

WASTE STREAM		2D93	Acidic Sample Waste in Analytical Services	
SITE	Sellafield			
SITE OWNER	Nuclear Decommissioning Authority			
WASTE CUSTODIAN	Sellafield Ltd			
WASTE TYPE	ILW			
WASTE VOLUMES				
		Reported (m ³)	OR	Conditioned (m ³) Packaged (m ³)
Stocks:	At 1.4.2025	0.6		
Future arisings:	1.4.2025 - 31.3.2028	0.1		
Total future arisings:		0.1		
Total waste volume:		0.7		
Number of waste packages in stock:	At 1.4.2025..... - packages			
Comment on arising rates:	The rate of waste arising from current analyses will reduce as operational plants come to the end of their life. However, there is likely to be an increase in analyses from new routes associated with wastes from legacy plant. Additionally, methods to dispose of the waste are being brought on line so an accelerated decrease in stocks held is expected in the next 2-5 years. The rate of disposals cannot be predicted at this time. Arisings are given at the current rate for the life time of the current plant (Analytical Services Facility). No arisings are attributed to future (Analytical Services Facility) replacement plants. This is due to uncertainty surrounding the nature of analytical methods to be used in the future, as it is hoped to introduce methods that reduce waste arisings, with the aim of having no liquid waste arisings.			
Additional information on quantities:	Despite continued arisings, disposals/processing of waste will outstrip arisings in the next few years. At the current time the uncertainties are highly unpredictable to the point of providing little benefit. The long term aim is for processing of legacy waste to be complete and for ongoing processing to be at the arising rate, i.e.the aim is to have no stocks held for which there is low uncertainty.			
Uncertainty factors on volumes:	Stock (upper): x 1.01 Stock (lower): x 0.99	Arisings (upper): x 1.50 Arisings (lower): x 0.50		
WASTE SOURCE	Analytical chemistry of site process samples.			
PHYSICAL CHARACTERISTICS				
General description:	-			
Changes since waste generated:	-			
Bulk density (t/m ³):	= 1.1			
Comment on density:	Density is variable depending on solute type and concentration.			
CHEMICAL COMPOSITION				
General description and components (%wt):	Most of the samples comprise of plutonium dissolved in nitric acid. A wide range of other chemicals species are present depending on reagents used for specific tests. In some instances there is a clear understanding of bottle contents due to accurate knowledge of analyses undertaken; in other instances this information is not available and the history of the bottle contents is highly uncertain. It is expected that a general GCMS analysis will be used to reduce the uncertainty for such bottles to ensure appropriate disposal.			
Chemical state:	-			
Sheet metal proportion / thickness:	-			

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	0	-	
Other ferrous metals.....	0	-	
Iron.....	0	-	
Aluminium.....	0	-	
Beryllium.....	0	-	
Cobalt.....	0	-	
Copper.....	0	-	
Lead.....	0	-	
Magnox/Magnesium.....	0	-	
Nickel.....	0	-	
Titanium.....	0	-	
Uranium.....	0	-	
Zinc.....	0	-	
Zircaloy/Zirconium.....	0	-	
Other metals.....	0	-	

Organics (%wt):

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

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.....	0	-	
Glass/Ceramics.....	0	-	
Graphite.....	0	-	
Desiccants/Catalysts.....	0	-	
Asbestos.....	0	-	
Non/low friable.....	0	-	
Moderately friable.....	0	-	
Highly friable.....	0	-	
Free aqueous liquids.....	100.0	-	
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.....	0	-
Nitrate.....	0	-
Nitrite.....	0	-
Phosphate.....	0	-
Sulphate.....	0	-
Sulphide.....	0	-

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.....	0	-
Corrosive materials.....	0	-
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.....	-	-
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):

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

Physical components:

	Number	Type(s) and comment
Sources.....	0	-
Electronic & Electrical Equipment (EEE)		
EEE Type 1.....	0	-
EEE Type 2.....	0	-
EEE Type 3.....	0	-
EEE Type 4.....	0	-
EEE Type 5.....	0	-

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:

At the present time trials are been done on using Spinlonic to remove the Pu from the Acidic sample waste so the liquor can be disposed of via consented effluent routes. The Pu will be retained in a filter catridge which will go as PCM waste. We are waiting for EARP to come back on line to allow continued discharge in to the EARP process for bottles that can't go through the Spinlonic's process.

Conditioning method:

Actinide removal.

Conditioning plants:

Plant Name	Location
Enhanced Actinide Removal Plant (EARP)	Sellafield

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 drum	100.0	-	-	-	-

Range in container waste loading:

Other information on packaging and conditioning:

Discharges to the EARP process will be processed producing floc for encapsulation. The contribution of Analytical waste will be negligible in relation to overall araisings from the EARP process. Non-radiological chemical species within permeate and washing will be disposed through consented effluent routes

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			
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: Not yet determined

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

RADIOACTIVITY

Source: Pu residues.

Uncertainty: Accurate within safeguard accountancy requirements.

Measurement of radioactivities: -

Chemical form of radionuclides: H-3: -
C-14: -
Cl-36: -
Se-79: -
Tc-99: -
I-129: -
Ra: -
Th: -
U: -
Np: -
Pu: -

WASTE STREAM		2D93		Acidic Sample Waste in Analytical Services					
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					Gd 153				
Be 10					Ho 163				
C 14					Ho 166m				
Na 22					Tm 170				
Al 26					Tm 171				
Cl 36					Lu 174				
Ar 39					Lu 176				
Ar 42					Hf 178n				
K 40					Hf 182				
Ca 41					Pt 193				
Mn 53					Tl 204				
Mn 54					Pb 205				
Fe 55					Pb 210				
Co 60					Bi 208				
Ni 59					Bi 210m				
Ni 63					Po 210				
Zn 65					Ra 223				
Se 79					Ra 225				
Kr 81					Ra 226				
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90					Th 227				
Zr 93					Th 228				
Nb 91					Th 229				
Nb 92					Th 230				
Nb 93m					Th 232				
Nb 94					Th 234				
Mo 93					Pa 231				
Tc 97					Pa 233				
Tc 99					U 232				
Ru 106					U 233				
Pd 107					U 234				
Ag 108m					U 235				
Ag 110m					U 236				
Cd 109					U 238				
Cd 113m					Np 237				
Sn 119m					Pu 236				
Sn 121m					Pu 238				
Sn 123					Pu 239				
Sn 126					Pu 240				
Sb 125					Pu 241				
Sb 126					Pu 242				
Te 125m					Am 241				
Te 127m					Am 242m				
I 129					Am 243				
Cs 134					Cm 242				
Cs 135					Cm 243				
Cs 137					Cm 244				
Ba 133					Cm 245				
La 137					Cm 246				
La 138					Cm 248				
Ce 144					Cf 249				
Pm 145					Cf 250				
Pm 147					Cf 251				
Sm 147					Cf 252				
Sm 151					Unsp a				
Eu 152					Unsp b/g				
Eu 154					Total a	0	*	0	*
Eu 155					Total b/g	0	*	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