WASTE STREAM 9C13 Magnox Dissolution Plant LLW

SITE Dungeness A

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Magnox Limited

WASTE TYPE LLW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	37.1 m³
Total future arisings:		0 m³
Total waste volume:		37.1 m³

Comment on volumes: The quoted volumes do not take into account possible volume reduction by supercompaction.

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

WASTE SOURCE Trash from the Magnox dissolution plant.

PHYSICAL CHARACTERISTICS

General description: Metal components, soil/rubble, plastic, rubber, small quantities wood and glass, traces of magnesium carbonate sludge, fine filter cartridges (polypropylene) and drums containing the waste. There are no large items.

Physical components (%vol): Protective covers, decontamination materials, fine filter cartridges, some metal components, and drums containing the waste.

Sealed sources: -

Bulk density (t/m³): 0.35

Comment on density: Density based on typical weight of 200 litre drum.

CHEMICAL COMPOSITION

General description and components (%wt): The waste comprises metal components, soil/rubble, plastic, rubber, small quantities of wood and glass, traces of magnesium carbonate sludge, fine filter cartridges (polypropylene). Magnesium carbonate is also present in trace quantities. Plastic/rubber (~36% wt), soil/rubble (~20% wt), metal waste (~8% wt) and drums (~29% wt) and Others (~7%). The others comprise wood, soft organic, glass, asbestos/MMMF and polypropylene filter cartridges (~4% wt),

Chemical state: Neutral

Chemical form of radionuclides:
H-3: The chemical form of tritium has not been determined.
C-14: The chemical form of carbon 14 has not been determined but may be graphite.
Cl-36: The chemical form of chlorine 36 has not been determined but may be chloride.
U: The chemical form of uranium isotopes has not been determined but may be uranium oxides.
Pu: The chemical form of plutonium isotopes has not been determined but may be plutonium oxides.

Metals and alloys (%wt): Metal thickness may vary from 1 mm to 10 mm.

Stainless steel.....	NE	Nickel and chromium in trace or zero quantities apart from any as constituents of stainless steel.
Other ferrous metals.....	~37.0	
Iron.....		
Aluminium.....	TR	
Beryllium.....	0	
Cobalt.....		
Copper.....	TR	
Lead.....	TR	
Magnox/Magnesium.....	TR	

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	Nickel		
	Titanium		
	Uranium	0	
	Zinc	TR	
	Zircaloy/Zirconium	0	
	Other metals	NE	
Organics (%wt):	The waste contains halogenated and non-halogenated plastics and small quantities of rubber.		
	Total cellulosics	2.0	
	Paper, cotton	~1.0	
	Wood	~1.0	
	Halogenated plastics	~30.0	PVC
	Total non-halogenated plastics	~5.0	
	Condensation polymers	0	
	Others	~5.0	
	Organic ion exchange materials	0	
	Total rubber	NE	
	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	TR	
Other materials (%wt):	-		
	Inorganic ion exchange materials.	0	
	Inorganic sludges and flocs	0	
	Soil	~1.0	
	Brick/Stone/Rubble	~19.0	
	Cementitious material	0	
	Sand		
	Glass/Ceramics	~1.0	
	Graphite	NE	
	Desiccants/Catalysts		
	Asbestos	<1.0	
	Non/low friable		
	Moderately friable		
	Highly friable		
	Free aqueous liquids	0	
	Free non-aqueous liquids	0	

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	Powder/Ash..... 0
Inorganic anions (%wt):	Some present in trace quantities.
	Fluoride..... 0
	Chloride..... TR
	Iodide..... 0
	Cyanide..... 0
	Carbonate..... TR
	Nitrate..... 0
	Nitrite..... 0
	Phosphate..... 0
	Sulphate..... TR
	Sulphide..... 0
Materials of interest for waste acceptance criteria:	Magnesium may be present in trace quantities and is not considered to constitute a hazard.
	Combustible metals..... TR
	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..... TR
	Active particles.....
	Soluble solids as bulk chemical compounds.....
Hazardous substances / non hazardous pollutants:	Asbestos present at <1% and lead may be present in trace quantities.
	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): Yes

EDTA.....

DPTA.....

NTA.....

Polycarboxylic acids……

Other organic complexants.....

Total complexing agents..... TR

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	Off-Site	23.0
Size reduction		
Decay storage		
Recyling / reuse		
Other / various	Off-site	16.0
None		61.0

Comment on planned treatments: 23% of this waste stream will be sent for Metal Recycle and 16% to Landfill as VLLW.

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Disposal Routes:

Disposal Route	Stream volume %
Expected to be consigned to the LLW Repository	61.0
Expected to be consigned to a Landfill Facility	16.0
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	23.0
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:

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	61.0	~8.59	3
2m box (no shielding)			
4m box (no shielding)			
Other			

Other information: -

Waste Planned for Disposal at the LLW Repository:

Container voidage: Expected to be less than 10%.

Waste Characterisation Form (WCH): The waste meets the LLWR's Waste Acceptance Criteria (WAC).
The waste does not have a current WCH.

Waste consigned for disposal to LLWR in year of generation: No. Processing, packing, activity assessment and ISO container loading may take longer than 1 year.

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: -

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RADIOACTIVITY

Source:	The waste is contaminated with fission products, activation products and actinides.
Uncertainty:	Specific activity is a function of Station operating history. The values are indicative of the activities that would be expected.
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 activities have been estimated from waste stream fingerprints.
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	5.15E-04	C C 2			Gd 153		8		
Be 10		8			Ho 163		8		
C 14	4.00E-05	C C 2			Ho 166m		8		
Na 22		8			Tm 170		8		
Al 26		8			Tm 171		8		
Cl 36	1E-05	C C 2			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	3.98E-06	C C 2			Pb 210		8		
Co 60	1.69E-05	C C 2			Bi 208		8		
Ni 59		8			Bi 210m		8		
Ni 63	2.76E-04	C C 2			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	4.52E-05	C C 2			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	3E-07	C C 2		
Mo 93		8			Pa 231		8		
Tc 97		8			Pa 233		8		
Tc 99		8			U 232		8		
Ru 106	1.33E-09	C C 2			U 233		8		
Pd 107		8			U 234	2E-07	C C 2		
Ag 108m	2.96E-06	C C 2			U 235	1E-09	C C 2		
Ag 110m		8			U 236	5.00E-09	C C 2		
Cd 109		8			U 238	3E-07	C C 2		
Cd 113m		8			Np 237		8		
Sn 119m		8			Pu 236		8		
Sn 121m		8			Pu 238	2.73E-06	C C 2		
Sn 123		8			Pu 239	5E-06	C C 2		
Sn 126		8			Pu 240	7.00E-06	C C 2		
Sb 125	1.02E-08	C C 2			Pu 241	1.13E-04	C C 2		
Sb 126		8			Pu 242		8		
Te 125m	2.56E-09	C C 2			Am 241	2.26E-05	C C 2		
Te 127m		8			Am 242m		8		
I 129		8			Am 243		8		
Cs 134	3.87E-08	C C 2			Cm 242		8		
Cs 135		8			Cm 243	1.51E-08	C C 2		
Cs 137	7.62E-05	C C 2			Cm 244	2.54E-07	C C 2		
Ba 133	1.83E-07	C C 2			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	4.01E-06	C C 2			Cf 251		8		
Sm 147		8			Cf 252		8		
Sm 151		8			Other a				
Eu 152	1.09E-07	C C 2			Other b/g				
Eu 154	3.86E-07	C C 2			**Total a**	**3.81E-05**	**C C 2**	**0**	
Eu 155	5.64E-08	C C 2			**Total b/g**	**1.10E-03**	**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