

WASTE STREAM	7A34	Low Activity Liquids (excluding Hg)
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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 = 4.1			
Future arisings:	1.4.2025 - 31.3.2027 = 6.0			
	1.4.2028 - 31.3.2030 = 8.0			
	1.4.2031 - 31.3.2033 = 6.0			
	1.4.2034 - 31.3.2036 = 3.0			
	1.4.2037 - 31.3.2039 = 3.0			
	1.4.2040 - 31.3.2042 = 3.0			
	1.4.2043 - 31.3.2080 = 0			
Total future arisings:	29.0			
Total waste volume:	33.1			

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

Comment on arising rates: The wastes that consist waste stream 7A34 are readily disposed of.

Additional information on quantities: There is uncertainty in stock volumes and arising rates, due to ongoing and continuous operations in specific facilities.

Uncertainty factors on volumes:

Stock (upper):	x 1.50	Arisings (upper):	x 5.00
Stock (lower):	x 0.50	Arisings (lower):	x 0.20

WASTE SOURCE

Contaminated liquids originate from four main sources: cutting oil from machining operations, lubrication oils, spent oil from vacuum pumps and sludge from liquid effluent treatment. Machining operations provide the most heavily contaminated wastes from the presence of swarf, whilst the other processes contain fine particulate. Other liquids include coolants, chemicals and chiller solutions.

PHYSICAL CHARACTERISTICS

General description: Liquids contaminated with pieces of swarf, fine particles and sludge / liquids with the potential to contain contamination.

Changes since waste generated: Some wastes were treated to reduce volume/remove contaminated constituents prior to storage as waste (e.g. ultrafiltration to remove water phase).

Bulk density (t/m³): = 0.87

Comment on density: The density has been reviewed for the 2025 UK RWI and remains unchanged. Both disposal and in-stock data have been used to determine the density.

CHEMICAL COMPOSITION

General description and components (%wt): Hydrocarbon oils, sludge, water and chemicals

Chemical state: Neutral

Sheet metal proportion / thickness: -

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	= 0	-	
Other ferrous metals.....	= 0	-	
Iron.....	= 0	-	
Aluminium.....	= 0	-	
Beryllium.....	= 0	-	
Cobalt.....	= 0	-	
Copper.....	= 0	-	
Lead.....	= 0	-	
Magnox/Magnesium.....	= 0	-	
Nickel.....	= 0	-	
Titanium.....	= 0	-	
Uranium.....	NE	Likely to be <0.1% weight	
Zinc.....	= 0	-	
Zircaloy/Zirconium.....	= 0	-	
Other metals.....	= 0	-	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulotics.....	= 0	-	
Paper, cotton.....	= 0	-	
Wood.....	= 0	-	
Halogenated plastics.....	= 0	-	
Total non-halogenated plastics.....	= 0	-	
Condensation polymers.....	= 0	-	
Others.....	= 0	-	
Organic ion exchange materials.....	= 0	-	
Total rubber.....	= 0	-	
Halogenated rubber.....	= 0	-	
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.....	P	Covered below under non-aqueous liquids	

Other materials (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials.....	= 0	-	
Inorganic sludges and flocs.....	~ 25.0	-	
Soil.....	= 0	-	
Brick/Stone/Rubble.....	= 0	-	
Cementitious material.....	= 0	-	
Sand.....	= 0	-	
Glass/Ceramics.....	= 0	-	
Graphite.....	= 0	-	
Desiccants/Catalysts.....	= 0	-	
Asbestos.....	= 0	-	
Non/low friable.....	= 0	-	
Moderately friable.....	= 0	-	
Highly friable.....	= 0	-	
Free aqueous liquids.....	~ 10.0	Includes acids, aqueous liquids, sludges	
Free non-aqueous liquids.....	~ 65.0	Oils, coolants and cutting oils	
Powder/Ash.....	= 0	-	

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

Inorganic anions (%wt):

	(%wt)	Type(s) and comment
Fluoride.....	NE	-
Chloride.....	NE	-
Iodide.....	NE	-
Cyanide.....	NE	-
Carbonate.....	NE	-
Nitrate.....	NE	-
Nitrite.....	NE	-
Phosphate.....	NE	-
Sulphate.....	NE	-
Sulphide.....	NE	-

Materials of interest for waste acceptance criteria:

	(%wt)	Type(s) and comment
Combustible metals.....	NE	-
Low flash point liquids.....	NE	-
Explosive materials.....	NE	-
Phosphorus.....	NE	-
Hydrides.....	NE	-
Biological etc. materials.....	P	-
Biodegradable materials.....	P	-
Putrescible wastes.....	= 0	-
Non-putrescible wastes.....	P	Biodegradeable oil and coolants
Corrosive materials.....	P	Acids
Pyrophoric materials.....	NE	-
Generating toxic gases.....	NE	Potentially acids
Reacting with water.....	P	Concentrated acids
Higher activity particles.....	= 0	-
Soluble solids as bulk chemical compounds.....	= 0	-

Hazardous substances / non hazardous pollutants:

-

	(%wt)	Type(s) and comment
Acrylamide.....	= 0	-
Benzene.....	NE	-
Chlorinated solvents.....	= 0	-
Formaldehyde.....	= 0	-
Organometallics.....	= 0	-
Phenol.....	NE	-
Styrene.....	= 0	-
Tri-butyl phosphate.....	NE	-
Other organophosphates.....	= 0	-
Vinyl chloride.....	= 0	-
Arsenic.....	NE	-
Barium.....	= 0	-
Boron.....	NE	-
Boron (in Boral).....	NE	-
Boron (non-Boral).....	= 0	-
Cadmium.....	NE	-
Caesium.....	NE	-
Selenium.....	NE	-
Chromium.....	NE	-
Molybdenum.....	NE	-
Thallium.....	= 0	-
Tin.....	-	-
Vanadium.....	NE	-
Mercury compounds.....	= 0	-
Others.....	NE	-

Complexing agents (%wt):

Not yet determined

	(%wt)	Type(s) and comment
EDTA.....	NE	-
DPTA.....	NE	-
NTA.....	NE	-
Polycarboxylic acids.....	NE	-
Other organic complexants.....	NE	-
Total complexing agents.....	NE	-

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	Off-site	~ 97.0
Decay storage		
Low force compaction		
Supercompaction (HFC)		
Incineration		
Drying/dewatering/liquid separation	Off-site	~ 3.0
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		

Comments on planned treatments:

Free liquids cannot be disposed via burial at the LLWR. Most liquids will be incinerated, some liquid waste 'material' could possibly be treated for material recovery if optioned and considered BAT.

Conditioning method:

-

Conditioning plants:

Plant Name	Location

Likely conditioning matrix:

-

Further information on the conditioning matrix:

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Waste Packaging:

Likely container type:

Container	Waste packaged (vol%)	Waste loading (m³)	Payload (m³)	Number of packages	Estimated start date for packaging
-	-	-	-	-	-

Range in container waste loading:

Other information on packaging and conditioning:

Not intended for disposal/burial at the LLWR as outside of the provisions of the LLWR WAC.

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)	~ 97.0	~ 0.87	
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	~ 3.0	~ 0.87	
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:

Opportunities for alternative disposal routing: No

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

RADIOACTIVITY

Source: This waste stream in totality contains tritium, plutonium and uranium, and has the potential to contain other minor species

Uncertainty: The stock waste activity is accurate and taken from the AWE Solid Radioactive Waste Management Records System (SRWMRS) Database.

Measurement of radioactivities: The majority of oils were assayed using a form of high resolution gamma-ray spectroscopy in conjunction with an associated modelling software package. Some oils were sampled and taken for either destructive or non-destructive assay to determine the radionuclides and their isotopic abundances.

Chemical form of radionuclides:

- H-3: May be present in future arisings in HTO, HT and organically bound form
- 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: 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 the waste stream in oxide form
- Np: Np-237 present in waste stream as oxide form from daughter product of Am-241 alpha decay
- Pu: Present in the waste stream in oxide form

WASTE STREAM 7A34 Low Activity Liquids (excluding Hg)									
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					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					Ti 204				
Mn 54					Pb 205				
Fe 55					Pb 210	= 8.55E-17	B B 2	= 5.87E-16	C C 2
Co 60					Bi 208				
Ni 59					Bi 210m				
Ni 63					Po 210	= 2.61E-17	B B 2	= 4.53E-16	C C 2
Zn 65					Ra 223	= 4.52E-14	B B 2	= 5.25E-14	C C 2
Se 79					Ra 225			= 3.36E-23	C C 2
Kr 81					Ra 226	= 8.67E-15	B B 2	= 1.00E-14	C C 2
Kr 85					Ra 228	= 4.29E-20	B B 2	= 4.69E-20	C C 2
Rb 87					Ac 227	= 5.75E-14	B B 2	= 5.46E-14	C C 2
Sr 90					Th 227	= 4.90E-14	B B 2	= 5.25E-14	C C 2
Zr 93					Th 228	= 4.62E-21	B B 2	= 2.22E-20	C C 2
Nb 91					Th 229				
Nb 92					Th 230	= 4.00E-11	B B 2	= 7.22E-12	C C 2
Nb 93m					Th 232	= 7.48E-19	B B 2	= 1.63E-19	C C 2
Nb 94					Th 234	= 7.76E-06	B B 2	= 7.05E-08	C C 2
Mo 93					Pa 231	= 3.65E-12	B B 2	= 6.08E-13	C C 2
Tc 97					Pa 233			= 1.57E-14	C C 2
Tc 99					U 232				
Ru 106					U 233			= 1.92E-19	C C 2
Pd 107					U 234	= 4.35E-06	B B 2	= 1.40E-07	C C 2
Ag 108m					U 235	= 1.72E-07	B B 2	= 4.77E-09	C C 2
Ag 110m					U 236	= 1.52E-08	B B 2	= 5.51E-10	C C 2
Cd 109					U 238	= 7.76E-06	B B 2	= 7.05E-08	C C 2
Cd 113m					Np 237			= 1.51E-14	C C 2
Sn 119m					Pu 236				
Sn 121m					Pu 238			= 2.09E-10	C C 2
Sn 123					Pu 239			= 4.80E-09	C C 2
Sn 126					Pu 240			= 1.12E-09	C C 2
Sb 125					Pu 241			= 2.20E-07	C C 2
Sb 126					Pu 242			= 4.86E-14	C C 2
Te 125m					Am 241			= 9.38E-09	C C 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					Unsp a				
Eu 152					Unsp b/g				
Eu 154					Total a	1.23E-05	*	2.31E-07	*
Eu 155					Total b/g	7.76E-06	*	2.90E-07	*

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