



**WASTE STREAM**

**9B17/C**

**Miscellaneous Contaminated Items**

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....			
Other ferrous metals.....	43.2	Including redundant pumps, filter pots and catch pans.	
Iron.....			
Aluminium.....	NE		
Beryllium.....	NE		
Cobalt.....			
Copper.....	NE		
Lead.....	NE		
Magnox/Magnesium.....	10.8	Predominantly Vault 4B FED	
Nickel.....			
Titanium.....			
Uranium.....			
Zinc.....	NE		
Zircaloy/Zirconium.....	NE		
Other metals.....	NE		

Organics (%wt):                      Plastics are present in the form of Hoover bags.

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	NE		
Paper, cotton.....	NE		
Wood.....	NE		
Halogenated plastics .....	NE		
Total non-halogenated plastics.....	2.2		
Condensation polymers.....	NE		
Others.....	2.2	Hoover bags	
Organic ion exchange materials....	0		
Total rubber.....	NE		
Halogenated rubber .....	NE		
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):                      -

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	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials..	0		
Inorganic sludges and flocs.....	13.6	Includes ADAP sludge.	
Soil.....	0		
Brick/Stone/Rubble.....	18.4	Gravel	
Cementitious material.....	0		
Sand.....	11.6		
Glass/Ceramics.....	0		
Graphite.....	NE		
Desiccants/Catalysts.....			
Asbestos.....	NE		
Non/low friable.....			
Moderately friable.....			
Highly friable.....			
Free aqueous liquids.....	0		
Free non-aqueous liquids.....	0		
Powder/Ash.....	P		

Inorganic anions (%wt):           None of the listed inorganic anions are expected to be present at greater than 1%.

	(%wt)	Type(s) and comment
Fluoride.....	<1.0	
Chloride.....	<1.0	
Iodide.....	<1.0	
Cyanide.....	0	
Carbonate.....	<1.0	
Nitrate.....	<1.0	
Nitrite.....	<1.0	
Phosphate.....	<1.0	
Sulphate.....	<1.0	
Sulphide.....	<1.0	

Materials of interest for waste acceptance criteria:           No materials likely to pose a fire or other non-radiological hazard have been identified.

	(%wt)	Type(s) and comment
Combustible metals.....	NE	
Low flash point liquids.....	0	
Explosive materials.....	0	
Phosphorus.....	0	
Hydrides.....	0	
Biological etc. materials.....	NE	
Biodegradable materials.....	0	
Putrescible wastes.....	0	
Non-putrescible wastes.....		

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Corrosive materials..... NE  
 Pyrophoric materials..... 0  
 Generating toxic gases..... NE  
 Reacting with water..... NE  
 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.....		

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Complexing agents (%wt): Yes

(%wt) Type(s) and comment

EDTA.....

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 (notably any stainless steel components).

**PACKAGING AND CONDITIONING**

Container type:	Container	Waste packaged (%vol)	Waste loading (m <sup>3</sup> )	Payload (m <sup>3</sup> )	Number of packages
	3m <sup>3</sup> RS box	100.0	2.29	2.29	12

Container type comment: -

Range in container waste volume: -

Other information on containers: The container material is cast iron.

Conditioned density (t/m<sup>3</sup>): 0.31

Conditioned density comment: Average of density from all package records, obtained by dividing waste mass by waste volume in each package.

Other information on conditioning: -

**RADIOACTIVITY**

Source: The waste usually arises from the irradiated fuel handling, active filtration systems and pond operations. Components that have been associated with fuel pond operations and waste from the primary gas circuits are likely to be of high activity.

Uncertainty: Specific activities of all 12 waste packages were determined using gamma spectroscopy and fingerprints. The above values (Tbq/m<sup>3</sup>) are calculated by summing the activity of each package and dividing by the total volume of the waste stream. Due to highly varying ages of ADAP sludge, the method adopted to calculate activity based on fingerprint means activity for some packages cannot be calculated before 2025. See WD/REP/0045/16 Issue 2 for explanation of method.

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: Specific activities of all 12 waste packages were measured and derived using gamma spectroscopy and the application of fingerprints and decayed for RWI 2022.

Other information: -

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**Miscellaneous Contaminated Items**

Nuclide	Mean radioactivity, TBq/m <sup>3</sup>				Nuclide	Mean radioactivity, TBq/m <sup>3</sup>			
	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	5.53E-03	CC 2			Gd 153		8		
Be 10		8			Ho 163	6.43E-09	CC 2		
C 14	3.79E-04	CC 2			Ho 166m	3.63E-07	CC 2		
Na 22		8			Tm 170		8		
Al 26		8			Tm 171	5.87E-09	CC 2		
Cl 36	2.64E-05	CC 2			Lu 174		8		
Ar 39	6.3E-06	CC 2			Lu 176		8		
Ar 42		8			Hf 178n	6.17E-07	CC 2		
K 40	1.23E-08	CC 2			Hf 182		8		
Ca 41	1.72E-04	CC 2			Pt 193	1.10E-03	CC 2		
Mn 53		8			Tl 204	5.38E-07	CC 2		
Mn 54	6.51E-08	CC 2			Pb 205		8		
Fe 55	4.82E-04	CC 2			Pb 210		8		
Co 60	1.44E-03	CC 2			Bi 208	1.35E-04	CC 2		
Ni 59	2.05E-05	CC 2			Bi 210m		8		
Ni 63	1.45E-03	CC 2			Po 210	1.47E-07	CC 2		
Zn 65	5.91E-09	CC 2			Ra 223		8		
Se 79	1.23E-09	CC 2			Ra 225		8		
Kr 81		8			Ra 226		8		
Kr 85	4.36E-07	CC 2			Ra 228		8		
Rb 87		8			Ac 227	1.20E-04	CC 2		
Sr 90	7.76E-04	CC 2			Th 227		8		
Zr 93	1.9E-06	CC 2			Th 228	6.11E-09	CC 2		
Nb 91		8			Th 229		8		
Nb 92		8			Th 230	2.16E-08	CC 2		
Nb 93m	6.18E-04	CC 2			Th 232	9.04E-09	CC 2		
Nb 94	2.03E-06	CC 2			Th 234	2.78E-07	CC 2		
Mo 93	4.2E-07	CC 2			Pa 231		8		
Tc 97		8			Pa 233	2.59E-08	CC 2		
Tc 99	1.27E-05	CC 2			U 232	1.74E-09	CC 2		
Ru 106	2.58E-08	CC 2			U 233	3.45E-09	CC 2		
Pd 107	2.99E-09	CC 2			U 234	7.31E-07	CC 2		
Ag 108m	7.24E-05	CC 2			U 235	1.99E-08	CC 2		
Ag 110m		8			U 236	7.82E-08	CC 2		
Cd 109	2.01E-05	CC 2			U 238	3.87E-07	CC 2		
Cd 113m	1.51E-07	CC 2			Np 237	4.91E-06	CC 2		
Sn 119m		8			Pu 236		8		
Sn 121m	4.92E-06	CC 2			Pu 238	7.52E-05	CC 2		
Sn 123		8			Pu 239	1.18E-04	CC 2		
Sn 126	1.11E-08	CC 2			Pu 240	1.36E-04	CC 2		
Sb 125	5.22E-07	CC 2			Pu 241	2.16E-03	CC 2		
Sb 126	1.74E-09	CC 2			Pu 242	4.06E-07	CC 2		
Te 125m	1.32E-07	CC 2			Am 241	5.18E-04	CC 2		
Te 127m		8			Am 242m	8.24E-07	CC 2		
I 129	1.13E-06	CC 2			Am 243	2.76E-07	CC 2		
Cs 134	1.97E-05	CC 2			Cm 242	1.51E-04	CC 2		
Cs 135	3.76E-08	CC 2			Cm 243	1.06E-07	CC 2		
Cs 137	2.21E-03	CC 2			Cm 244	1.71E-06	CC 2		
Ba 133	1.14E-04	CC 2			Cm 245		8		
La 137	1.3E-08	CC 2			Cm 246		8		
La 138		8			Cm 248		8		
Ce 144	2.88E-09	CC 2			Cf 249		8		
Pm 145		8			Cf 250		8		
Pm 147	3.52E-06	CC 2			Cf 251		8		
Sm 147		8			Cf 252		8		
Sm 151	3.48E-05	CC 2			Other a				
Eu 152	5.79E-06	CC 2			Other b/g				
Eu 154	7.45E-06	CC 2			<b>Total a</b>	<b>1.01E-03</b>	<b>CC 2</b>	<b>0</b>	
Eu 155	5.14E-05	CC 2			<b>Total b/g</b>	<b>1.70E-02</b>	<b>CC 2</b>	<b>0</b>	

**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