

| WASTE STREAM | 2D204 | Decommissioning PCM from Aldermaston |
|--------------|-------|--------------------------------------|
|--------------|-------|--------------------------------------|

**SITE** Sellafield

**SITE OWNER** Nuclear Decommissioning Authority

**WASTE CUSTODIAN** Sellafield Ltd

**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                |    |                               |                            |
| Future arisings:       |                            |    |                               |                            |
| Total future arisings: |                            |    |                               |                            |
| Total waste volume:    |                            |    |                               |                            |

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

Comment on arising rates: Future transfers of drums are not quantified in this waste stream to avoid double counting as they are reported by AWE in waste stream 7A111.

Additional information on quantities: -

Uncertainty factors on volumes: Stock (upper): x 1.00 Arisings (upper): x -  
Stock (lower): x 1.00 Arisings (lower): x -

**WASTE SOURCE** These wastes have arisen from decommissioning operations in redundant plutonium handling facilities. Waste is generated in operations associated with decommissioning, redundant plant and equipment, size reduction, maintenance and Health Physics support activities.

#### PHYSICAL CHARACTERISTICS

General description: Metal, plastics, rubber, glass, etc. arising from dismantling of contaminated gloveboxes and process equipment.

Changes since waste generated: -

Bulk density (t/m<sup>3</sup>): ~ 0.34

Comment on density: Mass of waste divided by volume.

#### CHEMICAL COMPOSITION

General description and components (%wt): Metals (54.99%), Plastics (44.19%), Rubber (0.29%), Cellulosics (0.54%).

Chemical state: Neutral

Sheet metal proportion / thickness: Metal is present in a large range of thicknesses.

Metals and alloys (%wt):

|                           | (%wt)  | Type(s) / Grades(s) with proportions | % of total C14 activity |
|---------------------------|--------|--------------------------------------|-------------------------|
| Stainless steel.....      | ~ 1.8  | -                                    |                         |
| Other ferrous metals..... | ~ 51.4 | -                                    |                         |
| Iron.....                 |        | -                                    |                         |
| Aluminium.....            | ~ 0.90 | -                                    |                         |
| Beryllium.....            | NE     | -                                    |                         |
| Cobalt.....               | NE     | -                                    |                         |
| Copper.....               | ~ 0.90 | -                                    |                         |
| Lead.....                 | NE     | -                                    |                         |
| Magnox/Magnesium.....     | NE     | -                                    |                         |
| Nickel.....               | NE     | -                                    |                         |
| Titanium.....             | NE     | -                                    |                         |
| Uranium.....              | NE     | -                                    |                         |
| Zinc.....                 | NE     | -                                    |                         |
| Zircaloy/Zirconium.....   | NE     | -                                    |                         |
| Other metals.....         | NE     | -                                    |                         |

Organics (%wt):

|                                     | (%wt)  | Type(s) and comment | % of total C14 activity |
|-------------------------------------|--------|---------------------|-------------------------|
| Total cellulose.....                | ~ 0.54 | -                   |                         |
| Paper, cotton.....                  | NE     | -                   |                         |
| Wood.....                           | ~ 0.54 | -                   |                         |
| Halogenated plastics.....           | ~ 30.5 | -                   |                         |
| Total non-halogenated plastics..... | ~ 13.7 | -                   |                         |
| Condensation polymers.....          | ~ 12.0 | -                   |                         |
| Others.....                         | ~ 1.7  | -                   |                         |
| Organic ion exchange materials..... | NE     | -                   |                         |
| Total rubber.....                   | ~ 0.29 | -                   |                         |
| Halogenated rubber.....             | NE     | -                   |                         |
| Non-halogenated rubber.....         | ~ 0.29 | -                   |                         |
| Hydrocarbons.....                   | NE     | -                   |                         |
| Oil or grease.....                  | NE     | -                   |                         |
| Fuel.....                           | NE     | -                   |                         |
| Asphalt/Tarmac (cont.coal tar)..... | NE     | -                   |                         |
| Asphalt/Tarmac (no coal tar).....   | NE     | -                   |                         |
| Bitumen.....                        | NE     | -                   |                         |
| Others.....                         | NE     | -                   |                         |
| Other organics.....                 | NE     | -                   |                         |

Other materials (%wt):

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

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

Inorganic anions (%wt):

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

Materials of interest for waste acceptance criteria:

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

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    | -                   |
| Total complexing agents.....   | NE    | -                   |

Physical components:

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

## TREATMENT, PACKAGING AND DISPOSAL

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

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

Comments on planned treatments:

WTC currently treats the drums using supercompaction.

Conditioning method:

Drums are processed through the Waste Treatment Complex (WTC). These drums could then be supercompacted in WTC and loaded into a basket within a 500 l drum such that there is a cement annulus between the basket and the drum skin.

Conditioning plants:

| Plant Name                       | Location   |
|----------------------------------|------------|
| Waste Treatment Complex 1 (WTC1) | Sellafield |

Likely conditioning matrix:

Non-standard

Further information on the conditioning matrix:

A GGBS/ CEM I grout mix is used to generate the grout annulus which surrounds the compacted feed drums in a WTC product drum. The conditioning matrix relevant to future facilities (WTC2 and WTC3) is currently unknown.

#### Waste Packaging:

| Likely container type: | Container                     | Waste packaged (vol%) | Waste loading (m³) | Payload (m³) | Number of packages | Estimated start date for packaging |
|------------------------|-------------------------------|-----------------------|--------------------|--------------|--------------------|------------------------------------|
|                        | 500 l drum (basket for waste) | 100.0                 | 1.1                | 0.50         | 1                  | 2025                               |

Range in container waste loading: The reported waste loading is for the current WTC (supercompaction) process. Typically between 1 and 10 compacted 200 litre drums will be loaded into a 500 litre drum, with an average of 5.7.

Other information on packaging and conditioning:

-

Conditioned density (t/m³):

= 2.1

Conditioned density comment:

Conditioned density calculated using data from current WTC product drum stock. The density is typically between 1.8 and 2.6 t/m³, although values outside of this range are possible.

#### 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) | = 100.0         |                  | 2050       |
| 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                                     |                 |                  |            |
| 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                             |                 |                  |            |
| 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 source of radioactivity is from decommissioning operations at AWE site.

Uncertainty:

The specific activity is based on records of arisings.

Measurement of radioactivities:

Specific activity has been derived using measured activity and dividing by the measured waste volume.

Chemical form of radionuclides:

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

| WASTE STREAM |                            | 2D204             |                 | Decommissioning PCM from Aldermaston |           |                            |                   |                 |                   |
|--------------|----------------------------|-------------------|-----------------|--------------------------------------|-----------|----------------------------|-------------------|-----------------|-------------------|
| 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          |                            |                   |                 |                                      | Gd 153    |                            |                   |                 |                   |
| Be 10        |                            |                   |                 |                                      | Ho 163    |                            |                   |                 |                   |
| C 14         |                            |                   |                 |                                      | Ho 166m   |                            |                   |                 |                   |
| Na 22        |                            |                   |                 |                                      | Tm 170    |                            |                   |                 |                   |
| Al 26        |                            |                   |                 |                                      | Tm 171    |                            |                   |                 |                   |
| Cl 36        |                            |                   |                 |                                      | 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        |                            |                   |                 |                                      | Po 210    |                            |                   |                 |                   |
| Zn 65        |                            |                   |                 |                                      | 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        |                            |                   |                 |                                      | Th 234    |                            |                   |                 |                   |
| Mo 93        |                            |                   |                 |                                      | Pa 231    |                            |                   |                 |                   |
| Tc 97        |                            |                   |                 |                                      | Pa 233    |                            |                   |                 |                   |
| Tc 99        |                            |                   |                 |                                      | U 232     |                            |                   |                 |                   |
| Ru 106       |                            |                   |                 |                                      | U 233     |                            |                   |                 |                   |
| Pd 107       |                            |                   |                 |                                      | U 234     |                            |                   |                 |                   |
| Ag 108m      |                            |                   |                 |                                      | U 235     |                            |                   |                 |                   |
| Ag 110m      |                            |                   |                 |                                      | U 236     |                            |                   |                 |                   |
| Cd 109       |                            |                   |                 |                                      | U 238     |                            |                   |                 |                   |
| Cd 113m      |                            |                   |                 |                                      | Np 237    |                            |                   |                 |                   |
| Sn 119m      |                            |                   |                 |                                      | Pu 236    |                            |                   |                 |                   |
| Sn 121m      |                            |                   |                 |                                      | Pu 238    | 4.34E-03                   | B B 2             |                 |                   |
| Sn 123       |                            |                   |                 |                                      | Pu 239    | 9.71E-02                   | B B 2             |                 |                   |
| Sn 126       |                            |                   |                 |                                      | Pu 240    | 2.62E-02                   | B B 2             |                 |                   |
| Sb 125       |                            |                   |                 |                                      | Pu 241    | 3.22E-02                   | B B 2             |                 |                   |
| Sb 126       |                            |                   |                 |                                      | Pu 242    | 6.58E-06                   | B B 2             |                 |                   |
| Te 125m      |                            |                   |                 |                                      | Am 241    | 3.34E-02                   | B B 2             |                 |                   |
| Te 127m      |                            |                   |                 |                                      | Am 242m   |                            |                   |                 |                   |
| I 129        |                            |                   |                 |                                      | Am 243    |                            |                   |                 |                   |
| Cs 134       |                            |                   |                 |                                      | Cm 242    |                            |                   |                 |                   |
| Cs 135       |                            |                   |                 |                                      | Cm 243    |                            |                   |                 |                   |
| Cs 137       |                            |                   |                 |                                      | Cm 244    |                            |                   |                 |                   |
| Ba 133       |                            |                   |                 |                                      | Cm 245    |                            |                   |                 |                   |
| La 137       |                            |                   |                 |                                      | Cm 246    |                            |                   |                 |                   |
| 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   | 1.61E-01                   | *                 | 0               | *                 |
| Eu 155       |                            |                   |                 |                                      | Total b/g | 3.22E-02                   | *                 | 0               | *                 |

#### 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