

<b>WASTE STREAM</b>	<b>3T08</b>	<b>LLW Cartridge Filters</b>
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**SITE** Hinkley Point C

**SITE OWNER** NNB GenCo (HPC) Ltd

**WASTE CUSTODIAN** NNB GenCo (HPC) Ltd

**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 -	1.4.2027 - 31.3.2028.....	0.1 m <sup>3</sup>
	1.4.2028 - 31.3.2029.....	0.1 m <sup>3</sup>
	1.4.2029 - 31.3.2030.....	0.1 m <sup>3</sup>
	1.4.2030 - 31.3.2031.....	0.1 m <sup>3</sup>
	1.4.2031 - 31.3.2032.....	0.1 m <sup>3</sup>
	1.4.2032 - 31.3.2033.....	0.1 m <sup>3</sup>
	1.4.2033 - 31.3.2034.....	0.1 m <sup>3</sup>
	1.4.2034 - 31.3.2035.....	0.1 m <sup>3</sup>
	1.4.2035 - 31.3.2036.....	0.1 m <sup>3</sup>
	1.4.2036 - 31.3.2037.....	0.1 m <sup>3</sup>
	1.4.2037 - 31.3.2038.....	0.1 m <sup>3</sup>
	1.4.2038 - 31.3.2039.....	0.1 m <sup>3</sup>
	1.4.2039 - 31.3.2040.....	0.1 m <sup>3</sup>
	1.4.2040 - 31.3.2041.....	0.1 m <sup>3</sup>
	1.4.2041 - 31.3.2042.....	0.1 m <sup>3</sup>
	1.4.2042 - 31.3.2043.....	0.1 m <sup>3</sup>
	1.4.2043 - 31.3.2044.....	0.1 m <sup>3</sup>
	1.4.2044 - 31.3.2045.....	0.1 m <sup>3</sup>
	1.4.2045 - 31.3.2046.....	0.1 m <sup>3</sup>
	1.4.2046 - 31.3.2047.....	0.1 m <sup>3</sup>
	1.4.2047 - 31.3.2048.....	0.1 m <sup>3</sup>
	1.4.2048 - 31.3.2049.....	0.1 m <sup>3</sup>
	1.4.2049 - 31.3.2050.....	0.1 m <sup>3</sup>
	1.4.2050 - 31.3.2051.....	0.1 m <sup>3</sup>
	1.4.2051 - 31.3.2052.....	0.1 m <sup>3</sup>
	1.4.2052 - 31.3.2053.....	0.1 m <sup>3</sup>
	1.4.2053 - 31.3.2054.....	0.1 m <sup>3</sup>
	1.4.2054 - 31.3.2055.....	0.1 m <sup>3</sup>
	1.4.2055 - 31.3.2056.....	0.1 m <sup>3</sup>
	1.4.2056 - 31.3.2057.....	0.1 m <sup>3</sup>
	1.4.2057 - 31.3.2058.....	0.1 m <sup>3</sup>
	1.4.2058 - 31.3.2059.....	0.1 m <sup>3</sup>
	1.4.2059 - 31.3.2060.....	0.1 m <sup>3</sup>
	1.4.2060 - 31.3.2061.....	0.1 m <sup>3</sup>
	1.4.2061 - 31.3.2062.....	0.1 m <sup>3</sup>
	1.4.2062 - 31.3.2063.....	0.1 m <sup>3</sup>
	1.4.2063 - 31.3.2064.....	0.1 m <sup>3</sup>
	1.4.2064 - 31.3.2065.....	0.1 m <sup>3</sup>
	1.4.2065 - 31.3.2066.....	0.1 m <sup>3</sup>
	1.4.2066 - 31.3.2067.....	0.1 m <sup>3</sup>
	1.4.2067 - 31.3.2068.....	0.1 m <sup>3</sup>
	1.4.2068 - 31.3.2069.....	0.1 m <sup>3</sup>
	1.4.2069 - 31.3.2070.....	0.1 m <sup>3</sup>
	1.4.2070 - 31.3.2071.....	0.1 m <sup>3</sup>
	1.4.2071 - 31.3.2072.....	0.1 m <sup>3</sup>
	1.4.2072 - 31.3.2073.....	0.1 m <sup>3</sup>
	1.4.2073 - 31.3.2074.....	0.1 m <sup>3</sup>
	1.4.2074 - 31.3.2075.....	0.1 m <sup>3</sup>

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1.4.2075 - 31.3.2076.....	0.1 m <sup>3</sup>
1.4.2076 - 31.3.2077.....	0.1 m <sup>3</sup>
1.4.2077 - 31.3.2078.....	0.1 m <sup>3</sup>
1.4.2078 - 31.3.2079.....	0.1 m <sup>3</sup>
1.4.2079 - 31.3.2080.....	0.1 m <sup>3</sup>
1.4.2080 - 31.3.2081.....	0.1 m <sup>3</sup>
1.4.2081 - 31.3.2082.....	0.1 m <sup>3</sup>
1.4.2082 - 31.3.2083.....	0.1 m <sup>3</sup>
1.4.2083 - 31.3.2084.....	0.1 m <sup>3</sup>
1.4.2084 - 31.3.2085.....	0.1 m <sup>3</sup>
1.4.2085 - 31.3.2086.....	0.1 m <sup>3</sup>
1.4.2086 - 31.3.2087.....	0.1 m <sup>3</sup>

Total future arisings: 6.0 m<sup>3</sup>  
 Total waste volume: 6.0 m<sup>3</sup>

Comment on volumes: No legacy waste, all future arisings No uncertainty data currently available.

Uncertainty factors on volumes: Stock (upper): x Arisings (upper) x 1.0  
 Stock (lower): x Arisings (lower) x 1.0

**WASTE SOURCE**

Corrosion occurring in the steam generators results in particulate corrosion products becoming mobile in the primary circuit, which can then become activated on passing through the reactor core. Filters are used to capture and hence minimise such particulate material in the UK EPR water auxiliary circuits. Spent filter cartridges arise from the treatment lines of the a number of water auxiliary circuits including the Chemical and Volume Control System (RCV [CVCS]), TEU [LWPS], and the Fuel Pool Cooling (and Purification) System (PTR [FPC(P)S]). Water filters are withdrawn from operation on the basis of clogging and/or dose rate and then treated as waste.

**PHYSICAL CHARACTERISTICS**

General description: Cartridge filters from auxiliary circuit. Stainless steel supports with filter medium and some organic materials.  
 Physical components (%wt): Stainless steel supports with filter medium and some organic materials.  
 Sealed sources: The waste does not contain sealed sources.  
 Bulk density (t/m<sup>3</sup>): ~0.3  
 Comment on density: Raw waste density

**CHEMICAL COMPOSITION**

General description and components (%wt): Stainless steel supports with filter medium and some organic materials.  
 Chemical state: Neutral  
 Chemical form of radionuclides: -  
 Metals and alloys (%wt): -

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	NE	Filters composed principally of stainless steel	
Other ferrous metals.....			
Iron.....			
Aluminium.....			
Beryllium.....	<0.01		
Cobalt.....			
Copper.....			
Lead.....	~0.04		
Magnox/Magnesium.....			

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Nickel.....	0.02		
Titanium.....			
Uranium.....			
Zinc.....			
Zircaloy/Zirconium.....			
Other metals.....	<0.01	Sb	
Organics (%wt):	-		
	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....			
Paper, cotton.....			
Wood.....			
Halogenated plastics .....			
Total non-halogenated plastics.....			
Condensation polymers.....			
Others.....			
Organic ion exchange materials....			
Total rubber.....	NE		
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):	As well as stainless steel supports, filters also contain glass fibre filter.		
	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials..			
Inorganic sludges and flocs.....			
Soil.....			
Brick/Stone/Rubble.....			
Cementitious material.....			
Sand.....			
Glass/Ceramics.....	NE		
Graphite.....			
Desiccants/Catalysts.....			
Asbestos.....			
Non/low friable.....			
Moderately friable.....			

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Highly friable.....

Free aqueous liquids.....

Free non-aqueous liquids.....

Powder/Ash.....

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: -

(%wt) Type(s) and comment

Combustible metals..... NE

Low flash point liquids..... NE

Explosive materials..... NE

Phosphorus..... NE

Hydrides..... NE

Biological etc. materials..... NE

Biodegradable materials..... NE

Putrescible wastes..... NE

Non-putrescible wastes..... NE

Corrosive materials..... NE

Pyrophoric materials..... NE

Generating toxic gases..... NE

Reacting with water..... NE

Higher activity particles..... NE

Soluble solids as bulk chemical  
compounds..... NEHazardous substances /  
non hazardous pollutants: -

(%wt) Type(s) and comment

Acrylamide.....

Benzene.....

Chlorinated solvents.....

Formaldehyde.....

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Organometallics.....	
Phenol.....	
Styrene.....	
Tri-butyl phosphate.....	
Other organophosphates.....	
Vinyl chloride.....	
Arsenic.....	<0.01
Barium.....	
Boron.....	~0.60
Boron (in Boral).....	
Boron (non-Boral).....	
Cadmium.....	<0.01
Caesium.....	
Selenium.....	<0.01
Chromium.....	~0.02
Molybdenum.....	
Thallium.....	
Tin.....	
Vanadium.....	
Mercury compounds.....	<0.01
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.....	

Potential for the waste to contain discrete items: No.

**TREATMENT, PACKAGING AND DISPOSAL**

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

Treatment	On-site / Off site	Stream volume %
Low force compaction Supercompaction (HFC) Incineration Solidification Decontamination Metal treatment Size reduction Decay storage Recycling / reuse Other / various None	On-site	100.0

Comment on planned treatments:

Cementation in 200l drums, direct disposal to LLWR to in HHISO

**Disposal Routes:**

Disposal Route	Stream volume %	Disposal density t/m3
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	100.0	NE

Classification codes for waste expected to be consigned to a landfill facility: -

**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
-	-	-	-	-	-

**Waste Packaging for Disposal:**

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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	100.0	NE	NE

Other information: -

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

Container voidage: -

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: Not yet determined. May not be immediately consigned as will need to wait for a full consignment.

**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: Radioactive particulate material trapped on the filter

Uncertainty: -

Definition of total alpha and total beta/gamma: In addition to the individual radionuclides which have been quantified the total beta gamma value accounts for relevant radionuclides which have been identified but not quantified individually. Total alpha may include some relevant radionuclides however which ones and in what quantity is not known at this stage.

Measurement of radioactivities: -

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					Gd 153				
Be 10				6	Ho 163				
C 14			~1.1E-05	BB 2	Ho 166m				
Na 22					Tm 170				
Al 26					Tm 171				
Cl 36				6	Lu 174				
Ar 39					Lu 176				
Ar 42					Hf 178n				
K 40					Hf 182				
Ca 41				6	Pt 193				
Mn 53					Tl 204				
Mn 54				6	Pb 205				
Fe 55				6	Pb 210				
Co 60			~3.28E-03	BB 2	Bi 208				
Ni 59				6	Bi 210m				
Ni 63					Po 210				
Zn 65				6	Ra 223				
Se 79				6	Ra 225				
Kr 81					Ra 226				
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90				6	Th 227				
Zr 93				6	Th 228				
Nb 91					Th 229				
Nb 92					Th 230				
Nb 93m					Th 232				
Nb 94				6	Th 234				
Mo 93				6	Pa 231				
Tc 97					Pa 233				
Tc 99				6	U 232				
Ru 106					U 233				
Pd 107				6	U 234				
Ag 108m				6	U 235				
Ag 110m				6	U 236				
Cd 109					U 238				
Cd 113m					Np 237				
Sn 119m					Pu 236				
Sn 121m				6	Pu 238				
Sn 123					Pu 239				
Sn 126				6	Pu 240				
Sb 125					Pu 241				
Sb 126					Pu 242				
Te 125m					Am 241				
Te 127m					Am 242m				
I 129			~4.34E-11	BB 2	Am 243				
Cs 134					Cm 242				
Cs 135				6	Cm 243				
Cs 137				6	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				6	Other a				
Eu 152					Other b/g				
Eu 154					<b>Total a</b>	<b>0</b>		~1.51E-07	<b>BB 2</b>
Eu 155					<b>Total b/g</b>	<b>0</b>		~2.13E-02	<b>BB 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