

WASTE STREAM	7A23	Operational LLW Requiring Further Assay Through the Recategorization Programme
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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	~ 40.0		
Future arisings:	1.4.2025 - 31.3.2080	= 0		
Total future arisings:		0.0		
Total waste volume:		40.0		

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

Comment on arising rates: This waste stream comprises of waste that was unacceptable to LLWR for burial, but since the limit of 0.1 GBq/t Pu was rescinded, this waste needs to be re-assayed. Some EU is present in this category due to the disparity between LLWR acceptance and the transport regulations for fissile materials. In-situ high resolution gamma-ray spectroscopy has been denounced as a possible assay method due to the waste being too dense, producing an unacceptable level of attenuation. Advice sought from the AWE Non-Destructive Assay Team has given rise to the employment of a Passive Neutron Coincident Counting measurement system.

Additional information on quantities: Once re-assayed and reassessed, waste from 7A23 will be transferred to either 7A21 or 7A27 waste streams. Exact stock volumes are unknown, as this waste stream (7A23) is an intermediary to either 7A21 or 7A27, where stocks would be transferred post re-assessment.

Upper stock uncertainty estimated only and based on projected figures of containers of interest.

Uncertainty factors on volumes: Stock (upper): x 5.00 Arisings (upper): x -
Stock (lower): x 0.50 Arisings (lower): x -

WASTE SOURCE Organic and inorganic solids arising from operations with plutonium and uranium

PHYSICAL CHARACTERISTICS

General description: The waste consists of solids arising from operations with plutonium and uranium. These include tools, filters, glove-boxes, discarded and unusable equipment. It also includes some facility re-kit (refurbishment) wastes.

Changes since waste generated: -

Bulk density (t/m³): ~ 0.26

Comment on density: This figure has been derived using 7A21 stock data, as composition of this waste stream is unknown.

CHEMICAL COMPOSITION

General description and components (%wt): Metal (38.0%), cellulosic material (6.7%), plastics (37.0%), non-organics (17.4%) and rubber (0.9%).

Chemical state: Neutral

Sheet metal proportion / thickness: Sheet metal of approximately 4mm in thickness may be present arising from parts of glove-boxes and ductwork.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	= 13.8	-	
Other ferrous metals.....	= 13.1	-	
Iron.....	NE	-	
Aluminium.....	= 2.9	-	
Beryllium.....	= 1.3	-	
Cobalt.....	= 0	-	
Copper.....	= 2.8	~1.0% (assumed to be in cable)	
Lead.....	= 2.5	-	
Magnox/Magnesium.....	= 0	-	
Nickel.....	= 0	-	
Titanium.....	= 0	-	
Uranium.....	NE	Present as a contaminant only	
Zinc.....	= 0	-	
Zircaloy/Zirconium.....	= 0	-	
Other metals.....	= 1.6	Tin (0.5%) and filters (1.1%)	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulotics.....	= 6.7	Paper/fibreboard and cotton	
Paper, cotton.....	= 6.7		
Wood.....	= 0		
Halogenated plastics.....	= 20.9	PVC	
Total non-halogenated plastics.....	= 16.1		
Condensation polymers.....	= 16.1		
Others.....	= 0	-	
Organic ion exchange materials.....	= 0	-	
Total rubber.....	= 0.90	-	
Halogenated rubber.....	= 0.90		
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.....	TR	-	
Inorganic sludges and flocs.....	= 0	-	
Soil.....	= 0	-	
Brick/Stone/Rubble.....	= 6.3	-	
Cementitious material.....	= 0	-	
Sand.....	= 0	-	
Glass/Ceramics.....	= 2.2	-	
Graphite.....	= 8.9	-	
Desiccants/Catalysts.....	0	-	
Asbestos.....	TR	-	
Non/low friable.....	TR	-	
Moderately friable.....	TR	-	
Highly friable.....	TR	-	
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.....	P	-
Iodide.....	= 0	-
Cyanide.....	= 0	-
Carbonate.....	= 0	-
Nitrate.....	P	-
Nitrite.....	= 0	-
Phosphate.....	= 0	-
Sulphate.....	= 1.0	-
Sulphide.....	< 0.01	-

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	Paper, fibreboard 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.....	= 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.....	P	0.5% weight (recorded in metals' section)
Vanadium.....	= 0	-
Mercury compounds.....	= 0	-
Others.....	= 0	-

Complexing agents (%wt):

Yes

	(%wt)	Type(s) and comment
EDTA.....		-
DPTA.....		-
NTA.....		-
Polycarboxylic acids.....	TR	-
Other organic complexants.....	TR	The waste could contain trace organic complexing agents from decontamination operations.
Total complexing agents.....	TR	-

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) Incineration Drying/dewatering/liquid separation Tie down/fixatives/strippable coating/painting application Decontamination Metal treatment Recycling / reuse Thermal treatment, including vitrification Encapsulation Polymer encapsulation Other physical treatment Other chemical treatment Containerisation Treatment not yet determined None	Off-site	~ 100.0

Comments on planned treatments:

All items in 7A23 waste stream will be transferred and managed into either 7A21 and 7A27 waste streams accordingly.

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
Not yet determined	100.0	-	-	-	-

Range in container waste loading:

Other information on packaging and conditioning:

-

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			
Expected to be consigned to a Landfill Facility			
Expected to be disposed On-Site			
Expected to be managed by In-Situ Disposal			
Expected to be consigned to an Incineration Facility			
Expected to be consigned to a Metal Treatment Facility			
Expected to be 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:

Opportunities for alternative disposal routing: No

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

RADIOACTIVITY

Source: Plutonium (principally) and uranium contaminated material.

Uncertainty: The gross alpha and gross beta activities for the in-stock wastes are accurate. The radionuclide breakdown has been estimated.

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

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: May be present in the waste stream in very small specific activities
Cl-36: May be present in the waste stream in very small specific activities
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

WASTE STREAM		7A23		Operational LLW Requiring Further Assay Through the Recategorization Programme					
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		5			Gd 153				
Be 10		5			Ho 163				
C 14		5			Ho 166m				
Na 22					Tm 170				
Al 26					Tm 171				
Cl 36		5			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		5			Pb 210		5		
Co 60	~ 1.00E-09	C C 2			Bi 208				
Ni 59					Bi 210m				
Ni 63		5			Po 210		5		
Zn 65		5			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		5			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		5			Th 234		5		
Mo 93					Pa 231		5		
Tc 97					Pa 233		5		
Tc 99					U 232	~ 1.00E-09	C C 2		
Ru 106		5			U 233		5		
Pd 107					U 234	~ 1.11E-04	C C 2		
Ag 108m					U 235	~ 3.56E-06	C C 2		
Ag 110m		5			U 236	~ 4.60E-07	C C 2		
Cd 109					U 238	~ 1.89E-07	C C 2		
Cd 113m					Np 237		5		
Sn 119m					Pu 236				
Sn 121m					Pu 238	~ 7.58E-06	C C 2		
Sn 123					Pu 239	~ 2.62E-04	C C 2		
Sn 126					Pu 240	~ 6.00E-05	C C 2		
Sb 125		5			Pu 241	~ 2.03E-06	C C 2		
Sb 126					Pu 242	~ 7.20E-09	C C 2		
Te 125m					Am 241	~ 8.19E-05	C C 2		
Te 127m					Am 242m				
I 129		5			Am 243				
Cs 134		5			Cm 242				
Cs 135		5			Cm 243				
Cs 137	~ 9.06E-08	C C 2			Cm 244				
Ba 133		5			Cm 245				
La 137					Cm 246				
La 138					Cm 248				
Ce 144		5			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	5.27E-04	*	0	*
Eu 155					Total b/g	2.12E-06	*	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 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