WASTE STREAM 5C321 Active Handling Facility Decommissioning ILW

SITE Harwell

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Magnox Limited

WASTE TYPE ILW

Is the waste subject to Scottish Policy: No

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2022.....	0 m³
Future arisings -	1.4.2022 - 31.3.2025.....	1.9 m³
Total future arisings:		1.9 m³
Total waste volume:		1.9 m³

Comment on volumes: Arisings as a result of decommissioning Active Handling Facility. Volume mainly expected to arise from areas surrounding the high active cell lines.

Uncertainty factors on volumes:

Stock (upper):	x	Arisings (upper)	x 1.2
Stock (lower):	x	Arisings (lower)	x 0.8

WASTE SOURCE Decommissioning of the active handling facility.

PHYSICAL CHARACTERISTICS

General description: ILW from miscellaneous items from the decommissioning of cells, ventilation systems and pipework.

Physical components (%vol): Ferrous metals, other metals, plastics, cellulose, glassware, and concrete.

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): ~2.9

Comment on density: The density of the waste varies with the nature of the waste items.

CHEMICAL COMPOSITION

General description and components (%wt): Metal, concrete , cellulose , plastic, rubber etc.

Chemical state: Neutral

Chemical form of radionuclides:
H-3: Metal activation product.
C-14: In labelled organic compounds and activation of metals.
Ra: Found as an oxide, a nitrate, and as a sulphate.
Th: Found as an oxide, a metal, and in irradiated fuel.
U: Found as an oxide, a metal, and as a fuel.
Pu: Found as an oxide, a metal, and as a fuel.

Metals and alloys (%wt): -

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	~80.0		
Other ferrous metals.....	P		
Iron.....			
Aluminium.....	P		
Beryllium.....			
Cobalt.....			
Copper.....	P		
Lead.....	P		
Magnox/Magnesium.....	TR		
Nickel.....			

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Titanium		
Uranium		
Zinc	TR	
Zircaloy/Zirconium	P	
Other metals	TR	Uranium, europium, cobalt, magnesium, tin, and nickel.

Organics (%wt): -

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulosics	~2.0		
Paper, cotton	~2.0		
Wood	P		
Halogenated plastics	P		
Total non-halogenated plastics	P		
Condensation polymers	P		
Others	NE		
Organic ion exchange materials	P		
Total rubber	P		
Halogenated rubber	P		
Non-halogenated rubber	P		
Hydrocarbons			
Oil or grease			
Fuel			
Asphalt/Tarmac (cont.coal tar)			
Asphalt/Tarmac (no coal tar)			
Bitumen			
Others			
Other organics	P		

Other materials (%wt): -

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials	P		
Inorganic sludges and flocs	0		
Soil	0		
Brick/Stone/Rubble	0		
Cementitious material	~18.0		
Sand			
Glass/Ceramics	P		
Graphite	P		
Desiccants/Catalysts			
Asbestos	TR		
Non/low friable			
Moderately friable			
Highly friable			

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Free aqueous liquids	TR
Free non-aqueous liquids	TR
Powder/Ash	P

Inorganic anions (%wt): -

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

Materials of interest for waste acceptance criteria: Combustible metals comprise mainly uranium and other finely divided metals. Free liquids will be immobilised in cement or evaporated to dryness before conditioning. Powder may be present as a result of decommissioning operations.

	(%wt)	Type(s) and comment
Combustible metals	TR	
Low flash point liquids	TR	
Explosive materials	TR	
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		
Benzene		
Chlorinated solvents		
Formaldehyde		
Organometallics		

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Phenol.....		
Styrene.....		
Tri-butyl phosphate.....		
Other organophosphates.....		
Vinyl chloride.....		
Arsenic.....		
Barium.....		
Boron.....	0	
Boron (in Boral).....		
Boron (non-Boral).....		
Cadmium.....		
Caesium.....		
Selenium.....		
Chromium.....		
Molybdenum.....		
Thallium.....		
Tin.....		
Vanadium.....		
Mercury compounds.....		
Others.....		
Electronic Electrical Equipment (EEE)		
EEE Type 1.....		
EEE Type 2.....		
EEE Type 3.....		
EEE Type 4.....		
EEE Type 5.....		

Complexing agents (%wt): Yes

	(%wt)	Type(s) and comment
EDTA.....	TR	Present at trace levels (includes EDTA, Citrate, TBP, etc).
DPTA.....		
NTA.....		
Polycarboxylic acids…….		
Other organic complexants.....		
Total complexing agents.....	TR	

Potential for the waste to contain discrete items: Not yet determined. In & of itself not a DI; waste stream may include DIs as defined elsewhere (notably any stainless steel components)

PACKAGING AND CONDITIONING

Conditioning method:	Waste will be treated by packaging and encapsulation into 6m3 box for transfer to the Harwell ILW Store
Plant Name:	Active Handling Facility
Location:	Harwell
Plant startup date:	2022

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Total capacity (m^3/y incoming waste): -

Target start date for packaging this stream: 2022

Throughput for this stream (m^3/y incoming waste): -

Other information: -

Likely container type:

Container	Waste packaged (%vol)	Waste loading (m^3)	Payload (m^3)	Number of packages
6m^3 concrete box (SD)	100.0	1.46	5.8	2

Likely container type comment: -

Range in container waste volume: -

Other information on containers: Stainless steel and concrete box

Likely conditioning matrix: Pulverised Fly Ash / Ordinary Portland Cement

Other information: -

Conditioned density (t/m^3): >2.0

Conditioned density comment: Estimated range 2 - 3 t/m3.

Other information on conditioning: -

Opportunities for alternative disposal routing: -

Baseline Management Route	Opportunity Management Route	Stream volume (%)	Estimated Date that Opportunity will be realised	Opportunity Confidence	Comment
-	-	-	-	-	-

RADIOACTIVITY

Source: Activity is principally contamination associated with historic operations.

Uncertainty: Fingerprint will vary from facility location and reflect historical processes performed. At this stage an assumed radioactivity is unable to be stated but characterisation work will take place nearer the time of decommissioning.

Definition of total alpha and total beta/gamma: Where totals are shown on the table of radionuclide activities they are the sums of the listed alpha or beta/gamma emitting radionuclides plus 'other alpha' or 'other beta/gamma'.

Measurement of radioactivities: -

Other information: -

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Nuclide	Mean radioactivity, TBq/m³				Nuclide	Mean radioactivity, TBq/m³			
	Waste at 1.4.2022	Bands and Code	Future arisings	Bands and Code		Waste at 1.4.2022	Bands and Code	Future arisings	Bands and Code
H 3				8	Gd 153				8
Be 10				8	Ho 163				8
C 14				8	Ho 166m				8
Na 22				8	Tm 170				8
Al 26				8	Tm 171				8
Cl 36				8	Lu 174				8
Ar 39				8	Lu 176				8
Ar 42				8	Hf 178n				8
K 40				8	Hf 182				8
Ca 41				8	Pt 193				8
Mn 53				8	Tl 204				8
Mn 54				8	Pb 205				8
Fe 55				8	Pb 210				6
Co 60				6	Bi 208				6
Ni 59				8	Bi 210m				8
Ni 63				8	Po 210				8
Zn 65				8	Ra 223				6
Se 79				8	Ra 225				8
Kr 81				8	Ra 226				8
Kr 85				8	Ra 228				6
Rb 87				8	Ac 227				6
Sr 90				6	Th 227				6
Zr 93				6	Th 228				6
Nb 91				8	Th 229				6
Nb 92				8	Th 230				6
Nb 93m				6	Th 232				6
Nb 94				8	Th 234				6
Mo 93				8	Pa 231				6
Tc 97				8	Pa 233				6
Tc 99				6	U 232				6
Ru 106				8	U 233				6
Pd 107				8	U 234				6
Ag 108m				8	U 235				6
Ag 110m				8	U 236				6
Cd 109				8	U 238				6
Cd 113m				6	Np 237				6
Sn 119m				8	Pu 236				6
Sn 121m				8	Pu 238				6
Sn 123				8	Pu 239				6
Sn 126				6	Pu 240				6
Sb 125				6	Pu 241				6
Sb 126				8	Pu 242				6
Te 125m				6	Am 241				6
Te 127m				8	Am 242m				6
I 129				8	Am 243				6
Cs 134				6	Cm 242				6
Cs 135				6	Cm 243				6
Cs 137				6	Cm 244				6
Ba 133				8	Cm 245				6
La 137				8	Cm 246				6
La 138				8	Cm 248				8
Ce 144				8	Cf 249				8
Pm 145				8	Cf 250				8
Pm 147				6	Cf 251				8
Sm 147				8	Cf 252				8
Sm 151				6	Other a				
Eu 152				6	Other b/g				
Eu 154				6	**Total a**	**0**		**NE**	
Eu 155				6	**Total b/g**	**0**		**NE**	

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 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