

<b>WASTE STREAM</b>	<b>9G109</b>	<b>Pond Scabbling Wastes</b>
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**SITE** Trawsfynydd

**SITE OWNER** Nuclear Decommissioning Authority

**WASTE CUSTODIAN** Magnox Limited

**WASTE TYPE** LLW

Is the waste subject to Scottish Policy: No

**WASTE VOLUMES**

		Reported
Stocks:	At 1.4.2022.....	107.5 m <sup>3</sup>
Total future arisings:		0 m <sup>3</sup>
Total waste volume:		107.5 m <sup>3</sup>
Comment on volumes:	There is no further forecasted project work; all scabbling waste operations have been completed.	
Uncertainty factors on volumes:	Stock (upper): x 1.1	Arisings (upper) x
	Stock (lower): x 0.9	Arisings (lower) x

**WASTE SOURCE** This waste stream captures plant, equipment and structural materials and secondary wastes generated from pond scabbling operations.

**PHYSICAL CHARACTERISTICS**

General description:	Most of the waste is concrete blocks, cores and dust arising from the removal of pond surfaces, which contain most of the contamination, packaged in steel Scabbled Waste Containers (SWCs), Lidded Containers (LCs) or 210 litre IP2 rated drums. The Ponds were used to cool fuel following its removal from the reactors before being removed for offsite reprocessing and hence contamination is mainly in the form of fission products.
Physical components (%wt):	Concrete (~84%wt), metal (~9%), plastic/rubber (~3%wt), wood (~1%) and others (including asbestos) (3%).
Sealed sources:	The waste does not contain sealed sources.
Bulk density (t/m <sup>3</sup> ):	~0.84
Comment on density:	WCH mass divided by volume

**CHEMICAL COMPOSITION**

General description and components (%wt):	Concrete (~84%wt), metal (~9%), plastic/rubber (~3%wt), wood (~1%) and others (including asbestos) (3%).
Chemical state:	Alkali
Chemical form of radionuclides:	H-3: Any tritium is expected to be present as water, but some may be in the form of other inorganic compounds or as organic compounds. C-14: Chemical form of carbon 14 has not been determined but may be graphite. Cl-36: The chemical form of chlorine 36 has not been determined. Se-79: The selenium content is insignificant. Tc-99: The technetium content is insignificant. Ra: Radium isotope content is insignificant. Th: The thorium content is insignificant. U: Chemical form of uranium has not been determined but may be uranium oxides. Np: The neptunium content is insignificant. Pu: Chemical form of plutonium has not been determined but may be plutonium oxides.
Metals and alloys (%wt):	The scabbled concrete is loaded into mild steel boxes.

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	4.3	Waste containers	
Other ferrous metals.....	4.2	Deplant equipment and mechanical components	
Iron.....	~		
Aluminium.....	0.24	Scaffolding	



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Glass/Ceramics.....		
Graphite.....		
Desiccants/Catalysts.....		
Asbestos.....	1.1	
Non/low friable.....	1.1	Asbestos contaminated material, insulation. Equal portions of white, brown and blue asbestos assumed.
Moderately friable.....	0	
Highly friable.....	0	
Free aqueous liquids.....		
Free non-aqueous liquids.....		
Powder/Ash.....	0.96	Concrete dust (0.72%), plaster dust (0.18%), dust paint (0.06%) within vac bags from operational cleaning.

Inorganic anions (%wt):           Carbonates, phosphates, silicates and alumino-silicates are expected to be present in the waste but their % weight is not known.

	(%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.....		
Low flash point liquids.....		
Explosive materials.....		
Phosphorus.....		
Hydrides.....		
Biological etc. materials.....		
Biodegradable materials.....	0	
Putrescible wastes.....		
Non-putrescible wastes.....		
Corrosive materials.....		
Pyrophoric materials.....		
Generating toxic gases.....		
Reacting with water.....	P	33.25m2

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Higher activity particles.....

Soluble solids as bulk chemical compounds.....

Hazardous substances /  
non hazardous pollutants: -

	(%wt)	
Acrylamide.....		Type(s) and comment
Benzene.....		
Chlorinated solvents.....		
Formaldehyde.....		
Organometallics.....		
Phenol.....		
Styrene.....		
Tri-butyl phosphate.....		
Other organophosphates.....		
Vinyl chloride.....		
Arsenic.....		
Barium.....		
Boron.....	0	
Boron (in Boral).....		
Boron (non-Boral).....		
Cadmium.....		
Caesium.....		
Selenium.....		
Chromium.....		
Molybdenum.....		
Thallium.....		
Tin.....		
Vanadium.....		
Mercury compounds.....		
Others.....		
Electronic Electrical Equipment (EEE)		
EEE Type 1.....		
EEE Type 2.....		
EEE Type 3.....		
EEE Type 4.....		
EEE Type 5.....		

Complexing agents (%wt): Yes

	(%wt)	
EDTA.....		Type(s) and comment
DPTA.....		
NTA.....		
Polycarboxylic acids.....		

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Other organic complexants..... 0.01      Decon-90  
 Total complexing agents..... 0.01

Potential for the waste to contain discrete items:      Not yet determined. Large Concrete Items (LCIs) may be DIs; drummed (ungrouned)/"rubbleised" wastes assumed not DIs  
 Large Metal Items (LMIs)/"substantial" thickness items considered "durable" assumed DIs;  
 Stainless items assumed DIs

**TREATMENT, PACKAGING AND DISPOSAL**

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

Treatment	On-site / Off site	Stream volume %
Low force compaction Supercompaction (HFC) Incineration Solidification Decontamination Metal treatment Size reduction Decay storage Recycling / reuse Other / various None	Off-site	13.3          86.7

Comment on planned treatments:

6.25% of this waste stream is expected to be sent to Landfill as VLLW.

**Disposal Routes:**

Disposal Route	Stream volume %	Disposal density t/m3
Expected to be consigned to the LLW Repository	80.5	0.84
Expected to be consigned to a Landfill Facility	6.3	0.84
Expected to be consigned to an On-Site Disposal Facility		
Expected to be consigned to an Incineration Facility	13.3	0.40
Expected to be consigned to a Metal Treatment Facility		
Expected to be consigned as Out of Scope		
Expected to be recycled / reused		
Disposal route not known		

Classification codes for waste expected to be consigned to a landfill facility:      17 04 07, 17 01 01, 17 06 01\*

**Upcoming (2022/23-2024/25) Waste Routing (if expected to change from above):**

Disposal Route	Stream volume %		
	2022/23	2023/24	2024/25
Expected to be consigned to the LLW Repository			
Expected to be consigned to a Landfill Facility			
Expected to be consigned to an On-Site Disposal Facility			
Expected to be consigned to an Incineration Facility			
Expected to be consigned to a Metal Treatment Facility			
Expected to be consigned as Out of Scope			
Expected to be recycled / reused			
Disposal route not known			

**Opportunities for alternative disposal routing:**      -

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

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**Waste Packaging for Disposal:**

Container	Stream volume %	Waste loading m <sup>3</sup>	Number of packages
1/3 Height IP-1 ISO			
2/3 Height IP-2 ISO			
1/2 Height WAMAC IP-2 ISO	0.05	43.2	< 1
1/2 Height IP-2 Disposal/Re-usable ISO	80.4	10	9
2m box (no shielding)			
4m box (no shielding)			
Other			

Other information: The scabbled concrete is placed into a mild steel box. This box is then placed into a HHISO container. About 18 of these mild steel boxes are placed into each HHISO.

**Waste Planned for Disposal at the LLW Repository:**

Container voidage: Significant in-accessible voidage is not expected.

Waste Characterisation Form (WCH): The waste meets the LLWR's Waste Acceptance Criteria (WAC). The waste has a current WCH. Inventory information is consistent with the current WCH.

Waste consigned for disposal to LLWR in year of generation: Yes.

**Non-Containerised Waste for In-Vault Grouting:** (Not applicable to this waste stream)

Stream volume (%): -  
Waste stream variation: -  
Bounding cuboidal volume:  
Inaccessible voidage: -  
Other information: -

**RADIOACTIVITY**

Source: Contamination of paint and concrete from walls and floors in the fuel ponds.

Uncertainty: The values quoted were derived by calculation and are indicative of the activities that are expected.

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: Data taken from WCH - 1MXN-3TRA-0-WCH-0-4741 V4 decayed by 1 year for RWI 2022

Other information: -

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Nuclide	Mean radioactivity, TBq/m <sup>3</sup>				Nuclide	Mean radioactivity, TBq/m <sup>3</sup>			
	Waste at 1.4.2022	Bands and Code	Future arisings	Bands and Code		Waste at 1.4.2022	Bands and Code	Future arisings	Bands and Code
H 3	1.33E-05	CC 1			Gd 153		8		
Be 10		8			Ho 163		8		
C 14	2.27E-05	CC 1			Ho 166m		8		
Na 22		8			Tm 170		8		
Al 26		8			Tm 171		8		
Cl 36	5.36E-05	CC 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			Tl 204		8		
Mn 54		8			Pb 205		8		
Fe 55	1.57E-06	CC 1			Pb 210		8		
Co 60	2.79E-06	CC 2			Bi 208		8		
Ni 59		8			Bi 210m		8		
Ni 63	2.84E-05	CC 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	1.44E-03	CC 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		8			Th 234	9.67E-07	CC 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	8.26E-07	CC 1		
Ag 108m		8			U 235	2.15E-08	CC 1		
Ag 110m		8			U 236	2.94E-09	CC 1		
Cd 109		8			U 238	9.67E-07	CC 1		
Cd 113m		8			Np 237		8		
Sn 119m		8			Pu 236		8		
Sn 121m		8			Pu 238	1.19E-05	CC 1		
Sn 123		8			Pu 239	9.65E-05	CC 1		
Sn 126		8			Pu 240	1.24E-04	CC 1		
Sb 125		8			Pu 241	3.61E-04	CC 1		
Sb 126		8			Pu 242		8		
Te 125m		8			Am 241	1.49E-04	CC 1		
Te 127m		8			Am 242m		8		
I 129		8			Am 243		8		
Cs 134	1.57E-08	CC 2			Cm 242		8		
Cs 135		8			Cm 243		8		
Cs 137	1.99E-03	CC 2			Cm 244		8		
Ba 133		8			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		8			Cf 251		8		
Sm 147		8			Cf 252		8		
Sm 151		8			Other a				
Eu 152		8			Other b/g				
Eu 154	3.98E-06	CC 2			<b>Total a</b>	<b>3.83E-04</b>	<b>CC 1</b>	<b>0</b>	
Eu 155	8.51E-07	CC 2			<b>Total b/g</b>	<b>3.92E-03</b>	<b>CC 1</b>	<b>0</b>	

**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