

WASTE STREAM	9D76	AETP Sludge LLW
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SITE Hinkley Point A
SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Magnox Limited

WASTE TYPE LLW

Is the waste subject to Scottish Policy: No

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2022.....	0 m ³
Future arisings -	1.4.2022 - 31.3.2023.....	0.6 m ³
Total future arisings:		0.6 m ³
Total waste volume:		0.6 m ³
Comment on volumes:	Transferred from 9D913 in 2009. Sludge recovered from FMDTs and TETs.	
Uncertainty factors on volumes:	Stock (upper): x	Arisings (upper) x 1.2
	Stock (lower): x	Arisings (lower) x 0.8

WASTE SOURCE Sludge that was generated during the operation of the Active Effluent Treatment Plant.

PHYSICAL CHARACTERISTICS

General description: The waste consists of debris washed from persons, floors and clothing,. There are no large items that may require special handling.
 Physical components (%wt): Sludge and other materials (~17% wt), water (83% wt).
 Sealed sources: The waste does not contain sealed sources.
 Bulk density (t/m³): ~1.5
 Comment on density: Average density of a number of discrete samples.

CHEMICAL COMPOSITION

General description and components (%wt): Water (~83% wt) sludge (~17% wt) which includes chlorides, nitrates and sulphates
 Chemical state: Acid
 Chemical form of radionuclides: H-3: Most tritium is expected to be present as water but some may be present in the form of other inorganic or organic compounds.
 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.
 Ra: The radium isotope content is insignificant.
 Th: The thorium content is insignificant.
 U: The chemical form of uranium isotopes has not been determined but will probably be uranium oxides.
 Np: The neptunium content is insignificant.
 Pu: The chemical form of plutonium isotopes has not been determined but will probably be plutonium oxides.
 Metals and alloys (%wt): No sheet or bulk metal present.

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	0		
Other ferrous metals.....	0		
Iron.....			
Aluminium.....	0		
Beryllium.....	0		
Cobalt.....			

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Copper.....	0
Lead.....	0
Magnox/Magnesium.....	0
Nickel.....	
Titanium.....	
Uranium.....	
Zinc.....	0
Zircaloy/Zirconium.....	0
Other metals.....	0

Organics (%wt): There are no halogenated plastics or rubbers present.

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

Other materials (%wt): -

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials..	0		
Inorganic sludges and flocs.....	17.0		
Soil.....	0		
Brick/Stone/Rubble.....	0		
Cementitious material.....	0		
Sand.....			
Glass/Ceramics.....	TR		
Graphite.....	0		
Desiccants/Catalysts.....			

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Asbestos.....	0
Non/low friable.....	
Moderately friable.....	
Highly friable.....	
Free aqueous liquids.....	83.0
Free non-aqueous liquids.....	0
Powder/Ash.....	0

Inorganic anions (%wt): -

	(%wt)	Type(s) and comment
Fluoride.....		
Chloride.....	0.10	
Iodide.....		
Cyanide.....	0	
Carbonate.....		
Nitrate.....		
Nitrite.....	0	
Phosphate.....		
Sulphate.....	2.4	
Sulphide.....		

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.....	0	
Putrescible wastes.....	0	
Non-putrescible wastes.....		
Corrosive materials.....	0	
Pyrophoric materials.....	0	
Generating toxic gases.....	0	
Reacting with water.....	0	
Higher activity particles.....		
Soluble solids as bulk chemical compounds.....		

Hazardous substances / non hazardous pollutants: None expected

	(%wt)	Type(s) and comment
Acrylamide.....		

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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.....
 Electronic Electrical Equipment (EEE)
 EEE Type 1.....
 EEE Type 2.....
 EEE Type 3.....
 EEE Type 4.....
 EEE Type 5.....

Complexing agents (%wt): No

(%wt) Type(s) and comment

EDTA.....
 DPTA.....
 NTA.....
 Polycarboxylic acids.....
 Other organic complexants.....
 Total complexing agents..... 0

Potential for the waste to contain discrete items: No. In & of itself not a DI; assumed not likely to contain any "rogue" items that could be.

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TREATMENT, PACKAGING AND DISPOSAL

Planned on-site / off-site treatment(s):

Treatment	On-site / Off site	Stream volume %
Low force compaction Supercompaction (HFC) Incineration Solidification Decontamination Metal treatment Size reduction Decay storage Recycling / reuse Other / various None		100.0

Comment on planned treatments:

-

Disposal Routes:

Disposal Route	Stream volume %	Disposal density t/m3
Expected to be consigned to the LLW Repository Expected to be consigned to a Landfill Facility Expected to be consigned to an On-Site Disposal Facility Expected to be consigned to an Incineration Facility Expected to be consigned to a Metal Treatment Facility Expected to be consigned as Out of Scope Expected to be recycled / reused Disposal route not known	100.0	1.5

Classification codes for waste expected to be consigned to a landfill facility:

-

Upcoming (2022/23-2024/25) Waste Routing (if expected to change from above):

Disposal Route	Stream volume %		
	2022/23	2023/24	2024/25
Expected to be consigned to the LLW Repository Expected to be consigned to a Landfill Facility Expected to be consigned to an On-Site Disposal Facility Expected to be consigned to an Incineration Facility Expected to be consigned to a Metal Treatment Facility Expected to be consigned as Out of Scope Expected to be recycled / reused Disposal route not known			

Opportunities for alternative disposal routing:

-

Baseline Management Route	Opportunity Management Route	Stream volume (%)	Estimated Date that Opportunity will be realised	Opportunity Confidence	Comment
-	-	-	-	-	-

Waste Packaging for Disposal:

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Container	Stream volume %	Waste loading m ³	Number of packages
1/3 Height IP-1 ISO 2/3 Height IP-2 ISO 1/2 Height WAMAC IP-2 ISO 1/2 Height IP-2 Disposal/Re-usable ISO 2m box (no shielding) 4m box (no shielding) Other	100.0	2.4	< 1

Other information: -

Waste Planned for Disposal at the LLW Repository:

Container voidage: Significant inaccessible voidage is not expected.

Waste Characterisation Form (WCH): The waste meets the LLWR's Waste Acceptance Criteria (WAC).
The waste does not have a current WCH.

Waste consigned for disposal to LLWR in year of generation: The timing of consignment of the waste for disposal cannot be determined at present.

Non-Containerised Waste for In-Vault Grouting: (Not applicable to this waste stream)

Stream volume (%): -

Waste stream variation: -

Bounding cuboidal volume:

Inaccessible voidage: -

Other information: -

RADIOACTIVITY

Source: Activation and contamination of materials.

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.

Definition of total alpha and total beta/gamma: Where totals are shown on the table of radionuclide activities they are the sums of the listed alpha or beta/gamma emitting radionuclides plus 'other alpha' or 'other beta/gamma'.

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

Other information: Activity estimates are shown in the table.

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Nuclide	Mean radioactivity, TBq/m ³				Nuclide	Mean radioactivity, TBq/m ³			
	Waste at 1.4.2022	Bands and Code	Future arisings	Bands and Code		Waste at 1.4.2022	Bands and Code	Future arisings	Bands and Code
H 3			3.95E-05	CC 1	Gd 153				8
Be 10				8	Ho 163				8
C 14			7.15E-06	CC 1	Ho 166m				8
Na 22				8	Tm 170				8
Al 26				8	Tm 171				8
Cl 36				8	Lu 174				8
Ar 39				8	Lu 176				8
Ar 42				8	Hf 178n				8
K 40			<9.28E-06	D 3	Hf 182				8
Ca 41				8	Pt 193				8
Mn 53				8	Tl 204				8
Mn 54			<8.54E-09	D 3	Pb 205				8
Fe 55			9.78E-06	CC 1	Pb 210		<1.65E-05	D 3	8
Co 60			1.11E-05	CC 1	Bi 208				8
Ni 59				8	Bi 210m		<1.31E-05	D 3	8
Ni 63			1.69E-05	CC 1	Po 210		<1.6E-05	D 3	8
Zn 65			<3.97E-09	D 3	Ra 223				8
Se 79				8	Ra 225				8
Kr 81				8	Ra 226		<4.29E-05	D 3	8
Kr 85				8	Ra 228				8
Rb 87				8	Ac 227				8
Sr 90			2.32E-04	CC 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		<4.22E-08	D 3	8
Mo 93				8	Pa 231				8
Tc 97				8	Pa 233		<7.36E-06	D 3	8
Tc 99			6.13E-07	CC 1	U 232		1.4E-09	CC 1	8
Ru 106			<3.44E-07	D 3	U 233		<1.17E-08	D 3	8
Pd 107				8	U 234		4.21E-08	CC 1	8
Ag 108m				8	U 235		1.1E-09	CC 1	8
Ag 110m				8	U 236		4.19E-09	CC 1	8
Cd 109				8	U 238		4.22E-08	CC 1	8
Cd 113m				8	Np 237		<7.36E-06	D 3	8
Sn 119m				8	Pu 236				8
Sn 121m				8	Pu 238		2.2E-05	CC 1	8
Sn 123				8	Pu 239		2.13E-05	CC 1	8
Sn 126				8	Pu 240		2.83E-05	CC 1	8
Sb 125			<2.02E-06	D 3	Pu 241		4.39E-04	CC 1	8
Sb 126				8	Pu 242		<4.22E-07	D 3	8
Te 125m			<5.33E-07	D 3	Am 241		1.02E-04	CC 1	8
Te 127m				8	Am 242m				8
I 129			<2.21E-07	D 3	Am 243				8
Cs 134			1.13E-05	CC 1	Cm 242				8
Cs 135				8	Cm 243		9.31E-08	CC 1	8
Cs 137			4.4E-03	CC 1	Cm 244		2.04E-06	CC 1	8
Ba 133				8	Cm 245				8
La 137				8	Cm 246				8
La 138				8	Cm 248				8
Ce 144			<3.04E-08	D 3	Cf 249				8
Pm 145				8	Cf 250				8
Pm 147				8	Cf 251				8
Sm 147				8	Cf 252				8
Sm 151				8	Other a				8
Eu 152			<6.12E-07	D 3	Other b/g				8
Eu 154			6.06E-06	CC 1	Total a	0	2.56E-04	CC 1	8
Eu 155			2.63E-06	CC 1	Total b/g	0	5.21E-03	CC 1	8

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 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