

WASTE STREAM	4B17	Miscellaneous Contaminated Items
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SITE Hunterston B

SITE OWNER EDFE NGL

WASTE CUSTODIAN EDFE NGL

WASTE TYPE ILW; SPD1

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	4.0 m ³
Future arisings -	1.4.2019 - 31.3.2023.....	0.4 m ³
	1.4.2023 - 31.3.2025.....	4.0 m ³
Total future arisings:		4.4 m ³
Total waste volume:		8.4 m ³

Comment on volumes: Waste volumes will be variable depending on station operating conditions. Production of redundant plant not predictable. Future arisings uncertain and values based on recent experience.

Uncertainty factors on volumes:	Stock (upper):	x 1.25	Arisings (upper)	x 1.5
	Stock (lower):	x 0.75	Arisings (lower)	x 0.5

WASTE SOURCE Redundant contaminated plant items and other materials contaminated beyond the limits for LLW.

PHYSICAL CHARACTERISTICS

General description: Primarily metallic items such as heat exchangers and candle filters. Other items may also be present.

Physical components (%vol): >50% Steel. Breakdown not fully assessed

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): ~1.5

Comment on density: As cut for packaging. Density is expected to lie between 1t/m³ and 2t/m³

CHEMICAL COMPOSITION

General description and components (%wt): The waste is principally steel but may include other components . Organic material may be present in small quantities e.g. traces of oil. Fission products, actinides and other activation products will be present as contaminants.

Chemical state: Neutral

Chemical form of radionuclides:

- H-3: Tritiated water
- C-14: Activated graphite and metallic components
- Cl-36: Not assessed
- Se-79: Not assessed
- Tc-99: Not assessed
- I-129: Not expected to be significant
- Ra: Not expected to be significant
- Th: Not expected to be significant
- U: Not expected to be significant
- Np: Not expected to be significant
- Pu: Not assessed

Metals and alloys (%wt): -

Stainless steel.....	P
Other ferrous metals.....	P
Iron.....	NE
Aluminium.....	NE
Beryllium.....	NE
Cobalt.....	NE
Copper.....	NE
Lead.....	NE

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	Magnox/Magnesium.....	0
	Nickel.....	NE
	Titanium.....	NE
	Uranium.....	NE
	Zinc.....	NE
	Zircaloy/Zirconium.....	0
	Other metals.....	NE
Organics (%wt):	To be further assessed. There may be traces of oil. Note that items may be wrapped in plastic.	
	Total cellulosics.....	NE
	Paper, cotton.....	NE
	Wood.....	NE
	Halogenated plastics	NE
	Total non-halogenated plastics.....	NE
	Condensation polymers.....	NE
	Others.....	NE
	Organic ion exchange materials....	0
	Total rubber.....	NE
	Halogenated rubber	NE
	Non-halogenated rubber.....	NE
	Hydrocarbons.....	NE
	Oil or grease	NE
	Fuel.....	
	Asphalt/Tarmac (cont.coal tar)...	
	Asphalt/Tarmac (no coal tar)....	
	Bitumen.....	
	Others.....	
	Other organics.....	TR
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.....	NE
	Non/low friable.....	
	Moderately friable.....	
	Highly friable.....	
	Free aqueous liquids.....	0

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	Free non-aqueous liquids.....	0
	Powder/Ash.....	0
Inorganic anions (%wt):	None of the listed inorganic anions are expected to be present at greater than 1%.	
	Fluoride.....	<1.0
	Chloride.....	<1.0
	Iodide.....	<1.0
	Cyanide.....	NE
	Carbonate.....	<1.0
	Nitrate.....	<1.0
	Nitrite.....	NE
	Phosphate.....	<1.0
	Sulphate.....	<1.0
	Sulphide.....	<1.0

Materials of interest for waste acceptance criteria: The possible presence of materials likely to represent a fire or other non-radiological hazard has not been fully assessed.

Combustible metals.....	0
Low flash point liquids.....	0
Explosive materials.....	0
Phosphorus.....	0
Hydrides.....	0
Biological etc. materials.....	NE
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

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

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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.....	NE
EEE Type 2.....	NE
EEE Type 3.....	NE
EEE Type 4.....	NE
EEE Type 5.....	NE

Complexing agents (%wt):	Not yet determined
EDTA.....	NE
DPTA.....	NE
NTA.....	NE
Polycarboxylic acids.....	NE
Other organic complexants.....	NE
Total complexing agents.....	NE

May be present in trace quantities.

PACKAGING AND CONDITIONING

Conditioning method:	The waste is expected to be encapsulated without being supercompacted.
Plant Name:	None.
Location:	Hunterston B Power Station.
Plant startup date:	Not yet determined.
Total capacity (m ³ /y incoming waste):	NE
Target start date for packaging this stream:	-
Throughput for this stream (m ³ /y incoming waste):	NE
Other information:	All waste will be retrieved when a conditioning campaign is undertaken. There will probably be more than one campaign.

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Likely container type:	Container	Waste packaged (%vol)	Waste loading (m ³)	Payload (m ³)	Number of packages
	500 l drum	100.0	~0.235	0.47	36

Likely container type comment:

-

Range in container waste volume:

-

Other information on containers:

Waste will be packaged in 500L drums with a conditioning factor of ~2.0

Likely conditioning matrix:

BFS/OPC

Other information:

PFA/OPC is another matrix that may be adopted.

Conditioned density (t/m³):

~3.0

Conditioned density comment:

Expected to be between 2 and 4 t/m³. The maximum density of the conditioned waste will be less than 7.5 t/m³.

Other information on conditioning:

Appropriate plant will be provided at the Station in accordance with EDF Energy strategy. Decontamination followed by cutting to reduce volumes may be appropriate for some wastes.

Opportunities for alternative disposal routing:

No

Treatment	Stream volume (%)	Comment
-	-	-

RADIOACTIVITY

Source:

Redundant contaminated plant items and materials, contaminated beyond the limits for LLW.

Uncertainty:

Activity data not yet assessed.

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. Radionuclides that are expected to be present are listed.

Other information:

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Nuclide	Mean radioactivity, TBq/m ³				Nuclide	Mean radioactivity, TBq/m ³			
	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		6		6	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		6		6	Ra 225				
Kr 81					Ra 226	8			8
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90		6		6	Th 227				
Zr 93		6		6	Th 228				
Nb 91					Th 229	8			8
Nb 92					Th 230	8			8
Nb 93m		8		8	Th 232	8			8
Nb 94		6		6	Th 234				
Mo 93		8		8	Pa 231	8			8
Tc 97					Pa 233				
Tc 99		6		6	U 232				
Ru 106		6		6	U 233	8			8
Pd 107		8		8	U 234	6			6
Ag 108m		6		6	U 235	8			8
Ag 110m		6		6	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	6			6
Sn 123					Pu 239	6			6
Sn 126		6		6	Pu 240	6			6
Sb 125		6		6	Pu 241	6			6
Sb 126					Pu 242	8			8
Te 125m					Am 241	6			6
Te 127m					Am 242m	6			6
I 129		8		8	Am 243	6			6
Cs 134		6		6	Cm 242	6			6
Cs 135		6		6	Cm 243	8			8
Cs 137		6		6	Cm 244	6			6
Ba 133		6		6	Cm 245	8			8
La 137					Cm 246	8			8
La 138					Cm 248				
Ce 144		6		6	Cf 249				
Pm 145					Cf 250				
Pm 147		6		6	Cf 251				
Sm 147					Cf 252				
Sm 151		6		6	Other a	8			8
Eu 152		6		6	Other b/g	6			6
Eu 154		6		6	Total a	NE	6	NE	6
Eu 155		6		6	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