WASTE STREAM 3K28 Miscellaneous Activated Components - Tie Bar Ends & Nuts

SITE Hartlepool

SITE OWNER EDFE NGL

WASTE CUSTODIAN EDFE NGL

WASTE TYPE ILW; SPD3

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	1.8 m³
Future arisings -	1.4.2019 - 31.3.2024.....	0.5 m³
	1.4.2024 - 31.3.2026.....	0.4 m³
Total future arisings:		0.9 m³
Total waste volume:		2.7 m³

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

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 Metallic components resulting from the dismantling of fuel element stringers.

PHYSICAL CHARACTERISTICS

General description: Tie bar ends and nuts. Some other components may be present. No large items are expected.

Physical components (%vol): ~100% Tie bar ends and nuts

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): ~0.5

Comment on density: -

CHEMICAL COMPOSITION

General description and components (%wt): Mainly stainless steel. Some nimonic alloy will also be present. Percentage breakdown not estimated.

Chemical state: Neutral

Chemical form of radionuclides: -

Metals and alloys (%wt): -

Stainless steel.....	NE
Other ferrous metals.....	NE
Iron.....	NE
Aluminium.....	
Beryllium.....	0
Cobalt.....	0
Copper.....	0
Lead.....	0
Magnox/Magnesium.....	0
Nickel.....	NE
Titanium.....	0
Uranium.....	0
Zinc.....	0
Zircaloy/Zirconium.....	0
Other metals.....	0

WASTE STREAM	3K28	Miscellaneous Activated Components - Tie Bar Ends & Nuts

Organics (%wt):	Other organics to be further assessed.	
	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	
	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	0
	Glass/Ceramics	
	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):	Not estimated but not expected to be present at greater than 1%wt.	

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

Materials of interest for waste acceptance criteria: None expected.

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
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): Not yet determined		
EDTA	NE	
DPTA	NE	
NTA	NE	
Polycarboxylic acids	NE	
Other organic complexants	NE	Expect only trace quantities, if any.
Total complexing agents	NE	

PACKAGING AND CONDITIONING

Conditioning method: The waste will be conditioned to satisfy the disposal requirements which are effective at the time of retrieval/conditioning. It is currently assumed that the waste will be placed in "baskets" in the waste packages and will be encapsulated.

Plant Name: None.

Location: Hartlepool power station

Plant startup date: ~2109

Total capacity (m^3/y incoming waste): -

Target start date for packaging this stream: -

Throughput for this stream (m^3/y incoming waste): -

Other information: All of the waste is expected to be retrieved and conditioned when a conditioning campaign is undertaken. The total plant process rate is not estimated.

Likely container type:

Container	Waste packaged (%vol)	Waste loading (m^3)	Payload (m^3)	Number of packages
4m box (100mm concrete shielding)	100.0	~12.2	~14.3	< 1

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Likely container type comment:	-
Range in container waste volume:	-
Other information on containers:	Stainless steel.
Likely conditioning matrix:	BFS/OPC
Other information:	-
Conditioned density (t/m³):	~2.5
Conditioned density comment:	The density of the encapsulated waste is expected to be approximately 2.5 t/m³.
Other information on conditioning:	Waste will be retained on site pending Final Site Clearance, to let nuclides such as Co-60 undergo considerable radioactive decay. Baskets of different Final Site Clearance ILW wastes may be in the same waste package.
Opportunities for alternative disposal routing:	No

Treatment	Stream volume (%)	Comment
-	-	-

RADIOACTIVITY

Source:	Activation of nuclides within the steel will be the main sources 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:	Theoretical assessments.
Other information:	Estimates have been based on theoretical assessments. Other beta/gamma nuclides (in TBq/m³) in arisings and stocks include: - S35 (6E-1, 8E-3); Ca45 (1E+0, 3E-2); Cr51 (2E+4, 1E+1); Co58 (1E+3, 9E+0); Zr95 (6E-1, 5E-3); Nb95 (1E+1, 1E-2); Sc46 (1E-1, 1E-3) and Fe59 (2E+2, 7E-1).

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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	1E-06	D D 2	2E-06	D D 2	Gd 153				
Be 10	1E-09	D D 2	1E-09	D D 2	Ho 163				
C 14	3E-06	D D 2	3E-06	D D 2	Ho 166m				
Na 22		4		4	Tm 170				
Al 26		4		4	Tm 171				
Cl 36	7E-05	D D 2	7E-05	D D 2	Lu 174				
Ar 39					Lu 176				
Ar 42					Hf 178n				
K 40					Hf 182				
Ca 41	7E-04	D D 2	7E-04	D D 2	Pt 193				
Mn 53					Tl 204				
Mn 54	6E+00	D D 2	1E+02	D D 2	Pb 205				
Fe 55	1E+03	D D 2	6E+03	D D 2	Pb 210		8		8
Co 60	2E+03	D D 2	3E+03	D D 2	Bi 208				
Ni 59	8E+00	D D 2	8E+00	D D 2	Bi 210m				
Ni 63	9E+02	D D 2	1E+03	D D 2	Po 210		8		8
Zn 65	2E-04	D D 2	5E-03	D D 2	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	5E-06	D D 2	5E-06	D D 2	Th 228				
Nb 91					Th 229		8		8
Nb 92					Th 230		8		8
Nb 93m	4E-03	D D 2	5E-03	D D 2	Th 232		8		8
Nb 94	2E-02	D D 2	2E-02	D D 2	Th 234				
Mo 93	6E-02	D D 2	6E-02	D D 2	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	9E-03	D D 2	9E-03	D D 2	U 235		8		8
Ag 110m	1E-01	D D 2	3E+00	D D 2	U 236		8		8
Cd 109	9E-03	D D 2	1E-01	D D 2	U 238		8		8
Cd 113m	6E-07	D D 2	8E-07	D D 2	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		8		8	Cm 242		8		8
Cs 135		8		8	Cm 243		8		8
Cs 137		8		8	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		8		8
Eu 152		8		8	Other b/g	2E+01	D D 2	2E+04	D D 2
Eu 154		8		8	**Total a**	**0**	**8**	**0**	**8**
Eu 155		8		8	**Total b/g**	**3.93E+03**	**D D 2**	**3.01E+04**	**D D 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