WASTE STREAM 3K04 Desiccant

SITE Hartlepool

SITE OWNER EDFE NGL

WASTE CUSTODIAN EDFE NGL

WASTE TYPE ILW

WASTE VOLUMES

		Reported
Stocks:	At 1.4.2019.....	35.5 m³
Future arisings -	1.4.2019 - 31.3.2021.....	0 m³
	1.4.2021 - 31.3.2022.....	16.5 m³
	1.4.2022 - 31.3.2023.....	16.5 m³
	1.4.2023 - 31.3.2024.....	0 m³
	1.4.2024 - 31.3.2025.....	33.0 m³
Total future arisings:		66.0 m³
Total waste volume:		101.5 m³

Comment on volumes: Waste volumes will be variable depending on station operating conditions.

Uncertainty factors on volumes:

Stock (upper):	x 1.25	Arisings (upper)	x 1.25
Stock (lower):	x 0.75	Arisings (lower)	x 0.75

WASTE SOURCE Exhausted desiccants that have been used for the drying of carbon dioxide reactor coolant.

PHYSICAL CHARACTERISTICS

General description: Desiccant materials. Some residual moisture may be associated with the desiccant. There will be no large items in the waste which may require special handling.

Physical components (%wt): Desiccant (<99%wt) with polythene liners (>1%) containing the waste.

Sealed sources: The waste does not contain sealed sources.

Bulk density (t/m³): ~0.8

Comment on density: -

CHEMICAL COMPOSITION

General description and components (%wt): Desiccant (<99%wt) with polythene liners (>1%) containing the waste. Some residual moisture may be associated with the desiccant.

Chemical state: Neutral

Chemical form of radionuclides:
H-3: Tritiated water absorbed onto desiccant.
C-14: May be present as Graphite contamination
Cl-36: Not determined
Se-79: Not expected to be present in significant quantities
Tc-99: Not expected to be present in significant quantities
I-129: Not expected to be present in significant quantities
Ra: Not expected to be present in significant quantities
Th: Not expected to be present in significant quantities
U: Not expected to be present in significant quantities
Np: Not expected to be present in significant quantities
Pu: Not expected to be present in significant quantities

Metals and alloys (%wt): -

Stainless steel.....	0
Other ferrous metals.....	0
Iron.....	0
Aluminium.....	
Beryllium.....	0
Cobalt.....	0
Copper.....	0
Lead.....	0

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	Magnox/Magnesium	0
	Nickel	0
	Titanium	0
	Uranium	0
	Zinc	0
	Zircaloy/Zirconium	0
	Other metals	0
Organics (%wt):	To be further assessed. Polythene drum liners are present. Cellulosic drum liners may be used if the waste is sent for supercompaction after detritiation.	
	Total cellulosics	0
	Paper, cotton	0
	Wood	0
	Halogenated plastics	0
	Total non-halogenated plastics	<1.0
	Condensation polymers	0
	Others	<1.0
	Organic ion exchange materials	0
	Total rubber	0
	Halogenated rubber	0
	Non-halogenated rubber	0
	Hydrocarbons	0
	Oil or grease	
	Fuel	
	Asphalt/Tarmac (cont.coal tar)	
	Asphalt/Tarmac (no coal tar)	
	Bitumen	
	Others	
	Other organics	NE
Other materials (%wt):	Silica desiccant (~99%)	
	Inorganic ion exchange materials.	0
	Inorganic sludges and flocs	0
	Soil	0
	Brick/Stone/Rubble	0
	Cementitious material	0
	Sand	0
	Glass/Ceramics	0
	Graphite	0
	Desiccants/Catalysts	<99.0
	Asbestos	0
	Non/low friable	
	Moderately friable	
	Highly friable	
	Free aqueous liquids	P

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Free non-aqueous liquids	P
Powder/Ash	0

Inorganic anions (%wt): None of the listed inorganic anions are expected to be present at greater than trace concentrations.

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

Materials of interest for waste acceptance criteria: There are no materials identified in the waste likely to present a fire or other non-radiological hazard. Free liquids are present before decontamination and drying.

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

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

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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

Expect only trace quantities, if any.

Total complexing agents..... NE

LAW TREATMENT, PACKAGING AND DISPOSAL

Waste that is currently ILW: This waste is ILW at the time of arising. The waste is stored temporarily to allow decay of short lived radionucliides, following this, the desiccant is transferred off-site for incineration.

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

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

Comment on planned treatments: The waste will be decontaminated prior to incineration or directly incinerated.

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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 Consigned to the LLW Repository:

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:	Contamination by tritium and activation products will be the main sources of activity.
Uncertainty:	Specific activity is a function of operating history. The values given are indicative of the activities that may be expected.
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:	Theoretical assessment.
Other information:	The degree of contamination of the materials requires further assessment. Other beta/gamma nuclides of arisings and stocks (in TBq/m^3) include S35 (8E-2, 7E-3); Cr51 (1E-7, 4E-10); Co58 (3E-8, 2E-9) and Ta182 (3E-8, 4E-9).

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Nuclide	Mean radioactivity, TBq/m³				Nuclide	Mean radioactivity, TBq/m³			
	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	2E-01	C C 2	2E-01	C C 2	Gd 153				
Be 10		8		8	Ho 163				
C 14		8		8	Ho 166m				
Na 22		4		4	Tm 170				
Al 26		4		4	Tm 171				
Cl 36	1E-04	C C 2	1E-04	C C 2	Lu 174				
Ar 39					Lu 176				
Ar 42					Hf 178n				
K 40					Hf 182				
Ca 41		8		8	Pt 193				
Mn 53					Tl 204				
Mn 54	3E-07	C C 2	3E-07	C C 2	Pb 205				
Fe 55	1E-06	C C 2	1E-06	C C 2	Pb 210		8		8
Co 60	2E-07	C C 2	2E-07	C C 2	Bi 208				
Ni 59		6		6	Bi 210m				
Ni 63	3E-07	C C 2	3E-07	C C 2	Po 210		8		8
Zn 65		8		8	Ra 223				
Se 79		8		8	Ra 225				
Kr 81					Ra 226		8		8
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90		8		8	Th 227				
Zr 93		8		8	Th 228				
Nb 91					Th 229		8		8
Nb 92					Th 230		8		8
Nb 93m		8		8	Th 232		8		8
Nb 94		8		8	Th 234				
Mo 93		8		8	Pa 231		8		8
Tc 97					Pa 233				
Tc 99		8		8	U 232				
Ru 106		8		8	U 233		8		8
Pd 107		8		8	U 234		8		8
Ag 108m		8		8	U 235		8		8
Ag 110m					U 236		8		8
Cd 109					U 238		8		8
Cd 113m					Np 237		8		8
Sn 119m					Pu 236				
Sn 121m		8		8	Pu 238		8		8
Sn 123					Pu 239		8		8
Sn 126		8		8	Pu 240		8		8
Sb 125					Pu 241		8		8
Sb 126					Pu 242		8		8
Te 125m					Am 241		8		8
Te 127m					Am 242m		8		8
I 129		8		8	Am 243		8		8
Cs 134		8		8	Cm 242		8		8
Cs 135		8		8	Cm 243		8		8
Cs 137		6		6	Cm 244		8		8
Ba 133					Cm 245		8		8
La 137					Cm 246		8		8
La 138					Cm 248				
Ce 144		8		8	Cf 249				
Pm 145					Cf 250				
Pm 147		8		8	Cf 251				
Sm 147					Cf 252				
Sm 151		8		8	Other a		8		8
Eu 152		8		8	Other b/g	8E-02	C C 2	8E-02	C C 2
Eu 154		8		8	**Total a**	**<1E-09**	**8**	**<1E-09**	**8**
Eu 155		8		8	**Total b/g**	**2.80E-01**	**C C 2**	**2.80E-01**	**C C 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