

WASTE STREAM	9H914	Auxiliary Gas Systems LLW			
SITE	Wylfa				
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	= 7.0			
Future arisings:	1.4.2025 - 31.3.2026	5.7			
	1.4.2026 - 31.3.2033	34.3			
	1.4.2033 - 31.3.2037	3.6			
Total future arisings:		43.5			
Total waste volume:		50.5			
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	Waste streams 9H914 represents LLW from the Burst Can Detection (BCD) system and Humidrier System.				
PHYSICAL CHARACTERISTICS					
General description:	The 9H914 waste stream has typically consisted of LLW resulting from operational, maintenance and decommissioning activities ongoing in the Burst Can Detection (BCD) and Humidrier system (HD) sub-areas. 9H914 has typically consisted of hard wastes and redundant metallic items from maintenance activities and associated soft waste. The volume of this waste stream is expected to be limited over the next 3-5 years as Wylfa anticipates no major de-planting projects to occur, thus waste will consist of mostly non-fixed minor redundant plant and soft trash. Most of the waste has historically originated from the Burst Can Detection system LLW is expected to arise from these sub-areas in 9H914 over the next WCH period: • Burst Can Detection • Humidrier system Principal components of this waste includes: bearings, wire, bolts, washers, broken tools, filters (including HEPA), fuelling machine and dry store ropes, plastic, scaffolding, buckets, lightbulbs, rubble and EEE. In addition, legacy waste associated with redundant plant and items such as pipework and valves, trit kegs (steel drums used to hold tritiated liquor extracted from the reactor driers) and drum packs that previously contained desiccant waste are also included. Glass, asbestos (3 wt.%), trace amounts of sludge, and secondary waste, including wrapping, misc. PPE and trace quantities of oil, totalling less than 10 litres, on paper and cloth. Some oil/solvents will be absorbed onto cloth/rags destined for combustible waste treatment. Halogenated rubbers are present in trace amounts. Small amounts of complexant (cleaning) chemicals. Since the last review, 9H914 areas have been through a large amount of post-operational clean out (POCO), in which all tritium kegs have been removed from the area. (However, there remain 8 uncoated mild steel trit kegs, approx. 13kg each, in the waste stores to be disposed of.) The area now has minimal non-fixed waste and consists mainly of fixed plant items.				
Changes since waste generated:	-				
Bulk density (t/m ³):	= 0.50				
Comment on density:	-				
CHEMICAL COMPOSITION					
General description and components (%wt):	Metal (85%), Concrete/rubble (1%), Biodegradable non-putrescibles (3%), Plastics halogenated (2%), Plastics non-halogenated (2%), Rubber (1%) Wood (1%), Other Organic (1%), Others (4%)				
Chemical state:	Neutral				
Sheet metal proportion / thickness:	Metal thicknesses will be variable from about 1 mm up to about several mm.				

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	~ 8.6	Drums, tooling, pipework, misc.	
Other ferrous metals.....	~ 74.5	Mild Steel - Drums, trit kegs, tooling, pipework, valves, filters, misc.	
Iron.....	-	-	
Aluminium.....	~ 1.1	Pipework, valves, filters, misc.	
Beryllium.....	-	-	
Cobalt.....	-	-	
Copper.....	~ 0.54	Cable	
Lead.....	-	-	
Magnox/Magnesium.....	-	-	
Nickel.....	-	-	
Titanium.....	-	-	
Uranium.....	-	-	
Zinc.....	~ 1.1	Tooling, scaffolding, buckets	
Zircaloy/Zirconium.....	-	-	
Other metals.....	P	Paint tins captured in material section.	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulotics.....	= 1.0	-	
Paper, cotton.....	= 0	-	
Wood.....	= 1.0	-	
Halogenated plastics.....	~ 2.1	Linens, lab waste/packaging.	
Total non-halogenated plastics.....	~ 1.8	Lab waste/packaging.	
Condensation polymers.....	~ 0.90	Lab waste/packaging.	
Others.....	~ 0.90	Lab waste/packaging.	
Organic ion exchange materials.....	= 0	-	
Total rubber.....	1.0	-	
Halogenated rubber.....	= 0.50	-	
Non-halogenated rubber.....	= 0.50	-	
Hydrocarbons.....	-	-	
Oil or grease.....	TR	-	
Fuel.....	-	-	
Asphalt/Tarmac (cont.coal tar).....	-	-	
Asphalt/Tarmac (no coal tar).....	-	-	
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.....	= 0	-	
Brick/Stone/Rubble.....	~ 1.0	-	
Cementitious material.....	-	-	
Sand.....	-	-	
Glass/Ceramics.....	= 0.50	fibreglass lagging	
Graphite.....	= 0	-	
Desiccants/Catalysts.....	-	-	
Asbestos.....	~ 3.0	-	
Non/low friable.....	~ 1.0	Equal portions of white/brown/blue asbestos assumed. Lagging.	
Moderately friable.....	~ 1.0	Equal portions of white/brown/blue asbestos assumed. Asbestos contaminated plant items and gaskets.	
Highly friable.....	~ 1.0	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.....	= 0	-
Chloride.....	= 0	-
Iodide.....	= 0	-
Cyanide.....	= 0	-
Carbonate.....	= 0	-
Nitrate.....	= 0	-
Nitrite.....	= 0	-
Phosphate.....	= 0	-
Sulphate.....	= 0	-
Sulphide.....	= 0	-

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.....	~ 3.0	-
Putrescible wastes.....	= 0	-
Non-putrescible wastes.....	~ 3.0	-
Corrosive materials.....	= 0	-
Pyrophoric materials.....	= 0	-
Generating toxic gases.....	= 0	-
Reacting with water.....	P	69.13m2 Reactive metals in alloys (e.g. Aluminium, Magnesium and Zinc) are not expected to react significantly on contact with water or cement. 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.....	-	-
Molybdenum.....	-	-
Thallium.....	-	-
Tin.....	~ 0.54	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	On-site	~ 5.4
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% planned for disposal as VLLW to landfill.

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	43.2	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	0.50	
Expected to be consigned to a Landfill Facility	~ 43.4	0.50	
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 02 03, 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: The majority of chlorine 36 is expected to be in the form of ammonium chloride.
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: The uranium isotope content is insignificant.
Np: The neptunium content is insignificant.
Pu: Chemical form of plutonium isotopes may be plutonium oxides.

WASTE STREAM 9H914 Auxiliary Gas Systems LLW									
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	3.90E-05	C C 1	3.90E-05	C C 1	Gd 153		8		8
Be 10		8		8	Ho 163		8		8
C 14	1.01E-07	C C 1	1.01E-07	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	3.72E-05	C C 1	3.72E-05	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	Ti 204		8		8
Mn 54		8		8	Pb 205		8		8
Fe 55	1.02E-08	C C 2	1.02E-08	C C 2	Pb 210		8		8
Co 60	3.24E-09	C C 2	3.24E-09	C C 2	Bi 208		8		8
Ni 59		8		8	Bi 210m		8		8
Ni 63	1.88E-09	C C 2	1.88E-09	C C 2	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	1.61E-09	C C 2	1.61E-09	C C 2	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		8		8	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		8		8	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		8		8
Sn 123		8		8	Pu 239		8		8
Sn 126		8		8	Pu 240		8		8
Sb 125		8		8	Pu 241	2.33E-09	C C 2	2.33E-09	C C 2
Sb 126		8		8	Pu 242		8		8
Te 125m		8		8	Am 241		8		8
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		8		8	Cm 244		8		8
Ba 133		8		8	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		8		8	Cf 251		8		8
Sm 147		8		8	Cf 252		8		8
Sm 151		8		8	Unsp a				
Eu 152		8		8	Unsp b/g				
Eu 154		8		8	Total a	5.69E-14	*	5.69E-14	*
Eu 155		8		8	Total b/g	7.63E-05	*	7.63E-05	*

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