WASTE STREAM 9A88 Fuel Fragments/High Dose Rate Items

SITE	Berkeley
SITE OWNER	Nuclear Decommissioning Authority
WASTE CUSTODIAN	Magnox Limited
WASTE TYPE	ILW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	<< 0.1 m³
Total future arisings:		0 m³
Total waste volume:		<< 0.1 m³

Comment on volumes: Estimate based on experience from retrievals from Vault 2 to date.

Uncertainty factors on volumes:				
	Stock (upper):	x 1.2	Arisings (upper)	x
	Stock (lower):	x 0.8	Arisings (lower)	x

WASTE SOURCE Waste has arisen due to historic errors in de-splittering process carrying over to FED vaults.

PHYSICAL CHARACTERISTICS

General description:	Uranium fuel fragments.
Physical components (%wt):	Uranium 100%
Sealed sources:	The waste does not contain sealed sources.
Bulk density (t/m³):	~18.95
Comment on density:	Density of uranium.

CHEMICAL COMPOSITION

General description and components (%wt):	-		
Chemical state:	Neutral		
Chemical form of radionuclides:	-		
Metals and alloys (%wt):	-		
	Stainless steel.....		
	Other ferrous metals.....		
	Iron.....		
	Aluminium.....		
	Beryllium.....		
	Cobalt.....		
	Copper.....		
	Lead.....		
	Magnox/Magnesium.....		
	Nickel.....		
	Titanium.....		
	Uranium.....	100.0	Fuel rod fragments.
	Zinc.....		
	Zircaloy/Zirconium.....		
	Other metals.....		
Organics (%wt):	-		

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	Total cellulosics	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):	-	

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.....

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.....

PACKAGING AND CONDITIONING

Conditioning method: -

Plant Name: -

Location: -

Plant startup date: -

Total capacity (m^3/y incoming waste): -

Target start date for packaging this stream: -

Throughput for this stream (m^3/y incoming waste): -

Other information: -

Likely container type:

Container	Waste packaged (%vol)	Waste loading (m^3)	Payload (m^3)	Number of packages
500 l RS drum (0mm Pb)	100.0	0.000	0.49	4

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Likely container type comment:	-
Range in container waste volume:	-
Other information on containers:	-
Likely conditioning matrix:	
Other information:	-
Conditioned density (t/m³):	-
Conditioned density comment:	-
Other information on conditioning:	-
Opportunities for alternative disposal routing:	

Treatment	Stream volume (%)	Comment
-	-	-

RADIOACTIVITY

Source:	Waste has arisen due to historic errors in de-splittering process carrying over to FED vaults.
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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Nuclide	Mean radioactivity, TBq/m³				Nuclide	Mean radioactivity, TBq/m³			
	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		8			Gd 153		8		
Be 10		8			Ho 163		8		
C 14		8			Ho 166m		8		
Na 22		8			Tm 170		8		
Al 26		8			Tm 171		8		
Cl 36		8			Lu 174		8		
Ar 39		8			Lu 176		8		
Ar 42		8			Hf 178n		8		
K 40		8			Hf 182		8		
Ca 41		8			Pt 193		8		
Mn 53		8			Tl 204		8		
Mn 54		8			Pb 205		8		
Fe 55		8			Pb 210		8		
Co 60		8			Bi 208		8		
Ni 59		8			Bi 210m		8		
Ni 63		8			Po 210		8		
Zn 65		8			Ra 223		8		
Se 79		8			Ra 225		8		
Kr 81		8			Ra 226		8		
Kr 85		8			Ra 228		8		
Rb 87		8			Ac 227		8		
Sr 90		8			Th 227		8		
Zr 93		8			Th 228		8		
Nb 91		8			Th 229		8		
Nb 92		8			Th 230		8		
Nb 93m		8			Th 232		8		
Nb 94		8			Th 234		8		
Mo 93		8			Pa 231		8		
Tc 97		8			Pa 233		8		
Tc 99		8			U 232		8		
Ru 106		8			U 233		8		
Pd 107		8			U 234		8		
Ag 108m		8			U 235		8		
Ag 110m		8			U 236		8		
Cd 109		8			U 238		8		
Cd 113m		8			Np 237		8		
Sn 119m		8			Pu 236		8		
Sn 121m		8			Pu 238		8		
Sn 123		8			Pu 239		8		
Sn 126		8			Pu 240		8		
Sb 125		8			Pu 241		8		
Sb 126		8			Pu 242		8		
Te 125m		8			Am 241		8		
Te 127m		8			Am 242m		8		
I 129		8			Am 243		8		
Cs 134		8			Cm 242		8		
Cs 135		8			Cm 243		8		
Cs 137		8			Cm 244		8		
Ba 133		8			Cm 245		8		
La 137		8			Cm 246		8		
La 138		8			Cm 248		8		
Ce 144		8			Cf 249		8		
Pm 145		8			Cf 250		8		
Pm 147		8			Cf 251		8		
Sm 147		8			Cf 252		8		
Sm 151		8			Other a	NE			
Eu 152		8			Other b/g	NE			
Eu 154		8			**Total a**	**NE**		**0**	
Eu 155		8			**Total b/g**	**NE**		**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