

WASTE STREAM	3S04	Sludges and Concentrates
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SITE Sizewell B

SITE OWNER EDFE NGL

WASTE CUSTODIAN EDFE NGL

WASTE TYPE LLW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	0 m ³
Future arisings -	1.4.2019 - 31.3.2035.....	16.0 m ³
	1.4.2035 - 31.3.2039.....	0 m ³
	1.4.2039 - 31.3.2040.....	9.8 m ³
	1.4.2040 - 31.3.2041.....	5.2 m ³
Total future arisings:		31.0 m ³
Total waste volume:		31.0 m ³

Comment on volumes: Waste volumes will be variable depending on station operating conditions. Following planned shutdown in 2035 and defuelling operations, the fuel storage ponds and associated plant will continue in operation for a number of years before removal of the last cartridge filters etc. The current plan shows this in 2040/1.

Uncertainty factors on volumes: Stock (upper): x Arisings (upper) x 1.5
 Stock (lower): x Arisings (lower) x 0.5

WASTE SOURCE Principally miscellaneous wet wastes and sludges from active drains etc.

PHYSICAL CHARACTERISTICS

General description: There are no large items that require special handling.

Physical components (%vol): Sludge and Concentrate (100 vol%). No other constituents have been identified.

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): 1.4

Comment on density: Density is expected to lie between 1.2 and 2.0 t/m³.

CHEMICAL COMPOSITION

General description and components (%wt): To be determined. Predominantly radioactive effluent plant sludges, detritus. Possible contamination with boric acid. Organic material may also be present.

Chemical state: Acid

Chemical form of radionuclides: H-3: Tritiated water.
 C-14: Trace quantities may be present in liquids.
 Ra: Not expected to be present in any measurable quantity.
 U: Trace quantities may be present.
 Pu: Trace quantities may be present.

Metals and alloys (%wt):

Stainless steel.....	TR
Other ferrous metals.....	TR
Iron.....	TR
Aluminium.....	
Beryllium.....	0
Cobalt.....	0
Copper.....	
Lead.....	0
Magnox/Magnesium.....	0
Nickel.....	
Titanium.....	0

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	Uranium.....	0
	Zinc.....	0
	Zircaloy/Zirconium.....	TR
	Other metals.....	TR
Organics (%wt):	Oil and grease may be present in trace quantities. None.	
	Total cellulosics.....	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.....	NE
	Oil or grease	NE
	Fuel.....	
	Asphalt/Tarmac (cont.coal tar)...	
	Asphalt/Tarmac (no coal tar)....	
	Bitumen.....	
	Others.....	
	Other organics.....	TR
Other materials (%wt):	-	
	Inorganic ion exchange materials.	0
	Inorganic sludges and flocs.....	100.0
	Soil.....	0
	Brick/Stone/Rubble.....	0
	Cementitious material.....	0
	Sand.....	0
	Glass/Ceramics.....	
	Graphite.....	0
	Desiccants/Catalysts.....	0
	Asbestos.....	0
	Non/low friable.....	
	Moderately friable.....	
	Highly friable.....	
	Free aqueous liquids.....	P
	Free non-aqueous liquids.....	0
	Powder/Ash.....	0
Inorganic anions (%wt):	In normal operation the listed anions are not expected to be present in significant quantities. Borate ion will be present.	

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Fluoride.....	TR
Chloride.....	TR
Iodide.....	TR
Cyanide.....	0
Carbonate.....	TR
Nitrate.....	TR
Nitrite.....	NE
Phosphate.....	TR
Sulphate.....	TR
Sulphide.....	TR

Materials of interest for waste acceptance criteria:

There are no materials identified which are likely to pose a fire or other non-radiological hazard.

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
Active particles.....	0
Soluble solids as bulk chemical compounds.....	0

Not expected.

Hazardous substances / non hazardous pollutants:

Contains boric acid in concentrate - listed substance code 060199.

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

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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..... NE
 EEE Type 2..... NE
 EEE Type 3..... NE
 EEE Type 4..... NE
 EEE Type 5..... NE

Complexing agents (%wt):

Yes
 EDTA..... NE
 DPTA..... NE
 NTA..... NE
 Polycarboxylic acids..... NE
 Other organic complexants..... NE

 Total complexing agents..... NE

Complexing agents are not expected to be present in any measurable quantity.

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 treatments for future arisings not yet determined but assumed to be encapsulation. The waste will be incinerated if possible or high force compaction may be used to condition the waste depending on the oil content and other factors which may affect these methods of treatment.

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Disposal Route	Stream volume %
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

Upcoming (2019/20-2021/22) Waste Routing (if expected to change from above):

Disposal Route	Stream volume %		
	2019/20	2020/21	2021/22
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			

Waste Packaging for Disposal:

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	~10.4	3

Other information: -

Waste Planned for Disposal at the LLW Repository:

Container voidage: -

Waste Characterisation Form (WCH): It is not yet determined if the waste meets LLWR's Waste Acceptance Criteria (WAC).

Waste consigned for disposal to LLWR in year of generation: Arisings are small and irregular. Waste will be consigned after a campaign of encapsulation.

Potential for the waste to contain discrete items: No

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: -

WASTE STREAM**3S04****Sludges and Concentrates****RADIOACTIVITY**

Source:	Contaminated sludge and concentrates. Contamination by fission products and activation products, with trace quantities of actinides.
Uncertainty:	-
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:	-
Other information:	-

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Nuclide	Mean radioactivity, TBq/m ³				Nuclide	Mean radioactivity, TBq/m ³			
	Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code		Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code
H 3			1E-02	CC 2	Gd 153				
Be 10				8	Ho 163				
C 14			3E-06	CC 2	Ho 166m				
Na 22				4	Tm 170				
Al 26				4	Tm 171				
Cl 36				8	Lu 174				
Ar 39					Lu 176				
Ar 42					Hf 178n				
K 40					Hf 182				
Ca 41				8	Pt 193				
Mn 53					Tl 204				
Mn 54			5E-04	CC 2	Pb 205				
Fe 55			7E-04	CC 2	Pb 210				8
Co 60			7E-04	CC 2	Bi 208				
Ni 59			9E-08	CC 2	Bi 210m				
Ni 63			1E-05	CC 2	Po 210				8
Zn 65			4E-05	CC 2	Ra 223				
Se 79				8	Ra 225				
Kr 81					Ra 226				8
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90			6E-06	CC 2	Th 227				
Zr 93				8	Th 228				
Nb 91					Th 229				8
Nb 92					Th 230				8
Nb 93m				8	Th 232				8
Nb 94			7E-09	CC 2	Th 234				
Mo 93			8E-09	CC 2	Pa 231				8
Tc 97					Pa 233				
Tc 99				8	U 232				
Ru 106			8E-05	CC 2	U 233				8
Pd 107				8	U 234				8
Ag 108m			2E-08	CC 2	U 235				8
Ag 110m			2E-05	CC 2	U 236				8
Cd 109					U 238				8
Cd 113m					Np 237				8
Sn 119m					Pu 236				
Sn 121m				8	Pu 238		5E-08	CC 2	
Sn 123					Pu 239		2E-08	CC 2	
Sn 126				8	Pu 240		2E-08	CC 2	
Sb 125			9E-05	CC 2	Pu 241		6E-06	CC 2	
Sb 126			5E-05	CC 2	Pu 242				8
Te 125m			7E-07	CC 2	Am 241		9E-09	CC 2	
Te 127m			8E-06	CC 2	Am 242m				8
I 129				8	Am 243		1E-09	CC 2	
Cs 134			2E-04	CC 2	Cm 242		1E-07	CC 2	
Cs 135				8	Cm 243				8
Cs 137			2E-04	CC 2	Cm 244		1E-08	CC 2	
Ba 133					Cm 245				8
La 137					Cm 246				8
La 138					Cm 248				
Ce 144			6E-05	CC 2	Cf 249				
Pm 145					Cf 250				
Pm 147			7E-06	CC 2	Cf 251				
Sm 147					Cf 252				
Sm 151			1E-08	CC 2	Other a				8
Eu 152				8	Other b/g		3E-03	CC 2	
Eu 154			6E-07	CC 2	Total a	0	2.1E-07	CC 2	
Eu 155			4E-07	CC 2	Total b/g	0	1.57E-02	CC 2	

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