WASTE STREAM 2F28 Interfacial Crud - ILW/LLW

SITE Sellafield

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Sellafield Limited

WASTE TYPE ILW

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 - 31.3.2030.....	0 m^3
	1.4.2030 - 31.3.2031.....	<0.1 m^3
Total future arisings:		0.1 m^3
Total waste volume:		0.6 m^3

Comment on volumes: Volume will only be known accurately when the tanks are emptied which is estimated to be during POCO operations (ca. 2030) . "<0.1" assumptions made on routine ops. The 0.1 m3 figure for 2030 is a worst-case prediction, as no more interfacial crud will be generated. Figures are believed to be as accurate as possible generated from measurement rather than modelling.

Uncertainty factors on volumes:

Stock (upper):	x 1.5	Arisings (upper)	x 1.5
Stock (lower):	x 0.5	Arisings (lower)	x 0.5

WASTE SOURCE The waste arises as a result of degradation of solvent used in reprocessing operations. Radioactivity currently unknown, but for the purposes of the 2022 Inventory the stream has been designated ILW.

PHYSICAL CHARACTERISTICS

General description: The waste is generally degraded solvent.

Physical components (%vol): Unknown

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m^3): <1

Comment on density: Insignificant.

CHEMICAL COMPOSITION

General description and components (%wt): Unknown.

Chemical state: Acid

Chemical form of radionuclides:
Ra: Dissolved in degraded solvent
Th: Dissolved in degraded solvent
U: Dissolved in degraded solvent
Np: Dissolved in degraded solvent
Pu: Dissolved in degraded solvent

Metals and alloys (%wt): N/A

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

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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 cellulosics	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	100.0	TBP, DBP, MBP & associated solvent degradation products.	

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		

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Non/low friable	0
Moderately friable	0
Highly friable	0
Free aqueous liquids	0
Free non-aqueous liquids	0
Powder/Ash	0

Inorganic anions (%wt): Phosphates expected to be present due to wastes comprising degraded TBP, DBP, MBP (as captured in 'Other organics'). Other inorganic anions are not expected and have not been estimated.

	(%wt)	Type(s) and comment
Fluoride	NE	
Chloride	NE	
Iodide	NE	
Cyanide	NE	
Carbonate	NE	
Nitrate	NE	
Nitrite	NE	
Phosphate	P	Present, value unknown.
Sulphate	NE	
Sulphide	NE	

Materials of interest for waste acceptance criteria: Wastes may contain materials of interest. However, this would be subject to future waste treatment and so are not estimated for the purpose of this assessment.

	(%wt)	Type(s) and comment
Combustible metals		
Low flash point liquids		
Explosive materials		
Phosphorus		
Hydrides		
Biological etc. materials		
Biodegradable materials		
Putrescible wastes		
Non-putrescible wastes		
Corrosive materials		
Pyrophoric materials		
Generating toxic gases		
Reacting with water		
Higher activity particles		
Soluble solids as bulk chemical compounds		

Hazardous substances / non hazardous pollutants: TBP (DBP, MBP and associated residual wastes expected)

	(%wt)	Type(s) and comment
Acrylamide	NE	

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Benzene	NE	
Chlorinated solvents	NE	
Formaldehyde	NE	
Organometallics	NE	
Phenol	NE	
Styrene	NE	
Tri-butyl phosphate	P	TBP expected to be present but yet to be quantified.
Other organophosphates		
Vinyl chloride	NE	
Arsenic	NE	
Barium	NE	
Boron	NE	
Boron (in Boral)	NE	
Boron (non-Boral)	NE	
Cadmium	NE	
Caesium	NE	
Selenium	NE	
Chromium	NE	
Molybdenum	NE	
Thallium	NE	
Tin	NE	
Vanadium	NE	
Mercury compounds	NE	
Others	NE	
Electronic Electrical Equipment (EEE)		
EEE Type 1	0	
EEE Type 2	0	
EEE Type 3	0	
EEE Type 4	0	
EEE Type 5	0	

Complexing agents (%wt): Not yet determined

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

Potential for the waste to contain discrete items: No. Waste is a residue. Discrete Item consideration will be required once waste is treated for disposal.

PACKAGING AND CONDITIONING

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Conditioning method:	To be determined
Plant Name:	To be determined.
Location:	-
Plant startup date:	-
Total capacity (m^3/y incoming waste):	-
Target start date for packaging this stream:	-
Throughput for this stream (m^3/y incoming waste):	-
Other information:	-

Likely container type:

Container	Waste packaged (%vol)	Waste loading (m^3)	Payload (m^3)	Number of packages
Not specified	100.0	NE	NE	NE

Likely container type comment:	-
Range in container waste volume:	-
Other information on containers:	-
Likely conditioning matrix:	
Other information:	-
Conditioned density (t/m^3):	-
Conditioned density comment:	-
Other information on conditioning:	-
Opportunities for alternative disposal routing:	Not yet determined

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

RADIOACTIVITY

Source:	Believed to be mainly Am241 and associated Pu.
Uncertainty:	Unable to sample at this time to determine activity.
Definition of total alpha and total beta/gamma:	Awaiting sampling.
Measurement of radioactivities:	Awaiting sampling.
Other information:	-

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Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2022	Bands and Code	Future arisings	Bands and Code	Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2022	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					Other a				
Eu 152					Other b/g				
Eu 154					**Total a**	**NE**		**NE**	
Eu 155					**Total b/g**	**NE**		**NE**	

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