

WASTE STREAM	5C18/C	Encapsulated ILW Liquors
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Lead.....	0
Magnox/Magnesium.....	0
Nickel.....	
Titanium.....	
Uranium.....	0
Zinc.....	0
Zircaloy/Zirconium.....	0
Other metals.....	0

Uranium and thorium are present, but are incorporated with grout minerals and so not present as pure metals.

Organics (%wt): -

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	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): -

	(%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.....	100.0		
Sand.....			
Glass/Ceramics.....	0		
Graphite.....	0		
Desiccants/Catalysts.....			

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Asbestos.....	0
Non/low friable.....	
Moderately friable.....	
Highly friable.....	
Free aqueous liquids.....	0
Free non-aqueous liquids.....	0
Powder/Ash.....	0

Inorganic anions (%wt): Values given are from sampling and analysis of the liquors, and by taking into account the change in density of the waste following encapsulation.

	(%wt)	Type(s) and comment
Fluoride.....		
Chloride.....	0.10	
Iodide.....		
Cyanide.....		
Carbonate.....		
Nitrate.....	4.0	
Nitrite.....		
Phosphate.....	0.20	
Sulphate.....	0.30	
Sulphide.....		

Materials of interest for waste acceptance criteria: Encapsulated free liquids will not present any non-radiological hazard.

	(%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.....		

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Hazardous substances / non hazardous pollutants: There are no toxic metals present.

	(%wt)	
Acrylamide.....		Type(s) and comment
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): Yes

	(%wt)	
EDTA.....		Type(s) and comment
DPTA.....		
NTA.....		
Polycarboxylic acids.....		
Other organic complexants.....	0.01	The waste contains tributyl phosphate (0.01%)
Total complexing agents.....	0.01	

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Potential for the waste to contain discrete items:

Yes. Grouted drums are considered to be DIs

PACKAGING AND CONDITIONING

Container type:	Container	Waste packaged (%vol)	Waste loading (m ³)	Payload (m ³)	Number of packages
	500 l drum (pre-cast annular)	100.0	0.4	0.4	41

Container type comment:

-

Range in container waste volume:

-

Other information on containers:

-

Conditioned density (t/m³):

2.0

Conditioned density comment:

Weight of conditioned waste in each drum = 772kg. Volume of original waste in each drum = 386 litres. Density range 1.95 to 2.03 t/m³.

Other information on conditioning:

-

RADIOACTIVITY

Source:

-

Uncertainty:

Tritium, mixed fission products, activation products and actinides from MTR operations, laboratory investigations and decontamination operations.

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:

The specific activities have been derived measurements of the liquors. Activity data needs to be reassessed post-2022 UKRWI due to changes noted in Magnox Technical Note 462/TN/1379

Other information:

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5C18/C

Encapsulated ILW Liquors

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	1.11E-03	AA 1			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	3.03E-04	AA 1		
Co 60	2.68E-04	AA 1			Bi 208		8		
Ni 59		8			Bi 210m		8		
Ni 63	3.50E-06	AA 1			Po 210	2.96E-04	AA 1		
Zn 65		8			Ra 223	1.25E-06	BB 2		
Se 79		8			Ra 225		8		
Kr 81		8			Ra 226	7.09E-04	BB 1		
Kr 85		8			Ra 228	1.07E-04	AA 1		
Rb 87		8			Ac 227	1.25E-06	BB 1		
Sr 90	2.23E-03	AA 1			Th 227	1.23E-06	BB 2		
Zr 93		8			Th 228	1.03E-04	BB 1		
Nb 91		8			Th 229		8		
Nb 92		8			Th 230	2.56E-07	BB 2		
Nb 93m		8			Th 232	1.14E-04	BB 1		
Nb 94		8			Th 234	2.48E-03	BB 1		
Mo 93		8			Pa 231	2.89E-06	BB 1		
Tc 97		8			Pa 233	9.92E-08	BB 2		
Tc 99		8			U 232		8		
Ru 106		8			U 233		8		
Pd 107		8			U 234	2.32E-03	BB 1		
Ag 108m		8			U 235	1.14E-04	BB 1		
Ag 110m		8			U 236	1.04E-08	BB 2		
Cd 109		8			U 238	2.48E-03	BB 1		
Cd 113m		8			Np 237	1.00E-07	BB 2		
Sn 119m		8			Pu 236		8		
Sn 121m		8			Pu 238	5.71E-03	BB 1		
Sn 123		8			Pu 239	2.83E-02	BB 1		
Sn 126		8			Pu 240	2.92E-02	BB 1		
Sb 125		8			Pu 241	2.05E-01	AA 1		
Sb 126		8			Pu 242	4.04E-05	BB 1		
Te 125m		8			Am 241	2.79E-02	BB 1		
Te 127m		8			Am 242m		8		
I 129		8			Am 243		8		
Cs 134		8			Cm 242		8		
Cs 135		8			Cm 243		8		
Cs 137	5.18E-02	AA 1			Cm 244	3.91E-04	BB 1		
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	1.77E-05	AA 1			Other b/g				
Eu 154	1.02E-05	AA 1			Total a	9.77E-02	BB 1	0	
Eu 155	4.28E-07	AA 1			Total b/g	2.63E-01	BB 1	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