

WASTE STREAM	3J27	Miscellaneous Activated Components & Fuel Stringer Debris - Debris Vault 2
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SITE Dungeness 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)	OR	Conditioned (m ³)	Packaged (m ³)
Stocks:	At 1.4.2025	= 324.3		
Future arisings:	1.4.2025 - 31.3.2028	= 52.4		
Total future arisings:		52.4		
Total waste volume:		376.7		

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

Comment on arising rates: Generation has ended and as such future arisings will be limited to those from defuelling. Conservative future arising of 17.48 m3/yr assumed based on previous estimates.

Additional information on quantities: -

Uncertainty factors on volumes: Stock (upper): x 1.25 Arisings (upper): x 1.75
Stock (lower): x 0.75 Arisings (lower): x 0.25

WASTE SOURCE Graphite, stainless steel and nimonic components resulting from the dismantling of fuel stringers.

PHYSICAL CHARACTERISTICS

General description: Tie-bars, central inertial collectors (CICs), Spring Collet Assemblies, Graphite Sleeves, other items, including additional high activity components in steel tins, may also be present.

Changes since waste generated: -

Bulk density (t/m³): ~ 0.95

Comment on density: -

CHEMICAL COMPOSITION

General description and components (%wt): Graphite items from the dismantling of fuel stringers, steel and nimonic. Breakdown is not assessed.

Chemical state: Neutral

Sheet metal proportion / thickness: -

Metals and alloys (%wt):

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

Organics (%wt):

	(%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.....	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.....	-	-	
Graphite.....	P	-	
Desiccants/Catalysts.....	= 0	-	
Asbestos.....	= 0	-	
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	-
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	-

Complexing agents (%wt):

Yes		
	(%wt)	Type(s) and comment
EDTA.....	NE	-
DPTA.....	NE	-
NTA.....	NE	-
Polycarboxylic acids.....	NE	-
Other organic complexants.....	NE	Expect only trace quantities, if any.
Total complexing agents.....	TR	-

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 None	On-site	= 100.0

Comments on planned treatments:

Conditioning method: "The waste will be conditioned to satisfy the disposal requirements which are effective at the time of retrieval/conditioning. It is currently assumed that the waste will be placed in 'baskets' in the waste packages and will be encapsulated."

Conditioning plants:

Plant Name	Location
Dungeness B Waste Management Centre (WMC)	Dungeness B

Likely conditioning matrix:

Further information on the conditioning matrix:

Conditioning matrix will be BFS/OPC. Mix ratios are yet to be established

Waste Packaging:

Likely container type:	Container	Waste packaged (vol%)	Waste loading (m³)	Payload (m³)	Number of packages	Estimated start date for packaging
	4 m box (100 mm concrete shielding)	100.0	12.2	14.3	31	-

Range in container waste loading:

Other information on packaging and conditioning:

Waste will be retained on site pending Final Site Clearance, to let nuclides such as Co-60 undergo considerable radioactive decay. Baskets of different Final Site Clearance ILW wastes may be in the same waste package.

Conditioned density (t/m³):
Conditioned density comment:

~ 3.0
The density of the encapsulated waste is expected to be approximately 3 t/m³.

Management Routes:

Disposal Route	Stream volume %	Raw density t/m³	Start date
Expected to be consigned to a Near Site, Near Surface Disposal Facility (Scotland)	= 100.0		
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			

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

Opportunities for alternative disposal routing: No

Baseline Management Route	Opportunity Management Route	Stream volume (%)	Opportunity Confidence	Comment
-	-	-	-	-

RADIOACTIVITY

Source:

Components resulting from the dismantling of fuel stringers. Activation of nuclides within the, graphite, steel and the Nimonic will be the main sources of activity.

Uncertainty:

Specific activity is a function of station operating history. The values quoted are indicative of the activities that might be expected.

Measurement of radioactivities:

"Estimates have been based on theoretical assessments. Other beta/gamma nuclides (in TBq/m³) expected in the arisings and stocks are: - S35 (1E-1, 1E-3); Ca45 (1E-1, 2E-3); Cr51 (2E+3, 8E-1); Co58 (2E+2, 1E+0); Sr89 (2E-6, 6E-9); Zr95 (4E-2, 2E-4); Nb95 (2E+0, 2E-3); Ta182 (1E-3, 1E-5); Sc46 (1E-2, 9E-5); Fe59 (3E+1, 7E-2); Sr85 (2E-6, 1E-8); Sn113 (9E-6, 1E-7); Sb124 (5E-8, 2E-10); Sm145 (5E-7, 3E-8) and W181 (5E-7, 8E-9)."

Chemical form of radionuclides:

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

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Nuclide	Mean radioactivity, TBq/m³				Nuclide	Mean radioactivity, TBq/m³			
	Waste at 1.4.2025	Bands and Code	Future Arisings	Bands and Code		Waste at 1.4.2025	Bands and Code	Future Arisings	Bands and Code
H 3	7.00E-03	C C 2	1.00E-02	C C 2	Gd 153				
Be 10	2.00E-07	C C 2	2.00E-07	C C 2	Ho 163				
C 14	5.00E-02	C C 2	5.00E-02	C C 2	Ho 166m				
Na 22		4		4	Tm 170				
Al 26		4		4	Tm 171				
Cl 36	2.00E-05	C C 2	2.00E-05	C C 2	Lu 174				
Ar 39					Lu 176				
Ar 42					Hf 178n				
K 40					Hf 182				
Ca 41	5.00E-05	C C 2	5.00E-05	C C 2	Pt 193				
Mn 53					Tl 204				
Mn 54	2.00E+00	C C 2	5.00E+01	C C 2	Pb 205				
Fe 55	1.00E+02	C C 2	5.00E+02	C C 2	Pb 210		8		8
Co 60	2.00E+02	C C 2	4.00E+02	C C 2	Bi 208				
Ni 59	5.00E-01	C C 2	5.00E-01	C C 2	Bi 210m				
Ni 63	5.00E+01	C C 2	5.00E+01	C C 2	Po 210		8		8
Zn 65	2.00E-05	C C 2	4.00E-04	C C 2	Ra 223				
Se 79		8		8	Ra 225				
Kr 81					Ra 226		8		8
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90		8		8	Th 227				
Zr 93	3.00E-07	C C 2	3.00E-07	C C 2	Th 228				
Nb 91					Th 229		8		8
Nb 92					Th 230		8		8
Nb 93m	4.00E-04	C C 2	4.00E-04	C C 2	Th 232		8		8
Nb 94	4.00E-02	C C 2	4.00E-02	C C 2	Th 234				
Mo 93	5.00E-03	C C 2	5.00E-03	C C 2	Pa 231		8		8
Tc 97					Pa 233				
Tc 99		8		8	U 232				
Ru 106		8		8	U 233		8		8
Pd 107		8		8	U 234		8		8
Ag 108m	3.00E-03	C C 2	3.00E-03	C C 2	U 235		8		8
Ag 110m	2.00E-01	C C 2	5.00E+00	C C 2	U 236		8		8
Cd 109	7.00E-04	C C 2	1.00E-02	C C 2	U 238		8		8
Cd 113m	4.00E-08	C C 2	5.00E-08	C C 2	Np 237		8		8
Sn 119m	2.00E-08	C C 2	4.00E-07	C C 2	Pu 236				
Sn 121m		8		8	Pu 238		8		8
Sn 123	2.00E-07	C C 2	9.00E-06	C C 2	Pu 239		8		8
Sn 126		8		8	Pu 240		8		8
Sb 125					Pu 241		8		8
Sb 126					Pu 242		8		8
Te 125m					Am 241		8		8
Te 127m					Am 242m		8		8
I 129		8		8	Am 243		8		8
Cs 134		8		8	Cm 242		8		8
Cs 135		8		8	Cm 243		8		8
Cs 137		8		8	Cm 244		8		8
Ba 133	7.00E-08	C C 2	1.00E-07	C C 2	Cm 245		8		8
La 137					Cm 246		8		8
La 138					Cm 248				
Ce 144		8		8	Cf 249				
Pm 145					Cf 250				
Pm 147		8		8	Cf 251				
Sm 147					Cf 252				
Sm 151	2.00E-06	C C 2	2.00E-06	C C 2	Unsp a		8		8
Eu 152	3.00E-03	C C 2	4.00E-03	C C 2	Unsp b/g	2.00E+00	2	2.00E+03	2
Eu 154	8.00E-04	C C 2	2.00E-03	C C 2	Total a	0	*	0	*
Eu 155	2.00E-04	C C 2	4.00E-04	C C 2	Total b/g	3.55E+02	*	3.01E+03	*

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