

WASTE STREAM	9E55	Ion Siv Filters
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SITE Oldbury
SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Magnox Limited

WASTE TYPE LLW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	2.9 m ³
Total future arisings:		0 m ³
Total waste volume:		2.9 m ³
Comment on volumes:	Each filter has a volume of 0.053m ³ . There are 55 filters remaining in this waste stream. All filters are currently stored in 85 litre drums.	
Uncertainty factors on volumes:	Stock (upper): x 1.2	Arisings (upper) x
	Stock (lower): x 0.8	Arisings (lower) x

WASTE SOURCE Filtration of pond water.

PHYSICAL CHARACTERISTICS

General description: Spent pre filters that form part of the submersible caesium removal unit. The waste consists of 78 Submersible Caesium Removal Unit (SCRU) pre (45), post (11) and unknown (22) filters. The filters are stainless steel with pleated stainless steel filter medium inside the housings. The filters are currently contained within vented 85ltr drums on the R1 Pilecap. Each individual filter is approximately 326mm by 643mm and weighs approximately 30kg. Each filter has a volume of 0.053m³. Underwater and in air surveys have been completed which confirm the IonSiv filter population as suitable for disposal at LLWR."

Physical components (%wt): Pre filters (58%), Post filters (14%), Unknown filters (28%).

Sealed sources: -

Bulk density (t/m³): ~0.57

Comment on density: The density of 0.57 t/m³ assumes that each filter will contain 2 kg of water/sludge, giving a total mass of 30 kg for each filter. WCH mass divided by volume

CHEMICAL COMPOSITION

General description and components (%wt): The waste is spent filters, which are composed principally of stainless steel supports with some organic material. Filters will typically hold a maximum of 2 kg of water/sludge. Stainless steel (~90%), 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.
Se-79: The selenium content is insignificant.
Tc-99: The technetium content is insignificant.
Ra: The radium isotope content is insignificant.
Th: The thorium isotope content is insignificant.
U: The chemical form of uranium isotopes may be uranium oxides.
Np: The neptunium content is insignificant.
Pu: The chemical form of plutonium isotopes may be plutonium oxides.

Metals and alloys (%wt): -

Stainless steel.....	~90.0	The stainless steel is SS316L; nickel and chromium will be major constituents of the stainless steel filter construction material.
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):	EPDM seal material (<1%wt) is present. Halogenated plastics and rubbers are not expected in the waste.		
	Total cellulosics.....	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 (EPDM is ethylene diene terpolymer)
	Hydrocarbons.....		
	Oil or grease		
	Fuel.....		
	Asphalt/Tarmac (cont.coal tar)...		
	Asphalt/Tarmac (no coal tar).....		
	Bitumen.....		
	Others.....		
	Other organics.....	NE	
Other materials (%wt):	-		
	Inorganic ion exchange materials.	0	
	Inorganic sludges and flocs.....	~10.0	
	Soil.....	0	
	Brick/Stone/Rubble.....	0	
	Cementitious material.....	0	
	Sand.....		
	Glass/Ceramics.....	0	
	Graphite.....	0	
	Desiccants/Catalysts.....		
	Asbestos.....	0	

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	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.	
	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:	Free water may be associated with the retained sludge.	
	Combustible metals.....	0
	Low flash point liquids.....	0
	Explosive materials.....	0
	Phosphorus.....	0
	Hydrides.....	0
	Biological etc. materials.....	0
	Biodegradable materials.....	
	Putrescible wastes.....	0
	Non-putrescible wastes.....	
	Corrosive materials.....	0
	Pyrophoric materials.....	0
	Generating toxic gases.....	0
	Reacting with water.....	0
	Active particles.....	
	Soluble solids as bulk chemical compounds.....	
Hazardous substances / non hazardous pollutants:	None expected.	
	Acrylamide.....	
	Benzene.....	
	Chlorinated solvents.....	
	Formaldehyde.....	
	Organometallics.....	
	Phenol.....	

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Styrene.....
 Tri-butyl phosphate.....
 Other organophosphates.....
 Vinyl chloride.....
 Arsenic.....
 Barium.....
 Boron.....
 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
 EDTA.....
 DPTA.....
 NTA.....
 Polycarboxylic acids.....
 Other organic complexants.....
 Total complexing agents..... TR

TREATMENT, PACKAGING AND DISPOSAL

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

Treatment	On-site / Off site	Stream volume %
Low force compaction		
Supercompaction (HFC)		
Incineration		
Solidification		
Decontamination		
Metal treatment		
Size reduction		
Decay storage		
Recycling / reuse		
Other / various		
None		100.0

Comment on planned treatments:

-

WASTE STREAM**9E55****Ion Siv Filters****Disposal Routes:**

Disposal Route	Stream volume %
Expected to be consigned to the LLW Repository Expected to be consigned to a Landfill Facility Expected to be consigned to an On-Site Disposal Facility Expected to be consigned to an Incineration Facility Expected to be consigned to a Metal Treatment Facility Expected to be consigned as Out of Scope Expected to be recycled / reused Disposal route not known	100.0

Upcoming (2019/20-2021/22) Waste Routing (if expected to change from above):

Disposal Route	Stream volume %		
	2019/20	2020/21	2021/22
Expected to be consigned to the LLW Repository Expected to be consigned to a Landfill Facility Expected to be consigned to an On-Site Disposal Facility Expected to be consigned to an Incineration Facility Expected to be consigned to a Metal Treatment Facility Expected to be consigned as Out of Scope Expected to be recycled / reused Disposal route not known			

Waste Packaging for Disposal:

Container	Stream volume %	Waste loading m ³	Number of packages
1/3 Height IP-1 ISO 2/3 Height IP-2 ISO 1/2 Height WAMAC IP-2 ISO 1/2 Height IP-2 Disposal/Re-usable ISO 2m box (no shielding) 4m box (no shielding) Other	100.0	10	< 1

Other information: -

Waste Planned for Disposal at the LLW Repository:

Container voidage: -

Waste Characterisation Form (WCH): The waste meets the LLWR's Waste Acceptance Criteria (WAC).
The waste has a current WCH.

Waste consigned for disposal to LLWR in year of generation: -

Potential for the waste to contain discrete items: -

Non-Containerised Waste for In-Vault Grouting: (Not applicable to this waste stream)

Stream volume (%): -

Waste stream variation: -

Bounding cuboidal volume:

Inaccessible voidage: -

Other information: -

RADIOACTIVITY

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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'.
Measurement of radioactivities:	Data taken from WCH - 1MXN-3OLD-0-WCH-L-4104 and decayed by 2 years for RWI 2019.
Other information:	-

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Nuclide	Mean radioactivity, TBq/m ³				Nuclide	Mean radioactivity, TBq/m ³			
	Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code		Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code
H 3	1.19E-04	CC 2			Gd 153		8		
Be 10		8			Ho 163		8		
C 14	5.17E-05	CC 2			Ho 166m		8		
Na 22		8			Tm 170		8		
Al 26		8			Tm 171		8		
Cl 36	4.6E-08	CC 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	1.55E-06	CC 2			Pb 210		8		
Co 60	4.73E-06	CC 2			Bi 208		8		
Ni 59		8			Bi 210m		8		
Ni 63	1.97E-05	CC 2			Po 210		8		
Zn 65		8			Ra 223		8		
Se 79	2.76E-09	CC 2			Ra 225		8		
Kr 81		8			Ra 226		8		
Kr 85	4.53E-06	CC 2			Ra 228		8		
Rb 87		8			Ac 227		8		
Sr 90	2.8E-04	CC 2			Th 227		8		
Zr 93	1.45E-08	CC 2			Th 228		8		
Nb 91		8			Th 229		8		
Nb 92		8			Th 230		8		
Nb 93m	1.23E-08	CC 2			Th 232		8		
Nb 94		8			Th 234	1.47E-08	CC 2		
Mo 93		8			Pa 231		8		
Tc 97		8			Pa 233	1.08E-09	CC 2		
Tc 99	1.19E-07	CC 2			U 232		8		
Ru 106		8			U 233		8		
Pd 107		8			U 234	1.69E-08	CC 2		
Ag 108m	6.49E-07	CC 2			U 235		8		
Ag 110m		8			U 236	1.47E-09	CC 2		
Cd 109		8			U 238	1.47E-08	CC 2		
Cd 113m	2.19E-08	CC 2			Np 237	1.08E-09	CC 2		
Sn 119m		8			Pu 236		8		
Sn 121m	1.25E-07	CC 2			Pu 238	4.55E-06	CC 2		
Sn 123		8			Pu 239	6.95E-06	CC 2		
Sn 126	4.84E-09	CC 2			Pu 240	1.03E-05	CC 2		
Sb 125	1.33E-09	CC 2			Pu 241	1.24E-04	CC 2		
Sb 126		8			Pu 242	5.4E-09	CC 2		
Te 125m		8			Am 241	3.23E-05	CC 2		
Te 127m		8			Am 242m	3.36E-08	CC 2		
I 129		8			Am 243	1.28E-08	CC 2		
Cs 134	9.05E-06	CC 2			Cm 242	2.76E-08	CC 2		
Cs 135	5.92E-09	CC 2			Cm 243	1.19E-08	CC 2		
Cs 137	5.13E-03	CC 2			Cm 244	1.68E-07	CC 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	7.84E-08	CC 2			Cf 251		8		
Sm 147		8			Cf 252		8		
Sm 151	2.05E-06	CC 2			Other a				
Eu 152	1.02E-08	CC 2			Other b/g				
Eu 154	6.45E-07	CC 2			Total a	5.44E-05	CC 2	0	
Eu 155	3.1E-08	CC 2			Total b/g	5.75E-03	CC 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