

WASTE STREAM	9J62	Bunker Graphite Fines
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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.....	~17.6 m ³
Total future arisings:		0 m ³
Total waste volume:		17.6 m ³

Comment on volumes: Waste volumes are uncertain, they have been back calculated from the LTP estimate of 2 off 3m3 drums per bunker = 10 off 3m3 drums with an assumed fill volume of 80%.

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

WASTE SOURCE Graphite fines that are generated from the SAWBR retrieval processing through the bunkers 1-5.

PHYSICAL CHARACTERISTICS

General description: -
 Physical components (%vol): -
 Sealed sources: -
 Bulk density (t/m³): ~1.32
 Comment on density: Derived from 9J19.

CHEMICAL COMPOSITION

General description and components (%wt): -

Chemical state: Neutral

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.....

Organics (%wt): -

WASTE STREAM**9J62****Bunker Graphite Fines**

	Total cellulose.....	0	
	Paper, cotton.....		
	Wood.....		
	Halogenated plastics		
	Total non-halogenated plastics.....	0	
	Condensation polymers.....		
	Others.....		
	Organic ion exchange materials....		
	Total rubber.....	0	
	Halogenated rubber		
	Non-halogenated rubber.....		
	Hydrocarbons.....		
	Oil or grease		
	Fuel.....		
	Asphalt/Tarmac (cont.coal tar)...		
	Asphalt/Tarmac (no coal tar)....		
	Bitumen.....		
	Others.....		
	Other organics.....		
Other materials (%wt):	-		
	Inorganic ion exchange materials.		
	Inorganic sludges and flocs.....		
	Soil.....		
	Brick/Stone/Rubble.....		
	Cementitious material.....		
	Sand.....		
	Glass/Ceramics.....		
	Graphite.....	~100.0	Graphite fines
	Desiccants/Catalysts.....		
	Asbestos.....		
	Non/low friable.....		
	Moderately friable.....		
	Highly friable.....		
	Free aqueous liquids.....		
	Free non-aqueous liquids.....		
	Powder/Ash.....		
Inorganic anions (%wt):	-		

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

Materials of interest for
 waste acceptance criteria:

-
 Combustible metals.....
 Low flash point liquids.....
 Explosive materials.....
 Phosphorus.....
 Hydrides.....
 Biological etc. materials.....
 Biodegradable materials.....
 Putrescible wastes.....
 Non-putrescible wastes.....
 Corrosive materials.....
 Pyrophoric materials.....
 Generating toxic gases.....
 Reacting with water.....
 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.....

WASTE STREAM**9J62****Bunker Graphite Fines**

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.....

PACKAGING AND CONDITIONING

Conditioning method: It is not expected that the waste will be tamped or compacted. Waste will be generated from the SAWBR retrieval processing through the bunkers will be loaded into 3m3 boxes for transit/interim storage before transfer into 3m3 drums within the SILWE plant.

Plant Name: SILWE

Location: Hunterston A Site

Plant startup date: -

Total capacity (m³/y incoming waste): -

Target start date for packaging this stream: -

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

Other information: -

Likely container type:	Container	Waste packaged (%vol)	Waste loading (m ³)	Payload (m ³)	Number of packages
	3m ³ drum	100.0	1.76	2.2	10

WASTE STREAM**9J62****Bunker Graphite Fines**

Likely container type comment:

-

Range in container waste volume:

No significant variability is expected.

Other information on containers:

The 3m3 drum is expected to be made from stainless steel.

Likely conditioning matrix:

Blast Furnace Slag / Ordinary Portland Cement

Other information:

The waste is expected to be encapsulated in BFS/OPC. PFA/OPC is another matrix that may be adopted.

Conditioned density (t/m³):

~2.0

Conditioned density comment:

Estimated based on 9J19.

Other information on conditioning:

-

Opportunities for alternative disposal routing:

Treatment	Stream volume (%)	Comment
-	-	-

RADIOACTIVITY

Source:

-

Uncertainty:

Waste streams 9J19-9J23 fingerprint is expected to be representative of this stream.

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

9J62

Bunker Graphite Fines

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