

WASTE STREAM	2P03	Central Laboratory, Laboratories and general active area
--------------	------	--

SITE Sellafield

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN United Kingdom National Nuclear Laboratory (UKNNL)

WASTE TYPE LLW

WASTE VOLUMES

	Reported (m ³)	OR	Conditioned (m ³)	Packaged (m ³)
Stocks:	At 1.4.2025	= 20.0		
Future arisings:	1.4.2025 - 31.3.2026	< 10.0		
	1.4.2026 - 31.3.2027	< 10.0		
	1.4.2027 - 31.3.2028	< 10.0		
	1.4.2029 - 31.3.2037	< 80.0		
Total future arisings:		110.0		
Total waste volume:		130.0		

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

Comment on arising rates: This waste stream has been operational since October 2004.

Additional information on quantities: -

Uncertainty factors on volumes: Stock (upper): x 1.00 Arisings (upper): x 1.25
Stock (lower): x 1.00 Arisings (lower): x 0.75

WASTE SOURCE General laboratory wastes plus general wastes arising from normal building operations.

PHYSICAL CHARACTERISTICS

General description: General mixed waste. Large items arise infrequently.

Changes since waste generated: No changes to report.

Bulk density (t/m³): ~ 0.26

Comment on density: The density of waste is based on the updated waste stream characterisation document (version 14.0) issued in August 2024. Disposals to date support this figure.

CHEMICAL COMPOSITION

General description and components (%wt): Metal (30%), Soil (1%), Biodegradable - Non-Putrescibles (1%), Plasterboard (1%), Halogenated Plastic (18%), Non-Halogenated Plastic (18%), Rubber (7%), Wood (1%), Other organic (1%), Others (15%). Others consist of glassware contained within rigid containers, Eli-dry absorbant granules loaded with Insta-Gel plus and or Insta-Fluor plus liquid scintillation cocktails, grouted ion-exchange resins, grouted fumed silica/nitric acid electrolyte decontamination gel, WEEE, lagging, HEPA filters, air filters, oils, paints, Hoover bags and contents, magnox and AGR graphite waste, onconel 601 crucible alloy elements (manganese, carbon, silicon, sulfur).

Chemical state: Neutral

Sheet metal proportion / thickness: Likely to be metals of various thicknesses.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	< 11.1	-	
Other ferrous metals.....	< 11.1	-	
Iron.....	< 4.8	-	
Aluminium.....	< 0.40	-	
Beryllium.....		-	
Cobalt.....		-	
Copper.....	< 1.5	-	
Lead.....	< 1.2	-	
Magnox/Magnesium.....	< 0.10	-	
Nickel.....	< 0.10	-	
Titanium.....	< 0.10	-	
Uranium.....		-	
Zinc.....	< 0.10	-	
Zircaloy/Zirconium.....		-	
Other metals.....		-	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	= 8.0	-	
Paper, cotton.....	= 7.0	-	
Wood.....	= 1.0	-	
Halogenated plastics.....	= 18.0	-	
Total non-halogenated plastics.....	= 18.0	-	
Condensation polymers.....	-	-	
Others.....	-	-	
Organic ion exchange materials.....	< 1.0	-	
Total rubber.....	= 7.0	-	
Halogenated rubber.....	-	-	
Non-halogenated rubber.....	-	-	
Hydrocarbons.....	-	-	
Oil or grease.....	< 1.0	-	
Fuel.....	-	-	
Asphalt/Tarmac (cont.coal tar).....	-	-	
Asphalt/Tarmac (no coal tar).....	-	-	
Bitumen.....	-	-	
Others.....	-	-	
Other organics.....	< 1.0	Relatively small quantities of liquid scintillation cocktails are also present.	

Other materials (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials.....	< 1.0	Liquid scintillation cocktails.	
Inorganic sludges and flocs.....	-	-	
Soil.....	< 1.0	-	
Brick/Stone/Rubble.....	= 1.0	-	
Cementitious material.....	= 1.0	Includes grout for resins, decon gels.	
Sand.....	-	-	
Glass/Ceramics.....	< 12.0	Glassware, uranium encapsulated in glass, HEPA filters.	
Graphite.....	< 1.0	Magnox and AGR reactor graphite waste (dust).	
Desiccants/Catalysts.....	-	-	
Asbestos.....	-	-	
Non/low friable.....	-	-	
Moderately friable.....	-	-	
Highly friable.....	-	-	
Free aqueous liquids.....	-	-	
Free non-aqueous liquids.....	-	-	
Powder/Ash.....	-	-	

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

Inorganic anions (%wt):

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

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.....	7.0	-
Putrescible wastes.....	= 0	-
Non-putrescible wastes.....	= 7.0	Paper, cotton and wood.
Corrosive materials.....	-	-
Pyrophoric materials.....	= 0	-
Generating toxic gases.....	= 0	-
Reacting with water.....	= 0	-
Higher activity particles.....	= 0	-
Soluble solids as bulk chemical compounds.....	= 0	-

Hazardous substances / non hazardous pollutants:

	(%wt)	Type(s) and comment
Acrylamide.....		-
Benzene.....	= 0	-
Chlorinated solvents.....		-
Formaldehyde.....		-
Organometallics.....		-
Phenol.....	= 0	-
Styrene.....		-
Tri-butyl phosphate.....	= 0	-
Other organophosphates.....		-
Vinyl chloride.....	P	PVC bags.
Arsenic.....	= 0	-
Barium.....		-
Boron.....	= 0	-
Boron (in Boral).....		-
Boron (non-Boral).....		-
Cadmium.....	= 0	-
Caesium.....		-
Selenium.....	= 0	-
Chromium.....	< 1.0	Alloy in stainless steel, inconel.
Molybdenum.....	P	Alloy in stainless steel.
Thallium.....		-
Tin.....	= 0	-
Vanadium.....	P	Alloy in stainless steel.
Mercury compounds.....		-
Others.....	= 0	-

Complexing agents (%wt):

Yes		
	(%wt)	Type(s) and comment
EDTA.....	P	0.00088 kg
DPTA.....		-
NTA.....		-
Polycarboxylic acids.....		-
Other organic complexants.....		-
Total complexing agents.....	< 0.01	-

Physical components:

	Number	Type(s) and comment
Sources.....	= 51	-
Electronic & Electrical Equipment (EEE)		-
EEE Type 1.....	= 100	Computers, telephones, circuit boards etc.
EEE Type 2.....	= 100	Pumps, motors, transformers etc.
EEE Type 3.....	= 100	Hand tools.
EEE Type 4.....	= 25	Fluorescent light tubes.
EEE Type 5.....	= 25	Lithium ion batteries.

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)	On-site	= 40.0
Incineration	Off-site	= 54.0
Drying/dewatering/liquid separation		
Tie down/fixatives/strippable coating/painting application		
Decontamination		
Metal treatment	Off-site	= 1.0
Recycling / reuse		
Thermal treatment, including vitrification		
Encapsulation		
Polymer encapsulation		
Other physical treatment	On-site	= 1.0
Other chemical treatment		
Containerisation		
Treatment not yet determined		
None	Off-site	= 4.0

Comments on planned treatments:

Other is on site disposal of VLLW eg putrescible waste, rubble etc to CLESA. None is off site direct disposal to LLWR where required.

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 IP-2 Disposal/Re-usable ISO (TC01/TC02)	1.0	10.0	18.3	1	-
	1/2 Height WAMAC IP-2 ISO (TC08)	41.0	59.3	18.8	1	-

Range in container waste loading:

Other information on packaging and conditioning: Small heavy duty items from research experiments and supporting plant operations. General laboratory and plant items. Soft wastes from research experiments or supporting plant operations.

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	= 41.0	NE	
Expected to be consigned to a Landfill Facility	= 1.0	NE	
Expected to be disposed On-Site	= 1.0	NE	
Expected to be managed by In-Situ Disposal			
Expected to be consigned to an Incineration Facility	= 54.0	NE	
Expected to be consigned to a Metal Treatment Facility	= 1.0	NE	
Expected to be Out of Scope	= 1.0	NE	
Expected to be recycled / reused	= 1.0	NE	
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: Process waste (such as gloves/paper etc.) contaminated with fission products and other radionuclides will be generated from experiments.

Uncertainty: This is a best estimate at present based on the WSCD and operations to date.

Measurement of radioactivities: The fingerprint is based on a theoretical assessment by Sellafield Ltd Remediation Characterisation Team, using data on real activities, materials and operations provided by UKNNL Plant personnel and Plant Solid Waste Coordinator in 2019.

Chemical form of radionuclides:

- H-3: Trace residues left in sample containers.
- C-14: Trace residues left in sample containers.
- Cl-36: Trace residues left in sample containers.
- Se-79: Not anticipated to be present.
- Tc-99: Trace residues left in sample containers
- I-129: Trace residues left in sample containers.
- Ra: Not anticipated to be present.
- Th: Thorium 232 Oxide and oxalate solids on filter papers or encapsulated in epoxy resin.
- U: Natural Uranium - U235, U236 and U238, Uranium metal, U oxides (UO2, UO3 and U3O8) powder or U nitrate solids.
- Np: Np237 as oxide or nitrate solids.
- Pu: Plutonium nitrate solids, plutonium oxides.

WASTE STREAM 2P03 Central Laboratory, Laboratories and general active area									
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	4.70E-07	C C 2	4.70E-07	C C 2	Gd 153				
Be 10					Ho 163				
C 14	3.74E-07	C C 2	3.74E-07	C C 2	Ho 166m				
Na 22					Tm 170				
Al 26					Tm 171				
Cl 36	8.85E-09	C C 2	8.85E-09	C C 2	Lu 174				
Ar 39					Lu 176				
Ar 42					Hf 178n				
K 40					Hf 182				
Ca 41					Pt 193				
Mn 53					Ti 204				
Mn 54	1.30E-09	C C 2	1.30E-09	C C 2	Pb 205				
Fe 55	2.12E-07	C C 2	2.12E-07	C C 2	Pb 210				
Co 60	1.16E-06	C C 2	1.16E-06	C C 2	Bi 208				
Ni 59	1.53E-10	C C 2	1.53E-10	C C 2	Bi 210m				
Ni 63	4.95E-08	C C 2	4.95E-08	C C 2	Po 210				
Zn 65	6.34E-09	C C 2	6.34E-09	C C 2	Ra 223				
Se 79					Ra 225				
Kr 81					Ra 226				
Kr 85	8.85E-07	C C 2	8.85E-07	C C 2	Ra 228				
Rb 87					Ac 227				
Sr 90	4.43E-07	C C 2	4.43E-07	C C 2	Th 227				
Zr 93					Th 228				
Nb 91					Th 229				
Nb 92					Th 230				
Nb 93m					Th 232	1.30E-09	C C 2	1.30E-09	C C 2
Nb 94					Th 234				
Mo 93					Pa 231				
Tc 97					Pa 233				
Tc 99	1.77E-06	C C 2	1.77E-06	C C 2	U 232	8.85E-13	C C 2	8.85E-13	C C 2
Ru 106	2.25E-09	C C 2	2.25E-09	C C 2	U 233	2.65E-07	C C 2	2.65E-07	C C 2
Pd 107					U 234	1.19E-06	C C 2	1.19E-06	C C 2
Ag 108m	7.63E-11	C C 2	7.63E-11	C C 2	U 235	5.08E-08	C C 2	5.08E-08	C C 2
Ag 110m	4.43E-07	C C 2	4.43E-07	C C 2	U 236	9.77E-12	C C 2	9.77E-12	C C 2
Cd 109	8.85E-12	C C 2	8.85E-12	C C 2	U 238	1.53E-06	C C 2	1.53E-06	C C 2
Cd 113m					Np 237	4.42E-07	C C 2	4.42E-07	C C 2
Sn 119m					Pu 236	8.85E-13	C C 2	8.85E-13	C C 2
Sn 121m					Pu 238	1.53E-08	C C 2	1.53E-08	C C 2
Sn 123					Pu 239	1.40E-08	C C 2	1.40E-08	C C 2
Sn 126					Pu 240	6.34E-09	C C 2	6.34E-09	C C 2
Sb 125	3.44E-07	C C 2	3.44E-07	C C 2	Pu 241	1.02E-08	C C 2	1.02E-08	C C 2
Sb 126					Pu 242	3.10E-07	C C 2	3.10E-07	C C 2
Te 125m					Am 241	8.85E-09	C C 2	8.85E-09	C C 2
Te 127m					Am 242m				
I 129	8.85E-09	C C 2	8.85E-09	C C 2	Am 243	1.42E-06	C C 2	1.42E-06	C C 2
Cs 134	5.11E-09	C C 2	5.11E-09	C C 2	Cm 242	7.63E-11	C C 2	7.63E-11	C C 2
Cs 135					Cm 243	1.53E-10	C C 2	1.53E-10	C C 2
Cs 137	8.85E-07	C C 2	8.85E-07	C C 2	Cm 244	8.85E-09	C C 2	8.85E-09	C C 2
Ba 133					Cm 245				
La 137					Cm 246				
La 138					Cm 248				
Ce 144	9.01E-08	C C 2	9.01E-08	C C 2	Cf 249				
Pm 145					Cf 250				
Pm 147	1.30E-09	C C 2	1.30E-09	C C 2	Cf 251				
Sm 147					Cf 252				
Sm 151	8.89E-08	C C 2	8.89E-08	C C 2	Unsp a	8.85E-13	C C 2	8.85E-13	C C 2
Eu 152	1.76E-07	C C 2	1.76E-07	C C 2	Unsp b/g	8.85E-12	C C 2	8.85E-12	C C 2
Eu 154	1.30E-09	C C 2	1.30E-09	C C 2	Total a	5.26E-06	*	5.26E-06	*
Eu 155	5.34E-10	C C 2	5.34E-10	C C 2	Total b/g	7.44E-06	*	7.44E-06	*

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