

WASTE STREAM	9E914	Ponds and Other Wet Fuel Routes LLW
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SITE Oldbury

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Nuclear Restoration Services Ltd (NRS)

WASTE TYPE LLW

WASTE VOLUMES

	Reported (m ³)	OR	Conditioned (m ³)	Packaged (m ³)
Stocks:	At 1.4.2025	= 0		
Future arisings:	1.4.2025 - 31.3.2026	= 25.5		
	1.4.2026 - 31.3.2027	= 25.5		
	1.4.2027 - 31.3.2028	= 25.5		
Total future arisings:		76.6		
Total waste volume:		76.6		

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

Comment on arising rates: -

Additional information on quantities: waste in this stream is assumed to arise after defueling.

Uncertainty factors on volumes:

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

WASTE SOURCE The 9E914 waste stream will be used to capture waste from the pond areas (PA) and associated irradiated fuel routes, flask washdown areas (FW), pond water treatment plant (PWTP), pond water filtration plant (PWFP) and active waste vaults (AWV).

PHYSICAL CHARACTERISTICS

General description: The waste consigned under waste stream 9E914 mainly comprises metal (aluminium, copper, iron, magnesium, mild steel, stainless steel, zinc and lead), concrete and rubble, soil, biodegradable materials, plasterboard, plastics, rubber, wood and other materials including glass, EEE materials, MMMF and asbestos. The waste is expected to be in the form of mixed trash, with occasional large items such as pipework, motors and pumps. The waste also includes PWFP Fine Filters. Each filter is a metal canister with a pleated paper internal and is approx 0.03m³ in volume and 5 kg in weight. The filters are drained. Depending on characterisation results there is likely to be approximately 30 PWFP Fine Filters in the 9E914 waste stream.

Changes since waste generated: -

Bulk density (t/m³): ~ 0.80

Comment on density: The density is of the waste as cut for packaging.

CHEMICAL COMPOSITION

General description and components (%wt): The waste comprises various general wastes, rubble and metals, including steel, stainless steel, iron ductwork and MMMF. Metal (~33% wt), rubble (~9%wt), soil (~1%), biodegradables (~9%), plasterboard (~1%), plastics (~37%), rubber (~1%), wood (~3%wt), other organic (~1%), Others including asbestos and MMMF (Man Made Mineral Fibre) (~5wt).

Chemical state: -

Sheet metal proportion / thickness: Thickness of metal items varies from 1 mm to 30 mm.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	~ 13.8	Items such as pipework, flooring plates, brackets, frames and PWF Fine Filters	
Other ferrous metals.....	~ 17.2	Mild steel - Items such as pipework, flooring plates, brackets, frames	
Iron.....	= 0.32	Iron in waste items such as cast iron piping	
Aluminium.....	~ 0.42	Aluminium in waste items such as ladders and ducting	
Beryllium.....	NE	-	
Cobalt.....	-	-	
Copper.....	~ 0.05	In waste items such as pipework	
Lead.....	= 1.1	sheet, pipe block and shot	
Magnox/Magnesium.....	TR	Potential to have trace magnesium metal in waste items	
Nickel.....	-	-	
Titanium.....	-	-	
Uranium.....	NE	-	
Zinc.....	= 0.08	In galvanised steel in items such as gratings or buckets	
Zircaloy/Zirconium.....	TR	-	
Other metals.....	= 0	"Other" metals have not been identified.	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	~ 3.0	-	
Paper, cotton.....	= 0	-	
Wood.....	~ 3.0	-	
Halogenated plastics.....	~ 17.0	PVC,PPE	
Total non-halogenated plastics.....	= 20.0	-	
Condensation polymers.....	= 10.0	pipes,poly, ppe, perspex, containers, sheet and hoses	
Others.....	= 10.0	pipes,poly, ppe, perspex, containers, sheet and hoses	
Organic ion exchange materials.....	= 0	-	
Total rubber.....	~ 1.0	-	
Halogenated rubber.....	~ 1.0	neoprene	
Non-halogenated rubber.....	-	-	
Hydrocarbons.....	-	-	
Oil or grease.....	-	-	
Fuel.....	-	-	
Asphalt/Tarmac (cont.coal tar).....	-	-	
Asphalt/Tarmac (no coal tar).....	-	-	
Bitumen.....	-	-	
Others.....	-	-	
Other organics.....	~ 1.0	Other organic includes miscellaneous items not covered in any other category e.g. wipes, absorbent material.	

Other materials (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials.....	= 0	-	
Inorganic sludges and flocs.....	= 0	-	
Soil.....	= 1.0	-	
Brick/Stone/Rubble.....	= 9.0	-	
Cementitious material.....	-	-	
Sand.....	-	-	
Glass/Ceramics.....	TR	including MMMF lagging and glass	
Graphite.....	= 0	-	
Desiccants/Catalysts.....	-	-	
Asbestos.....	~ 1.7	-	
Non/low friable.....	TR	gaskets/joints (Chrysotile - white)	
Moderately friable.....	= 1.7	PPE and soft waste (Chrysotile - white)	
Highly friable.....	TR	Lagging / gaskets (Chrysotile - white)	
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.....	= 0	-
Chloride.....	= 0	-
Iodide.....	= 0	-
Cyanide.....	= 0	-
Carbonate.....	TR	-
Nitrate.....	= 0	-
Nitrite.....	= 0	-
Phosphate.....	= 0	-
Sulphate.....	TR	-
Sulphide.....	= 0	-

Materials of interest for waste acceptance criteria:

	(%wt)	Type(s) and comment
Combustible metals.....	TR	-
Low flash point liquids.....	= 0	-
Explosive materials.....	= 0	-
Phosphorus.....	= 0	-
Hydrides.....	= 0	-
Biological etc. materials.....	= 0	-
Biodegradable materials.....	= 9.0	-
Putrescible wastes.....	= 1.0	-
Non-putrescible wastes.....	= 8.0	-
Corrosive materials.....	= 0	-
Pyrophoric materials.....	= 0	-
Generating toxic gases.....	= 0	-
Reacting with water.....	P	76.56m2
Higher activity particles.....		-
Soluble solids as bulk chemical compounds.....		-

Hazardous substances / non hazardous pollutants:

	(%wt)	Type(s) and comment
Acrylamide.....		-
Benzene.....		-
Chlorinated solvents.....		-
Formaldehyde.....		-
Organometallics.....		-
Phenol.....		-
Styrene.....		-
Tri-butyl phosphate.....		-
Other organophosphates.....		-
Vinyl chloride.....		-
Arsenic.....		-
Barium.....		-
Boron.....	0	-
Boron (in Boral).....		-
Boron (non-Boral).....		-
Cadmium.....		-
Caesium.....		-
Selenium.....		-
Chromium.....		-
Molybdenum.....		-
Thallium.....		-
Tin.....		-
Vanadium.....		-
Mercury compounds.....		-
Others.....	= 5.0	including 0.03% ET-150-AF Fixative and EEE materials (2.5te)

Complexing agents (%wt):

No		
	(%wt)	Type(s) and comment
EDTA.....		-
DPTA.....		-
NTA.....		-
Polycarboxylic acids.....		-
Other organic complexants.....		-
Total complexing agents.....	= 0	-

Physical components:

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

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	On-site	= 9.0
Supercompaction (HFC)	Off-site	= 9.0
Incineration	Off-site	= 58.7
Drying/dewatering/liquid separation		
Tie down/fixatives/strippable coating/painting application		
Decontamination		
Metal treatment	Off-site	= 15.3
Recycling / reuse		
Thermal treatment, including vitrification		
Encapsulation		
Polymer encapsulation		
Other physical treatment		
Other chemical treatment		
Containerisation		
Treatment not yet determined		
None		= 17.0

Comments on planned treatments:

6.67% of this waste stream is expected to be sent for VLLW Landfill.

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
1/2 Height WAMAC IP-2 ISO (TC08)	9.0	43.2	18.8	1	-
1/2 Height IP-2 Disposal/Re-usable ISO (TC01/TC02)	10.3	10.0	18.3	1	-

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)			
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	= 19.3	0.80	
Expected to be consigned to a Landfill Facility	6.7	0.80	
Expected to be disposed On-Site			
Expected to be managed by In-Situ Disposal			
Expected to be consigned to an Incineration Facility	= 58.7	0.40	
Expected to be consigned to a Metal Treatment Facility	= 15.3	1.4	
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:

17 04 05, 17 06 04, 17 01 07, 17 06 01*, 17 02 01, 17 02 02, 17 02 03, 17 05 04

Opportunities for alternative disposal routing: No

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

RADIOACTIVITY

Source: Activation and contamination of materials.

Uncertainty: Activity values are current best estimates. Specific activity is a function of Station operating history. The values quoted are indicative of the activities that would be expected, although demolition wastes are predicted to be lower in activity than the routine operational wastes and so the values quoted for this stream are expected to be an over estimate.

Measurement of radioactivities: -

Chemical form of radionuclides: H-3: The chemical form of tritium has not been determined but may be tritiated water.
C-14: Carbon 14 may be present as traces of graphite.
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 isotope content is expected to be insignificant.
Th: The thorium content is insignificant.
U: Chemical form of uranium isotopes has not been determined but may be uranium oxides.
Np: The neptunium content is insignificant.
Pu: Chemical form of plutonium isotopes has not been determined but may be plutonium oxides.

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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			6.29E-06	C C 1	Gd 153				8
Be 10				8	Ho 163				8
C 14			9.97E-06	C C 1	Ho 166m				8
Na 22				8	Tm 170				8
Al 26				8	Tm 171				8
Cl 36			1.51E-07	C C 1	Lu 174				8
Ar 39				8	Lu 176				8
Ar 42				8	Hf 178n				8
K 40				8	Hf 182				8
Ca 41				8	Pt 193				8
Mn 53				8	Ti 204				8
Mn 54				8	Pb 205				8
Fe 55			2.44E-06	C C 1	Pb 210				8
Co 60			1.83E-06	C C 2	Bi 208				8
Ni 59				8	Bi 210m				8
Ni 63			5.90E-06	C C 1	Po 210				8
Zn 65				8	Ra 223				8
Se 79				8	Ra 225				8
Kr 81				8	Ra 226				8
Kr 85				8	Ra 228				8
Rb 87				8	Ac 227				8
Sr 90			4.10E-04	C C 1	Th 227				8
Zr 93				8	Th 228				8
Nb 91				8	Th 229				8
Nb 92				8	Th 230				8
Nb 93m				8	Th 232				8
Nb 94			9.90E-08	C C 2	Th 234			1.65E-08	C C 2
Mo 93				8	Pa 231				8
Tc 97				8	Pa 233				8
Tc 99				8	U 232				8
Ru 106				8	U 233				8
Pd 107				8	U 234			1.48E-08	C C 2
Ag 108m			1.83E-07	C C 2	U 235				8
Ag 110m				8	U 236			4.14E-09	C C 2
Cd 109				8	U 238			1.65E-08	C C 2
Cd 113m				8	Np 237				8
Sn 119m				8	Pu 236				8
Sn 121m				8	Pu 238			2.10E-06	C C 1
Sn 123				8	Pu 239			2.90E-06	C C 1
Sn 126				8	Pu 240			3.75E-06	C C 1
Sb 125			2.85E-08	C C 2	Pu 241			6.75E-05	C C 1
Sb 126				8	Pu 242				8
Te 125m			7.13E-09	C C 2	Am 241			1.29E-05	C C 1
Te 127m				8	Am 242m				8
I 129				8	Am 243				8
Cs 134			1.01E-07	C C 2	Cm 242				8
Cs 135				8	Cm 243			1.23E-07	C C 1
Cs 137			3.11E-04	C C 2	Cm 244			1.20E-07	C C 1
Ba 133			1.31E-07	C C 2	Cm 245				8
La 137				8	Cm 246				8
La 138				8	Cm 248				8
Ce 144				8	Cf 249				8
Pm 145				8	Cf 250				8
Pm 147			4.14E-07	C C 1	Cf 251				8
Sm 147				8	Cf 252				8
Sm 151				8	Unsp a				
Eu 152			3.57E-07	C C 2	Unsp b/g				
Eu 154			4.61E-07	C C 2	Total a	0	*	2.19E-05	*
Eu 155			1.08E-07	C C 2	Total b/g	0	*	8.17E-04	*

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