WASTE STREAM 9A83 Miscellaneous Contaminated Items

SITE Berkeley

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Magnox Limited

WASTE TYPE ILW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	0.1 m³
Total future arisings:		0 m³
Total waste volume:		0.1 m³

Comment on volumes: Station operation ceased in March 1989. Accumulation of waste in this stream was in 1988. 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 Miscellaneous contaminated items from Berkeley Power Station.

PHYSICAL CHARACTERISTICS

General description: The waste comprises miscellaneous items from the Berkeley Power Station, including graphite pieces, splitter material, tacky rags, broken tools and dusts. The waste is containerised in 5 litre and 0.5 litre paint tins. The tins will form part of this waste stream also. There are no large items that may require special handling.

Physical components (%vol): The waste is expected to be ~50% mild steel (the cans), ~20% graphite material, ~15% plastics and ~15% dusts.

Sealed sources: -

Bulk density (t/m³): 0.64

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 mild steel (the cans), graphite material, plastics and dusts. 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.
U: Chemical form of uranium isotopes has not been determined but may be uranium oxides.
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 1mm) of the cans containing the waste.

Stainless steel.....	NE
Other ferrous metals.....	~50.0
Iron.....	
Aluminium.....	0
Beryllium.....	0
Cobalt.....	
Copper.....	0
Lead.....	0
Magnox/Magnesium.....	0
Nickel.....	

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	Titanium		
	Uranium		
	Zinc	0	
	Zircaloy/Zirconium	0	
	Other metals	NE	"Other" metals have not been assessed.
Organics (%wt):	-		
	Total cellulosics	0	
	Paper, cotton	0	
	Wood	0	
	Halogenated plastics	0	
	Total non-halogenated plastics	~15.0	
	Condensation polymers	0	
	Others	15.0	
	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):	Graphite material is expected to be present in the waste		
	Inorganic ion exchange materials.	0	
	Inorganic sludges and flocs	0	
	Soil	0	
	Brick/Stone/Rubble	0	
	Cementitious material	0	
	Sand		
	Glass/Ceramics	0	
	Graphite	~20.0	
	Desiccants/Catalysts		
	Asbestos	0	
	Non/low friable		
	Moderately friable		
	Highly friable		
	Free aqueous liquids	0	
	Free non-aqueous liquids	TR	
	Powder/Ash	~15.0	

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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	
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):	Yes		
	EDTA.....		
	DPTA.....		
	NTA.....		
	Polycarboxylic acids……		
	Other organic complexants.....	TR	Organic complexing agents may be present in trace quantities.
	Total complexing agents.....	TR	

PACKAGING AND CONDITIONING

Conditioning method:	This stream is to be co-packaged with 9A63, 9A64, 9A84, 9A33, 9A34, 9A35, 9A41, 9A42, 9A43, 9A49, 9A50, 9A51, 9A54, 9A55, 9A56, 9A74. Packages are assigned to 9A33, 9A34, 9A74.
Plant Name:	-
Location:	Berkeley Site
Plant startup date:	-
Total capacity (m^3/y incoming waste):	-
Target start date for packaging this stream:	-
Throughput for this stream (m^3/y incoming waste):	-
Other information:	-

Likely container type:

Container	Waste packaged (%vol)	Waste loading (m^3)	Payload (m^3)	Number of packages

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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:	The 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.

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Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code	Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code
H 3	1.53E-03	C C 2			Gd 153		8		
Be 10		8			Ho 163		8		
C 14	1.00E-05	C C 2			Ho 166m		8		
Na 22		8			Tm 170		8		
Al 26		8			Tm 171		8		
Cl 36	7E-07	C C 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-05	C C 2			Pb 210		8		
Co 60	1.03E-04	C C 2			Bi 208		8		
Ni 59	1E-06	C C 2			Bi 210m		8		
Ni 63	8.27E-05	C C 2			Po 210		8		
Zn 65		8			Ra 223		8		
Se 79	1.21E-08	C C 2			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-03	C C 2			Th 227		8		
Zr 93	6E-07	C C 2			Th 228		8		
Nb 91		8			Th 229		8		
Nb 92		8			Th 230		8		
Nb 93m	3.57E-07	C C 2			Th 232		8		
Nb 94		8			Th 234	3E-07	C C 2		
Mo 93		8			Pa 231		8		
Tc 97		8			Pa 233	4.12E-08	C C 2		
Tc 99	3E-06	C C 2			U 232		8		
Ru 106		8			U 233		8		
Pd 107		8			U 234	3.08E-07	C C 2		
Ag 108m	<2.96E-06	C 3			U 235	7E-09	C C 2		
Ag 110m		8			U 236	4.00E-08	C C 2		
Cd 109		8			U 238	3E-07	C C 2		
Cd 113m		8			Np 237	4.12E-08	C C 2		
Sn 119m		8			Pu 236		8		
Sn 121m		8			Pu 238	1.82E-04	C C 2		
Sn 123		8			Pu 239	1.00E-04	C C 2		
Sn 126	4.35E-08	C C 2			Pu 240	2.00E-04	C C 2		
Sb 125		8			Pu 241	1.69E-03	C C 2		
Sb 126	<6.09E-09	C 3			Pu 242	1E-07	C C 2		
Te 125m		8			Am 241	3.38E-04	C C 2		
Te 127m		8			Am 242m	8.48E-07	C C 2		
I 129	6E-09	C C 2			Am 243	3.00E-07	C C 2		
Cs 134	7.12E-08	C C 2			Cm 242	7E-07	C C 2		
Cs 135	1E-07	C C 2			Cm 243	2.28E-07	C C 2		
Cs 137	5.30E-03	C C 2			Cm 244	1.89E-06	C C 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	2.09E-06	C C 2			Cf 251		8		
Sm 147		8			Cf 252		8		
Sm 151	2.73E-05	C C 2			Other a				
Eu 152	1.62E-07	C C 2			Other b/g				
Eu 154	1.91E-05	C C 2			**Total a**	**8.24E-04**	**C C 2**	**0**	
Eu 155	1.28E-06	C C 2			**Total b/g**	**1.41E-02**	**C C 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