





**WASTE STREAM****2A07****Redundant Fuel Transport Flasks & Liners**

	Fuel.....		
	Asphalt/Tarmac (cont.coal tar)...		
	Asphalt/Tarmac (no coal tar)....		
	Bitumen.....		
	Others.....		
	Other organics.....	~0.10	CEGB System 6 Epoxy Paint.
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.....	TR	
	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	

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	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:	Lead (as a lead/antimony alloy) accounts for ~25% of the total mass of liners and flasks.	
	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.....	

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Complexing agents (%wt): No  
 EDTA.....  
 DPTA.....  
 NTA.....  
 Polycarboxylic acids.....  
 Other organic complexants.....  
 Total complexing agents..... 0

**TREATMENT, PACKAGING AND DISPOSAL**

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

Treatment	On-site / Off site	Stream volume %
Low force compaction	Off-site	80.0
Supercompaction (HFC)		
Incineration		
Solidification		
Decontamination		
Metal treatment		
Size reduction		
Decay storage		
Recycling / reuse		
Other / various		
None	20.0	

Comment on planned treatments:

It has been assumed for the 2019 UK RWI that 80% of the metallic waste will be treated by the supply chain and will subsequently be 'out of scope'. The remaining 20% is assumed to be consigned to LLWR for disposal as non-compactable LLW.

**Disposal Routes:**

Disposal Route	Stream volume %
Expected to be consigned to the LLW Repository	20.0
Expected to be consigned to a Landfill Facility	
Expected to be consigned to an On-Site Disposal Facility	80.0
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	

**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:**

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Container	Stream volume %	Waste loading m <sup>3</sup>	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	20.0	10	2

Other information: -

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

Container voidage: -

Waste Characterisation Form (WCH): It is not yet determined if the waste meets LLWR's Waste Acceptance Criteria (WAC).

Waste consigned for disposal to LLWR in year of generation: No.

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**

Source: Contamination from Magnox fuel.

Uncertainty: The flask 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: The specific activity levels of the flasks have yet to be determined.

Other information: There may be contamination by fission products, actinides and activation products in Magnox fuel.

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Nuclide	Mean radioactivity, TBq/m <sup>3</sup>				Nuclide	Mean radioactivity, TBq/m <sup>3</sup>			
	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		6			Pb 205				
Fe 55		6			Pb 210		6		
Co 60		6			Bi 208				
Ni 59		6			Bi 210m				
Ni 63		6			Po 210		6		
Zn 65		6			Ra 223				
Se 79		6			Ra 225		6		
Kr 81					Ra 226		6		
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90		6			Th 227				
Zr 93		6			Th 228				
Nb 91					Th 229		6		
Nb 92					Th 230		6		
Nb 93m		6			Th 232		8		
Nb 94		6			Th 234		6		
Mo 93		6			Pa 231		8		
Tc 97					Pa 233		6		
Tc 99		6			U 232				
Ru 106		6			U 233		6		
Pd 107		6			U 234		6		
Ag 108m		6			U 235		6		
Ag 110m					U 236		6		
Cd 109					U 238		6		
Cd 113m					Np 237		6		
Sn 119m					Pu 236				
Sn 121m		6			Pu 238		6		
Sn 123					Pu 239		6		
Sn 126		6			Pu 240		6		
Sb 125		6			Pu 241		6		
Sb 126					Pu 242		6		
Te 125m		6			Am 241		6		
Te 127m					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					Cm 245		8		
La 137					Cm 246		8		
La 138					Cm 248				
Ce 144		6			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		6			<b>Total a</b>	<b>0</b>	<b>8</b>		<b>NE</b>
Eu 155		6			<b>Total b/g</b>	<b>&lt;4.06E-04</b>	<b>C 3</b>		<b>NE</b>

**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