

WASTE STREAM	9J60	Ion Siv Unit Post Filters
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SITE Hunterston A

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Nuclear Restoration Services Ltd (NRS)

WASTE TYPE ILW

WASTE VOLUMES

	Reported (m ³)	OR	Conditioned (m ³)	Packaged (m ³)
Stocks:	At 1.4.2025	= 0.1		
Future arisings:				
Total future arisings:		0.0		
Total waste volume:		0.1		

Number of waste packages in stock: At 1.4.2025..... - packages

Comment on arising rates: -

Additional information on quantities: The MAETP plant was commissioned in 2009. The volume of each post filter is 0.044 m3.

Uncertainty factors on volumes:

Stock (upper):	x 1.20	Arisings (upper):	x -
Stock (lower):	x 0.80	Arisings (lower):	x -

WASTE SOURCE Filtration of cartridge cooling pond water.

PHYSICAL CHARACTERISTICS

General description: Spent post filters that form part of the Modular Active Effluent Treatment Plant. The size of the post filters will not influence the choice of treatment process or disposal container.

Changes since waste generated: -

Bulk density (t/m³): ~ 0.53

Comment on density: The density of 0.53 t/m3 assumes that each post filter will have trapped 20g of IONSIV material, giving a total mass of 28.1kg for each post filter.

CHEMICAL COMPOSITION

General description and components (%wt): The waste is a spent post filter, which is composed principally of stainless steel supports with some organic material. A post filter will typically hold a maximum of 20g of IONSIV material. Stainless steel (~100%), IONSIV material (<1%) and EPDM seal material (<1%). (EPDM is ethylene diene terpolymer).

Chemical state: Neutral

Sheet metal proportion / thickness: -

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	~ 100.0	The stainless steel is SS316L; nickel and chromium will be major constituents of the stainless steel post filter construction material.	
Other ferrous metals.....	NE	-	
Iron.....	-	-	
Aluminium.....	NE	-	
Beryllium.....	TR	-	
Cobalt.....	-	-	
Copper.....	NE	-	
Lead.....	NE	-	
Magnox/Magnesium.....	NE	-	
Nickel.....	-	-	
Titanium.....	-	-	
Uranium.....	-	-	
Zinc.....	NE	-	
Zircaloy/Zirconium.....	NE	-	
Other metals.....	NE	Only the stainless steel content of the waste has been assessed.	

Organics (%wt):

	(%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.....	< 1.0	-	
Halogenated rubber.....	= 0	-	
Non-halogenated rubber.....	< 1.0	EPDM (ethylene diene terpolymer) seal material	
Hydrocarbons.....	-	-	
Oil or grease.....	-	-	
Fuel.....	-	-	
Asphalt/Tarmac (cont.coal tar).....	-	-	
Asphalt/Tarmac (no coal tar).....	-	-	
Bitumen.....	-	-	
Others.....	-	-	
Other organics.....	NE	-	

Other materials (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials.....	< 1.0	IONSIV Material	
Inorganic sludges and flocs.....	= 0	-	
Soil.....	= 0	-	
Brick/Stone/Rubble.....	= 0	-	
Cementitious material.....	= 0	-	
Sand.....	-	-	
Glass/Ceramics.....	= 0	-	
Graphite.....	= 0	-	
Desiccants/Catalysts.....	-	-	
Asbestos.....	= 0	-	
Non/low friable.....	-	-	
Moderately friable.....	-	-	
Highly friable.....	-	-	
Free aqueous liquids.....	TR	-	
Free non-aqueous liquids.....	= 0	-	
Powder/Ash.....	= 0	-	

COMPONENTS OF MATERIALS, WASTE PROPERTIES, MATERIALS NOT CONTRIBUTING TO MASS

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.....	= 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.....	0	-
Benzene.....		-
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.....		-

Complexing agents (%wt):

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

Physical components:

	Number	Type(s) and comment
Sources.....		-
Electronic & Electrical Equipment (EEE)		-
EEE Type 1.....		-
EEE Type 2.....		-
EEE Type 3.....		-
EEE Type 4.....		-
EEE Type 5.....		-

TREATMENT, PACKAGING AND DISPOSAL

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

Treatment	On-site / Off-site	Stream volume %
Size reduction Decay storage Low force compaction Supercompaction (HFC) Incineration Drying/dewatering/liquid separation Tie down/fixatives/strippable coating/painting application Decontamination Metal treatment Recycling / reuse Thermal treatment, including vitrification Encapsulation Polymer encapsulation Other physical treatment Other chemical treatment Containerisation Treatment not yet determined None	On-site	100.0

Comments on planned treatments:

-

Conditioning method:

It is assumed that one post filter will be packaged into one drum, each drum will then be placed into a 3m3 box. The waste is expected to be conditioned in a cast iron drum. The drummed waste will be over packed in a 3m3 box. A strategy decision needs to be taken as to whether the 3m3 box will be grouted.

Conditioning plants:

Plant Name	Location
RDC Encap HNA	Hunterston A

Likely conditioning matrix:

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Further information on the conditioning matrix:

Work is in progress to determine the most appropriate matrix. Currently the matrix is anticipated to be 3:1 PFA/OPC.

Waste Packaging:

Likely container type:	Container	Waste packaged (vol%)	Waste loading (m³)	Payload (m³)	Number of packages	Estimated start date for packaging
	3 m³ box (side lifting)	100.0	0.04	2.9	2	-

Range in container waste loading: No significant variability is expected.

Other information on packaging and conditioning:

It is expected that a purpose-built cast iron drum with a 205 mm wall thickness will be used. One filter will be packaged into one drum.

Conditioned density (t/m³):
Conditioned density comment:

NE
Conditioned density is not estimated.

Management Routes:

Disposal Route	Stream volume %	Raw density t/m³	Start date
Expected to be consigned to a Near Site, Near Surface Disposal Facility (Scotland)	NE		
Expected to be Non-NSD HAW managed under Scottish Government's policy	NE		
Expected to be disposed to LLW Vaults NRS Dounreay			
Expected to be consigned to the Geological Disposal Facility			
Expected to be consigned to a Near Surface Disposal Facility			
Expected to be consigned to the LLW Repository			
Expected to be consigned to a Landfill Facility			
Expected to be disposed On-Site			
Expected to be managed by In-Situ Disposal			
Expected to be consigned to an Incineration Facility			
Expected to be consigned to a Metal Treatment Facility			
Expected to be Out of Scope			
Expected to be recycled / reused			
Disposal route not known			

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

Opportunities for alternative disposal routing: No

Baseline Management Route	Opportunity Management Route	Stream volume (%)	Opportunity Confidence	Comment
-	-	-	-	-

RADIOACTIVITY

Source: Spent post filters from the Modular Active Effluent Treatment Plant, used for the removal of caesium isotopes from Cartridge Cooling Pond water. Contamination by fission products, actinides and activation products.

Uncertainty: Specific activity is a function of Station operating history. The values quoted are indicative of the activities that might be expected.

Measurement of radioactivities: The activities were estimated from the fingerprint for the Cartridge Cooling Pond water sludge from waste stream 9J951 with a total activity of 0.06 TBq for the Cartridge Cooling Pond water.

Chemical form of radionuclides:

H-3: Any tritium is likely to be present as water.
C-14: The carbon 14 content is insignificant.
Cl-36: The chlorine 36 content is insignificant.
Se-79: The selenium content is insignificant.
Tc-99: The technetium content is insignificant.
I-129: -
Ra: The radium isotope content is insignificant.
Th: The thorium isotope content is insignificant.
U: The uranium isotope content is insignificant.
Np: The neptunium content is insignificant.
Pu: The chemical form of plutonium isotopes may be plutonium oxides.

WASTE STREAM		9J60		Ion Siv Unit Post Filters					
Nuclide	Mean radioactivity, TBq/m³				Nuclide	Mean radioactivity, TBq/m³			
	Waste at 1.4.2025	Bands and Code	Future Arisings	Bands and Code		Waste at 1.4.2025	Bands and Code	Future Arisings	Bands and Code
H 3			8		Gd 153			8	
Be 10			8		Ho 163			8	
C 14			8		Ho 166m			8	
Na 22			8		Tm 170			8	
Al 26			8		Tm 171			8	
Cl 36			8		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	9.56E-04	C C	2		Pb 210			8	
Co 60	1.45E-04	C C	2		Bi 208			8	
Ni 59			8		Bi 210m			8	
Ni 63			8		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	7.50E-03	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	9.14E-09	C C	2	
Tc 99			8		U 232			8	
Ru 106			8		U 233			8	
Pd 107			8		U 234	3.23E-08	C C	2	
Ag 108m			8		U 235			8	
Ag 110m			8		U 236			8	
Cd 109			8		U 238			8	
Cd 113m			8		Np 237	9.24E-09	C C	2	
Sn 119m			8		Pu 236			8	
Sn 121m			8		Pu 238	9.10E-04	C C	2	
Sn 123			8		Pu 239	2.00E-03	C C	2	
Sn 126			8		Pu 240	2.00E-03	C C	2	
Sb 125	9.81E-07	C C	2		Pu 241	2.81E-02	C C	2	
Sb 126			8		Pu 242			8	
Te 125m	< 2.46E-07	C	3		Am 241	2.68E-03	C C	2	
Te 127m			8		Am 242m			8	
I 129			6		Am 243			8	
Cs 134	8.92E-07	C C	2		Cm 242			8	
Cs 135			8		Cm 243	7.58E-05	C C	2	
Cs 137	1.52E-01	C C	2		Cm 244	6.31E-05	C C	2	
Ba 133			8		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			8		Cf 251			8	
Sm 147			8		Cf 252			8	
Sm 151			8		Unsp a			8	
Eu 152			8		Unsp b/g			8	
Eu 154	1.90E-04	C C	2		Total a	7.73E-03	*		0 *
Eu 155	3.59E-05	C C	2		Total b/g	1.89E-01	*		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 the 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
* Total calculated from the 114 declared radionuclides