SITE Hinkley Point A

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Magnox Limited

WASTE TYPE LLW

Is the waste subject to

Scottish Policy:

Stocks:

No

WASTE VOLUMES

Reported
At 1.4.2022...... 0 m³

Future arisings - 1.4.2085 - 31.3.2088....... 913.0 m³

Total future arisings: 913.0 m³

Total future arisings: 913.0 m³

Total waste volume: 913.0 m³

Comment on volumes: For inventory purposes the arisings are assumed to arise at a uniform rate over three years.

Final Dismantling & Site Clearance is assumed to commence in 2081 and end in 2090. Reactor dismantling will commence in 2085 and last for three years. Volumes and radioactivity have been calculated for 85 years after reactor shutdown, i.e. 2085.

Arisings (upper)

Uncertainty factors on Stock (upper): x

volumes: Stock (lower): x Arisings (lower) x 0.8

WASTE SOURCE Mild steel items from the reactor structure.

PHYSICAL CHARACTERISTICS

General description: A variety of mild steel items including the pressure vessel, diagrid and support plate.

Waste can be packaged in standard LLW packages.

Physical components (%wt): Mild steel items (100%).

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): ~1.4

Comment on density: The density is of the waste as cut for packaging.

CHEMICAL COMPOSITION

General description and components (%wt):

Mild steel (100%).

Chemical state: Neutral

Chemical form of H-3: The tritium content is insignificant.

radionuclides: C-14: The carbon 14 is incorporated in the steel. There also may be some contamination

as graphite.

CI-36: The chlorine 36 will be incorporated in the steel.

Se-79: The selenium content is insignificant.

Tc-99: The chemical form of technetium has not been determined.

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 plutonium content is insignificant.

Metals and alloys (%wt): All of the waste will be bulk metal items which have been cut for packaging. Metal

thicknesses will probably range from a few mm to about 100 mm.

(%wt) Type(s) / Grade(s) with proportions % of total C14 activity

Stainless steel...... 0

waste stream is mild steel. Mild steel types are BS1503-161, BS970-EN3B, PV Steel, BS1501, BS15 and

BS970-EN3A.

Iron.....

Aluminium	0		
Beryllium	0		
Cobalt	<0.03	Greatest measured value from the various components.	
Copper	0	·	
Lead	0		
Magnox/Magnesium	. 0		
Nickel	<0.15	Greatest measured value from the various components.	
Titanium			
Uranium			
Zinc	0		
Zircaloy/Zirconium	0		
Other metals	TR	Silver and niobium	
Organics (%wt): None expected. The	ere are no	halogenated plastics or rubbers present.	
	(%wt)	Type(s) and comment	% of total C14
Total cellulosics	0		activity
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): Some graphite dust	may be as	ssociated with reactor materials.	
Cano materiale (70117).	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials	0		,
Inorganic sludges and flocs	0		
Soil	0		
Brick/Stone/Rubble	0		
Cementitious material	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): There may be a tra	ace of chlor	ide present.
	(%wt)	Type(s) and comment
Fluoride	0	
Chloride	TR	
lodide	0	
Cyanide	0	
Carbonate	0	
Nitrate	0	
Nitrite	0	
Phosphate	0	
Sulphate	0	
Sulphide	0	
Materials of interest for No materials likely waste acceptance criteria:	to pose a f	ire or other non-radiological hazard have been identified.
	(%wt)	Type(s) and comment
Combustible metals		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	0	
Corrosive materials	0	
Pyrophoric materials	0	
Generating toxic gases	0	
Reacting with water	0	
Higher activity particles		
Southie chine ac hilly chemical		

compounds.....

Hazardous subs	stances /
non hazardous	pollutants:

None expected

	(%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	<0.03	Greatest measured value from the various components.
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): Yes		
	(%wt)	Type(s) and comment
EDTA		
DPTA		
NTA		
Polycarboxylic acids		
Other organic complexants		
Total complexing agents	TR	

Potential for the waste to contain discrete items:

Yes. Large Metal Items (LMIs)/"substantial" thickness items considered

"durable" assumed DIs. NB If recycled then DI Limits n/a

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 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	1.4

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 %				
Disposal Noute	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
_	<u>_</u>	_	_	_	<u>_</u>

Waste Packaging for Disposal:

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	92

Other information: Data have been presented as though the waste will be in one dedicated

container. It is likely that this waste will be placed in a container with other LLW.

Waste Planned for Disposal at the LLW Repository:

Container voidage: Not yet determined.

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:

The timing of consignment of the waste for disposal cannot be determined at

present.

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

Activation of the mild steel and its impurities. Source:

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

are indicative of the activities that are to be expected. The major source of uncertainty is

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 a neutron activation calculation using the

available material specifications.

Other information: The activities quoted are those at 85 years after reactor shutdown, i.e. in 2085. There may

be some contamination by Cs137.

WASTE STREAM Mild Steel (Reactor) LLW 9D314

Nuclide	Mean radioactivity, TBq/m³			Mean radioactivity, TBq/m³						
H3	Nuolido					Nuclido				Bands and
Be 10 C 14 Na 22 A126 C 14 C 2 2 Ho 166m 8 Tm 170 Tm 171 C 176 A7 39 A7 42 A7 39 A7 42 B 14 178a B 14 178a B 14 178a B 17 120 B 1		1.4.2022	Code	arisings			1.4.2022	Code	arisings	Code
C 14										8
Na 22 Al 26 Cl 36 Ar 39 Ar 42 Ar 39 Ar 42 Ar 40 Ar 39 Ar 44 Ar 40 Ar 39 Ar 47 Ar 40 Ar 40										8
A 26				5.52E-04						8
Clais										8
Ar 39 Ar 42 Kr 40 Ca 41 Mn 53 Mn 53 Mn 54 Fe 55 T.85E-09 CC 2 Pb 205 Ni 59 1.22E-05 Ni 59 1.22E-04 CC 2 Ri 30 Ri 8 Ra 223 Se 79 Kr 81 Kr 81 Kr 81 Kr 85 Bb 87 Rs 825 Kr 85 Bb 87 Rs 90 Zr 93 Nb 93 Ra 76 CC 2 Ru 100 Ru										8
A	:			2.29E-07	i					8
K 40										8
Ca 41										8
Mn 53 Mn 54 Mn 54 Fe 55 Co 60 Nn 54 Fe 55 Te 55 Te 55 Te 55 Te 55 Te 56 Te 57 Te 57 Te 59 Te 50										8
Mn 54									4.055.00	8
Fe 55 Co 60 1.2E-05 Co 60 1.2E-05 Co 2 1.2E-05 Co 2 1.2B-04 Ro 135 Ro 123E-03 Ro 123E-03 Ro 123E-03 Ro 123E-03 Ro 123E-03 Ro 123E-04 Ro 123E-03									1.65E-09	CC 2
Co 60				- o oo						8
Ni 59 Ni 63										8
Ni 63										8
Se 79										8
Se 79 8 Ra 225 Kr 81 8 Ra 226 Kr 85 8 Ra 228 Rb 87 8 Ac 227 Sr 90 8 Th 227 27 93 8 Th 228 Nb 91 8 Th 229 Nb 92 8 Th 230 Nb 93m 6 Th 232 Nb 93m 8.76E-06 CC 2 Pa 231 Tc 97 8 Pa 233 Tc 99 2.01E-06 CC 2 U 232 Ru 106 8 U 233 Pd 107 8 U 233 Ag 108m 1.74E-06 CC 2 U 235 Ag 110m 8 U 236 Cd 109 8 U 236 Cd 113m 8 Pu 239 Sn 121m 1.93E-05 CC 2 Pu 238 Sn 123 8 Pu 240 Sb 125 8 Pu 241 Sb 126 8 Pu 242 Te 125m 8 Pu 242 Te 125m 8 Cm 244 <				7.52E-03						8
Kr 81 Kr 85 Kr 85 Kr 85 Rb 87 Sr 90 Zr 93 Nb 91 Nb 92 Nb 93 Nb 93 Nb 94										8
Kr 85 Rb 87 8 Ra 228 Sr 90 8 Th 227 Zr 93 8 Th 228 Nb 91 8 Th 229 Nb 93m 6 Th 230 Nb 93m 6 Th 232 Nb 94 2.41E-07 CC 2 Th 234 Mo 93 8.76E-06 CC 2 Pa 231 Tc 97 8 Pa 233 Tc 99 2.01E-06 CC 2 U 232 Ru 106 8 U 234 Pd 107 8 U 236 Ag 110m 1.74E-06 CC 2 U 235 Ag 110m 8 U 236 Cd 113m 8 Np 237 Sn 121m 1.93E-05 CC 2 Pu 238 Sn 123 8 Pu 230 Sn 126 8 Pu 240 Sb 125 8 Pu 240 Sb 126 8 Pu 241 Sb 126 8 Pu 242 Sc 134 8 Cm 243 Cs 137 8 Cm 243 Cs 137 8										8 8
Rb 87 Sr 90 Sr 90 Rb 93 Rb 93 Rb 93 Rb 93 Rc 97 Rc 97 Rc 97 Rc 99 Rc 106 Rd 107 Rd 107 Rd 118 Rd 108										
Sr 90 Zr 93 Nb 91 Nb 92 Nb 93m Nb 94 Mo 93 Tc 97 Ru 106 Ru 107 Ag 110m Cd 109 Cd 119m Sn 121m Sn 126 Sb 126 Sc 134 Cc 134 Cc 133 Cc 134 Cc 135 Cc 134 Cc 135 Cc 137 Ba 133 La 137 La 138 Cc 14138 Cc 1414 Sc 1418 Sc 142 Sc 144 Sc 144 Sc 142 Sc 144 Sc 142 Sc 144 Sc 142 Sc 144 Sc										8
The content of the										8 8
Nb 91 Nb 92 Nb 93m Nb 94										8
Nb 92 Nb 93m Nb 94 2.41E-07										8
Nb 93m Nb 94 Nb 94 Nb 93 Nb 94 Nb 93 Ro 33 Ro 76E-06 Ro C 2 Ro 2 Ro 106 Ro 107 Ro 90 Ro 107 Ro 90 Ro 108 Ro 108 Ro 109 Ro 1174E-06 Ro 1238 Ro 1238 Ro 1236 Ro 1238 Ro 1236 Ro 1238 Ro 1236 Ro 1236 Ro 1238 Ro 1236 Ro 1236 Ro 1237 Ro 119m Ro 1238 Ro 1240 Ro 1258 Ro 126 Ro 1278 Ro 126 Ro 1278 Ro 1278 Ro 128 Ro 129 Ro										8
Nb 94 Mo 93 Tc 97 Tc 99 Ru 106 Pd 107 Ag 108m Ag 110m Cd 109 Sn 121m Sn 123 Sn 123 Sn 123 Sn 123 Sn 126 Sb 125 Sb 126 Te 125m Te 127m I 129 Cs 134 Cs 135 Cs 137 Ba 133 La 137 La 138 Ce 144 Sc 143 Sn 124 Sc 144 Sc										8
No 93				2.415.07						8
Tc 97 Tc 99 Ru 106 Ru 106 Ru 107 Ag 108m Ag 110m Cd 109 Cd 113m Sn 119m Sn 123 Sn 126 Sb 125 Sb 126 Te 125m Te 127m Te 127m Te 127m Te 127m Te 127m Te 127m Cs 134 Cs 135 Cs 137 Cs 137 Cs 137 Cs 137 Cs 138 Cc 144 Cs 138 Cc 144										8
Tc 99 Ru 106 Pd 107 Ag 108m Ag 110m Cd 109 Cd 113m Sn 119m Sn 121m Sn 123 Sn 126 Sb 125 Sb 126 Te 125m Te 127m I 129 Cs 134 Cs 135 Cs 134 Cs 135 Cs 137 Ba 133 La 137 La 138 Ce 144				8.76L-00						8
Ru 106 Pd 107 Ag 108m Ag 108m Ag 110m Cd 109 Cd 113m Sn 119m Sn 121m Sn 123 Sn 126 Sb 125 Sb 126 Te 125m Te 127m I 129 Cs 134 Cs 135 Cs 134 Cs 135 Cs 137 Ba 133 La 137 La 138 Ce 144				2.015.06						8
Pd 107 8 U 234 Ag 108m 1.74E-06 CC 2 U 235 Ag 110m 8 U 236 Cd 109 8 U 238 Cd 113m 8 Np 237 Sn 119m 8 Pu 236 Sn 121m 1.93E-05 CC 2 Pu 238 Sn 123 8 Pu 239 Sn 126 8 Pu 240 Sb 125 8 Pu 241 Sb 126 8 Pu 242 Te 125m 8 Am 241 Te 127m 8 Am 243 Tc 129 8 Am 243 Cs 134 Cm 242 Cm 242 Cs 135 Cm 243 Cm 244 Ba 133 8 Cm 245 La 137 8 Cm 248 Ce 144 8 Cf 249				2.01L-00						8
Ag 108m Ag 108m Ag 110m Cd 109 Cd 113m Sn 119m Sn 121m Sn 123 Sn 126 Sb 126 Sb 126 Te 125m Te 127m I 129 Cs 134 Cs 135 Cs 137 Ba 133 La 137 La 138 Ce 144 S 1088 1.74E-06 CC 2 U 235 U 236 U 238 V U 238 V U 236 Pu 236 Pu 238 Pu 239 Pu 239 Pu 240 Pu 241 Pu 242 Am 241 Am 241 Am 242m Am 242m Am 243 Cc 243 Cc 25 135 Cm 243 Cm 244 Cm 244 Cm 244 Cm 245 Cm 244 Cm 245 Cm 246 Cm 248 Cm 248 Cc 144										8
Ag 110m Cd 109 Cd 113m Sn 119m Sn 121m Sn 123 Sn 126 Sb 125 Sb 126 Te 125m Te 127m I 129 Cs 134 Cs 135 Cs 137 Ba 133 La 137 La 138 Ce 144 Cd 109 8				1 745 06						8
Cd 109 Cd 113m Sn 119m Sn 121m 1.93E-05 CC 2 Pu 238 Sn 123 Sn 126 Sb 125 Sb 126 Te 125m Te 127m I 129 Cs 134 Cs 135 Cs 137 Ba 133 La 137 La 138 Ce 144 Cd 109 8 U 238 Np 237 Pu 236 Pu 238 Pu 239 Pu 240 Pu 240 Pu 241 Pu 242 Ra Pu 242 Am 241 Am 242m Am 242m Am 243 Cc m 244 Cc m 248	-			1.74L-00	i					8
Cd 113m Sn 119m Sn 121m Sn 123 Sn 126 Sb 125 Sb 126 Te 125m Te 127m I 129 Cs 134 Cs 135 Cs 137 Ba 133 La 137 La 138 Ce 144 Ce 144 Cd 113m Sn Np 237 Pu 236 Pu 238 Pu 239 Sn 126 Sn Pu 240 Sn Pu 240 Sn Pu 241 Sn Pu 242 Sn Pu 24	-									8
Sn 119m 8 Pu 236 Sn 121m 1.93E-05 CC 2 Pu 238 Sn 123 8 Pu 239 Sn 126 8 Pu 240 Sb 125 8 Pu 241 Sb 126 8 Pu 242 Te 125m 8 Am 241 Te 127m 8 Am 242m I 129 8 Am 243 Cs 134 Cm 242 Cm 242 Cs 135 Cm 243 Cm 243 Cs 137 6 Cm 244 Ba 133 8 Cm 245 La 137 8 Cm 246 La 138 Cm 248 Cm 249 Ce 144 8 Cf 249										8
Sn 121m 1.93E-05 CC 2 Pu 238 Sn 123 8 Pu 239 Sn 126 8 Pu 240 Sb 125 8 Pu 241 Sb 126 8 Pu 242 Te 125m 8 Am 241 Te 127m 8 Am 242m I 129 8 Am 243 Cs 134 Cm 242 Cm 243 Cs 135 Cm 243 Cm 244 Ba 133 Cm 245 Cm 246 La 137 Cm 248 Cm 248 Ce 144 8 Cf 249						Pu 236				8
Sn 123 8 Pu 239 Sn 126 8 Pu 240 Sb 125 8 Pu 241 Sb 126 8 Pu 242 Te 125m 8 Am 241 Te 127m 8 Am 242m I 129 8 Am 243 Cs 134 Cm 242 Cm 242 Cs 135 Cm 243 Cm 243 Cs 137 6 Cm 244 Ba 133 8 Cm 245 La 137 8 Cm 246 La 138 Cm 248 Cm 248 Ce 144 8 Cf 249				1.93E-05						8
Sn 126 8 Pu 240 Sb 125 8 Pu 241 Sb 126 8 Pu 242 Te 125m 8 Am 241 Te 127m 8 Am 242m I 129 8 Am 243 Cs 134 Cm 242 Cm 242 Cs 135 Cm 243 Cm 243 Cs 137 Cm 244 Cm 244 Ba 133 Cm 245 Cm 246 La 137 Cm 248 Cm 248 Ce 144 8 Cf 249						Pu 239				8
Sb 125 8 Pu 241 Sb 126 8 Pu 242 Te 125m 8 Am 241 Te 127m 8 Am 242m I 129 8 Am 243 Cs 134 8 Cm 242 Cs 135 6 Cm 243 Cs 137 6 Cm 244 Ba 133 8 Cm 245 La 137 8 Cm 246 La 138 6 Cm 248 Ce 144 8 Cf 249						Pu 240				8
Sb 126 8 Pu 242 Te 125m 8 Am 241 Te 127m 8 Am 242m I 129 8 Am 243 Cs 134 8 Cm 242 Cs 135 6 Cm 243 Cs 137 6 Cm 244 Ba 133 8 Cm 245 La 137 8 Cm 246 La 138 6 Cm 248 Ce 144 8 Cf 249						Pu 241				8
Te 125m Te 127m I 129						Pu 242				8
Te 127m I 129 S Am 242m Am 243 Cs 134 Cs 135 Cs 137 Ba 133 La 137 La 138 Ce 144 Read						Am 241				8
I 129 8 Am 243 Cs 134 8 Cm 242 Cs 135 6 Cm 243 Cs 137 6 Cm 244 Ba 133 8 Cm 245 La 137 8 Cm 246 La 138 6 Cm 248 Ce 144 8 Cf 249 Ce 144 8 Cf 249						Am 242m				8
Cs 134 8 Cm 242 Cs 135 8 Cm 243 Cs 137 6 Cm 244 Ba 133 8 Cm 245 La 137 8 Cm 246 La 138 6 Cm 248 Ce 144 8 Cf 249 Consumption Cf 249						Am 243				8
Cs 135 Cs 137 Ba 133 La 137 La 138 Ce 144 Ce 144 Cs 135 C										8
Cs 137 Ba 133 La 137 La 138 Ce 144 Cs 137 B										8
Ba 133										8
La 138 Ce 144 8					8					8
La 138 Ce 144 8	_a 137				8					8
Ce 144 8 Cf 249					8					8
Pm 145 8 Cf 250					8					8
	Pm 145				8					8
Pm 147 8 Cf 251	² m 147				8					8
Sm 147 8 Cf 252	Sm 147				8					8
Sm 151 8 Other a	3m 151				8					
Eu 152 8 Other b/g	≣u 152				8	_				
Eu 154 8 Total a 0 0					8					
Eu 155 8 Total b/g 0 8.25E-03	≣u 155				8	Total b/g	0		8.25E-03	CC 2

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)

- 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