WASTE STREAM	4B17	Miscellaneous Contaminated Items

SITE Hunterston B

SITE OWNER EDF Energy Nuclear Generation Ltd (EDFE NGL)

WASTE CUSTODIAN EDF Energy Nuclear Generation Ltd (EDFE NGL)

WASTE TYPE ILW

WASTE VOLUMES

		Reported (m^3)
Stocks:	At 1.4.2025	= 4.0
Future arisings:	1.4.2025 - 31.3.2026	= 1.0
	1.4.2026 - 31.3.2027	= 6.4
	1.4.2027 - 31.3.2028	= 25.8
	1.4.2028 - 31.3.2029	= 25.8
Total future arisings:		**59.1**
Total waste volume:		**63.1**

OR

Conditioned (m^3)	Packaged (m^3)

Number of waste packages in stock: At 1.4.2025…… - packages

Comment on arising rates: Waste volumes will be variable depending on station operating conditions.
It is assumed that Hunterston B will be required to manage 42 AGR fuel transport skips. 4 of these are assumed to arise in the 26/27 arisings year, with the remaining 38 split evenly between 27/28 and 28/29.

Additional information on quantities: It is assumed that Hunterston B will be required to manage 42 AGR fuel transport skips. Each skip is assumed to have an envelope volume of 1.36m3, based on manufacturing drawings.

Uncertainty factors on volumes:

Stock (upper):	x 1.25	Arisings (upper):	x 1.10
Stock (lower):	x 0.75	Arisings (lower):	x 0.90

WASTE SOURCE Redundant contaminated plant items and other materials contaminated beyond the limits for LLW.

Also included under future arisings is AGR fuel transport skips. These were used to transport fuel from AGR sites to Sellafield. The skips are an integral part of Wet Fuel Route operations at AGR sites, and as such have become contaminated through Wet Fuel Route activities. It is expected that there is no measureable activation of the skips, and that radiological properties are borne solely from contamination.

This wastestream covers 42 skips expected to remain at Hunterston B.

PHYSICAL CHARACTERISTICS

General description: Expected to be primarily metal items. Other items such as filters and bags of vacuum cleaner waste may also be present.

The skips included under future arisings are:
- '14/15-compartment' element skip: 900 kg, 1.36 m3
- Total weight: 37,800 kg, 57.12 m3 ('as is')

The main body of the skips are fabricated from 304 stainless steel, and the internal fins are composed of 0.6% boronated stainless steel, with potential of small amount of lead paint flakes (0.01 kg). Expected weight of the boronated steel is ~288.70kg per '14/15-compartment' skip.

Changes since waste generated: -

Bulk density (t/m^3): ~ 0.66

Comment on density: Density based on skips with a weight of 900kg and envelope volume of 1.36m3 per skip.

CHEMICAL COMPOSITION

General description and components (%wt): The bulk of this waste is skips which are: 304 stainless steel (67%), boronated stainless steel (33%), carbonaceous / other debris (trace amounts)

The remaining waste is principally steel but may include other components . Organic material may be present in small quantities e.g. traces of oil. Fission products, actinides and other activation products will be present as contaminants.

Chemical state: Neutral

Sheet metal proportion / thickness: -

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel	~ 95.0	-	
Other ferrous metals	~ 4.0	-	
Iron		-	
Aluminium	NE	-	
Beryllium	NE	-	
Cobalt	NE	-	
Copper	NE	-	
Lead	NE	-	
Magnox/Magnesium	= 0	-	
Nickel	NE	-	
Titanium	NE	-	
Uranium	NE	-	
Zinc	NE	-	
Zircaloy/Zirconium	= 0	-	
Other metals	NE	-	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulosics	NE	-	
Paper, cotton	NE	-	
Wood	NE	-	
Halogenated plastics	NE	-	
Total non-halogenated plastics	~ 1.0	-	
Condensation polymers	NE	-	
Others	NE	-	
Organic ion exchange materials	= 0	-	
Total rubber	NE	-	
Halogenated rubber	NE	-	
Non-halogenated rubber	NE	-	
Hydrocarbons		-	
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	= 0	-	
Inorganic sludges and flocs	= 0	-	
Soil	= 0	-	
Brick/Stone/Rubble	= 0	-	
Cementitious material	= 0	-	
Sand	= 0	-	
Glass/Ceramics	= 0	-	
Graphite	NE	-	
Desiccants/Catalysts	= 0	-	
Asbestos	NE	-	
Non/low friable		-	
Moderately friable		-	
Highly friable		-	
Free aqueous liquids	= 0	-	
Free non-aqueous liquids	= 0	-	
Powder/Ash	= 0	-	

COMPONENTS OF MATERIALS, WASTE PROPERTIES, MATERIALS NOT CONTRIBUTING TO MASS

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	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	~ 0.02	Alloyed in boronated stainless steel
Boron (in Boral)	NE	-
Boron (non-Boral)	NE	-
Cadmium	NE	-
Caesium	NE	-
Selenium	NE	-
Chromium	~ 18.0	Alloyed in 304 and boronated stainless steel
Molybdenum	NE	-
Thallium	NE	-
Tin	NE	-
Vanadium	NE	-
Mercury compounds	NE	-
Others	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	May be present in trace quantities.
Total complexing agents	NE	-

Physical components:

	Number	Type(s) and comment
Sources	= 0	-
Electronic & Electrical Equipment (EEE)		-
EEE Type 1		-
EEE Type 2		-
EEE Type 3		-
EEE Type 4		-
EEE Type 5		-

TREATMENT, PACKAGING AND DISPOSAL

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

Treatment	On-site / Off-site	Stream volume %
Size reduction		
Decay storage		
Low force compaction		
Supercompaction (HFC)		
Incineration		
Drying/dewatering/liquid separation		
Tie down/fixatives/strippable coating/painting application		
Decontamination		
Metal treatment		
Recycling / reuse		
Thermal treatment, including vitrification		
Encapsulation		
Polymer encapsulation		
Other physical treatment		
Other chemical treatment		
Containerisation		
Treatment not yet determined	On-site	= 100.0
None		

Comments on planned treatments: The MCI will be processed according to the BPM principles. It is anticipated this will include decay storage, decontamination and metal treatment. LLW will be segregated and disposed of using the usual permitted routes.

For future arisngs of skips, a trial is due to commence soon to determine the prefered method for treating AGR fuel transport skips. The waste hierarchy and WAC will be followed to determine the BAT to recycling / disposal.

Conditioning method: ILW will be encapsulated

Conditioning plants:

Plant Name	Location

Likely conditioning matrix: Cement 1:1 BFS/PFA

Further information on the conditioning matrix: -

Waste Packaging:

Likely container type:

Container	Waste packaged (vol%)	Waste loading (m^3)	Payload (m^3)	Number of packages	Estimated start date for packaging
3 m^3 box (side lifting)	10.0	1.4	2.7	5	-

Range in container waste loading:

Other information on packaging and conditioning: Appropriate plant will be provided at the Station in accordance with EDF Energy strategy. Decontamination followed by cutting to reduce volumes may be appropriate for some wastes.

Conditioned density (t/m^3): ~ 3.0

Conditioned density comment: Expected to be between 2 and 4 t/m^3. The maximum density of the conditioned waste will be less than 7.5 t/m^3.

Management Routes:

Disposal Route	Stream volume %	Raw density t/m^3	Start date
Expected to be consigned to a Near Site, Near Surface Disposal Facility (Scotland)	= 10.0		
Expected to be Non-NSD HAW managed under Scottish Government's policy			
Expected to be disposed to LLW Vaults NRS Dounreay			
Expected to be consigned to the Geological Disposal Facility			
Expected to be consigned to a Near Surface Disposal Facility			
Expected to be consigned to the LLW Repository			
Expected to be consigned to a Landfill Facility			
Expected to be disposed On-Site			
Expected to be managed by In-Situ Disposal			
Expected to be consigned to an Incineration Facility			
Expected to be consigned to a Metal Treatment Facility			
Expected to be Out of Scope			
Expected to be recycled / reused			
Disposal route not known	= 90.0		

Classification codes for waste expected to be consigned to a landfill facility:

Opportunities for alternative disposal routing: Yes

Baseline Management Route	Opportunity Management Route	Stream volume (%)	Opportunity Confidence	Comment
Unknown	Metal treatment facility	= 90.0	AMBER	This opportunity applies to Fuel Transport Skips

RADIOACTIVITY

Source:

Redundant contaminated plant items and materials, contaminated beyond the limits for LLW.

For the future arisings of skips, radioactivity in the form of contamination from radionuclides present in the AGR fuel storage ponds at AGR stations and Sellafield. No notable activiation of the skip is anticipated.

Uncertainty:

Activity data not yet assessed.

For future arisings of skips,specific activity data is based on analysis of coupons recovered from the top of a limited number of skips. This is not fully representative of the whole skip. It is assumed that all AGR fuel transport skips can be treated as a single population, subject to confirmation from further characterisation in the future.

Measurement of radioactivities:

Not yet assessed. Radionucliides that are expected to be present are listed.

For future arising of skips, activities derived from exiting AGR fingerprints supplemented with information from analysis of coupons from a number of skips.

Chemical form of radionuclides:

H-3: Diffused into materials
C-14: Graphite
Cl-36: Not assessed
Se-79: Not assessed
Tc-99: Not assessed
I-129: Not expected to be significant
Ra: Not expected to be significant
Th: Not expected to be significant
U: Not assessed
Np: Not assessed
Pu: Not assessed

WASTE STREAM **4B17** **Miscellaneous Contaminated Items**

Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2025	Bands and Code	Future Arisings	Bands and Code	Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2025	Bands and Code	Future Arisings	Bands and Code
H 3		6	7.58E-06	C C 2	Gd 153				
Be 10		8			Ho 163				
C 14		6	3.23E-07	C C 2	Ho 166m				
Na 22		4			Tm 170				
Al 26		4			Tm 171				
Cl 36		6	3.50E-07	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		6	2.03E-06	C C 2	Pb 205				
Fe 55		6	1.16E-04	C C 2	Pb 210		8		
Co 60		6	8.78E-06	C C 2	Bi 208				
Ni 59		6			Bi 210m				
Ni 63		6	1.10E-05	C C 2	Po 210		8		
Zn 65		6	1.91E-07	C C 2	Ra 223				
Se 79		6			Ra 225				
Kr 81					Ra 226		8		
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90		6	1.29E-06	C C 2	Th 227				
Zr 93		6			Th 228				
Nb 91					Th 229		8		
Nb 92					Th 230		8		
Nb 93m		8			Th 232		8		
Nb 94		6	1.86E-07	C C 2	Th 234				
Mo 93		8			Pa 231		8		
Tc 97					Pa 233				
Tc 99		6			U 232				
Ru 106		6	2.18E-07	C C 2	U 233		8		
Pd 107		8			U 234		6	6.60E-08	C C 2
Ag 108m		6	4.64E-08	C C 2	U 235		8	1.06E-09	C C 2
Ag 110m		6	8.65E-07	C C 2	U 236		8	1.71E-08	C C 2
Cd 109					U 238		8	1.96E-08	C C 2
Cd 113m					Np 237		8		
Sn 119m					Pu 236				
Sn 121m		8			Pu 238		6	2.35E-05	C C 2
Sn 123					Pu 239		6	1.19E-05	C C 2
Sn 126		6			Pu 240		6	2.81E-05	C C 2
Sb 125		6	2.15E-07	C C 2	Pu 241		6	3.23E-05	C C 2
Sb 126					Pu 242		8		
Te 125m					Am 241		6	6.73E-05	C C 2
Te 127m					Am 242m		6		
I 129		8	1.87E-11	C C 2	Am 243		6		
Cs 134		6	1.86E-07	C C 2	Cm 242		6	9.46E-07	C C 2
Cs 135		6			Cm 243		8	7.09E-08	C C 2
Cs 137		6	5.41E-05	C C 2	Cm 244		6	4.22E-06	C C 2
Ba 133		6			Cm 245		8		
La 137					Cm 246		8		
La 138					Cm 248				
Ce 144		6	7.33E-08	C C 2	Cf 249				
Pm 145					Cf 250				
Pm 147		6	4.35E-07	C C 2	Cf 251				
Sm 147					Cf 252				
Sm 151		6			Unsp a		8		
Eu 152		6	1.39E-07	C C 2	Unsp b/g		6	1.06E-05	C C 2
Eu 154		6	3.23E-06	C C 2	**Total a**	**0**	*	**1.36E-04**	*
Eu 155		6	1.89E-06	C C 2	**Total b/g**	**0**	*	**2.52E-04**	*

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 the 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
* Total calculated from the 114 declared radionuclides