

WASTE STREAM	9H912	Flask Handling Area and AETP LLW
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SITE Wyifa

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Nuclear Restoration Services Ltd (NRS)

WASTE TYPE LLW

WASTE VOLUMES

	Reported (m ³)	OR	Conditioned (m ³)	Packaged (m ³)
Stocks:	At 1.4.2025	= 2.5		
Future arisings:	1.4.2025 - 31.3.2037	229.6		
Total future arisings:		229.6		
Total waste volume:		232.0		

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

Comment on arising rates: -

Additional information on quantities: -

Uncertainty factors on volumes:

Stock (upper):	x 1.10	Arisings (upper):	x 1.30
Stock (lower):	x 0.90	Arisings (lower):	x 0.70

WASTE SOURCE Initial Decommissioning Work and procedures in the areas covered by this waste stream.

PHYSICAL CHARACTERISTICS

General description: The 9H912 waste stream consists of waste produced from routine plant operations, maintenance activities, plant area housekeeping campaigns and decommissioning waste. The sub-areas that are now consigned under 9H912 are:

- Active Laundry (AL)
- Effluent Plant (EP)
- Flask Handling Area (FHA)
- Flask Filling Area (FFA)

The waste from 9H912 will include paint tins, lead shot, rubble (including asphalt and tarmac), soil, and light bulbs. It will also consist of redundant equipment and plant items such as pipework, valves, filters (metallic and potentially HEPA filters), insulation, lagging (including asbestos), flooring, EEE and redundant PPE. Secondary waste materials arising under this stream will include metal, plastics, paper, rubber, cloth, asbestos and glass. Small amounts of complexant (cleaning) chemicals.

Changes since waste generated: -

Bulk density (t/m³): ~ 0.47

Comment on density: -

CHEMICAL COMPOSITION

General description and components (%wt): Metal (44%), Concrete/rubble (26%), Plastics halogenated (9%), plastics non-halogenated (7%), rubber (2%), wood (1%), Other organic (1%), Others (9%)

Chemical state: Neutral

Sheet metal proportion / thickness: Metal thickness will be variable from about 1 mm up to about 30 mm. Nickel and chromium will be present in stainless steel.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	~ 0.64	Drums, tooling, pipework, misc.	
Other ferrous metals.....	~ 41.0	Drums, tooling, pipework, valves, filters, misc.	
Iron.....	-	-	
Aluminium.....	~ 0.71	Pipework, valves, filters, misc.	
Beryllium.....	-	-	
Cobalt.....	-	-	
Copper.....	~ 0.07	Cable	
Lead.....	~ 0.01	Lead shot.	
Magnox/Magnesium.....	-	Metal (pipework, valves, filters, misc.)	
Nickel.....	P	Nickel and chromium will be present in stainless steel.	
Titanium.....	-	-	
Uranium.....	-	-	
Zinc.....	~ 0.35	Tooling, scaffolding, buckets	
Zircaloy/Zirconium.....	= 0	-	
Other metals.....	P	Paint tins (0.31%wt) captured in 3.27.	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulotics.....	= 1.0	-	
Paper, cotton.....	-	-	
Wood.....	~ 1.0	-	
Halogenated plastics.....	~ 9.0	Liners, lab waste/packaging, PPE	
Total non-halogenated plastics.....	~ 7.0	Lab waste/packaging, PPE	
Condensation polymers.....	~ 3.5	Lab waste/packaging, PPE	
Others.....	~ 3.5	Lab waste/packaging, PPE	
Organic ion exchange materials.....	= 0	-	
Total rubber.....	~ 2.0	-	
Halogenated rubber.....	TR	-	
Non-halogenated rubber.....	~ 2.0	-	
Hydrocarbons.....	6.0	-	
Oil or grease.....	TR	-	
Fuel.....	-	-	
Asphalt/Tarmac (cont.coal tar).....	~ 2.5	floors	
Asphalt/Tarmac (no coal tar).....	~ 2.5	Flooring	
Bitumen.....	-	-	
Others.....	-	-	
Other organics.....	~ 1.0	-	

Other materials (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials.....	= 0	-	
Inorganic sludges and flocs.....	TR	-	
Soil.....	-	-	
Brick/Stone/Rubble.....	~ 26.0	-	
Cementitious material.....	-	-	
Sand.....	-	-	
Glass/Ceramics.....	~ 2.5	fibreglass (0.5%) and glass (2%)	
Graphite.....	= 0	-	
Desiccants/Catalysts.....	-	-	
Asbestos.....	~ 3.6	-	
Non/low friable.....	~ 1.2	Equal portions of white/brown/blue asbestos assumed. Lagging.	
Moderately friable.....	~ 1.2	Equal portions of white/brown/blue asbestos assumed. Asbestos contaminated plant items and gaskets.	
Highly friable.....	~ 1.2	Equal portions of white/brown/blue asbestos assumed. Insulating boards.	
Free aqueous liquids.....	= 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.....	TR	-
Chloride.....	TR	-
Iodide.....	TR	-
Cyanide.....	= 0	-
Carbonate.....	TR	-
Nitrate.....	TR	-
Nitrite.....	TR	-
Phosphate.....	TR	-
Sulphate.....	TR	-
Sulphide.....	TR	-

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.....	13.0	-
Putrescible wastes.....	= 0	-
Non-putrescible wastes.....	~ 13.0	-
Corrosive materials.....	= 0	-
Pyrophoric materials.....	= 0	-
Generating toxic gases.....	= 0	-
Reacting with water.....	P	13.92m2 Galvanised metal may be present in the waste. If there is more than 10 m2 of reactive metal in one consignment, the items will be treated, i.e. by painting, to prevent hydrogen production following interactions with grout.
Higher activity particles.....	-	-
Soluble solids as bulk chemical compounds.....	-	-

Hazardous substances / 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.....	TR	Light bulbs (<1m3).
Boron.....	0	-
Boron (in Boral).....	-	-
Boron (non-Boral).....	-	-
Cadmium.....	-	-
Caesium.....	-	-
Selenium.....	-	-
Chromium.....	P	Nickel and chromium will be present in stainless steel.
Molybdenum.....	-	-
Thallium.....	-	-
Tin.....	~ 0.35	Paint tins.
Vanadium.....	-	-
Mercury compounds.....	-	-
Others.....	-	-

Complexing agents (%wt):

Yes		
	(%wt)	Type(s) and comment
EDTA.....	-	-
DPTA.....	-	-
NTA.....	-	-
Polycarboxylic acids.....	-	-
Other organic complexants.....	TR	Citrates (decon-90) and Phosphoric acid (jenolite/Kamco)
Total complexing agents.....	TR	-

Physical components:

	Number	Type(s) and comment
Sources.....	-	-
Electronic & Electrical Equipment (EEE)	-	-
EEE Type 1.....	P	-
EEE Type 2.....	P	-
EEE Type 3.....	P	-
EEE Type 4.....	P	-
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)	Off-site	~ 5.4
Incineration	Off-site	= 48.8
Drying/dewatering/liquid separation		
Tie down/fixatives/strippable coating/painting application		
Decontamination		
Metal treatment	Off-site	= 2.4
Recycling / reuse		
Thermal treatment, including vitrification		
Encapsulation		
Polymer encapsulation		
Other physical treatment		
Other chemical treatment		
Containerisation		
Treatment not yet determined		
None		= 43.4

Comments on planned treatments:

43.37% to landfill as VLLW.

Conditioning method:

-

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
1/2 Height WAMAC IP-2 ISO (TC08)	5.4	21.6	18.8	1	-

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)			
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	= 5.4	0.47	
Expected to be consigned to a Landfill Facility	= 43.4	0.47	
Expected to be disposed On-Site			
Expected to be managed by In-Situ Disposal			
Expected to be consigned to an Incineration Facility	= 48.8	0.40	
Expected to be consigned to a Metal Treatment Facility	= 2.4	1.4	
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:

17 04 05, 17 04 07, 17 06 01*

Opportunities for alternative disposal routing: No

Baseline Management Route	Opportunity Management Route	Stream volume (%)	Opportunity Confidence	Comment
-	-	-	-	-

RADIOACTIVITY

Source: Contamination by activation products and fission products.

Uncertainty: Activity estimates are as shown in the radionuclide table.

Measurement of radioactivities: -

Chemical form of radionuclides: H-3: The chemical form of tritium has not been determined.
C-14: The chemical form of carbon 14 has not been determined.
Cl-36: Chemical form of chlorine 36 has not been determined.
Se-79: The selenium content is insignificant.
Tc-99: The technetium content is insignificant.
I-129: -
Ra: Radium isotope content is expected to be insignificant.
Th: The thorium content is insignificant.
U: Chemical form of uranium isotopes has not been determined but may be uranium oxides.
Np: The neptunium content is insignificant.
Pu: Chemical form of plutonium isotopes has not been determined but 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	8.62E-07	C C 1	8.62E-07	C C 1	Gd 153		8		8
Be 10		8		8	Ho 163		8		8
C 14	6.08E-09	C C 1	6.08E-09	C C 1	Ho 166m		8		8
Na 22		8		8	Tm 170		8		8
Al 26		8		8	Tm 171		8		8
Cl 36	6.29E-08	C C 1	6.29E-08	C C 1	Lu 174		8		8
Ar 39		8		8	Lu 176		8		8
Ar 42		8		8	Hf 178n		8		8
K 40		8		8	Hf 182		8		8
Ca 41		8		8	Pt 193		8		8
Mn 53		8		8	Tl 204		8		8
Mn 54		8		8	Pb 205		8		8
Fe 55	2.20E-07	C C 1	2.20E-07	C C 1	Pb 210		8		8
Co 60	1.95E-07	C C 2	1.95E-07	C C 2	Bi 208		8		8
Ni 59		8		8	Bi 210m		8		8
Ni 63	9.89E-09	C C 1	9.89E-09	C C 1	Po 210		8		8
Zn 65		8		8	Ra 223		8		8
Se 79		8		8	Ra 225		8		8
Kr 81		8		8	Ra 226		8		8
Kr 85		8		8	Ra 228		8		8
Rb 87		8		8	Ac 227		8		8
Sr 90	1.24E-07	C C 1	1.24E-07	C C 1	Th 227		8		8
Zr 93		8		8	Th 228		8		8
Nb 91		8		8	Th 229		8		8
Nb 92		8		8	Th 230		8		8
Nb 93m		8		8	Th 232		8		8
Nb 94	2.88E-09	C C 2	2.88E-09	C C 2	Th 234		8		8
Mo 93		8		8	Pa 231		8		8
Tc 97		8		8	Pa 233		8		8
Tc 99		8		8	U 232		8		8
Ru 106		8		8	U 233		8		8
Pd 107		8		8	U 234		8		8
Ag 108m	5.73E-09	C C 2	5.73E-09	C C 2	U 235		8		8
Ag 110m		8		8	U 236		8		8
Cd 109		8		8	U 238		8		8
Cd 113m		8		8	Np 237		8		8
Sn 119m		8		8	Pu 236		8		8
Sn 121m		8		8	Pu 238	1.44E-08	C C 2	1.44E-08	C C 2
Sn 123		8		8	Pu 239	2.05E-08	C C 2	2.05E-08	C C 2
Sn 126		8		8	Pu 240	2.64E-08	C C 2	2.64E-08	C C 2
Sb 125	1.28E-09	C C 2	1.28E-09	C C 2	Pu 241	5.20E-07	C C 2	5.20E-07	C C 2
Sb 126		8		8	Pu 242		8		8
Te 125m		8		8	Am 241	7.70E-08	C C 2	7.70E-08	C C 2
Te 127m		8		8	Am 242m		8		8
I 129		8		8	Am 243		8		8
Cs 134		8		8	Cm 242		8		8
Cs 135		8		8	Cm 243		8		8
Cs 137	6.58E-07	C C 2	6.58E-07	C C 2	Cm 244	1.28E-09	C C 2	1.28E-09	C C 2
Ba 133	2.89E-09	C C 2	2.89E-09	C C 2	Cm 245		8		8
La 137		8		8	Cm 246		8		8
La 138		8		8	Cm 248		8		8
Ce 144		8		8	Cf 249		8		8
Pm 145		8		8	Cf 250		8		8
Pm 147	6.61E-09	C C 1	6.61E-09	C C 1	Cf 251		8		8
Sm 147		8		8	Cf 252		8		8
Sm 151		8		8	Unsp a				
Eu 152	7.82E-09	C C 2	7.82E-09	C C 2	Unsp b/g				
Eu 154	2.43E-08	C C 2	2.43E-08	C C 2	Total a	1.40E-07	*	1.40E-07	*
Eu 155	7.29E-09	C C 2	7.29E-09	C C 2	Total b/g	2.72E-06	*	2.72E-06	*

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