

WASTE STREAM	2A30	Waste Oils
--------------	------	------------

SITE Calder Hall

SITE OWNER Nuclear Decommissioning Authority

WASTE CUSTODIAN Sellafield Ltd

WASTE TYPE LLW

WASTE VOLUMES

	Reported (m ³)	OR	Conditioned (m ³)	Packaged (m ³)
Stocks:	At 1.4.2025	~ 10.0		
Future arisings:	1.4.2025 - 31.3.2035	~ 5.0		
Total future arisings:		5.0		
Total waste volume:		15.0		

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

Comment on arising rates: Arisings are as a result of characterising oils remaining on the Calder Hall site after operations ceased. Although no future arisings are anticipated, more arisings may occur as decommissioning progresses and building contents are characterised. The main tanks on the site were cleared but a small quantity of oil may reside within the system and low lying pipework. A figure of approximately 5 m³ has been taken as remaining within the systems. Removal of the remaining blower oil is not currently planned however specific clearance of the Reactor 4 blower houses is being assessed and the date may be accelerated accelerating some of the future arisings.

Additional information on quantities: Still some uncertainty over exact volumes as no measuring devices fitted to storage tanks. Volumes are best estimate, probably accurate to 10%.

Uncertainty factors on volumes: Stock (upper): x 1.10 Arisings (upper): x 1.10
Stock (lower): x 0.90 Arisings (lower): x 0.90

WASTE SOURCE Calder Hall blower lubricating oil from within controlled areas and active areas.

PHYSICAL CHARACTERISTICS

General description: The waste originates as several types of lubricating oil, some containing water and cleaning solvent. No items require special handling. Water will be separated and disposed of via SETP.

Changes since waste generated: -

Bulk density (t/m³): ~ 0.90

Comment on density: A value of 0.9 t/m³ has been assumed.

CHEMICAL COMPOSITION

General description and components (%wt): Oil (99%), solvent (<1%).

Chemical state: -

Sheet metal proportion / thickness: -

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	TR	-	
Other ferrous metals.....	TR	-	
Iron.....		-	
Aluminium.....	TR	-	
Beryllium.....	NE	-	
Cobalt.....	= 0	-	
Copper.....	TR	-	
Lead.....	TR	-	
Magnox/Magnesium.....	NE	-	
Nickel.....		-	
Titanium.....		-	
Uranium.....	NE	-	
Zinc.....	TR	-	
Zircaloy/Zirconium.....	NE	-	
Other metals.....	= 0	-	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose.....	= 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 quantified under "Free non-aqueous liquids".	
Oil or grease.....	NE		
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.....	= 0	-	
Soil.....	= 0	-	
Brick/Stone/Rubble.....	= 0	-	
Cementitious material.....	= 0	-	
Sand.....	-	-	
Glass/Ceramics.....	-	-	
Graphite.....	= 0	-	
Desiccants/Catalysts.....	-	-	
Asbestos.....	= 0	-	
Non/low friable.....	-	-	
Moderately friable.....	-	-	
Highly friable.....	-	-	
Free aqueous liquids.....	= 0	-	
Free non-aqueous liquids.....	~ 99.0	-	
Powder/Ash.....	= 0	-	

COMPONENTS OF MATERIALS, WASTE PROPERTIES, MATERIALS NOT CONTRIBUTING TO MASS

Inorganic anions (%wt):

	(%wt)	Type(s) and comment
Fluoride.....	TR	-
Chloride.....	TR	-
Iodide.....	TR	-
Cyanide.....	TR	-
Carbonate.....	TR	-
Nitrate.....	TR	-
Nitrite.....	TR	-
Phosphate.....	TR	-
Sulphate.....	TR	-
Sulphide.....	TR	-

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 / non hazardous pollutants:

	(%wt)	Type(s) and comment
Acrylamide.....	-	-
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.....	-	-
DPTA.....	-	-
NTA.....	-	-
Polycarboxylic acids.....	-	-
Other organic complexants.....	TR	Trace levels of organic complexing agents will be present as oil additives and stabilisers or as organic degradation products.
Total complexing agents.....	TR	-

Physical components:

	Number	Type(s) and comment
Sources.....	= 0	-
Electronic & Electrical Equipment (EEE)	-	-
EEE Type 1.....	= 0	-
EEE Type 2.....	= 0	-
EEE Type 3.....	= 0	-
EEE Type 4.....	= 0	-
EEE Type 5.....	= 0	-

TREATMENT, PACKAGING AND DISPOSAL

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

Treatment	On-site / Off-site	Stream volume %
Size reduction	Off-site	= 100.0
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		

Comments on planned treatments:

It is expected that waste oil will be incinerated. Any water will be separated off and disposed of via SETP.

Conditioning method:

-

Conditioning plants:

Plant Name	Location

Likely conditioning matrix:

-

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
	-	-	-	-	-	-

Range in container waste loading: -

Other information on packaging and conditioning: It is expected that waste oil will be incinerated. It will not be disposed of to the LLWR.

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)	= 100.0	= 0.90	
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			

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: The main sources of activity are fission and activation products.

Uncertainty: The uncertainty has been derived from the accuracy of the analysis results for the sample with the highest specific activity. All other samples have low specific activity by comparison.

Measurement of radioactivities: The specific activity data has been derived from a weighted average of the reported analytical results detailed in the characterisation documents for each of the waste oil storage locations.

Chemical form of radionuclides: H-3: As H₂O.
C-14: As oil.
Cl-36: -
Se-79: -
Tc-99: -
I-129: -
Ra: -
Th: -
U: -
Np: -
Pu: -

WASTE STREAM				2A30		Waste Oils					
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	~ 1.21E-05	A A 1	~ 1.21E-05	A A 1	Gd 153						
Be 10					Ho 163						
C 14	~ 3.14E-08	A A 1	~ 3.14E-08	A A 1	Ho 166m						
Na 22					Tm 170						
Al 26					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					Pb 205						
Fe 55	~ 1.09E-07	A A 1	~ 1.09E-07	A A 1	Pb 210						
Co 60	~ 5.77E-08	A A 1	~ 5.77E-08	A A 1	Bi 208						
Ni 59					Bi 210m						
Ni 63	~ 3.01E-07	A A 1	~ 3.01E-07	A A 1	Po 210						
Zn 65					Ra 223						
Se 79					Ra 225						
Kr 81					Ra 226						
Kr 85					Ra 228						
Rb 87					Ac 227						
Sr 90		6		6	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					U 233						
Pd 107					U 234		6		6		
Ag 108m					U 235		6		6		
Ag 110m					U 236		6		6		
Cd 109					U 238		6		6		
Cd 113m					Np 237						
Sn 119m					Pu 236						
Sn 121m					Pu 238						
Sn 123					Pu 239						
Sn 126					Pu 240						
Sb 125					Pu 241						
Sb 126					Pu 242						
Te 125m					Am 241	~ 6.65E-10	A A 1	~ 6.65E-10	A A 1		
Te 127m					Am 242m						
I 129					Am 243						
Cs 134					Cm 242						
Cs 135					Cm 243						
Cs 137	~ 7.95E-08	A A 1	~ 7.95E-08	A A 1	Cm 244						
Ba 133					Cm 245						
La 137					Cm 246						
La 138					Cm 248						
Ce 144					Cf 249						
Pm 145					Cf 250						
Pm 147					Cf 251						
Sm 147					Cf 252						
Sm 151					Unsp a						
Eu 152					Unsp b/g						
Eu 154					Total a	6.65E-10	*	6.65E-10	*		
Eu 155					Total b/g	1.27E-05	*	1.27E-05	*		

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