WASTE STREAM 9C45 Fuel Skips in Pond

SITE	Dungeness A
SITE OWNER	Nuclear Decommissioning Authority
WASTE CUSTODIAN	Magnox Limited
WASTE TYPE	LLW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	14.0 m³
Total future arisings:		0 m³
Total waste volume:		14.0 m³

Comment on volumes: Volumes are based on the number of skips and their dimensions assuming a skip is 1.376m3.

Uncertainty factors on volumes:				
	Stock (upper):	x 1.1	Arisings (upper)	x
	Stock (lower):	x 0.9	Arisings (lower)	x

WASTE SOURCE Contamination from pond and plant operations.

PHYSICAL CHARACTERISTICS

General description:	The waste is contaminated skips. Pond skips are made of mild steel and are coated in UPC paint.
Physical components (%wt):	Metal (99.5%), putrescible waste (0.1%), plastics (0.2%), and wood (0.2%).
Sealed sources:	-
Bulk density (t/m³):	~0.33
Comment on density:	-

CHEMICAL COMPOSITION

General description and components (%wt):	Steel and small amount of UPC paint. Fission products, actinides and other activation products will be present as contaminants.
Chemical state:	Neutral
Chemical form of radionuclides:	Pu: The chemical form of plutonium isotopes may be plutonium oxides
Metals and alloys (%wt):	The long skips present have dimensions of 1.357 m x 1 m x 1.029 m. and constucted from 3.2 mm 10 gauge steel plate. The short skips present have dimensions of 1.17 m x 0.47 m x 0.68 m.

Stainless steel.....		
Other ferrous metals.....	~99.5	Painted mild steel
Iron.....		
Aluminium.....		
Beryllium.....		
Cobalt.....		
Copper.....		
Lead.....		
Magnox/Magnesium.....		
Nickel.....		
Titanium.....		
Uranium.....		
Zinc.....		
Zircaloy/Zirconium.....		
Other metals.....		

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Organics (%wt):	The skips are coated with paint.		
	Total cellulosics.....	0.20	
	Paper, cotton.....		
	Wood.....	0.20	
	Halogenated plastics	0.20	Packaging/wrapping
	Total non-halogenated plastics.....	0	
	Condensation polymers.....		
	Others.....		
	Organic ion exchange materials....		
	Total rubber.....	0	
	Halogenated rubber		
	Non-halogenated rubber.....		
	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.....		
	Cementitious material.....		
	Sand.....		
	Glass/Ceramics.....		
	Graphite.....		
	Desiccants/Catalysts.....		
	Asbestos.....		
	Non/low friable.....		
	Moderately friable.....		
	Highly friable.....		
	Free aqueous liquids.....		
	Free non-aqueous liquids.....		
	Powder/Ash.....		
Inorganic anions (%wt):	-		

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Fluoride.....		
Chloride.....		
Iodide.....		
Cyanide.....		
Carbonate.....	TR	Sodium carbonate. Trace only (from pond chemistry)
Nitrate.....		
Nitrite.....		
Phosphate.....		
Sulphate.....		
Sulphide.....		

Materials of interest for waste acceptance criteria: No materials likely to pose a fire or other non-radiological hazard have been identified.

Combustible metals.....	
Low flash point liquids.....	
Explosive materials.....	
Phosphorus.....	
Hydrides.....	
Biological etc. materials.....	
Biodegradable materials.....	0.10
Putrescible wastes.....	0.10
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.....	

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):

EDTA.....

DPTA.....

NTA.....

Polycarboxylic acids……

Other organic complexants.....

Total complexing agents..... NE

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		
Recyling / reuse		
Other / various		
None		100.0

Comment on planned treatments: -

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Disposal Routes:

Disposal Route	Stream volume %
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	

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 m³	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	100.0	11.008	2
2m box (no shielding)			
4m box (no shielding)			
Other			

Other information: Data have been presented as though the waste will be in dedicated containers. It is likely that this waste will be placed in containers with other LLW.

Waste Planned for Disposal at the LLW Repository:

Container voidage: Significant inaccessible voidage is not expected.

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.

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: -

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RADIOACTIVITY

Source:	Contamination from pond and plant operations.
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:	Activities are based upon measurement of Chapelcross fuel skips. Data taken from WCH and decayed to reference date of 01/04/2019.
Other information:	-

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Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code	Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code
H 3	7.96E-06	C C 1			Gd 153		8		
Be 10		8			Ho 163		8		
C 14	3.54E-06	C C 1			Ho 166m		8		
Na 22		8			Tm 170		8		
Al 26		8			Tm 171		8		
Cl 36	1.21E-08	C C 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	3.34E-07	C C 1			Pb 210		8		
Co 60	1.00E-06	C C 1			Bi 208		8		
Ni 59		8			Bi 210m		8		
Ni 63	6.88E-07	C C 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	1.45E-03	C C 1			Th 227		8		
Zr 93		8			Th 228	7.98E-09	C C 2		
Nb 91		8			Th 229		8		
Nb 92		8			Th 230		8		
Nb 93m		8			Th 232		8		
Nb 94		8			Th 234	1.82E-08	C C 2		
Mo 93		8			Pa 231		8		
Tc 97		8			Pa 233		8		
Tc 99	3.82E-07	C C 1			U 232	8.48E-09	C C 1		
Ru 106	1.38E-08	C C 1			U 233		8		
Pd 107		8			U 234	1.86E-08	C C 1		
Ag 108m		8			U 235		8		
Ag 110m		8			U 236		8		
Cd 109		8			U 238	1.82E-08	C C 1		
Cd 113m		8			Np 237		8		
Sn 119m		8			Pu 236		8		
Sn 121m		8			Pu 238	9.84E-06	C C 1		
Sn 123		8			Pu 239	6.22E-06	C C 1		
Sn 126		8			Pu 240	7.64E-06	C C 1		
Sb 125	1.65E-07	C C 1			Pu 241	3.46E-04	C C 1		
Sb 126		8			Pu 242	6.06E-09	C C 1		
Te 125m	4.14E-08	8			Am 241	5.80E-05	C C 1		
Te 127m		8			Am 242m		8		
I 129		8			Am 243		8		
Cs 134	3.29E-07	C C 1			Cm 242		8		
Cs 135		8			Cm 243	1.03E-08	C C 1		
Cs 137	6.07E-04	C C 1			Cm 244	2.36E-07	C C 1		
Ba 133		8			Cm 245		8		
La 137		8			Cm 246		8		
La 138		8			Cm 248		8		
Ce 144	1.57E-09	C C 1			Cf 249		8		
Pm 145		8			Cf 250		8		
Pm 147	1.82E-06	C C 1			Cf 251		8		
Sm 147		8			Cf 252		8		
Sm 151	7.17E-06	C C 1			Other a				
Eu 152	7.89E-08	C C 1			Other b/g				
Eu 154	2.40E-06	C C 1			**Total a**	**8.20E-05**	**C C 2**	**0**	
Eu 155	6.21E-07	C C 1			**Total b/g**	**2.43E-03**	**C C 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