

WASTE STREAM	2X19	Low Active Effluent Management Group: SETP Operational LLW
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SITE Sellafield

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Sellafield Ltd

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	= 16.3		
	1.4.2026 - 31.3.2027	= 16.3		
	1.4.2027 - 31.3.2028	= 16.3		
	1.4.2028 - 31.3.2029	= 16.3		
	1.4.2029 - 31.3.2030	= 16.3		
	1.4.2030 - 31.3.2031	= 16.3		
	1.4.2031 - 31.3.2032	= 16.3		
	1.4.2032 - 31.3.2033	= 16.3		
	1.4.2033 - 31.3.2034	= 16.3		
	1.4.2034 - 31.3.2035	= 16.3		
	1.4.2035 - 31.3.2036	= 16.3		
	1.4.2036 - 31.3.2037	= 16.3		
	1.4.2037 - 31.3.2038	= 16.3		
	1.4.2038 - 31.3.2039	= 16.3		
	1.4.2039 - 31.3.2040	= 16.3		
	1.4.2040 - 31.3.2041	= 16.3		
	1.4.2041 - 31.3.2042	= 16.3		
	1.4.2042 - 31.3.2043	= 16.3		
	1.4.2043 - 31.3.2044	= 16.3		
	1.4.2044 - 31.3.2045	= 16.3		
	1.4.2045 - 31.3.2046	= 16.3		
Total future arisings:		343.2		
Total waste volume:		343.2		

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

Comment on arising rates: Arisings are based on 5 years of forecasts, with the final year extrapolated to the end of the lifetime of the waste stream.

Additional information on quantities: Uncertainty information is notional.

Uncertainty factors on volumes:

Stock (upper):	x -	Arisings (upper):	x 1.50
Stock (lower):	x -	Arisings (lower):	x 0.50

WASTE SOURCE Waste arises as a result of routine operations and maintenance in SETP.

PHYSICAL CHARACTERISTICS

General description: The waste will mostly be a mixture of metallic wastes associated with maintenance and redundant plant items as well as secondary wastes associated with operations and maintenance.

Changes since waste generated: The waste has not undergone any changes since it was generated.

Bulk density (t/m³): = 0.28

Comment on density: The total bulk density has been calculated based on the 5 year forecast and relevant waste characterisation document.

CHEMICAL COMPOSITION

General description and components (%wt): Metals (44.3%), Concrete/Rubble (2%), Soil (1%), Wood (4%), Rubber (4%), Halogenated Plastics (17.8%), Non-Halogenated Plastics (17.8%), Hydrocarbons (3.6%), Other Organics (5%), Asbestos (0.3%) and Other (0.2%).

Chemical state: Neutral

Sheet metal proportion / thickness: Metal thickness not specified.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	= 6.3	-	
Other ferrous metals.....	= 23.1	-	
Iron.....	= 7.3	-	
Aluminium.....	= 0.21	-	
Beryllium.....	-	-	
Cobalt.....	-	-	
Copper.....	= 0.21	-	
Lead.....	= 6.3	-	
Magnox/Magnesium.....	-	-	
Nickel.....	-	-	
Titanium.....	-	-	
Uranium.....	-	-	
Zinc.....	= 0.10	-	
Zircaloy/Zirconium.....	-	-	
Other metals.....	= 0.80	-	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulotics.....	= 4.0	-	
Paper, cotton.....	-	-	
Wood.....	= 4.0	-	
Halogenated plastics.....	= 17.8	-	
Total non-halogenated plastics.....	= 17.8	-	
Condensation polymers.....	-	-	
Others.....	-	-	
Organic ion exchange materials.....	-	-	
Total rubber.....	= 4.0	-	
Halogenated rubber.....	-	-	
Non-halogenated rubber.....	-	-	
Hydrocarbons.....	= 3.6	-	
Oil or grease.....	= 1.3	-	
Fuel.....	-	-	
Asphalt/Tarmac (cont.coal tar).....	= 1.8	-	
Asphalt/Tarmac (no coal tar).....	= 0.10	-	
Bitumen.....	= 0.42	-	
Others.....	-	-	
Other organics.....	= 5.0	-	

Other materials (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials.....	-	-	
Inorganic sludges and flocs.....	-	-	
Soil.....	= 1.0	-	
Brick/Stone/Rubble.....	= 2.0	-	
Cementitious material.....	-	-	
Sand.....	-	-	
Glass/Ceramics.....	= 0.18	-	
Graphite.....	-	-	
Desiccants/Catalysts.....	-	-	
Asbestos.....	= 0.29	-	
Non/low friable.....	= 0.18	-	
Moderately friable.....	= 0.02	-	
Highly friable.....	= 0.09	-	
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.....	-	-
Low flash point liquids.....	-	-
Explosive materials.....	-	-
Phosphorus.....	-	-
Hydrides.....	-	-
Biological etc. materials.....	-	-
Biodegradable materials.....	= 5.0	-
Putrescible wastes.....	= 4.0	-
Non-putrescible wastes.....	= 1.0	-
Corrosive materials.....	-	-
Pyrophoric materials.....	-	-
Generating toxic gases.....	-	-
Reacting with water.....	= 0.31	-
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.....	-	-
Boron (in Boral).....	-	-
Boron (non-Boral).....	-	-
Cadmium.....	-	-
Caesium.....	-	-
Selenium.....	-	-
Chromium.....	-	-
Molybdenum.....	-	-
Thallium.....	-	-
Tin.....	-	-
Vanadium.....	= 0.13	-
Mercury compounds.....	-	-
Others.....	-	-

Complexing agents (%wt):

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

Physical components:

	Number	Type(s) and comment
Sources.....	= 0	-
Electronic & Electrical Equipment (EEE)	-	-
EEE Type 1.....	330 items every 5 years	-
EEE Type 2.....	330 items every 5 years	-
EEE Type 3.....	170 items every 5 years	-
EEE Type 4.....	170 items every 5 years	-
EEE Type 5.....	90 items every 5 years	-

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	= 10.8
Incineration	Off-site	= 77.3
Drying/dewatering/liquid separation		
Tie down/fixatives/strippable coating/painting application		
Decontamination		
Metal treatment	Off-site	= 2.3
Recycling / reuse		
Thermal treatment, including vitrification		
Encapsulation		
Polymer encapsulation		
Other physical treatment		
Other chemical treatment		
Containerisation		
Treatment not yet determined		
None		= 9.6

Comments on planned treatments:

For inventory purposes, it is assumed that supercompaction will continue after the closure of WAMAC in 2028. Incineration and Metal Treatment will take place off-site. Waste not requiring treatment is mostly 'out of scope' metal and non compactable LLW for direct disposal to LLWR.

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)	3.6	10.0	18.3	2	-
1/2 Height WAMAC IP-2 ISO (TC08)	10.8	59.3	18.8	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	= 14.4	= 0.40	2025
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	= 77.3	= 0.14	2025
Expected to be consigned to a Metal Treatment Facility	= 2.3	= 1.4	2025
Expected to be Out of Scope	= 6.0	= 1.4	2025
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 activity originates from effluents that in turn arise from a variety of site operations.

Uncertainty: The uncertainty associated with the fingerprinting analysis is likely to be low, however the volumes and total activity information (and possibly some other assumptions) are likely to be more notional and thus more uncertain.

Measurement of radioactivities: Specific activity data is based on data in the corresponding WCH, which in turn maps an estimated total activity to an analytically derived radionuclide fingerprint.

Chemical form of radionuclides:

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

WASTE STREAM		2X19		Low Active Effluent Management Group: SETP Operational 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			=	3.57E-07	C C 2	Gd 153				
Be 10										Ho 163
C 14			=	2.58E-07	C C 2	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			=	6.13E-09	C C 2	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	=	1.36E-06	C C 2	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			=	4.21E-09	C C 2	U 232				
Ru 106			=	1.80E-08	C C 2	U 233				
Pd 107					U 234			=	2.68E-09 C C 2	
Ag 108m					U 235			=	1.04E-10 C C 2	
Ag 110m					U 236			=	3.83E-10 C C 2	
Cd 109					U 238			=	3.07E-09 C C 2	
Cd 113m					Np 237					
Sn 119m					Pu 236					
Sn 121m					Pu 238			=	7.28E-09 C C 2	
Sn 123					Pu 239			=	7.66E-09 C C 2	
Sn 126					Pu 240			=	7.66E-09 C C 2	
Sb 125			=	1.46E-08	C C 2	Pu 241		=	4.15E-07 C C 2	
Sb 126					Pu 242					
Te 125m					Am 241			=	1.15E-08 C C 2	
Te 127m					Am 242m					
I 129					Am 243					
Cs 134			=	8.81E-09	C C 2	Cm 242				
Cs 135					Cm 243			=	1.42E-10 C C 2	
Cs 137			=	1.34E-06	C C 2	Cm 244		=	1.53E-09 C C 2	
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	*	4.20E-08	*	
Eu 155					Total b/g	0	*	3.79E-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