

WASTE STREAM	9D920	Miscellaneous Decommissioning ILW from Plant Items.
---------------------	--------------	--

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.....	5.5 m ³
Future arisings -	1.4.2022 - 31.3.2025.....	4.5 m ³
Total future arisings:		4.5 m ³
Total waste volume:		10.0 m ³

Comment on volumes: There is an assumption that the bulk of the pond furniture/fixtures and fittings will be decontaminated to LLW and be consigned to the waste stream 9D913 - Care and Maintenance Preparation: Pond & Effluent Treatment Plant LLW. However, if this does not occur and the materials are categorised as ILW then these can be assigned to this waste stream.

Uncertainty factors on volumes:	Stock (upper):	x 1.1	Arisings (upper)	x 1.2
	Stock (lower):	x 0.9	Arisings (lower)	x 0.9

WASTE SOURCE This waste stream will consist of solid waste that is deemed to be ILW. It may include quantities of existing contaminated pipework, valves and vessel components that have been in contact with ion exchange material and sludge. It will also include 'new build' plant that on completion of waste retrieval and packing operations cannot be decontaminated down to LLW.

PHYSICAL CHARACTERISTICS

General description: Existing contaminated pipework, valves and vessel components that had been in contact with ion exchange material and sludge. It will also include 'new build' plant that on completion of waste retrieval and packing operations cannot be decontaminated down to LLW.

Physical components (%vol): Various metallic items with some asbestos and plastic. Ferrous metals (~92% wt), asbestos (~3% wt), plastics (~3% wt) and Magnox (~2% wt).

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): ~1

Comment on density: -

CHEMICAL COMPOSITION

General description and components (%wt): Ferrous metals with other metals, asbestos and plastic.

Chemical state: -

Chemical form of radionuclides:

- H-3: The chemical form of tritium has not been determined.
- C-14: The chemical form of carbon-14 has not been determined.
- Cl-36: The chlorine 36 content is insignificant.
- Se-79: The selenium content is insignificant.
- Tc-99: The technetium content is insignificant.
- Ra: The radium isotopes content is insignificant.
- Th: The thorium isotopes content is insignificant.
- U: The chemical form of the uranium isotopes has not been determined.
- Np: The chemical form of the neptunium isotopes has not been determined.
- Pu: The chemical form of the plutonium isotopes has not been determined.

Metals and alloys (%wt): Not yet determined.

WASTE STREAM	9D920	Miscellaneous Decommissioning ILW from Plant Items.
---------------------	--------------	--

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	P		
Other ferrous metals.....	~92.0	Not yet determined.	
Iron.....			
Aluminium.....	P		
Beryllium.....	0		
Cobalt.....			
Copper.....	P		
Lead.....	P		
Magnox/Magnesium.....	2.0		
Nickel.....			
Titanium.....			
Uranium.....			
Zinc.....	NE		
Zircaloy/Zirconium.....	NE		
Other metals.....	NE		
Organics (%wt):	-		
	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	0		
Paper, cotton.....	0		
Wood.....	0		
Halogenated plastics	~3.0	Halogenated plastics as PVC (~3%wt).	
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):	-		

WASTE STREAM	9D920	Miscellaneous Decommissioning ILW from Plant Items.
---------------------	--------------	--

	(%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.....	~3.0	MMMF 3% Vol	
Non/low friable.....			
Moderately friable.....			
Highly friable.....			
Free aqueous liquids.....	TR		
Free non-aqueous liquids.....	0		
Powder/Ash.....	0		

Inorganic anions (%wt): -

	(%wt)	Type(s) and comment
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: -

	(%wt)	Type(s) and comment
Combustible metals.....	2.0	
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.....		

WASTE STREAM	9D920	Miscellaneous Decommissioning ILW from Plant Items.
---------------------	--------------	--

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 / Asbestos (~3%wt).
non hazardous pollutants:

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

WASTE STREAM	9D920	Miscellaneous Decommissioning ILW from Plant Items.
---------------------	--------------	--

Complexing agents (%wt):

	(%wt)	Type(s) and comment
EDTA.....		
DPTA.....		
NTA.....		
Polycarboxylic acids.....		
Other organic complexants.....		
Total complexing agents.....	NE	

Potential for the waste to contain discrete items: Yes. Large Metal Items (LMIs)/"substantial" thickness items considered "durable" assumed DIs; Stainless items assumed DIs

PACKAGING AND CONDITIONING

Conditioning method: Direct grout encapsulation of solids into 200 litre drums, grout 16 drums into RCB.

Plant Name: -

Location: -

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 (m³)	Payload (m³)	Number of packages
	6m³ concrete box (SD)	100.0	5	5.8	2

Likely container type comment: -

Range in container waste volume: -

Other information on containers: -

Likely conditioning matrix: Not specified

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:	Contamination of steel pipework, vessels and concrete structure.
Uncertainty:	The values quoted are notional, representing an indicative Total Activity scaled to the subzone R1 & R2 Ponds 9D913 LLW fingerprint.
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:	As per HINA/WASTE/076 (PROG/HPA/SILW/0069) this update was derived by scaling extant notional estimates of Total Activity to the subzone R1 & R2 Ponds 9D913 LLW Fingerprint with caveat that split between U-235 & U-236 and Pu-239 & Pu-240 is set so that U-235 and Pu-239 comprise 20% and 50% of the isotope pairs, respectively. Th-234, the short-lived daughter product of U-238, is assumed to be in secular equilibrium with its parent.
Other information:	Activity estimates are as shown in the table.

WASTE STREAM 9D920 Miscellaneous Decommissioning ILW from Plant Items.

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	5.08E-06	DD 2	5.08E-06	DD 2	Gd 153		8		8
Be 10		8		8	Ho 163		8		8
C 14	1.1E-05	DD 2	1.1E-05	DD 2	Ho 166m		8		8
Na 22		8		8	Tm 170		8		8
Al 26		8		8	Tm 171		8		8
Cl 36	3.53E-08	DD 2	3.53E-08	DD 2	Lu 174		8		8
Ar 39		8		8	Lu 176		8		8
Ar 42		8		8	Hf 178n		8		8
K 40		8		8	Hf 182		8		8
Ca 41		8		8	Pt 193		8		8
Mn 53		8		8	Tl 204		8		8
Mn 54		8		8	Pb 205		8		8
Fe 55	2.06E-06	DD 2	2.06E-06	DD 2	Pb 210		8		8
Co 60	2.63E-06	DD 2	2.63E-06	DD 2	Bi 208		8		8
Ni 59		8		8	Bi 210m		8		8
Ni 63	1.68E-05	DD 2	1.68E-05	DD 2	Po 210		8		8
Zn 65		8		8	Ra 223		8		8
Se 79		8		8	Ra 225		8		8
Kr 81		8		8	Ra 226		8		8
Kr 85		8		8	Ra 228		8		8
Rb 87		8		8	Ac 227		8		8
Sr 90	4.60E-03	DD 2	4.60E-03	DD 2	Th 227		8		8
Zr 93		8		8	Th 228		8		8
Nb 91		8		8	Th 229		8		8
Nb 92		8		8	Th 230		8		8
Nb 93m		8		8	Th 232		8		8
Nb 94	5.97E-07	DD 2	5.97E-07	DD 2	Th 234	1.21E-06	DD 2	1.21E-06	DD 2
Mo 93		8		8	Pa 231		8		8
Tc 97		8		8	Pa 233	2.37E-09	DD 2	2.37E-09	DD 2
Tc 99		8		8	U 232		8		8
Ru 106		8		8	U 233		8		8
Pd 107		8		8	U 234	1.1E-06	DD 2	1.1E-06	DD 2
Ag 108m	7.45E-07	DD 2	7.45E-07	DD 2	U 235	2.67E-08	DD 2	2.67E-08	DD 2
Ag 110m		8		8	U 236	1.07E-07	DD 2	1.07E-07	DD 2
Cd 109		8		8	U 238	1.21E-06	DD 2	1.21E-06	DD 2
Cd 113m		8		8	Np 237	2.46E-09	DD 2	2.46E-09	DD 2
Sn 119m		8		8	Pu 236		8		8
Sn 121m		8		8	Pu 238	3.14E-04	DD 2	3.14E-04	DD 2
Sn 123		8		8	Pu 239	6.35E-04	DD 2	6.35E-04	DD 2
Sn 126		8		8	Pu 240	6.35E-04	DD 2	6.35E-04	DD 2
Sb 125	8.85E-08	DD 2	8.85E-08	DD 2	Pu 241	6.45E-03	DD 2	6.45E-03	DD 2
Sb 126		8		8	Pu 242		8		8
Te 125m	2.22E-08	DD 2	2.22E-08	DD 2	Am 241	2.54E-03	DD 2	2.54E-03	DD 2
Te 127m		8		8	Am 242m		8		8
I 129		8		8	Am 243		8		8
Cs 134	1.3E-08	DD 2	1.3E-08	DD 2	Cm 242		8		8
Cs 135		8		8	Cm 243	3.35E-07	DD 2	3.35E-07	DD 2
Cs 137	7.94E-04	DD 2	7.94E-04	DD 2	Cm 244	1.16E-05	DD 2	1.16E-05	DD 2
Ba 133	3.75E-07	DD 2	3.75E-07	DD 2	Cm 245		8		8
La 137		8		8	Cm 246		8		8
La 138		8		8	Cm 248		8		8
Ce 144		8		8	Cf 249		8		8
Pm 145		8		8	Cf 250		8		8
Pm 147	1.43E-06	DD 2	1.43E-06	DD 2	Cf 251		8		8
Sm 147		8		8	Cf 252		8		8
Sm 151		8		8	Other a				
Eu 152	6.62E-07	DD 2	6.62E-07	DD 2	Other b/g				
Eu 154	2.36E-05	DD 2	2.36E-05	DD 2	Total a	4.14E-03	CC 2	4.14E-03	CC 2
Eu 155	1.57E-06	DD 2	1.57E-06	DD 2	Total b/g	1.19E-02	CC 2	1.19E-02	CC 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