

WASTE STREAM	9D913	Pond & Effluent Treatment Plant LLW
--------------	-------	-------------------------------------

SITE Hinkley Point A

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	= 0		
Future arisings:	1.4.2025 - 31.3.2041	1029.2		
Total future arisings:		1029.2		
Total waste volume:		1029.2		

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

Comment on arising rates: -

Additional information on quantities: 0.7m3 added to the waste from the degasser tower.

Uncertainty factors on volumes: Stock (upper): x - Arisings (upper): x 1.10
Stock (lower): x - Arisings (lower): x 0.50

WASTE SOURCE This stream represents decommissioning waste arising from areas associated with fuel handling including the pond areas, pond treatment plants and flask handling facilities.

PHYSICAL CHARACTERISTICS

General description: Waste consists of decommissioned plant and equipment (e.g. pumps, pipework, shielding and cranes); tooling (including electrical/electronic and batteries); structural materials (e.g. gantries, scaffolding and ducting); soil sludge; bitumen and concrete (roofing, flooring), asbestos insulation; and secondary wastes such as wood, coveralls, sheeting, plastic and rubber.

Changes since waste generated: -

Bulk density (t/m³): ~ 0.64

Comment on density: -

CHEMICAL COMPOSITION

General description and components (%wt): Metal items and general wastes including laboratory trash. Metal (including drums) (63%wt), rubble (6%wt), plastics/rubber (13%wt), wood (2%wt), other materials (1%wt), soil (5%), biodegradable materials (10%), Other material consists of glass (0.45%), small quantities of asbestos (0.1%wt), oils and grease (0.1%wt), polyurathane foam (0.2%wt) and EEE (0.15%wt)

Chemical state: Neutral

Sheet metal proportion / thickness: There are no bulk items present. Typical thicknesses have not been estimated although the drums will have walls ~1mm thick.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity	
Stainless steel.....	= 35.0	Stainless steel components including pipework, containment structures and tooling etc		
Other ferrous metals.....	= 27.0	Mild steel components including pipework, containment structures and tooling etc		
Iron.....	TR	Aluminium components including scaffolding and tooling etc		
Aluminium.....				
Beryllium.....				
Cobalt.....	TR	Copper components including electrical parts and cabling etc		
Copper.....				
Lead.....	TR	Lead components including sheeting and shielding etc		
Magnox/Magnesium.....	-	Galvanised steel components including ducting, buckets and scaffolding etc		
Nickel.....	-			
Titanium.....	-			
Uranium.....	-			
Zinc.....	TR			
Zircaloy/Zirconium.....	= 0	-		
Other metals.....	= 0	-		

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	~ 2.0	-	
Paper, cotton.....	~ 0	-	
Wood.....	~ 2.0	-	
Halogenated plastics.....	= 0	-	
Total non-halogenated plastics.....	~ 10.0	Plastic components including sheeting dura pipe and tooling etc	
Condensation polymers.....	~ 5.0	-	
Others.....	~ 5.0	-	
Organic ion exchange materials.....	= 0	-	
Total rubber.....	~ 3.0	-	
Halogenated rubber.....	~ 3.0	possibly halogenated rubber as neoprene	
Non-halogenated rubber.....	~ 0	-	
Hydrocarbons.....		-	
Oil or grease.....	= 0.10	Residual oils and greases removed from plant and equipment during decommissioning operations	
Fuel.....		-	
Asphalt/Tarmac (cont.coal tar).....		-	
Asphalt/Tarmac (no coal tar).....		-	
Bitumen.....	TR	Roofing felt or linings etc	
Others.....		-	
Other organics.....		-	

Other materials (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials.....	= 0	-	
Inorganic sludges and flocs.....	= 0	-	
Soil.....	= 5.0	-	
Brick/Stone/Rubble.....	= 6.0	-	
Cementitious material.....	= 0	-	
Sand.....	-	-	
Glass/Ceramics.....	= 0.47	0.02% MMMF insulation, 0.45% glass	
Graphite.....	0	-	
Desiccants/Catalysts.....	-	-	
Asbestos.....	= 0.06	-	
Non/low friable.....	= 0.02	Typically, low porosity, monolithic asbestos cement blocks and mouldings and asbestos cement sheeting, Chrysotile, amosite or crocidolite	
Moderately friable.....	= 0.02	Typically, ceiling tiles, insulating and asbestos cement sheeting, Chrysotile, amosite or crocidolite	
Highly friable.....	= 0.02	Typically asbestos cladding (e.g. pressed or sprayed cladding on pipework) and lagging Loose asbestos lagging or insulation, Chrysotile, amosite or crocidolite	
Free aqueous liquids.....	= 0	-	
Free non-aqueous liquids.....	= 0	-	
Powder/Ash.....	TR	-	

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.....	TR	-
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.....	= 10.0	-
Putrescible wastes.....	= 0	-
Non-putrescible wastes.....	= 10.0	-
Corrosive materials.....	= 0	-
Pyrophoric materials.....	= 0	-
Generating toxic gases.....	= 0	-
Reacting with water.....	P	20m2. Reactive metals including galvanised metal are likely to arise in this waste stream (<20 m2). If this metal is present at greater than 10 m2 in a given consignment, the items will be treated, i.e. by painting, to prevent hydrogen production following interactions with the 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.....	-	-
Boron.....	0	-
Boron (in Boral).....	-	-
Boron (non-Boral).....	-	-
Cadmium.....	-	-
Caesium.....	-	-
Selenium.....	-	-
Chromium.....	-	-
Molybdenum.....	-	-
Thallium.....	-	-
Tin.....	-	-
Vanadium.....	-	-
Mercury compounds.....	-	-
Others.....	= 0.09	Steve Vick International Foam pack polyurethane resin MP-41 will be used in conjunction with the MX-1 hardener.

Complexing agents (%wt):

	(%wt)	Type(s) and comment
EDTA.....	-	-
DPTA.....	-	-
NTA.....	-	-
Polycarboxylic acids.....	-	-
Other organic complexants.....	-	-
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.....		-
EEE Type 5.....	P	-

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	= 2.0
Supercompaction (HFC)	Off-site	= 2.0
Incineration	Off-site	= 7.0
Drying/dewatering/liquid separation		
Tie down/fixatives/strippable coating/painting application		
Decontamination		
Metal treatment	Off-site	= 1.0
Recycling / reuse		
Thermal treatment, including vitrification		
Encapsulation		
Polymer encapsulation		
Other physical treatment		
Other chemical treatment		
Containerisation		
Treatment not yet determined		
None		= 90.0

Comments on planned treatments:

The proposed waste routing for the waste stream is: 2 vol% Supercompaction, 7 vol% incineration, 2 vol% LLW disposal, 1 vol% metal recycling, 88 vol% VLLW disposal.

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)	2.0	43.2	18.8	1	-
1/2 Height IP-2 Disposal/Re-usable ISO (TC01/TC02)	2.0	10.0	18.3	3	-

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/m ³	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	= 4.0	0.64	
Expected to be consigned to a Landfill Facility	= 88.0	0.64	
Expected to be disposed On-Site			
Expected to be managed by In-Situ Disposal			
Expected to be consigned to an Incineration Facility	= 7.0	0.40	
Expected to be consigned to a Metal Treatment Facility	= 1.0	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, 17 05 03*, 17 05 04, 17 06 03*, 17 02 03

Opportunities for alternative disposal routing: No

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

RADIOACTIVITY

Source: Activation and contamination of materials. Activity estimates are shown in the table.

Uncertainty: Activity values are current best estimates. The values quoted are indicative of the activities that are expected. They are estimates based upon operating experience.

Measurement of radioactivities: Specific activities have been estimated from a radionuclide fingerprint derived from measurements.

Chemical form of radionuclides:

- H-3: Tritium present as surface contamination of waste by tritiated liquor.
- C-14: Contamination in the form of graphite dust.
- Cl-36: Chlorine 36 may be present as a contaminant of graphite dust.
- Se-79: The selenium content is insignificant.
- Tc-99: The technetium content is insignificant.
- I-129: -
- Ra: The radium isotope content is insignificant.
- Th: The thorium content is insignificant.
- U: The uranium isotope content is insignificant.
- Np: The neptunium content is insignificant.
- Pu: The plutonium isotope content is probably in the form of plutonium oxides.

WASTE STREAM 9D913 Pond & Effluent Treatment Plant 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			4.94E-07	C C 1	Gd 153				8
Be 10				8	Ho 163				8
C 14			2.35E-07	C C 1	Ho 166m				8
Na 22				8	Tm 170				8
Al 26				8	Tm 171				8
Cl 36			1.26E-07	C C 1	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			1.90E-07	C C 1	Pb 210				8
Co 60			2.26E-07	C C 2	Bi 208				8
Ni 59				8	Bi 210m				8
Ni 63			1.42E-06	C C 1	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			1.68E-04	C C 1	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			3.23E-08	C C 2
Mo 93				8	Pa 231				8
Tc 97				8	Pa 233				8
Tc 99				8	U 232				8
Ru 106				8	U 233				8
Pd 107				8	U 234			3.39E-08	C C 1
Ag 108m				8	U 235			1.68E-09	C C 1
Ag 110m				8	U 236			6.06E-09	C C 1
Cd 109				8	U 238			3.23E-08	C C 1
Cd 113m				8	Np 237				8
Sn 119m				8	Pu 236				8
Sn 121m				8	Pu 238			5.88E-06	C C 1
Sn 123				8	Pu 239			1.09E-05	C C 1
Sn 126				8	Pu 240			1.11E-05	C C 1
Sb 125			8.56E-09	C C 2	Pu 241			1.08E-04	C C 1
Sb 126				8	Pu 242				8
Te 125m			2.14E-09	C C 2	Am 241			4.53E-05	C C 1
Te 127m				8	Am 242m				8
I 129				8	Am 243				8
Cs 134			1.37E-08	C C 2	Cm 242				8
Cs 135				8	Cm 243			2.93E-08	C C 1
Cs 137			1.60E-04	C C 2	Cm 244			2.77E-07	C C 1
Ba 133				8	Cm 245				8
La 137				8	Cm 246				8
La 138				8	Cm 248				8
Ce 144				8	Cf 249				8
Pm 145				8	Cf 250				8
Pm 147			7.38E-08	C C 1	Cf 251				8
Sm 147				8	Cf 252				8
Sm 151				8	Unsp a				
Eu 152				8	Unsp b/g				
Eu 154			5.67E-07	C C 2	Total a	0	*	7.36E-05	*
Eu 155			5.77E-08	C C 2	Total b/g	0	*	4.39E-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