

**WASTE STREAM****4C13****Active Effluent and Workshop LLW****SITE** Torness**SITE OWNER** EDFE NGL**WASTE CUSTODIAN** EDFE NGL**WASTE TYPE** LLW**WASTE VOLUMES**

		Reported
Stocks:	At 1.4.2019.....	7.4 m <sup>3</sup>
Future arisings -	1.4.2019 - 31.3.2029.....	155.0 m <sup>3</sup>
	1.4.2029 - 31.3.2030.....	14.4 m <sup>3</sup>
	1.4.2030 - 31.3.2031.....	57.7 m <sup>3</sup>
	1.4.2031 - 31.3.2032.....	58.1 m <sup>3</sup>
	1.4.2032 - 31.3.2033.....	57.9 m <sup>3</sup>
	1.4.2033 - 31.3.2034.....	62.5 m <sup>3</sup>
	1.4.2034 - 31.3.2035.....	46.1 m <sup>3</sup>
Total future arisings:		451.6 m <sup>3</sup>
Total waste volume:		459.0 m <sup>3</sup>

Comment on volumes: Waste volumes will be variable depending on station operating conditions.

Uncertainty factors on volumes: Stock (upper): x 1.25 Arisings (upper) x 1.5  
 Stock (lower): x 0.75 Arisings (lower) x 0.5

**WASTE SOURCE** Waste arises from operation and maintenance of active effluent areas.

**PHYSICAL CHARACTERISTICS**

General description: The waste includes disposable items such as paper, plastic/rubber, clothes and metal tools.  
 Physical components (%wt): Metal (~2%), Plastic/Rubber (~50%), Wood (~4%), Soft Organics (~43%) and other (<1%).  
 Sealed sources: The waste does not contain sealed sources.  
 Bulk density (t/m<sup>3</sup>): ~0.66  
 Comment on density: Density based on conditioned volume in current WCF.

**CHEMICAL COMPOSITION**

General description and components (%wt): Metal (~2%), Plastic/Rubber (~50%), Wood (~4%), Soft Organics (~43%) and other (<1%).  
 The drum material is mild steel.

Chemical state: Neutral

Chemical form of radionuclides: H-3: Contamination from tritiated water  
 C-14: Graphite  
 Cl-36: To Be determined  
 Se-79: To Be determined  
 Tc-99: To Be determined  
 I-129: To Be determined  
 Ra: To Be determined  
 Th: To Be determined  
 U: To Be determined  
 Np: To Be determined  
 Pu: To Be determined

Metals and alloys (%wt): -  
 Stainless steel..... ~1.0  
 Other ferrous metals..... ~1.0  
 Iron..... 0  
 Aluminium..... 0  
 Beryllium..... NE  
 Cobalt..... 0  
 Copper..... 0

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Lead.....	0	
Magnox/Magnesium.....	0	
Nickel.....	0	
Titanium.....	0	
Uranium.....	0	
Zinc.....	~1.0	In galvanised metals
Zircaloy/Zirconium.....	NE	
Other metals.....	NE	

## Organics (%wt):

The waste will contain large quantities of cellulose in the form of paper, cloth, rubber and polythene. Mass fractions are indicative and will vary significantly with station operation. Not currently estimated.

Total cellulosics.....	~47.0	
Paper, cotton.....	~43.0	
Wood.....	~4.0	
Halogenated plastics .....	NE	
Total non-halogenated plastics.....	~45.0	
Condensation polymers.....	NE	
Others.....	~45.0	
Organic ion exchange materials....	0	
Total rubber.....	~5.0	
Halogenated rubber .....	NE	
Non-halogenated rubber.....	~5.0	
Hydrocarbons.....	~0	Small quantities may be present
Oil or grease .....		
Fuel.....		
Asphalt/Tarmac (cont.coal tar)...		
Asphalt/Tarmac (no coal tar)....		
Bitumen.....		
Others.....		
Other organics.....	NE	

## Other materials (%wt):

Some glass is expected to be present. The percentage given is indicative and will vary with station operation.

Inorganic ion exchange materials.	0	
Inorganic sludges and flocs.....	0	
Soil.....	0	
Brick/Stone/Rubble.....	0	
Cementitious material.....	0	
Sand.....	0	
Glass/Ceramics.....	~1.0	
Graphite.....	0	
Desiccants/Catalysts.....	0	
Asbestos.....	0	
Non/low friable.....		
Moderately friable.....		

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	Highly friable.....	
	Free aqueous liquids.....	0
	Free non-aqueous liquids.....	0
	Powder/Ash.....	0
Inorganic anions (%wt):	Inorganic anions are not estimated but may be present in trace quantities.	
	Fluoride.....	0
	Chloride.....	NE
	Iodide.....	NE
	Cyanide.....	0
	Carbonate.....	NE
	Nitrate.....	NE
	Nitrite.....	NE
	Phosphate.....	NE
	Sulphate.....	NE
	Sulphide.....	NE
Materials of interest for waste acceptance criteria:	Efforts are made to remove any hazardous materials from the waste during sorting and compaction.	
	Combustible metals.....	0
	Low flash point liquids.....	0
	Explosive materials.....	0
	Phosphorus.....	0
	Hydrides.....	0
	Biological etc. materials.....	0
	Biodegradable materials.....	44.0
	Putrescible wastes.....	0
	Non-putrescible wastes.....	44.0
	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:	-	
	Acrylamide.....	NE
	Benzene.....	NE
	Chlorinated solvents.....	NE
	Formaldehyde.....	NE
	Organometallics.....	NE
	Phenol.....	NE
	Styrene.....	NE
	Tri-butyl phosphate.....	0

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Other organophosphates.....	NE
Vinyl chloride.....	0
Arsenic.....	0
Barium.....	NE
Boron.....	0
Cadmium.....	0
Caesium.....	0
Selenium.....	0
Chromium.....	0
Molybdenum.....	0
Thallium.....	NE
Tin.....	0
Vanadium.....	0
Mercury compounds.....	0
Others.....	NE
Electronic Electrical Equipment (EEE)	
EEE Type 1.....	NE
EEE Type 2.....	NE
EEE Type 3.....	NE
EEE Type 4.....	NE
EEE Type 5.....	NE
Complexing agents (%wt):	No
EDTA.....	NE
DPTA.....	NE
NTA.....	NE
Polycarboxylic acids.....	NE
Other organic complexants.....	NE
Total complexing agents.....	0

Not expected to be present.

**TREATMENT, PACKAGING AND DISPOSAL**

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Planned on-site / off-site treatment(s):

Treatment	On-site / Off site	Stream volume %
Low force compaction		
Supercompaction (HFC)	Off-site	~10.0
Incineration	Off-site	~70.0
Solidification	Off-Site	<5.0
Decontamination		
Metal treatment	Off-Site	~10.0
Size reduction		
Decay storage		
Recycling / reuse		
Other / various		
None		~5.0

Comment on planned treatments:

In line with the waste hierarchy, wastes will be treated preferentially by incineration, metal decontamination/melting, supercompaction, optimal packaging in HHISOs or immobilisation by encapsulation where necessary, prior to ultimate disposal at the LLW Repository. These treatments will be carried out off-site under contract with companies such as LLWR Ltd, EDF Cyclife, Tradebe and Inutec. The percentages are based on the history of consignments across the fleet of EDF Energy Nuclear Generation stations.

**Disposal Routes:**

Disposal Route	Stream volume %
Expected to be consigned to the LLW Repository	15.0
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	70.0
Expected to be consigned to a Metal Treatment Facility	10.0
Expected to be consigned as Out of Scope	
Expected to be recycled / reused	5.0
Disposal route not known	

**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:**

Container	Stream volume %	Waste loading m <sup>3</sup>	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	15.0	~13.55	6
2m box (no shielding)			
4m box (no shielding)			
Other			

Other information:

Waste loading is representative of the raw waste following further planned treatments. The waste will be reduced to 50% of its original waste volume after further planned treatments.

**WASTE STREAM****4C13****Active Effluent and Workshop LLW****Waste Planned for Disposal at the LLW Repository:**

Container voidage:	-
Waste Characterisation Form (WCH):	The waste meets the LLWR's Waste Acceptance Criteria (WAC). The waste has a current WCH. Inventory information is consistent with the current WCH.
Waste consigned for disposal to LLWR in year of generation:	Yes. Waste will usually be disposed of in the year of arising, however this will be dependent upon rate of arising of LLW throughout the year for LLWR disposal.
Potential for the waste to contain discrete items:	Yes

**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:	The activity will come from actinides, fission products and activation products.
Uncertainty:	Activity expected to be within a factor of 10.
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:	-
Other information:	The specific activity will vary at various times in the history of the plant.

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Nuclide	Mean radioactivity, TBq/m <sup>3</sup>				Nuclide	Mean radioactivity, TBq/m <sup>3</sup>			
	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	1.21E-04	CC 2	1.21E-04	CC 2	Gd 153				
Be 10					Ho 163				
C 14	1.32E-06	CC 2	1.32E-06	CC 2	Ho 166m				
Na 22		4		4	Tm 170				
Al 26		4		4	Tm 171				
Cl 36	3.74E-08	CC 2	3.74E-08	CC 2	Lu 174				
Ar 39					Lu 176				
Ar 42					Hf 178n				
K 40					Hf 182				
Ca 41					Pt 193				
Mn 53					Tl 204				
Mn 54	6.70E-07	CC 2	6.70E-07	CC 2	Pb 205				
Fe 55	1.02E-04	CC 2	1.02E-04	CC 2	Pb 210				
Co 60	1.97E-05	CC 2	1.97E-05	CC 2	Bi 208				
Ni 59					Bi 210m				
Ni 63	1.73E-05	CC 2	1.73E-05	CC 2	Po 210				
Zn 65	9.54E-08	CC 2	9.54E-08	CC 2	Ra 223				
Se 79					Ra 225				
Kr 81					Ra 226				
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90	3.83E-07	CC 2	3.83E-07	CC 2	Th 227				
Zr 93					Th 228				
Nb 91					Th 229				
Nb 92					Th 230				
Nb 93m					Th 232				
Nb 94	2.24E-08	CC 2	2.24E-08	CC 2	Th 234				
Mo 93					Pa 231				
Tc 97					Pa 233				
Tc 99					U 232				
Ru 106	1.86E-07	CC 2	1.86E-07	CC 2	U 233				
Pd 107					U 233				
Ag 108m	2.58E-08	CC 2	2.58E-08	CC 2	U 234	2.41E-10	CC 2	2.41E-10	CC 2
Ag 110m	2.15E-08	CC 2	2.15E-08	CC 2	U 235	2.89E-12	CC 2	2.89E-12	CC 2
Cd 109					U 236	8.04E-11	CC 2	8.04E-11	CC 2
Cd 113m					U 238	8.04E-11	CC 2	8.04E-11	CC 2
Sn 119m					Np 237				
Sn 121m					Pu 236				
Sn 123					Pu 238	6.13E-08	CC 2	6.13E-08	CC 2
Sn 126					Pu 239	3.59E-08	CC 2	3.59E-08	CC 2
Sb 125	4.59E-08	CC 2	4.59E-08	CC 2	Pu 240	8.51E-08	CC 2	8.51E-08	CC 2
Sb 126					Pu 241	5.39E-06	CC 2	5.39E-06	CC 2
Te 125m					Pu 242				
Te 127m					Am 241	1.46E-07	CC 2	1.46E-07	CC 2
I 129					Am 242m				
Cs 134	5.32E-08	CC 2	5.32E-08	CC 2	Am 243				
Cs 135					Cm 242	4.90E-09	CC 2	4.90E-09	CC 2
Cs 137	1.91E-06	CC 2	1.91E-06	CC 2	Cm 243	2.41E-10	CC 2	2.41E-10	CC 2
Ba 133	2.07E-08	CC 2	2.07E-08	CC 2	Cm 244	1.20E-08	CC 2	1.20E-08	CC 2
La 137					Cm 245				
La 138					Cm 246				
Ce 144	5.89E-08	CC 2	5.89E-08	CC 2	Cm 248				
Pm 145					Cf 249				
Pm 147	1.38E-07	CC 2	1.38E-07	CC 2	Cf 250				
Sm 147					Cf 251				
Sm 151					Cf 252				
Eu 152	3.75E-08	CC 2	3.75E-08	CC 2	Other a		6		6
Eu 154	6.00E-08	CC 2	6.00E-08	CC 2	Other b/g				
Eu 155	4.32E-08	CC 2	4.32E-08	CC 2	<b>Total a</b>	<b>3.46E-07</b>	<b>CC 2</b>	<b>3.46E-07</b>	<b>CC 2</b>
					<b>Total b/g</b>	<b>2.70E-04</b>	<b>CC 2</b>	<b>2.70E-04</b>	<b>CC 2</b>

**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