

DUSTWATCH CC

Company registration Number : 2008/134744/23

| P.O. BOX 1810 Sun Valley 7985 Republic of South Africa |

| Tel: 021 785 6999 | Fax: 0866 181 421 | Cell: 082 875 0209 |

| info@dustwatch.com | www.dustwatch.com |

Bridgetown Dolomite Mine J/V

P O Box 160

Milnerton

For attention: **Mr. David Rees – DUST FALL-OUT MONITORING PROGRAMME**
Summary report.

1 INTRODUCTION

This report will summarise the fallout dust data collected at Bridgetown Dolomite Mine from March 2000 to December 2008.

There are two units installed at Bridgetown, namely the DuPont unit and the Bquarry unit.

Samples are collected every two weeks and monthly reports (28 days) are generated.

2 LEGISLATIVE STANDARDS

The fall-out dust standards from STANDARDS SOUTH AFRICA are shown in the table below.
(SANS 1929:2005)

Classification	Dustfall (mg/m ² /day) – averaged over 30 days.	Permitted frequency of exceeding the levels.
Target – long-term average	300	Long-term average (Annual)
Action – residential	600	Three within any year, no two sequential months.
Action – industrial	1200	Three within any year, no two sequential months.
Alert threshold	2400	None. First time exceeded, triggers remediation and reporting to authorities.

Table 1: Dustfall Standards SANS (2005)

The industrial action level of 1200 mg/m²/day is the action level that is applicable to both of the DustWatch units.

3 RESULTS

The DuPont unit is a two-bucket unit positioned to indicate dust being exported from the mine and dust being imported to the mine.

The Bridgetown DustWatch unit is a four bucket unit with buckets facing north, south, east and west.

The export bucket from the DuPont unit and the South Bucket from the Bquarry unit are the buckets that indicate the dust being exported from Bridgetown Dolomite mine and is indicative of the dust being generated by the activities taking place at the mine.

The DuPont unit started Monitoring in March 2000, while the Bquarry unit data starts in May 2002. The Bquarry unit was originally in a different position, but the unit was not providing meaningful results and so was moved to its current position.

Graphs in the Appendix show all the data collected at both of the DustWatch units. The red annual moving average trend line is the main indicator of the progress made by Bridgetown over the years, from a dust control point of view.

4 COMMENTS AND CONCLUSIONS

The fallout dust levels at the DuPont DustWatch unit have decreased from approximately 420 mg/m²/day to approximately 160 mg/m²/day. This is below the legislated long-term target of 300 mg/m²/day. The only result above 1200 mg/m²/day was collected in the cycle of the 23 February 2002, when the export bucket collected 1558 mg/m²/day. To apply this to the legislation, the average of two cycles has to be used and after this calculation, the industrial action level of 1200 mg/m²/day was not exceeded during the 28 day month of 23 February 2002.

The fallout dust levels at the Bquarry DustWatch unit have decreased from approximately 390 mg/m²/day to approximately 320 mg/m²/day. The lowest annual moving average achieved was approximately 200 mg/m²/day in February 2008, and the highest annual moving average was approximately 480 on the 9 March 2004. The south bucket exceeded the industrial action level of 1200 mg/m²/day three times, with the monthly average result being above 1200 mg/m²/day on one occasion during the 28 day month of 6 December 2008.

The legislation allows for one month to be above the industrial action level of 1200 mg/m²/day provided that consecutive months do not exceed the limit.

Bridgetown dolomite mine has shown continuous improvement from March 2000 to December 2008 with regard to the fallout dust levels. People working on the site are aware and being proactive with regard to dust control measures.



Gerry F. Kuhn
(FMVS, MSAIOH,
Grad SE)

Richard Kuhn

Richard F. Kuhn
(MSAIOH, COM Air
quality analyst
AMVS)



Chris Loans
(BSc Chemical
Engineer, Pr Eng)

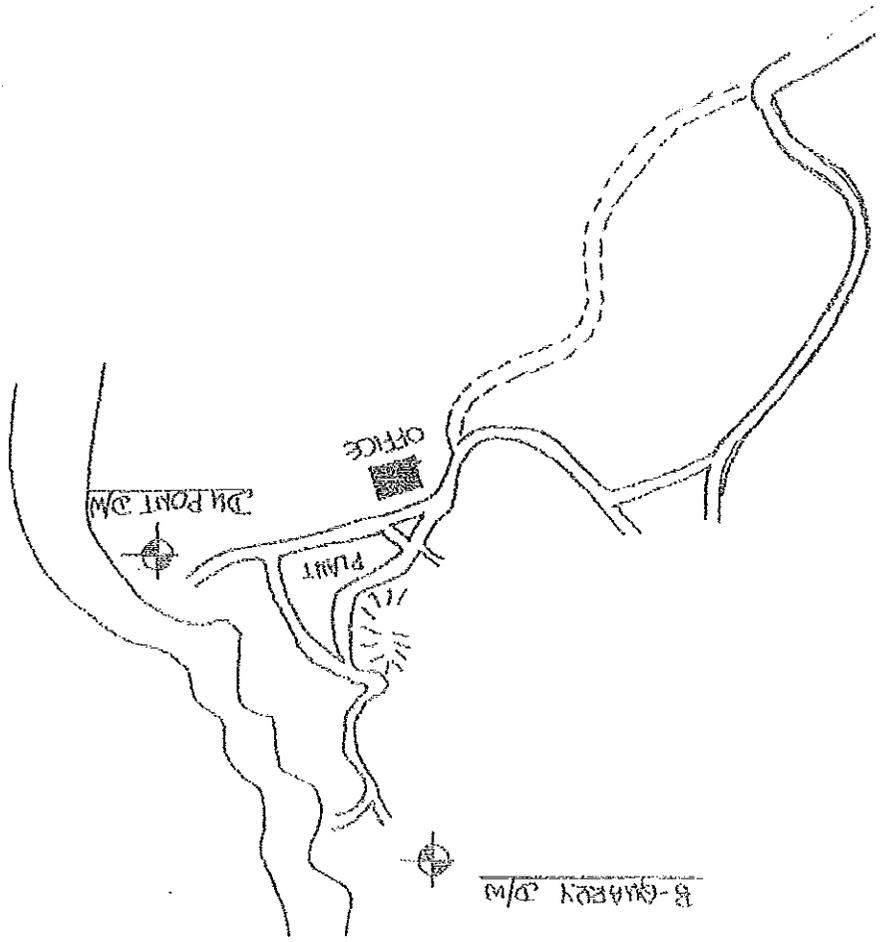


Suzanne Booyesen
Laboratory
Technician

Cape Town, 12 February 2009

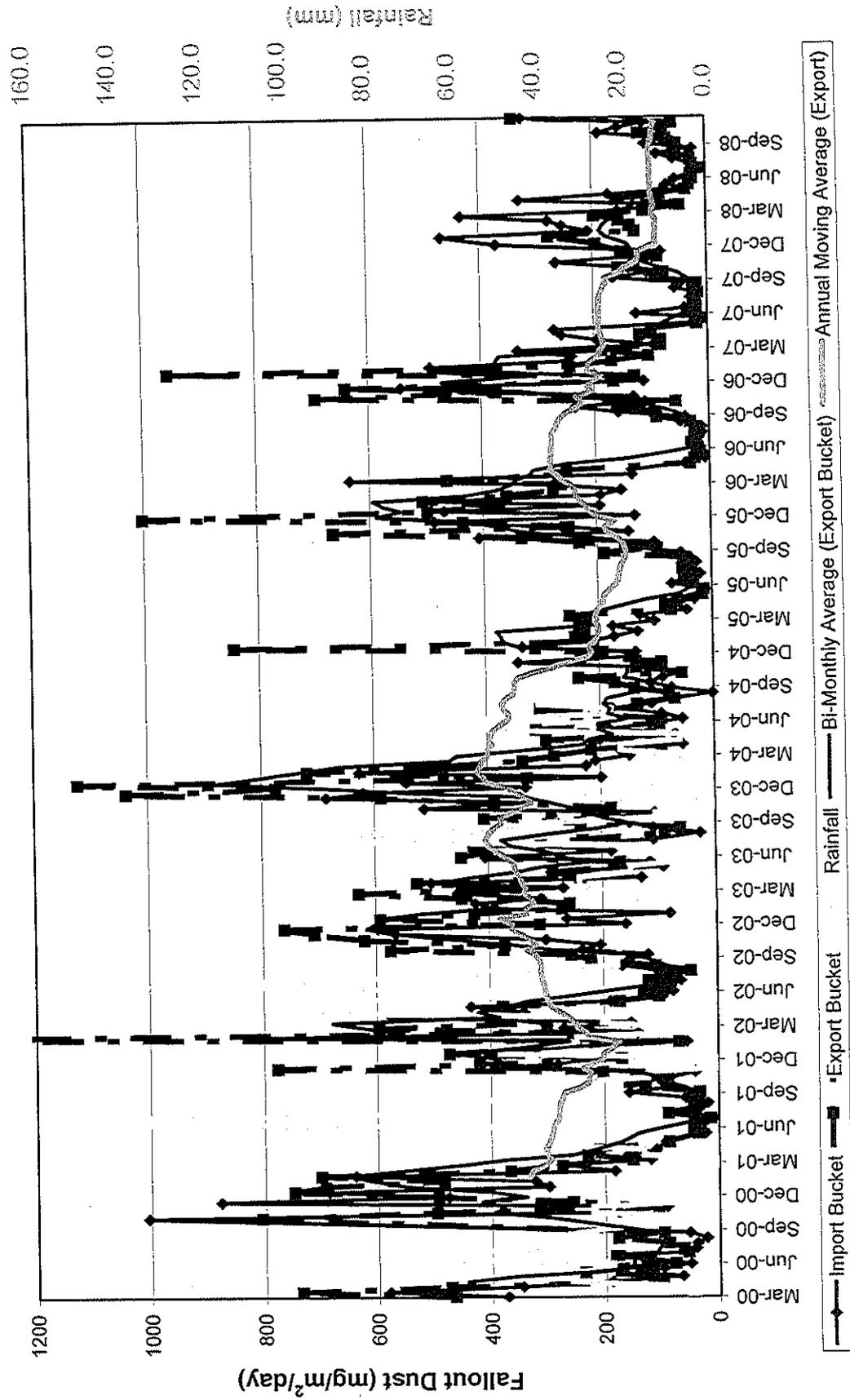
TOTAL 6 BUCKETS

MAP OF POSITIONS FOR DISTRICTS
AT BRIDGETOWN DOLOHITE

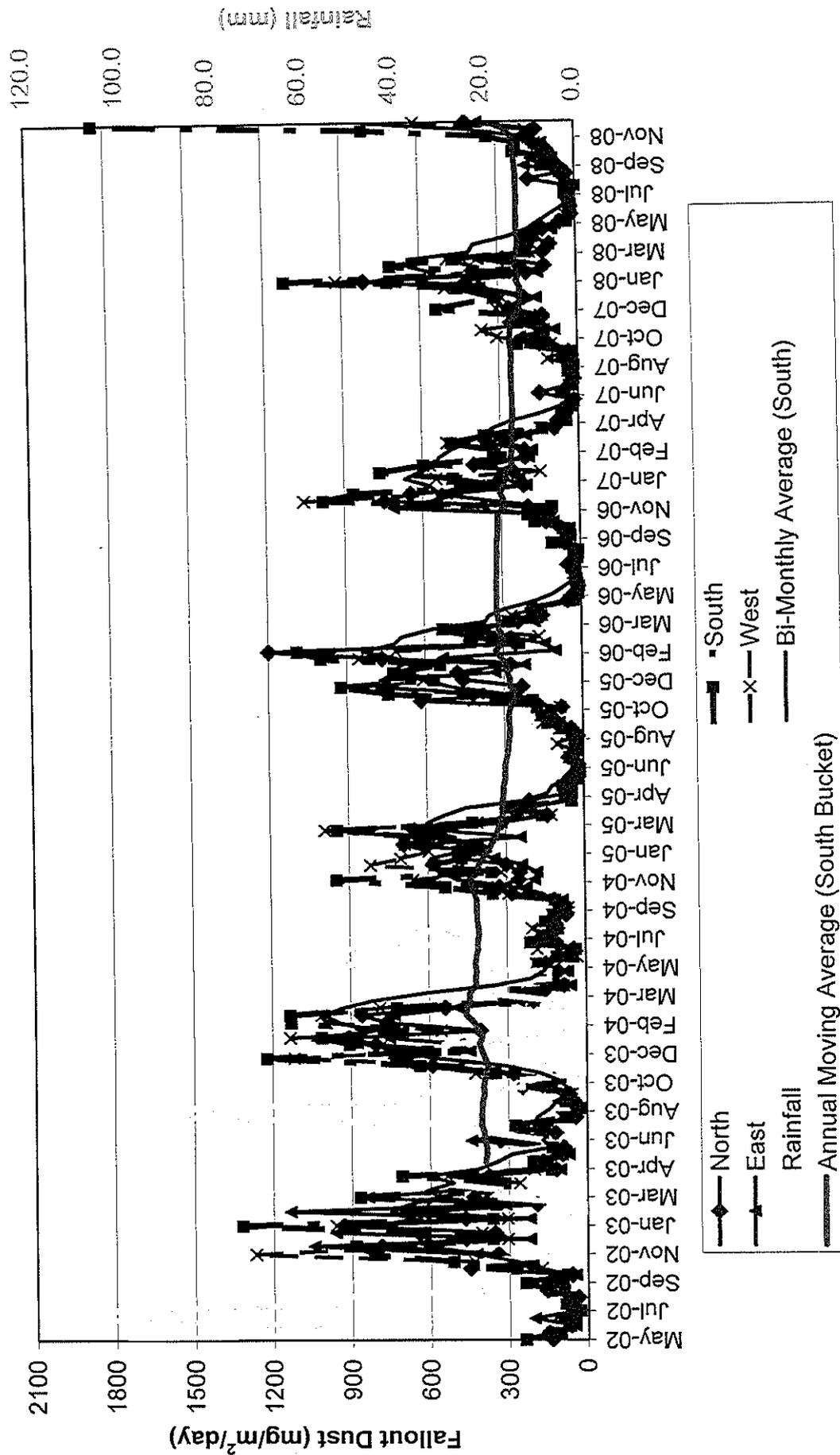


5 APPENDIX

Graph 1: Bridgetown duPont Unit



Graph 2: Bridgetown Bquarry Unit Results





DUSTWATCH
Dust Monitoring Specialists

DUSTWATCH CC

Company Registration Number : 2008/134744/23

| P.O. Box 1810 Sun Valley 7985, Republic of South Africa |

| Tel: 021 789 0847 | Fax: 086 618 1421 | Cell: 082 875 0209 |

| info@dustwatch.com | www.dustwatch.com |

SPH Kundalila Pty Ltd

P.O. Box 128

Saldanha

7395 (T:+27 21 527 5200 ; F:+27 21 527 5255 ; E: jean.m@sphgroup.co.za)

For attention: Jean Martin

Mr. Jean Martin – DUST FALL-OUT MONITORING PROGRAMME FOR THE PERIOD 13 April to 13 May 2019

1 INTRODUCTION

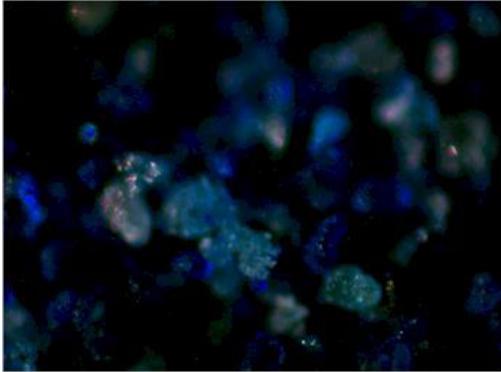
This report covers a 30-day period.

The unit design and methodology are based on the ASTM D1739 standard. Additional information is available in the DustWatch manual. Please contact us to enquire about the latest version of the manual; chris@dustwatch.com

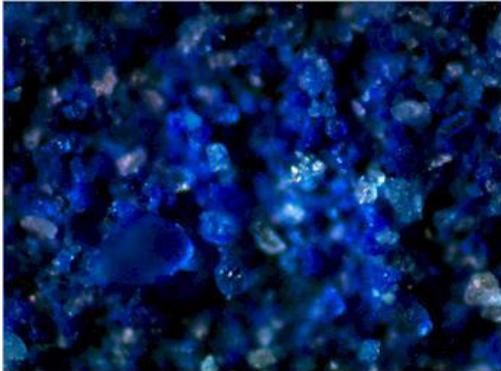
The area used in the calculations for the single bucket units is 0.02061m². The height of the bucket is twice the diameter.

The area of the bucket for the Smit unit is 0.022966m².

2 MICROSCAN PHOTOGRAPHS - HISTORICAL



Photograph 1: Smuts Filter - 75642 - East - High Haematite



Photograph 2: Smuts Filter 75643 - West

3 UNIT NAMES AND POSITIONS

The four single bucket units are named Smit, Office, Workshop and Dam. GPS positions for the single bucket units will be added when they are available.

The Position of the Smit DustWatch unit is 33 Deg 05 Min 22 Sec South and 18 Deg 49 Min 46 Sec East.

4 COMMENT ON THE RESULTS

The fall-out dust standards from National Dust Control Regulations, 2013.

Restriction Areas	Dustfall rate (D) (mg/m²/day) – averaged over 30 days.	Permitted frequency of exceeding dust fall rate
Residential area	D < 600	Two within a year, not sequential months.
Non-residential area	D < 1200	Two within a year, not sequential months.

Table 1: Acceptable Dust Fall Rates – National Dust Control Regulations, 2013.

The Smit unit yielded 506 and 132 mg/m²/day in this period.

The Office single bucket unit yielded 432 and 82 mg/m²/day, collected in the first and second cycle respectively.

The Workshop single bucket unit yielded 496 and 931 mg/m²/day, collected in the first and second cycle respectively.

The Dam single bucket unit yielded 918 and 52 mg/m²/day, collected in the first and second cycle respectively.

The results remained below 120 mg/m²/day in this period and are not a concern. Well done to those responsible.

The compliance table for **2019** is shown below.

Weather data has been added to this report from the closest reliable weather station. This is shown at the end of the report.

Unit name	Residential or Non-residential Area	Applicable Compliance - Dustfall rate (D) (mg/m²/day) – averaged over 30 days.	Non-compliant or compliant. Two within a year, not sequential months.
Smit	(Non-residential)	D < 1200	Compliant in this period. Compliant for the year. No exceedance.
Office (Single)	(Non-residential)	D < 1200	Compliant in this period. Compliant for the year. No exceedance.
Workshop (Single)	(Non-residential)	D < 1200	Compliant in this period. Compliant for the year. No exceedance
Dam (Single)	(Non-residential)	D < 1200	Compliant in this period. Non-compliant for the year. Exceedance in Jan, Feb

Table 2: Compliance Table **2019**

5 FILTER DESCRIPTION

A brief description of the dust on the filters is provided in the table.



Gerry F. Kuhn (FMVS,
MSAIOH, Grad SE)

**Richard
Kuhn**

Richard F. Kuhn
(MSAIOH, COM Air
quality analyst
AMVS)



Chris Loans
(BSc Chemical
Engineer, Pr Eng)

Piketberg, Doc Number: 0519211402: Date: 21-May-19

Appendix: Meteoblue.com Weather Information - Weather – Montague gardens (Nearest weather station)

Western Cape, South Africa, 33.87°S 18.52°E 19m (PPC Montague Gardens - Geoname)

Below is the data for this period 13 April to 13 May 2019. This is the Period for this report. (2019-04-13 to 2019-05-13)

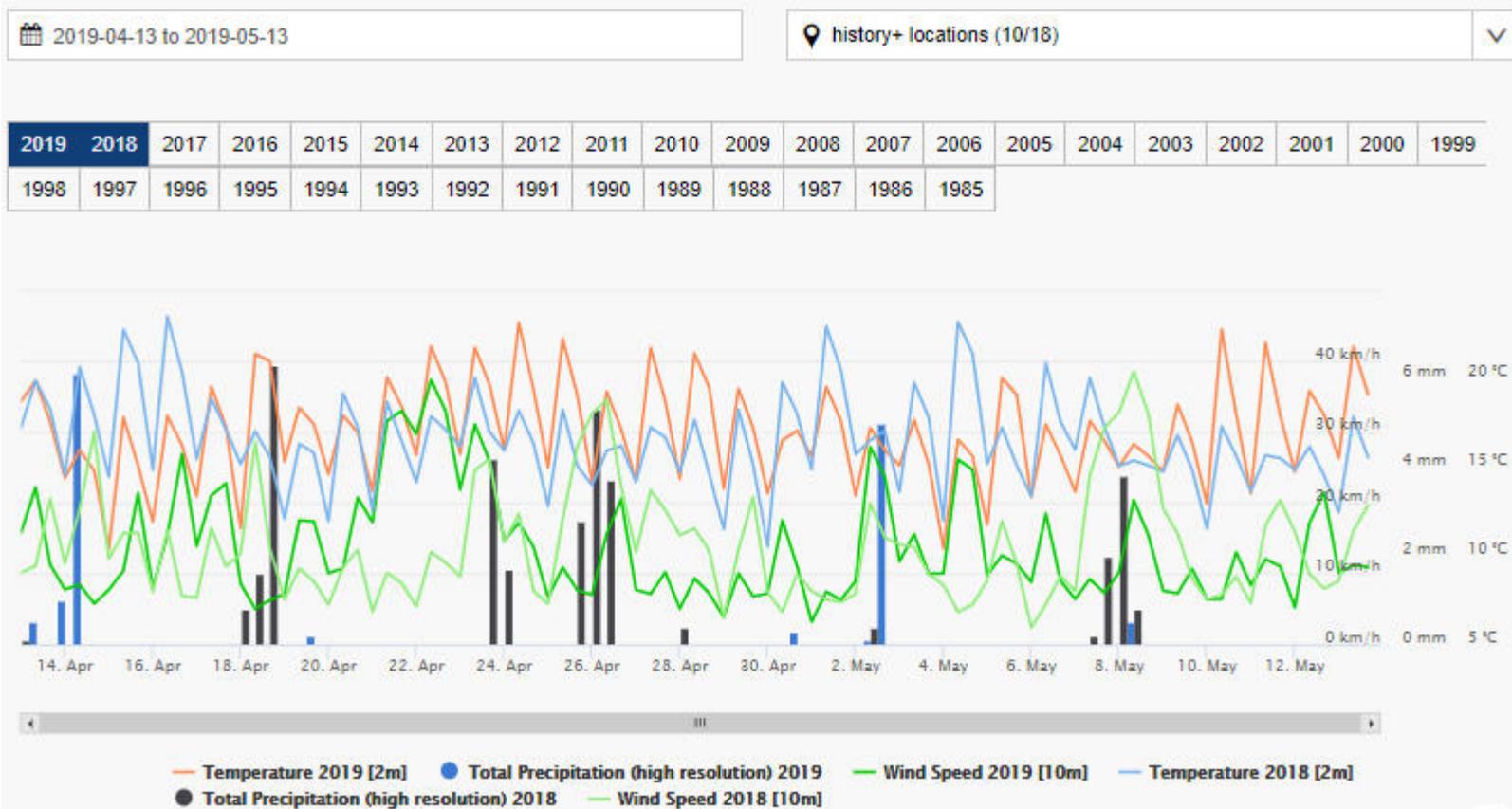
Data going back to 1985 is available for download or viewing if required. Please contact us if any weather information is required.

Other information pertaining to Risk Assessments for Heat, Cold, Water Capacity, Precipitation and Cloud Cover are also available. See below for information on this. Please request this if required.

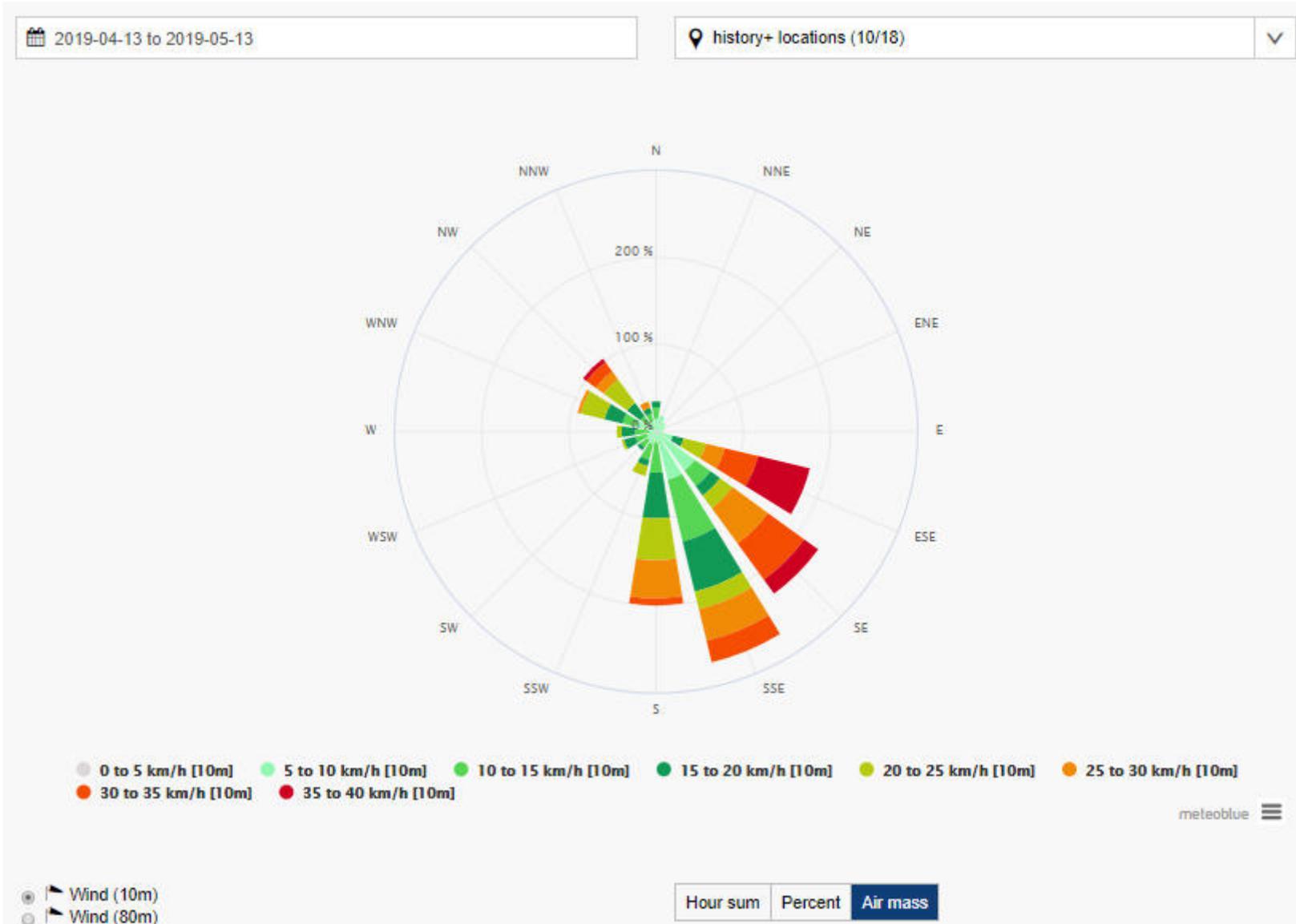
Risk assessment diagrams (Generic description below for information purposes)

- **Cold and warm events:** Probability of temperatures below or above a certain temperature threshold for a given time. Commonly used to evaluate frost. The first diagram shows the likelihood of the event in a day or in a week. You can approximate your personal tolerable risk with the second diagram. If your tolerable risk for a frost event is 20%, you should schedule sowing in late April for example. If you can accept 50% frost likelihood in favour of earlier sowing, second week of march is more suitable. The third diagrams show the occurrences of warm and cold events in the last 30 years for each year.
- **Precipitation:** This diagram evaluates precipitation amounts in a week above a certain threshold. Similar to cold and warm events you can estimate strong precipitation events and schedule activities accordingly.
- **Water capacity:** Estimated probability of remaining soil water amount. Select the maximum amount of soil water capacity depending on your soil and crop type. Higher soil water capacities better indicate extreme dry seasons. Yellow, orange and red bars indicate almost depleted soil water.
- **Cloud cover:** Cloud free hours per day. The first diagram shows the probabilistic distribution of cloud cover below a certain threshold. P80 and P20 indicate the second best and second worst out of ten events. So, there is an 60% likelihood of 5-7 hours of cloud cover below 15% in Basel in early October for a given day. The best cloud free days would be in middle of august in Basel statistically. The lower diagrams show the actual occurrence of cloud free hours in the last 30 years.

Year comparison – Temperature – Total Precipitation – Wind Speed @ 10m

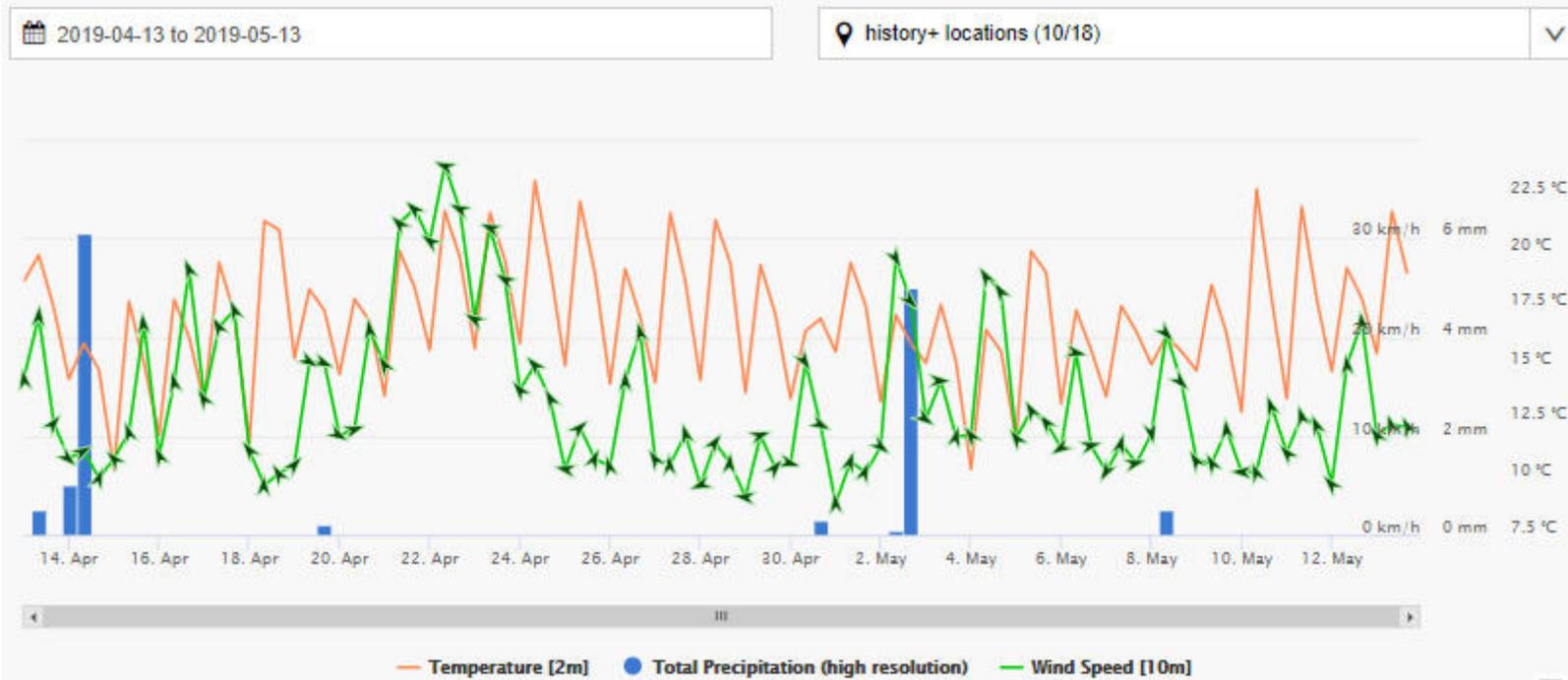


Wind Rose for the period: 13 April to 13 May 2019

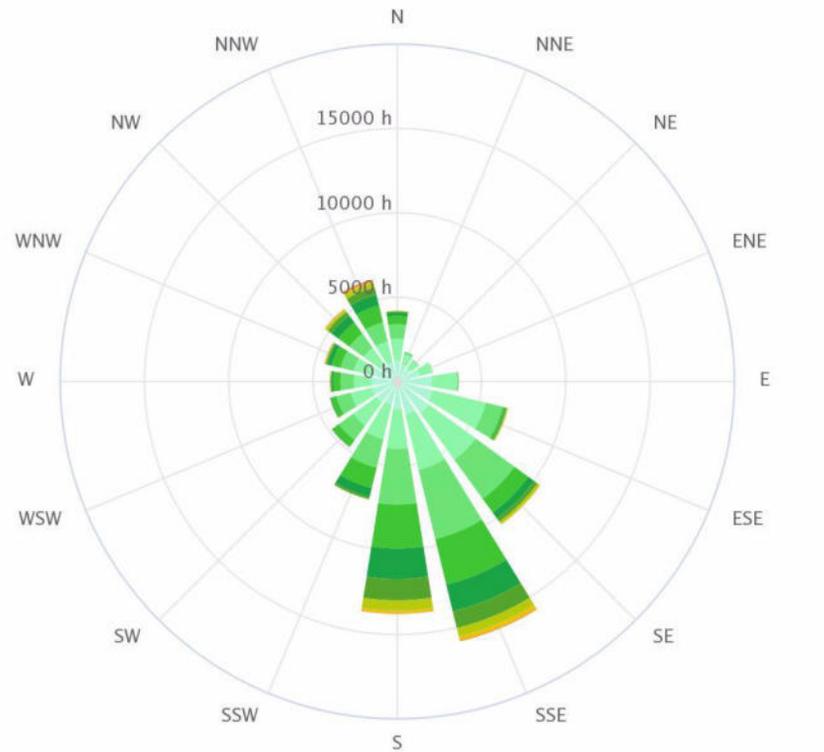


Data Download (Click here to download this data from Dropbox – The hourly wind speed and direction data is available)

Temperature – Total Precipitation – Wind Speed @ 10m



Historical Wind Rose – 11 Year Average - 2007-01-01 to 2018-01-01 – PPC Montague Gardens



- 0 to 5 km/h [10m]
- 5 to 10 km/h [10m]
- 10 to 15 km/h [10m]
- 15 to 20 km/h [10m]
- 20 to 25 km/h [10m]
- 25 to 30 km/h [10m]
- 30 to 35 km/h [10m]
- 35 to 40 km/h [10m]
- 40 to 45 km/h [10m]
- 45 to 50 km/h [10m]
- 50 to 55 km/h [10m]
- 55 to 60 km/h [10m]
- 60 to 65 km/h [10m]
- 65 to 70 km/h [10m]

meteoblue

CLIENT: SPH Kundalila Pty Ltd **SAMPLING PERIOD** - 13-Apr-2019 - 13-May-2019

LOCATION	FROM	TO	DUST MASS COLLECTED (mg)	FILTER	DUST CONCENTRATION mg/m ² /day	COMMENTS & NOTES
					SINGLE	
Smit	13-Apr-2019	26-Apr-2019	151.03	95587	506	Dolomite trace <5%, topsoils 45%, agricultural soil dust 25%, rounded sand quartz 20% and fine clay the balance of 10%.
Smit	26-Apr-2019	13-May-2019	51.59	95726	132	Agricultural soil dust 25%, topsoils 35%, fine rounded sandy quartz 25% with fine clay as a matrix. No dolomite present in the sample

Table 3: DustWatch Fall-out Dust Results

CLIENT: **Bridgetown**

SAMPLING PERIOD -

13-Apr-2019

-

13-May-2019

UNIT No.	LOCATION	FROM	TO	DUST MASS COLLECTED (mg)	FILTER	DUST mg/m ² /day	COMMENTS & NOTES
						Result	
SB1	Office	13-Apr-2019	26-Apr-2019	115.78	95597	432	We note increased synthetic poly propylene fine fibres from stock feed and bulk bags <5% of mass, pulverised roadway dust 20%, topsoils 45%, clays 15% with rounded sandy quartz and agricultural soil dust
SB1	Office	26-Apr-2019	13-May-2019	28.69	95724	82	This sample has fine quartzite 20% with 30% pulverised roadway dust, 10% dolomite grits and the balance all topsoil materials.

Table 4: DustWatch Fall-out Dust Results

CLIENT: **Bridgetown**

SAMPLING PERIOD -

13-Apr-2019

-

13-May-2019

UNIT No.	LOCATION	FROM	TO	DUST MASS COLLECTED (mg)	FILTER	DUST mg/m ² /day	COMMENTS & NOTES
						Result	
SB2	Workshop	13-Apr-2019	26-Apr-2019	132.88	95598	496	Fine pulverised roadway dust 25%, rounded sandy grits quartz 45% dolomite 15% clays 10% and isolated topsoils
SB2	Workshop	26-Apr-2019	13-May-2019	326.36	95725	931	Fine dolomite 35%, pulverised roadway dust 30%, topsoils 20%, clay and isolated rounded quartz 10%.

Table 5: DustWatch Fall-out Dust Results

CLIENT: **Bridgetown**

SAMPLING PERIOD -

13-Apr-2019

-

13-May-2019

UNIT No.	LOCATION	FROM	TO	DUST MASS COLLECTED (mg)	FILTER	DUST mg/m ² /day	COMMENTS & NOTES
						Result	
SB3	Dam	13-Apr-2019	26-Apr-2019	245.98	95596	918	Very large organic insect debris up to 400µm especially as a high mass material makes up an estimated 25%, rounded sandy quartz 35%, pulverised roadway dust 10% and dolomite 30%.
SB3	Dam	26-Apr-2019	13-May-2019	18.27	95723	52	Vegetation and insect organic debris is very high 5% due to the high period humidity which kept the air density low, limiting dust carriage.

Table 6: DustWatch Fall-out Dust Results

Calibration Certificates and SANAS Information

www.dustwatch.com/calibration-certificate.jpg

SCALETEC S.A. (PTY) LTD
P.O. Box 609, Cape Gate 7562
Unit 27 N1 Park
Sandpiper Crescent
Okavango Park, Brackenfell
Cape Town



Phone: +27 (0)21 982 0928
Fax: +27 (0)21 982 4523
E-mail: sales@scaletec-ct.co.za
Website: www.scaletec.co.za

"Alweighs A Step Ahead"

TEST REPORT

CUSTOMER DETAILS					12016	
DUSTWATCH						
4 Small Street Piketberg						
					SCALE NO.	1
SCALE DETAILS						
MAKE	Avery	MODEL	FAZ150	CAPACITY	210g	
DIVISION	1mg	SERIAL NO.	Scalet	LOCATION	on site	
CALIBRATED BY				C. Geyer	SIGN	
DATE	7/08/2018		EXPIRY DATE OF THIS REPORT	7/08/2019		
THIS IS TO CERTIFY THAT STANDARDS USED FOR TESTINGS ARE TRACEABLE TO NATIONAL STANDARDS VIA CERTIFICATE ISSUED BY SANAS ACCREDITED LABORATORY 1411						
CERTIFICATE NO.			CM17/210C	DATE	15/10/2017	
NO.	LOAD APPLIED	READING	VISUAL ERROR		ALLOWABLE ERROR	FINAL READING
			BEFORE	AFTER		
1	0,001mg	0,001mg			N/A	0,001mg
2	0,005mg	0,005mg			N/A	0,005mg
3	0,010mg	0,010mg			N/A	0,010mg
4	0,050mg	0,050mg			N/A	0,050mg
5	0,100mg	0,100mg			N/A	0,100mg
6	0,200mg	0,200mg			N/A	0,200mg
7						
8						
9						
10						

SPRINT PRINT 031 564 6777

DW

CERTIFICATE OF ACCREDITATION

In terms of section 22(2)(b) of the Accreditation for Conformity Assessment, Calibration and Good Laboratory Practice Act, 2006 (Act 19 of 2006), read with sections 23(1), (2) and (3) of the said Act, I hereby certify that:-

SCALETEC SA (PTY) LTD
Co. Reg. No.: 2004/017301/07
DURBAN

Facility Accreditation Number: **LTF0265**

is a South African National Accreditation System accredited Verification Laboratory provided that all SANAS conditions and requirements are complied with

This certificate is valid as per the scope as stated in the accompanying schedule of accreditation, Annexure "A", bearing the above accreditation number for

WEIGHING INSTRUMENTS

The facility is accredited in accordance with the recognised National Standard

SANS 10378:2012

The accreditation demonstrates technical competency for a defined scope and the operation of a laboratory quality management system

While this certificate remains valid, the Accredited Facility named above is authorised to use the relevant SANAS accreditation symbol on verification certificates and/or test reports




Mr R Josias
Chief Executive Officer

Effective Date: 26 November 2015
Certificate Expires: 23 October 2019

This certificate does not on its own confer authority to verify in terms of the Legal Metrology Act. Approval to verify is granted by the Regulator NRCS: Legal Metrology.

DW

ANNEXURE A

SCHEDULE OF ACCREDITATION

Facility Number: LTF0265

<p>Permanent Address of Laboratory: Durban Branch: Scaletec SA (Pty) Ltd 6 Klinker Place Unit 3, Brooklyn Park, Briardene Durban</p> <p>Postal Address: P O Box 609 Cape Gate 7562</p> <p>Tel: (031) 564-8755/59/9412 Fax: (031) 564-1053 E-mail: j.northcote@scaletec-ct.co.za</p>	<p>Satellite Address of Laboratory: Cape Town Branch: Scaletec SA (Pty) Ltd Unit 27, N1 Park, Sandpiper Crescent Okavango Park Brakenfell</p> <p>Tel: (021) 982-0928 Fax: (021) 982-4523 E-mail: j.northcote@scaletec-ct.co.za</p>	<p>Technical Signatories:</p> <table border="0"> <tr> <td>Mr GR Barbeau M539</td> <td>A1-A4, D,</td> <td>E1-E3</td> </tr> <tr> <td>Mr J Northcote M1039</td> <td>MA1</td> <td></td> </tr> <tr> <td>Ms AN Mbadaliga M1027</td> <td>MA1</td> <td></td> </tr> </table> <p>Nominated Representative : Mr J Northcote</p> <p>Issue No.: 13 Date of Issue: 26 November 2015 Expiry Date: 23 October 2019</p>	Mr GR Barbeau M539	A1-A4, D,	E1-E3	Mr J Northcote M1039	MA1		Ms AN Mbadaliga M1027	MA1	
Mr GR Barbeau M539	A1-A4, D,	E1-E3									
Mr J Northcote M1039	MA1										
Ms AN Mbadaliga M1027	MA1										
FIELD OF VERIFICATION	TYPE OF VERIFICATION AND RANGE	STANDARDS, SPECIFICATIONS, ACT, REGULATIONS									
<p>Regulatory: The supply of services as a verification laboratory in the field of weighing instruments.</p>	<p>Non-automatic self-indicating scales: Self-indicating digital scales (excluding vehicle scales)</p> <p>Range: 1,5 kg to 3 000 kg</p>	<p>Trade Metrology Regulations Part II Regulation 44 SANS 1649 Legal Metrology Act, 2014 (Act 09 of 2014)</p>									

Original date of accreditation: 23 October 2007

Page 1 of 1

ISSUED BY THE SOUTH AFRICAN NATIONAL ACCREDITATION SYSTEM

KEY:**A – Self-indicating scales**

- A1 – Self-indicating digital scales – Non-automatic (Excluding vehicle scales and scales with fixed weighing tracks)
- A2 – Self-indicating and semi-self-indicating analogue scales non-automatic
- A3 – All vehicles scales and scales with fixed weighing tracks.
- A4 – Hoppers

D – Automatic scales (Excluding conveyor belt scales)**E – Conventional non-self-indicating scales**

- E1 – Counter scales
- E2 – Compound lever scales, platforms, steelyards, wall beams etc.
- E3 – Vehicle scales

F – Beam scales and balances**MA – Non-automatic self-indicating and semi-self-indicating weighing instruments**

- MA1 – Self-indicating scales with digital indication (excluding vehicle scales)



Field Manager

Appendix – Ligno Sulphate Information – Chryso Eco Dust 200D

DustWatch can provide quotations for this product if required and provide advice on optimized application for different area requirements. **Gravel Roads, Haul Roads, Unpaved open areas, Stockpiles and Berms.** On site advice is available for site specific requirements and optimization.

The application spreadsheet is [available here](#) if required.

Revision number: 1
Date: 2017/05/07

Technical data sheet

CHRYSO[®] Eco Dust 200D (CPT)

High range dust suppressant.

Description

CHRYSO[®] Eco Dust 200D is an emulsified dust lubrication system that aids in the coalescing, stabilisation and suppression of rising dust particles and spores, preventing them from becoming air-borne.

Advantages

- Easy application and safe to use
- Helps with compliance to safety, environmental, health and occupational regulations
- Safety - Increased road visibility, increased grip
- Creates a dust free environment, complete dust suppression
- Less fuel usage
- Reduced road and vehicle maintenance
- Reduced man hours
- UV resistance
- Cuts down water usage
- Eliminate grading and watering
- Savings compared to traditional paving and tar roads
- VOC free

Application guidelines

Use

- Unpaved roads (gravel, farm, quarry roads)
- Road stabilization (gravel airstrips)
- Mine and industrial dust suppression (stock pile, mine dumps)

Directions

- For surface suppression
 - Apply to the surface by a water/tank truck with a rear mounted distribution bar that spreads the liquid evenly over the surface.

Physical and chemical properties

- Physical state (@25°C): Liquid
- Colour: Brown
- Specific gravity (@25°C): 1.095 (±0.02)
- pH: 5.00 (±0.01)
- Cl ion content: ≤0.01%
- Na₂O equivalent: ≤1%

- CHRYSO[®] Eco Dust 200D: 10 – 15% mixture by volume of water
- Maintenance of 2.5% to 5% mixture, depending on surface condition
- Coverage
 - Coverage depends on the method of application

Maintenance

- Factors that will influence the intervals between maintenance applications and life time of the surface include:
 - Quality of the base material
 - Climate conditions
 - Volumes and type of traffic

Storage

- If in the original sealed packaging at room temperature, CHRYSO[®] Eco Dust 200D has a shelf life of up to 12 months from the date of manufacturing.
- Should the product freeze, it will recover its properties after thawing and agitating.
- Avoid storing CHRYSO[®] Eco Dust 200D in direct sunlight.
- Avoid all contact with water (especially rain water).



JAMES SYDNEY & COMPANY

(Proprietary) Ltd.

Co. Reg. 54/02733/07

Distributors and Manufacturers of Explosives and Mining Materials

P.O. Box 215, Edenvale 1610
Tel: 606-6111
Fax: 606-2548
Tel: Add. "Bombers"
Factory 2, Modderfontein, Tvl.

The Manager
SPH Contracting
P.O.Box 257
Milnerton
7435

21 February 1997

ATTENTION: Mr E. Pretorius

ENVIRONMENTAL MONITORING AT BRIDGETOWN QUARRY

Dear Sir

Following your request to investigate the effects increased blasting activities will have on nearby private properties, I conducted a survey on 7 February 1997. The results of the survey are as follows:

1. Equipment

The vibro recorder used was a White Mini-Seis Digital Seismograph that is capable of recording vibrations between the 0,125 - 254 millimetres per second (mmps). It also has the capability to record acoustic levels, commonly known as Airblast.

The equipment analyses the recordings and displays the results on a screen for immediate viewing. It also contains communication software so that results can be downloaded to a computer for further analysing and reporting.

2. Recording Position

Two recorders were placed at strategic positions as indicated on plan.

Recorder No 637
Recorder No 830

SPH Workshop
Farmworkers houses



Directors: Dr. G.N. Edwards (Chairman), ~~Wade~~ Wade** (Managing), ~~Dr. M.W. Beck~~ H.J. Roets,
***British

3. Recording

Although it is not stipulated by law in South Africa, advised maximum levels for Peak Particle Velocities when blasting adjacent to private property is 25mm per second. A table that recommends maximum charge mass per delay is available.

Airblast is usually the cause for most complaints. Airblast is measured in decibels (db) with a maximum level for schools etc, is 128 db.

The equipment trigger levels were set at 1,0 mm/s for the ground vibration and 106 db for the airblast. The blast was fired and the following results were captured:

	Vibration (mm/s)	Airblast (db)
Recorder 637 <i>SPT Workshop at Aglitz Plant.</i>	Nil	126
Recorder 830 <i>At Bridgetown Lubeena Cottages.</i>	Nil	Nil

The above results indicate that ground vibration levels were too low to trigger the recorders and only airblast at the workshop was sufficient to trigger Recorder 637.

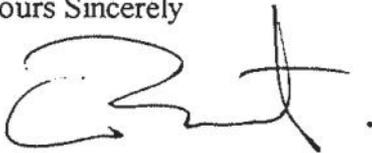
4. General

"Blasting is an emotional experience for the unsuspecting public and can be the cause for over reaction if not managed properly. It is good practice to exercise a high level of public relations and understanding of the concerns of the public in the region." } A.

Cloud and wind direction can also have an effect on noise levels. It may not always be practical, but blasting should preferably be done on clear days and when there is no wind or at least blowing in a direction away from areas of concern.

I hope that the survey is of assistance and I will be available to explain any further information if required.

Yours Sincerely



Andre Bester
AREA MANAGER
MINING SERVICES
WESTERN CAPE



BLASTING & EXCAVATING

Drilling, Blasting & Civil Engineering Contractors

Blasting & Excavating (Pty) Ltd. Reg. No. 1979/000127/07

Head Office:

388 Gild Road, Lilianton, Boksburg

P.O. Box 26889, East Rand, 1462

Tel: 011 323 4000

Fax: 011 323 4052

Cape Town Office:

72 Kyalami Drive, Killarney Gardens, 7441

Tel: 021 556 4372

Fax: 021 556 9142

11 March 2009

Bridgetown Dolomite Mine JV

P.O. Box 160

Gilnerton

7435

Attn: Mr. David Rees

Re: History of Blast Designs at Bridgetown Dolomite Mine

We were doing the drilling and blasting at Bridgetown Quarry when we were approached by SPH to also do the drilling and blasting for the new mine (Bridgetown Dolomite Mine) at Bridgetown.

Due to the nature of the work, while in the development stages of this mine, we were using various blast designs with an average powder factor of approximately 300 grams per ton of rock blasted.

In 1999 the powder factor for the production benches was reduced to 210 grams per ton and the overburden was being blasted at 270 grams per ton.

In order to reduce the percentage of fines it was decided to leave 4 metres of stemming on the production blasts, this was achieved by placing an airbag 1.5 metres deep in order to still achieve the desired fragmentation. By implementing this we also reduced the risk of fly rock, as well as limiting vibrations and air blast, due to the mass of explosives per delay being reduced while blasting.

Over the years the burden and spacing was increased in order to reduce the percentage of fines by implementing these changes in the burden and spacing the powder factor of the blasts were reduced and this resulted in a saving on the drilling and blasting cost to our client.

Our current design powder factor for the production blasts is set at 170 grams per ton and 200 grams per ton for the overburden blasts.

It was also agreed that no blasting operations would take place if there were overcast conditions and that we would cover all surface detonators with soft sand. We also have to set off all blasts between 12:00 and 15:00 when the humidity levels are lowest. These measures were implemented in order to reduce the noise levels from the blasts.

2/.....

We place vibration monitoring equipment at two locations on site in order to monitor the vibration and air blast levels of our blasts, we have also done vibration monitoring at neighbouring properties and our findings at these test have been very favourable as the readings on our vibration monitoring equipment were very low, we have attached a report that we wrote after one of these tests.

Although there is no law in South Africa stating vibration limits, we work according to the USBM standard (United States Bureau of Mines) and since we started monitoring our blasts we have never exceeded the limitations as stipulated by the USBM.

In order to create more stable final faces we have been experimenting with different blast timings and drill hole angles and early indications are that the faces would improve, but we need to do some more tests to achieve the desired results, with minimal cost implications.

All our drill rigs are fitted with dust suppression systems in order to minimise dust pollution which could negatively affect the neighbouring wheat crops.

We hope the above has provided you with some useful info and please do not hesitate to contact us should you require more information with regards to the drilling and blasting operations at Bridgetown Dolomite Mine. Please find attached the previously mentioned vibration report.

Yours faithfully



Gerard Schenk
Area Manager
824540528

Directors: F.J.V. van Wyk (Managing), P.S. Merifield, S.J. Marx, E. Broos, C.R. Schloesser, T Moldenhauer, A Oosthuysen.





BLASTING & EXCAVATING

Drilling, Blasting & Civil Engineering Contractors

Blasting & Excavating (Pty) Ltd. Reg. No. 1979/000127/07

Head Office:

94 Empire Road, Bartlett Ext. Jet Park, Boksburg
P.O. Box 26889, East Rand, 1462

Tel: 011 397 2130/4

Fax: 011 397 5681

Cape Town Office:

72 Kyalami Drive, Killarney Gardens, 7441

Tel: 021 556 4372

Fax: 021 556 9142

04 April 2006

SPH KUNDALILA (PTY) LTD.
P.O. Box 257
Milnerton
7435

Att.: Mr. Pretorius

RE: Vibration Monitoring

On 28 March 2006 we blasted at Bridgetown Dolomite Mine. Vibration monitoring equipment was set up at four different locations. The results of the monitoring are as follows:

Equipment:

The vibro-recorder used was an InstanTel Mini Mate DS-077. Four units were used and placed at different locations.

These units are capable of recording vibrations between 0.26 – 127 millimeters per second, as well as the ability of recording the acoustic levels, commonly known as "Airblast".

The units analyze the recordings and the results can then be downloaded to a computer, the results can then be viewed in graph form and printed.

Recording Positions:

Four recorders were placed at predetermined positions as indicated on your site plan.

Recorder No. 4747 – Farm School

Recorder No. 4748 – Farm Workers Houses

Recorder No. 4797 – Pump Station

Recorder No. 4803 – Wheat Fields

Results:

Although it is not stipulated by law in South Africa, advised maximum levels for Peak Particle Velocity (PPV) when blasting adjacent to private property is 25mm/second.

“Airblast” is usually the cause for most complaints and is measured in decibels (dB).

The following table lists “airblast” levels versus human responses:

TYPICAL OVERPRESSURE, AIRBLAST AND NOISE LEVELS

Sound Pressure (Airblast) (dB)	Source, Activity, Response and Damage
90	OSHA maximum for 8 hours
90 – 100	Normal to loud conversation
110	Perceptible, complaints begin
112	Complaints vary depending on ambient levels
115	Perception increases, complaints increase
120	Threshold of pain for continuous sound
125 – 130	Sounds very loud, rattling effect, no damage
140	OSHA maximum for impulse sound, intolerable
150	Some windows begin to break
170	Most windows break
180	Structural damage

The equipment trigger levels were set at 0.26mm/second for ground vibrations and 106.1 dB for the “Airblast”.

After the blast was fired the following results were captured:

	VIBRATION (PPV)	AIRBLAST (dB)
Farm School	0.524 mm/s	125.1 dB
Farm Workers Houses	0.349 mm/s	120.0 dB
Pump Station	5.050 mm/s	<100.0 dB
Wheat Fields	2.100 mm/s	129.5 dB

From the above results it can be seen that no damage or injury would be caused to any structures or persons at the areas where the monitoring equipment was placed.

GENERAL:

Blasting is an emotional experience for the unsuspecting public and can be the cause for over reaction if not managed properly. It is good practice to exercise a high level of public relations and understanding of the concerns of the public in the vicinity where blasting operations take place.

Cloud cover and wind direction could also have an effect on noise levels, therefore although not always practical; blasting should preferably be done on clear days when there is no wind or at least when it is not blowing in the direction of the areas of concern.

I hope that this survey was of assistance. Please do not hesitate to contact us with any queries.

Yours Faithfully



**Gerard Schenk
Area Manager
0824540528**

Directors: F.J.V. van Wyk (Managing), P.S. Merifield, S.J. Marx, E Broos, C.R. Schloesser, T Moldenhauer



BLASTING & EXCAVATING

Date/Time MicL at 13:22:31 March 28, 2006
Trigger Source Geo: 2.00 mm/s
 Mic: 106 dB(L)
Range Geo: 127 mm/s
Record Time 5.0 sec at 1024 sps

Serial Number 4747 V 2.6 MiniMate
Battery Level 6.4 Volts
Calibration September 15, 2000 by Instatel Inc.
File Name F747B31U.HJ0

Notes

Location: SCHOOL
Client: SPH KUNDALILA Bridgetown
User Name: BLASTING & EXCAVATING (Pty) Ltd.
Converted: March 29, 2006 06:43:39 (V4.30)

Extended Notes

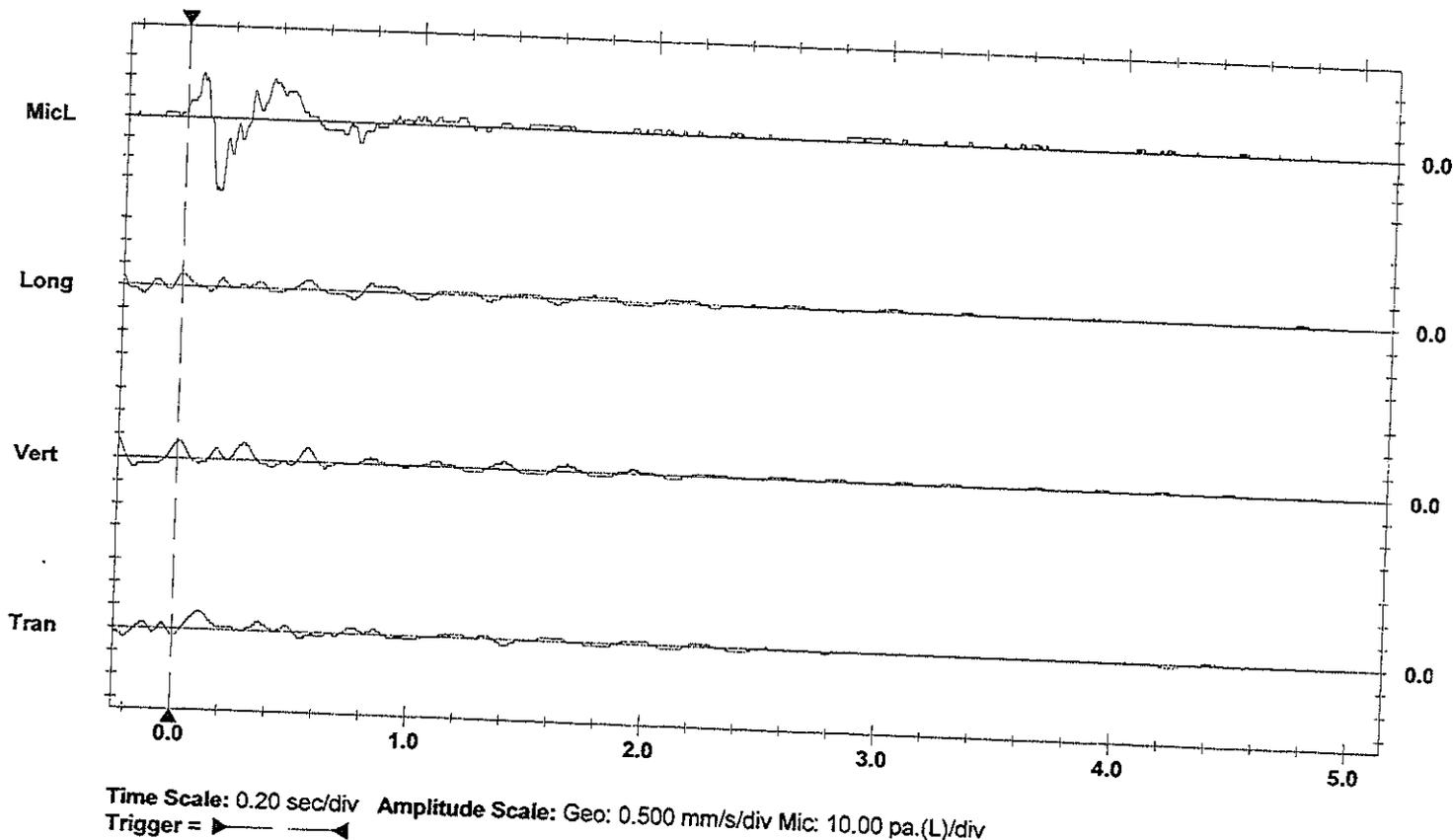
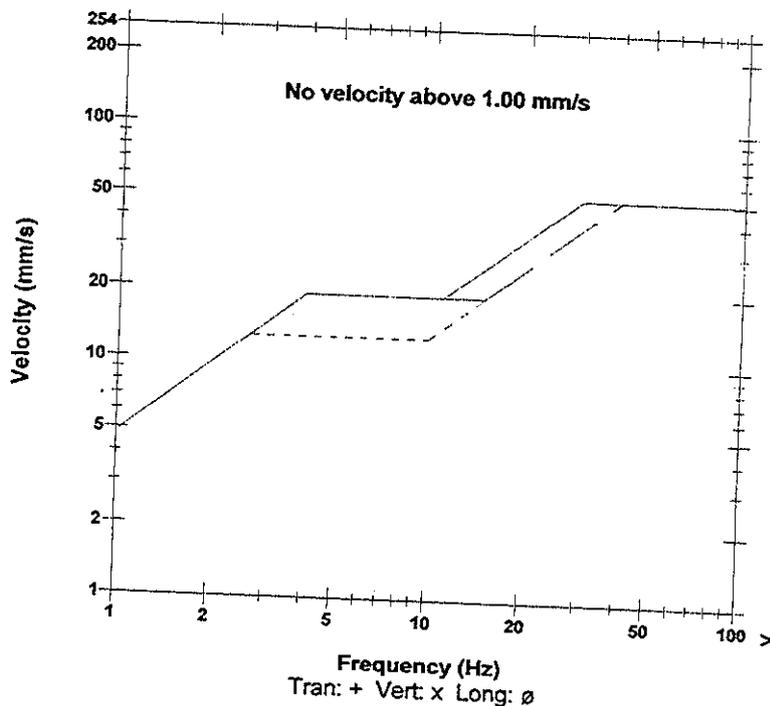
Post Event Notes

Microphone Linear Weighting
PSPL 125.1 dB(L) at 0.133 sec
ZC Freq 3.0 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 488 mv)

	Tran	Vert	Long	
PPV	0.381	0.445	0.254	mm/s
ZC Freq	4.0	17	7.0	Hz
Time (Rel. to Trig)	0.094	-0.247	0.019	sec
Peak Acceleration	0.00663	0.00663	0.00663	g
Peak Displacement	0.0129	0.0101	0.00388	mm
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.524 mm/s at -0.249 sec

USBM RI8507 And OSMRE



BLASTING & EXCAVATING

Date/Time MicL at 13:22:29 March 28, 2006
Trigger Source Geo: 2.49 mm/s
 Mic: 106 dB(L)
Range Geo :127 mm/s
Record Time 5.0 sec at 1024 sps

Serial Number 4748 V 2.6 MiniMate
Battery Level 6.5 Volts
Calibration September 15, 2000 by InstanTel Inc.
File Name F748B31U.HH0

Notes

Location: HOUSES
Client: SPH KUNDALILA Bridgetown
User Name: BLASTING & EXCAVATING (Pty) Ltd.
Converted: March 29, 2006 06:41:34 (V4.30)

Extended Notes

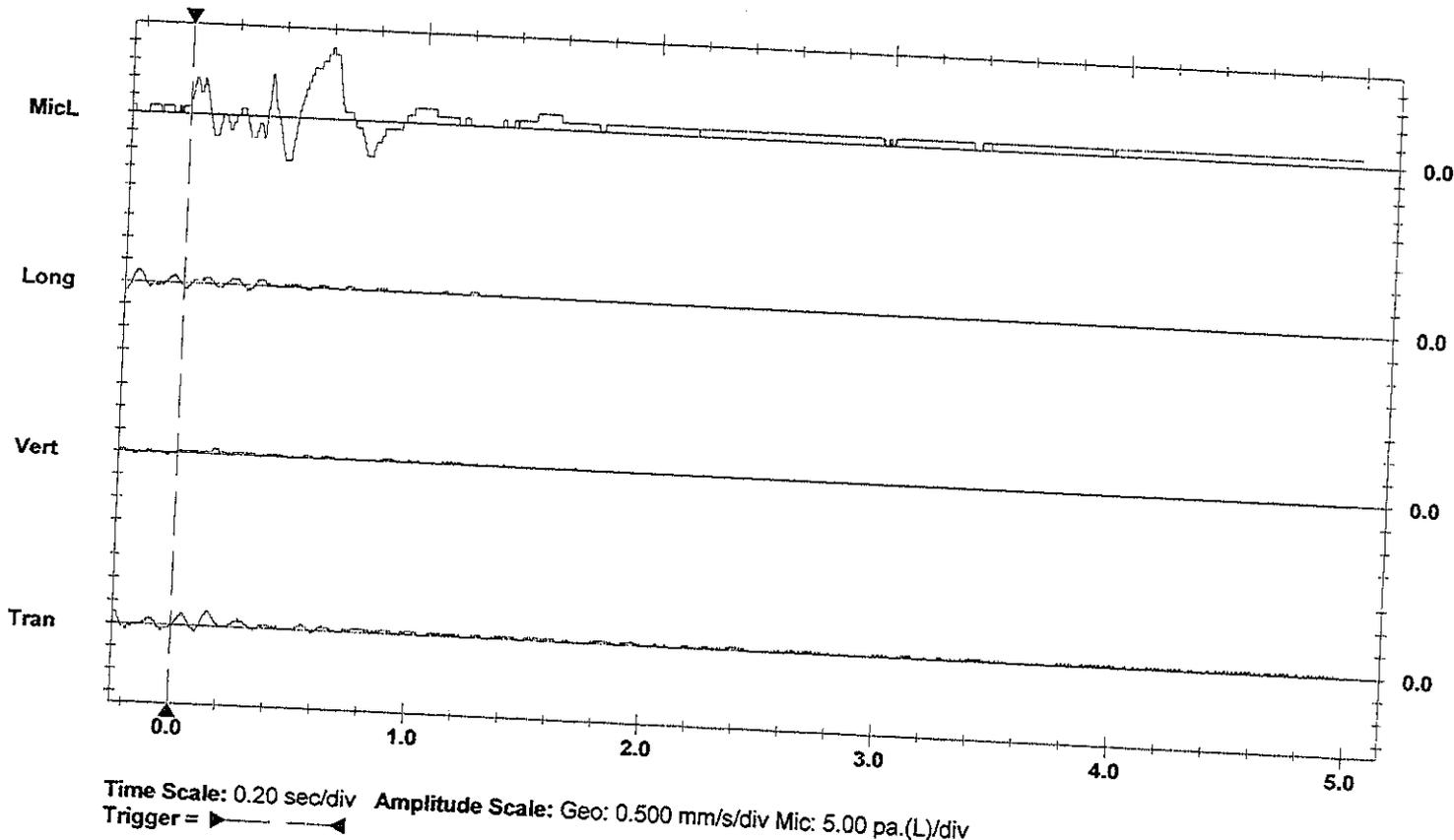
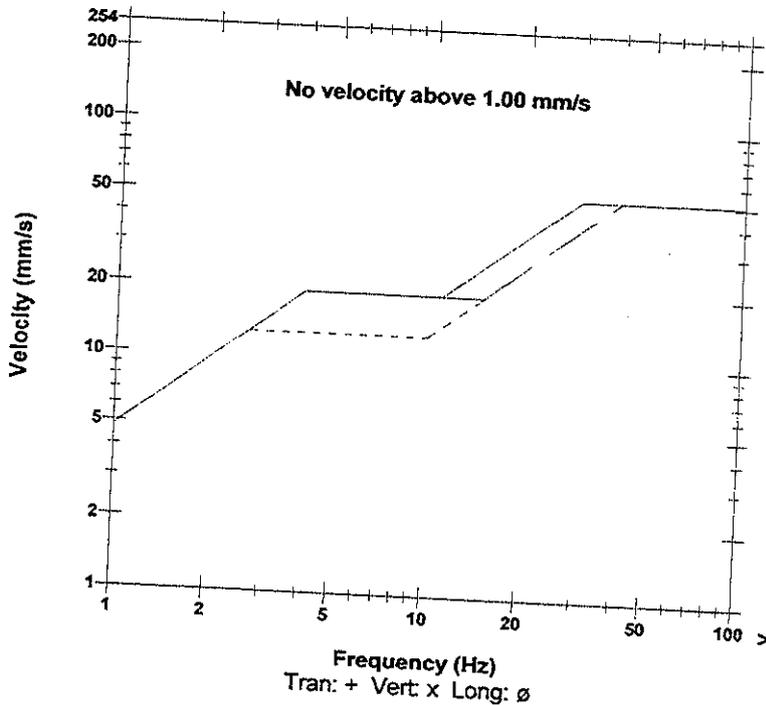
Post Event Notes

Microphone Linear Weighting
PSPL 120.0 dB(L) at 0.596 sec
ZC Freq 2.0 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 512 mv)

	Tran	Vert	Long	
PPV	0.318	0.127	0.254	mm/s
ZC Freq	8.0	19	10	Hz
Time (Rel. to Trig)	0.145	0.151	-0.184	sec
Peak Acceleration	0.00663	0.00663	0.00663	g
Peak Displacement	0.00471	0.00003	0.00226	mm
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.349 mm/s at 0.151 sec

USBM R18507 And OSMRE



BLASTING & EXCAVATING

Date/Time Tran at 13:22:31 March 28, 2006
Trigger Source Geo: 2.00 mm/s
 Mic: 106 dB(L)
 Geo :127 mm/s
Range 5.0 sec at 1024 sps
Record Time

Serial Number 4797 V 2.6 MiniMate
Battery Level 6.4 Volts
Calibration March 1, 2001 by InstanTel Inc.
File Name F797B31U.HJ0

Notes
Location: PUMP STATION
Client: SPH KUNDALILA Bridgetown
User Name: BLASTING & EXCAVATING (Pty) Ltd.
Converted: March 29, 2006 06:48:04 (V4.30)

Extended Notes

Post Event Notes

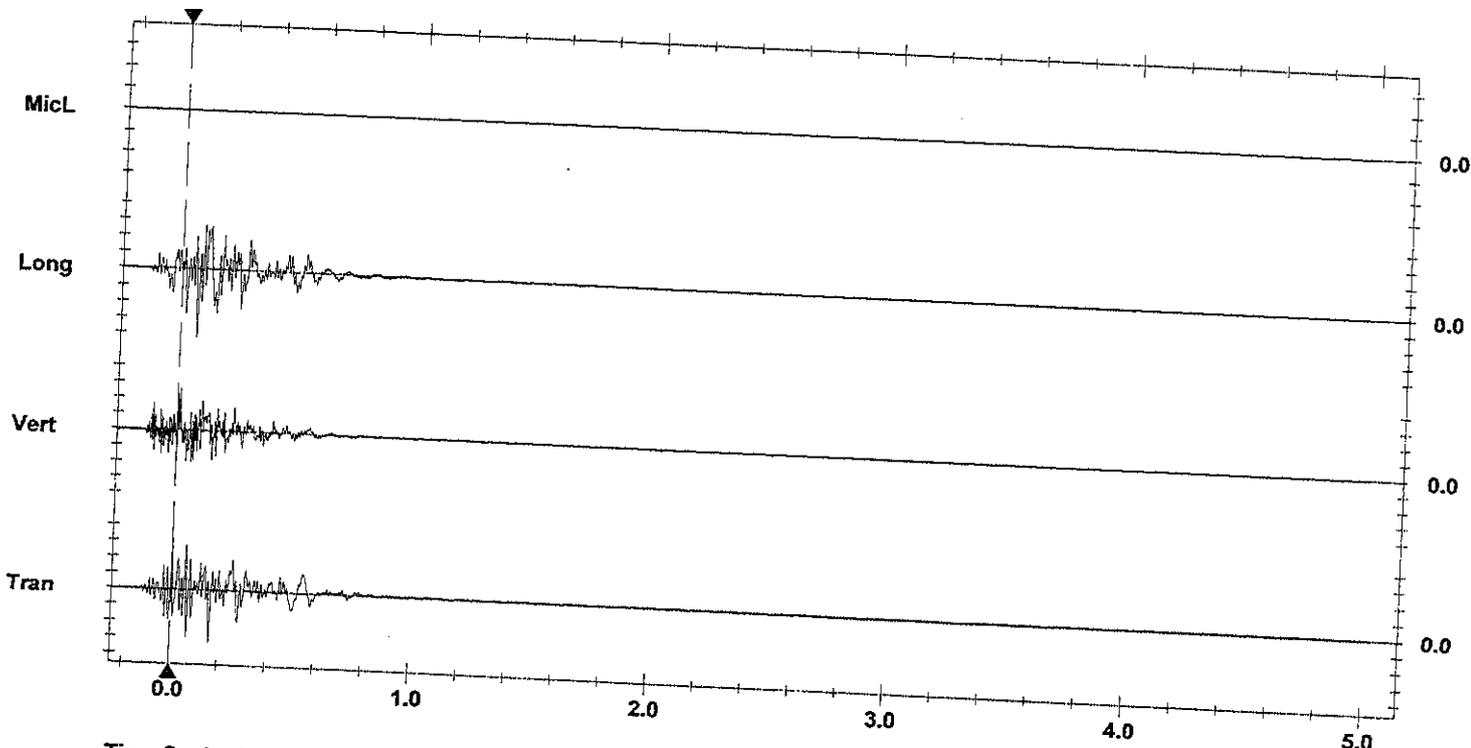
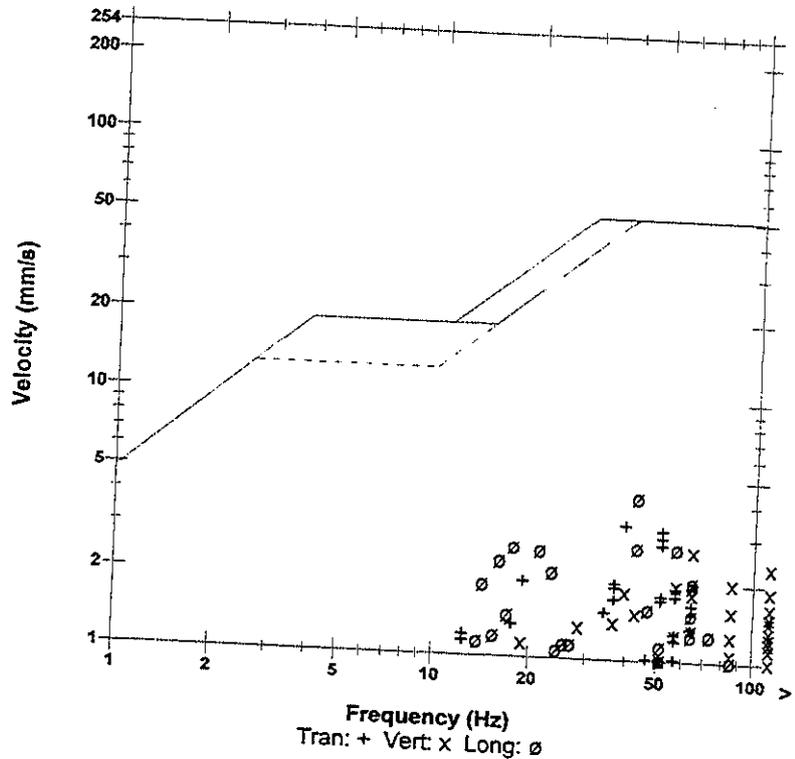
Microphone Linear Weighting
PSPL <100 dB(L) at 0.002 sec
ZC Freq N/A
Channel Test Passed (Freq = 20.0 Hz Amp = 307 mv)

	Tran	Vert	Long	
PPV	3.30	2.67	4.25	mm/s
ZC Freq	39	64	43	Hz
Time (Rel. to Trig)	0.163	0.014	0.067	sec
Peak Acceleration	0.0928	0.133	0.113	g
Peak Displacement	0.0153	0.0105	0.0222	mm
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 5.05 mm/s at 0.068 sec

N/A: Not Applicable

USBM R18507 And OSMRE



Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 1.000 mm/s/div Mic: 5.00 pa.(L)/div
Trigger =

Printed: March 29, 2006 (V 4.30 - 4.30)

Format Copyrighted 1996-2001

BLASTING & EXCAVATING

Date/Time MicL at 13:22:24 March 28, 2006
Trigger Source Geo: 2.00 mm/s
 Mic: 106 dB(L)
Range Geo :127 mm/s
Record Time 5.0 sec at 1024 sps

Serial Number 4803 V 2.6 MiniMate
Battery Level 6.4 Volts
Calibration April 12, 2001 by Instatel Inc.
File Name F803B31U.HC0

Notes

Location: WHEATFIELDS
Client: SPH KUNDALILA Bridgetown
User Name: BLASTING & EXCAVATING (Pty) Ltd.
Converted: March 29, 2006 06:40:48 (V4.30)

Extended Notes

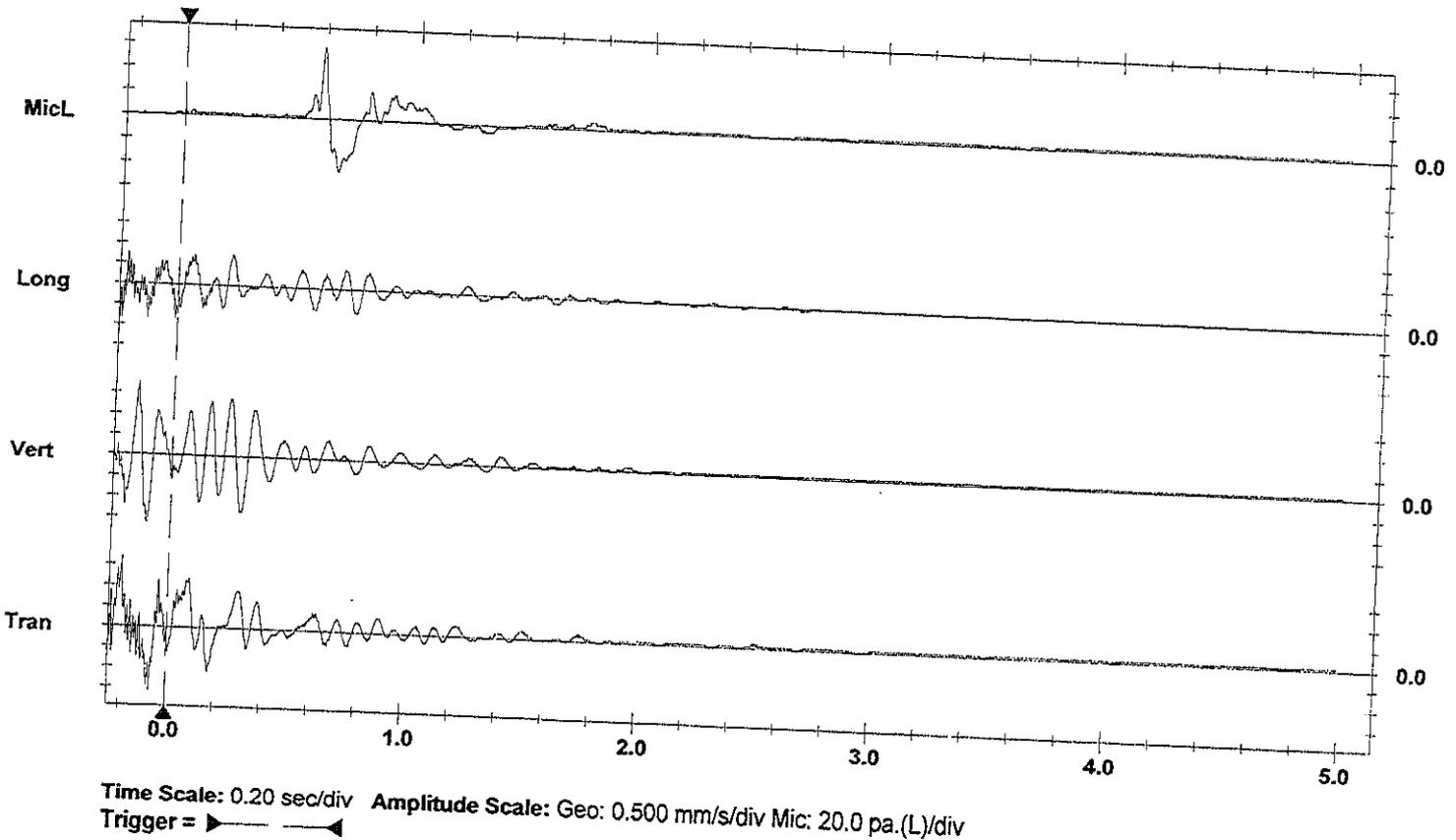
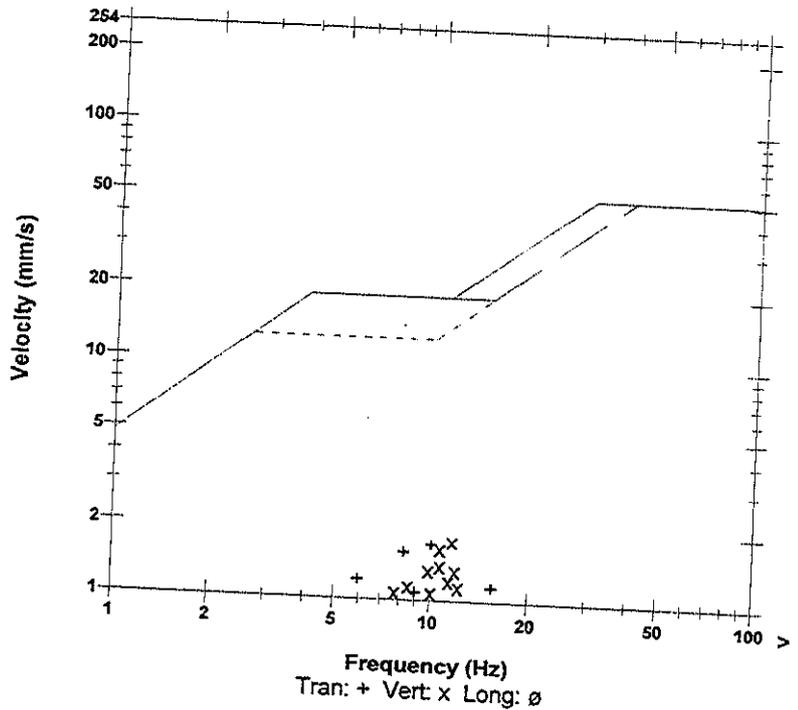
Post Event Notes

Microphone Linear Weighting
PSPL 129.5 dB(L) at 0.589 sec
ZC Freq 2.0 Hz
Channel Test Passed (Freq = 20.0 Hz Amp = 506 mv)

	Tran	Vert	Long	
PPV	1.71	1.78	1.21	mm/s
ZC Freq	10	12	26	Hz
Time (Rel. to Trig)	-0.196	-0.149	-0.248	sec
Peak Acceleration	0.0398	0.0133	0.0265	g
Peak Displacement	0.0317	0.0246	0.0136	mm
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 2.10 mm/s at -0.198 sec

USBM R18507 And OSMRE



SuperGraphics - Report

Telephone: (205)592-2488 x 23

Company: Bridgetown Dolomite mine

Location: Level: 36 South.

Operator: Blasting & Excavating

Notes: Seismograph placed at dams. Distance 187m.

2/6/2017 at 14:05:12 Event # 23

Graph: 13379

Last Calibration: 08Jun16

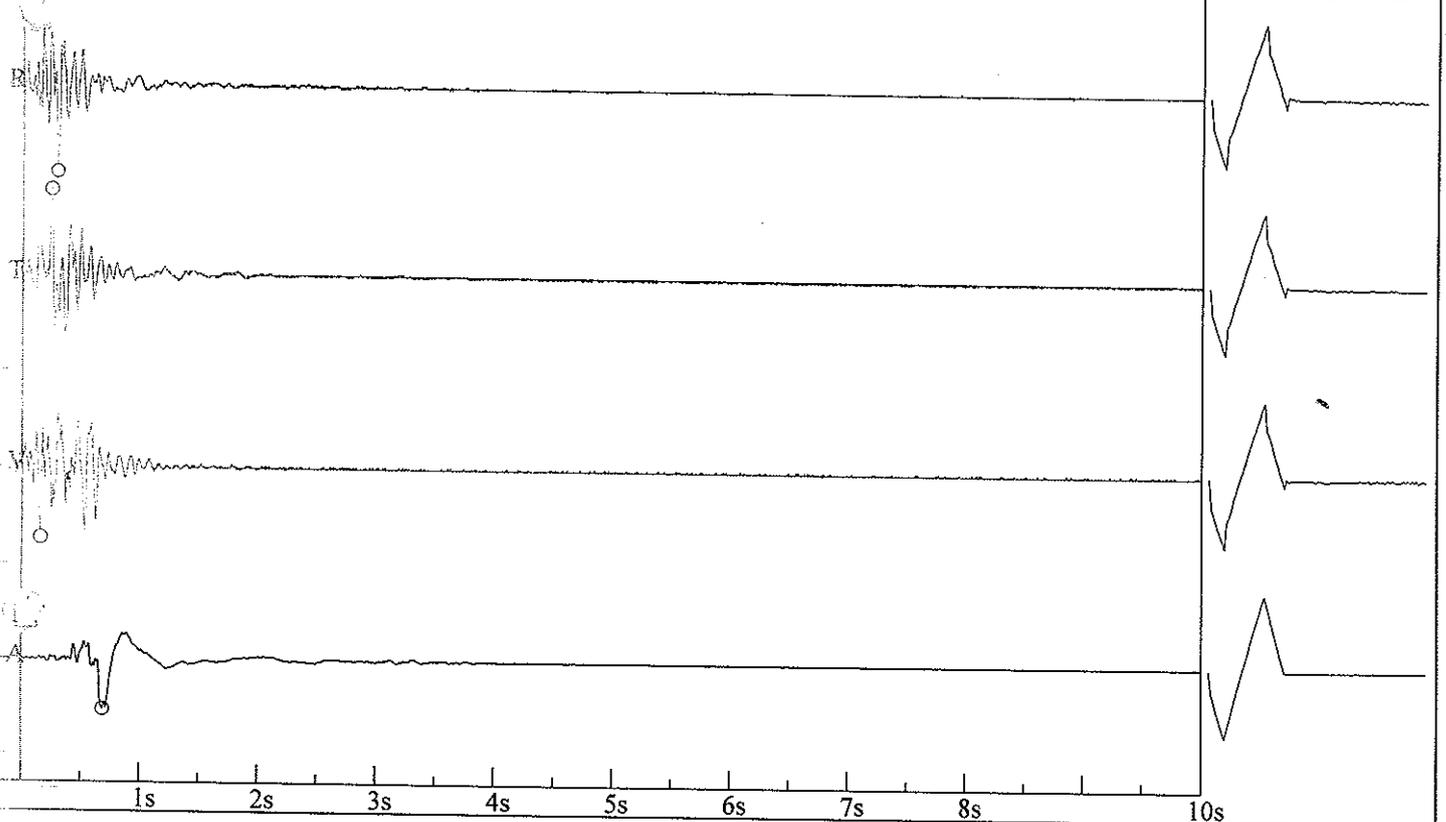
Record Duration: 10 sec

Sample Rate: 1024/sec

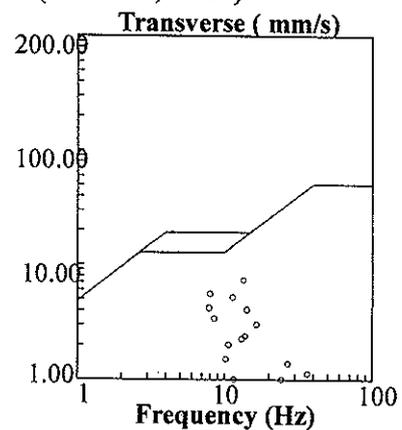
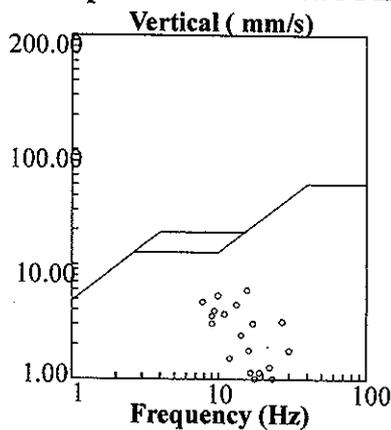
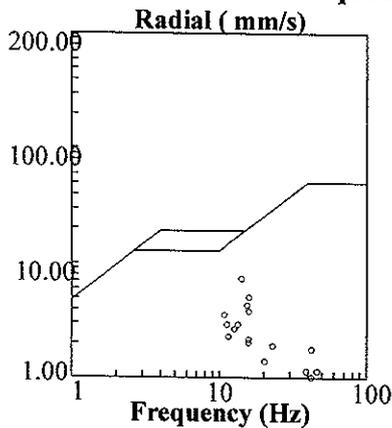
Amplitudes / Frequencies	Trigger >>> Peak	Scales / Triggers	Charge / Distance
Radial: 7.366 mm/s @ 14.2 Hz	297.9 ms	Air Scale: .12698 kPa/div.	Wgt. Per Delay: 184 kg
Transverse: 7.366 mm/s @ 13.4 Hz	248.0 ms	Seismic Scale: 8.13 mm/s/div.	Distance: 187 m
Vertical: 5.969 mm/s @ 15.5 Hz	158.2 ms	Air Trigger: 125 dBL	Scaled Distance: 13.8
Air: 130.6 dBL @ 2.6Hz / .0675kPa	689.5 ms	Seismic Trigger: 1.016 mm/s	
Vector Sum: 8.53 mm/s @ 13.1 Hz	250.0 ms		

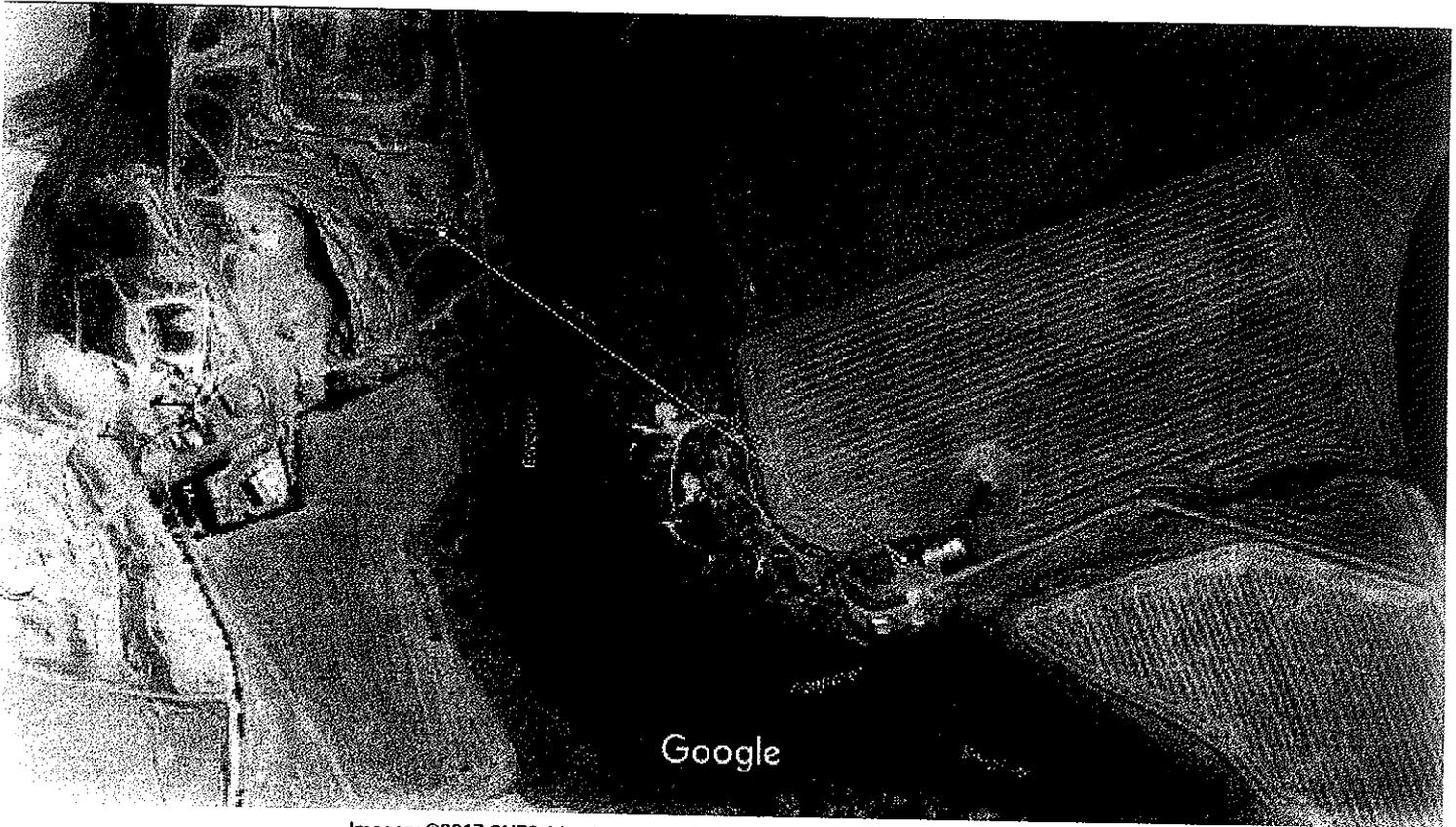
Waveform Analysis

Calibration



Frequency vs. Amplitude Plot - USBM Limits (RI 8507, 1980)





Imagery ©2017 CNES / Astrium, DigitalGlobe, Map data ©2017 AfriGIS (Pty) Ltd, Google 100 m

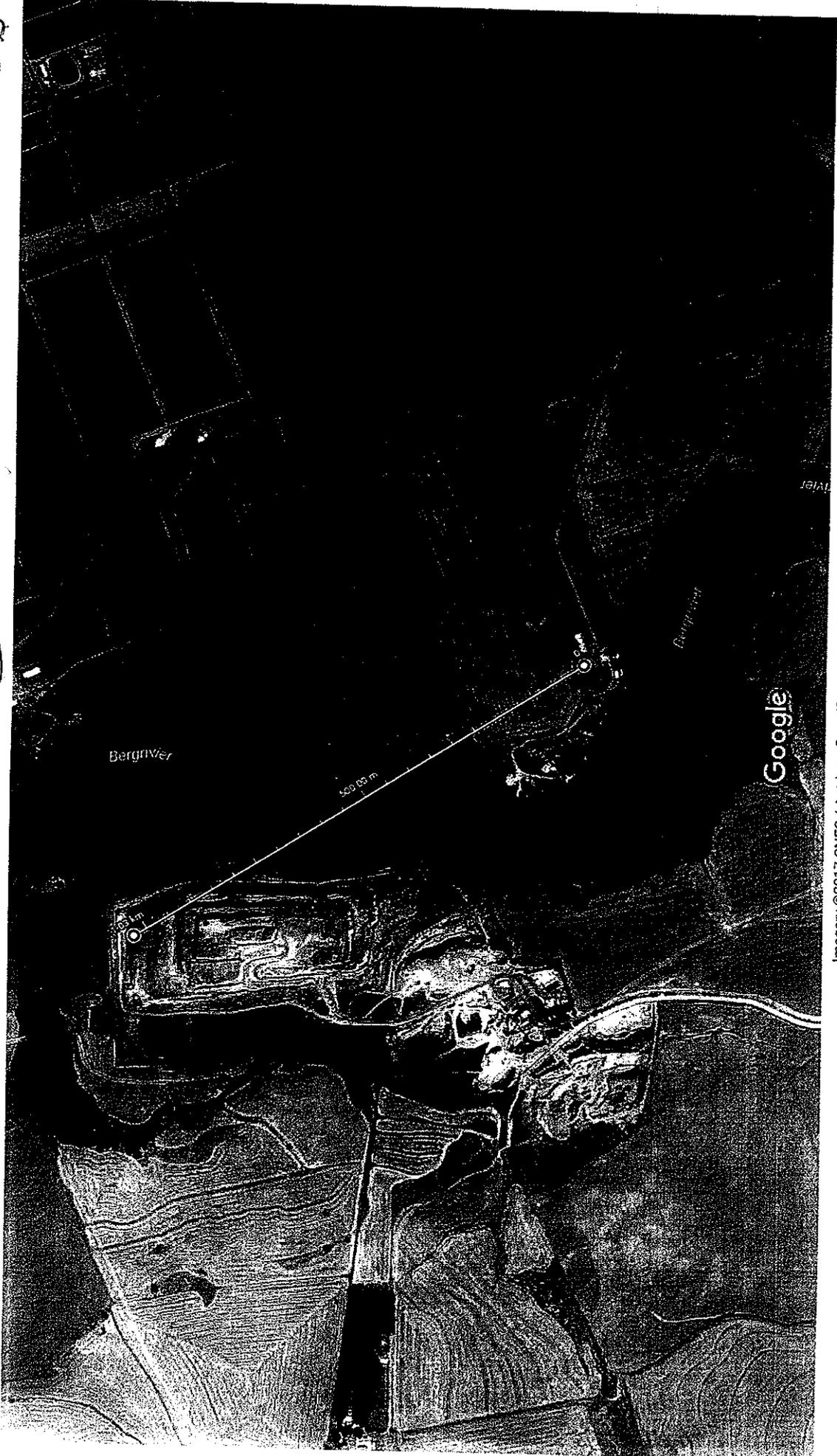
Measure distance

Total distance: 554.74 m (1,820.03 ft)

SEISMO GRAPA # 3828 - (NO EVENTS).

48 Berggrivier (not A BcaSZ)

3829



Imagery ©2017 CNES / Astrium, Cnes/Spot Image, DigitalGlobe, Map data ©2017 Afrigis (Pty) Ltd, Google 200 m

Measure distance
 Total distance: 1.03 km (3,378.53 ft)

THIS IS NOT A BLAST -

1

4 x READINGS AT TWO MINUTES APART.

Bridgetown Dolomite Mine
Level: 35 (north)
seismograph placed at "Mr Smits Home".

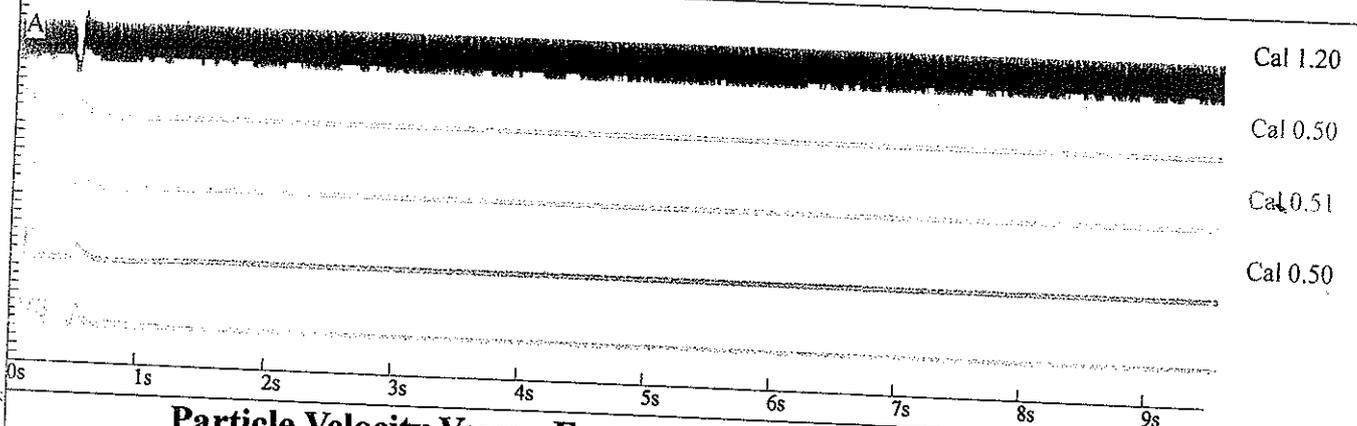
File Name: SN382920170406208.DTB
Number: 208
Date: 4/6/2017
Time: 14:10
Serial Number: 3829
Seismic Trigger: 0.0400 in/s 1.0160 mm/s
Acoustic Trigger: 124 dB
Sample Rate: 1024
Record Duration: 9.0 Seconds
Pre-Trigger: 0.50 Seconds
Sensor Gain: 2x
Battery: 5.2

Amplitudes and Frequencies

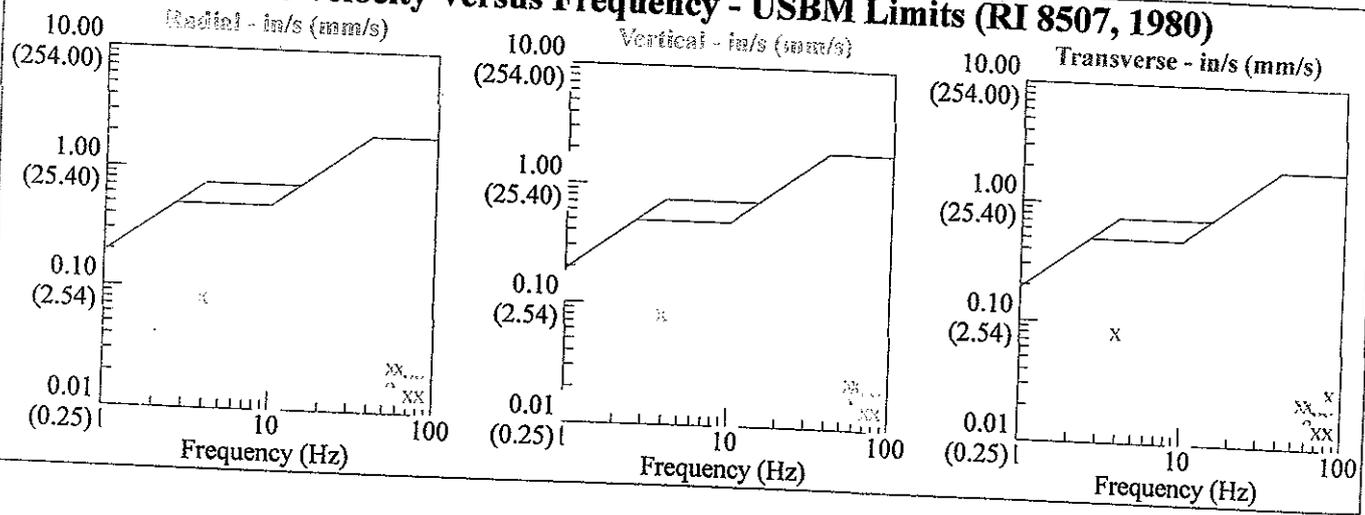
Acoustic: 122 dB @ 102.4 Hz
(0.24Mb 0.0035psi 0.0240kPa)
Radial: 0.085in/s 2.159mm/s @ 4.1Hz
Vertical: 0.085in/s 2.159mm/s @ 4.1Hz
Transverse: 0.085in/s 2.159mm/s @ 4.2Hz
Vector Sum (VS): 0.145in/s 3.683mm/s
Calibration Date: 2/23/2017

Graph Information

Duration: 0.000s To: 9.500s
Acoustic Scale:
122dB 0.25Mb (0.063Mb/div)
Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)
Time Line Intervals at: 1.00 s



Particle Velocity Versus Frequency - USBM Limits (RI 8507, 1980)



Bridgetown Dolomite Mine
Level: 35 (north)
seismograph placed at "Mr Smits Home".

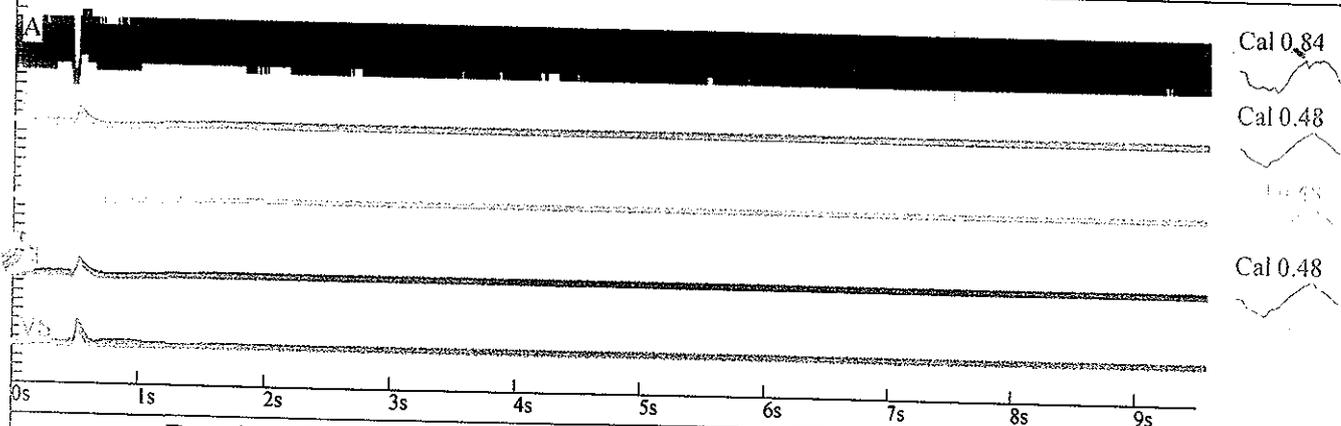
File Name: SN382920170406209.DTB
 Number: 209
 Date: 4/6/2017
 Time: 14:12
 Serial Number: 3829
 Seismic Trigger: 0.0400 in/s 1.0160 mm/s
 Acoustic Trigger: 124 dB
 Sample Rate: 1024
 Record Duration: 9.0 Seconds
 Pre-Trigger: 0.50 Seconds
 Sensor Gain: 2x
 Battery: 5.2

Amplitudes and Frequencies

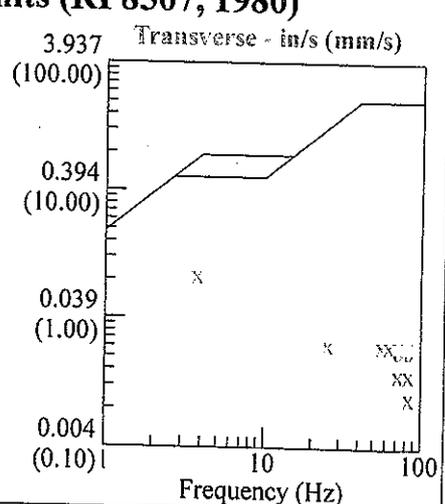
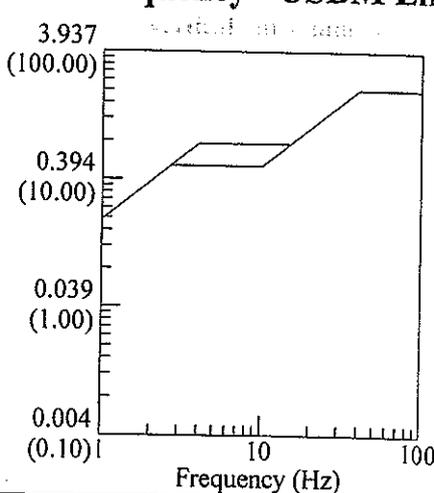
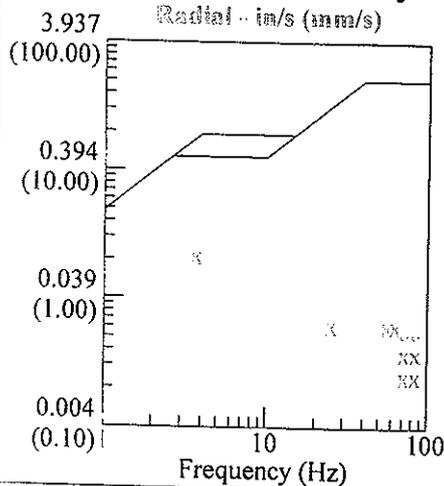
Acoustic: 120 dB @ 85.3 Hz
 (0.20Mb 0.0029psi 0.0200kPa)
 Radial: 0.085in/s 2.159mm/s @ 4.0Hz
 Transverse: 0.085in/s 2.159mm/s @ 4.0Hz
 Vector Sum (VS): 0.145in/s 3.683mm/s
 Calibration Date: 2/23/2017

Graph Information

Duration: 0.000s To: 9.500s
 Acoustic Scale:
 120dB 0.20Mb (0.050Mb/div)
 Seismic Scale:
 0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)
 Time Line Intervals at: 1.00 s



Particle Velocity Versus Frequency - USBM Limits (RI 8507, 1980)



Bridgetown Dolomite Mine
Level: 35 (north)
seismograph placed at "Mr Smits Home".

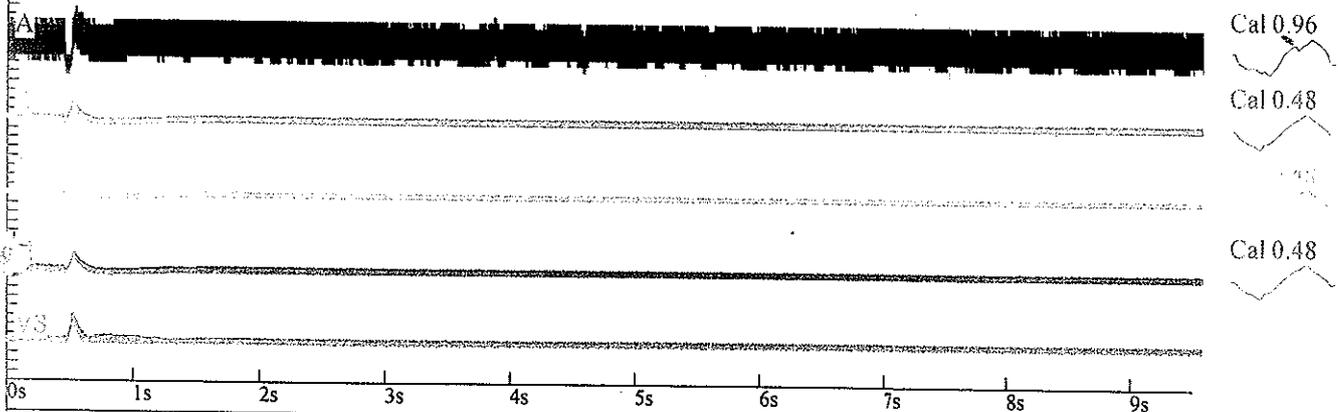
File Name: SN382920170406210.DTB
 Number: 210
 Date: 4/6/2017
 Time: 14:14
 Serial Number: 3829
 Seismic Trigger: 0.0400 in/s 1.0160 mm/s
 Acoustic Trigger: 124 dB
 Sample Rate: 1024
 Record Duration: 9.0 Seconds
 Pre-Trigger: 0.50 Seconds
 Sensor Gain: 2x
 Battery: 5.2

Amplitudes and Frequencies

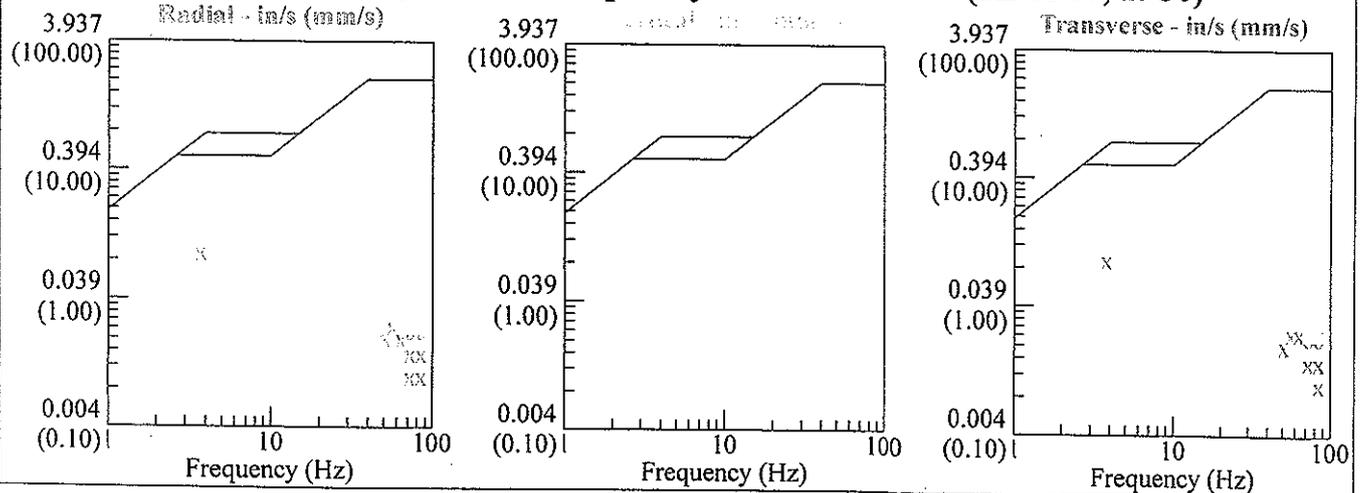
Acoustic: 122 dB @ 85.3 Hz
 (0.24Mb 0.0035psi 0.0240kPa)
 Radial: 0.09in/s 2.286mm/s @ 3.7Hz
 Transverse: 0.09in/s 2.286mm/s @ 3.7Hz
 Vector Sum (VS): 0.16in/s 4.064mm/s
 Calibration Date: 2/23/2017

Graph Information

Duration: 0.000s To: 9.500s
 Acoustic Scale:
 122dB 0.25Mb (0.063Mb/div)
 Seismic Scale:
 0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)
 Time Line Intervals at: 1.00 s



Particle Velocity Versus Frequency - USBM Limits (RI 8507, 1980)



Bridgetown Dolomite Mine
Level: 35 (north)
seismograph placed at "Mr Smits Home".

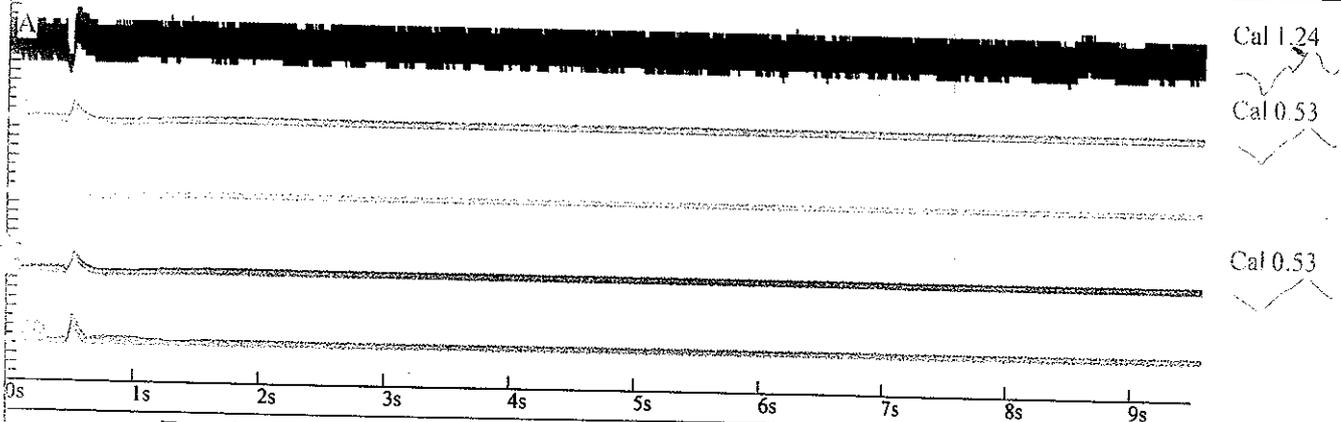
File Name: SN382920170406211.DTB
 Number: 211
 Date: 4/6/2017
 Time: 14:16
 Serial Number: 3829
 Seismic Trigger: 0.0400 in/s 1.0160 mm/s
 Acoustic Trigger: 124 dB
 Sample Rate: 1024
 Record Duration: 9.0 Seconds
 Pre-Trigger: 0.50 Seconds
 Sensor Gain: 2x
 Battery: 5.2

Amplitudes and Frequencies

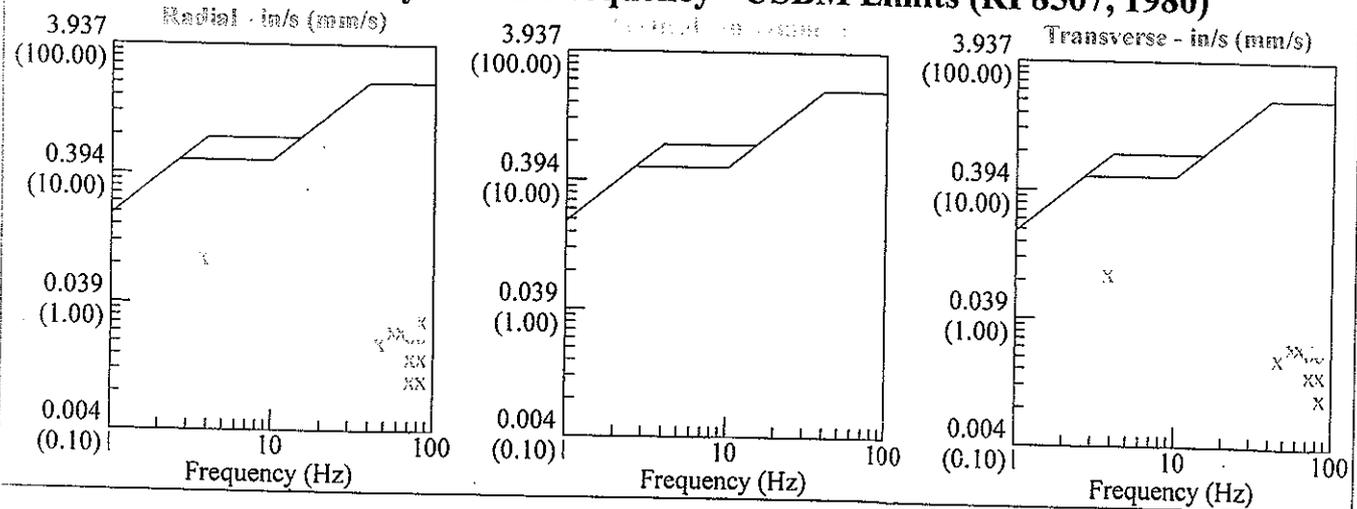
Acoustic: 122 dB @ 85.3 Hz
 (0.24Mb 0.0035psi 0.0240kPa)
 Radial: 0.09in/s 2.286mm/s @ 3.7Hz
 Transverse: 0.09in/s 2.286mm/s @ 3.7Hz
 Vector Sum (VS): 0.155in/s 3.937mm/s
 Calibration Date: 2/23/2017

Graph Information

Duration: 0.000s To: 9.500s
 Acoustic Scale:
 122dB 0.25Mb (0.063Mb/div)
 Seismic Scale:
 0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)
 Time Line Intervals at: 1.00 s



Particle Velocity Versus Frequency - USBM Limits (RI 8507, 1980)



SuperGraphics - Report

Telephone: (205)592-2488 x 23

Company: Bridgetown Dolomite Mine

Location: level 26 north.

Operator: Blasting & Excavating

Notes: Seismograph placed at gate, south of pit 528m away.

7/3/2017 at 15:13:49 Event # 133

Graph: 20068

Last Calibration: 2/23/2017

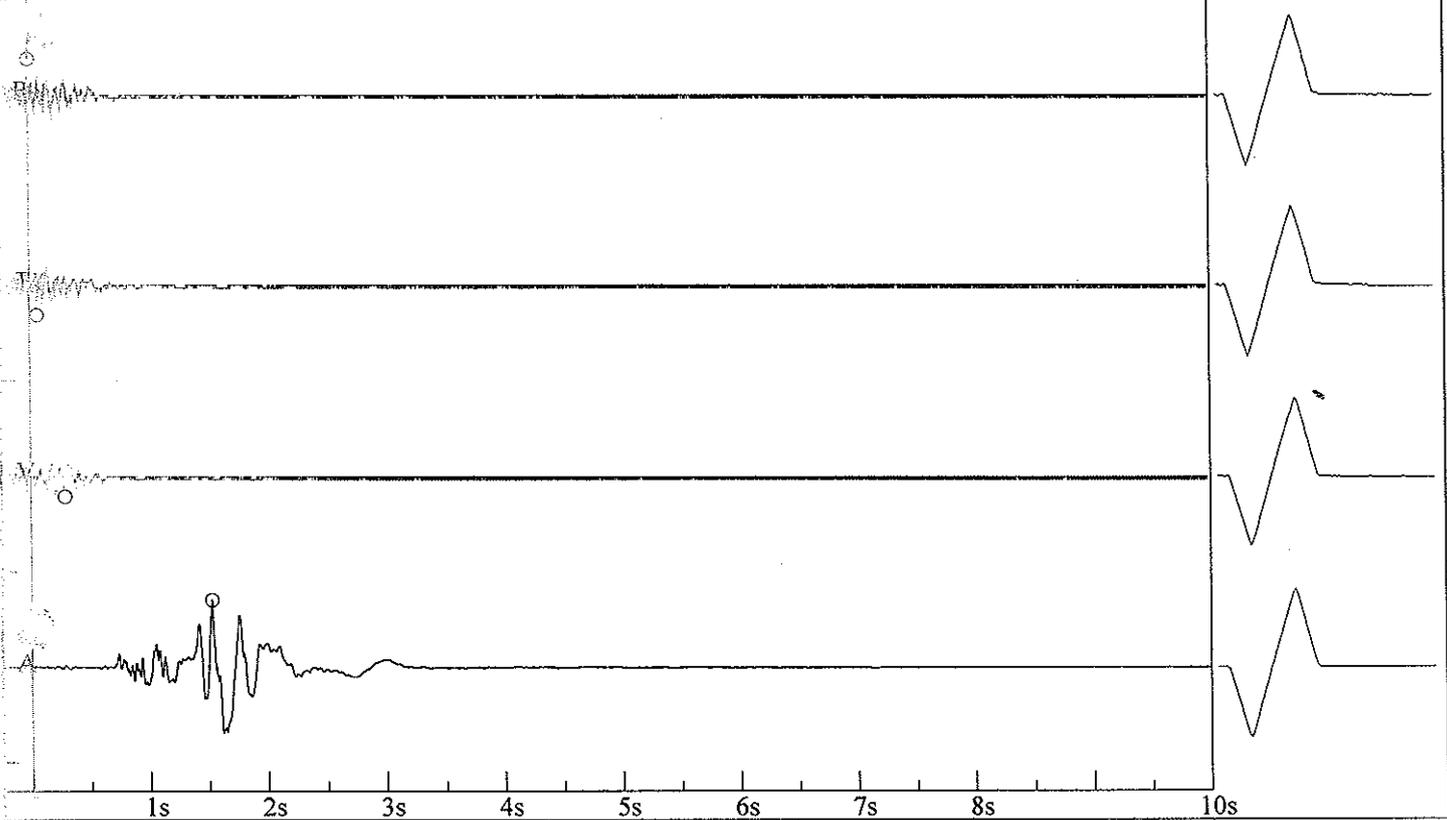
Record Duration: 10 sec

Sample Rate: 1024/sec

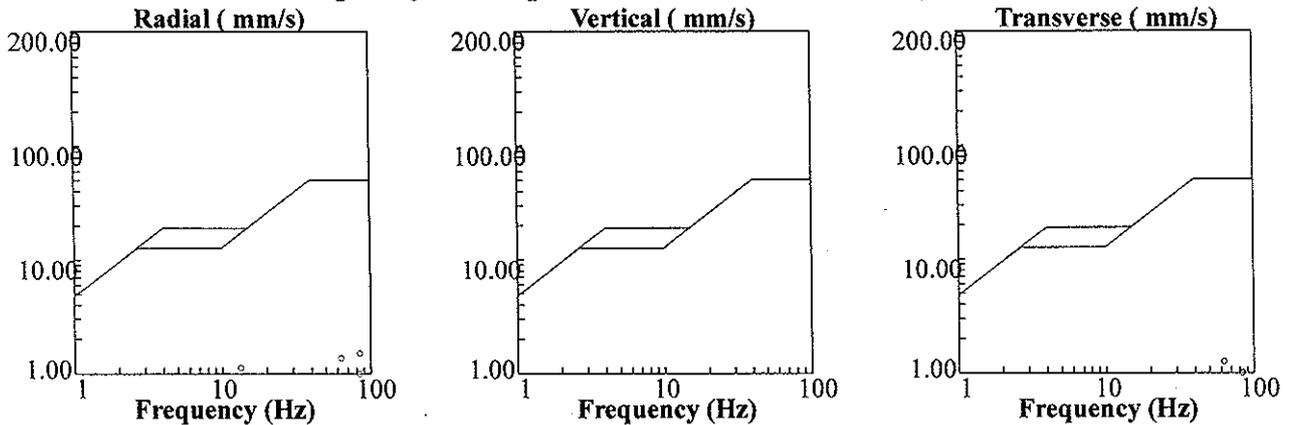
Amplitudes / Frequencies	Trigger >>> Peak	Scales / Triggers	Charge / Distance
Radial: 1.524 mm/s @ 85.3 Hz	1.0 ms	Air Scale: .03176 kPa/div.	Wgt. Per Delay: 180 kg
Transverse: 1.270 mm/s @ 64 Hz	65.4 ms	Seismic Scale: 4.06 mm/s/div.	Distance: 528 m
Vertical: 0.889 mm/s @ 13.8 Hz	291.0 ms	Air Trigger: 125 dBL	Scaled Distance: 39.3
Air: 121.0 dBL @ 8.6Hz / .0225kPa	1526.4 ms	Seismic Trigger: 1.016 mm/s	
Vector Sum: 1.89 mm/s @ 64.0 Hz	66.4 ms		

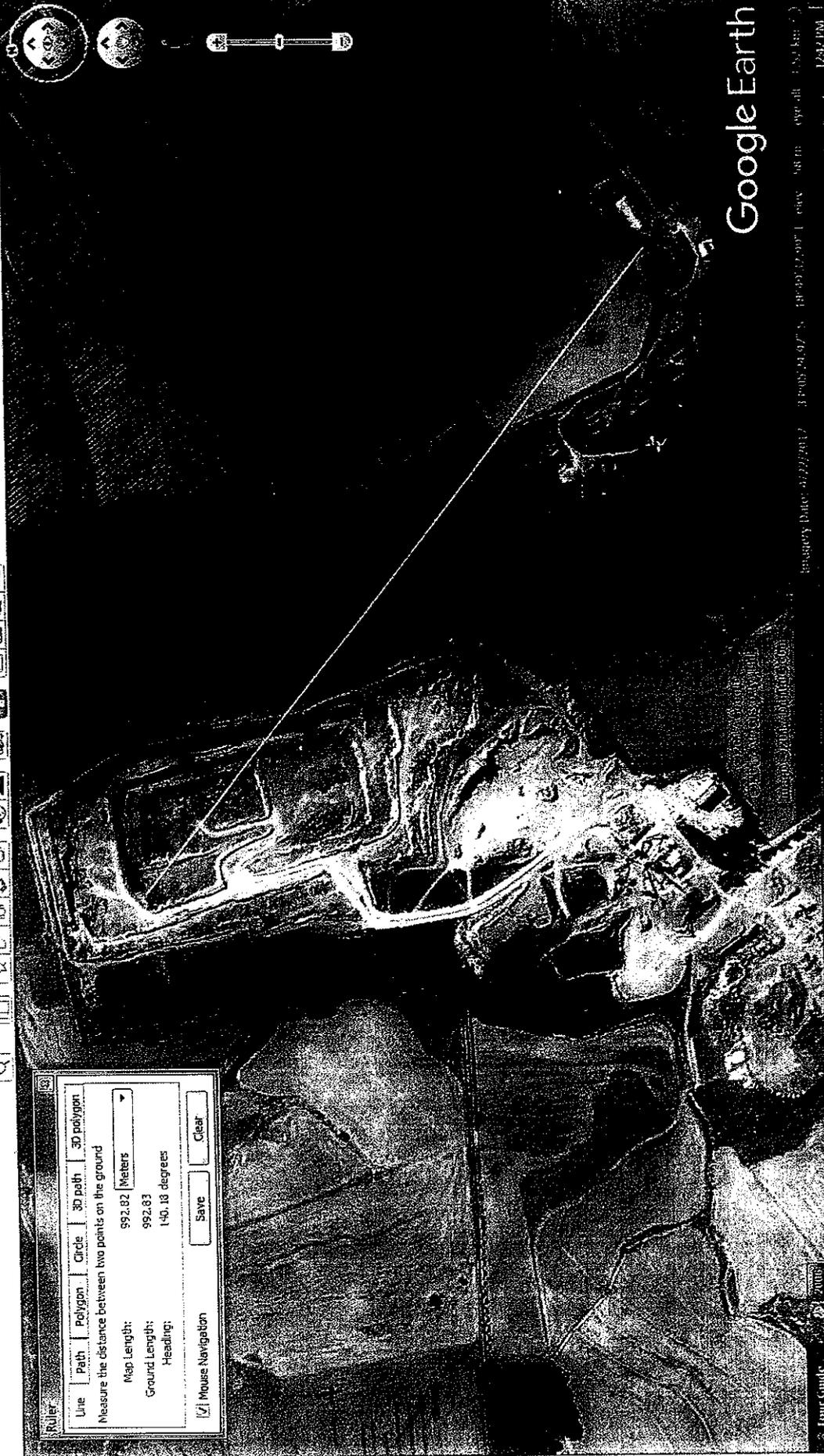
Waveform Analysis

Calibration



Frequency vs. Amplitude Plot - USBM Limits (RI 8507, 1980)





Ruler

Line Path Polygon Circle 3D path 3D polygon

Measure the distance between two points on the ground

Map Length:	992.82	Meters
Ground Length:	992.83	
Heading:	140.18	degrees

Mouse Navigation

Save Clear

Four Corners

Home, Back, Forward, Stop, Refresh, Print, Full Screen, Help, About

Bridgetown Dolomite Mine.
Level: 26 (North).
Seismograph placed at Mr Smuts farm.
Distance: 992m away.

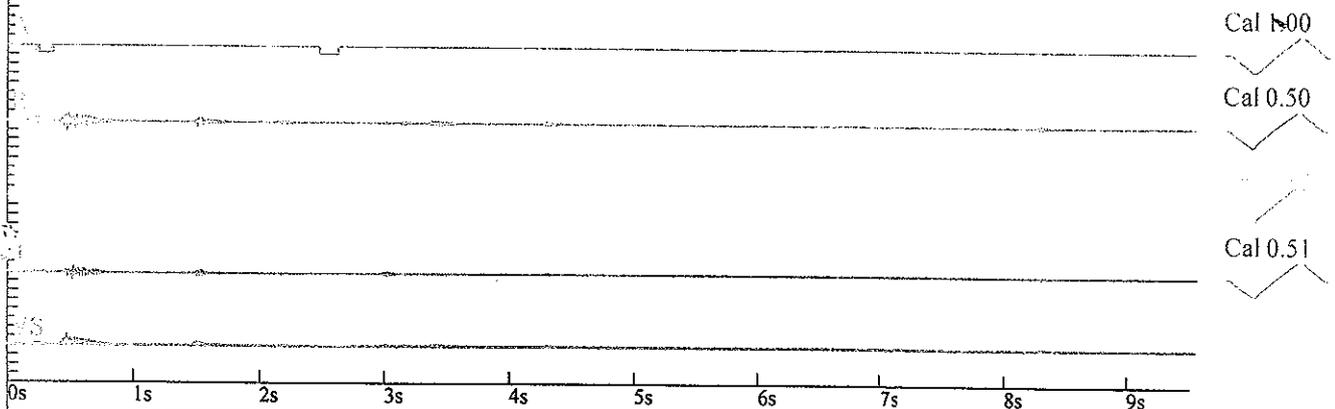
File Name: SN335920170703101.DTB
 Number: 101
 Date: 7/3/2017
 Time: 15:09
 Serial Number: 3359
 Seismic Trigger: 0.0400 in/s 1.0160 mm/s
 Acoustic Trigger: 123 dB
 Sample Rate: 1024
 Record Duration: 9.0 Seconds
 Pre-Trigger: 0.50 Seconds
 Sensor Gain: 2x
 Battery: 6.3

Amplitudes and Frequencies

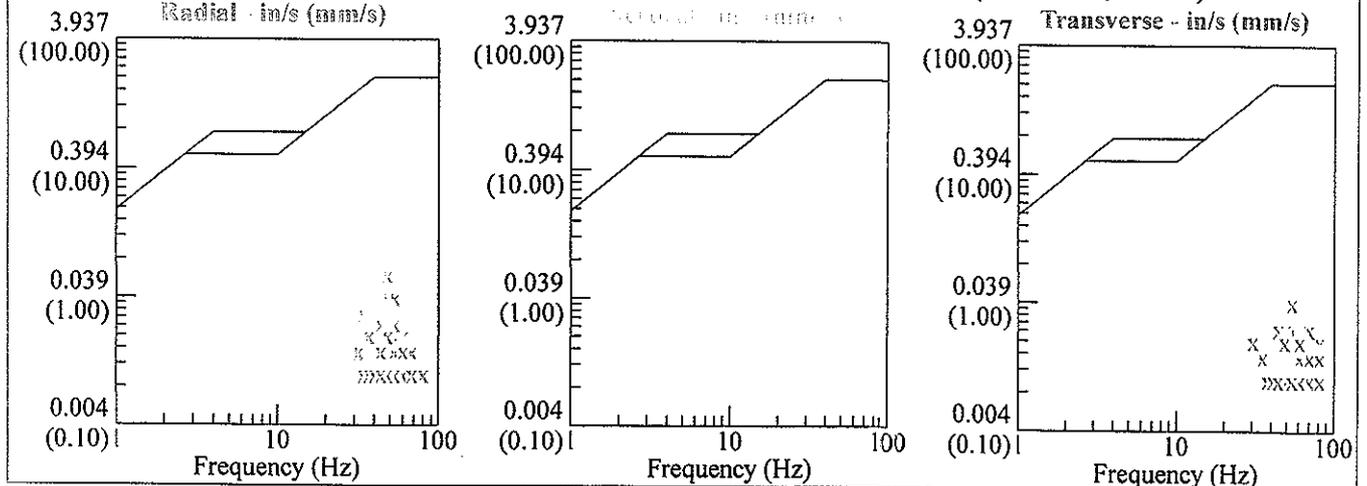
Acoustic: 106 dB @ 0.0 Hz
 (0.04Mb 0.0006psi 0.0040kPa)
 Radial: 0.06in/s 1.524mm/s @ 51.2Hz
 Transverse: 0.04in/s 1.016mm/s @ 56.8Hz
 Vector Sum (VS): 0.06in/s 1.524mm/s
 Calibration Date: 2/23/2017

Graph Information

Duration: 0.000s To: 9.500s
 Acoustic Scale:
 120dB 0.20Mb (0.050Mb/div)
 Seismic Scale:
 0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)
 Time Line Intervals at: 1.00 s



Particle Velocity Versus Frequency - USBM Limits (RI 8507, 1980)



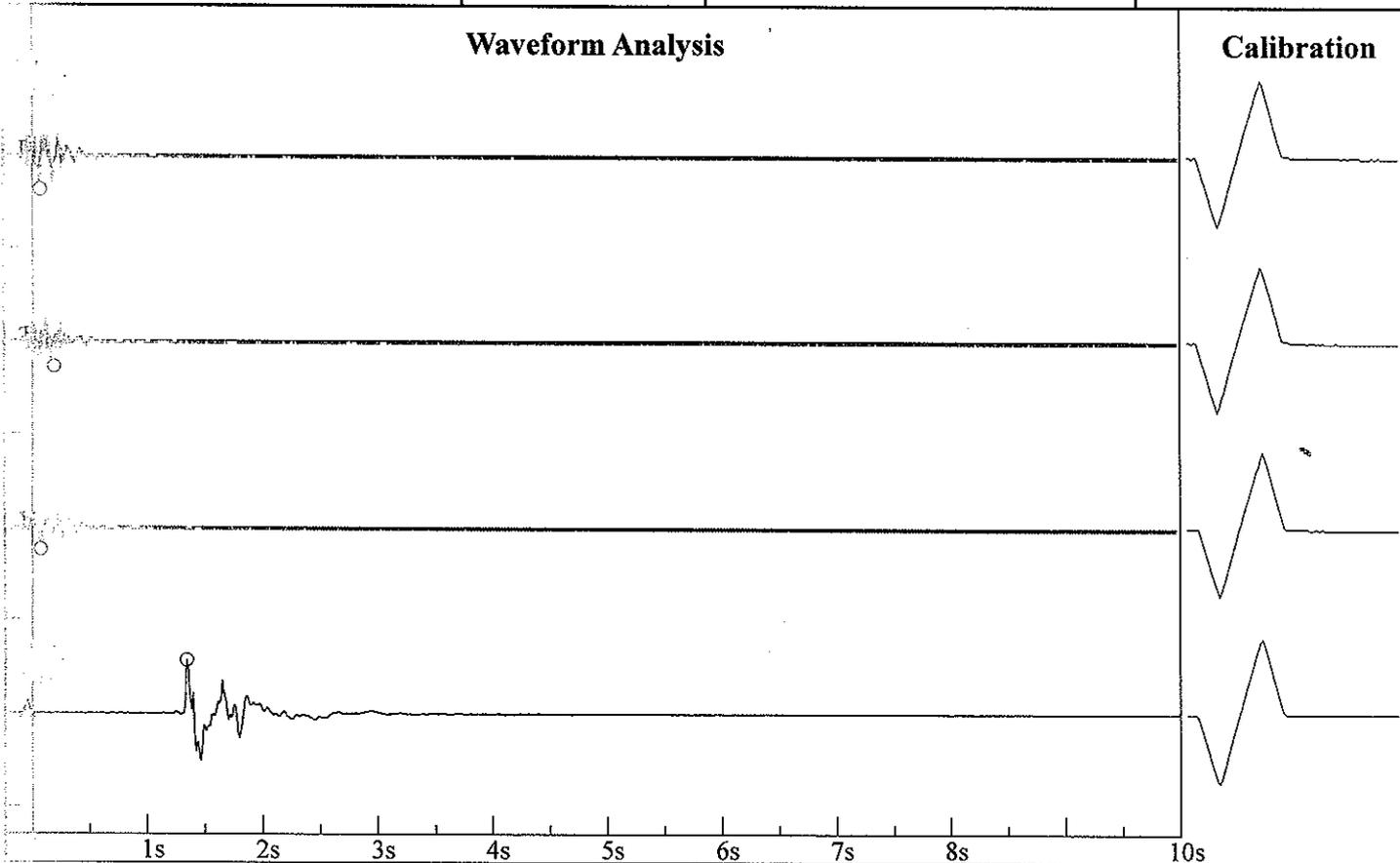
SuperGraphics - Report

Telephone: (205)592-2488 x 23

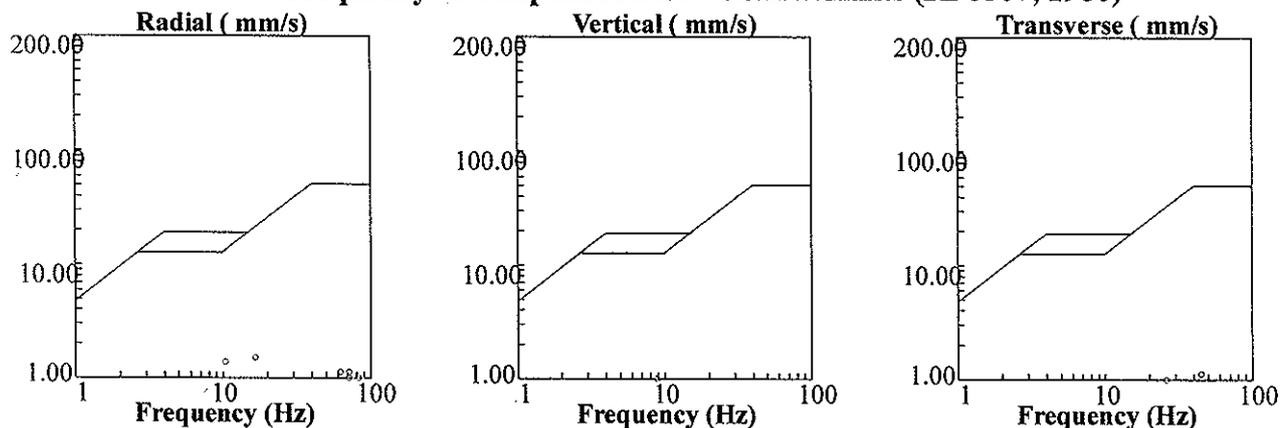
Company: Bridgetown Dolomite Mine.
Location: Level 20 (North).
Operator: Blasting & Excavating.
 Notes: Seismograph placed at South gate of pit. Distance 537m away from blast.

8/14/2017 at 15:18:49 Event # 1
 Graph: 20068
 Last Calibration: 2/23/2017
 Record Duration: 10 sec
 Sample Rate: 1024/sec

Amplitudes / Frequencies	Trigger >>> Peak	Scales / Triggers	Charge / Distance
Radial: 1.524 mm/s @ 17 Hz	70.3 ms	Air Scale: .06353 kPa/div.	Wgt. Per Delay: 200 kg
Transverse: 1.143 mm/s @ 46.5 Hz	193.4 ms	Seismic Scale: 4.06 mm/s/div.	Distance: 537 m
Vertical: 1.016 mm/s @ 9.1 Hz	78.1 ms	Air Trigger: 125 dBL	Scaled Distance: 38.0
Air: 125.2 dBL @ 5.6Hz / .0362kPa	1344.7 ms	Seismic Trigger: 1.016 mm/s	
Vector Sum: 1.73 mm/s @ 16.5 Hz	79.1 ms		



Frequency vs. Amplitude Plot - USBM Limits (RI 8507, 1980)



SuperGraphics - Report

Telephone: (205)592-2488 x 23

Company: -Bridgetown Dolomite Mine.

Location: Level: 20 (north).

Operator: Blasting & Excavating.

Notes: Seismograph placed at "farm workers houses". Distance 896m away.

8/14/2017 at 15:17:24 Event # 2

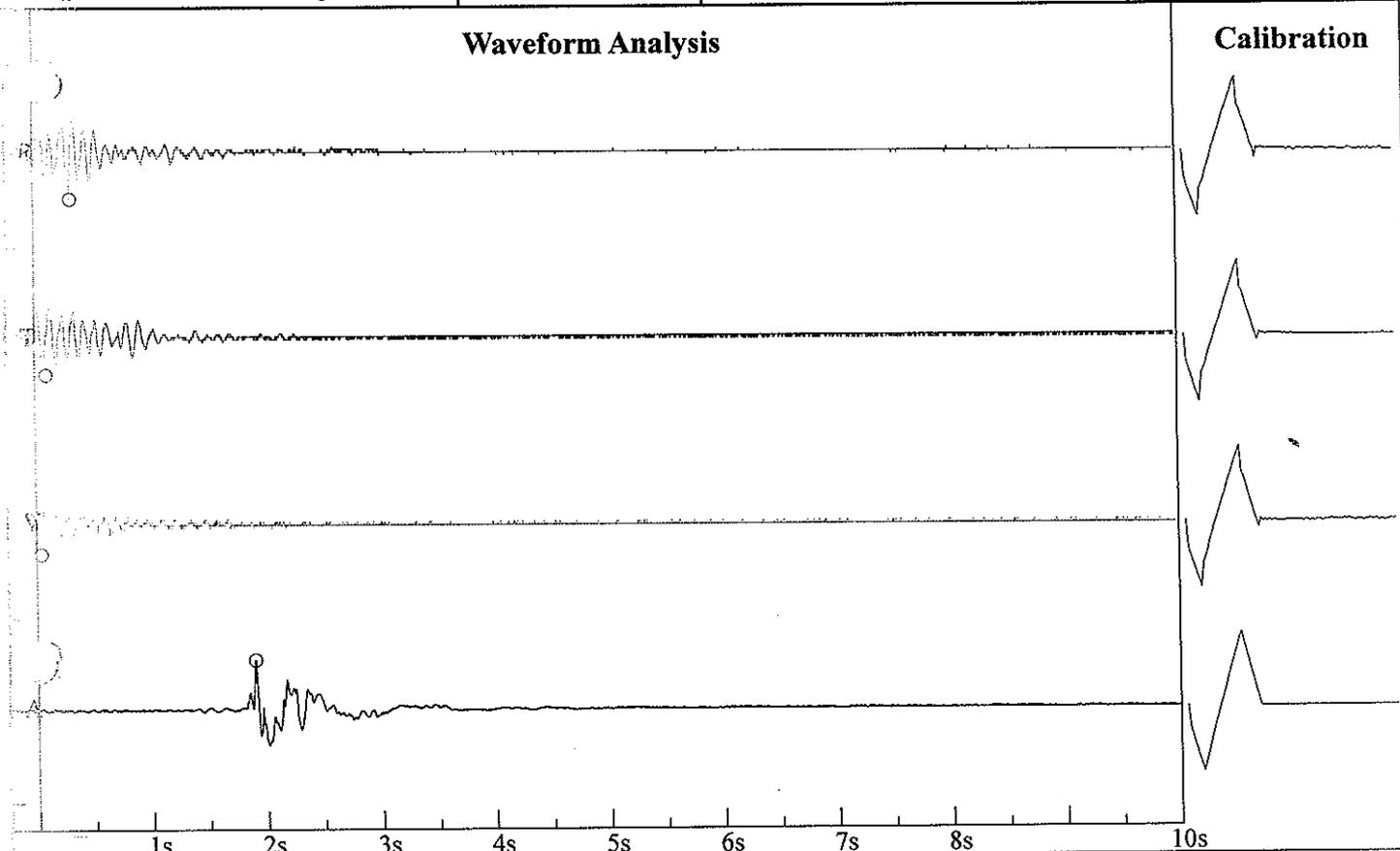
Graph: 13379

Last Calibration: 07Jun17

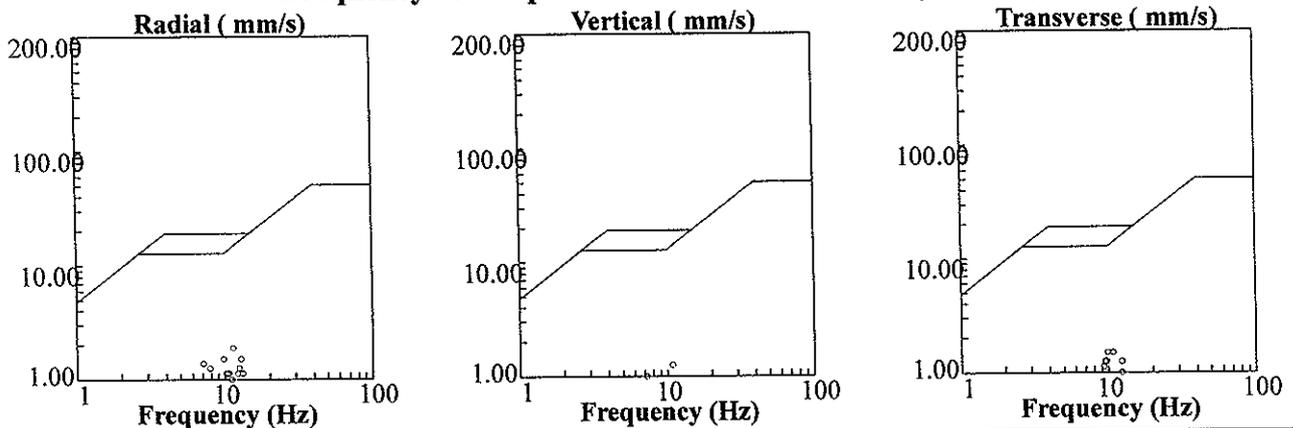
Record Duration: 10 sec

Sample Rate: 1024/sec

Amplitudes / Frequencies	Trigger >>> Peak	Scales / Triggers	Charge / Distance
Radial: 1.905 mm/s @ 11.6 Hz	325.2 ms	Air Scale: .03176 kPa/div.	Wgt. Per Delay: 200 kg
Transverse: 1.524 mm/s @ 11.1 Hz	100.6 ms	Seismic Scale: 4.06 mm/s/div.	Distance: 896 m
Vertical: 1.270 mm/s @ 11.1 Hz	41.0 ms	Air Trigger: 125 dBL	Scaled Distance: 63.4
Air: 118.8 dBL @ 3Hz / .0175kPa	1896.5 ms	Seismic Trigger: 1.016 mm/s	
Vector Sum: 2.05 mm/s @ 10.0 Hz	365.2 ms		



Frequency vs. Amplitude Plot - USBM Limits (RI 8507, 1980)





Line Path Polygon Circle 3D path 3D polygon

Measure the distance between two points on the ground

Map Length:	931.41	Meters
Ground Length:	931.41	
Heading:	132.40	degrees

Mouse Navigation

Save Clear

Google Earth

Imagery Date: 5/22/2017 33°45'26.31" S 139°49'57.47" E elev 44 m eye alt 1.12 km
3:34 PM 1/18/2018

Imagery © 2018 DigitalGlobe
© 2018 Air Data Pty Ltd
© 2018 Google

THIS IS NOT A BCAST RECORDING.

TAP FOR MACHINE [20 SEC IR 123] RECORDING.

Version 4.1.1

Executable Date: 17Dec2015

File: c:\SuperGraphics.TMP\71.NSZ

Nomis Seismographs, Inc.

SuperGraphics - Report

Telephone: (205)592-2488 x 23

Company: Bridgetown Dolomite Mine.

Location: Level, 42 (west).

Operator: Blasting & Excavating

Notes: Seismograph placed at Mr Smuts Farm, 931m away.

1/18/2018 at 12:36:35 Event # 71

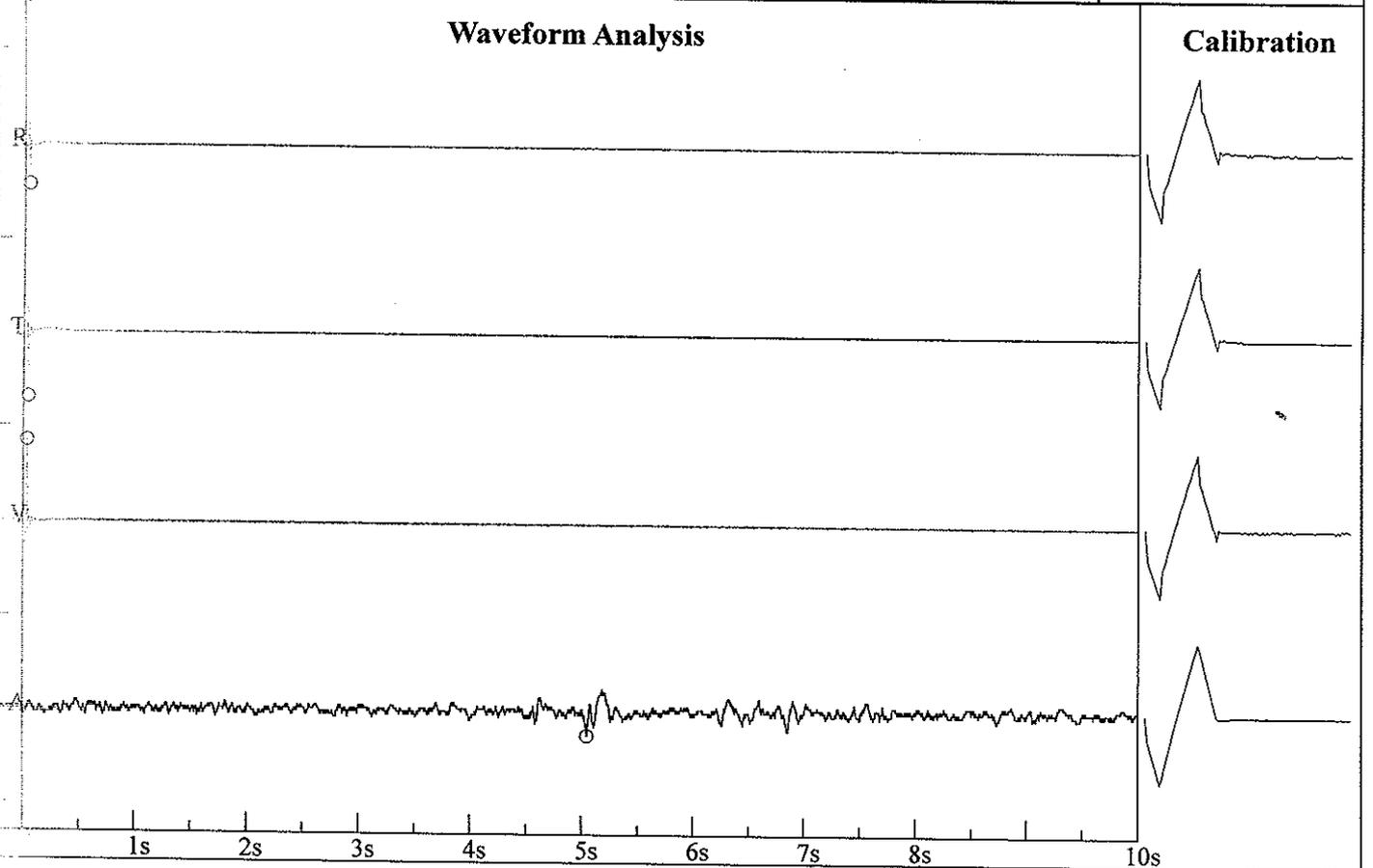
Graph: 13379

Last Calibration: 07Jun17

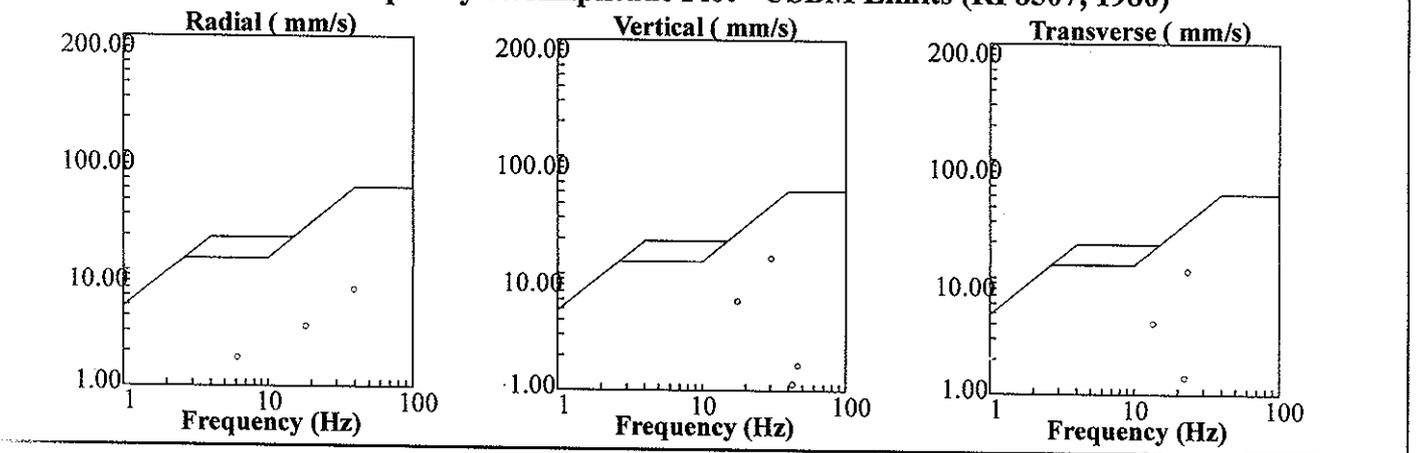
Record Duration: 10 sec

Sample Rate: 1024/sec

Amplitudes / Frequencies	Trigger >>> Peak	Scales / Triggers	Charge / Distance
Radial: 6.858 mm/s @ 39.3 Hz	43.0 ms	Air Scale: .00799 kPa/div.	Wgt. Per Delay: 180 kg
Transverse: 11.303 mm/s @ 23.2 Hz	43.0 ms	Seismic Scale: 16.26 mm/s/div.	Distance: 931 m
Vertical: 13.716 mm/s @ 30.1 Hz	34.2 ms	Air Trigger: 125 dBL	Scaled Distance: 69.4
Air: 100.0 dBL @ 11.9Hz / .002kPa	5050.8 ms	Seismic Trigger: 1.016 mm/s	
Vector Sum: 14.33 mm/s @ 30.1 Hz	34.2 ms		



Frequency vs. Amplitude Plot - USBM Limits (RI 8507, 1980)



Bridgetown Dolomite Mine
Level; 27 (North).
Seismograph placed at gate ,south of pit.,

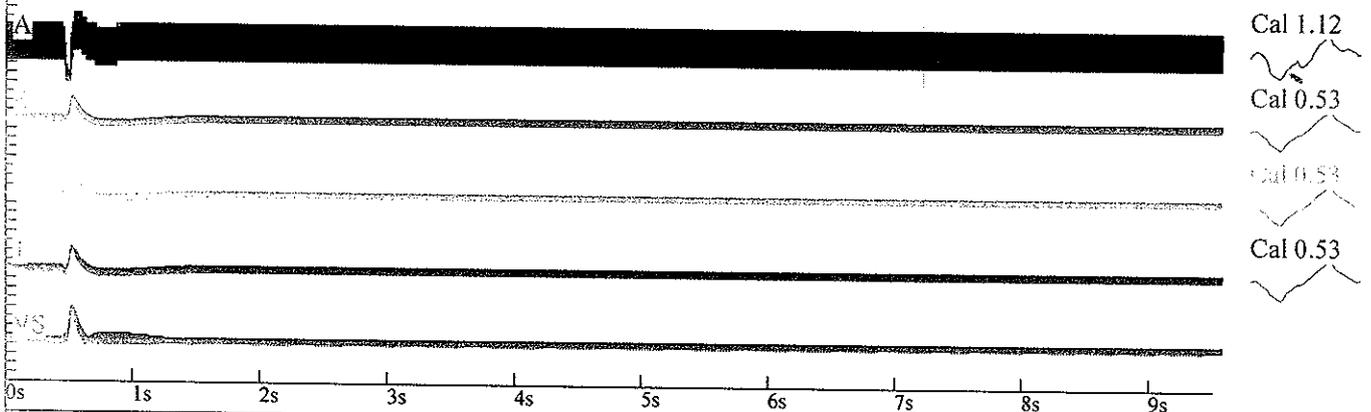
File Name: SN382920180515212.DTB
 Number: 212
 Date: 5/15/2018
 Time: 13:40
 Serial Number: 3829
 Seismic Trigger: 0.0400 in/s 1.0160 mm/s
 Acoustic Trigger: 124 dB
 Sample Rate: 1024
 Record Duration: 9.0 Seconds
 Pre-Trigger: 0.50 Seconds
 Sensor Gain: 2x
 Battery: 5.2

Amplitudes and Frequencies

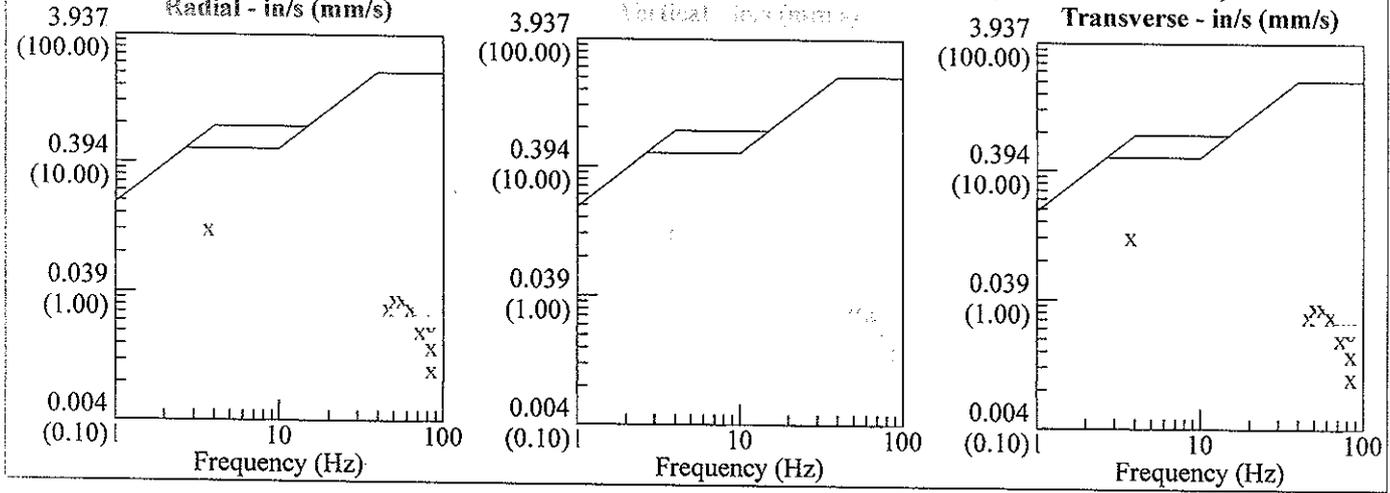
Acoustic: 123 dB @ 11.6 Hz
 (0.28Mb 0.0041psi 0.0280kPa)
 Radial: 0.12in/s 3.048mm/s @ 3.7Hz
 Transverse: 0.12in/s 3.048mm/s @ 3.7Hz
 Vector Sum (VS): 0.21in/s 5.334mm/s
 Calibration Date:3/6/2018

Graph Information

Duration:0.000s To: 9.500s
 Acoustic Scale:
 123dB 0.28Mb (0.071Mb/div)
 Seismic Scale:
 0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)
 Time Line Intervals at:1.00 s



Particle Velocity Versus Frequency - USBM Limits (RI 8507, 1980)



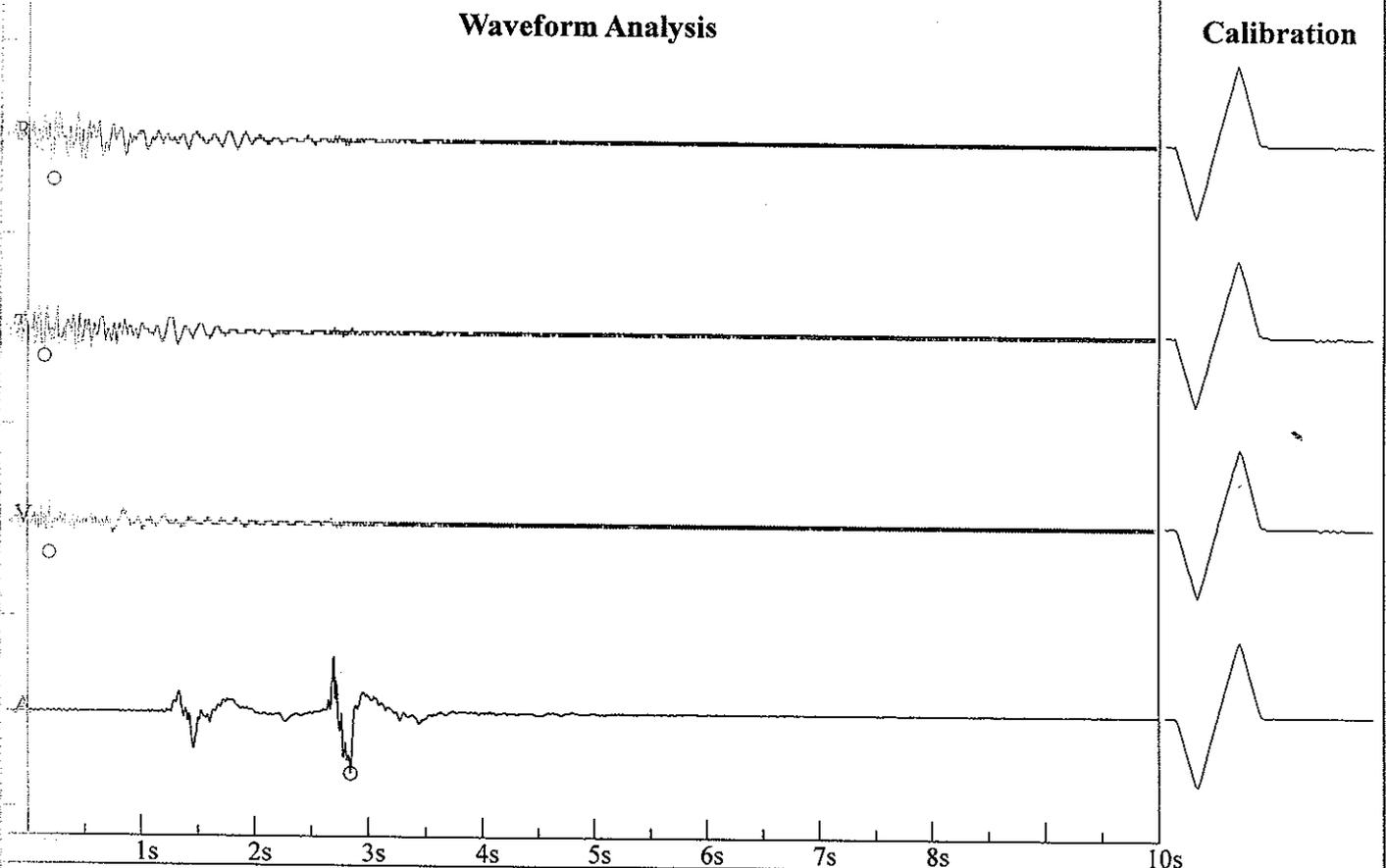
SuperGraphics - Report

Telephone: (205)592-2488 x 23

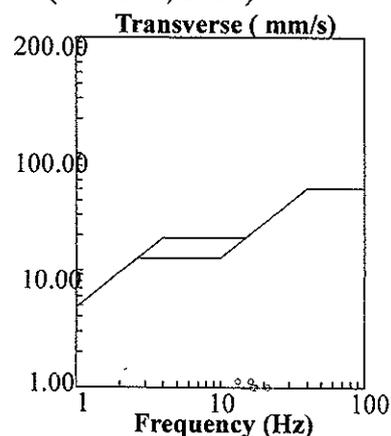
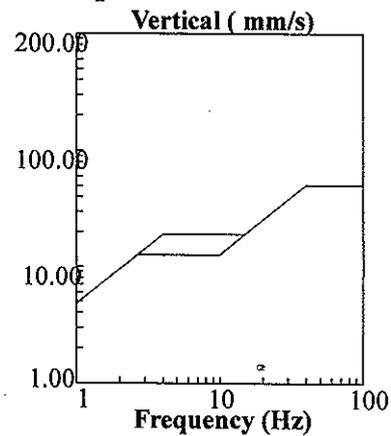
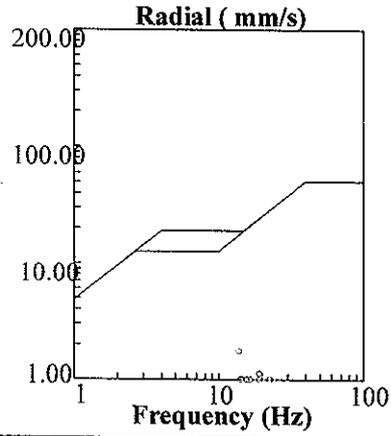
Company: Bridgetown Dolomite Mine.
Location: Level: 14 (south).
Operator: Blasting & Excavating
 Notes: Seismograph placed at "workers houses, 685m away.

6/26/2018 at 14:36:06 Event # 59
 Graph: 20068
 Last Calibration: 3/6/2018
 Record Duration: 10 sec
 Sample Rate: 1024/sec

Amplitudes / Frequencies	Trigger >>> Peak	Scales / Triggers	Charge / Distance
Radial: 1.778 mm/s @ 14.2 Hz	223.6 ms	Air Scale: .06353 kPa/div.	Wgt. Per Delay: 180 kg
Transverse: 1.143 mm/s @ 13.8 Hz	149.4 ms	Seismic Scale: 4.06 mm/s/div.	Distance: 685 m
Vertical: 1.397 mm/s @ 20.4 Hz	193.4 ms	Air Trigger: 125 dBL	Scaled Distance: 51.0
Air: 126.2 dBL @ 3.6Hz / .041kPa	2843.8 ms	Seismic Trigger: 1.016 mm/s	
Vector Sum: 2.19 mm/s @ 13.8 Hz	223.6 ms		



Frequency vs. Amplitude Plot - USBM Limits (RI 8507, 1980)





200m Radius

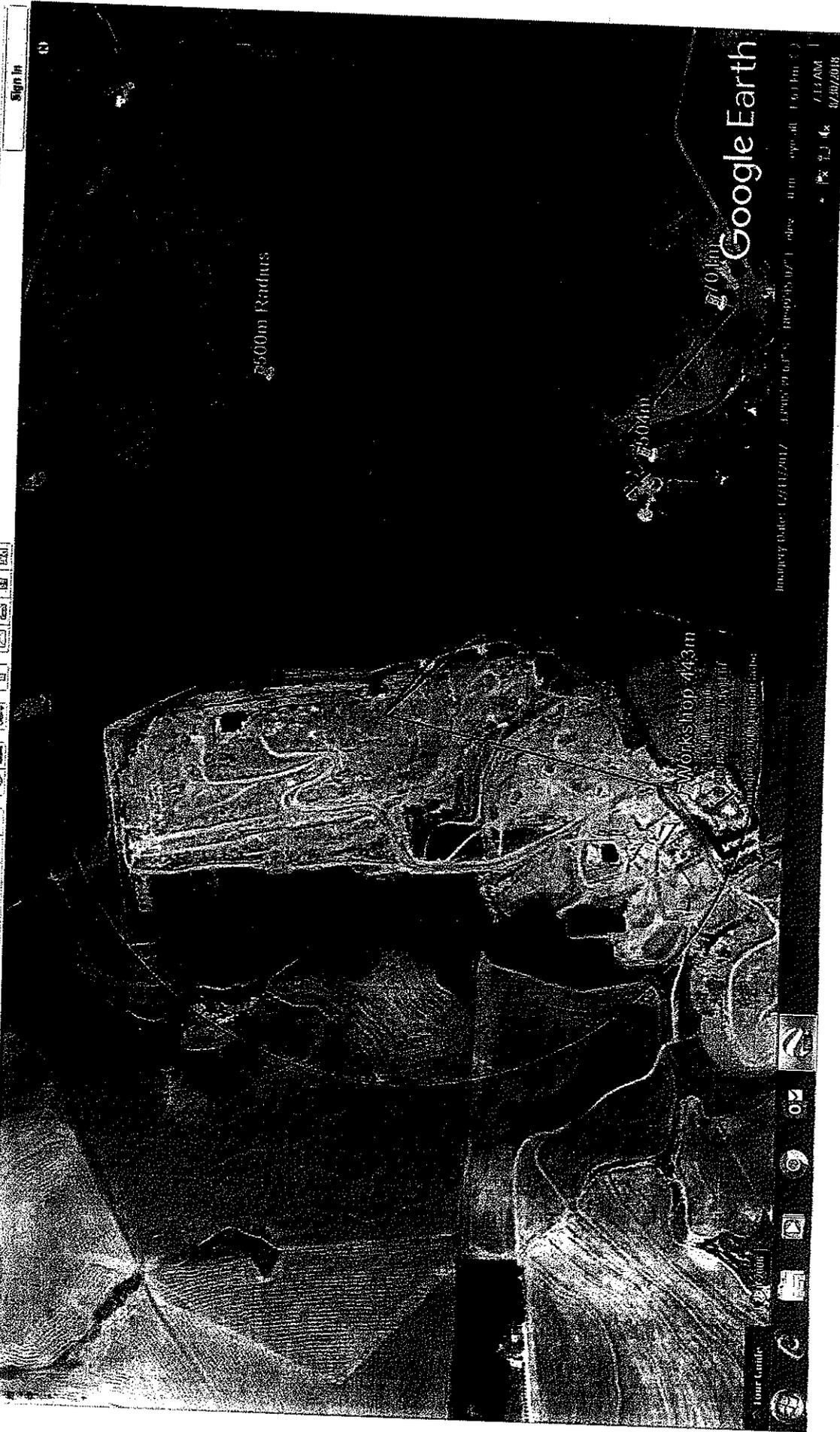
Home house 742m

Workers house 685m

© 2006 Google
All rights reserved.
Google Earth is a service mark of Google Inc.

Google Earth





7500m Radius

Workshop 443m

Google Earth

Imagery Date: 12/11/2017 1:00:45 PM
100% (1000m) 100% (1000m) 100% (1000m)
7:13 AM 8/29/2018

