WASTE STREAM 8A07 Metallic 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.....	~20.0 m³
Future arisings -	1.4.2022 - 31.3.2023.....	~9.6 m³
	1.4.2023 - 31.3.2024.....	~9.6 m³
	1.4.2024 - 31.3.2025.....	~~9.6 m³
	1.4.2025 - 31.3.2040.....	~~153.6 m³
Total future arisings:		182.4 m³
Total waste volume:		202.4 m³

Comment on volumes: Volumes are based on average of past three years arising. Volume is of decontaminated metallic parts loaded into 210L drums, as per site instructions. Volumes based on current rate of arising.

Uncertainty factors on volumes:				
	Stock (upper):	x 1.05	Arisings (upper)	x 2.0
	Stock (lower):	x 0.95	Arisings (lower)	x 0.5

WASTE SOURCE The waste arises from centrifuge plant operations and maintenance, auxiliary activities such as chemistry laboratories and a small fraction from clean-up and decommissioning activities.

PHYSICAL CHARACTERISTICS

General description:	Stripped pump and valve components arising from the refurbishment of plant equipment. Also small quantities of pipework and structural framing that will not be processed via the decontamination facility. Material has been washed in citric acid bath and water bath to decontaminate prior to loading into 210L drums for interim storage on site prior to processing and disposal.
Physical components (%wt):	The material will be mainly mild steel (70%), aluminium (20%), copper (10%).
Sealed sources:	The waste does not contain sealed sources.
Bulk density (t/m³):	~~1.143
Comment on density:	Based on weights of loaded 210 litre drums filled with this waste stream.

CHEMICAL COMPOSITION

General description and components (%wt):	All non hazardous
Chemical state:	Neutral
Chemical form of radionuclides:	Tc-99: Trace quantities present as Tc(IV) as TcO2 and Tc(VII) as pertechnate. U: Uranyl fluoride (70%), uranium tetrafluoride (30%). Np: Trace quantities present as the NpO2 ++ ion.
Metals and alloys (%wt):	-

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....			
Other ferrous metals.....	~70.0	Mild steel	
Iron.....			
Aluminium.....	~20.0		
Beryllium.....			
Cobalt.....			

WASTE STREAM 8A07 Metallic Waste

Copper	~10.0
Lead	
Magnox/Magnesium	
Nickel	
Titanium	
Uranium	
Zinc	
Zircaloy/Zirconium	
Other metals	

Organics (%wt): -

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulosics			
Paper, cotton			
Wood			
Halogenated plastics			
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			

WASTE STREAM 8A07 Metallic Waste

Asbestos.....

Non/low friable.....

Moderately friable.....

Highly friable.....

Free aqueous liquids.....

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: N/A

	(%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: N/A

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

WASTE STREAM 8A07 Metallic Waste

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..... NE

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.

WASTE STREAM 8A07 Metallic Waste

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 Recyling / reuse Other / various None	On-site	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	<80.0	~~1.1
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	>20.0	~~1.1
Expected to be consigned as Out of Scope		
Expected to be recycled / reused		
Disposal route not known		

Classification codes for waste expected to be consigned to a landfill facility: Non-hazardous. EWC Code - 17 04 07

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 8A07 Metallic 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: Variations in activity will occur due to changes in uranium concentration and enrichment.

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: Intrusive sampling and non-destructive HRGS Assay

Other information: Uranium daughter products are considered to be in equilibrium with the parent.

WASTE STREAM 8A07 Metallic 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	~8.73E-07	A A 2	~~8.65E-07	A A 2	U 232				
Ru 106					U 233				
Pd 107					U 234	~2.63E-05	A A 2	~~2.61E-05	A A 2
Ag 108m					U 235	~1.13E-06	A A 2	~~1.12E-06	A A 2
Ag 110m					U 236				
Cd 109					U 238	~1.28E-05	A A 2	~~1.27E-05	A A 2
Cd 113m					Np 237	~2.24E-07	A A 2	~~2.21E-07	A A 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**	**~4.05E-05**	**A A 2**	**~4.01E-05**	**A A 2**
Eu 155					**Total b/g**	**~8.73E-07**	**A A 2**	**~8.65E-07**	**A A 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