

WASTE STREAM

2D12/C

Conditioned MBGW in PFSP

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	23.8		
Other ferrous metals.....	6.3		
Iron.....			
Aluminium.....	0.30		
Beryllium.....	P		
Cobalt.....	0		
Copper.....	NE		
Lead.....			
Magnox/Magnesium.....	4.0		
Nickel.....	2.0		
Titanium.....	0		
Uranium.....	1.4		
Zinc.....	P		
Zircaloy/Zirconium.....	NE		
Other metals.....	P	Antimony, beryllium, lithium/magnesium alloy, nickel/chrome and nickel/aluminium. Weights not available, but all present individually in small quantities. Volumes of materials are difficult to quantify.	

Organics (%wt): Miscellaneous debris in pond may include paper, polythene sheet and bags, cable clips, contaminated clothing, etc. PVC and/or rubber may be present but only in small quantities.

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulosics.....	NE		
Paper, cotton.....	NE		
Wood.....	NE		
Halogenated plastics	NE		
Total non-halogenated plastics.....	NE		
Condensation polymers.....	NE		
Others.....	NE		
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.....	1.3	Magnesium oxide and sludge carryover	
Soil.....	0		
Brick/Stone/Rubble.....	0		
Cementitious material.....	57.1		
Sand.....			
Glass/Ceramics.....			
Graphite.....	3.8		
Desiccants/Catalysts.....			
Asbestos.....	NE		
Non/low friable.....			
Moderately friable.....			
Highly friable.....			
Free aqueous liquids.....	0		
Free non-aqueous liquids.....	0		
Powder/Ash.....	0		

Inorganic anions (%wt): Oxides, aluminate, nitrides. Activation products may include carbide in trace quantities.

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

Materials of interest for waste acceptance criteria: Toxic metals are generally contained in isotope cartridges. However, the integrity of the cartridges is unknown.

	(%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	

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Non-putrescible wastes.....	0
Corrosive materials.....	0
Pyrophoric materials.....	0
Generating toxic gases.....	
Reacting with water.....	
Higher activity particles.....	0
Soluble solids as bulk chemical compounds.....	0

Hazardous substances / -
non hazardous pollutants:

	(%wt)	Type(s) and comment
Acrylamide.....	0	
Benzene.....	0	
Chlorinated solvents.....	0	
Formaldehyde.....	0	
Organometallics.....	0	
Phenol.....	0	
Styrene.....	0	
Tri-butyl phosphate.....	0	
Other organophosphates.....	0	
Vinyl chloride.....	0	Trace in inventory.
Arsenic.....	0	
Barium.....		
Boron.....		
Boron (in Boral).....	0	
Boron (non-Boral).....	0	
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): Not yet determined

	(%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.

PACKAGING AND CONDITIONING

Container type:	Container	Waste packaged (%vol)	Waste loading (m ³)	Payload (m ³)	Number of packages
	500 l drum (basket for waste)	100.0	~0.47	0.47	4

Container type comment: -

Range in container waste volume: Waste container loading will be variable due to variable nature of waste. Have only received 4 drums so far which confirms variable nature of the waste.

Other information on containers: -

Conditioned density (t/m³): 2.55

Conditioned density comment: 1200 kg / 0.47 m³

Other information on conditioning: -

RADIOACTIVITY

Source: Activity originates from Cobalt and other isotope cartridges irradiated in Piles 1 and 2 and Calder reactors, activated fuel stringer and reactor control components. Also components such as bay pond furniture contaminated by fuel and pond water activity. Magnox swarf is now included in this stream.

Uncertainty: The data given is that for the whole MBGW in PFSP stream. The specific activity data has been updated to align with LoC submission for processing inWEP

Definition of total alpha and total beta/gamma: The beta activity is derived from estimates of the known quantities of cobalt and other MBGW that comprise this waste stream.

Measurement of radioactivities: -

Other information: No information on other radionuclides.

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Conditioned MBGW in PFSP

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	3.13E-02	EC 2			Gd 153	1.37E-31	BB 8		
Be 10	5.74E-08	BB 2			Ho 163	1.03E-12	BB 8		
C 14	1.47E-02	EB 2			Ho 166m	2.00E-09	BB 2		
Na 22					Tm 170	9.76E-64	BB 8		
Al 26					Tm 171	4.43E-08	BB 2		
Cl 36	1.36E-06	CB 2			Lu 174	1.38E-25	BB 8		
Ar 39	1.66E-04	CB 2			Lu 176	8.92E-16	BB 8		
Ar 42	5.60E-12	CB 8			Hf 178n	2.83E-15	BB 8		
K 40	1.91E-09	CB 2			Hf 182	1.14E-15	BB 8		
Ca 41	1.09E-05	BB 2			Pt 193	5.13E-08	BB 2		
Mn 53	1.79E-13	CB 8			Tl 204	9.13E-07	BB 2		
Mn 54	1.85E-28	CB 8			Pb 205	3.61E-07	BB 2		
Fe 55	8.03E-04	CB 2			Pb 210	6.12E-08	BB 2		
Co 60	3.75E-01	BB 2			Bi 208	2.03E-13	BB 8		
Ni 59	6.48E-01	CB 2			Bi 210m	3.06E-15	BB 8		
Ni 63	5.54E+01	CB 2			Po 210	7.35E-10	BA 2		
Zn 65					Ra 223	8.05E-09	BA 2		
Se 79	1.72E-06	CB 2			Ra 225	8.41E-13	BA 2		
Kr 81	1.57E-10	CB 8			Ra 226	2.87E-09	BA 2		
Kr 85	7.41E-03	BB 2			Ra 228	1.35E-10	BA 8		
Rb 87	2.02E-07	BB 2			Ac 227	1.15E-08	BA 2		
Sr 90	6.42E-01	BB 2			Th 227	8.05E-09	BA 2		
Zr 93	6.12E-05	BB 2			Th 228	2.79E-09	BA 2		
Nb 91	5.81E-11	BB 8			Th 229	1.26E-11	BA 8		
Nb 92	8.65E-13	BB 8			Th 230	2.30E-07	BA 2		
Nb 93m	2.24E-04	BB 2			Th 232	1.35E-10	BA 8		
Nb 94	1.79E-03	BB 2			Th 234	2.72E-04	BA 2		
Mo 93	1.30E-04	BB 2			Pa 231	2.27E-08	BA 2		
Tc 97	3.50E-10	BB 2			Pa 233	5.37E-07	BA 2		
Tc 99	4.68E-04	BB 2			U 232	1.01E-08	BA 2		
Ru 106	2.78E-10	BB 2			U 233	6.79E-10	BA 8		
Pd 107	1.87E-06	BB 2			U 234	4.33E-04	BA 2		
Ag 108m	2.61E-10	BB 2			U 235	1.83E-05	BA 2		
Ag 110m	2.72E-28	BB 8			U 236	9.72E-06	BA 2		
Cd 109	2.38E-09	BB 2			U 238	4.42E-04	BA 2		
Cd 113m	1.52E-04	BB 2			Np 237	2.16E-06	BA 2		
Sn 119m	1.20E-27	BB 8			Pu 236	4.21E-11	BA 8		
Sn 121m	4.83E-05	BB 2			Pu 238	9.29E-04	BA 2		
Sn 123	5.50E-55	BB 8			Pu 239	6.84E-02	BA 2		
Sn 126	1.55E-05	BB 2			Pu 240	2.13E-02	BA 2		
Sb 125	1.77E-06	BB 2			Pu 241	6.04E-02	BA 2		
Sb 126	5.22E-07	BB 2			Pu 242	1.90E-06	BA 2		
Te 125m	4.43E-09	BB 2			Am 241	3.28E-02	BA 2		
Te 127m	3.78E-64	BB 8			Am 242m	7.59E-06	BA 2		
I 129	8.92E-07	BB 2			Am 243	1.16E-06	BA 2		
Cs 134	7.63E-10	BB 8			Cm 242	1.31E-08	BA 8		
Cs 135	2.49E-05	BB 2			Cm 243	1.81E-07	BA 2		
Cs 137	8.13E-01	BB 2			Cm 244	7.60E-07	BA 2		
Ba 133	2.99E-12	BB 8			Cm 245	6.54E-11	BA 8		
La 137	4.56E-12	BB 8			Cm 246	1.40E-11	BA 8		
La 138	2.88E-13	BB 8			Cm 248	5.69E-27	BA 8		
Ce 144	3.80E-11	BB 8			Cf 249	7.51E-17	BA 8		
Pm 145	5.91E-07	BB 2			Cf 250	2.41E-21	BA 8		
Pm 147	1.48E-06	BB 2			Cf 251	6.23E-23	BA 8		
Sm 147	2.07E-10	BB 2			Cf 252	3.14E-28	BA 8		
Sm 151	2.43E-02	BB 2			Other a		BA 2		
Eu 152	8.54E-06	BB 2			Other b/g		BA 2		
Eu 154	1.38E-04	BB 2			Total a	-2.70E-01	CC 2	0	
Eu 155	2.13E-05	BB 2			Total b/g	-7.03E+03	BB 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