# SAN RAFAEL ROCK QUARRY VIBRATION REPORT

**Location:** PB-2  
**Max. Charge Weight:** 400  
**Date of Blast:** 2-3-12  
**Northing:** 37°35'11"N  
**Time of Blast:** 11:30  
**Easting:** 122°27'22"W  
**Blast Duration:** 260 ms  
**Blast Number:** 1547

### Seismograph Information

<table>
<thead>
<tr>
<th>Seismograph Model</th>
<th>micro</th>
<th>micro</th>
<th>micro</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial Number</td>
<td>2418</td>
<td>4567</td>
<td>4570</td>
</tr>
<tr>
<td>Last Calibration Date</td>
<td>5-31-11</td>
<td>8-26-11</td>
<td>5-31-11</td>
</tr>
</tbody>
</table>

### Location Information

<table>
<thead>
<tr>
<th>Location</th>
<th>Martinis V2</th>
<th>Via Crucis V2</th>
<th>San Martinas V2</th>
<th>1st Near Park V2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northing</td>
<td>37°35'19&quot;N</td>
<td>37°35'18&quot;N</td>
<td>37°35'31&quot;W</td>
<td>37°35'30&quot;W</td>
</tr>
<tr>
<td>Easting</td>
<td>122°27'22&quot;W</td>
<td>122°27'53&quot;W</td>
<td>122°27'30&quot;W</td>
<td>122°27'11&quot;W</td>
</tr>
<tr>
<td>Distance from Blast</td>
<td>10.3</td>
<td>316.8</td>
<td>2326</td>
<td>1048</td>
</tr>
<tr>
<td>Scaled Distance</td>
<td>50</td>
<td>158</td>
<td>118</td>
<td>92</td>
</tr>
</tbody>
</table>

### Vibration Information

<table>
<thead>
<tr>
<th>Longitudinal Peak Particle Velocity (ips)</th>
<th>.12</th>
<th>.06</th>
<th>.09</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longitudinal Peak Frequency (Hz)</td>
<td>31.2</td>
<td>16.6</td>
<td>25.0</td>
</tr>
<tr>
<td>Transverse Peak Particle Velocity (ips)</td>
<td>.15</td>
<td>.07</td>
<td>.07</td>
</tr>
<tr>
<td>Transverse Peak Frequency (Hz)</td>
<td>21.7</td>
<td>53</td>
<td>21.7</td>
</tr>
<tr>
<td>Vertical Peak Particle Velocity (ips)</td>
<td>.15</td>
<td>.08</td>
<td>.10</td>
</tr>
<tr>
<td>Vertical Peak Frequency (Hz)</td>
<td>21.4</td>
<td>15.1</td>
<td>27.7</td>
</tr>
<tr>
<td>Peak Vector Sum (ips)</td>
<td>.18</td>
<td>.09</td>
<td>.12</td>
</tr>
<tr>
<td>Peak Air Overpressure (db)</td>
<td>117</td>
<td>106</td>
<td>112</td>
</tr>
</tbody>
</table>

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**Seismograph Operator:**

**Signature:**
SAN RAFAEL ROCK QUARRY BLAST REPORT

BASE DATA:
Location: PB-7
Northing: 37° 59' 11" N
Easting: 122° 27' 15" W
Designed Beach Height (ft): 27.1/6/40
Rock Density (t/yd^3): 2.23
Relative Rock Hardness: 7
Date: 2.3.72
Time: 11:31
Blast Number: 1562

DESIGN DATA:
Number of Holes Shot: 12
Hole Dia.(in.): 6.75
Stemming (ft): 16.18.20
Loading Time Required (man hrs): 5
Ave. Hole Depth (ft): 39.36.40
Burden (ft): 17
Stern Type: 3/8.7/8.10
Staggered Pattern (y or n): y
Length (ft):
Deck Type:
Relative Containment:
Spacing (ft):
Subdrill (ft): 2
Number of Lost Holes: 0
Tons Shot: 4.1.6

EXPLOSIVES DATA:
Bulk Explosive
Weight: 606.65
Boosters:
Units: 95.02
Delays: 80.62
Misc.: 16
Max (lb/hole): 140

VIBRATION DATA:
Nearest Structure: Martin 45
Seismograph Loc.: 5
Temperature: 59°
Max. Chrg. (lb/8ms): 410
Northing: 37° 59' 19" N
Distance Away: 10.0
Easting: 122° 27' 15" W
Sky Condition: Clear
RPPV: .18
Wind Direction: N/E
Frequency: 2.1.4

PERFORMANCE DATA:
Powder Factor (lb/ton): 6.0
Displacement: Great
Crushability:
Lib/yd^3: 1.4
Vibration: Great
Fines:
Fragmentation: 6/2.6
Dig ability:
Comments:
Blast in Charge: 

Total Charge Wt.: 6764

Ramp to P.B. 3

Face

P.O.I

32 ft

36 ft

40 ft

El. Change

(39) 60
(39) 25
(39) 0
(39) 42
(39) 67
(39) 92
(39) 97
(39) 103
(39) 109
(39) 126
(39) 151
(39) 176
(39) 218
(39) 193
(39) 168
(39) 310
(39) 335
(39) 260

13 x 14

lbs/ft → # 32.0

steering 16°

18° 20°

18 holes

Depth 34/36/43 ft

main 1003

via M 3168

SM 2376

MN 1848

37° 5' 11' N

122° 27' 15' W

60/60 lbs titan
The seismograph at 114 San Marino Drive (S/N 7334) did not trigger during the shot on February 3, 2012 at approximately 11:30 indicating the ground vibrations produced were below the ground trigger level of 0.030 in/sec.
GeoSonics Inc. Seismic Analysis
Velocity Waveform Analysis

Serial No: 7179 v3.23
Date: 02/03/2012 11:30:24 (UTC-8)
Event No: 2
Record Time: 5.0 s
Client: COUNTY OF MARIN
Operation: SAN RAFAEL ROCK QUARRY
Location: ON QUARRY PROPERTY
Distance: 
Operator: VIBRA-TECH GSM
Comment: 
Seismic Trigger: 0.030 in/s

### Summary Data

<table>
<thead>
<tr>
<th></th>
<th>L</th>
<th>T</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPV (in/s)</td>
<td>0.040</td>
<td>0.028</td>
<td>0.055</td>
</tr>
<tr>
<td>FREQ (Hz)</td>
<td>35.7</td>
<td>20.8</td>
<td>31.3</td>
</tr>
<tr>
<td>PD (m/s)</td>
<td>0.20</td>
<td>0.47</td>
<td>0.29</td>
</tr>
<tr>
<td>PPA (g)</td>
<td>0.033</td>
<td>0.026</td>
<td>0.052</td>
</tr>
<tr>
<td>Peak Vector Sum</td>
<td>0.055 in/s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak Air Pressure</td>
<td>110 db</td>
<td>0.00089 PSI @ 1.8 Hz</td>
<td></td>
</tr>
</tbody>
</table>

### Additional Info:

j-GEO-01253
N37 59.481, W122 27.256

Shaketable Calibrated: 01/13/2012
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: 7179 Event: 2

![Velocity Waveform Graph](image-url)

Printed: February 03, 2012 File: 65_7179_20120203_113024_4b8y6wr.g3k (GeoSonics Inc. AnalysisNET v8.1.44)
GeoSonic Inc. Seismic Analysis
Velocity Waveform Analysis

Serial No: 7257 v3.23
Date: 02/03/2012 11:30:25 (UTC-8)
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

Summary Data

<table>
<thead>
<tr>
<th></th>
<th>L</th>
<th>T</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPV (in/s)</td>
<td>0.035</td>
<td>0.023</td>
<td>0.055</td>
</tr>
<tr>
<td>FREQ (Hz)</td>
<td>26.3</td>
<td>45.5</td>
<td>35.7</td>
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<tr>
<td>PD (.001&quot;)</td>
<td>0.21</td>
<td>0.25</td>
<td>0.28</td>
</tr>
<tr>
<td>PPA (g)</td>
<td>0.020</td>
<td>0.020</td>
<td>0.052</td>
</tr>
<tr>
<td>Peak Vector Sum</td>
<td>0.055 in/s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak Air Pressure</td>
<td>109 db</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.00086 PSI @ 1.4 Hz</td>
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<td></td>
</tr>
</tbody>
</table>

Additional Info:

j-GEO-01252
N37 59.524, W122 27.373

Shaketable Calibrated: 01/13/2012
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: 7257 Event: 2