



11 September 2019
466169/SUTF

Umfoloji Sugar Mill (Pty) Ltd
Private Bag x12
Mtubatuba
3935

Attention: Ms. Gwen Wareham

Dear Madam,

Classification of Waste (MBD, SEP and BSA) in terms of the National Environmental Management: Waste Act (NEM:WA) (Act No. 59 of 2008) for the USM Site

1. Introduction

SRK Consulting (South Africa) (Pty) Ltd (SRK) is currently undertaking the Water Use Licence Application (WULA) and the Integrated Water and Waste Management Plan (IWMMP) on behalf of Umfolozi Sugar Mill (Pty) Ltd (USM) for submission to Department of Human Settlements and Water and Sanitation (DHSWS). DHSWS require all barrier systems for all the facilities containing contaminated water or material to be designed in accordance with GN 636. In order to determine the type of barrier system required, DHSWS require the waste to be classified in accordance with the National Norms and Standards for Assessment of Waste for Landfill Disposal as documented in GN 634.

In order to meet the DHSWS requirements, the Molasses Bladder Dam (MBD), Smuts Emergency Pond (SEP) and Bagasse Storage Area (BSA) have been classified according to the Standard Assessment Methodology (GN 634).

2. Sampling and Analysis

A sample from the MBD and SEP was couriered by USM to the SRK Westville office, who submitted the sample to Element Materials Technology. USM couriered a bagasse sample directly to Element Materials Technology. Copies of the laboratory certificates and accreditation details of the laboratory are included in Appendix A.

According to the National Norms and Standards for Assessment of Waste for Landfill Disposal, samples can be leached by two different processes, namely using reagent water or pH adjusted leaching fluid. Reagent water (deionised water) was used in the leaching process (AS4439.3 - Australian dredging guidelines). Parameters analysed in all samples were according to Section 6 of

Partners R Armstrong, S Bartels, N Brien, JM Brown, CD Dalgliesh, BM Engelsman, R Gardiner, M Hinsch, W Jordaan, WC Joughin, DA Kilian, S Kisten, F Lake, JA Lake, V Maharaj, I Mahomed, HAC Meintjes, MJ Morris, GP Nel, VS Reddy, T Shepherd, PJ Shepherd, MJ Sim, VM Simposya, JS Stiff, AT van Zyl, MD Wanless, ML Wertz, A Wood

Directors AJ Barrett, CD Dalgliesh, WC Joughin, V Maharaj, VS Reddy, PE Schmidt, PJ Shepherd

Associate Partners PJ Aucamp, CM Bauman, LSE Coetser, M du Toit, SG Jones, L Linzer, JI Mainama, L Nedeljkovic, RD O'Brien, S Reuther, M van Huyssteen, D Visser

Consultants JR Dixon, PrEng, GC Howell, PrEng, PhD, PR Labrum, PrEng, RRW McNeill, PrTech Eng, PN Rosewarne, PrSci Nat, MSc, AA Smithen, PrEng, TR Stacey, PrEng, DSc, PJ Terbrugge, PrSci Nat, MSc, HFJ Theart, PrSci Nat, PhD, DJ Venter, PrTech Eng

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South America



the National Norms and Standards for metal ions and inorganic anions. Organics and pesticides were excluded, as they are not expected to occur in the process. However, since the SEP contains liquid, leaching was not required.

3. Classification of Waste

Two waste samples were classified in terms of the National Environmental Management: Waste Act (NEM:WA) National Norms and Standards for Assessment of Waste for Landfill Disposal (Government Gazette 36784, 2013).

The following waste definitions are applicable:

- **LC** – the leachable concentration of a particular element or chemical substance concentration contaminant in a waste, expressed as mg/L.
- **LCT** – the leachable concentration threshold limit for a particular elements and chemical substances a waste, expressed as mg/L, prescribed in Section 6 of the Norms and Standards for the assessment of waste for landfill disposal. Threshold limits are provided at 4 levels for classification purposes as LCT0, LCT1, LCT2, LCT 3, with LCT0 being the lowest limit and LCT3 the highest.
- **TC** - Total concentration of a particular element or chemical substance in a waste, expressed as mg/kg.
- **TCT** - Total concentration threshold limit for a particular element or chemical substances in a waste, expressed as mg/kg, prescribed in Section 6 of the Norms and Standards for the assessment of waste for landfill disposal. Threshold limits are provided at three levels as TCT0, TCT1 and TCT2, with TCT0 being the lowest and TCT2 the highest.

Wastes are classified by type with Type 0 being the most hazardous and Type 4 being the least hazardous. These types are defined in terms of the total concentration (TC) and leachable concentration (LC) of any contaminate considered in the classification system as shown Table 1.

Table 1: Concentration limits defining waste types

Criteria	Waste Type	Landfill Disposal Requirement
$LC > LCT3$ or $TC > TCT2$	Type 0	No disposal - treatment and re-assessment required in terms of the Norms and Standards for Assessment of Waste for Landfill Disposal.
$LCT2 < LC \leq LCT3$ or $TCT1 < TC \leq TCT2$	Type 1	Class A
$LCT1 < LC \leq LCT2$ and $TC \leq TCT1$	Type 2	Class B
$LCT0 < LC \leq LCT1$ and $TC \leq TCT1$	Type 3	Class C
$LC \leq LCT0$ and $TC \leq TCT0$	Type 4	Class D
$TC > TCT2$ and $LC < LCT3$	Type 1	Class A
$LC < LCT0$, irrespective of TC	Type 3	Class C

4. Results of Analyses and Waste Classification

The MBD, SEP and BSA samples provided by USM were analysed and the waste type determined. The waste was assessed based on the results recorded in **Error! Reference source not found.** and Table 3.

Table 2: Results of Recorded Total Concentrations (TC) of the MBD and BSA

Elements and Chemical Substances in Waste	Threshold Limits			MBD	BSA
	TCT0	TCT1	TCT2	TC	TC
Metal ions					
Arsenic	5.8	500	2 000	<0.5	<0.5
Boron	150	15 000	60 000	3.37	9.67
Barium	62.5	6 250	25 000	10	6
Cadmium	7.5	260	1 040	<0.1	<0.1
Cobalt	50	5000	20 000	2.6	<0.5
Chromium	46 000	800 000	N/A	1.5	6.6
Hexavalent Chromium	6.5	500	2 000	<0.3	<0.3
Copper	16	19 500	78 000	3	4
Mercury	0.93	160	640	<0.1	<0.1
Manganese	1 000	25 000	100 000	59	30
Molybdenum	40	1 000	4 000	<0.1	<0.1
Nickel	91	10 600	42 400	3.7	1
Lead	20	1 900	7 600	<5	<5
Antimony	10	75	300	<1	<1
Selenium	10	50	200	1	<1
Vanadium	150	2 680	10 720	<1	2
Zinc	240	160 000	640 000	<5	8
Inorganic Anions					
TDS	-	-	-	-	-
Chloride	-	-	-	-	-
Sulphate	-	-	-	-	-
NO3 as N, Nitrate-N	-	-	-	-	-
Fluoride	100	10 000	40 000	<0.3	NDP
CN total	14	10 500	42 000	<0.5	<0.5

Units expressed as mg/kg

NDP - Sample contains compounds that interfere with this test

Table 3: Results of Recorded Leachable Concentrations (LC) of the MBD, SEP and BSA

Elements and Substances in Waste	Chemical	Threshold Limits				MBD	SEP	BSA
		LCT0	LCT1	LCT2	LCT3	LC	LC	LC
Metal ions								
Arsenic		0.01	0.5	1	4	0.0124	0.032	<0.0025
Boron		0.5	25	50	200	0.12	0.3	0.23
Barium		0.7	35	70	280	0.35	0.03	0.61
Cadmium		0.003	0.15	0.3	1.2	<0.001	<0.0005	0.0005
Cobalt		0.5	25	50	200	0.082	<0.002	0.002
Chromium		0.1	5	10	40	0.026	0.002	0.0035
Hexavalent Chromium		0.05	2.5	5	20	<0.006	<0.006	<0.006
Copper		2	100	200	800	0.092	<0.007	0.009
Mercury		0.01	0.3	0.6	2.4	<2	<0.001	<0.001
Manganese		0.5	25	50	200	1.966	1.03	0.161
Molybdenum		0.07	3.5	7	28	<0.004	0.003	<0.002
Nickel		0.07	3.5	7	28	0.12	0.004	0.002
Lead		0.01	0.5	1	4	<0.01	<0.005	0.005
Antimony		0.02	1	2	8	<0.004	<0.002	<0.002
Selenium		0.01	0.5	1	4	<0.006	<0.003	<0.003
Vanadium		0.2	10	20	80	0.01	0.009	0.0056
Zinc		5	250	500	2000	0.17	0.013	0.477
Inorganic Anions								
TDS		1 000	12 500	25 000	100 000	33 557	1031	608
Chloride		300	15 000	30 000	120 000	1 172	119	8
Sulphate		250	12 500	25 000	100 000	979	106	4.2
NO ₃ as N, Nitrate-N		11	550	1 100	4 400	0.81	0.2	<0.05
Fluoride		1.5	75	150	600	NDP	1.6	NDP
CN total		0.07	3.5	7	28	<0.01	<0.01	<0.01

Units expressed as mg/kg

NDP - Sample contains compounds that interfere with this test

5. Conclusions

In terms of the National Norms and Standards (Government Gazette 36784, 2013), the following waste types apply:

- MBD is classified as waste type 1.
- SEP is classified as waste type 3.
- BSA is classified as waste type 4.

In terms of the National Norms and Standards for Assessment of Waste for Landfill Disposal, the MBD classification as waste type 1. In reality, this is incorrect because molasses is mainly sugar ($\approx 75\%$) and water ($\approx 22\%$). The leachable TDS (33 557 mg/l) is from the dissolution of sugar (carbohydrates) that do not pose a risk to the environment since they will degenerate quickly to water, CO, CO₂ and

not from the metal ions or inorganic anions. Taking this into consideration the MBD is classified as a waste type 3.

The containment barrier design for the respective storage areas must comply with the minimum engineering design requirements as follows:

- MBD is classified as waste type 3 – Class C landfill.
- SEP is classified as waste type 3 – Class C landfill.
- BSA is classified as waste type 4 – Class D landfill.

SRK Consulting (South Africa) (Pty) Ltd

SRK Consulting - Certified Electronic Signature

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466169/43717/Letter Report
3508-5288-9893-SUTF-11/09/2019
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F Sutton (Pr. Sci. Nat.)
Principal Scientist

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S Kisten (Pr. Sci. Nat.)
Partner

Disclaimer

The opinions expressed in this Report have been based on the information supplied to SRK Consulting (South Africa) (Pty) Ltd (SRK). SRK has exercised all due care in reviewing the supplied information. Whilst SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them. Opinions presented in this report apply to the site conditions and features as they existed at the time of SRK's investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this Report, about which SRK had no prior knowledge nor had the opportunity to evaluate.

SRK Consulting
Norfolk House 54
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3630

Attention : Fiona Sutton
Date : 6th August, 2019
Your reference : 466169
Our reference : Test Report 19/633 Batch 1
Location : USM
Date samples received : 18th July, 2019
Status : Final report
Issue : 1

Three samples were received for analysis on 18th July, 2019 of which two were 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.

Analysis was undertaken at either Element Materials Technology UK, which is ISO 17025 accredited under UKAS (4225) or Element Materials Technology (SA) which is ISO 17025 accredited under SANAS (T0729) or a subcontract laboratory where specified.

NOTE: Under International Laboratory Accreditation Cooperation (ILAC), ISO 17025 (UKAS) accreditation is recognised as equivalent to SANAS (South Africa) accreditation.

Compiled By:



Aatifah Latief

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Element Materials Technology

Client Name: SRK Consulting
Reference: 466169
Location: USM
Contact: Fiona Sutton
EMT Job No: 19/633

Report : Solid

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

EMT Sample No.										Please see attached notes for all abbreviations and acronyms		
Sample ID	Molasses Bladder Dam											
Depth												
COC No / misc												
Containers	P											
Sample Date	17/07/2019											
Sample Type	Sludge (Solid)											
Batch Number	1											
Date of Receipt	18/07/2019									LOD/LOR	Units	Method No.
Antimony*	<1									<1	mg/kg	UK_TM30/UK_PM15
Arsenic*	<0.5									<0.5	mg/kg	UK_TM30/UK_PM15
Barium*	10									<1	mg/kg	UK_TM30/UK_PM15
Cadmium*	<0.1									<0.1	mg/kg	UK_TM30/UK_PM15
Chromium*	1.5									<0.5	mg/kg	UK_TM30/UK_PM15
Cobalt*	2.6									<0.5	mg/kg	UK_TM30/UK_PM15
Copper*	3									<1	mg/kg	UK_TM30/UK_PM15
Lead*	<5									<5	mg/kg	UK_TM30/UK_PM15
Manganese*	59									<1	mg/kg	UK_TM30/UK_PM15
Mercury*	<0.1									<0.1	mg/kg	UK_TM30/UK_PM15
Molybdenum*	<0.1									<0.1	mg/kg	UK_TM30/UK_PM15
Nickel*	3.7									<0.7	mg/kg	UK_TM30/UK_PM15
Selenium*	1									<1	mg/kg	UK_TM30/UK_PM15
Vanadium*	<1									<1	mg/kg	UK_TM30/UK_PM15
Boron (Aqua Regia Soluble)*	3.37									<0.25	mg/kg	UK_TM30/UK_PM15
Zinc*	<5									<5	mg/kg	UK_TM30/UK_PM15
Hexavalent Chromium*	<0.3									<0.3	mg/kg	UK_TM38/UK_PM20
Total Cyanide*	<0.5									<0.5	mg/kg	UK_TM89/UK_PM45
Fluoride*	<0.3									<0.3	mg/kg	UK_TM173/UK_PM20

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 19/633

SOILS

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.

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.

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.

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.

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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.

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.
++	Result outside calibration range, results should be considered as indicative only and are 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
AB	x5 Dilution

EMT Job No: 19/633

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_PM31	Sample is filtered				
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_PM0	No preparation is required.				
UK_TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	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_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.				
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.				
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

SRK Consulting
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Westville
Kwa-Zulu Natal
South Africa
3630

Attention : Fiona Sutton
Date : 28th August, 2019
Your reference : 466169
Our reference : Test Report 19/633 Batch 2
Location : USM
Date samples received : 19th August, 2019
Status : Final report
Issue : 1

One sample were received for analysis on 19th August, 2019 of which one were 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.

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Compiled By:**Aatifah Latief****Inorganics Laboratory:****Musa Tiki****Technical Signatory (Inorganics)**

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NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 19/633

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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.

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.

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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.

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.
++	Result outside calibration range, results should be considered as indicative only and are 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

EMT Job No: 19/633

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_PM0	No preparation is required.				
UK_TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	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_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