WASTE STREAM 7V29 Vulcan Contact Handled ILW

SITE	Dounreay (Vulcan)
SITE OWNER	Ministry of Defence
WASTE CUSTODIAN	Ministry of Defence
WASTE TYPE	ILW; SPD1
Is the waste subject to Scottish Policy:	No

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2022.....	2.6 m^3
Future arisings -	1.4.2022 - 31.3.2025.....	5.0 m^3
Total future arisings:		5.0 m^3
Total waste volume:		7.6 m^3

Comment on volumes: The waste arisings will be dependant on future decommissioning operation timescales which have still to be confirmed. The waste arisings will be dependant on future decommissioning operation timescales which have still to be confirmed.

Uncertainty factors on volumes:

Stock (upper):	x 1.2	Arisings (upper)	x 2.0
Stock (lower):	x 0.8	Arisings (lower)	x 0.5

WASTE SOURCE The waste will arise from the removal of activated stainless steel components from the reactor.

PHYSICAL CHARACTERISTICS

General description:	Stainless steel components of various size and mass with trace exotic metallics. Secondary wastes in the form of swabs and contaminated RPE/PPE from characterisation and decontamination. There has been no physical/chemical changes to the waste.
Physical components (%vol):	Estimated stainless steel 70%, perspex 10%, aluminium 8%, PVC/rubber 6%, paper 6%.
Sealed sources:	Not yet determined.
Bulk density (t/m^3):	~0.3
Comment on density:	Based on typical payload in a CHILW drum.

CHEMICAL COMPOSITION

General description and components (%wt):	Estimated stainless steel 70%, perspex 10%, aluminium 8%, PVC/rubber 6%, paper 6% by volume%.
Chemical state:	Neutral
Chemical form of radionuclides:	H-3: To be determined C-14: To be determined Cl-36: To be determined Se-79: To be determined Tc-99: To be determined I-129: To be determined Ra: To be determined Th: To be determined U: To be determined Np: To be determined Pu: To be determined
Metals and alloys (%wt):	Metal proportions to be determined.

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	~70.0		
Other ferrous metals.....	NE		
Iron.....	NE		
Aluminium.....	~8.0		
Beryllium.....	0		

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Cobalt	0
Copper	0
Lead	0
Magnox/Magnesium	0
Nickel	0
Titanium	0
Uranium	0
Zinc	0
Zircaloy/Zirconium	TR
Other metals	0

Organics (%wt): The waste contains small amounts of organic material.

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulosics	~6.0		
Paper, cotton	6.0		
Wood	0		
Halogenated plastics	~10.0		
Total non-halogenated plastics	0		
Condensation polymers			
Others			
Organic ion exchange materials	0		
Total rubber	6.0		
Halogenated rubber	NE		
Non-halogenated rubber	NE		
Hydrocarbons	0		
Oil or grease			
Fuel			
Asphalt/Tarmac (cont.coal tar)			
Asphalt/Tarmac (no coal tar)			
Bitumen			
Others			
Other organics	0		

Other materials (%wt): No other materials estimated.

	(%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		

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Desiccants/Catalysts	0
Asbestos	0
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): To be determined.

	(%wt)	Type(s) and comment
Fluoride	NE	
Chloride	NE	
Iodide	NE	
Cyanide	NE	
Carbonate	NE	
Nitrate	NE	
Nitrite	NE	
Phosphate	NE	
Sulphate	NE	
Sulphide	NE	

Materials of interest for waste acceptance criteria: Aluminium

	(%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	NE	
Soluble solids as bulk chemical compounds	0	

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Hazardous substances / non hazardous pollutants: Aluminium

	(%wt)	Type(s) and comment
Acrylamide	NE	
Benzene	NE	
Chlorinated solvents	NE	
Formaldehyde	NE	
Organometallics	NE	
Phenol	NE	
Styrene	NE	
Tri-butyl phosphate	NE	
Other organophosphates	NE	
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	0	
DPTA	0	
NTA	0	
Polycarboxylic acids	0	
Other organic complexants	NE	May be decontamination agents in the form of decon wipes.
Total complexing agents	NE	

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Potential for the waste to contain discrete items: Not yet determined.

PACKAGING AND CONDITIONING

Conditioning method: Not yet determined

Plant Name: -

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: The waste will be stored in 200 litre CHILW drums

Range in container waste volume: -

Other information on containers: -

Likely conditioning matrix:

Other information: Not yet determined

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: The activation and surface contamination of metallic components.

Uncertainty: Will be confirmed following characterisation

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: Will be confirmed following characterisation

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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