

WASTE STREAM	9D917	Sludge/Resin from Post Operational Clean Out
---------------------	--------------	---

SITE Hinkley Point A
SITE OWNER Nuclear Decommissioning Authority
WASTE CUSTODIAN Magnox Limited
WASTE TYPE ILW
 Is the waste subject to Scottish Policy: No

WASTE VOLUMES

	Reported
Stocks: At 1.4.2022.....	0 m ³
Future arisings - 1.4.2023 - 31.3.2024.....	0.7 m ³
Total future arisings:	0.7 m ³
Total waste volume:	0.7 m ³

Comment on volumes: Arisings from treatment of supernate and interstitial water.
 Uncertainty factors on volumes: Stock (upper): x Arisings (upper) x 1.2
 Stock (lower): x Arisings (lower) x 0.9

WASTE SOURCE This waste stream accounts for sludge/resin arisings from various vessels during post operational clean-out.

PHYSICAL CHARACTERISTICS

General description: All tanks contain a mixture of different coloured resins which, from a distance, appeared to be brown and gold in colour. Closer examination showed that black and white resins are also present. All these are representative of the various resins used in the Caesium Removal Units and the Chemical Treatment Plant. Pond Sludge/ETP sludge and resins. The waste resided in various tanks and sumps. It will have experienced any processes involved in these vessels.
 Physical components (%vol): Waste stream is a mixture of various resins. Dry resin (90% wt) and water (10% wt) assuming a drained resin bed. Pond Sludge/ETP sludge and resins.
 Sealed sources: The waste does not contain sealed sources.
 Bulk density (t/m³): 1.2
 Comment on density: -

CHEMICAL COMPOSITION

General description and components (%wt): Various resins used in the Caesium Removal Units and the Chemical Treatment Plant. Dry resin (90% wt) and water (10% wt).
 Chemical state: -
 Chemical form of radionuclides: -
 Metals and alloys (%wt): -

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	0		
Other ferrous metals.....	0		
Iron.....			
Aluminium.....	0		
Beryllium.....			
Cobalt.....			
Copper.....	0		
Lead.....	0		
Magnox/Magnesium.....	0		

WASTE STREAM	9D917	Sludge/Resin from Post Operational Clean Out
---------------------	--------------	---

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

Organics (%wt): -

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	0		
Paper, cotton.....	0		
Wood.....	0		
Halogenated plastics	0		
Total non-halogenated plastics.....	0		
Condensation polymers.....	0		
Others.....	0		
Organic ion exchange materials....	90.0		
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): -

	(%wt)	Type(s) and comment	% of total C14 activity
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.....			

WASTE STREAM	9D917	Sludge/Resin from Post Operational Clean Out
---------------------	--------------	---

Highly friable.....	
Free aqueous liquids.....	10.0
Free non-aqueous liquids.....	0
Powder/Ash.....	0

Inorganic anions (%wt): -

	(%wt)	Type(s) and comment
Fluoride.....	NE	
Chloride.....	NE	
Iodide.....	NE	
Cyanide.....	NE	
Carbonate.....	NE	
Nitrate.....	NE	
Nitrite.....	NE	
Phosphate.....	NE	
Sulphate.....	NE	
Sulphide.....	NE	

Materials of interest for waste acceptance criteria: Magnox is present, but is in such low concentrations so as not to pose a hazard.

	(%wt)	Type(s) and comment
Combustible metals.....	0	
Low flash point liquids.....	0	
Explosive materials.....	0	
Phosphorus.....	0	
Hydrides.....	0	
Biological etc. materials.....	0	
Biodegradable materials.....	0	
Putrescible wastes.....	0	
Non-putrescible wastes.....		
Corrosive materials.....	0	
Pyrophoric materials.....	0	
Generating toxic gases.....	0	
Reacting with water.....	0	
Higher activity particles.....		
Soluble solids as bulk chemical compounds.....		

Hazardous substances / non hazardous pollutants: none expected

	(%wt)	Type(s) and comment
Acrylamide.....		
Benzene.....		
Chlorinated solvents.....		
Formaldehyde.....		

WASTE STREAM**9D917****Sludge/Resin from Post Operational Clean Out**

Organometallics.....
 Phenol.....
 Styrene.....
 Tri-butyl phosphate.....
 Other organophosphates.....
 Vinyl chloride.....
 Arsenic.....
 Barium.....
 Boron..... 0
 Boron (in Boral).....
 Boron (non-Boral).....
 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

(%wt) Type(s) and comment

EDTA.....
 DPTA.....
 NTA.....
 Polycarboxylic acids.....
 Other organic complexants.....
 Total complexing agents..... 0

Potential for the waste to contain discrete items: No. In & of itself not a DI; assumed not likely to contain any "rogue" items that could be.

PACKAGING AND CONDITIONING

Conditioning method: Lost paddle polymer encapsulation of resins into 196 litre drums, grout 16 drums into High Density CB.

Plant Name: -

Location: -

Plant startup date: -

WASTE STREAM	9D917	Sludge/Resin from Post Operational Clean Out
---------------------	--------------	---

Total capacity (m³/y incoming waste): -

Target start date for packaging this stream: -

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

Other information: Polymer encapsulation, the process is aiming at an 80% waste loading per drum, so 156 litres, x16 = 2.5m³ loading volume per container.

Likely container type:	Container	Waste packaged (%vol)	Waste loading (m ³)	Payload (m ³)	Number of packages
	6m ³ concrete box (HD)	100.0	2.5	5.8	< 1

Likely container type comment: -

Range in container waste volume: -

Other information on containers: -

Likely conditioning matrix: Polymer

Other information: -

Conditioned density (t/m³): -

Conditioned density comment: -

Other information on conditioning: -

Opportunities for alternative disposal routing: -

Baseline Management Route	Opportunity Management Route	Stream volume (%)	Estimated Date that Opportunity will be realised	Opportunity Confidence	Comment
-	-	-	-	-	-

RADIOACTIVITY

Source: Resin in pond water treatment plant tanks. The activity arises from activation products, fission products and fuel contamination.

Uncertainty: Indicative data of measurements taken of resin samples from tanks at Hinkley Point A and reported in May 2006.

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: Resin from tanks was sampled and counted. The specific activities were derived by weighting the relative volume of resin in tanks for the specific activity of each sample.

Other information: -

WASTE STREAM

9D917

Sludge/Resin from Post Operational Clean Out

Nuclide	Mean radioactivity, TBq/m ³				Nuclide	Mean radioactivity, TBq/m ³			
	Waste at 1.4.2022	Bands and Code	Future arisings	Bands and Code		Waste at 1.4.2022	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				4	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				8	Pb 210				8
Co 60			3.63E-03	BC 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				8	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		8.82E-07	BC	8
Tc 99				8	U 232				8
Ru 106			4.45E-08	BC 2	U 233				8
Pd 107				8	U 234				8
Ag 108m				8	U 235				8
Ag 110m				8	U 236				8
Cd 109			7.24E-06	BC 2	U 238				8
Cd 113m				8	Np 237		8.87E-07	BC	2
Sn 119m				8	Pu 236				8
Sn 121m				8	Pu 238				8
Sn 123				8	Pu 239				8
Sn 126				8	Pu 240				8
Sb 125			2.43E-04	BC 2	Pu 241				8
Sb 126				8	Pu 242				8
Te 125m			6.09E-05	BC 2	Am 241		1.59E-01	BC	2
Te 127m				8	Am 242m				8
I 129				8	Am 243				8
Cs 134			1.33E-04	BC 2	Cm 242				8
Cs 135				8	Cm 243				8
Cs 137			5.68E-01	BC 2	Cm 244				8
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			5.83E-03	BC 2	Total a	0	1.59E-01	BC 2	
Eu 155				8	Total b/g	0	5.78E-01	BC 2	

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