WASTE STREAM 5G04 Winfrith ILW Sources

SITE Winfrith

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Magnox Limited

WASTE TYPE ILW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	0.1 m³
Total future arisings:		0 m³
Total waste volume:		0.1 m³

Comment on volumes: The stream comprises of miscellaneous ILW sources, which have been identified and listed in the source register. As the stream is composed on a large number of individual items the uncertainty on the total volume is relatively high, although the volume is low.

Uncertainty factors on volumes:

Stock (upper):	x 1.75	Arisings (upper)	x
Stock (lower):	x 0.5	Arisings (lower)	x

WASTE SOURCE Redundant sources.

PHYSICAL CHARACTERISTICS

General description: Total volume of sources is very small. Individual sources to be packed with other RHILW within activity limits.

Physical components (%vol): Sources (100%)

Sealed sources: The waste contains sealed sources. Sources include Cl36, Co60, Sr90, Ba133, Cs137, Pm147, Eu152, Tl204, Ra226, Am241 sources.

Bulk density (t/m³): ~~8

Comment on density: Miscellaneous sources.

CHEMICAL COMPOSITION

General description and components (%wt): Sources include Cl36, Co60, Sr90, Ba133, Cs137, Pm147, Eu152, Tl204, Ra226, Am241 sources.

Chemical state: -

Chemical form of radionuclides: Cl-36: Not known, possibly chloride.
Ra: Not known, possibly chloride.

Metals and alloys (%wt): None.

Stainless steel.....	~~100.0	Source cans- grades not known. Source housing are expected to be mostly stainless steel.
Other ferrous metals.....	0	
Iron.....		
Aluminium.....	TR	
Beryllium.....	0	
Cobalt.....		
Copper.....	TR	
Lead.....	TR	
Magnox/Magnesium.....	0	
Nickel.....		
Titanium.....		
Uranium.....	TR	
Zinc.....	TR	
Zircaloy/Zirconium.....	0	

WASTE STREAM 5G04 Winfrith ILW Sources

	Other metals	TR	Various sources contain very small quantities of other metals.
Organics (%wt):	-		
	Total cellulosics	0	
	Paper, cotton	0	
	Wood	0	
	Halogenated plastics	0	
	Total non-halogenated plastics	0	
	Condensation polymers	0	
	Others	0	
	Organic ion exchange materials	0	
	Total rubber	0	
	Halogenated rubber	0	
	Non-halogenated rubber	0	
	Hydrocarbons		
	Oil or grease		
	Fuel		
	Asphalt/Tarmac (cont.coal tar)		
	Asphalt/Tarmac (no coal tar)		
	Bitumen		
	Others		
	Other organics	0	
Other materials (%wt):	-		
	Inorganic ion exchange materials.	0	
	Inorganic sludges and flocs	0	
	Soil	0	
	Brick/Stone/Rubble	0	
	Cementitious material	0	
	Sand		
	Glass/Ceramics	0	
	Graphite	0	
	Desiccants/Catalysts		
	Asbestos	0	
	Non/low friable		
	Moderately friable		
	Highly friable		
	Free aqueous liquids	0	
	Free non-aqueous liquids	0	
	Powder/Ash	NE	
Inorganic anions (%wt):	Cl-36 source present in arisings.		

WASTE STREAM 5G04 Winfrith ILW Sources

Fluoride	0
Chloride	TR
Iodide	0
Cyanide	0
Carbonate	0
Nitrate	0
Nitrite	0
Phosphate	0
Sulphate	0
Sulphide	0

Materials of interest for waste acceptance criteria: -

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..... 0

PACKAGING AND CONDITIONING

Conditioning method: Waste will be transferred to Harwell for onward processing via the Solid Waste Complex cells with other ILW streams (likely to be co-packaged with 6C32).

Plant Name: Harwell Head End Cells

Location: Harwell

Plant startup date: -

Total capacity (m³/y incoming waste): -

Target start date for packaging this stream: -

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

Other information: Total volume of sources is very small (~25 litres). Individual sources to be packed with other ILW at Harwell (likely 6C32) within activity limits.

Likely container type:

Container	Waste packaged (%vol)	Waste loading (m³)	Payload (m³)	Number of packages

WASTE STREAM 5G04 Winfrith ILW Sources

Likely container type comment:	Individual sources to be packed with other ILW at Harwell (likely to be 6C32) within activity limits, therefore maximising packaging efficiency.
Range in container waste volume:	-
Other information on containers:	-
Likely conditioning matrix:	
Other information:	-
Conditioned density (t/m³):	-
Conditioned density comment:	-
Other information on conditioning:	-
Opportunities for alternative disposal routing:	

Treatment	Stream volume (%)	Comment
-	-	-

RADIOACTIVITY

Source:	Sources.
Uncertainty:	The remaining arisings are sources, therefore the specific activity is dependent on the recorded volume of these small items. The volume has been estimated in some cases and therefore represents an area of some uncertainty on the specific activity, although the total activity.
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:	Recorded activities for specified sources.
Other information:	Sources in this stream include Cl36, Co60, Sr90, Ba133, Cs137, Pm147, Eu152, Tl204, Ra226, Am241, Am242 sources. The radionuclide activity content of each source is recorded in an inventory list.

WASTE STREAM 5G04 Winfrith ILW Sources

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	3.25E+00	A B 2			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	3.29E-05	A B 2			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	9.59E-03	A B 2		
Mn 54		8			Pb 205		8		
Fe 55	8.28E-06	A B 2			Pb 210	2.08E-01	A B 2		
Co 60	1.77E-01	A B 2			Bi 208		8		
Ni 59		8			Bi 210m		8		
Ni 63		8			Po 210	1.91E-01	A B 2		
Zn 65		8			Ra 223	1.05E-07	A B 2		
Se 79		8			Ra 225	4.2E-09	A B 2		
Kr 81		8			Ra 226	1.24E+00	A B 2		
Kr 85	1.56E-03	A B 2			Ra 228		8		
Rb 87		8			Ac 227	1.07E-07	A B 2		
Sr 90	1.05E-01	A B 2			Th 227	1.05E-07	A B 2		
Zr 93		8			Th 228	2.57E-07	A B 2		
Nb 91		8			Th 229	4.2E-09	A B 2		
Nb 92		8			Th 230		8		
Nb 93m		8			Th 232		8		
Nb 94		8			Th 234	1.28E-06	A B 2		
Mo 93		8			Pa 231	6.17E-07	A B 2		
Tc 97		8			Pa 233	7.49E-05	A B 2		
Tc 99		8			U 232	2.84E-07	A B 2		
Ru 106		8			U 233		8		
Pd 107		8			U 234	1.09E-07	A B 2		
Ag 108m		8			U 235		8		
Ag 110m		8			U 236		8		
Cd 109		8			U 238	1.28E-06	A B 2		
Cd 113m		8			Np 237	7.62E-05	A B 2		
Sn 119m		8			Pu 236		8		
Sn 121m		8			Pu 238	1.2E-08	A B 2		
Sn 123		8			Pu 239	2.26E-05	A B 2		
Sn 126		8			Pu 240		8		
Sb 125	1.55E-06	A B 2			Pu 241		8		
Sb 126		8			Pu 242		8		
Te 125m	3.89E-07	A B 2			Am 241	3.90E+01	A B 2		
Te 127m		8			Am 242m		8		
I 129	1.39E-06	A B 2			Am 243		8		
Cs 134		8			Cm 242		8		
Cs 135		8			Cm 243		8		
Cs 137	7.05E+01	A B 2			Cm 244	2.52E-09	A B 2		
Ba 133	6.82E-05	A B 2			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	5.48E-03	A B 2			Cf 251		8		
Sm 147		8			Cf 252	7.2E-07	A B 2		
Sm 151		8			Other a				
Eu 152	7.43E-03	A B 2			Other b/g				
Eu 154		8			**Total a**	**4.04E+01**	**A B 2**	**0**	
Eu 155		8			**Total b/g**	**7.42E+01**	**A B 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