

WASTE STREAM**3K03****Miscellaneous Contaminated Items****SITE** Hartlepool**SITE OWNER** EDFE NGL**WASTE CUSTODIAN** EDFE NGL**WASTE TYPE** ILW; SPD1**WASTE VOLUMES**

Reported

Stocks: At 1.4.2019..... 0 m³Future arisings - 1.4.2019 - 31.3.2024..... 0.5 m³1.4.2024 - 31.3.2026..... 4.0 m³Total future arisings: 4.5 m³Total waste volume: 4.5 m³

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

Uncertainty factors on Stock (upper): x Arisings (upper) x 1.5

volumes: Stock (lower): x Arisings (lower) x 0.5

WASTE SOURCE

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

PHYSICAL CHARACTERISTICS

General description: Expected to be primarily metallic items. No stock currently present.

Physical components (%vol): No stock currently present therefore breakdown is not assessed.

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): ~1.5Comment on density: As cut for packaging. Density is expected to lie between 1t/m³ and 2t/m³**CHEMICAL COMPOSITION**

General description and components (%wt): No stock currently present therefore breakdown is not assessed. The waste is expected to be principally steel but may include other components.

Chemical state: Neutral

Chemical form of radionuclides: -

Metals and alloys (%wt): -

Stainless steel..... P

Other ferrous metals..... P

Iron..... P

Aluminium..... NE

Beryllium..... NE

Cobalt..... NE

Copper..... NE

Lead..... NE

Magnox/Magnesium..... 0

Nickel..... NE

Titanium..... NE

Uranium..... NE

Zinc..... NE

Zircaloy/Zirconium..... 0

Other metals..... NE

WASTE STREAM**3K03****Miscellaneous Contaminated Items**

Organics (%wt):

To be further assessed. There may be traces of oil. Note that items may be wrapped in plastic.

| | |
|--------------------------------|----|
| Total cellulose | NE |
| Paper, cotton | NE |
| Wood | NE |
| Halogenated plastics | NE |
| Total non-halogenated plastics | NE |
| Condensation polymers | NE |
| Others | NE |
| Organic ion exchange materials | NE |
| Total rubber | NE |
| Halogenated rubber | NE |
| Non-halogenated rubber | NE |
| Hydrocarbons | |
| Oil or grease | |
| 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 | 0 |
| Graphite | 0 |
| Desiccants/Catalysts | 0 |
| Asbestos | NE |
| Non/low friable | |
| Moderately friable | |
| Highly friable | |
| Free aqueous liquids | 0 |
| 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%.

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Miscellaneous Contaminated Items

| | |
|----------------|------|
| 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..... | NE |
| Low flash point liquids..... | 0 |
| Explosive materials..... | 0 |
| Phosphorus..... | 0 |
| Hydrides..... | NE |
| Biological etc. materials..... | NE |
| Biodegradable materials..... | 0 |
| Putrescible wastes..... | 0 |
| Non-putrescible wastes..... | 0 |
| Corrosive materials..... | NE |
| Pyrophoric materials..... | 0 |
| Generating toxic gases..... | NE |
| 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..... TR
 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: Hartlepool Power Station.
 Plant startup date: Probably between 2024 and 2034.
 Total capacity (m³/y incoming waste): ~500.0
 Target start date for packaging this stream: -
 Throughput for this stream (m³/y incoming waste): ~
 Other information: All waste 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 ³) | Payload (m ³) | Number of packages |
|------------|-----------------------|---------------------------------|---------------------------|--------------------|
| 500 l drum | 100.0 | 0.23 | 0.47 | 20 |

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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: 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 assessment.

Other information: Specific activity is a function of station operating history. Figures were derived by estimation based upon available information. Other beta/gamma nuclides of arisings (in TBq/m³) include S35 (2E-2), Ca45 (8E-4), Cr51 (1E-3), Co58 (2E-4), Sr89 (6E-9), Y91 (5E-8), Zr95 (2E-4), Nb95 (1E-4), Ru103 (3E-4), Ta182 (7E-3), Sc46 (2E-5), Fe59 (4E-5), Se75 (6E-4) and Sb124 (2E-5).

WASTE STREAM

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Miscellaneous Contaminated Items

| 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 | | | 9E-03 | DD 2 | Gd 153 | | | | |
| Be 10 | | | | 8 | Ho 163 | | | | |
| C 14 | | | 6E-04 | DD 2 | Ho 166m | | | | |
| Na 22 | | | | 4 | Tm 170 | | | | |
| Al 26 | | | | 4 | Tm 171 | | | | |
| Cl 36 | | | 3E-03 | DD 2 | Lu 174 | | | | |
| Ar 39 | | | | | Lu 176 | | | | |
| Ar 42 | | | | | Hf 178n | | | | |
| K 40 | | | | | Hf 182 | | | | |
| Ca 41 | | | | 8 | Pt 193 | | | | |
| Mn 53 | | | | | Tl 204 | | | | |
| Mn 54 | | | 3E-03 | DD 2 | Pb 205 | | | | |
| Fe 55 | | | 4E-02 | DD 2 | Pb 210 | | | | 8 |
| Co 60 | | | 1E-02 | DD 2 | Bi 208 | | | | |
| Ni 59 | | | <1E-04 | D 3 | Bi 210m | | | | |
| Ni 63 | | | 3E-03 | DD 2 | Po 210 | | | | 8 |
| Zn 65 | | | 3E-04 | DD 2 | Ra 223 | | | | |
| Se 79 | | | 6.9E-10 | DD 2 | Ra 225 | | | | |
| Kr 81 | | | | | Ra 226 | | | | 8 |
| Kr 85 | | | | | Ra 228 | | | | |
| Rb 87 | | | | | Ac 227 | | | | |
| Sr 90 | | | 4E-04 | DD 2 | Th 227 | | | | |
| Zr 93 | | | 3E-08 | DD 2 | Th 228 | | | | |
| Nb 91 | | | | | Th 229 | | | | 8 |
| Nb 92 | | | | | Th 230 | | | | 8 |
| Nb 93m | | | 3E-09 | DD 2 | Th 232 | | | | 8 |
| Nb 94 | | | <4E-06 | D 3 | Th 234 | | | | |
| Mo 93 | | | | 8 | Pa 231 | | | | 8 |
| Tc 97 | | | | | Pa 233 | | | | |
| Tc 99 | | | 1E-07 | DD 2 | U 232 | | | | |
| Ru 106 | | | 1E-03 | DD 2 | U 233 | | | | 8 |
| Pd 107 | | | | 8 | U 234 | | 6E-08 | DD 2 | |
| Ag 108m | | | <8E-06 | D 3 | U 235 | | 1E-09 | DD 2 | |
| Ag 110m | | | 2E-04 | DD 2 | U 236 | | 1E-08 | DD 2 | |
| Cd 109 | | | | | U 238 | | 2E-08 | DD 2 | |
| Cd 113m | | | | | Np 237 | | 9E-09 | DD 2 | |
| Sn 119m | | | | | Pu 236 | | | | |
| Sn 121m | | | | 8 | Pu 238 | | 4E-06 | DD 2 | |
| Sn 123 | | | | | Pu 239 | | 5E-06 | DD 2 | |
| Sn 126 | | | 2.61E-09 | DD 2 | Pu 240 | | 8E-06 | DD 2 | |
| Sb 125 | | | 6E-06 | DD 2 | Pu 241 | | 4E-04 | DD 2 | |
| Sb 126 | | | | | Pu 242 | | <5E-08 | D 3 | |
| Te 125m | | | | | Am 241 | | 2E-05 | DD 2 | |
| Te 127m | | | | | Am 242m | | 3E-07 | DD 2 | |
| I 129 | | | | 8 | Am 243 | | 2E-07 | DD 2 | |
| Cs 134 | | | 6E-04 | DD 2 | Cm 242 | | 1E-06 | DD 2 | |
| Cs 135 | | | 5E-09 | DD 2 | Cm 243 | | 2E-08 | DD 2 | |
| Cs 137 | | | 1E-03 | DD 2 | Cm 244 | | 9E-07 | DD 2 | |
| Ba 133 | | | 2E-05 | DD 2 | Cm 245 | | | | 8 |
| La 137 | | | | | Cm 246 | | | | 8 |
| La 138 | | | | | Cm 248 | | | | |
| Ce 144 | | | 9E-07 | DD 2 | Cf 249 | | | | |
| Pm 145 | | | | | Cf 250 | | | | |
| Pm 147 | | | <8E-04 | D 3 | Cf 251 | | | | |
| Sm 147 | | | | | Cf 252 | | | | |
| Sm 151 | | | <1E-06 | D 3 | Other a | | | | 8 |
| Eu 152 | | | 2E-06 | DD 2 | Other b/g | | 3E-02 | DD 2 | |
| Eu 154 | | | 4E-06 | DD 2 | Total a | 0 | 3.93E-05 | DD 2 | |
| Eu 155 | | | 7E-06 | DD 2 | Total b/g | 0 | 1.04E-01 | DD 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