

WASTE STREAM**9A36****Miscellaneous Contaminated Items****SITE** Berkeley**SITE OWNER** Nuclear Decommissioning Authority**WASTE CUSTODIAN** Magnox Limited**WASTE TYPE** ILW**WASTE VOLUMES**Stocks: At 1.4.2019..... Reported 0.2 m³Total future arisings: 0 m³Total waste volume: 0.2 m³

Comment on volumes: Station operation ceased in March 1989. Last accumulation of waste in this stream was in 1966. There will be no further arisings of this waste stream.

Uncertainty factors on volumes: Stock (upper): x 1.1 Arisings (upper) x
Stock (lower): x 0.9 Arisings (lower) x**WASTE SOURCE** Redundant actuator ropes from reactor equipment maintenance work.**PHYSICAL CHARACTERISTICS**

General description: The waste comprises miscellaneous items from Berkeley Power Station, including steel actuator wires and ropes, contained within mild steel paint tins. There are no large items to influence treatment or disposal.

Physical components (%vol): Mild steel actuator wires and ropes contained in mild steel cans.

Sealed sources: -

Bulk density (t/m³): 0.49

Comment on density: Calculated from total mass and volume of this waste.

CHEMICAL COMPOSITION

General description and components (%wt): The waste is expected to be principally mild steel (>95% wt). Other components 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, in the form of other inorganic compounds or organic compounds, or as tritium gas incorporated in metal.

C-14: Chemical form of carbon 14 has not been determined but may be graphite.

Cl-36: The chemical form of chlorine 36 in these wastes is not known.

Se-79: The chemical form of selenium-79 has not been determined.

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

Ra: The chemical form of radium isotopes have not been determined.

Th: The chemical form of thorium isotopes have not been determined.

U: Chemical form of uranium isotopes has not been determined but may be uranium oxides.

Np: The chemical form of neptunium isotopes have not been determined.

Pu: Chemical form of plutonium isotopes has not been determined but may be plutonium oxides.

Metals and alloys (%wt): A small proportion of the metal will be the sheet metal (thickness probably about 1 mm) of the cans containing the waste. The waste is steel wires and ropes.

Stainless steel..... 0

Other ferrous metals..... >95.0

The waste is composed principally of carbon steel.

Iron.....

Aluminium..... 0

Beryllium..... 0

Cobalt.....

Copper..... 0

Lead..... 0

WASTE STREAM

9A36

Miscellaneous Contaminated Items

Magnox/Magnesium.....	0
Nickel.....	
Titanium.....	
Uranium.....	
Zinc.....	0
Zircaloy/Zirconium.....	0
Other metals.....	NE

"Other" metals have not been assessed.

Organics (%wt):

There may be traces of oil.

Total cellulose.....	0
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.....	TR

Other materials (%wt):

Traces of grapite may be present.

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

WASTE STREAM**9A36****Miscellaneous Contaminated Items**

	Free non-aqueous liquids.....	TR
	Powder/Ash.....	0
Inorganic anions (%wt):	Inorganic anion content is expected to be negligible.	
	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:	There are no identified materials likely to represent a fire or other non-radiological 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.....	

WASTE STREAM**9A36****Miscellaneous Contaminated Items**

Arsenic.....
 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: This stream is to be co-packaged with 9A37, 9A38, 9A57, 9A58, 9A59, 9A65, 9A68, 9A69, 9A70, 9A71, 9A72, 9A75, 9A77, 9A78, 9A82. Packages are assigned to 9A68, 9A71 & 9A75.
 Plant Name: -
 Location: Berkeley Site
 Plant startup date: -
 Total capacity (m³/y incoming waste): -
 Target start date for packaging this stream: -
 Throughput for this stream (m³/y incoming waste): -
 Other information: -

WASTE STREAM**9A36****Miscellaneous Contaminated Items**

Likely container type:	Container	Waste packaged (%vol)	Waste loading (m ³)	Payload (m ³)	Number of packages

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 radioactivity may have arisen both from activation and contamination while the material was used in the reactor area.

Uncertainty: The values quoted are indicative of the expected activities.

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 activities were derived by estimation based upon available information.

Other information: Specific activity is a function of Station operating history. Although this waste was originally classified as LLW, (since the activity is below the upper limit for LLW), it will be processed as ILW and so has been declared as ILW for this inventory.

WASTE STREAM

9A36

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	3.06E-06	CC 2			Gd 153		8		
Be 10		8			Ho 163		8		
C 14	1.00E-05	CC 2			Ho 166m		8		
Na 22		8			Tm 170		8		
Al 26		8			Tm 171		8		
Cl 36	7E-07	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	4.22E-07	CC 2			Pb 210		8		
Co 60	1.44E-05	CC 2			Bi 208		8		
Ni 59	1E-06	CC 2			Bi 210m		8		
Ni 63	7.36E-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	5.26E-05	CC 2			Th 227		8		
Zr 93	6E-09	CC 2			Th 228		8		
Nb 91		8			Th 229		8		
Nb 92		8			Th 230		8		
Nb 93m	1.33E-09	CC 2			Th 232		8		
Nb 94		8			Th 234	3E-09	CC 2		
Mo 93		8			Pa 231		8		
Tc 97		8			Pa 233		8		
Tc 99	3E-08	CC 2			U 232		8		
Ru 106		8			U 233		8		
Pd 107		8			U 234	3.08E-09	CC 2		
Ag 108m	<2.96E-06	C 3			U 235		8		
Ag 110m		8			U 236		8		
Cd 109		8			U 238	3E-09	CC 2		
Cd 113m		8			Np 237		8		
Sn 119m		8			Pu 236		8		
Sn 121m		8			Pu 238	1.82E-06	CC 2		
Sn 123		8			Pu 239	1.00E-06	CC 2		
Sn 126		8			Pu 240	2.00E-06	CC 2		
Sb 125		8			Pu 241	1.13E-05	CC 2		
Sb 126		8			Pu 242		8		
Te 125m		8			Am 241	3.22E-06	CC 2		
Te 127m		8			Am 242m	8.48E-09	CC 2		
I 129		8			Am 243	3.00E-09	CC 2		
Cs 134		8			Cm 242	7E-09	CC 2		
Cs 135		8			Cm 243	1.51E-09	CC 2		
Cs 137	5.30E-05	CC 2			Cm 244	1.27E-08	CC 2		
Ba 133		8			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	1.82E-07	CC 2			Other a				
Eu 152	1.07E-09	CC 2			Other b/g				
Eu 154	7.58E-08	CC 2			Total a	8.07E-06	CC 2	0	
Eu 155	1.28E-09	CC 2			Total b/g	2.23E-04	CC 2	0	

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