WASTE STREAM 2D23 Filters in Concrete Box

SITE	Sellafield
SITE OWNER	Nuclear Decommissioning Authority
WASTE CUSTODIAN	Sellafield Limited
WASTE TYPE	ILW
Is the waste subject to Scottish Policy:	No

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2022.....	16.0 m^3
Total future arisings:		0 m^3
Total waste volume:		16.0 m^3

Comment on volumes: No future arisings. The volume is for the filters as stored and does not include the concrete box.

Uncertainty factors on volumes:

Stock (upper):	x 1.5	Arisings (upper)	x
Stock (lower):	x 0.5	Arisings (lower)	x

WASTE SOURCE The receipt and storage of filters (and possibly other items) from early site operations, mainly from Windscale Pile chimneys. The material is stored in a Mortuary and Access Recovery Zone Facility which is an underground chamber beneath the Cuboid Flask Maintenance Facility, thus the waste is not expected to be accessible until this facility has been decommissioned and demolished (currently scheduled to be complete in 2039).

PHYSICAL CHARACTERISTICS

General description:	A concrete box which contains wastes such as old pile filters and possibly other items. The block measures 3.65m x 3.65m x 4.85m and contains approximately 250 filters. Filters are about 0.5m square and 0.05m thick. They consist of glass wool held by wire gauze in an aluminium-coated mild steel frame. The waste has not undergone any changes since it was generated.
Physical components (%vol):	Filters and other items (100%) held in a concrete box.
Sealed sources:	-
Bulk density (t/m^3):	*1
Comment on density:	The density has not been estimated. * A value of 1.0 t/m^3 has been assumed.

CHEMICAL COMPOSITION

General description and components (%wt):	Filters are composed of aluminium-coated mild steel frames and glass wool fibre. Composition of filters is approximately 3% steel and 97% glass fibre. The aluminium content is very small. The filters are held in a concrete box.
Chemical state:	-
Chemical form of radionuclides:	Pu: Pu239/240 may be present as sludge residue.
Metals and alloys (%wt):	3mm aluminium-coated mild steel formed into casings for glass fibre pads.

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	0		
Other ferrous metals.....	<2.0		
Iron.....			
Aluminium.....	<<1.0		
Beryllium.....	0		
Cobalt.....	0		
Copper.....	0		
Lead.....	0		

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

Organics (%wt): Unlikely to contain cellulosics. Epoxy and acrylates may be present.

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulosics	0		
Paper, cotton	0		
Wood	0		
Halogenated plastics	0		
Total non-halogenated plastics	TR		
Condensation polymers	TR		
Others	TR		
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): Some sludge residue may be present, since there is a possibility through wet filters being stored in the silos that Pu particles have formed a sludge on the glass fibres or the silo floor.

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials	0		
Inorganic sludges and flocs	TR		
Soil	0		
Brick/Stone/Rubble	0		
Cementitious material	0		
Sand			
Glass/Ceramics	>97.0		
Graphite	0		
Desiccants/Catalysts			
Asbestos	0		

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

Inorganic anions (%wt): Inorganic anions are unlikely to be present.

	(%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: No hazardous materials are likely to be present.

	(%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.....		

Hazardous substances / non hazardous pollutants: -

	(%wt)	Type(s) and comment
Acrylamide.....		
Benzene.....		

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Chlorinated solvents.....
Formaldehyde.....
Organometallics.....
Phenol.....
Styrene.....
Tri-butyl phosphate.....
Other organophosphates.....
Vinyl chloride.....
Arsenic.....
Barium.....
Boron.....
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): No

	(%wt)	Type(s) and comment
EDTA.....	0	
DPTA.....	0	
NTA.....	0	
Polycarboxylic acids…….	0	
Other organic complexants.....	0	No organic complexing agents are present.
Total complexing agents.....	0	

Potential for the waste to contain discrete items: Yes.

PACKAGING AND CONDITIONING

Conditioning method: Not yet established.
Plant Name: Not yet established.
Location: -

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Plant startup date:	Not yet established.
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
Sellafield 3m³ box	100.0	2.7	2.7	6

Likely container type comment:	-
Range in container waste volume:	-
Other information on containers:	Not Specified
Likely conditioning matrix:	Not specified
Other information:	-
Conditioned density (t/m³):	NE
Conditioned density comment:	-
Other information on conditioning:	-
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:	Fission products on filters. Contamination levels are assessed from samples taken from wash arisings prior to tipping into storage chamber. Main nuclides on filters: Cs137, Pu238, Pu239/240.
Uncertainty:	The accuracy of the activity estimate is within a factor of 100.
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:	-
Other information:	Other alpha includes Pu-239 and Pu-240.

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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					Gd 153				
Be 10					Ho 163				
C 14					Ho 166m				
Na 22					Tm 170				
Al 26					Tm 171				
Cl 36					Lu 174				
Ar 39					Lu 176				
Ar 42					Hf 178n				
K 40					Hf 182				
Ca 41					Pt 193				
Mn 53					Tl 204				
Mn 54					Pb 205				
Fe 55					Pb 210	3.39E-16	D D 2		
Co 60					Bi 208				
Ni 59					Bi 210m				
Ni 63					Po 210	3.12E-16	D D 2		
Zn 65					Ra 223				
Se 79					Ra 225				
Kr 81					Ra 226	2.10E-15	D D 2		
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90					Th 227				
Zr 93					Th 228				
Nb 91					Th 229				
Nb 92					Th 230	5.98E-13	D D 2		
Nb 93m					Th 232				
Nb 94					Th 234				
Mo 93					Pa 231				
Tc 97					Pa 233				
Tc 99					U 232				
Ru 106					U 233				
Pd 107					U 234	5.25E-09	D D 2		
Ag 108m					U 235				
Ag 110m					U 236				
Cd 109					U 238				
Cd 113m					Np 237				
Sn 119m					Pu 236				
Sn 121m					Pu 238	7.03E-05	D D 2		
Sn 123					Pu 239				
Sn 126					Pu 240				
Sb 125					Pu 241				
Sb 126					Pu 242				
Te 125m					Am 241				
Te 127m					Am 242m				
I 129					Am 243				
Cs 134					Cm 242				
Cs 135					Cm 243				
Cs 137	2.01E-02	D D 2			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					Other a	4.50E-04	D D 2		
Eu 152					Other b/g	1.90E-02	D D 2		
Eu 154					**Total a**	**5.20E-04**	**D D 2**	**0**	
Eu 155					**Total b/g**	**3.91E-02**	**D D 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