

WASTE STREAM	7A108	Decommissioning LLW Requiring Further Assay Through the Recategorization Programme
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SITE AWE Aldermaston

SITE OWNER Ministry of Defence

WASTE CUSTODIAN AWE plc

WASTE TYPE LLW

Is the waste subject to Scottish Policy: No

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2022.....	62.2 m ³
Future arisings -	1.4.2022 - 31.3.2080.....	0 m ³
Total future arisings:		0 m ³
Total waste volume:		62.2 m ³

Comment on volumes: This waste stream represents waste that was unacceptable to the LLWR. Since the 0.1 GBq/t Pu limit has now been removed, these drums are awaiting re-assay. The wastes in this category require re-assessment prior to being assigned a sentencing category. Once the re-assessment process has been completed, this waste stream will cease to exist, with the waste being transferred over to either 7A111 or 7A115.

Uncertainty factors on volumes: Stock (upper): x 1.0 Arisings (upper) x
 Stock (lower): x 1.0 Arisings (lower) x

WASTE SOURCE The wastes are generated from general decommissioning activities in plutonium/uranium contaminated facilities.

PHYSICAL CHARACTERISTICS

General description: PVC sheeting, tools, graphite, filler material, equipment, metal wastes typically from glove-boxes. Waste is held in fibreboard or polythene inner drums which are placed in metal outer drums.

Physical components (%wt): Metal (83.9%), plastics/rubber (9.98%), rubber (1.01%) cellulose (2.01%), rubble (1.95%), glass (1.05%) and asbestos (<0.1%).

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): 0.43

Comment on density: Accurate bulk density based on 2019 in-stock data.

CHEMICAL COMPOSITION

General description and components (%wt): Metal (83.9%), plastics (9.98%), rubber (1.01%) cellulose (2.01%), rubble (1.95%), glass (1.05%) and asbestos (<0.1%). Not changed since 2019, so identical to the last UKRWI submission.

Chemical state: Neutral

Chemical form of radionuclides: H-3: Not present in Waste Stream
 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 in Waste Stream as oxide form
 Np: Np-237 likely to be present in waste stream in oxide form as daughter product of Am-241 alpha decay.
 Pu: Present in Waste Stream as oxide form

Metals and alloys (%wt): Sheet metal of approximately 4mm thickness will be present arising from glove-box and ductwork.

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	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	36.0		
Other ferrous metals.....	45.0		
Iron.....	0		
Aluminium.....	1.0		
Beryllium.....	0		
Cobalt.....	0		
Copper.....	1.0		
Lead.....	<0.90		
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 cellulose.....	2.0		
Paper, cotton.....	0.80		
Wood.....	1.2		
Halogenated plastics	5.0		
Total non-halogenated plastics.....	5.0		
Condensation polymers.....	0		
Others.....	0		
Organic ion exchange materials....	0		
Total rubber.....	1.0		
Halogenated rubber	0		
Non-halogenated rubber.....	1.0		
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):	-		

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	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials..	0		
Inorganic sludges and flocs.....	0		
Soil.....	0		
Brick/Stone/Rubble.....	2.0		
Cementitious material.....	0		
Sand.....	0		
Glass/Ceramics.....	1.1		
Graphite.....	0		
Desiccants/Catalysts.....	0		
Asbestos.....	<0.10	Waste will contain asbestos with varying friability	
Non/low friable.....	<0.10		
Moderately friable.....	<0.10		
Highly friable.....	<0.10		
Free aqueous liquids.....	0		
Free non-aqueous liquids.....	0		
Powder/Ash.....	0		

Inorganic anions (%wt): -

	(%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: The waste stream contains lead and asbestos.

	(%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.....	P	
Putrescible wastes.....	0	
Non-putrescible wastes.....	P	

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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: The waste stream contains lead and asbestos.

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

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Complexing agents (%wt): Yes

	(%wt)	Type(s) and comment
EDTA.....		
DPTA.....		
NTA.....		
Polycarboxylic acids.....	<0.50	
Other organic complexants.....	<0.50	Complexing agents are likely to be present because of their use as decontaminants.
Total complexing agents.....		

Potential for the waste to contain discrete items: No.

TREATMENT, PACKAGING AND DISPOSAL

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	~90.0 ~10.0

Comment on planned treatments:

Some of the waste may remain as ILW following modern standards radiometric assay. Assumed 10%.

Disposal Routes:

Disposal Route	Stream volume %	Disposal density t/m3
Expected to be consigned to the LLW Repository	~93.0	0.43
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	~7.0	0.43

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):

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			

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Opportunities for alternative disposal routing: No

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

Waste Packaging for Disposal:

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	93.0	17	4

Other information: -

Waste Planned for Disposal at the LLW Repository:

Container voidage: Most wastes will be supercompacted, so voidage will be minimal.

Waste Characterisation Form (WCH): It is not yet determined if the waste meets LLWR's Waste Acceptance Criteria (WAC).
The waste does not have a current WCH.

Re-assay needs to be performed before the waste can be reassigned into one of two possible waste streams.

Waste consigned for disposal to LLWR in year of generation: No. Re-assay needs to be undertaken to confirm suitability for disposal at the LLWR.

Non-Containerised Waste for In-Vault Grouting: (Not applicable to this waste stream)

Stream volume (%): -

Waste stream variation: -

Bounding cuboidal volume:

Inaccessible voidage: -

Other information: -

RADIOACTIVITY

Source: Predominantly plutonium and uranium contamination.

Uncertainty: Total alpha and total beta/gamma activities are correct for the in-stock wastes, radionuclide breakdown estimated based on associated fingerprints from facilities.

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: Typically these wastes were assayed using PNCC (Pu drums), which (at the time) was not configured to distinguish between HAW and LLW or LRGS (HEU drums).

Other information: Once the re-assessment and recategorisation process is complete, the waste will be transferred to either waste stream 7A111 or 7A115.

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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					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		5		
Co 60					Bi 208				
Ni 59					Bi 210m				
Ni 63					Po 210		5		
Zn 65					Ra 223		5		
Se 79					Ra 225		5		
Kr 81					Ra 226		5		
Kr 85					Ra 228		5		
Rb 87					Ac 227		5		
Sr 90					Th 227		5		
Zr 93					Th 228		5		
Nb 91					Th 229		5		
Nb 92					Th 230		5		
Nb 93m					Th 232		5		
Nb 94					Th 234		5		
Mo 93					Pa 231		5		
Tc 97					Pa 233		5		
Tc 99					U 232				
Ru 106					U 233		5		
Pd 107					U 234	1.15E-07	CC 2		
Ag 108m					U 235	4.44E-09	CC 2		
Ag 110m					U 236	7.67E-10	CC 2		
Cd 109					U 238	7.07E-09	CC 2		
Cd 113m					Np 237		5		
Sn 119m					Pu 236				
Sn 121m					Pu 238	2.73E-05	CC 2		
Sn 123					Pu 239	6.90E-04	CC 2		
Sn 126					Pu 240	1.78E-04	CC 2		
Sb 125					Pu 241	1.87E-04	CC 2		
Sb 126					Pu 242	3.61E-08	CC 2		
Te 125m					Am 241	2.83E-04	CC 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					Other a				
Eu 152					Other b/g				
Eu 154					Total a	1.18E-03	CC 2	0	
Eu 155					Total b/g	1.87E-04	CC 2	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 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