

WASTE STREAM	9C45	Fuel Skips in Pond
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SITE Dungeness A
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.....	14.0 m ³
Total future arisings:		0 m ³
Total waste volume:		14.0 m ³

Comment on volumes: Volumes are based on the number of skips and their dimensions assuming a skip is 1.376m³

Uncertainty factors on volumes:	Stock (upper): x 1.1	Arisings (upper) x
	Stock (lower): x 0.9	Arisings (lower) x

WASTE SOURCE Contamination from pond and plant operations.

PHYSICAL CHARACTERISTICS

General description: The waste is contaminated skips. Pond skips are made of mild steel and are coated in UPC paint.

Physical components (%wt): Metal (99.5%), putrescible waste (0.1%), plastics (0.2%), and wood (0.2%).

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): ~0.33

Comment on density: -

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.

Chemical state: Neutral

Chemical form of radionuclides: Pu: The chemical form of plutonium isotopes may be plutonium oxides.

Metals and alloys (%wt): The long skips present have dimensions of 1.357 m x 1 m x 1.029 m. and constructed from 3.2 mm 10 gauge steel plate. The short skips present have dimensions of 1.17 m x 0.47 m x 0.68 m.

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....			
Other ferrous metals.....	~99.5	Painted mild steel	
Iron.....			
Aluminium.....			
Beryllium.....			
Cobalt.....			
Copper.....			
Lead.....			
Magnox/Magnesium.....			
Nickel.....			
Titanium.....			
Uranium.....			

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Zinc.....
 Zircaloy/Zirconium.....
 Other metals.....

Organics (%wt): The skips are coated with paint.

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulosics.....	0.20		
Paper, cotton.....			
Wood.....	0.20		
Halogenated plastics	0.20	Packaging/wrapping.	
Total non-halogenated plastics.....	0		
Condensation polymers.....			
Others.....			
Organic ion exchange materials....			
Total rubber.....	0		
Halogenated rubber			
Non-halogenated rubber.....			
Hydrocarbons.....			
Oil or grease			
Fuel.....			
Asphalt/Tarmac (cont.coal tar)...			
Asphalt/Tarmac (no coal tar)....			
Bitumen.....			
Others.....			
Other organics.....			

Other materials (%wt): -

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials..			
Inorganic sludges and flocs.....			
Soil.....			
Brick/Stone/Rubble.....			
Cementitious material.....			
Sand.....			
Glass/Ceramics.....			
Graphite.....			
Desiccants/Catalysts.....			
Asbestos.....	0		
Non/low friable.....			
Moderately friable.....			
Highly friable.....			
Free aqueous liquids.....			
Free non-aqueous liquids.....			

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Powder/Ash.....

Inorganic anions (%wt): -

(%wt) Type(s) and comment

Fluoride.....

Chloride.....

Iodide.....

Cyanide.....

Carbonate.....

TR Sodium carbonate. Trace only (from pond chemistry).

Nitrate.....

Nitrite.....

Phosphate.....

Sulphate.....

Sulphide.....

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.....

Low flash point liquids.....

Explosive materials.....

Phosphorus.....

Hydrides.....

Biological etc. materials.....

Biodegradable materials..... 0.10

Putrescible wastes..... 0.10

Non-putrescible wastes.....

Corrosive materials.....

Pyrophoric materials.....

Generating toxic gases.....

Reacting with water.....

Higher activity particles.....

Soluble solids as bulk chemical compounds.....

Hazardous substances / non hazardous pollutants: -

(%wt) Type(s) and comment

Acrylamide.....

Benzene.....

Chlorinated solvents.....

Formaldehyde.....

Organometallics.....

Phenol.....

Styrene.....

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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

TREATMENT, PACKAGING AND DISPOSAL

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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		100.0

Comment on planned treatments:

-

Disposal Routes:

Disposal Route	Stream volume %	Disposal density t/m3
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	100.0	0.33

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:

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Container	Stream volume %	Waste loading m ³	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	11.008	2

Other information: Data have been presented as though the waste will be in dedicated containers. It is likely that this waste will be placed in containers with other LLW. 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: Significant inaccessible voidage is not expected.

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: 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 from pond and plant operations.

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 measurement of Chapelcross fuel skips. Data taken from WCH and decayed to reference date of 01/04/2022.

Other information: -

WASTE STREAM 9C45 Fuel Skips in Pond

Nuclide	Mean radioactivity, TBq/m ³				Nuclide	Mean radioactivity, TBq/m ³			
	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	6.73E-06	CC 1			Gd 153		8		
Be 10		8			Ho 163		8		
C 14	3.54E-06	CC 1			Ho 166m		8		
Na 22		8			Tm 170		8		
Al 26		8			Tm 171		8		
Cl 36	1.21E-08	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	1.56E-07	CC 1			Pb 210		8		
Co 60	6.77E-07	CC 1			Bi 208		8		
Ni 59		8			Bi 210m		8		
Ni 63	6.73E-07	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	1.35E-03	CC 1			Th 227		8		
Zr 93		8			Th 228	8.21E-09	CC 2		
Nb 91		8			Th 229		8		
Nb 92		8			Th 230		8		
Nb 93m		8			Th 232		8		
Nb 94		8			Th 234	1.82E-08	CC 2		
Mo 93		8			Pa 231		8		
Tc 97		8			Pa 233		8		
Tc 99	3.82E-07	CC 1			U 232	8.23E-09	CC 1		
Ru 106	1.75E-09	CC 1			U 233		8		
Pd 107		8			U 234	1.87E-08	CC 1		
Ag 108m		8			U 235		8		
Ag 110m		8			U 236		8		
Cd 109		8			U 238	1.82E-08	CC 1		
Cd 113m		8			Np 237		8		
Sn 119m		8			Pu 236		8		
Sn 121m		8			Pu 238	9.61E-06	CC 1		
Sn 123		8			Pu 239	6.22E-06	CC 1		
Sn 126		8			Pu 240	7.63E-06	CC 1		
Sb 125	7.79E-08	CC 1			Pu 241	3.00E-04	CC 1		
Sb 126		8			Pu 242	6.06E-09	CC 1		
Te 125m	1.95E-08	8			Am 241	5.93E-05	CC 1		
Te 127m		8			Am 242m		8		
I 129		8			Am 243		8		
Cs 134	1.20E-07	CC 1			Cm 242		8		
Cs 135		8			Cm 243	9.60E-09	CC 1		
Cs 137	5.67E-04	CC 1			Cm 244	2.1E-07	CC 1		
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	8.25E-07	CC 1			Cf 251		8		
Sm 147		8			Cf 252		8		
Sm 151	7.01E-06	CC 1			Other a				
Eu 152	6.77E-08	CC 1			Other b/g				
Eu 154	1.88E-06	CC 1			Total a	8.3E-05	CC 2	0	
Eu 155	4.04E-07	CC 1			Total b/g	2.24E-03	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