WASTE STREAM	1A10	ILW Containing Radium

SITE Amersham

SITE OWNER GE Healthcare

WASTE CUSTODIAN GE Healthcare Limited

WASTE TYPE ILW

WASTE VOLUMES

	Reported (m^3)
Stocks: At 1.4.2025	~ 3.5
Future arisings: 1.4.2025 - 31.3.2030	~ 9.0
Total future arisings:	**9.0**
Total waste volume:	**12.5**

OR

Conditioned (m^3)	Packaged (m^3)

Number of waste packages in stock: At 1.4.2025…… - packages

Comment on arising rates: This waste stream represents legacy waste. Radium plant is in POCO and 7 x 500l DEVA produced = 3.5m3. Tins pulled from plant and measured but not opened. Future arisings remains the same due to uncertainty in volume. Radium in stock has previously included an inventory that is now available for medical reuse and no longer reported.

Additional information on quantities: Stock volume known. Future arising uncertain based on plant decommissioning and legacy waste arisings.

Uncertainty factors on volumes:

Stock (upper):	x 1.00	Arisings (upper):	x 2.00
Stock (lower):	x 1.00	Arisings (lower):	x 0.50

WASTE SOURCE Sealed and closed source production. Waste is now being processed from the plant in POCO.

PHYSICAL CHARACTERISTICS

General description: The waste consists of solid and absorbed liquid wastes within steel cans or fibreboard drums as primary containment, all contained in sealed PVC bags. (Wastes arising from 1990 are dry). Solids include glassware, rubber gloves, paper tissue, and small items of redundant laboratory equipment such as hotplates, retort stands, etc. Liquids comprise aqueous solutions.

Changes since waste generated: None

Bulk density (t/m^3): NE

Comment on density: NE

CHEMICAL COMPOSITION

General description and components (%wt): The waste is believed to consist mainly of glass, plastics, cellulosics and some metal.

Chemical state: Neutral

Sheet metal proportion / thickness: Not estimated

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel……	~ 5.0	316L used for sealed sources.	
Other ferrous metals……	~ 7.0	Mild steel tins.	
Iron……	= 0	-	
Aluminium……	< 1.0	-	
Beryllium……	= 0.10	-	
Cobalt……	= 0	-	
Copper……	< 1.0	-	
Lead……	< 2.0	-	
Magnox/Magnesium……	= 0	-	
Nickel……	= 0	-	
Titanium……	= 0	-	
Uranium……	= 0	-	
Zinc……	< 1.0	-	
Zircaloy/Zirconium……	= 0	-	
Other metals……	NE	The waste may contain platinium, rhodium, iridium and gold.	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulosics	~ 31.0	-	
Paper, cotton	~ 30.0	-	
Wood	~ 1.0	-	
Halogenated plastics	~ 17.0	PVC bags / sheeting.	
Total non-halogenated plastics	~ 16.0	-	
Condensation polymers	~ 9.5	-	
Others	~ 6.5	-	
Organic ion exchange materials	TR	-	
Total rubber	~ 4.0	-	
Halogenated rubber	~ 2.0	Hypalon/neoprene gloves.	
Non-halogenated rubber	< 2.0	Latex gloves.	
Hydrocarbons	= 0	-	
Oil or grease	= 0	-	
Fuel	= 0	-	
Asphalt/Tarmac (cont.coal tar)	= 0	-	
Asphalt/Tarmac (no coal tar)	= 0	-	
Bitumen	= 0	-	
Others	= 0	-	
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	~~ 14.8	-	
Graphite	= 0	-	
Desiccants/Catalysts	= 0	-	
Asbestos	< 0.10	-	
Non/low friable	< 0.05	-	
Moderately friable	< 0.05	-	
Highly friable	= 0	-	
Free aqueous liquids	= 0	-	
Free non-aqueous liquids	= 0	-	
Powder/Ash	NE	-	

COMPONENTS OF MATERIALS, WASTE PROPERTIES, MATERIALS NOT CONTRIBUTING TO MASS

Inorganic anions (%wt):

	(%wt)	Type(s) and comment
Fluoride	NE	Not thought to be present
Chloride	NE	Not thought to be present
Iodide	NE	Not thought to be present
Cyanide	NE	Not thought to be present
Carbonate	NE	Not thought to be present
Nitrate	NE	Not thought to be present
Nitrite	NE	Not thought to be present
Phosphate	NE	Not thought to be present
Sulphate	NE	Not thought to be present
Sulphide	NE	Not thought to be present

Materials of interest for waste acceptance criteria:

	(%wt)	Type(s) and comment
Combustible metals		-
Low flash point liquids		-
Explosive materials		-
Phosphorus		-
Hydrides		-
Biological etc. materials		-
Biodegradable materials		-
Putrescible wastes		-
Non-putrescible wastes		-
Corrosive materials	< 1.0	Aqua Regia (mixture of hydrochloric acid and nitric acid).
Pyrophoric materials		-
Generating toxic gases		-
Reacting with water		-
Higher activity particles		-
Soluble solids as bulk chemical compounds		-

Hazardous substances / non hazardous pollutants: -

	(%wt)	Type(s) and comment
Acrylamide	= 0	-
Benzene	= 0	-
Chlorinated solvents	= 0	-
Formaldehyde	= 0	-
Organometallics	= 0	-
Phenol	= 0	-
Styrene	= 0	-
Tri-butyl phosphate	= 0	-
Other organophosphates	= 0	-
Vinyl chloride	~ 17.0	17% PVC bags.
Arsenic	= 0	-
Barium	= 0	-
Boron	~~ 0.08	-
Boron (in Boral)		-
Boron (non-Boral)	~~ 0.08	Borosilicate Glass
Cadmium	= 0	-
Caesium	= 0	-
Selenium	= 0	-
Chromium	= 0	-
Molybdenum	= 0	-
Thallium	= 0	-
Tin	= 0	-
Vanadium	= 0	-
Mercury compounds	= 0	-
Others	NE	-

Complexing agents (%wt): Not yet determined

	(%wt)	Type(s) and comment
EDTA	NE	No details available at present.
DPTA	NE	No details available at present.
NTA	NE	No details available at present.
Polycarboxylic acids	NE	No details available at present.
Other organic complexants	NE	No details available at present.
Total complexing agents	NE	-

Physical components:

	Number	Type(s) and comment
Sources		-
Electronic & Electrical Equipment (EEE)		-
EEE Type 1		-
EEE Type 2		-
EEE Type 3		-
EEE Type 4		-
EEE Type 5		-

TREATMENT, PACKAGING AND DISPOSAL

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

Treatment	On-site / Off-site	Stream volume %
Size reduction		
Decay storage		
Low force compaction		
Supercompaction (HFC)		
Incineration		
Drying/dewatering/liquid separation		
Tie down/fixatives/strippable coating/painting application		
Decontamination		
Metal treatment		
Recycling / reuse		
Thermal treatment, including vitrification		
Encapsulation		
Polymer encapsulation		
Other physical treatment		
Other chemical treatment		
Containerisation		
Treatment not yet determined		
None		

Comments on planned treatments: -

Conditioning method: -

Conditioning plants:

Plant Name	Location

Likely conditioning matrix: -

Further information on the conditioning matrix: -

Waste Packaging:

Likely container type:

Container	Waste packaged (vol%)	Waste loading (m³)	Payload (m³)	Number of packages	Estimated start date for packaging
-	-	-	-	-	-

Range in container waste loading:

Other information on packaging and conditioning: -

Conditioned density (t/m³): -
Conditioned density comment: -

Management Routes:

Disposal Route	Stream volume %	Raw density t/m^3	Start date
Expected to be consigned to a Near Site, Near Surface Disposal Facility (Scotland)			
Expected to be Non-NSD HAW managed under Scottish Government's policy			
Expected to be disposed to LLW Vaults NRS Dounreay			
Expected to be consigned to the Geological Disposal Facility	= 100.0		
Expected to be consigned to a Near Surface Disposal Facility			
Expected to be consigned to the LLW Repository			
Expected to be consigned to a Landfill Facility			
Expected to be disposed On-Site			
Expected to be managed by In-Situ Disposal			
Expected to be consigned to an Incineration Facility			
Expected to be consigned to a Metal Treatment Facility			
Expected to be Out of Scope			
Expected to be recycled / reused			
Disposal route not known			

Classification codes for waste expected to be consigned to a landfill facility:

Opportunities for alternative disposal routing: No

Baseline Management Route	Opportunity Management Route	Stream volume (%)	Opportunity Confidence	Comment
-	-	-	-	-

RADIOACTIVITY

Source: This waste was generated from sealed source production.

Uncertainty: Stock activity now based on actual values of radium waste in 500l DEVA drums in site Radium store.

Measurement of radioactivities: Specific activity data has been calculated from records of waste holdings.

Chemical form of radionuclides:

H-3: -
C-14: -
Cl-36: -
Se-79: -
Tc-99: -
I-129: -
Ra: Radium sulphate, radium bromide, radium carbonate.
Th: -
U: -
Np: -
Pu: -

WASTE STREAM **1A10** **ILW Containing Radium**

Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2025	Bands and Code	Future Arisings	Bands and Code	Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2025	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				
Co 60					Bi 208				
Ni 59					Bi 210m				
Ni 63					Po 210				
Zn 65					Ra 223				
Se 79					Ra 225				
Kr 81					Ra 226	= 4.23E-02	A A 2	~~ 3.23E-02	A A 2
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					Th 234				
Mo 93					Pa 231				
Tc 97					Pa 233				
Tc 99					U 232				
Ru 106					U 233				
Pd 107					U 234				
Ag 108m					U 235				
Ag 110m					U 236				
Cd 109					U 238				
Cd 113m					Np 237				
Sn 119m					Pu 236				
Sn 121m					Pu 238				
Sn 123					Pu 239				
Sn 126					Pu 240				
Sb 125					Pu 241				
Sb 126					Pu 242				
Te 125m					Am 241				
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					Unsp a				
Eu 152					Unsp b/g				
Eu 154					**Total a**	**4.23E-02**	*	**3.23E-02**	*
Eu 155					**Total b/g**	**0**	*	**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 the 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
* Total calculated from the 114 declared radionuclides