

WASTE STREAM	9E913	AETP LLW
--------------	-------	----------

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	= 12.4		
Future arisings:	1.4.2025 - 31.3.2026	4.0		
	1.4.2026 - 31.3.2027	4.0		
	1.4.2027 - 31.3.2028	5.0		
	1.4.2028 - 31.3.2034	109.6		
Total future arisings:		122.6		
Total waste volume:		135.0		

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 from after defueling
Volume reduction value taken from shipment manifest.
Volume calculated on shipment spreadsheet is slightly different due to rounding of percentage and back calculation of volume.

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

WASTE SOURCE The 9E913 waste stream captures operational and maintenance wastes from the Active Effluent Treatment Plant (AETP) and associated areas. The AETP provides the processing facilities for active effluents onsite. Pond Water Treatment Plant and Active Waste Vaults are now incorporated into 9E914.

PHYSICAL CHARACTERISTICS

General description: This stream will act as an operational support waste stream as the majority of work planned is expected to be focused on the operation and maintenance of the AETP. It should be noted that the AETP fine filters and associated waste will now be consigned under the 9E913 waste stream.
The waste consigned under waste stream 9E913 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 EEE materials, MMMF, asbestos, glass and sand. The waste is expected to be in the form of mixed trash, with occasional large items such as pipework, motors and pumps. Fixative is included as it may be used to seal surface contamination to prevent an airborne hazard during size reduction operations.

Changes since waste generated: -

Bulk density (t/m³): ~ 0.27

Comment on density: -

CHEMICAL COMPOSITION

General description and components (%wt): The waste comprises metal (~34%wt), rubble including concrete and brick/blockwork (~7%wt), soil (~1%), biodegradables (~2%), plasterboard (1%), PVC/plastic pipework (~16%wt), rubber (~1%), wood (~4%wt), other organic (~1%) and others including asbestos and sand (~33%).

Chemical state: -

Sheet metal proportion / thickness: The thickness of the metal varies from 1 mm to 30 mm.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	~ 12.7	Items such as pipework, flooring plates, brackets, frames	
Other ferrous metals.....	~ 16.3	mild steel - Items such as pipework, flooring plates, brackets, frames	
Iron.....	= 0.54	Iron in waste items such as cast iron piping	
Aluminium.....	~ 0.78	Aluminium in waste items such as ladders and ducting	
Beryllium.....	0	-	
Cobalt.....	-	-	
Copper.....	= 0.47	Trace in waste items such as pipework	
Lead.....	= 2.9	Sheet, pipe, block & shot	
Magnox/Magnesium.....	= 0.01	Trace in waste items	
Nickel.....	-	-	
Titanium.....	-	-	
Uranium.....	NE	-	
Zinc.....	= 0.26	Galvanised steel in items such as gratings or buckets	
Zircaloy/Zirconium.....	TR	-	
Other metals.....	= 0	"Other" metals have not been identified. Mass estimates in the table above for mild steel and stainless steel include the constituent alloying elements such as Cr, Fe, Ni, & Co. Therefore, these constituent alloying elements are not recorded separately to avoid double accounting.	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	~ 4.0	-	
Paper, cotton.....	= 0	-	
Wood.....	~ 4.0	-	
Halogenated plastics.....	~ 9.0	PVC, PPE	
Total non-halogenated plastics.....	= 7.0	-	
Condensation polymers.....	= 0	-	
Others.....	= 7.0	Pipes, poly, PPE, perspex, containers, sheet and hoses	
Organic ion exchange materials.....	= 0	-	
Total rubber.....	~ 1.0	-	
Halogenated rubber.....	~ 0.50	Neoprene	
Non-halogenated rubber.....	~ 0.50	-	
Hydrocarbons.....	-	-	
Oil or grease.....	-	-	
Fuel.....	-	-	
Asphalt/Tarmac (cont.coal tar).....	-	-	
Asphalt/Tarmac (no coal tar).....	-	-	
Bitumen.....	-	-	
Others.....	-	-	
Other organics.....	~ 1.0	-	

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.....	~ 7.0	-	
Cementitious material.....	-	-	
Sand.....	= 31.8	sand - included in others total in WCH (3 tonnes)	
Glass/Ceramics.....	= 0.22	0.11% MMMF Lagging, 0.11% glass	
Graphite.....	= 0	-	
Desiccants/Catalysts.....	-	-	
Asbestos.....	= 0.22	-	
Non/low friable.....	= 0.11	gaskets/joints chrysotile (white)	
Moderately friable.....	= 0	-	
Highly friable.....	= 0.11	Lagging / gaskets chrysotile (white)	
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.....	= 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.....	= 2.0	-
Putrescible wastes.....	= 1.0	-
Non-putrescible wastes.....	= 1.0	-
Corrosive materials.....	= 0	-
Pyrophoric materials.....	= 0	-
Generating toxic gases.....	= 0	-
Reacting with water.....	P	20.846m2
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.....	~ 0.89	Others include ET-150-AF Fixative (~0.26%), and EEE materials (~0.63%). The weight of EEE materials is approx. 60kg

Complexing agents (%wt):

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

Physical components:

	Number	Type(s) and comment
Sources.....	P	-
Electronic & Electrical Equipment (EEE)		-
EEE Type 1.....		-
EEE Type 2.....		-
EEE Type 3.....		-
EEE Type 4.....		-
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	= 14.3
Supercompaction (HFC)	Off-site	= 14.3
Incineration	Off-site	= 42.9
Drying/dewatering/liquid separation		
Tie down/fixatives/strippable coating/painting application		
Decontamination		
Metal treatment	Off-site	= 8.6
Recycling / reuse		
Thermal treatment, including vitrification		
Encapsulation		
Polymer encapsulation		
Other physical treatment		
Other chemical treatment		
Containerisation		
Treatment not yet determined		
None		= 34.3

Comments on planned treatments:

14.29% of this waste stream is expected to be sent for VLLW Landfill disposal.

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)	14.3	43.2	18.8	1	-
1/2 Height IP-2 Disposal/Re-usable ISO (TC01/TC02)	20.0	10.0	18.3	3	-

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	= 34.3	0.27	
Expected to be consigned to a Landfill Facility	= 14.3	0.27	
Expected to be disposed On-Site			
Expected to be managed by In-Situ Disposal			
Expected to be consigned to an Incineration Facility	= 42.9	0.40	
Expected to be consigned to a Metal Treatment Facility	= 8.6	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 tritium may be present as tritiated water.
C-14: The chemical form of carbon 14 has not been determined.
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.

WASTE STREAM 9E913 AETP LLW									
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	2.00E-06	C C 1	2.00E-06	C C 1	Gd 153		8		8
Be 10		8		8	Ho 163		8		8
C 14	1.58E-06	C C 1	1.58E-06	C C 1	Ho 166m		8		8
Na 22		8		8	Tm 170		8		8
Al 26		8		8	Tm 171		8		8
Cl 36	1.81E-08	C C 1	1.81E-08	C C 1	Lu 174		8		8
Ar 39		8		8	Lu 176		8		8
Ar 42		8		8	Hf 178n		8		8
K 40		8		8	Hf 182		8		8
Ca 41		8		8	Pt 193		8		8
Mn 53		8		8	Ti 204		8		8
Mn 54		8		8	Pb 205		8		8
Fe 55	4.15E-07	C C 1	4.15E-07	C C 1	Pb 210		8		8
Co 60	1.07E-07	C C 2	1.07E-07	C C 2	Bi 208		8		8
Ni 59		8		8	Bi 210m		8		8
Ni 63	3.21E-07	C C 1	3.21E-07	C C 1	Po 210		8		8
Zn 65		8		8	Ra 223		8		8
Se 79		8		8	Ra 225		8		8
Kr 81		8		8	Ra 226		8		8
Kr 85		8		8	Ra 228		8		8
Rb 87		8		8	Ac 227		8		8
Sr 90	1.81E-05	C C 1	1.81E-05	C C 1	Th 227		8		8
Zr 93		8		8	Th 228		8		8
Nb 91		8		8	Th 229		8		8
Nb 92		8		8	Th 230		8		8
Nb 93m		8		8	Th 232		8		8
Nb 94	1.39E-07	C C 2	1.39E-07	C C 2	Th 234		8		8
Mo 93		8		8	Pa 231		8		8
Tc 97		8		8	Pa 233		8		8
Tc 99		8		8	U 232		8		8
Ru 106	1.30E-09	C C 2	1.30E-09	C C 2	U 233		8		8
Pd 107		8		8	U 234		8		8
Ag 108m	3.34E-07	C C 2	3.34E-07	C C 2	U 235		8		8
Ag 110m		8		8	U 236		8		8
Cd 109		8		8	U 238		8		8
Cd 113m		8		8	Np 237		8		8
Sn 119m		8		8	Pu 236		8		8
Sn 121m		8		8	Pu 238	5.08E-07	C C 1	5.08E-07	C C 1
Sn 123		8		8	Pu 239	6.04E-07	C C 1	6.04E-07	C C 1
Sn 126		8		8	Pu 240	8.30E-07	C C 1	8.30E-07	C C 1
Sb 125	6.59E-08	C C 2	6.59E-08	C C 2	Pu 241	1.55E-05	C C 1	1.55E-05	C C 1
Sb 126		8		8	Pu 242		8		8
Te 125m	1.65E-08	C C 2	1.65E-08	C C 2	Am 241	1.26E-06	C C 1	1.26E-06	C C 1
Te 127m		8		8	Am 242m		8		8
I 129		8		8	Am 243		8		8
Cs 134	3.65E-07	C C 2	3.65E-07	C C 2	Cm 242		8		8
Cs 135		8		8	Cm 243		8		8
Cs 137	1.06E-03	C C 2	1.06E-03	C C 2	Cm 244	9.00E-09	C C 1	9.00E-09	C C 1
Ba 133	2.21E-07	C C 2	2.21E-07	C C 2	Cm 245		8		8
La 137		8		8	Cm 246		8		8
La 138		8		8	Cm 248		8		8
Ce 144		8		8	Cf 249		8		8
Pm 145		8		8	Cf 250		8		8
Pm 147	3.72E-08	C C 1	3.72E-08	C C 1	Cf 251		8		8
Sm 147		8		8	Cf 252		8		8
Sm 151		8		8	Unsp a				
Eu 152	7.92E-07	C C 2	7.92E-07	C C 2	Unsp b/g				
Eu 154	1.02E-07	C C 2	1.02E-07	C C 2	Total a	3.21E-06	*	3.21E-06	*
Eu 155	7.49E-08	C C 2	7.49E-08	C C 2	Total b/g	1.10E-03	*	1.10E-03	*

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