

WASTE STREAM	7A13	Sea Disposal Packs (Concrete Lined Drums)
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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	= 476.5		
Future arisings:	1.4.2025 - 31.3.2080	= 0		
Total future arisings:		0.0		
Total waste volume:		476.5		

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

Comment on arising rates: There will no increase in waste activity. Concrete lined drums are no longer being created. Total number of packs is 743.

Additional information on quantities: The drums have not been subjected to modern standard assay, so the activity remains uncertain.

Uncertainty factors on volumes: Stock (upper): x 1.00 Arisings (upper): x -
Stock (lower): x 1.00 Arisings (lower): x -

WASTE SOURCE The waste stream represents part of the 1983 sea disposal consignment. Wastes were generated from AWE operations of that period, e.g. glovebox and reactor wastes.

PHYSICAL CHARACTERISTICS

General description: The drums are likely to suffer some corrosion in storage so will need to be handled with care/appropriately when transferred/moved. The actual waste component of these packages is in the mild steel drum that is surrounded by an over sheaf of concrete.

Changes since waste generated: Encapsulated waste in a concrete lined drum.

Bulk density (t/m³): = 1.5

Comment on density: The density of the drummed waste varies from 1.282 t/m³, to 2.74 t/m³, but the weighted average density of the waste is 1.473 t/m³.

CHEMICAL COMPOSITION

General description and components (%wt): Miscellaneous ILW, including metal (4.42%), organic (4.73%), ceramic (0.55%), vermiculite (0.30%) and cement (90.00%).

Chemical state: Neutral

Sheet metal proportion / thickness: Steel is present as drum reinforcement and lead is utilised in the package design.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	NE	-	
Other ferrous metals.....	NE	-	
Iron.....	NE	-	
Aluminium.....	= 0.72	Contained within filters	
Beryllium.....	TR	-	
Cobalt.....	= 0	-	
Copper.....	= 0	-	
Lead.....	NE	-	
Magnox/Magnesium.....	= 0	-	
Nickel.....	= 0	-	
Titanium.....	= 0	-	
Uranium.....	NE	Present as a contaminant only	
Zinc.....	= 0	-	
Zircaloy/Zirconium.....	= 0	-	
Other metals.....	= 3.7	Mixed metals (3.7%)	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	= 1.2	-	
Paper, cotton.....	= 1.1	Contained within filters	
Wood.....	= 0.05	-	
Halogenated plastics.....	= 1.9	PVC	
Total non-halogenated plastics.....	= 0.05	-	
Condensation polymers.....	= 0.05	-	
Others.....	= 0	-	
Organic ion exchange materials.....	TR	-	
Total rubber.....	= 1.6	-	
Halogenated rubber.....	= 1.6	-	
Non-halogenated rubber.....	= 0	-	
Hydrocarbons.....	= 0	-	
Oil or grease.....	= 0	-	
Fuel.....	= 0	-	
Asphalt/Tarmac (cont.coal tar).....	NE	-	
Asphalt/Tarmac (no coal tar).....	NE	-	
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.....	NE	-	
Brick/Stone/Rubble.....	= 0.30	Vermiculite (debris in filters)	
Cementitious material.....	= 90.0	-	
Sand.....	= 0	-	
Glass/Ceramics.....	= 0.55	-	
Graphite.....	= 0	-	
Desiccants/Catalysts.....	= 0	-	
Asbestos.....	TR	-	
Non/low friable.....	TR	-	
Moderately friable.....	TR	-	
Highly friable.....	TR	-	
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.....	NE	-
Chloride.....	NE	-
Iodide.....	NE	-
Cyanide.....	NE	-
Carbonate.....	NE	-
Nitrate.....	NE	-
Nitrite.....	NE	-
Phosphate.....	NE	-
Sulphate.....	NE	-
Sulphide.....	NE	-

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.....	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.....	= 0	-
Chlorinated solvents.....	= 0	-
Formaldehyde.....	= 0	-
Organometallics.....	= 0	-
Phenol.....	= 0	-
Styrene.....	= 0	-
Tri-butyl phosphate.....	= 0	-
Other organophosphates.....	= 0	-
Vinyl chloride.....	P	PVC present in halogenated plastics.
Arsenic.....	= 0	-
Barium.....	= 0	-
Boron.....	= 0	-
Boron (in Boral).....	= 0	-
Boron (non-Boral).....	= 0	-
Cadmium.....	= 0	-
Caesium.....	= 0	< 1ppm caesium
Selenium.....	= 0	-
Chromium.....	= 0	-
Molybdenum.....	= 0	-
Thallium.....	= 0	-
Tin.....	= 0	-
Vanadium.....	= 0	-
Mercury compounds.....	= 0	-
Others.....	= 0	-

Complexing agents (%wt):

No		
	(%wt)	Type(s) and comment
EDTA.....	= 0	-
DPTA.....	= 0	-
NTA.....	= 0	-
Polycarboxylic acids.....	= 0	-
Other organic complexants.....	= 0	The waste contains no organic complexing agents.
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		
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		
Treatment not yet determined	Off-site	= 100.0
None		

Comments on planned treatments:

Highly likely all Concrete Lined Drums will be overpacked on site and dispatched directly to the GDF.

Conditioning method:

-

Conditioning plants:

Plant Name	Location

Likely conditioning matrix:

-

Further information on the conditioning matrix:

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Waste Packaging:

Likely container type:	Container	Waste packaged (vol%)	Waste loading (m³)	Payload (m³)	Number of packages	Estimated start date for packaging
	3 m³ box (side lifting)	100.0	-	-	-	-

Range in container waste loading:

Other information on packaging and conditioning: These waste packages are being stored pending final disposal. Note that volumes will change, and waste will be re-assayed and recharacterised.

Conditioned density (t/m³): ~ 2.0
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)	= 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: The activity arises from plutonium, uranium, tritium and through the activation of materials in neutron fluxes/fields.

It is believed a high percentage of the Concrete Lined Drums may fall within the LLW category, potentially consider changing this waste stream to LLW. However, at present specific details are unknown and BAT options have not been optioned.

Uncertainty: The activity values and uncertainties have been amended to reflect the actual assay figures reported circa May 1983/4/5. All figures have been decay corrected using figures corrected at the date of assay measurement. Therefore the decay corrected figures are different to the figures reported in the 2022 UK RWI.

Measurement of radioactivities: Activity determination was conducted by a variety of analytical techniques such as low resolution gamma spectroscopy monitoring, passive neutron coincidence counting (PNCC) and liquid scintillation counting.

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 waste stream
Cl-36: Not present in waste stream
Se-79: Not present in waste stream
Tc-99: Not present in waste stream
I-129: Not present in waste stream
Ra: Only daughter products present from uranium in this waste stream. Oxide form
Th: Only daughter products present from uranium in this waste stream. Oxide form
U: Present as metal or metal oxide
Np: Np-237 present in waste stream as oxide form from daughter product of Am-241 alpha decay.
Pu: Present as metal or metal oxide

WASTE STREAM		7A13		Sea Disposal Packs (Concrete Lined Drums)					
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	~ 2.94E-04	B B 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	< 1.03E-03	B B 2			Pb 210	= 1.05E-10	B B 2		
Co 60	< 1.07E-03	B B 2			Bi 208				
Ni 59					Bi 210m	= 1.05E-10	B B 2		
Ni 63					Po 210	= 1.01E-10	B B 2		
Zn 65					Ra 223	= 1.18E-09	B B 2		
Se 79					Ra 225	= 3.99E-17	B B 2		
Kr 81					Ra 226	= 3.25E-10	B B 2		
Kr 85					Ra 228	= 6.41E-16	B B 2		
Rb 87					Ac 227	= 1.19E-09	B B 2		
Sr 90					Th 227	= 1.17E-09	B B 2		
Zr 93					Th 228	= 5.89E-16	B B 2		
Nb 91					Th 229	= 4.01E-17	B B 2		
Nb 92					Th 230	= 3.59E-08	B B 2		
Nb 93m					Th 232	= 7.98E-16	B B 2		
Nb 94					Th 234	= 4.87E-07	B B 2		
Mo 93					Pa 231	= 2.65E-09	B B 2		
Tc 97					Pa 233	= 5.32E-10	B B 2		
Tc 99					U 232				
Ru 106					U 233	= 3.73E-14	B B 2		
Pd 107					U 234	= 9.30E-05	B B 2		
Ag 108m					U 235	= 2.89E-06	B B 2		
Ag 110m					U 236	= 3.86E-07	B B 2		
Cd 109					U 238	= 4.87E-07	B B 2		
Cd 113m					Np 237	= 5.34E-10	B B 2		
Sn 119m					Pu 236				
Sn 121m					Pu 238	= 1.72E-04	B B 2		
Sn 123					Pu 239	= 6.16E-03	B B 2		
Sn 126					Pu 240	= 1.64E-03	B B 2		
Sb 125					Pu 241	= 2.81E-04	B B 2		
Sb 126					Pu 242	= 2.22E-03	B B 2		
Te 125m					Am 241	= 5.86E-05	B B 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					Unsp a				
Eu 152					Unsp b/g				
Eu 154					Total a	1.04E-02	*	0	*
Eu 155					Total b/g	2.68E-03	*	0	*

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