

<b>WASTE STREAM</b>	<b>2C34</b>	<b>Spark Arrestors</b>
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**SITE** Chapelcross  
**SITE OWNER** Nuclear Decommissioning Authority

**WASTE CUSTODIAN** Magnox Limited

**WASTE TYPE** ILW

Is the waste subject to Scottish Policy: Yes

**WASTE VOLUMES**

		Reported
Stocks:	At 1.4.2022.....	1.5 m <sup>3</sup>
Total future arisings:		0 m <sup>3</sup>
Total waste volume:		1.5 m <sup>3</sup>
Comment on volumes:	There will be no further arisings other than that currently in storage and in-situ within the facility.	
Uncertainty factors on volumes:	Stock (upper): x 1.2	Arisings (upper) x
	Stock (lower): x 0.8	Arisings (lower) x

**WASTE SOURCE** Aluminium spark arresters utilised within CXPP cave-line ventilation system.

**PHYSICAL CHARACTERISTICS**

General description: Aluminium based spark arrester assemblies  
 Physical components (%vol): Aluminium, elastomer seals  
 Sealed sources: The waste does not contain sealed sources.  
 Bulk density (t/m<sup>3</sup>): 0.5  
 Comment on density: Density of 0.5t/m<sup>3</sup> is an initial estimate and subject to confirmation.

**CHEMICAL COMPOSITION**

General description and components (%wt): Aluminium, elastomer seals  
 Chemical state: Neutral  
 Chemical form of radionuclides:  
 H-3: Present  
 C-14: Present  
 Se-79: Not present  
 Tc-99: Not present  
 Ra: Not present  
 Th: Present: Trace quantities  
 U: Present: Trace quantities  
 Np: Not present  
 Pu: Present: Trace quantities  
 Metals and alloys (%wt): -

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	NE		
Other ferrous metals.....	NE		
Iron.....			
Aluminium.....	~90.0	Aluminium	100.0
Beryllium.....			
Cobalt.....			
Copper.....	NE		
Lead.....			
Magnox/Magnesium.....	NE		

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

Organics (%wt): -

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	0		
Paper, cotton.....			
Wood.....			
Halogenated plastics .....			
Total non-halogenated plastics.....	0		
Condensation polymers.....			
Others.....			
Organic ion exchange materials....			
Total rubber.....	10.0		
Halogenated rubber .....			
Non-halogenated rubber.....	~10.0	elastomer seals	
Hydrocarbons.....			
Oil or grease .....			
Fuel.....			
Asphalt/Tarmac (cont.coal tar)...			
Asphalt/Tarmac (no coal tar)....			
Bitumen.....			
Others.....			
Other organics.....			

Other materials (%wt): -

	(%wt)	Type(s) and comment	% of total C14 activity
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): -

(%wt) Type(s) and comment

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

Materials of interest for waste acceptance criteria: -

(%wt) Type(s) and comment

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.....  
 Higher activity particles.....  
 Soluble solids as bulk chemical compounds.....

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):

(%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. In & of itself not a DI; waste stream may include DIs (notably any stainless steel components)

**PACKAGING AND CONDITIONING**

Conditioning method:      -  
 Plant Name:      -  
 Location:      Chapelcross.  
 Plant startup date:      -

**WASTE STREAM****2C34****Spark Arrestors**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	0.125	0.47	12

Likely container type comment: -

Range in container waste volume: -

Other information on containers: -

Likely conditioning matrix: Other information: -

Conditioned density (t/m<sup>3</sup>): 0.5

Conditioned density comment: -

Other information on conditioning: -

Opportunities for alternative disposal routing: -

Baseline Management Route	Opportunity Management Route	Stream volume (%)	Estimated Date that Opportunity will be realised	Opportunity Confidence	Comment
-	-	-	-	-	-

**RADIOACTIVITY**

Source: Principally tritium contamination from processing operations.

Uncertainty: Radionuclide inventory determined through active sampling and assessment.

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: Radionuclide inventory determined through active sampling and assessment.

Other information: -

**WASTE STREAM 2C34 Spark Arrestors**

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	1.53E+00	CC 2			Gd 153		8		
Be 10		8			Ho 163		8		
C 14	4.00E-06	CC 2			Ho 166m		8		
Na 22		8			Tm 170		8		
Al 26		8			Tm 171		8		
Cl 36	3E-06	CC 2			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	2.36E-05	CC 2			Pb 210		8		
Co 60	6.18E-06	CC 2			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	6E-08	CC 2			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	1E-09	CC 2		
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	1E-09	CC 2		
Cd 113m		8			Np 237		8		
Sn 119m		8			Pu 236		8		
Sn 121m		8			Pu 238		8		
Sn 123		8			Pu 239	5E-08	CC 2		
Sn 126		8			Pu 240		8		
Sb 125		8			Pu 241		8		
Sb 126		8			Pu 242		8		
Te 125m		8			Am 241	9.81E-09	CC 2		
Te 127m		8			Am 242m		8		
I 129		8			Am 243		8		
Cs 134	3.56E-08	CC 2			Cm 242		8		
Cs 135		8			Cm 243		8		
Cs 137	6.83E-07	CC 2			Cm 244		8		
Ba 133	9.11E-08	CC 2			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	4.85E-07	CC 2			Other b/g				
Eu 154	1.91E-08	CC 2			<b>Total a</b>	<b>6.08E-08</b>	<b>CC 2</b>	<b>0</b>	
Eu 155		8			<b>Total b/g</b>	<b>1.53E+00</b>	<b>CC 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