

| WASTE STREAM | 1A09 | Incinerated Waste |
|--------------|------|-------------------|
|--------------|------|-------------------|

| | | | |
|-------------------------|---|-------|-------------------------|
| | Titanium..... | 0 | |
| | Uranium..... | 0 | |
| | Zinc..... | 0 | |
| | Zircaloy/Zirconium..... | 0 | |
| | Other metals..... | 0 | |
| Organics (%wt): | 66%wt Organic component as paper / cotton and non-halogenated plastics. | | |
| | Total cellulosics..... | ~24.0 | |
| | Paper, cotton..... | ~20.0 | |
| | Wood..... | ~4.0 | |
| | Halogenated plastics | ~9.0 | PVC sheeting / gaitors |
| | Total non-halogenated plastics..... | ~31.0 | Polyethylene |
| | Condensation polymers..... | ~30.0 | |
| | Others..... | ~1.0 | |
| | Organic ion exchange materials.... | 0 | |
| | Total rubber..... | ~2.0 | Hypalon/neoprene gloves |
| | Halogenated rubber | ~2.0 | |
| | Non-halogenated rubber..... | | |
| | Hydrocarbons..... | | |
| | Oil or grease | | |
| | Fuel..... | | |
| | Asphalt/Tarmac (cont.coal tar)... | | |
| | Asphalt/Tarmac (no coal tar).... | | |
| | Bitumen..... | | |
| | Others..... | | |
| | Other organics..... | TR | |
| Other materials (%wt): | 29%wt glass, ZnBr. | | |
| | Inorganic ion exchange materials. | 0 | |
| | Inorganic sludges and flocs..... | 0 | |
| | Soil..... | 0 | |
| | Brick/Stone/Rubble..... | 0 | |
| | Cementitious material..... | 0 | |
| | Sand..... | 0 | |
| | Glass/Ceramics..... | ~5.0 | |
| | Graphite..... | 0 | |
| | Desiccants/Catalysts..... | 0 | |
| | Asbestos..... | 0 | |
| | Non/low friable..... | | |
| | Moderately friable..... | | |
| | Highly friable..... | | |
| | Free aqueous liquids..... | ~20.0 | |
| | Free non-aqueous liquids..... | ~4.0 | |
| | Powder/Ash..... | 0 | |
| Inorganic anions (%wt): | Not present - maybe trace - see table. | | |

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|----------------|----|
| Fluoride..... | 0 |
| Chloride..... | TR |
| Iodide..... | TR |
| Cyanide..... | 0 |
| Carbonate..... | TR |
| Nitrate..... | 0 |
| Nitrite..... | 0 |
| Phosphate..... | TR |
| Sulphate..... | 0 |
| Sulphide..... | 0 |

Materials of interest for waste acceptance criteria:

24% paper wood cotton.

| | |
|--------------------------------|---|
| Combustible metals..... | 0 |
| Low flash point liquids..... | 0 |
| Explosive materials..... | 0 |
| Phosphorus..... | 0 |
| Hydrides..... | 0 |
| Biological etc. materials..... | P |

Autoclaved biomedica in petri dishes

| | |
|------------------------------|-------|
| Biodegradable materials..... | ~24.0 |
| Putrescible wastes..... | 0 |
| Non-putrescible wastes..... | ~24.0 |

24%wt paper cotton wood.

| | |
|--|---|
| Corrosive materials..... | P |
| Pyrophoric materials..... | 0 |
| Generating toxic gases..... | 0 |
| Reacting with water..... | 0 |
| Active particles..... | 0 |
| Soluble solids as bulk chemical compounds..... | 0 |

Small quantities of acids

Hazardous substances / non hazardous pollutants:

| | |
|-----------------------------|------|
| - | |
| Acrylamide..... | 0 |
| Benzene..... | 0 |
| Chlorinated solvents..... | 0 |
| Formaldehyde..... | 0 |
| Organometallics..... | 0 |
| Phenol..... | 0 |
| Styrene..... | 0 |
| Tri-butyl phosphate..... | 0 |
| Other organophosphates..... | 0 |
| Vinyl chloride..... | ~9.0 |
| Arsenic..... | 0 |
| Barium..... | 0 |

9%wt PVC bags / sheet / gloves

WASTE STREAM**1A09****Incinerated Waste**

| | |
|---------------------------------------|---|
| Boron..... | 0 |
| Cadmium..... | 0 |
| Caesium..... | 0 |
| Selenium..... | 0 |
| Chromium..... | 0 |
| Molybdenum..... | 0 |
| Thallium..... | 0 |
| Tin..... | 0 |
| Vanadium..... | 0 |
| Mercury compounds..... | 0 |
| Others..... | 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 |

Complexing agents (%wt):

| | |
|--------------------------------|----|
| No | |
| EDTA..... | |
| DPTA..... | |
| NTA..... | |
| Polycarboxylic acids..... | |
| Other organic complexants..... | TR |
| Total complexing agents..... | TR |

There may be minute amounts of EDTA present on swabs.

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 Recycling / reuse Other / various None | Off-site | 100.0 |

Comment on planned treatments:

Incineration is carried out by specialist companies at their location.

WASTE STREAM**1A09****Incinerated Waste****Disposal Routes:**

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

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

| Container | Stream volume % | Waste loading m ³ | Number of packages |
|--|-----------------|------------------------------|--------------------|
| 1/3 Height IP-1 ISO 2/3 Height IP-2 ISO 1/2 Height WAMAC IP-2 ISO 1/2 Height IP-2 Disposal/Re-usable ISO 2m box (no shielding) 4m box (no shielding) 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**1A09****Incinerated Waste**

| | |
|---|---|
| Source: | The waste has become contaminated as a result of handling radionuclides in order to manufacture a range of healthcare products. The future Cs-137 figure will be from the incineration of contaminated zinc bromide drained from shielding windows and substantially decontaminated using ion exchange. The activity is in 0.2m ³ @ 20MBq/l. |
| Uncertainty: | The specific activity data have been calculated from data for waste in stock. |
| 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 specific activity data have been calculated from data for waste in stock, measured using high resolution gamma spec or accountancy for certain nuclides. |
| Other information: | The waste is typically contaminated with low energy short half life beta emitting radionuclides. |

WASTE STREAM 1A09 Incinerated Waste

| Nuclide | Mean radioactivity, TBq/m ³ | | | | Nuclide | Mean radioactivity, TBq/m ³ | | | |
|---------|--|----------------|-----------------|----------------|------------------|--|----------------|-----------------|----------------|
| | Waste at 1.4.2019 | Bands and Code | Future arisings | Bands and Code | | Waste at 1.4.2019 | Bands and Code | Future arisings | Bands and Code |
| H 3 | 5.96E-09 | AA 1 | 5.96E-09 | AA 1 | Gd 153 | | | | |
| Be 10 | | | | | Ho 163 | | | | |
| C 14 | 5.40E-09 | AA 1 | | 5 | Ho 166m | | | | |
| Na 22 | 7.75E-08 | AA 1 | | | 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 | 4.16E-11 | AA 1 | | 5 | Pb 205 | | | | |
| Fe 55 | 5.60E-08 | AA 1 | | | Pb 210 | | | | |
| Co 60 | 3.67E-07 | AA 1 | | 5 | Bi 208 | | | | |
| Ni 59 | | | | | Bi 210m | | | | |
| Ni 63 | 4.71E-07 | AA 1 | | | Po 210 | | | | |
| Zn 65 | 1.35E-08 | AA 1 | | | Ra 223 | | | | |
| Se 79 | | | | | Ra 225 | | | | |
| Kr 81 | | | | | Ra 226 | 6.99E-09 | AA 1 | | 5 |
| Kr 85 | | | | | Ra 228 | | | | |
| Rb 87 | | | | | Ac 227 | | | | |
| Sr 90 | 2.02E-05 | AA 1 | | 5 | 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 | 3.03E-10 | AA 1 | | 5 | U 233 | | | | |
| Pd 107 | | | | | U 234 | | | | |
| Ag 108m | 1.04E-09 | AA 1 | | | U 235 | | | | |
| Ag 110m | | | | | U 236 | | | | |
| Cd 109 | 9.14E-08 | AA 1 | | 5 | U 238 | | | | |
| Cd 113m | | | | | Np 237 | | | | |
| Sn 119m | | | | | Pu 236 | | | | |
| Sn 121m | | | | | Pu 238 | | | | |
| Sn 123 | | | | | Pu 239 | | | | |
| Sn 126 | | | | | Pu 240 | | | | |
| Sb 125 | 1.24E-09 | AA 1 | | 5 | Pu 241 | | | | |
| Sb 126 | | | | | Pu 242 | | | | |
| Te 125m | | | | | Am 241 | 2.48E-07 | AA 1 | | 5 |
| Te 127m | | | | | Am 242m | | | | |
| I 129 | | | | | Am 243 | | | | |
| Cs 134 | 9.03E-08 | AA 1 | | 5 | Cm 242 | | | | |
| Cs 135 | | | | | Cm 243 | | | | |
| Cs 137 | 1.07E-04 | AA 1 | ~2E-02 | AA 2 | Cm 244 | | | | |
| Ba 133 | 1.55E-07 | AA 1 | | 5 | 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 | | | | | Other a | | 5 | | 5 |
| Eu 152 | 1.40E-06 | AA 1 | | 5 | Other b/g | 1.28E-05 | AA 1 | | 5 |
| Eu 154 | | | | | Total a | 2.55E-07 | AA 1 | 0 | 5 |
| Eu 155 | | | | | Total b/g | 1.42E-04 | AA 1 | ~2E-02 | AA 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