

WASTE STREAM	5G21	Organic Wastes
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SITE Winfrith

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Magnox Limited

WASTE TYPE LLW

Is the waste subject to Scottish Policy: No

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2022.....	~0.5 m ³
Future arisings -	1.4.2022 - 31.3.2025.....	~~2.0 m ³
Total future arisings:		2.0 m ³
Total waste volume:		2.5 m ³

Comment on volumes: Collection of legacy stored stocks around site. Waste volumes are uncertain due to unknown arisings once facilities begin decommissioning.

Uncertainty factors on volumes: Stock (upper): x 1.05 Arisings (upper) x 1.05
 Stock (lower): x 0.5 Arisings (lower) x 0.5

WASTE SOURCE Organic waste from historic operations.

PHYSICAL CHARACTERISTICS

General description: Small batches of scintillation liquids, genklene, oils and solvents. There are no large items present in the stream. Miscellaneous Glovebox & cell operations, scintillant counting and pump oils.

Physical components (%vol): Oils (84%), oils and solvents in carboys (16%).

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): 0.8

Comment on density: -

CHEMICAL COMPOSITION

General description and components (%wt): Oil (70.0%), scintillants (12.8%), genklene (15.9%), 30% TBP/OK (1.3%). Scintillants mainly comprise toluene and xylene.

Chemical state: Acid

Chemical form of radionuclides: C-14: C-14 is associated with organic liquors.

Metals and alloys (%wt): -

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

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Zinc..... 0
 Zircaloy/Zirconium..... 0
 Other metals..... 0

Organics (%wt): -

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	NE		
Paper, cotton.....			
Wood.....			
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.....	70.0		
Oil or grease	70.0		
Fuel.....			
Asphalt/Tarmac (cont.coal tar)...			
Asphalt/Tarmac (no coal tar)....			
Bitumen.....			
Others.....			
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.....			
Glass/Ceramics.....	0		
Graphite.....	0		
Desiccants/Catalysts.....			
Asbestos.....	0		
Non/low friable.....			
Moderately friable.....			
Highly friable.....			
Free aqueous liquids.....	0		
Free non-aqueous liquids.....	30.0	Scintillants (12.8%), genklene (15.9%), 30% TBP/OK (1.3%).	

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Scintillants mainly comprise toluene and xylene.

Powder/Ash..... 0

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: Hydrocarbons and their oxygen, nitrogen and sulphur compounds (81.8%), organic halogen compounds (16.3%).

	(%wt)	Type(s) and comment
Combustible metals.....	0	
Low flash point liquids.....	10.0	
Explosive materials.....	0	
Phosphorus.....	0	
Hydrides.....	0	
Biological etc. materials.....	0	
Biodegradable materials.....	0	
Putrescible wastes.....	0	
Non-putrescible wastes.....		
Corrosive materials.....	0	
Pyrophoric materials.....	0	
Generating toxic gases.....	0	
Reacting with water.....	0	
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.....		

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Styrene.....
 Tri-butyl phosphate.....
 Other organophosphates.....
 Vinyl chloride.....
 Arsenic.....
 Barium.....
 Boron..... 0
 Boron (in Boral).....
 Boron (non-Boral).....
 Cadmium.....
 Caesium.....
 Selenium.....
 Chromium.....
 Molybdenum.....
 Thallium.....
 Tin.....
 Vanadium.....
 Mercury compounds.....
 Others.....
 Electronic Electrical Equipment (EEE)
 EEE Type 1.....
 EEE Type 2.....
 EEE Type 3.....
 EEE Type 4.....
 EEE Type 5.....

Complexing agents (%wt): Yes

	(%wt)	Type(s) and comment
EDTA.....		
DPTA.....		
NTA.....		
Polycarboxylic acids.....		
Other organic complexants.....	0.40	TBP is present in one package (0.4 wt%). Complexing agents may be present at trace levels in some other packages.
Total complexing agents.....	0.40	

Potential for the waste to contain discrete items: No. In & of itself not a DI

TREATMENT, PACKAGING AND DISPOSAL

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Planned on-site / off-site treatment(s):

Treatment	On-site / Off site	Stream volume %
Low force compaction Supercompaction (HFC) Incineration Solidification Decontamination Metal treatment Size reduction Decay storage Recycling / reuse Other / various None	Off-site	~100.0

Comment on planned treatments:

-

Disposal Routes:

Disposal Route	Stream volume %	Disposal density t/m3
Expected to be consigned to the LLW Repository Expected to be consigned to a Landfill Facility Expected to be consigned to an On-Site Disposal Facility Expected to be consigned to an Incineration Facility Expected to be consigned to a Metal Treatment Facility Expected to be consigned as Out of Scope Expected to be recycled / reused Disposal route not known	100.0	0.80

Classification codes for waste expected to be consigned to a landfill facility:

-

Upcoming (2022/23-2024/25) Waste Routing (if expected to change from above):

Disposal Route	Stream volume %		
	2022/23	2023/24	2024/25
Expected to be consigned to the LLW Repository Expected to be consigned to a Landfill Facility Expected to be consigned to an On-Site Disposal Facility Expected to be consigned to an Incineration Facility Expected to be consigned to a Metal Treatment Facility Expected to be consigned as Out of Scope Expected to be recycled / reused Disposal route not known			

Opportunities for alternative disposal routing:

-

Baseline Management Route	Opportunity Management Route	Stream volume (%)	Estimated Date that Opportunity will be realised	Opportunity Confidence	Comment
-	-	-	-	-	-

Waste Packaging for Disposal: (Not applicable to this waste stream)

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Container	Stream volume %	Waste loading m ³	Number of packages
1/3 Height IP-1 ISO			
2/3 Height IP-2 ISO			
1/2 Height WAMAC IP-2 ISO			
1/2 Height IP-2 Disposal/Re-usable ISO			
2m box (no shielding)			
4m box (no shielding)			
Other			

Other information: -

Waste Planned for Disposal at the LLW Repository: (Not applicable to this waste stream)

Container voidage: -

Waste Characterisation Form (WCH): -

Waste consigned for disposal to LLWR in year of generation: -

Non-Containerised Waste for In-Vault Grouting: (Not applicable to this waste stream)

Stream volume (%): -

Waste stream variation: -

Bounding cuboidal volume:

Inaccessible voidage: -

Other information: -

RADIOACTIVITY

Source: Solvents contaminated from variety of operations on Winfrith site.

Uncertainty: New stream for 2016 UKRWI and assumes similar fingerprint as 5C47 until further work is undertaken to better define the activities.

Definition of total alpha and total beta/gamma: Where totals are shown on the table of radionuclide activities they are the sums of the listed alpha or beta/gamma emitting radionuclides plus 'other alpha' or 'other beta/gamma'.

Measurement of radioactivities: -

Other information: -

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Nuclide	Mean radioactivity, TBq/m ³				Nuclide	Mean radioactivity, TBq/m ³			
	Waste at 1.4.2022	Bands and Code	Future arisings	Bands and Code		Waste at 1.4.2022	Bands and Code	Future arisings	Bands and Code
H 3	2.98E-04	BB 2	2.98E-04	BB 2	Gd 153		8		8
Be 10		8		8	Ho 163		8		8
C 14	1E-06	BB 2	1E-06	BB 2	Ho 166m		8		8
Na 22		8		8	Tm 170		8		8
Al 26		8		8	Tm 171		8		8
Cl 36	7.9E-09	BB 2	7.9E-09	BB 2	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	Tl 204		8		8
Mn 54		8		8	Pb 205		8		8
Fe 55		8		8	Pb 210		8		8
Co 60		8		8	Bi 208		8		8
Ni 59		8		8	Bi 210m		8		8
Ni 63		8		8	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		8		8	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		8		8	Th 234	2.8E-06	BB 2	2.8E-06	BB 2
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		8		8	U 233		8		8
Pd 107		8		8	U 234	1.5E-06	BB 2	1.5E-06	BB 2
Ag 108m		8		8	U 235	8.9E-08	BB 2	8.9E-08	BB 2
Ag 110m		8		8	U 236		8		8
Cd 109		8		8	U 238	2.8E-06	BB 2	2.8E-06	BB 2
Cd 113m		8		8	Np 237		8		8
Sn 119m		8		8	Pu 236		8		8
Sn 121m		8		8	Pu 238	1.82E-08	BB 2	1.82E-08	BB 2
Sn 123		8		8	Pu 239	3E-08	BB 2	3E-08	BB 2
Sn 126		8		8	Pu 240	2.3E-08	BB 2	2.3E-08	BB 2
Sb 125		8		8	Pu 241	7.57E-07	BB 2	7.57E-07	BB 2
Sb 126		8		8	Pu 242		8		8
Te 125m		8		8	Am 241	6.33E-08	BB 2	6.33E-08	BB 2
Te 127m		8		8	Am 242m		8		8
I 129		8		8	Am 243		8		8
Cs 134		8		8	Cm 242		8		8
Cs 135		8		8	Cm 243		8		8
Cs 137		8		8	Cm 244		8		8
Ba 133		8		8	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		8		8	Cf 251		8		8
Sm 147		8		8	Cf 252		8		8
Sm 151		8		8	Other a				
Eu 152		8		8	Other b/g				
Eu 154		8		8	Total a	4.52E-06	BB 2	4.52E-06	BB 2
Eu 155		8		8	Total b/g	3.02E-04	BB 2	3.02E-04	BB 2

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 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