

<b>WASTE STREAM</b>	<b>9D916</b>	<b>C&amp;M Preps LLW Buildings</b>
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**SITE** Hinkley Point A

**SITE OWNER** Nuclear Decommissioning Authority

**WASTE CUSTODIAN** Magnox Limited

**WASTE TYPE** LLW

Is the waste subject to Scottish Policy: No

**WASTE VOLUMES**

		Reported
Stocks:	At 1.4.2022.....	0 m <sup>3</sup>
Future arisings -	1.4.2025 - 31.3.2027.....	167.4 m <sup>3</sup>
Total future arisings:		167.4 m <sup>3</sup>
Total waste volume:		167.4 m <sup>3</sup>

Comment on volumes: -

Uncertainty factors on volumes:	Stock (upper): x	Arisings (upper) x 1.1
	Stock (lower): x	Arisings (lower) x 0.5

**WASTE SOURCE** Care and Maintenance preparations and procedures in the Decontamination Building.

**PHYSICAL CHARACTERISTICS**

**General description:** Hard trash and redundant equipment including metal, plastic, rubber and glass. Small quantities of cellulosic materials such as paper. Large items will be cut to fit standard packages.

**Physical components (%wt):** Redundant mechanical equipment and trash (~100%wt). Metal (including drums) (87%wt), rubble (5%wt), soil (1%wt), soft organic (2%wt), plastics/rubber (3%wt), wood (1%wt), other materials (1%wt). Other materials consist mainly of glass.

**Sealed sources:** The waste does not contain sealed sources.

**Bulk density (t/m<sup>3</sup>):** ~0.46

**Comment on density:** WCH mass divided by volume

**CHEMICAL COMPOSITION**

**General description and components (%wt):** Redundant mechanical equipment and trash (~100%wt). Metal (including drums) (87%wt), rubble (5%wt), soil (1%wt), soft organic (2%wt), plastics/rubber (3%wt), wood (1%wt), other materials (1%wt). Other materials consist mainly of glass.

**Chemical state:** Neutral

**Chemical form of radionuclides:** H-3: The chemical form of Tritium has not been determined but may be present as surface contamination of waste by tritiated liquor.  
C-14: The chemical form of carbon-14 has not been determined but may be in the form of graphite dust.  
Cl-36: The chemical form of chlorine 36 has not been determined but may be present as a contaminant of graphite dust.  
Se-79: The selenium content is insignificant.  
Tc-99: The technetium content is insignificant.  
Ra: The radium isotope content is insignificant.  
Th: The thorium content is insignificant.  
U: The uranium isotope content is insignificant.  
Np: The neptunium content is insignificant.  
Pu: The plutonium isotope content is probably in the form of plutonium oxides.

**Metals and alloys (%wt):** Typical thicknesses have not been estimated although the drums will have walls ~1mm thick.

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	NE		
Other ferrous metals.....	87.1	carbon and low alloy steels	
Iron.....			
Aluminium.....	TR		

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Beryllium.....		
Cobalt.....		
Copper.....		
Lead.....	TR	Lead may be present in trace amounts.
Magnox/Magnesium.....	0	
Nickel.....	~0.09	
Titanium.....		
Uranium.....		
Zinc.....	~0.19	In galvanised metals
Zircaloy/Zirconium.....	0	
Other metals.....	0	

Organics (%wt):                      The waste contains halogenated plastic as PVC and non-halogenated plastic as polythene. Rubbers will be present and there may be some paper present.

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	1.0		
Paper, cotton.....			
Wood.....	1.0		
Halogenated plastics .....	~1.0	Halogenated plastic as PVC and possibly halogenated rubber as neoprene may be present.	
Total non-halogenated plastics.....	~1.0		
Condensation polymers.....	~0.50		
Others.....	~0.50		
Organic ion exchange materials....	0		
Total rubber.....	~1.0	Halogenated plastic as PVC and possibly halogenated rubber as neoprene may be present.	
Halogenated rubber .....	~0.50		
Non-halogenated rubber.....	~0.50		
Hydrocarbons.....			
Oil or grease .....			
Fuel.....			
Asphalt/Tarmac (cont.coal tar)...			
Asphalt/Tarmac (no coal tar)....			
Bitumen.....			
Others.....			
Other organics.....	TR		

Other materials (%wt):                      -

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials..	0		
Inorganic sludges and flocs.....	0		
Soil.....	1.0		
Brick/Stone/Rubble.....	5.0		

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Cementitious material.....	0
Sand.....	
Glass/Ceramics.....	~1.0
Graphite.....	0
Desiccants/Catalysts.....	
Asbestos.....	0
Non/low friable.....	
Moderately friable.....	
Highly friable.....	
Free aqueous liquids.....	0
Free non-aqueous liquids.....	0
Powder/Ash.....	TR

Inorganic anions (%wt):           Trace amounts as dried out salts on surfaces of items.

	(%wt)	Type(s) and comment
Fluoride.....	TR	
Chloride.....	TR	
Iodide.....	TR	
Cyanide.....	0	
Carbonate.....	TR	
Nitrate.....	TR	
Nitrite.....	TR	
Phosphate.....	TR	
Sulphate.....	TR	
Sulphide.....	TR	

Materials of interest for           Possible trace powders from dried out salts on items.  
waste acceptance criteria:

	(%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.....	~2.0	
Putrescible wastes.....	~1.0	
Non-putrescible wastes.....	~1.0	
Corrosive materials.....	0	
Pyrophoric materials.....	0	
Generating toxic gases.....	0	
Reacting with water.....	P	28m2
Higher activity particles.....		

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Soluble solids as bulk chemical compounds.....

Hazardous substances /  
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.....	0.19	
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): Yes

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

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Total complexing agents..... TR

Potential for the waste to contain discrete items: Yes. Large Metal Items (LMIs)/"substantial" thickness items considered "durable" assumed DIs; Stainless items assumed DIs. Large Concrete Items (LCIs) may be DIs; drummed (ungrouted)/"rubbleised" wastes assumed not DIs

## TREATMENT, PACKAGING AND DISPOSAL

Planned on-site / off-site treatment(s):

Treatment	On-site / Off site	Stream volume %
Low force compaction	Off-site	5.0
Supercompaction (HFC)		
Incineration		
Solidification		
Decontamination	Off-site	60.0
Metal treatment		
Size reduction		
Decay storage		
Recycling / reuse		35.0
Other / various		
None		

Comment on planned treatments:

60% of this waste stream is expected to be sent for Metal Recycle, 30% LLW disposal, 5% Incineration and 5% to Landfill as VLLW.

### Disposal Routes:

Disposal Route	Stream volume %	Disposal density t/m3
Expected to be consigned to the LLW Repository	30.0	0.46
Expected to be consigned to a Landfill Facility	5.0	0.46
Expected to be consigned to an On-Site Disposal Facility		
Expected to be consigned to an Incineration Facility	5.0	0.40
Expected to be consigned to a Metal Treatment Facility	60.0	1.4
Expected to be consigned as Out of Scope		
Expected to be recycled / reused		
Disposal route not known		

Classification codes for waste expected to be consigned to a landfill facility: 17 04 05, 17 04 07, 17 01 07, 17 02 03

### Upcoming (2022/23-2024/25) Waste Routing (if expected to change from above):

Disposal Route	Stream volume %		
	2022/23	2023/24	2024/25
Expected to be consigned to the LLW Repository			
Expected to be consigned to a Landfill Facility			
Expected to be consigned to an On-Site Disposal Facility			
Expected to be consigned to an Incineration Facility			
Expected to be consigned to a Metal Treatment Facility			
Expected to be consigned as Out of Scope			
Expected to be recycled / reused			
Disposal route not known			

Opportunities for alternative disposal routing: -

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

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**Waste Packaging for Disposal:**

Container	Stream volume %	Waste loading m <sup>3</sup>	Number of packages
1/3 Height IP-1 ISO 2/3 Height IP-2 ISO 1/2 Height WAMAC IP-2 ISO 1/2 Height IP-2 Disposal/Re-usable ISO 2m box (no shielding) 4m box (no shielding) Other	30.0	10	6

Other information: -

**Waste Planned for Disposal at the LLW Repository:**

Container voidage: Significant inaccessible voidage is not expected.

Waste Characterisation Form (WCH): The waste meets the LLWR's Waste Acceptance Criteria (WAC).  
The waste does not have a current WCH.

Waste consigned for disposal to LLWR in year of generation: No. The timing of consignment of the waste for disposal cannot be determined at present.

**Non-Containerised Waste for In-Vault Grouting:** (Not applicable to this waste stream)

Stream volume (%): -

Waste stream variation: -

Bounding cuboidal volume:

Inaccessible voidage: -

Other information: -

**RADIOACTIVITY**

Source: Activation and contamination of materials.

Uncertainty: Activity values are current best estimates. The values quoted are indicative of the activities that are expected. They are estimates based upon operating experience.

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: Data was taken from WCH 1MXN-3HIA-0-WCH-0-3493 V3 decayed by six years for RWI 2022.

Other information: -

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Nuclide	Mean radioactivity, TBq/m <sup>3</sup>				Nuclide	Mean radioactivity, TBq/m <sup>3</sup>			
	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			2.42E-05	CC 1	Gd 153				8
Be 10				8	Ho 163				8
C 14			8.08E-07	CC 1	Ho 166m				8
Na 22				8	Tm 170				8
Al 26				8	Tm 171				8
Cl 36			4.41E-07	CC 1	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			1.59E-07	CC 1	Pb 210				8
Co 60			4.75E-07	CC 2	Bi 208				8
Ni 59				8	Bi 210m				8
Ni 63			2.12E-06	CC 1	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			1.78E-06	CC 1	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			3.43E-08	CC 2	Th 234			1E-08	8
Mo 93				8	Pa 231				8
Tc 97				8	Pa 233				8
Tc 99				8	U 232				8
Ru 106				8	U 233				8
Pd 107				8	U 234			8.57E-09	CC 1
Ag 108m			3.96E-08	CC 2	U 235			1.43E-09	CC 1
Ag 110m				8	U 236			8.57E-09	CC 1
Cd 109				8	U 238			1E-08	CC 1
Cd 113m				8	Np 237				8
Sn 119m				8	Pu 236				8
Sn 121m				8	Pu 238			1.16E-07	CC 1
Sn 123				8	Pu 239			1.37E-07	CC 1
Sn 126				8	Pu 240			1.79E-07	CC 1
Sb 125				8	Pu 241			3.04E-06	CC 1
Sb 126				8	Pu 242				8
Te 125m				8	Am 241			6.79E-07	CC 1
Te 127m				8	Am 242m				8
I 129				8	Am 243				8
Cs 134				8	Cm 242				8
Cs 135				8	Cm 243				8
Cs 137			5E-06	CC 2	Cm 244			7.95E-09	CC 1
Ba 133			5.01E-08	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			1.49E-08	CC 1	Cf 251				8
Sm 147				8	Cf 252				8
Sm 151				8	Other a				
Eu 152			2.1E-08	CC 2	Other b/g				
Eu 154			1.41E-08	CC 2	<b>Total a</b>	<b>0</b>		<b>1.15E-06</b>	<b>CC 2</b>
Eu 155			4.85E-09	CC 2	<b>Total b/g</b>	<b>0</b>		<b>3.82E-05</b>	<b>CC 2</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