WASTE STREAM 3S304 Decommissioning: Secondary Wastes & Miscellaneous Materials LLW

SITE	Sizewell B
SITE OWNER	EDFE NGL
WASTE CUSTODIAN	EDFE NGL
WASTE TYPE	LLW
Is the waste subject to Scottish Policy:	No

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2022.....	0 m³
Future arisings -	1.4.2022 - 31.3.2039.....	0 m³
	1.4.2039 - 31.3.2040.....	12.8 m³
	1.4.2040 - 31.3.2052.....	1933.5 m³
	1.4.2052 - 31.3.2100.....	0 m³
	1.4.2100 - 31.3.2101.....	8.1 m³
Total future arisings:		1954.4 m³
Total waste volume:		1954.4 m³

Comment on volumes:	Waste volumes will be variable depending on station operating conditions.			
Uncertainty factors on volumes:	Stock (upper):	x	Arisings (upper)	x 1.5
	Stock (lower):	x	Arisings (lower)	x 0.5

WASTE SOURCE Secondary wastes arising during plant dismantling, e.g. from contamination control procedures.

PHYSICAL CHARACTERISTICS

General description:	A variety of combustible materials. No large items are present in the waste.
Physical components (%vol):	Volume breakdown is not assessed. The waste will contain lagging, PPE and other materials.
Sealed sources:	The waste does not contain sealed sources.
Bulk density (t/m³):	0.75
Comment on density:	The density is likely to lie between 0.5 and 1 t/m³.

CHEMICAL COMPOSITION

General description and components (%wt):	Breakdown is not assessed.
Chemical state:	-
Chemical form of radionuclides:	-
Metals and alloys (%wt):	-

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	P		
Other ferrous metals.....	P	Misc. items and drums.	
Iron.....	NE		
Aluminium.....	NE		
Beryllium.....	NE		
Cobalt.....	NE		
Copper.....	P		
Lead.....	NE		
Magnox/Magnesium.....	NE		

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Nickel	NE
Titanium	NE
Uranium	NE
Zinc	NE
Zircaloy/Zirconium	NE
Other metals	NE

Organics (%wt): A wide variety of materials may be present.

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulosics	P		
Paper, cotton	NE		
Wood	NE		
Halogenated plastics	P		
Total non-halogenated plastics	P		
Condensation polymers	NE		
Others	NE		
Organic ion exchange materials	NE		
Total rubber	NE		
Halogenated rubber	NE		
Non-halogenated rubber	NE		
Hydrocarbons	NE		
Oil or grease			
Fuel			
Asphalt/Tarmac (cont.coal tar)			
Asphalt/Tarmac (no coal tar)			
Bitumen			
Others			
Other organics	NE		

Other materials (%wt): -

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials	NE		
Inorganic sludges and flocs	NE		
Soil	NE		
Brick/Stone/Rubble	NE		
Cementitious material	NE		
Sand	NE		
Glass/Ceramics	NE		
Graphite	0		
Desiccants/Catalysts	NE		
Asbestos	0		
Non/low friable			
Moderately friable			

Highly friable.....	
Free aqueous liquids.....	0
Free non-aqueous liquids.....	0
Powder/Ash.....	0

Inorganic anions (%wt): Only likely to be present in trace quantities.

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

Materials of interest for waste acceptance criteria: No materials likely to pose a fire or other non-radiological hazard have been identified.

	(%wt)	Type(s) and comment
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	
Higher activity particles.....	0	Not expected.
Soluble solids as bulk chemical compounds.....	0	

Hazardous substances / non hazardous pollutants: -

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

Organometallics	NE
Phenol	NE
Styrene	NE
Tri-butyl phosphate	NE
Other organophosphates	NE
Vinyl chloride	NE
Arsenic	NE
Barium	NE
Boron	NE
Boron (in Boral)	NE
Boron (non-Boral)	NE
Cadmium	NE
Caesium	NE
Selenium	NE
Chromium	NE
Molybdenum	NE
Thallium	NE
Tin	NE
Vanadium	NE
Mercury compounds	NE
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): Not yet determined

	(%wt)	Type(s) and comment
EDTA	NE	
DPTA	NE	
NTA	NE	
Polycarboxylic acids	NE	
Other organic complexants	NE	Not expected.
Total complexing agents	NE	

Potential for the waste to contain discrete items: No.

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	24.0
Incineration	Off-site	53.0
Solidification		
Decontamination		
Metal treatment	Off-site	13.0
Size reduction		
Decay storage		
Recyling / reuse		
Other / various		
None	Off-site	10.0

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, Cyclife, Tradebe 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 %	Disposal density t/m3
Expected to be consigned to the LLW Repository	34.0	
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	53.0	
Expected to be consigned to a Metal Treatment Facility	13.0	
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: -

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:

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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	34.0	40	17

Other information: Waste loading is representative of the raw waste following further planned treatments. Supercompaction assumed to reduce volume to 20% of original. Solidification assumed to increase volume to 300% of original. No treatment results in the same volume.

Waste Planned for Disposal at the LLW Repository:

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: Contamination by activation products from the reactor structure.

Uncertainty: Only very approximate estimates have been made of total specific activities. The activities quoted are those at the time of decommissioning.

Definition of total alpha and total beta/gamma: Total alpha and total beta/gamma are defined as the sums of the listed nuclide activities. Beta/gamma activity includes the activities of all nuclides other than alpha emitters.

Measurement of radioactivities: -

Other information: No nuclides other than those listed are expected to be significant.

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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			7.55E-05	C C 2	Gd 153				
Be 10				8	Ho 163				
C 14			3E-05	C C 2	Ho 166m				
Na 22					Tm 170				
Al 26					Tm 171				
Cl 36			1E-09	C C 2	Lu 174				
Ar 39					Lu 176				
Ar 42					Hf 178n				
K 40					Hf 182				
Ca 41				6	Pt 193				
Mn 53					Tl 204				
Mn 54			1.74E-08	C C 2	Pb 205				
Fe 55			1.39E-06	C C 2	Pb 210				8
Co 60			3.63E-06	C C 2	Bi 208				
Ni 59				6	Bi 210m				
Ni 63			7.73E-08	C C 2	Po 210				8
Zn 65			2.25E-10	C C 2	Ra 223				
Se 79				8	Ra 225				
Kr 81					Ra 226				8
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90			2.66E-07	C C 2	Th 227				
Zr 93				8	Th 228				
Nb 91					Th 229				8
Nb 92					Th 230				8
Nb 93m				6	Th 232				8
Nb 94				6	Th 234				
Mo 93				6	Pa 231				8
Tc 97					Pa 233				
Tc 99				6	U 232				
Ru 106			2.59E-08	C C 2	U 233				8
Pd 107				8	U 234				8
Ag 108m				6	U 235				8
Ag 110m			1.26E-10	C C 2	U 236				8
Cd 109					U 238				8
Cd 113m					Np 237				8
Sn 119m					Pu 236				
Sn 121m				6	Pu 238			1.92E-09	C C 2
Sn 123					Pu 239				8
Sn 126				8	Pu 240				8
Sb 125			1.97E-07	C C 2	Pu 241			1.57E-07	C C 2
Sb 126					Pu 242				8
Te 125m					Am 241				8
Te 127m				8	Am 242m				8
I 129				8	Am 243				8
Cs 134			3.72E-07	C C 2	Cm 242				8
Cs 135				8	Cm 243				8
Cs 137			5.35E-06	C C 2	Cm 244				8
Ba 133					Cm 245				8
La 137					Cm 246				8
La 138					Cm 248				
Ce 144			4.7E-09	C C 2	Cf 249				
Pm 145					Cf 250				
Pm 147				8	Cf 251				
Sm 147					Cf 252				
Sm 151				6	Other a				8
Eu 152				6	Other b/g			3.2E-10	C C 2
Eu 154				6	**Total a**	**0**		**1.92E-09**	**C C 2**
Eu 155				6	**Total b/g**	**0**		**1.17E-04**	**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