

WASTE STREAM	9R02	Miscellaneous 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	= 11.0		
Future arisings:				
Total future arisings:		0.0		
Total waste volume:		11.0		

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

Comment on arising rates: -

Additional information on quantities: -

Uncertainty factors on volumes:

Stock (upper):	x 1.20	Arisings (upper):	x -
Stock (lower):	x 0.80	Arisings (lower):	x -

WASTE SOURCE The waste is redundant equipment and material usually arising from examination of irradiated fuel, steel and graphite and there may be items resulting from the refurbishing of facilities, irradiated fuel handling and pond operations. This waste includes 8.468m3 of PIE waste that is the responsibility of EDF Energy.

PHYSICAL CHARACTERISTICS

General description: Graphite moderator sample waste, Magnox surveillance sample set carriers, irradiated steels. Filters, contaminated machine components and service materials. Waste will generally be compacted into 0.056 m3 or 0.028 m3 drums. There are no items that might require special handling.

Changes since waste generated: -

Bulk density (t/m³): ~ 0.60

Comment on density: The density of the waste as contained in 0.056 m3 and 0.028 m3 drums is estimated to be 0.6 t/m3.

CHEMICAL COMPOSITION

General description and components (%wt): The waste is expected to be principally steel and ferrous metals (~30%), low carbon stainless steel drums (~20%), lead (~2%), glass (~3%), Glass fibre (~4%) and epoxy resin (~4%) plastics and rubbers (~30%), and graphite (~7%). Fission products, actinides and other activation products will be present as contaminants.

Chemical state: Neutral

Sheet metal proportion / thickness: There is no sheet metal present apart from drums containing the waste.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	~ 30.0	-	
Other ferrous metals.....	~ 20.0	-	
Iron.....	-	-	
Aluminium.....	< 1.0	-	
Beryllium.....	0	-	
Cobalt.....	< 1.0	Stellite	
Copper.....	< 1.0	-	
Lead.....	~ 2.0	-	
Magnox/Magnesium.....	< 1.0	-	
Nickel.....	< 1.0	Inconel	
Titanium.....	-	-	
Uranium.....	-	-	
Zinc.....	< 1.0	-	
Zircaloy/Zirconium.....	< 1.0	-	
Other metals.....	< 1.0	"Other" metals have not been identified.	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	TR	-	
Paper, cotton.....	TR	-	
Wood.....	= 0	-	
Halogenated plastics.....	~ 5.0	-	
Total non-halogenated plastics.....	~ 24.0	-	
Condensation polymers.....	~ 4.0	-	
Others.....	~ 20.0	-	
Organic ion exchange materials.....	= 0	-	
Total rubber.....	~ 5.0	-	
Halogenated rubber.....	~ 2.5	-	
Non-halogenated rubber.....	~ 2.5	-	
Hydrocarbons.....		-	
Oil or grease.....		-	
Fuel.....		-	
Asphalt/Tarmac (cont.coal tar).....		-	
Asphalt/Tarmac (no coal tar).....		-	
Bitumen.....		-	
Others.....		-	
Other organics.....	TR	-	

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.....	~ 3.0	-	
Graphite.....	~ 7.0	-	
Desiccants/Catalysts.....		-	
Asbestos.....	= 0	-	
Non/low friable.....		-	
Moderately friable.....		-	
Highly friable.....		-	
Free aqueous liquids.....	= 0	-	
Free non-aqueous liquids.....	= 0	-	
Powder/Ash.....	= 0	-	

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

Inorganic anions (%wt):

	(%wt)	Type(s) and comment
Fluoride.....	TR	-
Chloride.....	TR	-
Iodide.....	TR	-
Cyanide.....	= 0	-
Carbonate.....	TR	-
Nitrate.....	TR	-
Nitrite.....	TR	-
Phosphate.....	TR	-
Sulphate.....	TR	-
Sulphide.....	TR	-

Materials of interest for waste acceptance criteria:

	(%wt)	Type(s) and comment
Combustible metals.....	< 1.0	-
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.....	< 1.0	-
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.....		Decontamination agents may be present in trace quantities.
Total complexing agents.....	TR	-

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	On-site	100.0
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:

To be co-packaged with 9R10, 9R13, 9R17, 9R19, 9R101, 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
	500 l RS drum (0mm Pb)	100.0	1.8	0.49	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: The waste usually arises from the examination of irradiated fuel, steel and graphite and there may be items resulting from the refurbishing of facilities, irradiated fuel handling and pond operations. Components that have been associated with fuel pond operations are likely to be of high activity. Wastes arising from post irradiation examination work are also likely to be a major contributor to activity. Specific activity is a function of operating history. Figures were derived by estimation based upon available information.

Uncertainty: The values quoted are indicative of the activities that might be expected.

Measurement of radioactivities: The arisings activities have been normalised and the stocks activities have been derived from measurements of the packages.

Chemical form of radionuclides: H-3: The chemical form of tritium has not been determined.
C-14: Carbon 14 will be predominantly in the form of graphite with some incorporated in the steel or as contamination.

Cl-36: The chemical form of chlorine 36 has not been determined.

Se-79: The selenium content is insignificant.

Tc-99: The technetium content is insignificant.

I-129: -

Ra: Radium isotopes are not present.

Th: The thorium content is insignificant.

U: Uranium isotopes are expected to be present in the form of metal and uranium oxides.

Np: The neptunium content is insignificant.

Pu: Plutonium isotopes are expected to be present possibly in the form of plutonium metal or plutonium oxides.

WASTE STREAM			9R02		Miscellaneous ILW				
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	2.91E-02	C C 2			Gd 153		8		
Be 10	8.00E-08	C C 2			Ho 163		8		
C 14	2.00E-03	C C 2			Ho 166m		8		
Na 22		8			Tm 170		8		
Al 26		8			Tm 171		8		
Cl 36	6.00E-03	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	1.00E-05	C C 2			Pt 193		8		
Mn 53		8			Tl 204		8		
Mn 54		8			Pb 205		8		
Fe 55	3.08E-02	C C 2			Pb 210		8		
Co 60	4.69E-02	C C 2			Bi 208		8		
Ni 59	1.00E-05	C C 2			Bi 210m		8		
Ni 63	2.65E-02	C C 2			Po 210		8		
Zn 65		8			Ra 223		8		
Se 79	5.17E-08	C C 2			Ra 225		8		
Kr 81		8			Ra 226		8		
Kr 85		8			Ra 228		8		
Rb 87		8			Ac 227		8		
Sr 90	3.90E-01	C C 2			Th 227		8		
Zr 93	2.00E-05	C C 2			Th 228		8		
Nb 91		8			Th 229		8		
Nb 92		8			Th 230		8		
Nb 93m	1.24E-05	C C 2			Th 232		8		
Nb 94	1.00E-04	C C 2			Th 234	3.00E-06	C C 2		
Mo 93		8			Pa 231		8		
Tc 97		8			Pa 233	2.13E-06	C C 2		
Tc 99	1.00E-04	C C 2			U 232		8		
Ru 106	1.68E-09	C C 2			U 233		8		
Pd 107	2.00E-09	C C 2			U 234	8.38E-06	C C 2		
Ag 108m	1.94E-04	C C 2			U 235	1.00E-07	C C 2		
Ag 110m		8			U 236	2.00E-06	C C 2		
Cd 109		8			U 238	3.00E-06	C C 2		
Cd 113m		8			Np 237	2.13E-06	C C 2		
Sn 119m		8			Pu 236		8		
Sn 121m	1.58E-04	C C 2			Pu 238	6.94E-03	C C 2		
Sn 123		8			Pu 239	3.00E-03	C C 2		
Sn 126	2.17E-06	C C 2			Pu 240	6.99E-03	C C 2		
Sb 125	5.35E-06	C C 2			Pu 241	1.27E-01	C C 2		
Sb 126	3.04E-07	C C 2			Pu 242	2.00E-05	C C 2		
Te 125m	1.34E-06	C C 2			Am 241	2.51E-02	C C 2		
Te 127m		8			Am 242m	4.58E-05	C C 2		
I 129	2.00E-07	C C 2			Am 243	9.99E-05	C C 2		
Cs 134	9.51E-06	C C 2			Cm 242	3.78E-05	C C 2		
Cs 135	3.00E-06	C C 2			Cm 243	5.95E-05	C C 2		
Cs 137	4.62E-01	C C 2			Cm 244	1.01E-04	C C 2		
Ba 133	6.15E-07	C C 2			Cm 245	4.00E-07	C C 2		
La 137		8			Cm 246	9.99E-08	C C 2		
La 138		8			Cm 248		8		
Ce 144		8			Cf 249		8		
Pm 145		8			Cf 250		8		
Pm 147	3.44E-04	C C 2			Cf 251		8		
Sm 147		8			Cf 252		8		
Sm 151	8.70E-04	C C 2			Unsp a				
Eu 152	1.19E-06	C C 2			Unsp b/g				
Eu 154	1.18E-03	C C 2			Total a	4.24E-02	*	0	*
Eu 155	2.34E-04	C C 2			Total b/g	1.12E+00	*	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