

<b>WASTE STREAM</b>	<b>2C35</b>	<b>Tritiated Mercury</b>
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**SITE** Chapelcross

**SITE OWNER** Nuclear Decommissioning Authority

**WASTE CUSTODIAN** Magnox Limited

**WASTE TYPE** ILW

**WASTE VOLUMES**

Stocks:	At 1.4.2019.....	Reported < 0.1 m <sup>3</sup>
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Total future arisings:		0 m <sup>3</sup>
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Total waste volume:		< 0.1 m <sup>3</sup>
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Comment on volumes: There will be no further waste arisings

Uncertainty factors on volumes:	Stock (upper):	x 1.2	Arisings (upper)	x
	Stock (lower):	x 0.8	Arisings (lower)	x

**WASTE SOURCE** Tritium contaminated mercury used as part of tritium processing operations.

**PHYSICAL CHARACTERISTICS**

General description: 35 Litres of tritium contaminated mercury

Physical components (%vol): Liquid Mercury (~100%) with slight organics contamination.

Sealed sources: -

Bulk density (t/m<sup>3</sup>): 11

Comment on density: Literature value

**CHEMICAL COMPOSITION**

General description and components (%wt): Liquid Mercury (~100%) with slight organics contamination.

Chemical state: Neutral

Chemical form of radionuclides:

- H-3: Present in significant quantities
- 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.....	0
Other ferrous metals.....	0
Iron.....	
Aluminium.....	0
Beryllium.....	
Cobalt.....	
Copper.....	0
Lead.....	0
Magnox/Magnesium.....	0
Nickel.....	
Titanium.....	
Uranium.....	
Zinc.....	0

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	Zircaloy/Zirconium.....	0	
	Other metals.....	100.0	Liquid Mercury
Organics (%wt):	-		
	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.....		
	Oil or grease .....		
	Fuel.....		
	Asphalt/Tarmac (cont.coal tar)...		
	Asphalt/Tarmac (no coal tar)....		
	Bitumen.....		
	Others.....		
	Other organics.....	NE	
Other materials (%wt):	-		
	Inorganic ion exchange materials.	0	
	Inorganic sludges and flocs.....	0	
	Soil.....	0	
	Brick/Stone/Rubble.....	0	
	Cementitious material.....	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):	-		

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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:

-	
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.....	

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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 (m<sup>3</sup>/y incoming waste): -  
 Target start date for packaging this stream: -  
 Throughput for this stream (m<sup>3</sup>/y incoming waste): -  
 Other information: -

Likely 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	0.04	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/m<sup>3</sup>): -

Conditioned density comment: -

Other information on conditioning: -

Opportunities for alternative disposal routing:

Treatment	Stream volume (%)	Comment
-	-	-

**RADIOACTIVITY**

Source: Principally tritium contamination from processing operations.

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

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 waste stream is in-situ and has not as yet been characterised. Activities are indicative only.

Other information: -

**WASTE STREAM 2C35 Tritiated Mercury**

Nuclide	Mean radioactivity, TBq/m <sup>3</sup>				Nuclide	Mean radioactivity, TBq/m <sup>3</sup>			
	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	1.81E-03	C C 2			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		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		8			Pb 205		8		
Fe 55		8			Pb 210		8		
Co 60		8			Bi 208		8		
Ni 59		8			Bi 210m		8		
Ni 63		8			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		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			U 236		8		
Cd 109		8			U 238		8		
Cd 113m		8			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			<b>Total a</b>	<b>0</b>			<b>0</b>
Eu 155		8			<b>Total b/g</b>	<b>1.81E-03</b>	<b>C C 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