## WASTE STREAM 9C915 LLAW Plant

**SITE** Dungeness A

**SITE OWNER** Nuclear Decommissioning Authority

**WASTE CUSTODIAN** Magnox Limited

**WASTE TYPE** LLW

**WASTE VOLUMES**

| | | Reported |
|---|---|---|
| Stocks: | At 1.4.2019..... | 0 m³ |
| Future arisings - | 1.4.2019 - 31.3.2022..... | 196.4 m³ |
| Total future arisings: | | 196.4 m³ |
| Total waste volume: | | 196.4 m³ |
| Comment on volumes: | - | |
| Uncertainty factors on volumes: | Stock (upper): x | Arisings (upper) x 1.2 |
| | Stock (lower): x | Arisings (lower) x 0.8 |

**WASTE SOURCE** Concrete wastes from dismantling building. Glass, wood, metals and plastics.

**PHYSICAL CHARACTERISTICS**

| | |
|---|---|
| General description: | A wide variety of concrete and reinforced concrete items. |
| Physical components (%vol): | - |
| Sealed sources: | - |
| Bulk density (t/m³): | 1.4 |
| Comment on density: | Density updated in line with WIF assumptions. |

**CHEMICAL COMPOSITION**

| | |
|---|---|
| General description and components (%wt): | Concrete (30%) some of the concrete may include iron shot. Glass (5%), wood (5%) metals (50%) and plastics (10%) (percentages of constituants very uncertain) |
| Chemical state: | Alkali |
| Chemical form of radionuclides: | - |
| Metals and alloys (%wt): | - |
| | Stainless steel..... |
| | Other ferrous metals..... ~50.0 |
| | Iron..... |
| | Aluminium..... |
| | Beryllium..... |
| | Cobalt..... |
| | Copper..... |
| | Lead..... |
| | Magnox/Magnesium..... |
| | Nickel..... |
| | Titanium..... |
| | Uranium..... |
| | Zinc..... |
| | Zircaloy/Zirconium..... |
| | Other metals..... |
| Organics (%wt): | - |

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|---|---|---|
| | Total cellulosics..... | 5.0 |
| | Paper, cotton..... | |
| | Wood..... | ~5.0 |
| | Halogenated plastics ..... | |
| | Total non-halogenated plastics..... | 10.0 |
| | Condensation polymers..... | |
| | Others..... | ~10.0 |
| | Organic ion exchange materials.... | |
| | Total rubber..... | 0 |
| | Halogenated rubber ..... | |
| | Non-halogenated rubber..... | |
| | Hydrocarbons..... | |
| | Oil or grease ..... | |
| | Fuel..... | |
| | Asphalt/Tarmac (cont.coal tar)... | |
| | Asphalt/Tarmac (no coal tar)..... | |
| | Bitumen..... | |
| | Others..... | |
| | Other organics..... | |
| Other materials (%wt): | - | |
| | Inorganic ion exchange materials. | |
| | Inorganic sludges and flocs..... | |
| | Soil..... | |
| | Brick/Stone/Rubble..... | |
| | Cementitious material..... | ~30.0 |
| | Sand..... | |
| | Glass/Ceramics..... | ~5.0 |
| | Graphite..... | |
| | Desiccants/Catalysts..... | |
| | Asbestos..... | |
| | Non/low friable..... | |
| | Moderately friable..... | |
| | Highly friable..... | |
| | Free aqueous liquids..... | |
| | Free non-aqueous liquids..... | |
| | Powder/Ash..... | |
| Inorganic anions (%wt): | - | |

| WASTE STREAM | 9C915 LLAW Plant |
|---|---|

Fluoride.....

Chloride.....

Iodide.....

Cyanide.....

Carbonate.....

Nitrate.....

Nitrite.....

Phosphate.....

Sulphate.....

Sulphide.....

Materials of interest for waste acceptance criteria: -

Combustible metals.....

Low flash point liquids.....

Explosive materials.....

Phosphorus.....

Hydrides.....

Biological etc. materials.....

Biodegradable materials.....

Putrescible wastes.....

Non-putrescible wastes.....

Corrosive materials.....

Pyrophoric materials.....

Generating toxic gases.....

Reacting with water.....

Active particles.....

Soluble solids as bulk chemical compounds.....

Hazardous substances / non hazardous pollutants: none expected

Acrylamide.....

Benzene.....

Chlorinated solvents.....

Formaldehyde.....

Organometallics.....

Phenol.....

Styrene.....

Tri-butyl phosphate.....

Other organophosphates.....

Vinyl chloride.....

Arsenic.....

Barium.....

Boron.....

Cadmium.....

Caesium.....

Selenium.....

Chromium.....

Molybdenum.....

Thallium.....

Tin.....

Vanadium.....

Mercury compounds.....

Others.....

Electronic Electrical Equipment (EEE)

EEE Type 1.....

EEE Type 2.....

EEE Type 3.....

EEE Type 4.....

EEE Type 5.....

Complexing agents (%wt):

EDTA.....

DPTA.....

NTA.....

Polycarboxylic acids……

Other organic complexants.....

Total complexing agents.....

**TREATMENT, PACKAGING AND DISPOSAL**

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

| Treatment | On-site / Off site | Stream volume % |
|---|---|---|
| Low force compaction | | |
| Supercompaction (HFC) | | |
| Incineration | | |
| Solidification | | |
| Decontamination | | |
| Metal treatment | | |
| Size reduction | | |
| Decay storage | | |
| Recyling / reuse | | |
| Other / various | | |
| None | | 100.0 |

Comment on planned treatments: It is expected that 100% of this waste stream will be sent for VLLW disposal

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**Disposal Routes:**

| Disposal Route | Stream volume % |
|---|---|
| Expected to be consigned to the LLW Repository<br>Expected to be consigned to a Landfill Facility<br>Expected to be consigned to an On-Site Disposal Facility<br>Expected to be consigned to an Incineration Facility<br>Expected to be consigned to a Metal Treatment Facility<br>Expected to be consigned as Out of Scope<br>Expected to be recycled / reused<br>Disposal route not known | 100.0 |

**Upcoming (2019/20-2021/22) Waste Routing (if expected to change from above):**

| Disposal Route | Stream volume % | | |
|---|---|---|---|
| | 2019/20 | 2020/21 | 2021/22 |
| Expected to be consigned to the LLW Repository<br>Expected to be consigned to a Landfill Facility<br>Expected to be consigned to an On-Site Disposal Facility<br>Expected to be consigned to an Incineration Facility<br>Expected to be consigned to a Metal Treatment Facility<br>Expected to be consigned as Out of Scope<br>Expected to be recycled / reused<br>Disposal route not known | | | |

**Waste Packaging for Disposal:** (Not applicable to this waste stream)

| Container | Stream volume % | Waste loading m³ | Number of packages |
|---|---|---|---|
| 1/3 Height IP-1 ISO<br>2/3 Height IP-2 ISO<br>1/2 Height WAMAC IP-2 ISO<br>1/2 Height IP-2 Disposal/Re-usable ISO<br>2m box (no shielding)<br>4m box (no shielding)<br>Other | | | |

Other information: -

**Waste Planned for Disposal at the LLW Repository:** (Not applicable to this waste stream)

Container voidage: -

Waste Characterisation Form (WCH): -

Waste consigned for disposal to LLWR in year of generation: -

Potential for the waste to contain discrete items: -

**Non-Containerised Waste for In-Vault Grouting:** (Not applicable to this waste stream)

Stream volume (%): -

Waste stream variation: -

Bounding cuboidal volume:

Inaccessible voidage: -

Other information: -

**RADIOACTIVITY**

## WASTE STREAM 9C915 LLAW Plant

| | |
|---|---|
| Source: | - |
| Uncertainty: | - |
| Definition of total alpha and total beta/gamma: | Where totals are shown on the table of radionuclide activities they are the sums of the listed alpha or beta/gamma emitting radionuclides plus 'other alpha' or 'other beta/gamma'. |
| Measurement of radioactivities: | The radionuclide fingerprint for this waste stream has been updated using an engineering assessment based on 2% of the total activity from waste streams 9C911 and 9C912. |
| Other information: | - |

## WASTE STREAM 9C915 LLAW Plant

| Nuclide | Mean radioactivity, TBq/m³ Waste at 1.4.2019 | Bands and Code | Future arisings | Bands and Code | Nuclide | Mean radioactivity, TBq/m³ Waste at 1.4.2019 | Bands and Code | Future arisings | Bands and Code |
|---|---|---|---|---|---|---|---|---|---|
| H 3 | | | 2.65E-06 | C C 2 | Gd 153 | | | | 8 |
| Be 10 | | | | 8 | Ho 163 | | | | 8 |
| C 14 | | | 8.21E-07 | C C 2 | Ho 166m | | | | 8 |
| Na 22 | | | | 8 | Tm 170 | | | | 8 |
| Al 26 | | | | 8 | Tm 171 | | | | 8 |
| Cl 36 | | | 2.54E-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 | Tl 204 | | | | 8 |
| Mn 54 | | | 3.6E-09 | C C 2 | Pb 205 | | | | 8 |
| Fe 55 | | | 8.62E-06 | C C 2 | Pb 210 | | | | 8 |
| Co 60 | | | 2.21E-06 | C C 2 | Bi 208 | | | | 8 |
| Ni 59 | | | | 8 | Bi 210m | | | | 8 |
| Ni 63 | | | 1.66E-06 | C C 2 | Po 210 | | | | 8 |
| Zn 65 | | | 1.56E-08 | C C 2 | 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 | | | 1.26E-05 | C C 2 | 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 | | | 2.85E-08 | 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 | | | 6.08E-07 | C C 2 | U 233 | | | | 8 |
| Pd 107 | | | | 8 | U 234 | | | 3.21E-09 | C C 2 |
| Ag 108m | | | 6.83E-08 | C C 2 | U 235 | | | | 8 |
| Ag 110m | | | 9.12E-09 | C C 2 | 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 | | | 3.36E-08 | C C 2 |
| Sn 123 | | | | 8 | Pu 239 | | | 3.31E-08 | C C 2 |
| Sn 126 | | | 6.1E-09 | C C 2 | Pu 240 | | | 3.36E-08 | C C 2 |
| Sb 125 | | | 1.6E-07 | C C 2 | Pu 241 | | | 3E-06 | C C 2 |
| Sb 126 | | | | 8 | Pu 242 | | | | 8 |
| Te 125m | | | 1.51E-07 | C C 2 | Am 241 | | | 7.07E-08 | C C 2 |
| Te 127m | | | | 8 | Am 242m | | | 1.22E-07 | C C 2 |
| I 129 | | | | 8 | Am 243 | | | | 8 |
| Cs 134 | | | 1.4E-07 | C C 2 | Cm 242 | | | 3.09E-09 | C C 2 |
| Cs 135 | | | | 8 | Cm 243 | | | | 8 |
| Cs 137 | | | 2.84E-05 | C C 2 | Cm 244 | | | 9.86E-09 | C C 2 |
| Ba 133 | | | 4.01E-08 | C C 2 | Cm 245 | | | | 8 |
| La 137 | | | | 8 | Cm 246 | | | | 8 |
| La 138 | | | | 8 | Cm 248 | | | | 8 |
| Ce 144 | | | 3.03E-07 | C C 2 | Cf 249 | | | | 8 |
| Pm 145 | | | | 8 | Cf 250 | | | | 8 |
| Pm 147 | | | 9.22E-07 | C C 2 | Cf 251 | | | | 8 |
| Sm 147 | | | | 8 | Cf 252 | | | | 8 |
| Sm 151 | | | 2.2E-09 | C C 2 | Other a | | | | |
| Eu 152 | | | 1.48E-07 | C C 2 | Other b/g | | | | |
| Eu 154 | | | 2.86E-07 | C C 2 | **Total a** | **0** | | **1.87E-07** | **C C 2** |
| Eu 155 | | | 1.78E-07 | C C 2 | **Total b/g** | **0** | | **6.57E-05** | **C C 2** |

**Bands (Upper and Lower)**

A a factor of 1.5
B a factor of 3
C a factor of 10
D a factor of 100
E a factor of 1000

Note: Bands quantify uncertainty in mean radioactivity.

**Code**

1 Measured activity
2 Derived activity (best estimate)
3 Derived activity (upper limit)
4 Not present
5 Present but not significant
6 Likely to be present but not assessed
7 Present in significant quantities but not determined
8 Not expected to be present in significant quantity