

WASTE STREAM**3N40****Miscellaneous Activated Components - Debris Vault 3****SITE** Hinkley Point B**SITE OWNER** EDFE NGL**WASTE CUSTODIAN** EDFE NGL**WASTE TYPE** ILW; SPD3

Is the waste subject to Scottish Policy: No

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2022.....	4.5 m ³
Total future arisings:		0 m ³
Total waste volume:		4.5 m ³

Comment on volumes: Waste volumes will be variable depending on station operating conditions.

Uncertainty factors on volumes:	Stock (upper):	x 1.25	Arisings (upper)	x
	Stock (lower):	x 0.75	Arisings (lower)	x

WASTE SOURCE Irradiated reactor control rods, control rod chains and graphite specimen assemblies.**PHYSICAL CHARACTERISTICS**

General description: Redundant or defective control rods and control rod chains and graphite specimen assemblies. The possibility of large items which may need special handling is not assessed.

Physical components (%vol): Percentage breakdown not assessed.

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): ~1Comment on density: Estimated as 1 t/m³**CHEMICAL COMPOSITION**

General description and components (%wt): The waste is predominantly stainless steel. The material breakdown is not currently assessed.

Chemical state: Neutral

Chemical form of radionuclides:

H-3: Diffused into materials
 C-14: Incorporated into metallic components, contamination by activated graphite.
 Cl-36: Incorporated into steels
 Se-79: Not expected to be significant
 Tc-99: Not expected to be significant
 I-129: Not expected to be significant
 Ra: Not expected to be significant
 Th: Not expected to be significant
 U: Not expected to be significant
 Np: Not expected to be significant
 Pu: Not expected to be significant

Metals and alloys (%wt): -

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

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Magnox/Magnesium.....	NE
Nickel.....	NE
Titanium.....	NE
Uranium.....	NE
Zinc.....	NE
Zircaloy/Zirconium.....	NE
Other metals.....	NE

Organics (%wt): Further assessment is required.

	(%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....	0		
Total rubber.....	0		
Halogenated rubber	0		
Non-halogenated rubber.....	0		
Hydrocarbons.....	NE		
Oil or grease	NE		
Fuel.....	0		
Asphalt/Tarmac (cont.coal tar)...	0		
Asphalt/Tarmac (no coal tar)....	0		
Bitumen.....	0		
Others.....	0		
Other organics.....	NE		

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.....	0		
Glass/Ceramics.....			
Graphite.....	NE		
Desiccants/Catalysts.....	0		
Asbestos.....	0		
Non/low friable.....			

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Moderately friable.....

Highly friable.....

Free aqueous liquids..... 0

Free non-aqueous liquids..... 0

Powder/Ash..... 0

Inorganic anions (%wt): This waste is not expected to contain any inorganic anions.

(%wt) Type(s) and comment

Fluoride..... 0

Chloride..... 0

Iodide..... 0

Cyanide..... 0

Carbonate..... 0

Nitrate..... 0

Nitrite..... 0

Phosphate..... 0

Sulphate..... 0

Sulphide..... 0

Materials of interest for waste acceptance criteria: There are no hazardous materials in the waste.

(%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..... 0

Corrosive materials..... 0

Pyrophoric materials..... 0

Generating toxic gases..... 0

Reacting with water..... 0

Higher activity particles..... P

Soluble solids as bulk chemical compounds..... 0

Hazardous substances / non hazardous pollutants: This waste is not expected to contain any listed substances.

(%wt) Type(s) and comment

Acrylamide..... NE

Benzene..... NE

Chlorinated solvents..... NE

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Formaldehyde.....	NE
Organometallics.....	NE
Phenol.....	NE
Styrene.....	NE
Tri-butyl phosphate.....	NE
Other organophosphates.....	NE
Vinyl chloride.....	NE
Arsenic.....	NE
Barium.....	NE
Boron.....	NE
Boron (in Boral).....	NE
Boron (non-Boral).....	NE
Cadmium.....	NE
Caesium.....	NE
Selenium.....	NE
Chromium.....	NE
Molybdenum.....	NE
Thallium.....	NE
Tin.....	NE
Vanadium.....	NE
Mercury compounds.....	NE
Others.....	NE
Electronic Electrical Equipment (EEE)	
EEE Type 1.....	0
EEE Type 2.....	0
EEE Type 3.....	0
EEE Type 4.....	0
EEE Type 5.....	0

Complexing agents (%wt): Not yet determined

	(%wt)	Type(s) and comment
EDTA.....	NE	
DPTA.....	NE	
NTA.....	NE	
Polycarboxylic acids.....	NE	
Other organic complexants.....	NE	There may be traces of complexing agents (decontamination chemicals)
Total complexing agents.....	NE	

Potential for the waste to contain discrete items: Yes.

PACKAGING AND CONDITIONING

Conditioning method: The waste will be conditioned to satisfy the disposal requirements which are effective at the time of retrieval/conditioning. It is currently assumed that the waste will be placed in "baskets" in the waste packages and will be encapsulated.

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Plant Name: -
 Location: Hinkley Point B Power Station
 Plant startup date: ~2107
 Total capacity (m³/y incoming waste): -
 Target start date for packaging this stream: -
 Throughput for this stream (m³/y incoming waste): -
 Other information: All of the waste is expected to be retrieved and conditioned when a conditioning campaign is undertaken. The total plant process rate is not estimated.

Likely container type:	Container	Waste packaged (%vol)	Waste loading (m ³)	Payload (m ³)	Number of packages
	4m box (100mm concrete shielding)	100.0	~12.2	~14.3	< 1

Likely container type comment: -
 Range in container waste volume: -
 Other information on containers: Stainless steel.
 Likely conditioning matrix: BFS/OPC
 Other information: -
 Conditioned density (t/m³): ~3.0
 Conditioned density comment: The density of the encapsulated waste is expected to be approximately 3 t/m³.
 Other information on conditioning: Waste will be retained on site pending Final Site Clearance, to let nuclides such as Co-60 undergo considerable radioactive decay. Baskets of different Final Site Clearance ILW wastes may be in the same waste package.
 Opportunities for alternative disposal routing: No

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

RADIOACTIVITY

Source: Source of activity is activation with possible contamination by fission products and actinides.
 Uncertainty: Needs further assessment.
 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: Theoretical estimates.
 Other information: -

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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		6			Gd 153				
Be 10		8			Ho 163				
C 14	5E-02	CC 2			Ho 166m				
Na 22		4			Tm 170				
Al 26		4			Tm 171				
Cl 36		6			Lu 174				
Ar 39					Lu 176				
Ar 42					Hf 178n				
K 40					Hf 182				
Ca 41		8			Pt 193				
Mn 53					Tl 204				
Mn 54	9E-02	CC 2			Pb 205				
Fe 55	3E+01	CC 2			Pb 210		8		
Co 60	3E+01	CC 2			Bi 208				
Ni 59	2E-01	CC 2			Bi 210m				
Ni 63	9E+00	CC 2			Po 210		8		
Zn 65	1E-07	CC 2			Ra 223				
Se 79		8			Ra 225				
Kr 81					Ra 226		8		
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90		8			Th 227				
Zr 93		8			Th 228				
Nb 91					Th 229		8		
Nb 92					Th 230		8		
Nb 93m	4E-05	CC 2			Th 232		8		
Nb 94	1E-03	CC 2			Th 234				
Mo 93	5E-04	CC 2			Pa 231		8		
Tc 97					Pa 233				
Tc 99		8			U 232				
Ru 106		8			U 233		8		
Pd 107		8			U 234		8		
Ag 108m	4E-03	CC 2			U 235		8		
Ag 110m					U 236		8		
Cd 109					U 238		8		
Cd 113m					Np 237		8		
Sn 119m					Pu 236				
Sn 121m		8			Pu 238		8		
Sn 123					Pu 239		8		
Sn 126		8			Pu 240		8		
Sb 125					Pu 241		8		
Sb 126					Pu 242		8		
Te 125m					Am 241		8		
Te 127m					Am 242m		8		
I 129		8			Am 243		8		
Cs 134		6			Cm 242		8		
Cs 135		8			Cm 243		8		
Cs 137		6			Cm 244		8		
Ba 133					Cm 245		8		
La 137					Cm 246		8		
La 138					Cm 248				
Ce 144		8			Cf 249				
Pm 145					Cf 250				
Pm 147		8			Cf 251				
Sm 147					Cf 252				
Sm 151		8			Other a		8		
Eu 152		8			Other b/g	5E-01	CC 2		
Eu 154		8			Total a	0	8		0
Eu 155		8			Total b/g	6.98E+01	CC 2		0

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