

WASTE STREAM	9C61	Contaminated Sand and Gravel from AETP and PWTP Sand Filters
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SITE Dungeness A
SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Magnox Limited

WASTE TYPE LLW

Is the waste subject to Scottish Policy: No

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2022.....	6.2m ³
Total future arisings:		0 m ³
Total waste volume:		6.2m ³
Comment on volumes:	The waste will arise when sand pressure filters (SPF) 1 (2m3), 2 (2.05m3) & 3 (1.57m3) are decommissioned. Also includes gravel from Cation tank 2 (0.52m3)	
Uncertainty factors on volumes:	Stock (upper): x 1.2	Arisings (upper) x
	Stock (lower): x 0.8	Arisings (lower) x

WASTE SOURCE Sand and gravel from the sand pressure filters in the Active Effluent Water (AEWTP) and Pond Water Treatment Plants (PWTP). Sludge and solids are removed by filtration through a mixed bed of sand and gravel which is then backwashed into sludge tanks. Additionally gravel from Cation Tank 2.

PHYSICAL CHARACTERISTICS

General description: Sand & Gravel
 Physical components (%wt): Sand (56%) & Gravel (44%)
 Sealed sources: The waste does not contain sealed sources.
 Bulk density (t/m³): ~1.56
 Comment on density: measured density average of ref EX09246_06_10_29, EX09246_06_10_31, EX09246/06/10/19 and EX09246/06/10/21

CHEMICAL COMPOSITION

General description and components (%wt): Sand (56%) & Gravel (44%)
 Chemical state: Neutral
 Chemical form of radionuclides: H-3: The chemical form of tritium has not been determined
 C-14: The chemical form of carbon has not been determined
 Tc-99: The chemical form of technetium has not been determined
 U: The chemical form of uranium has not been determined
 Np: The chemical form of neptunium has not been determined
 Pu: The chemical form of plutonium has not been determined

Metals and alloys (%wt): -

	(%wt)	Type(s) / Grade(s) with proportions	% of total C14 activity
Stainless steel.....	NE		
Other ferrous metals.....	NE		
Iron.....			
Aluminium.....	NE		
Beryllium.....			
Cobalt.....			
Copper.....	NE		
Lead.....	NE		
Magnox/Magnesium.....	NE		

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Nickel.....			
Titanium.....			
Uranium.....			
Zinc.....	NE		
Zircaloy/Zirconium.....	NE		
Other metals.....	0		
Organics (%wt):	-		
	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulosics.....	NE		
Paper, cotton.....	NE		
Wood.....	NE		
Halogenated plastics	NE		
Total non-halogenated plastics.....	NE		
Condensation polymers.....	NE		
Others.....	NE		
Organic ion exchange materials....	NE		
Total rubber.....	NE		
Halogenated rubber	NE		
Non-halogenated rubber.....	NE		
Hydrocarbons.....			
Oil or grease			
Fuel.....			
Asphalt/Tarmac (cont.coal tar)...			
Asphalt/Tarmac (no coal tar)....			
Bitumen.....			
Others.....			
Other organics.....	NE		
Other materials (%wt):	-		
	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials..	0		
Inorganic sludges and flocs.....	TR		
Soil.....	0		
Brick/Stone/Rubble.....	44.0	gravel	
Cementitious material.....	0		
Sand.....	56.0		
Glass/Ceramics.....	0		
Graphite.....	0		
Desiccants/Catalysts.....			
Asbestos.....	0		
Non/low friable.....			
Moderately friable.....			

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Sand Filters**

Highly friable.....

Free aqueous liquids..... NE

Free non-aqueous liquids..... 0

Powder/Ash..... 0

Inorganic anions (%wt): -

(%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: -

(%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 / none expected
non hazardous pollutants:

(%wt) Type(s) and comment

Acrylamide.....

Benzene.....

Chlorinated solvents.....

Formaldehyde.....

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Organometallics.....
 Phenol.....
 Styrene.....
 Tri-butyl phosphate.....
 Other organophosphates.....
 Vinyl chloride.....
 Arsenic.....
 Barium.....
 Boron..... 0
 Boron (in Boral).....
 Boron (non-Boral).....
 Cadmium.....
 Caesium.....
 Selenium.....
 Chromium.....
 Molybdenum.....
 Thallium.....
 Tin.....
 Vanadium.....
 Mercury compounds.....
 Others.....
 Electronic Electrical Equipment (EEE)
 EEE Type 1.....
 EEE Type 2.....
 EEE Type 3.....
 EEE Type 4.....
 EEE Type 5.....

Complexing agents (%wt):

(%wt) Type(s) and comment

EDTA.....
 DPTA.....
 NTA.....
 Polycarboxylic acids.....
 Other organic complexants.....
 Total complexing agents..... NE

Potential for the waste to contain discrete items:

No. In & of itself not a DI; context will define if likely to contain any "rogue" items that could be (i.e. if FED Vault lining then yes, but would be removed if > DI Limits in conditioned waste see FED; if SPFs then no, see Sand/Sludge/Resin)

WASTE STREAM**9C61****Contaminated Sand and Gravel from AETP and PWTP Sand Filters****TREATMENT, PACKAGING AND DISPOSAL**

Planned on-site / off-site treatment(s):

Treatment	On-site / Off site	Stream volume %
Low force compaction Supercompaction (HFC) Incineration Solidification Decontamination Metal treatment Size reduction Decay storage Recycling / reuse Other / various None	On-site	100.0

Comment on planned treatments:

Waste will be encapsulated to meet LLWR WAC, likely to be in HHISO's

Disposal Routes:

Disposal Route	Stream volume %	Disposal density t/m3
Expected to be consigned to the LLW Repository Expected to be consigned to a Landfill Facility Expected to be consigned to an On-Site Disposal Facility Expected to be consigned to an Incineration Facility Expected to be consigned to a Metal Treatment Facility Expected to be consigned as Out of Scope Expected to be recycled / reused Disposal route not known	100.0	2.4

Classification codes for waste expected to be consigned to a landfill facility: -

Upcoming (2022/23-2024/25) Waste Routing (if expected to change from above):

Disposal Route	Stream volume %		
	2022/23	2023/24	2024/25
Expected to be consigned to the LLW Repository Expected to be consigned to a Landfill Facility Expected to be consigned to an On-Site Disposal Facility Expected to be consigned to an Incineration Facility Expected to be consigned to a Metal Treatment Facility Expected to be consigned as Out of Scope Expected to be recycled / reused Disposal route not known			

Opportunities for alternative disposal routing: -

Baseline Management Route	Opportunity Management Route	Stream volume (%)	Estimated Date that Opportunity will be realised	Opportunity Confidence	Comment
Disposal at LLWR	Disposal at a Geological Disposal Facility	NE	2023	Medium	Baseline position is encapsulation and LLW disposal but this is under threat, under investigation still

Waste Packaging for Disposal:

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Container	Stream volume %	Waste loading m ³	Number of packages
1/3 Height IP-1 ISO 2/3 Height IP-2 ISO 1/2 Height WAMAC IP-2 ISO 1/2 Height IP-2 Disposal/Re-usable ISO 2m box (no shielding) 4m box (no shielding) Other	100.0	7.77	< 1

Other information: -

Waste Planned for Disposal at the LLW Repository:

Container voidage: -

Waste Characterisation Form (WCH): The waste meets the LLWR's Waste Acceptance Criteria (WAC).
The waste does not have a current WCH.

Waste consigned for disposal to LLWR in year of generation: -

Non-Containerised Waste for In-Vault Grouting: (Not applicable to this waste stream)

Stream volume (%): -

Waste stream variation: -

Bounding cuboidal volume:

Inaccessible voidage: -

Other information: -

RADIOACTIVITY

Source: Activity retained within the filter media after back flushing. Activity from filtering the effluents of the pond water and active effluent treatment plants. Contamination by fission products, actinides and activation products.

Uncertainty: The activity retained on the filter media cannot be known with accuracy until the filters are decommissioned and emptied.

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: samples taken and reported in EX09246_06_10_29, EX09246_06_10_31, EX09246/06/10/19 and EX09246/06/10/21 decayed by six years for RWI 2022

Other information: -

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Nuclide	Mean radioactivity, TBq/m ³				Nuclide	Mean radioactivity, TBq/m ³			
	Waste at 1.4.2022	Bands and Code	Future arisings	Bands and Code		Waste at 1.4.2022	Bands and Code	Future arisings	Bands and Code
H 3	5.32E-06	BB 2			Gd 153		8		
Be 10		8			Ho 163		8		
C 14	1.53E-05	BB 2			Ho 166m		8		
Na 22		8			Tm 170		8		
Al 26		8			Tm 171		8		
Cl 36		8			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		8			Pb 205		8		
Fe 55	4.63E-06	BB 2			Pb 210		8		
Co 60	3.78E-06	BB 2			Bi 208		8		
Ni 59		8			Bi 210m		8		
Ni 63	3.63E-05	BB 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	2.99E-03	BB 2			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		8			Th 234		8		
Mo 93		8			Pa 231		8		
Tc 97		8			Pa 233		8		
Tc 99	3.98E-07	BB 2			U 232		8		
Ru 106		8			U 233		8		
Pd 107		8			U 234		8		
Ag 108m	6.01E-07	BB 2			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	7.59E-05	BB 2		
Sn 123		8			Pu 239	2.28E-04	BB 2		
Sn 126		8			Pu 240	2.28E-04	BB 2		
Sb 125		8			Pu 241	2.71E-03	BB 2		
Sb 126		8			Pu 242		8		
Te 125m		8			Am 241	3.86E-04	BB 2		
Te 127m		8			Am 242m		8		
I 129		8			Am 243		8		
Cs 134	2.40E-06	BB 2			Cm 242		8		
Cs 135		8			Cm 243	7.88E-06	BB 2		
Cs 137	2.61E-02	BB 2			Cm 244	7.19E-06	BB 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		8			Cf 251		8		
Sm 147		8			Cf 252		8		
Sm 151		8			Other a				
Eu 152		8			Other b/g				
Eu 154	2.07E-05	BB 2			Total a	9.32E-04	BB 2	0	
Eu 155	1.21E-05	BB 2			Total b/g	3.18E-02	BB 2	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 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