

WASTE STREAM	9E962/C	Ion Siv Unit Cartridges
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SITE Oldbury

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		= 0.2	2.6
Future arisings:				0.0
				0.0
Total future arisings:			0.0	0.0
Total waste volume:			0.2	2.6

Number of waste packages in stock: At 1.4.2025..... 2 packages

Comment on arising rates: -

Additional information on quantities: The volume of each cartridge is 0.05 m3. There are 2 cartridges in each MOSAIK (Total of 4 cartridges).

Uncertainty factors on volumes:

Stock (upper):	x 1.00	Arisings (upper):	x -
Stock (lower):	x 1.00	Arisings (lower):	x -

WASTE SOURCE Ion Siv Cartridges used to remove caesium from pond water.

PHYSICAL CHARACTERISTICS

General description: Spent IONSIV cartridges that formed part of the submersible caesium removal unit. Each cartridge will contain about 10 kg of water, less than 10% of this is expected to be free water, the rest is absorbed into the resin beads.

Changes since waste generated: -

Bulk density (t/m³): ~ 1.2

Comment on density: The density of 1.2 t/m3 is given for the cartridges.

CHEMICAL COMPOSITION

General description and components (%wt): IONSIV ion exchange material (~53%), stainless steel (~32%), water (~15%) and EPDM seal material (<1%). (EPDM is ethylene diene terpolymer). IonSiv is a crystalline silicotitanate.

Chemical state: Neutral

Sheet metal proportion / thickness: The stainless steel forms a hollow cylinder with dimensions: internal diameter 122mm, external diameter 296mm and height 640mm.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	~ 32.0	The stainless steel is SS316L; nickel and chromium will be major constituents of the stainless steel cartridge housing.	
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 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...	~ 53.0	-	
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...	< 15.0	-	
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):

Yes		
	(%wt)	Type(s) and comment
EDTA.....	TR	-
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		

Comments on planned treatments:

Conditioning method: The waste has been packaged into 2 MOSAIKs.

Conditioning plants:

Plant Name	Location

Likely conditioning matrix:

Further information on the conditioning matrix:

Waste Packaging:

Likely container type:	Container	Waste packaged (vol%)	Waste loading (m³)	Payload (m³)	Number of packages	Estimated start date for packaging
	500 l RS drum (20mm Pb)	100.0	0.09	0.09	2	-

Range in container waste loading: -

Other information on packaging and conditioning: -

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

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)	100.0		
Expected to be Non-NSD HAW managed under Scottish Government's policy			
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 cartridges from the submersible caesium removal unit, used for the removal of caesium isotopes from 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: -

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

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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	8.00E-05	C C 2			Gd 153		8		
Be 10					Ho 163		8		
C 14	2.40E-04	C C 2			Ho 166m		8		
Na 22					Tm 170		8		
Al 26					Tm 171		8		
Cl 36	4.59E-07	C C 2			Lu 174		8		
Ar 39					Lu 176		8		
Ar 42					Hf 178n		8		
K 40					Hf 182		8		
Ca 41					Pt 193		8		
Mn 53					Tl 204		8		
Mn 54					Pb 205		8		
Fe 55	3.82E-04	C C 2			Pb 210		8		
Co 60	5.04E-04	C C 2			Bi 208		8		
Ni 59	2.30E-09	C C 2			Bi 210m		8		
Ni 63	3.00E-03	C C 2			Po 210		8		
Zn 65					Ra 223		8		
Se 79	8.75E-08	C C 2			Ra 225		8		
Kr 81					Ra 226		8		
Kr 85	7.62E-04	C C 2			Ra 228		8		
Rb 87					Ac 227		8		
Sr 90	4.30E+00	C C 2			Th 227		8		
Zr 93	4.80E-07	C C 2			Th 228		8		
Nb 91					Th 229		8		
Nb 92					Th 230		8		
Nb 93m	2.78E-07	C C 2			Th 232		8		
Nb 94					Th 234	7.02E-07	C C 2		
Mo 93					Pa 231		8		
Tc 97					Pa 233	3.10E-08	C C 2		
Tc 99	4.45E-06	C C 2			U 232		8		
Ru 106	2.97E-07	C C 2			U 233		8		
Pd 107	2.26E-08	C C 2			U 234	6.41E-07	C C 2		
Ag 108m	5.10E-06	C C 2			U 235	2.35E-08	C C 2		
Ag 110m					U 236	6.62E-08	C C 2		
Cd 109					U 238	7.02E-07	C C 2		
Cd 113m	2.14E-06	C C 2			Np 237	3.11E-08	C C 2		
Sn 119m					Pu 236		8		
Sn 121m	5.19E-06	C C 2			Pu 238	5.15E-04	C C 2		
Sn 123					Pu 239	7.26E-04	C C 2		
Sn 126	1.76E-07	C C 2			Pu 240	7.20E-04	C C 2		
Sb 125	2.63E-05	C C 2			Pu 241	2.30E-02	C C 2		
Sb 126	2.46E-08	C C 2			Pu 242	1.15E-07	C C 2		
Te 125m	6.57E-06	C C 2			Am 241	2.65E-03	C C 2		
Te 127m					Am 242m	1.15E-06	C C 2		
I 129	7.91E-09	C C 2			Am 243	2.18E-07	C C 2		
Cs 134	9.29E-02	C C 2			Cm 242	9.47E-07	C C 2		
Cs 135	2.24E-07	C C 2			Cm 243	5.80E-05	C C 2		
Cs 137	4.17E+01	C C 2			Cm 244	5.43E-06	C C 2		
Ba 133					Cm 245		8		
La 137					Cm 246		8		
La 138					Cm 248		8		
Ce 144	1.83E-08	C C 2			Cf 249		8		
Pm 145					Cf 250		8		
Pm 147	4.60E-04	C C 2			Cf 251		8		
Sm 147					Cf 252		8		
Sm 151	1.15E-04	C C 2			Unsp a				
Eu 152	6.38E-06	C C 2			Unsp b/g				
Eu 154	2.50E-04	C C 2			Total a	4.68E-03	*	0	*
Eu 155	6.06E-05	C C 2			Total b/g	4.62E+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