

WASTE STREAM	9C15	Incinerator Ash
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SITE Dungeness A

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Magnox Limited

WASTE TYPE LLW

Is the waste subject to Scottish Policy: No

WASTE VOLUMES

Stocks:	At 1.4.2022.....	Reported 0.5 m ³
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Total future arisings:		0 m ³
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Total waste volume:		0.5 m ³
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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: The waste does not contain 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.

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	NE		
Other ferrous metals.....	~17.0		
Iron.....			
Aluminium.....	TR		
Beryllium.....	0		
Cobalt.....			
Copper.....	TR		
Lead.....	TR		
Magnox/Magnesium.....	TR		
Nickel.....			

WASTE STREAM	9C15	Incinerator Ash
---------------------	-------------	------------------------

Titanium.....
 Uranium..... 0
 Zinc..... TR
 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.

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	~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%

	(%wt)	Type(s) and comment	% of total C14 activity
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.....			

WASTE STREAM	9C15	Incinerator Ash
---------------------	-------------	------------------------

Free aqueous liquids.....	0	
Free non-aqueous liquids.....	0	
Powder/Ash.....	80.0	ash

Inorganic anions (%wt): -

	(%wt)	Type(s) and comment
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.

	(%wt)	Type(s) and comment
Combustible metals.....	0	
Low flash point liquids.....	0	
Explosive materials.....	0	
Phosphorus.....	0	
Hydrides.....	0	
Biological etc. materials.....	0	
Biodegradable materials.....	0	
Putrescible wastes.....	0	
Non-putrescible wastes.....		
Corrosive materials.....	0	
Pyrophoric materials.....	0	
Generating toxic gases.....	0	
Reacting with water.....	0	
Higher activity particles.....		
Soluble solids as bulk chemical compounds.....		

Hazardous substances / non hazardous pollutants: Lead may be present in trace quantities.

	(%wt)	Type(s) and comment
Acrylamide.....		
Benzene.....		
Chlorinated solvents.....		
Formaldehyde.....		
Organometallics.....		

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

Phenol.....
 Styrene.....
 Tri-butyl phosphate.....
 Other organophosphates.....
 Vinyl chloride.....
 Arsenic.....
 Barium.....
 Boron..... 0
 Boron (in Boral).....
 Boron (non-Boral).....
 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

(%wt) Type(s) and comment

EDTA.....
 DPTA.....
 NTA.....
 Polycarboxylic acids.....
 Other organic complexants.....
 Total complexing agents..... TR

Potential for the waste to No. In & of itself not a DI
 contain discrete items:

TREATMENT, PACKAGING AND DISPOSAL

WASTE STREAM 9C15 Incinerator Ash

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:

-

Disposal Routes:

Disposal Route	Stream volume %	Disposal density t/m3
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	0.58

Classification codes for waste expected to be consigned to a landfill facility:

-

Upcoming (2022/23-2024/25) Waste Routing (if expected to change from above):

Disposal Route	Stream volume %		
	2022/23	2023/24	2024/25
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			

Opportunities for alternative disposal routing:

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Baseline Management Route	Opportunity Management Route	Stream volume (%)	Estimated Date that Opportunity will be realised	Opportunity Confidence	Comment
-	-	-	-	-	-

Waste Packaging for Disposal:

WASTE STREAM	9C15	Incinerator Ash
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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.

Waste consigned for disposal to LLWR in year of generation: No. Residual ash from incinerator - will not be disposed of until plant POCO.

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: -

WASTE STREAM 9C15 Incinerator Ash

Nuclide	Mean radioactivity, TBq/m ³				Nuclide	Mean radioactivity, TBq/m ³			
	Waste at 1.4.2022	Bands and Code	Future arisings	Bands and Code		Waste at 1.4.2022	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	1.15E-05	CC 2			Pb 210		8		
Co 60	6.36E-06	CC 2			Bi 208		8		
Ni 59		8			Bi 210m		8		
Ni 63	2.72E-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	4.29E-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	5.86E-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	1.79E-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	2.99E-08	CC 2			Pu 241	1.02E-04	CC 2		
Sb 126		8			Pu 242		8		
Te 125m	7.49E-09	CC 2			Am 241	7.13E-06	CC 2		
Te 127m		8			Am 242m		8		
I 129		8			Am 243		8		
Cs 134	3.80E-08	CC 2			Cm 242		8		
Cs 135		8			Cm 243	7.23E-09	CC 2		
Cs 137	1.45E-04	CC 2			Cm 244	1.76E-07	CC 2		
Ba 133	7.96E-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	1.02E-06	CC 2			Cf 251		8		
Sm 147		8			Cf 252		8		
Sm 151		8			Other a				
Eu 152	9.71E-08	CC 2			Other b/g				
Eu 154	6.41E-07	CC 2			Total a	1.11E-05	CC 2	0	
Eu 155	1.38E-07	CC 2			Total b/g	3.24E-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