WASTE STREAM 4B15 Miscellaneous Sludges

SITE Hunterston B

SITE OWNER EDFE NGL

WASTE CUSTODIAN EDFE NGL

WASTE TYPE LLW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	~5.9 m³
Future arisings -	1.4.2019 - 31.3.2023.....	NE m³
Total future arisings:		0 m³
Total waste volume:		5.9 m³

Comment on volumes: Future arisings possible but unpredictable. The volume of waste is approximate, based on numbers of drums currently in storage.

Uncertainty factors on volumes:

Stock (upper):	x 1.5	Arisings (upper)	x
Stock (lower):	x 0.5	Arisings (lower)	x

WASTE SOURCE Waste arises from the treatment of active effluent. Occasionally sludge cannot be transferred to purpose built storage vessels and is removed from process/treatment vessels into drums, IBCs or similar containers for storage prior to characterisation and disposal.

PHYSICAL CHARACTERISTICS

General description: Sludge recovered from active effluent treatment plant vessels.

Physical components (%vol): Sludge (100% vol), no other items have been identified.

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): ~1.9

Comment on density: Waste density is an estimate based on average of current arisings.

CHEMICAL COMPOSITION

General description and components (%wt): A variety of materials.

Chemical state: Neutral

Chemical form of radionuclides:
H-3: Tritiated water
C-14: Activated graphite and metallic particulate
Cl-36: Not expected to be significant
Se-79: Not expected to be significant
Tc-99: Not expected to be significant
I-129: Not expected to be significant
Ra: Not expected to be significant
Th: Not expected to be significant
U: Not expected to be significant
Np: Not expected to be significant
Pu: Not assessed

Metals and alloys (%wt): -

Stainless steel.....	NE
Other ferrous metals.....	NE
Iron.....	NE
Aluminium.....	NE
Beryllium.....	NE
Cobalt.....	NE
Copper.....	NE
Lead.....	NE
Magnox/Magnesium.....	NE

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	Nickel	NE
	Titanium	NE
	Uranium	NE
	Zinc	NE
	Zircaloy/Zirconium	NE
	Other metals	NE
Organics (%wt):	-	
	Total cellulosics	NE
	Paper, cotton	
	Wood	
	Halogenated plastics	NE
	Total non-halogenated plastics	NE
	Condensation polymers	
	Others	
	Organic ion exchange materials	NE
	Total rubber	NE
	Halogenated rubber	
	Non-halogenated rubber	
	Hydrocarbons	NE
	Oil or grease	NE
	Fuel	
	Asphalt/Tarmac (cont.coal tar)	
	Asphalt/Tarmac (no coal tar)	
	Bitumen	
	Others	
	Other organics	NE
Other materials (%wt):	-	
	Inorganic ion exchange materials.	NE
	Inorganic sludges and flocs	100.0
	Soil	NE
	Brick/Stone/Rubble	NE
	Cementitious material	NE
	Sand	NE
	Glass/Ceramics	NE
	Graphite	NE
	Desiccants/Catalysts	NE
	Asbestos	0
	Non/low friable	
	Moderately friable	
	Highly friable	
	Free aqueous liquids	P
	Free non-aqueous liquids	P
	Powder/Ash	0

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Inorganic anions (%wt):	Inorganic anions may be present.		
	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:	Waste contains oil.		
	Combustible metals	0	
	Low flash point liquids	0	
	Explosive materials	0	
	Phosphorus	0	
	Hydrides	0	
	Biological etc. materials	NE	
	Biodegradable materials	NE	
	Putrescible wastes	0	
	Non-putrescible wastes	NE	
	Corrosive materials	0	
	Pyrophoric materials	0	
	Generating toxic gases	0	
	Reacting with water	0	
	Active particles	0	Not expected
	Soluble solids as bulk chemical compounds	0	
Hazardous substances / non hazardous pollutants:	-		
	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

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..... 0

EEE Type 2..... 0

EEE Type 3..... 0

EEE Type 4..... 0

EEE Type 5..... 0

Complexing agents (%wt): Not yet determined

EDTA..... NE

DPTA..... NE

NTA..... NE

Polycarboxylic acids…… NE

Other organic complexants..... NE

Total complexing agents..... NE

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 Recyling / reuse Other / various None	Off-site	100.0

Comment on planned treatments: For the current stock of miscellaneous sludge, plans are in place to treat by incineration. The strategy for future arisings will be case dependent, however in line with the waste hierarchy, waste will be preferentially treated by incineration, drying & supercompaction or cementation prior to disposal.

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Disposal Routes:

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: (Not applicable to this waste stream)

Container	Stream volume %	Waste loading m³	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			

Other information: -

Waste Planned for Disposal at the LLW Repository: (Not applicable to this waste stream)

Container voidage: -

Waste Characterisation Form (WCH): -

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

Potential for the waste to contain discrete items: -

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

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Source:	Contaminated sludge. Contamination by activation products will be the main source of activity.
Uncertainty:	Characterisation not yet complete.
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:	Nuclides likely to be present in significant quantities estimated from sludge waste stream 4B04.
Other information:	-

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Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code	Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2019	Bands and Code	Future arisings	Bands and Code
H 3		6			Gd 153				
Be 10					Ho 163				
C 14					Ho 166m				
Na 22		4			Tm 170				
Al 26		4			Tm 171				
Cl 36					Lu 174				
Ar 39					Lu 176				
Ar 42					Hf 178n				
K 40					Hf 182				
Ca 41					Pt 193				
Mn 53					Tl 204				
Mn 54		7			Pb 205				
Fe 55		7			Pb 210				
Co 60		7			Bi 208				
Ni 59		7			Bi 210m				
Ni 63		7			Po 210				
Zn 65		6			Ra 223				
Se 79					Ra 225				
Kr 81					Ra 226				
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90		7			Th 227				
Zr 93					Th 228				
Nb 91					Th 229				
Nb 92					Th 230				
Nb 93m					Th 232				
Nb 94					Th 234				
Mo 93					Pa 231				
Tc 97					Pa 233				
Tc 99					U 232				
Ru 106		6			U 233				
Pd 107					U 234				
Ag 108m					U 235				
Ag 110m					U 236				
Cd 109					U 238				
Cd 113m					Np 237				
Sn 119m					Pu 236				
Sn 121m					Pu 238				
Sn 123					Pu 239		6		
Sn 126					Pu 240		6		
Sb 125					Pu 241		6		
Sb 126					Pu 242				
Te 125m					Am 241		6		
Te 127m					Am 242m				
I 129					Am 243				
Cs 134		6			Cm 242				
Cs 135					Cm 243				
Cs 137		7			Cm 244				
Ba 133					Cm 245				
La 137					Cm 246				
La 138					Cm 248				
Ce 144		6			Cf 249				
Pm 145					Cf 250				
Pm 147		6			Cf 251				
Sm 147					Cf 252				
Sm 151		6			Other a		8		
Eu 152					Other b/g		7		
Eu 154		6			**Total a**	**NE**	**6**	**0**	
Eu 155					**Total b/g**	**NE**	**7**	**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