

<b>WASTE STREAM</b>	<b>7J23</b>	<b>Miscellaneous ILW</b>
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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.....	5.0 m <sup>3</sup>
Future arisings -	1.4.2022 - 31.3.2023.....	~1.0 m <sup>3</sup>
	1.4.2023 - 31.3.2024.....	~1.0 m <sup>3</sup>
	1.4.2024 - 31.3.2034.....	~2.0 m <sup>3</sup>
	1.4.2034 - 31.3.2044.....	~2.0 m <sup>3</sup>
	1.4.2044 - 31.3.2054.....	~1.0 m <sup>3</sup>
	1.4.2054 - 31.3.2064.....	~1.0 m <sup>3</sup>
	1.4.2064 - 31.3.2074.....	~1.0 m <sup>3</sup>
Total future arisings:		9.0 m <sup>3</sup>
Total waste volume:		14.0 m <sup>3</sup>

Comment on volumes: HMNB Portsmouth is a repository for redundant MoD equipment that contains radioactive sources and instrument check sources. Waste arising does not occur at a constant rate. Items are declared as waste upon transfer to the authorised disposal contractor. Any future waste arisings are difficult to determine as they are dependent on a number of factors such as equipment being declared as obsolete by equipment manager and legacy items being returned following site closures. Items held as original equipment, not packaged i.e. transit cases removed prior to authorised disposal contractor consigning to approved disposal route.

Uncertainty factors on volumes:	Stock (upper):	x 1.5	Arisings (upper)	x 2.0
	Stock (lower):	x 0.5	Arisings (lower)	x 0.5

**WASTE SOURCE** MoD stock and residual holdings of NNPP material and effluent receipt facility material.

**PHYSICAL CHARACTERISTICS**

General description: Spark gaps, smoke detectors, electronic valves, functional check sources, thoriated optical lenses, Swabs, paper towels, coveralls, contaminated tools, equipment, etc. that include some contaminated steel pipes, and other small quantities of redundant NPW ancillary shore based support equipment. Following disposals made in late 2001 there are no large items associated with any of the waste. The wastes have not been subject to any physical/chemical processes save that of delay and decay which has resulted in both 'free release' and disposal as VLLW to a controlled landfill site.

Physical components (%vol): By volume the waste contains steels, other ferrous metals, brass, bronze, monel and lead (60%), clothing such as coveralls and rubber gloves (10%), and non-halogenated rubber (10%), plastics/ perspex (20%)

Sealed sources: The waste contains sealed sources. Functional instrument check sources several thousand in a wide mix of radionuclides

Bulk density (t/m<sup>3</sup>): NE

Comment on density: The waste bulk will be calculated upon declaring items as waste post any volume reduction exercise.

**CHEMICAL COMPOSITION**

General description and components (%wt): Metal (84%) Organics (4%) Other materials (10%)

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Chemical state: Neutral

Chemical form of radionuclides: H-3: Present in gaseous, water and in luminised paint  
 C-14: Not present in significant amounts  
 Cl-36: impregnated gauze as a check source  
 Se-79: Not present  
 Tc-99: metallic check source  
 I-129: unknown, solid check source/ calibration plaque  
 Ra: Radium 226, in luminised paint  
 Th: Thorium 232 in alloys with magnesium in engine cases and glass optical lenses  
 U: metallic in the form of check sources and DU weights  
 Np: Not present  
 Pu: metallic in the form of check sources

Metals and alloys (%wt): No metal is present in sheet form

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	35.0	Austenitic SS	25.0
Other ferrous metals.....	0		
Iron.....	5.0		10.0
Aluminium.....	30.0	Aluminium (20%), Dural (10%)	25.0
Beryllium.....	0		
Cobalt.....	0		
Copper.....	8.0	Copper (5%), Brass (2%), Bronze (1%)	10.0
Lead.....	<1.0		
Magnox/Magnesium.....	0		
Nickel.....	5.0	electroplated Nickel (5%)	10.0
Titanium.....	0		
Uranium.....	2.0	DU weights	10.0
Zinc.....	0		
Zircaloy/Zirconium.....	0		
Other metals.....	0		

Organics (%wt): The waste contains cellulose in the form of paper, coveralls, cotton swabs and rubber. None present.

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	2.0		
Paper, cotton.....	2.0	Paper (1.5%), cotton (0.5%)	10.0
Wood.....	0		
Halogenated plastics .....	0		
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%)	5.0
Hydrocarbons.....	0		
Oil or grease .....	0		
Fuel.....	0		

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Asphalt/Tarmac (cont.coal tar)...	0
Asphalt/Tarmac (no coal tar)....	0
Bitumen.....	0
Others.....	0
Other organics.....	0

Other materials (%wt):           None of these materials are present within retained arisings of the waste stream.

	(%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.....	~10.0	glass dial fronts	10.0
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.....			

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:           There are no hazardous / problematic materials present in the waste.

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	(%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.....	0	
Arsenic.....	0	
Barium.....	NE	
Boron.....	NE	
Boron (in Boral).....	NE	
Boron (non-Boral).....	NE	
Cadmium.....	NE	
Caesium.....	NE	
Selenium.....	0	
Chromium.....	0	
Molybdenum.....	0	
Thallium.....	0	
Tin.....	NE	

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Vanadium..... 0  
 Mercury compounds..... 0  
 Others..... NE  
 Electronic Electrical Equipment (EEE)  
 EEE Type 1..... ~25.0  
 EEE Type 2..... 0  
 EEE Type 3..... ~5.0  
 EEE Type 4..... 0  
 EEE Type 5..... 0

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. Waste disposed of from HMNB Portsmouth is in the form of MoD sources and items containing radioactive material, as such each container will hold a number discrete sources of radioactivity.

**PACKAGING AND CONDITIONING**

Conditioning method: 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.

Plant Name: -  
 Location: -  
 Plant startup date: -  
 Total capacity (m³/y incoming waste): -  
 Target start date for packaging this stream: -  
 Throughput for this stream (m³/y incoming waste): -  
 Other information: -

Likely container type:	Container	Waste packaged (%vol)	Waste loading (m³)	Payload (m³)	Number of packages
	Not specified	100.0	NE	NE	NE

Likely container type comment: To be specified in the contract to dispose by the contractor.

Range in container waste volume: -

Other information on containers: -

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Likely conditioning matrix:

Other information: -

Conditioned density (t/m<sup>3</sup>): -

Conditioned density comment: Cannot be accurately ascertained until the ILW has been declared to the waste contractor

Other information on conditioning: There are no packaging or conditioning plants planned

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
-	-	-	-	-	-

**RADIOACTIVITY**

Source: Redundant MoD sources, includes some historic wastes, contaminated items with activation products from reactor operations.

Uncertainty: The accuracy of activity measurement for the wastes are estimates to be approximately between 90 - 100% for the redundant MoD items containing radioactive sources. For the historic wastes the accuracy is estimated to be within 50%.

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: The measurement of activity for the historic waste is to be undertaken by specialist assay team.

Other information: The data for the redundant MoD items containing radioactive sources is new data that has not been reported to this date. The data for the historic waste is at present a best estimate until the waste can be characterised to confirm the radionuclide content and activities.

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Nuclide	Mean radioactivity, TBq/m <sup>3</sup>				Nuclide	Mean radioactivity, TBq/m <sup>3</sup>			
	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	7.56E-06	AA 2	~1E-05	BB 2	Gd 153				
Be 10					Ho 163				
C 14	3.83E-06	AA 2	~~1E-06	BB 2	Ho 166m				
Na 22	5.31E-08	AA 2	~~1E-07	BB 2	Tm 170				
Al 26					Tm 171				
Cl 36	2.9E-04	AA 2	~~1E-04	BB 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	3.23E-10	AA 2	~~2E-08	BB 2	Pb 205				
Fe 55	1.59E-08	AA 2	~~2E-08	BB 2	Pb 210	4.85E-07	AA 2	~~2E-07	BB 2
Co 60	1.74E-05	AA 2	~~3E-05	BB 2	Bi 208				
Ni 59					Bi 210m				
Ni 63	4.20E-01	AA 2	~5E-01	BB 2	Po 210	4.91E-07	AA 2	~~1E-06	BB 2
Zn 65					Ra 223				
Se 79					Ra 225				
Kr 81					Ra 226				
Kr 85	3.29E-06	AA 2	~~2E-06	BB 2	Ra 228				
Rb 87					Ac 227				
Sr 90	2.61E-01	AA 2	~~3E-01	BB 2	Th 227				
Zr 93					Th 228				
Nb 91					Th 229				
Nb 92					Th 230	4.8E-09	AA 2	~~1E-09	BB 2
Nb 93m					Th 232	4.57E-04	AA 2	~~1E-04	BB 2
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	5.8E-05	AA 2	~~4E-05	BB 2
Cd 113m					Np 237				
Sn 119m					Pu 236				
Sn 121m					Pu 238	3.75E-07	AA 2	~~2E-07	BB 2
Sn 123					Pu 239	6.34E-07	AA 2	~~2E-07	BB 2
Sn 126					Pu 240				
Sb 125					Pu 241				
Sb 126					Pu 242				
Te 125m					Am 241	9.79E-04	AA 2	~9E-04	BB 2
Te 127m					Am 242m				
I 129	3E-08	AA 2	~~1E-08	BB 2	Am 243				
Cs 134	1.03E-09	AA 2	~~3E-09	BB 2	Cm 242				
Cs 135					Cm 243				
Cs 137	3.99E-04	AA 2	~~3E-04	BB 2	Cm 244				
Ba 133	3.84E-06	AA 2	~~2E-04	BB 2	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	3.16E-08	AA 2	<1E-07	BB 2
Sm 151					Other a				
Eu 152	1.00E-07	AA 2	~~1E-07	BB 2	Other b/g	3.61E-08	AA 2	~~2E-08	BB 2
Eu 154					<b>Total a</b>	<b>1.50E-03</b>	<b>AA 2</b>	<b>1.04E-03</b>	<b>BB 2</b>
Eu 155					<b>Total b/g</b>	<b>6.81E-01</b>	<b>AA 2</b>	<b>8.01E-01</b>	<b>BB 2</b>

**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