

| WASTE STREAM | 2X10 | Reprocessing Plant: Thermal Denitration Plant Area and UO3 Rework Facility LLW |
|--------------|------|--------------------------------------------------------------------------------|
|--------------|------|--------------------------------------------------------------------------------|

**SITE** Sellafield

**SITE OWNER** Nuclear Decommissioning Authority

**WASTE CUSTODIAN** Sellafield Ltd

**WASTE TYPE** LLW

#### WASTE VOLUMES

|                        | Reported (m <sup>3</sup> ) | OR           | Conditioned (m <sup>3</sup> ) | Packaged (m <sup>3</sup> ) |
|------------------------|----------------------------|--------------|-------------------------------|----------------------------|
| Stocks:                | At 1.4.2025                | = 0          |                               |                            |
| Future arisings:       | 1.4.2025 - 31.3.2026       | = 30.4       |                               |                            |
|                        | 1.4.2026 - 31.3.2027       | = 55.1       |                               |                            |
|                        | 1.4.2027 - 31.3.2028       | = 55.1       |                               |                            |
|                        | 1.4.2028 - 31.3.2029       | = 55.1       |                               |                            |
|                        | 1.4.2029 - 31.3.2030       | = 55.1       |                               |                            |
|                        | 1.4.2030 - 31.3.2031       | = 55.1       |                               |                            |
| Total future arisings: |                            | <b>306.0</b> |                               |                            |
| Total waste volume:    |                            | <b>306.0</b> |                               |                            |

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

Comment on arising rates: Arisings are based on 5 years of forecasts, with the final year extrapolated to the end of the lifetime of the waste stream.

Additional information on quantities: Uncertainty information is notional.

Uncertainty factors on volumes: Stock (upper): x - Arisings (upper): x 1.50  
Stock (lower): x - Arisings (lower): x 0.50

**WASTE SOURCE** Waste is generated as a result of routine operations and maintenance and project work.

#### PHYSICAL CHARACTERISTICS

General description: The waste will include secondary wastes (such as PPE) and redundant plant items.

Changes since waste generated: The waste has not undergone any change since it was generated.

Bulk density (t/m<sup>3</sup>): = 0.52

Comment on density: The total bulk density has been calculated based on the 5 year forecast and relevant waste characterisation document.

#### CHEMICAL COMPOSITION

General description and components (%wt): Metals (29.2%), Concrete/Rubble (4%), Soil (1%), Wood (2%), Rubber (6%), Halogenated Plastics (18.7%), Non-Halogenated Plastics (13.3%), Hydrocarbons (6.2%), Other Organics (15%), Asbestos (4%) and Other (0.6%).

Chemical state: Neutral

Sheet metal proportion / thickness: Metal thickness not specified.

Metals and alloys (%wt):

|                           | (%wt)  | Type(s) / Grades(s) with proportions | % of total C14 activity |
|---------------------------|--------|--------------------------------------|-------------------------|
| Stainless steel.....      | = 5.4  | -                                    |                         |
| Other ferrous metals..... | = 10.7 | -                                    |                         |
| Iron.....                 | = 5.4  | -                                    |                         |
| Aluminium.....            | = 1.1  | -                                    |                         |
| Beryllium.....            | -      | -                                    |                         |
| Cobalt.....               | -      | -                                    |                         |
| Copper.....               | = 3.2  | -                                    |                         |
| Lead.....                 | = 1.1  | -                                    |                         |
| Magnox/Magnesium.....     | -      | -                                    |                         |
| Nickel.....               | -      | -                                    |                         |
| Titanium.....             | -      | -                                    |                         |
| Uranium.....              | -      | -                                    |                         |
| Zinc.....                 | = 0.54 | -                                    |                         |
| Zircaloy/Zirconium.....   | -      | -                                    |                         |
| Other metals.....         | = 1.8  | -                                    |                         |

Organics (%wt):

|                                     | (%wt)  | Type(s) and comment | % of total C14 activity |
|-------------------------------------|--------|---------------------|-------------------------|
| Total cellulose.....                | = 2.0  | -                   |                         |
| Paper, cotton.....                  |        | -                   |                         |
| Wood.....                           | = 2.0  | -                   |                         |
| Halogenated plastics.....           | = 18.7 | -                   |                         |
| Total non-halogenated plastics..... | = 13.3 | -                   |                         |
| Condensation polymers.....          |        | -                   |                         |
| Others.....                         |        | -                   |                         |
| Organic ion exchange materials..... |        | -                   |                         |
| Total rubber.....                   | = 6.0  | -                   |                         |
| Halogenated rubber.....             |        | -                   |                         |
| Non-halogenated rubber.....         |        | -                   |                         |
| Hydrocarbons.....                   | = 6.2  | -                   |                         |
| Oil or grease.....                  | = 2.2  | -                   |                         |
| Fuel.....                           |        | -                   |                         |
| Asphalt/Tarmac (cont.coal tar)..... | = 2.7  | -                   |                         |
| Asphalt/Tarmac (no coal tar).....   | = 1.1  | -                   |                         |
| Bitumen.....                        | = 0.27 | -                   |                         |
| Others.....                         |        | -                   |                         |
| Other organics.....                 | = 15.0 | -                   |                         |

Other materials (%wt):

|                                       | (%wt)  | Type(s) and comment | % of total C14 activity |
|---------------------------------------|--------|---------------------|-------------------------|
| Inorganic ion exchange materials..... |        | -                   |                         |
| Inorganic sludges and flocs.....      |        | -                   |                         |
| Soil.....                             | = 1.0  | -                   |                         |
| Brick/Stone/Rubble.....               | = 4.0  | -                   |                         |
| Cementitious material.....            |        | -                   |                         |
| Sand.....                             |        | -                   |                         |
| Glass/Ceramics.....                   | = 0.54 | -                   |                         |
| Graphite.....                         |        | -                   |                         |
| Desiccants/Catalysts.....             |        | -                   |                         |
| Asbestos.....                         | = 4.0  | -                   |                         |
| Non/low friable.....                  | = 1.9  | -                   |                         |
| Moderately friable.....               | = 1.1  | -                   |                         |
| Highly friable.....                   | = 1.1  | -                   |                         |
| Free aqueous liquids.....             |        | -                   |                         |
| Free non-aqueous liquids.....         |        | -                   |                         |
| Powder/Ash.....                       |        | -                   |                         |

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

Inorganic anions (%wt):

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

Materials of interest for waste acceptance criteria:

|                                                | (%wt)  | Type(s) and comment |
|------------------------------------------------|--------|---------------------|
| Combustible metals.....                        |        | -                   |
| Low flash point liquids.....                   |        | -                   |
| Explosive materials.....                       |        | -                   |
| Phosphorus.....                                |        | -                   |
| Hydrides.....                                  |        | -                   |
| Biological etc. materials.....                 |        | -                   |
| Biodegradable materials.....                   | = 16.0 | -                   |
| Putrescible wastes.....                        | = 1.0  | -                   |
| Non-putrescible wastes.....                    | = 15.0 | -                   |
| Corrosive materials.....                       |        | -                   |
| Pyrophoric materials.....                      |        | -                   |
| Generating toxic gases.....                    |        | -                   |
| Reacting with water.....                       | = 1.6  | -                   |
| Higher activity particles.....                 |        | -                   |
| Soluble solids as bulk chemical compounds..... |        | -                   |

Hazardous substances / non hazardous pollutants:

|                             | (%wt)  | Type(s) and comment |
|-----------------------------|--------|---------------------|
| Acrylamide.....             | = 0.27 | -                   |
| Benzene.....                |        | -                   |
| Chlorinated solvents.....   |        | -                   |
| Formaldehyde.....           |        | -                   |
| Organometallics.....        |        | -                   |
| Phenol.....                 |        | -                   |
| Styrene.....                |        | -                   |
| Tri-butyl phosphate.....    |        | -                   |
| Other organophosphates..... |        | -                   |
| Vinyl chloride.....         |        | -                   |
| Arsenic.....                |        | -                   |
| Barium.....                 |        | -                   |
| Boron.....                  |        | -                   |
| Boron (in Boral).....       |        | -                   |
| Boron (non-Boral).....      |        | -                   |
| Cadmium.....                |        | -                   |
| Caesium.....                |        | -                   |
| Selenium.....               |        | -                   |
| Chromium.....               |        | -                   |
| Molybdenum.....             |        | -                   |
| Thallium.....               |        | -                   |
| Tin.....                    |        | -                   |
| Vanadium.....               |        | -                   |
| Mercury compounds.....      |        | -                   |
| Others.....                 |        | -                   |

Complexing agents (%wt):

| Yes                            |        |                     |
|--------------------------------|--------|---------------------|
|                                | (%wt)  | Type(s) and comment |
| EDTA.....                      | < 0.01 | -                   |
| DPTA.....                      | 0      | -                   |
| NTA.....                       | 0      | -                   |
| Polycarboxylic acids.....      | 0      | -                   |
| Other organic complexants..... | 0      | -                   |
| Total complexing agents.....   | < 0.01 | -                   |

Physical components:

|                                         | Number | Type(s) and comment     |
|-----------------------------------------|--------|-------------------------|
| Sources.....                            | = 0    | -                       |
| Electronic & Electrical Equipment (EEE) |        | -                       |
| EEE Type 1.....                         |        | 200 items every 5 years |
| EEE Type 2.....                         |        | 200 items every 5 years |
| EEE Type 3.....                         |        | 200 items every 5 years |
| EEE Type 4.....                         |        | 200 items every 5 years |
| EEE Type 5.....                         |        | 200 items every 5 years |

## TREATMENT, PACKAGING AND DISPOSAL

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

| Treatment                                                  | On-site / Off-site | Stream volume % |
|------------------------------------------------------------|--------------------|-----------------|
| Size reduction                                             | On-site            | = 65.5          |
| Decay storage                                              |                    |                 |
| Low force compaction                                       |                    |                 |
| Supercompaction (HFC)                                      |                    |                 |
| Incineration                                               |                    |                 |
| Drying/dewatering/liquid separation                        | Off-site           | = 7.8           |
| Tie down/fixatives/strippable coating/painting application |                    |                 |
| Decontamination                                            |                    |                 |
| Metal treatment                                            |                    |                 |
| Recycling / reuse                                          |                    |                 |
| Thermal treatment, including vitrification                 |                    |                 |
| Encapsulation                                              |                    |                 |
| Polymer encapsulation                                      |                    |                 |
| Other physical treatment                                   |                    |                 |
| Other chemical treatment                                   |                    |                 |
| Containerisation                                           |                    | = 26.7          |
| Treatment not yet determined                               |                    |                 |
| None                                                       |                    |                 |

Comments on planned treatments:

For inventory purposes, it is assumed that supercompaction will continue after the closure of WAMAC in 2028. Metal treatment will take place off-site. Waste not requiring treatment is non-compactable LLW for direct disposal to LLWR.

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) | 26.7                  | 10.0               | 18.3         | 9                  | -                                  |
|                        | 1/2 Height WAMAC IP-2 ISO (TC08)                   | 65.5                  | 59.3               | 18.8         | 4                  | -                                  |

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) | = 92.2          | = 0.44           | 2025       |
| 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                                     | = 7.8           | = 1.4            | 2025       |
| 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                               |                 |                  |            |
| Expected to be consigned to a Metal Treatment Facility                             | = 7.8           | = 1.4            | 2025       |
| 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: The activity arises from operations to chemically convert uranium into a form for long term storage. The waste has become contaminated as a result of these operations.

Uncertainty: The uncertainty associated with the fingerprinting analysis is likely to be low, however the volumes and total activity information (and possibly some other assumptions) are likely to be more notional and thus more uncertain.

Measurement of radioactivities: Specific activity data is based on data in the corresponding WCH, which in turn maps an estimated total activity to an analytically derived radionuclide fingerprint.

Chemical form of radionuclides:

- H-3: -
- C-14: -
- Cl-36: -
- Se-79: -
- Tc-99: -
- I-129: -
- Ra: -
- Th: -
- U: -
- Np: -
- Pu: -

| WASTE STREAM |                            | 2X10           |                 | Reprocessing Plant: Thermal Denitration Plant Area and UO3 Rework Facility LLW |           |                            |                |                 |                |
|--------------|----------------------------|----------------|-----------------|--------------------------------------------------------------------------------|-----------|----------------------------|----------------|-----------------|----------------|
| Nuclide      | Mean radioactivity, TBq/m³ |                |                 |                                                                                | Nuclide   | Mean radioactivity, TBq/m³ |                |                 |                |
|              | Waste at 1.4.2025          | Bands and Code | Future Arisings | Bands and Code                                                                 |           | Waste at 1.4.2025          | Bands and Code | Future Arisings | Bands and Code |
| H 3          |                            |                |                 |                                                                                | Gd 153    |                            |                |                 |                |
| Be 10        |                            |                |                 |                                                                                | Ho 163    |                            |                |                 |                |
| C 14         |                            |                |                 |                                                                                | Ho 166m   |                            |                |                 |                |
| Na 22        |                            |                |                 |                                                                                | Tm 170    |                            |                |                 |                |
| Al 26        |                            |                |                 |                                                                                | Tm 171    |                            |                |                 |                |
| Cl 36        |                            |                | = 1.65E-07      | 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        |                            |                |                 |                                                                                | Pb 205    |                            |                |                 |                |
| Fe 55        |                            |                |                 |                                                                                | Pb 210    |                            |                |                 |                |
| Co 60        |                            |                |                 |                                                                                | Bi 208    |                            |                |                 |                |
| Ni 59        |                            |                |                 |                                                                                | Bi 210m   |                            |                |                 |                |
| Ni 63        |                            |                | = 2.59E-07      | C C 2                                                                          | Po 210    |                            |                |                 |                |
| Zn 65        |                            |                |                 |                                                                                | Ra 223    |                            |                |                 |                |
| Se 79        |                            |                |                 |                                                                                | Ra 225    |                            |                |                 |                |
| Kr 81        |                            |                |                 |                                                                                | Ra 226    |                            |                |                 |                |
| Kr 85        |                            |                |                 |                                                                                | Ra 228    |                            |                |                 |                |
| Rb 87        |                            |                |                 |                                                                                | Ac 227    |                            |                |                 |                |
| Sr 90        |                            |                | = 9.42E-08      | C C 2                                                                          | Th 227    |                            |                |                 |                |
| Zr 93        |                            |                |                 |                                                                                | Th 228    |                            |                | = 8.24E-08      | C C 2          |
| Nb 91        |                            |                |                 |                                                                                | Th 229    |                            |                |                 |                |
| Nb 92        |                            |                |                 |                                                                                | Th 230    |                            |                |                 |                |
| Nb 93m       |                            |                |                 |                                                                                | Th 232    |                            |                |                 |                |
| Nb 94        |                            |                |                 |                                                                                | Th 234    |                            |                |                 |                |
| Mo 93        |                            |                |                 |                                                                                | Pa 231    |                            |                |                 |                |
| Tc 97        |                            |                |                 |                                                                                | Pa 233    |                            |                |                 |                |
| Tc 99        |                            |                | = 7.30E-07      | C C 2                                                                          | U 232     |                            |                | = 1.77E-07      | C C 2          |
| Ru 106       |                            |                | = 2.34E-06      | C C 2                                                                          | U 233     |                            |                | = 2.43E-10      | C C 2          |
| Pd 107       |                            |                |                 |                                                                                | U 234     |                            |                | = 4.86E-05      | C C 2          |
| Ag 108m      |                            |                |                 |                                                                                | U 235     |                            |                | = 1.24E-06      | C C 2          |
| Ag 110m      |                            |                |                 |                                                                                | U 236     |                            |                | = 6.20E-06      | C C 2          |
| Cd 109       |                            |                |                 |                                                                                | U 238     |                            |                | = 5.48E-05      | C C 2          |
| Cd 113m      |                            |                |                 |                                                                                | Np 237    |                            |                | = 1.18E-08      | C C 2          |
| Sn 119m      |                            |                |                 |                                                                                | Pu 236    |                            |                |                 |                |
| Sn 121m      |                            |                |                 |                                                                                | Pu 238    |                            |                | = 3.53E-08      | C C 2          |
| Sn 123       |                            |                |                 |                                                                                | Pu 239    |                            |                | = 5.89E-08      | C C 2          |
| Sn 126       |                            |                |                 |                                                                                | Pu 240    |                            |                | = 5.89E-08      | C C 2          |
| Sb 125       |                            |                |                 |                                                                                | Pu 241    |                            |                | = 2.70E-06      | C C 2          |
| Sb 126       |                            |                |                 |                                                                                | Pu 242    |                            |                |                 |                |
| Te 125m      |                            |                |                 |                                                                                | Am 241    |                            |                | = 2.36E-08      | C C 2          |
| Te 127m      |                            |                |                 |                                                                                | Am 242m   |                            |                |                 |                |
| I 129        |                            |                |                 |                                                                                | Am 243    |                            |                |                 |                |
| Cs 134       |                            |                |                 |                                                                                | Cm 242    |                            |                |                 |                |
| Cs 135       |                            |                |                 |                                                                                | Cm 243    |                            |                |                 |                |
| Cs 137       |                            |                | = 7.07E-08      | C C 2                                                                          | Cm 244    |                            |                |                 |                |
| Ba 133       |                            |                |                 |                                                                                | Cm 245    |                            |                | = 2.72E-09      | C C 2          |
| La 137       |                            |                |                 |                                                                                | Cm 246    |                            |                | = 2.47E-10      | C C 2          |
| La 138       |                            |                |                 |                                                                                | Cm 248    |                            |                |                 |                |
| Ce 144       |                            |                |                 |                                                                                | Cf 249    |                            |                |                 |                |
| Pm 145       |                            |                |                 |                                                                                | Cf 250    |                            |                |                 |                |
| Pm 147       |                            |                |                 |                                                                                | Cf 251    |                            |                |                 |                |
| Sm 147       |                            |                |                 |                                                                                | Cf 252    |                            |                |                 |                |
| Sm 151       |                            |                |                 |                                                                                | Unsp a    |                            |                |                 |                |
| Eu 152       |                            |                |                 |                                                                                | Unsp b/g  |                            |                |                 |                |
| Eu 154       |                            |                |                 |                                                                                | Total a   | 0                          | *              | 1.11E-04        | *              |
| Eu 155       |                            |                | = 1.18E-07      | C C 2                                                                          | Total b/g | 0                          | *              | 6.48E-06        | *              |

#### 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