanium.....	= 0	-	
Uranium.....	= 16.7	Radiography source shielding & calibration /experiments	
Zinc.....	= 0	-	
Zircaloy/Zirconium.....	= 0	-	
Other metals.....	= 0	-	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose...	= 0	-	
Paper, cotton...	= 0	-	
Wood...	= 0	-	
Halogenated plastics...	= 6.1	PVC	
Total non-halogenated plastics...	= 25.3	-	
Condensation polymers...	= 25.3	-	
Others...	= 0	-	
Organic ion exchange materials...	= 0	-	
Total rubber...	= 0	-	
Halogenated rubber...	= 0	-	
Non-halogenated rubber...	= 0	-	
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...	= 0	-	

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...	= 5.5	Glass	
Graphite...	= 0	-	
Desiccants/Catalysts...	= 0	-	
Asbestos...	= 0	-	
Non/low friable...	= 0	-	
Moderately friable...	= 0	-	
Highly friable...	= 0	-	
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...	<< 0.10	-
Iodide...	= 0	-
Cyanide...	= 0	-
Carbonate...	= 0	-
Nitrate...	<< 0.10	-
Nitrite...	= 0	-
Phosphate...	= 0	-
Sulphate...	<< 0.10	-
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...	= 0	-
Putrescible wastes...	= 0	-
Non-putrescible wastes...	= 0	-
Corrosive materials...	NE	-
Pyrophoric materials...	NE	-
Generating toxic gases...	NE	-
Reacting with water...	NE	-
Higher activity particles...	P	Source
Soluble solids as bulk chemical compounds...	NE	-

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.....	NE	-
Other organophosphates.....	= 0	-
Vinyl chloride.....	P	PVC
Arsenic.....	NE	-
Barium.....	= 0	-
Boron.....	NE	-
Boron (in Boral).....	NE	-
Boron (non-Boral).....	NE	-
Cadmium.....	NE	-
Caesium.....	TR	-
Selenium.....	NE	-
Chromium.....	NE	-
Molybdenum.....	NE	-
Thallium.....	= 0	-
Tin.....	NE	-
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 present in the waste stream.
Total complexing agents.....	= 0	-

Physical components:

	Number	Type(s) and comment
Sources.....	NE	-
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		
Decay storage		
Low force compaction		
Supercompaction (HFC)		
Incineration		
Drying/dewatering/liquid separation		
Tie down/fixatives/strippable coating/painting application		
Decontamination		
Metal treatment		
Recycling / reuse	Off-site	~ 5.0
Thermal treatment, including vitrification		
Encapsulation		
Polymer encapsulation		
Other physical treatment	Off-site	~ 95.0
Other chemical treatment		
Containerisation		
Treatment not yet determined		
None		

Comments on planned treatments:

The bulk of the sources are consolidated at a Contractor's site and then sentenced through a final disposal solution, e.g. LLWR Burial, Combustion, Permitted LA-LLW, etc. Sources are re-used or recycled whenever possible. However, recycling/reuse tends to be available for higher activity sources, so the crux of the waste stream is shipped to an off-site Contractor's facility to be consolidated before final disposal.

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
	Not yet determined	100.0	-	-	-	-

Range in container waste loading:

Other information on packaging and conditioning: At present, the disposal does not fall under any of the above, as this waste stream is currently transferred to an off-site source disposal Contractor. This stance may alter in near distant future if/when the BAT option changes.

Conditioned density (t/m³): -

Conditioned density comment: -

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)			
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	~ 5.0	= 0.29	
Disposal route not known	~ 95.0	= 0.28	

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

Opportunities for alternative disposal routing: No

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

RADIOACTIVITY

Source: The source of activity could be from any number of radionuclides.

Uncertainty: As reported in the 2022 UK RWI, the activity and radionuclides declared are not accurate, as they will vary depending on what radioactive sources are declared redundant and thus which sources will require disposal in any given year.

Measurement of radioactivities: The activity levels are determined from the 2018-2021 disposal figures. Decay corrections have not been undertaken as it is assumed that new sources will be bought and eventually disposed.

Chemical form of radionuclides:

H-3: Present in the waste stream in oxide / chloride form

C-14: Present in the waste stream in oxide / chloride / sulphate form

Cl-36: May be present in waste stream in compound form, depending upon future demand

Se-79: May be present in waste stream in compound form, depending upon future demand

Tc-99: Not present in the waste stream

I-129: Not present in the waste stream

Ra: Present in the waste stream in oxide / chloride / sulphate form

Th: Present in the waste stream in oxide / chloride / sulphate form

U: Present in waste stream as metal and metal oxide / metal chloride / metal sulphate

Np: Present in the waste stream in oxide / chloride / sulphate form

Pu: Present in the waste stream in oxide / chloride / sulphate form

WASTE STREAM 7A32 Sealed and Unsealed Sources									
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			~ 6.79E-05	D D 2	Gd 153				
Be 10					Ho 163				
C 14			~ 1.19E-07	D D 2	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					Ti 204				
Mn 54					Pb 205				
Fe 55					Pb 210				
Co 60			~ 7.55E-02	D D 2	Bi 208				
Ni 59					Bi 210m				
Ni 63			~ 5.30E-06	D D 2	Po 210				
Zn 65					Ra 223				
Se 79					Ra 225				
Kr 81					Ra 226			~ 1.80E-06	D D 2
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90			~ 6.97E-05	D D 2	Th 227				
Zr 93					Th 228			~ 2.34E-08	D D 2
Nb 91					Th 229				
Nb 92					Th 230			~ 2.65E-10	D D 2
Nb 93m					Th 232			~ 1.36E-09	D D 2
Nb 94					Th 234				
Mo 93					Pa 231			~ 5.92E-06	D D 2
Tc 97					Pa 233				
Tc 99					U 232				
Ru 106			~ 5.00E-11	D D 2	U 233				
Pd 107					U 234			~ 3.48E-04	D D 2
Ag 108m					U 235			~ 1.17E-05	D D 2
Ag 110m					U 236			~ 1.20E-06	D D 2
Cd 109			~ 2.03E-09	D D 2	U 238			~ 5.08E-04	D D 2
Cd 113m					Np 237			~ 9.75E-08	D D 2
Sn 119m					Pu 236				
Sn 121m					Pu 238			~ 1.40E-03	D D 2
Sn 123					Pu 239			~ 1.73E-05	D D 2
Sn 126					Pu 240			~ 1.39E-09	D D 2
Sb 125					Pu 241				
Sb 126					Pu 242				
Te 125m					Am 241			~ 1.70E-02	D D 2
Te 127m					Am 242m				
I 129					Am 243				
Cs 134					Cm 242				
Cs 135					Cm 243				
Cs 137			~ 2.05E-04	D D 2	Cm 244				
Ba 133			~ 4.21E-08	D D 2	Cm 245				
La 137					Cm 246				
La 138					Cm 248				
Ce 144					Cf 249				
Pm 145					Cf 250				
Pm 147			~ 4.51E-11	D D 2	Cf 251				
Sm 147					Cf 252			~ 1.47E-06	D D 2
Sm 151					Unsp a				
Eu 152			~ 5.02E-05	D D 2	Unsp b/g				
Eu 154					Total a	0	*	1.93E-02	*
Eu 155					Total b/g	0	*	7.59E-02	*

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