

WASTE STREAM

2F10/C

Encapsulated Centrifuge Cake

	Stainless steel.....	0.50	
	Other ferrous metals.....	0.10	
	Iron.....		
	Aluminium.....		
	Beryllium.....	<0.01	
	Cobalt.....	0	
	Copper.....		
	Lead.....		
	Magnox/Magnesium.....	0	
	Nickel.....		
	Titanium.....	NE	
	Uranium.....	0.20	
	Zinc.....	0	
	Zircaloy/Zirconium.....	0.40	
	Other metals.....	0	
Organics (%wt):	No organic materials are present.		
	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.....	98.8	Includes centrifuge cake carrier liquor.
	Sand.....	0	No added sand in encapsulation grout.

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	Glass/Ceramics.....	0	
	Graphite.....	0	
	Desiccants/Catalysts.....	0	
	Asbestos.....	0	No asbestos present.
	Non/low friable.....		
	Moderately friable.....		
	Highly friable.....		
	Free aqueous liquids.....	0	
	Free non-aqueous liquids.....	0	
	Powder/Ash.....	0	
Inorganic anions (%wt):	Nitrates will be present.		
	Fluoride.....	0	
	Chloride.....	0	
	Iodide.....	0	
	Cyanide.....	0	
	Carbonate.....	0	
	Nitrate.....	P	
	Nitrite.....	0	
	Phosphate.....	0	
	Sulphate.....	0	
	Sulphide.....	0	
Materials of interest for waste acceptance criteria:	Zircaloy fines are present.		
	Combustible metals.....	0	
	Low flash point liquids.....	0	
	Explosive materials.....	0	
	Phosphorus.....	0	
	Hydrides.....		
	Biological etc. materials.....	0	
	Biodegradable materials.....	0	
	Putrescible wastes.....	0	
	Non-putrescible wastes.....	0	
	Corrosive materials.....	0	
	Pyrophoric materials.....	0	
	Generating toxic gases.....	0	
	Reacting with water.....	0	
	Active particles.....	P	Small fraction bound by encapsulation grout.
	Soluble solids as bulk chemical compounds.....	P	Some soluble calcium compounds.

WASTE STREAM**2F10/C****Encapsulated Centrifuge Cake**Hazardous substances /
non hazardous pollutants:

-

Acrylamide.....

Benzene..... 0

Chlorinated solvents.....

Formaldehyde.....

Organometallics.....

Phenol..... 0

Styrene.....

Tri-butyl phosphate..... 0

Other organophosphates.....

Vinyl chloride..... 0

Arsenic..... 0

Barium.....

Boron..... 0

Cadmium..... 0

Caesium.....

Selenium..... 0

Chromium..... P

Small amount in encapsulation
grout.

Molybdenum..... 0

Thallium.....

Tin..... P

Trace amount in encapsulation
grout.

Vanadium..... 0

Mercury compounds.....

Others..... 0

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..... 0

Other organic complexants..... 0

No organic or inorganic
complexing agents are present.

Total complexing agents..... 0

PACKAGING AND CONDITIONING

WASTE STREAM**2F10/C****Encapsulated Centrifuge Cake**

Container	Waste packaged (%vol)	Waste loading (m ³)	Payload (m ³)	Number of packages
500 l drum	100.0	0.472	0.472	1345

Container type comment: Conditioning factor is 1, packaging factor is 1.21.

Range in container waste volume: -

Other information on containers: Stainless steel drum with an in-drum mixing paddle. Drum is fitted with a lid that has a filter fitted.

Conditioned density (t/m³): 1.8

Conditioned density comment: -

Other information on conditioning: Waste is already conditioned.

RADIOACTIVITY

Source: The waste will contain insoluble fission products, insoluble plutonium and fuel in solution.

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: The activities are a combination of measurements and calculated activities, based on characteristics of fuel reprocessed to date for stocks and that still to be reprocessed for arisings.

Other information: -

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Nuclide	Mean radioactivity, TBq/m ³				Nuclide	Mean radioactivity, TBq/m ³			
	Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code		Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code
H 3	3.53E-03	BB 1	6.71E-03	BB 1	Gd 153	1.28E-09	BB 2	3.46E-08	BB 2
Be 10	4.62E-09	BB 2	5.27E-09	BB 2	Ho 163	1.15E-12	BB 2	1.31E-12	BB 2
C 14	9.14E-06	BB 2	8.99E-06	BB 2	Ho 166m	6.77E-08	BB 2	9.23E-08	BB 2
Na 22					Tm 170	4.42E-16	BB 2	2.21E-14	BB 2
Al 26					Tm 171	4.28E-08	BB 2	4.45E-07	BB 2
Cl 36	1.02E-03	BB 2	1.02E-03	BB 2	Lu 174		8		8
Ar 39	1.61E-09	BB 2	1.40E-09	BB 2	Lu 176	1.61E-18	BB 2	1.00E-18	BB 2
Ar 42		8		8	Hf 178n		8		8
K 40	2.83E-12	BB 2	2.39E-12	BB 2	Hf 182	4.51E-17	BB 2	5.30E-17	BB 2
Ca 41	4.30E-08	BB 2	3.57E-08	BB 2	Pt 193		8		8
Mn 53	1.61E-15	BB 2	1.37E-15	BB 2	Tl 204		8		8
Mn 54	1.07E-07	BB 2	2.26E-06	BB 2	Pb 205		5		5
Fe 55	1.35E-01	BB 1	9.72E-01	BB 1	Pb 210	7.40E-08	BB 2	2.93E-12	BB 2
Co 60	1.89E-01	BB 1	6.61E-01	BB 1	Bi 208		8		8
Ni 59	7.40E-06	BB 2	1.19E-05	BB 2	Bi 210m		5		5
Ni 63	1.73E-01	BB 1	2.15E-01	BB 1	Po 210	6.91E-08	BB 2	2.80E-12	BB 2
Zn 65	3.47E-10	BB 2	9.25E-09	BB 2	Ra 223	4.00E-10	BB 2	2.29E-10	BB 2
Se 79	1.28E-06	BB 2	1.46E-06	BB 2	Ra 225	3.04E-09	BB 2	4.06E-12	BB 2
Kr 81	2.77E-12	BB 2	3.32E-12	BB 2	Ra 226	3.77E-07	BB 2	1.86E-11	BB 2
Kr 85	5.29E-02	BB 2	1.25E-01	BB 2	Ra 228	3.82E-10	BB 2	3.01E-15	BB 2
Rb 87	4.77E-10	BB 2	5.44E-10	BB 2	Ac 227	4.03E-10	BB 2	2.28E-10	BB 2
Sr 90	2.44E+00	BB 1	2.86E+00	BB 1	Th 227	3.96E-10	BB 2	2.26E-10	BB 2
Zr 93	4.06E-05	BB 2	4.63E-05	BB 2	Th 228	1.17E-03	BB 2	4.30E-07	BB 2
Nb 91	4.12E-18	BB 2	6.00E-18	BB 2	Th 229	3.07E-09	BB 2	4.06E-12	BB 2
Nb 92	1.29E-16	BB 2	1.46E-16	BB 2	Th 230	6.23E-05	BB 1	1.84E-05	BB 1
Nb 93m	2.61E-05	BB 2	1.93E-05	BB 2	Th 232	4.57E-10	BB 1	5.89E-15	BB 2
Nb 94	1.48E-02	BB 1	7.23E-07	BB 2	Th 234	2.83E-05	BB 2	1.05E-05	BB 2
Mo 93	4.30E-08	BB 2	3.04E-08	BB 2	Pa 231	1.09E-09	BB 2	8.18E-10	BB 2
Tc 97	3.76E-15	BB 2	4.25E-15	BB 2	Pa 233	9.72E-02	BB 2	5.38E-06	BB 2
Tc 99	1.93E-01	BB 1	2.09E-01	BB 1	U 232	1.33E-03	BB 2	4.52E-07	BB 2
Ru 106	1.97E-01	BB 1	3.58E+00	BB 1	U 233	4.77E-06	BB 2	6.35E-10	BB 2
Pd 107	2.04E-06	BB 2	2.33E-06	BB 2	U 234	6.64E-04	BB 1	1.27E-03	BB 1
Ag 108m	2.89E-10	BB 2	3.35E-10	BB 2	U 235	1.73E-06	BB 1	1.45E-06	BB 1
Ag 110m	1.91E-07	BB 2	4.99E-06	BB 2	U 236	1.56E-05	BB 1	1.32E-05	BB 1
Cd 109	4.70E-12	BB 2	6.98E-11	BB 2	U 238	2.84E-05	BB 1	2.24E-05	BB 1
Cd 113m	1.92E-04	BB 2	3.96E-04	BB 2	Np 237	9.77E-02	BB 1	1.07E-01	BB 1
Sn 119m	7.52E-09	BB 2	1.69E-07	BB 2	Pu 236	7.44E-03	BB 1	5.23E-02	BB 1
Sn 121m	4.07E-04	BB 2	5.45E-04	BB 2	Pu 238	1.60E-01	BB 1	1.95E-01	BB 1
Sn 123	3.08E-11	BB 2	1.53E-09	BB 2	Pu 239	3.16E-02	BB 1	3.11E-02	BB 1
Sn 126	6.78E-06	BB 2	7.78E-06	BB 2	Pu 240	5.05E-02	BB 1	5.19E-02	BB 1
Sb 125	4.52E-01	BB 2	3.47E+00	BB 2	Pu 241	2.84E+00	BB 1	4.83E+00	BB 1
Sb 126	9.53E-07	BB 2	2.51E-06	BB 2	Pu 242	1.78E-04	BB 1	2.17E-04	BB 1
Te 125m	1.05E-01	BB 2	5.41E-03	BB 2	Am 241	2.89E-01	BB 1	3.41E-01	BB 1
Te 127m	8.35E-12	BB 2	4.92E-10	BB 2	Am 242m	9.20E-05	BB 2	1.21E-04	BB 2
I 129	6.72E-07	BB 2	7.64E-07	BB 2	Am 243	1.91E-04	BB 2	2.50E-04	BB 2
Cs 134	2.71E-02	BB 1	2.63E-01	BB 1	Cm 242	7.60E-05	BB 1	1.01E-04	BB 2
Cs 135	1.05E-05	BB 2	1.29E-05	BB 2	Cm 243	1.25E-04	BB 1	1.60E-04	BB 1
Cs 137	5.13E+00	BB 1	7.06E+00	BB 1	Cm 244	7.84E-03	BB 1	1.24E-02	BB 1
Ba 133	3.66E-11	BB 2	8.70E-11	BB 2	Cm 245	1.53E-06	BB 2	2.25E-06	BB 2
La 137	6.33E-11	BB 2	7.17E-11	BB 2	Cm 246	2.34E-07	BB 2	3.75E-07	BB 2
La 138	5.36E-15	BB 2	5.97E-15	BB 2	Cm 248	1.28E-12	BB 2	2.33E-12	BB 2
Ce 144	1.27E-03	BB 2	2.92E-02	BB 2	Cf 249	1.15E-11	BB 2	2.22E-11	BB 2
Pm 145	7.04E-12	BB 2	1.38E-11	BB 2	Cf 250	2.55E-11	BB 2	7.53E-11	BB 2
Pm 147	4.55E-02	BB 2	3.61E-01	BB 2	Cf 251	4.17E-13	BB 2	8.32E-13	BB 2
Sm 147	1.65E-10	BB 2	1.78E-10	BB 2	Cf 252	6.15E-13	BB 2	4.95E-12	BB 2
Sm 151	5.73E-03	BB 2	6.77E-03	BB 2	Other a	2.97E-05	BB 2	3.72E-05	BB 2
Eu 152	3.82E-05	BB 2	8.29E-05	BB 2	Other b/g	8.29E-03	BB 2	7.92E-03	BB 2
Eu 154	5.02E-02	BB 1	1.28E-01	BB 1	Total a	6.48E-01	BB 2	7.93E-01	BB 2
Eu 155	3.01E-03	BB 2	1.31E-02	BB 2	Total b/g	1.22E+01	BB 2	2.48E+01	BB 2

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