WASTE STREAM 5G10 ILW Concrete-lined Drums

SITE Winfrith

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Magnox Limited

WASTE TYPE ILW; PFSD

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	2.0 m³
Total future arisings:		0 m³
Total waste volume:		2.0 m³

Comment on volumes: The arisings have been calculated from the internal volume of the CLDs i.e. 1 off 1804 @ 0.78m3 plus 2 off 1803 @ 0.63m3 each = 2.04m3

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: -

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): -

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.....		
Uranium.....	TR	
Zinc.....	0	
Zircaloy/Zirconium.....	TR	
Other metals.....	NE	Be is present.

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Organics (%wt):	-		
	Total cellulosics	~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.		
	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	
	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.		

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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.

Combustible metals	0
Low flash point liquids	0
Explosive materials	0
Phosphorus	0
Hydrides	0
Biological etc. materials	0
Biodegradable materials	
Putrescible wastes	0
Non-putrescible wastes	
Corrosive materials	0
Pyrophoric materials	0
Generating toxic gases	0
Reacting with water	0
Active particles	
Soluble solids as bulk chemical compounds	

Hazardous substances / non hazardous pollutants: -

Acrylamide	
Benzene	
Chlorinated solvents	
Formaldehyde	
Organometallics	
Phenol	
Styrene	
Tri-butyl phosphate	
Other organophosphates	
Vinyl chloride	
Arsenic	
Barium	
Boron	

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

EDTA.....

DPTA.....

NTA.....

Polycarboxylic acids……

Other organic complexants.....

Total complexing agents.....

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 (m^3/y incoming waste): -

Target start date for packaging this stream: -

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

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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:	

Treatment	Stream volume (%)	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:	-

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Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code	Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2019	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	2.02E-08	C C 2			Pb 210	1.53E-04	C C 2		
Co 60	5.22E-03	C C 2			Bi 208		8		
Ni 59		8			Bi 210m		8		
Ni 63	2.26E-07	C C 2			Po 210	1.45E-04	C C 2		
Zn 65		8			Ra 223		8		
Se 79		8			Ra 225		8		
Kr 81		8			Ra 226	6.31E-04	C C 2		
Kr 85		8			Ra 228	7.55E-06	C C 2		
Rb 87		8			Ac 227		8		
Sr 90	5.63E-05	C C 2			Th 227		8		
Zr 93		8			Th 228	5.84E-06	C C 2		
Nb 91		8			Th 229		8		
Nb 92		8			Th 230		8		
Nb 93m		8			Th 232	1.14E-05	C C 2		
Nb 94		8			Th 234		8		
Mo 93		8			Pa 231		8		
Tc 97		8			Pa 233	2.79E-07	C C 2		
Tc 99		8			U 232		8		
Ru 106		8			U 233		8		
Pd 107		8			U 234	1.06E-06	C C 2		
Ag 108m		8			U 235	3.02E-06	C C 2		
Ag 110m		8			U 236	3.68E-05	C C 2		
Cd 109		8			U 238		8		
Cd 113m		8			Np 237	2.83E-07	C C 2		
Sn 119m		8			Pu 236		8		
Sn 121m		8			Pu 238	2.56E-02	C C 2		
Sn 123		8			Pu 239	2.01E-02	C C 2		
Sn 126		8			Pu 240	1.01E-02	C C 2		
Sb 125	2.92E-07	C C 2			Pu 241	1.48E-01	C C 2		
Sb 126		8			Pu 242		8		
Te 125m	7.32E-08	C C 2			Am 241	9.77E-02	C C 2		
Te 127m		8			Am 242m		8		
I 129		8			Am 243		8		
Cs 134	3.87E-09	C C 2			Cm 242		8		
Cs 135		8			Cm 243		8		
Cs 137	1.27E-02	C C 2			Cm 244	3.99E-07	C C 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	1.83E-07	C C 2			**Total a**	**1.54E-01**	**C C 2**	**0**	
Eu 155		8			**Total b/g**	**1.66E-01**	**C C 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