

WASTE STREAM**2F08****AGR Stainless Steel Fuel Assembly Components**

SITE Sellafield
SITE OWNER Nuclear Decommissioning Authority
WASTE CUSTODIAN Sellafield Limited
WASTE TYPE ILW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	652.0 m ³
Future arisings -	1.4.2019 - 31.3.2020.....	14.5 m ³
	1.4.2020 - 31.3.2021.....	14.6 m ³
	1.4.2021 - 31.3.2022.....	14.4 m ³
	1.4.2022 - 31.3.2025.....	48.7 m ³
	1.4.2025 - 31.3.2028.....	66.5 m ³
	1.4.2028 - 31.3.2031.....	59.2 m ³
	1.4.2031 - 31.3.2034.....	22.8 m ³
	1.4.2034 - 31.3.2036.....	27.1 m ³
Total future arisings:		267.8 m ³
Total waste volume:		919.8 m ³

Comment on volumes: Arisings dependent on dismantling programme. Arising volumes are based on 110 SS elements per drum. The uncertainty factors have been provided to allow for uncertainty in this filling rate. Figure is total volume in EPS and DWS.

Uncertainty factors on volumes:	Stock (upper):	x 1.01	Arisings (upper)	x 1.3
	Stock (lower):	x 0.99	Arisings (lower)	x 0.9

WASTE SOURCE From the dismantling of AGR fuel prior to storage.

PHYSICAL CHARACTERISTICS

General description: Activated AGR stainless steel. No items require special handling. The waste has not undergone any change since it was generated.

Physical components (%vol): Stainless steel (about 100%) - grids, braces and support tubes. There may be very small amounts of graphite dust and chippings from vacuum cleaning of dismantler cell.

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): 0.293

Comment on density: The density is based on 110 SS elements per drum.

CHEMICAL COMPOSITION

General description and components (%wt): Stainless steel (about 100%). May be very small amounts of graphite dust and chippings.

Chemical state: Neutral

Chemical form of radionuclides: C-14: Probably present as solid carbon.

Metals and alloys (%wt):	100% of metal present as small bulk items.		
	Stainless steel.....	~100.0	Type 304L and 20Cr/25Ni/Ti in an unknown ratio.
	Other ferrous metals.....	0	
	Iron.....	0	
	Aluminium.....		
	Beryllium.....	0	
	Cobalt.....	0	
	Copper.....	0	
	Lead.....	0	
	Magnox/Magnesium.....	0	

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	Nickel.....	0
	Titanium.....	0
	Uranium.....	0
	Zinc.....	0
	Zircaloy/Zirconium.....	0
	Other metals.....	0
Organics (%wt):	The waste contains no organic materials. None present.	
	Total cellulose.....	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):	-	
	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.....	TR
	Desiccants/Catalysts.....	0
	Asbestos.....	0
	Non/low friable.....	
	Moderately friable.....	
	Highly friable.....	
	Free aqueous liquids.....	0
	Free non-aqueous liquids.....	0
	Powder/Ash.....	TR

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Inorganic anions (%wt):

None likely to be present.

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:No hazardous materials likely to be present. There may be very small amounts of graphite
dust and chippings.

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

Active particles..... 0

Soluble solids as bulk chemical
compounds..... 0Hazardous substances /
non hazardous pollutants:

-

Acrylamide..... 0

Benzene..... 0

Chlorinated solvents..... 0

Formaldehyde..... 0

Organometallics..... 0

Phenol..... 0

Styrene..... 0

Tri-butyl phosphate..... 0

Other organophosphates..... 0

Vinyl chloride..... 0

Arsenic..... 0

Barium..... 0

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Boron..... 0
 Cadmium..... 0
 Caesium..... 0
 Selenium..... 0
 Chromium..... 0
 Molybdenum..... 0
 Thallium..... 0
 Tin..... 0
 Vanadium..... 0
 Mercury compounds..... 0
 Others..... 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

Complexing agents (%wt):

No
 EDTA.....
 DPTA.....
 NTA.....
 Polycarboxylic acids.....
 Other organic complexants.....
 Total complexing agents..... 0

No organic or inorganic
complexing agents are present.

PACKAGING AND CONDITIONING

Conditioning method: Not yet established.
 Plant Name: Not yet established.
 Location: Sellafield.
 Plant startup date: -
 Total capacity (m³/y incoming waste): -
 Target start date for packaging this stream: -
 Throughput for this stream (m³/y incoming waste): -
 Other information: -

Likely container type:

Container	Waste packaged (%vol)	Waste loading (m ³)	Payload (m ³)	Number of packages
500 l drum	100.0	0.367	0.367	2507

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Likely container type comment: -

Range in container waste volume: -

Other information on containers: Waste is in two types of drum - mild steel and stainless steel. Drums stored in AGR Store and EP Stores.

Likely conditioning matrix: Not specified

Other information: -

Conditioned density (t/m³): NE

Conditioned density comment: -

Other information on conditioning: Conditioning plans are not established.

Opportunities for alternative disposal routing: No

Treatment	Stream volume (%)	Comment
-	-	-

RADIOACTIVITY

Source: The waste is activated stainless steel debris. The main sources of activity are Fe-55, Ni-63 and Co-60.

Uncertainty: Best available.

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 1.4.2019	Bands and Code	Future arisings	Bands and Code		Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code
H 3					Gd 153				
Be 10					Ho 163				
C 14	2.81E-01	CC 2	1.74E-01	CC 2	Ho 166m				
Na 22					Tm 170				
Al 26					Tm 171				
Cl 36	1.56E-04	BB 2	9.61E-05	BB 2	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	2.54E+01	CC 2	2.89E+02	CC 2	Pb 210				
Co 60	7.67E+00	CC 2	4.05E+01	CC 2	Bi 208				
Ni 59	3.20E+00	CC 2	1.97E+00	CC 2	Bi 210m				
Ni 63	3.15E+02	CC 2	2.32E+02	CC 2	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	0	5	0	5
Eu 155					Total b/g	3.52E+02	CC 2	5.64E+02	CC 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