

WASTE STREAM	5C313	B466 Ponds Decommissioning LLW
---------------------	--------------	---------------------------------------

SITE Harwell
SITE OWNER Nuclear Decommissioning Authority
WASTE CUSTODIAN Magnox Limited
WASTE TYPE LLW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	4.0 m ³
Future arisings -	1.4.2021 - 31.3.2022.....	7.5 m ³
Total future arisings:		7.5 m ³
Total waste volume:		11.5 m ³
Comment on volumes:	Volumes updated for 2016 RWI to reflect SMART Inventory Review.	
Uncertainty factors on volumes:	Stock (upper): x 1.2	Arisings (upper) x 1.2
	Stock (lower): x 0.8	Arisings (lower) x 0.8

WASTE SOURCE Decommissioning of Co60 ponds.

PHYSICAL CHARACTERISTICS

General description: Waste from decommissioning ponds/tanks consisting of metal, concrete and building rubble.
 Physical components (%vol): Metal, concrete, building rubble, cellulose, plastics, and rubber.
 Sealed sources: -
 Bulk density (t/m³): ~1.5
 Comment on density: Density will vary between 1 to 2 Te/m³.

CHEMICAL COMPOSITION

General description and components (%wt): Metal, concrete, building rubble, cellulose, plastics, and rubber.

Chemical state: Neutral

Chemical form of radionuclides: -

Metals and alloys (%wt): -

Stainless steel.....	P
Other ferrous metals.....	~35.0
Iron.....	
Aluminium.....	P
Beryllium.....	
Cobalt.....	
Copper.....	P
Lead.....	P
Magnox/Magnesium.....	TR
Nickel.....	
Titanium.....	
Uranium.....	TR
Zinc.....	NE
Zircaloy/Zirconium.....	TR
Other metals.....	

Traces of Uranium metal may be present.

Organics (%wt): Halogenated plastics present are PVC and PTFE. Halogenated rubbers present are

WASTE STREAM

5C313 B466 Ponds Decommissioning LLW

	hypalon and neoprene.	
	Total celluloseics.....	5.0
	Paper, cotton.....	P
	Wood.....	~5.0
	Halogenated plastics	P
		PVC and PTFE.
	Total non-halogenated plastics.....	NE
	Condensation polymers.....	NE
	Others.....	NE
	Organic ion exchange materials....	NE
	Total rubber.....	P
	Halogenated rubber	P
	Non-halogenated rubber.....	NE
	Hydrocarbons.....	
	Oil or grease	
	Fuel.....	
	Asphalt/Tarmac (cont.coal tar)...	
	Asphalt/Tarmac (no coal tar)....	
	Bitumen.....	
	Others.....	
	Other organics.....	NE
Other materials (%wt):	-	
	Inorganic ion exchange materials.	NE
	Inorganic sludges and flocs.....	NE
	Soil.....	0
	Brick/Stone/Rubble.....	P
	Cementitious material.....	~60.0
	Sand.....	
	Glass/Ceramics.....	0
	Graphite.....	0
	Desiccants/Catalysts.....	
	Asbestos.....	0
	Non/low friable.....	
	Moderately friable.....	
	Highly friable.....	
	Free aqueous liquids.....	0
	Free non-aqueous liquids.....	0
	Powder/Ash.....	0
Inorganic anions (%wt):	Carbonates present in concrete.	

WASTE STREAM**5C313****B466 Ponds Decommissioning LLW**

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

Materials of interest for
waste acceptance criteria:

Traces of uranium metal may be present.

Combustible metals.....	TR
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:

-	
Acrylamide.....	
Benzene.....	
Chlorinated solvents.....	
Formaldehyde.....	
Organometallics.....	
Phenol.....	
Styrene.....	
Tri-butyl phosphate.....	
Other organophosphates.....	
Vinyl chloride.....	
Arsenic.....	
Barium.....	
Boron.....	

WASTE STREAM**5C313****B466 Ponds Decommissioning LLW**

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 DISPOSALPlanned 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		100.0

Comment on planned
treatments:

-

WASTE STREAM**5C313****B466 Ponds Decommissioning LLW****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	~10	2

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. Data not yet available.

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

WASTE STREAM**5C313****B466 Ponds Decommissioning LLW**

Source:	The radionuclide fingerprint for this waste stream has been updated using data from waste stream 5C331.
Uncertainty:	The radionuclides are expected to be present but dominated by Co60 and Cs137. Full characterisation will be undertaken near to the start of decommissioning.
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 above radionuclides are expected to be present but dominated by Co60 and Cs137. Full characterisation will be undertaken near to the start of decommissioning.
Other information:	-

WASTE STREAM

5C313

B466 Ponds Decommissioning LLW

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		6	Gd 153		6		6
Be 10		8		8	Ho 163		8		8
C 14		8		8	Ho 166m		8		8
Na 22		8		8	Tm 170		8		8
Al 26		8		8	Tm 171		8		8
Cl 36		8		8	Lu 174		8		8
Ar 39		8		8	Lu 176		8		8
Ar 42		8		8	Hf 178n		8		8
K 40		6		6	Hf 182		8		8
Ca 41		8		8	Pt 193		8		8
Mn 53		8		8	Tl 204		8		8
Mn 54		8		8	Pb 205		8		8
Fe 55		6		6	Pb 210	2.55E-09	CC 2	2.55E-09	CC 2
Co 60	1.43E-07	CC 2	1.43E-07	CC 2	Bi 208		8		8
Ni 59		8		8	Bi 210m		8		8
Ni 63		8		8	Po 210	2.1E-09	CC 2	2.1E-09	CC 2
Zn 65		8		8	Ra 223	1.46E-09	CC 2	1.46E-09	CC 2
Se 79		8		8	Ra 225		8		8
Kr 81		8		8	Ra 226	2.91E-08	CC 2	2.91E-08	CC 2
Kr 85		8		8	Ra 228		8		8
Rb 87		8		8	Ac 227	1.46E-09	CC 2	1.46E-09	CC 2
Sr 90		8		8	Th 227	1.44E-09	CC 2	1.44E-09	CC 2
Zr 93		8		8	Th 228		8		8
Nb 91		8		8	Th 229		8		8
Nb 92		8		8	Th 230	2.91E-08	CC 2	2.91E-08	CC 2
Nb 93m		8		8	Th 232	2.42E-09	CC 2	2.42E-09	CC 2
Nb 94		8		8	Th 234	2.91E-08	CC 2	2.91E-08	CC 2
Mo 93		8		8	Pa 231	1.46E-09	CC 2	1.46E-09	CC 2
Tc 97		8		8	Pa 233		8		8
Tc 99		8		8	U 232		8		8
Ru 106		8		8	U 233		8		8
Pd 107		8		8	U 234	2.91E-08	CC 2	2.91E-08	CC 2
Ag 108m		8		8	U 235	1.46E-09	CC 2	1.46E-09	CC 2
Ag 110m		8		8	U 236		8		8
Cd 109		8		8	U 238	2.91E-08	CC 2	2.91E-08	CC 2
Cd 113m		8		8	Np 237		8		8
Sn 119m		8		8	Pu 236		8		8
Sn 121m		8		8	Pu 238	1.63E-08	CC 2	1.63E-08	CC 2
Sn 123		8		8	Pu 239	2.3E-07	CC 2	2.3E-07	CC 2
Sn 126		8		8	Pu 240	2.3E-07	CC 2	2.3E-07	CC 2
Sb 125		8		8	Pu 241	2.94E-07	CC 2	2.94E-07	CC 2
Sb 126		8		8	Pu 242		8		8
Te 125m		8		8	Am 241	2.07E-07	CC 2	2.07E-07	CC 2
Te 127m		8		8	Am 242m		8		8
I 129		8		8	Am 243		8		8
Cs 134		8		8	Cm 242		8		8
Cs 135		8		8	Cm 243		8		8
Cs 137	2.3E-07	CC 2	2.3E-07	CC 2	Cm 244		8		8
Ba 133		8		8	Cm 245		8		8
La 137		8		8	Cm 246		8		8
La 138		8		8	Cm 248		8		8
Ce 144		8		8	Cf 249		8		8
Pm 145		8		8	Cf 250		8		8
Pm 147		8		8	Cf 251		8		8
Sm 147		8		8	Cf 252		8		8
Sm 151		8		8	Other a				
Eu 152		6		6	Other b/g				
Eu 154		6		6	Total a	8.1E-07	CC 2	8.1E-07	CC 2
Eu 155		6		6	Total b/g	7.00E-07	CC 2	7.00E-07	CC 2

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