

WASTE STREAM	2C32	CEGB Cartridges (Bradwell)
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SITE Chapelcross
SITE OWNER Nuclear Decommissioning Authority
WASTE CUSTODIAN Magnox Limited
WASTE TYPE ILW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	0.2 m ³
Total future arisings:		0 m ³
Total waste volume:		0.2 m ³
Comment on volumes:	There will be no further arisings.	
Uncertainty factors on volumes:	Stock (upper): x 1.2	Arisings (upper) x
	Stock (lower): x 0.8	Arisings (lower) x

WASTE SOURCE Dummy cartridges used to irradiate CEGB materials.

PHYSICAL CHARACTERISTICS

General description: Dummy cartridges fabricated from both stainless steel and magnox items used to irradiate CEGB material.
 Physical components (%vol): Mild Steel, Magnox, Stainless steel.
 Sealed sources: -
 Bulk density (t/m³): 4
 Comment on density: Mean density of component materials. Initial estimate and subject to confirmation.

CHEMICAL COMPOSITION

General description and components (%wt): -

Chemical state: Neutral
 Chemical form of radionuclides: H-3: Not determined.
 C-14: Not determined.
 Se-79: Not determined.
 Tc-99: Not determined.
 Ra: Not determined.
 Th: Not determined.
 U: Not determined.
 Np: Not determined.
 Pu: Not determined.

Metals and alloys (%wt): -

Stainless steel.....	~33.3	Dummy cartridges fabricated from both stainless steel and magnox items used to irradiate CEGB material
Other ferrous metals.....	~33.3	Dummy cartridges fabricated from both stainless steel and magnox items used to irradiate CEGB material
Iron.....		
Aluminium.....		
Beryllium.....		
Cobalt.....		
Copper.....		
Lead.....		
Magnox/Magnesium.....	~33.3	Dummy cartridges fabricated from both stainless steel and

magnox items used to irradiate
CEGB material

Nickel.....
Titanium.....
Uranium.....
Zinc.....
Zircaloy/Zirconium.....
Other metals.....

Mild Steel, Magnox, Stainless
steel.

Organics (%wt):

-
Total cellulosics..... 0
 Paper, cotton.....
 Wood.....
Halogenated plastics
Total non-halogenated plastics..... 0
 Condensation polymers.....
 Others.....
Organic ion exchange materials....
Total rubber..... 0
 Halogenated rubber
 Non-halogenated rubber.....
Hydrocarbons.....
 Oil or grease
 Fuel.....
 Asphalt/Tarmac (cont.coal tar)...
 Asphalt/Tarmac (no coal tar)....
 Bitumen.....
 Others.....
Other organics.....

Other materials (%wt):

-
Inorganic ion exchange materials.
Inorganic sludges and flocs.....
Soil.....
Brick/Stone/Rubble.....
Cementitious material.....
Sand.....
Glass/Ceramics.....
Graphite.....
Desiccants/Catalysts.....
Asbestos.....
 Non/low friable.....
 Moderately friable.....
 Highly friable.....
Free aqueous liquids.....

	Free non-aqueous liquids.....
	Powder/Ash.....
Inorganic anions (%wt):	-
	Fluoride.....
	Chloride.....
	Iodide.....
	Cyanide.....
	Carbonate.....
	Nitrate.....
	Nitrite.....
	Phosphate.....
	Sulphate.....
	Sulphide.....
Materials of interest for waste acceptance criteria:	-
	Combustible metals.....
	Low flash point liquids.....
	Explosive materials.....
	Phosphorus.....
	Hydrides.....
	Biological etc. materials.....
	Biodegradable materials.....
	Putrescible wastes.....
	Non-putrescible wastes.....
	Corrosive materials.....
	Pyrophoric materials.....
	Generating toxic gases.....
	Reacting with water.....
	Active particles.....
	Soluble solids as bulk chemical compounds.....
Hazardous substances / non hazardous pollutants:	-
	Acrylamide.....
	Benzene.....
	Chlorinated solvents.....
	Formaldehyde.....
	Organometallics.....
	Phenol.....
	Styrene.....
	Tri-butyl phosphate.....
	Other organophosphates.....
	Vinyl chloride.....

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Arsenic.....
 Barium.....
 Boron.....
 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):

EDTA.....
 DPTA.....
 NTA.....
 Polycarboxylic acids.....
 Other organic complexants.....
 Total complexing agents..... 0

PACKAGING AND CONDITIONING

Conditioning method: -
 Plant Name: -
 Location: -
 Plant startup date: -
 Total capacity (m³/y incoming waste): -
 Target start date for packaging this stream: -
 Throughput for this stream (m³/y incoming waste): -
 Other information: -

Likely container type:

Container	Waste packaged (%vol)	Waste loading (m ³)	Payload (m ³)	Number of packages
500 l drum	100.0	0.2	0.47	1

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Likely container type comment: -

Range in container waste volume: -

Other information on containers: -

Likely conditioning matrix: Not specified

Other information: -

Conditioned density (t/m³): -

Conditioned density comment: -

Other information on conditioning: -

Opportunities for alternative disposal routing:

Treatment	Stream volume (%)	Comment
-	-	-

RADIOACTIVITY

Source: Activation products.

Uncertainty: The waste stream is in-situ and has not as yet been characterised.

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: -

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		8			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		6			Lu 176		8		
Ar 42		8			Hf 178n		8		
K 40		8			Hf 182		8		
Ca 41		6			Pt 193		8		
Mn 53		8			Tl 204		8		
Mn 54		6			Pb 205		8		
Fe 55		6			Pb 210		8		
Co 60		6			Bi 208		8		
Ni 59		6			Bi 210m		8		
Ni 63		6			Po 210		8		
Zn 65		8			Ra 223		8		
Se 79		8			Ra 225		8		
Kr 81		8			Ra 226		8		
Kr 85		8			Ra 228		8		
Rb 87		8			Ac 227		8		
Sr 90		8			Th 227		8		
Zr 93		8			Th 228		8		
Nb 91		8			Th 229		8		
Nb 92		8			Th 230		8		
Nb 93m		6			Th 232		8		
Nb 94		8			Th 234		8		
Mo 93		6			Pa 231		8		
Tc 97		8			Pa 233		8		
Tc 99		8			U 232		8		
Ru 106		8			U 233		8		
Pd 107		8			U 234		8		
Ag 108m		6			U 235		8		
Ag 110m		8			U 236		8		
Cd 109		6			U 238		8		
Cd 113m		6			Np 237		8		
Sn 119m		8			Pu 236		8		
Sn 121m		8			Pu 238		8		
Sn 123		8			Pu 239		8		
Sn 126		8			Pu 240		8		
Sb 125		8			Pu 241		8		
Sb 126		8			Pu 242		8		
Te 125m		8			Am 241		8		
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		8			Cm 244		8		
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		8			Other b/g				
Eu 154		8			Total a	NE		0	
Eu 155		8			Total b/g	NE		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