

WASTE STREAM	9G69	Miscellaneous Contaminated Items - Debris from Fuel Cooling Ponds
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SITE Trawsfynydd
SITE OWNER Nuclear Decommissioning Authority
WASTE CUSTODIAN Magnox Limited
WASTE TYPE ILW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	0.7 m ³
Total future arisings:		0 m ³
Total waste volume:		0.7 m ³
Comment on volumes:	There will be no further arisings of this waste stream.	
Uncertainty factors on volumes:	Stock (upper): x 1.2	Arisings (upper) x
	Stock (lower): x 0.8	Arisings (lower) x

WASTE SOURCE Cooling Ponds Operation and Maintenance.

PHYSICAL CHARACTERISTICS

General description: The nature of the debris in the three 200L drums has not been determined. One unencapsulated drum has been cemented into a 3m3 Box, 2 drums are stored in a 3m3 box (unencapsulated).

Physical components (%vol): Principally metal components.

Sealed sources: -

Bulk density (t/m³): ~1

Comment on density: The assumption of 1 t/m3 as the average bulk density may be subject to revision. The contents of the three drums have yet to be assessed.

CHEMICAL COMPOSITION

General description and components (%wt): The waste is principally metallic debris found at the bottom of the cooling ponds. Activation products will be present as contaminants.

Chemical state: Neutral

Chemical form of radionuclides: H-3: Tritium may be present as water or in the form of other inorganic or organic compounds.
C-14: Chemical form of carbon 14 has not been determined but may be graphite.
Se-79: The chemical form of selenium has not been determined.
Tc-99: The chemical form of technetium has not been determined.
Ra: Radium isotope content is insignificant.
Th: Thorium isotope content is insignificant.
U: Chemical form of uranium isotopes has not been determined but may be uranium oxides.
Np: The chemical form of neptunium has not been determined.
Pu: Chemical form of plutonium isotopes has not been determined but may be plutonium oxides.

Metals and alloys (%wt): -

Stainless steel.....	NE	
Other ferrous metals.....	NE	Not yet determined.
Iron.....		
Aluminium.....	NE	
Beryllium.....		
Cobalt.....		
Copper.....	NE	
Lead.....	NE	
Magnox/Magnesium.....	NE	
Nickel.....		

WASTE STREAM**9G69****Miscellaneous Contaminated Items - Debris from Fuel Cooling Ponds**

	Titanium.....	
	Uranium.....	
	Zinc.....	NE
	Zircaloy/Zirconium.....	NE
	Other metals.....	NE
Organics (%wt):	Not yet determined.	
	Total cellulose.....	NE
	Paper, cotton.....	NE
	Wood.....	NE
	Halogenated plastics	NE
	Total non-halogenated plastics.....	NE
	Condensation polymers.....	NE
	Others.....	NE
	Organic ion exchange materials....	NE
	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):	Not yet determined.	
	Inorganic ion exchange materials.	NE
	Inorganic sludges and flocs.....	NE
	Soil.....	NE
	Brick/Stone/Rubble.....	NE
	Cementitious material.....	NE
	Sand.....	
	Glass/Ceramics.....	NE
	Graphite.....	NE
	Desiccants/Catalysts.....	
	Asbestos.....	NE
	Non/low friable.....	
	Moderately friable.....	
	Highly friable.....	
	Free aqueous liquids.....	NE
	Free non-aqueous liquids.....	NE
	Powder/Ash.....	NE
Inorganic anions (%wt):	Not yet determined.	

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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:

The possible presence of materials likely to represent a fire or other non-radiological hazard has not been fully assessed.

Combustible metals.....	NE
Low flash point liquids.....	NE
Explosive materials.....	NE
Phosphorus.....	NE
Hydrides.....	NE
Biological etc. materials.....	NE
Biodegradable materials.....	
Putrescible wastes.....	NE
Non-putrescible wastes.....	
Corrosive materials.....	NE
Pyrophoric materials.....	NE
Generating toxic gases.....	NE
Reacting with water.....	NE
Active particles.....	
Soluble solids as bulk chemical compounds.....	

Hazardous substances / non hazardous pollutants:

-	
Acrylamide.....	
Benzene.....	
Chlorinated solvents.....	
Formaldehyde.....	
Organometallics.....	
Phenol.....	
Styrene.....	
Tri-butyl phosphate.....	
Other organophosphates.....	
Vinyl chloride.....	
Arsenic.....	
Barium.....	
Boron.....	

WASTE STREAM**9G69****Miscellaneous Contaminated Items - Debris from Fuel Cooling Ponds**

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):

EDTA.....
 DPTA.....
 NTA.....
 Polycarboxylic acids.....
 Other organic complexants.....
 Total complexing agents..... NE

PACKAGING AND CONDITIONING

Conditioning method: The waste will be packaged in 3m³ stainless steel boxes and encapsulated.
 Plant Name: None
 Location: Trawsfynydd Power Station
 Plant startup date: -
 Total capacity (m³/y incoming waste): -
 Target start date for packaging this stream: -
 Throughput for this stream (m³/y incoming waste): -0.2
 Other information: -

Likely container type:	Container	Waste packaged (%vol)	Waste loading (m ³)	Payload (m ³)	Number of packages
	3m ³ box (round corners)	100.0	0.33	2.7	2

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Likely container type comment: The conditioning factor assigned to this waste stream may be subject to amendment during waste retrieval.

Range in container waste volume: Not yet determined. No significant variability is expected.

Other information on containers: The container material is expected to be stainless steel.

Likely conditioning matrix: Blast Furnace Slag / Ordinary Portland Cement

Other information: The encapsulation matrix is expected to be 3:1 BFS/OPC but is still under discussion.

Conditioned density (t/m³): ~2.0

Conditioned density comment: The conditioned wastefrom density is expected to vary by not more than about 10% from the average.

Other information on conditioning: Appropriate plant will be provided on the station in accordance with company strategy.

Opportunities for alternative disposal routing:

Treatment	Stream volume (%)	Comment
-	-	-

RADIOACTIVITY

Source: The waste usually arises from the irradiated fuel handling and pond operations. Components that have been associated with fuel pond operations are likely to be of high activity. Fission products, actinides and other activation products will be present.

Uncertainty: Activity best estimate thought to be accurate to within two orders of magnitude, but not fully assessed.

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: Figures were derived by estimation based upon available information.

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

WASTE STREAM

9G69

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Nuclide	Mean radioactivity, TBq/m ³				Nuclide	Mean radioactivity, TBq/m ³			
	Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code		Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code
H 3		6			Gd 153		8		
Be 10		6			Ho 163		8		
C 14		6			Ho 166m		8		
Na 22		8			Tm 170		8		
Al 26		8			Tm 171		8		
Cl 36		6			Lu 174		8		
Ar 39		8			Lu 176		8		
Ar 42		8			Hf 178n		8		
K 40		8			Hf 182		8		
Ca 41		6			Pt 193		8		
Mn 53		8			Tl 204		8		
Mn 54		6			Pb 205		8		
Fe 55		6			Pb 210		8		
Co 60	3.06E-02	CC 1			Bi 208		8		
Ni 59		6			Bi 210m		8		
Ni 63		6			Po 210		8		
Zn 65		6			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		6			Th 227		8		
Zr 93		6			Th 228		8		
Nb 91		8			Th 229		8		
Nb 92		8			Th 230		8		
Nb 93m		6			Th 232		8		
Nb 94		8			Th 234		8		
Mo 93		6			Pa 231		8		
Tc 97		8			Pa 233	5.72E-09	CC 2		
Tc 99		6			U 232		8		
Ru 106		6			U 233		8		
Pd 107		8			U 234		6		
Ag 108m		6			U 235		8		
Ag 110m		8			U 236		6		
Cd 109		8			U 238		6		
Cd 113m		8			Np 237	5.79E-09	CC 2		
Sn 119m		8			Pu 236		8		
Sn 121m		6			Pu 238		6		
Sn 123		8			Pu 239		6		
Sn 126		8			Pu 240		6		
Sb 125		8			Pu 241		6		
Sb 126		8			Pu 242		6		
Te 125m		8			Am 241	1.97E-03	CC 2		
Te 127m		8			Am 242m		6		
I 129		8			Am 243		6		
Cs 134		6			Cm 242		6		
Cs 135		8			Cm 243		6		
Cs 137	5.69E-03	CC 1			Cm 244		6		
Ba 133		8			Cm 245		8		
La 137		8			Cm 246		8		
La 138		8			Cm 248		8		
Ce 144		6			Cf 249		8		
Pm 145		8			Cf 250		8		
Pm 147		6			Cf 251		8		
Sm 147		8			Cf 252		8		
Sm 151		6			Other a				
Eu 152		6			Other b/g				
Eu 154	9.66E-04	CC 2			Total a	1.97E-03	CC 2	0	
Eu 155	8.33E-05	CC 2			Total b/g	3.73E-02	CC 2	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 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