

WASTE STREAM	3J25	Gag Pistons
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SITE Dungeness B

SITE OWNER EDFE NGL

WASTE CUSTODIAN EDFE NGL

WASTE TYPE ILW; SPD1

WASTE VOLUMES

Stocks:	At 1.4.2019.....	Reported ~2.0 m ³
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Total future arisings:		0 m ³
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Total waste volume:		2.0 m ³
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Comment on volumes: Station Ops have developed an approach that means gag pistons can be refurbished suitably for reuse in the reactor and thus there are not anticipated to be any future arisings now considered as radioactive material. Whole cylinder (envelope) volume is ~0.051m³ 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):

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	
Cobalt.....	0	
Copper.....	0	
Lead.....	0	

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

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	Powder/Ash.....	0	
Inorganic anions (%wt):	To be further assessed.		
	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:	-		
	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	
	Active particles.....	P	May be present
	Soluble solids as bulk chemical compounds.....	0	
Hazardous substances / non hazardous pollutants:	-		
	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	

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Barium.....	NE
Boron.....	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
EDTA.....	NE
DPTA.....	NE
NTA.....	NE
Polycarboxylic acids.....	NE
Other organic complexants.....	NE
Total complexing agents.....	0

LAW 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 treatments(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.

WASTE STREAM**3J25****Gag Pistons****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	19.34	< 1

Other information: Waste loading assumes some size reduction carried out.

Waste Consigned to the LLW Repository:

Container voidage: -

Waste Characterisation Form (WCH): 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.

Potential for the waste to contain discrete items: Yes

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**3J25****Gag Pistons****RADIOACTIVITY**

Source:	Activation and contamination of fuel assembly components
Uncertainty:	Activity to be determined.
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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Gag Pistons

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		6			Gd 153				
Be 10					Ho 163				
C 14	1.8E-11	DD 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	DD 2			Pb 210				
Co 60	5.4E-03	DD 2			Bi 208				
Ni 59	9E-06	DD 2			Bi 210m				
Ni 63	9.4E-04	DD 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	DD 2			Pa 231				
Tc 97					Pa 233				
Tc 99	2.2E-07	DD 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