



**WASTE STREAM**

**9J63**

**CCP Sludge**

Nickel.....  
 Titanium.....  
 Uranium.....  
 Zinc..... 0  
 Zircaloy/Zirconium..... 0  
 Other metals..... TR

"Other" metals include nickel, chromium, cobalt, calcium and strontium at trace quantities.

**Organics (%wt):**

Small amounts of rubber coating from pond walls, hydraulic fluid and oil spillage, and some ion exchange resins, may be present. Trace quantity of halogenated plastics and rubbers present, if any.

Total cellulose..... 0  
 Paper, cotton..... 0  
 Wood..... 0  
 Halogenated plastics ..... TR  
 Total non-halogenated plastics..... 0  
 Condensation polymers..... 0  
 Others..... 0  
 Organic ion exchange materials.... TR  
 Total rubber..... TR  
 Halogenated rubber ..... TR  
 Non-halogenated rubber..... TR  
 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..... ~100.0  
 Soil..... 0  
 Brick/Stone/Rubble..... 0  
 Cementitious material..... 0  
 Sand.....  
 Glass/Ceramics..... 0  
 Graphite..... 0  
 Desiccants/Catalysts.....  
 Asbestos..... 0  
 Non/low friable.....  
 Moderately friable.....

Including approximately 1% aluminium hydroxide and 2% magnesium hydroxide

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	Highly friable.....	
	Free aqueous liquids.....	P
	Free non-aqueous liquids.....	TR
	Powder/Ash.....	0
Inorganic anions (%wt):	Some ferrous-ferro-cyanide anticipated.	
	Fluoride.....	TR
	Chloride.....	TR
	Iodide.....	TR
	Cyanide.....	NE
	Carbonate.....	TR
	Nitrate.....	TR
	Nitrite.....	TR
	Phosphate.....	TR
	Sulphate.....	TR
	Sulphide.....	TR
Materials of interest for waste acceptance criteria:	The waste is unlikely to present a fire hazard, but this requires confirmation since Magnox may be present and will ignite under appropriate conditions. Potassium ferrous-ferro-cyanide may be hazardous.	
	Combustible metals.....	~2.0
	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.....	~2.0
	Active particles.....	
	Soluble solids as bulk chemical compounds.....	
Hazardous substances / non hazardous pollutants:	-	
	Acrylamide.....	
	Benzene.....	
	Chlorinated solvents.....	
	Formaldehyde.....	
	Organometallics.....	
	Phenol.....	
	Styrene.....	
	Tri-butyl phosphate.....	

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Other organophosphates.....

Vinyl chloride.....

Arsenic.....

Barium.....

Boron.....

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

**PACKAGING AND CONDITIONING**

Conditioning method: Waste will be mechanically retrieved adjacent to its current location in the PPS. It will be loaded into small (approx. 130- 165 L) cans for solidification in a tumble mixer machine, prior to loading into a 3m3 stainless steel box for entombment using the SILWE facility. The project expects to use 500 cans and 63 boxes.

Plant Name: SILWE

Location: Hunterston A Decommissioning Site

Plant startup date: -

Total capacity (m<sup>3</sup>/y incoming waste): ~100.0

Target start date for packaging this stream: -

Throughput for this stream (m<sup>3</sup>/y incoming waste): ~60.0

Other information: All the waste being held in a tank is expected to be retrieved when a conditioning campaign is undertaken.

**WASTE STREAM      9J63      CCP Sludge**

Likely container type:	Container	Waste packaged (%vol)	Waste loading (m <sup>3</sup> )	Payload (m <sup>3</sup> )	Number of packages
	3m <sup>3</sup> box (round corners)	100.0	0.932	2.7	63

Likely container type comment: -

Range in container waste volume: Not yet determined. No significant variability is expected.

Other information on containers: The container material is expected to be stainless steel.

Likely conditioning matrix: Blast Furnace Slag / Ordinary Portland Cement

Other information: The matrix is expected to be 9:1 BFS/OPC.

Conditioned density (t/m<sup>3</sup>): ~2.0

Conditioned density comment: The conditioned density range is not estimated.

Other information on conditioning: Wet ILW recovery and encapsulation plant used to condition Waste.

Opportunities for alternative disposal routing:

Treatment	Stream volume (%)	Comment
-	-	-

**RADIOACTIVITY**

Source: The principal source of radioactivity is Cs-137, Sr-90 and Pu-241 from fuel.

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 and consist of the pro rata addition of waste streams 9J33, 9J34 and 9J951 which have been combined under 9J33.

Other information: -

**WASTE STREAM 9J63 CCP Sludge**

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		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		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	5.98E-05	CC 2			Pb 210		8		
Co 60	1.78E-05	CC 2			Bi 208		8		
Ni 59		8			Bi 210m		8		
Ni 63		8			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	4.51E-03	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		8		
Mo 93		8			Pa 231		8		
Tc 97		8			Pa 233	4.35E-09	CC 2		
Tc 99		8			U 232		8		
Ru 106		8			U 233		8		
Pd 107		8			U 234	9.82E-09	CC 2		
Ag 108m		8			U 235		8		
Ag 110m		8			U 236		8		
Cd 109		8			U 238		8		
Cd 113m		8			Np 237	4.41E-09	CC 2		
Sn 119m		8			Pu 236		8		
Sn 121m		8			Pu 238	3.73E-04	CC 2		
Sn 123		8			Pu 239	7.00E-04	CC 2		
Sn 126		8			Pu 240	7.00E-04	CC 2		
Sb 125	6.92E-08	CC 2			Pu 241	1.30E-02	CC 2		
Sb 126		8			Pu 242		8		
Te 125m	1.73E-08	CC 2			Am 241	1.61E-03	CC 2		
Te 127m		8			Am 242m		8		
I 129		8			Am 243		8		
Cs 134	2.68E-08	CC 2			Cm 242		8		
Cs 135		8			Cm 243	4.55E-05	CC 2		
Cs 137	5.69E-02	CC 2			Cm 244	2.97E-05	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	9.66E-05	CC 2			<b>Total a</b>	<b>3.46E-03</b>	<b>CC 2</b>	<b>0</b>	
Eu 155	5E-06	CC 2			<b>Total b/g</b>	<b>7.46E-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