

WASTE STREAM	9J52	Desiccant
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SITE Hunterston A

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Magnox Limited

WASTE TYPE ILW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	6.5 m ³
Total future arisings:		0 m ³
Total waste volume:		6.5 m ³

Comment on volumes: No future arisings expected.

Uncertainty factors on volumes:	Stock (upper):	x 1.1	Arisings (upper)	x
	Stock (lower):	x 0.9	Arisings (lower)	x

WASTE SOURCE Desiccant is from the reactor's humidifiers, used for removing moisture from the reactor coolant.

PHYSICAL CHARACTERISTICS

General description: The desiccant is aluminium oxide in pelletised form. There are no large items.

Physical components (%wt): Desiccant 100%.

Sealed sources: -

Bulk density (t/m³): ~1.2

Comment on density: Density estimate for damp drained bulk alumina.

CHEMICAL COMPOSITION

General description and components (%wt): Aluminium oxide 100%.

Chemical state: Neutral

Chemical form of radionuclides: H-3: The chemical form of tritium will be as adsorbed tritiated water.
C-14: Carbon 14 will probably be present as graphite dust.
Cl-36: Chlorine 36 will probably be present in graphite dust contamination.
Se-79: The chemical form of selenium has not been determined.
Tc-99: The chemical form of technetium has not been determined.
Ra: The radium isotope content is insignificant.
Th: The thorium isotope content is insignificant.
U: The uranium isotope content is insignificant.
Np: The neptunium content is insignificant.
Pu: The chemical form of plutonium isotopes has not been assessed.

Metals and alloys (%wt): There are no large or bulk metal items.

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

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	Zinc.....	0	
	Zircaloy/Zirconium.....	0	
	Other metals.....	0	There are no "other" metals.
Organics (%wt):	There may be trace quantities of organic materials present. Halogenated plastics or rubbers are not present.		
	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.....	TR	
Other materials (%wt):	-		
	Inorganic ion exchange materials.	0	
	Inorganic sludges and flocs.....	0	
	Soil.....	0	
	Brick/Stone/Rubble.....	0	
	Cementitious material.....	0	
	Sand.....		
	Glass/Ceramics.....	0	
	Graphite.....	TR	
	Desiccants/Catalysts.....	100.0	Aluminium oxide desiccant
	Asbestos.....	0	
	Non/low friable.....		
	Moderately friable.....		
	Highly friable.....		
	Free aqueous liquids.....	0	
	Free non-aqueous liquids.....	0	
	Powder/Ash.....	TR	
Inorganic anions (%wt):	The waste is 100% aluminium oxide. There may be traces of contamination.		

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

Materials of interest for waste acceptance criteria:

No hazardous materials present.

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:

There are no toxic metals present.

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

LAW TREATMENT, PACKAGING AND DISPOSAL**Waste that is currently ILW:** -

Planned on-site / off-site treatments(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:

Waste will be washed and incinerated.

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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: (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 Consigned to the LLW Repository:

Container voidage: -

Waste Characterisation Form (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

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Source:	Tritium in water retained by desiccant.
Uncertainty:	The values quoted are indicative of the activities that might be expected.
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:	Activities have been estimated from available information.
Other information:	-

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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	1.81E-01	CC 2			Gd 153		8		
Be 10		8			Ho 163		8		
C 14	2.00E-04	CC 2			Ho 166m		8		
Na 22					Tm 170		8		
Al 26					Tm 171		8		
Cl 36	<4E-04	C 3			Lu 174		8		
Ar 39		8			Lu 176		8		
Ar 42		8			Hf 178n		8		
K 40		8			Hf 182		8		
Ca 41	<4E-04	C 3			Pt 193		8		
Mn 53		8			Tl 204		8		
Mn 54		8			Pb 205		8		
Fe 55	<4.04E-08	C 3			Pb 210		8		
Co 60	2.14E-06	CC 2			Bi 208		8		
Ni 59	<3E-04	C 3			Bi 210m		8		
Ni 63	<2.82E-04	C 3			Po 210		8		
Zn 65		8			Ra 223		8		
Se 79	<5.17E-05	C 3			Ra 225		8		
Kr 81		8			Ra 226		8		
Kr 85		8			Ra 228		8		
Rb 87		8			Ac 227		8		
Sr 90	<2.42E-04	C 3			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	<9.00E-08	C 3			Th 234		8		
Mo 93		8			Pa 231		8		
Tc 97		8			Pa 233		8		
Tc 99	<3E-04	C 3			U 232		8		
Ru 106		8			U 233		8		
Pd 107		8			U 234		8		
Ag 108m	<4.94E-08	C 3			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	<3.73E-05	C 3		
Sn 123		8			Pu 239	<4E-05	C 3		
Sn 126	<3.04E-07	C 3			Pu 240	<4.00E-05	C 3		
Sb 125		8			Pu 241	1.95E-04	CC 2		
Sb 126	4.26E-08	CC 2			Pu 242		8		
Te 125m		8			Am 241	<8.42E-06	C 3		
Te 127m		8			Am 242m		8		
I 129		8			Am 243		8		
Cs 134		8			Cm 242		8		
Cs 135	<3E-04	C 3			Cm 243		8		
Cs 137	5.69E-07	CC 2			Cm 244		8		
Ba 133	<1.11E-08	C 3			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	<3.71E-07	C 3			Cf 251		8		
Sm 147		8			Cf 252		8		
Sm 151		8			Other a				
Eu 152	1.89E-07	CC 2			Other b/g				
Eu 154	1.94E-08	CC 2			Total a	1.26E-04	CC 2	0	
Eu 155	<5.55E-09	C 3			Total b/g	1.84E-01	CC 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