

WASTE STREAM	5G10	ILW Concrete-lined Drums
---------------------	-------------	---------------------------------

SITE Winfrith
SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Magnox Limited

WASTE TYPE ILW; PFSD

Is the waste subject to Scottish Policy: No

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2022.....	2.0m ³
Total future arisings:		0 m ³
Total waste volume:		2.0m ³
Comment on volumes:	The arisings have been calculated from the internal volume of the CLDs i.e. 1 off 1804 @ 0.78m ³ plus 2 off 1803 @ 0.63m ³ each = 2.04m ³	
Uncertainty factors on volumes:	Stock (upper): x 1.1	Arisings (upper) x
	Stock (lower): x 0.9	Arisings (lower) x

WASTE SOURCE Historic Processing of wastes for sea disposal. Waste origins varied.

PHYSICAL CHARACTERISTICS

General description: Concrete lined drums: 1off 1804 (0.78m³ each) & 2 off 1803 (0.63m³ each). Miscellaneous waste held in mild steel drums within a concrete carcass.

Physical components (%wt): 100% Concrete lined drums: 1off 1804 (0.78m³ each) & 2 off 1803 (0.63m³ each). Waste in containers within the core, 30" high by 18" dia (Type 1804); 36" hgh by 22" dia (Type 1803).

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): 1.56

Comment on density: Recorded masses divided by total volume.

CHEMICAL COMPOSITION

General description and components (%wt): Concrete (>80 vol%), metals, plastics, glass, rubber, cellulose, possibly graphite (proportions not known, but have been estimated).

Chemical state: Neutral

Chemical form of radionuclides: U: Predominantly as oxide.
Pu: Predominantly as oxide.

Metals and alloys (%wt): -

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	P		
Other ferrous metals.....	~10.0	Mild steel present as outer drum, inner cans and reinforcement	
Iron.....			
Aluminium.....	P		
Beryllium.....	P		
Cobalt.....			
Copper.....	P		
Lead.....	P	Lead provides shielding in cores.	
Magnox/Magnesium.....	0		
Nickel.....			
Titanium.....			

WASTE STREAM	5G10	ILW Concrete-lined Drums
---------------------	-------------	---------------------------------

Uranium.....	TR		
Zinc.....	0		
Zircaloy/Zirconium.....	TR		
Other metals.....	NE	Be is present.	
Organics (%wt):	-		
	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	~2.0		
Paper, cotton.....	~2.0		
Wood.....	NE		
Halogenated plastics	~2.0	PVC	
Total non-halogenated plastics.....	~2.0		
Condensation polymers.....	NE		
Others.....	~2.0		
Organic ion exchange materials....	0		
Total rubber.....	~2.0		
Halogenated rubber	~2.0	Neoprene	
Non-halogenated rubber.....	NE		
Hydrocarbons.....			
Oil or grease			
Fuel.....			
Asphalt/Tarmac (cont.coal tar)...			
Asphalt/Tarmac (no coal tar)....			
Bitumen.....			
Others.....			
Other organics.....	NE		
Other materials (%wt):	Graphite present in one drum with the Be-clad fuel pins.		
	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials..	0		
Inorganic sludges and flocs.....	0		
Soil.....	0		
Brick/Stone/Rubble.....	0		
Cementitious material.....	~80.0		
Sand.....			
Glass/Ceramics.....	~2.0		
Graphite.....	NE		
Desiccants/Catalysts.....			
Asbestos.....	0		
Non/low friable.....			
Moderately friable.....			
Highly friable.....			
Free aqueous liquids.....	0		

WASTE STREAM	5G10	ILW Concrete-lined Drums
---------------------	-------------	---------------------------------

Free non-aqueous liquids..... NE

Powder/Ash..... P

Inorganic anions (%wt): Chloride may be present in one package as eutectic powder. Other anions only present as components of cement.

	(%wt)	Type(s) and comment
Fluoride.....	0	
Chloride.....	<0.01	
Iodide.....	0	
Cyanide.....	0	
Carbonate.....	P	
Nitrate.....	0	
Nitrite.....	0	
Phosphate.....	0	
Sulphate.....	NE	
Sulphide.....	0	

Materials of interest for waste acceptance criteria: Beryllium is present in sources and (unirradiated) fuel cladding.

	(%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.....	0	
Putrescible wastes.....	0	
Non-putrescible wastes.....		
Corrosive materials.....	0	
Pyrophoric materials.....	0	
Generating toxic gases.....	0	
Reacting with water.....	0	
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.....		
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): No

(%wt) Type(s) and comment

EDTA.....
 DPTA.....
 NTA.....
 Polycarboxylic acids.....
 Other organic complexants.....
 Total complexing agents.....

Potential for the waste to contain discrete items: No. In & of itself not a DI; waste stream may include DIs (notably any stainless steel components)

PACKAGING AND CONDITIONING

Conditioning method: The CLDs will be overpacked into either TN Gemini or Full Height ISOs for transfer to Sellafield where they will receive final treatment in preparation for long term storage at GDF.

Plant Name: -

Location: -

Plant startup date: -

Total capacity (m³/y incoming waste): -

WASTE STREAM**5G10****ILW Concrete-lined Drums**

Target start date for packaging this stream: -

Throughput for this stream (m³/y incoming waste): -

Other information: -

Likely container type:

Container	Waste packaged (%vol)	Waste loading (m ³)	Payload (m ³)	Number of packages

Likely container type comment: -

Range in container waste volume: -

Other information on containers: -

Likely conditioning matrix: Not specified

Other information: -

Conditioned density (t/m³): NE

Conditioned density comment: -

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: Activated metals, fuel contamination. Some sources and clad fuel.

Uncertainty: -

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: Combination of historic declarations, facility fingerprints and recent gamma measurements.

Other information: -

WASTE STREAM

5G10

ILW Concrete-lined Drums

Nuclide	Mean radioactivity, TBq/m ³				Nuclide	Mean radioactivity, TBq/m ³			
	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	9.44E-09	CC 2			Pb 210	1.95E-04	CC 2		
Co 60	3.52E-03	CC 2			Bi 208		8		
Ni 59		8			Bi 210m		8		
Ni 63	2.21E-07	CC 2			Po 210	1.87E-04	CC 2		
Zn 65		8			Ra 223		8		
Se 79		8			Ra 225		8		
Kr 81		8			Ra 226	6.30E-04	CC 2		
Kr 85		8			Ra 228	8.72E-06	CC 2		
Rb 87		8			Ac 227		8		
Sr 90	5.24E-05	CC 2			Th 227		8		
Zr 93		8			Th 228	7.45E-06	CC 2		
Nb 91		8			Th 229		8		
Nb 92		8			Th 230		8		
Nb 93m		8			Th 232	1.14E-05	CC 2		
Nb 94		8			Th 234		8		
Mo 93		8			Pa 231		8		
Tc 97		8			Pa 233	3.75E-07	CC 2		
Tc 99		8			U 232		8		
Ru 106		8			U 233		8		
Pd 107		8			U 234	1.27E-06	CC 2		
Ag 108m		8			U 235	3.02E-06	CC 2		
Ag 110m		8			U 236	3.68E-05	CC 2		
Cd 109		8			U 238		8		
Cd 113m		8			Np 237	3.78E-07	CC 2		
Sn 119m		8			Pu 236		8		
Sn 121m		8			Pu 238	2.5E-02	CC 2		
Sn 123		8			Pu 239	2.01E-02	CC 2		
Sn 126		8			Pu 240	1.01E-02	CC 2		
Sb 125	1.37E-07	CC 2			Pu 241	1.28E-01	CC 2		
Sb 126		8			Pu 242		8		
Te 125m	3.44E-08	CC 2			Am 241	9.79E-02	CC 2		
Te 127m		8			Am 242m		8		
I 129		8			Am 243		8		
Cs 134	1.41E-09	CC 2			Cm 242		8		
Cs 135		8			Cm 243		8		
Cs 137	1.18E-02	CC 2			Cm 244	3.56E-07	CC 2		
Ba 133		8			Cm 245		8		
La 137		8			Cm 246		8		
La 138		8			Cm 248		8		
Ce 144		8			Cf 249		8		
Pm 145		8			Cf 250		8		
Pm 147		8			Cf 251		8		
Sm 147		8			Cf 252		8		
Sm 151		8			Other a				
Eu 152		8			Other b/g				
Eu 154	1.44E-07	CC 2			Total a	1.54E-01	CC 2	0	
Eu 155		8			Total b/g	1.44E-01	CC 2	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 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