

WASTE STREAM

2D31

Magnox Fuel Transport Flasks

Stainless steel.....	4.0	
Other ferrous metals.....	96.0	BS 1503, ASTM/A350.
Iron.....		
Aluminium.....		
Beryllium.....		
Cobalt.....	0	
Copper.....		
Lead.....	0	
Magnox/Magnesium.....	TR	
Nickel.....	TR	
Titanium.....		
Uranium.....		
Zinc.....	0	
Zircaloy/Zirconium.....	0	
Other metals.....	0	No "other" metals present.

Organics (%wt):

Viton "O" ring seals between flask lid and flask body, and around valves, are made of Viton B rubber. Flasks are coated with CEEB System 6 epoxy based. Viton B in "O" rings trapped into the assembly.

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.....	<0.01
Halogenated rubber	<0.01
Non-halogenated rubber.....	0
Hydrocarbons.....	
Oil or grease	
Fuel.....	
Asphalt/Tarmac (cont.coal tar)...	
Asphalt/Tarmac (no coal tar)....	
Bitumen.....	
Others.....	
Other organics.....	~0.10

Other materials (%wt):

-	
Inorganic ion exchange materials.	0
Inorganic sludges and flocs.....	0
Soil.....	0
Brick/Stone/Rubble.....	0
Cementitious material.....	0

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	Sand.....	
	Glass/Ceramics.....	
	Graphite.....	0
	Desiccants/Catalysts.....	
	Asbestos.....	0
	Non/low friable.....	
	Moderately friable.....	
	Highly friable.....	
	Free aqueous liquids.....	0
	Free non-aqueous liquids.....	0
	Powder/Ash.....	0
Inorganic anions (%wt):	Inorganic anions are unlikely to be present.	
	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:	No materials likely to pose a fire or other non-radiological hazard have been identified.	
	Combustible metals.....	0
	Low flash point liquids.....	0
	Explosive materials.....	0
	Phosphorus.....	0
	Hydrides.....	0
	Biological etc. materials.....	0
	Biodegradable materials.....	0
	Putrescible wastes.....	0
	Non-putrescible wastes.....	0
	Corrosive materials.....	0
	Pyrophoric materials.....	0
	Generating toxic gases.....	0
	Reacting with water.....	0
	Active particles.....	
	Soluble solids as bulk chemical compounds.....	

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non hazardous pollutants:

-

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): No

EDTA.....

DPTA.....

NTA.....

Polycarboxylic acids.....

Other organic complexants.....

Total complexing agents..... 0

There are no organic complexing
agents present.

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:

Treatment will be via size reduction and decontamination, with an anticipated maximum of 5% of the flask assumed to then be disposed of to the LLWR as LLW. The remainder is anticipated to be free release scrap.

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	5.0 95.0

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:

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	5.0	10	< 1

Other information:

After size reduction and dismantling only an anticipated maximum of 5% of the flask is assumed to then be disposed of to the LLWR as LLW. The remainder is anticipated to be free release scrap.

Waste Planned for Disposal at the LLW Repository:

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Container voidage:

-

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

It is assumed that the WAC will be prepared in the future in line with the precedent already set for the disposal of a cylindrical package previously consigned to LLWR.

Waste consigned for
disposal to LLWR in
year of generation:

No. The waste will be disposed of when the flasks are prepared for disposal. This is dependent upon work load and NDA strategy.

Potential for the waste
to contain discrete
items:

-

Non-Containerised Waste for In-Vault Grouting:

Stream volume (%):

-

Waste stream variation:

-

Bounding cuboidal volume:

Inaccessible voidage:

-

Other information:

-

RADIOACTIVITY

Source:

Contamination from Magnox fuel cooling pond water.

Uncertainty:

The activity values are current best estimates. The waste is expected to be LLW but levels of contamination have to be determined.

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:

Estimated from sampling and analysis data.

Other information:

There may be contamination by fission products, actinides and activation products in Magnox fuel. The values quoted are indicative of the values that might be expected.

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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		6			Gd 153				
Be 10		8			Ho 163				
C 14		8			Ho 166m				
Na 22					Tm 170				
Al 26					Tm 171				
Cl 36		8			Lu 174				
Ar 39					Lu 176				
Ar 42					Hf 178n				
K 40					Hf 182				
Ca 41		8			Pt 193				
Mn 53					Tl 204				
Mn 54	1.37E-17	CC 2			Pb 205				
Fe 55		6			Pb 210	5.70E-16	CC 2		
Co 60	9.43E-09	CC 2			Bi 208				
Ni 59		6			Bi 210m				
Ni 63		6			Po 210	5.38E-16	CC 2		
Zn 65		6			Ra 223			5	
Se 79		6			Ra 225	2.35E-12	CC 2		
Kr 81					Ra 226	2.57E-15	CC 2		
Kr 85					Ra 228			5	
Rb 87					Ac 227			5	
Sr 90	2.07E-06	CC 2			Th 227			5	
Zr 93		6			Th 228			5	
Nb 91					Th 229	2.36E-12	CC 2		
Nb 92					Th 230	4.59E-13	CC 2		
Nb 93m		6			Th 232			5	
Nb 94		6			Th 234	2.89E-09	CC 2		
Mo 93		6			Pa 231			5	
Tc 97					Pa 233	4.86E-12	CC 2		
Tc 99		6			U 232				
Ru 106	4.97E-15	CC 2			U 233	9.62E-10	CC 2		
Pd 107		6			U 234	1.92E-09	CC 2		
Ag 108m		6			U 235	7.39E-15	CC 2		
Ag 110m					U 236	7.40E-14	CC 2		
Cd 109					U 238	2.89E-09	CC 2		
Cd 113m					Np 237	4.88E-12	CC 2		
Sn 119m					Pu 236				
Sn 121m		6			Pu 238	3.25E-09	CC 2		
Sn 123					Pu 239	2.89E-07	CC 2		
Sn 126		6			Pu 240	9.60E-08	CC 2		
Sb 125	2.61E-10	CC 2			Pu 241	2.20E-06	CC 2		
Sb 126					Pu 242			6	
Te 125m	6.54E-11	CC 2			Am 241	6.40E-07	CC 2		
Te 127m					Am 242m			6	
I 129		6			Am 243			6	
Cs 134	1.55E-10	CC 2			Cm 242	8.22E-26	CC 2		
Cs 135		6			Cm 243			6	
Cs 137	1.06E-05	CC 2			Cm 244			6	
Ba 133					Cm 245			8	
La 137					Cm 246			8	
La 138					Cm 248				
Ce 144	1.78E-17	CC 2			Cf 249				
Pm 145					Cf 250				
Pm 147		6			Cf 251				
Sm 147					Cf 252				
Sm 151		6			Other a			8	
Eu 152		6			Other b/g				
Eu 154	8.28E-09	CC 2			Total a	1.03E-06	CC 2	0	
Eu 155		6			Total b/g	1.49E-05	CC 2	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