WASTE STREAM 3L17 Gas Circulator Maintenance Sludge

SITE	Heysham 1
SITE OWNER	EDFE NGL
WASTE CUSTODIAN	EDFE NGL
WASTE TYPE	LLW; SPD1
Is the waste subject to Scottish Policy:	No

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2022.....	1.5 m³
Future arisings -	1.4.2022 - 31.3.2024.....	0.3 m³
	1.4.2024 - 31.3.2026.....	0.2 m³
Total future arisings:		0.5 m³
Total waste volume:		2.0 m³

Comment on volumes: Waste volumes will be variable depending on station operating conditions.

Uncertainty factors on volumes:

Stock (upper):	x 1.5	Arisings (upper)	x 1.5
Stock (lower):	x 0.5	Arisings (lower)	x 0.5

WASTE SOURCE Sludge arising from Gas Circulator Maintenance.

PHYSICAL CHARACTERISTICS

General description: Sludge, sand and pre-coat materials. There are no large items that may require special handling.

Physical components (%vol): Sludge (100% vol). No other items identified. The breakdown of the components constituting the sludge has not been assessed.

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): ~2

Comment on density: -

CHEMICAL COMPOSITION

General description and components (%wt): Sludge (100% vol). No other items identified. The breakdown of the components constituting the sludge has not been assessed.

Chemical state: -

Chemical form of radionuclides:
H-3: Not Assessed
C-14: Not Assessed
Cl-36: Not Assessed
Se-79: Not Assessed
Tc-99: Not Assessed
I-129: Not Assessed
Ra: Not Assessed
Th: Not Assessed
U: Not Assessed
Np: Not Assessed
Pu: Not Assessed

Metals and alloys (%wt): Trace quantities expected as particulate.

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	TR		
Other ferrous metals.....	TR		
Iron.....	TR		
Aluminium.....	TR		
Beryllium.....	NE		
Cobalt.....	NE		

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Copper	TR
Lead	TR
Magnox/Magnesium	0
Nickel	NE
Titanium	NE
Uranium	NE
Zinc	TR
Zircaloy/Zirconium	0
Other metals	NE

Organics (%wt): Oil and grease may be present.

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

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

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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.

	(%wt)	Type(s) and comment
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.

	(%wt)	Type(s) and comment
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	
Higher activity particles	P	May be present
Soluble solids as bulk chemical compounds	0	

Hazardous substances / non hazardous pollutants: -

	(%wt)	Type(s) and comment
Acrylamide	NE	

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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
Boron (in Boral)	NE
Boron (non-Boral)	NE
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

	(%wt)	Type(s) and comment
EDTA	NE	
DPTA	NE	
NTA	NE	
Polycarboxylic acids	NE	
Other organic complexants	NE	Expect only trace quantities, if any.
Total complexing agents	TR	

Potential for the waste to contain discrete items: No.

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TREATMENT, PACKAGING AND DISPOSAL

Planned on-site / off-site treatment(s):

Treatment	On-site / Off site	Stream volume %
Low force compaction Supercompaction (HFC) Incineration Solidification Decontamination Metal treatment Size reduction Decay storage Recyling / reuse Other / various None	Off-site	100.0

Comment on planned treatments: Treatment is expected to be same as the equivalent waste stream at Hartlepool Power Station, where a preliminary characterisation campaign showed this as incinerable.

Disposal Routes:

Disposal Route	Stream volume %	Disposal density t/m3
Expected to be consigned to the LLW Repository Expected to be consigned to a Landfill Facility Expected to be consigned to an On-Site Disposal Facility Expected to be consigned to an Incineration Facility Expected to be consigned to a Metal Treatment Facility Expected to be consigned as Out of Scope Expected to be recycled / reused Disposal route not known	100.0	

Classification codes for waste expected to be consigned to a landfill facility: -

Upcoming (2022/23-2024/25) Waste Routing (if expected to change from above):

Disposal Route	Stream volume %		
	2022/23	2023/24	2024/25
Expected to be consigned to the LLW Repository Expected to be consigned to a Landfill Facility Expected to be consigned to an On-Site Disposal Facility Expected to be consigned to an Incineration Facility Expected to be consigned to a Metal Treatment Facility Expected to be consigned as Out of Scope Expected to be recycled / reused Disposal route not known			

Opportunities for alternative disposal routing: -

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

Waste Packaging for Disposal: (Not applicable to this waste stream)

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Container	Stream volume %	Waste loading m³	Number of packages
1/3 Height IP-1 ISO			
2/3 Height IP-2 ISO			
1/2 Height WAMAC IP-2 ISO			
1/2 Height IP-2 Disposal/Re-usable ISO			
2m box (no shielding)			
4m box (no shielding)			
Other			

Other information: -

Waste Planned for Disposal at the LLW Repository: (Not applicable to this waste stream)

Container voidage: -

Waste Characterisation Form (WCH): -

Waste consigned for disposal to LLWR in year of generation: -

Non-Containerised Waste for In-Vault Grouting: (Not applicable to this waste stream)

Stream volume (%): -

Waste stream variation: -

Bounding cuboidal volume:

Inaccessible voidage: -

Other information: -

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/m³				Nuclide	Mean radioactivity, TBq/m³			
	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		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	**Total a**	**NE**	**8**	**NE**	**8**
Eu 155		8		8	**Total b/g**	**NE**	**7**	**NE**	**7**

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