## WASTE STREAM 9C55 Doulton Filters

**SITE** Dungeness A

**SITE OWNER** Nuclear Decommissioning Authority

**WASTE CUSTODIAN** Magnox Limited

**WASTE TYPE** LLW

**WASTE VOLUMES**

| | | Reported |
|---|---|---|
| Stocks: | At 1.4.2019..... | 6.4 m³ |
| Total future arisings: | | 0 m³ |
| Total waste volume: | | 6.4 m³ |

Comment on volumes: -

Uncertainty factors on volumes:

| | | | |
|---|---|---|---|
| Stock (upper): | x 1.2 | Arisings (upper) | x |
| Stock (lower): | x 0.8 | Arisings (lower) | x |

**WASTE SOURCE** Filtration of aqueous effluent from the Active Effluent Treatment Plant prior to transfer to the Final Monitoring Delay Tank.

### PHYSICAL CHARACTERISTICS

General description: Water filter cartridge. Cartridge ~510mm in length by ~70mm diameter. Cartridge contains particulate from the active effluent treatment plant.

Physical components (%vol): Filter cartridge + particulate, total 100%

Sealed sources: -

Bulk density (t/m³): >1.2

Comment on density: -

### CHEMICAL COMPOSITION

General description and components (%wt): The cartridge has a cloth type filter media supported on a pleated card structure. Around the media are plastic hoops to keep the structure rigid with the housing believed to be polypropylene. The sludge is mainly made up of magnesium hydroxide and oxide. Some residual water may be present inside the filter cartridge.

Chemical state: Neutral

Chemical form of radionuclides: -

Metals and alloys (%wt): -

| | |
|---|---|
| Stainless steel..... | 0 |
| Other ferrous metals..... | 40.0 |
| Iron..... | |
| Aluminium..... | 0 |
| Beryllium..... | |
| Cobalt..... | |
| Copper..... | 0 |
| Lead..... | 0 |
| Magnox/Magnesium..... | NE |
| Nickel..... | |
| Titanium..... | |
| Uranium..... | |
| Zinc..... | 0 |
| Zircaloy/Zirconium..... | 0 |
| Other metals..... | 0 |

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|---|---|---|---|
| Organics (%wt): | - | | |
| | Total cellulosics..... | NE | |
| | Paper, cotton..... | NE | |
| | Wood..... | 0 | |
| | Halogenated plastics ..... | ~60.0 | Composition of the plastics in the filter is polypropylene. |
| | Total non-halogenated plastics..... | NE | |
| | Condensation polymers..... | NE | |
| | Others..... | NE | |
| | Organic ion exchange materials.... | 0 | |
| | Total rubber..... | NE | The gaskets and O-rings are made of ethylene propylene rubber, PTFE encapsulated, slicone, vitron, nitrile or polypropylene felt. |
| | Halogenated rubber ..... | NE | |
| | Non-halogenated rubber..... | NE | |
| | Hydrocarbons..... | | |
| | Oil or grease ..... | | |
| | Fuel..... | | |
| | Asphalt/Tarmac (cont.coal tar)... | | |
| | Asphalt/Tarmac (no coal tar)..... | | |
| | Bitumen..... | | |
| | Others..... | | |
| | Other organics..... | NE | |
| Other materials (%wt): | - | | |
| | Inorganic ion exchange materials. | 0 | |
| | Inorganic sludges and flocs..... | TR | |
| | Soil..... | 0 | |
| | Brick/Stone/Rubble..... | 0 | |
| | Cementitious material..... | 0 | |
| | Sand..... | | |
| | Glass/Ceramics..... | 0 | |
| | Graphite..... | 0 | |
| | Desiccants/Catalysts..... | | |
| | Asbestos..... | 0 | |
| | Non/low friable..... | | |
| | Moderately friable..... | | |
| | Highly friable..... | | |
| | Free aqueous liquids..... | NE | |
| | Free non-aqueous liquids..... | 0 | |
| | Powder/Ash..... | TR | |
| Inorganic anions (%wt): | - | | |

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|---|---|---|

| | |
|---|---|
| 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: -

| | |
|---|---|
| Combustible metals | 0 |
| Low flash point liquids | 0 |
| Explosive materials | 0 |
| Phosphorus | 0 |
| Hydrides | 0 |
| Biological etc. materials | 0 |
| Biodegradable materials | |
| Putrescible wastes | 0 |
| Non-putrescible wastes | |
| Corrosive materials | 0 |
| Pyrophoric materials | 0 |
| Generating toxic gases | 0 |
| Reacting with water | 0 |
| 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 | |

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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..... NE

**TREATMENT, PACKAGING AND DISPOSAL**

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

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

Comment on planned treatments: Drying.

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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:**

| 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 | 100.0 | 10 | < 1 |

Other information: -

**Waste Planned for Disposal at the LLW Repository:**

Container voidage: -

Waste Characterisation Form (WCH): The waste meets the LLWR's Waste Acceptance Criteria (WAC).
The waste does not have a current WCH.

Waste consigned for disposal to LLWR in year of generation: No. it is unknown at this time when waste will be consigned

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**

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|---|---|---|

| | |
|---|---|
| Source: | Activity from particulate retained by the filter on final filtration of active effluent prior to transfer to the delay tank. |
| Uncertainty: | The activity on the filter media originates from the active effluent treatment plant, AETP, probably particulate. |
| Definition of total alpha and total beta/gamma: | No current data on the radionuclide inventory for the Doulton filter. The radionuclides expected to be present are indicated in the table. |
| Measurement of radioactivities: | No data available at this time |
| Other information: | - |

## WASTE STREAM 9C55 Doulton Filters

| 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 | | 6 | | | Gd 153 | | 8 | | |
| Be 10 | | 6 | | | Ho 163 | | 8 | | |
| C 14 | | 6 | | | Ho 166m | | 8 | | |
| Na 22 | | 8 | | | Tm 170 | | 8 | | |
| Al 26 | | 8 | | | Tm 171 | | 8 | | |
| Cl 36 | | 6 | | | Lu 174 | | 8 | | |
| Ar 39 | | 8 | | | Lu 176 | | 8 | | |
| Ar 42 | | 8 | | | Hf 178n | | 8 | | |
| K 40 | | 8 | | | Hf 182 | | 8 | | |
| Ca 41 | | 6 | | | Pt 193 | | 8 | | |
| Mn 53 | | 8 | | | Tl 204 | | 8 | | |
| Mn 54 | | 6 | | | Pb 205 | | 8 | | |
| Fe 55 | | 6 | | | Pb 210 | | 8 | | |
| Co 60 | | 6 | | | Bi 208 | | 8 | | |
| Ni 59 | | 6 | | | Bi 210m | | 8 | | |
| Ni 63 | | 6 | | | Po 210 | | 8 | | |
| Zn 65 | | 8 | | | Ra 223 | | 8 | | |
| Se 79 | | 6 | | | Ra 225 | | 8 | | |
| Kr 81 | | 8 | | | Ra 226 | | 8 | | |
| Kr 85 | | 8 | | | Ra 228 | | 8 | | |
| Rb 87 | | 8 | | | Ac 227 | | 8 | | |
| Sr 90 | | 6 | | | Th 227 | | 8 | | |
| Zr 93 | | 6 | | | Th 228 | | 8 | | |
| Nb 91 | | 8 | | | Th 229 | | 8 | | |
| Nb 92 | | 8 | | | Th 230 | | 8 | | |
| Nb 93m | | 6 | | | Th 232 | | 8 | | |
| Nb 94 | | 8 | | | Th 234 | | 8 | | |
| Mo 93 | | 8 | | | Pa 231 | | 8 | | |
| Tc 97 | | 8 | | | Pa 233 | | 8 | | |
| Tc 99 | | 6 | | | U 232 | | 8 | | |
| Ru 106 | | 6 | | | U 233 | | 8 | | |
| Pd 107 | | 6 | | | U 234 | | 6 | | |
| Ag 108m | | 6 | | | U 235 | | 6 | | |
| Ag 110m | | 6 | | | U 236 | | 6 | | |
| Cd 109 | | 8 | | | U 238 | | 6 | | |
| Cd 113m | | 8 | | | Np 237 | | 6 | | |
| Sn 119m | | 8 | | | Pu 236 | | 8 | | |
| Sn 121m | | 8 | | | Pu 238 | | 6 | | |
| Sn 123 | | 8 | | | Pu 239 | | 6 | | |
| Sn 126 | | 8 | | | Pu 240 | | 6 | | |
| Sb 125 | | 8 | | | Pu 241 | | 6 | | |
| Sb 126 | | 8 | | | Pu 242 | | 6 | | |
| Te 125m | | 8 | | | Am 241 | | 6 | | |
| Te 127m | | 8 | | | Am 242m | | 6 | | |
| I 129 | | 6 | | | Am 243 | | 6 | | |
| Cs 134 | | 6 | | | Cm 242 | | 6 | | |
| Cs 135 | | 6 | | | Cm 243 | | 6 | | |
| Cs 137 | | 6 | | | Cm 244 | | 6 | | |
| Ba 133 | | 8 | | | Cm 245 | | 8 | | |
| La 137 | | 8 | | | Cm 246 | | 8 | | |
| La 138 | | 8 | | | Cm 248 | | 8 | | |
| Ce 144 | | 6 | | | Cf 249 | | 8 | | |
| Pm 145 | | 8 | | | Cf 250 | | 8 | | |
| Pm 147 | | 6 | | | Cf 251 | | 8 | | |
| Sm 147 | | 8 | | | Cf 252 | | 8 | | |
| Sm 151 | | 6 | | | Other a | NE | | | |
| Eu 152 | | 6 | | | Other b/g | NE | | | |
| Eu 154 | | 6 | | | **Total a** | **NE** | | **0** | |
| Eu 155 | | 6 | | | **Total b/g** | **NE** | | **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 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