WASTE STREAM 5C315 Active Handling Facility Decommissioning LLW

SITE Harwell

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Magnox Limited

WASTE TYPE LLW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	0 m³
Future arisings -	1.4.2021 - 31.3.2026.....	420.0 m³
Total future arisings:		420.0 m³
Total waste volume:		420.0 m³

Comment on volumes: Volumes updated for 2016 RWI to reflect SMART Inventory Review

Uncertainty factors on volumes:

Stock (upper):	x	Arisings (upper)	x 1.3
Stock (lower):	x	Arisings (lower)	x 0.7

WASTE SOURCE Decommissioning of a PIE facility.

PHYSICAL CHARACTERISTICS

General description: The waste comprises materials which have been removed during the consolidation of intermediate level wastes, and various waste materials from the decommissioning of redundant plant. There are also secondary materials such as used PPE, swabs etc. associate

Physical components (%vol): Metal, concrete and building rubble, cellulose, plastics and rubber.

Sealed sources: -

Bulk density (t/m³): 1.9

Comment on density: Density taken from WSCD. This density is for the waste following any treatments i.e. supercompaction.

CHEMICAL COMPOSITION

General description and components (%wt): Metal, concrete and building rubble, cellulose, plastics and rubber.

Chemical state: Neutral

Chemical form of radionuclides: H-3: Activation product.
Ra: Source contamination and decay product.
Pu: Fuel contamination.

Metals and alloys (%wt): Bulky materials such as large metal containers generated during the consolidation of intermediate levels wastes are present.

Stainless steel.....	NE
Other ferrous metals.....	~20.0
Iron.....	
Aluminium.....	NE
Beryllium.....	
Cobalt.....	
Copper.....	NE
Lead.....	~4.0
Magnox/Magnesium.....	NE
Nickel.....	
Titanium.....	
Uranium.....	
Zinc.....	NE

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	Zircaloy/Zirconium	NE	
	Other metals	NE	No information is available on the breakdown of metal types.
Organics (%wt):	Both plastics and rubbers will be present but it is not known whether they will be halogenated.		
	Total cellulosics	P	
	Paper, cotton	P	
	Wood	1.0	
	Halogenated plastics	NE	
	Total non-halogenated plastics	NE	
	Condensation polymers	NE	
	Others	NE	
	Organic ion exchange materials	0	
	Total rubber	P	
	Halogenated rubber	NE	
	Non-halogenated rubber	NE	
	Hydrocarbons		
	Oil or grease		
	Fuel		
	Asphalt/Tarmac (cont.coal tar)		
	Asphalt/Tarmac (no coal tar)		
	Bitumen		
	Others		
	Other organics	NE	
Other materials (%wt):	-		
	Inorganic ion exchange materials.	0	
	Inorganic sludges and flocs	NE	
	Soil	NE	
	Brick/Stone/Rubble	~75.0	
	Cementitious material	P	
	Sand		
	Glass/Ceramics	NE	
	Graphite	NE	
	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 Anion content of waste is unknown.		

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Fluoride.....

Chloride.....

Iodide.....

Cyanide.....

Carbonate.....

Nitrate.....

Nitrite.....

Phosphate.....

Sulphate.....

Sulphide.....

Materials of interest for waste acceptance criteria: -

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: none expected

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.....

TREATMENT, PACKAGING AND DISPOSAL

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

Treatment	On-site / Off site	Stream volume %
Low force compaction		
Supercompaction (HFC)		
Incineration		~36.0
Solidification		
Decontamination		
Metal treatment		~3.0
Size reduction		
Decay storage		
Recyling / reuse		
Other / various		
None		~61.0

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	61.0
Expected to be consigned to an On-Site Disposal Facility	
Expected to be consigned to an Incineration Facility	36.0
Expected to be consigned to a Metal Treatment Facility	3.0
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: (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:	Activity is from fuel contamination and fission products.
Uncertainty:	Data is taken from a variety of sources and has been published in the WSCD.
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		8	Gd 153		8		8
Be 10		8		8	Ho 163		8		8
C 14		8		8	Ho 166m		8		8
Na 22		8		8	Tm 170		8		8
Al 26		8		8	Tm 171		8		8
Cl 36		8		8	Lu 174		8		8
Ar 39		8		8	Lu 176		8		8
Ar 42		8		8	Hf 178n		8		8
K 40		8		8	Hf 182		8		8
Ca 41		8		8	Pt 193		8		8
Mn 53		8		8	Tl 204		8		8
Mn 54		8	1.18E-07	B B 2	Pb 205		8		8
Fe 55		8	4.1E-08	B B 2	Pb 210		8	2.34E-08	B B 2
Co 60		8	8.81E-06	B B 2	Bi 208		8		8
Ni 59		8		8	Bi 210m		8		8
Ni 63		8	3.3E-08	B B 2	Po 210		8	2.03E-08	B B 2
Zn 65		8		8	Ra 223		8		8
Se 79		8		8	Ra 225		8		8
Kr 81		8		8	Ra 226		8	2.03E-07	B B 2
Kr 85		8		8	Ra 228		8		8
Rb 87		8		8	Ac 227		8		8
Sr 90		8	4.35E-05	B B 2	Th 227		8		8
Zr 93		8		8	Th 228		8		8
Nb 91		8		8	Th 229		8		8
Nb 92		8		8	Th 230		8		8
Nb 93m		8		8	Th 232		8		8
Nb 94		8		8	Th 234		8		8
Mo 93		8		8	Pa 231		8		8
Tc 97		8		8	Pa 233		8		8
Tc 99		8		8	U 232		8		8
Ru 106		8	1.37E-08	B B 2	U 233		8		8
Pd 107		8		8	U 234		8		8
Ag 108m		8		8	U 235		8		8
Ag 110m		8		8	U 236		8		8
Cd 109		8		8	U 238		8		8
Cd 113m		8		8	Np 237		8		8
Sn 119m		8		8	Pu 236		8		8
Sn 121m		8		8	Pu 238		8	3.61E-07	B B 2
Sn 123		8		8	Pu 239		8	1.36E-07	B B 2
Sn 126		8		8	Pu 240		8	2.03E-07	B B 2
Sb 125		8		8	Pu 241		8	1.15E-05	B B 2
Sb 126		8		8	Pu 242		8		8
Te 125m		8		8	Am 241		8	5.08E-07	B B 2
Te 127m		8		8	Am 242m		8		8
I 129		8		8	Am 243		8		8
Cs 134		8	1.95E-07	B B 2	Cm 242		8		8
Cs 135		8		8	Cm 243		8		8
Cs 137		8	5.81E-05	B B 2	Cm 244		8	1.36E-07	B B 2
Ba 133		8		8	Cm 245		8		8
La 137		8		8	Cm 246		8		8
La 138		8		8	Cm 248		8		8
Ce 144		8	9.04E-09	B B 2	Cf 249		8		8
Pm 145		8		8	Cf 250		8		8
Pm 147		8	2.13E-05	B B 2	Cf 251		8		8
Sm 147		8		8	Cf 252		8		8
Sm 151		8		8	Other a				
Eu 152		8		8	Other b/g				
Eu 154		8	5.32E-07	B B 2	**Total a**	**0**		**1.57E-06**	**B B 2**
Eu 155		8	1.31E-06	B B 2	**Total b/g**	**0**		**1.46E-04**	**B B 2**

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