WASTE STREAM 8A10 Aqueous Waste

SITE	Capenhurst
SITE OWNER	Urenco
WASTE CUSTODIAN	URENCO
WASTE TYPE	LLW; SPD1
Is the waste subject to Scottish Policy:	No

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2022.....	40.0 m^3
Future arisings -	1.4.2022 - 31.3.2023.....	20.0 m^3
	1.4.2023 - 31.3.2024.....	20.0 m^3
	1.4.2024 - 31.3.2025.....	20.0 m^3
	1.4.2025 - 31.3.2040.....	300.0 m^3
Total future arisings:		360.0 m^3
Total waste volume:		400.0 m^3

Comment on volumes: Assumes that all liquor generated from floor washings and other daily arisings (chiller unit flush water) are unsuitable for discharge via the site's active drainage system. Generated from routine floor washings within the enrichment buildings - unsuitable for discharge via the sites drains.

Uncertainty factors on volumes:

Stock (upper):	x 2.0	Arisings (upper)	x 2.0
Stock (lower):	x 0.5	Arisings (lower)	x 0.5

WASTE SOURCE Floor washings from the enrichment buildings.

PHYSICAL CHARACTERISTICS

General description:	Water based cleaning solution (>5L hard surface cleaner in 1000L raw water) for the floor washings in the enrichment buildings. Chiller unit water is raw water, however contains small quantity of metal (copper, zinc) therefore unsuitable for discharge via the sites drains.
Physical components (%wt):	Water based solution (100%)
Sealed sources:	The waste does not contain sealed sources.
Bulk density (t/m^3):	~~1
Comment on density:	Predominantly raw water.

CHEMICAL COMPOSITION

General description and components (%wt):	Water based solution from floor washings in enrichment buildings - potentially contaminated with uranium isotopes.
Chemical state:	Neutral
Chemical form of radionuclides:	U: UO2F2, UF4
Metals and alloys (%wt):	-

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....			
Other ferrous metals.....			
Iron.....			
Aluminium.....			
Beryllium.....			
Cobalt.....			
Copper.....	<0.01		
Lead.....			

WASTE STREAM 8A10 Aqueous Waste

Magnox/Magnesium.....			
Nickel.....			
Titanium.....			
Uranium.....			
Zinc.....	<0.01		
Zircaloy/Zirconium.....			
Other metals.....			

Organics (%wt): -

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulosics.....			
Paper, cotton.....			
Wood.....			
Halogenated plastics	<7.0	1m3 plastic IBCs	
Total non-halogenated plastics.....			
Condensation polymers.....			
Others.....			
Organic ion exchange materials....			
Total rubber.....			
Halogenated rubber			
Non-halogenated rubber.....			
Hydrocarbons.....			
Oil or grease			
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.....			
Soil.....			
Brick/Stone/Rubble.....			
Cementitious material.....			
Sand.....			
Glass/Ceramics.....			
Graphite.....			
Desiccants/Catalysts.....			
Asbestos.....			
Non/low friable.....			

WASTE STREAM 8A10 Aqueous Waste

Moderately friable.....		
Highly friable.....		
Free aqueous liquids.....	~~93.0	
Free non-aqueous liquids.....		
Powder/Ash.....		

Inorganic anions (%wt): Present as fluorides of uranium

	(%wt)	Type(s) and comment
Fluoride.....	~0.30	
Chloride.....		
Iodide.....		
Cyanide.....		
Carbonate.....		
Nitrate.....		
Nitrite.....		
Phosphate.....		
Sulphate.....		
Sulphide.....		

Materials of interest for waste acceptance criteria: Liquor is suitable for incineration (no chemical issue for WAC) - use non hazardous floor cleaning solution.

	(%wt)	Type(s) and comment
Combustible metals.....		
Low flash point liquids.....		
Explosive materials.....		
Phosphorus.....		
Hydrides.....		
Biological etc. materials.....		
Biodegradable materials.....		
Putrescible wastes.....		
Non-putrescible wastes.....		
Corrosive materials.....		
Pyrophoric materials.....		
Generating toxic gases.....		
Reacting with water.....		
Higher activity particles.....		
Soluble solids as bulk chemical compounds.....		

Hazardous substances / non hazardous pollutants: -

	(%wt)	Type(s) and comment
Acrylamide.....		
Benzene.....		
Chlorinated solvents.....		

WASTE STREAM 8A10 Aqueous Waste

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.....

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.....		

Potential for the waste to contain discrete items: No.

TREATMENT, PACKAGING AND DISPOSAL

WASTE STREAM 8A10 Aqueous Waste

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 Recyling / reuse Other / various None	Off-site	100.0

Comment on planned treatments: No treatment on site - equipment and processes being reviewed to reduce volumes.

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	~1.0

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: (Not applicable to this waste stream)

WASTE STREAM 8A10 Aqueous Waste

Container	Stream volume %	Waste loading m³	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			

Other information: -

Waste Planned for Disposal at the LLW Repository: (Not applicable to this waste stream)

Container voidage: -

Waste Characterisation Form (WCH): -

Waste consigned for disposal to LLWR in year of generation: -

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: Uranium enrichment and recovery operations.

Uncertainty: Activity per IBC is assessed via intrusive sampling. The data stated is based on experience to date, and assumes an average activity (for the future) based on this historical sampling.

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: Estimated total activity content from existing sampling. Individual containers will be characterised prior to arranging disposal.

Other information: -

WASTE STREAM 8A10 Aqueous Waste

Nuclide	Mean radioactivity, TBq/m³				Nuclide	Mean radioactivity, TBq/m³			
	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					Gd 153				
Be 10					Ho 163				
C 14					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					Tl 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				
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90					Th 227				
Zr 93					Th 228				
Nb 91					Th 229				
Nb 92					Th 230				
Nb 93m					Th 232				
Nb 94					Th 234				
Mo 93					Pa 231				
Tc 97					Pa 233				
Tc 99	~4.22E-07	C C 2	~~4.22E-07	C C 2	U 232				
Ru 106					U 233				
Pd 107					U 234	~9.73E-06	C C 2	~~9.73E-06	C D 2
Ag 108m					U 235	~4.38E-07	C C 2	~~4.38E-07	C D 2
Ag 110m					U 236				
Cd 109					U 238	~9.3E-06	C C 2	~~9.3E-06	C D 2
Cd 113m					Np 237	~1.08E-07	C C 2	~~1.08E-07	C D 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					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					Other a				
Eu 152					Other b/g				
Eu 154					**Total a**	**~1.96E-05**	**C C 2**	**~~1.96E-05**	**C D 2**
Eu 155					**Total b/g**	**~4.22E-07**	**C C 2**	**~~4.22E-07**	**C D 2**

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