

WASTE STREAM	9C912	Effluent Treatment Plant, Ponds and Decontamination LLW
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SITE Dungeness A

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Magnox Limited

WASTE TYPE LLW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	0 m ³
Future arisings -	1.4.2019 - 31.3.2023.....	63.3 m ³
Total future arisings:		63.3 m ³
Total waste volume:		63.3 m ³

Comment on volumes: Waste volumes take no account of volume reduction by supercompaction.

Uncertainty factors on volumes:

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

WASTE SOURCE Care and Maintenance preparations and procedures in the areas covered by this waste stream.

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.

Sealed sources: -

Bulk density (t/m³): ~0.23

Comment on density: -

CHEMICAL COMPOSITION

General description and components (%wt): Protective clothing, HEPA filters, rags, paper, plastic sheeting, scrap metal, plastic pipework, resins, rubble, wood, glass, drums, concrete and contaminated soil. Percentage breakdown by weight is metal waste (~23%wt), plastics (~4%wt), rubble/concrete (~33%wt), wood (~25%wt), rubber (~15%wt), and other (<1%wt).

Chemical state: Neutral

Chemical form of radionuclides: H-3: Tritium present in 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.....	
Other ferrous metals.....	23.0
Iron.....	
Aluminium.....	<0.10
Beryllium.....	
Cobalt.....	
Copper.....	
Lead.....	<0.10
Magnox/Magnesium.....	TR
Nickel.....	<0.10
Titanium.....	

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	Uranium.....		
	Zinc.....	<0.10	
	Zircaloy/Zirconium.....		
	Other metals.....		
Organics (%wt):	-		
	Total cellulose.....	25.0	
	Paper, cotton.....		
	Wood.....	25.0	
	Halogenated plastics	0.60	Plastic bags and other items
	Total non-halogenated plastics.....	3.5	
	Condensation polymers.....		
	Others.....	3.5	Plastic bags and other items
	Organic ion exchange materials....		
	Total rubber.....	14.5	From rubber boots and gloves and overshoes (soles). The waste may also contain halogenated rubber as neoprene
	Halogenated rubber	7.0	
	Non-halogenated rubber.....	7.5	
	Hydrocarbons.....		
	Oil or grease		
	Fuel.....		
	Asphalt/Tarmac (cont.coal tar)...		
	Asphalt/Tarmac (no coal tar)....		
	Bitumen.....		
	Others.....		
	Other organics.....		
Other materials (%wt):	-		
	Inorganic ion exchange materials.		
	Inorganic sludges and flocs.....		
	Soil.....		
	Brick/Stone/Rubble.....	33.0	Concrete/rubble
	Cementitious material.....		
	Sand.....		
	Glass/Ceramics.....	<0.20	Man made mineral fibre lagging
	Graphite.....		
	Desiccants/Catalysts.....		
	Asbestos.....		
	Non/low friable.....		
	Moderately friable.....		
	Highly friable.....		
	Free aqueous liquids.....		
	Free non-aqueous liquids.....		
	Powder/Ash.....		

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Inorganic anions (%wt):

Carbonates, aluminates and silicates will be associated with concrete.

Fluoride.....

Chloride.....

Iodide.....

Cyanide.....

Carbonate.....

Nitrate.....

Nitrite.....

Phosphate.....

Sulphate.....

Sulphide.....

Materials of interest for
waste acceptance criteria:

Sodium carbonate <<0.01%, Sodium Hydroxide <<0.01%

Combustible metals.....

Low flash point liquids.....

Explosive materials.....

Phosphorus.....

Hydrides.....

Biological etc. materials.....

Biodegradable materials.....

Putrescible wastes.....

Non-putrescible wastes.....

Corrosive materials.....

Pyrophoric materials.....

Generating toxic gases.....

Reacting with water.....

Active particles.....

Soluble solids as bulk chemical
compounds.....Hazardous substances /
non hazardous pollutants:

-

Acrylamide.....

Benzene.....

Chlorinated solvents.....

Formaldehyde.....

Organometallics.....

Phenol.....

Styrene.....

Tri-butyl phosphate.....

Other organophosphates.....

Vinyl chloride.....

Arsenic.....

Barium.....

Boron.....

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Cadmium.....
 Caesium.....
 Selenium.....
 Chromium..... <0.10
 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

TREATMENT, PACKAGING AND DISPOSAL

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

Treatment	On-site / Off site	Stream volume %
Low force compaction	On-site	1.0
Supercompaction (HFC)	Off-site	1.0
Incineration	Off-site	14.0
Solidification		
Decontamination		
Metal treatment	Off-site	0.50
Size reduction		
Decay storage		
Recycling / reuse		
Other / various		
None		84.5

Comment on planned treatments:

81% disposal as VLLW to landfill

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Disposal Route	Stream volume %
Expected to be consigned to the LLW Repository	4.5
Expected to be consigned to a Landfill Facility	81.0
Expected to be consigned to an On-Site Disposal Facility	
Expected to be consigned to an Incineration Facility	14.0
Expected to be consigned to a Metal Treatment Facility	0.50
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 m ³	Number of packages
1/3 Height IP-1 ISO			
2/3 Height IP-2 ISO			
1/2 Height WAMAC IP-2 ISO	1.0	~43.2	< 1
1/2 Height IP-2 Disposal/Re-usable ISO	3.5	~10	< 1
2m box (no shielding)			
4m box (no shielding)			
Other			

Other information:

43.2m³ loading volume is calculated based on the fact that you can low force compact two times the normal volume of waste into a 200 litre/0.2m³ drum (400 litres/0.4m³), you can then fit 36 drums (14.4m³) into a ½ height ISO, each drum can be super-compacted to a 1/3 of its original volume so therefore we can get 3 x the amount of un-compacted drums into the final disposal container (43.2m³).

Waste Planned for Disposal at the LLW Repository:

Container voidage: -

Waste Characterisation Form (WCH):

The waste meets the LLWR's Waste Acceptance Criteria (WAC).
The waste has a current WCH.

Waste consigned for disposal to LLWR in year of generation:

Yes. 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: -

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Bounding cuboidal volume:

Inaccessible voidage: -

Other information: -

RADIOACTIVITY

Source: Activation and contamination of materials.

Uncertainty: Activity values are current best estimates. Specific activity is a function of Station operating history. The values quoted 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: Data taken from WCH 1MXN-3DUA-0-WCH-0-3391 and decayed by three years for RWI 2019

Other information: -

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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			2.43E-06	CC 1	Gd 153				8
Be 10				8	Ho 163				8
C 14			1.07E-06	CC 1	Ho 166m				8
Na 22				8	Tm 170				8
Al 26				8	Tm 171				8
Cl 36			6.18E-07	CC 1	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			2.08E-06	CC 1	Pb 210				8
Co 60			6.17E-07	CC 1	Bi 208				8
Ni 59				8	Bi 210m				8
Ni 63			3.5E-06	CC 1	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			1.36E-05	CC 1	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			2.71E-08	CC 1	Th 234		1.09E-08	CC 2	
Mo 93				8	Pa 231				8
Tc 97				8	Pa 233				8
Tc 99				8	U 232				8
Ru 106			2.77E-09	CC 1	U 233				8
Pd 107				8	U 234		7.68E-09	CC 1	
Ag 108m			6.04E-08	CC 1	U 235				8
Ag 110m				8	U 236		1.8E-09	CC 1	
Cd 109				8	U 238		1.09E-08	CC 1	
Cd 113m				8	Np 237				8
Sn 119m				8	Pu 236				8
Sn 121m				8	Pu 238		1.81E-06	CC 1	
Sn 123				8	Pu 239		1.28E-06	CC 1	
Sn 126				8	Pu 240		1.67E-06	CC 1	
Sb 125			7.39E-08	CC 1	Pu 241		6.41E-05	CC 1	
Sb 126				8	Pu 242				8
Te 125m			1.85E-08	8	Am 241		3.68E-06	CC 1	
Te 127m				8	Am 242m				8
I 129				8	Am 243				8
Cs 134			2.04E-07	CC 1	Cm 242				8
Cs 135				8	Cm 243		1.05E-08	CC 1	
Cs 137			1.16E-04	CC 1	Cm 244		1.91E-07	CC 1	
Ba 133			4.84E-08	CC 1	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			1.02E-06	CC 1	Cf 251				8
Sm 147				8	Cf 252				8
Sm 151			1.09E-06	CC 1	Other a				
Eu 152			6.07E-08	CC 1	Other b/g				
Eu 154			8.56E-07	CC 1	Total a	0	8.66E-06	CC 1	
Eu 155			2.5E-07	CC 1	Total b/g	0	2.07E-04	CC 1	

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