

WASTE STREAM	9C917	Ponds Underwater LLW
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SITE Dungeness 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	= 140.8		
Future arisings:				
Total future arisings:		0.0		
Total waste volume:		140.8		

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 1.20	Arisings (upper):	x -
Stock (lower):	x 0.80	Arisings (lower):	x -

WASTE SOURCE The 9C917 waste stream scope encompasses all surface contaminated waste material (fission products and actinides coming about through direct, repeated or prolonged contact with ponds water and sludges) presenting an activity concentration sufficiently low enough for LLW disposal (or diversion), which has or will arise during the various stages of emptying and cleaning of both cooling ponds at Dungeness A.

PHYSICAL CHARACTERISTICS

General description: Primary waste types predominantly include mild steel, aluminium, galvanised metals, and stainless steel, some of which include surface coatings (i.e. paint layers). However, smaller quantities of other materials such as electrical, lead and plastic is likely to arise also. Secondary waste arising during the project will include materials such as plastics, PPE, rubber and paper/card.

Changes since waste generated: -

Bulk density (t/m³): = 0.58

Comment on density: -

CHEMICAL COMPOSITION

General description and components (%wt): Metal (86%), Plastics (7%), Rubber (1%), Wood (1%), Other organic (4%), others (1%).

Chemical state: Neutral

Sheet metal proportion / thickness: -

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	= 9.1	plates, pipes, valves, brackets, frames	
Other ferrous metals.....	= 77.6	Mild Steel - valves/plate/gates/pipes/brackets/frames/ drums	
Iron.....	-	-	
Aluminium.....	= 0.01	pipes, sheet, tubes	
Beryllium.....	-	-	
Cobalt.....	-	-	
Copper.....	-	-	
Lead.....	= 0.43	lead weights/shielding	
Magnox/Magnesium.....	-	-	
Nickel.....	-	-	
Titanium.....	-	-	
Uranium.....	-	-	
Zinc.....	= 0.06	galvanised coating on mild steel plant items	
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.....	= 1.1	PVC,PTFE, seals/gasket/covers/coatings	
Total non-halogenated plastics.....	= 6.3	-	
Condensation polymers.....	= 6.3	plastic bags, PPE and sheeting	
Others.....	NE	-	
Organic ion exchange materials.....		-	
Total rubber.....	= 1.0	-	
Halogenated rubber.....	= 0.50	-	
Non-halogenated rubber.....	= 0.50	-	
Hydrocarbons.....		-	
Oil or grease.....		-	
Fuel.....		-	
Asphalt/Tarmac (cont.coal tar).....		-	
Asphalt/Tarmac (no coal tar).....		-	
Bitumen.....		-	
Others.....		-	
Other organics.....	= 4.0	-	

Other materials (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials.....		-	
Inorganic sludges and flocs.....		-	
Soil.....		-	
Brick/Stone/Rubble.....		-	
Cementitious material.....		-	
Sand.....		-	
Glass/Ceramics.....		-	
Graphite.....		-	
Desiccants/Catalysts.....		-	
Asbestos.....	= 0.11	-	
Non/low friable.....		-	
Moderately friable.....	= 0.11	CAF joints - chrysotile (white)	
Highly friable.....		-	
Free aqueous liquids.....		-	
Free non-aqueous liquids.....		-	
Powder/Ash.....		-	

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

Inorganic anions (%wt):

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

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	28.45m2
Higher activity particles.....		-
Soluble solids as bulk chemical compounds.....		-

Hazardous substances / non hazardous pollutants:

	(%wt)	Type(s) and comment
Acrylamide.....	0	-
Benzene.....		-
Chlorinated solvents.....		-
Formaldehyde.....		-
Organometallics.....		-
Phenol.....		-
Styrene.....		-
Tri-butyl phosphate.....		-
Other organophosphates.....		-
Vinyl chloride.....		-
Arsenic.....		-
Barium.....		-
Boron.....		-
Boron (in Boral).....		-
Boron (non-Boral).....		-
Cadmium.....		-
Caesium.....		-
Selenium.....		-
Chromium.....		-
Molybdenum.....		-
Thallium.....		-
Tin.....		-
Vanadium.....		-
Mercury compounds.....		-
Others.....		-

Complexing agents (%wt):

No		
	(%wt)	Type(s) and comment
EDTA.....	= 0	-
DPTA.....		-
NTA.....		-
Polycarboxylic acids.....		-
Other organic complexants.....		-
Total complexing agents.....		-

Physical components:

	Number	Type(s) and comment
Sources.....	= 0 = 3	-
Electronic & Electrical Equipment (EEE)		-
EEE Type 1.....		-
EEE Type 2.....		-
EEE Type 3.....		-
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	On-site	= 16.6
Decay storage		
Low force compaction		
Supercompaction (HFC)	Off-site	= 16.6
Incineration	Off-site	= 2.9
Drying/dewatering/liquid separation	Off-site	= 6.9
Tie down/fixatives/strippable coating/painting application		
Decontamination		
Metal treatment		
Recycling / reuse		
Thermal treatment, including vitrification		
Encapsulation		
Polymer encapsulation		
Other physical treatment		
Other chemical treatment		
Containerisation		
Treatment not yet determined		
None		= 73.6

Comments on planned treatments:

6.65% of the stream is expected to be disposed of to VLLW landfill sites.

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)	16.6	43.2	18.8	1	-
	1/2 Height IP-2 Disposal/Re-usable ISO (TC01/TC02)	66.9	10.0	18.3	10	-

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	= 83.6	= 0.58	
Expected to be consigned to a Landfill Facility	= 6.7	= 0.58	
Expected to be disposed On-Site			
Expected to be managed by In-Situ Disposal			
Expected to be consigned to an Incineration Facility	= 2.9	= 0.40	
Expected to be consigned to a Metal Treatment Facility	= 6.9	= 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 05 03*, 17 05 04, 17 06 01*, 17 02 01, 17 02 03

Opportunities for alternative disposal routing: No

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

RADIOACTIVITY

Source: Surface contamination of ponds underwater furniture has arisen through prolonged contact with pond water and fuel derived sludges accumulated on the pond floor that have been periodically remobilised during decommissioning.

Uncertainty: -

Measurement of radioactivities: -

Chemical form of radionuclides: H-3: -
C-14: -
Cl-36: -
Se-79: -
Tc-99: -
I-129: -
Ra: -
Th: -
U: -
Np: -
Pu: -

WASTE STREAM		9C917		Ponds Underwater 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	1.62E-06	C C 1			Gd 153		8		
Be 10					Ho 163		8		
C 14	2.66E-06	C C 1			Ho 166m		8		
Na 22					Tm 170		8		
Al 26					Tm 171		8		
Cl 36	1.74E-08	C C 1			Lu 174		8		
Ar 39					Lu 176		8		
Ar 42					Hf 178n		8		
K 40					Hf 182		8		
Ca 41					Pt 193		8		
Mn 53					Tl 204		8		
Mn 54					Pb 205		8		
Fe 55	5.01E-06	C C 1			Pb 210		8		
Co 60	4.05E-06	C C 2			Bi 208		8		
Ni 59					Bi 210m		8		
Ni 63	1.76E-05	C C 1			Po 210		8		
Zn 65					Ra 223		8		
Se 79					Ra 225		8		
Kr 81					Ra 226		8		
Kr 85					Ra 228		8		
Rb 87					Ac 227		8		
Sr 90	1.17E-03	C C 2			Th 227		8		
Zr 93					Th 228		8		
Nb 91					Th 229		8		
Nb 92					Th 230		8		
Nb 93m					Th 232		8		
Nb 94					Th 234		8		
Mo 93					Pa 231		8		
Tc 97					Pa 233		8		
Tc 99	3.59E-08	C C 2			U 232		8		
Ru 106					U 233		8		
Pd 107					U 234		8		
Ag 108m	3.05E-07	C C 2			U 235		8		
Ag 110m					U 236		8		
Cd 109					U 238		8		
Cd 113m					Np 237		8		
Sn 119m					Pu 236		8		
Sn 121m					Pu 238	4.22E-05	C C 1		
Sn 123					Pu 239	3.33E-05	C C 1		
Sn 126					Pu 240	4.29E-05	C C 1		
Sb 125					Pu 241	1.55E-03	C C 1		
Sb 126					Pu 242		8		
Te 125m					Am 241	1.49E-04	C C 1		
Te 127m					Am 242m		8		
I 129					Am 243		8		
Cs 134	6.40E-08	C C 2			Cm 242		8		
Cs 135					Cm 243	3.63E-07	C C 1		
Cs 137	3.55E-04	C C 2			Cm 244	5.09E-06	C C 1		
Ba 133					Cm 245		8		
La 137					Cm 246		8		
La 138					Cm 248		8		
Ce 144					Cf 249		8		
Pm 145					Cf 250		8		
Pm 147					Cf 251		8		
Sm 147					Cf 252		8		
Sm 151					Unsp a				
Eu 152	6.47E-07	C C 1			Unsp b/g				
Eu 154	1.44E-05	C C 1			Total a	2.73E-04	*	0	*
Eu 155	3.12E-06	C C 1			Total b/g	3.12E-03	*	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 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