WASTE STREAM 9E960 Active Waste Store, Active Laundry LLW

SITE Oldbury

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Magnox Limited

WASTE TYPE LLW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	1.5 m³
Future arisings -	1.4.2019 - 31.3.2020.....	10.5 m³
	1.4.2020 - 31.3.2021.....	34.7 m³
	1.4.2021 - 31.3.2027.....	86.8 m³
Total future arisings:		132.0 m³
Total waste volume:		133.5 m³

Comment on volumes: -

Uncertainty factors on volumes:

Stock (upper):	x 1.1	Arisings (upper)	x 1.2
Stock (lower):	x 0.9	Arisings (lower)	x 0.8

WASTE SOURCE Waste arising from unstreamed vacuum cleaner waste, active low level waste store and active laundry.

PHYSICAL CHARACTERISTICS

General description: The waste consists mostly of mixed trash and demolition wastes. Large items do occasionally arise. This happens infrequently and it is therefore difficult to include specific details. Any items will be cut to fit standard packages.

Physical components (%wt): Metal (~30% wt), concrete/rubble (3%), soil (2%), biodegradables (35%), plasterboard (1%), plastics (10%), rubber (9%), wood (~4%), other organic (1%), and others including vacuum debris from redundant incinerator (~5%).

Sealed sources: -

Bulk density (t/m³): ~0.52

Comment on density: data taken from WCH mass divided by volume

CHEMICAL COMPOSITION

General description and components (%wt): Waste comprises metal, various plastics and wood. The metals will include steel and iron. Metal (~30% wt), concrete/rubble (3%), soil (2%), biodegradables (35%), plasterboard (1%), plastics (10%), rubber (9%), wood (~4%), other organic (1%), and others including vacuum debris from redundant incinerator (~5%).

Chemical state: Alkali

Chemical form of radionuclides:
H-3: Chemical form of tritium has not been determined.
C-14: Chemical form of carbon 14 has not been determined.
Cl-36: Chemical form of chlorine 36 has not been determined.
Se-79: The selenium-79 content is insignificant.
Tc-99: The technetium-99 content is insignificant.
I-129: The iodine-129 content is insignificant.
Ra: The radium isotope content is insignificant.
Th: The thorium content is insignificant.
U: The uranium isotope content is insignificant.
Np: The neptunium isotope content is insignificant.
Pu: The chemical form of plutonium isotopes has not been determined but may be plutonium oxides.

Metals and alloys (%wt): -

Stainless steel.....	3.0	pumps,motors,pipework
Other ferrous metals.....	26.3	mild steel - pumps,motors,pipework
Iron.....		
Aluminium.....	0.32	
Beryllium.....	NE	

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	Cobalt		
	Copper	0.03	
	Lead	0.32	sheet,pipe,block and shot
	Magnox/Magnesium	TR	Magnox may be present in trace quantities, but will not consitute a hazard
	Nickel		
	Titanium		
	Uranium	NE	
	Zinc	0.03	Trace (in galvanised steel)
	Zircaloy/Zirconium	0	
	Other metals	0	Mass estimates in the table above for mild steel and stainless steel include the constituent alloying elements such as Cr, Fe, Ni and Co. Therefore, these constituent alloying elements are not recorded seperately to avoid double accounting.
Organics (%wt):	-		
	Total cellulosics	~4.0	
	Paper, cotton	0	
	Wood	~4.0	
	Halogenated plastics	~4.0	PVC, PPE
	Total non-halogenated plastics	~6.0	
	Condensation polymers	~3.0	pipes,poly,PPE,perspex,containers, sheet and hoses
	Others	~3.0	pipes,poly,PPE,perspex,containers, sheet and hoses
	Organic ion exchange materials	0	
	Total rubber	~9.0	
	Halogenated rubber	~4.5	Neoprene
	Non-halogenated rubber	~4.5	
	Hydrocarbons		
	Oil or grease		
	Fuel		
	Asphalt/Tarmac (cont.coal tar)		
	Asphalt/Tarmac (no coal tar)		
	Bitumen		
	Others		
	Other organics	~1.0	
Other materials (%wt):	-		
	Inorganic ion exchange materials	0	
	Inorganic sludges and flocs	0	
	Soil	2.0	
	Brick/Stone/Rubble	3.0	
	Cementitious material	0	

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	Sand		
	Glass/Ceramics	0.03	MMMF lagging (associated with general plant items)
	Graphite	TR	
	Desiccants/Catalysts		
	Asbestos	~0.03	
	Non/low friable	0	
	Moderately friable	0	
	Highly friable	~0.03	Lagging / gaskets - chrysotile (white)
	Free aqueous liquids	0	
	Free non-aqueous liquids	0	
	Powder/Ash	5.0	vacuum debris produced from redundant incinerator
Inorganic anions (%wt):	-		
	Fluoride	1.0	Inorganic anions
	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:	-		
	Combustible metals	0	
	Low flash point liquids	0	
	Explosive materials	0	
	Phosphorus	0	
	Hydrides	0	
	Biological etc. materials	TR	
	Biodegradable materials	35.0	
	Putrescible wastes	1.0	
	Non-putrescible wastes	34.0	
	Corrosive materials	0	
	Pyrophoric materials	0	
	Generating toxic gases	TR	
	Reacting with water	0	
	Active particles		
	Soluble solids as bulk chemical compounds		

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Hazardous substances / non hazardous pollutants: Toxic metals are not expected to be present.

Acrylamide.....		
Benzene.....		
Chlorinated solvents.....		
Formaldehyde.....		
Organometallics.....		
Phenol.....		
Styrene.....		
Tri-butyl phosphate.....		
Other organophosphates.....		
Vinyl chloride.....		
Arsenic.....		
Barium.....		
Boron.....		
Cadmium.....		
Caesium.....		
Selenium.....		
Chromium.....		
Molybdenum.....		
Thallium.....		
Tin.....		
Vanadium.....		
Mercury compounds.....		
Others.....		
Electronic Electrical Equipment (EEE)		
EEE Type 1.....	P	5 off Electronic panels and test equipment,
EEE Type 2.....	P	25 off Electronic motors and pumps
EEE Type 3.....	P	40 off Electrical power tools
EEE Type 4.....	P	25 off Fluorescent tubes / lamps
EEE Type 5.....	P	5 off Rechargeable batteries, Nickel-Cadmium/Lithium-Ion

Complexing agents (%wt): Yes

EDTA.....	TR
DPTA.....	
NTA.....	
Polycarboxylic acids……	
Other organic complexants.....	
Total complexing agents.....	TR

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TREATMENT, PACKAGING AND DISPOSAL

Planned on-site / off-site treatment(s):

Treatment	On-site / Off site	Stream volume %
Low force compaction	On-site	10.0
Supercompaction (HFC)	Off-site	10.0
Incineration	Off-site	75.0
Solidification		
Decontamination		
Metal treatment	Off-site	5.0
Size reduction		
Decay storage		
Recyling / reuse		
Other / various		
None		10.0

Comment on planned treatments: 5% of this waste stream is expected to be sent for Metal Recycle.

Disposal Routes:

Disposal Route	Stream volume %
Expected to be consigned to the LLW Repository	20.0
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	75.0
Expected to be consigned to a Metal Treatment Facility	5.0
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 m³	Number of packages
1/3 Height IP-1 ISO			
2/3 Height IP-2 ISO			
1/2 Height WAMAC IP-2 ISO	10.0	~43.2	< 1
1/2 Height IP-2 Disposal/Re-usable ISO	10.0	~10	2
2m box (no shielding)			
4m box (no shielding)			
Other			

Other information: 43.2m3 loading volume is calculated based on the fact that you can low force compact two times the normal volume of waste into a 200 litre/0.2m3 drum (400 litres/0.4m3), you can then fit 36 drums (14.4m3) into a ½ height ISO, each drum can be super-compacted to a 1/3 of its original volume so therefore we can get 3 x the amount of un-compacted drums into the final disposal container (43.2m3).

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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 has a current WCH.
Waste consigned for disposal to LLWR in year of generation:	Yes.
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

Source:	Fission products, actinides and activation products.
Uncertainty:	Activity values are current best estimates. Specific activity is a function of Station operating history. The values quoted are indicative of the activities that would be expected, although demolition wastes are predicted to be lower in activity than the routine operational wastes and so the values quoted for this stream are expected to be an over estimate.
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:	Data taken from WCH - 1MXN-3OLD-0-WCH-0-3926 V5 decayed for 2 years for RWI 2019
Other information:	-

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Nuclide	Mean radioactivity, TBq/m³				Nuclide	Mean radioactivity, TBq/m³			
	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	1.26E-04	C C 1	1.26E-04	C C 1	Gd 153		8		8
Be 10		8		8	Ho 163		8		8
C 14	2.76E-05	C C 1	2.76E-05	C C 1	Ho 166m		8		8
Na 22		8		8	Tm 170		8		8
Al 26		8		8	Tm 171		8		8
Cl 36	5.56E-07	C C 1	5.56E-07	C C 1	Lu 174		8		8
Ar 39		8		8	Lu 176		8		8
Ar 42		8		8	Hf 178n		8		8
K 40		8		8	Hf 182		8		8
Ca 41		8		8	Pt 193		8		8
Mn 53		8		8	Tl 204		8		8
Mn 54		8		8	Pb 205		8		8
Fe 55	1.39E-06	C C 1	1.39E-06	C C 1	Pb 210		8		8
Co 60	1.2E-06	C C 2	1.2E-06	C C 2	Bi 208		8		8
Ni 59		8		8	Bi 210m		8		8
Ni 63	5.81E-07	C C 1	5.81E-07	C C 1	Po 210		8		8
Zn 65		8		8	Ra 223		8		8
Se 79		8		8	Ra 225		8		8
Kr 81		8		8	Ra 226		8		8
Kr 85		8		8	Ra 228		8		8
Rb 87		8		8	Ac 227		8		8
Sr 90	7.22E-08	C C 1	7.22E-08	C C 1	Th 227		8		8
Zr 93		8		8	Th 228		8		8
Nb 91		8		8	Th 229		8		8
Nb 92		8		8	Th 230		8		8
Nb 93m		8		8	Th 232		8		8
Nb 94	2.61E-07	C C 2	2.61E-07	C C 2	Th 234		8		8
Mo 93		8		8	Pa 231		8		8
Tc 97		8		8	Pa 233		8		8
Tc 99		8		8	U 232		8		8
Ru 106	2.37E-08	C C 2	2.37E-08	C C 2	U 233		8		8
Pd 107		8		8	U 234		8		8
Ag 108m	2.33E-07	C C 2	2.33E-07	C C 2	U 235		8		8
Ag 110m		8		8	U 236		8		8
Cd 109		8		8	U 238		8		8
Cd 113m		8		8	Np 237		8		8
Sn 119m		8		8	Pu 236		8		8
Sn 121m		8		8	Pu 238	8.2E-09	C C 1	8.2E-09	C C 1
Sn 123		8		8	Pu 239	2.83E-09	C C 1	2.83E-09	C C 1
Sn 126		8		8	Pu 240	3.83E-09	C C 1	3.83E-09	C C 1
Sb 125	9.02E-08	C C 2	9.02E-08	C C 2	Pu 241	5.84E-07	C C 1	5.84E-07	C C 1
Sb 126		8		8	Pu 242		8		8
Te 125m	2.26E-08	C C 2	2.26E-08	C C 2	Am 241	4.48E-08	C C 1	4.48E-08	C C 1
Te 127m		8		8	Am 242m		8		8
I 129		8		8	Am 243		8		8
Cs 134	1.19E-07	C C 2	1.19E-07	C C 2	Cm 242		8		8
Cs 135		8		8	Cm 243		8		8
Cs 137	3.07E-07	C C 2	3.07E-07	C C 2	Cm 244	1.97E-08	C C 1	1.97E-08	C C 1
Ba 133	1.42E-07	C C 2	1.42E-07	C C 2	Cm 245		8		8
La 137		8		8	Cm 246		8		8
La 138		8		8	Cm 248		8		8
Ce 144	3.1E-09	C C 2	3.1E-09	C C 2	Cf 249		8		8
Pm 145		8		8	Cf 250		8		8
Pm 147	7.6E-08	C C 1	7.6E-08	C C 1	Cf 251		8		8
Sm 147		8		8	Cf 252		8		8
Sm 151		8		8	Other a				
Eu 152	4.47E-07	C C 2	4.47E-07	C C 2	Other b/g				
Eu 154	3.34E-07	C C 2	3.34E-07	C C 2	**Total a**	**7.94E-08**	**C C 2**	**7.94E-08**	**C C 2**
Eu 155	2.73E-07	C C 2	2.73E-07	C C 2	**Total b/g**	**1.60E-04**	**C C 2**	**1.60E-04**	**C C 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

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