WASTE STREAM 9G78/C Sludge (incorporating MSV and RV1 WRATS) - Conditioned Material

SITE Trawsfynydd

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Magnox Limited

WASTE TYPE ILW

WASTE VOLUMES

		Conditioned	Packaged
Stocks:	At 1.4.2019.....	94.6 m³	112.2 m³
Total future arisings:		0 m³	0 m³
Total waste volume:		94.6 m³	112.2 m³
Number of waste packages in stock:	At 1.4.2019.....	43 package(s)	

Comment on volumes: Conditioned volume calculated based on 43 packages x 2.2m3 = 94.6m3.

Uncertainty factors on volumes:

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

WASTE SOURCE Includes oily/sludge residues from the base of the vault and sludge resulting from routine filtration of liquid effluents and cooling pond water and from special clean-up operations on cooling ponds.

PHYSICAL CHARACTERISTICS

General description: The waste consists of debris washed from persons, corrosion products such as magnesium hydroxide and carbonate detached from fuel elements and extraneous materials such as flakes of paint. There is also some filter sand.

Physical components (%wt): 4% oil, 11% organic IX resin, 40% sludge, 45% cement.

Sealed sources: -

Bulk density (t/m³): ~1.8

Comment on density: Conditioned density.

CHEMICAL COMPOSITION

General description and components (%wt): Magnesium hydroxide, magnesium carbonate and a wide variety of other materials.

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: Carbon 14 may be present as graphite.
Se-79: Not determined.
Tc-99: Not determined.
Ra: Insignificant.
Th: Traces of thorium may be present in its natural form or as insoluble salts.
U: Not determined but may be uraium oxides.
Np: Not determined.
Pu: Not determined but may be plutonium oxides.

Metals and alloys (%wt): -

Stainless steel.....

Other ferrous metals.....

Iron.....

Aluminium.....

Beryllium.....

Cobalt.....

Copper.....

Lead.....

Magnox/Magnesium.....

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	Nickel	
	Titanium	
	Uranium	
	Zinc	
	Zircaloy/Zirconium	0
	Other metals	NE
Organics (%wt):	The cellulosic material content of the waste is to be determined. There is some oil and grease. Organic ion exchange resins would be expected only in trace quantities if any.	
	Total cellulosics	NE
	Paper, cotton	NE
	Wood	NE
	Halogenated plastics	0
	Total non-halogenated plastics	0
	Condensation polymers	0
	Others	0
	Organic ion exchange materials	11.0
	Total rubber	0
	Halogenated rubber	0
	Non-halogenated rubber	0
	Hydrocarbons	4.0
	Oil or grease	4.0
	Fuel	
	Asphalt/Tarmac (cont.coal tar)	
	Asphalt/Tarmac (no coal tar)	
	Bitumen	
	Others	
	Other organics	
Other materials (%wt):	-	
	Inorganic ion exchange materials.	NE
	Inorganic sludges and flocs	40.0
	Soil	NE
	Brick/Stone/Rubble	NE
	Cementitious material	45.0
	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

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	Powder/Ash	0
Inorganic anions (%wt):	-	
	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	0
	Low flash point liquids	0
	Explosive materials	0
	Phosphorus	0
	Hydrides	0
	Biological etc. materials	TR
	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:	-	
	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..... TR

PACKAGING AND CONDITIONING

Container type:

Container	Waste packaged (%vol)	Waste loading (m^3)	Payload (m^3)	Number of packages
3m^3 drum	100.0	2.2	2.2	43

Container type comment: -

Range in container waste volume: -

Other information on containers: -

Conditioned density (t/m^3): 1.8

Conditioned density comment: The maximum density of the waste is expected to be 2.0t/m3.

Other information on conditioning: -

RADIOACTIVITY

Source: -

Uncertainty: -

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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 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	1.11E-03	C C 2			Gd 153		8		
Be 10		8			Ho 163		8		
C 14	2.71E-04	C C 2			Ho 166m		8		
Na 22					Tm 170		8		
Al 26					Tm 171		8		
Cl 36	2.51E-06	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	5E-07	C C 2			Pt 193		8		
Mn 53		8			Tl 204		8		
Mn 54		8			Pb 205		8		
Fe 55	2.25E-05	C C 2			Pb 210		8		
Co 60	2.35E-04	C C 2			Bi 208		8		
Ni 59	1.07E-05	C C 2			Bi 210m		8		
Ni 63	4.40E-04	C C 2			Po 210		8		
Zn 65		8			Ra 223		8		
Se 79	1E-05	C C 2			Ra 225		8		
Kr 81		8			Ra 226		8		
Kr 85		8			Ra 228		8		
Rb 87		8			Ac 227		8		
Sr 90	8.92E-01	C C 2			Th 227		8		
Zr 93	5E-05	C C 2			Th 228		8		
Nb 91		8			Th 229		8		
Nb 92		8			Th 230		8		
Nb 93m	2.28E-05	C C 2			Th 232		8		
Nb 94	5.12E-08	C C 2			Th 234	1.47E-05	C C 2		
Mo 93		8			Pa 231		8		
Tc 97		8			Pa 233	5.00E-05	C C 2		
Tc 99	<1.04E-03	C 3			U 232		8		
Ru 106	4.96E-09	C C 2			U 233	1.14E-08	C C 2		
Pd 107	2.5E-06	C C 2			U 234	2.01E-05	C C 2		
Ag 108m	2.03E-06	C C 2			U 235	<4.81E-07	C 3		
Ag 110m		8			U 236	2.15E-06	C C 2		
Cd 109		8			U 238	1.47E-05	C C 2		
Cd 113m		8			Np 237	5.00E-05	C C 2		
Sn 119m		8			Pu 236		8		
Sn 121m	3.24E-01	C C 2			Pu 238	2.92E-03	C C 2		
Sn 123		8			Pu 239	5.61E-03	C C 2		
Sn 126	2E-05	C C 2			Pu 240	6.62E-03	C C 2		
Sb 125	1.35E-06	C C 2			Pu 241	1.31E-01	C C 2		
Sb 126	2.8E-06	C C 2			Pu 242	5E-06	C C 2		
Te 125m	3.37E-07	C C 2			Am 241	2.12E-02	C C 2		
Te 127m		8			Am 242m	2.92E-05	C C 2		
I 129	5.02E-07	C C 2			Am 243	1.5E-05	C C 2		
Cs 134	2.93E-06	C C 2			Cm 242	2.41E-05	C C 2		
Cs 135	1.5E-04	C C 2			Cm 243	1.11E-05	C C 2		
Cs 137	8.71E+00	C C 2			Cm 244	1.79E-04	C C 2		
Ba 133		8			Cm 245	5.00E-09	C C 2		
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	5.43E-05	C C 2			Cf 251		8		
Sm 147		8			Cf 252		8		
Sm 151	6.24E-03	C C 2			Other a				
Eu 152	8.07E-05	C C 2			Other b/g				
Eu 154	6.90E-04	C C 2			**Total a**	**3.67E-02**	**C C 2**	**0**	
Eu 155	7.23E-05	C C 2			**Total b/g**	**1.01E+01**	**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