WASTE STREAM 3S306 Decommissioning: Stainless Steel ILW

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 m³
Future arisings -	1.4.2022 - 31.3.2042.....	0 m³
	1.4.2042 - 31.3.2052.....	198.2 m³
Total future arisings:		198.2 m³
Total waste volume:		198.2 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 Stainless steel items from reactor dismantling.

PHYSICAL CHARACTERISTICS

General description:	A variety of stainless steel items from the reactor core internals. Waste can be packaged in standard RWM 2m packages and MOSAIK casks depending on dose rate.
Physical components (%vol):	Stainless steel items (100%).
Sealed sources:	The waste does not contain sealed sources.
Bulk density (t/m³):	~1.4
Comment on density:	The density is of the waste as cut for packaging.

CHEMICAL COMPOSITION

General description and components (%wt):	Almost completely stainless steel (100%) with possibly a trace of other metals.
Chemical state:	-
Chemical form of radionuclides:	-
Metals and alloys (%wt):	-

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	100.0		
Other ferrous metals.....	0		
Iron.....	0		
Aluminium.....			
Beryllium.....	0		
Cobalt.....	0		
Copper.....			
Lead.....	0		
Magnox/Magnesium.....	0		
Nickel.....			
Titanium.....	0		
Uranium.....	0		

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Zinc	0
Zircaloy/Zirconium	0
Other metals	0

Organics (%wt): None expected.

	(%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			
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): None likely to be present.

	(%wt)	Type(s) and comment
Fluoride	0	
Chloride	0	
Iodide	0	
Cyanide	0	
Carbonate	0	
Nitrate	0	
Nitrite	0	
Phosphate	0	
Sulphate	0	
Sulphide	0	

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	P	May be present.
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.....	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	Only trace quantities, if any.
Total complexing agents.....	NE	

Potential for the waste to contain discrete items: Yes.

PACKAGING AND CONDITIONING

Conditioning method: The waste will be cut under water as required to enable optimised loading within packages. Lower activity sections will be placed into baskets and then into 2m box waste packages with 200mm shielding which are then assumed to be encapsulated. Higher activity sections will be placed into smaller baskets and loaded into MOSAIKs with 40mm lead shielding.

Plant Name: -

Location: -

Plant startup date: About 8 years after reactor shutdown.

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Total capacity (m^3/y incoming waste):	~500.0
Target start date for packaging this stream:	-
Throughput for this stream (m^3/y incoming waste):	-
Other information:	Waste will be conditioned when removed from the reactor.

Likely container type:

Container	Waste packaged (%vol)	Waste loading (m^3)	Payload (m^3)	Number of packages
2m box (200mm concrete shielding)	~75.0	~6.2	~4.9	24
500 l RS drum (40mm Pb)	25.0	0.84	0.309	59

Likely container type comment:	-
Range in container waste volume:	-
Other information on containers:	Stainless steel (2m boxes) or mild steel (MOSAIK).
Likely conditioning matrix:	BFS/OPC
Other information:	-
Conditioned density (t/m^3):	~3.43
Conditioned density comment:	-
Other information on conditioning:	The waste will be in baskets placed in the waste packages.
Opportunities for alternative disposal routing:	No

Baseline Management Route	Opportunity Management Route	Stream volume (%)	Estimated Date that Opportunity will be realised	Opportunity Confidence	Comment
-	-	-	-	-	-

RADIOACTIVITY

Source:	Activation of the stainless steel and impurities.
Uncertainty:	The values quoted were derived by calculation from available material specifications and are indicative of the activities that are to be expected. These figures require review as there is significant uncertainty in the values quoted.
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:	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.

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Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2022	Bands and Code	Future arisings	Bands and Code	Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2022	Bands and Code	Future arisings	Bands and Code
H 3			1E+00	C C 2	Gd 153				
Be 10				8	Ho 163				
C 14			3E-01	C C 2	Ho 166m			3.7E-05	C C 2
Na 22				4	Tm 170				
Al 26				4	Tm 171				
Cl 36			1E-04	C C 2	Lu 174				
Ar 39					Lu 176				
Ar 42					Hf 178n				
K 40					Hf 182				
Ca 41				8	Pt 193				
Mn 53					Tl 204				
Mn 54				8	Pb 205				
Fe 55			4E+02	C C 2	Pb 210				8
Co 60			7E+01	C C 2	Bi 208				
Ni 59			8E-01	C C 2	Bi 210m				
Ni 63			1E+02	C C 2	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				8	Th 227				
Zr 93				8	Th 228				
Nb 91					Th 229				8
Nb 92			3E-09	C C 2	Th 230				8
Nb 93m			3E+00	C C 2	Th 232				8
Nb 94			1E-02	C C 2	Th 234				
Mo 93			3E-03	C C 2	Pa 231				8
Tc 97					Pa 233				
Tc 99			3E-04	C C 2	U 232				
Ru 106				8	U 233				8
Pd 107				8	U 234				8
Ag 108m			9E-05	C C 2	U 235				8
Ag 110m					U 236				8
Cd 109					U 238				8
Cd 113m					Np 237				8
Sn 119m					Pu 236				
Sn 121m			2E-02	C C 2	Pu 238				8
Sn 123					Pu 239				8
Sn 126				8	Pu 240				8
Sb 125					Pu 241				8
Sb 126					Pu 242				8
Te 125m					Am 241				8
Te 127m					Am 242m				8
I 129				8	Am 243				8
Cs 134				8	Cm 242				8
Cs 135				8	Cm 243				8
Cs 137				8	Cm 244				8
Ba 133					Cm 245				8
La 137					Cm 246				8
La 138					Cm 248				
Ce 144				8	Cf 249				
Pm 145			1.43E-05	C C 2	Cf 250				
Pm 147				8	Cf 251				
Sm 147					Cf 252				
Sm 151			3E-06	C C 2	Other a				8
Eu 152			4E-05	C C 2	Other b/g				8
Eu 154			1E-05	C C 2	**Total a**	**0**		**<1E-09**	**8**
Eu 155			1E-05	C C 2	**Total b/g**	**0**		**5.75E+02**	**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