

WASTE STREAM	9G48/C	Encapsulated Skips and Debris from Fuel Cooling Pond
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SITE Trawsfynydd

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Nuclear Restoration Services Ltd (NRS)

WASTE TYPE ILW

WASTE VOLUMES

	Reported (m ³)	OR	Conditioned (m ³)	Packaged (m ³)
Stocks:	At 1.4.2025		= 8.7	9.8
Future arisings:				0.0
Total future arisings:			0.0	0.0
Total waste volume:			8.7	9.8

Number of waste packages in stock: At 1.4.2025..... 3 packages

Comment on arising rates: The debris from the transfer of waste stream 9G17 to 9G16 has been added to this stream. There will be no further arisings of this waste stream.

Additional information on quantities: Waste consists of debris contained in pond skips. It was removed during final clearing of the fuel cooling ponds. It has been conditioned in 3m3 boxes.

Uncertainty factors on volumes: Stock (upper): x 1.00 Arisings (upper): x -
Stock (lower): x 1.00 Arisings (lower): x -

WASTE SOURCE The source of the waste is the residual debris after the removal of fuel elements, skips and equipment from the fuel-cooling ponds.

PHYSICAL CHARACTERISTICS

General description: The waste consists of three packages of conditioned pond debris. The packages are stainless steel 3-cubic-metre boxes. The waste is mostly Magnox metal which may be contaminated by fission products and actinides. Some Nimonic springs are present in a shielded pot and there will be a little zirconium with the Magnox. There are also some concrete blocks and small scrap items. Each box also contains a contaminated fuel skip, in which the waste was loaded. A mild steel anti-floatation plate of 20 mm thickness was also included in the encapsulated package. The boxes are standard containers and weigh about 6 tonnes.

Changes since waste generated: -

Bulk density (t/m³): = 1.6

Comment on density: -

CHEMICAL COMPOSITION

General description and components (%wt): Magnox Bulk (7.51%), Nimonic (0.01%), Mild Steel Shielded Pot (0.24%), Mild Steel Skip (11.79%), Skip Paint (0.19%), Mild Steel Anti Floatation Device (2.8%), Cement Grout (Base & Infill) (77.46%) Superplasticiser (Sikament N) (accounted for in cementous grout)

Chemical state: Alkali

Sheet metal proportion / thickness: The fuel skip is made from mild steel plate 6.5 mm thick. The floatation plate is made of mild steel 20 mm thick.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	14.8	-	
Other ferrous metals.....		shielded pot, skip, anti-floatation device	
Iron.....		-	
Aluminium.....		-	
Beryllium.....		-	
Cobalt.....		-	
Copper.....	7.5	-	
Lead.....		-	
Magnox/Magnesium.....		magnox bulk	
Nickel.....		-	
Titanium.....		-	
Uranium.....		-	
Zinc.....	= 0	-	
Zircaloy/Zirconium.....		-	
Other metals.....		There are no "other" metals.	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulotics.....	= 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.....		-	
Oil or grease.....		-	
Fuel.....		-	
Asphalt/Tarmac (cont.coal tar).....		-	
Asphalt/Tarmac (no coal tar).....		-	
Bitumen.....		-	
Others.....		-	
Other organics.....	P	grout contains 1 to 1.5% superplasticiser (sulphonated naphthalene formaldehyde). The fuel skip was painted with 9kg Calvinac HR800. included in cementous grout	

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.....	77.5	grout, includes totals for superplasticiser	
Sand.....		-	
Glass/Ceramics.....	= 0	-	
Graphite.....		-	
Desiccants/Catalysts.....		-	
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.....	= 0	-
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.....		-
Corrosive materials.....	= 0	-
Pyrophoric materials.....	= 0	-
Generating toxic gases.....	= 0	-
Reacting with water.....	0	-
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.....	= 0.19	Paint

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		
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		

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
	3 m³ box (side lifting)	100.0	2.9	2.9	3	-

Range in container waste loading: There is no significant variability in the volume of waste per container.

Other information on packaging and conditioning: The container material is stainless steel.

Conditioned density (t/m³): = 1.6

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)	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: The source of the waste is mostly splitter debris from fuel elements prior to dispatch of the elements to Sellafield. Activation of trace nuclides in the Magnox and contamination by fission products and actinides will be the main sources of activity. There are 155 small, but highly-activated, Nimonic springs in one package, within a steel pot, one-inch thick. There are a number of other small contaminated scrap items from the pond floor.

Uncertainty: The uncertainties are a combination of systematic and counting errors at the one sigma level.

Measurement of radioactivities: Values were derived from spectrometry measurements, and fingerprinting of debris samples.

Chemical form of radionuclides:

- H-3: Tritium is expected to be present as surface contamination, possibly as water but perhaps in the form of other inorganic or organic compounds.
- C-14: Carbon 14 will probably be present as graphite.
- Cl-36: Chlorine 36 incorporated in the Magnox may be associated with barium impurity (barium chloride), other chlorine 36 may be associated with surface contamination.
- Se-79: The selenium content is insignificant.
- Tc-99: The technetium content is insignificant.
- I-129: -
- Ra: Radium isotope content is not significant.
- Th: The thorium isotope content is insignificant.
- U: Chemical form of uranium isotopes has not been determined but may be uranium oxides.
- Np: The neptunium content is insignificant.
- Pu: Chemical form of plutonium isotopes has not been determined but may be plutonium oxides.

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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	1.71E-03	C C 2			Gd 153		8		
Be 10		8			Ho 163		8		
C 14	6.43E-05	C C 2			Ho 166m		8		
Na 22		8			Tm 170		8		
Al 26		8			Tm 171		8		
Cl 36	6.77E-07	C C 2			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			Tl 204		8		
Mn 54		8			Pb 205		8		
Fe 55	1.65E-06	C C 2			Pb 210		8		
Co 60	6.94E-03	C C 2			Bi 208		8		
Ni 59		8			Bi 210m		8		
Ni 63	4.61E-01	C C 2			Po 210		8		
Zn 65		8			Ra 223		8		
Se 79	9.96E-08	C C 2			Ra 225		8		
Kr 81		8			Ra 226		8		
Kr 85		8			Ra 228		8		
Rb 87		8			Ac 227		8		
Sr 90	7.47E-03	C C 2			Th 227		8		
Zr 93		8			Th 228		8		
Nb 91		8			Th 229		8		
Nb 92		8			Th 230	1.27E-09	C C 2		
Nb 93m		8			Th 232		8		
Nb 94		8			Th 234	6.13E-06	C C 2		
Mo 93		8			Pa 231		8		
Tc 97		8			Pa 233	1.81E-08	C C 2		
Tc 99	6.90E-09	C C 2			U 232		8		
Ru 106		8			U 233		8		
Pd 107		8			U 234	8.63E-06	C C 2		
Ag 108m	1.15E-06	C C 2			U 235	2.46E-07	C C 2		
Ag 110m		8			U 236		8		
Cd 109		8			U 238	6.13E-06	C C 2		
Cd 113m		8			Np 237	1.82E-08	C C 2		
Sn 119m		8			Pu 236		8		
Sn 121m		8			Pu 238	1.36E-03	C C 2		
Sn 123		8			Pu 239	6.17E-04	C C 2		
Sn 126		8			Pu 240	7.69E-04	C C 2		
Sb 125	8.61E-09	C C 2			Pu 241	3.71E-03	C C 2		
Sb 126		8			Pu 242		8		
Te 125m	2.16E-09	C C 2			Am 241	3.52E-03	C C 2		
Te 127m		8			Am 242m		8		
I 129	9.29E-09	C C 2			Am 243		8		
Cs 134	6.80E-08	C C 2			Cm 242		8		
Cs 135		8			Cm 243	3.82E-06	C C 2		
Cs 137	3.54E-03	C C 2			Cm 244	5.00E-05	C C 2		
Ba 133	4.34E-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	7.15E-06	C C 2			Cf 251		8		
Sm 147		8			Cf 252		8		
Sm 151		8			Unsp a		8		
Eu 152	1.30E-06	C C 2			Unsp b/g		8		
Eu 154	7.93E-07	C C 2			Total a	6.33E-03	*	0	*
Eu 155	6.06E-08	C C 2			Total b/g	4.85E-01	*	0	*

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