

WASTE STREAM	9D45	Contaminated Gravel and particulate
--------------	------	-------------------------------------

SITE Hinkley Point 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	= 10.0		
Future arisings:				
Total future arisings:		0.0		
Total waste volume:		10.0		

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

Comment on arising rates: Gravel (stone chippings) was placed on the floor of the waste vault before any waste was discharged to the facilities. No more gravel will be added to the cell.

Additional information on quantities: Gravel will be removed from the vaults when the wastes accumulated in the vaults are retrieved.

Uncertainty factors on volumes: Stock (upper): x 1.20 Arisings (upper): x -
Stock (lower): x 0.80 Arisings (lower): x -

WASTE SOURCE Contaminated gravel (stone chippings) on the floor of the vault. The gravel was applied before any waste was discharged to the facility. FED sludge entrained with the gravel.

PHYSICAL CHARACTERISTICS

General description: Contaminated gravel. There are no large items.

Changes since waste generated: -

Bulk density (t/m³): ~ 1.5

Comment on density: The gravel is assumed to be either limestone or silica based.

CHEMICAL COMPOSITION

General description and components (%wt): The chemical composition of the chippings is not known. It is likely that either silica or limestone based material has been used.

Chemical state: Neutral

Sheet metal proportion / thickness: No bulk metal items present.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	= 0	-	Only trace metallic content would be expected to be associated with the original gravel, but there may be contamination from the wastes resting on the gravel.
Other ferrous metals.....	= 0	-	
Iron.....	-	-	
Aluminium.....	= 0	-	
Beryllium.....	NE	-	
Cobalt.....	-	-	
Copper.....	= 0	-	
Lead.....	= 0	-	
Magnox/Magnesium.....	TR	-	
Nickel.....	TR	-	
Titanium.....	-	-	
Uranium.....	TR	-	
Zinc.....	= 0	-	
Zircaloy/Zirconium.....	NE	-	
Other metals.....	= 0	-	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulotics.....	= 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.....	-	-	
Oil or grease.....	-	-	
Fuel.....	-	-	
Asphalt/Tarmac (cont.coal tar).....	-	-	
Asphalt/Tarmac (no coal tar).....	-	-	
Bitumen.....	-	-	
Others.....	-	-	
Other organics.....	TR	-	

Other materials (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials.....	= 0	-	
Inorganic sludges and flocs.....	= 1.0	-	
Soil.....	= 0	-	
Brick/Stone/Rubble.....	= 99.0	gravel - likely to be silica or limestone based material	
Cementitious material.....	= 0	-	
Sand.....	-	-	
Glass/Ceramics.....	= 0	-	
Graphite.....	TR	-	
Desiccants/Catalysts.....	-	-	
Asbestos.....	= 0	-	
Non/low friable.....	-	-	
Moderately friable.....	-	-	
Highly friable.....	-	-	
Free aqueous liquids.....	TR	-	
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.....	NE	-
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.....	NE	-
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):

Yes		
	(%wt)	Type(s) and comment
EDTA.....	TR	-
DPTA.....		-
NTA.....		-
Polycarboxylic acids.....		-
Other organic complexants.....		-
Total complexing agents.....	TR	-

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:

Cement encapsulation into 3m3 box using PCF external mixer.

Conditioning plants:

Plant Name	Location
HPA MILWEP	Hinkley Point A

Likely conditioning matrix:

Unknown

Further information on the conditioning matrix:

-

Waste Packaging:

Likely container type:

Container	Waste packaged (vol%)	Waste loading (m³)	Payload (m³)	Number of packages	Estimated start date for packaging
3 m³ box (side lifting)	100.0	1.4	2.9	7	-

Range in container waste loading:

-

Other information on packaging and conditioning:

-

Conditioned density (t/m³):

-

Conditioned density comment:

-

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) 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	100.0		

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: Contamination may have been transferred to the chippings via direct contact with waste materials and this may have been enhanced by moisture from the waste. The ability of the chippings to absorb soluble active materials depends on the chemical composition of the chippings themselves. It may not be feasible to totally separate this stream from the FED and Nimonic streams in the vault.

Uncertainty: The waste may fall into the ILW or LLW category. This depends on the success of any separation and washing.

Measurement of radioactivities: Estimation of possible contamination from fuel element debris.

Chemical form of radionuclides: H-3: Tritium will be present as contamination possibly in the form of water or as other inorganic compounds or as organic compounds.
C-14: Carbon 14 will be present as surface contamination.
Cl-36: The chemical form of chlorine 36 has not been assessed.
Se-79: The selenium content is insignificant.
Tc-99: The chemical form of technetium has not been determined.
I-129: -
Ra: Radium isotope content is insignificant.
Th: The thorium isotope content is insignificant.
U: The chemical form of uranium isotopes has not been assessed but may be in the form of uranium oxides as surface contamination.
Np: The neptunium content is insignificant.
Pu: The chemical form of plutonium isotopes has not been assessed but may be in the form of plutonium oxides as surface contamination.

WASTE STREAM 9D45 Contaminated Gravel and particulate									
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	< 1.27E-03	C 3			Gd 153		8		
Be 10	1.00E-08	C C 2			Ho 163		8		
C 14	4.99E-05	C C 2			Ho 166m		8		
Na 22		8			Tm 170		8		
Al 26	4.00E-08	C C 2			Tm 171		8		
Cl 36	2.00E-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	< 2.00E-06	C 3			Pt 193		8		
Mn 53		8			Tl 204		8		
Mn 54		8			Pb 205		8		
Fe 55	< 1.03E-06	C 3			Pb 210		8		
Co 60	< 2.68E-03	C 3			Bi 208		8		
Ni 59	6.00E-04	C C 2			Bi 210m		8		
Ni 63	5.40E-02	C C 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	2.78E-06	C C 2			Th 227		8		
Zr 93	7.00E-06	C C 2			Th 228		8		
Nb 91		8			Th 229		8		
Nb 92		8			Th 230		8		
Nb 93m	5.14E-06	C C 2			Th 232		8		
Nb 94		8			Th 234		8		
Mo 93	6.99E-06	C C 2			Pa 231		8		
Tc 97		8			Pa 233		8		
Tc 99	1.00E-06	C C 2			U 232		8		
Ru 106		8			U 233		8		
Pd 107		8			U 234	3.09E-09	C C 2		
Ag 108m		8			U 235		8		
Ag 110m		8			U 236		8		
Cd 109		8			U 238		8		
Cd 113m		8			Np 237		8		
Sn 119m		8			Pu 236		8		
Sn 121m		8			Pu 238	1.77E-06	C C 2		
Sn 123		8			Pu 239	1.00E-06	C C 2		
Sn 126		8			Pu 240	2.00E-06	C C 2		
Sb 125	1.92E-08	C C 2			Pu 241	2.87E-05	C C 2		
Sb 126		8			Pu 242		8		
Te 125m	< 4.80E-09	C 3			Am 241	4.93E-06	C C 2		
Te 127m		8			Am 242m		8		
I 129		8			Am 243	3.00E-09	C C 2		
Cs 134		8			Cm 242		8		
Cs 135		8			Cm 243	2.10E-09	C C 2		
Cs 137	4.22E-06	C C 2			Cm 244	2.23E-08	C C 2		
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	< 7.04E-07	C 3			Cf 251		8		
Sm 147		8			Cf 252		8		
Sm 151	8.00E-06	C C 2			Unsp a				
Eu 152	1.37E-04	C C 2			Unsp b/g				
Eu 154	5.81E-04	C C 2			Total a	9.73E-06	*	0	*
Eu 155	3.42E-06	C C 2			Total b/g	5.94E-02	*	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