



**WASTE STREAM****3L17****Gas Circulator Maintenance Sludge**

	Titanium.....	NE
	Uranium.....	NE
	Zinc.....	TR
	Zircaloy/Zirconium.....	0
	Other metals.....	NE
Organics (%wt):	Oil and grease may be present.	
	Total cellulosics.....	NE
	Paper, cotton.....	
	Wood.....	
	Halogenated plastics .....	TR
	Total non-halogenated plastics.....	TR
	Condensation polymers.....	TR
	Others.....	TR
	Organic ion exchange materials....	0
	Total rubber.....	0
	Halogenated rubber .....	0
	Non-halogenated rubber.....	0
	Hydrocarbons.....	NE
	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.....	~100.0
	Soil.....	0
	Brick/Stone/Rubble.....	0
	Cementitious material.....	0
	Sand.....	0
	Glass/Ceramics.....	0
	Graphite.....	0
	Desiccants/Catalysts.....	0
	Asbestos.....	0
	Non/low friable.....	
	Moderately friable.....	
	Highly friable.....	
	Free aqueous liquids.....	0
	Free non-aqueous liquids.....	0
	Powder/Ash.....	0
Inorganic anions (%wt):	Only trace quantities expected.	

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

Materials of interest for waste acceptance criteria:

Expect only trace quantities if any.

Combustible metals.....	0
Low flash point liquids.....	0
Explosive materials.....	0
Phosphorus.....	0
Hydrides.....	0
Biological etc. materials.....	NE
Biodegradable materials.....	NE
Putrescible wastes.....	
Non-putrescible wastes.....	0
Corrosive materials.....	0
Pyrophoric materials.....	0
Generating toxic gases.....	
Reacting with water.....	0
Active particles.....	P
Soluble solids as bulk chemical compounds.....	0

May be present

Hazardous substances / non hazardous pollutants:

-	
Acrylamide.....	NE
Benzene.....	NE
Chlorinated solvents.....	NE
Formaldehyde.....	NE
Organometallics.....	NE
Phenol.....	NE
Styrene.....	NE
Tri-butyl phosphate.....	NE
Other organophosphates.....	NE
Vinyl chloride.....	NE
Arsenic.....	NE
Barium.....	NE
Boron.....	NE

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Cadmium..... NE  
 Caesium..... NE  
 Selenium..... NE  
 Chromium..... NE  
 Molybdenum..... NE  
 Thallium..... NE  
 Tin..... NE  
 Vanadium..... NE  
 Mercury compounds..... NE  
 Others..... NE  
 Electronic Electrical Equipment (EEE)  
 EEE Type 1..... 0  
 EEE Type 2..... 0  
 EEE Type 3..... 0  
 EEE Type 4..... 0  
 EEE Type 5..... 0

Complexing agents (%wt):

Not yet determined

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

Expect only trace quantities, if any.

**PACKAGING AND CONDITIONING**

Conditioning method: The waste is expected to be encapsulated probably in a BFS/OPC matrix. Another approach being kept under review is (i) to dry the sludge (ii) to supercompact drums of dry sludge (iii) to grout the supercompacted drums in an "enhanced" drum.

Plant Name: None.

Location: Heysham 1 Power Station.

Plant startup date: Probably between 2019 and 2029.

Total capacity (m<sup>3</sup>/y incoming waste): ~175.0

Target start date for packaging this stream: -

Throughput for this stream (m<sup>3</sup>/y incoming waste): -

Other information: All waste in a tank will be retrieved when a conditioning campaign is undertaken. There may be more than one campaign.

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	~0.33	0.47	6

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Likely container type comment: -

Range in container waste volume: -

Other information on containers: The container material is expected to be stainless steel.

Likely conditioning matrix: BFS/OPC  
Other information: The matrix is expected to be 9:1 BFS/OPC.

Conditioned density (t/m<sup>3</sup>): ~2.0  
Conditioned density comment: The conditioned density range is not estimated.

Other information on conditioning: Appropriate plant to be provided at the Station in accordance with strategy.

Opportunities for alternative disposal routing: No

Treatment	Stream volume (%)	Comment
-	-	-

**RADIOACTIVITY**

Source: Contaminated sludge. Contamination by activation products will be the main source of activity.

Uncertainty: As the activity data is not currently assessed, the waste is expected to be ILW but may fall into the LLW category. This will need further assessment in the future.

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: Not yet assessed.

Other information: Specific activity will be a function of station operating history.

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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		6		6	Gd 153				
Be 10		8		8	Ho 163				
C 14		8		8	Ho 166m				
Na 22		4		4	Tm 170				
Al 26		4		4	Tm 171				
Cl 36		6		6	Lu 174				
Ar 39					Lu 176				
Ar 42					Hf 178n				
K 40					Hf 182				
Ca 41		8		8	Pt 193				
Mn 53					Tl 204				
Mn 54		6		6	Pb 205				
Fe 55		6		6	Pb 210	8			8
Co 60		6		6	Bi 208				
Ni 59		6		6	Bi 210m				
Ni 63		6		6	Po 210	8			8
Zn 65		6		6	Ra 223				
Se 79		8		8	Ra 225				
Kr 81					Ra 226	8			8
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90		8		8	Th 227				
Zr 93		8		8	Th 228				
Nb 91					Th 229	8			8
Nb 92					Th 230	8			8
Nb 93m		8		8	Th 232	8			8
Nb 94		8		8	Th 234				
Mo 93		8		8	Pa 231	8			8
Tc 97					Pa 233				
Tc 99		8		8	U 232				
Ru 106		8		8	U 233	8			8
Pd 107		8		8	U 234	8			8
Ag 108m		8		8	U 235	8			8
Ag 110m					U 236	8			8
Cd 109					U 238	8			8
Cd 113m					Np 237	8			8
Sn 119m					Pu 236				
Sn 121m		8		8	Pu 238	8			8
Sn 123					Pu 239	8			8
Sn 126		8		8	Pu 240	8			8
Sb 125					Pu 241	8			8
Sb 126					Pu 242	8			8
Te 125m					Am 241	8			8
Te 127m					Am 242m	8			8
I 129		8		8	Am 243	8			8
Cs 134		6		6	Cm 242	8			8
Cs 135		8		8	Cm 243	8			8
Cs 137		6		6	Cm 244	8			8
Ba 133					Cm 245	8			8
La 137					Cm 246	8			8
La 138					Cm 248				
Ce 144		8		8	Cf 249				
Pm 145					Cf 250				
Pm 147		8		8	Cf 251				
Sm 147					Cf 252				
Sm 151		8		8	Other a				
Eu 152		8		8	Other b/g				
Eu 154		8		8	<b>Total a</b>	<b>NE</b>	<b>8</b>	<b>NE</b>	<b>8</b>
Eu 155		8		8	<b>Total b/g</b>	<b>NE</b>	<b>7</b>	<b>NE</b>	<b>7</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