

WASTE STREAM**9E22****Miscellaneous Contaminated Items**

SITE Oldbury
SITE OWNER Nuclear Decommissioning Authority
WASTE CUSTODIAN Magnox Limited
WASTE TYPE ILW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	8.5 m ³
Future arisings -	1.4.2019 - 31.3.2020.....	0.5 m ³
Total future arisings:		0.5 m ³
Total waste volume:		9.0 m ³
Comment on volumes:	-	
Uncertainty factors on volumes:	Stock (upper): x 1.2	Arisings (upper) x 1.2
	Stock (lower): x 0.8	Arisings (lower) x 0.8

WASTE SOURCE Redundant contaminated plant items and material not suitable for disposal as LLW to the LLWR.

PHYSICAL CHARACTERISTICS

General description: Drums of: fine filters, Vacuum cleaner debris, sand, poly, size reduced fuel reception tray and miscellaneous waste.

Physical components (%vol): Drums of: fine filters(35% vol), Vacuum cleaner debris(23.5% vol), sand(18% vol), poly(3% vol), size reduced fuel reception tray (8.5% vol) and miscellaneous waste (12% vol).

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): ~1

Comment on density: The assumption of 1 t/m³ as the average bulk density may be subject to revision.

CHEMICAL COMPOSITION

General description and components (%wt): The waste comprises of sand, steel and other components which have not been assessed. Fission products, actinides and other activation products will be present as contaminants.

Chemical state: Neutral

Chemical form of radionuclides:
 H-3: Tritium may be present as water.
 C-14: Carbon 14 will be present as graphite dust particles.
 Cl-36: Chlorine 36 may be present in graphite dust particles.
 Se-79: The selenium content is insignificant.
 Tc-99: The technetium content is insignificant.
 Ra: The radium isotope content is insignificant.
 Th: Traces of thorium may be present in metallic form, as oxide or as insoluble salts.
 U: Uranium isotopes are expected to be present as trace contamination in the form of natural uranium metal.
 Np: The neptunium content is insignificant.
 Pu: Plutonium isotopes are expected to be present as trace amounts from minor fuel leakage, probably metallic.

Metals and alloys (%wt): -

Stainless steel.....	16.7
Other ferrous metals.....	18.0
Iron.....	
Aluminium.....	NE
Beryllium.....	0
Cobalt.....	
Copper.....	NE
Lead.....	0
Magnox/Magnesium.....	NE

WASTE STREAM

9E22

Miscellaneous Contaminated Items

	Nickel.....	
	Titanium.....	
	Uranium.....	
	Zinc.....	NE
	Zircaloy/Zirconium.....	NE
	Other metals.....	NE
		Not fully assessed.
Organics (%wt):	Not fully assessed. The possible presence of cellulose is to be determined. There may be traces of oil and grease. Halogenated plastics and rubbers unlikely to be present.	
	Total cellulosics.....	NE
	Paper, cotton.....	NE
	Wood.....	NE
	Halogenated plastics	NE
	Total non-halogenated plastics.....	~1.5
	Condensation polymers.....	~0.75
	Others.....	~0.75
	Organic ion exchange materials....	NE
	Total rubber.....	NE
	Halogenated rubber	NE
	Non-halogenated rubber.....	NE
	Hydrocarbons.....	
	Oil or grease	
	Fuel.....	
	Asphalt/Tarmac (cont.coal tar)...	
	Asphalt/Tarmac (no coal tar)....	
	Bitumen.....	
	Others.....	
	Other organics.....	TR
Other materials (%wt):	Traces of graphite may be present.	
	Inorganic ion exchange materials.	0
	Inorganic sludges and flocs.....	0
	Soil.....	0
	Brick/Stone/Rubble.....	0
	Cementitious material.....	0
	Sand.....	42.0
	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

WASTE STREAM

9E22

Miscellaneous Contaminated Items

	Powder/Ash.....	20.0
Inorganic anions (%wt):	None greater than 1%.	
	Fluoride.....	0.20
	Chloride.....	0.20
	Iodide.....	0.20
	Cyanide.....	0
	Carbonate.....	0.20
	Nitrate.....	0.20
	Nitrite.....	0.20
	Phosphate.....	0.20
	Sulphate.....	0.20
	Sulphide.....	0.20
Materials of interest for waste acceptance criteria:	No fire or other hazardous material expected but not fully assessed at present.	
	Combustible metals.....	NE
	Low flash point liquids.....	0
	Explosive materials.....	0
	Phosphorus.....	0
	Hydrides.....	0
	Biological etc. materials.....	NE
	Biodegradable materials.....	
	Putrescible wastes.....	0
	Non-putrescible wastes.....	
	Corrosive materials.....	0
	Pyrophoric materials.....	0
	Generating toxic gases.....	NE
	Reacting with water.....	NE
	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.....	

WASTE STREAM**9E22****Miscellaneous Contaminated Items**

Barium.....
 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): Yes
 EDTA.....
 DPTA.....
 NTA.....
 Polycarboxylic acids.....
 Other organic complexants.....
 Total complexing agents..... TR

PACKAGING AND CONDITIONING

Conditioning method: The waste has been sorted and some was classified as LLW and moved to an alternative LLW stream for disposal as such. Waste will be packaged to fit into as few containers as possible.

Plant Name: -
 Location: Oldbury Power Station
 Plant startup date: -
 Total capacity (m³/y incoming waste): -
 Target start date for packaging this stream: 2021
 Throughput for this stream (m³/y incoming waste): -
 Other information: -

Likely container type:	Container	Waste packaged (%vol)	Waste loading (m ³)	Payload (m ³)	Number of packages
	3m ³ RS box	100.0	4.5	2.5	2

WASTE STREAM**9E22****Miscellaneous Contaminated Items**

Likely container type comment: -

Range in container waste volume: -

Other information on containers: -

Likely conditioning matrix: Other information: -

Conditioned density (t/m³): -

Conditioned density comment: -

Other information on conditioning: -

Opportunities for alternative disposal routing:

Treatment	Stream volume (%)	Comment
-	-	-

RADIOACTIVITY

Source: The waste usually arises from the irradiated fuel handling and pond operations. Some of the waste came from AETP refurbishment. Components that have been associated with fuel pond operations are likely to be of high activity.

Uncertainty: The values quoted are indicative of the activities that might 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: Specific activity is a function of Station operating history. Figures were derived by estimation based upon available information.

Other information: -

WASTE STREAM

9E22

Miscellaneous Contaminated Items

Nuclide	Mean radioactivity, TBq/m ³				Nuclide	Mean radioactivity, TBq/m ³			
	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	1.21E-03	DD 2	3.78E-03	DD 2	Gd 153		8		8
Be 10		8		8	Ho 163		8		8
C 14	3.98E-04	DD 2	4E-04	DD 2	Ho 166m		8		8
Na 22		8		8	Tm 170		8		8
Al 26		8		8	Tm 171		8		8
Cl 36	6.97E-04	DD 2	7E-04	DD 2	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	4.52E-09	DD 2	8.89E-06	DD 2	Pb 205		8		8
Fe 55	9.49E-05	DD 2	3.1E-03	DD 2	Pb 210		8		8
Co 60	3.11E-05	DD 2	3.51E-04	DD 2	Bi 208		8		8
Ni 59		8		6	Bi 210m		8		8
Ni 63	8.41E-05	DD 2	9.93E-05	DD 2	Po 210		8		8
Zn 65	4.82E-09	DD 2	2.13E-05	DD 2	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	3.21E-03	DD 2	5.86E-03	DD 2	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	7.43E-09	DD 2		8
Nb 93m		8		8	Th 232		8		8
Nb 94		8		8	Th 234	2.99E-05	DD 2	3E-05	DD 2
Mo 93		8		8	Pa 231		8		8
Tc 97		8		8	Pa 233	2.89E-08	DD 2		8
Tc 99		8		8	U 232		8		8
Ru 106	2E-06	DD 2	2.01E-03	DD 2	U 233		8		8
Pd 107		8		8	U 234	2.99E-05	DD 2	3E-05	DD 2
Ag 108m		8		8	U 235	6.97E-07	DD 2	7E-07	DD 2
Ag 110m		8	3.27E-06	DD 2	U 236	3.98E-06	DD 2	4E-06	DD 2
Cd 109		8		8	U 238	2.99E-05	DD 2	3E-05	DD 2
Cd 113m		8		8	Np 237	2.91E-08	DD 2		6
Sn 119m		8		8	Pu 236		8		8
Sn 121m		8		8	Pu 238	4.64E-04	DD 2	5.96E-04	DD 2
Sn 123		8		8	Pu 239	9.96E-04	DD 2	1E-03	DD 2
Sn 126		8		8	Pu 240	9.95E-04	DD 2	1E-03	DD 2
Sb 125	1.09E-06	DD 2	4.67E-05	DD 2	Pu 241	1.95E-02	DD 2	4.77E-02	DD 2
Sb 126		8		8	Pu 242		8		6
Te 125m	2.73E-07	DD 2	<1.23E-05	C 3	Am 241	3.29E-03	DD 2	2.07E-03	DD 2
Te 127m		8		8	Am 242m		8		6
I 129	5.97E-09	DD 2	6E-09	DD 2	Am 243		8		6
Cs 134	2.1E-04	DD 2	1.43E-02	DD 2	Cm 242	3.81E-09	DD 2	6.34E-05	DD 2
Cs 135		8		8	Cm 243	3.24E-06	DD 2	5.86E-06	DD 2
Cs 137	8.12E-03	DD 2	1.95E-02	DD 2	Cm 244	2.84E-05	DD 2	5.77E-05	DD 2
Ba 133	3.34E-06	DD 2	1.87E-05	DD 2	Cm 245		8		8
La 137		8		8	Cm 246		8		8
La 138		8		8	Cm 248		8		8
Ce 144	1.09E-06	DD 2	2.88E-03	DD 2	Cf 249		8		8
Pm 145		8		8	Cf 250		8		8
Pm 147	3.89E-04	DD 2	1.54E-02	DD 2	Cf 251		8		8
Sm 147		8		8	Cf 252		8		8
Sm 151		8		8	Other a				
Eu 152	6.29E-07	DD 2	1.9E-06	DD 2	Other b/g	2.86E-09	DD 2	3.48E-04	DD 2
Eu 154	9.74E-06	DD 2	4.61E-05	DD 2	Total a	5.84E-03	DD 2	4.86E-03	DD 2
Eu 155	1.69E-06	DD 2	1.73E-05	DD 2	Total b/g	3.40E-02	DD 2	1.17E-01	DD 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