

| WASTE STREAM | 9E958 | Dry Fuel Route (excluding BCD) LLW |
|--------------|-------|------------------------------------|
|--------------|-------|------------------------------------|

**SITE** Oldbury

**SITE OWNER** Nuclear Decommissioning Authority

**WASTE CUSTODIAN** Nuclear Restoration Services Ltd (NRS)

**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       | = 16.0      |                               |                            |
|                        | 1.4.2026 - 31.3.2027       | = 16.0      |                               |                            |
|                        | 1.4.2027 - 31.3.2039       | 46.8        |                               |                            |
| Total future arisings: |                            | <b>78.8</b> |                               |                            |
| Total waste volume:    |                            | <b>78.8</b> |                               |                            |

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

Comment on arising rates: -

Additional information on quantities: -

Uncertainty factors on volumes:

|                |     |                   |        |
|----------------|-----|-------------------|--------|
| Stock (upper): | x - | Arisings (upper): | x 1.20 |
| Stock (lower): | x - | Arisings (lower): | x 0.80 |

**WASTE SOURCE** Waste stream 9E958 captures a large area of Oldbury site, made up of multiple contributing areas surrounding the reactor and boiler systems. The contributing areas can be divided into two main sub-areas, Pile Cap (PC) and Gas Circulators (GC), which both have their own sub-fingerprint. The waste is operational waste from activities carried out in these areas with the majority of the waste being from the Pile cap area.

#### PHYSICAL CHARACTERISTICS

General description: The waste consigned under waste stream 9E958 mainly comprises metal, concrete and rubble, soil, biodegradable materials, plasterboard, plastics, rubber, wood, glass and other materials. The waste is expected to be in the form of mixed trash, with occasional large items such as pipework, motors and pumps. The material of the waste includes aluminium, asphalt or tarmac, copper, iron, magnesium, mild steel, plastics, stainless steel, zinc, lead, EEE materials, MMMF, asbestos and oil.

Changes since waste generated: -

Bulk density (t/m<sup>3</sup>): ~ 0.40

Comment on density: The density is of the waste as cut for packaging.

#### CHEMICAL COMPOSITION

General description and components (%wt): Metal (~50%wt), concrete (~6%wt), soil (~3% wt), biodegradables (~6%), plasterboard (~1%), plastic (5%wt), rubber (~4%), wood (~4%), other organic (~1%), others oil and asbestos (~20%).

Chemical state: Neutral

Sheet metal proportion / thickness: Metal thickness may vary from 1 mm to 30 mm.

Metals and alloys (%wt):

|                           | (%wt)  | Type(s) / Grades(s) with proportions                                   | % of total C14 activity |
|---------------------------|--------|------------------------------------------------------------------------|-------------------------|
| Stainless steel.....      | ~ 5.0  | Items such as pipework, flooring plates, brackets, frames              |                         |
| Other ferrous metals..... | ~ 22.3 | mild steel - Items such as pipework, flooring plates, brackets, frames |                         |
| Iron.....                 | = 0.83 | -                                                                      |                         |
| Aluminium.....            | = 1.0  | Aluminium in waste items such as ladders and ducting                   |                         |
| Beryllium.....            | 0      | -                                                                      |                         |
| Cobalt.....               | -      | -                                                                      |                         |
| Copper.....               | ~ 0.25 | Trace in waste items such as pipework                                  |                         |
| Lead.....                 | = 20.0 | sheet, pipe, block and shot                                            |                         |
| Magnox/Magnesium.....     | = 0.01 | Trace in waste items                                                   |                         |
| Nickel.....               | -      | -                                                                      |                         |
| Titanium.....             | -      | -                                                                      |                         |
| Uranium.....              | -      | -                                                                      |                         |
| Zinc.....                 | = 0.50 | Galvanised steel in items such as gratings or buckets                  |                         |
| Zircaloy/Zirconium.....   | TR     | -                                                                      |                         |
| Other metals.....         | = 0    | "Other" metals have not been identified.                               |                         |

Organics (%wt):

|                                     | (%wt)  | Type(s) and comment                                                                                          | % of total C14 activity |
|-------------------------------------|--------|--------------------------------------------------------------------------------------------------------------|-------------------------|
| Total cellulose.....                | ~ 4.0  | -                                                                                                            |                         |
| Paper, cotton.....                  | = 0    | -                                                                                                            |                         |
| Wood.....                           | ~ 4.0  | -                                                                                                            |                         |
| Halogenated plastics.....           | ~ 2.0  | PVC, PPE                                                                                                     |                         |
| Total non-halogenated plastics..... | = 3.0  | -                                                                                                            |                         |
| Condensation polymers.....          | -      | -                                                                                                            |                         |
| Others.....                         | = 3.0  | pipes, poly, ppe, perspex, containers, sheet and hoses                                                       |                         |
| Organic ion exchange materials..... | = 0    | -                                                                                                            |                         |
| Total rubber.....                   | ~ 4.0  | -                                                                                                            |                         |
| Halogenated rubber.....             | ~ 4.0  | neoprene                                                                                                     |                         |
| Non-halogenated rubber.....         | -      | -                                                                                                            |                         |
| Hydrocarbons.....                   | ~ 15.1 | -                                                                                                            |                         |
| Oil or grease.....                  | ~ 15.0 | Liquid - (various types) e.g. from pumps, motors and circulator pipework,                                    |                         |
| Fuel.....                           | -      | -                                                                                                            |                         |
| Asphalt/Tarmac (cont.coal tar)..... | -      | -                                                                                                            |                         |
| Asphalt/Tarmac (no coal tar).....   | ~ 0.10 | road surface                                                                                                 |                         |
| Bitumen.....                        | -      | -                                                                                                            |                         |
| Others.....                         | -      | -                                                                                                            |                         |
| Other organics.....                 | ~ 1.0  | Other organic includes miscellaneous items not covered in any other category e.g. wipes, absorbent material. |                         |

Other materials (%wt):

|                                       | (%wt)  | Type(s) and comment                                                  | % of total C14 activity |
|---------------------------------------|--------|----------------------------------------------------------------------|-------------------------|
| Inorganic ion exchange materials..... | = 0    | -                                                                    |                         |
| Inorganic sludges and flocs.....      | = 0    | -                                                                    |                         |
| Soil.....                             | = 3.0  | -                                                                    |                         |
| Brick/Stone/Rubble.....               | = 6.0  | -                                                                    |                         |
| Cementitious material.....            | -      | -                                                                    |                         |
| Sand.....                             | -      | -                                                                    |                         |
| Glass/Ceramics.....                   | = 0.45 | 0.05% MMMF Lagging (associated with general plant items), 0.4% glass |                         |
| Graphite.....                         | TR     | -                                                                    |                         |
| Desiccants/Catalysts.....             | -      | -                                                                    |                         |
| Asbestos.....                         | ~ 0.05 | -                                                                    |                         |
| Non/low friable.....                  | = 0    | -                                                                    |                         |
| Moderately friable.....               | = 0    | -                                                                    |                         |
| Highly friable.....                   | ~ 0.05 | Lagging / gaskets chrysotile (white)                                 |                         |
| Free aqueous liquids.....             | = 0    | -                                                                    |                         |
| Free non-aqueous liquids.....         | = 0    | -                                                                    |                         |
| Powder/Ash.....                       | = 0    | -                                                                    |                         |

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

Inorganic anions (%wt):

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

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.....                 | TR    | -                   |
| Biodegradable materials.....                   | ~ 6.0 | -                   |
| Putrescible wastes.....                        | ~ 1.0 | -                   |
| Non-putrescible wastes.....                    | ~ 5.0 | -                   |
| Corrosive materials.....                       | = 0   | -                   |
| Pyrophoric materials.....                      | = 0   | -                   |
| Generating toxic gases.....                    | = 0   | -                   |
| Reacting with water.....                       | = 0   | -                   |
| Higher activity particles.....                 |       | -                   |
| Soluble solids as bulk chemical compounds..... |       | -                   |

Hazardous substances / non hazardous pollutants:

-

|                             | (%wt) | Type(s) and comment                                             |
|-----------------------------|-------|-----------------------------------------------------------------|
| Acrylamide.....             |       | -                                                               |
| Benzene.....                |       | -                                                               |
| Chlorinated solvents.....   |       | -                                                               |
| Formaldehyde.....           |       | -                                                               |
| Organometallics.....        |       | -                                                               |
| Phenol.....                 |       | -                                                               |
| Styrene.....                |       | -                                                               |
| Tri-butyl phosphate.....    |       | -                                                               |
| Other organophosphates..... |       | -                                                               |
| Vinyl chloride.....         |       | -                                                               |
| Arsenic.....                |       | -                                                               |
| Barium.....                 |       | -                                                               |
| Boron.....                  | 0     | -                                                               |
| Boron (in Boral).....       |       | -                                                               |
| Boron (non-Boral).....      |       | -                                                               |
| Cadmium.....                |       | -                                                               |
| Caesium.....                |       | -                                                               |
| Selenium.....               |       | -                                                               |
| Chromium.....               |       | -                                                               |
| Molybdenum.....             |       | -                                                               |
| Thallium.....               |       | -                                                               |
| Tin.....                    |       | -                                                               |
| Vanadium.....               |       | -                                                               |
| Mercury compounds.....      |       | -                                                               |
| Others.....                 | = 4.0 | Others include EEE materials. EEE weight is approx. 800kg or 4% |

Complexing agents (%wt):

No

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

Physical components:

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

## TREATMENT, PACKAGING AND DISPOSAL

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

| Treatment                                                  | On-site / Off-site | Stream volume % |
|------------------------------------------------------------|--------------------|-----------------|
| Size reduction                                             |                    |                 |
| Decay storage                                              |                    |                 |
| Low force compaction                                       | Off-site           | = 24.0          |
| Supercompaction (HFC)                                      | Off-site           | = 24.0          |
| Incineration                                               | Off-site           | = 40.0          |
| Drying/dewatering/liquid separation                        |                    |                 |
| Tie down/fixatives/strippable coating/painting application |                    |                 |
| Decontamination                                            |                    |                 |
| Metal treatment                                            | Off-site           | = 14.0          |
| Recycling / reuse                                          |                    |                 |
| Thermal treatment, including vitrification                 |                    |                 |
| Encapsulation                                              |                    |                 |
| Polymer encapsulation                                      |                    |                 |
| Other physical treatment                                   |                    |                 |
| Other chemical treatment                                   |                    |                 |
| Containerisation                                           |                    |                 |
| Treatment not yet determined                               |                    |                 |
| None                                                       |                    | = 22.0          |

Comments on planned treatments:

2% of this waste stream is expected to be sent for VLLW Landfill disposal.

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 WAMAC IP-2 ISO (TC08)                   | 24.0                  | 43.2               | 18.8         | 1                  | -                                  |
| 1/2 Height IP-2 Disposal/Re-usable ISO (TC01/TC02) | 20.0                  | 10.0               | 18.3         | 2                  | -                                  |

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                                     | = 44.0          | 0.40             |            |
| Expected to be consigned to a Landfill Facility                                    | 2.0             | 0.40             |            |
| Expected to be disposed On-Site                                                    |                 |                  |            |
| Expected to be managed by In-Situ Disposal                                         |                 |                  |            |
| Expected to be consigned to an Incineration Facility                               | = 40.0          | 0.40             |            |
| Expected to be consigned to a Metal Treatment Facility                             | = 14.0          | 1.4              |            |
| 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:

17 04 05, 17 06 04, 17 01 07, 17 06 01\*, 17 02 01, 17 02 02, 17 02 03, 17 05 04

Opportunities for alternative disposal routing: No

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

#### RADIOACTIVITY

Source: Activation and contamination of materials.

Uncertainty: Activity values are current best estimates. Specific activity is a function of Station operating history. The values quoted are indicative of the activities that would be expected, although demolition wastes are predicted to be lower in activity than the routine operational wastes and so the values quoted for this stream are expected to be an over estimate.

Measurement of radioactivities: -

Chemical form of radionuclides: H-3: Tritium present as surface contamination of waste by tritiated water.  
C-14: Carbon 14 may be present as contamination in the form of graphite dust.  
Cl-36: Chlorine 36 may be present as a contaminant of graphite dust.  
Se-79: The selenium content is insignificant.  
Tc-99: The technetium content is insignificant.  
I-129: -  
Ra: The radium isotope content is insignificant.  
Th: The thorium content is insignificant.  
U: The chemical form of uranium isotopes has not been determined but may be uranium oxides.  
Np: The neptunium content is insignificant.  
Pu: The chemical form of plutonium isotopes has not been determined but may be plutonium oxides.

| WASTE STREAM 9E958 Dry Fuel Route (excluding BCD) 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                                                   |                            |                | 2.42E-04        | C C 1          | Gd 153           |                            |                |                 | 8              |
| Be 10                                                 |                            |                |                 | 8              | Ho 163           |                            |                |                 | 8              |
| C 14                                                  |                            |                | 5.47E-05        | C C 1          | Ho 166m          |                            |                |                 | 8              |
| Na 22                                                 |                            |                |                 | 8              | Tm 170           |                            |                |                 | 8              |
| Al 26                                                 |                            |                |                 | 8              | Tm 171           |                            |                |                 | 8              |
| Cl 36                                                 |                            |                | 7.97E-06        | C C 2          | Lu 174           |                            |                |                 | 8              |
| Ar 39                                                 |                            |                |                 | 8              | Lu 176           |                            |                |                 | 8              |
| Ar 42                                                 |                            |                |                 | 8              | Hf 178n          |                            |                |                 | 8              |
| K 40                                                  |                            |                |                 | 8              | Hf 182           |                            |                |                 | 8              |
| Ca 41                                                 |                            |                |                 | 8              | Pt 193           |                            |                |                 | 8              |
| Mn 53                                                 |                            |                |                 | 8              | Ti 204           |                            |                |                 | 8              |
| Mn 54                                                 |                            |                |                 | 8              | Pb 205           |                            |                |                 | 8              |
| Fe 55                                                 |                            |                | 2.28E-05        | C C 1          | Pb 210           |                            |                |                 | 8              |
| Co 60                                                 |                            |                | 1.34E-05        | C C 2          | Bi 208           |                            |                |                 | 8              |
| Ni 59                                                 |                            |                |                 | 8              | Bi 210m          |                            |                |                 | 8              |
| Ni 63                                                 |                            |                | 5.26E-06        | C C 1          | Po 210           |                            |                |                 | 8              |
| Zn 65                                                 |                            |                |                 | 8              | Ra 223           |                            |                |                 | 8              |
| Se 79                                                 |                            |                |                 | 8              | Ra 225           |                            |                |                 | 8              |
| Kr 81                                                 |                            |                |                 | 8              | Ra 226           |                            |                |                 | 8              |
| Kr 85                                                 |                            |                |                 | 8              | Ra 228           |                            |                |                 | 8              |
| Rb 87                                                 |                            |                |                 | 8              | Ac 227           |                            |                |                 | 8              |
| Sr 90                                                 |                            |                | 1.37E-06        | C C 1          | Th 227           |                            |                |                 | 8              |
| Zr 93                                                 |                            |                |                 | 8              | Th 228           |                            |                |                 | 8              |
| Nb 91                                                 |                            |                |                 | 8              | Th 229           |                            |                |                 | 8              |
| Nb 92                                                 |                            |                |                 | 8              | Th 230           |                            |                |                 | 8              |
| Nb 93m                                                |                            |                |                 | 8              | Th 232           |                            |                |                 | 8              |
| Nb 94                                                 |                            |                | 5.70E-07        | C C 2          | Th 234           |                            |                |                 | 8              |
| Mo 93                                                 |                            |                |                 | 8              | Pa 231           |                            |                |                 | 8              |
| Tc 97                                                 |                            |                |                 | 8              | Pa 233           |                            |                |                 | 8              |
| Tc 99                                                 |                            |                |                 | 8              | U 232            |                            |                |                 | 8              |
| Ru 106                                                |                            |                |                 | 8              | U 233            |                            |                |                 | 8              |
| Pd 107                                                |                            |                |                 | 8              | U 234            |                            |                |                 | 8              |
| Ag 108m                                               |                            |                | 5.68E-07        | C C 2          | U 235            |                            |                |                 | 8              |
| Ag 110m                                               |                            |                |                 | 8              | U 236            |                            |                |                 | 8              |
| Cd 109                                                |                            |                |                 | 8              | U 238            |                            |                |                 | 8              |
| Cd 113m                                               |                            |                |                 | 8              | Np 237           |                            |                |                 | 8              |
| Sn 119m                                               |                            |                |                 | 8              | Pu 236           |                            |                |                 | 8              |
| Sn 121m                                               |                            |                |                 | 8              | Pu 238           |                            |                | 1.40E-08        | C C 1          |
| Sn 123                                                |                            |                |                 | 8              | Pu 239           |                            |                | 5.80E-09        | C C 1          |
| Sn 126                                                |                            |                |                 | 8              | Pu 240           |                            |                | 7.40E-09        | C C 1          |
| Sb 125                                                |                            |                | 6.73E-08        | C C 2          | Pu 241           |                            |                | 8.37E-07        | C C 1          |
| Sb 126                                                |                            |                |                 | 8              | Pu 242           |                            |                |                 | 8              |
| Te 125m                                               |                            |                | 1.69E-08        | C C 2          | Am 241           |                            |                | 6.13E-08        | C C 1          |
| Te 127m                                               |                            |                |                 | 8              | Am 242m          |                            |                |                 | 8              |
| I 129                                                 |                            |                |                 | 8              | Am 243           |                            |                |                 | 8              |
| Cs 134                                                |                            |                | 9.24E-09        | C C 2          | Cm 242           |                            |                |                 | 8              |
| Cs 135                                                |                            |                |                 | 8              | Cm 243           |                            |                |                 | 8              |
| Cs 137                                                |                            |                | 1.16E-06        | C C 2          | Cm 244           |                            |                | 4.47E-09        | C C 1          |
| Ba 133                                                |                            |                | 1.74E-07        | C C 2          | Cm 245           |                            |                |                 | 8              |
| La 137                                                |                            |                |                 | 8              | Cm 246           |                            |                |                 | 8              |
| La 138                                                |                            |                |                 | 8              | Cm 248           |                            |                |                 | 8              |
| Ce 144                                                |                            |                |                 | 8              | Cf 249           |                            |                |                 | 8              |
| Pm 145                                                |                            |                |                 | 8              | Cf 250           |                            |                |                 | 8              |
| Pm 147                                                |                            |                | 1.58E-08        | C C 2          | Cf 251           |                            |                |                 | 8              |
| Sm 147                                                |                            |                |                 | 8              | Cf 252           |                            |                |                 | 8              |
| Sm 151                                                |                            |                |                 | 8              | Unsp a           |                            |                |                 |                |
| Eu 152                                                |                            |                | 1.00E-06        | C C 2          | Unsp b/g         |                            |                |                 |                |
| Eu 154                                                |                            |                | 4.71E-07        | C C 2          | <b>Total a</b>   | <b>0</b>                   | <b>*</b>       | <b>9.30E-08</b> | <b>*</b>       |
| Eu 155                                                |                            |                | 2.35E-07        | C C 2          | <b>Total b/g</b> | <b>0</b>                   | <b>*</b>       | <b>3.52E-04</b> | <b>*</b>       |

#### 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