WASTE STREAM 3K29 Bypass Blowdown Filters

SITE	Hartlepool
SITE OWNER	EDFE NGL
WASTE CUSTODIAN	EDFE NGL
WASTE TYPE	ILW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	10.0 m³
Future arisings -	1.4.2019 - 31.3.2024.....	9.5 m³
Total future arisings:		9.5 m³
Total waste volume:		19.5 m³

Comment on volumes: 5 filter assemblies estimated to be generated per year of operations.

Uncertainty factors on volumes:				
	Stock (upper):	x 1.25	Arisings (upper)	x 1.75
	Stock (lower):	x 0.75	Arisings (lower)	x 0.25

WASTE SOURCE Filters remove particulate from the primary coolant circuit and are replaced when differential pressure rises above a certain level and backflushing is ineffective.

PHYSICAL CHARACTERISTICS

General description: Each filter assembly consists of 19 stainless steel filter elements attached to a stainless steel tubesheet. The filter elements have sintered stainless steel metal fibre filter elements. The assemblies are approximately 0.6m in diameter and 1.3m in length, equating to a volume of 0.38m3. The assemblies weigh 220kg.

Physical components (%wt): Stainless steel (~100%)

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): ~0.6

Comment on density: Based on filter volume and mass.

CHEMICAL COMPOSITION

General description and components (%wt): Filter assemblies are made entirely of stainless steel, however, small quantities of debris (spalled oxides, carbonaceous debris) will be present in the waste.

Chemical state: Neutral

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

Metals and alloys (%wt): 100% bulk items.

Stainless steel.....	~100.0
Other ferrous metals.....	TR
Iron.....	0
Aluminium.....	0
Beryllium.....	0
Cobalt.....	0
Copper.....	0
Lead.....	0
Magnox/Magnesium.....	0

WASTE STREAM	3K29 Bypass Blowdown Filters	
	Nickel	0
	Titanium	0
	Uranium	0
	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	NE
	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	0
	Sand	0
	Glass/Ceramics	
	Graphite	TR
	Desiccants/Catalysts	0
	Asbestos	0
	Non/low friable	
	Moderately friable	
	Highly friable	
	Free aqueous liquids	0
	Free non-aqueous liquids	0
	Powder/Ash	0

WASTE STREAM	3K29	Bypass Blowdown Filters

Inorganic anions (%wt):	-		
	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	0	
	Putrescible wastes	0	
	Non-putrescible wastes	0	
	Corrosive materials	0	
	Pyrophoric materials	0	
	Generating toxic gases	0	
	Reacting with water	0	
	Active particles	P	May be present
	Soluble solids as bulk chemical compounds	0	
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

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): No

EDTA..... NE

DPTA..... NE

NTA..... NE

Polycarboxylic acids…… NE

Other organic complexants..... NE

Total complexing agents..... NE

LAW TREATMENT, PACKAGING AND DISPOSAL

Waste that is currently ILW: Waste is ILW but will be decay stored to become LLW. The time taken for the waste to become LLW is varied.

Planned on-site / off-site treatments(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	On-site	100.0

Comment on planned treatments: -

WASTE STREAM 3K29 Bypass Blowdown Filters

Disposal Routes:

Disposal Route	Stream volume %
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

Upcoming (2019/20-2021/22) waste routing (if expected to change from above)

Disposal Route	Stream volume %		
	2019/20	2020/21	2021/22
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			

Waste Packaging for Disposal:

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	100.0	~11.2	2

Other information: Wastes likely to be packaged with other LLW in order to optimise waste loading. Any filters that cannot be decayed or decontaminated such that they meet the WAC for disposal at LLWR will be managed as ILW along with MCI wastes (3K03). PF 1.32 assumed.

Waste Consigned to the LLW Repository:

Container voidage: -

Waste Characterisation Form (WCH): The waste does not meet the LLWR's Waste Acceptance Criteria (WAC).

Awaiting decay storage to radionuclide activity levels suitable for disposal to LLWR.

Waste consigned for disposal to LLWR in year of generation: No. Stored safely for decay storage prior to disposal.

Potential for the waste to contain discrete items: Yes

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

Stream volume (%): -

Waste stream variation: -

Bounding cuboidal volume:

WASTE STREAM 3K29 Bypass Blowdown Filters

Inaccessible voidage:	-
Other information:	-

RADIOACTIVITY

Source:	Contamination by activation products will be the main source of activity.
Uncertainty:	Specific activity is a function of station operating history. The values quoted are indicative of the activities that might 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:	A combination of sample analysis and theoretical assessments. The specific activities stated for future arisings are typical values for a filter at the time of arising.
Other information:	-

WASTE STREAM 3K29 Bypass Blowdown Filters

Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code	Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code
H 3	2.21E-03	C C 2	2.92E-03	C C 2	Gd 153				
Be 10					Ho 163				
C 14	1.65E-04	C C 2	1.65E-04	C C 2	Ho 166m				
Na 22		4		4	Tm 170				
Al 26		4		4	Tm 171				
Cl 36	5.65E-04	C C 2	5.65E-04	C C 2	Lu 174				
Ar 39					Lu 176				
Ar 42					Hf 178n				
K 40					Hf 182				
Ca 41					Pt 193				
Mn 53					Tl 204				
Mn 54	6.91E-05	C C 2	3.97E-03	C C 2	Pb 205				
Fe 55	3.12E-03	C C 2	1.12E-02	C C 2	Pb 210				
Co 60	7.14E-04	C C 2	1.38E-03	C C 2	Bi 208				
Ni 59					Bi 210m				
Ni 63	1.41E-03	C C 2	1.46E-03	C C 2	Po 210				
Zn 65	2.29E-07	C C 2	4.08E-05	C C 2	Ra 223				
Se 79					Ra 225				
Kr 81					Ra 226				
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90	6.11E-07	C C 2	6.88E-07	C C 2	Th 227				
Zr 93					Th 228				
Nb 91					Th 229				
Nb 92					Th 230				
Nb 93m					Th 232				
Nb 94	2.34E-06	C C 2	2.34E-06	C C 2	Th 234				
Mo 93					Pa 231				
Tc 97					Pa 233				
Tc 99					U 232				
Ru 106	3.03E-07	C C 2	9.38E-06	C C 2	U 233				
Pd 107					U 234	1.03E-09	C C 2	1.03E-09	C C 2
Ag 108m	2.32E-06	C C 2	2.34E-06	C C 2	U 235	1.64E-11	C C 2	1.64E-11	C C 2
Ag 110m	5.70E-09	C C 2	9.04E-07	C C 2	U 236	2.63E-10	C C 2	2.63E-10	C C 2
Cd 109					U 238	3.06E-10	C C 2	3.06E-10	C C 2
Cd 113m					Np 237				
Sn 119m					Pu 236				
Sn 121m					Pu 238	5.01E-07	C C 2	5.22E-07	C C 2
Sn 123					Pu 239		6		6
Sn 126					Pu 240	<1.55E-06	C 3	<1.55E-06	C 3
Sb 125	7.09E-06	C C 2	2.52E-05	C C 2	Pu 241	7.44E-04	C C 2	9.46E-04	C C 2
Sb 126					Pu 242				
Te 125m					Am 241	1.18E-06	C C 2	1.19E-06	C C 2
Te 127m					Am 242m				
I 129	2.37E-11	C C 2	2.37E-11	C C 2	Am 243				
Cs 134	3.28E-06	C C 2	1.76E-05	C C 2	Cm 242	9.69E-11	C C 2	2.29E-07	C C 2
Cs 135					Cm 243		6		6
Cs 137	7.59E-05	C C 2	8.52E-05	C C 2	Cm 244	<6.53E-09	C 3	<7.33E-09	C 3
Ba 133					Cm 245				
La 137					Cm 246				
La 138					Cm 248				
Ce 144	3.71E-08	C C 2	3.15E-06	C C 2	Cf 249				
Pm 145					Cf 250				
Pm 147	4.09E-06	C C 2	1.53E-05	C C 2	Cf 251				
Sm 147					Cf 252				
Sm 151					Other a		8		8
Eu 152	3.72E-06	C C 2	4.82E-06	C C 2	Other b/g	2.41E-06	C C 2	5.21E-02	C C 2
Eu 154	2.95E-06	C C 2	4.41E-06	C C 2	**Total a**	**3.24E-06**	**C C 2**	**3.50E-06**	**C C 2**
Eu 155	2.33E-06	C C 2	4.69E-06	C C 2	**Total b/g**	**9.10E-03**	**C C 2**	**7.50E-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