WASTE STREAM 5C312 Western Storage Area LLW

SITE Harwell

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Magnox Limited

WASTE TYPE LLW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	2.0 m³
Total future arisings:		0 m³
Total waste volume:		2.0 m³

Comment on volumes: Grouted 200l drums container waste. Miscellaneous items and equipment remain.

Uncertainty factors on volumes:

Stock (upper):	x 1.2	Arisings (upper)	x
Stock (lower):	x 0.8	Arisings (lower)	x

WASTE SOURCE Equipment and items remaining from the stabilisation of hazardous wastes generated during a land remediation project.

PHYSICAL CHARACTERISTICS

General description: Original waste was stablilised in a concrete matrix but only the resulting equipment and items remain as the drums of waste have been disposed of. Partial chemical stabilisation.

Physical components (%wt): 26% metal, 1% soil, 67% concrete, 3% plastic, 1% wood, 2% other including glass, and grinding discs.

Sealed sources: -

Bulk density (t/m³): ~0.36

Comment on density: Based on data in WCH mass divided by volume.

CHEMICAL COMPOSITION

General description and components (%wt): 26% metal, 1% soil, 67% concrete, 3% plastic, 1% wood, 2% other including glass, and grinding discs.

Chemical state: Alkali

Chemical form of radionuclides: -

Metals and alloys (%wt): -

Stainless steel.....		
Other ferrous metals.....	26.0	Solid - size reduced concrete mixer drum
Iron.....		
Aluminium.....		
Beryllium.....		
Cobalt.....		
Copper.....		
Lead.....		
Magnox/Magnesium.....		
Nickel.....		
Titanium.....		
Uranium.....		
Zinc.....		
Zircaloy/Zirconium.....		
Other metals.....		

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Organics (%wt):	-	
	Total cellulosics	1.0
	Paper, cotton	
	Wood	~1.0
	Halogenated plastics	
	Total non-halogenated plastics	~3.0
	Condensation polymers	~1.5
	Others	~1.5
	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	~1.0
	Brick/Stone/Rubble	
	Cementitious material	~67.0
	Sand	
	Glass/Ceramics	~1.0
	Graphite	
	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):	-	

Fluoride.....

Chloride.....

Iodide.....

Cyanide.....

Carbonate.....

Nitrate.....

Nitrite.....

Phosphate.....

Sulphate.....

Sulphide.....

Materials of interest for waste acceptance criteria: None of these hazardous materials present at levels that would prohibit disposal to landfill.

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: The waste contains polychlorinated biphenyl, arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc, cyanide, volatile organic compounds, polycyclic aromatic hydrocarbons, and mineral oil.

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.....

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		
Recyling / reuse		
Other / various		
None		100.0

Comment on planned treatments: 100% is expected to be disposed to landfill, therefore no waste packages will be produced.

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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: (Not applicable to this waste stream)

Container	Stream volume %	Waste loading m³	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

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Source:	Equipment and miscellaneous items from processing of WSA drums.
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:	Rad data taken from WCH: 1MXN-2HAR-0-WCH-0-4369 and decayed by one year to 2019.
Other information:	-

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Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code	Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code
H 3	7.66E-09	C C 1			Gd 153		8		
Be 10		8			Ho 163		8		
C 14	2.38E-09	C C 1			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	1.49E-09	C C 2		
Rb 87		8			Ac 227		8		
Sr 90		8			Th 227		8		
Zr 93		8			Th 228	1.04E-09	C C 2		
Nb 91		8			Th 229		8		
Nb 92		8			Th 230	1.38E-08	C C 2		
Nb 93m		8			Th 232	5.71E-09	C C 2		
Nb 94		8			Th 234	1.33E-08	C C 2		
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	1.38E-08	C C 2		
Ag 108m		8			U 235		8		
Ag 110m		8			U 236		8		
Cd 109		8			U 238	1.33E-08	C C 2		
Cd 113m		8			Np 237		8		
Sn 119m		8			Pu 236		8		
Sn 121m		8			Pu 238		8		
Sn 123		8			Pu 239	5.24E-09	C C 2		
Sn 126		8			Pu 240	1.02E-08	C C 2		
Sb 125		8			Pu 241	1.95E-08	C C 2		
Sb 126		8			Pu 242		8		
Te 125m		8			Am 241	2.17E-09	C C 2		
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	5.58E-09	C C 2			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				
Eu 152		8			Other b/g				
Eu 154		8			**Total a**	**6.53E-08**	**C C 2**	**0**	
Eu 155		8			**Total b/g**	**5.00E-08**	**C C 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