



**WASTE STREAM****5G03/C Conditioned SGHWR Sludges**

## 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.... 0
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..... <0.10

## Other materials (%wt):

-
Inorganic ion exchange materials.
Inorganic sludges and flocs..... 0
Soil..... 0
Brick/Stone/Rubble..... 0
Cementitious material..... 88.0
Sand.....
Glass/Ceramics..... 0
Graphite..... 0
Desiccants/Catalysts.....
Asbestos..... 0
Non/low friable.....
Moderately friable.....
Highly friable.....
Free aqueous liquids..... 0
Free non-aqueous liquids..... 0
Powder/Ash..... 0

Grouted sludge including some ion exchange material (copolymer of styrene and divinylbenzene).

## Inorganic anions (%wt):

The waste contains a small amount of sulphites and thiosulphates. The data provided give the worst case values for the material at the reference formulation.

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Fluoride.....	TR	Grouted sludge, solid
Chloride.....	<0.03	
Iodide.....	0	
Cyanide.....	0	
Carbonate.....	0	
Nitrate.....	TR	
Nitrite.....	<0.50	
Phosphate.....	0	
Sulphate.....	TR	
Sulphide.....	0	

Materials of interest for waste acceptance criteria:

There are no hazardous materials in the waste, and, the waste contains no toxic metals.

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.....	TR	Grouted sludge, solid

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Cadmium.....		
Caesium.....		
Selenium.....		
Chromium.....	P	Metal drum, grouted sludge, solid
Molybdenum.....	P	Metal drum, solid
Thallium.....		
Tin.....		
Vanadium.....	P	Grouted sludge, solid
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.....		Citrate, oxalate & picolinate may be present but are believed to be <0.1% of wet weight.
Total complexing agents.....	<0.10	

**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		
Recycling / reuse		
Other / various		
None		100.0

Comment on planned treatments:

Waste has already been encapsulated ready for disposal.

**WASTE STREAM****5G03/C Conditioned SGHWR Sludges****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 m <sup>3</sup>	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	8.7	74

Other information: -

**Waste Planned for Disposal at the LLW Repository:**

Container voidage: Voidage will be minimal: limited to ullage within the 500 litre drum

Waste Characterisation Form (WCH): The waste meets the LLWR's Waste Acceptance Criteria (WAC).  
The waste has a current WCH.

5G03/C was reported as an ILW waste stream in the 2010 UKRWI. It is now decayed sufficiently to be LLW. Disposal to LLWR is currently planned for 2017-2019.

Waste consigned for disposal to LLWR in year of generation: No. Disposal to LLWR is currently planned for 2019-2021.

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: -

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Other information:

-

**RADIOACTIVITY**

Source:

The activity originated from removal of contamination from the SGHWR primary circuit and fuel ponds.

Uncertainty:

Inventory taken from WCH submission.

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:

Radionuclide data has been compiled from analysis of the supernate and solids content:- radionuclide inventory from Tank 1 and 2 based on homogenised samples.- high resolution gamma spectrometry has been conducted on samples from Tank 2.- high resolution gamma spectrometry and alpha spectrometry have been conducted on samples from Tanks 3/4. Rad data taken from WCH submission: 1MXN-1WIN-0-WCH-0-4320 and decayed by one year to 2019.

Other information:

-

**WASTE STREAM**

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Nuclide	Mean radioactivity, TBq/m <sup>3</sup>				Nuclide	Mean radioactivity, TBq/m <sup>3</sup>			
	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	1.68E-04	CC 1			Gd 153		8		
Be 10		8			Ho 163		8		
C 14	1.45E-04	CC 1			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	7.06E-05	CC 2			Pb 210		8		
Co 60	1.04E-03	CC 2			Bi 208		8		
Ni 59		8			Bi 210m		8		
Ni 63	2.71E-03	CC 1			Po 210		8		
Zn 65	1.70E-09	CC 2			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	2.23E-04	CC 1			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	4.81E-09	CC 2		
Mo 93		8			Pa 231		8		
Tc 97		8			Pa 233		8		
Tc 99		8			U 232		8		
Ru 106		8			U 233		8		
Pd 107		8			U 234	2.58E-08	CC 1		
Ag 108m		8			U 235		8		
Ag 110m		8			U 236		8		
Cd 109		8			U 238	4.81E-09	CC 1		
Cd 113m		8			Np 237		8		
Sn 119m		8			Pu 236		8		
Sn 121m		8			Pu 238	8.20E-07	CC 1		
Sn 123		8			Pu 239	1.04E-06	CC 1		
Sn 126		8			Pu 240	8.52E-07	CC 1		
Sb 125		8			Pu 241	9.72E-06	CC 1		
Sb 126		8			Pu 242	7.2E-09	CC 1		
Te 125m		8			Am 241	2.58E-06	CC 2		
Te 127m		8			Am 242m		8		
I 129	2.31E-08	CC 2			Am 243		8		
Cs 134	1.02E-08	CC 2			Cm 242		8		
Cs 135		8			Cm 243	1.60E-08	CC 2		
Cs 137	7.68E-03	CC 2			Cm 244	1.00E-06	CC 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		8			Other b/g				
Eu 154		8			<b>Total a</b>	<b>6.35E-06</b>	<b>CC 2</b>	<b>0</b>	
Eu 155		8			<b>Total b/g</b>	<b>1.21E-02</b>	<b>CC 2</b>	<b>0</b>	

**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