

WASTE STREAM	3S303	Decommissioning: Concrete LLW
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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 m ³
Future arisings -	1.4.2022 - 31.3.2040.....	0 m ³
	1.4.2040 - 31.3.2052.....	235.5 m ³
Total future arisings:		235.5 m ³
Total waste volume:		235.5 m ³

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 Concrete blocks from the removal of the reactor building bioshield and concrete rubble from shaving of ingrained contamination within floors and walls.

PHYSICAL CHARACTERISTICS

General description: Concrete and some steel reinforcement.

Physical components (%vol): Concrete and some steel reinforcement.

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): ~1.5

Comment on density: The density is of the waste as cut for packaging.

CHEMICAL COMPOSITION

General description and components (%wt): Concrete (100%). Some of the concrete includes steel reinforcement.

Chemical state: -

Chemical form of radionuclides: -

Metals and alloys (%wt): -

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	0		
Other ferrous metals.....	NE	Iron shot or reinforcing bar may be present.	
Iron.....	0		
Aluminium.....	0		
Beryllium.....	0		
Cobalt.....	0		
Copper.....	0		
Lead.....	0		
Magnox/Magnesium.....	0		
Nickel.....	0		
Titanium.....	0		
Uranium.....	0		

WASTE STREAM	3S303	Decommissioning: Concrete LLW
---------------------	--------------	--------------------------------------

Zinc..... 0
 Zircaloy/Zirconium..... 0
 Other metals..... 0

Organics (%wt): None expected.

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	0		
Paper, cotton.....	0		
Wood.....	0		
Halogenated plastics	0		
Total non-halogenated plastics.....	0		
Condensation polymers.....	0		
Others.....	0		
Organic ion exchange materials....	0		
Total rubber.....	0		
Halogenated rubber	0		
Non-halogenated rubber.....	0		
Hydrocarbons.....	0		
Oil or grease			
Fuel.....			
Asphalt/Tarmac (cont.coal tar)...			
Asphalt/Tarmac (no coal tar)....			
Bitumen.....			
Others.....			
Other organics.....	0		

Other materials (%wt): -

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials..	0		
Inorganic sludges and flocs.....	0		
Soil.....	0		
Brick/Stone/Rubble.....	0		
Cementitious material.....	~100.0		
Sand.....	0		
Glass/Ceramics.....			
Graphite.....	0		
Desiccants/Catalysts.....	0		
Asbestos.....	0		
Non/low friable.....			
Moderately friable.....			
Highly friable.....			
Free aqueous liquids.....	0		
Free non-aqueous liquids.....	0		

WASTE STREAM**3S303****Decommissioning: Concrete LLW**

Powder/Ash..... 0

Inorganic anions (%wt): Carbonates may be present.

	(%wt)	Type(s) and comment
Fluoride.....	NE	
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: 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	

WASTE STREAM	3S303	Decommissioning: Concrete LLW
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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.....	0
EEE Type 2.....	0
EEE Type 3.....	0
EEE Type 4.....	0
EEE Type 5.....	0

Complexing agents (%wt): Not yet determined

	(%wt)	Type(s) and comment
EDTA.....	NE	
DPTA.....	NE	
NTA.....	NE	
Polycarboxylic acids.....	NE	
Other organic complexants.....	NE	None expected.
Total complexing agents.....	NE	

Potential for the waste to contain discrete items: No.

TREATMENT, PACKAGING AND DISPOSAL

WASTE STREAM

3S303

Decommissioning: Concrete LLW

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		
Recycling / reuse		
Other / various		
None	On-site	100.0

Comment on planned treatments:

Wastes expected to be loaded directly to HHISO containers for disposal. Dusts / rubble may be immobilised in sacrificial containers within disposal packages.

Disposal Routes:

Disposal Route	Stream volume %	Disposal density t/m3
Expected to be consigned to the LLW Repository	100.0	
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		
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		

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:

WASTE STREAM 3S303 Decommissioning: Concrete LLW

Container	Stream volume %	Waste loading m ³	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	100.0	~6.6	36

Other information: -

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: Primarily activation of the concrete and steel reinforcement. Rubble / shavings will be contaminated rather than activated.

Uncertainty: -

Definition of total alpha and total beta/gamma: Radionuclides and ratios based on Primary Circuit activity values. Activity values normalised to calculated upper LLW limit of ~1.80E-2TBq/m³. Data sheet provided by Alan Simpson on 28/2/18 (future arisings only).

Measurement of radioactivities: Activation/decay calculations based on neutron flux and operating history.

Other information: There may be some contamination by Cs137. The activities quoted are those at the time of decommissioning.

WASTE STREAM

3S303

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Nuclide	Mean radioactivity, TBq/m ³				Nuclide	Mean radioactivity, TBq/m ³			
	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			1.8E-02	CC 3	Gd 153				
Be 10				8	Ho 163				
C 14			2.16E-05	CC 3	Ho 166m				
Na 22				4	Tm 170				
Al 26				4	Tm 171				
Cl 36				6	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				8	Pb 205				
Fe 55			2.16E-07	CC 3	Pb 210				8
Co 60			1.98E-06	CC 3	Bi 208				
Ni 59				6	Bi 210m				
Ni 63			1.38E-06	CC 3	Po 210				8
Zn 65				8	Ra 223				
Se 79				8	Ra 225				
Kr 81					Ra 226				8
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90			1.19E-07	CC 3	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			3.05E-10	CC 3	U 233				8
Pd 107				8	U 234				8
Ag 108m				6	U 235				8
Ag 110m					U 236				8
Cd 109					U 238				8
Cd 113m					Np 237				8
Sn 119m					Pu 236				
Sn 121m				6	Pu 238		6.47E-09	CC 3	
Sn 123					Pu 239		3.05E-09	CC 3	
Sn 126				8	Pu 240		3.05E-09	CC 3	
Sb 125			1.19E-08	CC 3	Pu 241		2.16E-07	CC 3	
Sb 126					Pu 242		9.52E-12	CC 3	
Te 125m					Am 241		1.4E-09	CC 3	
Te 127m					Am 242m		9.88E-07	CC 3	
I 129				8	Am 243		1.8E-10	CC 3	
Cs 134			3.05E-08	CC 3	Cm 242				8
Cs 135			8.62E-06	CC 3	Cm 243		7.19E-12	CC 3	
Cs 137				6	Cm 244		7.01E-10	CC 3	
Ba 133				6	Cm 245				8
La 137					Cm 246				8
La 138					Cm 248				
Ce 144				8	Cf 249				
Pm 145					Cf 250				
Pm 147				8	Cf 251				
Sm 147					Cf 252				
Sm 151				6	Other a				8
Eu 152				7	Other b/g				8
Eu 154				6	Total a	0	<1.49E-08	8	
Eu 155				6	Total b/g	0	<1.8E-02	C 3	

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