

<b>WASTE STREAM</b>	<b>9C38</b>	<b>Ion Siv Unit Pre Filters</b>
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**SITE** Dungeness 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.....	1.4 m <sup>3</sup>
Total future arisings:		0 m <sup>3</sup>
Total waste volume:		1.4 m <sup>3</sup>
Comment on volumes:	Each pre filter has a volume of 0.053 m <sup>3</sup> and the volume is based on 27 pre filters in stock.	
Uncertainty factors on volumes:	Stock (upper): x 1.2	Arisings (upper) x
	Stock (lower): x 0.8	Arisings (lower) x

**WASTE SOURCE** Ion Siv pre-filter for the removal of particulate from pond water prior to the removal of caesium.

**PHYSICAL CHARACTERISTICS**

General description: Spent pre filters that form part of the submersible caesium removal unit. There are no bulk items present in the waste.

Physical components (%wt): Pre filters (100%). The waste is composed of spent pre filters, which are composed principally of stainless steel supports with glass fibre/polyester filter elements and some organic materials. Pre filters will typically hold a maximum of 2 kg of sludge. Some early filters (about 5) will be stainless steel (~80%), glass fibre/polyester (~13%), sludge (~7%) and EPDM seal material (<1%). The remainder will be stainless steel (~90%), sludge (~10%) and EPDM seal material (<1%) (EPDM is ethylene diene terpolymer).

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m<sup>3</sup>): ~0.57

Comment on density: The density of 0.57 t/m<sup>3</sup> assumes that each pre filter will contain 2 kg of sludge, giving a total mass of 30 kg for each pre filter.

**CHEMICAL COMPOSITION**

General description and components (%wt): Some early filters (about 5) will contain sludge (~7%) and EPDM seal material (<1%). The remainder will contain sludge (~10%) and EPDM seal material (<1%) (EPDM is ethylene diene terpolymer).

Chemical state: Neutral

Chemical form of radionuclides:  
 H-3: Most tritium is expected to be present as water.  
 C-14: The chemical form of carbon 14 may be graphite.  
 Cl-36: The chemical form of chlorine 36 may be chloride.  
 U: The chemical form of uranium isotopes be be uranium oxides  
 Pu: The chemical form of plutonium isotopes may be plutonium oxides.

Metals and alloys (%wt): -

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	~90.0	The stainless steel is SS316L; nickel and chromium will be major constituents of the stainless steel pre filter construction material. Only the stainless steel content of the waste has been assessed.	
Other ferrous metals.....	NE		
Iron.....			
Aluminium.....	NE		

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Beryllium.....	TR
Cobalt.....	
Copper.....	NE
Lead.....	NE
Magnox/Magnesium.....	NE
Nickel.....	
Titanium.....	
Uranium.....	
Zinc.....	NE
Zircaloy/Zirconium.....	NE
Other metals.....	NE

Organics (%wt):                      Some non-halogenated plastic in the form of polyester is present. EPDM seal material (<1%wt) is also present. Halogenated plastics and rubbers are not expected in the waste.

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	0		
Paper, cotton.....	0		
Wood.....	0		
Halogenated plastics .....	0		
Total non-halogenated plastics.....	NE	polyester	
Condensation polymers.....	0		
Others.....	NE	polyester	
Organic ion exchange materials....	0		
Total rubber.....	<0.10	EPDM seal material	
Halogenated rubber .....	0		
Non-halogenated rubber.....	<0.10	EPDM 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..	0		
Inorganic sludges and flocs.....	10.0		
Soil.....	0		
Brick/Stone/Rubble.....	0		
Cementitious material.....	0		
Sand.....			
Glass/Ceramics.....	0		

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

Inorganic anions (%wt):           The inorganic anion content of the waste has not been assessed.

	(%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:           The sludge may contain some unreacted Magnox. Free water may be associated with the retained sludge.

	(%wt)	Type(s) and comment
Combustible metals.....	TR	
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.....	TR	
Higher activity particles.....		
Soluble solids as bulk chemical compounds.....		

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Hazardous substances / none expected  
 non hazardous pollutants:

	(%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): Yes

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

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Potential for the waste to contain discrete items: Yes. Stainless Steel so DI by definition

**PACKAGING AND CONDITIONING**

Conditioning method: Initially the filters will be held in shielded drums in a buffer store, then transferred into a drum, crushed and the pucks placed into a DCIC

Plant Name: -

Location: Dungeness A Site

Plant startup date: -

Total capacity (m<sup>3</sup>/y incoming waste): -

Target start date for packaging this stream: -

Throughput for this stream (m<sup>3</sup>/y incoming waste): -

Other information: -

Likely container type:	Container	Waste packaged (%vol)	Waste loading (m <sup>3</sup> )	Payload (m <sup>3</sup> )	Number of packages
	3m <sup>3</sup> RS box	100.0	1.43	2.5	1

Likely container type comment: -

Range in container waste volume: -

Other information on containers: -

Likely conditioning matrix: -

Other information: -

Conditioned density (t/m<sup>3</sup>): -

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: Contaminated sludge. 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.

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'.

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Measurement of  
radioactivities:

Specific activities have been estimated using a sample of Dungeness A pond water. It is assumed that the water throughput is 18m<sup>3</sup> per hour and that the dwell time of the pre filter is 30 days.

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		8			Gd 153		8		
Be 10		8			Ho 163		8		
C 14	5.00E-03	CC 2			Ho 166m		8		
Na 22		8			Tm 170		8		
Al 26		8			Tm 171		8		
Cl 36	<2E-04	C 3			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	4.21E-09	CC 2			Pb 205		8		
Fe 55	2.14E-04	CC 2			Pb 210		8		
Co 60	1.78E-04	CC 2			Bi 208		8		
Ni 59	<8E-04	C 3			Bi 210m		8		
Ni 63	<6.33E-04	C 3			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	4.94E-03	CC 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	<2E-04	C 3			Th 234	2E-05	CC 2		
Mo 93		8			Pa 231	7.03E-09	CC 2		
Tc 97		8			Pa 233	8.19E-08	CC 2		
Tc 99		8			U 232		8		
Ru 106	1.23E-05	CC 2			U 233		8		
Pd 107		8			U 234	<1.05E-05	C 3		
Ag 108m	<2.94E-04	C 3			U 235	<2E-05	C 3		
Ag 110m		8			U 236	1.83E-09	8		
Cd 109		8			U 238	<2E-05	C 3		
Cd 113m		8			Np 237	<8.26E-08	C 3		
Sn 119m		8			Pu 236		8		
Sn 121m		8			Pu 238	8.95E-03	CC 2		
Sn 123		8			Pu 239	7E-03	CC 2		
Sn 126		8			Pu 240	7.00E-03	CC 2		
Sb 125	1.14E-04	CC 2			Pu 241	3.65E-01	CC 2		
Sb 126		8			Pu 242		8		
Te 125m	2.86E-05	CC 2			Am 241	2.11E-02	CC 2		
Te 127m		8			Am 242m		8		
I 129	<4E-06	C 3			Am 243	5.60E-09	CC 2		
Cs 134	1.03E-04	CC 2			Cm 242		8		
Cs 135		8			Cm 243	1.43E-03	CC 2		
Cs 137	5.85E-02	CC 2			Cm 244	1.15E-03	CC 2		
Ba 133	<8.44E-05	C 3			Cm 245		8		
La 137		8			Cm 246		8		
La 138		8			Cm 248		8		
Ce 144	2.89E-06	CC 2			Cf 249		8		
Pm 145		8			Cf 250		8		
Pm 147	6.45E-03	CC 2			Cf 251		8		
Sm 147		8			Cf 252		8		
Sm 151	8.93E-02	CC 2			Other a				
Eu 152	<2.45E-04	C 3			Other b/g				
Eu 154	6.23E-03	CC 2			<b>Total a</b>	<b>4.66E-02</b>	<b>CC 2</b>	<b>0</b>	
Eu 155	1.54E-03	CC 2			<b>Total b/g</b>	<b>5.40E-01</b>	<b>CC 2</b>	<b>0</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