Appendix 5

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100 North 3rd Street
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Date: March 22, 2004

Subject: GROUND MOTION ATTENUATION STUDIES
EAST CRESSON MINE EXTENSION
February 25, 2004
Teller County, Colorado

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PHOTOGRAPHS
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CRIPPLE CREEK & VICTOR GOLD MINING COMPANY
GROUND MOTION ATTENUATION STUDIES
EAST CRESSON MINE EXTENSION

February 25, 2004

Executive Summary

Matheson Mining Consultants, Inc. (MMC) monitored six test blasts in three directions from the East Cresson Mine Extension (ECME) near the Cripple Creek and Victor Gold Mining Company (CC&V) property northwest of the unincorporated area of Goldfield, Colorado, with eighteen seismographs. All data, the least squares linear regression analyses, a map, photographs, and instrument information and calibration certificates are attached to this report.

Scaled distance is a relationship used in explosives engineering to interrelate blasts with different maximum charge weights per delay period:

$$SD = D / \sqrt{W}$$

Where: SD = Scaled Distance
D = Distance, in feet
W = Maximum charge weight per delay period, in pounds

The recommended scaled distance to not exceed the regulatory limit of 0.50 inches per second peak particle velocity (ips ppv) for the ECME in the A-Line direction is 34.1, in the B-Line direction is 32.4, and in the C-Line direction is 31.4. The A-Line regression analysis is the most conservative of the three studies.

The A-Line analysis is comprised of thirty-one data points and has a correlation coefficient of 0.894; the B-Line analysis is comprised of thirty data points and has a correlation coefficient of 0.804; and the C-Line analysis is comprised of thirty-six data points and has a correlation coefficient of 0.788.

Below is a table of distances and charge weights per delay based on the regulatory limit of 0.50 ips ppv and the site-specific scaled distance determinations for the three lines. The charge weight per delay is the maximum explosive charge per 8 millisecond (ms) delay that may be fired at a given distance.

Distance vs. Charge Weight for A-Line, B-Line, and C-Line

Distance, feet	A-Line, SD=34.1 Charge Weight, pounds per 8ms delay	B-Line, SD=32.4 Charge Weight, pounds per 8ms delay	C-Line, SD=31.4 Charge Weight, pounds per 8ms delay
500	215	239	253
1000	862	954	1012
1500	1939	2147	2277
2000	3448	3817	4047
2500	5387	5964	6324
3000	7758	8589	9107
3500	10559	11690	12395
4000	13792	15269	16190
4500	17455	19325	20490
5000	21550	23858	25296

INTRODUCTION

Matheson Mining Consultants, Inc. (MMC) was retained by Cripple Creek and Victor Gold Mining Company (CC&V) to perform ground motion attenuation studies in three directions from the southern permit boundary of the East Cresson area resulting from ground vibrations created by test blasting. This area is located northwest of the town of Goldfield, Colorado. Appendix I contains a map showing the test shot and seismograph recording locations. Photographs showing test shot and seismograph locations are attached to the end of this report. Eighteen seismographs (six in each of the three directions studied) were used to record the ground motion from each of six test blasts. The seismographs were positioned at varying distances from each test blast towards the nearest structures in three directions.

Particle velocity data acquired in the field are input into a least squares linear regression analysis program. The United States Office of Surface Mining and Reclamation Enforcement (OSMRE) have approved this program. The regression analysis yields a site-specific vibration attenuation formula in the form:

$$PPV = H(SD)^{-B}$$

where, H = the velocity (y axis intercept) at a scaled distance of one,
B = the slope of the curve,
PPV = the peak particle velocity in inches per second, and
SD = scaled distance = distance from shot to recorder divided by the square root of the charge weight.

The program also yields the correlation coefficient (goodness of fit), r^2. The procedure for the analysis performed is outlined in the "Blasting Guidance Manual," March, 1987, published by the OSMRE.

The resulting analysis is used to determine distance and charge weight relationships required for ground motion regulatory compliance. These studies were designed to be conservative in nature. The intent was to maximize the ground motion produced by the test shots. Typically in mine production blasting, explosive energy is consumed by fragmentation and displacement of the rock mass. The confined test blasts minimized fragmentation and displacement while maximizing ground motion.

INSTRUMENTATION

Vibration records were collected using eighteen Instantel Blastmate III and Minimate Plus seismographs. Four CC&V owned seismographs and twelve MMC owned seismographs were used. The seismographs record particle velocity digitally in the frequency range of 1.5 to 250 Hertz. Each shot is measured in three orthogonal channels of ground motion: vertical, longitudinal, and transverse; and one channel of air-overpressure. Zero-crossings of each of the four-waveform components are calculated to determine frequency response.

Attached, as Appendix II, is an excerpt from the Blastmate III User's Manual describing the specifications and function of the instrumentation and record processing.

An independent party using shake table, piston phone, and electronics traceable to the National Institute of Science and Technology has calibrated the instruments within the past year. Copies of the calibration certificates for the instruments, geophones, and microphones are on file at MMC, or CC&V. In addition, the instrument performs a self-test before monitoring. This is a check of the geophone's overswing and dampening. The microphone is also checked.

It is not possible to alter the vibration recordings or file names in any way, other than the ability to add post event notes. For security reasons, the instrument and software manufacturer (Instantel) will not release any of the programming code to any outside interests for any reason.

PROCEDURE

The energy source involved the individual detonation of six, 6-inch diameter test holes. The test holes were drilled in a line on 50-foot centers to 40-foot depths. Each hole was loaded with 100 pounds of ANFO, a cast booster, and was then stemmed with cuttings. The test holes were located at the southern permit boundary of the proposed East Cresson Mine Extension. The test hole location and lines toward non-CC&V structures were chosen in as undisturbed areas as was possible. However, due to extensive mining in the area in the past, much of the surface material has been disturbed and is unconsolidated. The drill holes were reported to be in unconsolidated material. The charge weight was selected to maximize the ground motion created by each detonation, while eliminating energy loss due to creation of fly-rock and permanent ground displacement.

Seismographs were placed at distances of from 107 feet to 703 feet on the A-Line, 93 feet to 815 feet on the B-Line, and from 52 feet to 875 feet on the C-Line (see map in Appendix I). These three lines were set up in directions to the nearest non-CC&V structures from the test shots located at the southern boundary of the East Cresson Mine Extension. Care was taken to ensure good geophone coupling with the ground. Snow and the top frozen soil layer were removed when possible and spikes were used on the geophones. Coordinates for the test shot holes and seismograph recording locations were surveyed by CC&V. Surface distances were then calculated from these coordinates.

Ground motion data was obtained for scaled distances in the range from: 10.7 to 70.3 on the A-Line, 9.3 to 81.5 on the B-Line, and 5.2 to 87.5 on the C-Line.

A least squares linear regression analysis was then performed on each data set to determine the +95% confidence equation as recommended by OSMRE and United States Bureau of Mines (USBM) regulatory guidelines. The statistical validity of the data set is evaluated using the correlation coefficient calculated during the analysis. The equation for the +95% confidence interval is then used to calculate the maximum charge weight per delay period for any given particle velocity and distance.

Recommendations are made based on regulatory criteria and historic vibration monitoring from existing mine production.

RESULTS

Appendix III contains the regression analysis, data, and tables for the A-Line study, appendix IV contains the regression analysis, data, and tables for the B-Line study, and Appendix V contains the regression analysis, data, and tables for the C-Line study. Each appendix contains the regression analysis, a page of statistics, a +95% confidence distance vs. charge weight per 8ms delay period table for 0.50 ips, a +95% confidence scaled distance vs. peak particle velocity table, a table summarizing the vibration data, followed by the vibration recordings.

The vibration recordings are ordered by shot and distance. The USBM and OSMRE variable particle velocity vs. frequency criteria is plotted on each vibration event report. The upper line represents the threshold level for possible sheetrock damage, while the lower, dashed line represents the threshold level for possible plaster-on-lath damage.

All tables were generated using the +95% confidence equation. The +95% curve is two standard deviations from the mean (50% curve) and is the curve specified for use by the USBM and OSMRE.

For the A-Line study, in the direction towards the residence located northeast of the test shots, the +95% confidence equation is $PPV = 313.29 * (SD)^{-1.825}$ and the correlation coefficient (r^2) is 0.894.

For the B-Line study, in the direction towards Goldfield, southeast of the test shots, the +95% confidence equation is $PPV = 19.89 * (SD)^{-1.059}$ and the correlation coefficient (r^2) is 0.804.

For the C-Line study, in the direction towards the cabin located southwest of the test shots, the +95% confidence equation is $PPV = 21.89 * (SD)^{-1.096}$ and the correlation coefficient (r^2) is 0.788.

Given a not-to-exceed peak particle velocity and a distance, the maximum charge weight per delay may be calculated using the equations above. The tables found in the appropriate appendices listed above use the equations above to calculate maximum allowable charge weights per delay at given distances and a given not-to-exceed peak particle velocity.

The equations above are in accordance with previous studies that have been performed in the area (see: Ground Motion Attenuation Studies, Ajax and Ridge Road Test Sites, May 28 &29, 1997, and Ground Motion Attenuation Study, North Cresson Area, February 25, 2000). All three data sets have good correlation coefficients. A high degree of reliability may be placed on these results.

CONCULSIONS

The East Cresson analyses recommend scaled distances of 34.1 in the A-Line direction, 32.4 in the B-Line direction, and 31.4 in the C-Line direction in order to not exceed 0.50 ips ppv limit on ground motion created by CC&V blasting operations at the nearest non-CC&V controlled structures. A high degree of confidence may be placed in the recommended scaled distances. The site-specific ground motion attenuation equations may be used to calculate a scaled distance for any peak particle velocity.

Attached to Appendix III for A-Line, Appendix IV for B-Line, and Appendix V for C-Line, are tables listing maximum particle velocities at varying distances for given charge weights. Corresponding tables list maximum allowable charge weights per delay at varying distances given a peak particle velocity. A summary sheet and the individual seismograph records measured and used in each study are also found the appendices listed above.

Sincerely,

Mark L. Burgus

Mark L. Burgus, P.G.
Geophysicist

Colin M. Matheson

Colin M. Matheson,
Mining Engineer, President

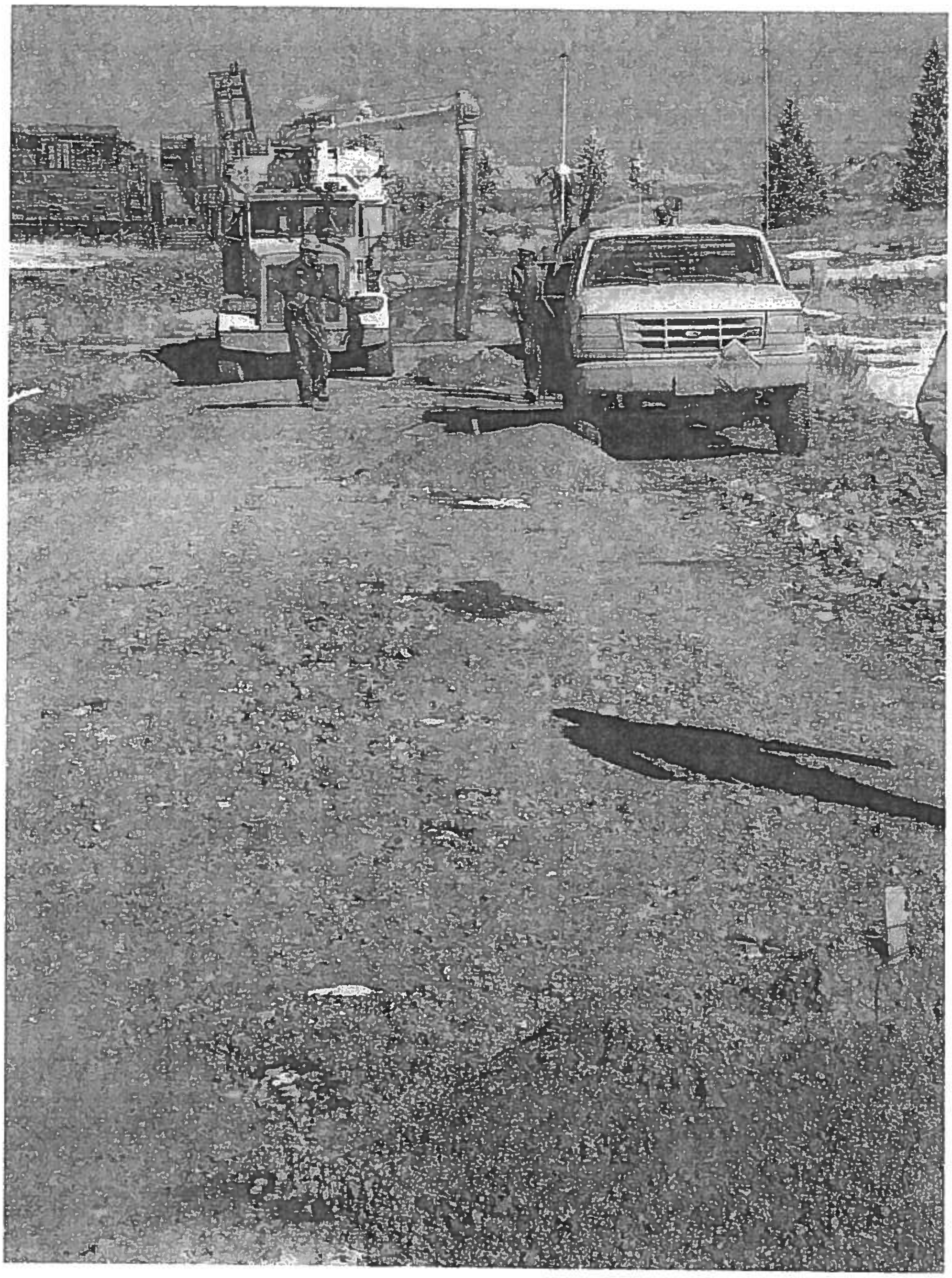


Photo 1 - Test Hole Loading

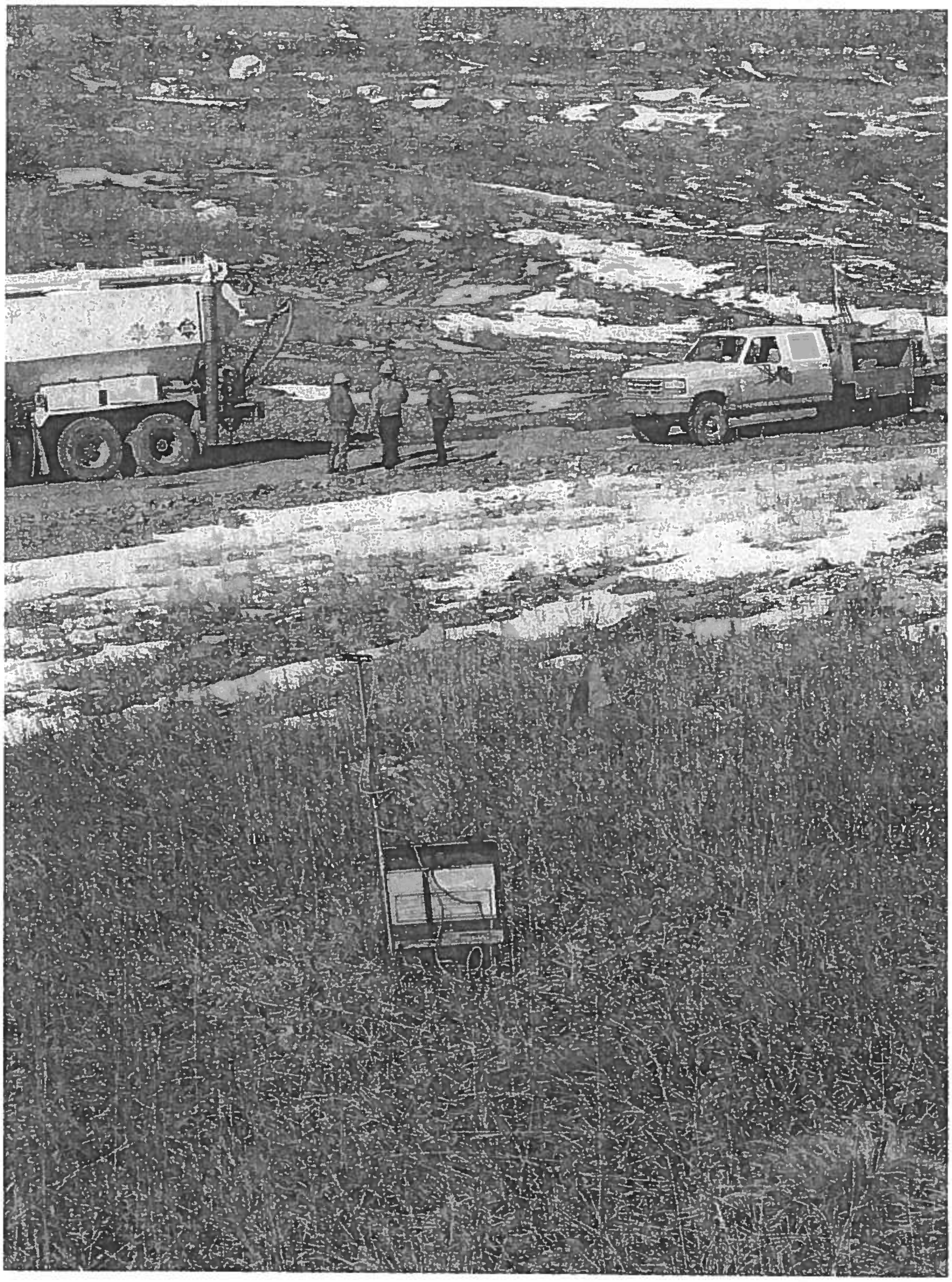


Photo 2 - Seismograph at Recording Location A1

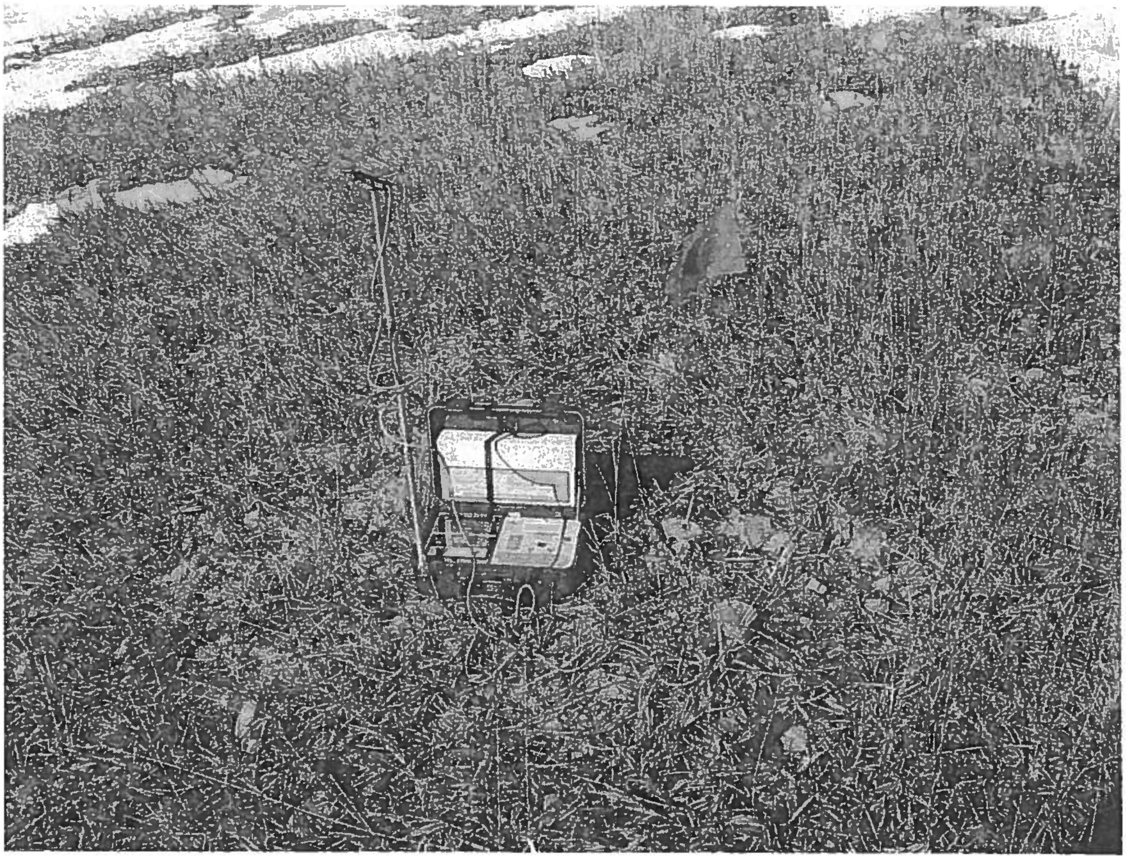


Photo 3 - Typical Seismograph Recording Location

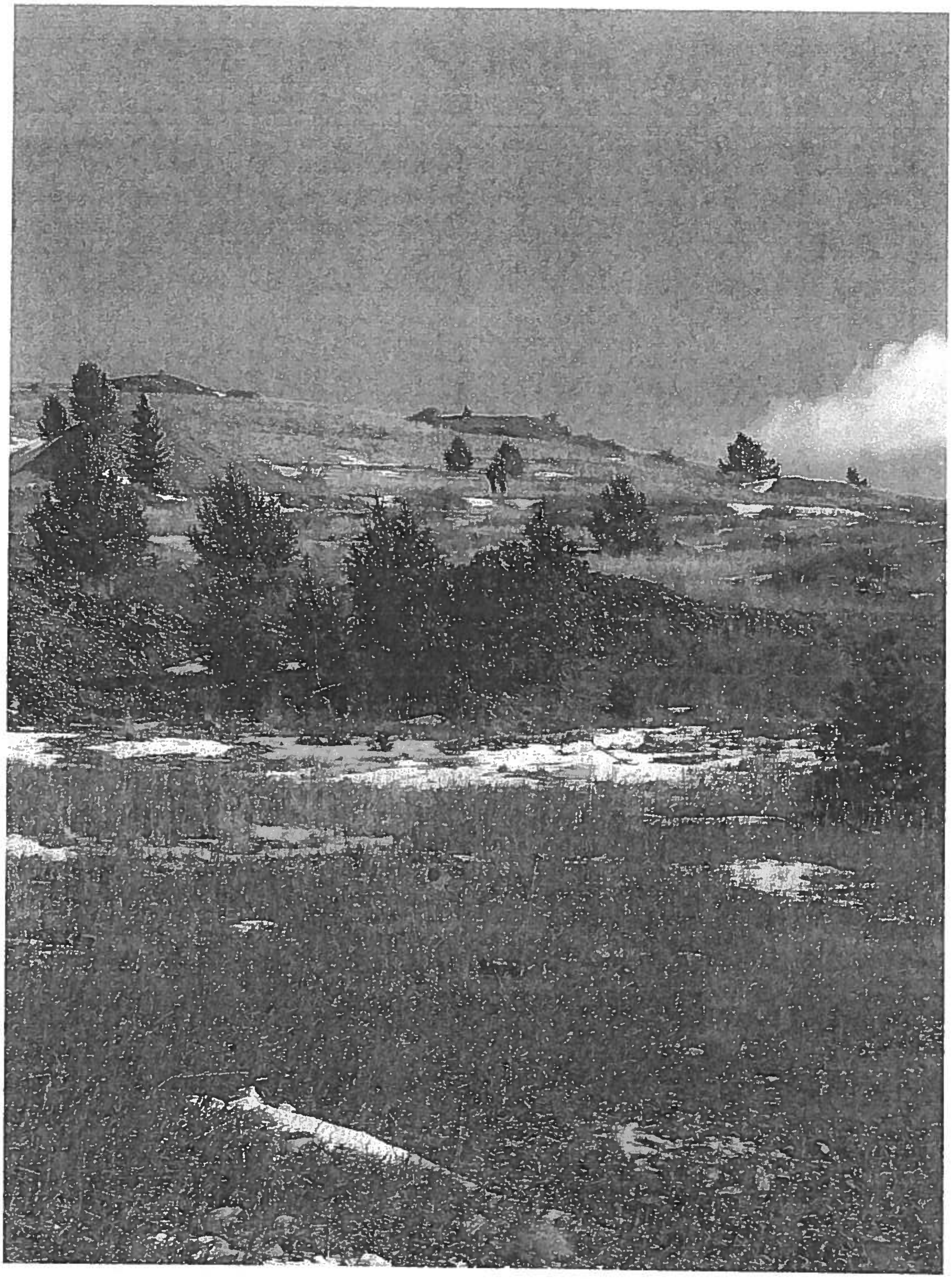


Photo 4 - A-Line looking NE from test shots.

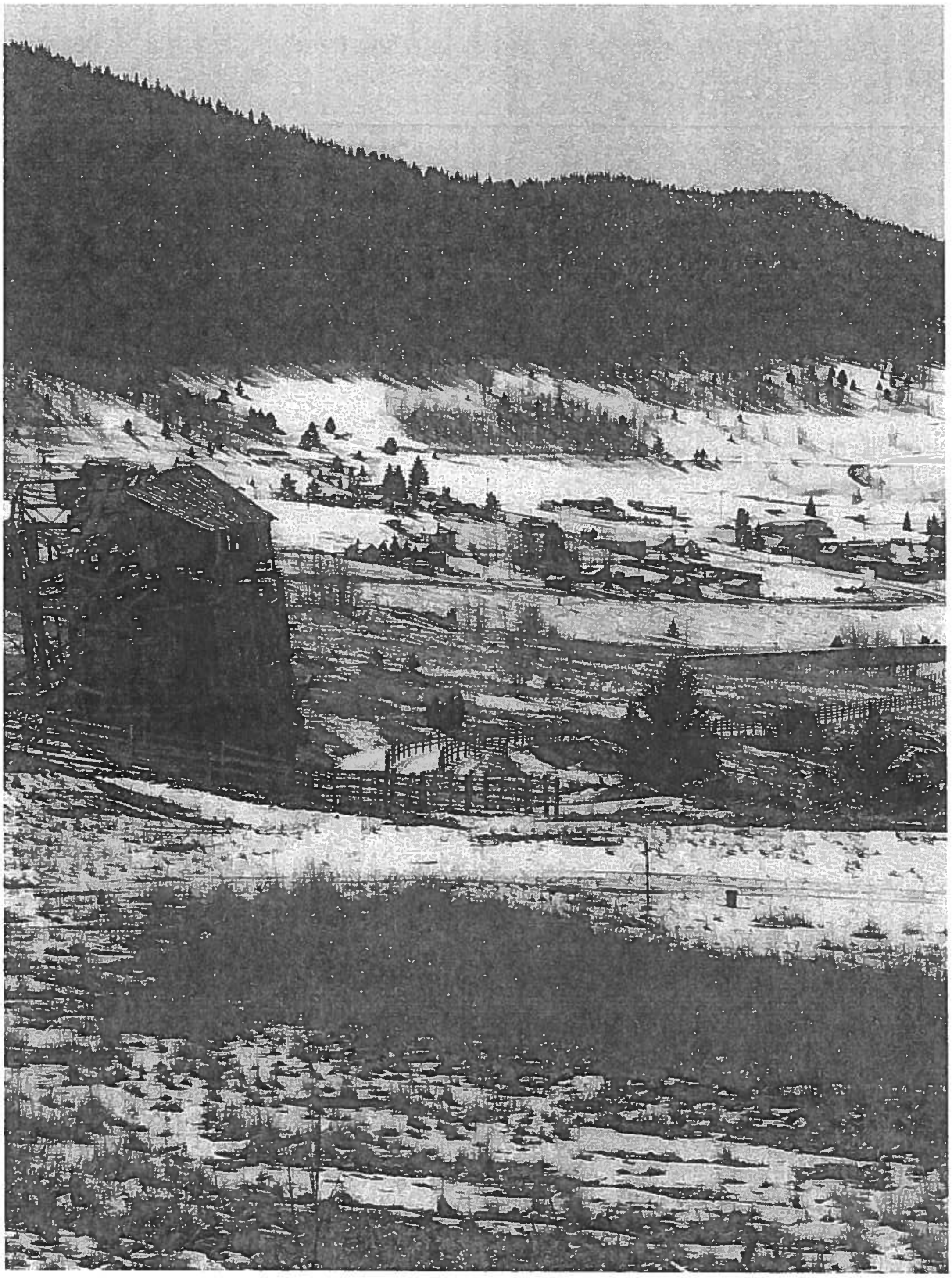
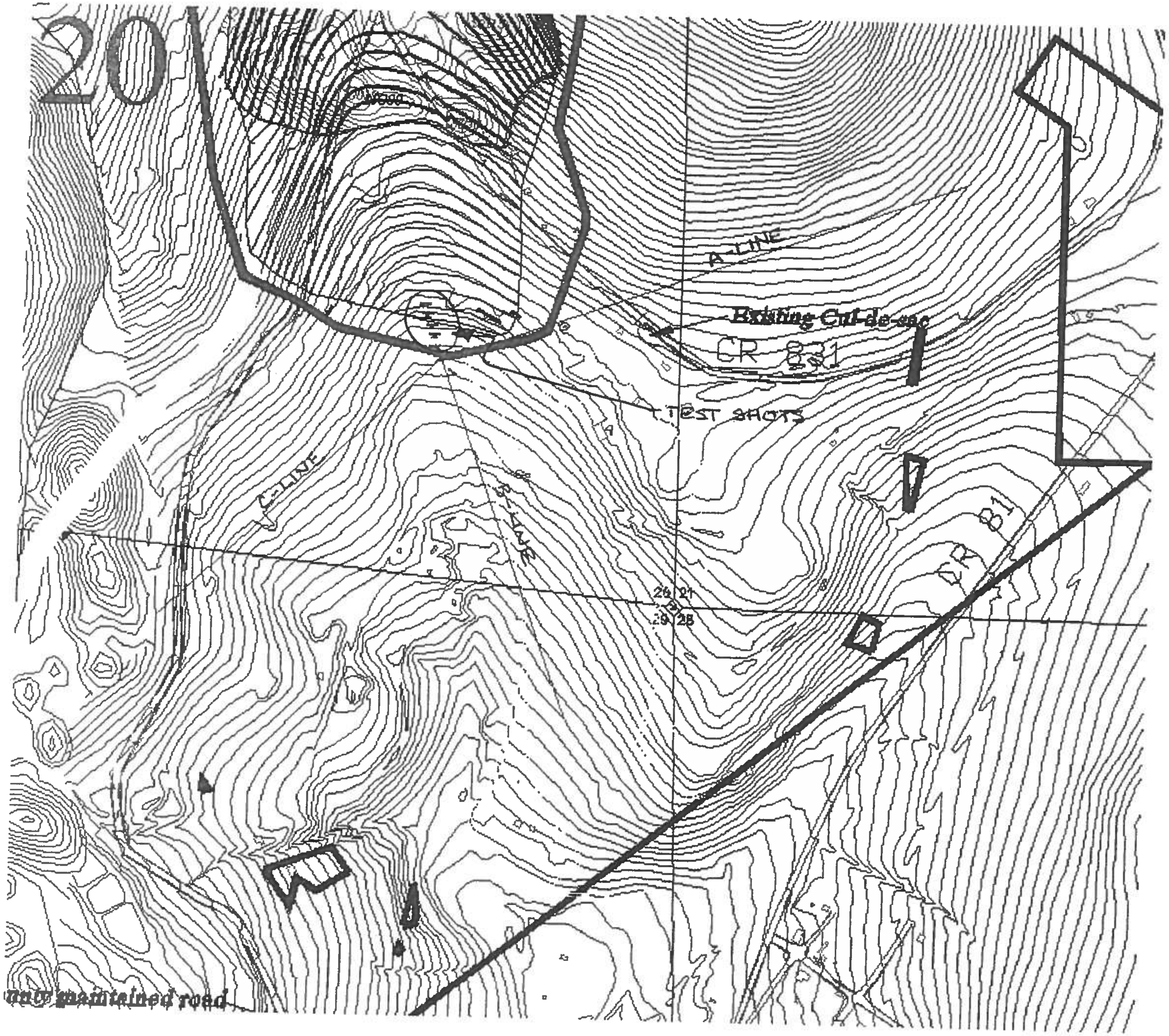


Photo 5 - B-Line looking SE from test shots.

Photo 6 - C-Line looking SW from test shots.

APPENDIX I

TEST SHOTS & SEISMOGRAPH RECORDING LOCATIONS MAP



20
A-LINE
Existing Cul-de-sac
CR 831
TEST SHOTS
C-LINE
B-LINE
26 21
29 28
CR 81
unty maintained road

APPENDIX II

INSTRUMENT SPECIFICATIONS & PROCESSING INFORMATION

b) Series III Specifications

Seismic	Range	10 in/s (254 mm/s).
	Resolution	0.005 in/s (0.127 mm/s). to 0.000625 in/s (0.0159 mm/s) with built–in preamp.
	Trigger Levels	0.005 to 10 in/s (0.127 to 254 mm/s) in steps of 0.001 in/s (0.01 mm).
	Frequency Analysis	National and Local Standards for all countries (see text).
	Accuracy	3% at 15 Hz.
	Acceleration. Displacement	Calculated using entire waveform. not estimated at peak.
Air Linear	Range	88–148 dB. 7.25 x 10^{-5} psi to 0.0725 psi. 0.5 Pa to 500 Pa.
	Resolution	0.1 dB above 120 dB (0.25 Pa).
	Trigger Levels	100–148 dB in 1 dB steps.
	Accuracy	0.2 dB at 30 Hertz and 127 dB.
"A" Weight (optional)	Range	50 to 110 dB in steps of 0.1 dB. (Impulse Response – 35 milliseconds)
Sampling Rate		Standard 1024 samples per second per channel to 16.384 (8.192 for 8 channel).
Event Storage	Full Waveform Events	300 standard and 1500 optional at standard sample rate of 1024.
	Summary Events	1750 standard and 8750 optional at standard sample rates of 1024.
Frequency Response	2 to 300 Hz	Ground and Air. Independent of record time.
Full Waveform Recording	Fixed Record Modes	Manual. single shot. continuous and programmed start/stop.
	Fixed Record Time	1 to 100. 300 or 500 sec plus 0.25 sec pre-trigger.
	Auto Record Mode	1 to 100. 300 or 500 sec plus 0.25 sec pre-trigger.
Strip Chart Recording	Record Method	Record to memory and/or internal printer. Program interval 2. 5. 15. 60. 300 or 900 sec.
	Days Storage	2.8 or 14 days at 5 second interval. 34 or 170 days at 60 second interval.
Histogram Combo Mode	Histogram Record Method	Record to memory and/or internal printer. Program interval 2. 5. 15. 60. 300 or 900 sec.
	Histogram Days Storage	2.4 or 12 days at 5 second interval. 29 or 147 days at 60 second interval.
	Waveform Events	Up to 13 one-second events (1024 sample rate. four channels recording).
	Waveform Record Times	1 to 13 seconds plus 0.25 sec pre-trigger.
Special Functions	Timer Operation	Programmed start/stop.
	Self Check	Programmable daily check.
	Scaled Distance	Weight and distance stored with event.
	Monitor Log	History printout programmable up to all events stored.
	Automatic download	Automatic downloading of data from a unattended monitor with Auto Call Home.
	Measurement Units	Imperial or metric. dB or linear air pressure. or in units of custom sensors.
Printer	Resolution	576 dots/line and 0.0049 inches (0.125 mm) per dot.
	Print Time	Less than 10 seconds for typical 1 second event with full analysis.
	Paper Control	Paper tear slot or automatic paper takeup. separate keys for feed and takeup.
	Rated Life – print head	18 miles (30 km) of printing.
	Number of Copies	1 to 10 copies automatic. any number manual.
User interface	Keyboard	64 domed tactile with separate keys for common functions.
	Display	4 line by 20 character high contrast backlit display with on line help.
Battery Life		30 days continuous recording. 70 days with timer. printing will decrease life.
Fuse		5 A/250 V

Series III Specifications (continued)

Dimensions		10.6 " x 14.0 " x 6.5 " (269 mm x 355 mm x 165 mm).
Weight		14 lbs. (6.4 kg).
Warranty	2 Years Parts and Labor	Calibration and equipment check required at 1 year to maintain warranty.
Environmental	Printer/ LCD	14 to 122 degrees F (–10 to 50 degrees C) operating.
	Electronics	–4 to 140 degrees F (–20 to 60 degrees C) operating.
	Humidity	5 – 90% RH non – condensing
	Storage	–4 to 160 degrees F (–20 to 70 degrees C).

Instantel reserves the right to change specifications without notice.

c) Compliance Reports

The BlastMate III supports numerous Compliance Reports, also called National Frequency Analysis Standards, including U.S.A. USBM/OSMRE, British Standard BS 6472, French GFEE, German DIN 4150, New Zealand 4403:1976, and Spain UNE 22.381. Two frequency standards, U.S.A. USBM/OSMRE and German DIN 4150, appear below. Use the BlastWare III software to choose the Compliance Report used by your monitor.

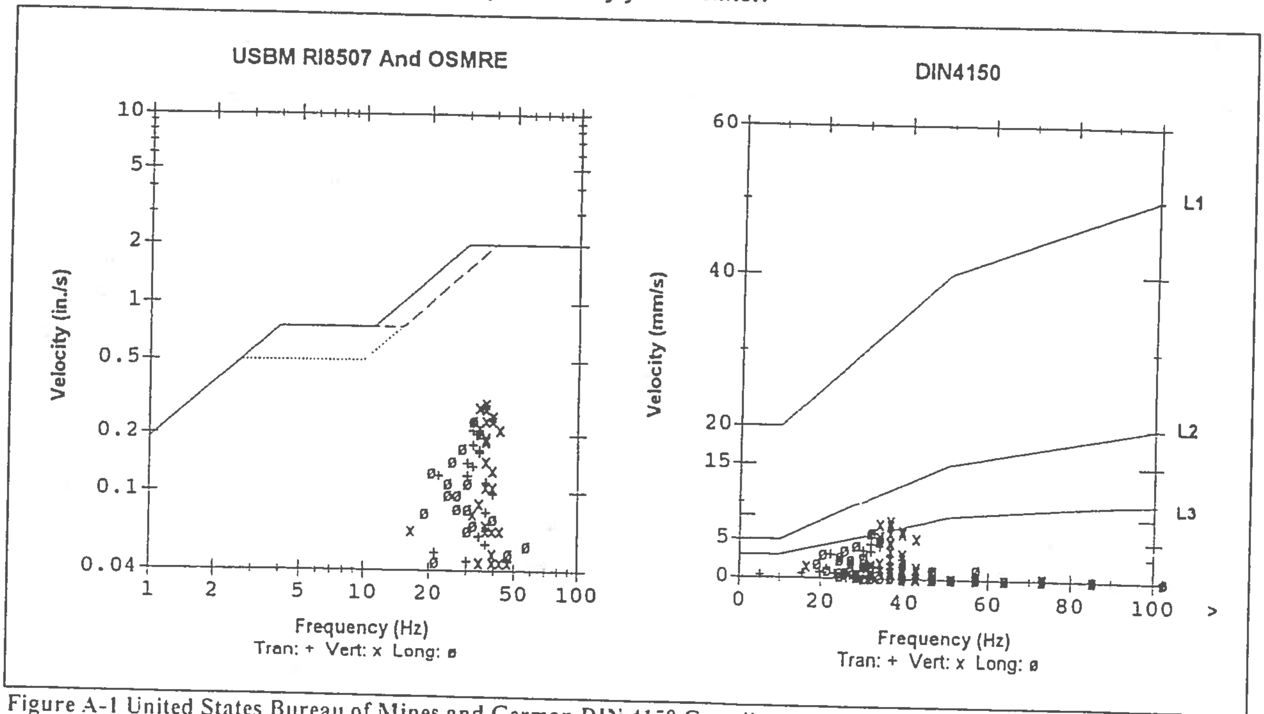


Figure A-1 United States Bureau of Mines and German DIN 4150 Compliance Reports.

Note: Data points appearing outside of the report boundaries indicates the recorded data was outside the range of the report. In the DIN 4150 example, some peaks occurred at frequencies greater than 100 Hz and were therefore drawn outside the boundaries of the report.

Using the optional BlastWare III Advanced Module, you can edit Compliance Reports or create an entirely new report to meet your specific needs.

3. Compliance Module

This chapter provides instructions to install and setup the BlastMate III.

3.1. What is Event Monitoring?

Event monitoring measures both ground vibrations and air pressure. The monitor measures transverse, vertical, and longitudinal ground vibrations. Transverse ground vibrations agitate particles in a side to side motion. Vertical ground vibrations agitate particles in an up and down motion. Longitudinal ground vibrations agitate particles in a forward and back motion progressing outward from the event site. Events also affect air pressure by creating what is commonly referred to as "air blast". By measuring air pressures, we can determine the effect of air blast energy on structures, measured on the Linear "L" scale, or as perceived by the human ear, measured on the "A" Weight scale.

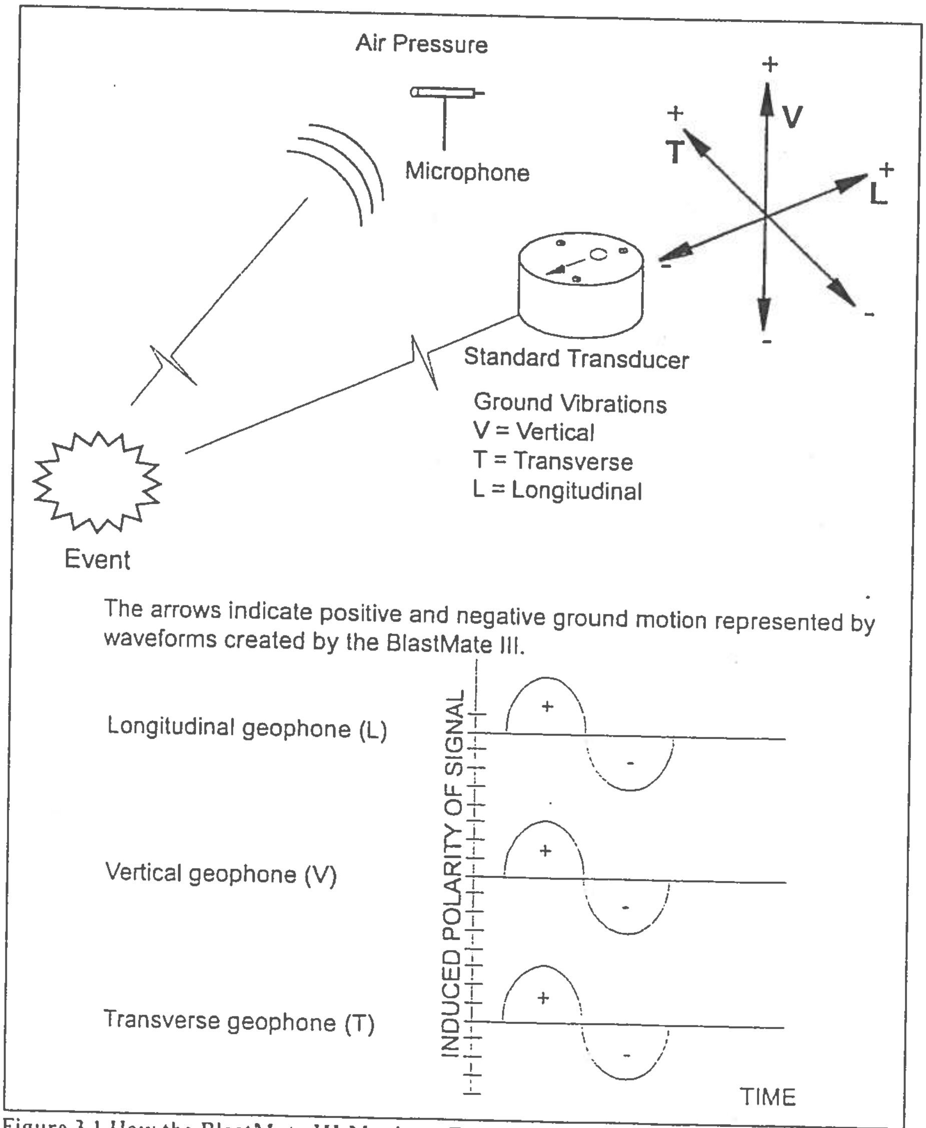


Figure 3.1 How the BlastMate III Monitors Events.

a. Geophone Operation

Functionally a geophone sensor is a coil of wire suspended around a magnet. The magnet is free to move in a field of magnetic flux lines. By Lenzs' Law, induced voltage is proportional to the speed at which flux lines are traversed. Induced coil voltage is therefore proportional to the relative velocity of the coil to the magnet. In practice, it does not matter whether the coil or the magnet moves. Only the motion and speed relative to each other are important.

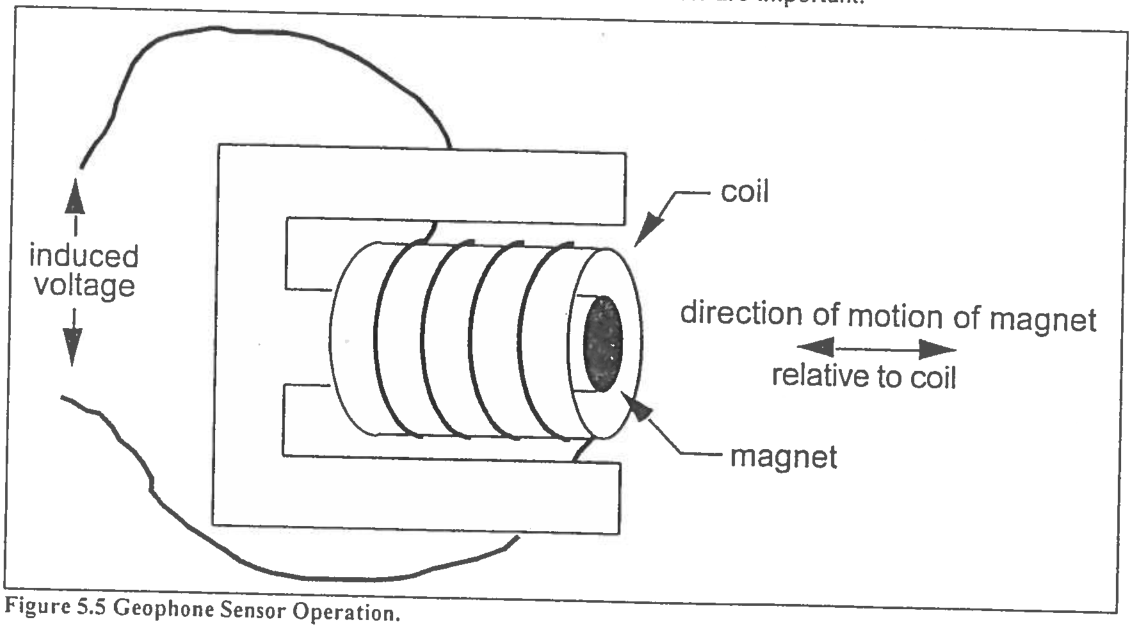


Figure 5.5 Geophone Sensor Operation.

Geophone sensor specifications give a number known as the Intrinsic Voltage Sensitivity. It is the coil voltage induced for a given coil versus magnet speed with units of V/in/s. In seismic applications, the magnet is moved by the blast energy because it is coupled to the particles of the surrounding terrain. The coil, because of its inertia, does not move and the resulting magnet versus coil motion induces a voltage which is proportional to particle velocity.

b. Instantel Standard Transducer

Instantel offers a 2 to 300 Hz standard transducer in a round package. The transducer may be installed on a floor, wall, or ceiling using a variety of installation procedures including ground spikes, burying, mounting rod, or optional leveling plate with leveling feet and integrated bubble level. The figure below includes an Instantel Standard Transducer (a) and a Standard Transducer with leveling plate (b).

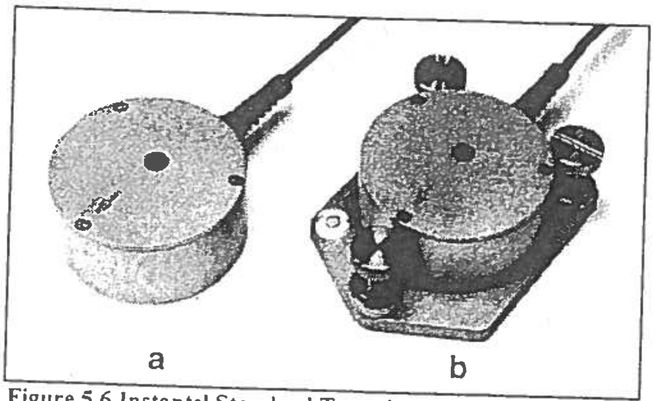


Figure 5.6 Instantel Standard Transducer (a) and Standard Transducer with Optional Leveling Plate (b).

c. Transducer Calibration Requirements

The geophone sensors inside Instantel's transducers must be calibrated annually by Instantel or an authorized Instantel service facility. Contact your dealer for further information.

5.2.2. Microphone

The microphone measures air pressure. Instantel offers two types, Linear "L" (standard) and "A" Weight (optional). Both come with a three foot (one meter) microphone mounting stand.

a. Measurement Scales

The BlastMate III supports two sound pressure measurement scales: Linear "L" and "A" Weight.

(1) Linear "L"

Linear measurement is generally used to measure the effect of low frequency air pressure on buildings. The linear scale records sound pressure without modification in the 2 to 300 Hz range. Measurement units may be in absolute, Pascal, or relative dB scales.

(2) Weight

"A" Weight measures noise levels people may consider an annoyance. The signal is then converted to root mean square (RMS). Units are measured using the decibel scale, dB(A).

b. Microphone Calibration Requirements

Instantel's microphone must be calibrated annually by Instantel or an authorized Instantel service facility. Contact your dealer for further information.

5.3. Sensorcheck

Sensorcheck performs a two stage test on the BlastMate III and its sensors. In the first stage, the program displays the BlastMate III serial number, software version, the total amount of memory installed in the BlastMate III, the total amount of memory available to store events, and the number of events presently stored in memory. The second stage tests each geophone within Instantel's transducer and the microphone operation. The program also tests the operation of the BlastMate III itself and the sensor connecting cables. Pass or fail results appear on the display. See the Basic Reference chapter of this manual to choose when Sensorcheck operates automatically.

5.3.1. Checking the Transducer's Geophones

Sensorcheck measures a geophone's natural frequency and damping indicated by an Overswing Ratio (OR). Sensorcheck sends an electric pulse to the geophones and measures the response. If the geophone's response falls within a specified calibration range, the geophone is in calibration and monitoring operations can continue. If the geophone's response does not fall within a specified calibration range, the geophone is not calibrated. You cannot record events until you fix or replace the geophones. See the troubleshooting section of this manual for the appropriate procedures to follow.

a. Natural Frequency

Waveform measurements check the natural period (t) of a geophone's sensor coil assembly. Referring to the figure below, the distance from P_1 to P_2 represents 0.125 seconds. Since Frequency is the reciprocal of the period, F=1/t, the frequency is approximately 8 Hz. A calibrated sensor has a natural frequency between 6.5 and 9.5 Hertz. Calculations for all geophones appear with each recorded event.

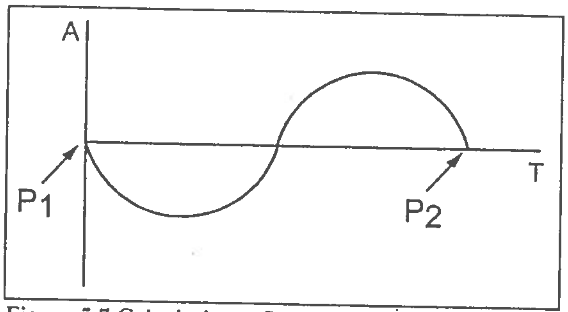


Figure 5.7 Calculating a Geophone's Natural Frequency.

b. Damping – Overswing Ratio (OR)

The overswing ratio (OR) measures damping and is calculated by computing the ratio of the magnitude of adjacent waveform peaks according to the following formula:

$$OR = \frac{A_1}{A_2}$$

Acceptable overswing ratios range from 2.8 to 4.8. The figure below displays a graph of a geophone coil's "free fall" response. A_1 and A_2 are used for overswing calculations.

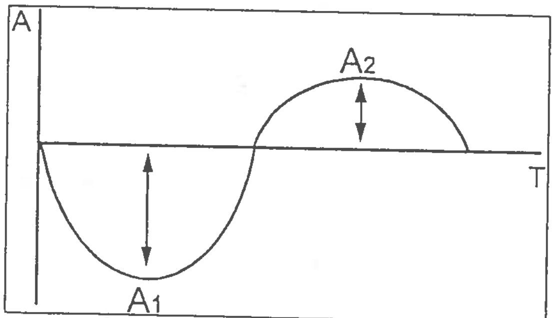


Figure 5.8 Calculating a Geophone's Overswing Ratio.

5.3.2. Checking the Microphone

Sensorcheck tests the microphone's operation by sending a signal to the microphone and measuring its frequency and amplitude response. If the results of the test fall within specified ranges, the microphone is within calibration.

5.3.3. Sensorcheck Report

The Sensorcheck report appears on the BlastMate III display. The message "All Channels Working, Press Print to Print" indicates the BlastMate III sensors have passed the Sensorcheck.

5.4. Anti-alias Filters

Aliasing occurs when a high–frequency signal appears as an erroneous low frequency because the waveform was sampled at too low a sampling rate. An anti-aliasing filter solves this problem by removing the high–frequencies.

5.5. Data Analysis Techniques

The following sections define the BlastMate III data analysis techniques. The first section, ground vibrations, discusses calculations applied to event data recorded by a transducer. The second section, sound pressure, describes the microphone event data calculations.

5.5.1. Ground Vibrations

The BlastMate III calculates the Peak Particle Velocity, Zero Crossing Frequency, Peak Acceleration, and Peak Displacement for each of the transverse, vertical, and longitudinal axes. The BlastMate III calculates Peak Vector Sum using data from all three axes.

a. Peak Particle Velocity (PPV)

Peak Particle Velocity indicates the maximum speed particles travel resulting from an event's ground vibrations. The BlastMate III calculates the PPV for each geophone.

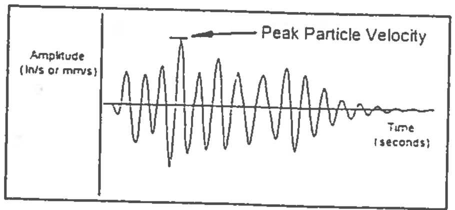


Figure 5.9 Calculating Peak Particle Velocity.

b. Zero Crossing Frequency (ZC Freq)

The Zero Crossing Frequency calculates the event waveform's frequency at the largest peak.

(1) Calculating Zero Crossing Frequency

To calculate the Zero Crossing Frequency, we need to determine the period of oscillation of the waveform. Convenient waveform positions for measuring period, the time for one complete cycle, occur between two successive peaks, troughs, or zero crossings. The BlastMate III measures between zero crossings. Frequency is the number of periods that occur in one second calculated by the formula: Frequency = 1/period.

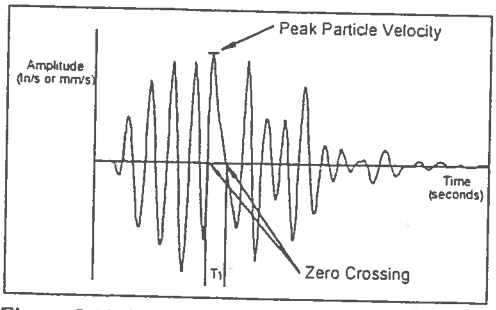


Figure 5.10 Calculating the Zero Crossing Frequency.

(2) Zero Crossing Frequency Limitation

The Zero Crossing Frequency calculation is limited because it assumes a single predominant frequency at the peak, typically represented by sinusoidal waveforms. In practice, the peak may be the result of two or more major frequency components representing compound waveforms as illustrated in the figure below. It is therefore only an approximation of the frequency of the Peak Particle Velocity.

Waveforms may have the same Peak Particle Velocities but different Zero Crossing Frequencies depending on the shape of the waveforms involved. With reference to the figures above and below; both waveforms have the same Peak Particle Velocities however their Zero Crossing Frequencies differ. In the figure above, the zero crossing frequency uses the 1/2 period indicated by T_1. In the figure below, the zero crossing frequency uses the 1/2 period indicated by T_2. Notice that T_1 is less than T_2 because of the different waveform shapes, therefore the Zero Crossing Frequency in figure above is greater than the Zero Crossing Frequency in the figure below. It is for this reason, the Zero Crossing Frequency may differ for peaks having the same Peak Particle Velocity.

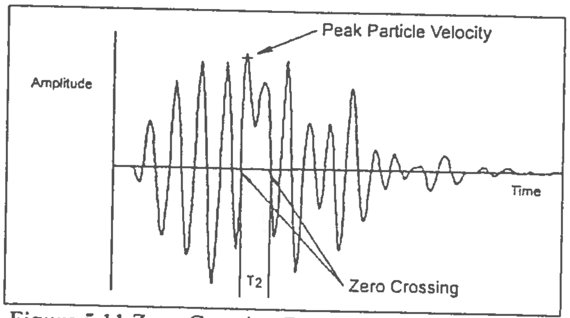


Figure 5.11 Zero Crossing Frequency Calculation Limitation.

(3) Sample Rate Error

The Zero Crossing Frequency requires the period of a wavelength before it can calculate the wavelength's frequency using the formula 1/period. A sampling error occurs for higher frequencies when wavelength periods become relatively small and the sampling rate begins to miss zero crossing points. In other words, the wavelength periods occur much faster than a BlastMate III can sample and use in the calculation.

At higher frequencies there are fewer sample points per cycle and therefore greater error. The following table illustrates how error increases with frequency.

Zero Crossing Frequency Sample Rate Error			
Frequency Range	Recording Rate		
	Standard (1024 Hz)	Fast (2048 Hz)	Faster (4096 Hz)
0 – 30 Hz	negligible error	negligible error	negligible error
31 – 50 Hz	up to 5 Hz error	up to 2.5 Hz error	negligible error
51 – 70 Hz	up to 8 Hz error	up to 4 Hz error	up to 2 Hz error
71 – 90 Hz	up to 18 Hz error	up to 9 Hz error	up to 4.5 Hz error
91 – 150 Hz	up to 50 Hz error	up to 25 Hz error	up to 12.5 Hz error

The BlastMate III does not calculate frequencies above 100 Hz because of the high error level at 1024 samples per second. The message ">100 Hz" displays. At 2048 samples per second, the message ">200 Hz" displays. When recording at 4096 samples per second, the message ">400 Hz" displays. Furthermore if a waveform is very complex, or if it contains a large offset value, the zero crossings may lie outside an acceptable window. Whenever a frequency cannot be calculated the message "<1 Hz" displays. The message N/A indicates an entire waveform was not captured and therefore no frequency could be calculated. More accurate analysis is available using the BlastWare III software.

c. Peak Acceleration

The BlastMate III calculates peak acceleration, the rate of change of velocity, by dividing the difference in velocity by the difference in time. To obtain the peak acceleration, the BlastMate III subtracts two velocity readings and divides the result by the elapsed time between them.

$$a = \frac{dV}{dT} \approx \frac{\Delta V}{\Delta T}$$

where:

Δt = a small interval

The BlastMate III calculates the peak acceleration at each point along the entire waveform and reports the peak value. Note that this is not necessarily at the peak velocity for an individual waveform.

d. Peak Displacement

The BlastMate III calculates peak displacement, or particle distance traveled, by multiplying speed by time. In the BlastMate III the interval velocity is multiplied by the time interval and the resulting displacement segments are summed.

$$s = \int V dt \approx \sum (V \Delta t)$$

where:

V = the velocity in each interval

To obtain the peak displacement, the BlastMate III integrates each wave segment of the entire waveform between zero crossings, selects the largest, then divides the value by half. Note that this is not necessarily at the peak velocity of the waveform.

e. Peak Vector Sum (PVS)

The figure below displays three event waveforms. The figure illustrates the procedure of graphically calculating peak vector sums. Measured magnitudes are tabulated for six different times and represent velocities in each of the three axes. The vector sum represents the resultant particle velocity magnitude and is calculated by squaring and adding the magnitudes and taking the square root.

$$PVS = \sqrt{T^2 + V^2 + L^2}$$

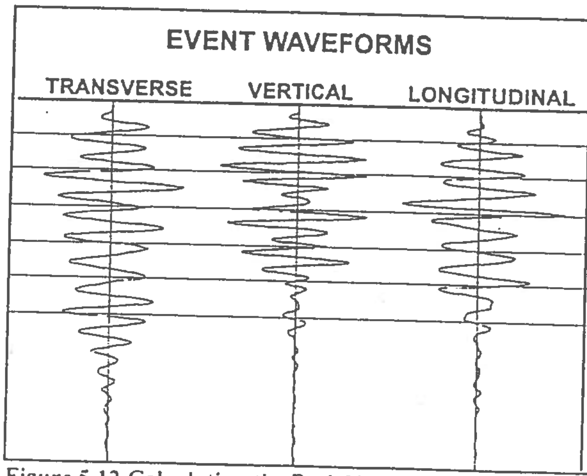
where:

T = particle velocity along the transverse plane

V = particle velocity along the vertical plane

L = particle velocity along the longitudinal plane

The BlastMate III calculates the peak vector sum for each point of the sampled waveforms and displays the largest value. Note that this is not necessarily at the peak velocity for an individual waveform.



MAGNITUDE T	MAGNITUDE V	MAGNITUDE L	PEAK VECTOR
-0.34	-0.33	0.14	0.494
0.38	-0.47	0.38	0.714
0.29	-0.31	0.51	0.663
-0.53	0.23	-0.31	0.655
0.24	0.07	0.36	0.440
-0.23	-0.16	-0.15	0.318

Figure 5.12 Calculating the Peak Vector Sum.

5.5.2. Sound Pressure

The BlastMate III calculates two sound pressure indicators, peak sound pressure and zero crossing frequency.

a. Peak Sound Pressure (PSP)

The BlastMate III checks the entire event waveform and displays the largest sound pressure called the Peak Sound Pressure (PSP), also referred to as the Peak Air Over–Pressure. Results appear on the BlastMate III display and in the Event Summary Report.

b. Zero Crossing Frequency (ZC Freq)

The Zero Crossing Frequency calculation for sound pressure is the same calculation used for ground vibrations. Please see above for a complete discussion.

Note: The Zero Crossing Frequency calculation is performed for Linear microphones only. This calculation does not appear on the BlastMate III display or on Event Summary Reports when using an "A" Weight microphone.

5.6. Alternate Manual Waveform Calculations

The following sections discuss manual waveform analysis techniques. These have been included for reference purposes only. They do not represent the calculation techniques employed by the BlastMate III.

Graphical methods for calculating area and slope depend on the shape of the waveform being analyzed. A complete discussion of the procedures is beyond the scope of this manual. Two useful reference texts are G. A. BOLLIGER, *BLAST VIBRATION ANALYSIS*, Southern Illinois University Press and CHARLES H. DOWDING, *BLAST VIBRATION MONITORING AND CONTROL*, Prentice-Hall Inc.

In each of the subsequent examples some formulae appear with no attempt at derivation. The following definitions apply:

A = amplitude in inches/second measured from the zero line

A_m = amplitude measured in millimeters/second

T = period in seconds

Y = absolute change in amplitude over time measured in inches/second

Y_m = absolute change in amplitude over time measured in millimeters/second

5.6.1. Sinusoidal Waveforms

The motion is essentially sinusoidal with gradual amplitude and frequency changes.

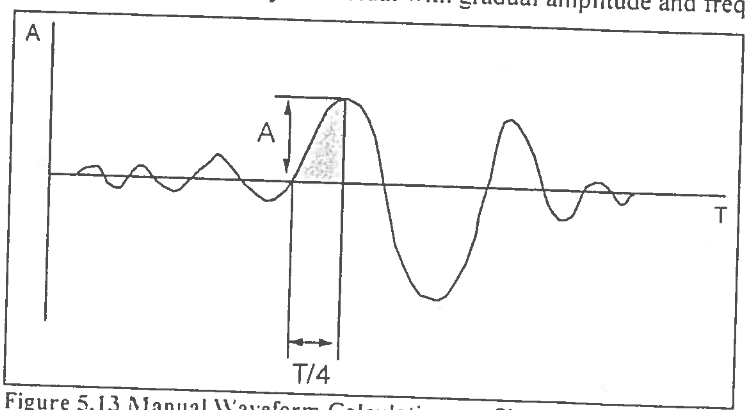


Figure 5.13 Manual Waveform Calculations on Sinusoidal Waveforms.

a. Calculating Displacement:

Maximum Displacement (in.) $= \frac{T}{2\pi} \times A$

Maximum Displacement (mm) $= \frac{T}{2\pi} \times A_m$

b. Calculating Acceleration:

Maximum Acceleration (in./s²) $= \frac{2\pi}{T} \times A$

$$\text{Maximum Acceleration (mm/s}^2\text{)} = \frac{2\pi}{T} \times A_m$$

5.6.2. Nearly Triangular Waveforms

Motion is irregular and has large amplitude.

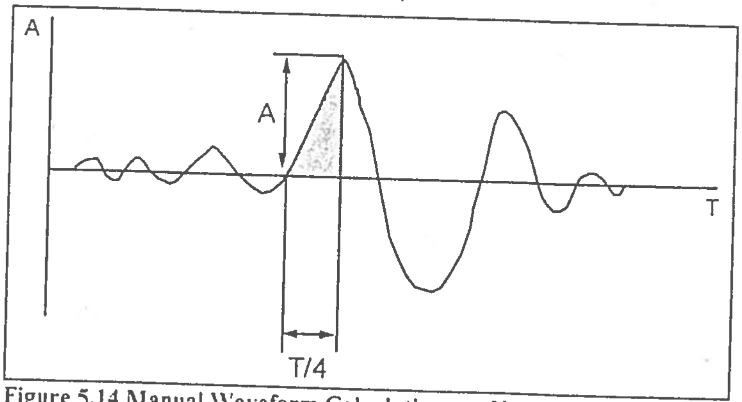


Figure 5.14 Manual Waveform Calculations on Nearly Triangular Waveforms.

a. Calculating Displacement:

$$\text{Maximum Displacement (in.)} = \frac{T}{8} \times A$$

$$\text{Maximum Displacement (mm)} = \frac{T}{8} \times A_m$$

b. Calculating Acceleration:

$$\text{Maximum Acceleration (in./s}^2\text{)} = \frac{1}{T} \times Y$$

$$\text{Maximum Acceleration (mm/s}^2\text{)} = \frac{1}{T} \times Y_m$$

5.6.3. Compound Waveforms

If the record exhibits interference by two or more predominant frequencies then the maximum displacement will be the sum of the maximum of each individual frequency component.

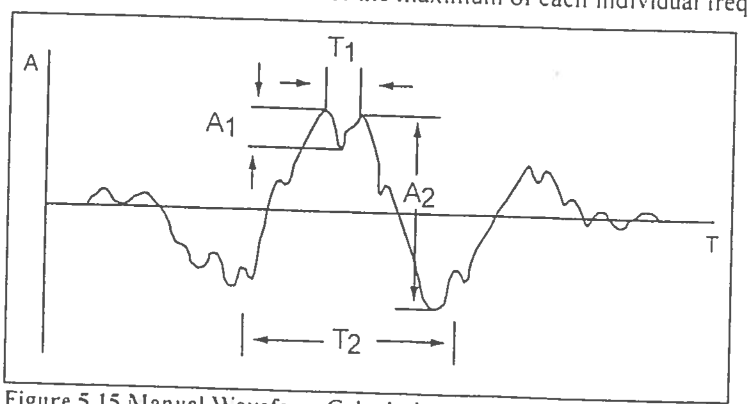


Figure 5.15 Manual Waveform Calculations on Compound Waveforms.

a. Calculating Displacement:

Maximum Displacement (in.) $= \frac{T_1}{2\pi} \times A_1 + \frac{T_2}{2\pi} \times A_2$

Maximum Displacement (mm) $= \frac{T_1}{2\pi} \times A_{1m} + \frac{T_2}{2\pi} \times A_{2m}$

b. Calculating Acceleration:

Maximum Acceleration (in./s^2) $= \frac{2\pi}{T_1} \times A_1 + \frac{2\pi}{T_2} \times A_2$

Maximum Acceleration (mm/s^2) $= \frac{2\pi}{T_1} \times A_{1m} + \frac{2\pi}{T_2} \times A_{2m}$

5.6.4. Irregular Waveforms

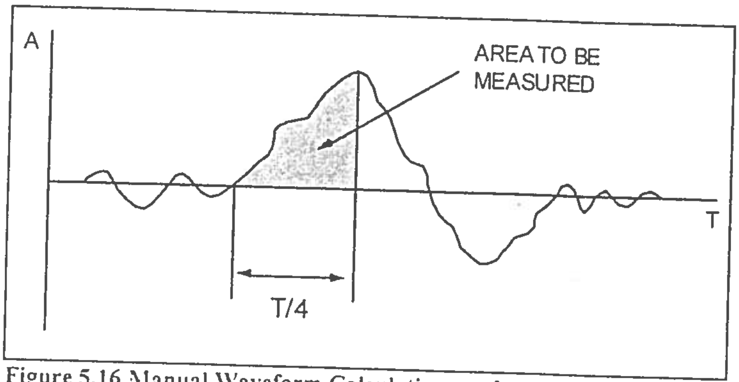


Figure 5.16 Manual Waveform Calculations on Irregular Waveforms.

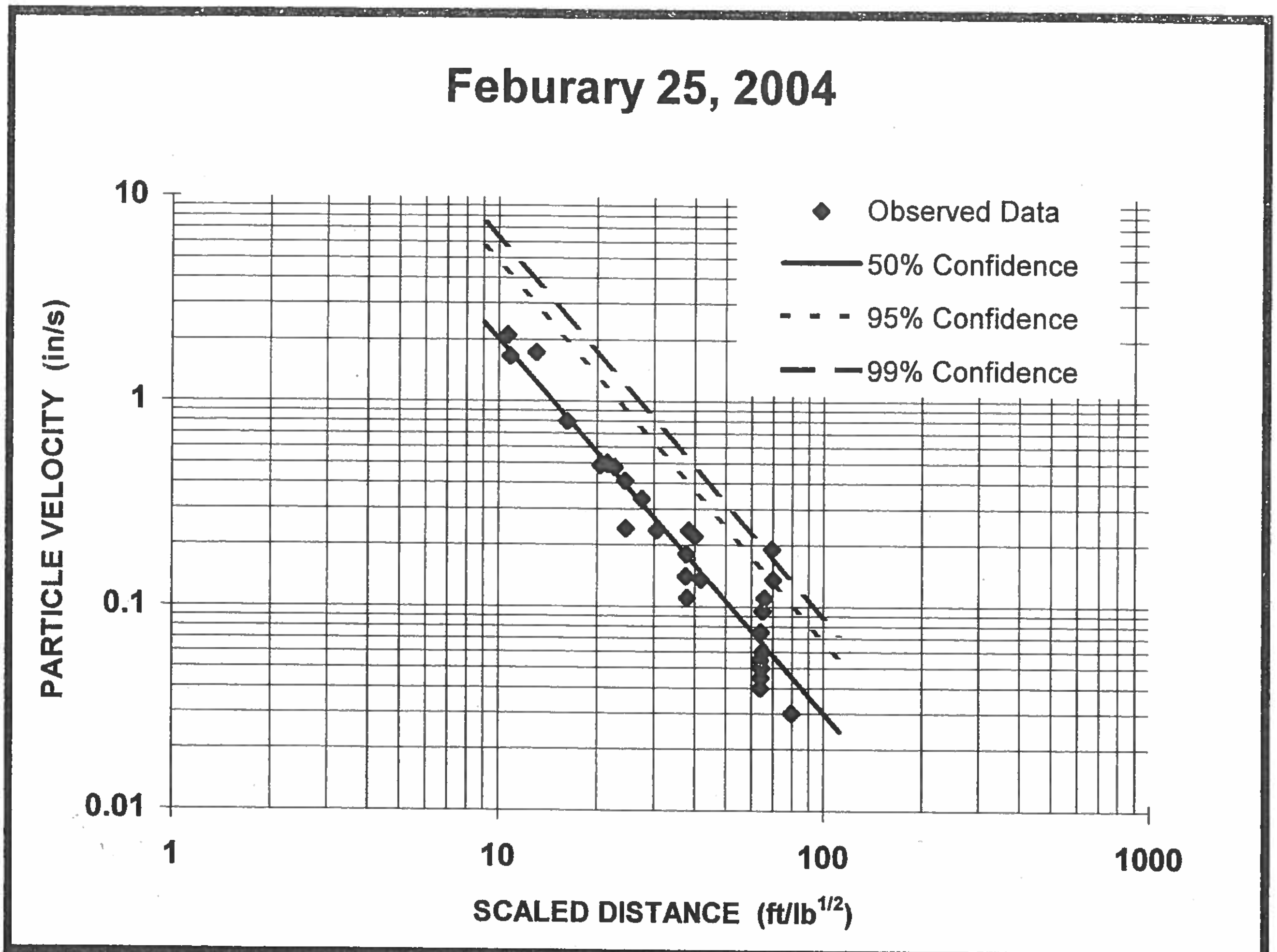
a. Calculating Displacement:

Maximum Displacement = area under curve measured by a planimeter.

APPENDIX III

A-LINE
GROUND MOTION ATTENUATION STUDY, SCALED DISTANCE, CHARGE WEIGHT, & PPV TABLES, VIBRATION RECORDINGS

A-Line Regression Analysis



[redacted]

Cripple Creek Regression Analysis Statistics

Data Points	Max SD	Min SD	Max PV	Min PV
31	80.12	10.67	2.09	0.03

Sum of SD	Sum of PV	Sum of SD^2	Sum of PV^2	Sum of SD x PV
112.3	-52.9	417.9	132.1	-212.1

Sum SD x Sum PV	Sum of $(SD)^2$	Sum of $(PV)^2$
-5937.5	12607.5	2796.3

SSX	SSY	SSXY	Xbar	Ybar
11.246	41.930	-20.529	3.622	-1.706

S	Se	R	R^2
0.392	4.46	-0.945	0.894

Slope	Intercept
-1.825	4.906

Regression Line Equation 50%

PV= 4.91 X $(SD)^{-1.825}$

95% Confidence Equation

PV= 313.29 X $(SD)^{-1.825}$

K Values		Z
135.08	K_{50}	
273.67	K_{90}	1.645
313.29	K_{95}	1.96
366.58	K_{98}	2.326
408.11	K_{99}	2.576
554.69	$K_{99.9}$	3.291
717.61	$K_{99.99}$	3.891

Z values from Basic Statistical Methods for Engineers and Scientists
Neville and Kennedy 1964 , Table 10-1 p. 111

Matheson Mining Consultants, Inc. 2004

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Explanation of Regression Analysis

Data Statistics
Data Points is the number of data points used in the analysis.
Max PPV is the maximum peak particle velocity measured in inches per second used in the analysis.
Min PPV is the minimum peak particle velocity, measured in inches per second used in the data analysis.
Max SD is the maximum scaled distance ($SD= D/(W^{1/2})$) used in the analysis.
Min SD is the minimum scaled distance used in the analysis.

Calculated Sums
Sum of SD is the sum of the natural log (ln) of the Scaled Distance values
Sum of PPV is the sum of the ln of the Peak Particle Velocity values
Sum of SD^2 is the sum of the squares of the ln of the Scaled Distance values.
Sum of PPV^2 is the sum of the squares of the ln of the Peak Particle Velocity values.
Sum of SD x PPV is the sum of the ln of the SD values times the log of the PPV values.

Sums of Squares
SSX is the sum of the ln of the SD values squared minus the $(\text{Sum of SD})^2$ divided by the Number of Data Points or: SSX = Sum of SD^2 – (Sum of SD^2/Number of Data Points)
SSY is the sum of the ln of the PPV values squared minus the $(\text{Sum of PPV})^2$ divided by the Number of Data Points or: SSY = Sum of PPV^2 – (Sum of PPV^2/Number of Data Points)
SSXY = Sum of SD x PPV– ((Sum of SD*Sum of PPV)/Number of Data Points)
Sum of SD x Sum of PPV is the product of the sum of the ln of the SD's and the ln of the PPV's.
$(\text{Sum of SD})^2$ is the square of the sum of the ln of the SD's.

Calculated Means & Calculated Coefficients
Xbar is the sum of the ln of the SD's divided by the Number of Data Points.
Ybar is the sum of the ln of the PPV's divided by the Number of Data Points.
Intercept is the value of Particle Velocity at Scaled Distance=1
K50 is the value of the Particle Velocity (Y) intercept of the mean line or e^a.
K95 is the value of the Particle Velocity (Y) intercept of the second standard deviation line.
K99 is the value of the Particle Velocity (Y) intercept of the third standard deviation line.
Slope is the value of the slope of the mean line and the value of the slope of confidence lines

Sample Standard Deviation & Coefficient of Correlation
S is the standard deviation.
Se_2 is the variance.
R is the correlation coefficient
R^2 is the multiple correlation coefficient or the "goodness of fit".

The 95% Confidence Level Equation – the equation of the second standard deviation from the mean line or $Y= K95*X^{(B)}$

Where: Y is the PPV
X is the Scaled Distance

Charge Weight per Delay
Calculated From Given Distances for Particle Velocity
0.5 ips

Distance (feet)	Charge Weight (pounds)	Distance (feet)	Charge Weight (pounds)
100	9	3600	11171
200	34	3700	11801
300	78	3800	12447
400	138	3900	13111
500	215	4000	13792
600	310	4100	14490
700	422	4200	15206
800	552	4300	15938
900	698	4400	16688
1000	862	4500	17455
1100	1043	4600	18240
1200	1241	4700	19041
1300	1457	4800	19860
1400	1690	4900	20696
1500	1939	5000	21550
1600	2207	5100	22420
1700	2491	5200	23308
1800	2793	5300	24213
1900	3112	5400	25136
2000	3448	5500	26075
2100	3801	5600	27032
2200	4172	5700	28006
2300	4560	5800	28997
2400	4965	5900	30006
2500	5387	6000	31032
2600	5827	6100	32075
2700	6284	6200	33135
2800	6758	6300	34212
2900	7249	6400	35307
3000	7758	6500	36419
3100	8284	6600	37548
3200	8827	6700	38695
3300	9387	6800	39858
3400	9965	6900	41039
3500	10559	7000	42238

REGRESSION ANALYSIS

95% CONFIDENCE LEVEL
SCALED DISTANCE TABLE

Scaled Distance	Particle Velocity	Scaled Distance	Particle Velocity
1	313.29	125	0.05
5	16.60	130	0.04
10	4.68	135	0.04
15	2.23	140	0.04
20	1.32	145	0.04
25	0.88	150	0.03
30	0.63	155	0.03
35	0.48	160	0.03
40	0.37	165	0.03
45	0.30	170	0.03
50	0.25	175	0.03
55	0.21	180	0.02
60	0.18	185	0.02
65	0.15	190	0.02
70	0.13	195	0.02
75	0.12	200	0.02
80	0.11	205	0.02
85	0.09	210	0.02
90	0.08	215	0.02
95	0.08	220	0.02
100	0.07	225	0.02
105	0.06	230	0.02
110	0.06	235	0.01
115	0.05	240	0.01
120	0.05	245	0.01

CRIPPLE CREEK & VICTOR GOLD MINING COMPANY, INC.
Ground Motion Attenuation Study Data Set
Feburary 25, 2004

Shot Number	Recording Station	Charge Weight (pounds)	Instrument Number	Distance (feet)	Scaled Distance (ft/lb^2)	Peak Particle Velocity (inches per second)
1	A-1	100	BA7882	106.712	10.7	2.09
1	A-2	100	BA7802	215.993	21.6	0.5
1	A-3	100	BA7884	378.924	37.9	0.11
1	A-5	100	BA5546	644.931	64.5	0.050
2	A-1	100	BA7882	108.799	10.9	1.650
2	A-2	100	BA7802	216.702	21.7	0.495
2	A-3	100	BA7884	375.967	37.6	0.140
2	A-5	100	BA5546	641.931	64.2	0.050
3	A-1	100	BA7882	130.574	13.1	1.720
3	A-2	100	BA7802	226.987	22.7	0.475
3	A-3	100	BA7884	377.571	37.8	0.180
3	A-5	100	BA5546	640.619	64.1	0.055
3	A-5	100	BE8979	640.619	64.1	0.040
3	A-6	100	BA7803	801.191	80.1	0.030
4	A-1	100	BA7882	162.244	16.2	0.795
4	A-2	100	BA7802	245.092	24.5	0.410
4	A-3	100	BA7884	384.513	38.5	0.235
4	A-5	100	BA5546	642.433	64.2	0.075
4	A-5	100	BE8979	642.433	64.2	0.045
4	A-6	100	BA7803	801.066	80.1	0.030
5	A-1	100	BA7882	205.653	20.6	0.485
5	A-2	100	BA7802	275.232	27.5	0.335
5	A-3	100	BA7884	400.841	40.1	0.220
5	A-5	100	BA5546	650.774	65.1	0.095
5	A-5	100	BE8979	650.774	65.1	0.060
5	A-7	100	BA7803	694.988	69.5	0.190
6	A-1	100	BA7882	246.244	24.6	0.24
6	A-2	100	BA7802	305.554	30.6	0.235
6	A-3	100	BA7884	418.384	41.8	0.135
6	A-5	100	BA5546	659.481	65.9	0.110
6	A-7	100	BA7803	702.682	70.3	0.135

Event Report

Date/Time	Long at 11:31:13 February 25, 2004
Trigger Source	Geo: 0.0500 in/s
Range	Geo :10.00 in/s
Record Time	4.0 sec at 1024 sps

Serial Number	BA7882 V 4.37-4.35 BlastMate III
Battery Level	6.3 Volts
Calibration	May 15, 2003 by Instantel Inc.
File Name	I8829ZSQ.O10

Notes
Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

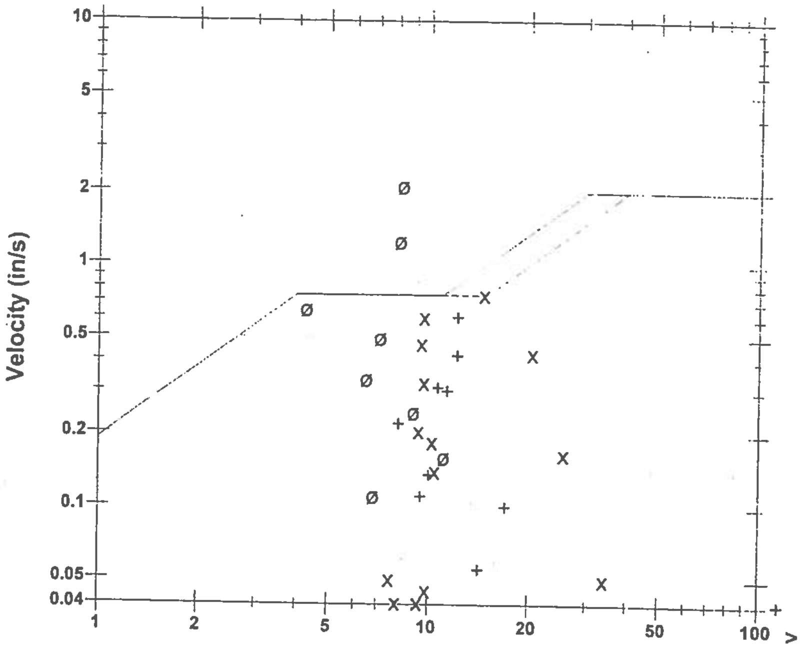
Post Event Notes
Blast 1 Location A-1

Microphone	Linear Weighting
PSPL	119.7 dB(L) at 0.227 sec
ZC Freq	5.4 Hz
Channel Test	Passed (Freq = 19.7 Hz Amp = 740 mv)

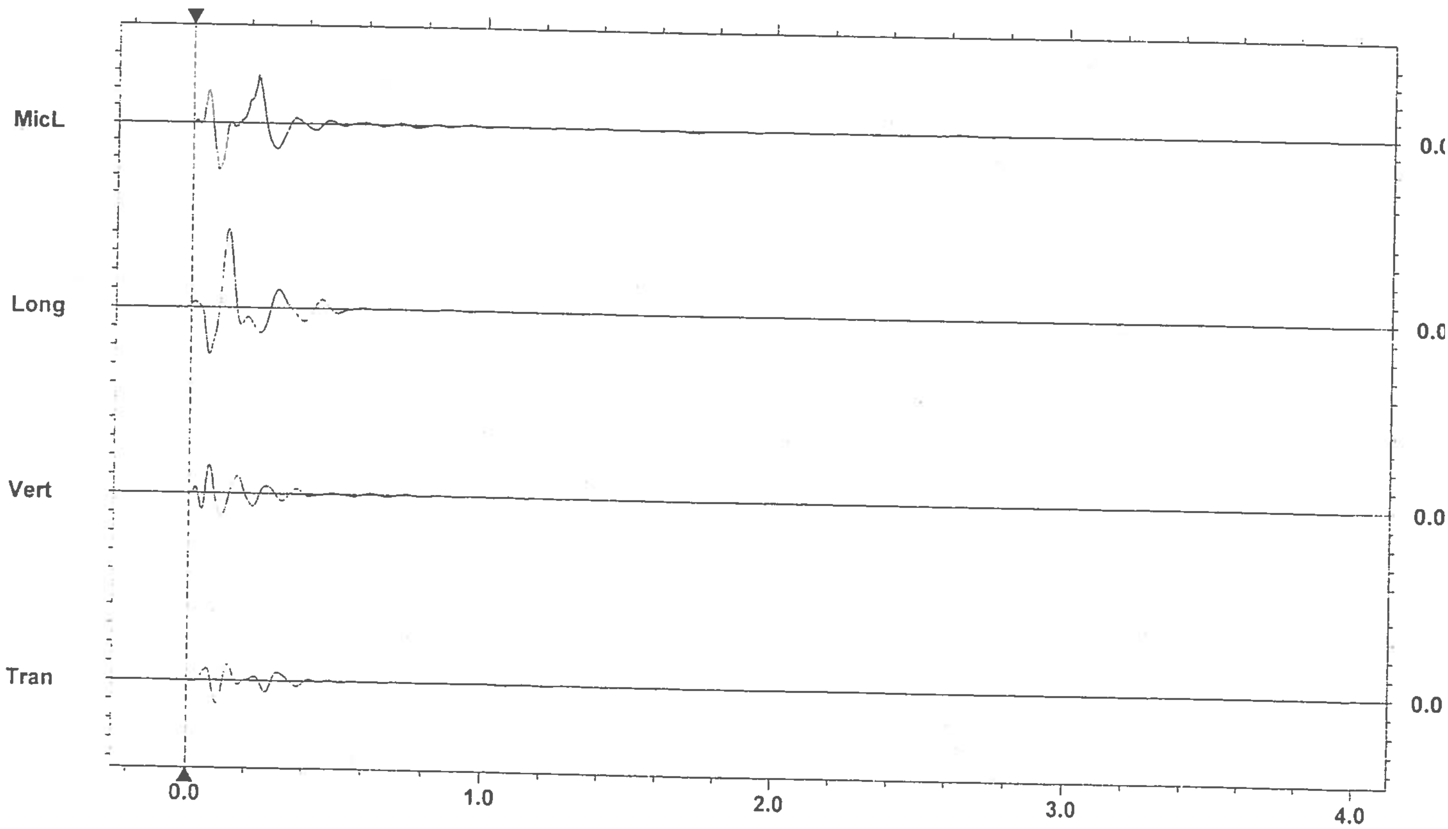
	Tran	Vert	Long	
PPV	0.605	0.750	2.09	in/s
ZC Freq	12	15	8.3	Hz
Time (Rel. to Trig)	0.103	0.071	0.129	sec
Peak Acceleration	0.119	0.199	0.265	g
Peak Displacement	0.00817	0.0101	0.0371	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 2.13 in/s at 0.129 sec

USBM RI8507 And OSMRE



Frequency (Hz)
Tran: + Vert: x Long: ø



Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.500 in/s/div Mic: 0.00100 psi(L)/div
Trigger = ▶---------◀

Printed: March 5, 2004 (V 4.33 - 4.33)

Format Copyrighted 1996-2001

Event Report

Date/Time	Long at 11:37:18 February 25, 2004
Trigger Source	Geo: 0.0500 in/s
Range	Geo :10.00 in/s
Record Time	4.0 sec at 1024 sps

Serial Number	BA7882 V 4.37-4.35 BlastMate III
Battery Level	6.3 Volts
Calibration	May 15, 2003 by Instantel Inc.
File Name	I8829ZSQ.Y60

Notes
Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

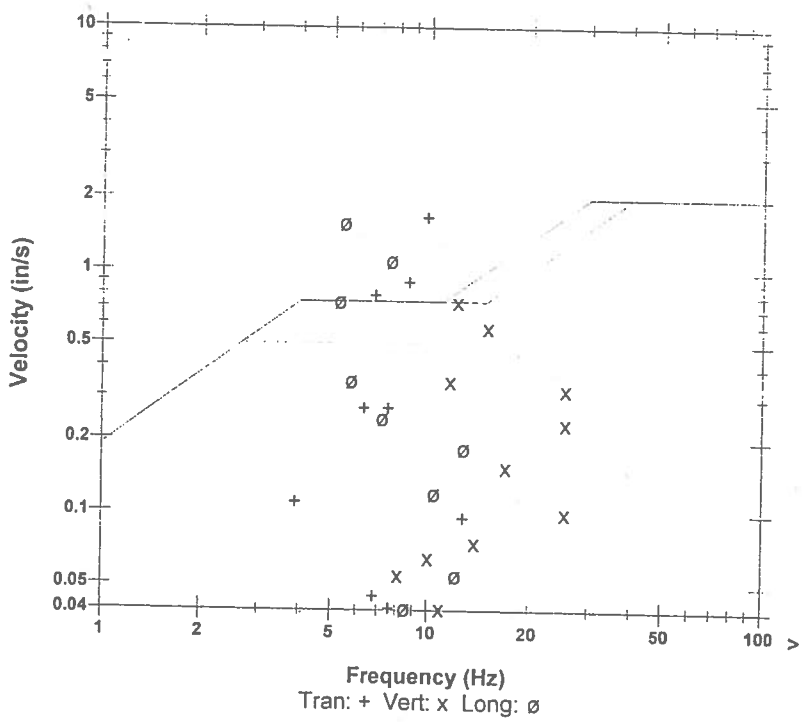
Post Event Notes
Blast 2 Location A-1

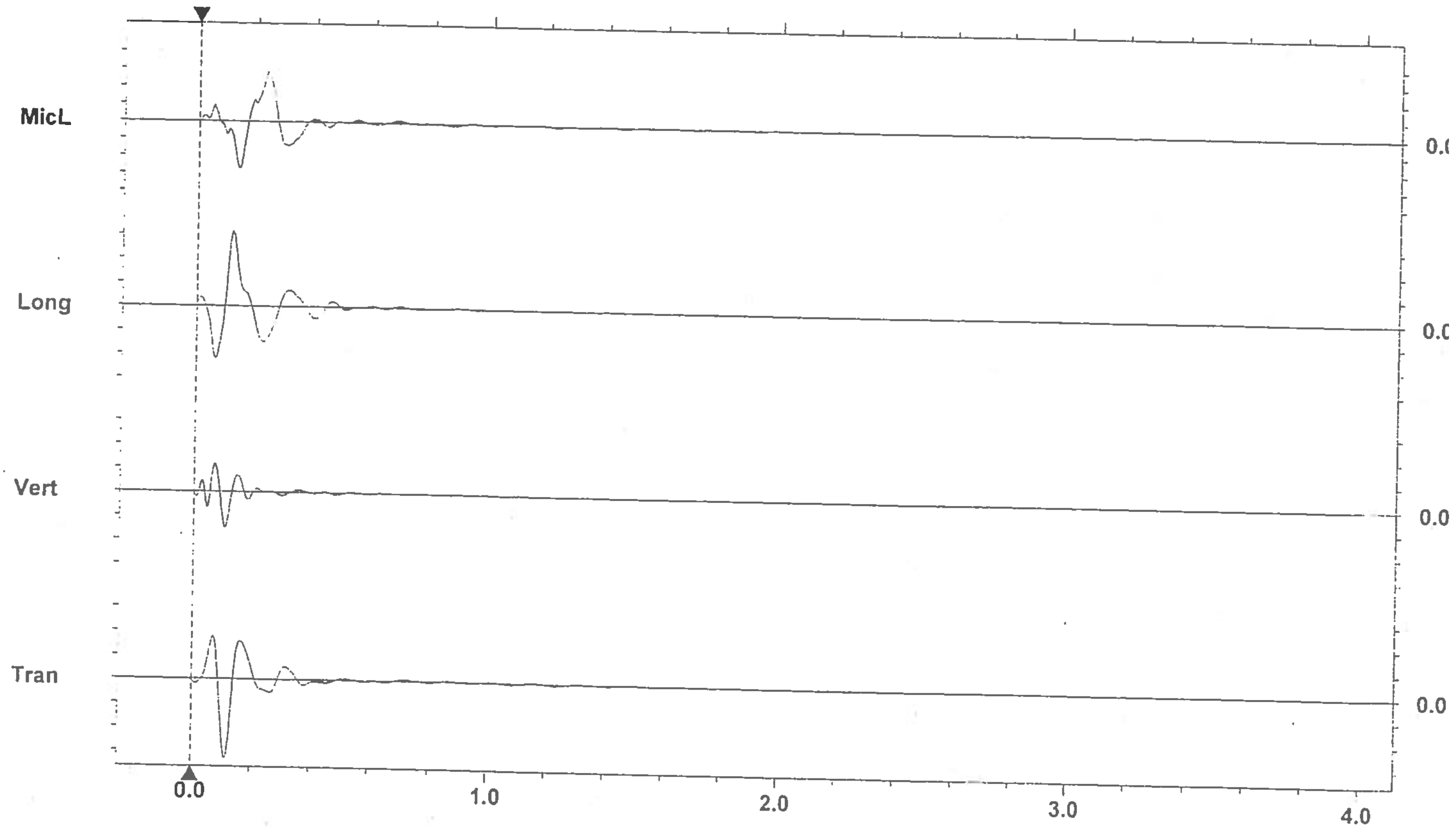
Microphone	Linear Weighting
PSPL	119.9 dB(L) at 0.231 sec
ZC Freq	4.9 Hz
Channel Test	Passed (Freq = 19.7 Hz Amp = 740 mv)

	Tran	Vert	Long	
PPV	1.65	0.745	1.57	in/s
ZC Freq	9.8	12	5.4	Hz
Time (Rel. to Trig)	0.114	0.107	0.121	sec
Peak Acceleration	0.239	0.159	0.212	g
Peak Displacement	0.0258	0.00924	0.0328	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 2.27 in/s at 0.118 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.500 in/s/div Mic: 0.00100 psi(L)/div
Trigger = ▶-------◀

Event Report

Date/Time	Tran at 12:31:58 February 25, 2004
Trigger Source	Geo: 0.0500 in/s
Range	Geo :10.00 in/s
Record Time	4.0 sec at 1024 sps

Serial Number	BA7882 V 4.37-4.35 BlastMate III
Battery Level	6.3 Volts
Calibration	May 15, 2003 by Instantel Inc.
File Name	I8829ZST.HA0

Notes
Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

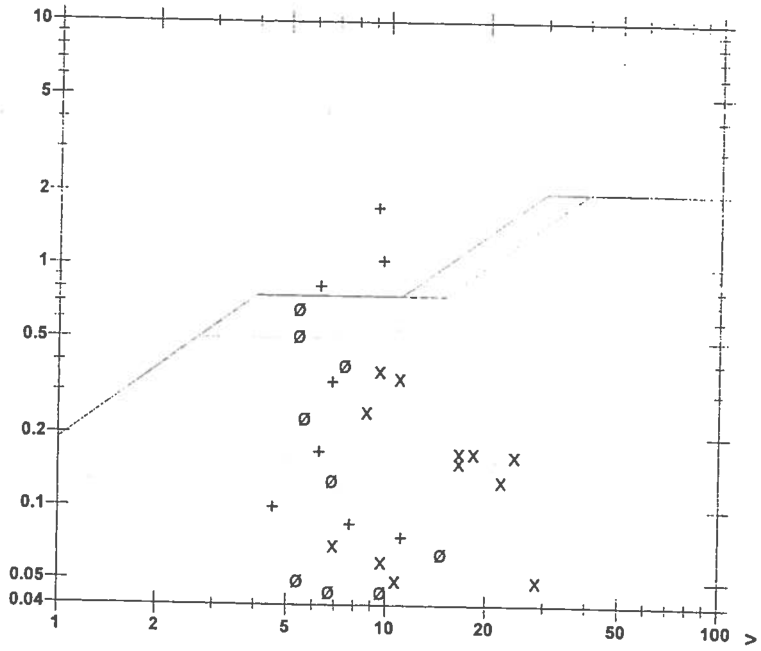
Post Event Notes
Blast 3 Location A-1

Microphone	Linear Weighting
PSPL	121.3 dB(L) at 0.132 sec
ZC Freq	6.9 Hz
Channel Test	Passed (Freq = 19.3 Hz Amp = 728 mv)

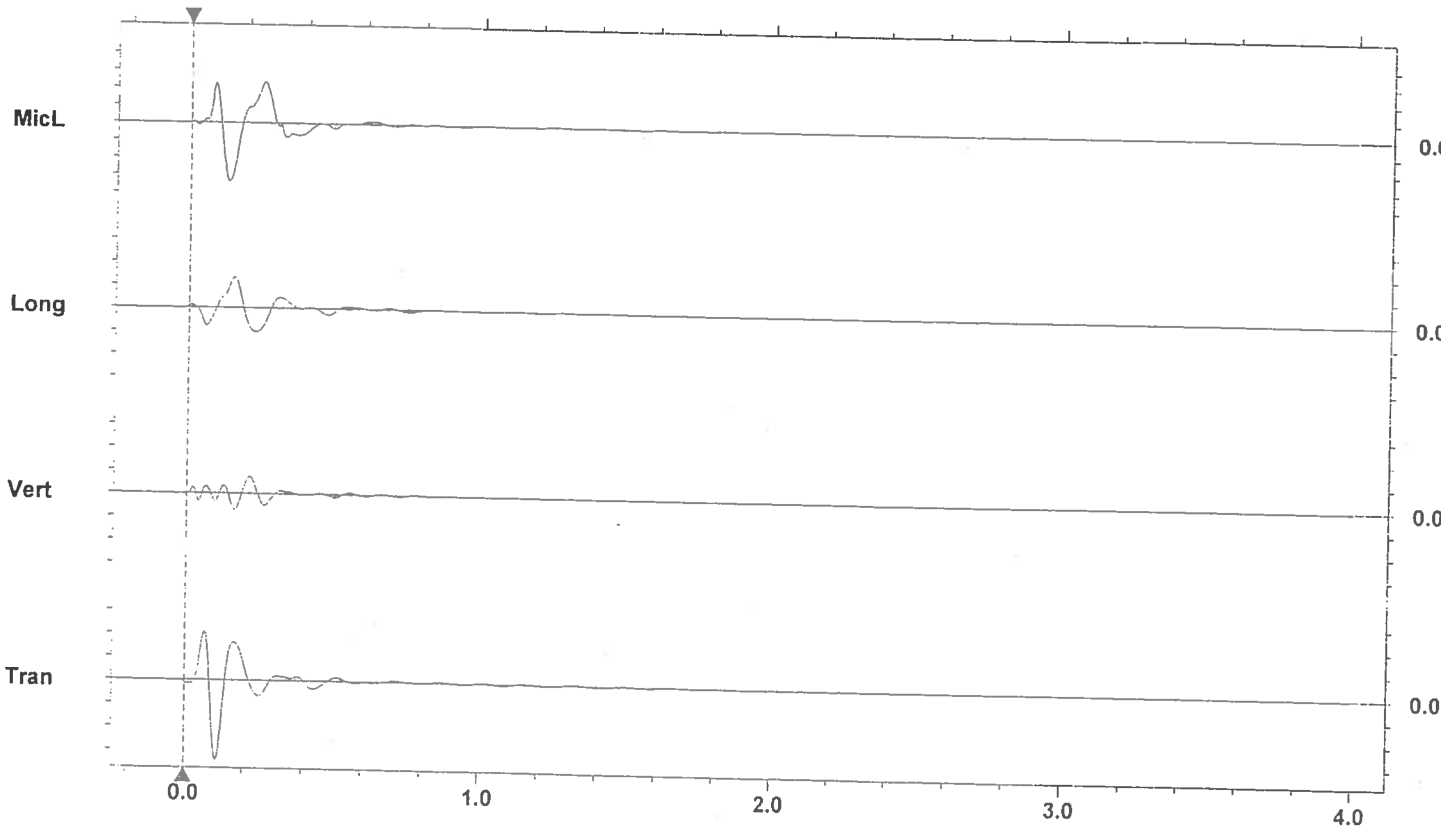
	Tran	Vert	Long	
PPV	1.72	0.370	0.665	in/s
ZC Freq	9.3	9.5	5.4	Hz
Time (Rel. to Trig)	0.109	0.214	0.155	sec
Peak Acceleration	0.305	0.0663	0.0795	g
Peak Displacement	0.0283	0.00612	0.0167	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 1.73 in/s at 0.110 sec

USBM RI8507 And OSMRE



Frequency (Hz)
Tran: + Vert: x Long: ø



Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.500 in/s/div Mic: 0.00100 psi(L)/div
Trigger = ▶------◀

Printed: March 5, 2004 (V 4.33 - 4.33)

Format Copyrighted 1996-2001

Event Report

Date/Time	Vert at 12:35:41 February 25, 2004
Trigger Source	Geo: 0.0500 in/s
Range	Geo :10.00 in/s
Record Time	4.0 sec at 1024 sps

Serial Number	BA7882 V 4.37-4.35 BlastMate III
Battery Level	6.3 Volts
Calibration	May 15, 2003 by Instantel Inc.
File Name	I8829ZST.NH0

Notes
Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

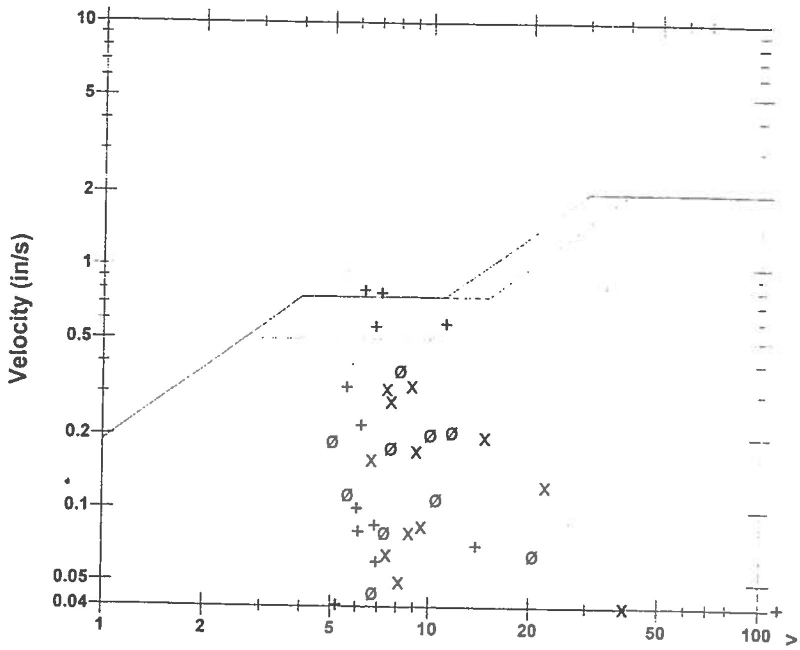
Post Event Notes
Blast 4 Location A-1

Microphone	Linear Weighting
PSPL	117.6 dB(L) at 0.202 sec
ZC Freq	5.5 Hz
Channel Test	Passed (Freq = 19.3 Hz Amp = 728 mv)

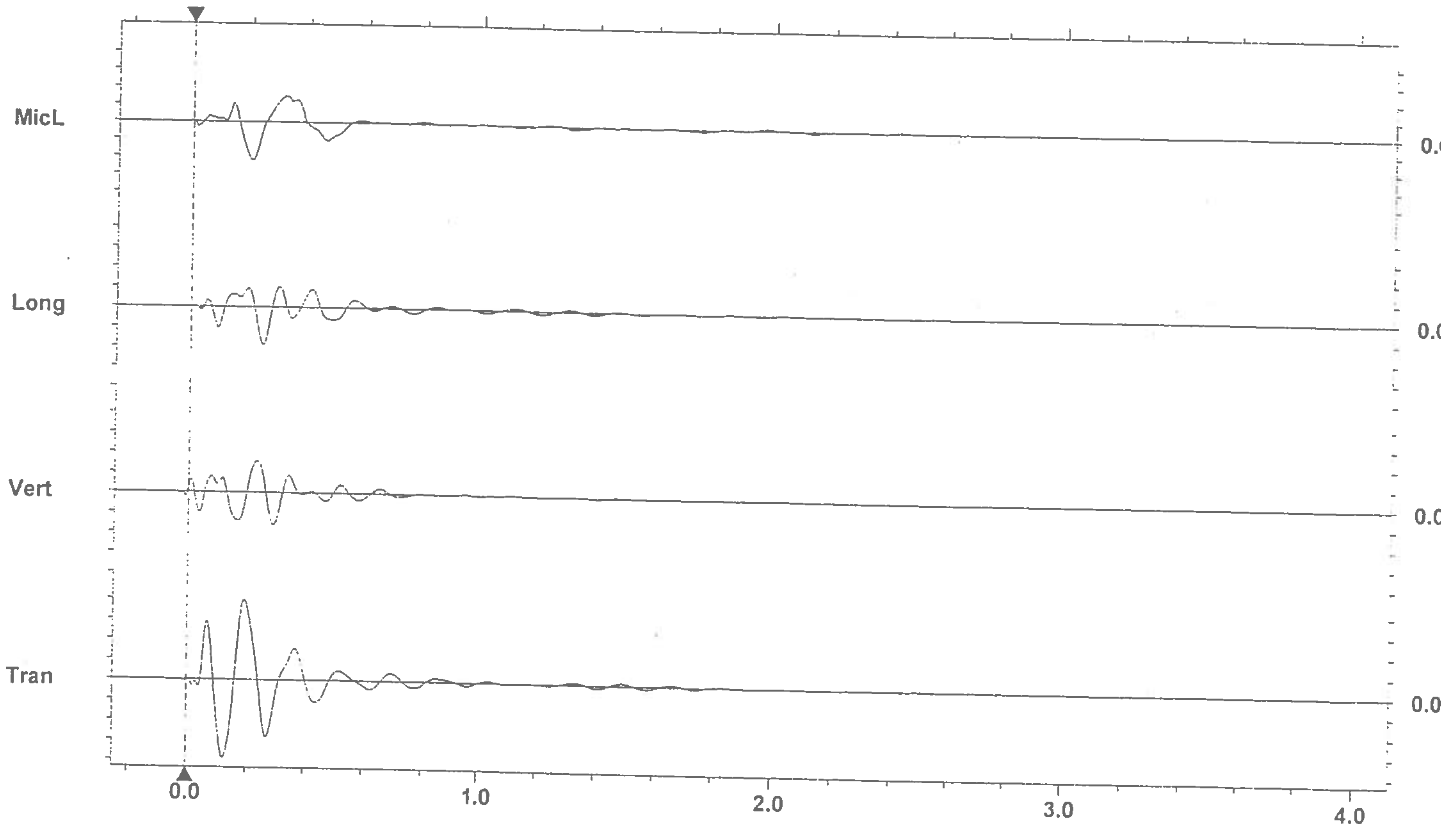
	Tran	Vert	Long	
PPV	0.795	0.325	0.375	in/s
ZC Freq	6.3	8.8	8.1	Hz
Time (Rel. to Trig)	0.191	0.290	0.244	sec
Peak Acceleration	0.106	0.0663	0.0530	g
Peak Displacement	0.0191	0.00710	0.00706	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.820 in/s at 0.191 sec

USBM RI8507 And OSMRE



Frequency (Hz)
Tran: + Vert: x Long: ø



Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.200 in/s/div Mic: 0.00100 psi(L)/div
Trigger = ▶----------◀

Printed: March 5, 2004 (V 4.33 - 4.33)

Event Report

Date/Time	Vert at 12:45:14 February 25, 2004
Trigger Source	Geo: 0.0500 in/s
Range	Geo :10.00 in/s
Record Time	4.0 sec at 1024 sps

Serial Number	BA7882 V 4.37-4.35 BlastMate III
Battery Level	6.3 Volts
Calibration	May 15, 2003 by Instantel Inc.
File Name	I8829ZSU.3E0

Notes
Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

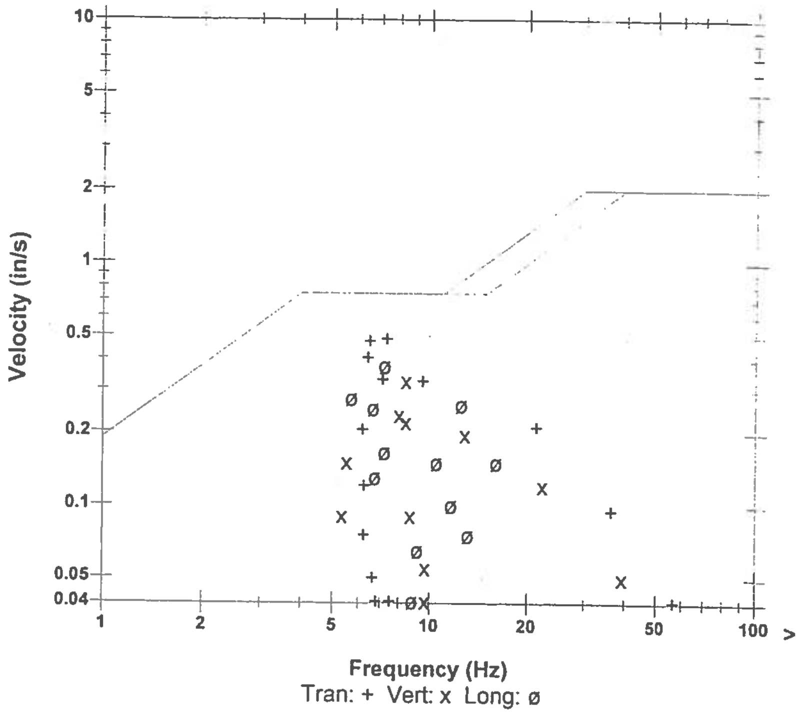
Post Event Notes
Blast 5 Location A-1

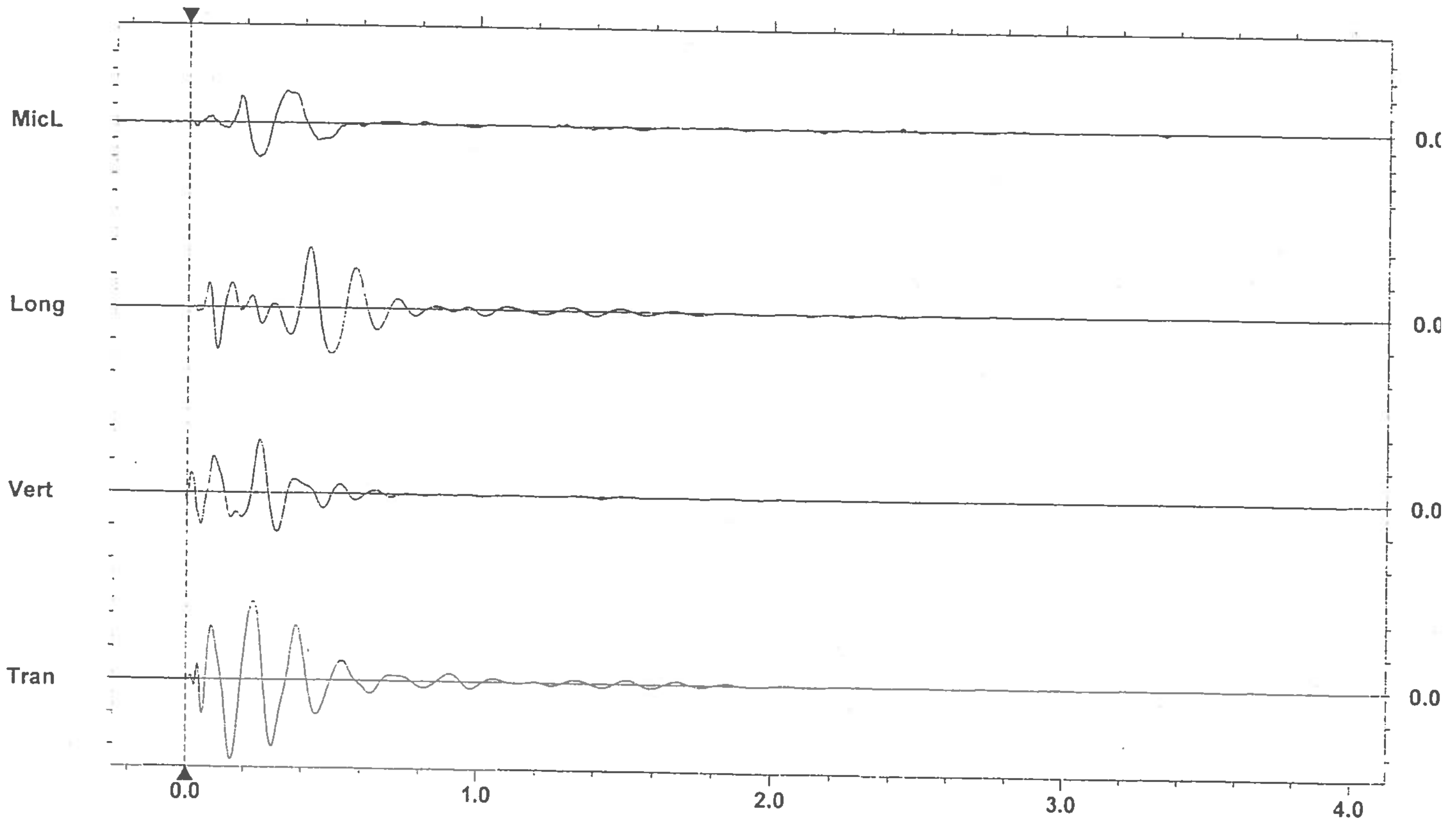
Microphone	Linear Weighting
PSPL	116.7 dB(L) at 0.244 sec
ZC Freq	5.8 Hz
Channel Test	Passed (Freq = 19.3 Hz Amp = 728 mv)

	Tran	Vert	Long	
PPV	0.485	0.325	0.375	in/s
ZC Freq	7.3	8.4	7.2	Hz
Time (Rel. to Trig)	0.155	0.252	0.422	sec
Peak Acceleration	0.0795	0.0663	0.0663	g
Peak Displacement	0.0119	0.00593	0.00844	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.527 in/s at 0.155 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.200 in/s/div Mic: 0.00100 psi(L)/div
Trigger =

Event Report

Date/Time	Vert at 13:08:47 February 25, 2004
Trigger Source	Geo: 0.0500 in/s
Range	Geo :10.00 in/s
Record Time	4.0 sec at 1024 sps

Serial Number	BA7882 V 4.37-4.35 BlastMate III
Battery Level	6.3 Volts
Calibration	May 15, 2003 by Instantel Inc.
File Name	I8829ZSV.6N0

Notes
Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

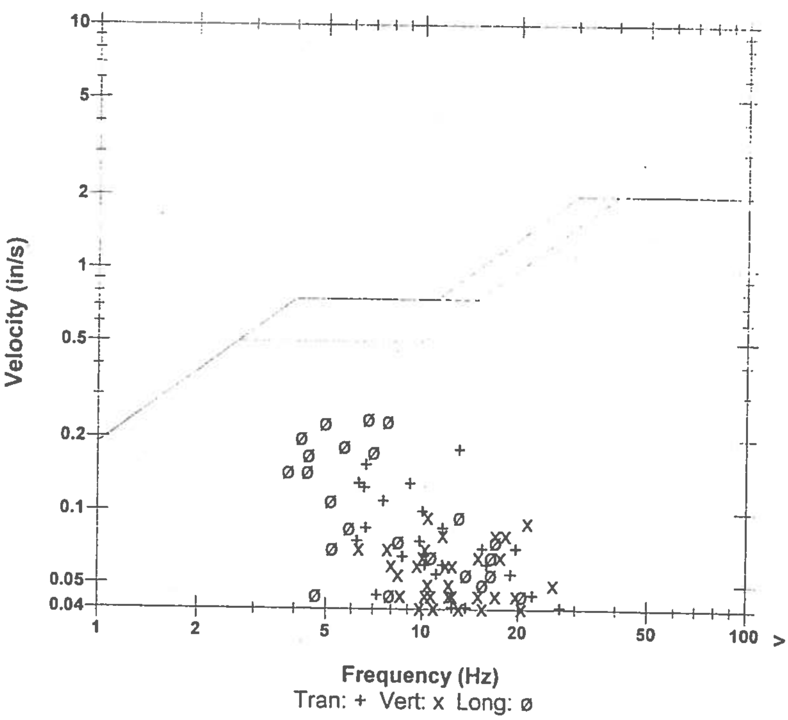
Post Event Notes
Blast 6 Location A-1

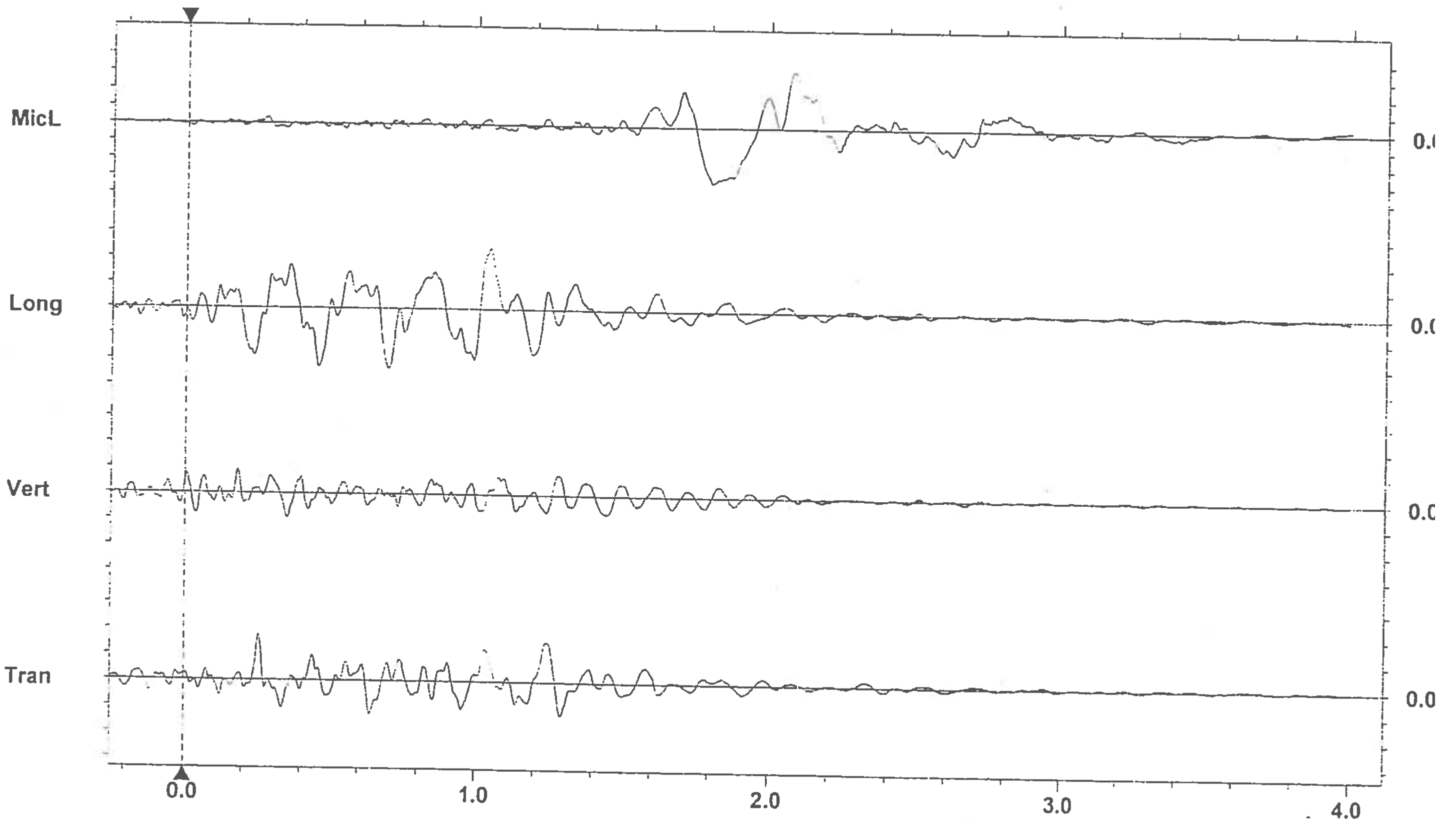
Microphone	Linear Weighting
PSPL	121.1 dB(L) at 2.076 sec
ZC Freq	3.5 Hz
Channel Test	Passed (Freq = 19.3 Hz Amp = 728 mv)

	Tran	Vert	Long	
PPV	0.180	0.0950	0.240	in/s
ZC Freq	13	10	6.7	Hz
Time (Rel. to Trig)	0.257	0.349	1.041	sec
Peak Acceleration	0.0398	0.0398	0.0398	g
Peak Displacement	0.00320	0.00156	0.00718	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.269 in/s at 1.041 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.100 in/s/div Mic: 0.00100 psi(L)/div
Trigger = ▶-------◀

Printed: March 5, 2004 (V 4.33 - 4.33)

Event Report

Date/Time	Vert at 11:31:12 February 25, 2004
Trigger Source	Geo: 0.0500 in/s
Range	Geo :10.00 in/s
Record Time	4.0 sec at 1024 sps

Serial Number	BA7802 V 4.37-4.35 BlastMate III
Battery Level	6.4 Volts
Calibration	May 15, 2003 by Instantel Inc.
File Name	I8029ZSQ.O00

Notes

Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

Post Event Notes

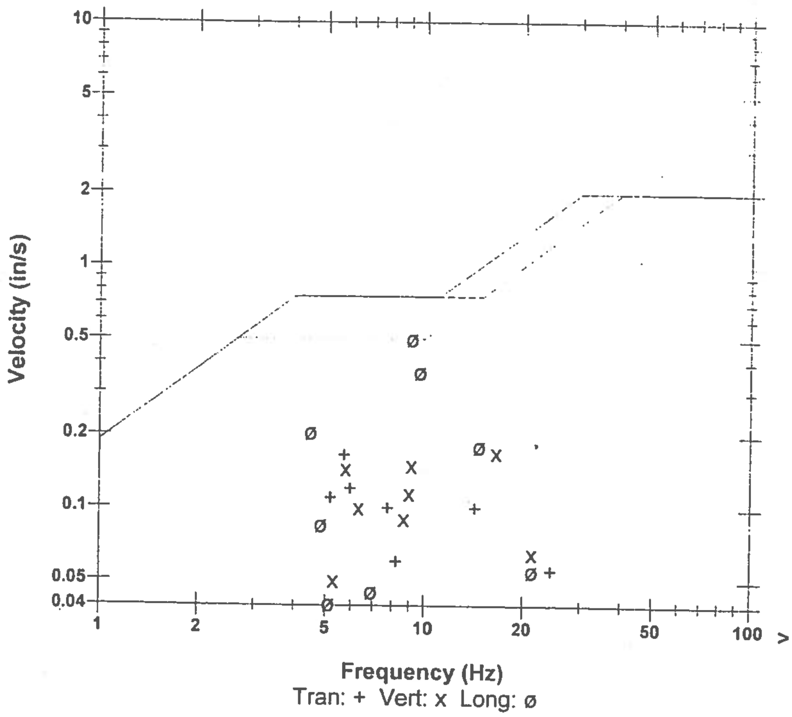
Blast 1 Location A-2

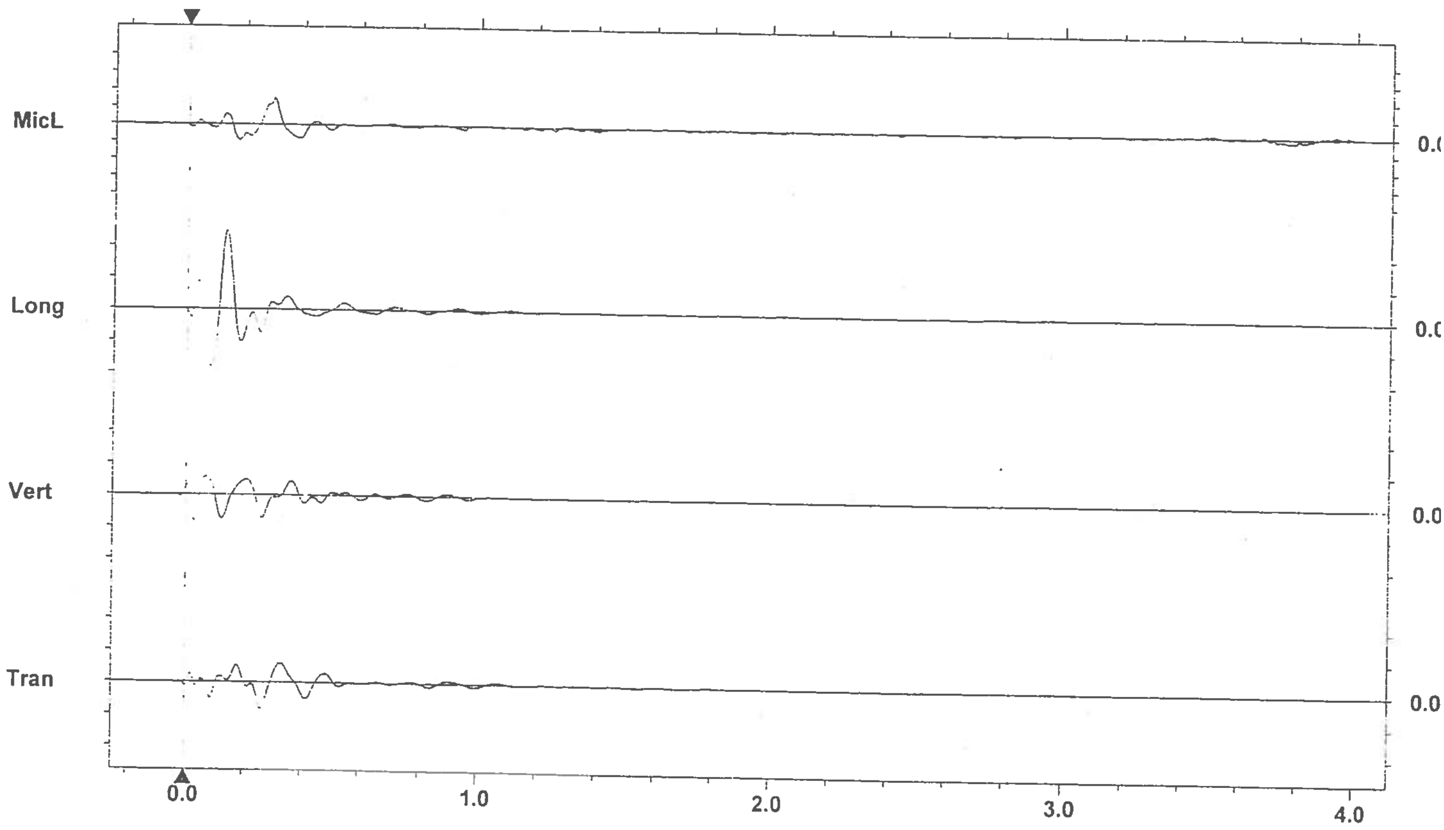
Microphone	Linear Weighting
PSPL	114.6 dB(L) at 0.294 sec
ZC Freq	6.4 Hz
Channel Test	Passed (Freq = 20.5 Hz Amp = 590 mv)

	Tran	Vert	Long	
PPV	0.165	0.170	0.500	in/s
ZC Freq	5.7	17	9.1	Hz
Time (Rel. to Trig)	0.262	0.029	0.133	sec
Peak Acceleration	0.0265	0.0530	0.0795	g
Peak Displacement	0.00311	0.00264	0.00850	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.516 in/s at 0.133 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.200 in/s/div Mic: 0.00100 psi(L)/div
Trigger = ▶------◀

Printed: March 5, 2004 (V 4.33 - 4.33)

Event Report

Date/Time	Vert at 11:37:17 February 25, 2004
Trigger Source	Geo: 0.0500 in/s
Range	Geo :10.00 in/s
Record Time	4.0 sec at 1024 sps

Serial Number	BA7802 V 4.37-4.35 BlastMate III
Battery Level	6.4 Volts
Calibration	May 15, 2003 by Instantel Inc.
File Name	I8029ZSQ.Y50

Notes
Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

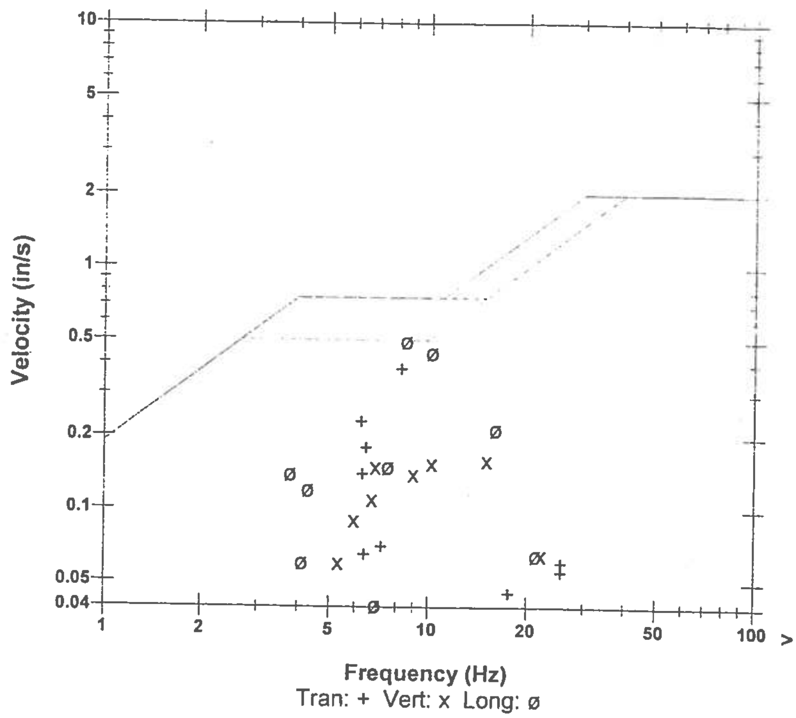
Post Event Notes
Blast 2 Location A-2

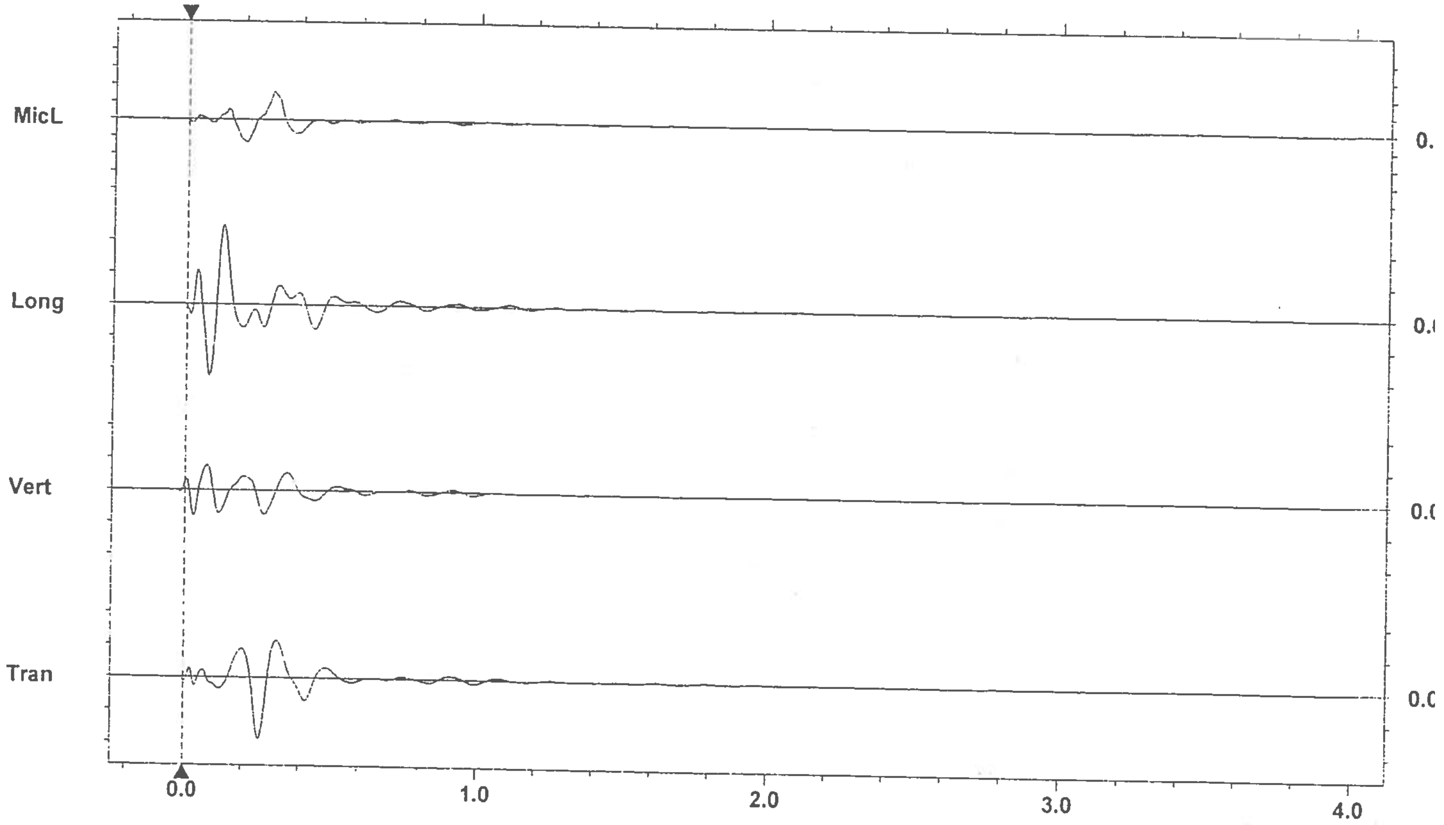
Microphone	Linear Weighting
PSPL	115.0 dB(L) at 0.296 sec
ZC Freq	5.2 Hz
Channel Test	Passed (Freq = 20.5 Hz Amp = 590 mv)

	Tran	Vert	Long	
PPV	0.380	0.160	0.495	in/s
ZC Freq	8.3	15	8.5	Hz
Time (Rel. to Trig)	0.263	0.029	0.126	sec
Peak Acceleration	0.0530	0.0398	0.0928	g
Peak Displacement	0.00688	0.00329	0.00853	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.515 in/s at 0.126 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.200 in/s/div Mic: 0.00100 psi(L)/div
Trigger = ▶-----------◀

Event Report

Date/Time	Long at 12:31:57 February 25, 2004
Trigger Source	Geo: 0.0500 in/s
Range	Geo :10.00 in/s
Record Time	4.0 sec at 1024 sps

Serial Number	BA7802 V 4.37-4.35 BlastMate III
Battery Level	6.4 Volts
Calibration	May 15, 2003 by Instantel Inc.
File Name	I8029ZST.H90

Notes
Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

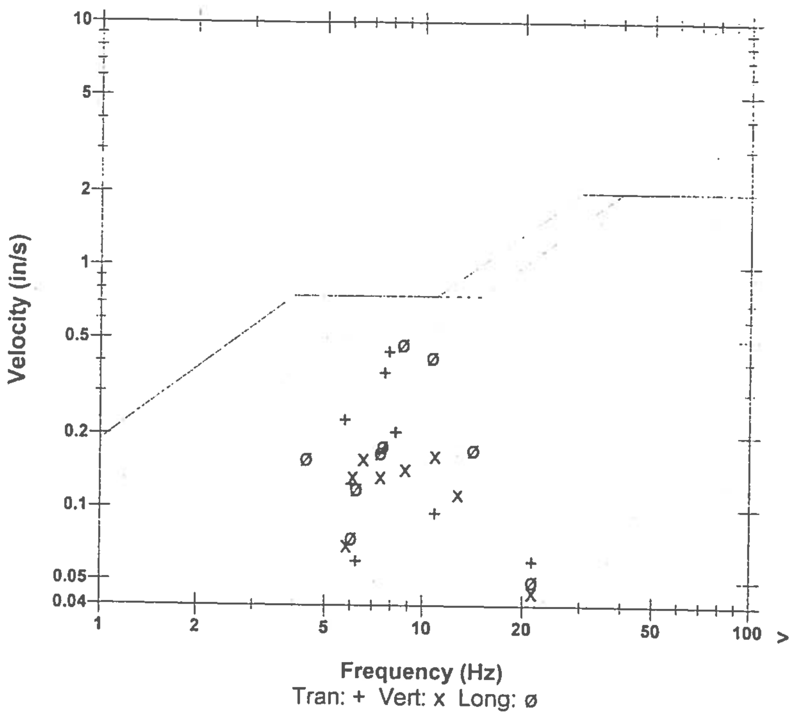
Post Event Notes
Blast 3 Location A-2

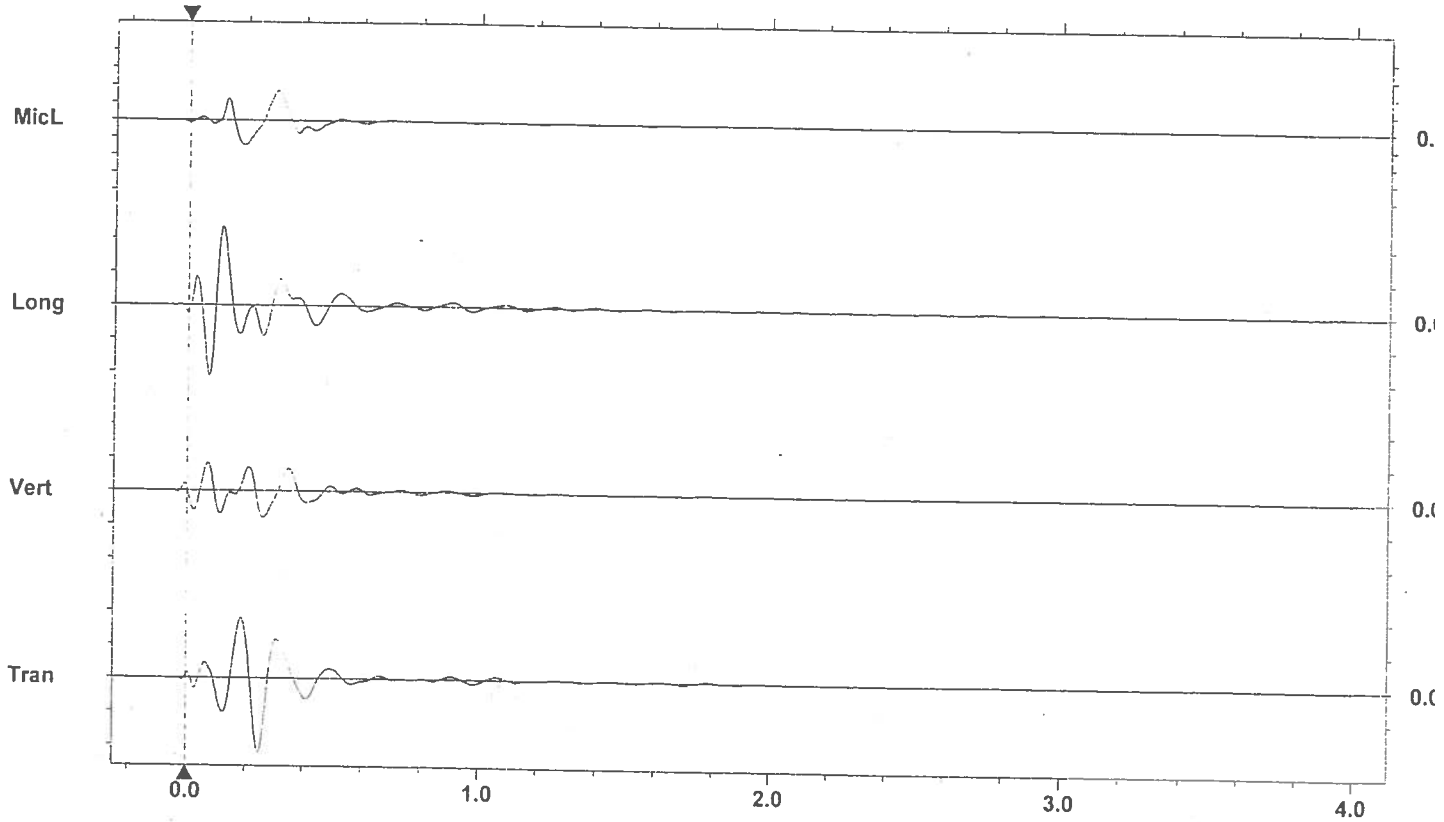
Microphone	Linear Weighting
PSPL	115.6 dB(L) at 0.299 sec
ZC Freq	5.3 Hz
Channel Test	Passed (Freq = 20.1 Hz Amp = 511 mv)

	Tran	Vert	Long	
PPV	0.440	0.165	0.475	in/s
ZC Freq	7.9	11	8.7	Hz
Time (Rel. to Trig)	0.247	0.065	0.115	sec
Peak Acceleration	0.0663	0.0398	0.0928	g
Peak Displacement	0.00861	0.00368	0.00830	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.526 in/s at 0.117 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.200 in/s/div Mic: 0.00100 psi(L)/div
Trigger = ▶------------◀

Printed: March 5, 2004 (V 4.33 - 4.33)

Event Report

Date/Time Vert at 12:35:40 February 25, 2004
Trigger Source Geo: 0.0500 in/s
Range Geo :10.00 in/s
Record Time 4.0 sec at 1024 sps

Serial Number BA7802 V 4.37-4.35 BlastMate III
Battery Level 6.4 Volts
Calibration May 15, 2003 by Instantel Inc.
File Name I8029ZST.NG0

Notes
Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

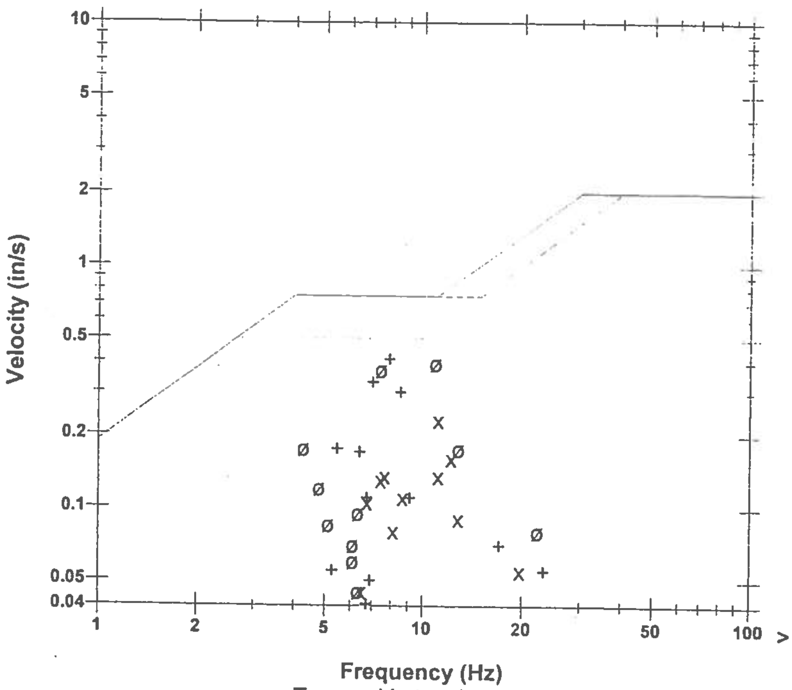
Post Event Notes
Blast 4 Location A-2

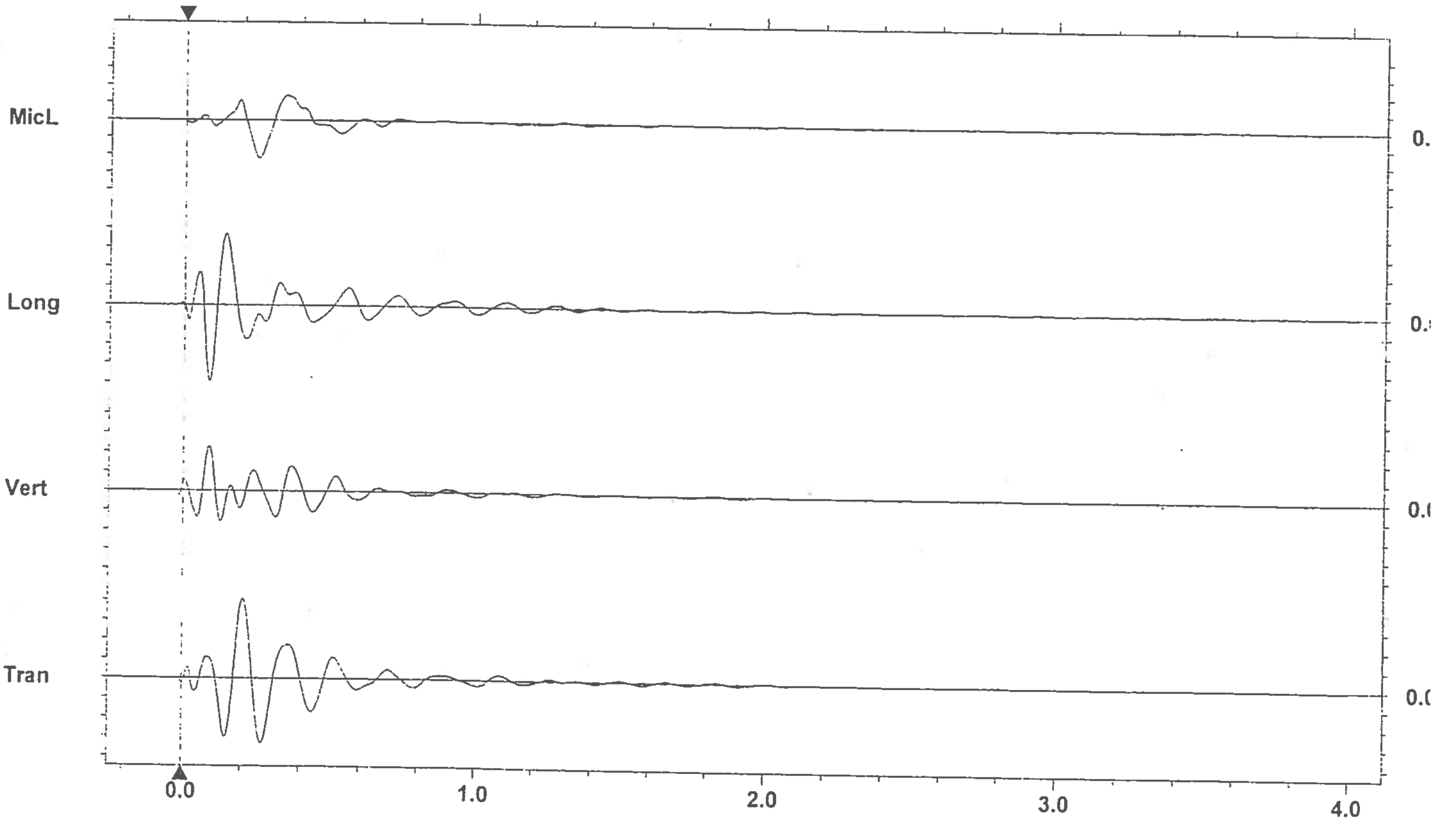
Microphone Linear Weighting
PSPL 117.5 dB(L) at 0.249 sec
ZC Freq 5.3 Hz
Channel Test Passed (Freq = 20.1 Hz Amp = 511 mv)

	Tran	Vert	Long	
PPV	0.410	0.230	0.395	in/s
ZC Freq	7.9	11	11	Hz
Time (Rel. to Trig)	0.206	0.089	0.088	sec
Peak Acceleration	0.0530	0.0398	0.0795	g
Peak Displacement	0.00820	0.00324	0.00761	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.474 in/s at 0.144 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.100 in/s/div Mic: 0.00100 psi(L)/div
Trigger = ▶---------◀

Printed: March 5, 2004 (V 4.33 - 4.33)

Event Report

Date/Time	Vert at 12:45:14 February 25, 2004
Trigger Source	Geo: 0.0500 in/s
Range	Geo :10.00 in/s
Record Time	4.0 sec at 1024 sps

Serial Number	BA7802 V 4.37-4.35 BlastMate III
Battery Level	6.4 Volts
Calibration	May 15, 2003 by Instantel Inc.
File Name	I8029ZSU.3E0

Notes
Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

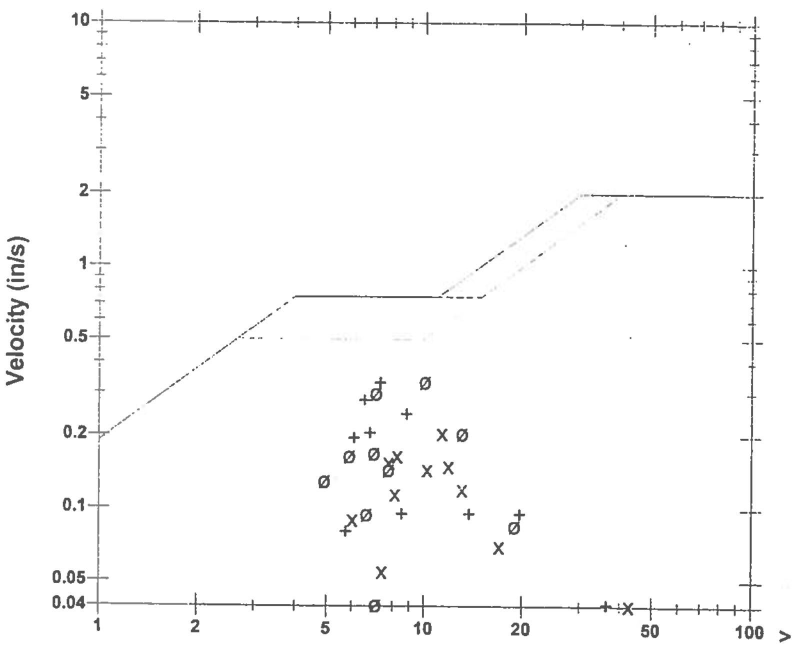
Post Event Notes
Blast 5 Location A-2

Microphone	Linear Weighting
PSPL	117.6 dB(L) at 0.377 sec
ZC Freq	5.2 Hz
Channel Test	Passed (Freq = 20.1 Hz Amp = 511 mv)

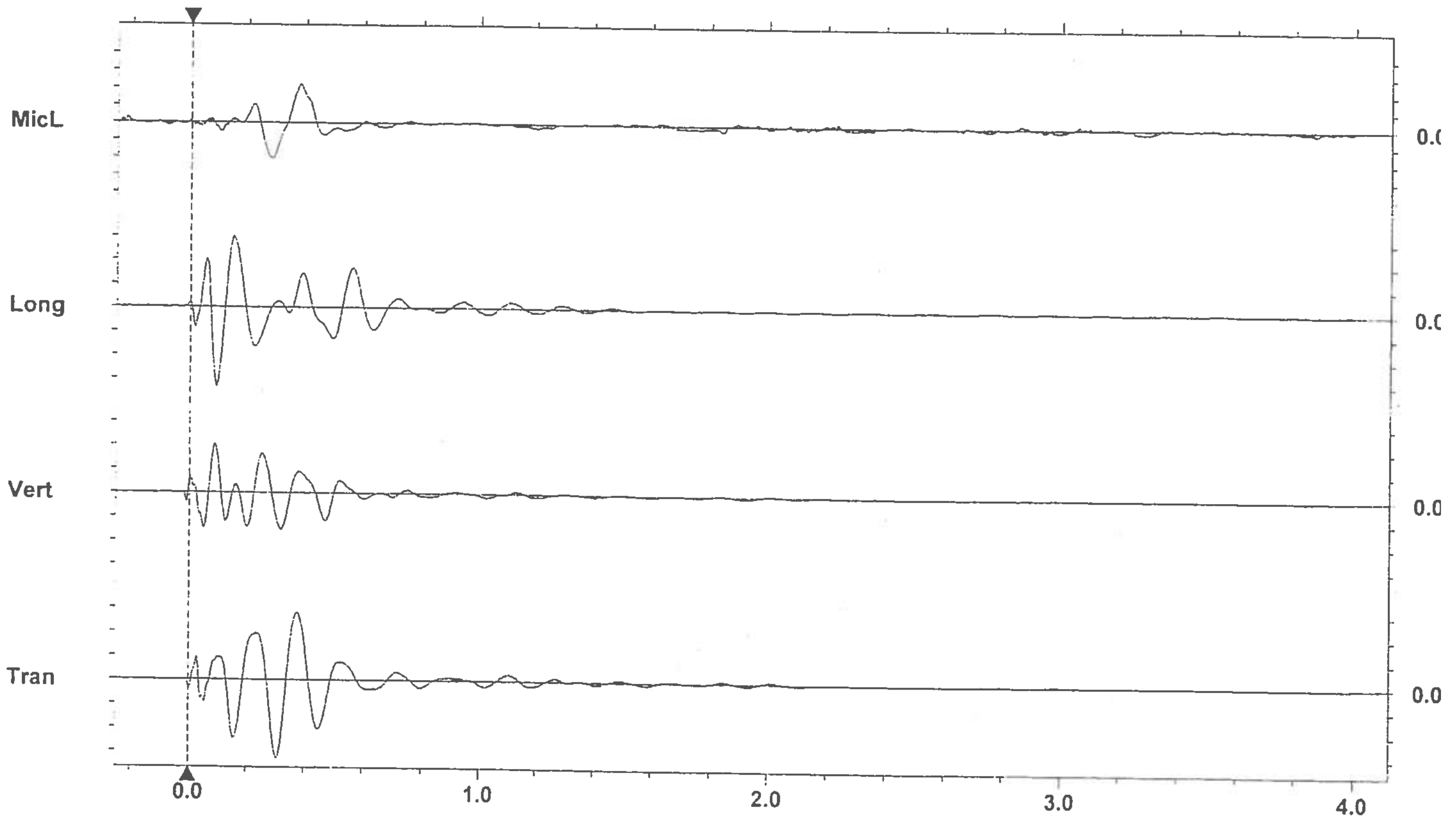
	Tran	Vert	Long	
PPV	0.330	0.205	0.335	in/s
ZC Freq	7.3	11	10	Hz
Time (Rel. to Trig)	0.306	0.089	0.093	sec
Peak Acceleration	0.0530	0.0530	0.0795	g
Peak Displacement	0.00690	0.00320	0.00645	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.393 in/s at 0.093 sec

USBM RI8507 And OSMRE



Frequency (Hz)
Tran: + Vert: x Long: ø



Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.100 in/s/div Mic: 0.00100 psi(L)/div
Trigger = ▶---------◀

Printed: March 5, 2004 (V 4.33 - 4.33)

Event Report

Date/Time	Tran at 13:08:47 February 25, 2004	**Serial Number**	BA7802 V 4.37-4.35 BlastMate III
Trigger Source	Geo: 0.0500 in/s	**Battery Level**	6.4 Volts
Range	Geo :10.00 in/s	**Calibration**	May 15, 2003 by Instantel Inc.
Record Time	4.0 sec at 1024 sps	**File Name**	I8029ZSV.6N0

Notes
Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

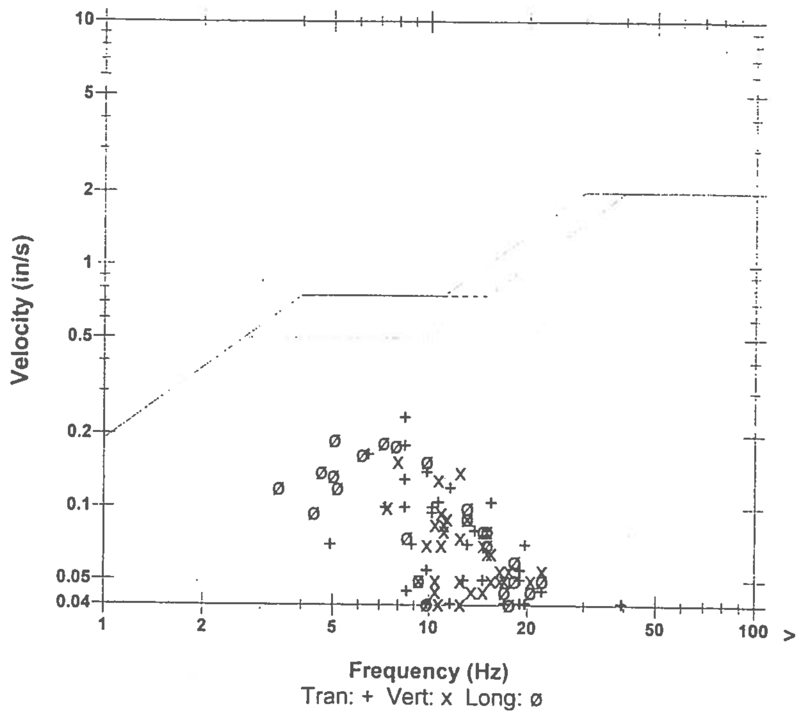
Post Event Notes
Blast 6 Location A-2

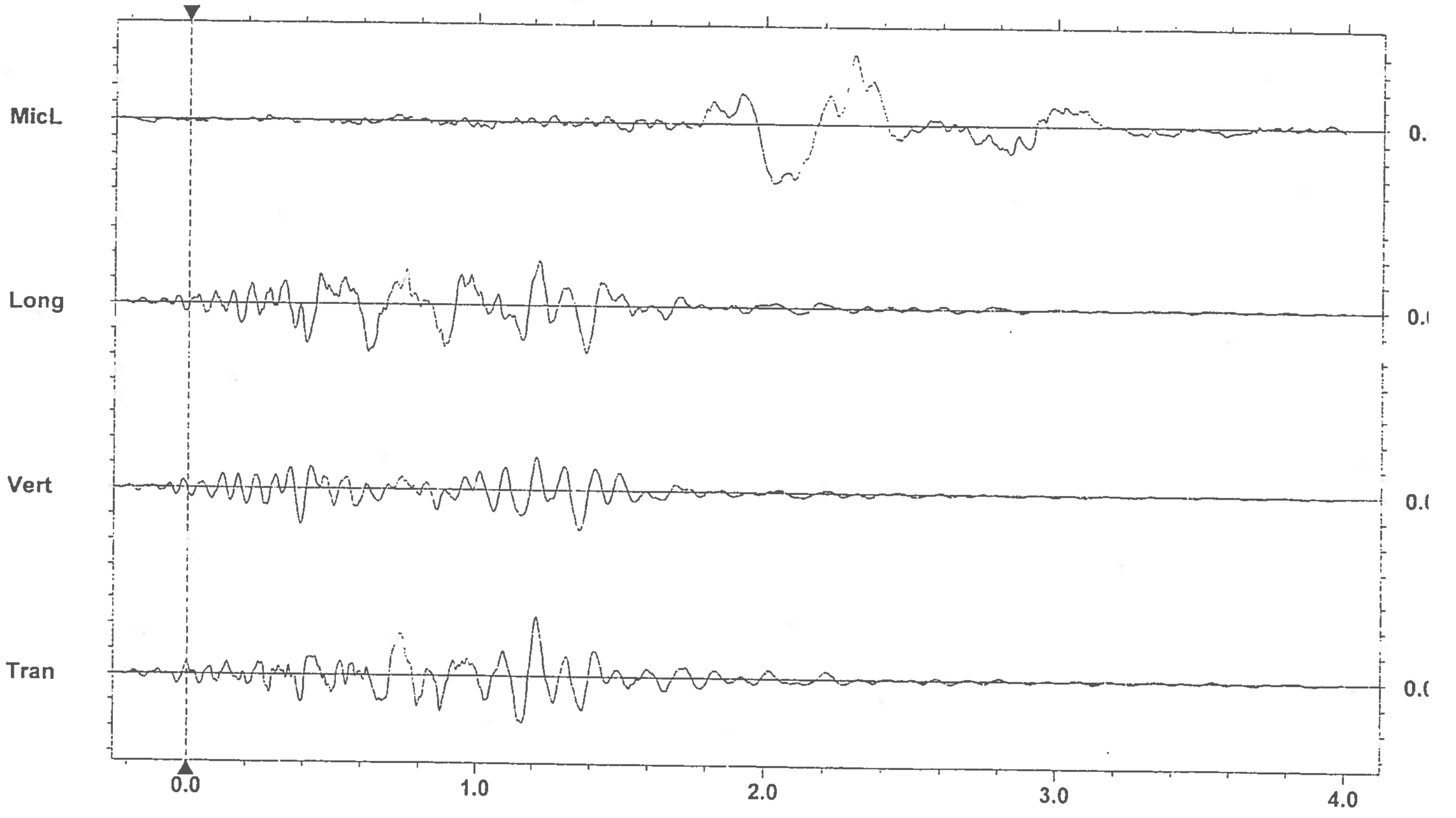
Microphone Linear Weighting
PSPL 123.0 dB(L) at 2.302 sec
ZC Freq 2.1 Hz
Channel Test Passed (Freq = 20.1 Hz Amp = 511 mv)

	Tran	Vert	Long	
PPV	0.235	0.155	0.190	in/s
ZC Freq	8.4	8.0	5.1	Hz
Time (Rel. to Trig)	1.211	1.359	0.623	sec
Peak Acceleration	0.0398	0.0265	0.0398	g
Peak Displacement	0.00392	0.00309	0.00456	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.315 in/s at 1.215 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.100 in/s/div Mic: 0.00100 psi(L)/div
Trigger = ▶---------◀

Printed: March 5, 2004 (V 4.33 - 4.33)

Event Report

Date/Time Long at 11:31:13 February 25, 2004
Trigger Source Geo: 0.0500 in/s
Range Geo :10.00 in/s
Record Time 4.0 sec at 1024 sps

Serial Number BA7884 V 4.37-4.35 BlastMate III
Battery Level 6.3 Volts
Calibration August 28, 2003 by Instantel Inc.
File Name I8849ZSQ.O10

Notes
Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

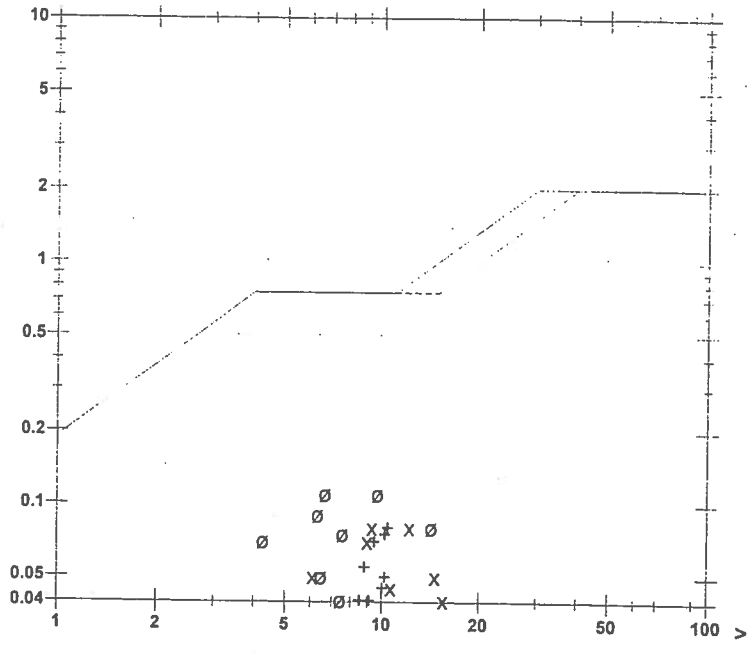
Post Event Notes
Blast 1 Location A-3

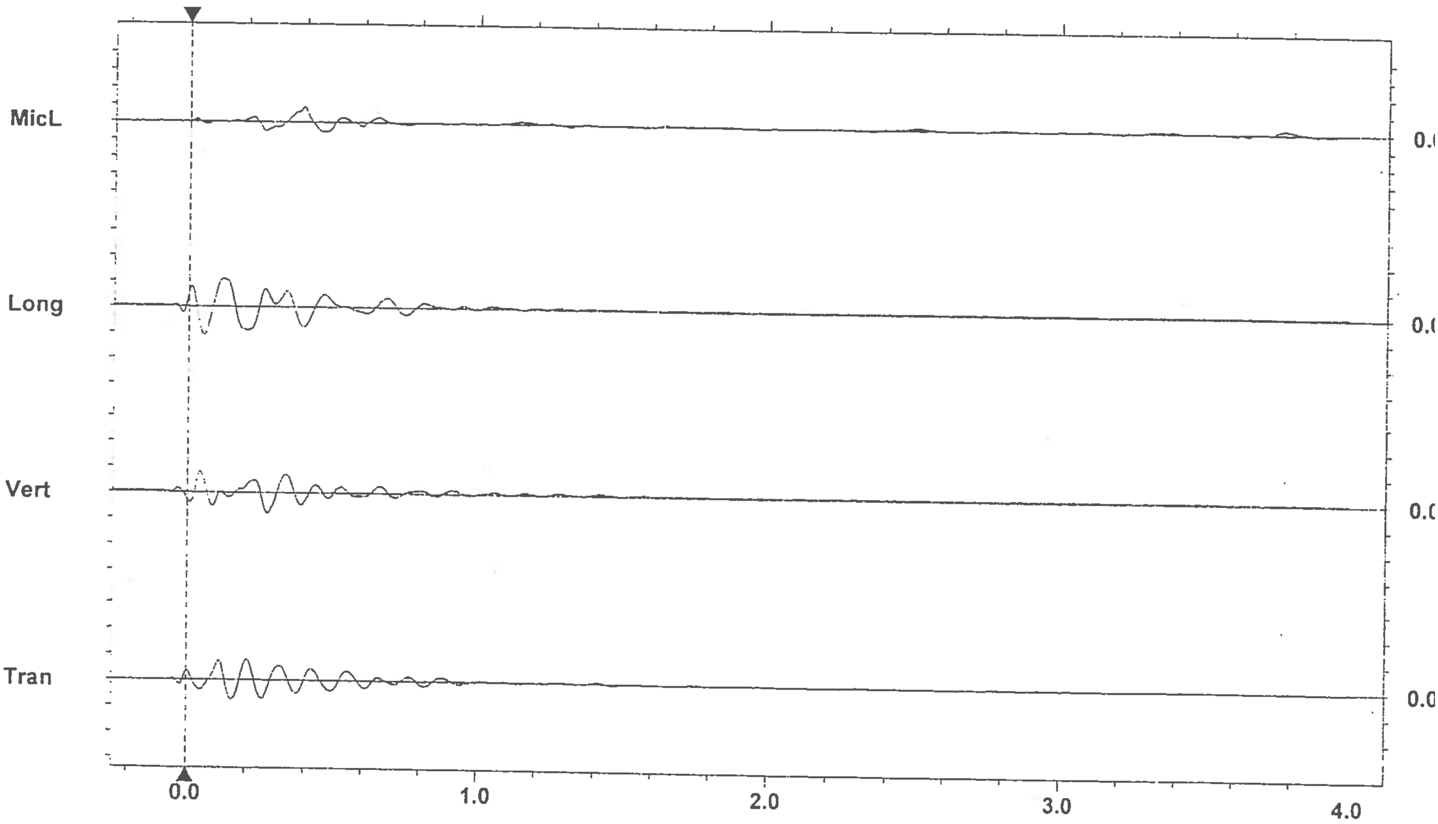
Microphone Linear Weighting
PSPL 109.9 dB(L) at 0.389 sec
ZC Freq 5.8 Hz
Channel Test Passed (Freq = 20.5 Hz Amp = 627 mv)

	Tran	Vert	Long	
PPV	0.0800	0.0800	0.110	in/s
ZC Freq	10	12	9.7	Hz
Time (Rel. to Trig)	0.203	0.040	0.050	sec
Peak Acceleration	0.0265	0.0265	0.0265	g
Peak Displacement	0.00126	0.00138	0.00292	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.137 in/s at 0.047 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.100 in/s/div Mic: 0.00100 psi(L)/div
Trigger = ▶---------◀

Printed: March 5, 2004 (V 4.33 - 4.33)

Event Report

Date/Time	Long at 11:37:18 February 25, 2004
Trigger Source	Geo: 0.0500 in/s
Range	Geo :10.00 in/s
Record Time	4.0 sec at 1024 sps

Serial Number	BA7884 V 4.37-4.35 BlastMate III
Battery Level	6.3 Volts
Calibration	August 28, 2003 by Instantel Inc.
File Name	I8849ZSQ.Y60

Notes
Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

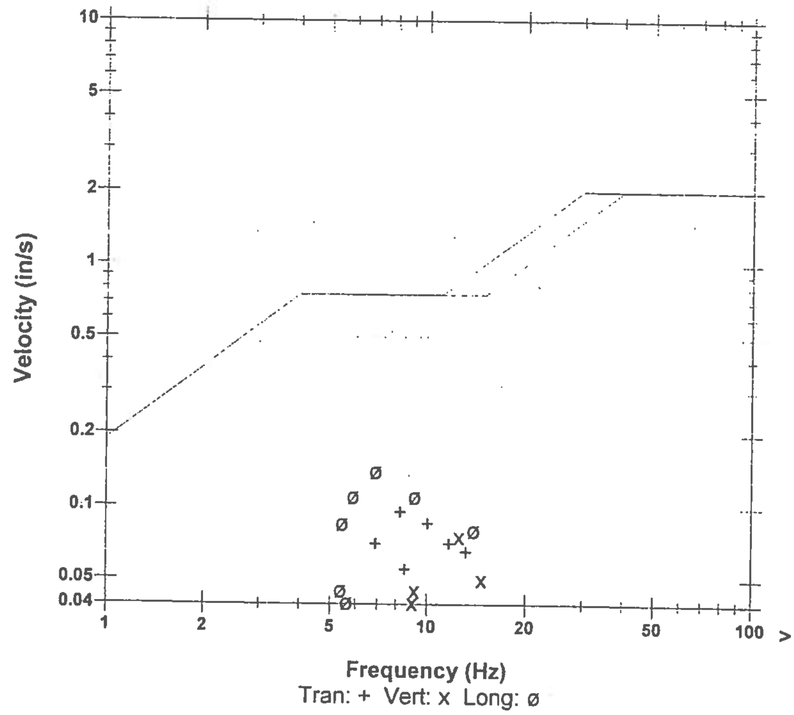
Post Event Notes
Blast 2 Location A-3

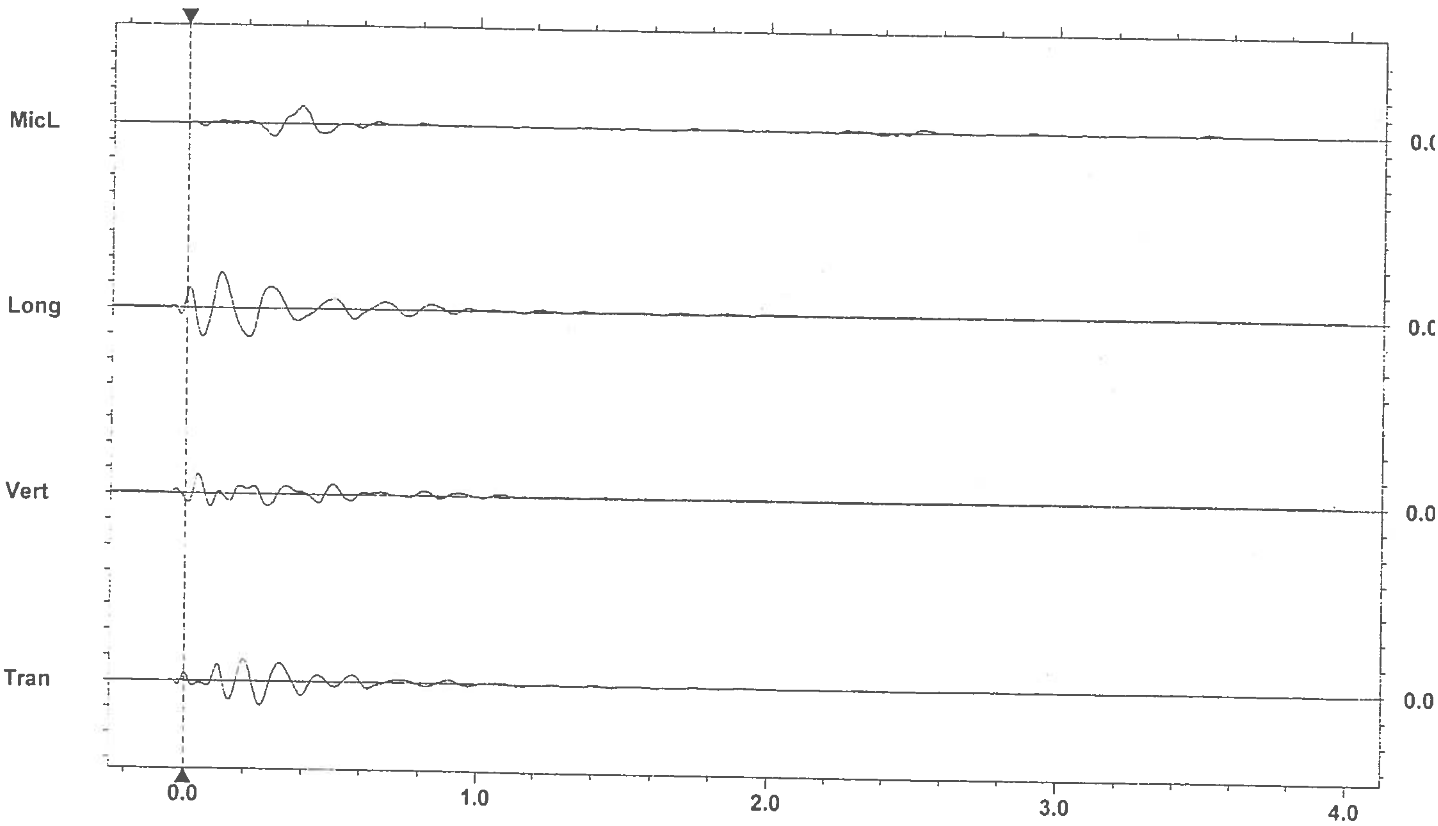
Microphone	Linear Weighting
PSPL	111.2 dB(L) at 0.386 sec
ZC Freq	4.8 Hz
Channel Test	Passed (Freq = 20.5 Hz Amp = 627 mv)

	Tran	Vert	Long	
PPV	0.0950	0.0750	0.140	in/s
ZC Freq	8.3	12	6.9	Hz
Time (Rel. to Trig)	0.258	0.041	0.112	sec
Peak Acceleration	0.0265	0.0265	0.0265	g
Peak Displacement	0.00182	0.00101	0.00319	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.155 in/s at 0.113 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.100 in/s/div Mic: 0.00100 psi(L)/div
Trigger = ▶------◀

Printed: March 5, 2004 (V 4.33 - 4.33)

Event Report

Date/Time	Long at 12:31:58 February 25, 2004
Trigger Source	Geo: 0.0500 in/s
Range	Geo :10.00 in/s
Record Time	4.0 sec at 1024 sps

Serial Number	BA7884 V 4.37-4.35 BlastMate III
Battery Level	6.3 Volts
Calibration	August 28, 2003 by Instantel Inc.
File Name	I8849ZST.HA0

Notes
Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

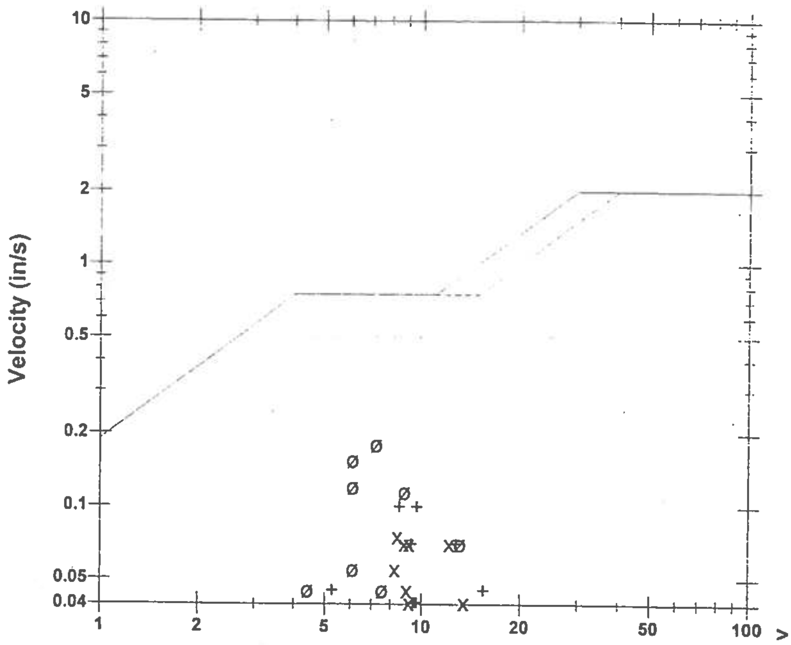
Post Event Notes
Blast 3 Location A-3

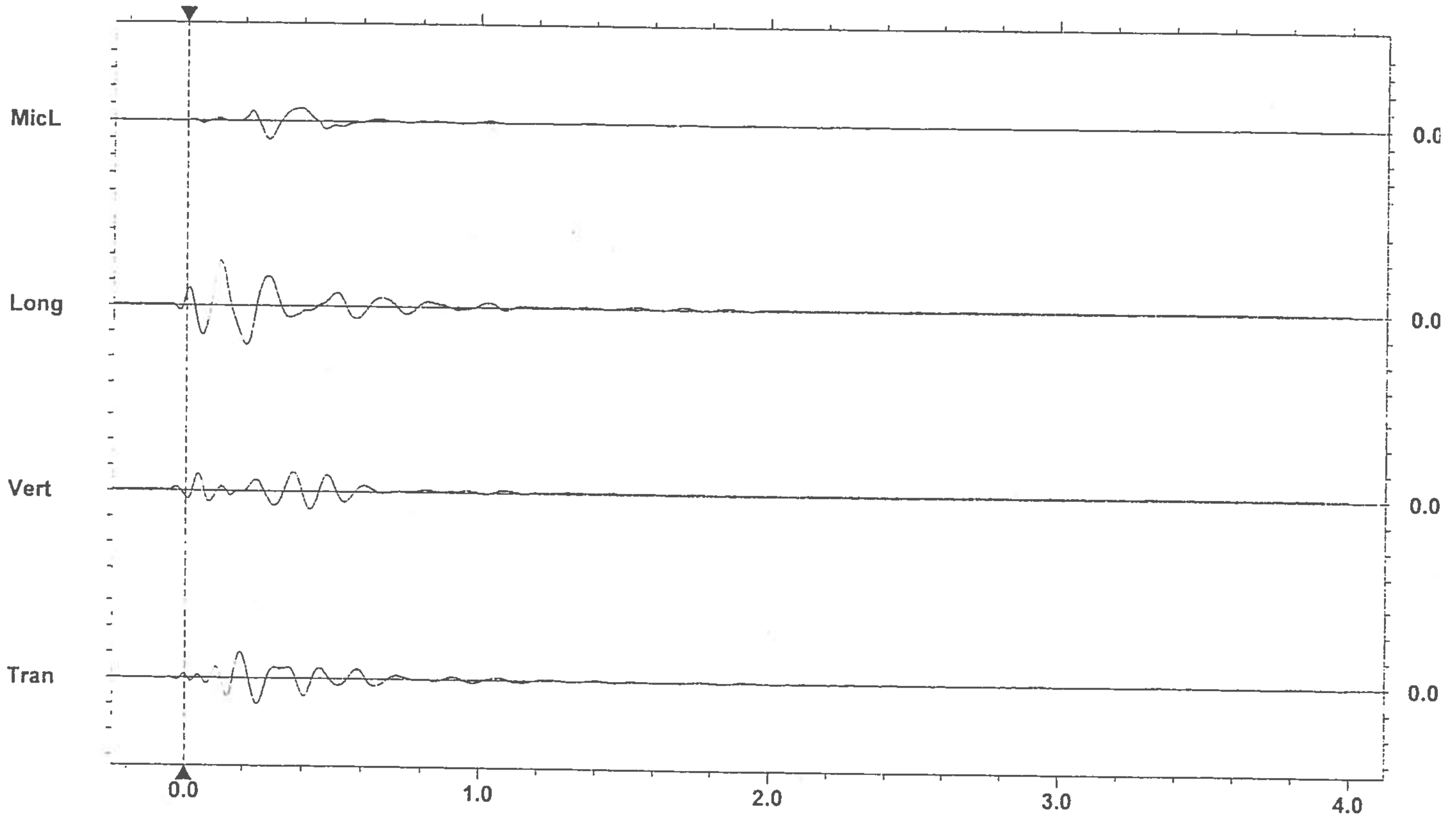
Microphone	Linear Weighting
PSPL	111.5 dB(L) at 0.281 sec
ZC Freq	6.8 Hz
Channel Test	Passed (Freq = 20.5 Hz Amp = 667 mv)

	Tran	Vert	Long	
PPV	0.1000	0.0750	0.180	in/s
ZC Freq	9.7	8.4	7.2	Hz
Time (Rel. to Trig)	0.188	0.362	0.119	sec
Peak Acceleration	0.0265	0.0265	0.0265	g
Peak Displacement	0.00187	0.00148	0.00381	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.182 in/s at 0.119 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.100 in/s/div Mic: 0.00100 psi(L)/div
Trigger = ▶-----------◀

Printed: March 5, 2004 (V 4.33 - 4.33)

Event Report

Date/Time	Long at 12:35:41 February 25, 2004	**Serial Number**	BA7884 V 4.37-4.35 BlastMate III
Trigger Source	Geo: 0.0500 in/s	**Battery Level**	6.3 Volts
Range	Geo :10.00 in/s	**Calibration**	August 28, 2003 by Instantel Inc.
Record Time	4.0 sec at 1024 sps	**File Name**	I8849ZST.NH0

Notes
Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

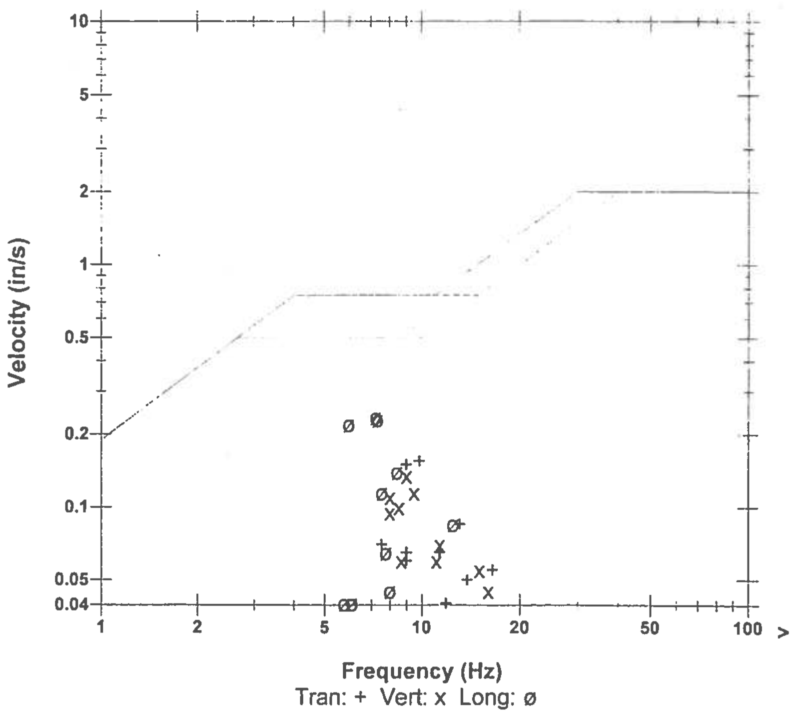
Post Event Notes
Blast 4 Location A-3

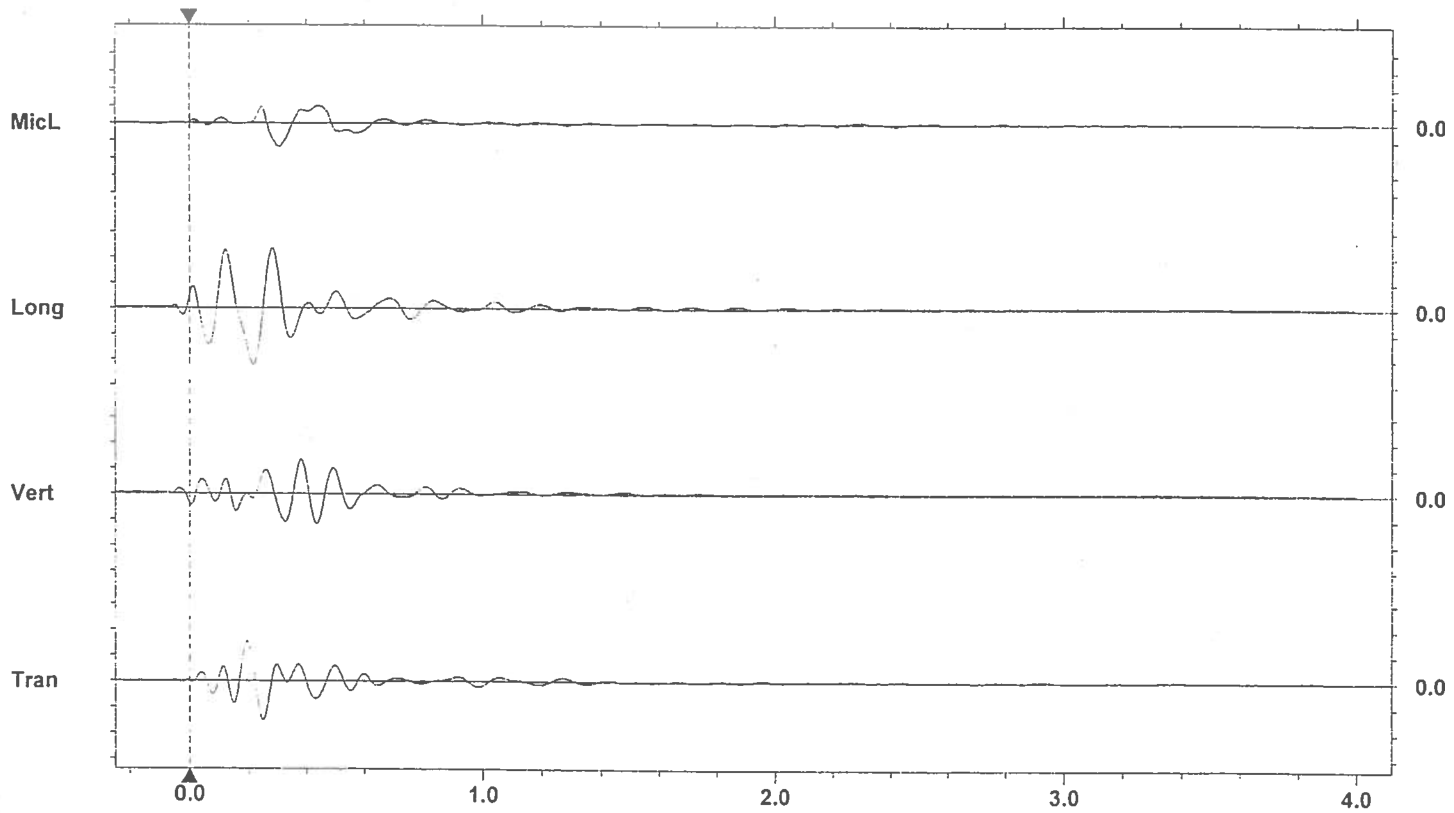
Microphone Linear Weighting
PSPL 113.5 dB(L) at 0.309 sec
ZC Freq 5.8 Hz
Channel Test Passed (Freq = 20.5 Hz Amp = 667 mv)

	Tran	Vert	Long	
PPV	0.155	0.135	0.235	in/s
ZC Freq	9.8	9.0	7.2	Hz
Time (Rel. to Trig)	0.194	0.379	0.280	sec
Peak Acceleration	0.0398	0.0265	0.0398	g
Peak Displacement	0.00266	0.00238	0.00538	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.241 in/s at 0.121 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.100 in/s/div Mic: 0.00100 psi(L)/div
Trigger = ▶-------◀

Printed: March 5, 2004 (V 4.33 - 4.33) **Format Copyrighted 1996-2001**

Event Report

Date/Time	Long at 12:45:14 February 25, 2004
Trigger Source	Geo: 0.0500 in/s
Range	Geo :10.00 in/s
Record Time	4.0 sec at 1024 sps

Serial Number	BA7884 V 4.37-4.35 BlastMate III
Battery Level	6.3 Volts
Calibration	August 28, 2003 by Instantel Inc.
File Name	I8849ZSU.3E0

Notes
Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

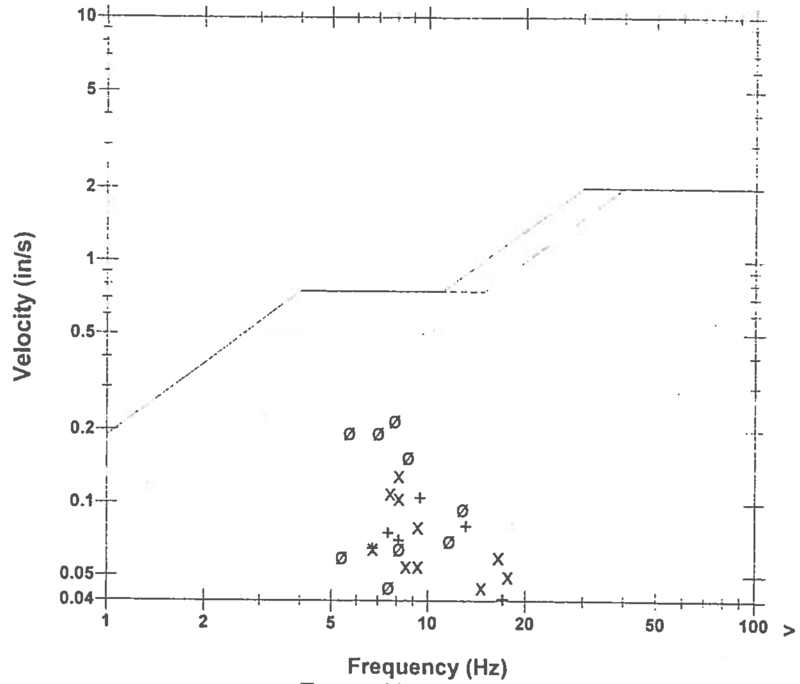
Post Event Notes
Blast 5 Location A-3

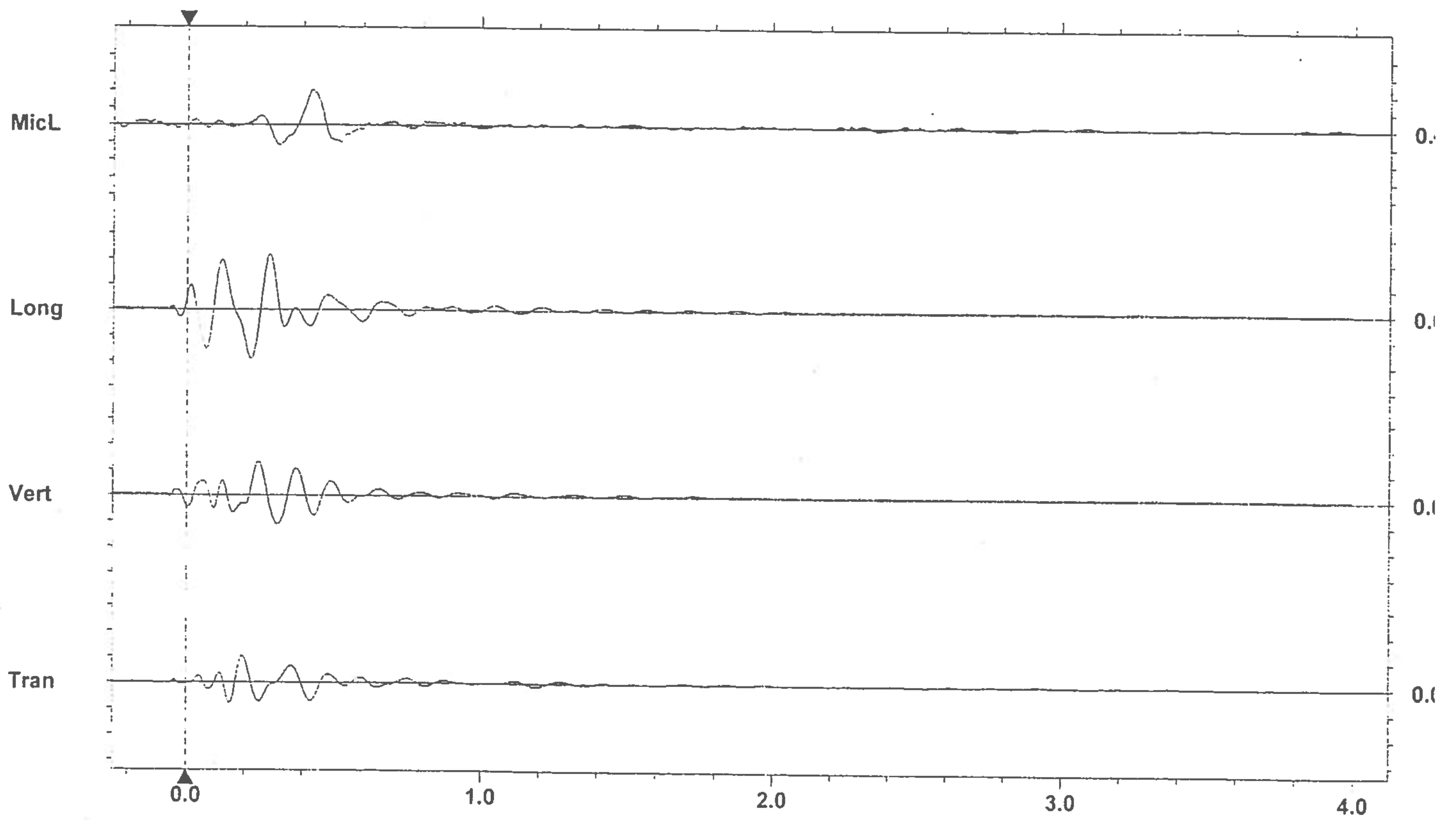
Microphone	Linear Weighting
PSPL	116.7 dB(L) at 0.426 sec
ZC Freq	5.3 Hz
Channel Test	Passed (Freq = 20.5 Hz Amp = 667 mv)

	Tran	Vert	Long	
PPV	0.105	0.130	0.220	in/s
ZC Freq	9.5	8.1	7.9	Hz
Time (Rel. to Trig)	0.191	0.245	0.286	sec
Peak Acceleration	0.0265	0.0265	0.0398	g
Peak Displacement	0.00174	0.00257	0.00465	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.223 in/s at 0.286 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.100 in/s/div Mic: 0.00100 psi(L)/div
Trigger = ▶---------◀

Printed: March 5, 2004 (V 4.33 - 4.33)

Event Report

Date/Time	Vert at 13:08:48 February 25, 2004
Trigger Source	Geo: 0.0500 in/s
Range	Geo :10.00 in/s
Record Time	4.0 sec at 1024 sps

Serial Number	BA7884 V 4.37-4.35 BlastMate III
Battery Level	6.3 Volts
Calibration	August 28, 2003 by Instantel Inc.
File Name	I8849ZSV.6O0

Notes
Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

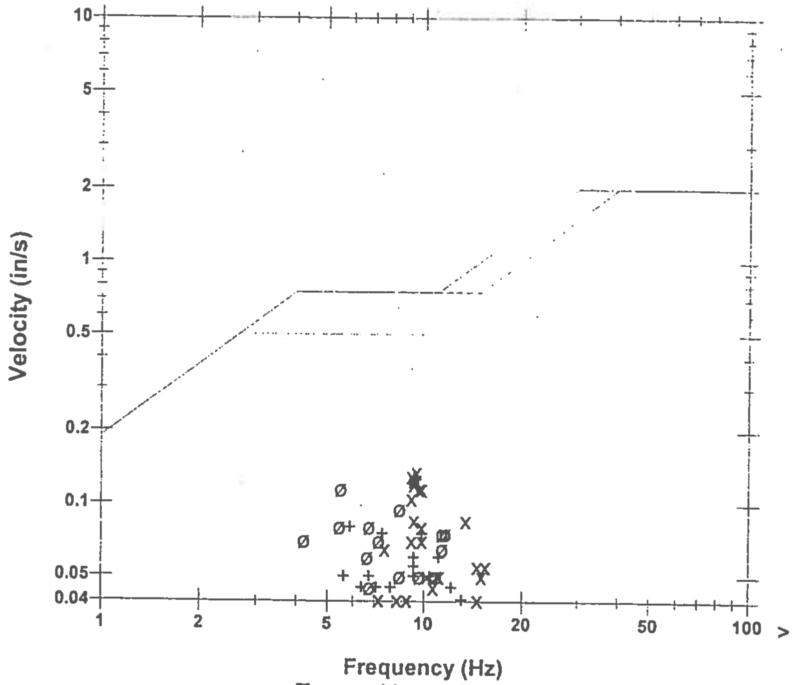
Post Event Notes
Blast 6 Location A-3

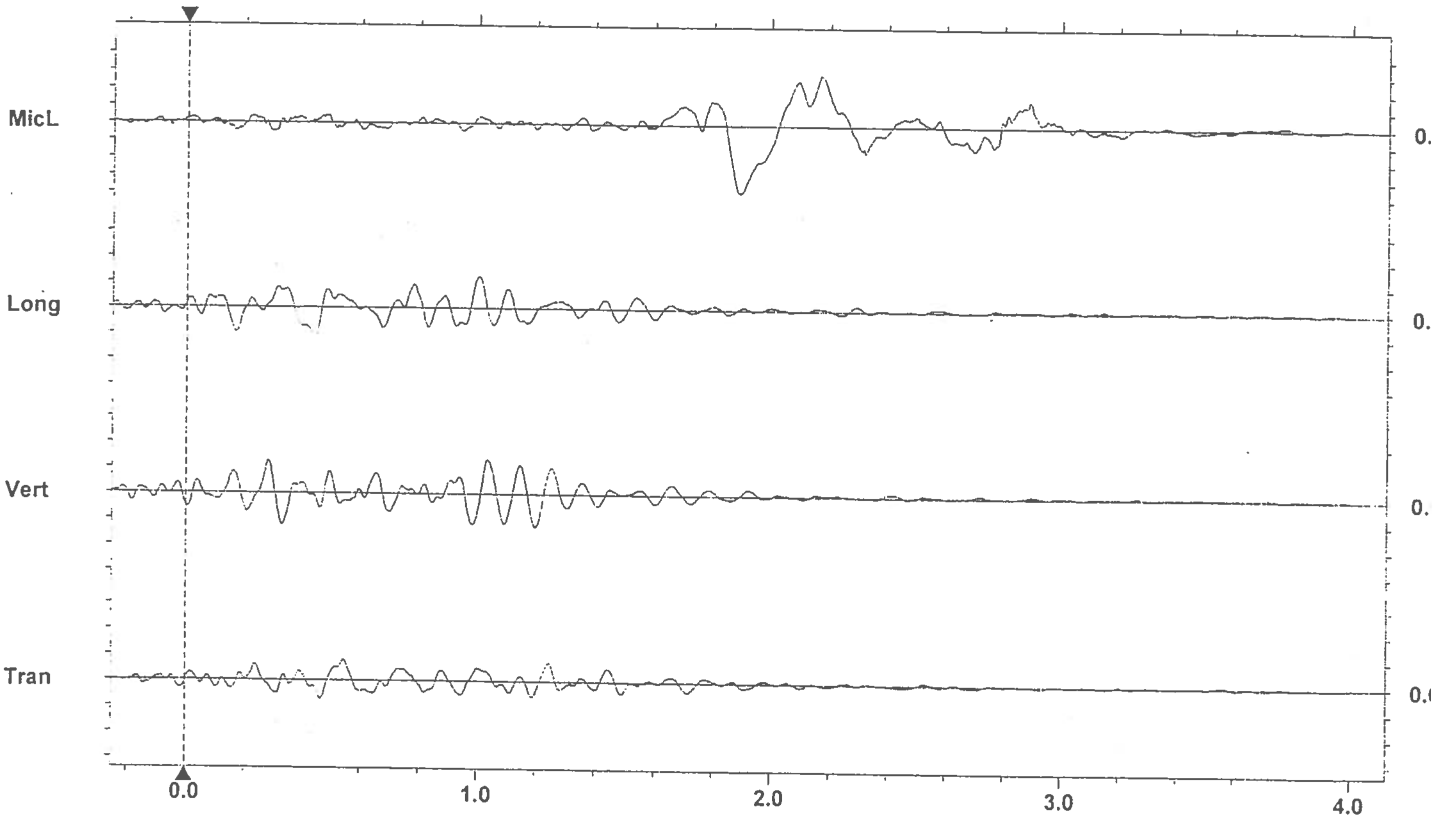
Microphone	Linear Weighting
PSPL	122.5 dB(L) at 1.890 sec
ZC Freq	2.8 Hz
Channel Test	Passed (Freq = 20.5 Hz Amp = 667 mv)

	Tran	Vert	Long	
PPV	0.0800	0.135	0.125	in/s
ZC Freq	5.9	9.5	9.3	Hz
Time (Rel. to Trig)	0.543	1.032	1.001	sec
Peak Acceleration	0.0265	0.0398	0.0398	g
Peak Displacement	0.00197	0.00229	0.00327	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.154 in/s at 0.998 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.100 in/s/div Mic: 0.00100 psi(L)/div
Trigger = ▶---------◀

Printed: March 5, 2004 (V 4.33 - 4.33)

Event Report

Date/Time	Long at 11:31:08 February 25, 2004
Trigger Source	Geo: 0.0500 in/s
Range	Geo :10.00 in/s
Record Time	4.0 sec at 1024 sps

Serial Number	BA5546 V 4.37-4.32 BlastMate III
Battery Level	6.4 Volts
Calibration	September 19, 2003 by Instantel Inc.
File Name	G5469ZSQ.NW0

Notes
Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

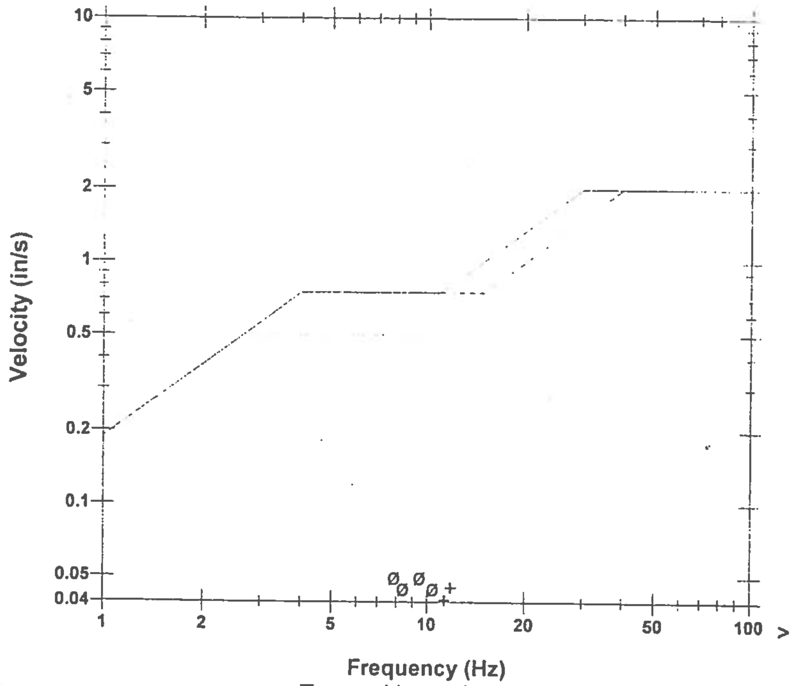
Post Event Notes
Blast 1 Location A-5

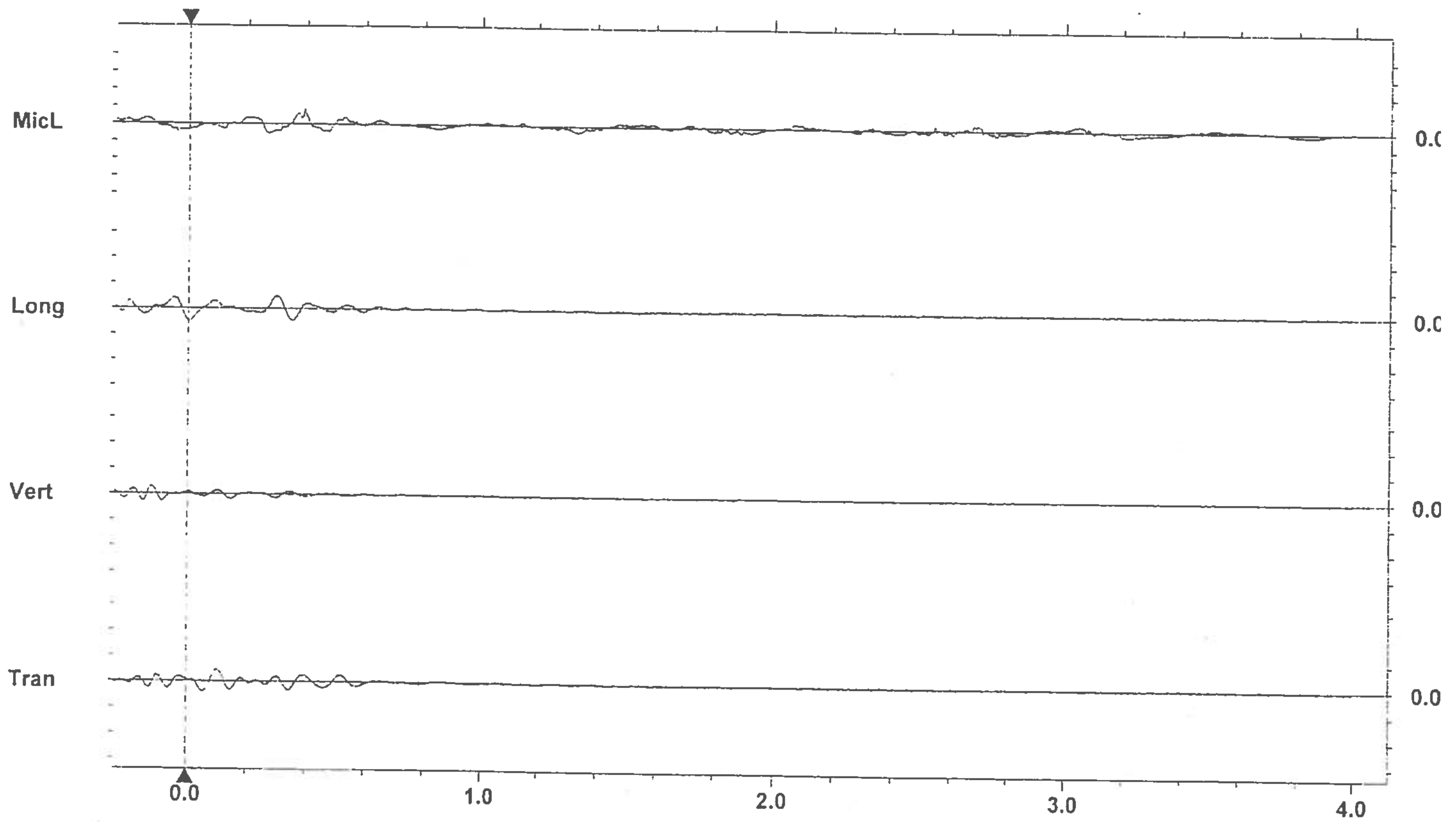
Microphone	Linear Weighting
PSPL	109.5 dB(L) at 0.391 sec
ZC Freq	7.6 Hz
Channel Test	Passed (Freq = 19.7 Hz Amp = 818 mv)

	Tran	Vert	Long	
PPV	0.0450	0.0300	0.0500	in/s
ZC Freq	12	17	7.9	Hz
Time (Rel. to Trig)	0.101	-0.127	0.000	sec
Peak Acceleration	0.0265	0.0265	0.0265	g
Peak Displacement	0.00065	0.00032	0.00096	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.0579 in/s at 0.349 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.100 in/s/div Mic: 0.00100 psi(L)/div
Trigger = ▶------◀

Printed: March 5, 2004 (V 4.33 - 4.33)

Event Report

Date/Time	Long at 11:37:13 February 25, 2004
Trigger Source	Geo: 0.0500 in/s
Range	Geo :10.00 in/s
Record Time	4.0 sec at 1024 sps

Serial Number	BA5546 V 4.37-4.32 BlastMate III
Battery Level	6.4 Volts
Calibration	September 19, 2003 by Instantel Inc.
File Name	G5469ZSQ.Y10

Notes
Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

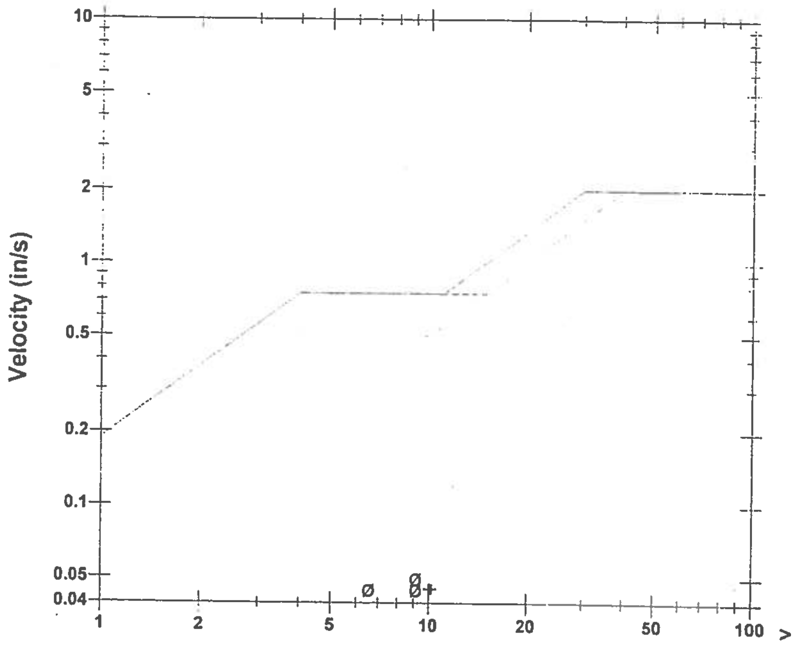
Post Event Notes
Blast 2 Location A-5

Microphone	Linear Weighting
PSPL	110.6 dB(L) at 0.430 sec
ZC Freq	5.0 Hz
Channel Test	Passed (Freq = 19.7 Hz Amp = 818 mv)

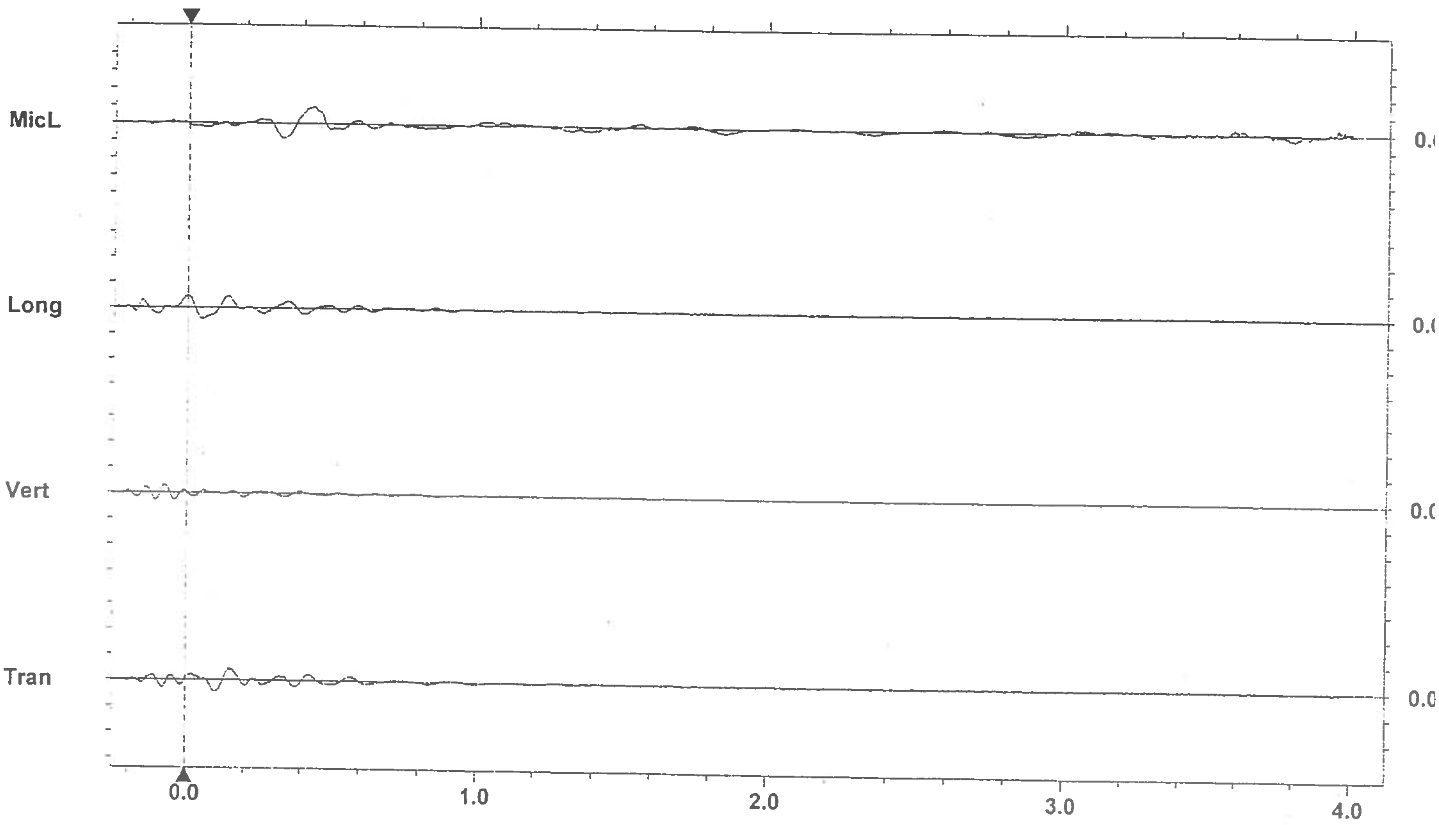
	Tran	Vert	Long	
PPV	0.0450	0.0300	0.0500	in/s
ZC Freq	10	19	9.1	Hz
Time (Rel. to Trig)	·0.098	-0.106	0.000	sec
Peak Acceleration	0.0265	0.0265	0.0265	g
Peak Displacement	0.00074	0.00032	0.00112	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.0572 in/s at 0.149 sec

USBM RI8507 And OSMRE



Frequency (Hz)
Tran: + Vert: x Long: ø



Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.100 in/s/div Mic: 0.00100 psi(L)/div
Trigger = ▶---------◀

Printed: March 5, 2004 (V 4.33 - 4.33)

Event Report

Date/Time	Long at 12:31:53 February 25, 2004
Trigger Source	Geo: 0.0500 in/s
Range	Geo :10.00 in/s
Record Time	4.0 sec at 1024 sps

Serial Number	BA5546 V 4.37-4.32 BlastMate III
Battery Level	6.4 Volts
Calibration	September 19, 2003 by Instantel Inc.
File Name	G5469ZST.H50

Notes
Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

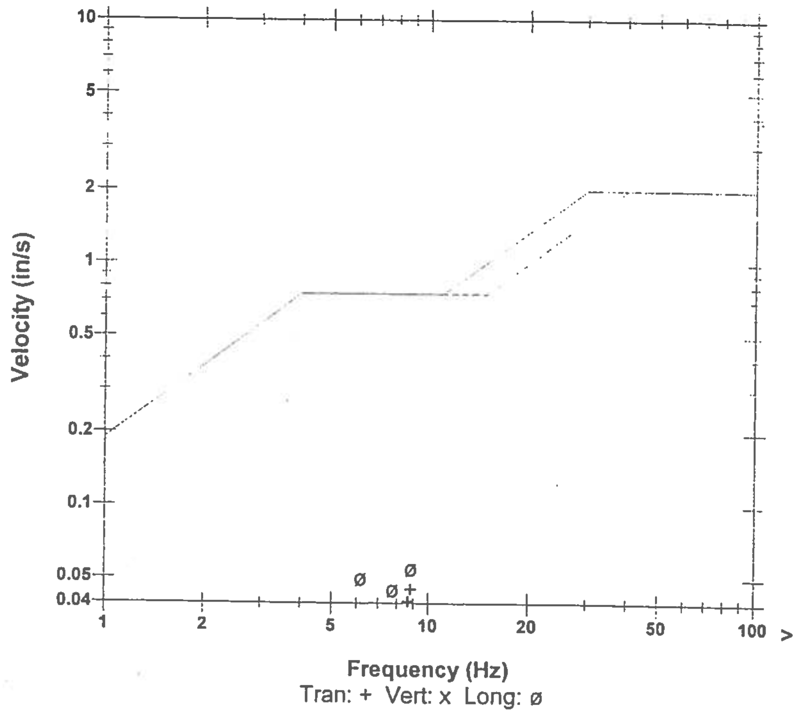
Post Event Notes
Blast 3 Location A-5

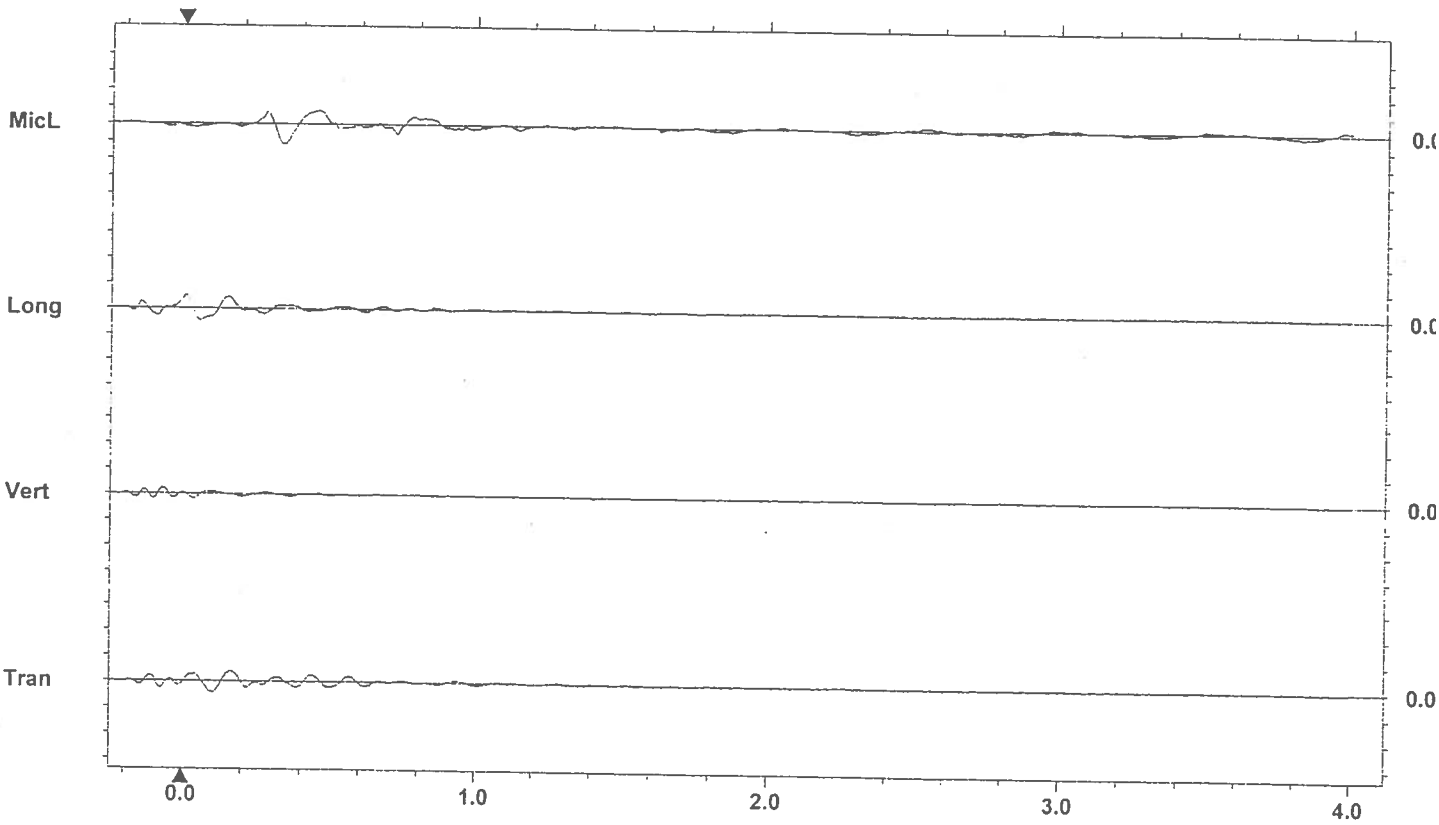
Microphone	Linear Weighting
PSPL	112.0 dB(L) at 0.328 sec
ZC Freq	6.3 Hz
Channel Test	Passed (Freq = 19.7 Hz Amp = 845 mv)

	Tran	Vert	Long	
PPV	0.0450	0.0250	0.0550	in/s
ZC Freq	8.8	17	8.8	Hz
Time (Rel. to Trig)	0.101	-0.070	0.006	sec
Peak Acceleration	0.0265	0.0265	0.0265	g
Peak Displacement	0.00083	0.00025	0.00125	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.0552 in/s at 0.006 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.100 in/s/div Mic: 0.00100 psi(L)/div
Trigger =

Printed: March 5, 2004 (V 4.33 - 4.33)

Event Report

Date/Time	Long at 12:31:57 February 25, 2004
Trigger Source	Geo: 0.0300 in/s
Range	Geo :10.00 in/s
Record Time	4.0 sec at 1024 sps

Serial Number	BE8979 V 4.37-4.35 MiniMate Plus
Battery Level	6.1 Volts
Calibration	September 4, 2003 by Instantel Inc.
File Name	J9799ZST.H90

Notes
Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

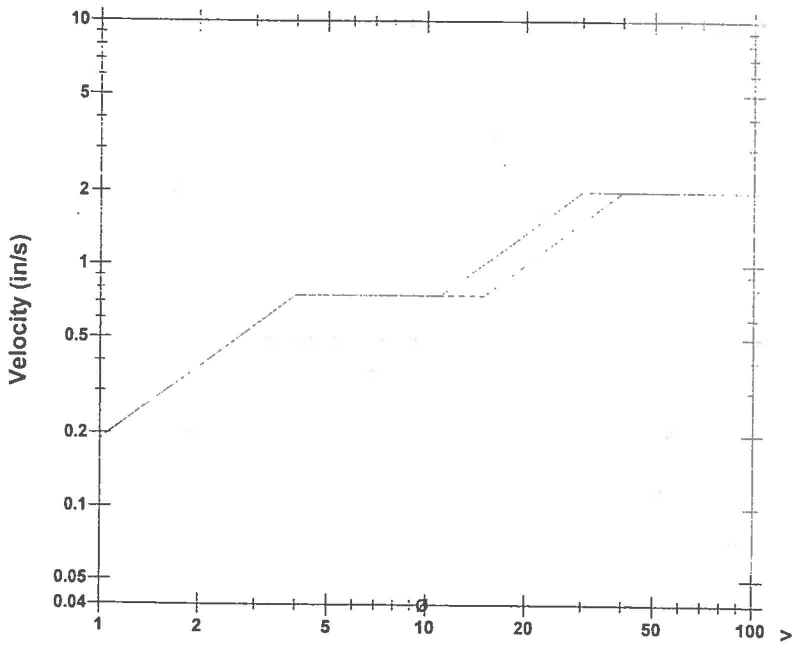
Post Event Notes
Blast 3 Location A-5

Microphone	Linear Weighting
PSPL	104.2 dB(L) at 0.383 sec
ZC Freq	6.0 Hz
Channel Test	Passed (Freq = 20.5 Hz Amp = 617 mv)

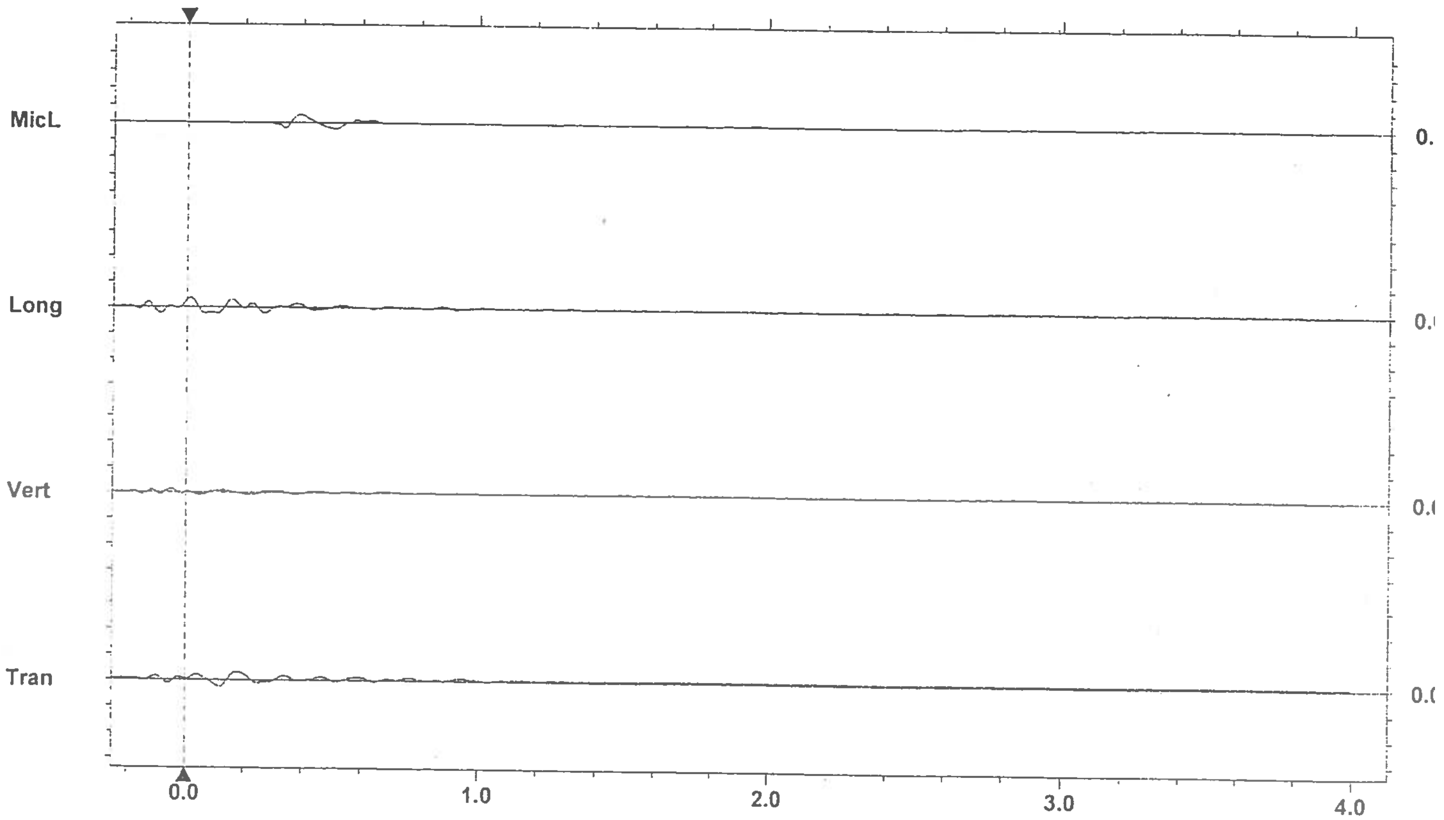
	Tran	Vert	Long	
PPV	0.0300	0.0150	0.0400	in/s
ZC Freq	7.1	20	9.8	Hz
Time (Rel. to Trig)	0.170	-0.053	0.014	sec
Peak Acceleration	0.0133	0.0133	0.0133	g
Peak Displacement	0.00080	0.00014	0.00078	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.0406 in/s at 0.014 sec

USBM RI8507 And OSMRE



Frequency (Hz)
Tran: + Vert: x Long: ø



Time Scale: 0.20 sec/div Amplitude Scale: Geo: 0.100 in/s/div Mic: 0.00100 psi(L)/div
Trigger = ▶-------◀

Printed: March 5, 2004 (V 4.33 - 4.33)

Event Report

Date/Time	Tran at 12:35:36 February 25, 2004
Trigger Source	Geo: 0.0300 in/s
Range	Geo :10.00 in/s
Record Time	4.0 sec at 1024 sps

Serial Number	BA5546 V 4.37-4.32 BlastMate III
Battery Level	6.3 Volts
Calibration	September 19, 2003 by Instantel Inc.
File Name	G5469ZST.NC0

Notes
Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

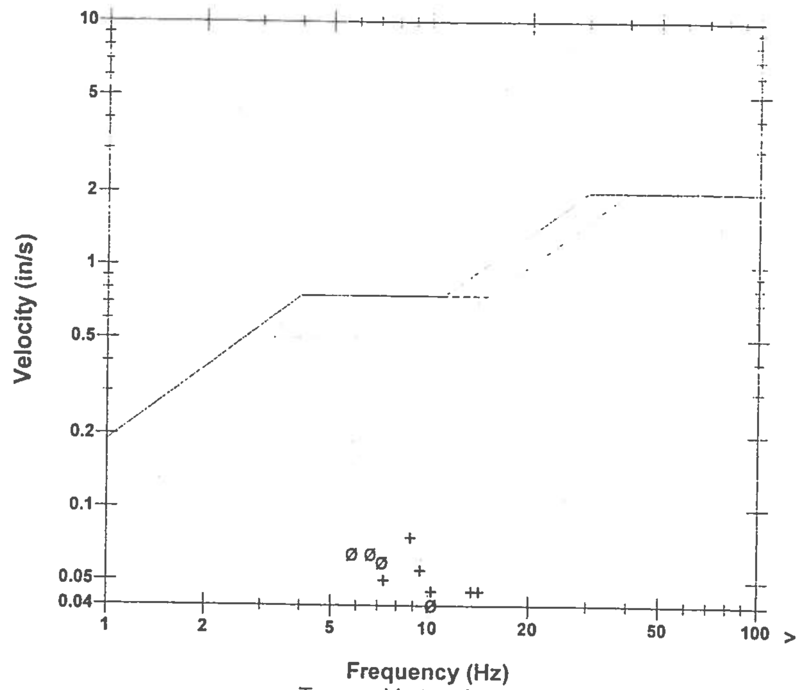
Post Event Notes
Blast 4 Location A-5

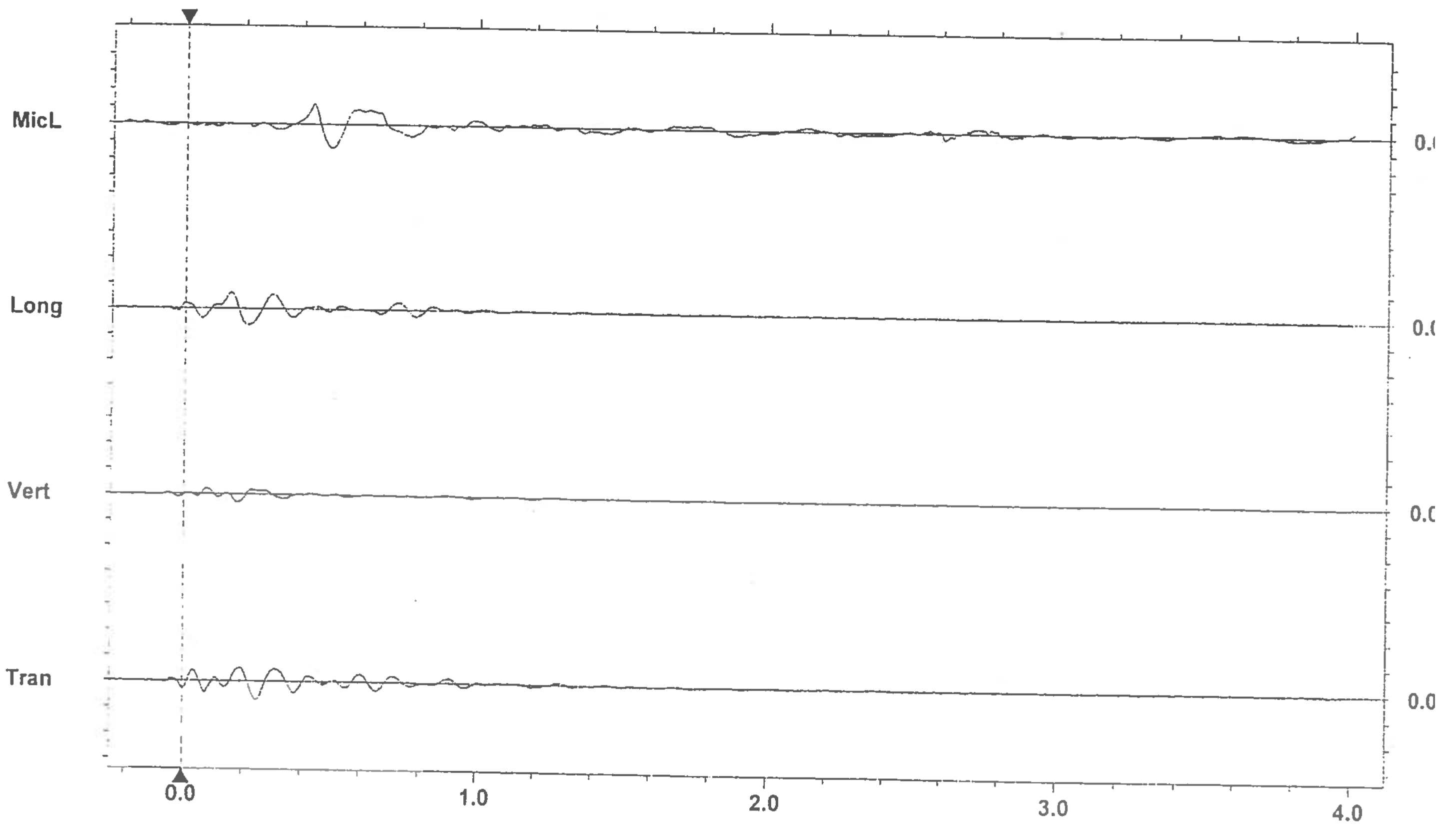
Microphone	Linear Weighting
PSPL	113.5 dB(L) at 0.492 sec
ZC Freq	5.8 Hz
Channel Test	Passed (Freq = 19.7 Hz Amp = 939 mv)

	Tran	Vert	Long	
PPV	0.0750	0.0300	0.0650	in/s
ZC Freq	8.8	11	5.8	Hz
Time (Rel. to Trig)	0.249	0.177	0.150	sec
Peak Acceleration	0.0265	0.0265	0.0265	g
Peak Displacement	0.00135	0.00052	0.00162	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.0805 in/s at 0.249 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.100 in/s/div Mic: 0.00100 psi(L)/div
Trigger =

Printed: March 5, 2004 (V 4.33 - 4.33)

Event Report

Date/Time	Tran at 12:35:40 February 25, 2004
Trigger Source	Geo: 0.0300 in/s
Range	Geo :10.00 in/s
Record Time	4.0 sec at 1024 sps

Serial Number	BE8979 V 4.37-4.35 MiniMate Plus
Battery Level	6.2 Volts
Calibration	September 4, 2003 by Instantel Inc.
File Name	J9799ZST.NG0

Notes
Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

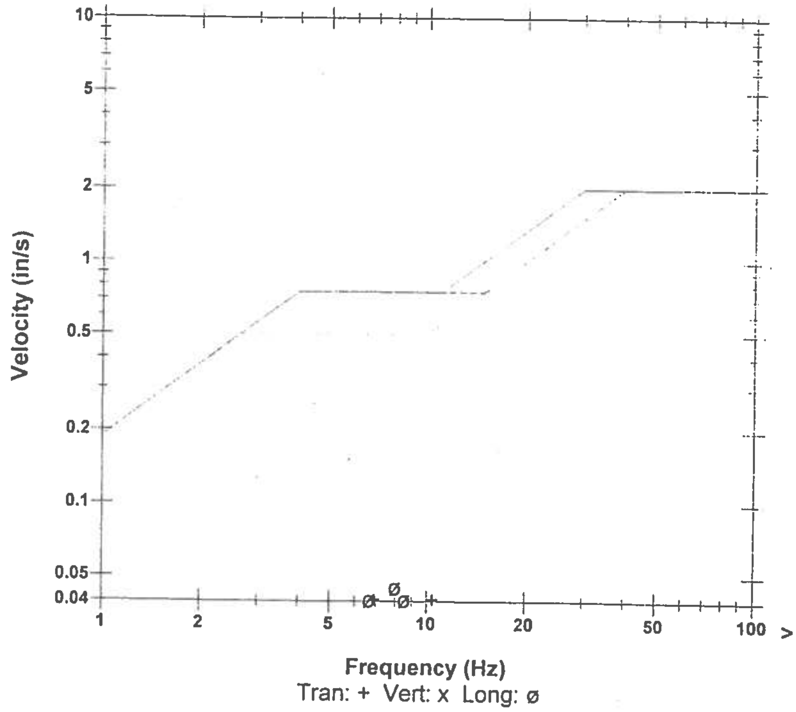
Post Event Notes
Blast 4 Location A-5

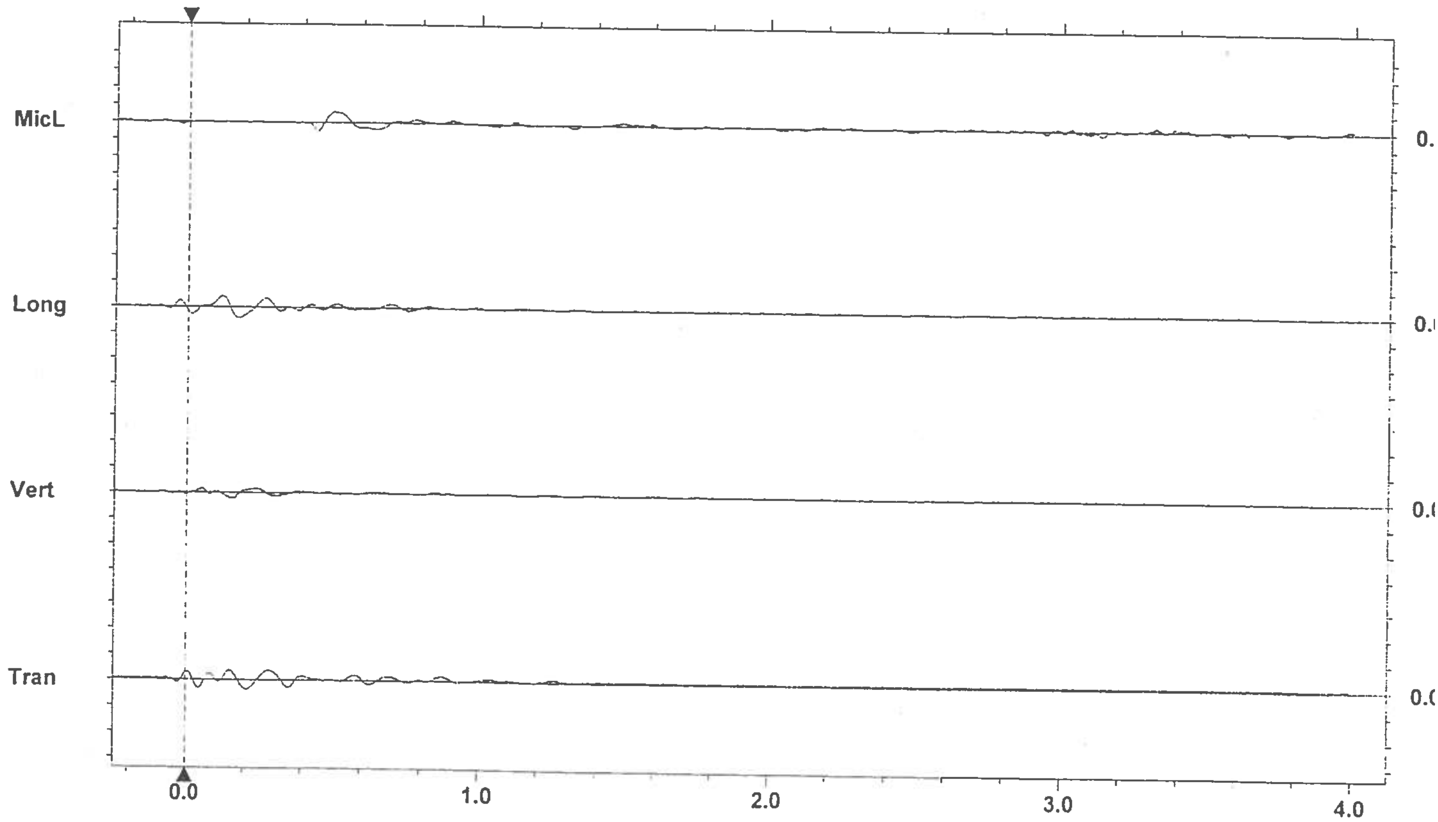
Microphone	Linear Weighting
PSPL	107.0 dB(L) at 0.499 sec
ZC Freq	5.4 Hz
Channel Test	Passed (Freq = 20.5 Hz Amp = 617 mv)

	Tran	Vert	Long	
PPV	0.0400	0.0200	0.0450	in/s
ZC Freq	10	11	8.0	Hz
Time (Rel. to Trig)	0.154	0.147	0.117	sec
Peak Acceleration	0.0133	0.0133	0.0133	g
Peak Displacement	0.00096	0.00043	0.00104	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.0534 in/s at 0.163 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.100 in/s/div Mic: 0.00100 psi(L)/div
Trigger =

Printed: March 5, 2004 (V 4.33 - 4.33)

Event Report

Date/Time	Tran at 12:45:09 February 25, 2004
Trigger Source	Geo: 0.0300 in/s
Range	Geo :10.00 in/s
Record Time	4.0 sec at 1024 sps

Serial Number	BA5546 V 4.37-4.32 BlastMate III
Battery Level	6.3 Volts
Calibration	September 19, 2003 by Instantel Inc.
File Name	G5469ZSU.390

Notes
Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

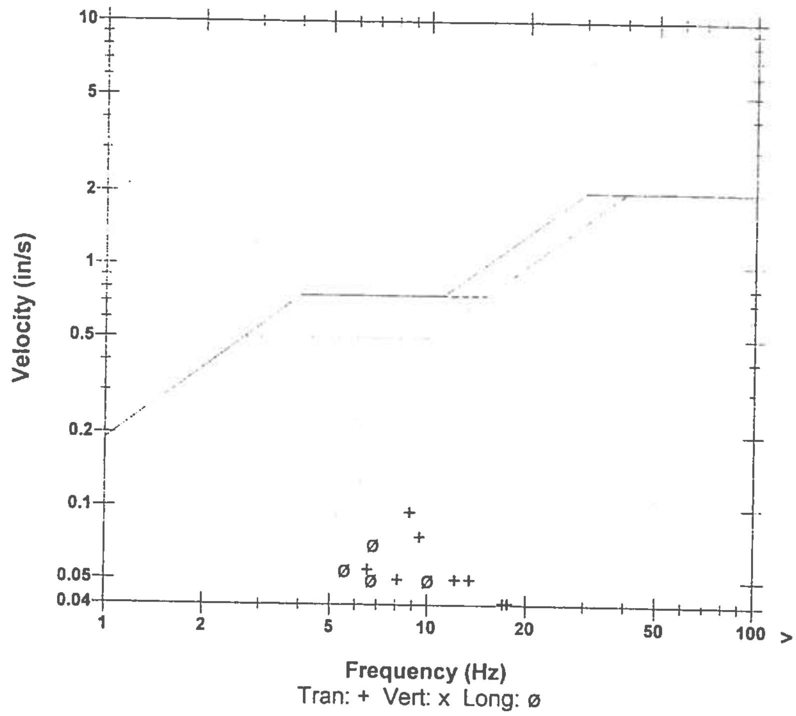
Post Event Notes
Blast 5 Location A-5

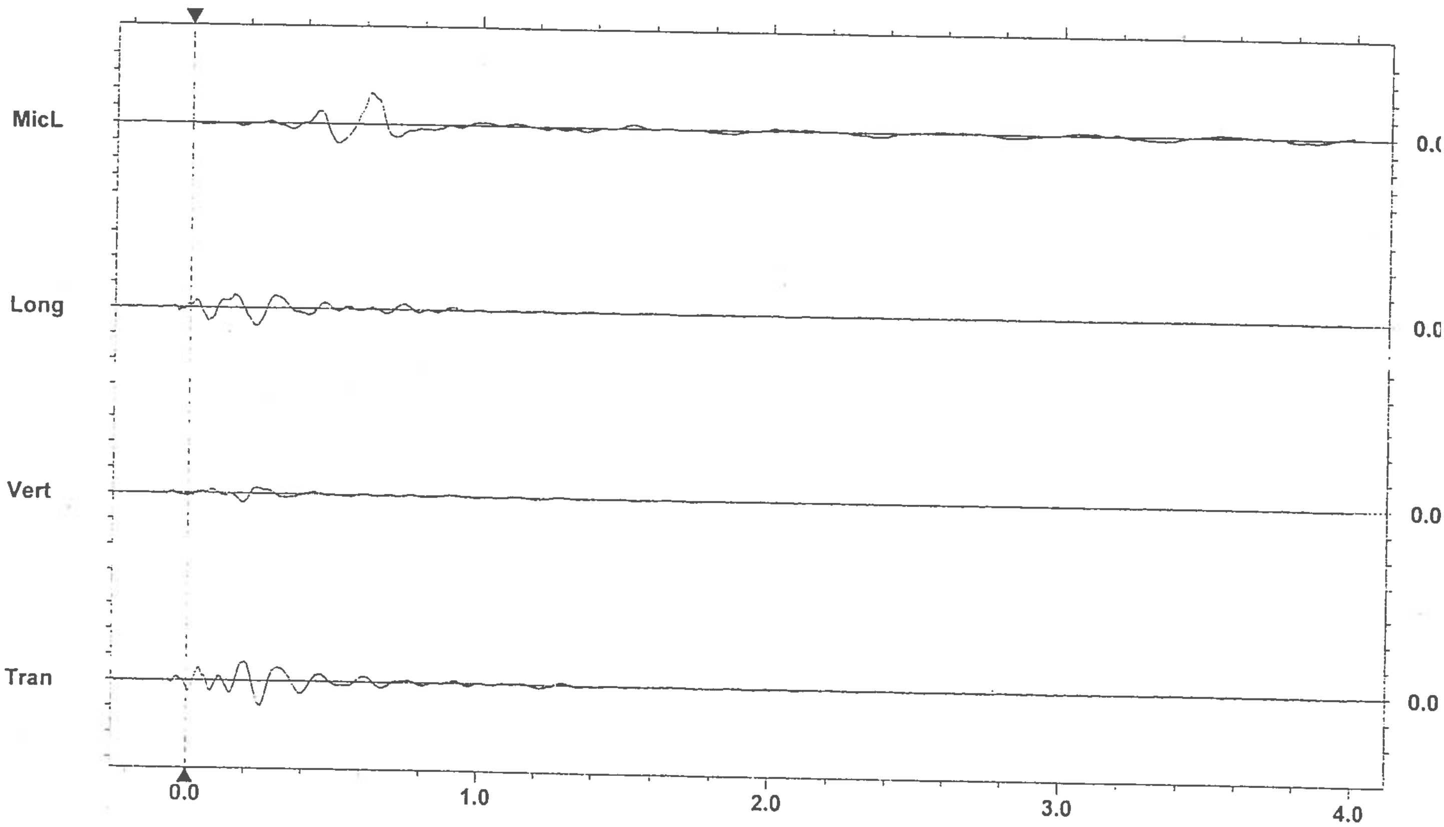
Microphone	Linear Weighting
PSPL	115.9 dB(L) at 0.615 sec
ZC Freq	5.0 Hz
Channel Test	Passed (Freq = 19.7 Hz Amp = 939 mv)

	Tran	Vert	Long	
PPV	0.0950	0.0350	0.0700	in/s
ZC Freq	8.8	9.8	6.8	Hz
Time (Rel. to Trig)	0.251	0.184	0.225	sec
Peak Acceleration	0.0265	0.0265	0.0265	g
Peak Displacement	0.00171	0.00060	0.00161	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.105 in/s at 0.251 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.100 in/s/div Mic: 0.00100 psi(L)/div
Trigger = ▶- - - - - - -◀

Printed: March 5, 2004 (V 4.33 - 4.33)

Event Report

Date/Time	Tran at 12:45:14 February 25, 2004
Trigger Source	Geo: 0.0300 in/s
Range	Geo :10.00 in/s
Record Time	4.0 sec at 1024 sps

Serial Number	BE8979 V 4.37-4.35 MiniMate Plus
Battery Level	6.2 Volts
Calibration	September 4, 2003 by Instantel Inc.
File Name	J9799ZSU.3E0

Notes
Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

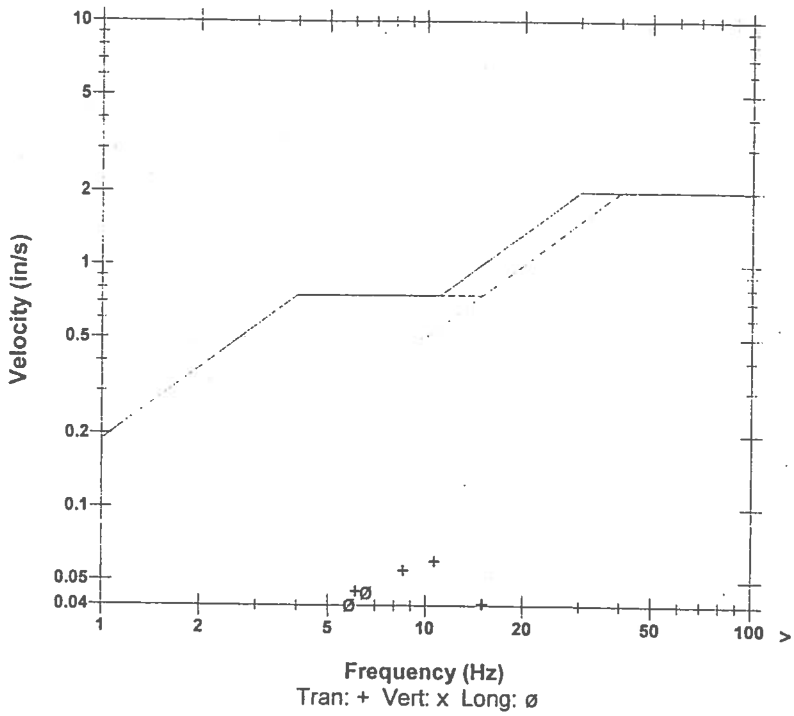
Post Event Notes
Blast 5 Location A-5

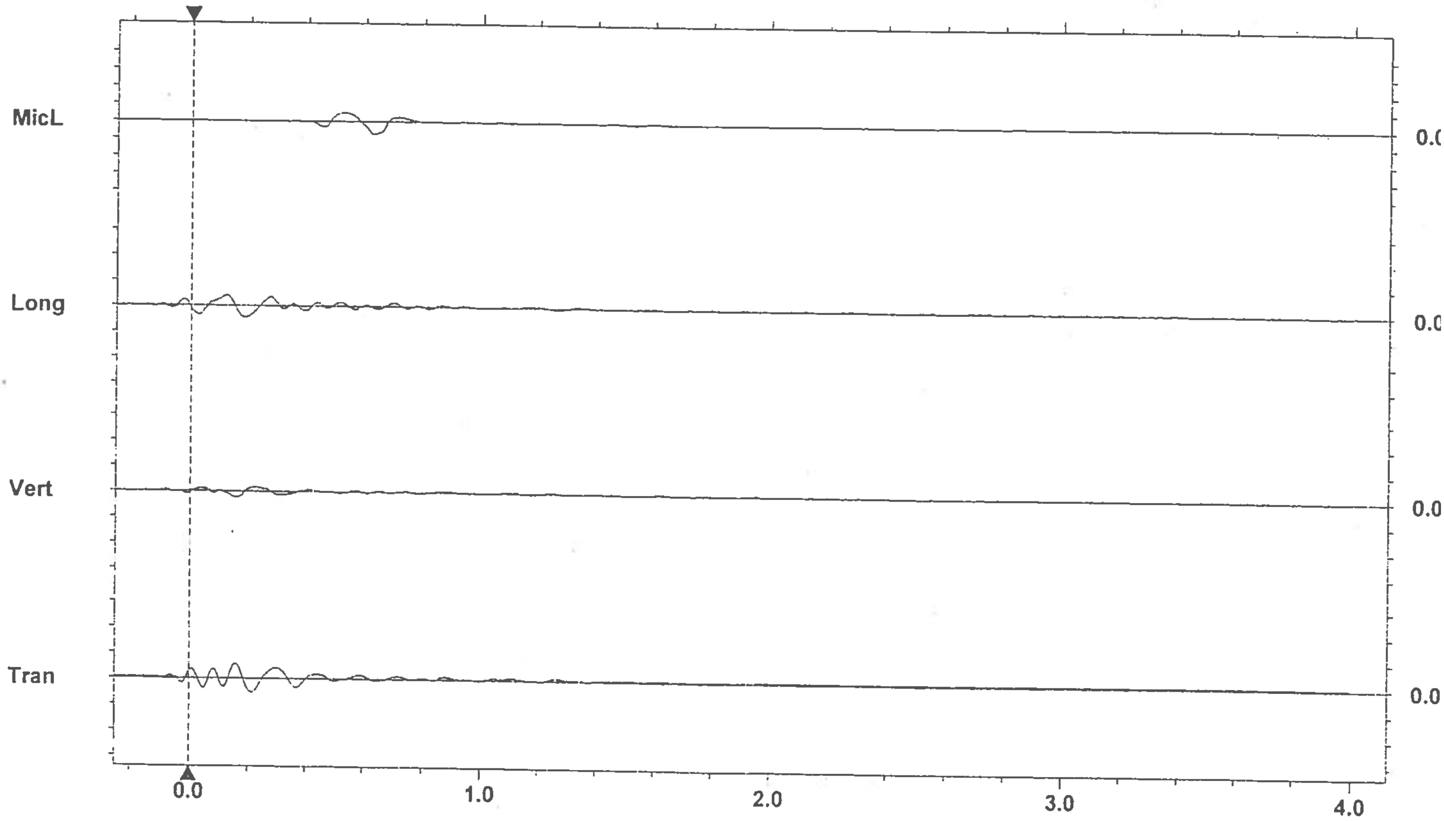
Microphone	Linear Weighting
PSPL	108.0 dB(L) at 0.622 sec
ZC Freq	5.6 Hz
Channel Test	Passed (Freq = 20.5 Hz Amp = 617 mv)

	Tran	Vert	Long	
PPV	0.0600	0.0250	0.0450	in/s
ZC Freq	11	10	6.6	Hz
Time (Rel. to Trig)	0.157	0.161	0.178	sec
Peak Acceleration	0.0133	0.0265	0.0265	g
Peak Displacement	0.00119	0.00046	0.00114	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.0663 in/s at 0.159 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.100 in/s/div Mic: 0.00100 psi(L)/div
Trigger = ▶---------◀

Printed: March 5, 2004 (V 4.33 - 4.33)

Event Report

Date/Time	Tran at 13:08:42 February 25, 2004
Trigger Source	Geo: 0.0300 in/s
Range	Geo :10.00 in/s
Record Time	4.0 sec at 1024 sps

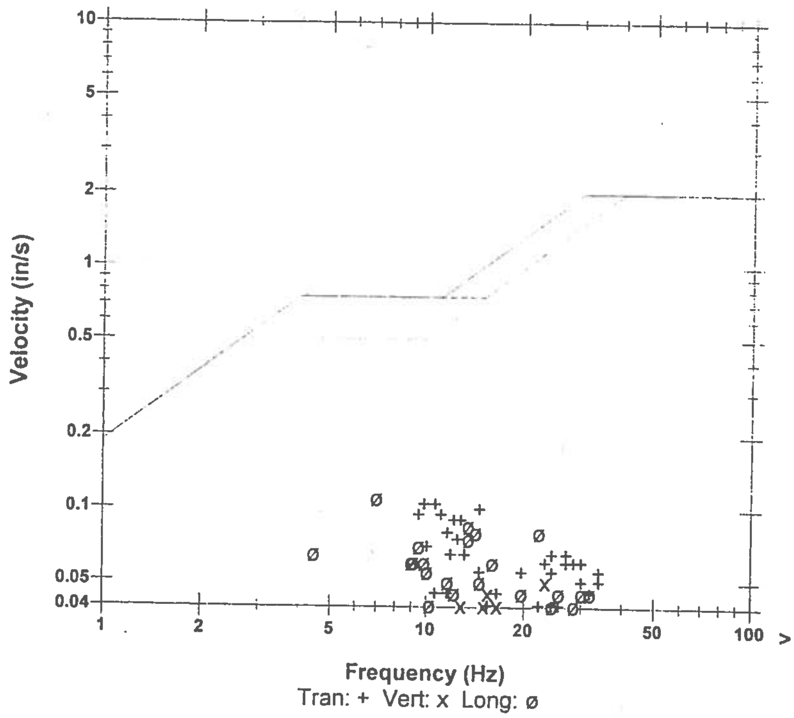
Serial Number	BA5546 V 4.37-4.32 BlastMate III
Battery Level	6.3 Volts
Calibration	September 19, 2003 by Instantel Inc.
File Name	G5469ZSV.6I0

Notes
Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

Post Event Notes
Blast 6 Location A-5

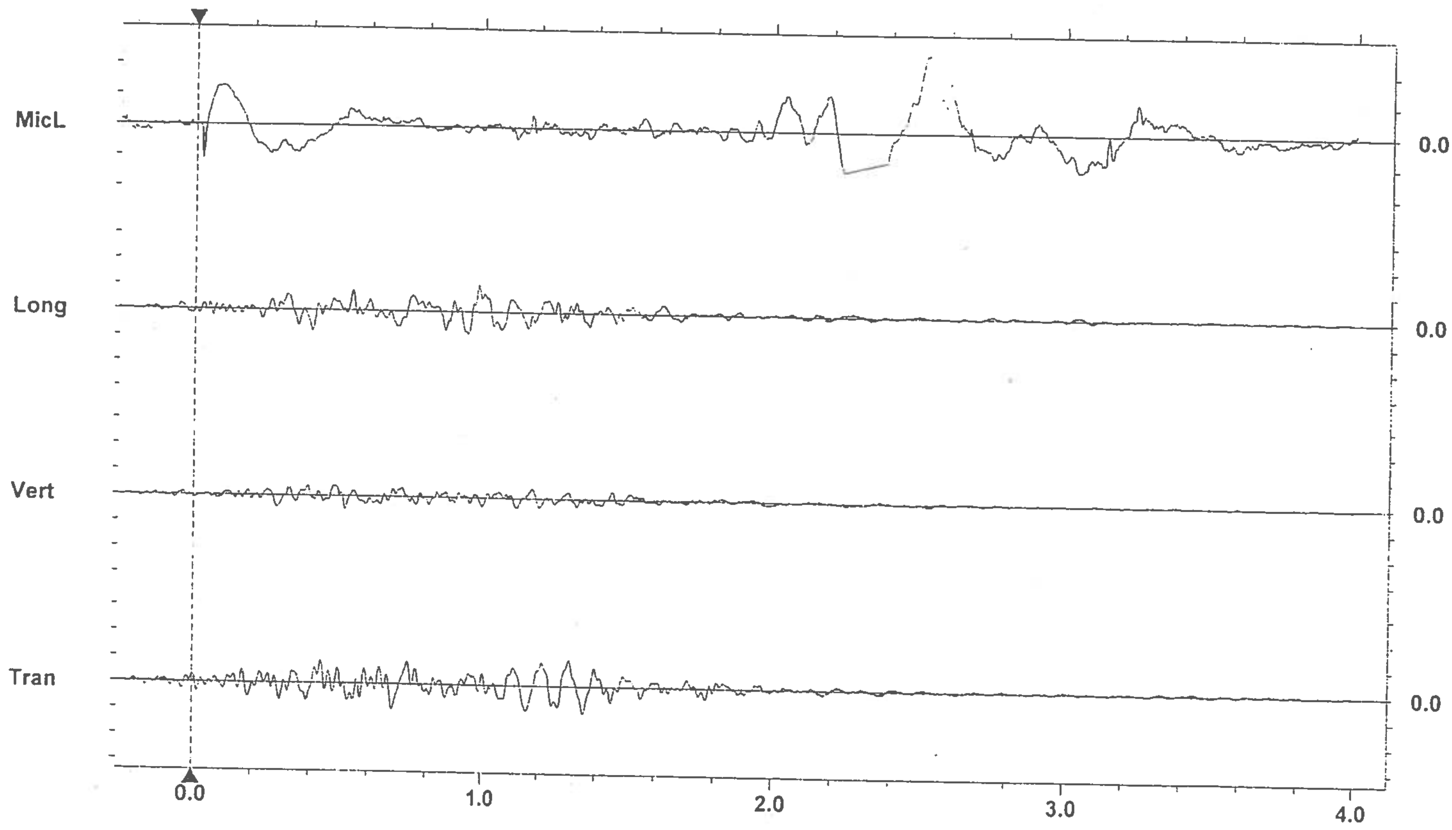
USBM RI8507 And OSMRE



Microphone	Linear Weighting
PSPL	124.9 dB(L) at 2.522 sec
ZC Freq	2.0 Hz
Channel Test	Passed (Freq = 19.7 Hz Amp = 939 mv)

	Tran	Vert	Long	
PPV	0.105	0.0500	0.110	in/s
ZC Freq	9.8	23	7.0	Hz
Time (Rel. to Trig)	1.311	0.518	0.982	sec
Peak Acceleration	0.0398	0.0265	0.0398	g
Peak Displacement	0.00151	0.00059	0.00200	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.114 in/s at 0.686 sec



Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.100 in/s/div Mic: 0.00200 psi(L)/div
Trigger = ▶---------◀

Printed: March 5, 2004 (V 4.33 - 4.33)

Event Report

Date/Time	Long at 12:31:58 February 25, 2004
Trigger Source	Geo: 0.0200 in/s
Range	Geo :10.00 in/s
Record Time	4.0 sec at 1024 sps

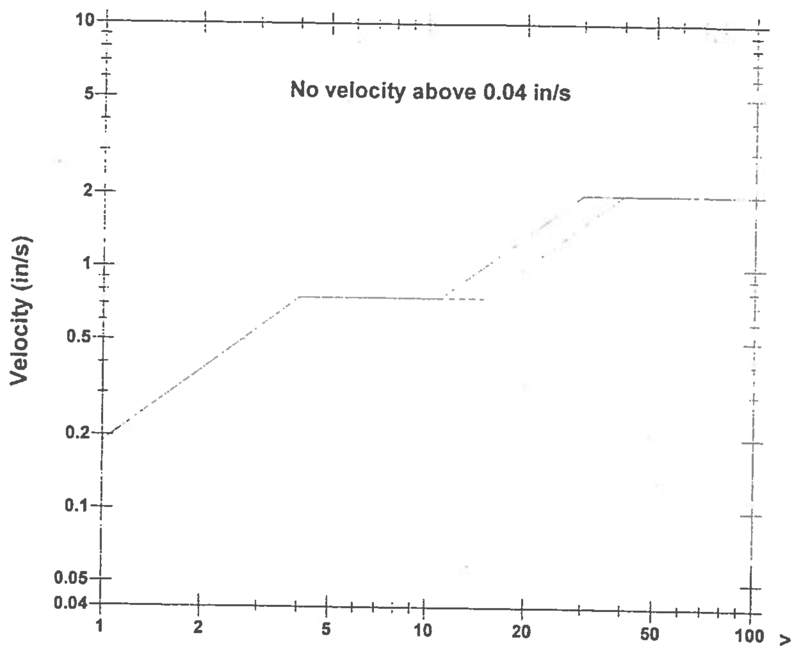
Serial Number	BA7803 V 4.37-4.35 BlastMate III
Battery Level	6.2 Volts
Calibration	May 21, 2003 by Instantel Inc.
File Name	I8039ZST.HA0

Notes
Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

Post Event Notes
Blast 3 Location A-6

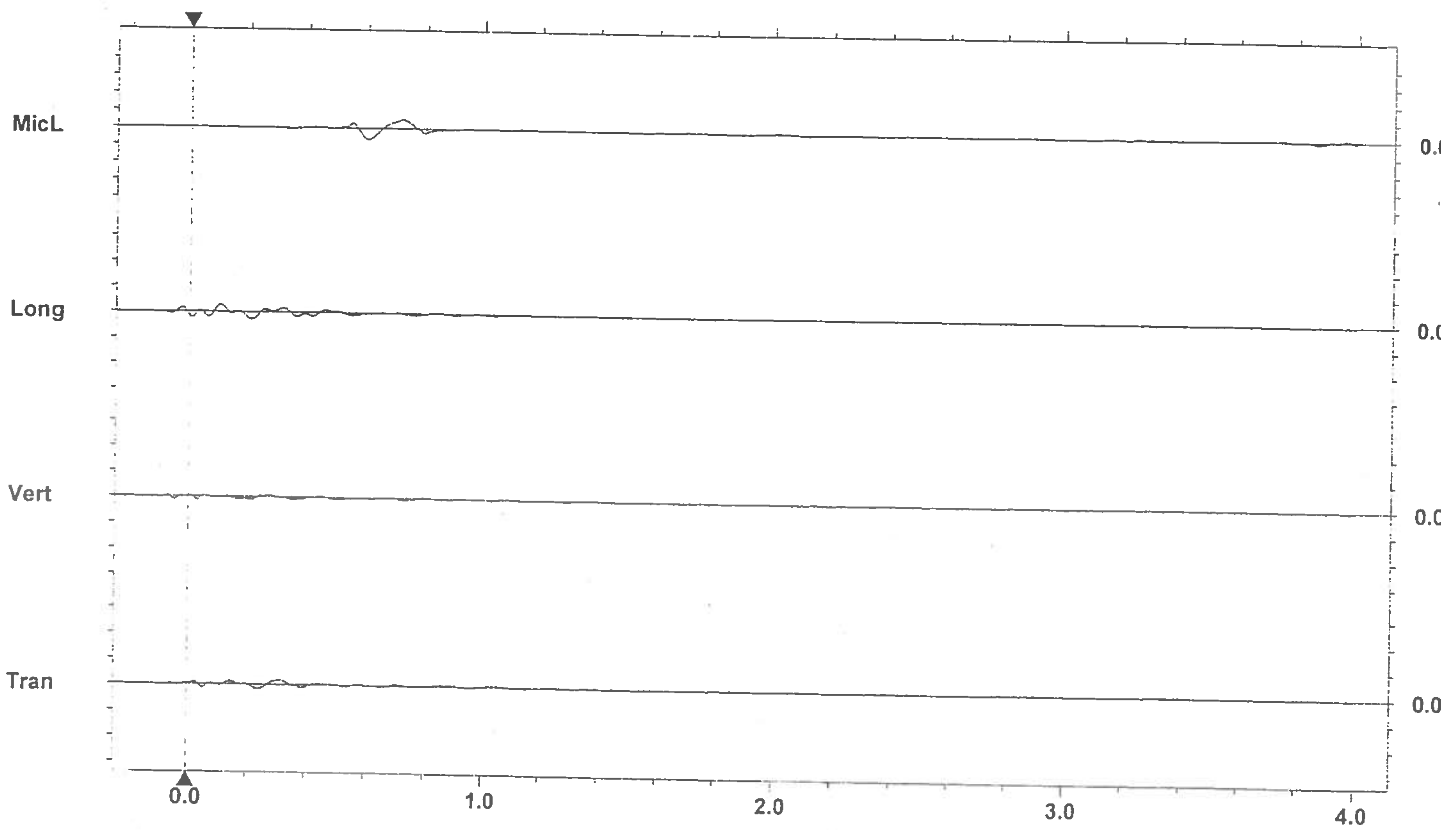
USBM RI8507 And OSMRE



Microphone	Linear Weighting
PSPL	107.0 dB(L) at 0.604 sec
ZC Freq	6.4 Hz
Channel Test	Passed (Freq = 20.9 Hz Amp = 579 mv)

	Tran	Vert	Long	
PPV	0.0200	0.0150	0.0300	in/s
ZC Freq	9.0	28	12	Hz
Time (Rel. to Trig)	0.310	0.033	0.102	sec
Peak Acceleration	0.0133	0.0133	0.0265	g
Peak Displacement	0.00039	0.00009	0.00048	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.0316 in/s at 0.208 sec



Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.100 in/s/div Mic: 0.00100 psi(L)/div
Trigger = ▶-----------◀

Printed: March 5, 2004 (V 4.33 - 4.33)

Event Report

Date/Time	Long at 12:35:41 February 25, 2004
Trigger Source	Geo: 0.0200 in/s
Range	Geo :10.00 in/s
Record Time	4.0 sec at 1024 sps

Serial Number	BA7803 V 4.37-4.35 BlastMate III
Battery Level	6.2 Volts
Calibration	May 21, 2003 by Instantel Inc.
File Name	I8039ZST.NH0

Notes
Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

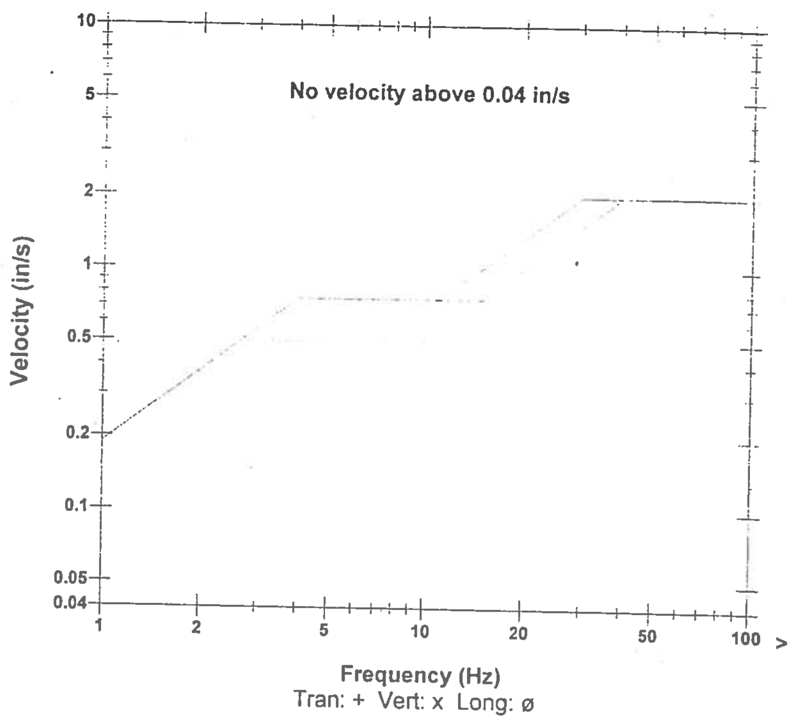
Post Event Notes
Blast 4 Location A-6

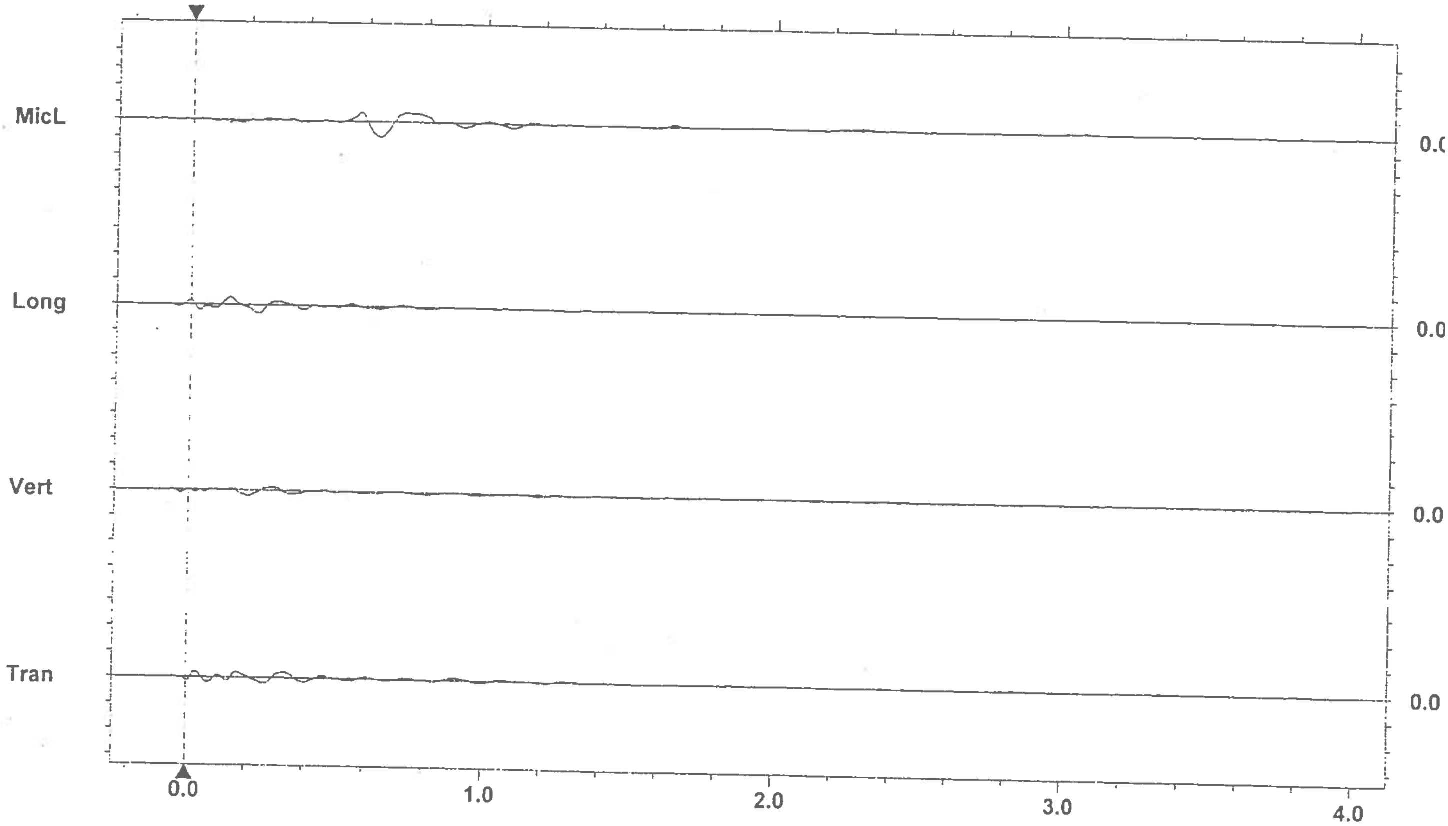
Microphone	Linear Weighting
PSPL	109.9 dB(L) at 0.640 sec
ZC Freq	5.9 Hz
Channel Test	Passed (Freq = 20.9 Hz Amp = 579 mv)

	Tran	Vert	Long	
PPV	0.0250	0.0200	0.0300	in/s
ZC Freq	16	8.3	9.5	Hz
Time (Rel. to Trig)	0.030	0.196	0.131	sec
Peak Acceleration	0.0133	0.0265	0.0265	g
Peak Displacement	0.00053	0.00045	0.00064	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.0339 in/s at 0.226 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.100 in/s/div Mic: 0.00100 psi(L)/div
Trigger = ▶---------◀

Event Report

Date/Time	Long at 12:45:14 February 25, 2004
Trigger Source	Geo: 0.0200 in/s
Range	Geo :10.00 in/s
Record Time	4.0 sec at 1024 sps

Serial Number	BA7803 V 4.37-4.35 BlastMate III
Battery Level	6.0 Volts
Calibration	May 21, 2003 by Instantel Inc.
File Name	I8039ZSU.3E0

Notes

Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

Post Event Notes

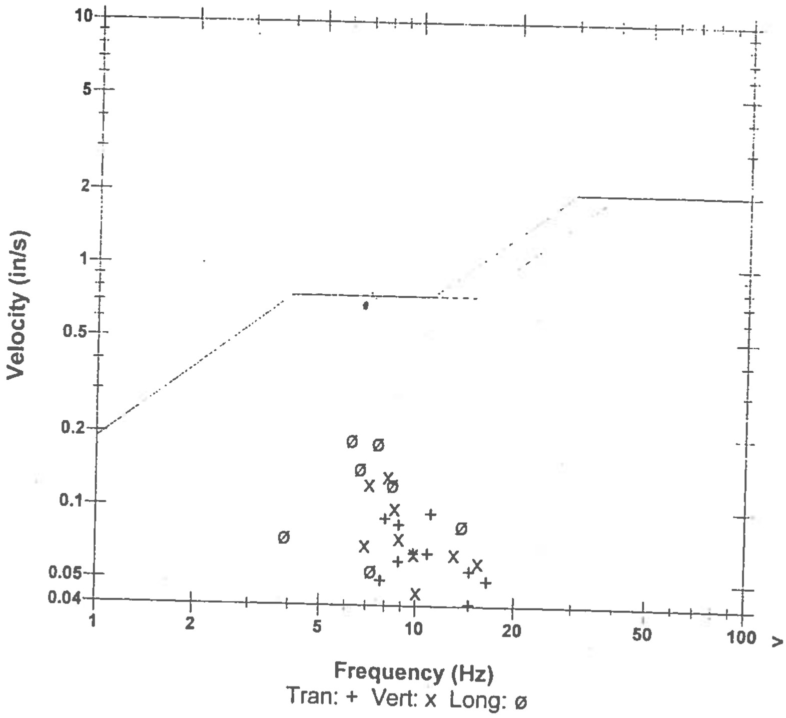
Blast 5 Location A-7

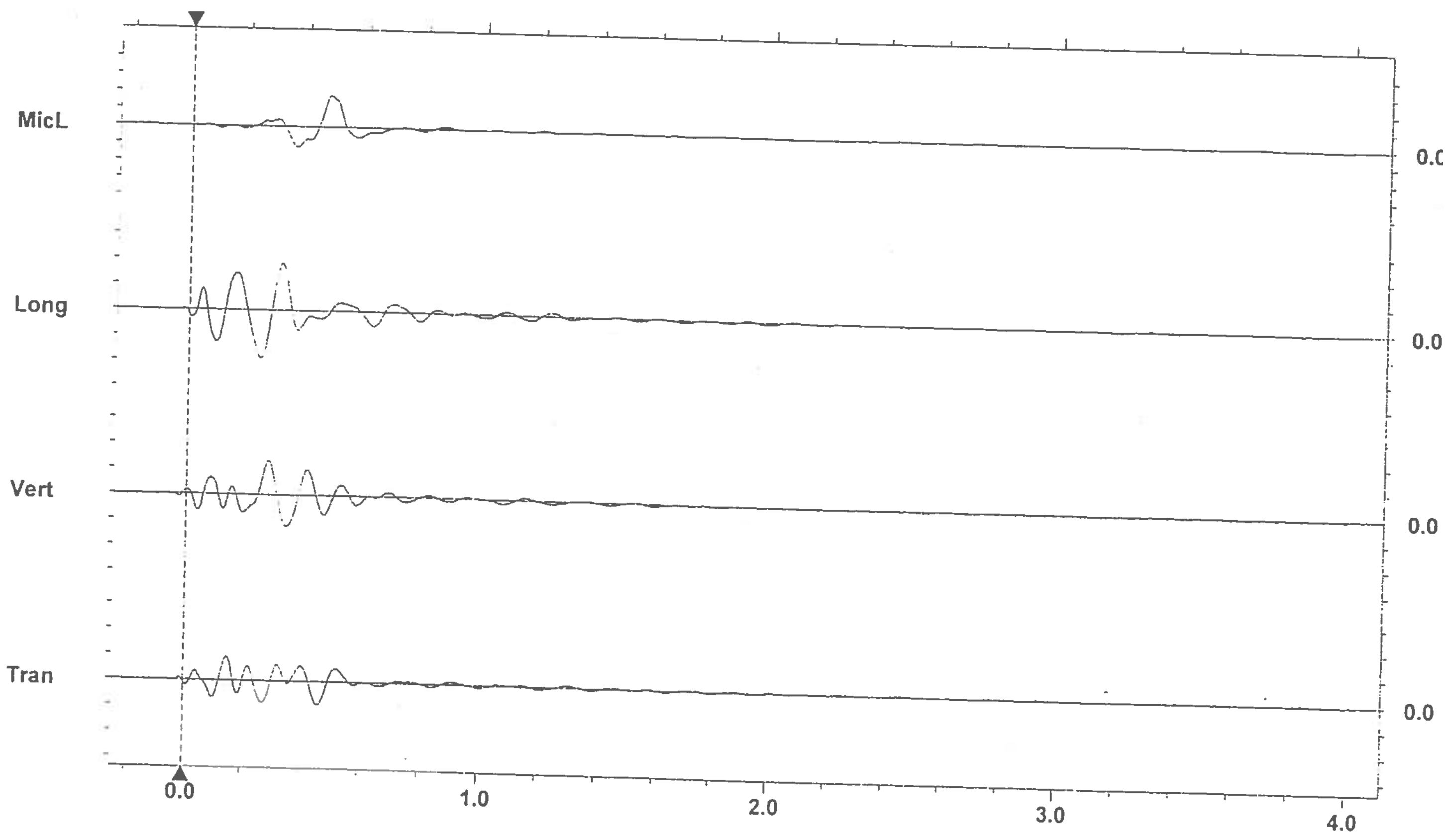
Microphone	Linear Weighting
PSPL	115.9 dB(L) at 0.470 sec
ZC Freq	5.4 Hz
Channel Test	Passed (Freq = 20.9 Hz Amp = 603 mv)

	Tran	Vert	Long	
PPV	0.0950	0.135	0.190	in/s
ZC Freq	11	8.1	6.2	Hz
Time (Rel. to Trig)	0.150	0.277	0.245	sec
Peak Acceleration	0.0265	0.0265	0.0398	g
Peak Displacement	0.00179	0.00287	0.00471	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.201 in/s at 0.322 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.100 in/s/div Mic: 0.00100 psi(L)/div
Trigger =

Printed: March 5, 2004 (V 4.33 - 4.33)

Event Report

Date/Time	Vert at 13:08:47 February 25, 2004
Trigger Source	Geo: 0.0200 in/s
Range	Geo :10.00 in/s
Record Time	4.0 sec at 1024 sps

Serial Number	BA7803 V 4.37-4.35 BlastMate III
Battery Level	6.1 Volts
Calibration	May 21, 2003 by Instantel Inc.
File Name	I8039ZSV.6N0

Notes
Client: Cripple Creek & Victor Gold Mining Co.
Project: East Cresson Attenuation Study
User: Matheson Mining Consultants, Inc.

Extended Notes

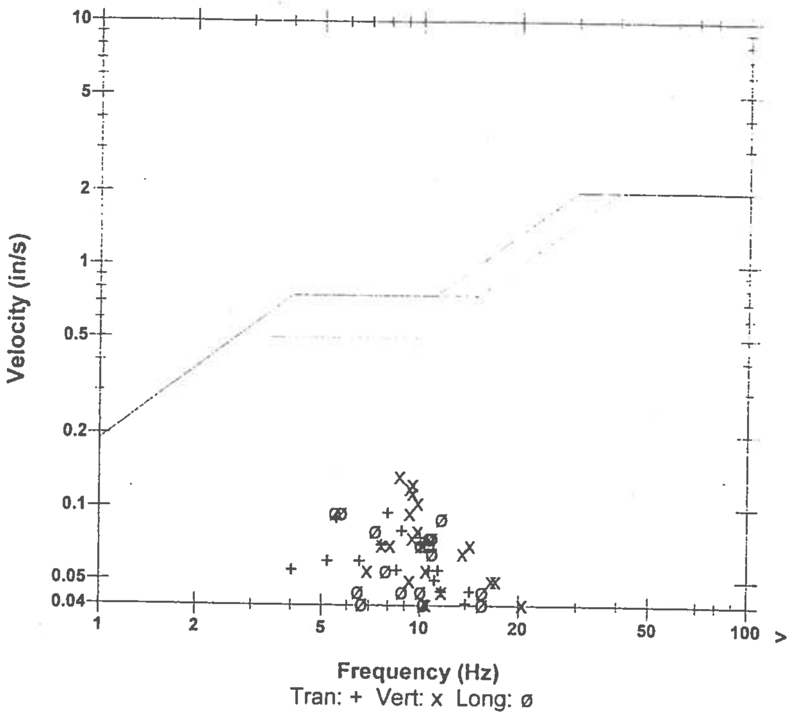
Post Event Notes
Blast 6 Location A-7

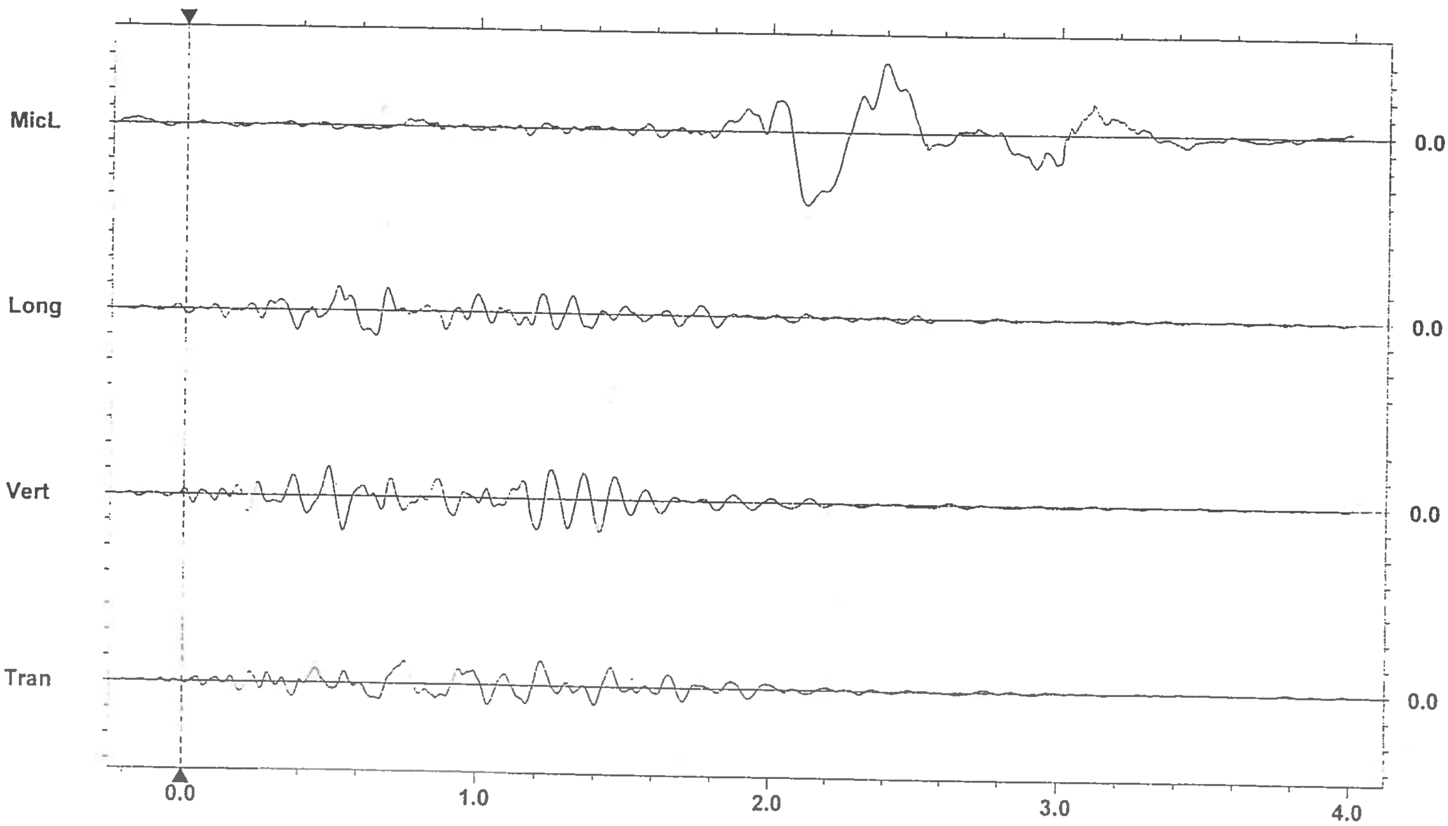
Microphone	Linear Weighting
PSPL	123.2 dB(L) at 2.125 sec
ZC Freq	2.5 Hz
Channel Test	Passed (Freq = 20.9 Hz Amp = 603 mv)

	Tran	Vert	Long	
PPV	0.0950	0.135	0.0950	in/s
ZC Freq	8.0	8.7	5.5	Hz
Time (Rel. to Trig)	1.215	0.546	0.523	sec
Peak Acceleration	0.0265	0.0265	0.0265	g
Peak Displacement	0.00239	0.00230	0.00297	in
Sensorcheck	Passed	Passed	Passed	

Peak Vector Sum 0.151 in/s at 1.212 sec

USBM RI8507 And OSMRE





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.100 in/s/div Mic: 0.00100 psi(L)/div
Trigger = ▶---------◀

Printed: March 5, 2004 (V 4.33 - 4.33)