

| | | |
|---------------------|-------------|-------------------------|
| WASTE STREAM | 9E54 | Contaminated Oil |
|---------------------|-------------|-------------------------|

SITE Oldbury
SITE OWNER Nuclear Decommissioning Authority
WASTE CUSTODIAN Magnox Limited
WASTE TYPE LLW

WASTE VOLUMES

| | | Reported |
|---------------------------------|---------------------------|------------------------|
| Stocks: | At 1.4.2019..... | ~1.0 m ³ |
| Future arisings - | 1.4.2019 - 31.3.2020..... | 0.5 m ³ |
| | 1.4.2020 - 31.3.2022..... | 3.3 m ³ |
| | 1.4.2022 - 31.3.2027..... | 5.5 m ³ |
| Total future arisings: | | 9.3 m ³ |
| Total waste volume: | | 10.3 m ³ |
| Comment on volumes: | - | |
| Uncertainty factors on volumes: | Stock (upper): x 1.2 | Arisings (upper) x 1.2 |
| | Stock (lower): x 0.8 | Arisings (lower) x 0.8 |

WASTE SOURCE Waste arises from various site machinery e.g. pond machines, reactor blowers.

PHYSICAL CHARACTERISTICS

General description: The wastes are lubricating and hydraulic oils from various site machinery e.g. pond machines and reactor blowers.No items require special handling.

Physical components (%vol): Oils (100%).

Sealed sources: -

Bulk density (t/m³): 0.9

Comment on density: -

CHEMICAL COMPOSITION

General description and components (%wt): Lubricating and hydraulic oils (100%).

Chemical state: Acid

Chemical form of radionuclides: -

Metals and alloys (%wt): Metal swarf will be present in the waste (<1%).

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

WASTE STREAM**9E54****Contaminated Oil**

Organics (%wt):

The waste consists of oils.

| | |
|--------------------------------|-------|
| Total cellulose | 0 |
| Paper, cotton | 0 |
| Wood | 0 |
| Halogenated plastics | 0 |
| Total non-halogenated plastics | 0 |
| Condensation polymers | 0 |
| Others | 0 |
| Organic ion exchange materials | 0 |
| Total rubber | 0 |
| Halogenated rubber | 0 |
| Non-halogenated rubber | 0 |
| Hydrocarbons | 100.0 |
| Oil or grease | 100.0 |
| Fuel | |
| Asphalt/Tarmac (cont.coal tar) | |
| Asphalt/Tarmac (no coal tar) | |
| Bitumen | |
| Others | |
| Other organics | 0 |

Other materials (%wt):

| | |
|----------------------------------|---|
| - | |
| Inorganic ion exchange materials | 0 |
| Inorganic sludges and flocs | 0 |
| 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 | 0 |
| Free non-aqueous liquids | |
| Powder/Ash | 0 |

Inorganic anions (%wt):

Chlorides, sulphates, phosphates and sulphides will be present at trace levels. Others may be present in trace amounts.

WASTE STREAM**9E54****Contaminated Oil**

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

Materials of interest for
waste acceptance criteria:

Oils are flammable materials.

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

Oils (100%). Toxic metals will be present at low concentrations in swarf and as additives.

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

WASTE STREAM**9E54****Contaminated Oil**

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):

Yes
 EDTA.....
 DPTA.....
 NTA.....
 Polycarboxylic acids.....
 Other organic complexants.....
 Total complexing agents..... TR

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:

-

WASTE STREAM**9E54****Contaminated Oil****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**9E54****Contaminated Oil**

| | |
|---|---|
| Source: | The main source of activity is activated steel in the oil, containing Co-60 and Cs-137. |
| Uncertainty: | The activity data is based on sampling and the accuracy is good. |
| Definition of total alpha and total beta/gamma: | The total beta/gamma activity is the sum of the listed beta/gamma emitting radionuclides. There is no alpha activity. |
| Measurement of radioactivities: | - |
| Other information: | - |

WASTE STREAM

9E54

Contaminated Oil

| 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 | <2.22E-07 | B 1 | <2.84E-07 | B 3 | Gd 153 | | 8 | | 8 |
| Be 10 | | 8 | | 8 | Ho 163 | | 8 | | 8 |
| C 14 | <1E-06 | B 1 | <1E-06 | B 3 | Ho 166m | | 8 | | 8 |
| Na 22 | | 8 | | 8 | Tm 170 | | 8 | | 8 |
| Al 26 | | 8 | | 8 | Tm 171 | | 8 | | 8 |
| Cl 36 | | 8 | | 8 | Lu 174 | | 8 | | 8 |
| Ar 39 | | 8 | | 8 | Lu 176 | | 8 | | 8 |
| Ar 42 | | 8 | | 8 | Hf 178n | | 8 | | 8 |
| K 40 | | 8 | | 8 | Hf 182 | | 8 | | 8 |
| Ca 41 | | 8 | | 8 | Pt 193 | | 8 | | 8 |
| Mn 53 | | 8 | | 8 | Tl 204 | | 8 | | 8 |
| Mn 54 | | 8 | | 8 | Pb 205 | | 8 | | 8 |
| Fe 55 | | 8 | | 8 | Pb 210 | | 8 | | 8 |
| Co 60 | 3.31E-08 | AB 1 | 7.01E-08 | AB 2 | Bi 208 | | 8 | | 8 |
| Ni 59 | | 8 | | 8 | Bi 210m | | 8 | | 8 |
| Ni 63 | | 8 | | 8 | Po 210 | | 8 | | 8 |
| Zn 65 | | 8 | | 8 | Ra 223 | | 8 | | 8 |
| Se 79 | | 8 | | 8 | Ra 225 | | 8 | | 8 |
| Kr 81 | | 8 | | 8 | Ra 226 | | 8 | | 8 |
| Kr 85 | | 8 | | 8 | Ra 228 | | 8 | | 8 |
| Rb 87 | | 8 | | 8 | Ac 227 | | 8 | | 8 |
| Sr 90 | | 8 | | 8 | Th 227 | | 8 | | 8 |
| Zr 93 | | 8 | | 8 | Th 228 | | 8 | | 8 |
| Nb 91 | | 8 | | 8 | Th 229 | | 8 | | 8 |
| Nb 92 | | 8 | | 8 | Th 230 | | 8 | | 8 |
| Nb 93m | | 8 | | 8 | Th 232 | | 8 | | 8 |
| Nb 94 | | 8 | | 8 | Th 234 | | 8 | | 8 |
| Mo 93 | | 8 | | 8 | Pa 231 | | 8 | | 8 |
| Tc 97 | | 8 | | 8 | Pa 233 | | 8 | | 8 |
| Tc 99 | | 8 | | 8 | U 232 | | 8 | | 8 |
| Ru 106 | | 8 | | 8 | U 233 | | 8 | | 8 |
| Pd 107 | | 8 | | 8 | U 234 | | 8 | | 8 |
| Ag 108m | | 8 | | 8 | U 235 | | 8 | | 8 |
| Ag 110m | | 8 | | 8 | U 236 | | 8 | | 8 |
| Cd 109 | | 8 | | 8 | U 238 | | 8 | | 8 |
| Cd 113m | | 8 | | 8 | Np 237 | | 8 | | 8 |
| Sn 119m | | 8 | | 8 | Pu 236 | | 8 | | 8 |
| Sn 121m | | 8 | | 8 | Pu 238 | | 8 | | 8 |
| Sn 123 | | 8 | | 8 | Pu 239 | | 8 | | 8 |
| Sn 126 | | 8 | | 8 | Pu 240 | | 8 | | 8 |
| Sb 125 | | 8 | | 8 | Pu 241 | | 8 | | 8 |
| Sb 126 | | 8 | | 8 | Pu 242 | | 8 | | 8 |
| Te 125m | | 8 | | 8 | Am 241 | | 8 | | 8 |
| Te 127m | | 8 | | 8 | Am 242m | | 8 | | 8 |
| I 129 | | 8 | | 8 | Am 243 | | 8 | | 8 |
| Cs 134 | | 8 | | 8 | Cm 242 | | 8 | | 8 |
| Cs 135 | | 8 | | 8 | Cm 243 | | 8 | | 8 |
| Cs 137 | 7.08E-08 | AB 1 | 7.82E-08 | AB 2 | Cm 244 | | 8 | | 8 |
| Ba 133 | | 8 | | 8 | Cm 245 | | 8 | | 8 |
| La 137 | | 8 | | 8 | Cm 246 | | 8 | | 8 |
| La 138 | | 8 | | 8 | Cm 248 | | 8 | | 8 |
| Ce 144 | | 8 | | 8 | Cf 249 | | 8 | | 8 |
| Pm 145 | | 8 | | 8 | Cf 250 | | 8 | | 8 |
| Pm 147 | | 8 | | 8 | Cf 251 | | 8 | | 8 |
| Sm 147 | | 8 | | 8 | Cf 252 | | 8 | | 8 |
| Sm 151 | | 8 | | 8 | Other a | | | | |
| Eu 152 | | 8 | | 8 | Other b/g | | 5.54E-08 | AB 2 | |
| Eu 154 | | 8 | | 8 | Total a | 0 | 0 | | |
| Eu 155 | | 8 | | 8 | Total b/g | 1.33E-06 | AB 1 | 1.49E-06 | AB 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