WASTE STREAM	9C324	Effluent Treatment Plant, Ponds and Decontamination LLW

SITE Dungeness A

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Magnox Limited

WASTE TYPE LLW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	0 m³
Future arisings -	1.4.2092 - 31.3.2095.....	159.3 m³
Total future arisings:		159.3 m³
Total waste volume:		159.3 m³

Comment on volumes: Some waste has been deferred from C&M Prep (9C912) to FSC (this waste stream)

Uncertainty factors on volumes:

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

WASTE SOURCE -

PHYSICAL CHARACTERISTICS

General description: Plastic, rubble, wood, glass, metals, resin, paper, HEPA filters, cloth, soil, scrapped plant items and drums containing the waste. Any large items will be cut to fit standard packages.

Physical components (%wt): Protective clothing, HEPA filters, rags, paper, plastic sheeting, scrap metal, plastic pipework, resins, rubble, wood, glass, drums and concrete. Percentage breakdown by weight is metal waste (~25%), plastics (~15%), rubble/concrete (~45%), wood/paper/cloth (~6%), glass (~2%), HEPA filters (<1%wt), encapsulated ion exchange materials (~6%wt), asbestos (<1%wt) and rubber (<1%wt).

Sealed sources: -

Bulk density (t/m³): 0.45

Comment on density: Density is based on the typical weight of a 200 litre drum.

CHEMICAL COMPOSITION

General description and components (%wt): The waste consists of metal , plastic, rubble, wood and glass all in the form of scrapped plant, protective sheeting, decontamination materials and filters. The filters may contain aluminium. The breakdown is metal (including the steel drum) ~25%wt, plastic ~15%wt, wood ~6%wt, glass/rubble ~47%wt and others 7% (including encapsulated ion exchange materials (~6%wt), and about 1% asbestos and some rubber)

Chemical state: Alkali

Chemical form of radionuclides:
H-3: Tritium is present as surface contamination of waste by tritiated liquor.
C-14: Carbon 14 may be present in the form of graphite dust.
Cl-36: Chlorine 36 may be present as a contaminant of graphite dust.
U: The chemical form of uranium isotopes has not been determined but may be uranium oxides.
Pu: The chemical form of plutonium isotopes has not been determined but may be plutonium oxides.

Metals and alloys (%wt): Metal thickness may vary from ~1mm to ~30mm.

Stainless steel.....	~5.0	Nickel and chromium present as constituents of stainless steel.
Other ferrous metals.....	~20.0	
Iron.....		
Aluminium.....	TR	
Beryllium.....	NE	
Cobalt.....		
Copper.....	NE	
Lead.....	TR	
Magnox/Magnesium.....	TR	

WASTE STREAM	9C324	Effluent Treatment Plant, Ponds and Decontamination LLW

	Nickel		
	Titanium		
	Uranium		
	Zinc	TR	
	Zircaloy/Zirconium	TR	
	Other metals	NE	"Other" metals have not been identified.
Organics (%wt):	The waste contains cellulose (in the form of wood, cloth, paper), and plastics (consisting of PVC and polythene). Organic ion exchange materials are to be encapsulated for disposal.		
	Total cellulosics	~6.0	
	Paper, cotton	~3.0	
	Wood	~3.0	
	Halogenated plastics	~7.5	
	Total non-halogenated plastics	~7.5	
	Condensation polymers	~4.0	
	Others	~3.5	
	Organic ion exchange materials	~3.0	
	Total rubber	<1.0	
	Halogenated rubber	<0.50	From rubber boots and gloves and overshoes (soles). The waste may also contain neoprene.
	Non-halogenated rubber	<0.50	
	Hydrocarbons		
	Oil or grease		
	Fuel		
	Asphalt/Tarmac (cont.coal tar)		
	Asphalt/Tarmac (no coal tar)		
	Bitumen		
	Others		
	Other organics	TR	
Other materials (%wt):	-		
	Inorganic ion exchange materials.	~3.0	
	Inorganic sludges and flocs	0	
	Soil		
	Brick/Stone/Rubble	~38.0	
	Cementitious material	~7.0	
	Sand		
	Glass/Ceramics	~2.0	
	Graphite	P	
	Desiccants/Catalysts		
	Asbestos	<1.0	
	Non/low friable		
	Moderately friable		
	Highly friable		

WASTE STREAM	9C324	Effluent Treatment Plant, Ponds and Decontamination LLW

Free aqueous liquids..... 0

Free non-aqueous liquids..... 0

Powder/Ash..... 0

Inorganic anions (%wt): Carbonates, aluminates and silicates will be associated with concrete.

Fluoride..... NE

Chloride..... NE

Iodide..... TR

Cyanide..... 0

Carbonate..... NE

Nitrate..... NE

Nitrite..... NE

Phosphate..... NE

Sulphate..... NE

Sulphide..... NE

Materials of interest for waste acceptance criteria: Asbestos (<1%wt).

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: Asbestos from steam pipe lagging <1%wt. lead may be present in trace quantities.

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):

EDTA.....

DPTA.....

NTA.....

Polycarboxylic acids……

Other organic complexants.....

Total complexing agents..... NE

TREATMENT, PACKAGING AND DISPOSAL

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

Treatment	On-site / Off site	Stream volume %
Low force compaction		
Supercompaction (HFC)	Off-site	12.5
Incineration	Off-site	75.0
Solidification		
Decontamination		
Metal treatment	Off-site	1.5
Size reduction		
Decay storage		
Recyling / reuse		
Other / various		
None		11.0

Comment on planned treatments: It is expected that 2.5% of this waste stream will be sent to landfill as VLLW.

WASTE STREAM 9C324 Effluent Treatment Plant, Ponds and Decontamination LLW

Disposal Routes:

Disposal Route	Stream volume %
Expected to be consigned to the LLW Repository	21.0
Expected to be consigned to a Landfill Facility	2.5
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	1.5
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			
1/2 Height IP-2 Disposal/Re-usable ISO	21.0	10	4
2m box (no shielding)			
4m box (no shielding)			
Other			

Other information: -

Waste Planned for Disposal at the LLW Repository:

Container voidage: .

Waste Characterisation Form (WCH): -

Waste consigned for disposal to LLWR in year of generation: The timing of consignment of the waste for disposal cannot be determined at present.

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: -

WASTE STREAM	9C324	Effluent Treatment Plant, Ponds and Decontamination LLW

RADIOACTIVITY

Source:	Activation and contamination of materials.
Uncertainty:	Activity values are current best estimates. Specific activity is a function of operating history. The values are indicative of the activities that would 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:	The specific activities have been estimated from the equivalent operational waste stream and appropriately decayed for FSC.
Other information:	-

WASTE STREAM 9C324 Effluent Treatment Plant, Ponds and Decontamination LLW

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		8	2.79E-07	C C 2	Gd 153		8		8
Be 10		8		8	Ho 163		8		8
C 14		8	2.97E-06	C C 2	Ho 166m		8		8
Na 22		8		8	Tm 170		8		8
Al 26		8		8	Tm 171		8		8
Cl 36		8	1E-06	C C 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		8		8	Pb 205		8		8
Fe 55		8		8	Pb 210		8		8
Co 60		8	3.2E-10	C C 2	Bi 208		8		8
Ni 59		8		8	Bi 210m		8		8
Ni 63		8	2.35E-06	C C 2	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		8	6.45E-05	C C 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		8		8
Nb 93m		8		8	Th 232		8		8
Nb 94		8		8	Th 234		8	3E-08	C C 2
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		8		8	U 233		8		8
Pd 107		8		8	U 234		8	1E-07	C C 2
Ag 108m		8	8.82E-07	C C 2	U 235		8	6E-09	C C 2
Ag 110m		8		8	U 236		8	5E-09	C C 2
Cd 109		8		8	U 238		8	3E-08	C C 2
Cd 113m		8		8	Np 237		8		8
Sn 119m		8		8	Pu 236		8		8
Sn 121m		8		8	Pu 238		8	1.77E-06	C C 2
Sn 123		8		8	Pu 239		8	9.98E-07	C C 2
Sn 126		8	2E-07	C C 2	Pu 240		8	9.93E-07	C C 2
Sb 125		8		8	Pu 241		8	2.32E-06	C C 2
Sb 126		8	2.8E-08	C C 2	Pu 242		8		8
Te 125m		8		8	Am 241		8	4.43E-06	C C 2
Te 127m		8		8	Am 242m		8	2.75E-06	C C 2
I 129		8		8	Am 243		8		8
Cs 134		8		8	Cm 242		8	2.27E-06	C C 2
Cs 135		8		8	Cm 243		8	1.55E-09	C C 2
Cs 137		8	1.57E-04	C C 2	Cm 244		8	1.63E-08	C C 2
Ba 133		8	6.17E-09	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		8		8	Cf 249		8		8
Pm 145		8		8	Cf 250		8		8
Pm 147		8		8	Cf 251		8		8
Sm 147		8		8	Cf 252		8		8
Sm 151		8		8	Other a				
Eu 152		8	6.1E-08	C C 2	Other b/g				
Eu 154		8	1.74E-08	C C 2	**Total a**	**0**		**1.06E-05**	**C C 2**
Eu 155		8		8	**Total b/g**	**0**		**2.34E-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