

WASTE STREAM	8A03	Contaminated Compactable Waste
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SITE Capenhurst

SITE OWNER Urenco

WASTE CUSTODIAN Urenco

WASTE TYPE LLW

WASTE VOLUMES

Stocks: At 1.4.2013..... ~292.0 m³

Future arisings - 1.4.2013 - 31.3.2015..... ~100.0 m³

1.4.2015 - 31.3.2030..... ~915.0 m³

Total future arisings: 1015.0 m³

Total waste volume: 1307.0 m³

Comment on volumes: -

Uncertainty factors on Stock (upper): x 1.05 Arisings (upper) x 2.0

volumes: 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: The waste comprises general compactable waste (e.g. paper, plastic, cloth, small quantities of wood) in mild steel drums. There are no large items present in the waste. No changes to the waste since generated.

Physical components (%vol): The material will be mainly Paper (41%), rags (5%), wood (1.5%), plastics (3.5%), mild steel drums (49%).

Bulk density (t/m³): ~0.2

Comment on density: Based on weights of 210 litre drums.

CHEMICAL COMPOSITION

General description and components (%wt): Cellulose (47.5%), plastic (3.5%), mild steel (49%). Uranium will not be present at levels greater than 1%.

Chemical state: The waste should be neutral with no strong oxidising or reducing agents.

Chemical form of radionuclides: Tc-99: Trace quantities present as Tc(IV) as TcO₂ and Tc(VII) as pertechnetate.

U: Uranyl fluoride (70%), uranium tetrafluoride (30%).

Np: Trace quantities present as the NpO₂⁺⁺ ion.

Metals and alloys (%wt): No metal present excluding outer container which is mild steel. The drums containing the waste could be considered as sheet metal with a typical thickness of 2-3mm.

Stainless steel.....		Bronze.....	
Other ferrous metals.....	~50.0	Inconel.....	
Aluminium.....		Nimonic.....	
Copper.....		Stellite.....	
Lead.....		Boral.....	
Zinc.....		Dural.....	
Magnox/Magnesium.....		Monel.....	
Zircaloy.....		Uranium.....	<0.10
Brass.....		Beryllium.....	
		Other metals (below).....	

Other metals: -

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

Fluoride.....	0.30	Nitrate.....
Chloride.....		Nitrite.....
Iodide.....		Phosphate.....
Cyanide.....		Sulphate.....
Carbonate.....		Sulphide.....

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Listed substances: Not present.

Hazardous and problematic materials (%wt): Hazardous only in respect that it is combustible and presents a conventional fire hazard.

Combustible metals.....	~1.0	Strong oxidising agents.....	
Low flash point liquids.....		Pyrophoric materials.....	
Explosive materials.....		Generating toxic gases.....	
Phosphorus.....		Reacting with water.....	
Hydrides.....		Asbestos.....	0
Putrescible wastes.....		Free aqueous liquids.....	
Biological etc. materials.....		Free non-aqueous liquids.....	<1.0
Powder.....	<		

Asbestos types and proportions: None.

Complexing agents (%wt): Not present. There are no complexing agents present.

Complexing agents.....

Organics (%wt): -

Total cellulose.....	~47.5
Paper, cotton.....	
Wood.....	
Halogenated plastics	~1.0
Total non-halogenated plastics....	~2.5
Condensation polymers.....	
Others.....	~2.5
Organic ion exchange materials...	
Total rubber.....	
Halogenated rubber	
Non-halogenated rubber.....	
Other organics.....	

Halogenated plastics and rubber (%wt): PVC may be present at up to 1%.

Other materials (%wt): -

Inorganic ion exchange materials..	
Inorganic sludges and flocs.....	<1.0
Soil.....	
Rubble.....	
Concrete, cement and sand.....	
Glass.....	
Ceramics.....	
Graphite.....	

LLW TREATMENT AND DISPOSAL

Status of waste: Expected to be consigned to landfill sites.

Waste Characterisation Form (WCF): It is not yet determined if the waste meets the LLWR's Waste Acceptance Criteria (WAC). The waste is expected to be managed by LLWR with likely disposal to be consigned to Clifton Marsh. The waste is in a non-compacted form.

Waste consigned in year of generation: Not yet determined.

Treatments already carried out:

Treatment	Waste treated (%vol)	Volume change factor
Low force compaction		
Supercompaction (HFC)		
Incineration		
Encapsulation		
Metal decontamination		
Metal melting		
Other		
None	100.0	

Comment on treatments already carried out: -

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Further treatments planned:

Treatment	Waste treated (%vol)	Volume change factor
Low force compaction	100.0	~0.33
Supercompaction (HFC)		
Incineration		
Encapsulation		
Metal decontamination		
Metal melting		
Other		
None		

Comment on further treatments:

-

Category of waste after further planned treatments:

Category	Waste (%vol)
High force compactable waste	100.0
Uncompactable waste in disposal containers	
Large items for direct in-vault grouting	
Not yet determined	

Comment on category of waste:

-

High Force Compactable Waste

Density bands:

Waste density (t/m ³)	Waste (%vol)	
	200-litre drums	Loose
< 0.25	70.0	
0.25 - 0.5	30.0	
0.5 - 1.2		
> 1.2		
Not analysed by density		

Other information:

-

Uncompactable Waste in Disposal Containers (Not applicable to this waste stream)

Disposal container type:

Container	Waste (%vol)	Waste loading (m ³)
Third height ISO		
Half height ISO		
4m box (no shielding)		
2m box (no shielding)		
Other		

Inaccessible voidage:

-

Other information:

-

Large Items For Direct In-Vault Grouting (Not applicable to this waste stream)Bounding cuboidal volume (m³):

-

Inaccessible voidage:

-

Other information:

-

RADIOACTIVITY

Source:

The main sources of activity are uranium and uranium daughters.

Accuracy:

Variations in activity will occur due to changes in uranium concentration and enrichment. Estimates for the enrichment of recycled uranium and operation of the Tails Deconversion Plant contain a considerable amount of uncertainty as the projects are still in early stages and are not scheduled to come on line post 2013. It is anticipated that further information will be available in 2014.

Definition of total alpha and total beta/gamma:

Totals shown on table of radionuclide activities are the sums of the listed alpha or beta/gamma emitting radionuclides plus 'other alpha' or 'other beta/gamma.'

Measurement of specific activities:

Analysis of the waste using gamma spectrometry. Estimates have been derived for future activities by increasing the activity and volume disposed by the ratio increase expected.

Other information:

Activity estimates are based on measured activity levels of existing waste. Uranium

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daughter products are considered to be in equilibrium with the parent.

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Nuclide	Average specific activity, TBq/m ³				Nuclide	Average specific activity, TBq/m ³			
	Waste at 1.4.2013	Bands and Code	Future arisings	Bands and Code		Waste at 1.4.2013	Bands and Code	Future arisings	Bands and Code
H 3					Ho 163				
Be 10					Ho 166m				
C 14					Tm 170				
Cl 36					Tm 171				
Ar 39					Lu 174				
Ar 42					Lu 176				
K 40					Hf 178n				
Ca 41					Hf 182				
Mn 53					Pt 193				
Mn 54					Tl 204				
Fe 55					Pb 205				
Co 60					Pb 210				
Ni 59					Bi 208				
Ni 63					Bi 210m				
Zn 65					Po 210				
Se 79					Ra 223				
Kr 81					Ra 225				
Kr 85					Ra 226				
Rb 87					Ra 228				
Sr 90					Ac 227				
Zr 93					Th 227				
Nb 91					Th 228				
Nb 92					Th 229				
Nb 93m					Th 230				
Nb 94					Th 232				
Mo 93					Th 234				
Tc 97					Pa 231				
Tc 99	1E-07	BD 2	1E-07	BD 2	Pa 233				
Ru 106					U 232				
Pd 107					U 233				
Ag 108m					U 234	5.77E-06	BB 1	1.94E-05	BB 2
Ag 110m					U 235	4.31E-05	BB 1	1.54E-04	BB 2
Cd 109					U 236				
Cd 113m					U 238	1.47E-04	BB 1	4.93E-04	BB 2
Sn 119m					Np 237				
Sn 121m					Pu 236				
Sn 123					Pu 238				
Sn 126					Pu 239				
Sb 125					Pu 240				
Sb 126					Pu 241				
Te 125m					Pu 242				
Te 127m					Am 241				
I 129					Am 242m				
Cs 134					Am 243				
Cs 135					Cm 242				
Cs 137					Cm 243				
Ba 133					Cm 244				
La 137					Cm 245				
La 138					Cm 246				
Ce 144					Cm 248				
Pm 145					Cf 249				
Pm 147					Cf 250				
Sm 147					Cf 251				
Sm 151					Cf 252				
Eu 152					Other a				
Eu 154					Other b/g	1E-05	BD 2	1E-04	BB 2
Eu 155					Total a	1.95E-04	BB 2	6.66E-04	BB 2
Gd 153					Total b/g	1.01E-05	BB 2	1E-04	BB 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 the average specific activity.

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