

WASTE STREAM	7A28	Operational LLW - Miscellaneous Radionuclides
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SITE AWE Aldermaston

SITE OWNER Ministry of Defence (MOD)

WASTE CUSTODIAN AWE plc

WASTE TYPE LLW

WASTE VOLUMES

	Reported (m ³)	OR	Conditioned (m ³)	Packaged (m ³)
Stocks:	At 1.4.2025 = 0			
Future arisings:	1.4.2025 - 31.3.2027 = 3.9			
	1.4.2028 - 31.3.2030 = 1.5			
	1.4.2031 - 31.3.2032 = 5.5			
	1.4.2033 - 31.3.2080 = 0			
Total future arisings:	10.9			
Total waste volume:	10.9			

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

Comment on arising rates: The stock has remained at zero for the last few UKRWI exercises. The future waste arisings have been reviewed and reduced since the last UK RWI in 2022.

Additional information on quantities: The total volume of arisings in this category is small and likely to arise in drums and small wrapped packages. This waste stream is likely to be disposed alongside wastes in other waste streams (i.e. 7A27) and therefore, may be recategorised prior to disposal off-site.

Uncertainty factors on volumes: Stock (upper): x - Arisings (upper): x 3.00
Stock (lower): x - Arisings (lower): x 0.30

WASTE SOURCE Waste arising from operations where the fingerprint predominantly contains beta/gamma emitting radionuclides.

PHYSICAL CHARACTERISTICS

General description: This waste stream contains plastic, rubber, cellulose, metal and other materials (in small quantities).

Changes since waste generated: -

Bulk density (t/m³): ~ 0.56

Comment on density: Last reviewed on stock in 2013, but no stock. Based the density and composition on waste stream 7A27.

CHEMICAL COMPOSITION

General description and components (%wt): Metals (59.61%), cellulosic material (9.16%), plastics (23.05%), rubber (2.84%) and other (5.34%)

Chemical state: Neutral

Sheet metal proportion / thickness: -

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	= 7.6	-	
Other ferrous metals.....	= 34.4	-	
Iron.....	= 0	-	
Aluminium.....	= 2.8	-	
Beryllium.....	< 0.05	-	
Cobalt.....	= 0	-	
Copper.....	= 0.86	-	
Lead.....	= 0.19	-	
Magnox/Magnesium.....	= 0	-	
Nickel.....	= 0	-	
Titanium.....	= 0	-	
Uranium.....	= 0	-	
Zinc.....	= 0	-	
Zircaloy/Zirconium.....	= 0	-	
Other metals.....	= 13.7	-	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulosics.....	= 9.2	-	
Paper, cotton.....	= 5.4	Includes hoover bags and detritus	
Wood.....	= 3.7		
Halogenated plastics.....	= 17.0	-	
Total non-halogenated plastics.....	= 6.1	-	
Condensation polymers.....	= 6.1	-	
Others.....	= 0	-	
Organic ion exchange materials.....	= 0	-	
Total rubber.....	= 2.8	-	
Halogenated rubber.....	= 2.8	-	
Non-halogenated rubber.....	= 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):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials.....	= 0	-	
Inorganic sludges and flocs.....	= 0	-	
Soil.....	= 0	-	
Brick/Stone/Rubble.....	= 4.6	-	
Cementitious material.....	= 0	-	
Sand.....	= 0.05	-	
Glass/Ceramics.....	= 0.40	-	
Graphite.....	= 0.21	-	
Desiccants/Catalysts.....	= 0	-	
Asbestos.....	< 0.10	-	
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	-	

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

Inorganic anions (%wt):

	(%wt)	Type(s) and comment
Fluoride.....	= 0	-
Chloride.....	< 0.70	-
Iodide.....	= 0	-
Cyanide.....	= 0	-
Carbonate.....	< 0.50	-
Nitrate.....	< 0.50	-
Nitrite.....	= 0	-
Phosphate.....	< 0.50	-
Sulphate.....	< 0.70	-
Sulphide.....	= 0	-

Materials of interest for waste acceptance criteria:

	(%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	Wood, paper and cotton
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.....	P	PVC
Arsenic.....	NE	-
Barium.....	= 0	-
Boron.....	NE	-
Boron (in Boral).....	NE	-
Boron (non-Boral).....	-	-
Cadmium.....	NE	-
Caesium.....	= 0	-
Selenium.....	= 0	-
Chromium.....	= 0	-
Molybdenum.....	= 0	-
Thallium.....	= 0	-
Tin.....	= 0	-
Vanadium.....	= 0	-
Mercury compounds.....	= 0	-
Others.....	= 0	-

Complexing agents (%wt):

No		
	(%wt)	Type(s) and comment
EDTA.....	= 0	-
DPTA.....	= 0	-
NTA.....	= 0	-
Polycarboxylic acids.....	= 0	-
Other organic complexants.....	= 0	Complexing agents are not present in the waste stream
Total complexing agents.....	= 0	-

Physical components:

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

TREATMENT, PACKAGING AND DISPOSAL

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

Treatment	On-site / Off-site	Stream volume %
Size reduction		
Decay storage		
Low force compaction		
Supercompaction (HFC)	Off-site	~ 3.0
Incineration	Off-site	~ 35.0
Drying/dewatering/liquid separation		
Tie down/fixatives/strippable coating/painting application		
Decontamination		
Metal treatment	Off-site	~ 55.0
Recycling / reuse		
Thermal treatment, including vitrification		
Encapsulation		
Polymer encapsulation		
Other physical treatment		
Other chemical treatment		
Containerisation		
Treatment not yet determined		
None		~ 7.0

Comments on planned treatments:

-

Conditioning method:

-

Conditioning plants:

Plant Name	Location

Likely conditioning matrix:

-

Further information on the conditioning matrix:

-

Waste Packaging:

Likely container type:	Container	Waste packaged (vol%)	Waste loading (m³)	Payload (m³)	Number of packages	Estimated start date for packaging
	1/2 Height IP-2 Disposal/Re-usable ISO (TC01/TC02)	3.0	17.0	18.3	1	-

Range in container waste loading:

Other information on packaging and conditioning: Wastes destined for LLWR are likely to go via supercompaction.

Conditioned density (t/m³): -
Conditioned density comment: -

Management Routes:

Disposal Route	Stream volume %	Raw density t/m³	Start date
Expected to be consigned to a Near Site, Near Surface Disposal Facility (Scotland)			
Expected to be Non-NSD HAW managed under Scottish Government's policy			
Expected to be disposed to LLW Vaults NRS Dounreay			
Expected to be consigned to the Geological Disposal Facility			
Expected to be consigned to a Near Surface Disposal Facility			
Expected to be consigned to the LLW Repository	~ 3.0	~ 0.56	
Expected to be consigned to a Landfill Facility	~ 7.0	~ 0.56	
Expected to be disposed On-Site			
Expected to be managed by In-Situ Disposal			
Expected to be consigned to an Incineration Facility	~ 35.0	< 0.56	
Expected to be consigned to a Metal Treatment Facility	~ 55.0	~ 0.56	
Expected to be Out of Scope			
Expected to be recycled / reused			
Disposal route not known			

Classification codes for waste expected to be consigned to a landfill facility: 17 06 01*, 15 02 02*, 15 02 03, 20 01 40, 20 03 01

Opportunities for alternative disposal routing: No

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

RADIOACTIVITY

Source: Miscellaneous operations that generate and involve handling a multitude of radionuclides.

Uncertainty: The activity of the waste arisings has been estimated from the facility declared fingerprints and expected activities.

Measurement of radioactivities: Typically, these wastes are measured using gamma-ray spectroscopy with the use of a robust fingerprint.

Chemical form of radionuclides: H-3: May be present in the waste stream in very small specific activities in HTO, HT and organically bound forms

C-14: Not present in the waste stream
 Cl-36: Not present in the waste stream
 Se-79: Not present in the waste stream
 Tc-99: Not present in the waste stream
 I-129: Not present in the waste stream
 Ra: Not present in the waste stream
 Th: Not present in the waste stream
 U: Present in Waste Stream as oxide, chloride or nitrate form
 Np: Not present in the waste stream
 Pu: Present in Waste Stream as oxide, chloride or nitrate form

WASTE STREAM		7A28		Operational LLW - Miscellaneous Radionuclides					
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			= 6.02E-07	D D 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			= 1.69E-07	D D 2	Pb 210				
Co 60			= 1.96E-06	D D 2	Bi 208				
Ni 59					Bi 210m				
Ni 63			= 1.08E-06	D D 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					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			= 8.41E-10	D D 2
Ru 106					U 233				
Pd 107					U 234			NE	
Ag 108m					U 235			NE	
Ag 110m					U 236			NE	
Cd 109					U 238			NE	
Cd 113m					Np 237				
Sn 119m					Pu 236				
Sn 121m					Pu 238				
Sn 123					Pu 239			= 1.20E-06	D D 2
Sn 126					Pu 240				
Sb 125					Pu 241				
Sb 126					Pu 242			= 1.02E-09	D D 2
Te 125m					Am 241			= 5.26E-08	D D 2
Te 127m					Am 242m				
I 129					Am 243				
Cs 134					Cm 242				
Cs 135					Cm 243				
Cs 137			= 1.06E-06	D D 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					Unsp b/g				
Eu 154					Total a	0	*	1.25E-06	*
Eu 155					Total b/g	0	*	4.87E-06	*

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