

WASTE STREAM	9R101	Berkeley Centre Decommissioning : Primary ILW
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SITE Berkeley

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Nuclear Restoration Services Ltd (NRS)

WASTE TYPE ILW

WASTE VOLUMES

	Reported (m ³)	OR	Conditioned (m ³)	Packaged (m ³)
Stocks:	At 1.4.2025			
Future arisings:				
Total future arisings:				
Total waste volume:				

0.0
18.9

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

Comment on arising rates: -

Additional information on quantities: Decommissioning of active facilities commenced in 2005.

Uncertainty factors on volumes: Stock (upper): x 1.20 Arisings (upper): x -
Stock (lower): x 0.80 Arisings (lower): x -

WASTE SOURCE Materials that have been used in the examination of irradiated fuel, steel and graphite.

PHYSICAL CHARACTERISTICS

General description: A variety of mild steel, stainless steel, lead and other materials mostly laboratory constructional materials and equipment. Includes some secondary waste. Waste can be packaged in standard ILW packages.

Changes since waste generated: -

Bulk density (t/m³): ~ 1.5

Comment on density: The average bulk density is estimated at ~1.5 t/m³.

CHEMICAL COMPOSITION

General description and components (%wt): A variety of mild steels, stainless steels, lead and other materials. Percentage breakdown has not been assessed.

Chemical state: Neutral

Sheet metal proportion / thickness: Proportions of bulk metal items have not been assessed. Some items may be cut for packaging.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	NE	-	
Other ferrous metals.....	NE	-	
Iron.....	-	-	
Aluminium.....	NE	-	
Beryllium.....	NE	-	
Cobalt.....	NE	Stellite	
Copper.....	NE	-	
Lead.....	NE	-	
Magnox/Magnesium.....	TR	-	
Nickel.....	TR	Nimonic	
Titanium.....	-	-	
Uranium.....	-	-	
Zinc.....	NE	-	
Zircaloy/Zirconium.....	NE	-	
Other metals.....	NE	Not fully assessed.	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	NE	-	
Paper, cotton.....	NE	-	
Wood.....	NE	-	
Halogenated plastics.....	NE	-	
Total non-halogenated plastics.....	NE	-	
Condensation polymers.....	NE	-	
Others.....	NE	-	
Organic ion exchange materials.....	= 0	-	
Total rubber.....	NE	-	
Halogenated rubber.....	NE	-	
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):

	(%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.....		-	
Glass/Ceramics.....	NE	-	
Graphite.....	NE	-	
Desiccants/Catalysts.....		-	
Asbestos.....	= 0	-	
Non/low friable.....		-	
Moderately friable.....		-	
Highly friable.....		-	
Free aqueous liquids.....	= 0	-	
Free non-aqueous liquids.....	= 0	-	
Powder/Ash.....	TR	-	

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

Inorganic anions (%wt):

	(%wt)	Type(s) and comment
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:

	(%wt)	Type(s) and comment
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.....		-
Corrosive materials.....	= 0	-
Pyrophoric materials.....	= 0	-
Generating toxic gases.....	= 0	-
Reacting with water.....	= 0	-
Higher activity particles.....		-
Soluble solids as bulk chemical compounds.....		-

Hazardous substances / non hazardous pollutants:

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

Complexing agents (%wt):

Yes		
	(%wt)	Type(s) and comment
EDTA.....	TR	-
DPTA.....		-
NTA.....		-
Polycarboxylic acids.....		-
Other organic complexants.....		-
Total complexing agents.....		-

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	On-site	100.0

Comments on planned treatments:

-

Conditioning method:

To be co-packaged with 9R02, 9R10, 9R13, 9R17, 9R19, 9R112, 9R118. Packages are assigned to 9R02 & 9R101.

Conditioning plants:

Plant Name	Location
BRK AVDS	Berkeley

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
	3 m³ RS box	100.0	3.2	2.5	6	-

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/m³	Start date
Expected to be consigned to a Near Site, Near Surface Disposal Facility (Scotland)	100.0		
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			
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: There will be contamination by fission products and activation products.

Uncertainty: Estimates have been made from waste disposed during previous cave line refurbishment.

Measurement of radioactivities: From health physics returns of LLW packages sent for disposal.

Chemical form of radionuclides:

- H-3: The chemical form of tritium has not been assessed.
- C-14: The chemical form of carbon 14 has not been assessed.
- Cl-36: The chemical form of chlorine 36 has not been assessed.
- Se-79: -
- Tc-99: -
- I-129: -
- Ra: The radium isotopes content is expected to be insignificant.
- Th: The thorium isotopes content is expected to be insignificant.
- U: The chemical form of uranium isotopes has not been assessed.
- Np: -
- Pu: The chemical form of plutonium isotopes has not been assessed.

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Nuclide	Mean radioactivity, TBq/m³				Nuclide	Mean radioactivity, TBq/m³			
	Waste at 1.4.2025	Bands and Code	Future Arisings	Bands and Code		Waste at 1.4.2025	Bands and Code	Future Arisings	Bands and Code
H 3	1.71E-04	C C 2			Gd 153		8		
Be 10		8			Ho 163		8		
C 14	2.00E-05	C C 2			Ho 166m		8		
Na 22		8			Tm 170		8		
Al 26		8			Tm 171		8		
Cl 36	5.00E-05	C C 2			Lu 174		8		
Ar 39		8			Lu 176		8		
Ar 42		8			Hf 178n		8		
K 40		8			Hf 182		8		
Ca 41		6			Pt 193		8		
Mn 53		8			Tl 204		8		
Mn 54		8			Pb 205		8		
Fe 55	2.36E-05	C C 2			Pb 210		8		
Co 60	5.38E-05	C C 2			Bi 208		8		
Ni 59		6			Bi 210m		8		
Ni 63	5.60E-04	C C 2			Po 210		8		
Zn 65		8			Ra 223		8		
Se 79		6			Ra 225		8		
Kr 81		8			Ra 226		8		
Kr 85		8			Ra 228		8		
Rb 87		8			Ac 227		8		
Sr 90	1.57E-02	C C 2			Th 227		8		
Zr 93		6			Th 228		8		
Nb 91		8			Th 229		8		
Nb 92		8			Th 230		8		
Nb 93m		6			Th 232		8		
Nb 94		6			Th 234	1.00E-07	C C 2		
Mo 93		6			Pa 231		8		
Tc 97		8			Pa 233		8		
Tc 99		6			U 232		8		
Ru 106	1.03E-08	C C 2			U 233		8		
Pd 107		6			U 234	4.08E-07	C C 2		
Ag 108m	9.83E-06	C C 2			U 235	7.00E-09	C C 2		
Ag 110m		8			U 236	8.00E-08	C C 2		
Cd 109		8			U 238	1.00E-07	C C 2		
Cd 113m		8			Np 237		8		
Sn 119m		8			Pu 236		6		
Sn 121m		6			Pu 238	2.77E-04	C C 2		
Sn 123		8			Pu 239	7.00E-05	C C 2		
Sn 126		6			Pu 240	1.00E-04	C C 2		
Sb 125	4.85E-06	C C 2			Pu 241	4.33E-03	C C 2		
Sb 126		8			Pu 242		6		
Te 125m	1.21E-06	C C 2			Am 241	3.84E-04	C C 2		
Te 127m		8			Am 242m		6		
I 129	4.00E-09	C C 2			Am 243		8		
Cs 134	3.49E-06	C C 2			Cm 242		8		
Cs 135		6			Cm 243	1.60E-06	C C 2		
Cs 137	7.15E-03	C C 2			Cm 244	5.46E-05	C C 2		
Ba 133	3.63E-06	C C 2			Cm 245		6		
La 137		8			Cm 246		6		
La 138		8			Cm 248		8		
Ce 144		8			Cf 249		8		
Pm 145		8			Cf 250		8		
Pm 147	4.28E-05	C C 2			Cf 251		8		
Sm 147		8			Cf 252		8		
Sm 151		8			Unsp a				
Eu 152		6			Unsp b/g				
Eu 154	8.95E-05	C C 2			Total a	8.88E-04	*	0	*
Eu 155	1.21E-05	C C 2			Total b/g	2.83E-02	*	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