

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

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	62.2 m ³
Future arisings -	1.4.2019 - 31.3.2080.....	0 m ³
Total future arisings:		0 m ³
Total waste volume:		62.2 m ³

Comment on volumes: The previous title for this waste stream is now obsolete, hence the change in waste stream title. Waste arisings have been set at zero as the waste in this category is waste that was unacceptable to the LLWR as it did not meet the 0.1GBq/t Pu limit. Since the limit has been removed the waste stream needs re-assaying. The forward programme for recategorizing this waste has moved along since the last UK RWI in 2016 was undertaken and 80% of the 2016 stock has now been transferred to Waste Stream 7A115, as these drums are envisaged to be LLW after re-assay. The wastes in this category are now those that require re-assessment prior to being assigned a sentencing category, it is likely that some will be disposed under 7A115 and some under 7A111.

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, filter material, equipment, metal wastes typically from gloveboxes. Waste is held in fibreboard or polythene inner drums which are placed in metal outer drums.

Physical components (%wt): Metal (84%), plastics/rubber (11%), cellulose (2%), rubble (2%) and glass (1%).

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): 0.43

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

CHEMICAL COMPOSITION

General description and components (%wt): Metal (84%), plastics/rubber (11%), cellulose (2%), rubble (2%) and glass (1%). Not reviewed for 2019 RWI as no change since 2016.

Chemical state: Neutral

Chemical form of radionuclides: U: Oxide form
 Pu: Oxide form.

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

Stainless steel.....	36.0
Other ferrous metals.....	45.0
Iron.....	
Aluminium.....	1.0
Beryllium.....	
Cobalt.....	
Copper.....	1.0
Lead.....	<0.90
Magnox/Magnesium.....	
Nickel.....	

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	Titanium.....	
	Uranium.....	
	Zinc.....	
	Zircaloy/Zirconium.....	
	Other metals.....	
Organics (%wt):	-	
	Total cellulose.....	2.0
	Paper, cotton.....	1.0
	Wood.....	1.0
	Halogenated plastics	5.0
	Total non-halogenated plastics.....	5.0
	Condensation polymers.....	
	Others.....	5.0
	Organic ion exchange materials....	
	Total rubber.....	1.0
	Halogenated rubber	
	Non-halogenated rubber.....	1.0
	Hydrocarbons.....	
	Oil or grease	
	Fuel.....	
	Asphalt/Tarmac (cont.coal tar)...	
	Asphalt/Tarmac (no coal tar)....	
	Bitumen.....	
	Others.....	
	Other organics.....	
Other materials (%wt):	-	
	Inorganic ion exchange materials.	
	Inorganic sludges and flocs.....	
	Soil.....	
	Brick/Stone/Rubble.....	2.0
	Cementitious material.....	
	Sand.....	
	Glass/Ceramics.....	1.0
	Graphite.....	
	Desiccants/Catalysts.....	
	Asbestos.....	<0.10
	Non/low friable.....	
	Moderately friable.....	
	Highly friable.....	
	Free aqueous liquids.....	
	Free non-aqueous liquids.....	
	Powder/Ash.....	
Inorganic anions (%wt):	-	

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Fluoride.....
 Chloride.....
 Iodide.....
 Cyanide.....
 Carbonate.....
 Nitrate.....
 Nitrite.....
 Phosphate.....
 Sulphate.....
 Sulphide.....

Materials of interest for waste acceptance criteria:

This waste contains asbestos and lead.

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
 Corrosive materials..... 0
 Pyrophoric materials..... 0
 Generating toxic gases..... 0
 Reacting with water..... 0
 Active particles..... 0
 Soluble solids as bulk chemical compounds..... 0

Paper, cotton, wood.

Hazardous substances / non hazardous pollutants:

This waste contains asbestos and lead.

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
 Arsenic..... NE
 Barium..... 0
 Boron..... NE

PVC.

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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.....
 EEE Type 2.....
 EEE Type 3.....
 EEE Type 4.....
 EEE Type 5.....

Complexing agents (%wt):

Yes
 EDTA.....
 DPTA.....
 NTA.....
 Polycarboxylic acids..... <0.50
 Other organic complexants..... <0.50
 Total complexing agents..... <0.50

Complexing agents are likely to be present because of their use as decontaminants.

TREATMENT, PACKAGING AND DISPOSAL

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

Treatment	On-site / Off site	Stream volume %
Low force compaction Supercompaction (HFC)	Off-site	~97.0
Incineration		
Solidification		
Decontamination		
Metal treatment		
Size reduction		
Decay storage		
Recycling / reuse		
Other / various		
None		
		~3.0

Comment on planned treatments:

3% of waste will not be acceptable for supercompaction because of high fissile content.

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Disposal Route	Stream volume %
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

Upcoming (2019/20-2021/22) Waste Routing (if expected to change from above):

Disposal Route	Stream volume %		
	2019/20	2020/21	2021/22
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			

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	~100.0	~15	5

Other information: -

Waste Planned for Disposal at the LLW Repository:

Container voidage: Most wastes will be supercompacted, 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.

Further assay to be undertaken, at which point wastes will be reassigned into different waste streams.

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

Potential for the waste to contain discrete items: No, wastes will be supercompacted pucks.

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

Stream volume (%): -

Waste stream variation: -

Bounding cuboidal volume:

Inaccessible voidage: -

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Other information:

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RADIOACTIVITY

Source:

Predominantly plutonium and uranium

Uncertainty:

Total alpha and beta / gamma activity are correct for in-stock wastes, radionuclide breakdown has been estimated based on predicted fingerprints.

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:

Some of this waste will go as ILW, at which point it will be transferred to waste code 7A111.

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Nuclide	Mean radioactivity, TBq/m ³				Nuclide	Mean radioactivity, TBq/m ³			
	Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code		Waste at 1.4.2019	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				
Co 60					Bi 208				
Ni 59					Bi 210m				
Ni 63					Po 210				
Zn 65					Ra 223				
Se 79					Ra 225				
Kr 81					Ra 226				
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	1.15E-07	CC 2		
Ag 108m					U 235	4.44E-09	CC 2		
Ag 110m					U 236	7.51E-10	CC 2		
Cd 109					U 238	7.07E-09	CC 2		
Cd 113m					Np 237				
Sn 119m					Pu 236				
Sn 121m					Pu 238	2.8E-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	2.16E-04	CC 2		
Sb 126					Pu 242	3.61E-08	CC 2		
Te 125m					Am 241	2.62E-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	1.16E-03	CC 2	0	
Eu 155					Total b/g	2.16E-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