WASTE STREAM **3S310 Fuel Pond Solid Absorber Assemblies**

SITE Sizewell B

SITE OWNER EDFE NGL

WASTE CUSTODIAN EDFE NGL

WASTE TYPE ILW

Is the waste subject to Scottish Policy: No

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2022.....	0 m^3
Future arisings -	1.4.2022 - 31.3.2035.....	0 m^3
	1.4.2035 - 31.3.2038.....	31.2 m^3
Total future arisings:		31.2 m^3
Total waste volume:		31.2 m^3

Comment on volumes: -

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

WASTE SOURCE Metallic components used in the Fuel Storage Pond for Criticality Control.

PHYSICAL CHARACTERISTICS

General description: 420 in number neutron absorber assembies used in the fuel storage pond for criticality control.

Physical components (%vol): Each SAA consists of 24 neutron absorber rods held in a stainless steel framework. Each absorber rod consist of B4C (Boron carbide) pellets in a stainless steel tube.

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m^3): ~1

Comment on density: Density expected to be fairly low.

CHEMICAL COMPOSITION

General description and components (%wt): Each SAA has a nominal mass of 24.2kg and consists of 24 stainless steel rods enclosing Boron Carbide pellets held in a Stainless steel framework.

Chemical state: Neutral

Chemical form of radionuclides: -

Metals and alloys (%wt): -

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	~63.0	Primarily 318ss and 304ss	
Other ferrous metals.....	NE		
Iron.....	NE		
Aluminium.....	NE		
Beryllium.....	NE		
Cobalt.....	NE		
Copper.....	NE		
Lead.....	NE		
Magnox/Magnesium.....	NE		
Nickel.....	NE		
Titanium.....	NE		
Uranium.....	NE		

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Zinc	NE	
Zircaloy/Zirconium	NE	
Other metals	NE	Boron carbide

Organics (%wt): -

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulosics	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	0		
Sand	0		
Glass/Ceramics	~37.0	Boron carbide.	
Graphite	0		
Desiccants/Catalysts	0		
Asbestos	0		
Non/low friable			
Moderately friable			
Highly friable			
Free aqueous liquids	0		
Free non-aqueous liquids	0		

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Powder/Ash	0

Inorganic anions (%wt): -

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

Materials of interest for waste acceptance criteria: -

	(%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	P	
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	

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Tri-butyl phosphate.....	NE	
Other organophosphates.....	NE	
Vinyl chloride.....	NE	
Arsenic.....	NE	
Barium.....	NE	
Boron.....	P	Boron carbide pellets~37% wt.
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):

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

Potential for the waste to contain discrete items: No.

TREATMENT, PACKAGING AND DISPOSAL

Waste that is currently ILW: Through decontamination.

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

Treatment	On-site / Off site	Stream volume %
Low force compaction		
Supercompaction (HFC)		
Incineration		
Solidification	On-site	100.0
Decontamination	On-site	100.0
Metal treatment		
Size reduction		
Decay storage		
Recyling / reuse		
Other / various		
None		

Comment on planned treatments: Waste expected to be loaded into half height ISO containers with other LLW and encapsulated.

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:

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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	100.0	~9.5	4

Other information: Waste loading is estimated. Waste assemblies will be placed into interstitial spaced with other waste streams.

Waste Planned for Disposal at the LLW Repository:

Container voidage: -

It is not yet determined if the waste meets LLWR's Waste Acceptance Criteria (WAC).

Waste consigned for disposal to LLWR in year of generation: Not yet determined.

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: Metallic components removed from the fuel ponds following pond defuelling. The components will be contaminated with actinides and fission products from the storage pond. The rods will also be activated from proximity to the used fuel for extended period of which Co-60 is likely to be the most dominant in the medium term. It is expected that waste SSAs will be LLW or capable of being decontaminated down to that level.

Uncertainty: No activity values available at present. Radionuclides typical of pond items.

Definition of total alpha and total beta/gamma: Activity calculated using neurton flux measurements taken from dry store casks. Radionuclide content based on 50y activation of SAB assembly materials and ignores potential contamination. Data sheet provided by Alan Simpson on 28/2/18 (future arisings only) retained in task file.

Measurement of radioactivities: -

Other information: -

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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				6	Gd 153				
Be 10				6	Ho 163				
C 14			4.9E-11	C C 2	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				6	Pb 205				
Fe 55			8.33E-05	C C 2	Pb 210				6
Co 60			1.3E-05	C C 2	Bi 208				
Ni 59			1.25E-07	C C 2	Bi 210m				
Ni 63			1.38E-05	C C 2	Po 210				6
Zn 65				6	Ra 223				
Se 79				6	Ra 225				
Kr 81					Ra 226				6
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90				6	Th 227				
Zr 93				6	Th 228				
Nb 91					Th 229				6
Nb 92					Th 230				6
Nb 93m			2.05E-10	C C 2	Th 232				6
Nb 94				6	Th 234				
Mo 93			3.21E-10	C C 2	Pa 231				6
Tc 97					Pa 233				
Tc 99			6.2E-11	C C 6	U 232				
Ru 106				6	U 233				6
Pd 107				6	U 234				6
Ag 108m				6	U 235				6
Ag 110m				6	U 236				6
Cd 109					U 238				6
Cd 113m					Np 237				6
Sn 119m					Pu 236				
Sn 121m				6	Pu 238				6
Sn 123					Pu 239				6
Sn 126				6	Pu 240				6
Sb 125				6	Pu 241				6
Sb 126				6	Pu 242				6
Te 125m				6	Am 241				6
Te 127m					Am 242m				6
I 129				6	Am 243				6
Cs 134				6	Cm 242				6
Cs 135				6	Cm 243				6
Cs 137				6	Cm 244				6
Ba 133					Cm 245				6
La 137					Cm 246				6
La 138					Cm 248				
Ce 144				6	Cf 249				
Pm 145					Cf 250				
Pm 147				6	Cf 251				
Sm 147					Cf 252				
Sm 151				6	Other a				
Eu 152				6	Other b/g				
Eu 154				6	**Total a**	**0**		**0**	
Eu 155				6	**Total b/g**	**0**		**1.1E-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