WASTE STREAM 9E70 LLW Pond Skips

SITE Oldbury

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.....	146.4 m³
Total future arisings:		0 m³
Total waste volume:		146.4 m³

Comment on volumes: Volume is based on the skip size of 1.4m x 1m x 1m for long skips and 1.2m x 1m x 1m for standard skips.Prior to disposals there were 112 Ponds skips in this waste stream: 94 long skips and 18 standard skips.

Uncertainty factors on volumes:

Stock (upper):	x 1.2	Arisings (upper)	x
Stock (lower):	x 0.8	Arisings (lower)	x

WASTE SOURCE Skips are / were used for the movement and storage of materials within the pond. Contamination from pond operations and plant operation.

PHYSICAL CHARACTERISTICS

General description: Total waste stream was originally 112 contaminated skips prior to disposals. 94 skips are approximately 1.4m x 1m x 1m in size and 18 skips are 1.2m x 1m x 1m in size.

Physical components (%vol): Pond skips are made of mild steel and are coated in UPC paint.

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): ~0.32

Comment on density: This has been calculated using the approximate weight of 0.42te and the average volume of the skips of 1.3m3.

CHEMICAL COMPOSITION

General description and components (%wt): Steel and small amount of UPC paint. Fission products, actinides and other activation products will be present as contaminants. Steel ponds skips (95.5%), Pactec bags (4%), Portland cement powder (0.5%).

Chemical state: Neutral

Chemical form of radionuclides:
H-3: The tritium content is insignificant.
C-14: The carbon-14 content is in significant.
Se-79: The selenium content is insignificant.
Tc-99: The technetium content is insignificant.
Ra: The radium content is insignificant.
Th: The thorium content is insignificant.
U: The uranium content is insignificant.
Np: The neptunium content is insignificant.
Pu: The chemical form of plutonium isotopes may be plutonium oxides.

Metals and alloys (%wt): 112 skips are present, these are constructed from 3.2 mm 10 gauge steel plate.

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	0		
Other ferrous metals.....	~95.5	Steel Pond Skip.	
Iron.....			
Aluminium.....	0		
Beryllium.....			
Cobalt.....			
Copper.....	0		

WASTE STREAM 9E70 LLW Pond Skips

Lead	0	
Magnox/Magnesium	0	
Nickel		
Titanium		
Uranium		
Zinc	0	
Zircaloy/Zirconium	0	
Other metals	0	None.

Organics (%wt): There may be organics in the UPC paint.

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulosics	0		
Paper, cotton	0		
Wood	0		
Halogenated plastics	0		
Total non-halogenated plastics	4.0		
Condensation polymers	0		
Others	4.0	PacTec Bag.	
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	NE		

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			
Cementitious material	0.50	Portland Cement Powder.	
Sand			
Glass/Ceramics	0		
Graphite	0		
Desiccants/Catalysts			
Asbestos	0		

WASTE STREAM 9E70 LLW Pond Skips

Non/low friable.....	
Moderately friable.....	
Highly friable.....	
Free aqueous liquids.....	0
Free non-aqueous liquids.....	0
Powder/Ash.....	0

Inorganic anions (%wt): Not expected to be present.

	(%wt)	Type(s) and comment
Fluoride.....	0	
Chloride.....	0	
Iodide.....	0	
Cyanide.....	0	
Carbonate.....	0	
Nitrate.....	0	
Nitrite.....	0	
Phosphate.....	0	
Sulphate.....	0	
Sulphide.....	0	

Materials of interest for waste acceptance criteria: No materials likely to pose a fire or other non-radiological hazard have been identified.

	(%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: Portland Cement Powder

	(%wt)	Type(s) and comment
Acrylamide.....		
Benzene.....		

WASTE STREAM 9E70 LLW Pond Skips

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: Yes. Large Metal Items (LMIs)/"substantial" thickness items considered "durable" assumed DIs; Stainless items assumed DIs

WASTE STREAM 9E70 LLW Pond Skips

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		
Recyling / reuse		
Other / various		
None		100.0

Comment on planned treatments: -

Disposal Routes:

Disposal Route	Stream volume %	Disposal density t/m3
Expected to be consigned to the LLW Repository	100.0	0.32
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		

Classification codes for waste expected to be consigned to a landfill facility: -

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
-	-	-	-	-	-

Waste Packaging for Disposal:

WASTE STREAM 9E70 LLW Pond Skips

Container	Stream volume %	Waste loading m³	Number of packages
1/3 Height IP-1 ISO 2/3 Height IP-2 ISO 1/2 Height WAMAC IP-2 ISO 1/2 Height IP-2 Disposal/Re-usable ISO 2m box (no shielding) 4m box (no shielding) Other	100.0	10.97	14

Other information: Waste is undergoing additional characterisation prior to new WCH being submitted as a characterisation review identified deficiencies. Therefore, further sampling and analysis is required and subsequently the strategies will be reviewed.

Waste Planned for Disposal at the LLW Repository:

Container voidage: -

Waste Characterisation Form (WCH): The waste meets the LLWR's Waste Acceptance Criteria (WAC).
The waste does not have a current WCH.

Waste consigned for disposal to LLWR in year of generation: No.

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 from pond operations and plant operation.

Uncertainty: -

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: Activities are based upon WCH - 1MXN-3OLD-0-WCH-L-4048 and decayed 5 years for RWI 2022.

Other information: -

WASTE STREAM 9E70 LLW Pond Skips

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	8.23E-06	C C 2			Gd 153		8		
Be 10		8			Ho 163		8		
C 14	3.36E-06	C C 2			Ho 166m		8		
Na 22		8			Tm 170		8		
Al 26		8			Tm 171		8		
Cl 36	1.12E-08	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	1.32E-09	C C 2			Pb 205		8		
Fe 55	4.72E-07	C C 2			Pb 210		8		
Co 60	1.16E-06	C C 2			Bi 208		8		
Ni 59		8			Bi 210m		8		
Ni 63	5.42E-07	C C 2			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	1.41E-03	C C 2			Th 227		8		
Zr 93		8			Th 228	6.59E-09	C C 2		
Nb 91		8			Th 229		8		
Nb 92		8			Th 230		8		
Nb 93m		8			Th 232		8		
Nb 94		8			Th 234	1.65E-08	C C 2		
Mo 93		8			Pa 231		8		
Tc 97		8			Pa 233		8		
Tc 99	2.8E-07	C C 2			U 232	7.74E-09	C C 2		
Ru 106	5.40E-08	C C 2			U 233		8		
Pd 107		8			U 234	1.67E-08	C C 2		
Ag 108m		8			U 235		8		
Ag 110m		8			U 236		8		
Cd 109		8			U 238	1.65E-08	C C 2		
Cd 113m		8			Np 237		8		
Sn 119m		8			Pu 236		8		
Sn 121m		8			Pu 238	9.16E-06	C C 2		
Sn 123		8			Pu 239	5.61E-06	C C 2		
Sn 126		8			Pu 240	7.01E-06	C C 2		
Sb 125	2.40E-07	C C 2			Pu 241	3.50E-04	C C 2		
Sb 126		8			Pu 242	5.33E-09	C C 2		
Te 125m	6.00E-08	C C 2			Am 241	5.27E-05	C C 2		
Te 127m		8			Am 242m		8		
I 129		8			Am 243		8		
Cs 134	5.74E-07	C C 2			Cm 242		8		
Cs 135		8			Cm 243	9.98E-09	C C 2		
Cs 137	5.85E-04	C C 2			Cm 244	2.31E-07	C C 2		
Ba 133		8			Cm 245		8		
La 137		8			Cm 246		8		
La 138		8			Cm 248		8		
Ce 144	9.88E-09	C C 2			Cf 249		8		
Pm 145		8			Cf 250		8		
Pm 147	2.86E-06	C C 2			Cf 251		8		
Sm 147		8			Cf 252		8		
Sm 151	6.74E-06	C C 2			Other a				
Eu 152	8.05E-08	C C 2			Other b/g	1.17E-09	C C 2		
Eu 154	2.62E-06	C C 2			**Total a**	**7.47E-05**	**C C 2**	**0**	
Eu 155	8.20E-07	C C 2			**Total b/g**	**2.37E-03**	**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