WASTE STREAM 9D15 PWTP Fine Filters

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.....	5.8 m^3
Total future arisings:		0 m^3
Total waste volume:		5.8 m^3

Comment on volumes: The site is now being decommissioned so there will be no further arisings in this operational stream. This waste has been reclassified to ILW from LLW as does not meet LLWR WAC

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

WASTE SOURCE Cartridge filter elements from filtration of process liquors.

PHYSICAL CHARACTERISTICS

General description: Cartridge filter elements in 240 litre drums; 3 to 6 filters per drum. The filters were grouted for disposal as LLW but subsequently found to not meet LLWR WAC. There are no large items to influence the choice of treatment process or disposal container.

Physical components (%wt): Fibreglass (~1% wt), plastic (~0.02% wt), stainless steel (~0.02% wt), rubber (<0.01% wt), 3:1 PFA/OPC grout (~81% wt), 240 litre drums (~5% wt), steel in-drum frame (~10% wt).

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m^3): 2

Comment on density: Density of conditioned filters as contained in 240 litre drums. 3 to 6 filters per drum.

CHEMICAL COMPOSITION

General description and components (%wt): Fibreglass (~1% wt), plastic (~0.02% wt), stainless steel (~0.02% wt), rubber (<0.01% wt), 3:1 PFA/OPC grout (~81% wt), steel frame (~10% wt) and drums (~5% wt).

Chemical state: Neutral

Chemical form of radionuclides:
H-3: The chemical form of tritium is probably water.
C-14: The chemical form of carbon 14 may be graphite.
Cl-36: The chemical form of chlorine 36 may be chloride.
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 content is insignificant.
Np: The neptunium content is insignificant.
Pu: The chemical form of plutonium isotopes may be oxides.

Metals and alloys (%wt): There are no bulk metal items present. There is the sheet metal of the drums containing the waste which have walls about 1 mm thick. There is also a steel in-drum frame.

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	~0.02		
Other ferrous metals.....	~15.0		
Iron.....			
Aluminium.....	0		
Beryllium.....	0		
Cobalt.....			

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Copper	0
Lead	0
Magnox/Magnesium	0
Nickel	
Titanium	
Uranium	
Zinc	0
Zircaloy/Zirconium	0
Other metals	0

Organics (%wt): Traces of resin fines may be present on the filters.

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulosics	0		
Paper, cotton	0		
Wood	0		
Halogenated plastics	0		
Total non-halogenated plastics	~0.02		
Condensation polymers	~0.02		
Others	0		
Organic ion exchange materials	TR		
Total rubber	<0.01		
Halogenated rubber	<0.01	Rubbers will be present in small quantities. It is not determined whether they are halogenated.	
Non-halogenated rubber	NE		
Hydrocarbons			
Oil or grease			
Fuel			
Asphalt/Tarmac (cont.coal tar)			
Asphalt/Tarmac (no coal tar)			
Bitumen			
Others			
Other organics	0		

Other materials (%wt): Other materials may include Fibreglass (~1% wt).

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials	TR		
Inorganic sludges and flocs	0		
Soil	0		
Brick/Stone/Rubble	0		
Cementitious material	81.0		
Sand			
Glass/Ceramics	~1.0		
Graphite	0		

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Desiccants/Catalysts.....	
Asbestos.....	0
Non/low friable.....	
Moderately friable.....	
Highly friable.....	
Free aqueous liquids.....	0
Free non-aqueous liquids.....	0
Powder/Ash.....	0

Inorganic anions (%wt): Traces of salts from drying out of the held moisture will be present. Silicate will be present in the filter medium.

	(%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 waste acceptance criteria: No materials likely to pose a fire or other non-radiological hazard have been identified.

	(%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.....		

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Hazardous substances / non hazardous pollutants: None expected

	(%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.....		

Complexing agents (%wt):

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

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Potential for the waste to contain discrete items: No. In & of itself not a DI; waste stream may include DIs (notably any stainless steel components)

PACKAGING AND CONDITIONING

Conditioning method: Assumption is that up to 8 drums will be encapsulated per 6m3 Concrete box as per other MCI streams.

Plant Name: -

Location: -

Plant startup date: -

Total capacity (m^3/y incoming waste): -

Target start date for packaging this stream: -

Throughput for this stream (m^3/y incoming waste): -

Other information: -

Likely container type:

Container	Waste packaged (%vol)	Waste loading (m^3)	Payload (m^3)	Number of packages
6m^3 concrete box (SD)	100.0	1.92	5.8	3

Likely container type comment: -

Range in container waste volume: -

Other information on containers: -

Likely conditioning matrix:

Other information: -

Conditioned density (t/m^3): -

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: Activity source is fission products, activation products and actinides.

Uncertainty: The values quoted are indicative of the activities that are expected.

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: The specific activities have been estimated from measurement of the drum activity corrected to 2022.

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Other information:	The activities refer to conditioned waste assuming 6 filters per drum. Other similar wastes (not encapsulated) too active to be LLW are described in waste stream 9D17.

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Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2022	Bands and Code	Future arisings	Bands and Code	Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2022	Bands and Code	Future arisings	Bands and Code
H 3	8.63E-05	C C 2			Gd 153		8		
Be 10		8			Ho 163		8		
C 14	5.00E-05	C C 2			Ho 166m		8		
Na 22					Tm 170		8		
Al 26					Tm 171		8		
Cl 36	7E-06	C C 2			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	8.74E-07	C C 2			Pb 210		8		
Co 60	6.95E-06	C C 2			Bi 208		8		
Ni 59		8			Bi 210m		8		
Ni 63	5.41E-05	C C 2			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	1.39E-04	C C 2			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		
Tc 99		8			U 232		8		
Ru 106		8			U 233		8		
Pd 107		8			U 234		8		
Ag 108m		8			U 235		8		
Ag 110m		8			U 236		8		
Cd 109		8			U 238		8		
Cd 113m		8			Np 237		8		
Sn 119m		8			Pu 236		8		
Sn 121m		8			Pu 238	5.33E-05	C C 2		
Sn 123		8			Pu 239	4E-05	C C 2		
Sn 126		8			Pu 240	5.00E-05	C C 2		
Sb 125		8			Pu 241	9.74E-04	C C 2		
Sb 126		8			Pu 242		8		
Te 125m		8			Am 241	2.30E-04	C C 2		
Te 127m		8			Am 242m		8		
I 129		8			Am 243		8		
Cs 134		8			Cm 242		8		
Cs 135		8			Cm 243	2.12E-07	C C 2		
Cs 137	4.96E-05	C C 2			Cm 244	3.38E-06	C C 2		
Ba 133	7.49E-08	C C 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	7.60E-08	C C 2			Cf 251		8		
Sm 147		8			Cf 252		8		
Sm 151		8			Other a				
Eu 152		8			Other b/g				
Eu 154	1.20E-06	C C 2			**Total a**	**3.76E-04**	**C C 2**	**0**	
Eu 155	8.35E-08	C C 2			**Total b/g**	**1.37E-03**	**C C 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