SITE Dungeness A SITE OWNER **Nuclear Decommissioning Authority WASTE CUSTODIAN** Magnox Limited LLW **WASTE TYPE** Is the waste subject to Nο Scottish Policy: **WASTE VOLUMES** Reported At 1.4.2022..... Stocks: $0 \, \text{m}^3$ Future arisings -1.4.2092 - 31.3.2095...... 23611.0 m³ Total future arisings: 23611.0 m³ Total waste volume: 23611.0 m³ Comment on volumes: It has been assumed that the whole of the bioshield will be knocked down and disposed of as LLW. There will be no segregation of waste. Final Dismantling & Site Clearance is assumed to commence in 2088 with reactor dismantling commencing in 2092 and lasting for 3 years. The volumes and radioactivity have been calculated for 85 years after reactor shutdown, i.e. 2091. Uncertainty factors on Stock (upper): Arisings (upper) x 1.2 volumes: Stock (lower): Arisings (lower) х x 0.8**WASTE SOURCE** Concrete wastes from dismantling of reactors and associated plant. PHYSICAL CHARACTERISTICS General description: A wide variety of concrete and reinforced concrete items. (Reinforcing steel is described in waste stream 9C314). Waste can be packaged in standard LLW packages. Physical components (%wt): Concrete and reinforced concrete. Sealed sources: The waste does not contain sealed sources. Bulk density (t/m3): Comment on density: The density is of the waste as cut for packaging. The density is the effective density for packaging assuming 20% of the concrete is in blocks and 80% is rubble. CHEMICAL COMPOSITION General description and Concrete (100%). Some of the concrete may include iron shot. components (%wt): Chemical state: Alkali Chemical form of H-3: The tritium is incorporated in the concrete. radionuclides: C-14: The carbon 14 is incorporated in the concrete. Cl-36: The chlorine 36 is incorporated in the concrete. There is no sheet metal or bulk metal in this waste stream. Reinforcing steel is described in Metals and alloys (%wt): waste stream 9C314. (%wt) % of total C14 Type(s) / Grade(s) with proportions activity Stainless steel..... Other ferrous metals..... NF Some of the concrete may include iron shot; otherwise only trace quantities of metals are expected. Iron..... Aluminium..... Beryllium...... 0 Cobalt..... Copper...... 0

Lead...... 0

Magnox/Magnesium	0		
Nickel			
Titanium			
Uranium			
Zinc	0		
Zircaloy/Zirconium	0		
Other metals	0		
Organics (%wt): None expected.	There are no	halogenated plastics or rubbers present.	
	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulosics	0		donvity
Paper, cotton	0		
Wood	0		
Halogenated plastics	0		
Total non-halogenated plastics	0		
Condensation polymers	0		
Others	0		
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	0		
Other materials (%wt): There might be tr	aces of grap	phite.	
	(%wt)	Type(s) and comment	% of total C14
	(70111)	Type(3) and comment	activity
Inorganic ion exchange materials	0		
Inorganic sludges and flocs	0		
Soil	0		
Brick/Stone/Rubble	0		
Cementitious material	100.0		100.0
Sand			
Glass/Ceramics	0		
Graphite	TR		
Desiccants/Catalysts			
Asbestos	0		
Non/low friable			

Moderately friable		
Highly friable		
Free aqueous liquids	0	
Free non-aqueous liquids	0	
Powder/Ash	0	
Inorganic anions (%wt): Principal anions wi be up to 20% if lime		es and aluminates in various anionic forms. Carbonates could d as an aggregate.
	(%wt)	Type(s) and comment
Fluoride	<1.0	
Chloride	<1.0	
lodide	<1.0	
Cyanide	0	
Carbonate	<2.0	
Nitrate	<1.0	
Nitrite	<1.0	
Phosphate	<1.0	
Sulphate	~2.0	
Sulphide	<1.0	
Materials of interest for No materials likely waste acceptance criteria:	to pose a fi	ire 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		
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 / None expected non hazardous pollutants:		
	(%wt)	Type(s) and comment
Acrylamide		
Benzene		

Chlorinated solvents		
Formaldehyde		
Organometallics		
Phenol		
Styrene		
Tri-butyl phosphate		
Other organophosphates		
Vinyl chloride		
Arsenic		
Barium		
Boron		
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 Yes. Large Concret	e Items (L	Cls) may be Dls; drumme

Potential for contain discrete items:

d (ungrouted)/"rubbleised" wastes assumed NOT 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		
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		
Expected to be consigned to a Landfill Facility	100.0	1.4
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:

17 01 01

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

Disposal Route		Stream volume	%
Disposal Notice	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:

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

Waste Packaging for Disposal: (Not applicable to this waste stream)

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	

Other information: -

Waste Planned for Disposal at the LLW Repository: (Not applicable to this waste stream)

Container voidage:

Waste Characterisation

Form (WCH):

- (-)

Waste consigned for disposal to LLWR in year of generation:

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: Activation of the concrete and impurities. There may be some contamination.

Uncertainty: The values quoted were derived by calculation from available material specifications and

are indicative of the activities that are expected. The majority of uncertainty is in the

impurity levels.

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:

The specific activities were estimated from neutron activation calculations of the material

and its impurities.

Other information: The activities quoted are those at 85 years after reactor shutdown, i.e. in 2091. There may

be some contamination by Cs137.

Nuclide	q/m³	civity, i bq/iii	Mean radioa			tivity, TBq/m³	Mean radioac		
H 3 Be 10 C 14 Na 22 A 126 C 136 A 1-72E-06 C C 2 B 10 163 C C 14 C 136 A 1-72E-06 C C 2 B		Future		Nuclido					Nuclido
Be 10		arisings	1.4.2022 Code				22 Code	1.4.2022	
C 14	8					5.58E-05			
Na 22	8	0.005.00				0.075.00			
Al 26		8.36E-09				2.37E-06			
Ci 36	8								
Ar 39 Ar 42 K 40 Ca 41 K 40 Ca 41 Mn 53 Mn 53 Mn 54 Fe 55 Co 60 Ni 59 Ni 59 Ni 59 Ni 59 Ni 58 Ra 223 Se 79 Kr 81 Kr 85 Ra 87 Sr 90 S	8					4 705 00			
Ar 42	8					1.72E-06			
K 40 Ca 41 Ca 41 1.24E-05 CC 2 P1193 Mn 53 Mn 54 Fe 55 Co 60 Ni 59 Ni 63 Zn 65 Se 79 Kr 81 Kr 81 Kr 85 Rb 87 Sr 90 Zr 93 Nb 91 Nb 92 Nb 93m Nb 94 Mn 93 Nb 94 Days 94	8								
Ca 41	8								
Mn 53 Mn 54 Fe 55 Co 60 Ni 59 Ni 63 Re 223 Se 79 Kr 81 Kr 81 Kr 85 Rb 87 Sr 90 Zr 93 Nb 91 Nb 92 Nb 93m Nb 92 Nb 93m Nb 94 Nb 93 Te 97 Te 99 Ru 106 Pd 107 Rq 108m Rq 110m Rd 108m Rq 110m Rd 108m Rq 110m Rd 109 Rd 110m Rd 110m Rd 109 Rd 110m Rd 11	8					4.045.05			
Mn 54	8					1.24E-05			
Fe 55	8								
Co 60	8								
Ni 59	8					1 E 4 E 00			
Ni 63	8								
Zn 65 Se 79 Ra 223 Ra 225 Ra 225 Ra 81 Ra 225 Ra 81 Ra 828 Ra 226 Ra 85 Ra 827 Ra 828	8							1	
Se 79	8					4.8E-07			
Kr 81 Kr 85 Rb 87 Kr 86 Rb 87 Kr 80 Kr 81 Kr 82 Rb 87 Kr 80 Kr 81 Kr 82 Rb 87 Kr 83 Rb 87 Kr 84 Kr 85 Kr 84 Kr 84 Kr 85 Kr 84 Rb 87 Kr 84 Kr 84 Kr 85 Kr 84 Kr 84 Kr 84 Kr 84 Kr 84 Kr 85 Kr 84	8		i						
Kr 85 8 Ra 228 Rb 87 8 Ac 227 Sr 90 8 Th 227 Zr 93 8 Th 228 Nb 91 8 Th 229 Nb 92 8 Th 230 Nb 93m 8 Th 232 Nb 94 1.76E-08 CC 2 Th 234 Mo 93 8 Pa 231 Tc 97 8 U 233 Ru 106 8 U 233 Pd 107 8 U 234 Ag 108m 1.81E-08 CC 2 U 235 Ag 110m 8 U 236 Cd 109 8 U 238 Cd 113m 8 Np 237 Sn 12im 8 Pu 236 Sn 123 8 Pu 239 Sn 126 8 Pu 241 Sb 126 8 Pu 242 Te 125m 8 Am 241 Te 127m 8 Am 243 Cs 134 8 Cm 244 Cs 135 8 Cm 244 Cs 137 8 Cm 246	8								
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Sr 90 8 Th 227 Zr 93 8 Th 228 Nb 91 8 Th 229 Nb 92 8 Th 230 Nb 93m 8 Th 232 Nb 94 1.76E-08 CC 2 Th 234 Mo 93 8 Pa 231 Tc 97 8 Pa 233 Tc 99 8 U 232 Ru 106 8 U 234 Pd 107 8 U 234 Ag 108m 1.81E-08 CC 2 U 235 Ag 110m 8 U 236 Cd 113m 8 Np 237 Sn 119m 8 Pu 236 Sn 121m 8 Pu 238 Sn 123 8 Pu 238 Sn 126 8 Pu 240 Sb 125 8 Pu 241 Sb 126 8 Pu 242 Te 127m 8 Am 241 Te 127m 8 Am 243 Cs 134 8 Cm 244 Cs 135 8 Cm 244 Cs 137 8 Cm 245 </td <td>8</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	8								
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Te 125m Te 127m I 129	8			Pu 241	8				Sb 125
Te 125m Te 127m I 129	8			Pu 242					
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Pm 145 8 Cf 250	8				8				
Pm 147 8 Cf 251	8				8				Pm 147
Sm 147 8 Cf 252	8								
Sm 151 7.21E-07 CC 2 Other a						7.21E-07			Sm 151
Eu 152 4.79E-06 C C 2 Other b/g				_		4.79E-06			Eu 152
Eu 154 2.5E-08 CC 2 Total a 0	0				CC 2	2.5E-08			Eu 154
Eu 155 8 Total b/g 0 7.8	-05 CC 2	7.84E-05	[0	Total b/g	8				

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

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