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

SITE	Trawsfynydd
SITE OWNER	Nuclear Decommissioning Authority
WASTE CUSTODIAN	Magnox Limited
WASTE TYPE	ILW
Is the waste subject to Scottish Policy:	No

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2022.....	0.7 m³
Total future arisings:		0 m³
Total waste volume:		0.7 m³

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:	The waste does not contain 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 asessed.

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):	-

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	NE		
Other ferrous metals.....	NE	Not yet determined.	
Iron.....			
Aluminium.....	NE		
Beryllium.....			
Cobalt.....			

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Copper	NE
Lead	NE
Magnox/Magnesium	NE
Nickel	
Titanium	
Uranium	
Zinc	NE
Zircaloy/Zirconium	NE
Other metals	NE

Organics (%wt): Not yet determined

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulosics	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

	(%wt)	Type(s) and comment	% of total C14 activity
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			

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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

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

	(%wt)	Type(s) and comment
Combustible metals	NE	
Low flash point liquids	NE	
Explosive materials	NE	
Phosphorus	NE	
Hydrides	NE	
Biological etc. materials	NE	
Biodegradable materials	0	
Putrescible wastes	NE	
Non-putrescible wastes		
Corrosive materials	NE	
Pyrophoric materials	NE	
Generating toxic gases	NE	
Reacting with water	NE	
Higher activity particles		
Soluble solids as bulk chemical compounds		

Hazardous substances / non hazardous pollutants: -

	(%wt)	Type(s) and comment
Acrylamide		

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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):

	(%wt)	Type(s) and comment
EDTA.....		
DPTA.....		
NTA.....		
Polycarboxylic acids…….		
Other organic complexants.....		
Total complexing agents.....	NE	

Potential for the waste to contain discrete items: Not yet determined. In & of itself not a DI; waste stream may include DIs (notably any stainless steel components)

PACKAGING AND CONDITIONING

Conditioning method: The waste will be packaged in 3m3 stainless steel boxes and encapsulated.

Plant Name: None

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Location:	Trawsfynydd Power Station
Plant startup date:	-
Total capacity (m^3/y incoming waste):	-
Target start date for packaging this stream:	-
Throughput for this stream (m^3/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	2.9	2

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 variabilty 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/m^3):	~2.0
Conditioned density comment:	The conditioned wasteform 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:	-

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

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Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2022	Bands and Code	Future arisings	Bands and Code	Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2022	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	2.06E-02	C C 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	7.63E-09	C C 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	7.70E-09	C C 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	1.96E-03	C C 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	5.32E-03	C C 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	7.58E-04	C C 2			**Total a**	**1.96E-03**	**C C 2**	**0**	
Eu 155	5.42E-05	C C 2			**Total b/g**	**2.68E-02**	**C C 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