

# SAN RAFAEL ROCK QUARRY VIBRATION REPORT

**BLAST INFORMATION**

Location: PB-7      Max. Charge Weight: 400      Date of Blast: 6/20/11  
 Northing: 37°59'10"N      Blast Duration: 349 m/s      Time of Blast: 11:51  
 Easting: 122°27'15"W      Blast Number: 1550

**SEISMOGRAPH INFORMATION**

	UNIT #1	UNIT #2	UNIT #3	UNIT #4	UNIT #5
Seismograph Model	2000	Micro	Micro	Micro	Micro
Serial Number	2481	4550	4507	4521	4521
Last Calibration Date	5/24/11	5/26/11	5/26/11	5/26/11	5/26/11

**LOCATION INFORMATION**

Location	Northing	Easting	Distance from Blast	Scaled Distance
Main e.g.				
Via West	37°59'18"N	122°27'53"W	3188	158
San Marino	37°59'31"N	122°27'30"W	2491	124
Miclar Park	37°59'30"N	122°27'16"W	2141	108

**VIBRATION INFORMATION**

Longitudinal Peak Particle Velocity (ips)	.07	.07	.07
Longitudinal Peak Frequency (Hz)	33.3	12.8	12.8
Transverse Peak Particle Velocity (ips)	.13	.08	.07
Transverse Peak Frequency (Hz)	19.2	12.1	12.1
Vertical Peak Particle Velocity (ips)	.10	.07	.08
Vertical Peak Frequency (Hz)	19.2	13.8	13.5
Peak Vector Sum (ips)	.14	.09	.09
Peak Air Overpressure (db)	106	106	106

**GENERAL COMMENTS**

Unit #4 did not trigger

Seismograph Operator: Brian Lopez      Signature: [Signature]

# SAN RAFAEL ROCK QUARRY BLAST REPORT

**BASE DATA:**

Location: PB-7      Designed Bench Height (ft): 40      Date: 6.20.81  
 Northing: 37° 59' 10.1 N      Rock Density (lb/ft<sup>3</sup>): 2.7      Time: 11:57  
 Easting: 122° 27' 15.1 W      Relative Rock Hardness: 7      Blast Number: 1550

**DESIGN DATA:**

Number of Holes Shot: 17      Hole Dia. (in.): 6 3/4"      Stemming (ft): 17      Loading Time Required (man hrs): 7      Deck Type: \_\_\_\_\_  
 Ave. Hole Depth (ft): 43      Burden (ft): 15      Stem Type: 3 1/2" Stone      Staggered Pattern (y or n): N      Length (ft): \_\_\_\_\_  
 Relative Confinement: \_\_\_\_\_      Spacing (ft): 16      Subdrill (ft): 3      Number of Lost Holes: 0      Tons Shot: 18,240

**EXPLOSIVES DATA:**

Bulk Explosive	Weight	Boosters	Units	Delays	Misc.	Units	Max (lb/ftole)	Blast Duration (sec)	Total Charge Wt.
Titan 1000 G	6,200	450 gran	38	80 zap		10	400		
				80 ezda		9		344 ms	
				50 zap		19			
				42ms eztl		7			6238

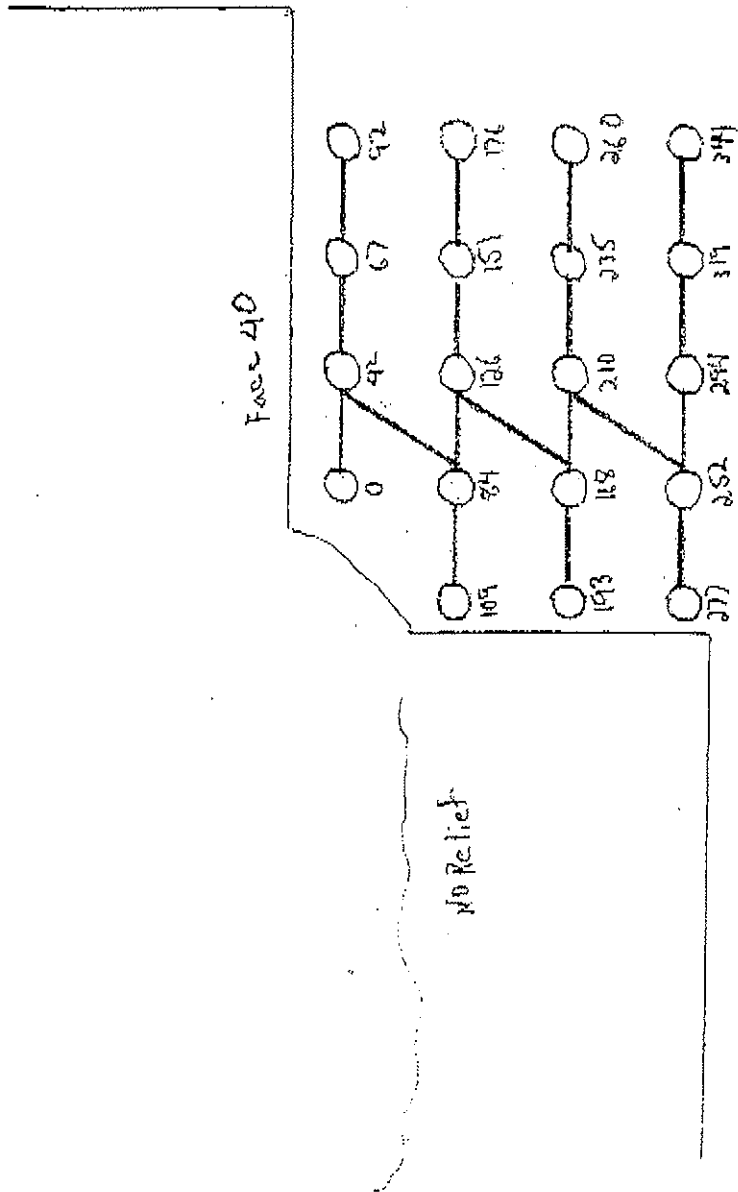
**VIBRATION DATA:**

Nearest Structure: mine      Seismograph Loc.: same      Temperature: 77°      Max. Chrg. (lb/8ms): 700  
 Northing: 37° 59' 13.1 N      Northing: \_\_\_\_\_      Sky Condition: CL      RPPV: 14  
 Easting: 122° 27' 22.1 W      Easting: \_\_\_\_\_      Wind Direction: 114      Frequency: 300  
 Distance Away: 1107      Distance Away: \_\_\_\_\_      Wind Speed: 0.1      Airblast: 10.6

**PERFORMANCE DATA:**

Powder Factor (lb/ton): 4      Displacement: \_\_\_\_\_      Crushability: \_\_\_\_\_  
 Lb/yard<sup>3</sup>: 112      Vibration: Good      Fines: \_\_\_\_\_  
 Fragmentation: Good      Dig ability: \_\_\_\_\_  
 Comments: \_\_\_\_\_      Blaster in Charge: [Signature]

6.20.11  
P.B.7  
#1550



19 Holes  
10: 80' zip jets  
9: 80' EC jets  
19: 50' zip jets  
7: 42ms EZL  
38: 150' <sup>3000</sup>  
6,200 titan

depth 40-43'  
400 lb max per  
18' stemming  
all Holes West!!

Mean 1109  
Variance 2168  
SD 46.8  
11'N 2164  
37° 59' 10N  
122° 20' 15W

15 x 16

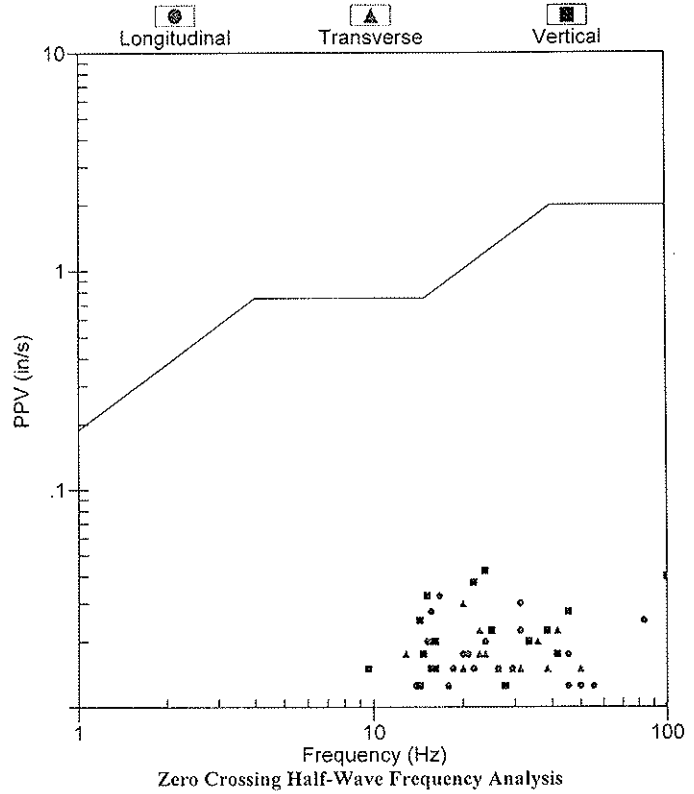
# Seismic Analysis

## Velocity Waveform Analysis

Serial No: 9856 v3.23  
 Date: 06/20/2011 11:58:43 (UTC-7)  
 Event No: 2  
 Record Time: 5.0 s  
 Client: COUNTY MARIN  
 Operation: SAN RAFAEL ROCK QUARRY  
 Location: ON QUARRY PROPERTY  
 Distance:  
 Operator: VIBRA-TECH GSM  
 Comment:  
 Seismic Trigger: 0.030 in/s

### USBM Safe Blasting Levels

SN: 9856 Event: 2



	Summary Data		
	L	T	V
PPV (in/s)	0.033	0.030	0.043
FREQ (Hz)	16.7	20.0	41.7
PD (.001")	0.24	0.24	0.32
PPA (g)	0.026	0.020	0.033
Peak Vector Sum :	0.050 in/s		
Peak Air Pressure:	108 db		
	0.00080 PSI @ 7.6 Hz		

**Additional Info:**

j-GEO-01253  
N37 59.481, W122 27.256

Shaketable Calibrated: 01/27/2011

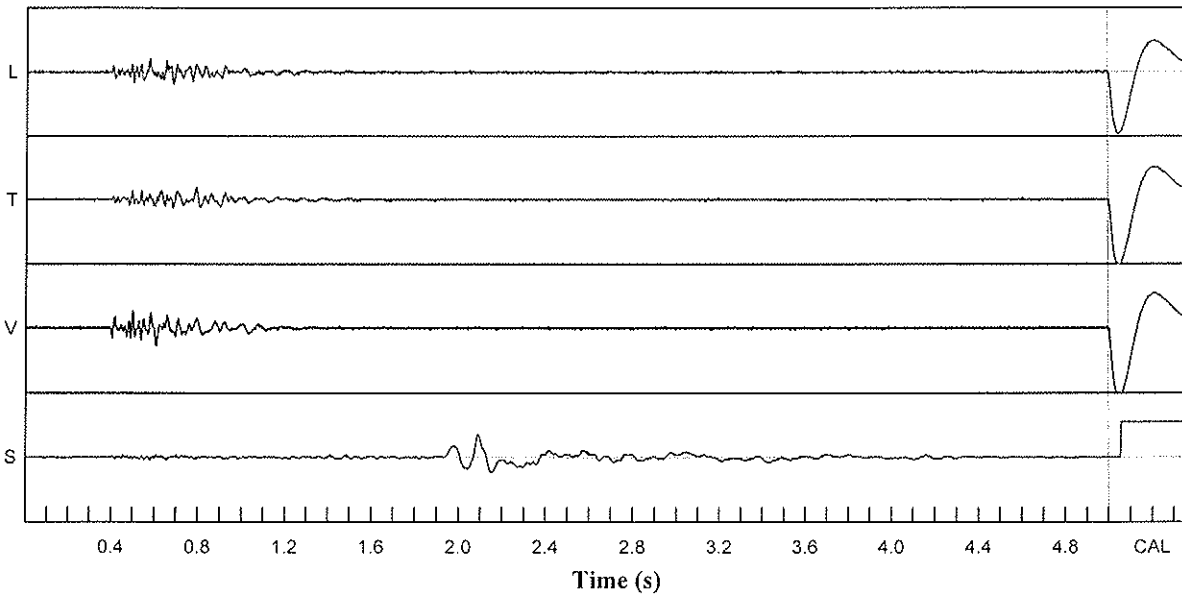
By: Vibra-Tech, Inc.  
2700 Holloway Road - Suite 113  
Louisville, KY 40299 U.S.A.  
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

Time Scale: 0.100 s  
 Seismic Scale: +/- 0.160 in/s  
 Sound Scale: +/- 0.0023 PSI

### Velocity Waveform

SN: 9856 Event: 2



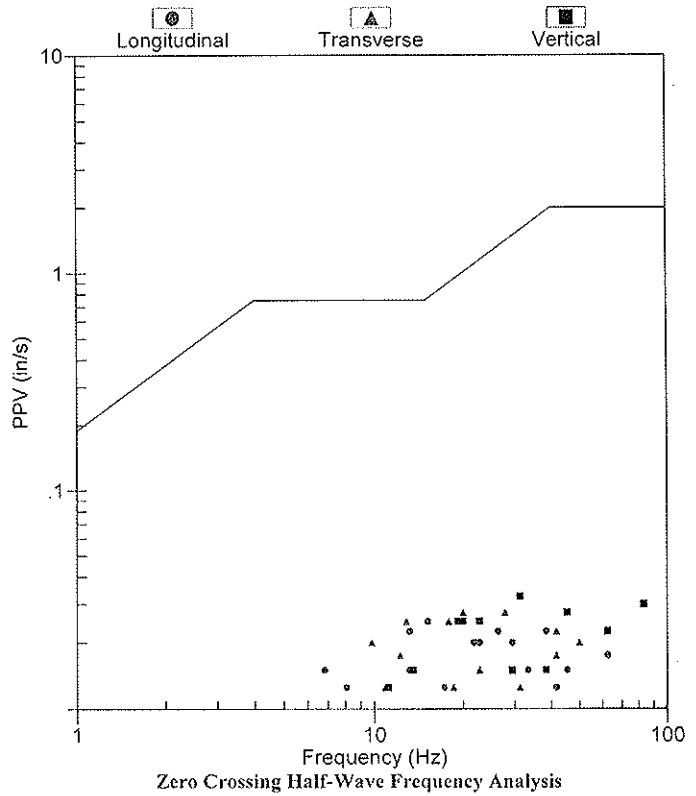
# Seismic Analysis

## Velocity Waveform Analysis

Serial No: 7155 v3.23  
 Date: 06/20/2011 11:58:44 (UTC-7)  
 Event No: 2  
 Record Time: 5.0 s  
 Client: COUNTY OF MARIN  
 Operation: SAN RAFAEL ROCK QUARRY  
 Location: 16 MARIN BAY PARK CT.  
 Distance:  
 Operator: VIBRA-TECH GSM  
 Comment: WILLIAM HOSKEN RESIDENC  
 Seismic Trigger: 0.030 in/s

### USBM Safe Blasting Levels

SN: 7155 Event: 2



	Summary Data		
	L	T	V
PPV (in/s)	0.025	0.028	0.035
FREQ (Hz)	15.2	20.0	38.5
PD (.001")	0.25	0.23	0.24
PPA (g)	0.020	0.020	0.033
Peak Vector Sum :	0.040 in/s		
Peak Air Pressure:	103 db		
	0.00048 PSI @ 7.7 Hz		

**Additional Info:**

j-GEO-01252  
N37 59.524, W122 27.373

Shaketable Calibrated: 01/26/2011

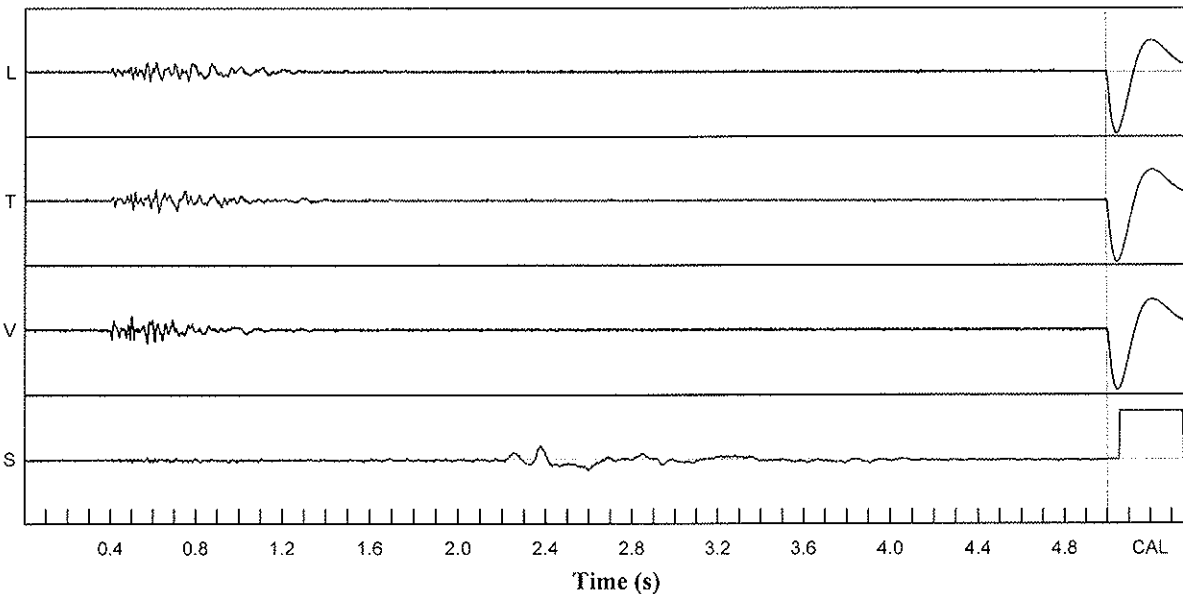
By: Vibra-Tech, Inc.  
2700 Holloway Road - Suite 113  
Louisville, KY 40299 U.S.A.  
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

Time Scale: 0.100 s  
 Seismic Scale: +/- 0.160 in/s  
 Sound Scale: +/- 0.0023 PSI

### Velocity Waveform

SN: 7155 Event: 2



# GeoSonics Inc. Seismic Analysis

## Stop Event Report

Serial No: 9669 v3.23  
Client: COUNTY MARIN  
Operation: SAN RAFAEL ROCK QUARRY  
Location: 114 SAN MARINO DRIVE  
Distance:  
Operator: VIBRA-TECH GSM  
Comment: VERONIQUE RASKIN

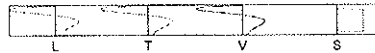
Begin Date: 06/20/2011 07:00:50 (UTC-7)  
End Date: 06/20/2011 12:22:40 (UTC-7)  
Events over Trigger: 0 (2-1)  
Record Time: 5.0 s  
Seismic Trigger: 0.030 in/s  
Sound Trigger: N/A  
Battery Level: 8.9

### Additional Info:

j-GEO-01254  
N37 59.395, W122 27.700

Shaketable Calibrated: 01/26/2011  
By: Vibra-Tech, Inc.  
2700 Holloway Road - Suite 113  
Louisville, KY 40299 U.S.A.  
TEL: 502.240.9900 FAX: 502.240.9902

Dynamic Calibration Graph:



### Cal Test Results:

Longitudinal: Pass  
Transverse: Pass  
Vertical: Pass  
Sound: Pass

The seismograph at 114 San Marino Drive (S/N 9669) did not trigger during the shot on June 20, 2011 at approximately 11:58 indicating the ground vibrations produced were below the ground trigger level of 0.030 in/sec.