WASTE STREAM 9A932 Cooling Water Valve Chamber Sludge

SITE Berkeley

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Magnox Limited

WASTE TYPE LLW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	0.2 m³
Total future arisings:		0 m³
Total waste volume:		0.2 m³

Comment on volumes: No further arisings expected.

Uncertainty factors on volumes:

Stock (upper):	x 1.1	Arisings (upper)	x
Stock (lower):	x 0.9	Arisings (lower)	x

WASTE SOURCE Decontamination and Delicensing of former Low Level Active Facility.

PHYSICAL CHARACTERISTICS

General description: The stocks are sludge arisings from the clean up and decommissioning of the Low Level Active Facility. The waste is stored in 225 litre mild steel drums. There are no large items.

Physical components (%vol): Sludge (~94 wt%) in 225 litre mild Steel containers (~6 wt%).

Sealed sources: -

Bulk density (t/m³): ~1.5

Comment on density: -

CHEMICAL COMPOSITION

General description and components (%wt): Sludge (~94 wt%) in 225 litre mild Steel containers (~6 wt%).

Chemical state: Alkali

Chemical form of radionuclides: H-3: Most tritium is expected to be present as water but some may be present in the form of other inorganic compounds or as organic compounds.
C-14: Chemical form of carbon 14 has not been determined but may be graphite.
U: Chemical form of uranium has not been determined but may be uranium oxides.
Pu: Chemical form of plutonium isotopes has not been determined but may be plutonium oxides

Metals and alloys (%wt): There are no metal items in the waste.

Stainless steel.....	0	
Other ferrous metals.....	~6.0	
Iron.....		
Aluminium.....	0	
Beryllium.....		
Cobalt.....		
Copper.....	0	
Lead.....	0	
Magnox/Magnesium.....	TR	
Nickel.....		
Titanium.....		
Uranium.....		
Zinc.....	0	
Zircaloy/Zirconium.....	TR	
Other metals.....	TR	Unidentified metals may be

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present in trace quantities.

Organics (%wt):	There may be traces of oil and grease.	
	Total cellulosics	0
	Paper, cotton	0
	Wood	0
	Halogenated plastics	0
	Total non-halogenated plastics	0
	Condensation polymers	0
	Others	0
	Organic ion exchange materials	NE
	Total rubber	0
	Halogenated rubber	0
	Non-halogenated rubber	0
	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.	NE
	Inorganic sludges and flocs	~94.0
	Soil	0
	Brick/Stone/Rubble	0
	Cementitious material	NE
	Sand	
	Glass/Ceramics	0
	Graphite	TR
	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):	Not fully assessed.	

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Fluoride	NE
Chloride	NE
Iodide	NE
Cyanide	0
Carbonate	TR
Nitrate	NE
Nitrite	NE
Phosphate	NE
Sulphate	TR
Sulphide	NE

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	

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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): No

EDTA.....

DPTA.....

NTA.....

Polycarboxylic acids……

Other organic complexants.....

Total complexing agents..... 0

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	On-site	100.0

Comment on planned treatments: The waste will be encapsulated in a cement matrix and contained within a HHISO. Any remaining voidage will be filled with grout at LLWR prior to disposal.

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Disposal Routes:

Disposal Route	Stream volume %
Expected to be consigned to the LLW Repository	100.0
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	

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	100.0	~7.2	< 1
2m box (no shielding)			
4m box (no shielding)			
Other			

Other information: It is likely that this waste will be encapsulated with other sludge arisings in the same containers. Other solid LLW items may be added as well.

Waste Planned for Disposal at the LLW Repository:

Container voidage: No significant inaccessible voidage is present.

Waste Characterisation Form (WCH): The waste has yet to be characterised, but should meet the LLWR's Conditions for Acceptance (CFA). The characterisation data will be incorporated into a WSCD.

Waste consigned for disposal to LLWR in year of generation: No. The waste is held in a raw state in drums and will be conditioned prior to disposal. Processing of the waste will be under taken as part of a sludge encapsulation campaign. The waste was not consigned in the year of generation, as treatment facilities were not available at that time.

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: -

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Bounding cuboidal volume:

Inaccessible voidage: -

Other information: -

RADIOACTIVITY

Source:	The majority of activity is associated with the decommissioning of the ponds. Caesium 137 will be the major radionuclide.
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:	Currently awaiting characterisation. Will be estimated using a radionuclide fingerprint for ponds area waste.
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					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		6			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					**Total a**	**NE**		**0**	
Eu 155					**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