

WASTE STREAM	5B332	RHILW Retrievable Drum Store ILW
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SITE Dounreay
SITE OWNER Nuclear Decommissioning Authority
WASTE CUSTODIAN Dounreay Site Restoration Limited
WASTE TYPE ILW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	8.8 m ³
Total future arisings:		0 m ³
Total waste volume:		8.8 m ³
Comment on volumes:	There will be no further arisings of this waste stream. The definition of "The Retrievable Drum Store" has been redefined for this submission.	
Uncertainty factors on volumes:	Stock (upper): x 1.02	Arisings (upper) x
	Stock (lower): x 0.98	Arisings (lower) x

WASTE SOURCE POCO & Decommissioning of shielded drum store and associated Cave/Cell Suite.

PHYSICAL CHARACTERISTICS

General description: The waste consists of primary air filters and decontamination liquid filters, plus other contaminated items. There are no large items that will influence packaging selection.
 Physical components (%vol): Filter casings (20%), filter elements, swabs, etc. (80%).
 Sealed sources: The waste does not contain sealed sources.
 Bulk density (t/m³): 0.89
 Comment on density: The density is based on consignor's records.

CHEMICAL COMPOSITION

General description and components (%wt): Metals (24%), paper/cloth (76%).
 Chemical state: Neutral
 Chemical form of radionuclides: Cl-36: Not likely to be present
 Se-79: Likely to be present.
 I-129: Likely to be present.
 U: May be present as oxide or other forms.
 Np: Likely to be present.
 Pu: May be present as oxide or other forms.
 Metals and alloys (%wt): Total metals are 24%, likely to be mostly steels with some aluminium. Both sheet and bulk metals likely to be present, proportions not specified.

Stainless steel.....	NE
Other ferrous metals.....	24.0
Iron.....	
Aluminium.....	NE
Beryllium.....	0
Cobalt.....	0
Copper.....	
Lead.....	0
Magnox/Magnesium.....	0
Nickel.....	
Titanium.....	
Uranium.....	P
Zinc.....	0

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	Zircaloy/Zirconium.....	0	
	Other metals.....	NE	Other metals not specified.
Organics (%wt):	Organic materials are mostly paper and cloth. Traces of plastics and rubbers may also be present. PVC and neoprene may be present.		
	Total cellulosics.....	76.0	
	Paper, cotton.....	76.0	
	Wood.....	0	
	Halogenated plastics	TR	PVC
	Total non-halogenated plastics.....	TR	
	Condensation polymers.....	NE	
	Others.....	NE	
	Organic ion exchange materials....	0	
	Total rubber.....	TR	
	Halogenated rubber	NE	Neoprene
	Non-halogenated rubber.....	NE	
	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.....		
	Soil.....	0	
	Brick/Stone/Rubble.....	0	
	Cementitious material.....	0	
	Sand.....	0	
	Glass/Ceramics.....		
	Graphite.....	0	
	Desiccants/Catalysts.....	0	
	Asbestos.....	0	
	Non/low friable.....		
	Moderately friable.....		
	Highly friable.....		
	Free aqueous liquids.....	0	
	Free non-aqueous liquids.....	0	
	Powder/Ash.....	0	
Inorganic anions (%wt):	Trace quantities may be present dependent on operations being undertaken.		

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Fluoride.....	NE
Chloride.....	NE
Iodide.....	NE
Cyanide.....	0
Carbonate.....	NE
Nitrate.....	NE
Nitrite.....	NE
Phosphate.....	NE
Sulphate.....	NE
Sulphide.....	NE

Materials of interest for waste acceptance criteria:

-	
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.....	0
Corrosive materials.....	0
Pyrophoric materials.....	0
Generating toxic gases.....	0
Reacting with water.....	0
Active particles.....	NE
Soluble solids as bulk chemical compounds.....	0

Hazardous substances / non hazardous pollutants:

-	
Acrylamide.....	
Benzene.....	NE
Chlorinated solvents.....	
Formaldehyde.....	
Organometallics.....	
Phenol.....	NE
Styrene.....	
Tri-butyl phosphate.....	NE
Other organophosphates.....	
Vinyl chloride.....	NE
Arsenic.....	NE
Barium.....	
Boron.....	NE

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Cadmium..... NE
 Caesium.....
 Selenium..... NE
 Chromium..... NE
 Molybdenum..... NE
 Thallium.....
 Tin..... NE
 Vanadium..... NE
 Mercury compounds.....
 Others..... NE
 Electronic Electrical Equipment (EEE)
 EEE Type 1.....
 EEE Type 2.....
 EEE Type 3.....
 EEE Type 4.....
 EEE Type 5.....

Complexing agents (%wt): No
 EDTA.....
 DPTA.....
 NTA.....
 Polycarboxylic acids.....
 Other organic complexants.....
 Total complexing agents..... 0

PACKAGING AND CONDITIONING

Conditioning method: RHILW will be packaged into 500l drums for long term storage. CHILW will be supercompacted with the pucks being encapsulated into 500L drums.
 Plant Name: TBC
 Location: Dounreay
 Plant startup date: TBC
 Total capacity (m³/y incoming waste): NE
 Target start date for packaging this stream: -
 Throughput for this stream (m³/y incoming waste): NE
 Other information: -

Likely container type:	Container	Waste packaged (%vol)	Waste loading (m ³)	Payload (m ³)	Number of packages
	500 l drum	100.0	0.53	0.5	17

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Likely container type comment: The conditioning factor for RHILW will be about 1.7 while that for CHILW is about 0.5.

Range in container waste volume: It is estimated that between 2 and 8 CHILW pucks will be placed into each 500l drum with the average being 5 drums per 500L drum. A small percentage of drums may not be suitable for supercompaction and will be directly immobilised into the 500l drum.

Other information on containers: -

Likely conditioning matrix: Cement

Other information: -

Conditioned density (t/m³): ~2.5

Conditioned density comment: The density is likely to be around 2-3 te/m3

Other information on conditioning: -

Opportunities for alternative disposal routing: No

Treatment	Stream volume (%)	Comment
-	-	-

RADIOACTIVITY

Source: The main sources of activity are contaminated equipment.

Uncertainty: The estimates given for stocks are taken directly from consignors records.

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: From consignment data.

Other information: Specific activities have been reevaluated since the 2016 UK Inventory.

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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					Gd 153				
Be 10					Ho 163				
C 14	1.74E-05	CC 2			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	1.20E-05	CC 2			Pb 210				
Co 60	8.33E-01	CC 2			Bi 208				
Ni 59	2.23E-04	CC 2			Bi 210m				
Ni 63	3.73E-04	CC 2			Po 210	2.45E-09	CC 2		
Zn 65					Ra 223				
Se 79					Ra 225				
Kr 81					Ra 226	1.06E-08	CC 2		
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90	1.94E-01	CC 2			Th 227				
Zr 93					Th 228				
Nb 91					Th 229				
Nb 92					Th 230				
Nb 93m	1.39E-04	CC 2			Th 232				
Nb 94	4.31E-07	CC 2			Th 234				
Mo 93	1.93E-04	CC 2			Pa 231				
Tc 97					Pa 233				
Tc 99	2.34E-07	CC 2			U 232				
Ru 106	1.25E-06	CC 2			U 233				
Pd 107					U 234	5.88E-06	CC 2		
Ag 108m					U 235	2.25E-07	CC 2		
Ag 110m					U 236	1.24E-07	CC 2		
Cd 109					U 238	8.59E-07	CC 2		
Cd 113m					Np 237	3.63E-07	CC 2		
Sn 119m					Pu 236	8.75E-06	CC 2		
Sn 121m	2.09E-07	CC 2			Pu 238	1.29E-04	CC 2		
Sn 123					Pu 239	6.38E-03	CC 2		
Sn 126					Pu 240	8.20E-03	CC 2		
Sb 125	4.25E-06	CC 2			Pu 241	1.27E-01	CC 2		
Sb 126					Pu 242	3.55E-06	CC 2		
Te 125m					Am 241	1.25E-01	CC 2		
Te 127m					Am 242m				
I 129					Am 243				
Cs 134	4.41E-05	CC 2			Cm 242	1.44E-13	CC 2		
Cs 135					Cm 243				
Cs 137	5.44E-01	CC 2			Cm 244	5.66E-09	CC 2		
Ba 133					Cm 245				
La 137					Cm 246				
La 138					Cm 248				
Ce 144	1.60E-08	CC 2			Cf 249				
Pm 145					Cf 250				
Pm 147	3.78E-05	CC 2			Cf 251				
Sm 147					Cf 252				
Sm 151	4.07E-05	CC 2			Other a				
Eu 152	4.54E-04	CC 2			Other b/g				
Eu 154	7.71E-03	CC 2			Total a	1.39E-01	CC 2	0	
Eu 155	3.3E-03	CC 2			Total b/g	1.71E+00	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