

WASTE STREAM	9C15	Incinerator Ash
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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.....	0.5 m ³
Total future arisings:	0 m ³
Total waste volume:	0.5 m ³

Comment on volumes: No more arisings predicted. The station ceased generation on 31/12/2006.

Uncertainty factors on volumes:

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

WASTE SOURCE Ash from incineration of wastes from Dungeness A and B stations. (Approximately 50:50 mix).

PHYSICAL CHARACTERISTICS

General description: Ash, very small amounts of metal, drums containing the waste and cloth drum liners. No large items have been identified.

Physical components (%vol): Incinerator ash, very small amounts of metal, cloth and drums containing the waste.

Sealed sources: -

Bulk density (t/m³): 0.58

Comment on density: Density stated is best estimate of bulk density based on weights of 200 litre drums.

CHEMICAL COMPOSITION

General description and components (%wt): The waste is incinerator ash and waste from the process, eg. paper and some cloth. Very small quantities of metal. Ash (~80% wt), cloth (~2% wt), metal waste (<1% wt) and drums (~17% wt).

Chemical state: Neutral

Chemical form of radionuclides:

C-14: The chemical form of carbon 14 has not been determined.

Cl-36: The chemical form of chlorine 36 has not been determined but may be chloride.

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): There are no bulk or sheet metal items apart from 200 litre drums with wall thicknesses of about 1.6 mm.

Stainless steel.....	NE
Other ferrous metals.....	~17.0
Iron.....	
Aluminium.....	TR
Beryllium.....	0
Cobalt.....	
Copper.....	TR
Lead.....	TR
Magnox/Magnesium.....	TR
Nickel.....	
Titanium.....	
Uranium.....	0
Zinc.....	TR

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	Zircaloy/Zirconium.....	0	
	Other metals.....	0	
Organics (%wt):	The waste contains cellulose in the form of cloth drum liners (~2% wt). No plastics or rubbers are expected in waste after incineration.		
	Total cellulosics.....	~2.0	
	Paper, cotton.....	~2.0	cloth drum liners
	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.....	0	
Other materials (%wt):	Ash ~ 80%		
	Inorganic ion exchange materials.	0	
	Inorganic sludges and flocs.....	0	
	Soil.....	0	
	Brick/Stone/Rubble.....	NE	
	Cementitious material.....	0	
	Sand.....		
	Glass/Ceramics.....	NE	
	Graphite.....	TR	
	Desiccants/Catalysts.....		
	Asbestos.....	0	
	Non/low friable.....		
	Moderately friable.....		
	Highly friable.....		
	Free aqueous liquids.....	0	
	Free non-aqueous liquids.....	0	
	Powder/Ash.....	80.0	Ash
Inorganic anions (%wt):	-		

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Fluoride.....	TR
Chloride.....	TR
Iodide.....	0
Cyanide.....	0
Carbonate.....	TR
Nitrate.....	0
Nitrite.....	0
Phosphate.....	0
Sulphate.....	TR
Sulphide.....	TR

Materials of interest for waste acceptance criteria:

Powder in the form of ash.

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:

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.....	

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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

TREATMENT, PACKAGING AND DISPOSAL

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

Treatment	On-site / Off site	Stream volume %
Low force compaction Supercompaction (HFC) Incineration Solidification Decontamination Metal treatment Size reduction Decay storage Recycling / reuse Other / various None	Off-Site	100.0

Comment on planned treatments:

-

WASTE STREAM**9C15****Incinerator Ash****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 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	100.0

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 1/2 Height IP-2 Disposal/Re-usable ISO 2m box (no shielding) 4m box (no shielding) Other	100.0	21.6	< 1

Other information: -

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 does not have a current WCH.

The composition and radionuclide data for this stream have been derived from the latest issue of the WSCD.

Waste consigned for disposal to LLWR in year of generation:

No. Residual ash from incinerator - will not be disposed of until plant POCO.

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

Source:	The source of activity will be variable and will include fission products, actinides and activation products, (includes waste incinerated from Dungeness A and B stations).
Uncertainty:	Specific activity is a function of Station 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 waste stream fingerprint data that was reviewed in 2007.
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		8			Gd 153		8		
Be 10		8			Ho 163		8		
C 14	6.00E-06	BC 2			Ho 166m		8		
Na 22		8			Tm 170		8		
Al 26		8			Tm 171		8		
Cl 36	6E-06	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	2.47E-05	CC 2			Pb 210		8		
Co 60	9.44E-06	CC 2			Bi 208		8		
Ni 59		8			Bi 210m		8		
Ni 63	2.78E-06	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	4.62E-05	CC 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	2E-08	CC 2			Th 234	3E-09	CC 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	1.00E-08	CC 2		
Ag 108m	5.89E-08	CC 2			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	1.84E-06	CC 2		
Sn 123		8			Pu 239	1.00E-06	CC 2		
Sn 126		8			Pu 240	1.00E-06	CC 2		
Sb 125	6.35E-08	CC 2			Pu 241	1.18E-04	CC 2		
Sb 126		8			Pu 242		8		
Te 125m	1.59E-08	CC 2			Am 241	6.64E-06	CC 2		
Te 127m		8			Am 242m		8		
I 129		8			Am 243		8		
Cs 134	1.04E-07	CC 2			Cm 242		8		
Cs 135		8			Cm 243	7.74E-09	CC 2		
Cs 137	1.55E-04	CC 2			Cm 244	1.97E-07	CC 2		
Ba 133	9.69E-09	CC 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	2.25E-06	CC 2			Cf 251		8		
Sm 147		8			Cf 252		8		
Sm 151		8			Other a				
Eu 152	1.13E-07	CC 2			Other b/g				
Eu 154	8.17E-07	CC 2			Total a	1.07E-05	CC 2	0	
Eu 155	2.12E-07	CC 2			Total b/g	3.71E-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