

WASTE STREAM	5C317	Harwell Contact Handled ILW Drums
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SITE Harwell

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Nuclear Restoration Services Ltd (NRS)

WASTE TYPE ILW

WASTE VOLUMES

	Reported (m ³)	OR	Conditioned (m ³)	Packaged (m ³)
Stocks:	At 1.4.2025	= 85.4		
Future arisings:				
Total future arisings:		0.0		
Total waste volume:		85.4		

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

Comment on arising rates: -

Additional information on quantities: Volume in stock has been updated to reflect drums that have been transferred from Harwell to Sellafield. Volume in stock at 2013 UKRWI was 915m³ however this was based on a volume of 0.227m³ per drum not the agreed 0.2m³ per drum used by SL. Revised volumes are therefore: Total original volume = 799.8m³, Volume transferred from 1/4/13 to 1/4/16 = 490.8m³ therefore volume left in stock was 309m³. Shipments since 01/04/2016 have been deducted as and when they occur.

Uncertainty factors on volumes: Stock (upper): x 1.20 Arisings (upper): x -
Stock (lower): x 0.80 Arisings (lower): x -

WASTE SOURCE Operational and decommissioning solid wastes from gloveboxes and other alpha-handling facilities.

PHYSICAL CHARACTERISTICS

General description: Laboratory waste and HEPA filters. Miscellaneous items from decommissioning of laboratories, glove boxes and shop window. Small volumes of ionium sludge CHILW and NDS CHILW are mixed with this waste.

Changes since waste generated: -

Bulk density (t/m³): = 0.60

Comment on density: Mass of wastes in stock divided by volume.

CHEMICAL COMPOSITION

General description and components (%wt): Approximate densities have been assumed to derive this from the inventory information which is in volume format. Metals 81.8%; Soil/Rubble 2.5%; Soft Organics 0.6%; Plastic/Rubber 10.1%; Paper/Wood 1.3%; Absorbed Liquid 0.1%; Others 3.6%.

Chemical state: Neutral

Sheet metal proportion / thickness: Metal is present in a large range of thicknesses.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	~ 43.0	-	The identity of steels/other alloys is not known.
Other ferrous metals.....	~ 16.0	-	
Iron.....	-	-	
Aluminium.....	~ 3.0	-	
Beryllium.....	~ 2.0	-	
Cobalt.....	-	-	
Copper.....	~ 3.4	-	
Lead.....	~ 2.0	-	
Magnox/Magnesium.....	TR	-	
Nickel.....	-	-	
Titanium.....	-	-	
Uranium.....	TR	-	
Zinc.....	TR	-	
Zircaloy/Zirconium.....	TR	-	
Other metals.....	~ 14.0	Other metals consist of cadmium, uranium, gold, iron, magnesium, molybdenum, nickel, palladium, silver, tantalum, thorium, tin, titanium, tungsten, zinc and zirconium.	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	~ 2.0	-	PVC and PTFE
Paper, cotton.....	~ 1.5	-	
Wood.....	~ 0.50	-	
Halogenated plastics.....	~ 8.0	-	
Total non-halogenated plastics.....	~ 1.2	-	
Condensation polymers.....	TR	-	
Others.....	< 1.2	-	
Organic ion exchange materials.....	TR	-	
Total rubber.....	~ 1.2	-	
Halogenated rubber.....	< 1.2	neoprene and hypalon.	
Non-halogenated rubber.....	TR	-	
Hydrocarbons.....	-	-	
Oil or grease.....	-	-	
Fuel.....	-	-	
Asphalt/Tarmac (cont.coal tar).....	-	-	
Asphalt/Tarmac (no coal tar).....	-	-	
Bitumen.....	-	-	
Others.....	-	-	
Other organics.....	TR	-	

Other materials (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials.....	TR	-	
Inorganic sludges and flocs.....	TR	-	
Soil.....	TR	-	
Brick/Stone/Rubble.....	= 0.70	-	
Cementitious material.....	= 1.7	-	
Sand.....	-	-	
Glass/Ceramics.....	= 0.70	-	
Graphite.....	TR	-	
Desiccants/Catalysts.....	-	-	
Asbestos.....	TR	-	
Non/low friable.....	-	-	
Moderately friable.....	-	-	
Highly friable.....	-	-	
Free aqueous liquids.....	TR	-	
Free non-aqueous liquids.....	NE	-	
Powder/Ash.....	~ 0.20	-	

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

Inorganic anions (%wt):

	(%wt)	Type(s) and comment
Fluoride.....	TR	-
Chloride.....	TR	-
Iodide.....	TR	-
Cyanide.....	= 0	-
Carbonate.....	~ 0.20	-
Nitrate.....	P	-
Nitrite.....	TR	-
Phosphate.....	TR	-
Sulphate.....	TR	-
Sulphide.....	TR	-

Materials of interest for waste acceptance criteria:

	(%wt)	Type(s) and comment
Combustible metals.....	P	-
Low flash point liquids.....	TR	-
Explosive materials.....	= 0	-
Phosphorus.....	TR	-
Hydrides.....	TR	-
Biological etc. materials.....	TR	-
Biodegradable materials.....	0	-
Putrescible wastes.....	TR	-
Non-putrescible wastes.....		-
Corrosive materials.....	TR	-
Pyrophoric materials.....	TR	-
Generating toxic gases.....	TR	-
Reacting with water.....	TR	-
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.....		-
Caesium.....		-
Selenium.....		-
Chromium.....		-
Molybdenum.....		-
Thallium.....		-
Tin.....		-
Vanadium.....		-
Mercury compounds.....		-
Others.....		-

Complexing agents (%wt):

Yes		
	(%wt)	Type(s) and comment
EDTA.....		-
DPTA.....		-
NTA.....		-
Polycarboxylic acids.....		-
Other organic complexants.....		Complexing agents are present in a few packages.
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:

-

Conditioning method:

The waste is contained within, or will be repacked into 200-litre drums. These will be transferred to Sellafield using Nupak, Novapak or Full Height ISOs for treatment alongside similar wastes.

Conditioning plants:

Plant Name	Location

Likely conditioning matrix:

-

Further information on the conditioning matrix:

3:1 PCA:OPC, w/s 0.42.

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:

Stainless Steel.

Conditioned density (t/m³):

~ 2.0

Conditioned density comment:

The density of the wasteform will vary with the nature of the waste (soft or hard) in individual packages.

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			

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: Activity is present as alpha and mixed fission product contaminated trash from gloveboxes. The major sources of activity are plutonium isotopes. Other alpha/ other beta gamma not defined.

Uncertainty: -

Measurement of radioactivities: Activities measured/ estimated by a range of methods including sampling/analysis and radiation measurements.

Chemical form of radionuclides: H-3: Tritium may be present as gaseous sources, but is expected to be absorbed in metal targets.
C-14: Present as labelled organic materials.
Cl-36: -
Se-79: Unknown.
Tc-99: Unknown.
I-129: -
Ra: Variable, comprising mainly oxide plus small amounts of salts.
Th: Present as a metal or oxide and in irradiated fuel.
U: Variable, comprising mainly oxide and metal plus small amounts of nitrates.
Np: Unknown.
Pu: Variable comprising mainly oxide plus small amounts of salts eg nitrates.

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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	4.77E-02	B B 2			Gd 153		8		
Be 10		8			Ho 163		8		
C 14	2.72E-04	B B 2			Ho 166m		8		
Na 22		8			Tm 170		8		
Al 26		8			Tm 171		8		
Cl 36	2.41E-05	B B 2			Lu 174		8		
Ar 39		8			Lu 176		8		
Ar 42		8			Hf 178n		8		
K 40	1.31E-08	B B 2			Hf 182		8		
Ca 41		8			Pt 193		8		
Mn 53		8			Tl 204	3.77E-08	B B 2		
Mn 54		8			Pb 205		8		
Fe 55	4.61E-07	B B 2			Pb 210	6.92E-05	B B 2		
Co 60	1.14E-05	B B 2			Bi 208		8		
Ni 59		8			Bi 210m		8		
Ni 63	1.63E-03	B B 2			Po 210	6.71E-05	B B 2		
Zn 65		8			Ra 223	3.82E-05	B B 2		
Se 79		8			Ra 225	2.28E-07	B B 2		
Kr 81		8			Ra 226	1.90E-04	B B 2		
Kr 85	3.72E-05	B B 2			Ra 228	5.55E-06	B B 2		
Rb 87		8			Ac 227	3.84E-05	B B 2		
Sr 90	4.53E-04	B B 2			Th 227	3.77E-05	B B 2		
Zr 93	3.98E-09	B B 2			Th 228	5.27E-06	B B 2		
Nb 91		8			Th 229	2.28E-07	B B 2		
Nb 92		8			Th 230	2.85E-05	B B 2		
Nb 93m	1.28E-06	B B 2			Th 232	6.73E-06	B B 2		
Nb 94	3.07E-07	B B 2			Th 234	7.43E-05	B B 2		
Mo 93	4.60E-06	B B 2			Pa 231	9.53E-05	B B 2		
Tc 97		8			Pa 233	3.58E-05	B B 2		
Tc 99	2.04E-05	B B 2			U 232	2.95E-07	B B 2		
Ru 106		8			U 233	2.14E-05	B B 2		
Pd 107		8			U 234	5.23E-05	B B 2		
Ag 108m	1.82E-09	B B 2			U 235	2.75E-06	B B 2		
Ag 110m		8			U 236	1.29E-07	B B 2		
Cd 109		8			U 238	7.43E-05	B B 2		
Cd 113m		8			Np 237	3.58E-05	B B 2		
Sn 119m		8			Pu 236		8		
Sn 121m		8			Pu 238	2.00E-02	B B 2		
Sn 123		8			Pu 239	1.71E-02	B B 2		
Sn 126		8			Pu 240	1.50E-02	B B 2		
Sb 125		8			Pu 241	1.87E-01	B B 2		
Sb 126		8			Pu 242	8.65E-06	B B 2		
Te 125m		8			Am 241	3.21E-02	B B 2		
Te 127m		8			Am 242m		8		
I 129	1.10E-08	B B 2			Am 243	1.67E-06	B B 2		
Cs 134	2.04E-07	B B 2			Cm 242		8		
Cs 135	2.40E-08	B B 2			Cm 243		8		
Cs 137	5.56E-04	B B 2			Cm 244	3.89E-05	B B 2		
Ba 133	1.39E-06	B B 2			Cm 245		8		
La 137		8			Cm 246		8		
La 138		8			Cm 248	4.62E-07	B B 2		
Ce 144		8			Cf 249	4.21E-07	B B 2		
Pm 145		8			Cf 250		8		
Pm 147	1.95E-06	B B 2			Cf 251		8		
Sm 147		8			Cf 252		8		
Sm 151	1.21E-06	B B 2			Unsp a				
Eu 152	1.96E-07	B B 2			Unsp b/g				
Eu 154	1.54E-07	B B 2			Total a	8.49E-02	*	0	*
Eu 155		8			Total b/g	2.37E-01	*	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