WASTE STREAM 8A22 Liquors / Sludges from LCF

SITE Capenhurst

SITE OWNER Urenco

WASTE CUSTODIAN Urenco Nuclear Stewardship

WASTE TYPE LLW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	0 m³
Future arisings -	1.4.2028 - 31.3.2053.....	13.9 m³
Total future arisings:		13.9 m³
Total waste volume:		13.9 m³

Comment on volumes: Arisings from the future container handling facility have been estimated but cannot be confirmed until design is finalised. Timescales for arisings are assumed to be the same as for the cylinders in 8A05 so will occur over the period 2028-2053

Uncertainty factors on volumes:

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

WASTE SOURCE This waste arises from the processes to wash out cylinders which have previously contained UF6.

PHYSICAL CHARACTERISTICS

General description: Various types of oil and sludges will be contaminated with UO2F2/UF4

Physical components (%wt): The exact types of oil are not known yet as design of plant is not complete. Make up of sludges cannot be determined at this time.Oil 5% Sludges 95%

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): ~1.15

Comment on density: Average of estimated densities for oils and sludges

CHEMICAL COMPOSITION

General description and components (%wt): Oil 5%Sludges 95%

Chemical state: Neutral

Chemical form of radionuclides:
C-14: Unknown.
Tc-99: TcO2.
I-129: Unknown.
Ra: Unknown.
Th: ThO2, ThO2F2, ThF4.
U: UO2F2, UF4.
Np: NpO2, NpO2F2.

Metals and alloys (%wt): N/A

Stainless steel.....	0	
Other ferrous metals.....	0	
Iron.....	0	
Aluminium.....	0	
Beryllium.....	0	
Cobalt.....	0	
Copper.....	0	
Lead.....	0	
Magnox/Magnesium.....	0	
Nickel.....	0	
Titanium.....	0	
Uranium.....	<<0.01	Present as UO2F2 and UF4

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	Zinc	0	
	Zircaloy/Zirconium	0	
	Other metals	0	
Organics (%wt):	5		
	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	~5.0	
	Oil or grease	~5.0	Type of oils unknown at this time
	Fuel		
	Asphalt/Tarmac (cont.coal tar)		
	Asphalt/Tarmac (no coal tar)		
	Bitumen		
	Others		
	Other organics		
Other materials (%wt):	95		
	Inorganic ion exchange materials.	0	
	Inorganic sludges and flocs	95.0	make up of sludges not known at this time
	Soil	0	
	Brick/Stone/Rubble	0	
	Cementitious material	0	
	Sand	0	
	Glass/Ceramics	0	
	Graphite	0	
	Desiccants/Catalysts	0	
	Asbestos	0	
	Non/low friable	0	
	Moderately friable	0	
	Highly friable	0	
	Free aqueous liquids	0	
	Free non-aqueous liquids	0	
	Powder/Ash	0	
Inorganic anions (%wt):	Fluorides will be present. Other inorganic anions may be present in trace quantities.		

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Fluoride	<0.10
Chloride	<0.01
Iodide	<0.01
Cyanide	NE
Carbonate	<0.01
Nitrate	<0.01
Nitrite	NE
Phosphate	<0.01
Sulphate	<0.01
Sulphide	<0.01

Materials of interest for waste acceptance criteria: Fluorides are present in the waste as stored, processing of some waste types may remove this material.

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
Active particles	0
Soluble solids as bulk chemical compounds	0

Hazardous substances / non hazardous pollutants: UO_2F_2 and UF_4 <0.1wt%.

Acrylamide	0
Benzene	0
Chlorinated solvents	0
Formaldehyde	0
Organometallics	0
Phenol	0
Styrene	0
Tri-butyl phosphate	0
Other organophosphates	0
Vinyl chloride	0
Arsenic	0
Barium	0
Boron	0

Cadmium..... 0

Caesium..... 0

Selenium..... 0

Chromium..... 0

Molybdenum..... 0

Thallium..... 0

Tin..... 0

Vanadium..... 0

Mercury compounds..... 0

Others..... 0

Electronic Electrical Equipment (EEE)

EEE Type 1..... 0

EEE Type 2..... 0

EEE Type 3..... 0

EEE Type 4..... 0

EEE Type 5..... 0

Complexing agents (%wt): No

EDTA..... 0

DPTA..... 0

NTA..... 0

Polycarboxylic acids…… 0

Other organic complexants..... 0

Total complexing agents..... 0

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	Off-site	100.0

Comment on planned treatments: Current expectations are that the waste will meet the WAC for incineration. Final disposal route may change subject to actual data, BAT assessment and changes to WAC for disposal facilities.

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Disposal Routes:

Disposal Route	Stream volume %
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

Upcoming (2019/20-2021/22) Waste Routing (if expected to change from above):

Disposal Route	Stream volume %		
	2019/20	2020/21	2021/22
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			

Waste Packaging for Disposal: (Not applicable to this waste stream)

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: -

Potential for the waste to contain discrete items: -

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

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Source:	Contamination by uranium and daughters, with some Tc-99 and Np-237.
Uncertainty:	Activity is estimated as plant design is not complete
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:	Activity has been estimated using data for similar materials
Other information:	-

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Nuclide	Mean radioactivity, TBq/m³				Nuclide	Mean radioactivity, TBq/m³			
	Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code		Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code
H 3					Gd 153				
Be 10					Ho 163				
C 14			~1.38E-09	C C 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					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			~1.65E-08	C C 2
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90					Th 227				
Zr 93					Th 228			~2.34E-08	C C 2
Nb 91					Th 229				
Nb 92					Th 230			~2.13E-07	C C 2
Nb 93m					Th 232			~2.75E-09	C C 2
Nb 94					Th 234				
Mo 93					Pa 231				
Tc 97					Pa 233				
Tc 99			~8.23E-07	C C 2	U 232			~6.74E-08	C C 2
Ru 106					U 233			~3.88E-07	C C 2
Pd 107					U 234			~2.23E-05	C C 2
Ag 108m					U 235			~9.5E-07	C C 2
Ag 110m					U 236			~3.06E-07	C C 2
Cd 109					U 238			~7.24E-06	C C 2
Cd 113m					Np 237			~3.99E-08	C C 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			~7.87E-07	C C 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					Other a				
Eu 152					Other b/g				
Eu 154					**Total a**	**0**		**3.15E-05**	**C C 2**
Eu 155					**Total b/g**	**0**		**1.61E-06**	**C C 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