

WASTE STREAM	9C20	AETP Sludge
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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			
Future arisings:	~ 12.7			
Total future arisings:	0.0			
Total waste volume:	12.7			

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

Comment on arising rates: -

Additional information on quantities: Contents of the Evap/Regen Tank (0.6m3), Backwash Tank 2 (1.5m3), and Oil Trap Tank (10.56m3)

Uncertainty factors on volumes:

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

WASTE SOURCE The sludge originates from routine filtration of liquid effluents. Some of the sludge has also originated from filtration of cooling pond water. Pond sludge is now accumulated separately (see waste stream 9C16). Contents of the Evap/Regen Tank (0.6m3), Backwash Tank 2 (1.5m3), and Oil Trap Tank (10.56m3)

PHYSICAL CHARACTERISTICS

General description: The waste consists of debris washed from persons, floors and clothing, corrosion products such as magnesium hydroxide and carbonate detached from fuel elements, and extraneous materials such as flakes of paint. Also there is oil and some filter sand. Sludge particles may be up to millimetre size, and there will probably be 50-450 kg/m3 of dry material. Once fluidised the sludges should be readily transferred by pumping but reconcentration may be time consuming. There are no large items that may require special handling.

Changes since waste generated: -

Bulk density (t/m³): = 1.9

Comment on density: The bulk density of the sludge is expected to range from 1.05 to 1.15 t/m3 with an average of about 1.1 t/m3. Sand from sand filters (5.9 m3) will have a density of about 2.65 t/m3 so that the overall mean bulk density is about 1.9 t/m3.

CHEMICAL COMPOSITION

General description and components (%wt): Magnesium hydroxide, magnesium carbonate, water, siliceous materials including sand, oil (~10% wt) and a range of other materials.

Chemical state: Alkali

Sheet metal proportion / thickness: The metal content has not been fully assessed, but some unreacted Magnox is expected. There are no bulk metal items present.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	-		
Other ferrous metals.....	-		
Iron.....	-		
Aluminium.....	-		
Beryllium.....	-		
Cobalt.....	-		
Copper.....	-		
Lead.....	-		
Magnox/Magnesium.....	-		
Nickel.....	-		
Titanium.....	-		
Uranium.....	-		
Zinc.....	-		
Zircaloy/Zirconium.....	-		
Other metals.....	-		

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	0	-	
Paper, cotton.....		-	
Wood.....		-	
Halogenated plastics.....		-	
Total non-halogenated plastics.....	0	-	
Condensation polymers.....		-	
Others.....		-	
Organic ion exchange materials.....		-	
Total rubber.....	0	-	
Halogenated rubber.....		-	
Non-halogenated rubber.....		-	
Hydrocarbons.....		-	
Oil or grease.....	~ 10.0	-	
Fuel.....		-	
Asphalt/Tarmac (cont.coal tar).....		-	
Asphalt/Tarmac (no coal tar).....		-	
Bitumen.....		-	
Others.....		-	
Other organics.....		-	

Other materials (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials.....		-	
Inorganic sludges and flocs.....	~ 45.0	-	
Soil.....		-	
Brick/Stone/Rubble.....		-	
Cementitious material.....		-	
Sand.....	~ 45.0	-	
Glass/Ceramics.....		-	
Graphite.....		-	
Desiccants/Catalysts.....		-	
Asbestos.....	0	-	
Non/low friable.....		-	
Moderately friable.....		-	
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.....	< 1.0	-
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.....	< 1.0	-
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.....		-
DPTA.....		-
NTA.....		-
Polycarboxylic acids.....		-
Other organic complexants.....		-
Total complexing agents.....		-

Physical components:

	Number	Type(s) and comment
Sources.....		-
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		= 100.0
Decay storage		
Low force compaction		
Supercompaction (HFC)		
Incineration		
Drying/dewatering/liquid separation		
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		

Comments on planned treatments:

Waste will be encapsulated to meet LLWR WAC, likely to be in HHISO's. Waste may be co-disposed with LLW pond skips from SZA.

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 IP-2 Disposal/Re-usable ISO (TC01/TC02)	100.0	6.3	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/m³	Start date
Expected to be consigned to a Near Site, Near Surface Disposal Facility (Scotland)	= 100.0	2.4	
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			
Expected to be consigned to a Landfill Facility			
Expected to be disposed On-Site			
Expected to be managed by In-Situ Disposal			
Expected to be consigned to an Incineration Facility			
Expected to be consigned to a Metal Treatment Facility			
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:

Opportunities for alternative disposal routing: No

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

RADIOACTIVITY

Source: -

Uncertainty: -

Measurement of radioactivities: Data taken from sample results in 2016 and decayed by nine years for RWI 2025.

Chemical form of radionuclides:

H-3: H-3: Most tritium is expected to be present as water but some may be present in the form of other organic or inorganic compounds.

C-14: C-14: Carbon 14 may be present as graphite.

Cl-36: -

Se-79: Se-79: The chemical form of selenium has not been determined.

Tc-99: Tc-99: The chemical form of technetium has not been determined.

I-129: -

Ra: -

Th: -

U: U: The chemical form of uranium isotopes has not been determined but may be uranium oxides.

Np: Np: The chemical form of neptunium has not been determined.

Pu: Pu: The chemical form of plutonium isotopes has not been determined but may be plutonium oxides.

WASTE STREAM 9C20 AETP Sludge									
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	2.12E-05	B B 2			Gd 153		8		
Be 10					Ho 163		8		
C 14	1.51E-05	B B 2			Ho 166m		8		
Na 22					Tm 170		8		
Al 26					Tm 171		8		
Cl 36	1.10E-06	B B 2			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					Ti 204		8		
Mn 54					Pb 205		8		
Fe 55	7.78E-06	B B 2			Pb 210		8		
Co 60	5.76E-06	B B 2			Bi 208		8		
Ni 59					Bi 210m		8		
Ni 63	6.27E-05	B B 2			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	5.12E-04	B B 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	1.41E-07	B B 2			Th 234	3.32E-08	B B 2		
Mo 93					Pa 231		8		
Tc 97					Pa 233		8		
Tc 99	4.32E-07	B B 2			U 232		8		
Ru 106	9.40E-09	B B 2			U 233		8		
Pd 107					U 234	3.36E-08	B B 2		
Ag 108m	7.42E-06	B B 2			U 235		8		
Ag 110m					U 236	3.02E-09	B B 2		
Cd 109					U 238	3.32E-08	B B 2		
Cd 113m					Np 237		8		
Sn 119m					Pu 236		8		
Sn 121m					Pu 238	1.14E-04	B B 2		
Sn 123					Pu 239	2.05E-04	B B 2		
Sn 126					Pu 240	2.05E-04	B B 2		
Sb 125	1.49E-07	B B 2			Pu 241	2.86E-03	B B 2		
Sb 126					Pu 242		8		
Te 125m	3.73E-08	B B 2			Am 241	3.17E-04	B B 2		
Te 127m					Am 242m		8		
I 129	1.66E-09	B B 2			Am 243		8		
Cs 134	2.54E-07	B B 2			Cm 242		8		
Cs 135					Cm 243	1.38E-05	B B 2		
Cs 137	2.93E-03	B B 2			Cm 244	1.20E-05	B B 2		
Ba 133	3.70E-07	B B 2			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	5.54E-07	B B 2			Unsp b/g				
Eu 154	2.57E-05	B B 2			Total a	8.65E-04	*	0	*
Eu 155	5.58E-06	B B 2			Total b/g	6.45E-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