

WASTE STREAM	8A103	Capenhurst Decommissioning Waste
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SITE Capenhurst

SITE OWNER Urenco

WASTE CUSTODIAN Urenco Nuclear Stewardship

WASTE TYPE LLW

WASTE VOLUMES

	Reported (m ³)	OR	Conditioned (m ³)	Packaged (m ³)
Stocks:	At 1.4.2025	= 50.0		
Future arisings:	1.4.2025 - 31.3.2026	~ 400.0		
	1.4.2026 - 31.3.2027	~ 774.0		
	1.4.2027 - 31.3.2028	~ 661.0		
	1.4.2028 - 31.3.2050	~ 1180.0		
Total future arisings:		3015.0		
Total waste volume:		3065.0		

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

Comment on arising rates: Arisings have been estimated based on current programmes which have not yet been confirmed. Also characterisation of some of the materials has not been completed so volumes may change when this work is carried out. Future works are also expected to slow down as current UNS buildings are handed over to new ownership and waste streams.

Additional information on quantities: Wastes will be size reduced where appropriate, packaged as required by transport regulations and disposed of as LLW and VLLW via NWS. Volumes currently stored may have been estimated due to containers not being full. Some wastes are not fully characterised and hence volume for disposal may be reduced.

Uncertainty factors on volumes: Stock (upper): x 2.00 Arisings (upper): x 5.00
Stock (lower): x 1.00 Arisings (lower): x 0.20

WASTE SOURCE General plant decommissioning and building demolition and refurbishment. Wastes include but not limited to:
Soft waste
Non compactable wastes
Metallic wastes
Asbestos wastes

PHYSICAL CHARACTERISTICS

General description: Soft Waste (such as PPE, Wipes, poly sheeting etc)
Non compactable wastes (WEEE, Hoses, hard plastics and rubble)
Metallic wastes (pipes, valves, bracketry, structural steelwork, cladding)
General Asbestos waste (fire curtains, cladding)

Changes since waste generated: Some materials have been size reduced.

Bulk density (t/m³): ~ 0.56

Comment on density: Density is an average for the whole waste stream.

CHEMICAL COMPOSITION

General description and components (%wt): Various metals (42.31%), Organics (43.21%), asbestos (14.42%).

Chemical state: Neutral

Sheet metal proportion / thickness: The average thickness of sheet metal components is 10mm. Most of the waste is made up of various components e.g. valves, pipes.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	TR 0	-	
Other ferrous metals.....	~ 39.5	-	
Iron.....	0	-	
Aluminium.....	~ 2.6	-	
Beryllium.....	0	-	
Cobalt.....	= 0	-	
Copper.....	~ 0.10	-	
Lead.....	= 0	-	
Magnox/Magnesium.....	= 0	-	
Nickel.....	= 0	-	
Titanium.....	0	-	
Uranium.....	<< 0.10	-	
Zinc.....	= 0	-	
Zircaloy/Zirconium.....	= 0	-	
Other metals.....	0	-	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulotics.....	~ 18.0	-	100.0
Paper, cotton.....	~ 8.0	-	45.0
Wood.....	~ 10.0	-	55.0
Halogenated plastics.....	~ 7.2	-	
Total non-halogenated plastics.....	~ 0.09	-	
Condensation polymers.....	P 0	-	
Others.....	P 0	-	
Organic ion exchange materials.....	= 0	-	
Total rubber.....	P 0	-	
Halogenated rubber.....	P 0	-	
Non-halogenated rubber.....	P 0	-	
Hydrocarbons.....	~ 2.0	-	
Oil or grease.....	~ 2.0	-	
Fuel.....	0	-	
Asphalt/Tarmac (cont.coal tar).....	0	-	
Asphalt/Tarmac (no coal tar).....	0	-	
Bitumen.....	0	-	
Others.....	0	-	
Other organics.....	~ 16.0	-	

Other materials (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials.....	= 0	-	
Inorganic sludges and flocs.....	= 0	-	
Soil.....	0	-	
Brick/Stone/Rubble.....	= 0	-	
Cementitious material.....	0	-	
Sand.....	0	-	
Glass/Ceramics.....	= 0	-	
Graphite.....	= 0	-	
Desiccants/Catalysts.....	0	-	
Asbestos.....	~ 14.4	Type not determined	
Non/low friable.....	0	-	
Moderately friable.....	0	-	
Highly friable.....	0	-	
Free aqueous liquids.....	= 0	-	
Free non-aqueous liquids.....	= 0	-	
Powder/Ash.....	= 0	-	

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

Inorganic anions (%wt):

	(%wt)	Type(s) and comment
Fluoride.....	= 0.02	-
Chloride.....	TR	-
Iodide.....	= 0	-
Cyanide.....	= 0	-
Carbonate.....	= 0	-
Nitrate.....	= 0	-
Nitrite.....	= 0	-
Phosphate.....	= 0	-
Sulphate.....	= 0	-
Sulphide.....	= 0	-

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

Hazardous substances / non hazardous pollutants:

-

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

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.....	~~ 5	-
EEE Type 2.....	~~ 5	-
EEE Type 3.....	~~ 5	-
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	Off-site	~ 20.0
Decay storage		
Low force compaction		
Supercompaction (HFC)		
Incineration		
Drying/dewatering/liquid separation	Off-site	~ 20.0
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		~ 60.0

Comments on planned treatments:

None - covers soft waste/non compactable wastes that are currently sent as LA-LLW to Radioactive permitted landfill. If BAT to do so metals will be sent for off-site metals treatment.

Conditioning method:

No conditioning plants on site

Conditioning plants:

Plant Name	Location

Likely conditioning matrix:

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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
-	-	-	-	-	-

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)	~ 60.0	~ 1.6	
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	~ 20.0	~ 1.0	
Expected to be consigned to a Landfill Facility			
Expected to be disposed On-Site	~ 20.0	~ 7.8	
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: Contamination by uranium isotopes and their daughters and technetium.

Uncertainty: The accuracy is good for the measured data. Overall accuracy to within a factor of 10.

Measurement of radioactivities: Chemical analysis of some materials and calculation of weighted average for whole stream.

Chemical form of radionuclides:

- H-3: -
- C-14: Unknown.
- Cl-36: -
- Se-79: -
- Tc-99: TcO₂.
- I-129: Unknown.
- Ra: Unknown.
- Th: ThO₂, ThO₂F₂, ThF₄.
- U: UO₂F₂, UF₄.
- Np: NpO₂F₂, NpO₂.
- Pu: -

WASTE STREAM 8A103 Capenhurst Decommissioning Waste									
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					Gd 153				
Be 10					Ho 163				
C 14	~ 1.21E-08	B B 2	~ 1.21E-08	B B 2	Ho 166m				
Na 22					Tm 170				
Al 26					Tm 171				
Cl 36					Lu 174				
Ar 39					Lu 176				
Ar 42					Hf 178n				
K 40					Hf 182				
Ca 41					Pt 193				
Mn 53					Ti 204				
Mn 54					Pb 205				
Fe 55					Pb 210				
Co 60					Bi 208				
Ni 59					Bi 210m				
Ni 63					Po 210				
Zn 65					Ra 223				
Se 79					Ra 225				
Kr 81					Ra 226	~ 2.33E-08	B B 2	~ 2.33E-08	B B 2
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90					Th 227				
Zr 93					Th 228	~ 4.50E-07	B B 2	~ 4.50E-07	B B 2
Nb 91					Th 229				
Nb 92					Th 230	~ 4.27E-07	B B 2	~ 4.27E-07	B B 2
Nb 93m					Th 232	~ 2.36E-09	B B 2	~ 2.36E-09	B B 2
Nb 94					Th 234				
Mo 93					Pa 231				
Tc 97					Pa 233				
Tc 99	~ 4.34E-05	B B 2	~ 4.34E-05	B B 2	U 232	~ 2.99E-08	B B 2	~ 2.99E-08	B B 2
Ru 106					U 233	~ 8.97E-08	B B 2	~ 8.97E-08	B B 2
Pd 107					U 234	~ 1.37E-04	B B 2	~ 1.37E-04	B B 2
Ag 108m					U 235	~ 5.10E-06	B B 2	~ 5.10E-06	B B 2
Ag 110m					U 236	~ 6.81E-07	B B 2	~ 6.81E-07	B B 2
Cd 109					U 238	~ 1.76E-05	B B 2	~ 1.76E-05	B B 2
Cd 113m					Np 237	~ 4.14E-07	B B 2	~ 4.14E-07	B B 2
Sn 119m					Pu 236				
Sn 121m					Pu 238				
Sn 123					Pu 239				
Sn 126					Pu 240				
Sb 125					Pu 241				
Sb 126					Pu 242				
Te 125m					Am 241				
Te 127m					Am 242m				
I 129	~ 1.75E-08	B B 2	~ 1.75E-08	B B 2	Am 243				
Cs 134					Cm 242				
Cs 135					Cm 243				
Cs 137					Cm 244				
Ba 133					Cm 245				
La 137					Cm 246				
La 138					Cm 248				
Ce 144					Cf 249				
Pm 145					Cf 250				
Pm 147					Cf 251				
Sm 147					Cf 252				
Sm 151					Unsp a				
Eu 152					Unsp b/g				
Eu 154					Total a	1.62E-04	*	1.62E-04	*
Eu 155					Total b/g	4.34E-05	*	4.34E-05	*

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