

WASTE STREAM	7E23	LLW Metallic Waste
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SITE Rosyth Royal Dockyard

SITE OWNER Ministry of Defence (MOD)

WASTE CUSTODIAN Ministry of Defence (MOD)

WASTE TYPE LLW

WASTE VOLUMES

	Reported (m ³)	OR	Conditioned (m ³)	Packaged (m ³)
Stocks:	At 1.4.2025	~~ 68.5		
Future arisings:	1.4.2025 - 31.3.2026	~~ 1.0		
	1.4.2026 - 31.3.2035	~~ 137.0		
Total future arisings:		138.0		
Total waste volume:		206.5		

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

Comment on arising rates: Current stocks are made up of miscellaneous metal wastes from processing operations and redundant containers following the transfer of wastes into new containers. An estimate of 1m³ per year (10m³ over time period stated) of miscellaneous metal waste generated has been made based on current general stock. This is metallic secondary waste generated during waste dismantling and processing operations, such as tooling and other redundant equipment. The remainder (127m³), and majority, of the future arisings estimated is for thirty-two containers expected to become waste in future - by this time they will be under the management of a waste contractor who is treating the waste inside the containers, and who are expected to manage the subsequent disposal of the containers also.

Additional information on quantities: Visual estimate for current stocks and assumptions made about rate of future arisings based on what seen so far, however, there is expected to be variation depending upon timing of particular operations. Volume calculated from dimensions of containers.

Uncertainty factors on volumes: Stock (upper): x 2.00 Arisings (upper): x 2.00
Stock (lower): x 0.20 Arisings (lower): x 0.20

WASTE SOURCE Tools, plant and equipment used in support of submarine dismantling operations, or those activities in other facilities support it. Containers have become waste following the transfer of their contents and reaching end of life.

PHYSICAL CHARACTERISTICS

General description: Miscellaneous metal tools, plant and equipment and empty containers. Stock containers consist of an outer and inner mild steel layer with concrete in between for shielding purposes. Future arisings containers have a stainless steel inner container which is expected to be able to be removed from the concrete parts of the container.

Changes since waste generated: -

Bulk density (t/m³): ~ 1.4

Comment on density: Calculated based on estimates.

CHEMICAL COMPOSITION

General description and components (%wt): Expected to be mild steel (5%), stainless steel (68%), concrete (26.5%), and plastic (0.5%). Some items will be EEE.

Chemical state: Neutral

Sheet metal proportion / thickness: -

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	~ 68.0	-	
Other ferrous metals.....	~ 5.0	-	
Iron.....		-	
Aluminium.....		-	
Beryllium.....		-	
Cobalt.....		-	
Copper.....		-	
Lead.....		-	
Magnox/Magnesium.....		-	
Nickel.....		-	
Titanium.....		-	
Uranium.....		-	
Zinc.....		-	
Zircaloy/Zirconium.....		-	
Other metals.....		-	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulotics.....		-	
Paper, cotton.....		-	
Wood.....		-	
Halogenated plastics.....	~ 0.50	-	
Total non-halogenated plastics.....		-	
Condensation polymers.....		-	
Others.....		-	
Organic ion exchange materials.....		-	
Total rubber.....		-	
Halogenated rubber.....		-	
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):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials.....		-	
Inorganic sludges and flocs.....		-	
Soil.....		-	
Brick/Stone/Rubble.....		-	
Cementitious material.....	~ 26.5	-	
Sand.....		-	
Glass/Ceramics.....		-	
Graphite.....		-	
Desiccants/Catalysts.....		-	
Asbestos.....		-	
Non/low friable.....		-	
Moderately friable.....		-	
Highly friable.....		-	
Free aqueous liquids.....		-	
Free non-aqueous liquids.....		-	
Powder/Ash.....		-	

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

Inorganic anions (%wt):

	(%wt)	Type(s) and comment
Fluoride.....		-
Chloride.....		-
Iodide.....		-
Cyanide.....		-
Carbonate.....		-
Nitrate.....		-
Nitrite.....		-
Phosphate.....		-
Sulphate.....		-
Sulphide.....		-

Materials of interest for waste acceptance criteria:

	(%wt)	Type(s) and comment
Combustible metals.....	-	-
Low flash point liquids.....	-	-
Explosive materials.....	-	-
Phosphorus.....	-	-
Hydrides.....	-	-
Biological etc. materials.....	-	-
Biodegradable materials.....	-	-
Putrescible wastes.....	-	-
Non-putrescible wastes.....	-	-
Corrosive materials.....	-	-
Pyrophoric materials.....	-	-
Generating toxic gases.....	-	-
Reacting with water.....	-	-
Higher activity particles.....	-	-
Soluble solids as bulk chemical compounds.....	-	-

Hazardous substances / non hazardous pollutants:

	(%wt)	Type(s) and comment
Acrylamide.....	-	-
Benzene.....	-	-
Chlorinated solvents.....	-	-
Formaldehyde.....	-	-
Organometallics.....	-	-
Phenol.....	-	-
Styrene.....	-	-
Tri-butyl phosphate.....	-	-
Other organophosphates.....	-	-
Vinyl chloride.....	-	-
Arsenic.....	-	-
Barium.....	-	-
Boron.....	-	-
Boron (in Boral).....	-	-
Boron (non-Boral).....	-	-
Cadmium.....	-	-
Caesium.....	-	-
Selenium.....	-	-
Chromium.....	-	-
Molybdenum.....	-	-
Thallium.....	-	-
Tin.....	-	-
Vanadium.....	-	-
Mercury compounds.....	-	-
Others.....	-	-

Complexing agents (%wt):

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

Physical components:

	Number	Type(s) and comment
Sources.....	-	-
Electronic & Electrical Equipment (EEE)	-	-
EEE Type 1.....	~ 7	-
EEE Type 2.....	-	-
EEE Type 3.....	-	-
EEE Type 4.....	-	-
EEE Type 5.....	-	-

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

Comments on planned treatments:

Conditioning method:

Conditioning plants:

Likely conditioning matrix:

Further information on the conditioning matrix:

—

Likely container type:

Range in container waste loading:

Other information on packaging and conditioning:

—

Conditioned density (t/m³):

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Conditioned density comment:

—

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

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Opportunities for alternative disposal routing: No

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

RADIOACTIVITY

Source: The activity arises mainly from activation products.

Uncertainty: Estimates based on calculations from previously consigned wastes. Characterisation campaigns underway and further planned to better determine inventory data related to current stock wastes.

Measurement of radioactivities: Derived fingerprints (from sampling and analysis) applied to measured data. Future arisings for miscellaneous metal using estimates derived from past stocks and application of generic fingerprint. Further characterisation activities will inform inventory data for current stocks and future arisings.

Chemical form of radionuclides:

- H-3: -
- C-14: -
- Cl-36: -
- Se-79: -
- Tc-99: -
- I-129: -
- Ra: -
- Th: -
- U: -
- Np: -
- Pu: -

WASTE STREAM		7E23		LLW Metallic Waste					
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	9.93E-11	C C 2	1.82E-08	C D 2	Gd 153				
Be 10					Ho 163				
C 14	1.64E-07	C C 2	7.87E-06	C C 2	Ho 166m				
Na 22					Tm 170				
Al 26					Tm 171				
Cl 36	8.05E-10	C C 2	8.05E-10	C D 2	Lu 174				
Ar 39					Lu 176				
Ar 42					Hf 178n				
K 40					Hf 182				
Ca 41					Pt 193				
Mn 53					Tl 204				
Mn 54			5.13E-08	C C 2	Pb 205				
Fe 55	3.01E-08	C C 2	1.80E-06	C C 2	Pb 210				
Co 60	2.58E-06	C C 2	1.97E-05	C C 2	Bi 208				
Ni 59	2.36E-08	C C 2	2.36E-08	C D 2	Bi 210m				
Ni 63	2.74E-06	C C 2	4.37E-06	C C 2	Po 210				
Zn 65					Ra 223				
Se 79					Ra 225				
Kr 81					Ra 226				
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90	5.99E-10	C C 2	5.99E-10	C D 2	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	6.85E-10	C C 2	6.85E-10	C D 2	U 232				
Ru 106					U 233				
Pd 107					U 234				
Ag 108m	1.30E-09	C C 2	1.30E-09	C D 2	U 235	2.98E-13	C C 2	2.98E-13	C D 2
Ag 110m			1.45E-07	C C 2	U 236				
Cd 109					U 238	6.94E-12	C C 2	6.94E-12	C D 2
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	1.62E-12	C C 2	1.62E-12	C D 2
Te 127m					Am 242m				
I 129	1.97E-10	C C 2	1.97E-10	C D 2	Am 243				
Cs 134					Cm 242				
Cs 135					Cm 243				
Cs 137	6.07E-10	C C 2	9.71E-08	C C 2	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	8.54E-09	C C 2	8.54E-09	C D 2	Unsp b/g				
Eu 154					Total a	8.86E-12	*	8.86E-12	*
Eu 155					Total b/g	5.55E-06	*	3.41E-05	*

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