

WASTE STREAM	5C314	LETP Decommissioning LLW
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SITE Harwell

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Nuclear Restoration Services Ltd (NRS)

WASTE TYPE LLW

WASTE VOLUMES

	Reported (m ³)	OR	Conditioned (m ³)	Packaged (m ³)
Stocks:	At 1.4.2025	= 306.0		
Future arisings:				
Total future arisings:		0.0		
Total waste volume:		306.0		

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

Comment on arising rates: -

Additional information on quantities: -

Uncertainty factors on volumes:

Stock (upper):	x 1.05	Arisings (upper):	x -
Stock (lower):	x 0.95	Arisings (lower):	x -

WASTE SOURCE

The waste arisings from the LETP arise from 2 main project areas:

- The Higher Level Area (HLA) generating primarily LLW and soft waste from decommissioning
- The Medium Level and Low Activity area generating VLLW from removal of buildings and structures.

PHYSICAL CHARACTERISTICS

General description: Building rubble, concrete, metal and organic material from the decommissioning of buildings, tanks, over-ground and underground structures at the LETP.

Changes since waste generated: -

Bulk density (t/m³): ~ 0.93

Comment on density: -

CHEMICAL COMPOSITION

General description and components (%wt): Metal (36%), concrete/building rubble (19%), Soil (13%), biodegradables (3%), plasterboard (1%), plastics (15%), rubber (2%), wood (2%), other organic (3%), others (6%) including asbestos and glass

Chemical state: Neutral

Sheet metal proportion / thickness: -

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	~ 15.1	Plate pieces/pipework/ HEPA filter cases	
Other ferrous metals.....	~ 15.5	mild steel - Drums, tank pieces, pipework	
Iron.....	~ 4.2	Plant, equipment, tank pieces, pipework	
Aluminium.....	~ 0.01	Vent work. Ladders. Tooling	
Beryllium.....	-	-	
Cobalt.....	-	-	
Copper.....	~ 0.01	Alloy in metals	
Lead.....	~ 1.0	Shielding materials	
Magnox/Magnesium.....	TR	Steel and grout	
Nickel.....	~ 0.01	Alloy in metals	
Titanium.....	TR	Alloy in metals	
Uranium.....	-	-	
Zinc.....	~ 0.04	Alloy in metals / galvanised metals	
Zircaloy/Zirconium.....	TR	-	
Other metals.....	TR	Trace amounts of uranium metal may be present.	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	= 2.0	-	
Paper, cotton.....	= 0	-	
Wood.....	= 2.0	-	
Halogenated plastics.....	= 2.0	Soft waste / PPE / Wrapping PVC and PTFE	
Total non-halogenated plastics.....	= 13.0	-	
Condensation polymers.....	~ 0	-	
Others.....	~ 13.0	Soft waste / PPE / Wrapping	
Organic ion exchange materials.....	-	-	
Total rubber.....	~ 2.0	-	
Halogenated rubber.....	~ 1.0	hypalon and neoprene	
Non-halogenated rubber.....	~ 1.0	-	
Hydrocarbons.....	-	-	
Oil or grease.....	-	-	
Fuel.....	-	-	
Asphalt/Tarmac (cont.coal tar).....	-	-	
Asphalt/Tarmac (no coal tar).....	-	-	
Bitumen.....	~ 3.1	Tank bund liners	
Others.....	-	-	
Other organics.....	= 3.0	undefined	

Other materials (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials.....	NE	-	
Inorganic sludges and flocs.....	NE	-	
Soil.....	= 13.0	-	
Brick/Stone/Rubble.....	~ 19.0	-	
Cementitious material.....	-	-	
Sand.....	-	-	
Glass/Ceramics.....	~ 5.0	Mylar and glass. Glass reinforced plastic (GRP) from removal of the HLA tanks	
Graphite.....	= 0	-	
Desiccants/Catalysts.....	-	-	
Asbestos.....	= 0.46	-	
Non/low friable.....	~ 0.46	Building cladding (bound) chrysotile (white)	
Moderately friable.....	= 0	-	
Highly friable.....	= 0	-	
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	-
Iodide.....	= 0	-
Cyanide.....	= 0	-
Carbonate.....	P	-
Nitrate.....	= 0	-
Nitrite.....	= 0	-
Phosphate.....	TR	Grout
Sulphate.....	= 0	-
Sulphide.....	= 0	-

Materials of interest for waste acceptance criteria:

	(%wt)	Type(s) and comment
Combustible metals.....	TR	-
Low flash point liquids.....	= 0	-
Explosive materials.....	= 0	-
Phosphorus.....	= 0	-
Hydrides.....	= 0	-
Biological etc. materials.....	= 0	-
Biodegradable materials.....	~ 3.0	-
Putrescible wastes.....	~ 1.0	organics; leaves/foilage
Non-putrescible wastes.....	~ 2.0	-
Corrosive materials.....	= 0	-
Pyrophoric materials.....	= 0	-
Generating toxic gases.....	= 0	-
Reacting with water.....	P	50m2
Higher activity particles.....	-	-
Soluble solids as bulk chemical compounds.....	-	-

Hazardous substances / non hazardous pollutants:

	(%wt)	Type(s) and comment
Acrylamide.....	0	-
Benzene.....		-
Chlorinated solvents.....		-
Formaldehyde.....		-
Organometallics.....		-
Phenol.....		-
Styrene.....		-
Tri-butyl phosphate.....		-
Other organophosphates.....		-
Vinyl chloride.....		-
Arsenic.....		-
Barium.....		-
Boron.....		-
Boron (in Boral).....		-
Boron (non-Boral).....		-
Cadmium.....	~ 0.01 TR	Alloy in metals
Caesium.....		Alloy in metals
Selenium.....	~ 0.02 TR	-
Chromium.....		Alloy in metals
Molybdenum.....		Alloy in metals
Thallium.....		-
Tin.....	~ 0.02 TR	Alloy in metals
Vanadium.....		Alloy in metals
Mercury compounds.....	-	-
Others.....	-	-

Complexing agents (%wt):

Not yet determined		
	(%wt)	Type(s) and comment
EDTA.....	NE	-
DPTA.....		-
NTA.....		-
Polycarboxylic acids.....		-
Other organic complexants.....		-
Total complexing agents.....		-

Physical components:

	Number	Type(s) and comment
Sources.....	P P P P P	-
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 Off-site	~~ 1.9 ~~ 4.3
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		~~ 93.8

Comments on planned treatments:

86.29% of this stream is expected to be disposed to landfill.

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 WAMAC IP-2 ISO (TC08)	1.9	21.6	18.8	1	-
	1/2 Height IP-2 Disposal/Re-usable ISO (TC01/TC02)	7.5	10.0	18.3	3	-

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	= 9.4	0.93	
Expected to be consigned to a Landfill Facility	= 86.3	0.93	
Expected to be disposed On-Site			
Expected to be managed by In-Situ Disposal			
Expected to be consigned to an Incineration Facility	= 4.3	0.40	
Expected to be consigned to a Metal Treatment Facility			
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 04 07, 17 05 03*, 17 05 04, 17 06 01*, 17 02 03, 17 02 02

Opportunities for alternative disposal routing: No

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

RADIOACTIVITY

Source: Activity in waste has arisen from the treatment of liquid effluent.

Uncertainty: -

Measurement of radioactivities: -

Chemical form of radionuclides:

H-3: -
C-14: -
Cl-36: -
Se-79: -
Tc-99: -
I-129: -
Ra: Present as a decay product of fuel.
Th: -
U: Present as a metal or an oxide.
Np: -
Pu: Present as metal, oxide or nitrate

WASTE STREAM 5C314 LETP Decommissioning LLW									
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	3.51E-06	C C 1			Gd 153			8	
Be 10					Ho 163			8	
C 14	6.24E-06	C C 1			Ho 166m			8	
Na 22					Tm 170			8	
Al 26					Tm 171			8	
Cl 36	2.01E-08	C C 2			Lu 174			8	
Ar 39					Lu 176			8	
Ar 42					Hf 178n			8	
K 40	2.64E-08	C C 2			Hf 182			8	
Ca 41					Pt 193			8	
Mn 53					Ti 204			8	
Mn 54					Pb 205			8	
Fe 55	3.00E-08	C C 1			Pb 210	1.30E-07	C C 2		
Co 60	4.66E-08	C C 1			Bi 208			8	
Ni 59					Bi 210m			8	
Ni 63	8.80E-07	C C 1			Po 210	1.21E-07	C C 2		
Zn 65					Ra 223			8	
Se 79					Ra 225			8	
Kr 81					Ra 226	6.74E-07	C C 2		
Kr 85					Ra 228	3.23E-07	C C 2		
Rb 87					Ac 227			8	
Sr 90	4.63E-05	C C 1			Th 227			8	
Zr 93					Th 228	2.24E-07	C C 2		
Nb 91					Th 229			8	
Nb 92					Th 230			8	
Nb 93m					Th 232	5.67E-07	C C 2		
Nb 94	3.01E-09	C C 2			Th 234	1.75E-06		8	
Mo 93					Pa 231			8	
Tc 97					Pa 233			8	
Tc 99					U 232			8	
Ru 106					U 233			8	
Pd 107					U 234	1.75E-06	C C 2		
Ag 108m					U 235	8.16E-08	C C 2		
Ag 110m					U 236			8	
Cd 109					U 238	1.75E-06	C C 2		
Cd 113m					Np 237			8	
Sn 119m					Pu 236			8	
Sn 121m					Pu 238	1.47E-05	C C 2		
Sn 123					Pu 239	1.35E-05	C C 2		
Sn 126					Pu 240	6.66E-06	C C 2		
Sb 125	1.05E-09	C C 2			Pu 241	1.02E-05	C C 1		
Sb 126					Pu 242	7.75E-09	C C 2		
Te 125m					Am 241	1.54E-05	C C 2		
Te 127m					Am 242m			8	
I 129	3.06E-09	C C 2			Am 243			8	
Cs 134					Cm 242			8	
Cs 135					Cm 243	3.68E-06	C C 2		
Cs 137	3.72E-05	C C 2			Cm 244	3.31E-06	C C 2		
Ba 133					Cm 245	9.67E-09	C C 2		
La 137					Cm 246	9.66E-09	C C 2		
La 138					Cm 248			8	
Ce 144					Cf 249			8	
Pm 145					Cf 250			8	
Pm 147					Cf 251			8	
Sm 147					Cf 252			8	
Sm 151					Unsp a				
Eu 152	5.16E-08	C C 2			Unsp b/g				
Eu 154	3.33E-08	C C 2			Total a	6.24E-05	*	0	*
Eu 155	3.39E-08	C C 2			Total b/g	1.07E-04	*	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