

WASTE STREAM**9J61****Pond Skip Decontamination Liquor****SITE** Hunterston A**SITE OWNER** Nuclear Decommissioning Authority**WASTE CUSTODIAN** Magnox Limited**WASTE TYPE** ILW**WASTE VOLUMES**

		Reported
Stocks:	At 1.4.2019.....	140.0 m ³

Total future arisings:		0 m ³
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Total waste volume:		140.0 m ³
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Comment on volumes: There are no more arisings expected for this waste stream. The predicted volume for this stream does not account for any volume reduction measures that may be used.

Uncertainty factors on volumes:	Stock (upper):	x 1.2	Arisings (upper)	x
	Stock (lower):	x 0.8	Arisings (lower)	x

WASTE SOURCE Acid liquor from the decontamination of aluminium pond skips.**PHYSICAL CHARACTERISTICS****General description:** Acid liquor from the decontamination of aluminium pond skips.**Physical components (%vol):** Nitric acid containing dissolved metal salts and lanthanides. There will also be a small amount of insoluble silicates.**Sealed sources:** -**Bulk density (t/m³):** ~1.15**Comment on density:** Based on 150 g/l of metals and silicon salts in the decontamination liquor.**CHEMICAL COMPOSITION****General description and components (%wt):** Nitric acid (1M) containing aluminium nitrate, magnesium nitrate, iron (III) nitrate as dissolved salts and insoluble sodium silicate.**Chemical state:** Acid

Chemical form of radionuclides:
H-3: The chemical form of tritium has not been determined.
C-14: The carbon-14 content is insignificant.
Se-79: The selenium content is insignificant.
Tc-99: The chemical form of technetium has not been determined.
Ra: The radium content is insignificant.
Th: The thorium content is insignificant.
U: The chemical form of uranium isotopes may be uranium oxides.
Np: The chemical form of neptunium has not been determined.
Pu: The chemical form of plutonium isotopes may be plutonium oxides.

Metals and alloys (%wt): Present as nitrates and insoluble silicates.

Stainless steel..... 0

Other ferrous metals..... 0

Iron.....

Aluminium..... 0

Beryllium.....

Cobalt.....

Copper..... 0

Lead..... 0

Magnox/Magnesium..... 0

Nickel.....

Titanium.....

Uranium.....

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	Zinc.....	0
	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....	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
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.....	0
	Desiccants/Catalysts.....	
	Asbestos.....	0
	Non/low friable.....	
	Moderately friable.....	
	Highly friable.....	
	Free aqueous liquids.....	100.0
	Free non-aqueous liquids.....	0
	Powder/Ash.....	0
Inorganic anions (%wt):	About 24%wt is in the form of insoluble silicates.	

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Fluoride.....	0
Chloride.....	0
Iodide.....	0
Cyanide.....	0
Carbonate.....	0
Nitrate.....	16.0
Nitrite.....	0
Phosphate.....	0
Sulphate.....	0
Sulphide.....	0

Materials of interest for waste acceptance criteria:

Nitric acid is corrosive.	
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.....	100.0
Pyrophoric materials.....	0
Generating toxic gases.....	0
Reacting with water.....	0
Active particles.....	
Soluble solids as bulk chemical compounds.....	

Hazardous substances / non hazardous pollutants:

Nitric acid.	
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):

EDTA.....
 DPTA.....
 NTA.....
 Polycarboxylic acids.....
 Other organic complexants.....
 Total complexing agents..... NE

PACKAGING AND CONDITIONING

Conditioning method: The waste is expected to be encapsulated in a 3m3 drum.

Plant Name: WILWRRP

Location: Hunterston A Power Station

Plant startup date: -

Total capacity (m³/y incoming waste): -

Target start date for packaging this stream: -

Throughput for this stream (m³/y incoming waste): ~70.0

Other information: The wet waste will be retrieved and transferred to tanks. There are no plans to neutralise the acid prior to encapsulation. However, it is possible that lime or calcium hydroxide or sodium hydroxide can be added to BFS/OPC mixture when the waste is encapsulated in a 3m³ drum.

Likely container type:

Container	Waste packaged (%vol)	Waste loading (m ³)	Payload (m ³)	Number of packages
3m ³ drum	100.0	1.63	2.2	86

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Likely container type comment:

-

Range in container waste volume:

No significant variability is expected.

Other information on containers:

The container material is expected to be stainless steel.

Likely conditioning matrix:
Other information:

Not specified

The most likely conditioning matrix is a BFS/OPC mixture, but this will be finalised nearer the time of waste encapsulation.

Conditioned density (t/m³):

NE

Conditioned density comment:

The conditioned density has not been estimated.

Other information on conditioning:

Transportable ILW Solidification Plant to be used for the conditioning of the waste.

Opportunities for alternative disposal routing:

Treatment	Stream volume (%)	Comment
-	-	-

RADIOACTIVITY

Source:

Contamination from pond operations and plant operation.

Uncertainty:

-

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 are based upon measurement of several representative skips. These activities have previously been accounted for in waste stream 9J50. As all of the pond skips have now been decontaminated, it has been estimated that about 80% of the skip contamination would appear in the acid liquor stream.

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		8			Gd 153		8		
Be 10		8			Ho 163		8		
C 14		8			Ho 166m		8		
Na 22		8			Tm 170		8		
Al 26		8			Tm 171		8		
Cl 36	4E-05	CC 2			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	2.02E-04	CC 2			Pb 210		8		
Co 60	6.13E-06	CC 2			Bi 208		8		
Ni 59		8			Bi 210m		8		
Ni 63	1.88E-03	CC 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	3.22E-02	CC 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	2E-06	CC 2		
Mo 93		8			Pa 231		8		
Tc 97		8			Pa 233	1.61E-08	CC 2		
Tc 99	2E-07	CC 2			U 232		8		
Ru 106		8			U 233		8		
Pd 107		8			U 234	8.20E-07	CC 2		
Ag 108m		8			U 235	3E-08	CC 2		
Ag 110m		8			U 236		8		
Cd 109		8			U 238	2E-06	CC 2		
Cd 113m		8			Np 237	1.62E-08	CC 2		
Sn 119m		8			Pu 236		8		
Sn 121m		8			Pu 238	7.45E-04	CC 2		
Sn 123		8			Pu 239	7.00E-04	CC 2		
Sn 126		8			Pu 240	8.00E-04	CC 2		
Sb 125	8.28E-09	CC 2			Pu 241	1.30E-02	CC 2		
Sb 126		8			Pu 242		8		
Te 125m	2.07E-09	CC 2			Am 241	2.21E-03	CC 2		
Te 127m		8			Am 242m		8		
I 129		8			Am 243		8		
Cs 134	1.45E-08	CC 2			Cm 242		8		
Cs 135		8			Cm 243	4.07E-06	CC 2		
Cs 137	1.63E-03	CC 2			Cm 244	4.25E-05	CC 2		
Ba 133	1.66E-06	CC 2			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	1.45E-05	CC 2			Total a	4.50E-03	CC 2	0	
Eu 155	1.11E-06	CC 2			Total b/g	4.90E-02	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