

WASTE STREAM	3J25	Gag Pistons
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SITE Dungeness B

SITE OWNER EDFE NGL

WASTE CUSTODIAN EDFE NGL

WASTE TYPE ILW; SPD1

Is the waste subject to Scottish Policy: No

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2022.....	2.0 m ³
Total future arisings:		0 m ³
Total waste volume:		2.0 m ³

Comment on volumes: An approach has now been developed that means gag pistons can be refurbished for reuse in the reactor. Therefore, future arisings are not expected under this waste stream. Whole cylinder (envelope) volume is ~0.051 m³ per piston..

Uncertainty factors on volumes: Stock (upper): x 1.25 Arisings (upper) x
 Stock (lower): x 0.75 Arisings (lower) x

WASTE SOURCE Gag Piston assembly unit.

PHYSICAL CHARACTERISTICS

General description: Gag piston units consist primarily of three major parts of either mild or carbon steel, they are hollow in the centre and weigh 34.13kg (75.24lbs) each.

Physical components (%vol): 100% metal (~78% Mild Steel (MS 23), 22% Carbon Steel (BS 1504-821 w Cobalt 1% Max.))

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): ~1.5

Comment on density: Based on envelope volume of gag piston.

CHEMICAL COMPOSITION

General description and components (%wt): Mild and carbon steels (100%).

Chemical state: Neutral

Chemical form of radionuclides: H-3: Diffused into materials.
 C-14: Some contamination by activated graphite may be present
 Cl-36: Not assessed
 Se-79: Not assessed
 Tc-99: Not assessed
 I-129: Not assessed
 Ra: Not assessed
 Th: Not assessed
 U: Not assessed
 Np: Not assessed
 Pu: Not assessed

Metals and alloys (%wt): -

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	0		
Other ferrous metals.....	100.0	~78% Mild Steel (MS 23), 22% Carbon Steel (BS 1504-821 w Cobalt 1% Max.	
Iron.....	0		
Aluminium.....	0		
Beryllium.....	0		

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Cobalt.....	0
Copper.....	0
Lead.....	0
Magnox/Magnesium.....	0
Nickel.....	0
Titanium.....	0
Uranium.....	0
Zinc.....	0
Zircaloy/Zirconium.....	0
Other metals.....	TR Cobalt (Max 1% in Carbon Steel)

Organics (%wt): Proprietary organic ion-exchange resins and oil will be present.

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	0		
Paper, cotton.....	0		
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.....	NE		
Oil or grease			
Fuel.....			
Asphalt/Tarmac (cont.coal tar)...			
Asphalt/Tarmac (no coal tar)....			
Bitumen.....			
Others.....			
Other organics.....	0		

Other materials (%wt): -

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials..	0		
Inorganic sludges and flocs.....	0		
Soil.....	0		
Brick/Stone/Rubble.....	0		
Cementitious material.....	0		
Sand.....	0		
Glass/Ceramics.....			
Graphite.....	0		

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Desiccants/Catalysts.....	0
Asbestos.....	0
Non/low friable.....	
Moderately friable.....	
Highly friable.....	
Free aqueous liquids.....	0
Free non-aqueous liquids.....	0
Powder/Ash.....	0

Inorganic anions (%wt): To be further assessed.

	(%wt)	Type(s) and comment
Fluoride.....	NE	
Chloride.....	NE	
Iodide.....	NE	
Cyanide.....	NE	
Carbonate.....	NE	
Nitrate.....	NE	
Nitrite.....	NE	
Phosphate.....	NE	
Sulphate.....	NE	
Sulphide.....	NE	

Materials of interest for
waste acceptance criteria: -

	(%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.....	0	
Corrosive materials.....	0	
Pyrophoric materials.....	0	
Generating toxic gases.....	0	
Reacting with water.....	0	
Higher activity particles.....	P	May be present
Soluble solids as bulk chemical compounds.....	0	

WASTE STREAM**3J25****Gag Pistons**Hazardous substances /
non hazardous pollutants:

-

	(%wt)	Type(s) and comment
Acrylamide.....	NE	
Benzene.....	NE	
Chlorinated solvents.....	NE	
Formaldehyde.....	NE	
Organometallics.....	NE	
Phenol.....	NE	
Styrene.....	NE	
Tri-butyl phosphate.....	NE	
Other organophosphates.....	NE	
Vinyl chloride.....	NE	
Arsenic.....	NE	
Barium.....	NE	
Boron.....	NE	
Boron (in Boral).....	NE	
Boron (non-Boral).....	NE	
Cadmium.....	NE	
Caesium.....	NE	
Selenium.....	NE	
Chromium.....	NE	
Molybdenum.....	NE	
Thallium.....	NE	
Tin.....	NE	
Vanadium.....	NE	
Mercury compounds.....	NE	
Others.....	NE	
Electronic Electrical Equipment (EEE)		
EEE Type 1.....	0	
EEE Type 2.....	0	
EEE Type 3.....	0	
EEE Type 4.....	0	
EEE Type 5.....	0	

Complexing agents (%wt): Not yet determined

	(%wt)	Type(s) and comment
EDTA.....	NE	
DPTA.....	NE	
NTA.....	NE	
Polycarboxylic acids.....	NE	
Other organic complexants.....	NE	
Total complexing agents.....	0	

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Potential for the waste to contain discrete items: Yes.

TREATMENT, PACKAGING AND DISPOSAL

Waste that is currently ILW: Waste will be decay stored and decontaminated to LLW levels where required. To be determined.

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

Treatment	On-site / Off site	Stream volume %
Low force compaction	On-site	30.0
Supercompaction (HFC)		
Incineration		
Solidification		
Decontamination		
Metal treatment	On-site	100.0
Size reduction		
Decay storage		
Recycling / reuse		
Other / various		
None		70.0

Comment on planned treatments:

All metals will be decontaminated on site, further off site treatment prior to disposal may be carried out for size reuction subject to BAT assessment.

Disposal Routes:

Disposal Route	Stream volume %	Disposal density t/m3
Expected to be consigned to the LLW Repository	100.0	
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		

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: -

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

WASTE STREAM**3J25****Gag Pistons****Waste Packaging for Disposal:**

Container	Stream volume %	Waste loading m ³	Number of packages
1/3 Height IP-1 ISO	100.0	19.34	< 1
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 loading assumes some size reduction carried out.

Waste Planned for Disposal at the LLW Repository:

Container voidage: -

It is not yet determined if the waste meets LLWR's Waste Acceptance Criteria (WAC).

Waste consigned for disposal to LLWR in year of generation: No.

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: Activation and contamination of fuel assembly components

Uncertainty: -

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: -

Other information: Activity derived from calculated Neutron Flux and materials specification. Radionuclide data sheet provided by Alan Simpson on 7 March 2018 (Stock only).

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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		6			Gd 153				
Be 10					Ho 163				
C 14	1.8E-11	CC 2			Ho 166m				
Na 22		4			Tm 170				
Al 26		4			Tm 171				
Cl 36		6			Lu 174				
Ar 39					Lu 176				
Ar 42					Hf 178n				
K 40					Hf 182				
Ca 41					Pt 193				
Mn 53					Tl 204				
Mn 54		6			Pb 205				
Fe 55	1.8E-02	CC 2			Pb 210				
Co 60	5.4E-03	CC 2			Bi 208				
Ni 59	9E-06	CC 2			Bi 210m				
Ni 63	9.4E-04	CC 2			Po 210				
Zn 65		6			Ra 223				
Se 79					Ra 225				
Kr 81					Ra 226				
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90					Th 227				
Zr 93					Th 228				
Nb 91					Th 229				
Nb 92					Th 230				
Nb 93m					Th 232				
Nb 94		6			Th 234				
Mo 93	1.1E-06	CC 2			Pa 231				
Tc 97					Pa 233				
Tc 99	2.2E-07	CC 2			U 232				
Ru 106		6			U 233				
Pd 107					U 234				
Ag 108m		6			U 235				
Ag 110m		6			U 236				
Cd 109					U 238				
Cd 113m					Np 237				
Sn 119m					Pu 236				
Sn 121m					Pu 238		6		
Sn 123					Pu 239				
Sn 126					Pu 240		6		
Sb 125					Pu 241		6		
Sb 126					Pu 242				
Te 125m					Am 241		6		
Te 127m					Am 242m				
I 129					Am 243				
Cs 134					Cm 242		6		
Cs 135					Cm 243		6		
Cs 137					Cm 244		6		
Ba 133		6			Cm 245				
La 137					Cm 246				
La 138					Cm 248				
Ce 144		6			Cf 249				
Pm 145					Cf 250				
Pm 147		6			Cf 251				
Sm 147					Cf 252				
Sm 151					Other a		8		
Eu 152		6			Other b/g		6		
Eu 154		6			Total a	<1E-09	6	0	
Eu 155		6			Total b/g	2.44E-02	3	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