



Waste Classification and Landfill Assessment of DCF Waste generated by Sasol Clariant Catalysts

RAISING THE WASTE GAME



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Customer: Sasol Clariant Catalysts
Waste Type: DCF Waste
WIR No: D04438-01
Reference No: 278731
Physical Nature: Solid
Compilation Date: April 2023

Introduction:

The Catalysts business unit of Clariant is a leading global and independent manufacturer of high-performance catalysts for use in the chemicals, plastics, and oil and gas industries.

Clariant Catalysts has two manufacturing facilities in South Africa. One in Richards Bay and another in Sasolburg.

During the manufacturing process at the Sasolburg facility, catalyst dust falls on the floor and is collected. This dust is classified as a waste and is identified as DCF Waste.

Sasol Clariant Catalysts has requested EnviroServ to compile a waste classification and landfill assessment for this waste stream.

Scope of Work:

The classification and landfill assessment was conducted by applying the following:

1. National Environmental Management: Waste Act, 2008
 - 1.1 Waste Classification and Management Regulations, GN R634
 - 1.2 National Norms and Standards for the Assessment of Waste for Landfill Disposal, GN R635
 - 1.3 National Norms and Standards for Disposal of Waste to Landfill, GN R636
 - 1.4 National Environmental Management: Waste Amendment Act, 2014
2. Globally Harmonised System (GHS) of Classification and Labelling of Chemicals, Revision 09

One (1) sample was supplied by EnviroServ's sales consultant.

The sample was analysed at Element Materials Technology for inorganic elements and organic compounds.

Classification:

There were no applicable processes listed under Schedule 3 in the NEM: Waste Amendment Act, 2014 for this waste stream.

Therefore, GHS Rev. 09 was applied to determine the classification.

The concentrations of the risk elements/compounds were compared against the cut-off values of the hazard classes – see Figure 1.



Figure 1: GHS Rev 09 Hazard Class Cut-off Values

Hazard class	Cut-off value/concentration limit
Acute toxicity	≥ 1.0 %
Skin corrosion/Irritation	≥ 1.0 %
Serious eye damage/eye irritation	≥ 1.0 %
Respiratory/Skin sensitization	≥ 0.1 %
Germ cell mutagenicity (Category 1)	≥ 0.1 %
Germ cell mutagenicity (Category 2)	≥ 1.0 %
Carcinogenicity	≥ 0.1 %
Reproductive toxicity	≥ 0.1 %
Specific target organ toxicity (single exposure)	≥ 1.0 %
Specific target organ toxicity (repeated exposure)	≥ 1.0 %
Aspiration hazard (Category 1)	≥ 1.0 %
Aspiration hazard (Category 2)	≥ 1.0 %
Hazardous to the aquatic environment	≥ 1.0 %

There were no inorganic elements or organic compounds that exceeded the above health and environmental hazards.


The pH was tested on an aqueous extract of the sample as received. The pH was determined to be 1.32. The pH value falls outside the GHS Rev.09 limit of $2 < \text{pH} < 11.5$ for Skin Corrosion. This implies that the waste has the potential to cause a skin corrosion or irritation risk.

Ingredient:	Concentration	Mixture classified as: Skin
Acid with $\text{pH} \leq 2$	≥ 1 %	Category 1
Base with $\text{pH} \geq 11.5$	≥ 1 %	Category 1
Other corrosive (Category 1) ingredient	≥ 1 %	Category 1
Other irritant (Category 2/3) ingredient, including acids and bases	≥ 3 %	Category 2/3

Therefore, based on the potential skin corrosion or irritation risk, the waste would classify as hazardous.

Appropriate PPE must be worn when handling the material.

A Safety Data Sheet (SDS) will be required for storage, transport and disposal.

Hazard Class	Hazard Symbol	Signal Word	Hazard Statement/s	Precautionary Statement
Acute Toxicity - Oral	Not enough evidence to suspect waste may be toxic via ingestion			P260: Do not breathe dust/ fumes/ gas/ mist/ vapours/ spray
Acute Toxicity - Dermal	Not enough evidence to suspect waste may be toxic via dermal contact			P262: Do not get in eyes, on skin or on clothing
Acute Toxicity - Inhalation	Not enough evidence to suspect waste may be toxic via inhalation			P260: Do not breathe dust/ fumes/ gas/ mist/ vapours/ spray
Skin Corrosion / Irritation		Warning	H315: Causes skin irritation	P262: Do not get in eyes, on skin or on clothing
Skin Sensitisation	Not enough evidence to suspect waste may cause skin sensitisation			P262: Do not get in eyes, on skin or on clothing
Serious Eye Damage / Eye Irritation	Not enough evidence to suspect waste may be toxic via inhalation			P262: Do not get in eyes, on skin or on clothing
Respiratory Sensitisation	Not enough evidence to suspect waste may cause respiratory sensitisation			P260: Do not breathe dust/ fumes/ gas/ mist/ vapours/ spray
Carcinogenicity	No evidence to suspect waste is carcinogenic			P260: Do not breathe dust/ fumes/ gas/ mist/ vapours/ spray
Reproductive Toxicity	Not enough evidence to suspect waste may cause reproductive toxicity			P260: Do not breathe dust/ fumes/ gas/ mist/ vapours/ spray
Toxic to Aquatic Life	Not enough evidence to suspect waste may be toxic to aquatic life			P273: Avoid release to the environment
Toxic to Aquatic Life with long lasting effects	Not enough evidence to suspect waste may be toxic to aquatic life with long lasting effects			P273: Avoid release to the environment

Landfill Assessment:

A landfill assessment was conducted based on the National Norms and Standards for the Assessment of Waste for Landfill Disposal and National Norms and Standards for Disposal of Waste to Landfill

These concentrations were compared against the thresholds listed in the Standard.



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WASTE MANAGEMENT

		TCT 0 mg/kg	TCT 1 mg/kg	TCT 2 mg/kg	LCT 0 mg/l	LCT 1 mg/l	LCT 2 mg/l	LCT 3 mg/l	DCF Waste (mg/kg)	DCF Waste (mg/l)	Landfill Assessment
Arsenic	As	5,8	500	2000	0,01	0,5	1	4	30,1	0,4	Type 3
Antimony	Sb	10	75	300	0,02	1	2	8	4	0,009	Type 3
Barium	Ba	62,5	6250	25000	0,7	35	70	280	80	0,57	Type 3
Boron	B	150	15000	60000	0,5	25	50	200	5,89	0,51	Type 3
Cadmium	Cd	7,5	260	1040	0,003	0,15	0,3	1,2	BDL	B	Type 3
Chromium (VI)	Cr6	6,5	500	2000	0,05	2,5	5	20			Type 3
Chromium Total	Cr Total	46000	800000	N/A	0,1	5	10	40	34,7	0,23	Type 3
Cobalt	Co	50	5000	20000	0,5	25	50	200	1,7	0,05	Type 3
Copper	Cu	16	19500	78000	2	100	200	800	6	0,06	Type 3
Lead	Pb	20	1900	7600	0,01	0,5	1	4	BDL	BDL	Type 3
Manganese	Mn	1000	25000	100000	0,5	25	50	200	79	2,6	Type 3
Mercury	Hg	0,9	160	640	0,006	0,3	0,6	2,4	0,4	BDL	Type 3
Molybdenum	Mo	40	1000	4000	0,07	3,5	7	28	4,1	0,02	Type 3
Nickel	Ni	91	10600	42400	0,07	3,5	7	28	9	0,2	Type 3
Selenium	Se	10	50	200	0,01	0,5	1	4	BDL	BDL	Type 3
Vanadium	V	150	2680	10720	0,2	10	20	80	38	0,7	Type 3
Zinc	Zn	240	160000	640000	5	250	500	2000	33	0,9	Type 3
Chloride		N/A	N/A	N/A	300	15000	30000	120000		BDL	Type 3
Cyanide Total	CN-Total	14	10500	42000	0,07	3,5	7	28		BDL	Type 3
Fluoride	F	100	10000	40000	1,5	75	150	600		0,9	Type 3
Nitrate-N	NO3 as N	N/A	N/A	N/A	11	550	1100	4400		BDL	Type 3
Sulphate		N/A	N/A	N/A	250	12500	25000	100000		BDL	Type 3
TDS		N/A	N/A	N/A	1000	12500	25000	100000		17381	Type 2
1,1,1,2-Tetrachloroethane		N/A	400	1600	N/A	5	10	40	BDL	BDL	Type 3
1,1,1-Trichloroethane		N/A	1200	4800	N/A	15	30	120	BDL	BDL	Type 3
1,1,2,2-Tetrachloroethane		N/A	5	20	N/A	0,65	1,3	5,3	BDL	BDL	Type 3
1,1,2-Trichloroethane		N/A	48	192	N/A	0,6	1	4	BDL	BDL	Type 3
1,1-Dichloroethylene (1,1-Dichloroethene)		N/A	150	600	N/A	0,35	0,7	2,8	BDL	BDL	Type 3
1,2-Dichlorobenzene		N/A	31900	127600	N/A	5	10	40	BDL	BDL	Type 3
1,2-Dichloroethane		N/A	3,7	14,8	N/A	1,5	3	12	BDL	BDL	Type 3
1,2-Dichloroethylene (1,2-Dichloroethene)		N/A	3750	15000	N/A	2,5	5	20	BDL	BDL	Type 3
1,4-Dichlorobenzene		N/A	18400	73600	N/A	15	30	120	BDL	BDL	Type 3
2,4,6-Trichlorophenol		N/A	1770	7080	N/A	10	20	80	BDL	BDL	Type 3
2,4-Dichlorophenol		N/A	800	3200	N/A	10	20	80	BDL	BDL	Type 3
2,4-Dinitrotoluene		N/A	5,2	20,8	N/A	0,065	0,13	0,52	BDL	BDL	Type 3
2-Chlorophenol		N/A	2100	8400	N/A	15	30	120	BDL	BDL	Type 3
Benzene		N/A	10	40	N/A	0,01	0,02	0,08	BDL	BDL	Type 3
Benzo-a-pyrene		N/A	1,7	6,8	N/A	0,035	0,07	0,28	BDL	BDL	Type 3
Carbon tetrachloride	CCl4	N/A	4	16	N/A	0,2	0,4	1,6	BDL	BDL	Type 3
Chlorobenzene		N/A	8800	35200	N/A	5	10	40	BDL	BDL	Type 3
Chloroform		N/A	700	2800	N/A	15	30	120	BDL	BDL	Type 3
Di-2-ethylhexyl-phthalate (Bis-2-ethylhexyl-phthalate)		N/A	40	160	N/A	0,5	1	4	BDL	BDL	Type 3
Dichloromethane		N/A	16	64	N/A	0,25	0,5	2	BDL	BDL	Type 3
Ethylbenzene		N/A	540	2160	N/A	3,5	7	28	BDL	BDL	Type 3
Formaldehyde		N/A	2000	8000	N/A	25	50	200	BDL	BDL	Type 3
Hexachlorobutadiene		N/A	2,8	5,4	N/A	0,03	0,06	0,24	BDL	BDL	Type 3
Methyl ethyl ketone		N/A	8000	32000	N/A	100	200	800	BDL	BDL	Type 3
Methyl t-butyl ether	MTBE	N/A	1435	5740	N/A	2,5	5	20	BDL	BDL	Type 3
Nitrobenzene		N/A	45	180	N/A	1	2	8	BDL	BDL	Type 3
PAHs Total		N/A	50	200	N/A	N/A	N/A	N/A	BDL	BDL	Type 3
Petroleum Hydrocarbons C6 to C9		N/A	650	2600	N/A	N/A	N/A	N/A			
Petroleum Hydrocarbons C10 to C36		N/A	10000	40000	N/A	N/A	N/A	N/A			
Phenols (total, non-halogenated)		N/A	560	2240	N/A	7	14	56	BDL	BDL	Type 3
Polychlorinated biphenyls	PCBs	N/A	12	48	N/A	0,025	0,05	0,2	BDL	BDL	Type 3
Styrene		N/A	120	480	N/A	1	2	8	BDL	BDL	Type 3
Tetrachloroethylene (Tetrachloroethene)		N/A	200	800	N/A	0,25	0,5	2	BDL	BDL	Type 3
Toluene		N/A	1150	4600	N/A	35	70	280	BDL	BDL	Type 3
Trichlorobenzenes (total)		N/A	3300	13200	N/A	3,5	7	28	BDL	BDL	Type 3
Trichloroethylene		N/A	11600	46400	N/A	0,25	2	8	BDL	BDL	Type 3
Vinyl chloride		N/A	1,5	6	N/A	0,015	0,03	0,12	BDL	BDL	Type 3
Xylenes (total)		N/A	890	3560	N/A	25	50	200	BDL	BDL	Type 3
2,4-D		0,05	120	480		1,5	3	3	BDL	BDL	Type 3
Aldrin + Dieldrin		0,05	1,2	4,8		0,015	0,03	0,03	BDL	BDL	Type 3
Chlordane		0,05	4	16		0,05	0,1	0,1	BDL	BDL	Type 3
DDT + DDD + DDE		0,05	50	200		1	2	2	BDL	BDL	Type 3
Heptachlor		0,05	1,2	4,8		0,015	0,03	0,03	BDL	BDL	Type 3



The results indicated the waste assesses as type 2 since the TDS concentration is above LCT1 but less than LCT2.

Type 2 waste may be disposed to a licensed Class A or B landfill.

Landfill Restrictions:

Waste Restricted or Prohibited in terms of Disposal	DCF Waste
(a) Waste which, in the conditions of a landfill, is explosive, corrosive, oxidising (according to SANS 10234 or SANS 10228)	n/a
(b) Waste with a pH < 6 or > 12	1.32
(c) Flammable waste with closed cup flash point of lower than 61 ^o Celsius	> 61 ^o C
(d) Reactive waste that may react with water, air, acids or components of the waste, or that could generate unacceptable amounts of toxic gases within the landfill	Not reactive
(e) Waste compressed gases (according to SANS 10234 or SANS 10228)	n/a
(f) Untreated Health Care Risk Waste (HCRW)	n/a
(g) (i) POP's pesticides listed under the Stockholm Convention	n/a
(ii) Other waste pesticides	n/a
(h) Lead acid batteries	n/a
(i) Other batteries	n/a
(j) Re-usable, recoverable or recyclable used lubricating mineral oils, as well as oil filters, but excluding other oil containing wastes	n/a
(k) Re-usable, recoverable or recyclable used or spent solvents	n/a
(l) PCB containing wastes (> 50mg/kg or 50ppm)	n/a
(m) Hazardous Waste Electric and Electronic Equipment (WEEE) - Lamps	n/a
(n) Hazardous Waste Electric and Electronic Equipment (WEEE) - Other	n/a
(o) Waste tyres: Whole	n/a
(p) Waste tyres: Quartered	n/a
(q) Liquid Waste -	
(i) Waste which has an angle of repose of less than 5 degrees, or becomes free-flowing at or below 61 ^o C, or when it is transported, or is not generally capable of being picked up by a spade or shovel; or	Sample is a Solid



(ii) Waste with a moisture content of > 40% or that liberates moisture under pressure in landfill conditions, and which has not been stabilised by treatment	Sample is a Solid
(r) Hazardous waste with a Calorific Value of:	
(i) > 25 MJ/kg	n/a
(ii) > 20 MJ/kg	n/a
(iii) > 10MJ/kg	n/a
(iv) > 6% TOC	n/a
(s) Brine or waste with a high salt content (TDS > 5%), and a leachable concentration for TDS of more than 100 000 mg/l	n/a
(t) Disposal of garden waste:	n/a
(i) 25% diversion from the baseline at a particular landfill of separated garden waste	n/a
(ii) 50% diversion from the baseline at a particular landfill of separated garden waste	n/a
(u) Infectious animal carcasses and animal waste	n/a

The sample triggers the landfill restriction for waste with a pH value of less than 6 pH units.

The waste must be treated to a pH value between 6 and 12 pH unit.

Conclusion:

1. DCF Waste classifies as hazardous due to the potential skin corrosion risk
2. Appropriate PPE must be worn when handling the material
3. An SDS is required for storage, transport and disposal
4. The sample assessed as type 2 due to the TDS concentration
5. Type 2 waste may be disposed at a licensed Class A or B landfill
6. The waste triggers the landfill restriction for waste with a pH value less than 6 pH units
7. The waste must be treated to a pH value between 6 and 12 pH units

Enviroserv Waste Management
3 Brickfield Road
Meadowdale
Germiston
Gauteng

Attention : Sarisha Dasrath
Date : 6th March, 2023
Your reference : Enviroserv Waste Analysis
Our reference : Test Report 23/117 Batch 1
Location :
Date samples received : 22nd February, 2023
Status : Final report
Issue : 1

One sample was received for analysis on 22nd February, 2023 and was scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:**Debbie van Wyk****Organics Laboratory:****Paloma Boo**
Technical Signatory (Organics)**Inorganics Laboratory:****Asakhe Dondolo**
Technical Signatory (Inorganics)

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Enviroserv Waste Management
Reference: Enviroserv Waste Analysis
Location:
Contact: Sarisha Dasrath
EMT Job No: 23/117

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	Sample ID	DS278731_Waste_Clariant Sasol Catalysts	Depth		COC No / misc		Containers	J	Sample Date	19/02/2023	Sample Type	Solid	Batch Number	1	Date of Receipt	22/02/2023	LOD/LOR	Units	Method No.
Antimony*	4																	<1	mg/kg	UK_TM30/UK_PM15
Arsenic*	30.1																	<0.5	mg/kg	UK_TM30/UK_PM15
Barium*	80																	<1	mg/kg	UK_TM30/UK_PM15
Cadmium*	<0.1																	<0.1	mg/kg	UK_TM30/UK_PM15
Chromium*	34.7																	<0.5	mg/kg	UK_TM30/UK_PM15
Cobalt*	1.7																	<0.5	mg/kg	UK_TM30/UK_PM15
Copper*	6																	<1	mg/kg	UK_TM30/UK_PM15
Lead*	<5																	<5	mg/kg	UK_TM30/UK_PM15
Manganese*	79																	<1	mg/kg	UK_TM30/UK_PM15
Mercury*	0.4																	<0.1	mg/kg	UK_TM30/UK_PM15
Molybdenum*	4.1																	<0.1	mg/kg	UK_TM30/UK_PM15
Nickel*	9.0																	<0.7	mg/kg	UK_TM30/UK_PM15
Selenium*	<1																	<1	mg/kg	UK_TM30/UK_PM15
Vanadium*	38																	<1	mg/kg	UK_TM30/UK_PM15
Boron (Aqua Regia Soluble)*	5.89																	<0.25	mg/kg	UK_TM30/UK_PM15
Zinc*	33																	<5	mg/kg	UK_TM30/UK_PM15

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Enviroserv Waste Management
Reference: Enviroserv Waste Analysis
Location:
Contact: Sarisha Dasrath
EMT Job No: 23/117

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3									LOD/LOR	Units	Method No.
Sample ID	DS278731_Waste_Clariant Sasol Catalysts											
Depth												
COC No / misc												
Containers	J											
Sample Date	19/02/2023											
Sample Type	Solid											
Batch Number	1											
Date of Receipt	22/02/2023											
Formaldehyde (water soluble)	78AA									<2	mg/kg	SA_TM51/SA_PM112
pH	NDP									<2.00	pH units	SA_TM19/SA_PM11

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Enviroserv Waste Management
 Reference: Enviroserv Waste Analysis
 Location:
 Contact: Sarisha Dasrath
 EMT Job No: 23/117

Report : ASLP (20:1)-Acetate pH 5 or 2.9

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3												LOD/LOR	Units	Method No.
Sample ID	DS278731_Waste_Clariant Sasol Catalysts														
Depth															
COC No / misc															
Containers	J														
Sample Date	19/02/2023														
Sample Type	Solid														
Batch Number	1														
Date of Receipt	22/02/2023														
Dissolved Antimony	9												<2	ug/l	UK_TM30/UK_PM14
Dissolved Arsenic	399.6												<2.5	ug/l	UK_TM30/UK_PM14
Dissolved Barium	572												<3	ug/l	UK_TM30/UK_PM14
Dissolved Boron	508												<12	ug/l	UK_TM30/UK_PM14
Dissolved Cadmium	<0.5												<0.5	ug/l	UK_TM30/UK_PM14
Dissolved Chromium	225.7												<1.5	ug/l	UK_TM30/UK_PM14
Dissolved Cobalt	49												<2	ug/l	UK_TM30/UK_PM14
Dissolved Copper	56												<7	ug/l	UK_TM30/UK_PM14
Dissolved Lead	<5												<5	ug/l	UK_TM30/UK_PM14
Dissolved Manganese	2609												<2	ug/l	UK_TM30/UK_PM14
Dissolved Mercury	<1												<1	ug/l	UK_TM30/UK_PM14
Dissolved Molybdenum	22												<2	ug/l	UK_TM30/UK_PM14
Dissolved Nickel	200												<2	ug/l	UK_TM30/UK_PM14
Dissolved Selenium	<3												<3	ug/l	UK_TM30/UK_PM14
Dissolved Vanadium	695.2												<1.5	ug/l	UK_TM30/UK_PM14
Dissolved Zinc	904												<3	ug/l	UK_TM30/UK_PM14
EPH (C10-C36)	<10												<10	ug/l	SA_TM5/SA_PM30
GRO (C6-C9)	<10												<10	ug/l	SA_TM36/SA_PM88

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Enviroserv Waste Management
Reference: Enviroserv Waste Analysis
Location:
Contact: Sarisha Dasrath
EMT Job No: 23/117

Report : ASLP (20:1)-Acetate pH 5 or 2.9

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3																					
Sample ID	DS278731_Waste_Clariant Sasol Catalysts																					
Depth																						
COC No / misc																						
Containers	J																					
Sample Date	19/02/2023																					
Sample Type	Solid																					
Batch Number	1																					
Date of Receipt	22/02/2023																					
											LOD/LOR	Units	Method No.									
SVOC MS																						
Other SVOCs																						
2,4-Dinitrotoluene	<0.5																			<0.5	ug/l	SA_TM16/SA_PM30
Hexachlorobutadiene	<1																			<1	ug/l	SA_TM16/SA_PM30
Nitrobenzene	<1																			<1	ug/l	SA_TM16/SA_PM30
Surrogate Recovery 2-Fluorobiphenyl	112																			<0	%	SA_TM16/SA_PM30
Surrogate Recovery p-Terphenyl-d14	115																			<0	%	SA_TM16/SA_PM30
PCBs (Total vs Aroclor 1254)	<0.2																			<0.2	ug/l	SA_TM17/SA_PM30
Total Phenols HPLC*	<0.15																			<0.15	mg/l	UK_TM26/UK_PM0
Sulphate as SO4*	<0.5																			<0.5	mg/l	UK_TM38/UK_PM0
Chloride*	<0.3																			<0.3	mg/l	UK_TM38/UK_PM0
Hexavalent Chromium*	0.084																			<0.006	mg/l	UK_TM38/UK_PM0
Nitrate as N*	<0.05																			<0.05	mg/l	UK_TM38/UK_PM0
Fluoride*	0.9																			<0.3	mg/l	UK_TM173/UK_PM0
Total Cyanide*	<0.01																			<0.01	mg/l	UK_TM89/UK_PM0
Pesticides																						
Organochlorine Pesticides																						
Aldrin	<10																			<10	ug/l	SA_TM42/SA_PM30
Dieldrin	<10																			<10	ug/l	SA_TM42/SA_PM30
Heptachlor	<10																			<10	ug/l	SA_TM42/SA_PM30
DDE (o,p & p,p)	<20																			<20	ug/l	SA_TM42/SA_PM30
DDT (o,p & p,p)	<20																			<20	ug/l	SA_TM42/SA_PM30
TDE (o,p & p,p)	<20																			<20	ug/l	SA_TM42/SA_PM30
Chlordane (cis & trans)	<20																			<20	ug/l	SA_TM42/SA_PM30
2,4-D	<30																			<30	ug/l	SA_TM42/SA_PM30
pH of leaching fluid	5.0																			<	pH units	NONE/SA_PM80
pH of leaching fluid	5.0																			<	pH units	NONE/SA_PM88
Formaldehyde	<0.5																			<0.5	mg/l	SA_TM51/SA_PM0
Total Dissolved Solids	17381																			<35	mg/l	SA_TM20/SA_PM80

Please see attached notes for all abbreviations and acronyms

Client Name: Enviroserv Waste Management
Reference: Enviroserv Waste Analysis
Location:
Contact: Sarisha Dasrath

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Method No.	NDP Reason
23/117	1	DS278731_Waste_Clariant Sasol Catalysts		1-3	SA_TM19/SA_PM11	Sample pH is acidic and not suitable for this test
23/117	1	DS278731_Waste_Clariant Sasol Catalysts		1-3	UK_TM38/UJK_PM20	Sample unsuitable for this test

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 23/117

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x2 Dilution

EMT Job No: 23/117

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
NONE	No Method Code	SA_PM80	A 20:1 ratio of leaching fluid to as received soil, is leached for 18 hours. The client can choose to use any of the following leaching fluids a) deionised water b) pH5 c) pH 5/pH2.9 depending on pH of sample d) pH9.2			AR	No
NONE	No Method Code	SA_PM88	A 20:1 ratio of deionised water to as received soil, is leached for 18 hours with zero headspace.				No
SA_PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	SA_PM0	No preparation is required.			AR	
SA_TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds by Headspace GC-MS.	SA_PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
SA_TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds by Headspace GC-MS.	SA_PM88	A 20:1 ratio of deionised water to as received soil, is leached for 18 hours with zero headspace.			AR	No
SA_TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	SA_PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.			AR	No
SA_TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	SA_PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
SA_TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	SA_PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.			AR	No
SA_TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	SA_PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
SA_TM19	Determination of pH by bench pH meter	SA_PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.			AR	No

EMT Job No: 23/117

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
SA_TM20	Modified BS 1377-3: 1990 Gravimetric determination of Total Dissolved Solids	SA_PM80	A 20:1 ratio of leaching fluid to as received soil, is leached for 18 hours. The client can choose to use any of the following leaching fluids a) deionised water b) pH5 c) pH 5/pH2.9 depending on pH of sample d) pH9.2			AR	No
SA_TM27	Major ions by Ion Chromatography	SA_PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using an orbital shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using an orbital shaker.			AD	Yes
SA_TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12, MTBE and BTEX by headspace GC-FID.	SA_PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
SA_TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12, MTBE and BTEX by headspace GC-FID.	SA_PM88	A 20:1 ratio of deionised water to as received soil, is leached for 18 hours with zero headspace.			AR	No
SA_TM42	Modified US EPA method 8270. Pesticides and herbicides by GC-MS	SA_PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.			AR	
SA_TM42	Modified US EPA method 8270. Pesticides and herbicides by GC-MS	SA_PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.			AR	No
SA_TM42	Modified US EPA method 8270. Pesticides and herbicides by GC-MS	SA_PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
SA_TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	SA_PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.			AR	No
SA_TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	SA_PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
SA_TM51	Formaldehyde determination by reaction with Ammonium Ions and acetylacetone which is analysed spectrophotometrically.	SA_PM0	No preparation is required.				

EMT Job No: 23/117

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
SA_TM51	Formaldehyde determination by reaction with Ammonium Ions and acetylacetone which is analysed spectrophotometrically.	SA_PM112	As received soils are extracted with deionised water in a 4:1 ratio			AR	Yes
UK_TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	UK_PM0	No preparation is required.				No
UK_TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	UK_PM0	No preparation is required.				No
UK_TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	UK_PM21B	As Received samples are extracted in Methanol: Water (60:40) by reciprocal shaker.				Yes
UK_TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	UK_PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.				No
UK_TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	UK_PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.				Yes
UK_TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	UK_PM0	No preparation is required.				No
UK_TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	UK_PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.				Yes
UK_TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	UK_PM0	No preparation is required.				No
UK_TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	UK_PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide and Thiocyanate analysis.				Yes



ENVIROSERV

WASTE MANAGEMENT

Enviroserv Waste Management (Pty) Limited
3 Brickfield Road, Meadowdale
Tel No.: 011 456 5400
Fax No.: 011 453 3032

Ref. No.: **278731_199828**

Issued at: Meadowdale

Date issued: 04 April 2023

Page 1 of 1

TEST REPORT

Results Reported Relate Only To Items Tested As Received

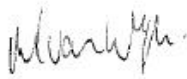
Client Name: Clariant Sasol Catalysts (Pty) Ltd
 Contact Info: Eugene Houndry Road North Industries Sasolburg
 Lab Sample ID: 278731-000001
 Customer Identification: DCF Waste
 Description of Sample: DCF Waste
 Physical State: Solid
 Condition of Sample: Sample was received in a suitable condition for analyses requested
 Sample Supplied by: Sample supplied by Customer
 Instructed by: Sarisha Dasrath
 Date Received: 12 January 2023
 Date Analysed: 04 April 2023
 Environmental Conditions: Environmental conditions were suitable for testing

Basis of Test: Analysis on a 1:2 Solid/ Water (m/m) extract of the sample as received

<u>Determinant</u>	<u>Method Detection Limit</u>	<u>Result</u>	<u>Units</u>
pH	1	1.32	N/A

Method Reference : SW846 US EPA Method 9045D

BDL: Below Detection Limit

Maretha van Wyk		Senior Laboratory Analyst	04 April 2023
Name and Surname	Signature	Designation	Date

Additions to deviations or exclusions from the method not applicable.
Disclaimer: Test report cannot be reproduced except in full without the written consent of Enviroserv Waste Management (Pty) Limited Laboratory Meadowdale who performed the tests. Opinions and interpretations expressed herein are outside of the scope of SANAS accreditation.