WASTE STREAM 7A36 Pyrochemical Wastes

SITE	AWE Aldermaston
SITE OWNER	Ministry of Defence
WASTE CUSTODIAN	AWE plc
WASTE TYPE	ILW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	2.5 m³
Future arisings -	1.4.2019 - 31.3.2030.....	4.5 m³
	1.4.2030 - 31.3.2080.....	0 m³
Total future arisings:		4.5 m³
Total waste volume:		7.0 m³

Comment on volumes: Actual stock waste arisings have decreased due to omission of overpackaging. Waste contained within a 205 litre drum now constitutes to 20 x 1 litre packages. Data reviewed in 2019. The stock volume has changed, as the outer drums that contain the waste packages, are just handling aids. It is the inner smaller packages that will be processed. A project is currently looking at the viability of repacking 50% of the waste.

Uncertainty factors on volumes:				
	Stock (upper):	x 2.0	Arisings (upper)	x 5.0
	Stock (lower):	x 0.5	Arisings (lower)	x 0.5

WASTE SOURCE The wastes are generated from processes used to refine metals.

PHYSICAL CHARACTERISTICS

General description:	Mixed pyrochemical salts & crucible wastes.
Physical components (%vol):	The composition of this waste has not been determined.
Sealed sources:	The waste does not contain sealed sources.
Bulk density (t/m³):	3.15
Comment on density:	Reviewed for 2019 RWI and takes into account of exclusive inner package processing only.

CHEMICAL COMPOSITION

General description and components (%wt):	-
Chemical state:	-
Chemical form of radionuclides:	-
Metals and alloys (%wt):	-
	Stainless steel.....
	Other ferrous metals.....
	Iron.....
	Aluminium.....
	Beryllium.....
	Cobalt.....
	Copper.....
	Lead.....
	Magnox/Magnesium.....
	Nickel.....
	Titanium.....
	Uranium.....
	Zinc.....
	Zircaloy/Zirconium.....

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	Other metals.....
Organics (%wt):	-
	Total cellulosics.....
	Paper, cotton.....
	Wood.....
	Halogenated plastics .....
	Total non-halogenated plastics.....
	Condensation polymers.....
	Others.....
	Organic ion exchange materials....
	Total rubber.....
	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.....

Nitrate.....

Nitrite.....

Phosphate.....

Sulphate.....

Sulphide.....

Materials of interest for waste acceptance criteria: -

Combustible metals.....

Low flash point liquids.....

Explosive materials.....

Phosphorus.....

Hydrides.....

Biological etc. materials.....

Biodegradable materials.....

Putrescible wastes.....

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..... 0

Benzene.....

Chlorinated solvents..... 0

Formaldehyde..... 0

Organometallics..... 0

Phenol.....

Styrene..... 0

Tri-butyl phosphate.....

Other organophosphates..... 0

Vinyl chloride.....

Arsenic.....

Barium..... 0

Boron.....

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Cadmium.....

Caesium..... 0

Selenium.....

Chromium.....

Molybdenum.....

Thallium..... 0

Tin.....

Vanadium.....

Mercury compounds..... 0

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.....

PACKAGING AND CONDITIONING

Conditioning method: The length of storage and treatment process is undecided.

Plant Name: -

Location: -

Plant startup date: -

Total capacity (m^3/y incoming waste): -

Target start date for packaging this stream: -

Throughput for this stream (m^3/y incoming waste): -

Other information: -

Likely container type:

Container	Waste packaged (%vol)	Waste loading (m^3)	Payload (m^3)	Number of packages
Not specified	100.0	NE	NE	NE

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Likely container type comment:	-
Range in container waste volume:	-
Other information on containers:	-
Likely conditioning matrix:	
Other information:	-
Conditioned density (t/m³):	-
Conditioned density comment:	-
Other information on conditioning:	-
Opportunities for alternative disposal routing:	

Treatment	Stream volume (%)	Comment
-	-	-

RADIOACTIVITY

Source:	Plutonium contamination.
Uncertainty:	The total stock activity is based on the declared values in the 2016 UKRWI decayed by 3 years for 2019 inventory. The specific activities have increased by 10, as the volume has reduced from 200 litres to 20 litres per drum.
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:	A programme is ongoing to reassay these wastes using PNCC and high resolution gamma spectrometry. Decay nuclides with a half life of less than 3 months have been omitted.
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					Gd 153				
Be 10					Ho 163				
C 14					Ho 166m				
Na 22					Tm 170				
Al 26					Tm 171				
Cl 36					Lu 174				
Ar 39					Lu 176				
Ar 42					Hf 178n				
K 40					Hf 182				
Ca 41					Pt 193				
Mn 53					Tl 204				
Mn 54					Pb 205				
Fe 55					Pb 210	2.90E-14	C C 2	2.90E-14	C C 2
Co 60					Bi 208				
Ni 59					Bi 210m				
Ni 63					Po 210	2.31E-14	C C 2	2.31E-14	C C 2
Zn 65					Ra 223	6.41E-13	C C 2	6.41E-13	C C 2
Se 79					Ra 225	2.02E-14	C C 2	2.02E-14	C C 2
Kr 81					Ra 226	4.42E-13	C C 2	4.42E-13	C C 2
Kr 85					Ra 228	3.34E-17	C C 2	3.34E-17	C C 2
Rb 87					Ac 227	6.66E-13	C C 2	6.66E-13	C C 2
Sr 90					Th 227	6.41E-13	C C 2	6.41E-13	C C 2
Zr 93					Th 228	1.64E-17	C C 2	1.64E-17	C C 2
Nb 91					Th 229	2.07E-14	C C 2	2.07E-14	C C 2
Nb 92					Th 230	3.39E-10	C C 2	3.39E-10	C C 2
Nb 93m					Th 232	1.2E-16	C C 2	1.2E-16	C C 2
Nb 94					Th 234	3.30E-13	C C 2	3.30E-13	C C 2
Mo 93					Pa 231	7.49E-12	C C 2	7.49E-12	C C 2
Tc 97					Pa 233	4.41E-06	C C 2	4.41E-06	C C 2
Tc 99					U 232				
Ru 106					U 233	7.78E-11	C C 2	7.78E-11	C C 2
Pd 107					U 234	8.09E-06	C C 2	8.09E-06	C C 2
Ag 108m					U 235	7.84E-08	C C 2	7.84E-08	C C 2
Ag 110m					U 236	5.41E-07	C C 2	5.41E-07	C C 2
Cd 109					U 238	3.34E-13	C C 2	3.34E-13	C C 2
Cd 113m					Np 237	4.48E-06	C C 2	4.48E-06	C C 2
Sn 119m					Pu 236				
Sn 121m					Pu 238	3.07E-01	C C 2	3.07E-01	C C 2
Sn 123					Pu 239	8.85E+00	C C 2	8.85E+00	C C 2
Sn 126					Pu 240	2.03E+00	C C 2	2.03E+00	C C 2
Sb 125					Pu 241	4.70E+01	C C 2	4.70E+01	C C 2
Sb 126					Pu 242	2.39E-04	C C 2	2.39E-04	C C 2
Te 125m					Am 241	1.92E+00	C C 2	1.92E+00	C C 2
Te 127m					Am 242m				
I 129					Am 243				
Cs 134					Cm 242				
Cs 135					Cm 243				
Cs 137					Cm 244				
Ba 133					Cm 245				
La 137					Cm 246				
La 138					Cm 248				
Ce 144					Cf 249				
Pm 145					Cf 250				
Pm 147					Cf 251				
Sm 147					Cf 252				
Sm 151					Other a				
Eu 152					Other b/g				
Eu 154					**Total a**	**1.31E+01**	**C C 2**	**1.31E+01**	**C C 2**
Eu 155					**Total b/g**	**4.70E+01**	**C C 2**	**4.70E+01**	**C C 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