WASTE STREAM 2C926 Chapelcross Processing Plant Dismantling ILW

SITE Chapelcross

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Magnox Limited

WASTE TYPE ILW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	0 m³
Future arisings -	1.4.2019 - 31.3.2025.....	30.0 m³
Total future arisings:		30.0 m³
Total waste volume:		30.0 m³

Comment on volumes: The four reactors at Chapelcross ceased generating in the period from August 2001 (R1) to February 2004 (R2).

Uncertainty factors on volumes:

Stock (upper):	x	Arisings (upper)	x 1.2
Stock (lower):	x	Arisings (lower)	x 0.8

WASTE SOURCE These wastes arise from clean-out of the Chapelcross Processing Plant.

PHYSICAL CHARACTERISTICS

General description: These wastes arise from clean-out of the Chapelcross Processing Plant and consist of structural concrete and moderate volume plant items.The waste could include large items individually weighing several tonnes.

Physical components (%vol): Structural Concrete (~80%), Plant Items (<20%).

Sealed sources: -

Bulk density (t/m³): ~0.7

Comment on density: Density of 0.7t/m3 is an initial estimate subject to confirmation.

CHEMICAL COMPOSITION

General description and components (%wt): Concrete (~80%), Metal (<20%).

Chemical state: Neutral

Chemical form of radionuclides:
H-3: Tritium is likely to be in the form of tritiated water absorbed into the concrete.
C-14: The chemical form of carbon 14 has not been determined.
Se-79: The chemical form of selenium has not been determined.
Tc-99: The chemical form of technetium has not been determined.
Ra: Radium isotope content is expected to be insignificant.
Th: The thorium content is insignificant.
U: Uranium isotope content is expected to be insignificant.
Np: Neptunium isotope content is expected to be insignificant.
Pu: Chemical form of plutonium isotopes has not been determined but may be plutonium oxides.

Metals and alloys (%wt): This waste stream will contain waste of various sizes and thicknesses.

Stainless steel.....	5.0
Other ferrous metals.....	15.0
Iron.....	
Aluminium.....	0
Beryllium.....	
Cobalt.....	
Copper.....	0
Lead.....	0
Magnox/Magnesium.....	0
Nickel.....	

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	Titanium	
	Uranium	
	Zinc	0
	Zircaloy/Zirconium	0
	Other metals	0
Organics (%wt):	-	
	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	80.0
	Sand	
	Glass/Ceramics	0
	Graphite	0
	Desiccants/Catalysts	
	Asbestos	0
	Non/low friable	
	Moderately friable	
	Highly friable	
	Free aqueous liquids	0
	Free non-aqueous liquids	0
	Powder/Ash	0
Inorganic anions (%wt):	-	

Fluoride	NE
Chloride	NE
Iodide	NE
Cyanide	NE
Carbonate	NE
Nitrate	NE
Nitrite	NE
Phosphate	NE
Sulphate	NE
Sulphide	NE

Materials of interest for waste acceptance criteria: -

Combustible metals	0
Low flash point liquids	0
Explosive materials	0
Phosphorus	0
Hydrides	0
Biological etc. materials	0
Biodegradable materials	
Putrescible wastes	0
Non-putrescible wastes	
Corrosive materials	0
Pyrophoric materials	0
Generating toxic gases	0
Reacting with water	0
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
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): No

EDTA.....

DPTA.....

NTA.....

Polycarboxylic acids……

Other organic complexants.....

Total complexing agents..... 0

PACKAGING AND CONDITIONING

Conditioning method: -

Plant Name: -

Location: Chapelcross

Plant startup date: -

Total capacity (m^3/y incoming waste): -

Target start date for packaging this stream: -

Throughput for this stream (m^3/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	0.375	0.47	80

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Likely container type comment:	-
Range in container waste volume:	-
Other information on containers:	-
Likely conditioning matrix:	
Other information:	-
Conditioned density (t/m³):	NE
Conditioned density comment:	-
Other information on conditioning:	-
Opportunities for alternative disposal routing:	

Treatment	Stream volume (%)	Comment
-	-	-

RADIOACTIVITY

Source:	Activation and contamination of materials.
Uncertainty:	Activity values are current best estimates. Specific activity is a function of operating history. The values are indicative of the activities that would be expected.
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 specific activities have been estimated from the equivalent operational waste stream.
Other information:	-

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Nuclide	Mean radioactivity, TBq/m³				Nuclide	Mean radioactivity, TBq/m³			
	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			5.59E-02	C C 2	Gd 153				8
Be 10				8	Ho 163				8
C 14			1E-05	C C 2	Ho 166m				8
Na 22				8	Tm 170				8
Al 26				8	Tm 171				8
Cl 36				8	Lu 174				8
Ar 39				8	Lu 176				8
Ar 42				8	Hf 178n				8
K 40				8	Hf 182				8
Ca 41				8	Pt 193				8
Mn 53				8	Tl 204				8
Mn 54			3.91E-07	C C 2	Pb 205				8
Fe 55			2.54E-04	C C 2	Pb 210				8
Co 60			1.78E-04	C C 2	Bi 208				8
Ni 59				8	Bi 210m				8
Ni 63				8	Po 210				8
Zn 65			1.11E-06	C C 2	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				8	Th 232				8
Nb 94				8	Th 234				8
Mo 93				8	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				8	U 235				8
Ag 110m			8.68E-09	C C 2	U 236				8
Cd 109			1.12E-06	C C 2	U 238				8
Cd 113m				8	Np 237				8
Sn 119m				8	Pu 236				8
Sn 121m				8	Pu 238			2.08E-07	C C 2
Sn 123				8	Pu 239			2E-07	C C 2
Sn 126				8	Pu 240			3E-07	C C 2
Sb 125				8	Pu 241			1.65E-06	C C 2
Sb 126				8	Pu 242				8
Te 125m				8	Am 241			5.09E-07	C C 2
Te 127m				8	Am 242m				8
I 129				8	Am 243				8
Cs 134			5.21E-07	C C 2	Cm 242			5.99E-09	C C 2
Cs 135				8	Cm 243				8
Cs 137				8	Cm 244			4.29E-07	C C 2
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**	**0**		**1.65E-06**	**C C 2**
Eu 155			1.13E-06	C C 2	**Total b/g**	**0**		**5.64E-02**	**C C 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