J. MULLER

LABORATORIES (PTY) LTD

Reg. No.80/04037/07

P.O. BOX 511,
PAARDEN EILAND 7420
REP. OF SOUTH AFRICA
TELEPHONE: 27-021-5118301/2
FAX: 27-021-5103800
E-mail: jmlabs@iafrica.com

ANALYTICAL CHEMISTS

OFFICE & LABORATORIES AT:
30 MARINE DRIVE
PAARDEN EILAND 7405
REP. OF SOUTH AFRICA

Our Ref LN706869-SGEN-02

Date of Issue: 27 JUNE 1997

Certificate of Analysis

This is to certify that the samples listed below were analysed

SUBMITTED BY: SETPLAN
BOX 3405, CAPE TOWN, 8000
ATTENTION: MR VAN DER WESTHUIZEN

SAMPLE TYPE: WATER

SAMPLE MARKS: 01 A
02 B
03 C

DATE SAMPLE RECEIVED: 17 JUNE 1997
DATE ANALYSIS STARTED: 19 JUNE 1997
DATE ANALYSIS COMPLETED: 26 JUNE 1997

Analysis relates only to the sample/s tested.

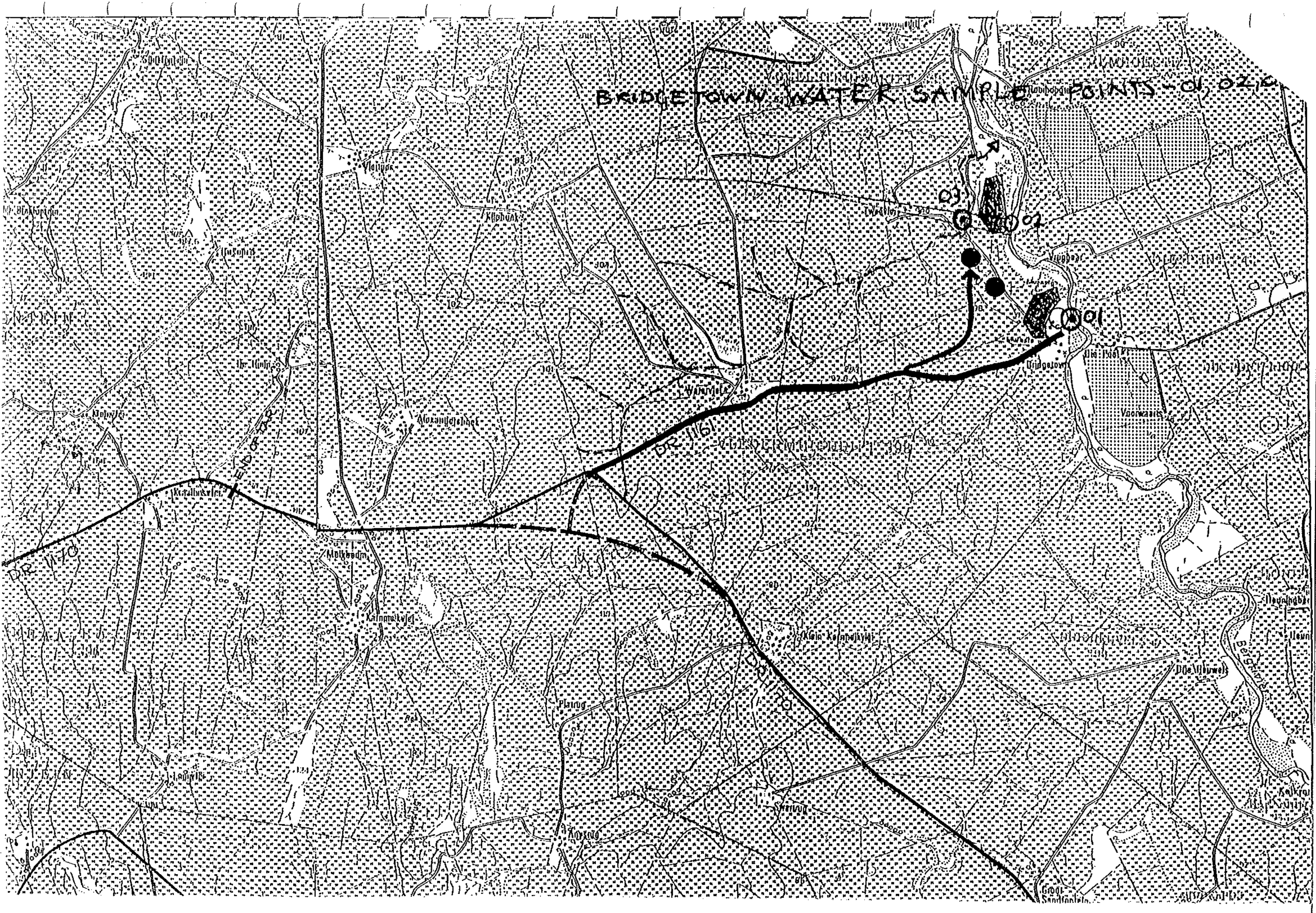
APHA 19TH EDITION METHOD NO		SAMPLE RESULTS 01	02	03
4500-H⁺ B	pH Value	6,20	6,19	8,56
2510 B	Conductivity mS/m @ 25°C	27,8	33,9	1288
2330 B	Saturation Index @25°C	minus 3,81	minus 3,17	plus 1,51
			mg/L	
2510 A	Total Dissolved Solids @ 180°C	167	203	7728
3500 -Ca D	Calcium (Ca)	11	13	305
3500-Mg E	Magnesium (Mg)	6	6	322
2340 C	Total Hardness ($CaCO_3$)	52	57	2077
3500-Na B	Sodium (Na)	35	42	2152
4500-Cl B	Chlorides (Cl)	63	66	3916
2320-B	Total Alkalinity ($CaCO_3$)	21	34	286
	Bicarbonates (HCO_3)	25	40	342
	Carbonates (CO_3)	Nil	Nil	Nil
	Hydroxides (OH)	Nil	Nil	Nil
4500-SO_4 B	Sulphates (SO_4)	16	20	942

COMMENTS:

1. Sample 01 and sample 02 have negative Saturation Index's and should have the tendency to dissolve Calcium Carbonate.
2. Sample 03 has positive Saturation Index and should deposit Calcium Carbonate.

ANALYST (C.JOHNSON)

LAB MANAGER (S.TERRY)



BRIDGETOWN WATER SAMPLE POINTS
01
02
03
DR 1161
DR 1170
DR 1170
END OF ROAD

LIME SALES LTD

Reg. No. 1949/033856/06

VOORSIENERS VAN LANDBOUKALK EN INDUSTRIëLEKALK
SUPPLIERS OF AGRICULTURAL LIME & INDUSTRIAL LIME

POSBUS
PO BOX 160
MILNERTON
7435
TEL : 021 552-3090
FAKS/FAX: 021 551-3761

3 August 2009

ATT: Mr. van Zyl
Depart. Of Water Affairs
Private Bag X16
Sanlamhof
7532

Dear Mr. van Zyl

RE: SUBMISSION OF DATA FOR YOUR CONSIDERATION FOR AN AUTHORIZATION TO ABSTRACT WATER FROM THE BRIDGETOWN DOLOMITE MINE AND PUMP THE SUB-STANDARD WATER INTO A SIDE-STREAM OF THE BERG RIVER.

Following on from your conversation with our Mr. D. Rees on 24th July 2009 I would like to present the following information for your consideration.

1. **BACKGROUND**

The Bridgetown Dolomite Mine J/V situated adjacent to the Berg River at Bridgetown commenced mining metallurgical grade dolomite in 1998 for the Arcelor Mittal Steel plant at Saldanha Bay. Since 2004 we have been abstracting ground water from the quarry in order to continue the mining operation. The abstracted ground water is discharged into an adjacent saline (brak) side stream which is normally dry. The abstracted water seeps into the stream bed and does not reach the Berg River except during winter storms when the stream is in spate.

In 2004/2005 we discussed the situation with your regional manager, Mr. R. Khan at several meetings and he advised that we should first acquire more information regarding the quality of the ground water and the volumes involved and then re-approach the Department of Water Affairs regarding an application for authorization or a permit to abstract the ground water until mining is completed.

We subsequently commenced to monitor the various parameters and now consider that reasonably stable conditions apply and a decision can be taken regarding the matter of abstracting the quarry water.

2. MONOTORING 2004/5 TO 2009

2.1 At four monthly intervals we have sampled:-

(i) the Berg river both upstream and downstream of the Bridgetown operations
(ii) the quarry water extracted from the sump situated at the lowest point in the quarry
(iii) two water boreholes situated immediately to the west and east of the quarry

All the above water samples have been analysed by the CSIR in Stellenbosch.

2.2 In addition, flow-meters were installed on the pipeline abstracting water from the Berg River to our dolomite crushing and washing plant and the pipeline abstracting the quarry ground water to waste.

The monitoring data, chemical analyses of the water samples and a map showing the monitoring points is enclosed together with this letter.

3. RELEVANT INFORMATION

3.1 Life of Mine (at present production rates and present mine plan)

The Bridgetown mining operations will be conducted in 2 phases viz.

(i) The present phase 1 quarry will continue until 2029 down to the 7m a.m.s.l. elevation.
(ii) A second phase 2 quarry will commence when the phase 1 quarry is mined out. This second quarry situated ± 2km to the south of phase 1 will continue to be mined to about 2040 and it is also expected to yield sub-standard ground water which will have to be abstracted to waste.

Because dolomite in the Western Cape is a scarce commodity it should be considered that if in 2029 the ingress of ground water into the phase 1 quarry is not excessive, then this quarry may be mined deeper because deeper ore reserves have already been proved. If this proves to be the case, both phase 1 and phase 2 quarries will continue to be mined for a longer period of time.

3.2 Summary of Monitoring Work

For convenience the monitoring work we have done is summarised below together with applicable comments.

- Daily average of water extracted from the Berg River for industrial purposes at our mineral processing plant is 96 cubic metres per day (ie. 35 040 m^3 per year, we have a permit to extract 73 000 m^3 per year from the Berg River)

- Daily average of ground water discharged to the side stream is 169m^3 per day (ie 61 685m^3 per year)

- Daily average of sub-standard quarry water (ground water) used on haul roads for dust suppression is 20 m^3 per day.

- The quality of the quarry water (ground water) is sub-standard, and it is too low for use in the mineral processing plant because it will cause serious corrosion problems with the mechanical equipment. (see samples QW in enclosed report)

- The discharged quarry water only reaches the Berg River when the side-stream and the Berg River are in spate in winter storm conditions.
- The discharged quarry water seeps into the bed of the side-stream
- Upstream and downstream samples from the Berg River (samples BRU and BRD) show that the river is not polluted by the discharge of ground water into the side-stream.
- The quality of the water in the side stream is worse than the quarry water except when the side stream is in spate.(see samples SS in enclosed report)
- The quality of the western water monitoring borehole (sample WBW) is considerably more inferior to the eastern water monitoring borehole (sample WBE) because WBW is located in phyllite rock and WBE is situated in dolomite rock.
- It is unlikely that the quarry ground water would improve in quality during the life of the mine. The quality of the ground water appears to have stabilized at present levels.
- The volume of ground water pumped from the quarry may gradually increase as the quarry is deepened and the draw-down increases.
- Unless the ground water is pumped out of the quarry, dolomite mining will not be able to continue at the site.
- The water table lies at about 11m below the land surface at monitoring boreholes WBW and WBE. The quarry sump is presently at 16m elevation above mean sea level and the surrounding land varies between 42m to 50m elevation above mean sea level.

I trust that the enclosed data will enable you to assess the water situation at Bridgetown so that an acceptable conclusion can be made regarding the abstraction of the quarry ground water.

Should you wish to visit the site or require any further information please advise me accordingly.

I am enclosing an extra copy of this letter for your Regional Manager, Mr. Kahn.

Yours faithfully

J. Katzeff
Director

cc Regional Manager Department of Water Affairs
D. Rees

BRIDGETOWN DOLOMITE MINE
JOINT VENTURE

PO BOX 160
MILNERTON
7435
18 MARCONI ROAD
MONTAGUE GARDENS
7441

TEL: (021) 552-3090
FAKS/FAX: (021) 551-3761

17 December 2008

WATER MONITORING AND WATER QUALITY AT BRIDGETOWN DOLOMITE MINE

1. BACKGROUND

1.1 Pumping

Intermittent pumping of the seepage water in the quarry to the western side-stream commenced in the winter of 2001. As the quarry deepened after 2001 the pumping during winter became routine.

Regular pumping of the seepage water started in the 2004 winter, and since January 2005 flow-meters were installed to measure the daily volumes pumped into the side-stream and the amount of water utilized for damping the roads at Bridgetown.

1.2 Water Chemistry

Sporadic water samples of the seepage water were taken and analysed in 2000, and at that stage the chlorides were low (viz. 380, 220 and 200 mg/l).

BDM J/V wrote to the DWA & F at that stage to obtain a permit to pump the water out of the quarry. However, as the DWA & F wanted more details of volumes and the chemistry of the water, it was decided to wait until these parameters could be determined.

In March 2005 in conjunction with Kumba Technologists it was decided that the seepage water situation had become reasonably stable, and for the first time reliable parameters of the water qualities in and around the quarry and the pumping rates could be measured. A comprehensive water sampling system was then instituted.

2. RATIONALE

This report is only intended to collate the relevant data we have confirmed to date so that it is available for consideration.

It is recommended that we continue assembling the data until at least April 2008 and then approach the DWA & F for a permit, because I think another full year's data would be a more reliable benchmark for a permit application

3. WATER MONITORING BOREHOLE

To monitor the quality of the water below the water-table and the depth of the water-table on either side of the quarry two boreholes were drilled in April 2006 and fitted with slotted PVC stand-pipes and capped for protection. The positions of these 2 boreholes are shown on the attached map. They are positioned so that the enlarging quarry will not interfere with the borehole monitoring until the end of the life of the quarry.

4. OBSERVATIONS FROM DATA TO DATE (See Tabulations of Water Chemistry and Pumping Rates)

4.1 The quality of the seepage water (samples QW) into the quarry sump has deteriorated since 2000 but has not yet stabilised. The reduction in quality is due to seepage water originating from the phyllites situated to the west of the quarry. The quality of this water also varies considerably.

4.2 The quality of the western side stream (samples 55) is very poor, in keeping with similar streams in the Boland. Adding quarry water (QW) to this stream lessens its impact on the Berg River in winter. This stream only flows in winter after heavy rain. When quarry water is discharged in summer into this "dry stream" it soaks away into the soil and rock and does not reach the Berg River.
The side stream is no longer sampled (ie 55).

4.3 "Surface water", ie rainfall collecting in pools (ie samples SW) on the land surface becomes rapidly contaminated by the topsoil. This water "runs off" into adjacent streams and to the Berg River.
The surface water is no longer sampled (ie SW).

4.4 The quality of the chemical water in the Berg River is better in summer than in winter. This is due to the poor quality of the winter "run-off" water from the streams in the Boland.

4.5 The daily volume of water seeping into the quarry exceeds the daily volume of water extracted from the Berg River for dolomite production purposes by an average of 89 kl per day.

4.6 There is little evidence that the rate of seepage water flowing into the quarry is slowly reducing.

4.7 The chemical quality of the "quarry seepage water" is slightly better in winter than in summer. This is due to the dilution effect of rainwater. Nevertheless, the quality of this water is very likely to cause corrosion if it is used in the plant production process instead of Berg River water.

4.8 The water monitoring boreholes (WBW and WBE) indicate clearly that the chemical quality of the phreatic water west of the quarry is worse than the phreatic water to the east of the quarry. Although both boreholes are in dolomite rock, the proximity of the phyllite west of the quarry is the main source of contamination of the water seeping into the quarry.

4.9 The elevations of the water table is being reliably and accurately monitored in borehols WBW and WBE.
At WBE the water table is at 27,81 m.a.m.s.l. (ie 11,05m below land surface).
At WBE the water table is at 25,85 m.a.m.s.l. (ie 11,55m below land surface).

4.10 At present the Bridgetown Quarry is planned to be deepened to the 7m elevation. This is 9m below the present sump floor at 16m elevation. When this work commences in say 2 to 3 years time, it is expected that the volumes of seepage water will increase due to the greater "draw-down". Furter deepening of the quarry in say 20 years time will again increase the volumes of seepage water.

4.11 The daily average amount of water pumped from the quarry sump over 4 year period since measurements were commenced is 184 kilolitres per day.

The following table give all the water analyses at Bridgetown and the volumes of water pumped from the quarry and Berg River for the period 10/01/2005 to date.

The enclosed map illustrates the localities at which water samples and or measurements have been collected.

D.W. Rees
c.c. J. Katzeff
K. Msimango
SPH Bridgetown
S. van der Westhuizen
Department of Water Affairs and Forestry

The following Table sets out the volumes of water managed at the project:

: VOLUMES OF WATER UTILISED AT THE PROJECT

PERIOD	PUMPED FROM BERG RIVER IN (kl.)	PUMPED FROM QUARRY SUMP (kl.)	DISCHARGED TO SIDE STREAM (kl.)	QUARRY WATER USED ON ROADS (kl.)
Jan 2005 to Dec 2005	36 930	67 991	60 896	7 231
Daily average	94	186	167	20
Jan 2006 to Dec 2006	31 533	65 202	57 939	7 534
Daily average	86	179	159	21
Jan 2007 to Dec 2007	34 516	79 936	72 779	7 161
Daily average	93	215	196	21
Jan 2008 to Dec 2008	37 181	62 050	55 580	7 740
Daily average	102	170	152	21
Jan 2005 to Dec 2008	140 160	275 179	247 194	29 666
Daily average	96	188	169	20

The above results show a very steady extraction rate from the Berg River of around 96 Kl. per day. This extraction rate is directly related to the production rate of processed metallurgical grade dolomite of ±157 000 t.p.a.

The volume of ground water pumped from the quarry to the side stream over the 3 year period is also reasonably uniform at 169 kl per day. The higher 2007 figure is due to the higher rainfall and run-off for that year and the expanding quarry area.

CHEMICAL RESULTS OF WATER SAMPLES AT BRIDGETOWN

SAMPLE ID. BRU = BERG RIVER UPSTREAM

SAMPLE ID	BRU	BRU	BRU	BRU	BRU	BRU	BRU	BRU	BRU	BRU	BRU
SAMPLE DATE	12/12/04	15/07/05	31/08/05	4/11/05	24/05/06	11/11/06	28/03/07	26/02/08	25/06/08	22/12/08	21/04/09
Potassium mg/ℓ	0.2	3.6	2.9								
Sodium mg/ℓ	17	29	31								
Calcium mg/ℓ	5.1	8.1	8.4								
Magnesium mg/ℓ	3.6	5.4	6.3								
Sulphate SO4 mg/ℓ	6	17	14								
Chloride as Cl mg/ℓ	27	48	51	47	26	45	25	27.1	20.0	3.5	32.0
Alkalinity as CaCO3 mg/ℓ	21	21	26								
Nitrate plus nitrite as Nmg/ℓ	<0.1	2.1	1.2								0.3
Conductivity mS/m (25°C)	15	25	27	26	14	24	15	15.0	11.5	20	15
pH (20°C)	6.8	7.0	7.3					6.8	7.1	7.2	6.7
Saturation pH (pH5)(20°C)	9.5	9.3	9.2								
TDS (Calc.) mg/ℓ	96	160	173	139	90	154	96	96	74	128	96
Hardness as CaCO3 mg/ℓ	28	42	47								
Sodium absorption ration (SAR)	1.4	1.9	2.0								
% Difference	0.87	4.06	1.03								
Cations meq/ℓ	1.30	2.18	2.36								
Anions meq/ℓ	1.31	2.27	2.33								

SAMPLE ID. BRD = BERG RIVER DOWNSTREAM

SAMPLE ID	BRD	BRD	BRD	BRD	BRD	BRD	BRD	BRD	BRD	BRD
SAMPLE DATE	15/07/05	31/08/05	04/11/05	24/05/06	15/11/06	28/03/07	26/02/08	25/06/08	22/12/08	21/04/09
Potassium mg/ℓ	3.7	2.9								
Sodium mg/ℓ	36	32								
Calcium mg/ℓ	9.3	8.4								
Magnesium mg/ℓ	6.5	6.4								
Sulphate SO4 mg/ℓ	19	14								
Chloride as Cl mg/ℓ	60	53	49	24	50	25	25	25	42	35
Alkalinity as CaCO3 mg/ℓ	22	26								
Nitrate plus nitrite as Nmg/ℓ	1.9	1.2								0.2
Conductivity mS/m (25°C)	30	27	31	13	25	15	15.0	14.0	20	16
pH (Lab) (20°C)	6.8	7.1					6.6	6.9	7.0	6.6
Saturation pH (pH5)(20°C)	9.3	9.2								
TDS (Calc.) mg/ℓ	192	173	148	83	160	93	96	90	128	102
Hardness as CaCO3 mg/ℓ	50	47								
Sodium absorption ration (SAR)	2.2	2.0								
% Difference	0.09	0.93								
Cations meq/ℓ	2.67	2.41								
Anions meq/ℓ	2.68	2.39								

SAMPLE ID	QW QUARRY SUMP														
SAMPLE DATE	07/03/00	21/07/00	24/07/00	12/12/04	26/04/05	18/07/05	31/08/05	04/11/05	24/05/06	15/11/06	28/03/07	26/02/08	25/06/08	22/12/08	21/04/09
Potassium mg/ℓ				30		5.8	5.3		10	4.0	13	17.1	12.1	16	12.3
Sodium mg/ℓ	111	157	123	690	NaCl 3300ppm	555	544		941	517	1040	966.7	780	808	607
Calcium mg/ℓ				143		118	112		162	117	148	145.8	137	141	127
Magnesium mg/ℓ				156		111	117		167	117	187	185.8	153	174	151
Sulphate SO4 mg/ℓ				239		191	188		345	167	381	343.8	255	152	25.0
Chloride as Cl mg/ℓ	380	220	200	1317		1015	967	2000	1738	944	1975	1705	1383	1540	1343
Alkalinity as CaCO3 mg/ℓ				352		278	285		336	276	334	304	310	443	298
Nitrate plus nitrite as Nmg/ℓ				16		14	14		8.9	16	7.5	9.31	9.01	12	9.2
Conductivity mS/m (25°C)	201	213	177.7	480	666.6	390	382	680	630	382	660	600	580	580	520
pH (Lab) (20°C)		8.5	8.62	7.3		7.8	8.0		7.4	7.8	7.6	7.6	8.2	7.8	8.1
Saturation pH (pH5)(20°C)				7.0		7.1	7.2		6.9	7.1	7.0	7.0	7.0	6.9	7.1
TDS (Calc.) mg/ℓ	1286	1363	1137	3072		2496	2445	4441	3898	2445	4224	3840	3712	3712	3328
Hardness as CaCO3 mg/ℓ				999		754	762		1090	772	1140	1129	971	1070	940
Sodium absorption ration (SAR)				9.5		8.8	8.6		12.4	8.1	13.4	12.5	10.9	10.75	8.6
% Difference				0.91		0.52	3.14		0.94	3.38	3.68	4.95	4.83	1.06	1.15
Cations meq/ℓ				50.75		39.37	39.02		62.97	38.01	68.34	65.05	53.65	56.95	45.52
Anions meq/ℓ				50.30		39.16	37.83		63.56	36.76	70.86	61.98	51.18	56.35	45.01

WATERBOREHOLE EAST (WBE)

WBE is a permanent properly installed borehole for collecting uncontaminated water samples and for testing water table elevations situated east of quarry.

SAMPLE ID	WBE	WBE	WBE	WBE	WBE	WBE	WBE
SAMPLE DATE	24/05/06	15/11/06	28/03/07	26/02/08	25/06/08	22/12/08	21/04/09
Potassium mg/ℓ							
Sodium mg/ℓ							
Calcium mg/ℓ							
Magnesium mg/ℓ							
Sulphate SO4 mg/ℓ							
Chloride as Cl mg/ℓ	289	189	204	200	237	203	121
Alkalinity as CaCO3 mg/ℓ							
Nitrate plus nitrite as Nmg/ℓ							5.2
Conductivity mS/m (25°C)	173	138	135	136.0	130	140	130
pH (20°C)	7.0			7.9	8.2	7.8	7.9
Saturation pH (pH5)(20°C)							
TDS (Calc.) mg/ℓ	1072	883	864	870	832	896	832
Hardness as CaCO3 mg/ℓ							
Sodium absorption ration (SAR)							
% Difference							
Cations meq/ℓ							
Anions meq/ℓ							

WATERBOREHOLE WEST (WBW)

WBW is a permanent properly installed borehole for collecting uncontaminated water samples and for testing water table elevations situated west of quarry.

SAMPLE ID	WBW	WBW	WBW	WBW	WBW	WBW	WBW
SAMPLE DATE	24/05/06	15/11/06	28/03/07	26/02/08	25/06/08	22/12/08	21/04/09
Potassium mg/ℓ							
Sodium mg/ℓ							
Calcium mg/ℓ							
Magnesium mg/ℓ							
Sulphate SO4 mg/ℓ							
Chloride as Cl mg/ℓ	1543	533	1366	1265	1350	993	963
Alkalinity as CaCO3 mg/ℓ							
Nitrate plus nitrite as Nmg/ℓ							11.1
Conductivity mS/m (25°C)	565	555	530	500	560	445	410
pH (20°C)	7.4			7.5	8.0	7.4	7.5
Saturation pH (pH5)(20°C)							
TDS (Calc.) mg/ℓ	3977	3552	3392	3200	3584	2848	2624
Hardness as CaCO3 mg/ℓ							
Sodium absorption ration (SAR)							
% Difference							
Cations meq/ℓ							
Anions meq/ℓ							

Chemical Results of Water Samples Bridgetown – Side Stream SS

Sample ID	* SS	+ SS								Sample No SS
Sample Date	15/07/05	31/08/05								
Potassium mg/l	66	42								
Sodium mg/l	3320	2187								
Calcium mg/l	233	144								
Magnesium mg/l	397	253								
Sulphate mg/l	1463	865								
Chloride mg/l	5434	3525								
Alkalinity as CaCO3 mg/l	338	325								
Nitrate plus nitrite as Nmg/l	<0,1	<0,1								
Conductivity mS/m (25°C)	1750	1160								
PH (Lab) (20°C)	7,9	8,4								
Saturation pH (pH5)(20°C)	6,8	7,0								
TDS (Calc.) mg/l	11200	7424								
Hardness as CaCO3 mg/l	2216	1402								
Sodium absorption ratio (SAR)	30,7	25,4								
% Difference	0,06	0,22								
Cations meq/l	190,39	124,21								
Anions meq/l	190,50	123,94								

Conditions

* Water only just trickling

\+ Water running slowly

Chemical Results of Water Samples Bridgetown – Surface Water

Sample ID	* SW	+ SW								Sample No SW
Sample Date	15/07/05	31/08/05								
Potassium mg/l	18	26								
Sodium mg/l	37	42								
Calcium mg/l	40	13								
Magnesium mg/l	14	5,9								
Sulphate mg/l	10	7,3								
Chloride mg/l	27	28								
Alkalinity as CaCO3 mg/l	199	128								
Nitrate plus nitrite as Nmg/l	<0,1	<0,1								
Conductivity mS/m (25°C)	45	37								
PH (Lab) (20°C)	8,1	7,8								
Saturation pH (pH5)(20°C)	7,7	8,4								
TDS (Calc.) mg/l	288	236								
Hardness as CaCO3 mg/l	157	57								
Sodium absorption ratio (SAR)	1,3	2,4								
% Difference	4,19	3,40								
Cations meq/l	5,19	3,63								
Anions meq/l	4,99	3,51								

Conditions

* Roadside pool 1 week after rain

\+ Vlei conditions 2 days after rain

The following results of the quality of the Berg River immediately below the Misverstand Dam are given for further comparison purposes. The analyses were done in 2000 and 2001 by a local laboratory which is not accredited.

	EC mS/m	SS mg/l	Na mg/l	Mg mg/l	Cl mg/l	N mg/l	SO4 mg/l	PH
15-Jul-00	33	12	36	250	63	3.00	35	7.60
18-Jul-00	65							
19-Jul-00	31							
20-Jul-00	18							
21-Jul-00	58							
23-Jul-00	96	12	340	700	256	4.00	24	7.30
24-Jul-00	37							
25-Jul-00	44							
08-Aug-00	21							
05-Sep-00	61							7.66
07-Sep-00	41	0	50	350	104	2.50	26	7.71
10-Sep-00	31							
18-Sep-00	57							
10-Jul-01	33	0	90	57	2.7	5.00	35	9.12
11-Jul-01	40	0	75	68	2.4	3.50	31	9.68
12-Jul-01	32							
13-Jul-01	70							
16-Jul-01	70							
17-Jul-01	61							
18-Jul-01	70	0	75	57		3.90	26	8.91
19-Jul-01	49							
20-Jul-01	43							
23-Jul-01	53							
24-Jul-01	61							
26-Jul-01	55							
27-Jul-01	62	0	75	57	1.9	4.00	30	9.89
29-Jul-01	59							
30-Jul-01	58							
31-Jul-01	59							
01-Aug-01	73							
02-Aug-01	57							
03-Aug-01	50							
21-Aug-01	39							
22-Aug-01	52							
23-Aug-01	44							
24-Aug-01	43							
27-Aug-01	86							
28-Aug-01	28							
29-Aug-01	28	0	1250	41	1.2	2.5	22	10.09
30-Aug-01	33							
31-Aug-01	79							

CSIR
our future through science
Tel: (+27) 21 888 2400/2433
Fax: (+27) 21 888 2630

sanas Testing Laboratory
T0093

CSIR Implementation Unit
Jan Celliers Street
Stellenbosch, 7600
P O Box 320
Stellenbosch, 7599

Chemistry Laboratory - Stellenbosch

Certificate of Analysis

Report NO: SAL-2019-14420
Customer: Lime Sales Limited
Address: P O Box 160
Milnerton 7435

Contact: Georgia Aukett
Phone: 022 433 3008 Fax: 086 607 8962
Email: anthea@sphgroup.co.za

Sample Description: Water samples in 1L plastic bottles with white lids
No of Samples 5
Sample Condition: Room Temperature
Date Received: 20-May-2019
Date Completed: 3-Jun-19
Order No:

Sample Disposal
a) Liquid Sample One Month - After issuing of final Certificate of Analysis
b) Solid Sample Three Months - After issuing of final Certificate of Analysis

Lab No		1914420-94178FW	1914420-94179FW	1914420-94180FW	1914420-94181FW	1914420-94182FW
Sample Date						
Sample ID		BRD	BRU	WBE	WBW	QW
Analysis	**Unit**					
Potassium as K Dissolved	mg/l					7.2
Sodium as Na Dissolved	mg/l					620
Calcium as Ca Dissolved	mg/l					127
Magnesium as Mg Dissolved	mg/l					135
Sulphate as SO4 Dissolved	mg/l					189
Chloride as Cl Dissolved	mg/l	56	40	157	920	1140
Alkalinity as CaCO3	mg/l					272
Electrical Conductivity	mS/m (25°C)	23	20	84	370	440
pH (Lab) (20°C)		7.2	6.6	7.8	8.2	8.0
Saturation pH (pHs) (20°C) *						7.1
Total dissolved salts (Calc) *	mg/l	147	128	538	2368	2816
Hardness as CaCO3 *	mg/l					873
Sod Ad Ratio - (SAR) *						9.1
Ryznar Index *						6.2
Indication (Ryznar 1942)						6,0 - 7,0 Little scale or corrosion
Total Dissolved Salts (Measured) *	mg/L			515	2442	2744
% Difference (Standard Method) *						3.6
CATIONS meq/L *						44.6
ANIONS meq/L *						41.5
Abs Difference *						-3.07

Remarks: * Method is not SANAS accredited and is not included in the SANAS Schedule of accreditation for this laboratory.
Opinions and interpretations expressed herein are outside the scope of SANAS accreditation.

Sebastian Brown - Technical Manager

Efraim Fieland - Technical Signatory

Date Printed
13-Jun-2019

CSIR
our future through science
Tel: (+27) 21 888 2400/2433
Fax: (+27) 21 888 2630

sanas Testing Laboratory
T0093

CSIR Implementation Unit
Jan Celliers Street
Stellenbosch, 7600
P O Box 320
Stellenbosch, 7599

Chemistry Laboratory - Stellenbosch

Certificate of Analysis

Report NO: SAL-2019-14420
Customer: Lime Sales Limited
Address: P O Box 160
Milnerton 7435

Contact: Georgia Aukett
Phone: 022 433 3008 Fax: 086 607 8962
Email: anthea@sphgroup.co.za

Sample Description: Water samples in 1L plastic bottles with white lids
No of Samples 5
Sample Condition: Room Temperature
Date Received: 20-May-2019
Date Completed: 3-Jun-19
Order No:

		1914420-94178FW	1914420-94179FW	1914420-94180FW	1914420-94181FW	1914420-94182FW
		BRD	BRU	WBE	WBW	QW
Ca Hardness as CaCO₃ *	mg/L					317
Mg Hardness as CaCO₃ *	mg/L					556

Remarks: * Method is not SANAS accredited and is not included in the SANAS Schedule of accreditation for this laboratory.
Opinions and interpretations expressed herein are outside the scope of SANAS accreditation.

Sebastian Brown - Technical Manager

Efraim Fieland - Technical Signatory

Date Printed
13-Jun-2019

End of Report

*Note: * Marks Parameters not included in Scope of Accreditation*

Fresh-, Potable- & Effluent Samples	
Ammonia & Soluble Phosphate in mg/L	(SALM.6.0 Flow Injection Colorimetry)
*Nitrate + Nitrite, *Nitrite in mg/L	(SALM.7.0 & SALM.8.0 Flow Injection Colorimetry)
*Total phosphate in mg/L	(SALM.10 & MALS6.4 ICP OES Detection)
pH	(SALM.2.0 Electrometric measurement)
Electrical Conductivity in mS/m	(SALM.3.0 Electrometric measurement)
Alkalinity as CaCO3 in mg/L	(SALM.5.0 Potentiometric titration)
Calcium, Magnesium, Potassium, Sodium, Sulphate in mg/L	(MALS6.5-A ICP OES Detection)
Chloride in mg/L	(SALM.1.0 (Flow Injection Colorimetry)
*Fluoride in mg/L	(SALM.29 Potentiometric measurement)
Dissolved & Total Organic Carbon in mg/L	(SALM.25 Thermocatalytic oxidation)
*Turbidity in NTU	(SALM.22 Turbidimetric measurement)
*Colour	(SALM.35 Spectrophotometric method)
*Chemical Oxygen Demand in mg/L	(SALM28.0 HACH method)
*Kjeldahl nitrogen in mg/L	(SALM.13 Distillation & Titrimetric method)
*Total dissolved solids in mg/L	(SALM.26 Gravimetric Measurement)
*Suspended Solids in mg/L	(SALM.19 Gravimetric Measurement)
*Volatile suspended solids in mg/L	(SALM.19 Thermal Ignition & Gravimetric Measurement)
*Fats, Oils & Greases in mg/L	(SALM.18 Solvent Extraction, Gravimetric Measurement)
Aluminium, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, in mg/L	(MALS6.4 ICP OES Detection)
Chromium, Cobalt, Copper, Iron, Lead, Manganese, Molybdenum, Nickel, in mg/L	(MALS6.4 ICP OES Detection)
Strontium, Selenium, Vanadium, Zinc in mg/L	(MALS6.4 ICP OES Detection)
*Silica, *Tin in mg/L	(MALS6.4 ICP OES Detection)
Arsenic, Antimony, Beryllium, Cadmium, Cobalt, Copper, Lead, Manganese in µg/L	(SALM 20 ICP MS Detection)
Mercury, Nickel, Selenium, Uranium, Vanadium, Zinc in µg/L	(SALM 20 ICP MS Detection)
*Chromium, *Tin in µg/L	(SALM 20 ICP MS Detection)
*Hexavalent Chromium (Cr6+) in mg/L	(SALM.29 Colorimetric method)
*Chlorophyll a in µg/L	(SALM.31 Solvent extraction and UV detection)
*Cyanide in mg/L	(SALM.27 Colorimetric method)
*Hydrogen Sulphide in mg/L	(SALM.30 Iodometric titration)
*Ammonia via Distillation in mg/L	(SALM.34 Distillation & Titration)
*Total Nitrogen in mg/L	(SALM.36 Thermocatalytic oxidation)
*Mercury in µg/L	(SALM.32 Direct Mercury Analysis)
*UV Absorbance @ 254nm	(SALM.39 Spectrophotometric Measurement)
*Free Chlorine	(SALM.41 DPD Colorimetric method)
*Bromine in mg/L	(SALM.46 ICP MS Detection)
Seawater and High Saline samples	
pH	(SALM.2.0 Electrometric measurement)
Electrical Conductivity in mS/m	(SALM.3.0 Electrometric measurement)
Alkalinity as CaCO3 in mg/L	(SALM.5.0 Potentiometric titration)
Calcium, Magnesium, Potassium, Sodium, Sulphate in mg/L	(MALS6.5 ICP OES Detection)
Chloride in mg/L	(SALM.1.0 Flow Injection Colorimetry)
*Fluoride in mg/L	(SALM.29 Potentiometric measurement)
Dissolved & Total Organic Carbon in mg/L	(SALM.25 Thermocatalytic oxidation)
*Turbidity in NTU	(SALM.22 Turbidimetric measurement)
*Colour	(SALM.35 Spectrophotometric method)
*Chemical Oxygen Demand in mg/L	(SALM.28 HACH method)
*Total dissolved solids in mg/L	(SALM.26 Gravimetric Measurement)
*Suspended Solids in mg/L	(SALM.19 Gravimetric Measurement)
*Volatile suspended solids in mg/L	(SALM. 19 Thermal Ignition & Gravimetric Measurement)
*Fats, Oils & Greases in mg/L	(SALM.18 Solvent Extraction, Gravimetric Measurement)
*Arsenic, *Antimony, *Beryllium, *Cadmium, *Cobalt, *Copper, *Lead, in µg/L	(SALM 20 ICP MS Detection)
*Aluminium, *Manganese ,*Mercury, *Nickel, *Selenium, *Uranium, in µg/L	(SALM 20 ICP MS Detection)
*Vanadium, *Zinc, *Chromium, *Tin in µg/L	(SALM 20 ICP MS Detection)
*Hexavalent Chromium (Cr6+) in mg/L	(SALM.29 Colorimetric method)
*Chlorophyll a in µg/L	(SALM.31 Solvent extraction and UV detection)
*Cyanide in mg/L	(SALM.15 Colorimetric method)
*Hydrogen Sulphide in mg/L	(SALM.30 Iodometric titration)

*Note: * Marks Parameters not included in Scope of Accreditation*

Sediment & Soil samples	
Sample Preparation (Drying, Ball Milling, Microwave digestion)	(MALS.4.5 Microwave digestion)
Arsenic, Cadmium, Cobalt, Copper, Iron, Lead, Manganese, Nickel, Zinc in mg/kg	(MALS6.2 ICP OES Detection)
*Aluminium, *Barium, *Beryllium, *Chromium, *Selenium, *Strontium in mg/kg	(MALS6.2 ICP OES Detection)
*Titanium, *Phosphorus, *Sulphur, *Silica in mg/kg	(MALS6.2 ICP OES Detection)
*Arsenic, *Cadmium, *Cobalt, *Copper, *Lead, *Manganese, *Nickel, *Zinc in µg/kg	(SALM.44 ICP MS Detection)
*Beryllium, *Chromium, *Selenium, *Antimony, *Titanium in µg/kg	(SALM.44 ICP MS Detection)
*Mercury in µg/kg	(SALM.32 Direct Mercury Analyser)
*Moisture Content in %	(SALM.40 Gravimetric Measurement)
*Lost on Ignition in %	(SALM.40 Thermal Ignition & Gravimetric Measurement)
*Acid Volatile Sulphides in mmol/kg	(SALM.16 Acid Stripping and Iodometric Titration)
*Total & Organic Carbon and Nitrogen in %	(SALM.48 Elemental Analyser)
*Particle Size Analysis in %	(SALM.17 Gravel, sand and Mud)
Biological Tissue & Plant samples	
Sample Preparation (Drying, Ball Milling, Microwave digestion)	(MALS.4.5 Microwave digestion)
Arsenic, Cadmium, Cobalt, Copper, Iron, Nickel, Manganese, Selenium in mg/kg	(MALS.6.3 ICP OES detection)
Vanadium, Zinc in mg/kg	(MALS.6.3 ICP OES detection)
*Aluminium, *Barium, *Beryllium, *Chromium, *Silica, *Strontium, *Sulphur in mg/kg	(MALS6.3 ICP OES Detection)
*Phosphorus, *Titanium in mg/kg	(MALS6.3 ICP OES Detection)
*Arsenic, *Cadmium, *Cobalt, *Copper, *Iron, *Nickel, *Manganese, in µg/kg	(SALM.44 ICP MS detection)
*Aluminium, *Antimony, *Barium, *Vanadium, *Zinc, *Beryllium in µg/kg	(SALM.44 ICP MS detection)
*Chromium,*Phosphorus, *Silica, *Strontium, *Sulphur, *Titanium, *Uranium in µg/kg	(SALM.44 ICP MS detection)