

<b>WASTE STREAM</b>	<b>9E324</b>	<b>BCD LLW</b>
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**SITE** Oldbury  
**SITE OWNER** Nuclear Decommissioning Authority  
**WASTE CUSTODIAN** Magnox Limited  
**WASTE TYPE** LLW

**WASTE VOLUMES**

		Reported
Stocks:	At 1.4.2019.....	0 m <sup>3</sup>
Future arisings -	1.4.2096 - 31.3.2101.....	114.9 m <sup>3</sup>
Total future arisings:		114.9 m <sup>3</sup>
Total waste volume:		114.9 m <sup>3</sup>
Comment on volumes:	This waste has been deferred from C&M Prep Waste stream 9E959 to FSC	
Uncertainty factors on volumes:	Stock (upper): x	Arisings (upper) x 1.2
	Stock (lower): x	Arisings (lower) x 0.8

**WASTE SOURCE** Waste arising from areas associated with BCDs.

**PHYSICAL CHARACTERISTICS**

**General description:** Mixed trash. Large items do occasionally arise. This happens infrequently and it is therefore difficult to include specific details.

**Physical components (%wt):** Metal (81% wt), soft organic (10% wt), plastics/rubber (3% wt), soil/rubble (1% wt), wood (4% wt)

**Sealed sources:** -

**Bulk density (t/m<sup>3</sup>):** 0.4

**Comment on density:** -

**CHEMICAL COMPOSITION**

**General description and components (%wt):** The waste comprises metal, various plastics including polythene, paper, wood and rubber. The metals will include steel, copper and aluminium.

**Chemical state:** Neutral

**Chemical form of radionuclides:** H-3: Tritium is present as surface contamination of waste by tritiated liquor.  
C-14: Carbon 14 may be contamination in the form of graphite dust.  
Cl-36: Chlorine 36 may be present as a contaminant of graphite dust.  
Se-79: The selenium 79 content is insignificant.  
Tc-99: The technetium 99 content is insignificant.  
Ra: The radium isotope content is insignificant.  
Th: The thorium content is insignificant.  
U: Chemical form of uranium isotopes has not been determined but may be uranium oxides.  
Np: The neptunium isotope content is insignificant.  
Pu: Chemical form of plutonium isotopes has not been determined but may be plutonium oxides.

**Metals and alloys (%wt):** Thicknesses of metal may vary from 1 mm to 30 mm.

Stainless steel.....	~35.0
Other ferrous metals.....	~45.0
Iron.....	
Aluminium.....	TR
Beryllium.....	0
Cobalt.....	
Copper.....	TR
Lead.....	0
Magnox/Magnesium.....	TR
Nickel.....	

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	Titanium.....	
	Uranium.....	NE
	Zinc.....	0
	Zircaloy/Zirconium.....	TR
	Other metals.....	<1.0 Chromium may be present.
Organics (%wt):	The waste contains plastics/rubber (3% wt), wood (4% wt) and soft organic (10% wt). Halogenated plastics and rubbers are present.	
	Total cellulose.....	14.0
	Paper, cotton.....	10.0
	Wood.....	4.0
	Halogenated plastics .....	~1.0
	Total non-halogenated plastics.....	~2.0
	Condensation polymers.....	~1.0
	Others.....	~1.0
	Organic ion exchange materials....	0
	Total rubber.....	~1.0
	Halogenated rubber .....	~0.50
	Non-halogenated rubber.....	~0.50
	Hydrocarbons.....	
	Oil or grease .....	
	Fuel.....	
	Asphalt/Tarmac (cont.coal tar)...	
	Asphalt/Tarmac (no coal tar)....	
	Bitumen.....	
	Others.....	
	Other organics.....	TR
Other materials (%wt):	-	
	Inorganic ion exchange materials.	0
	Inorganic sludges and flocs.....	0
	Soil.....	~0.50
	Brick/Stone/Rubble.....	~0.50
	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

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## Inorganic anions (%wt):

None present.

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:

Trace of Magnox may be present but will not constitute a hazard.

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
Active particles.....	
Soluble solids as bulk chemical compounds.....	

## Hazardous substances / non hazardous pollutants:

None expected.

Acrylamide.....	
Benzene.....	
Chlorinated solvents.....	
Formaldehyde.....	
Organometallics.....	
Phenol.....	
Styrene.....	
Tri-butyl phosphate.....	
Other organophosphates.....	
Vinyl chloride.....	
Arsenic.....	
Barium.....	

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Boron.....  
 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): No  
     EDTA.....  
     DPTA.....  
     NTA.....  
     Polycarboxylic acids.....  
     Other organic complexants.....  
     Total complexing agents..... 0

**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		39.0
Size reduction		
Decay storage		
Recycling / reuse		
Other / various		
None		61.0

Comment on planned treatments:

39% of this waste stream is expected to be sent for Metal Recycle.

**WASTE STREAM****9E324****BCD LLW****Disposal Routes:**

Disposal Route	Stream volume %	
Expected to be consigned to the LLW Repository	61.0	
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		39.0
Expected to be consigned as Out of Scope		
Expected to be recycled / reused		
Disposal route not known		

**Upcoming (2019/20-2021/22) Waste Routing (if expected to change from above):**

Disposal Route	Stream volume %		
	2019/20	2020/21	2021/22
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			

**Waste Packaging for Disposal:**

Container	Stream volume %	Waste loading m <sup>3</sup>	Number of packages
1/3 Height IP-1 ISO	61.0	10	8
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:**

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: -

Potential for the waste to contain discrete items: -

**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**

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Source:	Principal constituents are activation products arising from dry fuel routes. Waste also contains fission products and actinides.
Uncertainty:	Specific activity is a function of Station operating history. The values quoted are indicative of the activities that would be expected.
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 have been estimated from the equivalent operational waste stream and decayed for 3 years.
Other information:	-

**WASTE STREAM**

**9E324**

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Nuclide	Mean radioactivity, TBq/m <sup>3</sup>				Nuclide	Mean radioactivity, TBq/m <sup>3</sup>			
	Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code		Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code
H 3			1.88E-05	CC 2	Gd 153				8
Be 10				8	Ho 163				8
C 14			9.9E-04	CC 2	Ho 166m				8
Na 22				8	Tm 170				8
Al 26				8	Tm 171				8
Cl 36			2E-04	CC 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				8	Pb 205				8
Fe 55				8	Pb 210				8
Co 60			7.29E-10	CC 2	Bi 208				8
Ni 59				8	Bi 210m				8
Ni 63			2.24E-05	CC 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			5.45E-06	CC 2	Th 227				8
Zr 93				8	Th 228				8
Nb 91				8	Th 229				8
Nb 92				8	Th 230				8
Nb 93m				8	Th 232				8
Nb 94			8.97E-06	CC 2	Th 234		1E-09	CC 2	8
Mo 93				8	Pa 231				8
Tc 97				8	Pa 233		5.28E-10	CC 2	8
Tc 99				8	U 232				8
Ru 106				8	U 233				8
Pd 107				8	U 234				8
Ag 108m			6.97E-06	CC 2	U 235				8
Ag 110m				8	U 236				8
Cd 109				8	U 238		1E-09	CC 2	8
Cd 113m				8	Np 237		5.29E-10	CC 2	8
Sn 119m				8	Pu 236				8
Sn 121m				8	Pu 238		1.56E-07	CC 2	8
Sn 123				8	Pu 239		1E-07	CC 2	8
Sn 126				8	Pu 240		1.25E-07	CC 2	8
Sb 125				8	Pu 241		7.36E-07	CC 2	8
Sb 126				8	Pu 242				8
Te 125m				8	Am 241		1.87E-05	CC 2	8
Te 127m				8	Am 242m				8
I 129				8	Am 243				8
Cs 134				8	Cm 242				8
Cs 135				8	Cm 243		7.35E-08	CC 2	8
Cs 137			5.94E-06	CC 2	Cm 244		4.16E-07	CC 2	8
Ba 133			3.47E-08	CC 2	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	Cf 251				8
Sm 147				8	Cf 252				8
Sm 151				8	Other a				8
Eu 152			2.84E-07	CC 2	Other b/g				8
Eu 154			2.47E-08	CC 2	<b>Total a</b>	<b>0</b>	<b>1.96E-05</b>	<b>CC 2</b>	8
Eu 155			1.4E-10	CC 2	<b>Total b/g</b>	<b>0</b>	<b>1.26E-03</b>	<b>CC 2</b>	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

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