WASTE STREAM 6C32 NDS Remote Handled ILW

SITE	Harwell
SITE OWNER	Minor Waste Producers
WASTE CUSTODIAN	Minor Waste Producers
WASTE TYPE	ILW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	0.3 m³
Total future arisings:		0 m³
Total waste volume:		0.3 m³

Comment on volumes: Any receipt of waste from off-site sources is expected to be minimal.

Uncertainty factors on volumes:

Stock (upper):	x 1.05	Arisings (upper)	x
Stock (lower):	x 0.95	Arisings (lower)	x

WASTE SOURCE The waste arises from industry, research laboratories, educational establishments, institutes and hospitals - originally via the National Disposal Service. Newer arisings were consigned via Safeguard International.

PHYSICAL CHARACTERISTICS

General description: Laboratory waste, sealed sources, electrical equipment, compasses. The waste is packaged in cans with a maximum volume of 100 litres. Some sources have been segregated from the corresponding CHILW stream.

Physical components (%vol): Sources and their immediate shielding (79%), miscellaneous items.

Sealed sources: The waste contains sealed sources.

Bulk density (t/m³): ~1.2

Comment on density: Recorded mass divided by volume of outer containers. Not all consignments declare a mass.

CHEMICAL COMPOSITION

General description and components (%wt): Sources (79%), unspecified and ferrous metals (12%), plastics (7%), others (2%). Sources will comprise metal/ plastic/ mica holders and source material.

Chemical state: -

Chemical form of radionuclides: H-3: H3 may be present as gaseous sources, but is expected to be absorbed in metal targets.
C-14: Present as labelled organic compounds
Ra: Radium wil be present in Ra and Ra/Be sources
U: Metal or oxide.

Metals and alloys (%wt): Metal is expected to be present mostly as small items. It has been assumed that source housings will be mostly stainless steel.

Stainless steel.....	~10.0	The identity of steels/other alloys is not known.
Other ferrous metals.....	~67.0	The identity of steels/other alloys is not known.
Iron.....		
Aluminium.....	~0.10	
Beryllium.....		
Cobalt.....		
Copper.....	TR	
Lead.....	~10.0	
Magnox/Magnesium.....	0	
Nickel.....		
Titanium.....		

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	Uranium		
	Zinc	0	
	Zircaloy/Zirconium	0	
	Other metals	1.0	Tungsten and depleted uranium.
Organics (%wt):	One source is encapsulated in vinyl ester styrene.		
	Total cellulosics	~0.90	
	Paper, cotton	~0.90	Only paper is declared
	Wood	0	
	Halogenated plastics	~1.0	PVC is expected to be present together with small amounts of PTFE
	Total non-halogenated plastics	~10.0	
	Condensation polymers	NE	
	Others	~10.0	
	Organic ion exchange materials	0	
	Total rubber	TR	
	Halogenated rubber	TR	Neoprene and hypalon
	Non-halogenated rubber	TR	
	Hydrocarbons		
	Oil or grease		
	Fuel		
	Asphalt/Tarmac (cont.coal tar)		
	Asphalt/Tarmac (no coal tar)		
	Bitumen		
	Others		
	Other organics	0	
Other materials (%wt):	-		
	Inorganic ion exchange materials.	0	
	Inorganic sludges and flocs	0	
	Soil	0	
	Brick/Stone/Rubble	0	
	Cementitious material	0	
	Sand		
	Glass/Ceramics	~0.80	
	Graphite	0	
	Desiccants/Catalysts		
	Asbestos	P	
	Non/low friable		
	Moderately friable		
	Highly friable		
	Free aqueous liquids	P	
	Free non-aqueous liquids		
	Powder/Ash	NE	
Inorganic anions (%wt):	Inorganic anions are not present in significant quantities.		

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Fluoride	<0.01
Chloride	<0.01
Iodide	<0.01
Cyanide	0
Carbonate	<0.10
Nitrate	<0.10
Nitrite	<0.10
Phosphate	<0.10
Sulphate	<0.10
Sulphide	<0.10

Materials of interest for waste acceptance criteria: Free liquids mainly comprise inactive isopropyl alcohol in compasses which will be removed before conditioning. 2.2% combustible metals mainly consists of uranium.

Combustible metals	2.2
Low flash point liquids	~0.30
Explosive materials	<0.01
Phosphorus	<0.01
Hydrides	<0.01
Biological etc. materials	0.10
Biodegradable materials	0.01
Putrescible wastes	<0.01
Non-putrescible wastes	
Corrosive materials	<0.01
Pyrophoric materials	<0.01
Generating toxic gases	<0.01
Reacting with water	<0.01
Active particles	
Soluble solids as bulk chemical compounds	

Hazardous substances / non hazardous pollutants: Hydrocarbons (0.13%), pharmaceutical compounds (0.1%).

Acrylamide	
Benzene	
Chlorinated solvents	
Formaldehyde	
Organometallics	
Phenol	
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): No

EDTA.....

DPTA.....

NTA.....

Polycarboxylic acids……

Other organic complexants.....

Total complexing agents..... 0

PACKAGING AND CONDITIONING

Conditioning method: The waste will be co-packaged into 500-litre drums with 5C52.

Plant Name: Head End Cells

Location: Harwell

Plant startup date: -

Total capacity (m^3/y incoming waste): -

Target start date for packaging this stream: -

Throughput for this stream (m^3/y incoming waste): NE

Other information: Plant only packages waste. NDS RHILW will be co-packaged with Harwell RHILW as stream 5C52- see for details of conditioning.

Likely container type:

Container	Waste packaged (%vol)	Waste loading (m^3)	Payload (m^3)	Number of packages

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Likely container type comment:	Currently conditioning factors of ~1 are being achieved, but this will vary.
Range in container waste volume:	Loading will vary depending on drum contents and specific limits.
Other information on containers:	314L Stainless Steel
Likely conditioning matrix:	PFA/OPC and None
Other information:	3:1 PFA:OPC w/s 0.42
Conditioned density (t/m³):	~2.0
Conditioned density comment:	Will vary according to nature of wastes.
Other information on conditioning:	-
Opportunities for alternative disposal routing:	

Treatment	Stream volume (%)	Comment
-	-	-

RADIOACTIVITY

Source:	Most activity from sealed sources. Remainder from contamination.
Uncertainty:	Activities are currently only as accurate as the original declarations. This information will be verified as far as possible on packing the waste.
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:	Declarations from waste consignors. Some fingerprints have been applied to generic terms.
Other information:	-

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Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code	Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code
H 3	4.38E-01	B B 2			Gd 153		8		
Be 10		8			Ho 163		8		
C 14	1.52E-03	B B 2			Ho 166m		8		
Na 22		8			Tm 170		8		
Al 26		8			Tm 171		8		
Cl 36	5.81E-08	B B 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	4.44E-05	B B 2		
Mn 54		8			Pb 205		8		
Fe 55	8.79E-03	B B 2			Pb 210	4.58E-02	B B 2		
Co 60	2.14E-01	B B 2			Bi 208		8		
Ni 59		8			Bi 210m		8		
Ni 63	1.06E-02	B B 2			Po 210	4.28E-02	B B 2		
Zn 65	7.67E-05	B B 2			Ra 223	2.03E-04	B B 2		
Se 79		8			Ra 225		8		
Kr 81		8			Ra 226	2.24E-01	B B 2		
Kr 85	4.33E-01	B B 2			Ra 228	9.79E-07	B B 2		
Rb 87		8			Ac 227	2.02E-04	B B 2		
Sr 90	1.09E+00	B B 2			Th 227	2E-04	B B 2		
Zr 93		8			Th 228	6.26E-07	B B 2		
Nb 91		8			Th 229		8		
Nb 92		8			Th 230		8		
Nb 93m		8			Th 232	1.9E-06	B B 2		
Nb 94		8			Th 234	6.12E-03	B B 2		
Mo 93		8			Pa 231	3.82E-09	B B 2		
Tc 97		8			Pa 233	1.3E-06	B B 2		
Tc 99		8			U 232		8		
Ru 106	6.39E-07	B B 2			U 233	4.95E-07	B B 2		
Pd 107		8			U 234	2.01E-05	B B 2		
Ag 108m		8			U 235	2.99E-05	B B 2		
Ag 110m		8			U 236		8		
Cd 109	8.33E-05	B B 2			U 238	6.12E-03	B B 2		
Cd 113m		8			Np 237	1.32E-06	B B 2		
Sn 119m		8			Pu 236		8		
Sn 121m		8			Pu 238	8.37E-02	B B 2		
Sn 123		8			Pu 239	3.44E-06	B B 2		
Sn 126		8			Pu 240	2.71E-07	B B 2		
Sb 125		8			Pu 241		8		
Sb 126		8			Pu 242		8		
Te 125m		8			Am 241	3.96E-01	B B 2		
Te 127m		8			Am 242m		8		
I 129		8			Am 243		8		
Cs 134		8			Cm 242		8		
Cs 135		8			Cm 243		8		
Cs 137	1.33E+01	B B 2			Cm 244		8		
Ba 133	1E-06	B B 2			Cm 245		8		
La 137		8			Cm 246		8		
La 138		8			Cm 248	2.8E-08	B B 2		
Ce 144		8			Cf 249		8		
Pm 145		8			Cf 250		8		
Pm 147	2.50E-01	B B 2			Cf 251		8		
Sm 147		8			Cf 252	8.66E-04	B B 2		
Sm 151		8			Other a				
Eu 152	9.35E-04	B B 2			Other b/g				
Eu 154		8			**Total a**	**7.54E-01**	**B B 2**	**0**	
Eu 155		8			**Total b/g**	**1.58E+01**	**B B 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