

WASTE STREAM	9F910	Reactor Area LLW
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SITE Sizewell A

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Nuclear Restoration Services Ltd (NRS)

WASTE TYPE LLW

WASTE VOLUMES

	Reported (m ³)	OR	Conditioned (m ³)	Packaged (m ³)
Stocks:	At 1.4.2025 = 0			
Future arisings:	1.4.2025 - 31.3.2041 225.0			
Total future arisings:	225.0			
Total waste volume:	225.0			

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

Comment on arising rates: -

Additional information on quantities: Volumes stated assume waste has been removed from the system and size corrected awaiting further treatment and disposal. This work will occur during Initial Decommissioning Works.

Uncertainty factors on volumes:

Stock (upper):	x -	Arisings (upper):	x 1.10
Stock (lower):	x -	Arisings (lower):	x 0.90

WASTE SOURCE The wastestream consists of waste arising from areas associated with the pile cap, burst can detection system, contaminated workshop, boiler externals, gas circulators and paper/carboard filters from the reactor ventilation plant.

PHYSICAL CHARACTERISTICS

General description: The types of waste associated with this wastestream include decommissioned plant and equipment, structural materials and secondary wastes such as wood, coveralls, plastic and rubber. Small quantities of paint, putrescible waste and trace quantities of oil/grease may also be present in the waste.

Changes since waste generated: -

Bulk density (t/m³): ~ 0.80

Comment on density: Bulk density has been based on the assumed density of concrete 2.4 t/m³, lead 11 t/m³, metal 7.9 t/m³, plastic 1.3 t/m³, and wood 0.5 t/m³.

CHEMICAL COMPOSITION

General description and components (%wt): The waste comprises metals, mainly steel, various plastics including polythene, rubber, paper and components. The waste also contains HEPA filters. Metal (~40%), plastic (30%), rubber/paper/wood (11%), concrete/rubble (7%), Soil (1%), organics (10%), and other materials (1%).

Chemical state: Neutral

Sheet metal proportion / thickness: 200 litre steel drums have a wall thickness of about 1mm.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	~ 20.0	Redundant plant components.	
Other ferrous metals.....	~ 20.0	mild steel redundant plant components - this may typically include redundant ladders / walkways to be de-planted as part of planned boiler asbestos remediation work	
Iron.....	-	-	
Aluminium.....	~ 0.17	scaffolding	
Beryllium.....	-	-	
Cobalt.....	-	-	
Copper.....	-	-	
Lead.....	~ 0.15	shielding	
Magnox/Magnesium.....	-	-	
Nickel.....	-	-	
Titanium.....	-	-	
Uranium.....	-	-	
Zinc.....	~ 0.17	cladding, buckets, scaffolding	
Zircaloy/Zirconium.....	-	-	
Other metals.....	-	-	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulotics.....	= 1.0	-	
Paper, cotton.....		-	
Wood.....	= 1.0	-	
Halogenated plastics.....	= 10.0	Polyethylene sheeting, general miscellaneous waste	
Total non-halogenated plastics.....	= 20.0	-	
Condensation polymers.....		-	
Others.....	= 20.0	Polyethylene sheeting, general miscellaneous waste	
Organic ion exchange materials.....		-	
Total rubber.....	= 10.0	-	
Halogenated rubber.....		-	
Non-halogenated rubber.....	= 10.0	-	
Hydrocarbons.....		-	
Oil or grease.....	= 0.17	-	
Fuel.....		-	
Asphalt/Tarmac (cont.coal tar).....		-	
Asphalt/Tarmac (no coal tar).....		-	
Bitumen.....	= 0.04	Sisalkraft - paper including a bitumen layer	
Others.....		-	
Other organics.....	= 10.0	-	

Other materials (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials.....		-	
Inorganic sludges and flocs.....		-	
Soil.....	= 1.0	-	
Brick/Stone/Rubble.....	= 3.5	-	
Cementitious material.....	= 3.5	-	
Sand.....		-	
Glass/Ceramics.....		-	
Graphite.....		-	
Desiccants/Catalysts.....		-	
Asbestos.....	0	-	
Non/low friable.....		-	
Moderately friable.....		-	
Highly friable.....		-	
Free aqueous liquids.....		-	
Free non-aqueous liquids.....		-	
Powder/Ash.....		-	

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

Inorganic anions (%wt):

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

Materials of interest for waste acceptance criteria:

	(%wt)	Type(s) and comment
Combustible metals.....		-
Low flash point liquids.....		-
Explosive materials.....		-
Phosphorus.....		-
Hydrides.....		-
Biological etc. materials.....		-
Biodegradable materials.....	= 0.17	-
Putrescible wastes.....	= 0.17	pigeon waste
Non-putrescible wastes.....		-
Corrosive materials.....		-
Pyrophoric materials.....		-
Generating toxic gases.....		-
Reacting with water.....	P	43.3m2
Higher activity particles.....		-
Soluble solids as bulk chemical compounds.....		-

Hazardous substances / non hazardous pollutants:

	(%wt)	Type(s) and comment
Acrylamide.....	0	-
Benzene.....		-
Chlorinated solvents.....		-
Formaldehyde.....		-
Organometallics.....		-
Phenol.....		-
Styrene.....		-
Tri-butyl phosphate.....		-
Other organophosphates.....		-
Vinyl chloride.....		-
Arsenic.....		-
Barium.....		-
Boron.....		-
Boron (in Boral).....		-
Boron (non-Boral).....		-
Cadmium.....		-
Caesium.....		-
Selenium.....		-
Chromium.....		-
Molybdenum.....		-
Thallium.....		-
Tin.....		-
Vanadium.....		-
Mercury compounds.....		-
Others.....	= 0.40	includes vacuum cleaner (nilfisk) bags, respirators and HEPA filters.

Complexing agents (%wt):

No		
	(%wt)	Type(s) and comment
EDTA.....	= 0	-
DPTA.....		-
NTA.....		-
Polycarboxylic acids.....		-
Other organic complexants.....		-
Total complexing agents.....		-

Physical components:

	Number	Type(s) and comment
Sources.....		-
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	On-site	= 3.0
Decay storage		
Low force compaction		
Supercompaction (HFC)	Off-site	= 3.0
Incineration	Off-site	= 81.0
Drying/dewatering/liquid separation	Off-site	= 8.0
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		= 8.0

Comments on planned treatments:

Conditioning method:

Conditioning plants:

Plant Name	Location

Likely conditioning matrix:

Further information on the conditioning matrix:

Waste Packaging:

Likely container type:	Container	Waste packaged (vol%)	Waste loading (m³)	Payload (m³)	Number of packages	Estimated start date for packaging
	1/2 Height WAMAC IP-2 ISO (TC08)	3.0	43.2	18.8	1	-
	1/2 Height IP-2 Disposal/Re-usable ISO (TC01/TC02)	8.0	10.0	18.3	2	-

Range in container waste loading: -

Other information on packaging and conditioning: -

Conditioned density (t/m³): -
Conditioned density comment: -**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)			
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	= 11.0	0.80	
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	= 81.0	0.40	
Expected to be consigned to a Metal Treatment Facility	= 8.0	1.4	
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: Activation and contamination of materials.

Uncertainty: All of the waste will fall into the LLW category. The activity values quoted are the current best estimates.

Measurement of radioactivities: -

Chemical form of radionuclides:

H-3: Tritium may be present as surface contamination of waste by tritiated liquor.

C-14: Chemical form of carbon 14 may be contamination in the form of graphite dust.

Cl-36: Chlorine 36 may be present as a contaminant of graphite dust.

Se-79: The selenium 79 content is insignificant.

Tc-99: The technetium-99 content is insignificant.

I-129: -

Ra: The radium isotope content is insignificant.

Th: The thorium content is insignificant.

U: The chemical form of uranium isotopes has not been determined but may be uranium oxides.

Np: The neptunium isotope content is insignificant.

Pu: The chemical form of plutonium isotopes has not been determined but may be plutonium oxides.

WASTE STREAM 9F910 Reactor Area LLW									
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			1.76E-04	C C 1	Gd 153				8
Be 10				8	Ho 163				8
C 14			2.00E-05	C C 1	Ho 166m				8
Na 22				8	Tm 170				8
Al 26				8	Tm 171				8
Cl 36			1.37E-05	C C 1	Lu 174				8
Ar 39				8	Lu 176				8
Ar 42				8	Hf 178n				8
K 40				8	Hf 182				8
Ca 41				8	Pt 193				8
Mn 53				8	Ti 204				8
Mn 54				8	Pb 205				8
Fe 55			1.49E-06	C C 1	Pb 210				8
Co 60			1.78E-06	C C 2	Bi 208				8
Ni 59				8	Bi 210m				8
Ni 63			6.70E-06	C C 1	Po 210				8
Zn 65				8	Ra 223				8
Se 79				8	Ra 225				8
Kr 81				8	Ra 226				8
Kr 85				8	Ra 228				8
Rb 87				8	Ac 227				8
Sr 90			5.49E-06	C C 1	Th 227				8
Zr 93				8	Th 228				8
Nb 91				8	Th 229				8
Nb 92				8	Th 230				8
Nb 93m				8	Th 232				8
Nb 94			2.56E-07	C C 2	Th 234			3.95E-07	C C 2
Mo 93				8	Pa 231				8
Tc 97				8	Pa 233				8
Tc 99				8	U 232				8
Ru 106				8	U 233				8
Pd 107				8	U 234			4.04E-07	C C 1
Ag 108m			2.10E-07	C C 2	U 235			2.48E-08	C C 1
Ag 110m				8	U 236			1.25E-07	C C 1
Cd 109				8	U 238			3.95E-07	C C 1
Cd 113m				8	Np 237				8
Sn 119m				8	Pu 236				8
Sn 121m				8	Pu 238			6.05E-08	C C 1
Sn 123				8	Pu 239			7.17E-08	C C 1
Sn 126				8	Pu 240			9.30E-08	C C 1
Sb 125			1.81E-08	C C 2	Pu 241			4.04E-06	C C 1
Sb 126				8	Pu 242				8
Te 125m			4.54E-09	C C 2	Am 241			2.86E-07	C C 1
Te 127m				8	Am 242m				8
I 129				8	Am 243				8
Cs 134			4.28E-09	C C 2	Cm 242				8
Cs 135				8	Cm 243			3.87E-09	C C 1
Cs 137			1.83E-06	C C 2	Cm 244			7.56E-08	C C 1
Ba 133			1.07E-07	C C 2	Cm 245				8
La 137				8	Cm 246				8
La 138				8	Cm 248				8
Ce 144				8	Cf 249				8
Pm 145				8	Cf 250				8
Pm 147			1.30E-07	C C 1	Cf 251				8
Sm 147				8	Cf 252				8
Sm 151				8	Unsp a				
Eu 152			3.21E-07	C C 2	Unsp b/g				
Eu 154			2.85E-07	C C 2	Total a	0	*	1.54E-06	*
Eu 155			9.19E-08	C C 2	Total b/g	0	*	2.33E-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