

WASTE STREAM	7J25	Luminised Waste
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SITE HMNB Portsmouth

SITE OWNER Ministry of Defence

WASTE CUSTODIAN Ministry of Defence

WASTE TYPE ILW

Is the waste subject to Scottish Policy: No

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2022.....	2.4 m ³
Future arisings -	1.4.2022 - 31.3.2023.....	1.0 m ³
	1.4.2023 - 31.3.2024.....	1.0 m ³
	1.4.2024 - 31.3.2034.....	1.0 m ³
	1.4.2034 - 31.3.2044.....	1.0 m ³
	1.4.2044 - 31.3.2054.....	1.0 m ³
	1.4.2054 - 31.3.2064.....	1.0 m ³
	1.4.2064 - 31.3.2074.....	1.0 m ³
Total future arisings:		7.0 m ³
Total waste volume:		9.4 m ³

Comment on volumes: MoD(N) luminised wastes are primarily derived from the decommissioning of naval vessels and the disposal of obsolete equipments at the end of their useful life. These are events wholly governed by factors beyond the control of the site from which they are finally accumulated for remediation processes and disposal. Luminised accumulations are not expected to exceed 1 m³ per year for the next 5 years

Uncertainty factors on volumes: Stock (upper): x 1.2 Arisings (upper) x 2.0
Stock (lower): x 0.8 Arisings (lower) x 0.5

WASTE SOURCE Luminised scrap/unserviceable MOD stores items and other radioactive items from the de-equipping of ships, together with smaller quantities (annually <1m³) from the MOD Institute of Naval Medicine Alverstoke.

PHYSICAL CHARACTERISTICS

General description: Luminised aluminium boxes such as luminised sound powered telephones, telephone control boards. Dials, gauges, compasses, rudder indicators, signs. Small quantities of soil, spoil and rubble contaminated with, principally radium-226 luminising compounds. There are no large items. The waste has not undergone any physical/chemical processes or changes.

Physical components (%wt): The waste contains by weight: metal (80%), organics (8%) other materials (12%)

Sealed sources: Not yet determined.

Bulk density (t/m³): 0.8

Comment on density: The type of equipment and metal arising that predominates within this waste stream is well known and documented within the WSCD.

CHEMICAL COMPOSITION

General description and components (%wt): Metal (80%), Organics (8%) and Other materials (12%)

Chemical state: Neutral

Chemical form of radionuclides: H-3: Present as internal contaminant after processing. 5% of wastes by volume are H-3.
C-14: Not present
Cl-36: Not present
Se-79: Not present
Tc-99: Not present
I-129: Not present
Ra: Luminised compounds within gauges, dials etc. and representing 95% by volume of all arisings.
Th: In equilibrium with Ra-226 luminised compounds within gauges, dials etc. and representing 95% by volume of all arisings.
U: Not present

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Np: Not present
Pu: Not present

Metals and alloys (%wt): No sheet metal present in this form of waste stream. Very little bulk metals present. High proportion of metals are in the form of boxes typically 20cm x 30cm x 15cm (average), typical thicknesses are about 3 mm with Metal (80%) and other materials (20%)

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	7.0		
Other ferrous metals.....	<1.0	Mild steel (<1%)	
Iron.....	0		
Aluminium.....	70.0	Cast (50%), Dural (20%)	
Beryllium.....	0		
Cobalt.....	0		
Copper.....	<1.0	Copper brass (each less than 1%)	
Lead.....	<1.0		
Magnox/Magnesium.....	0		
Nickel.....	0		
Titanium.....	0		
Uranium.....	0		
Zinc.....	0		
Zircaloy/Zirconium.....	0		
Other metals.....	0		

Organics (%wt): -

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulosics.....	~4.0		
Paper, cotton.....	<3.0	Paper (2 %), cotton (1%)	
Wood.....	<1.0	Soft woods boxes such as pine	
Halogenated plastics	2.0	PVC from electrical components	
Total non-halogenated plastics.....	0		
Condensation polymers.....	0		
Others.....	0		
Organic ion exchange materials....	0		
Total rubber.....	2.0		
Halogenated rubber	0		
Non-halogenated rubber.....	2.0	Latex (2%)	
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): -

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	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials..	0		
Inorganic sludges and flocs.....	0		
Soil.....	7.0	Samples	
Brick/Stone/Rubble.....	0		
Cementitious material.....	0		
Sand.....	<2.0	Samples	
Glass/Ceramics.....	3.0	Glass (2%), ceramics (1%)	
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		

Inorganic anions (%wt): No inorganic anions are present.

	(%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: Combustible tissues and smear papers from sampling, clean up and units

	(%wt)	Type(s) and comment
Combustible metals.....	40.0	Glass 37%, Paper 3% by weight
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	

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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.....	0	
Arsenic.....	0	
Barium.....	0	
Boron.....	0	
Boron (in Boral).....	0	
Boron (non-Boral).....	0	
Cadmium.....	0	
Caesium.....	0	
Selenium.....	0	
Chromium.....	0	
Molybdenum.....	0	
Thallium.....	0	
Tin.....	0	
Vanadium.....	0	
Mercury compounds.....	0	
Others.....	0	
Electronic Electrical Equipment (EEE)		
EEE Type 1.....	40.0	Radios
EEE Type 2.....	0	
EEE Type 3.....	20.0	Military vehicle instruments
EEE Type 4.....	0	
EEE Type 5.....	0	

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Complexing agents (%wt): No

	(%wt)	Type(s) and comment
EDTA.....	0	
DPTA.....	0	
NTA.....	0	
Polycarboxylic acids.....	0	
Other organic complexants.....	0	
Total complexing agents.....	0	

Potential for the waste to contain discrete items: Yes. Disposals from HMNB Portsmouth are of individual MoD sources and items containing radioactive material as such each package will contain a number of discrete sources.

TREATMENT, PACKAGING AND DISPOSAL

Waste that is currently ILW: For H3 and Pm147, the items will be stored until they have been decayed sufficiently to fall below the LLW threshold. For Ra226 items are to be treated (incineration) and encapsulated to become LLW. This can not be done onsite so this will form part of any disposal contract. Radionuclides for decay storage will be reclassified as LLW 5 years after declassification for Pm147 and 15 years for H3.

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

Treatment	On-site / Off site	Stream volume %
Low force compaction Supercompaction (HFC) Incineration Solidification Decontamination Metal treatment Size reduction Decay storage Recycling / reuse Other / various None	Off-site	<<60.0
	On-site	<40.0

Comment on planned treatments: There are no plans or strategy, even tentative, for the use of any packaging or conditioning plant.

Disposal Routes:

Disposal Route	Stream volume %	Disposal density t/m3
Expected to be consigned to the LLW Repository Expected to be consigned to a Landfill Facility Expected to be consigned to an On-Site Disposal Facility Expected to be consigned to an Incineration Facility Expected to be consigned to a Metal Treatment Facility Expected to be consigned as Out of Scope Expected to be recycled / reused Disposal route not known	100.0	

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

Upcoming (2022/23-2024/25) Waste Routing (if expected to change from above):

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Disposal Route	Stream volume %		
	2022/23	2023/24	2024/25
Expected to be consigned to the LLW Repository			
Expected to be consigned to a Landfill Facility			
Expected to be consigned to an On-Site Disposal Facility			
Expected to be consigned to an Incineration Facility			
Expected to be consigned to a Metal Treatment Facility			
Expected to be consigned as Out of Scope			
Expected to be recycled / reused			
Disposal route not known	100.0	100.0	100.0

Opportunities for alternative disposal routing: Not yet determined

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

Waste Packaging for Disposal: (Not applicable to this waste stream)

Container	Stream volume %	Waste loading m ³	Number of packages
1/3 Height IP-1 ISO			
2/3 Height IP-2 ISO			
1/2 Height WAMAC IP-2 ISO			
1/2 Height IP-2 Disposal/Re-usable ISO			
2m box (no shielding)			
4m box (no shielding)			
Other			

Other information: 100% of the waste is consigned to an authorised disposal contractor. The contractor will determine the quantity that requires routing as radioactive waste and consign it as appropriate to the LLWR, metal decontamination, incineration, recycling/ reuse, out of scope etc.

Waste Planned for Disposal at the LLW Repository: (Not applicable to this waste stream)

Container voidage: -

Waste consigned for disposal to LLWR in year of generation: -

Non-Containerised Waste for In-Vault Grouting:

Stream volume (%): -

Waste stream variation: -

Bounding cuboidal volume:

Inaccessible voidage: -

Other information: -

RADIOACTIVITY

Source: Luminised wastes that contain or have been contaminated with H-3, Pm-147 or Ra-226 luminising compounds. Principally processed metal shells, TCB, SPT shells / metal boxes in a raw state that may contain Ra-226 or Pm-147 painted indicators or dials.

Uncertainty: The accuracy of the specific activity data is within +/- 10%.

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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:

Samples of all 7J25 'type' material is sent to DSTL (DRPS) NAMAS accredited lab for assay to ensure quantitative activities are representative with holdings as declared.

Other information:

There are no other waste activity or radionuclides that have not been listed on the radionuclide table.

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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	4.56E+01	AA 2	2.1E-03	AA 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	3.25E-04	BB 2	1E-05	BB 2
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	2.79E-02	AA 2			Cf 251				
Sm 147					Cf 252				
Sm 151					Other a				
Eu 152					Other b/g				
Eu 154					Total a	3.25E-04	BB 2	1E-05	BB 2
Eu 155					Total b/g	4.56E+01	BB 2	2.1E-03	BB 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