WASTE STREAM 9C58 AEWTP Cationic, Anionic and CRU1 Resin

SITE Dungeness A

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Magnox Limited

WASTE TYPE LLW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	7.2 m³
Total future arisings:		0 m³
Total waste volume:		7.2 m³

Comment on volumes: -

Uncertainty factors on volumes:

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

WASTE SOURCE Ion exchange media from the active effluent water treatment plant in the following vessels: Anion Tank 2.3m3, Cation Tank 1.36m3, Cation Tank 2 1.43m3 and CRU1 2.11m3.

PHYSICAL CHARACTERISTICS

General description: Amberlite 120 Acidic cation exchange resin with sulfonic acid functionality. Ion exchange media used in the treatment of active effluent. The material is stored under water in a vessel. The ion exchange media is flooded with water and would be expected to have a voidage of about 0.3. That is about 0.3 of the volume of a settled bed of flooded media would be interstial water. There are no large items that may require special handling.

Physical components (%wt): Ion exchange media (~70%), interstitial water (~30%). Other minor components have not been assessed.

Sealed sources: -

Bulk density (t/m³): ~0.969

Comment on density: The bulk density of the waste was measured as ~0.969t/m³. Ref EX09246_06_10_19 and EX09246_06_10_21.

CHEMICAL COMPOSITION

General description and components (%wt): Proprietary ion exchange material(s) (~70%), interstitial water (~30%).

Chemical state: -

Chemical form of radionuclides: -

Metals and alloys (%wt): -

Stainless steel.....	0
Other ferrous metals.....	0
Iron.....	
Aluminium.....	0
Beryllium.....	
Cobalt.....	
Copper.....	0
Lead.....	0
Magnox/Magnesium.....	0
Nickel.....	
Titanium.....	
Uranium.....	
Zinc.....	0

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	Zircaloy/Zirconium	0
	Other metals	0
Organics (%wt):	-	
	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	NE
Other materials (%wt):	-	
	Inorganic ion exchange materials.	~70.0
	Inorganic sludges and flocs	TR
	Soil	0
	Brick/Stone/Rubble	0
	Cementitious material	0
	Sand	
	Glass/Ceramics	0
	Graphite	0
	Desiccants/Catalysts	
	Asbestos	0
	Non/low friable	
	Moderately friable	
	Highly friable	
	Free aqueous liquids	~30.0
	Free non-aqueous liquids	0
	Powder/Ash	0
Inorganic anions (%wt):	-	

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

Materials of interest for waste acceptance criteria: -

Combustible metals	TR
Low flash point liquids	0
Explosive materials	0
Phosphorus	0
Hydrides	0
Biological etc. materials	NE
Biodegradable materials	
Putrescible wastes	0
Non-putrescible wastes	
Corrosive materials	0
Pyrophoric materials	0
Generating toxic gases	NE
Reacting with water	0
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.....

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: Waste will be encapsulated to meet LLWR WAC, likely to be in HHISO's.

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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:

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	100.0	~7.2	1

Other information: -

Waste Planned for Disposal at the LLW Repository:

Container voidage: -

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: -

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

WASTE STREAM	9C58	AEWTP Cationic, Anionic and CRU1 Resin

Source:	Contaminated resin. Contamination by fission products, actinides and activation products.
Uncertainty:	Activity is derived from sample results refs: EX09246/06/10/17 Issue 1, EX09246/06/10/19 Issue 1, EX09246/06/10/21 Issue 1 & EX09246/06/10/35 Issue 1.
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:	Data taken from sample results and decayed by three years for RWI 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	6.82E-05	B B 2			Gd 153		8		
Be 10		8			Ho 163		8		
C 14	3.48E-05	B B 2			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	1.03E-05	B B 2			Pb 210		8		
Co 60	2.78E-06	B B 2			Bi 208		8		
Ni 59		8			Bi 210m		8		
Ni 63	1.21E-05	B B 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	3.63E-04	B B 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		8		
Mo 93		8			Pa 231		8		
Tc 97		8			Pa 233		8		
Tc 99	9.51E-05	B B 2			U 232		8		
Ru 106	9.82E-08	B B 2			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	5.49E-05	B B 2		
Sn 123		8			Pu 239	6.84E-05	B B 2		
Sn 126		8			Pu 240	6.84E-05	B B 2		
Sb 125	8.57E-07	B B 2			Pu 241	1.94E-03	B B 2		
Sb 126		8			Pu 242		8		
Te 125m	2.15E-07	B B 2			Am 241	1.71E-04	B B 2		
Te 127m		8			Am 242m		8		
I 129	1.66E-07	B B 2			Am 243		8		
Cs 134	1.46E-07	B B 2			Cm 242	1.42E-08	B B 2		
Cs 135		8			Cm 243	1.46E-05	B B 2		
Cs 137	2.53E-03	B B 2			Cm 244	1.39E-05	B B 2		
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	2.04E-07	B B 2			Other b/g				
Eu 154	5.48E-05	B B 2			**Total a**	**3.91E-04**	**B B 2**	**0**	
Eu 155	1.76E-05	B B 2			**Total b/g**	**5.13E-03**	**B B 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