WASTE STREAM	9F19	Miscellaneous Drummed Contaminated and Activated Items

SITE Sizewell A

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Magnox Limited

WASTE TYPE LLW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	48.0 m³
Total future arisings:		0 m³
Total waste volume:		48.0 m³
Comment on volumes:	-	
Uncertainty factors on volumes:	Stock (upper): x 1.2	Arisings (upper) x
	Stock (lower): x 0.8	Arisings (lower) x

WASTE SOURCE The waste is redundant equipment and material usually arising from reactor operation, irradiated fuel handling and pond operations.

PHYSICAL CHARACTERISTICS

General description:	The majority of drummed waste is contained in 120-litre drums with a small percentage in 200-litre drums. There are no large items. Special handling requirements have not been assessed.
Physical components (%vol):	Drummed combustible (100%).
Sealed sources:	-
Bulk density (t/m³):	0.4
Comment on density:	The bulk density of the waste ranges from 0.2 t/m³ to 0.5 t/m³.

CHEMICAL COMPOSITION

General description and components (%wt):	A mixture of combustible materials in 120-litre and 200-litre steel drums. Waste generally comprises paper, cloth, wood, steel, glass and polythene bags.
Chemical state:	Neutral
Chemical form of radionuclides:	H-3: The chemical form of tritium may be water or other inorganic or organic compounds. C-14: The chemical form of carbon 14 may be graphite. Cl-36: The chemical form of chlorine 36 has not been determined. Se-79: The selenium content is insignificant. Tc-99: The technetium content is insignificant. Ra: The radium isotope content is insignificant. Th: The thorium isotope content is insignificant. U: The chemical form of uranium isotopes has not been determined but may be uranium oxides. Np: The neptunium content is insignificant. Pu: The chemical form of plutonium isotopes has not been determined but may be plutonium oxides.
Metals and alloys (%wt):	Approximately 45% by weight is mild steel drums of 1 mm thickness.

Stainless steel.....	0	
Other ferrous metals.....	~45.0	
Iron.....		
Aluminium.....	<0.10	
Beryllium.....	0	
Cobalt.....		
Copper.....	<0.10	
Lead.....	<0.10	
Magnox/Magnesium.....	TR	Trace amounts of Magnox possible due to contamination with fuel.

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	Nickel		
	Titanium		
	Uranium		
	Zinc	0	
	Zircaloy/Zirconium	0	
	Other metals	0	There are no "other" metals present.
Organics (%wt):	Not fully assessed. Non-halogenated plastic present as polythene. There may be traces of oil and grease. The waste includes cellulosic materials. Halogenated rubber may be present as viton and neoprene.		
	Total cellulosics	~45.0	
	Paper, cotton	~30.0	
	Wood	~15.0	
	Halogenated plastics	NE	
	Total non-halogenated plastics	NE	
	Condensation polymers	NE	
	Others	~5.0	Non-halogenated plastic present as polythene.
	Organic ion exchange materials	0	
	Total rubber	NE	
	Halogenated rubber	NE	possibly viton and neoprene
	Non-halogenated rubber	NE	
	Hydrocarbons		
	Oil or grease	TR	
	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	
	Brick/Stone/Rubble	0	
	Cementitious material	0	
	Sand		
	Glass/Ceramics	0	
	Graphite	0	
	Desiccants/Catalysts		
	Asbestos	0	
	Non/low friable		
	Moderately friable		
	Highly friable		

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Free aqueous liquids..... 0

Free non-aqueous liquids..... TR

Powder/Ash..... NE

Inorganic anions (%wt): Not fully assessed although it is recognised that carbonates will be present.

Fluoride..... NE

Chloride..... NE

Iodide..... NE

Cyanide..... 0

Carbonate..... NE

Nitrate..... NE

Nitrite..... NE

Phosphate..... NE

Sulphate..... NE

Sulphide..... NE

Materials of interest for waste acceptance criteria: The possible presence of materials likely to represent a fire or other non-radiological hazard is highly improbable. However, it should be recognised that some of the waste is combustible if exposed to a source of ignition.

Combustible metals..... TR

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..... TR

Active particles.....

Soluble solids as bulk chemical compounds.....

Hazardous substances / non hazardous pollutants: Lead might be present but in very small quantities, if any.

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.....

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	Off-site	55.0
Solidification		
Decontamination		
Metal treatment	Off-site	45.0
Size reduction		
Decay storage		
Recyling / reuse		
Other / various		
None		

Comment on planned treatments: It is expected that 45% of this waste stream will be sent for Metal Recycling.

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Disposal Routes:

Disposal Route	Stream volume %
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	55.0
Expected to be consigned to a Metal Treatment Facility	45.0
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: (Not applicable to this waste stream)

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			
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: (Not applicable to this waste stream)

Container voidage: -

Waste Characterisation Form (WCH): 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:	Combustible wastes. Components that have been associated with fuel route operations are likely to be of high activity.
Uncertainty:	The values quoted are indicative of the activities that are 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:	Figures were derived by estimation based upon available information.
Other information:	Specific activity is a function of Station operating history.

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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	2.04E-04	C C 2			Gd 153		8		
Be 10		8			Ho 163		8		
C 14	2E-05	C C 2			Ho 166m		8		
Na 22		8			Tm 170		8		
Al 26		8			Tm 171		8		
Cl 36	5E-05	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-06	C C 2			Pb 210		8		
Co 60	1.03E-05	C C 2			Bi 208		8		
Ni 59		8			Bi 210m		8		
Ni 63	4.6E-05	C C 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	1.50E-04	C C 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			Th 234	7E-08	C C 2		
Mo 93		8			Pa 231		8		
Tc 97		8			Pa 233		8		
Tc 99		8			U 232		8		
Ru 106		8			U 233		8		
Pd 107		8			U 234	7E-08	C C 2		
Ag 108m		8			U 235		8		
Ag 110m		8			U 236		8		
Cd 109		8			U 238	7E-08	C C 2		
Cd 113m		8			Np 237		8		
Sn 119m		8			Pu 236		8		
Sn 121m		8			Pu 238	1.82E-06	C C 2		
Sn 123		8			Pu 239	3E-06	C C 2		
Sn 126		8			Pu 240	3E-06	C C 2		
Sb 125		8			Pu 241	4.48E-05	C C 2		
Sb 126		8			Pu 242		8		
Te 125m		8			Am 241	1.1E-05	C C 2		
Te 127m		8			Am 242m		8		
I 129		8			Am 243		8		
Cs 134	1.78E-08	C C 2			Cm 242		8		
Cs 135		8			Cm 243	4.55E-09	C C 2		
Cs 137	2.28E-04	C C 2			Cm 244	5.06E-08	C C 2		
Ba 133	1.36E-08	C C 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	1.68E-08	C C 2			Cf 251		8		
Sm 147		8			Cf 252		8		
Sm 151		8			Other a				
Eu 152	1.07E-07	C C 2			Other b/g		C C 2		
Eu 154	1.52E-07	C C 2			**Total a**	**1.90E-05**	**C C 2**	**0**	
Eu 155	1.28E-08	C C 2			**Total b/g**	**7.57E-04**	**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