



<b>WASTE STREAM</b>	<b>2D202/C</b>	<b>Dragon Fuel from Winfrith</b>
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Copper.....	0	
Lead.....	0	
Magnox/Magnesium.....	0	
Nickel.....	0	
Titanium.....		
Uranium.....	0	
Zinc.....	0	
Zircaloy/Zirconium.....	0	
Other metals.....	0.11	Uranium, thorium and zinc are present as only oxides and carbides, but not in elemental form.

Organics (%wt):                      The waste contains no organic materials.

	(%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.....	0		
Oil or grease .....	0		
Fuel.....	0		
Asphalt/Tarmac (cont.coal tar)...	0		
Asphalt/Tarmac (no coal tar)....	0		
Bitumen.....	0		
Others.....	0		
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.....	94.4		
Sand.....	0		
Glass/Ceramics.....	0		
Graphite.....	1.8		100.0

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

Inorganic anions (%wt): -

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

Materials of interest for waste acceptance criteria: -

	(%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.....	0	
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: -

	(%wt)	Type(s) and comment
Acrylamide.....		
Benzene.....		
Chlorinated solvents.....		
Formaldehyde.....		
Organometallics.....		
Phenol.....		
Styrene.....		
Tri-butyl phosphate.....		
Other organophosphates.....		
Vinyl chloride.....		
Arsenic.....		
Barium.....		
Boron.....		
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): No

	(%wt)	Type(s) and comment
EDTA.....		
DPTA.....		
NTA.....		
Polycarboxylic acids.....		
Other organic complexants.....		
Total complexing agents.....	0	

Potential for the waste to contain discrete items: No.

### PACKAGING AND CONDITIONING

Container type:	Container	Waste packaged (%vol)	Waste loading (m <sup>3</sup> )	Payload (m <sup>3</sup> )	Number of packages
	500 l drum	100.0	0.5	0.5	57

Container type comment: 500 l drum for Dragon Fuel has a centralised frame, 0.5m<sup>3</sup>.

Range in container waste volume: -

Other information on containers: Waste per container is 0.034 m<sup>3</sup>.

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

Conditioned density comment: -

Other information on conditioning: -

### RADIOACTIVITY

Source: Irradiation of enriched uranium and U/Th compact fuels.

Uncertainty: Total alpha and beta/gamma activities vary by about three orders of magnitude between cans, and some individual isotopes by more than this.

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: Maximum and minimum activities of each radionuclide in individual cans determined by FISPIN. Average inventories for each isotope assigned to each can transferred, and total divided by the estimated volume of drum payload. Exception U235 and daughters where can-specific activities assigned.

Other information: -

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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	1.24E-02	BB 2			Gd 153				
Be 10	6.31E-08	BB 2			Ho 163				
C 14	6.94E-03	BB 2			Ho 166m				
Na 22					Tm 170				
Al 26					Tm 171				
Cl 36	9.98E-06	BB 2			Lu 174				
Ar 39					Lu 176				
Ar 42					Hf 178n				
K 40					Hf 182				
Ca 41					Pt 193				
Mn 53					Tl 204				
Mn 54					Pb 205				
Fe 55					Pb 210	4.18E-10	BB 2		
Co 60					Bi 208				
Ni 59					Bi 210m				
Ni 63	4.93E-09	BB 2			Po 210	4.03E-10	BB 2		
Zn 65					Ra 223	4.90E-06	BB 2		
Se 79	1.26E-05	BB 2			Ra 225	4.19E-06	BB 2		
Kr 81					Ra 226	1.31E-09	BB 2		
Kr 85					Ra 228	2.41E-06	BB 2		
Rb 87					Ac 227	4.92E-06	BC 2		
Sr 90	1.07E+01	BB 2			Th 227	4.84E-06	BB 2		
Zr 93	6.15E-04	BB 2			Th 228	1.09E-03	BC 2		
Nb 91					Th 229	4.22E-06	BB 2		
Nb 92					Th 230	9.87E-08	BB 2		
Nb 93m	3.37E-04	BB 2			Th 232	2.68E-06	BB 2		
Nb 94	2.01E-08	BB 2			Th 234	8.37E-06	BB 2		
Mo 93					Pa 231	1.08E-05	BB 2		
Tc 97					Pa 233	7.79E-05	BB 2		
Tc 99	4.42E-03	BB 2			U 232	1.07E-03	BB 2		
Ru 106	2.18E-11	BB 2			U 233	4.96E-03	BB 2		
Pd 107	1.33E-05	BB 2			U 234	1.93E-04	BB 2		
Ag 108m					U 235	5.20E-05	BB 2		
Ag 110m					U 236	1.24E-08	BB 2		
Cd 109					U 238	8.37E-06	BB 2		
Cd 113m					Np 237	7.80E-05	BB 2		
Sn 119m					Pu 236				
Sn 121m	6.65E-04	BB 2			Pu 238	3.25E-01	BB 2		
Sn 123					Pu 239	6.99E-02	BB 2		
Sn 126	7.37E-05	BB 2			Pu 240	4.66E-02	BB 2		
Sb 125					Pu 241	3.56E+00	BB 2		
Sb 126	1.03E-05	BB 2			Pu 242	2.22E-04	BB 2		
Te 125m					Am 241	7.73E-01	BB 2		
Te 127m					Am 242m	7.55E-06	BB 2		
I 129	8.70E-06	BB 2			Am 243	1.99E-03	BC 2		
Cs 134	2.60E-05	BB 2			Cm 242	6.23E-06	BC 2		
Cs 135	2.50E-04	BB 2			Cm 243	9.13E-04	BC 2		
Cs 137	1.24E+01	BB 2			Cm 244	5.46E-02	BC 2		
Ba 133					Cm 245				
La 137					Cm 246				
La 138					Cm 248				
Ce 144					Cf 249				
Pm 145					Cf 250				
Pm 147	1.08E-03	BB 2			Cf 251				
Sm 147					Cf 252				
Sm 151	1.79E-01	BB 2			Other a				
Eu 152	8.73E-05	BB 2			Other b/g				
Eu 154	4.93E-02	BB 2			<b>Total a</b>	<b>1.28E+00</b>	<b>BB 2</b>	<b>0</b>	
Eu 155	1.87E-03	BB 2			<b>Total b/g</b>	<b>2.69E+01</b>	<b>BB 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