

<b>WASTE STREAM</b>	<b>9R116</b>	<b>High Enriched Uranium</b>
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**SITE** Berkeley  
**SITE OWNER** Nuclear Decommissioning Authority  
**WASTE CUSTODIAN** Magnox Limited  
**WASTE TYPE** LLW

**WASTE VOLUMES**

		Reported
Stocks:	At 1.4.2019.....	<< 0.1 m <sup>3</sup>
Total future arisings:		0 m <sup>3</sup>
Total waste volume:		<< 0.1 m <sup>3</sup>
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** Laboratory materials previously used in research studies.

**PHYSICAL CHARACTERISTICS**

General description: -  
 Physical components (%vol): High Enriched Uranium (100%).  
 Sealed sources: -  
 Bulk density (t/m<sup>3</sup>): 19.1  
 Comment on density: -

**CHEMICAL COMPOSITION**

General description and components (%wt): High Enriched Uranium (100%).  
 Chemical state: Neutral  
 Chemical form of radionuclides: U: 20% U235  
 Pu: Plutonium present as per natural Uranium.  
 Metals and alloys (%wt): -  
 Stainless steel.....  
 Other ferrous metals.....  
 Iron.....  
 Aluminium.....  
 Beryllium.....  
 Cobalt.....  
 Copper.....  
 Lead.....  
 Magnox/Magnesium.....  
 Nickel.....  
 Titanium.....  
 Uranium.....  
 Zinc.....  
 Zircaloy/Zirconium.....  
 Other metals..... 100.0 Uranium  
 Organics (%wt): -

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Total cellulose	0
Paper, cotton	
Wood	
Halogenated plastics	
Total non-halogenated plastics	0
Condensation polymers	
Others	
Organic ion exchange materials	
Total rubber	0
Halogenated rubber	
Non-halogenated rubber	
Hydrocarbons	
Oil or grease	
Fuel	
Asphalt/Tarmac (cont.coal tar)	
Asphalt/Tarmac (no coal tar)	
Bitumen	
Others	
Other organics	
Other materials (%wt):	-
Inorganic ion exchange materials	
Inorganic sludges and flocs	
Soil	
Brick/Stone/Rubble	
Cementitious material	
Sand	
Glass/Ceramics	
Graphite	
Desiccants/Catalysts	
Asbestos	
Non/low friable	
Moderately friable	
Highly friable	
Free aqueous liquids	
Free non-aqueous liquids	
Powder/Ash	
Inorganic anions (%wt):	-

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Fluoride.....  
 Chloride.....  
 Iodide.....  
 Cyanide.....  
 Carbonate.....  
 Nitrate.....  
 Nitrite.....  
 Phosphate.....  
 Sulphate.....  
 Sulphide.....

Materials of interest for  
 waste acceptance criteria:

-  
 Combustible metals.....  
 Low flash point liquids.....  
 Explosive materials.....  
 Phosphorus.....  
 Hydrides.....  
 Biological etc. materials.....  
 Biodegradable materials.....  
     Putrescible wastes.....  
     Non-putrescible wastes.....  
 Corrosive materials.....  
 Pyrophoric materials.....  
 Generating toxic gases.....  
 Reacting with water.....  
 Active particles.....  
 Soluble solids as bulk chemical  
 compounds.....

Hazardous substances /  
 non hazardous pollutants:

-  
 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.....

**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:

-

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**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:**

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	100.0	3.5	< 1

Other information: -

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

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**

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Source:	-
Uncertainty:	-
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:	-
Other information:	-

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**High Enriched Uranium**

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					Gd 153				
Be 10					Ho 163				
C 14					Ho 166m				
Na 22					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					Pb 205				
Fe 55					Pb 210				
Co 60					Bi 208				
Ni 59					Bi 210m				
Ni 63					Po 210				
Zn 65					Ra 223				
Se 79					Ra 225				
Kr 81					Ra 226				
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90					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					U 233				
Pd 107					U 234				
Ag 108m					U 235				
Ag 110m					U 236				
Cd 109					U 238				
Cd 113m					Np 237				
Sn 119m					Pu 236				
Sn 121m					Pu 238				
Sn 123					Pu 239				
Sn 126					Pu 240				
Sb 125					Pu 241				
Sb 126					Pu 242				
Te 125m					Am 241				
Te 127m					Am 242m				
I 129					Am 243				
Cs 134					Cm 242				
Cs 135					Cm 243				
Cs 137					Cm 244				
Ba 133					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				
Eu 152					Other b/g				
Eu 154					<b>Total a</b>	<b>NE</b>			<b>0</b>
Eu 155					<b>Total b/g</b>	<b>NE</b>			<b>0</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