

WASTE STREAM		9G106		Ponds LLW	
SITE	Trawsfynydd				
SITE OWNER	Nuclear Decommissioning Authority				
WASTE CUSTODIAN	Nuclear Restoration Services Ltd (NRS)				
WASTE TYPE	LLW				
WASTE VOLUMES					
Stocks:	At 1.4.2025	Reported (m ³)	= 0	OR	Conditioned (m ³)
Future arisings:	1.4.2025 - 31.3.2028	~ 160.7			Packaged (m ³)
Total future arisings:			160.7		
Total waste volume:			160.7		
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 -	Arisings (upper):	x 1.20	
	Stock (lower):	x -	Arisings (lower):	x 0.80	
WASTE SOURCE	The Ponds waste stream captures plant, equipment, structural materials and secondary waste arising from decommissioning of the wet fuel route.				
PHYSICAL CHARACTERISTICS					
General description:	The Ponds waste stream captures plant, equipment, structural materials and secondary waste arising from decommissioning of the wet fuel route. Optimal decommissioning strategies for the Ponds complex are still to be determined. It is expected that as new areas become the focus of operations and decommissioning, new characterisation data will be obtained. Both of which have the potential to affect the fingerprint, arisings and mapping during the new WCH period and hence the validity of the fingerprint should be monitored. The following subareas contribute to 9G106: • Ponds Area (PA) • Pond Water Treatment Plant (PWTP) • Active Effluent Treatment Plant and Effluent lab (AETP) (including Modular Active Effluent Treatment Plant (MAETP)) • Effluent Lab (AL) • Fuel Element Debris (FED) • Sludge plants and vaults (Main Sludge Vault - MSV) • Active Laundry (LA) • Active Waste Vault (AWV) • Fuel Flasks (FH) Also incorporated into this waste stream are the minimal residual stocks of 9G120: Active Drains SS1 basement sumps & gullies. The Initial Review [1] justified this on the basis that no further 9G120 waste would arise beyond 2023, and the contamination on this waste is broadly represented by the 2017 9G106 fingerprint and hence that efficiencies in waste management could be realised by incorporating 9G120 into 9G106.				
Changes since waste generated:	-				
Bulk density (t/m ³):	= 0.65				
Comment on density:	-				
CHEMICAL COMPOSITION					
General description and components (%wt):	metal (51%), concrete/rubble (21%), soil(1%), plastics (13%), rubber (2%), wood(1%), other organics (9%), and others (2%)				
Chemical state:	Neutral				
Sheet metal proportion / thickness:	Not assessed.				

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	= 1.9	Stainless steel standard grade : Drums, tanks, graphex bag cradles, containers, flanges and pipework	
Other ferrous metals.....	= 43.1	Mild Steel standard grade de-plant equipment including tanks,pumps,air blowers,pipework,flanges,valves,sieves, ducting,pressure gauges,fans,motors,cable trays,vent ducting and 50 no of Hepa filters.	
Iron.....	-	-	
Aluminium.....	= 1.1	Scaffolding, deplanted equipment/components	
Beryllium.....	-	-	
Cobalt.....	-	-	
Copper.....	= 0.28	Pipework, cabling, deplanted equipment/components	
Lead.....	= 4.4	Tank, shielding 124kg paint dust containing typically less than 1.24kg (1%) of lead	
Magnox/Magnesium.....	-	-	
Nickel.....	-	-	
Titanium.....	-	-	
Uranium.....	-	-	
Zinc.....	~ 0.02	Zinc coating of thin wire mesh of steel - 50 no of Hepa filters	
Zircaloy/Zirconium.....	-	-	
Other metals.....	-	-	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	= 1.0	-	
Paper, cotton.....	-	-	
Wood.....	= 1.0	-	
Halogenated plastics.....	= 7.5	Pipework, pumps,valves, tanks , ducting, sheeting,	
Total non-halogenated plastics.....	= 5.2	-	
Condensation polymers.....	= 0	-	
Others.....	= 5.2	Soft waste, PPE, takki rags, sample pots, pipework, scaffolding boards, visqueen, poly bags, hosing	
Organic ion exchange materials.....	= 0.01	Lewatit TP-207 ion exchange resin	
Total rubber.....	= 2.0	-	
Halogenated rubber.....	= 1.0	-	
Non-halogenated rubber.....	= 1.0	-	
Hydrocarbons.....	-	-	
Oil or grease.....	~ 0.01	White mineral oil Takki rag coating	
Fuel.....	-	-	
Asphalt/Tarmac (cont.coal tar).....	-	-	
Asphalt/Tarmac (no coal tar).....	-	-	
Bitumen.....	-	-	
Others.....	-	-	
Other organics.....	9.0	7.39% sludge	

Other materials (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials.....	-	-	
Inorganic sludges and flocs.....	-	-	
Soil.....	= 1.0	-	
Brick/Stone/Rubble.....	-	-	
Cementitious material.....	= 21.0	Concrete/rubble	
Sand.....	-	-	
Glass/Ceramics.....	-	-	
Graphite.....	-	-	
Desiccants/Catalysts.....	-	-	
Asbestos.....	= 0.72	-	
Non/low friable.....	= 0.72	Asbestos contaminated material, gratings, cements, insulation covers. Equal portions of white, brown and blue asbestos assumed.,Asbestos content analysed on a consignment basis and detailed on the WCI for VLLW disposal and incineration.	
Moderately friable.....	= 0	-	
Highly friable.....	= 0	-	
Free aqueous liquids.....	-	-	
Free non-aqueous liquids.....	-	-	
Powder/Ash.....	= 0.19	Concrete dust (0.12%), Plaster dust (0.03%), Magnesium oxide (0.01%), Paint dust (0.03%)	

COMPONENTS OF MATERIALS, WASTE PROPERTIES, MATERIALS NOT CONTRIBUTING TO MASS

Inorganic anions (%wt):

	(%wt)	Type(s) and comment
Fluoride.....	TR	-
Chloride.....	TR	-
Iodide.....	= 0	-
Cyanide.....	= 0	-
Carbonate.....	TR	-
Nitrate.....	= 0	-
Nitrite.....	= 0	-
Phosphate.....	TR	-
Sulphate.....	TR	-
Sulphide.....	= 0	-

Materials of interest for waste acceptance criteria:

	(%wt)	Type(s) and comment
Combustible metals.....	-	-
Low flash point liquids.....	-	-
Explosive materials.....	-	-
Phosphorus.....	-	-
Hydrides.....	-	-
Biological etc. materials.....	-	-
Biodegradable materials.....	0	-
Putrescible wastes.....	-	-
Non-putrescible wastes.....	-	-
Corrosive materials.....	-	-
Pyrophoric materials.....	-	-
Generating toxic gases.....	-	-
Reacting with water.....	P	486m2
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.....	-	-
Boron.....	0	-
Boron (in Boral).....	-	-
Boron (non-Boral).....	-	-
Cadmium.....	-	-
Caesium.....	-	-
Selenium.....	-	-
Chromium.....	-	-
Molybdenum.....	-	-
Thallium.....	-	-
Tin.....	-	-
Vanadium.....	-	-
Mercury compounds.....	-	-
Others.....	-	-

Complexing agents (%wt):

Yes		
	(%wt)	Type(s) and comment
EDTA.....	-	-
DPTA.....	-	-
NTA.....	-	-
Polycarboxylic acids.....	-	-
Other organic complexants.....	= 0.01	Decon-90 will be soaked into takki rags and used for manual plant item cleaning and will be disposed of via incineration route.
Total complexing agents.....	= 0.01	-

Physical components:

	Number	Type(s) and comment
Sources.....	-	-
Electronic & Electrical Equipment (EEE)	-	-
EEE Type 1.....	P	-
EEE Type 2.....	-	-
EEE Type 3.....	P	-
EEE Type 4.....	-	-
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	= 3.1
Supercompaction (HFC)	Off-site	= 3.1
Incineration	Off-site	= 37.5
Drying/dewatering/liquid separation		
Tie down/fixatives/strippable coating/painting application		
Decontamination		
Metal treatment	Off-site	= 3.8
Recycling / reuse		
Thermal treatment, including vitrification		
Encapsulation		
Polymer encapsulation		
Other physical treatment		
Other chemical treatment		
Containerisation		
Treatment not yet determined		
None		= 55.6

Comments on planned treatments:

33.43% of the stream is planned to be disposed of 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)	3.1	43.2	18.8	1	-
1/2 Height IP-2 Disposal/Re-usable ISO (TC01/TC02)	22.1	10.0	18.3	4	-

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	= 25.3	0.65	
Expected to be consigned to a Landfill Facility	= 33.4	0.65	
Expected to be disposed On-Site			
Expected to be managed by In-Situ Disposal			
Expected to be consigned to an Incineration Facility	= 37.5	0.40	
Expected to be consigned to a Metal Treatment Facility	= 3.8	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 07, 15 02 02*, 17 05 03*, 17 05 04, 17 01 01, 17 02 03, 13 02 08*

Opportunities for alternative disposal routing: No

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

RADIOACTIVITY

Source: Activity is from a mixture of fission and activation products and actinides. Tritium is also present.

Uncertainty: The values quoted are derived from available measurements and are indicative of the activities that might be expected.

Measurement of radioactivities: -

Chemical form of radionuclides: H-3: Most tritium is expected to be present as water but some may be in the form of other inorganic compounds or as organic compounds.
C-14: Carbon 14 will probably be present as graphite.
Cl-36: The 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 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.

WASTE STREAM 9G106 Ponds 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			8.06E-08	C C 2	Gd 153				8
Be 10				8	Ho 163				8
C 14			7.62E-09	C C 2	Ho 166m				8
Na 22				8	Tm 170				8
Al 26				8	Tm 171				8
Cl 36			2.08E-08	C C 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	Ti 204				8
Mn 54				8	Pb 205				8
Fe 55				8	Pb 210				8
Co 60				8	Bi 208				8
Ni 59				8	Bi 210m				8
Ni 63			1.39E-08	C C 2	Po 210				8
Zn 65				8	Ra 223				8
Se 79				8	Ra 225				8
Kr 81				8	Ra 226				8
Kr 85				8	Ra 228				8
Rb 87				8	Ac 227				8
Sr 90			6.26E-05	C C 2	Th 227				8
Zr 93				8	Th 228				8
Nb 91				8	Th 229				8
Nb 92				8	Th 230				8
Nb 93m				8	Th 232				8
Nb 94				8	Th 234			6.61E-08	C C 2
Mo 93				8	Pa 231				8
Tc 97				8	Pa 233				8
Tc 99			8.86E-09	C C 2	U 232				8
Ru 106				8	U 233				8
Pd 107				8	U 234			5.65E-08	C C 2
Ag 108m			1.15E-09	C C 2	U 235			1.50E-09	C C 2
Ag 110m				8	U 236				8
Cd 109				8	U 238			6.61E-08	C C 2
Cd 113m				8	Np 237				8
Sn 119m				8	Pu 236				8
Sn 121m				8	Pu 238			6.18E-06	C C 2
Sn 123				8	Pu 239			8.87E-06	C C 2
Sn 126				8	Pu 240			1.14E-05	C C 2
Sb 125				8	Pu 241			1.10E-04	C C 2
Sb 126				8	Pu 242				8
Te 125m				8	Am 241			3.94E-05	C C 2
Te 127m				8	Am 242m				8
I 129				8	Am 243				8
Cs 134				8	Cm 242				8
Cs 135				8	Cm 243			3.91E-08	C C 2
Cs 137			1.45E-04	C C 2	Cm 244			4.51E-07	C C 2
Ba 133				8	Cm 245			3.30E-07	C C 2
La 137				8	Cm 246			3.14E-08	C C 2
La 138				8	Cm 248				8
Ce 144				8	Cf 249				8
Pm 145				8	Cf 250				8
Pm 147			2.84E-08	C C 2	Cf 251				8
Sm 147				8	Cf 252				8
Sm 151			2.55E-07	C C 2	Unsp a				
Eu 152			1.52E-09	C C 2	Unsp b/g				
Eu 154			2.87E-09	C C 2	Total a	0	*	6.68E-05	*
Eu 155				8	Total b/g	0	*	3.18E-04	*

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