

WASTE STREAM	9C30	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	= 52.0		
Future arisings:				
Total future arisings:		0.0		
Total waste volume:		52.0		

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 absorber bars; stand pipe assemblies and charge chute 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 and stainless steel) and there is also graphite and concrete (graphite in absorber bars, concrete in standpipe assemblies). Presence of other minor components is not 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.....	~ 59.0	Chromium and nickel will be present in the stainless steel.	
Other ferrous metals.....	~ 36.0	-	
Iron.....	-	-	
Aluminium.....	0	-	
Beryllium.....	0	-	
Cobalt.....	-	-	
Copper.....	0	-	
Lead.....	0	-	
Magnox/Magnesium.....	0	-	
Nickel.....	-	-	
Titanium.....	-	-	
Uranium.....	-	-	
Zinc.....	0	-	
Zircaloy/Zirconium.....	0	-	
Other metals.....	0	"Other" metals have not been identified.	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulotics.....	= 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 rubbers are not expected but may possibly be present in small quantities.	
Halogenated rubber.....	= 0	-	
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.....	NE	maybe some concrete in SPAs - percentage not estimated	
Sand.....	-	-	
Glass/Ceramics.....	0	-	
Graphite.....	~ 5.0	in absorber bars	
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	On-site	100.0
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		

Comments on planned treatments:

-

Conditioning method:

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

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 (m³)	Payload (m³)	Number of packages	Estimated start date for packaging
	4 m box (0 mm concrete shielding)	100.0	16.2	18.9	4	-

Range in container waste loading: Not yet determined.

Other information on packaging and conditioning: The waste will be placed in baskets which are placed 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 conditioning with a cement based grout.

Management Routes:

Disposal Route	Stream volume %	Raw density t/m³	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. Absorber bars 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 assumptions.

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

WASTE STREAM		9C30		Miscellaneous Activated Components					
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	3.30E-08	C D 2			Pb 205		8		
Fe 55	9.84E-01	C D 2			Pb 210		8		
Co 60	9.62E-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	< 5.17E-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	< 4.57E-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	6.63E+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