

| WASTE STREAM | 3K04 | Desiccant |
|--------------|------|-----------|
|--------------|------|-----------|

**SITE** Hartlepool

**SITE OWNER** EDF Energy Nuclear Generation Ltd (EDFE NGL)

**WASTE CUSTODIAN** EDF Energy Nuclear Generation Ltd (EDFE NGL)

**WASTE TYPE** ILW

#### WASTE VOLUMES

|                        | Reported (m <sup>3</sup> ) | OR          | Conditioned (m <sup>3</sup> ) | Packaged (m <sup>3</sup> ) |
|------------------------|----------------------------|-------------|-------------------------------|----------------------------|
| Stocks:                | At 1.4.2025                | = 35.6      |                               |                            |
| Future arisings:       | 1.4.2025 - 31.3.2026       | = 33.0      |                               |                            |
|                        | 1.4.2026 - 31.3.2027       | = 0         |                               |                            |
| Total future arisings: |                            | <b>33.0</b> |                               |                            |
| Total waste volume:    |                            | <b>68.6</b> |                               |                            |

Number of waste packages in stock: At 1.4.2025..... - packages

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

Additional information on quantities: Current stock volumes are known. The volume of desiccant waste in each tower is known and so future arising volumes are predictable

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

**WASTE SOURCE** Exhausted desiccants that have been used for the drying of carbon dioxide reactor coolant.

#### PHYSICAL CHARACTERISTICS

General description: Desiccant materials. Some residual moisture may be associated with the desiccant. There will be no large items in the waste which may require special handling.

Changes since waste generated: -

Bulk density (t/m<sup>3</sup>): ~ 0.80

Comment on density: -

#### CHEMICAL COMPOSITION

General description and components (%wt): Desiccant (<99%wt) with polythene liners (>1%) containing the waste. Some residual moisture may be associated with the desiccant.

Chemical state: Neutral

Sheet metal proportion / thickness: -

Metals and alloys (%wt):

|                           | (%wt) | Type(s) / Grades(s) with proportions | % of total C14 activity |
|---------------------------|-------|--------------------------------------|-------------------------|
| Stainless steel.....      | = 0   | -                                    |                         |
| Other ferrous metals..... | = 0   | -                                    |                         |
| Iron.....                 | = 0   | -                                    |                         |
| Aluminium.....            | = 0   | -                                    |                         |
| Beryllium.....            | = 0   | -                                    |                         |
| Cobalt.....               | = 0   | -                                    |                         |
| Copper.....               | = 0   | -                                    |                         |
| Lead.....                 | = 0   | -                                    |                         |
| Magnox/Magnesium.....     | = 0   | -                                    |                         |
| Nickel.....               | = 0   | -                                    |                         |
| Titanium.....             | = 0   | -                                    |                         |
| Uranium.....              | = 0   | -                                    |                         |
| Zinc.....                 | = 0   | -                                    |                         |
| Zircaloy/Zirconium.....   | = 0   | -                                    |                         |
| Other metals.....         | = 0   | -                                    |                         |

Organics (%wt):

|                                     | (%wt) | Type(s) and comment | % of total C14 activity |
|-------------------------------------|-------|---------------------|-------------------------|
| Total cellulose.....                | = 0   | -                   |                         |
| Paper, cotton.....                  | = 0   | -                   |                         |
| Wood.....                           | = 0   | -                   |                         |
| Halogenated plastics.....           | = 0   | -                   |                         |
| Total non-halogenated plastics..... | < 1.0 | -                   |                         |
| Condensation polymers.....          | = 0   | -                   |                         |
| Others.....                         | < 1.0 | -                   |                         |
| Organic ion exchange materials..... | = 0   | -                   |                         |
| Total rubber.....                   | = 0   | -                   |                         |
| Halogenated rubber.....             | = 0   | -                   |                         |
| Non-halogenated rubber.....         | = 0   | -                   |                         |
| Hydrocarbons.....                   | = 0   | -                   |                         |
| 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.....      | = 0    | -                   |                         |
| Soil.....                             | = 0    | -                   |                         |
| Brick/Stone/Rubble.....               | = 0    | -                   |                         |
| Cementitious material.....            | = 0    | -                   |                         |
| Sand.....                             | = 0    | -                   |                         |
| Glass/Ceramics.....                   | = 0    | -                   |                         |
| Graphite.....                         | = 0    | -                   |                         |
| Desiccants/Catalysts.....             | < 99.0 | -                   |                         |
| Asbestos.....                         | = 0    | -                   |                         |
| Non/low friable.....                  | -      | -                   |                         |
| Moderately friable.....               | -      | -                   |                         |
| Highly friable.....                   | -      | -                   |                         |
| Free aqueous liquids.....             | P      | -                   |                         |
| Free non-aqueous liquids.....         | P      | -                   |                         |
| Powder/Ash.....                       | = 0    | -                   |                         |

#### COMPONENTS OF MATERIALS, WASTE PROPERTIES, MATERIALS NOT CONTRIBUTING TO MASS

Inorganic anions (%wt):

|                | (%wt) | Type(s) and comment |
|----------------|-------|---------------------|
| Fluoride.....  | TR    | -                   |
| Chloride.....  | TR    | -                   |
| Iodide.....    | TR    | -                   |
| Cyanide.....   | NE    | -                   |
| Carbonate..... | TR    | -                   |
| Nitrate.....   | = 0   | -                   |
| Nitrite.....   | = 0   | -                   |
| Phosphate..... | = 0   | -                   |
| Sulphate.....  | TR    | -                   |
| Sulphide.....  | TR    | -                   |

Materials of interest for waste acceptance criteria:

|                                                | (%wt) | Type(s) and comment |
|------------------------------------------------|-------|---------------------|
| 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   | -                   |
| Higher activity particles.....                 | = 0   | -                   |
| Soluble solids as bulk chemical compounds..... | = 0   | -                   |

Hazardous substances / non hazardous pollutants:

|                             | (%wt) | Type(s) and comment |
|-----------------------------|-------|---------------------|
| 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    | -                   |
| 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    | -                   |

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.....   | NE    | -                                     |

Physical components:

|                                         | Number | Type(s) and comment |
|-----------------------------------------|--------|---------------------|
| Sources.....                            | = 0    | -                   |
| Electronic & Electrical Equipment (EEE) |        |                     |
| EEE Type 1.....                         |        | -                   |
| EEE Type 2.....                         |        | -                   |
| EEE Type 3.....                         |        | -                   |
| EEE Type 4.....                         |        | -                   |
| EEE Type 5.....                         |        | -                   |

## TREATMENT, PACKAGING AND DISPOSAL

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

| Treatment                                                  | On-site / Off-site | Stream volume % |
|------------------------------------------------------------|--------------------|-----------------|
| Size reduction                                             |                    |                 |
| Decay storage                                              | On-site            | = 100.0         |
| Low force compaction                                       |                    |                 |
| Supercompaction (HFC)                                      |                    |                 |
| Incineration                                               | Off-site           | = 50.0          |
| Drying/dewatering/liquid separation                        |                    |                 |
| Tie down/fixatives/strippable coating/painting application |                    |                 |
| Decontamination                                            | Off-site           | = 100.0         |
| Metal treatment                                            |                    |                 |
| Recycling / reuse                                          |                    |                 |
| Thermal treatment, including vitrification                 |                    |                 |
| Encapsulation                                              | Off-site           | = 50.0          |
| Polymer encapsulation                                      |                    |                 |
| Other physical treatment                                   |                    |                 |
| Other chemical treatment                                   |                    |                 |
| Containerisation                                           |                    |                 |
| Treatment not yet determined                               |                    |                 |
| None                                                       |                    |                 |

Comments on planned treatments:

The waste will be decontaminated and incinerated if possible. Some waste is expected to have elevated gamma activity that does not meet acceptance criteria for incineration. This will be encapsulated. BAT/BPM applied to ensure solidification and disposal to LLWR is minimised.

Conditioning method:

-

Conditioning plants:

| Plant Name | Location |
|------------|----------|
|            |          |

Likely conditioning matrix:

-

Further information on the conditioning matrix:

-

**Waste Packaging:**

| Likely container type: | Container                                          | Waste packaged (vol%) | Waste loading (m³) | Payload (m³) | Number of packages | Estimated start date for packaging |
|------------------------|----------------------------------------------------|-----------------------|--------------------|--------------|--------------------|------------------------------------|
|                        | 1/2 Height IP-2 Disposal/Re-usable ISO (TC01/TC02) | 50.0                  | 6.2                | 18.3         | 6                  | -                                  |

Range in container waste loading:

Other information on packaging and conditioning: -

Conditioned density (t/m³): -

Conditioned density comment: -

**Management Routes:**

| Disposal Route                                                                     | Stream volume % | Raw density t/m³ | Start date |
|------------------------------------------------------------------------------------|-----------------|------------------|------------|
| Expected to be consigned to a Near Site, Near Surface Disposal Facility (Scotland) |                 |                  |            |
| Expected to be Non-NSD HAW managed under Scottish Government's policy              |                 |                  |            |
| Expected to be disposed to LLW Vaults NRS Dounreay                                 |                 |                  |            |
| Expected to be consigned to the Geological Disposal Facility                       |                 |                  |            |
| Expected to be consigned to a Near Surface Disposal Facility                       |                 |                  |            |
| Expected to be consigned to the LLW Repository                                     | = 50.0          | NE               |            |
| Expected to be consigned to a Landfill Facility                                    |                 |                  |            |
| Expected to be disposed On-Site                                                    |                 |                  |            |
| Expected to be managed by In-Situ Disposal                                         |                 |                  |            |
| Expected to be consigned to an Incineration Facility                               | = 50.0          | NE               |            |
| Expected to be consigned to a Metal Treatment Facility                             |                 |                  |            |
| Expected to be Out of Scope                                                        |                 |                  |            |
| Expected to be recycled / reused                                                   |                 |                  |            |
| Disposal route not known                                                           |                 |                  |            |

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

Opportunities for alternative disposal routing: No

| Baseline Management Route | Opportunity Management Route | Stream volume (%) | Opportunity Confidence | Comment |
|---------------------------|------------------------------|-------------------|------------------------|---------|
| -                         | -                            | -                 | -                      | -       |

**RADIOACTIVITY**

Source: Contamination by tritium and activation products will be the main sources of activity.

Uncertainty: The values given are from one set of desiccant samples from 2016, so give a good indication of activities present but may not be bounding. Specific activity is a function of operating history.

Measurement of radioactivities: Analysis of HAR desiccant samples from 2016.

Chemical form of radionuclides:

- H-3: Tritiated water absorbed onto desiccant.
- C-14: May be present as Graphite contamination
- Cl-36: Activation of sulphide components within the gas stream.
- Se-79: Not expected to be present in significant quantities
- Tc-99: Not expected to be present in significant quantities
- I-129: Not expected to be present in significant quantities
- Ra: Not expected to be present in significant quantities
- Th: Not expected to be present in significant quantities
- U: Not expected to be present in significant quantities
- Np: Not expected to be present in significant quantities
- Pu: Not expected to be present in significant quantities

| WASTE STREAM |                            |                   | 3K04            |                   |           | Desiccant                  |                   |                 |                   |
|--------------|----------------------------|-------------------|-----------------|-------------------|-----------|----------------------------|-------------------|-----------------|-------------------|
| Nuclide      | Mean radioactivity, TBq/m³ |                   |                 |                   | Nuclide   | Mean radioactivity, TBq/m³ |                   |                 |                   |
|              | Waste at<br>1.4.2025       | Bands and<br>Code | Future Arisings | Bands and<br>Code |           | Waste at<br>1.4.2025       | Bands and<br>Code | Future Arisings | Bands and<br>Code |
| H 3          | 1.41E-01                   | C C 1             | 1.41E-01        | C C 1             | Gd 153    |                            |                   |                 |                   |
| Be 10        |                            |                   |                 |                   | Ho 163    |                            |                   |                 |                   |
| C 14         | 5.84E-05                   | C C 1             | 5.84E-05        | C C 1             | Ho 166m   |                            |                   |                 |                   |
| Na 22        |                            |                   |                 |                   | Tm 170    |                            |                   |                 |                   |
| Al 26        |                            |                   |                 |                   | Tm 171    |                            |                   |                 |                   |
| Cl 36        | 2.64E-05                   | C C 1             | 2.64E-05        | C C 1             | Lu 174    |                            |                   |                 |                   |
| Ar 39        |                            |                   |                 |                   | Lu 176    |                            |                   |                 |                   |
| Ar 42        |                            |                   |                 |                   | Hf 178n   |                            |                   |                 |                   |
| K 40         |                            | 8                 |                 | 8                 | Hf 182    |                            |                   |                 |                   |
| Ca 41        |                            |                   |                 |                   | Pt 193    |                            |                   |                 |                   |
| Mn 53        |                            |                   |                 |                   | Tl 204    |                            |                   |                 |                   |
| Mn 54        | 5.04E-06                   | C C 1             | 5.04E-06        | C C 1             | Pb 205    |                            |                   |                 |                   |
| Fe 55        | 3.52E-05                   | C C 1             | 3.52E-05        | C C 1             | Pb 210    |                            |                   |                 |                   |
| Co 60        | 2.11E-06                   | C C 1             | 2.11E-06        | C C 1             | Bi 208    |                            |                   |                 |                   |
| Ni 59        |                            |                   |                 |                   | Bi 210m   |                            |                   |                 |                   |
| Ni 63        | 4.72E-05                   | C C 1             | 4.72E-05        | C C 1             | Po 210    |                            |                   |                 |                   |
| Zn 65        | 3.19E-08                   | C C 1             | 3.19E-08        | C C 1             | Ra 223    |                            |                   |                 |                   |
| Se 79        |                            |                   |                 |                   | Ra 225    |                            |                   |                 |                   |
| Kr 81        |                            |                   |                 |                   | Ra 226    |                            |                   |                 |                   |
| Kr 85        |                            |                   |                 |                   | Ra 228    |                            |                   |                 |                   |
| Rb 87        |                            |                   |                 |                   | Ac 227    |                            |                   |                 |                   |
| Sr 90        |                            |                   |                 |                   | Th 227    |                            |                   |                 |                   |
| Zr 93        |                            |                   |                 |                   | Th 228    |                            |                   |                 |                   |
| Nb 91        |                            |                   |                 |                   | Th 229    |                            |                   |                 |                   |
| Nb 92        |                            |                   |                 |                   | Th 230    |                            |                   |                 |                   |
| Nb 93m       |                            |                   |                 |                   | Th 232    |                            |                   |                 |                   |
| Nb 94        |                            | 8                 |                 | 8                 | Th 234    |                            |                   |                 |                   |
| Mo 93        |                            |                   |                 |                   | Pa 231    |                            |                   |                 |                   |
| Tc 97        |                            |                   |                 |                   | Pa 233    |                            |                   |                 |                   |
| Tc 99        |                            |                   |                 |                   | U 232     |                            |                   |                 |                   |
| Ru 106       |                            | 8                 |                 | 8                 | U 233     |                            |                   |                 |                   |
| Pd 107       |                            |                   |                 |                   | U 234     |                            |                   |                 |                   |
| Ag 108m      |                            | 8                 |                 | 8                 | U 235     |                            |                   |                 |                   |
| Ag 110m      |                            | 8                 |                 | 8                 | U 236     |                            |                   |                 |                   |
| Cd 109       |                            |                   |                 |                   | U 238     |                            |                   |                 |                   |
| Cd 113m      |                            |                   |                 |                   | Np 237    |                            |                   |                 |                   |
| Sn 119m      |                            |                   |                 |                   | Pu 236    |                            |                   |                 |                   |
| Sn 121m      |                            |                   |                 |                   | Pu 238    |                            |                   |                 |                   |
| Sn 123       |                            |                   |                 |                   | Pu 239    |                            |                   |                 |                   |
| Sn 126       |                            |                   |                 |                   | Pu 240    |                            |                   |                 |                   |
| Sb 125       |                            | 8                 |                 | 8                 | Pu 241    |                            |                   |                 |                   |
| Sb 126       |                            |                   |                 |                   | Pu 242    |                            |                   |                 |                   |
| Te 125m      |                            |                   |                 |                   | Am 241    |                            | 8                 |                 | 8                 |
| Te 127m      |                            |                   |                 |                   | Am 242m   |                            |                   |                 |                   |
| I 129        |                            |                   |                 |                   | Am 243    |                            |                   |                 |                   |
| Cs 134       | 4.08E-09                   | C C 1             | 4.08E-09        | C C 1             | Cm 242    |                            |                   |                 |                   |
| Cs 135       |                            |                   |                 |                   | Cm 243    |                            |                   |                 |                   |
| Cs 137       | 4.08E-07                   | C C 1             | 4.08E-07        | C C 1             | Cm 244    |                            |                   |                 |                   |
| Ba 133       |                            | 8                 |                 | 8                 | Cm 245    |                            |                   |                 |                   |
| La 137       |                            |                   |                 |                   | Cm 246    |                            |                   |                 |                   |
| La 138       |                            |                   |                 |                   | Cm 248    |                            |                   |                 |                   |
| Ce 144       |                            | 8                 |                 | 8                 | Cf 249    |                            |                   |                 |                   |
| Pm 145       |                            |                   |                 |                   | Cf 250    |                            |                   |                 |                   |
| Pm 147       |                            |                   |                 |                   | Cf 251    |                            |                   |                 |                   |
| Sm 147       |                            |                   |                 |                   | Cf 252    |                            |                   |                 |                   |
| Sm 151       |                            |                   |                 |                   | Unsp a    |                            | 8                 |                 | 8                 |
| Eu 152       |                            | 8                 |                 | 8                 | Unsp b/g  | 2.24E-04                   | C C 1             | 2.24E-04        | C C 1             |
| Eu 154       |                            | 8                 |                 | 8                 | Total a   | 0                          | *                 | 0               | *                 |
| Eu 155       |                            | 8                 |                 | 8                 | Total b/g | 1.41E-01                   | *                 | 1.41E-01        | *                 |

#### 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 the 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  
\* Total calculated from the 114 declared radionuclides