

WASTE STREAM	2S314	WAGR - HVVLLW
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SITE Windscale
SITE OWNER Nuclear Decommissioning Authority
WASTE CUSTODIAN Sellafield Limited
WASTE TYPE VLLW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	0 m ³
Future arisings -	1.4.2019 - 31.3.2026.....	0 m ³
	1.4.2026 - 31.3.2051.....	~6656.2 m ³
Total future arisings:		6656.2 m ³
Total waste volume:		6656.2 m ³

Comment on volumes: Includes HVVLLW component of bioshield, plus general HVVLLW from WAGR decommissioning.

Uncertainty factors on volumes: Stock (upper): x Arisings (upper) x 1.5
 Stock (lower): x Arisings (lower) x 0.5

WASTE SOURCE The waste is the HVVLLW components of the arisings from WAGR decommissioning.

PHYSICAL CHARACTERISTICS

General description: -
 Physical components (%vol): General HVVLLW from WAGR decommissioning (90% by volume) plus concrete from WAGR bioshield (10% by volume).
 Sealed sources: The waste does not contain sealed sources.
 Bulk density (t/m³): NE
 Comment on density: -

CHEMICAL COMPOSITION

General description and components (%wt): -
 Chemical state: -
 Chemical form of radionuclides: -
 Metals and alloys (%wt): -

Stainless steel.....	
Other ferrous metals.....	
Iron.....	
Aluminium.....	
Beryllium.....	
Cobalt.....	
Copper.....	
Lead.....	
Magnox/Magnesium.....	
Nickel.....	
Titanium.....	
Uranium.....	
Zinc.....	
Zircaloy/Zirconium.....	
Other metals.....	<80.0 All metals.

WASTE STREAM**2S314****WAGR - HVVLLW**

Organics (%wt):

-

Total cellulosics.....

 Paper, cotton.....

 Wood.....

Halogenated plastics

Total non-halogenated plastics.....

 Condensation polymers.....

 Others.....

Organic ion exchange materials....

Total rubber.....

 Halogenated rubber

 Non-halogenated rubber.....

Hydrocarbons.....

 Oil or grease

 Fuel.....

 Asphalt/Tarmac (cont.coal tar)...

 Asphalt/Tarmac (no coal tar)....

 Bitumen.....

 Others.....

Other organics..... <10.0 All organics.

Other materials (%wt):

-

Inorganic ion exchange materials.

Inorganic sludges and flocs.....

Soil.....

Brick/Stone/Rubble.....

Cementitious material..... >10.0

Sand.....

Glass/Ceramics.....

Graphite.....

Desiccants/Catalysts.....

Asbestos.....

 Non/low friable.....

 Moderately friable.....

 Highly friable.....

Free aqueous liquids.....

Free non-aqueous liquids.....

Powder/Ash.....

Inorganic anions (%wt):

-

WASTE STREAM**2S314****WAGR - HVVLLW**

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

Materials of interest for
 waste acceptance criteria:

-
 Combustible metals..... NE
 Low flash point liquids..... NE
 Explosive materials..... NE
 Phosphorus..... NE
 Hydrides..... NE
 Biological etc. materials..... NE
 Biodegradable materials..... NE
 Putrescible wastes..... NE
 Non-putrescible wastes..... NE
 Corrosive materials..... NE
 Pyrophoric materials..... NE
 Generating toxic gases..... NE
 Reacting with water..... NE
 Active particles..... NE
 Soluble solids as bulk chemical
 compounds..... NE

Hazardous substances /
 non hazardous pollutants:

-
 Acrylamide.....
 Benzene..... NE
 Chlorinated solvents.....
 Formaldehyde.....
 Organometallics.....
 Phenol..... NE
 Styrene.....
 Tri-butyl phosphate..... NE
 Other organophosphates.....
 Vinyl chloride..... NE
 Arsenic..... NE
 Barium.....
 Boron..... NE

WASTE STREAM**2S314****WAGR - HVVLLW**

Cadmium..... NE
 Caesium.....
 Selenium..... NE
 Chromium..... NE
 Molybdenum..... NE
 Thallium.....
 Tin..... NE
 Vanadium..... NE
 Mercury compounds.....
 Others..... NE
 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 Recycling / reuse Other / various None	Off-site	<100.0

Comment on planned treatments:

Possible buffer storage prior to reuse/recycling. Decontamination, segregation and size-reduction may be applied.

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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: (Not applicable to this waste stream)

Container	Stream volume %	Waste loading m ³	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			

Other information: -

Waste Planned for Disposal at the LLW Repository: (Not applicable to this waste stream)

Container voidage: -

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

Not intended for LLWR disposal. Will be disposed of to specified landfill.

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: -

WASTE STREAM

2S314

WAGR - HVLLW

RADIOACTIVITY

Source:	-
Uncertainty:	Activity of bioshield (10% by volume of total) expected to be ~ 4.74E-03 TBq/m3 beta/gamma.
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:	-

WASTE STREAM

2S314

WAGR - HVLLW

Nuclide	Mean radioactivity, TBq/m ³				Nuclide	Mean radioactivity, TBq/m ³			
	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				6	Gd 153				
Be 10					Ho 163				
C 14				6	Ho 166m				
Na 22					Tm 170				
Al 26					Tm 171				
Cl 36				6	Lu 174				
Ar 39					Lu 176				
Ar 42					Hf 178n				
K 40					Hf 182				
Ca 41					Pt 193				
Mn 53					Tl 204				
Mn 54				6	Pb 205				
Fe 55				6	Pb 210				
Co 60				6	Bi 208				
Ni 59					Bi 210m				
Ni 63				6	Po 210				
Zn 65				5	Ra 223				
Se 79					Ra 225				6
Kr 81					Ra 226				
Kr 85				8	Ra 228				
Rb 87					Ac 227				
Sr 90				6	Th 227				
Zr 93					Th 228				6
Nb 91					Th 229				8
Nb 92					Th 230				6
Nb 93m					Th 232				6
Nb 94					Th 234				
Mo 93					Pa 231				
Tc 97					Pa 233				
Tc 99				6	U 232				6
Ru 106				6	U 233				6
Pd 107					U 234				6
Ag 108m					U 235				6
Ag 110m				5	U 236				6
Cd 109					U 238				6
Cd 113m					Np 237				6
Sn 119m					Pu 236				
Sn 121m					Pu 238				6
Sn 123					Pu 239				6
Sn 126					Pu 240				6
Sb 125				6	Pu 241				6
Sb 126					Pu 242				6
Te 125m					Am 241				6
Te 127m					Am 242m				
I 129				6	Am 243				
Cs 134				6	Cm 242				6
Cs 135					Cm 243				5
Cs 137				6	Cm 244				6
Ba 133					Cm 245				6
La 137					Cm 246				6
La 138					Cm 248				
Ce 144				6	Cf 249				
Pm 145					Cf 250				
Pm 147				6	Cf 251				
Sm 147					Cf 252				
Sm 151				6	Other a				
Eu 152				5	Other b/g				5
Eu 154				6	Total a	0		NE	
Eu 155				6	Total b/g	0		NE	

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