

WASTE STREAM	2P05	BTC Rig Hall
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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	= 15.0		
Future arisings:				
Total future arisings:		0.0		
Total waste volume:		15.0		

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

Comment on arising rates: Work has ceased on the Geomelt and there are no current plans to reinstate. This is liable to change if new workstreams are required.

Additional information on quantities: Whilst there is a known stock level, waste will be generated from the decommissioning of the Geomelt rig and there is uncertainty associated with this. No future arisings identified at present.

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

WASTE SOURCE Waste generated from the Rig Hall is from the manufacture, operation and POCO of the 'Geomelt' and other associated test rigs researched by UKNNL. Geomelt is a demonstration rig. Typical associated waste arisings will be in the majority steel and metal work arising from the dismantling of rigs as well as gloves, paper, PVC, rubber and plastics from general operations.

PHYSICAL CHARACTERISTICS

General description: Typical associated waste arisings are in the majority steel and metal work arising from the dismantling of rigs as well as rubbers and plastics from general operations. This mixed general waste is able to fit within a skip. Larger items may arise but this is thought to be infrequent.

Changes since waste generated: No physical / chemical changes - this waste stream covers process / maintenance / soft bagged waste as well as the geomelt rig itself (WEEE / metal) for which no conditioning has occurred or is required.

Bulk density (t/m³): ~ 0.75

Comment on density: This is based on the the density of the product boxes, the rig, and the operating waste.

CHEMICAL COMPOSITION

General description and components (%wt): Concrete/rubble 1%, Metal 30%, biodegradable non putrescible 7% halogenated plastics 18%, non-halogenated plastics 18%, soil 1%, rubber 7%, wood 1%

Chemical state: Neutral

Sheet metal proportion / thickness: Sheet metal 50% - typical thickness 5 mm. Bulk items 50% - typical dimensions 1000 mm x 300 mm x 300 mm.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	11.0	-	
Other ferrous metals.....	11.0	-	
Iron.....	5.0	-	
Aluminium.....	0.50	-	
Beryllium.....	-	-	
Cobalt.....	1.0	-	
Copper.....	1.5	-	
Lead.....	1.2	-	
Magnox/Magnesium.....	0.01	-	
Nickel.....	1.5	-	
Titanium.....	0.01	-	
Uranium.....	0.01	-	
Zinc.....	0.20	-	
Zircaloy/Zirconium.....	-	-	
Other metals.....		Unspecified metals.	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	= 5.0	-	
Paper, cotton.....		-	
Wood.....	1.0	-	
Halogenated plastics.....	= 18.0	PVC.	
Total non-halogenated plastics.....	18.0	-	
Condensation polymers.....		-	
Others.....		-	
Organic ion exchange materials.....		-	
Total rubber.....	7.0	-	
Halogenated rubber.....		-	
Non-halogenated rubber.....	5.0	-	
Hydrocarbons.....		-	
Oil or grease.....		-	
Fuel.....		-	
Asphalt/Tarmac (cont.coal tar).....		-	
Asphalt/Tarmac (no coal tar).....		-	
Bitumen.....		-	
Others.....		-	
Other organics.....	= 1.0	Unspecified amounts of plastic and rubber.	

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.....	1.0	-	
Cementitious material.....	10.0	Concrete from refractory boxes.	
Sand.....		-	
Glass/Ceramics.....	2.0	Vitrified product.	
Graphite.....		-	
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.....	= 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.....	= 0	-
Chlorinated solvents.....		-
Formaldehyde.....		-
Organometallics.....		-
Phenol.....	= 0	-
Styrene.....		-
Tri-butyl phosphate.....	= 0	-
Other organophosphates.....		-
Vinyl chloride.....	= 0	-
Arsenic.....	= 0	-
Barium.....		-
Boron.....	= 0	-
Boron (in Boral).....		-
Boron (non-Boral).....		-
Cadmium.....	= 0	-
Caesium.....		-
Selenium.....	= 0	-
Chromium.....	= 0.10	Within alloy metals.
Molybdenum.....	= 0	-
Thallium.....		-
Tin.....	= 0	-
Vanadium.....	= 0	-
Mercury compounds.....		-
Others.....	= 0	-

Complexing agents (%wt):

Yes		
	(%wt)	Type(s) and comment
EDTA.....	< 0.01	0.00007kg per 0.6t soft waste; nil in blocks.
DPTA.....		-
NTA.....		-
Polycarboxylic acids.....	0	-
Other organic complexants.....	0	-
Total complexing agents.....	< 0.01	-

Physical components:

	Number	Type(s) and comment
Sources.....	= 0	-
Electronic & Electrical Equipment (EEE)		
EEE Type 1.....	= 30	monitors, printer, desktop PCs keyboards, telephones.
EEE Type 2.....	= 5	duct heater, chiller unit, power supply.
EEE Type 3.....	= 50	flow meters, pressure sensors, control panels, junction panels, isolators, extension leads, switch boxes.
EEE Type 4.....	= 0	-
EEE Type 5.....	= 5	Rechargeable Batteries used in hand tools.

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	40.0
Drying/dewatering/liquid separation		
Tie down/fixatives/strippable coating/painting application		
Decontamination		
Metal treatment	Off-site	10.0
Recycling / reuse		
Thermal treatment, including vitrification		
Encapsulation		
Polymer encapsulation		
Other physical treatment		
Other chemical treatment		
Containerisation		
Treatment not yet determined		
None		10.0

Comments on planned treatments:

The metal and WEEE will be suitable for recycling after decontamination (where required).The soft bagged waste or larger items e.g. wood, may be suitable for incineration depending on monitoring level, otherwise compaction.

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)	7.0	10.0	18.3	1	-
	1/2 Height WAMAC IP-2 ISO (TC08)	29.0	35.0	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	~ 36.0	NE	
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	~ 28.0	NE	
Expected to be consigned to a Metal Treatment Facility	~ 6.0	NE	
Expected to be Out of Scope	~ 30.0	NE	
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: Uranium, caesium and strontium were used in the Rig Hall as inventory within the Geomelt blocks (the blocks are now either disposed of or documented in a separate waste stream). Contaminated process waste is generated (such as gloves/ paper etc.) from maintenance and ultimate dismantling of the Geomelt rig and other associated rigs. No operations are currently taking place,

Uncertainty: This waste stream became fully operational in Dec 2017. This waste stream is based on known plans for the experimental make up of the Geomelt blocks.

Measurement of radioactivities: The activity is a known amount based on the planned experimental make up of each Geomelt block. The activity of the soft bagged waste is based on Activity Conversion Factors derived from the make up of the blocks and an assumption of the activity that may migrate via the off-gas system, and the portion of that which may contaminate the soft bagged waste.

Chemical form of radionuclides: H-3: Not anticipated to be present.
C-14: Not anticipated to be present.
Cl-36: Not anticipated to be present.
Se-79: Not anticipated to be present.
Tc-99: Not anticipated to be present.
I-129: Not anticipated to be present.
Ra: Not anticipated to be present.
Th: Not anticipated to be present.
U: U234, U235, and U238.
Np: Not anticipated to be present.
Pu: Not anticipated to be present.

WASTE STREAM		2P05		BTC Rig Hall							
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	1.00E-05 A B 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					2.44E-06	A B 3
Ag 108m					U 235					1.12E-07	A B 3
Ag 110m					U 236						
Cd 109					U 238					2.44E-06	A B 3
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	1.00E-05	A B 3								
Eu 154	Total a	4.99E-06	*								
Eu 155	Total b/g	2.00E-05	*								

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