

WASTE STREAM	9C32	Miscellaneous Activated Components
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SITE Dungeness A

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Nuclear Restoration Services Ltd (NRS)

WASTE TYPE ILW

WASTE VOLUMES

	Reported (m ³)	OR	Conditioned (m ³)	Packaged (m ³)
Stocks:	At 1.4.2025	= 8.4		
Future arisings:				
Total future arisings:		0.0		
Total waste volume:		8.4		

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

Comment on arising rates: -

Additional information on quantities: The station ceased generation on 31/12/2006.

Uncertainty factors on volumes:

Stock (upper):	x 1.20	Arisings (upper):	x -
Stock (lower):	x 0.80	Arisings (lower):	x -

WASTE SOURCE Redundant or defective reactor components.

PHYSICAL CHARACTERISTICS

General description: Redundant or defective components such as control rods; fuel element grabs, cables and capsules; thermocouples and bob weights removed from stand pipe assemblies. The possibility of large items which may need special handling has not been fully assessed. Items may weigh up to about 1.5 t; sizes may be up to 5 m long and approximately 250 mm diameter.

Changes since waste generated: -

Bulk density (t/m³): ~ 1.0

Comment on density: The assumption of 1 t/m³ as the average bulk density may be subject to revision.

CHEMICAL COMPOSITION

General description and components (%wt): Irradiated components removed from the reactor. The material is principally steel (mild steel, stainless steel, boron steel). Presence of other minor components has not been assessed.

Chemical state: Neutral

Sheet metal proportion / thickness: Metal thicknesses have not been fully assessed but bulk metal items may be present.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	~ 45.0	-	
Other ferrous metals.....	~ 45.0	Chromium and nickel will be present in the stainless steel.	
Iron.....	-	-	
Aluminium.....	0	-	
Beryllium.....	0	-	
Cobalt.....	-	-	
Copper.....	0	-	
Lead.....	0	-	
Magnox/Magnesium.....	0	-	
Nickel.....	-	-	
Titanium.....	-	-	
Uranium.....	-	-	
Zinc.....	0	-	
Zircaloy/Zirconium.....	0	-	
Other metals.....	~ 10.0	Not analysed.	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	= 0	-	
Paper, cotton.....	= 0	-	
Wood.....	= 0	-	
Halogenated plastics.....	= 0	Halogenated plastics are not expected but may possibly be present in small quantities.	
Total non-halogenated plastics.....	= 0	-	
Condensation polymers.....	= 0	-	
Others.....	= 0	-	
Organic ion exchange materials.....	= 0	-	
Total rubber.....	= 0	-	
Halogenated rubber.....	= 0	Halogenated rubbers are not expected but may possibly be present in small quantities.	
Non-halogenated rubber.....	= 0	-	
Hydrocarbons.....	-	-	
Oil or grease.....	-	-	
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.....	TR	-	
Desiccants/Catalysts.....	-	-	
Asbestos.....	= 0	-	
Non/low friable.....	-	-	
Moderately friable.....	-	-	
Highly friable.....	-	-	
Free aqueous liquids.....	= 0	-	
Free non-aqueous liquids.....	= 0	-	
Powder/Ash.....	TR	-	

COMPONENTS OF MATERIALS, WASTE PROPERTIES, MATERIALS NOT CONTRIBUTING TO MASS

Inorganic anions (%wt):

	(%wt)	Type(s) and comment
Fluoride.....	NE	-
Chloride.....	NE	-
Iodide.....	NE	-
Cyanide.....	= 0	-
Carbonate.....	NE	-
Nitrate.....	NE	-
Nitrite.....	NE	-
Phosphate.....	NE	-
Sulphate.....	NE	-
Sulphide.....	NE	-

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.....	-	-
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.....	0	-
Benzene.....		-
Chlorinated solvents.....		-
Formaldehyde.....		-
Organometallics.....		-
Phenol.....		-
Styrene.....		-
Tri-butyl phosphate.....		-
Other organophosphates.....		-
Vinyl chloride.....		-
Arsenic.....		-
Barium.....		-
Boron.....		-
Boron (in Boral).....		-
Boron (non-Boral).....		-
Cadmium.....		-
Caesium.....		-
Selenium.....		-
Chromium.....		-
Molybdenum.....		-
Thallium.....		-
Tin.....		-
Vanadium.....		-
Mercury compounds.....		-
Others.....		-

Complexing agents (%wt):

No		
	(%wt)	Type(s) and comment
EDTA.....	= 0	-
DPTA.....		-
NTA.....		-
Polycarboxylic acids.....		-
Other organic complexants.....		-
Total complexing agents.....		-

Physical components:

	Number	Type(s) and comment
Sources.....		-
Electronic & Electrical Equipment (EEE)		-
EEE Type 1.....		-
EEE Type 2.....		-
EEE Type 3.....		-
EEE Type 4.....		-
EEE Type 5.....		-

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) Incineration Drying/dewatering/liquid separation Tie down/fixatives/strippable coating/painting application Decontamination Metal treatment Recycling / reuse Thermal treatment, including vitrification Encapsulation Polymer encapsulation Other physical treatment Other chemical treatment Containerisation Treatment not yet determined None	On-site	100.0

Comments on planned treatments:

-

Conditioning method:

The waste will be placed in baskets, then in the 4m box and grouted. The waste will be packaged into 4m boxes (with no shielding) and encapsulated with grout.

Conditioning plants:

Plant Name	Location
RDC Encap DNA	Dungeness A

Likely conditioning matrix:

Unknown

Further information on the conditioning matrix:

It is not yet known which grouting mix will be used when this waste is processed.

Waste Packaging:

Likely container type:	Container	Waste packaged (vol%)	Waste loading (m ³)	Payload (m ³)	Number of packages	Estimated start date for packaging
	4 m box (0 mm concrete shielding)	100.0	16.2	18.9	1	-

Range in container waste loading: Not yet determined.

Other information on packaging and conditioning: The container material is expected to be stainless steel. The waste will be placed in baskets, then in the 4m box and grouted.
Baskets of other SPD3 ILW waste may be in the same package.

Conditioned density (t/m³): ~ 3.0
Conditioned density comment: The density assumes the waste will be conditioned with a cement based grout.

Management Routes:

Disposal Route	Stream volume %	Raw density t/m ³	Start date
Expected to be consigned to a Near Site, Near Surface Disposal Facility (Scotland)	100.0		
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			
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			
Expected to be consigned to a Metal Treatment Facility			
Expected to be Out of Scope			
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: Irradiated components removed from the reactor. Control rods are likely to be components of high activity.

Uncertainty: Specific activity is a function of Station operating history. The values quoted are indicative of the activities expected.

Measurement of radioactivities: Estimates are based upon theoretical assessments.

Chemical form of radionuclides: H-3: The tritium is likely to be incorporated into the steel.
C-14: Carbon 14 is principally incorporated in steel. There may also be some graphite contamination.

Cl-36: The chemical form of chlorine 36 has not been determined.
Se-79: -
Tc-99: -
I-129: -
Ra: -
Th: -
U: The chemical form of uranium isotopes has not been determined but may be uranium oxides.
Np: -
Pu: The chemical form of plutonium isotopes has not been determined but may be plutonium oxides.

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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	< 1.10E+00	D 3			Gd 153		8		
Be 10		8			Ho 163		8		
C 14	2.00E-02	C D 2			Ho 166m		8		
Na 22		8			Tm 170		8		
Al 26		8			Tm 171		8		
Cl 36	3.00E-05	C C 2			Lu 174		8		
Ar 39		8			Lu 176		8		
Ar 42		8			Hf 178n		8		
K 40		8			Hf 182		8		
Ca 41		8			Pt 193		8		
Mn 53		8			Tl 204		8		
Mn 54	3.07E-08	C D 2			Pb 205		8		
Fe 55	9.75E-01	C D 2			Pb 210		8		
Co 60	9.59E-01	C D 2			Bi 208		8		
Ni 59	4.00E-02	C D 2			Bi 210m		8		
Ni 63	3.53E+00	C D 2			Po 210		8		
Zn 65		8			Ra 223		8		
Se 79		8			Ra 225		8		
Kr 81		8			Ra 226		8		
Kr 85		8			Ra 228		8		
Rb 87		8			Ac 227		8		
Sr 90	< 3.90E-05	D 3			Th 227		8		
Zr 93		8			Th 228		8		
Nb 91		8			Th 229		8		
Nb 92		8			Th 230		8		
Nb 93m		8			Th 232		8		
Nb 94	4.00E-05	C D 2			Th 234	7.00E-09	C C 2		
Mo 93		8			Pa 231		8		
Tc 97		8			Pa 233		8		
Tc 99	< 1.00E-08	D 3			U 232		8		
Ru 106		8			U 233		8		
Pd 107		8			U 234	< 6.14E-09	D 3		
Ag 108m	3.88E-05	C D 2			U 235		8		
Ag 110m		8			U 236		8		
Cd 109		8			U 238	< 7.00E-09	D 3		
Cd 113m		8			Np 237		8		
Sn 119m		8			Pu 236		8		
Sn 121m		8			Pu 238	< 2.60E-06	D 3		
Sn 123		8			Pu 239	< 3.00E-06	D 3		
Sn 126		8			Pu 240	< 4.00E-06	D 3		
Sb 125		8			Pu 241	< 8.43E-05	D 3		
Sb 126		8			Pu 242	< 2.00E-09	D 3		
Te 125m		8			Am 241	< 1.16E-05	D 3		
Te 127m		8			Am 242m	< 1.83E-08	D 3		
I 129		8			Am 243	< 5.99E-09	D 3		
Cs 134	< 5.12E-09	D 3			Cm 242	< 1.51E-08	D 3		
Cs 135		8			Cm 243	< 3.96E-09	D 3		
Cs 137	< 1.32E-04	D 3			Cm 244	< 4.53E-08	D 3		
Ba 133		8			Cm 245		8		
La 137		8			Cm 246		8		
La 138		8			Cm 248		8		
Ce 144		8			Cf 249		8		
Pm 145		8			Cf 250		8		
Pm 147	< 4.53E-08	D 3			Cf 251		8		
Sm 147		8			Cf 252		8		
Sm 151	< 7.83E-07	D 3			Unsp a				
Eu 152	7.94E-06	C D 2			Unsp b/g				
Eu 154	4.71E-06	C D 2			Total a	2.12E-05	*	0	*
Eu 155		8			Total b/g	6.62E+00	*	0	*

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