# SAN RAFAEL ROCK QUARRY VIBRATION REPORT

**Location:** PR-1  
**Max. Charge Weight:** 485  
**Date of Blast:** 5.15.12  
**Northing:** 37°59.19'N  
**Time of Blast:** 11:31  
**Easting:** 122°27.09'W  
**Blast Duration:** 276 ms  
**Blast Number:** 1576

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Last Calibration Date</td>
<td>4.27.12</td>
<td>4.27.12</td>
<td>4.27.12</td>
<td>4.27.12</td>
<td>4.27.12</td>
</tr>
</tbody>
</table>

| Location | PR-1  
|----------|------|
| Northing | 37°59.19'N  
| Easting | 122°27.09'W  
| Distance from Blast | 1056 | 3484 | 2112 | 546 | 57 |
| Scaled Distance | 48 | 158 | 96 | 57 |

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Longitudinal Peak Particle Velocity (ips)</td>
<td>.12</td>
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<tr>
<td>Longitudinal Peak Frequency (Hz)</td>
<td>2.1</td>
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<tr>
<td>Transverse Peak Particle Velocity (ips)</td>
<td>.06</td>
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<tr>
<td>Transverse Peak Frequency (Hz)</td>
<td>41.6</td>
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<td>Vertical Peak Particle Velocity (ips)</td>
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</tr>
<tr>
<td>Vertical Peak Frequency (Hz)</td>
<td>11.6</td>
</tr>
<tr>
<td>Peak Vector Sum (ips)</td>
<td>.12</td>
</tr>
<tr>
<td>Peak Air Overpressure (db)</td>
<td>125</td>
</tr>
</tbody>
</table>

Seismographs out for calibration, using rentals

Seismograph Operator: Deran Lopes  
Signature: [Signature]


**SAN RAFAEL ROCK QUARRY BLAST REPORT**

**BASE DATA:**

- **Location:** RB-1
- **Designed Bench Height (ft):** 5.0
- **Rock Density (lb/ft³):** 2.23
- **Relative Rock Hardness:** 2
- **Date:** 5.15.12
- **Time:** 11:31
- **Blast Number:** 1576

**DESIGN DATA:**

- **Number of Holes Shot:** 17
- **Hole Dia. (in.):** 3/4
- **Steering (ft):** 23
- **Loading Time Required (man hrs):** 6
- **Deck Type:**
- **Ave. Hole Depth (ft):** 50
- **Burden (ft):** 16
- **Staggered Pattern (y or n):** Y
- **Length (ft):**
- **Relative Confinement:**
- **Spacing (ft):** 1.7
- **Subdrill (ft):** 0
- **Number of Lost Holes:** 0
- **Tons Shot:** 19.015

**EXPLOSIVES DATA:**

<table>
<thead>
<tr>
<th>Bulk Explosive</th>
<th>Weight</th>
<th>Boosters</th>
<th>Units</th>
<th>Delays</th>
<th>Units</th>
<th>Misc.</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>4.4 lbs.</td>
<td>100.0</td>
<td>45.0</td>
<td>24</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4.4 lbs.</td>
<td>30.0</td>
<td>15.0</td>
<td>24</td>
<td>2</td>
<td>1</td>
<td>1</td>
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<tr>
<td>4.4 lbs.</td>
<td>40.0</td>
<td>20.0</td>
<td>24</td>
<td>2</td>
<td>1</td>
<td>1</td>
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<tr>
<td>4.4 lbs.</td>
<td>50.0</td>
<td>25.0</td>
<td>24</td>
<td>2</td>
<td>1</td>
<td>1</td>
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<tr>
<td>4.4 lbs.</td>
<td>60.0</td>
<td>30.0</td>
<td>24</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL CHARGE Wt.: 8,524 lbs.**

**VIBRATION DATA:**

- **Nearest Structure:** Main A
- **Seismograph loc.:** Same
- **Temperature:** 77°F
- **Max. Chrg. (lb/8ms):** 48.5
- **RPPV:** 1.2
- **Sky Condition:** Clear
- **Frequency:** 41.6

**PERFORMANCE DATA:**

- **Powder Factor (lb/ton):** 4
- **Displacement:** Good
- **Crushability:**
- **Lb/yard³:** 9
- **Vibration:** Low
- **Digability:**
- **Comments:** Brown Rock
- **Blaster in Charge:** (Signature)
GeoSonics Inc. Seismic Analysis
Stop Event Report

Serial No: 7178 v3.23
Client: COUNTY OF MARIN
Operation: SAN RAFAEL ROCK QUARRY
Location: 114 SAN MARINO DRIVE
Distance: 
Operator: VIBRA-TECH GSM
Comment: VERONIQUE RASKIN

Begin Date: 05/15/2012 06:00:50 (UTC-7)
End Date: 05/15/2012 12:00:18 (UTC-7)
Events over Trigger: 0 (5-4)
Record Time: 5.0 s
Seismic Trigger: 0.030 in/s
Sound Trigger: N/A
Battery Level: 8.9

Shaketable Calibrated: 01/16/2012
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 7178) did not trigger during the shot on May 15, 2012 at approximately 11:31 indicating the ground vibrations produced were below the ground trigger level of 0.030 in/sec.
Seismic Analysis
Velocity Waveform Analysis

Serial Number: 7257
Firmware Version: 08-03-23
Event Date: 05/15/2012 11:31:20 (UTC -07:00)
Event number: 12
Recording Time: 5 s
Client: COUNTY OF MARIN
Operation: SAN RAFAEL ROCK QUARRY
Location: 16 MARIN BAY PARK CT.
Distance: Operator: VIBRA-TECH GSM
Comment: William Hosken Residence
Seismic Trigger: 0.03 in/s
Sound Trigger: 75.9 DB
Additional Info:

j-GEO-01252
N37 59.524, W122 27.373

Summary Data

<table>
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<tr>
<th></th>
<th>L</th>
<th>T</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPV (in/s):</td>
<td>0.04</td>
<td>0.035</td>
<td>0.0275</td>
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<tr>
<td>FREQ (HZ):</td>
<td>7</td>
<td>6.5</td>
<td>8.2</td>
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<tr>
<td>PD (do):</td>
<td>0.835</td>
<td>0.845</td>
<td>0.5775</td>
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<tr>
<td>PPA (g):</td>
<td>0.01302</td>
<td>0.01302</td>
<td>0.01953</td>
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<tr>
<td>Peak Vector Sum:</td>
<td>0.0425 in/s</td>
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<td></td>
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<tr>
<td>Peak Air Pressure:</td>
<td>116.7 DB</td>
<td></td>
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<tr>
<td>0.002014 psi @ 1.6 HZ</td>
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</table>

Shaketable Calibrated
On: 01/13/2012 (UTC -07:00)
By: Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40203 U.S.A.

Waveform Graph Scale
Time Scale: 0.1 s
Seismic Scale: +/- 0.16 in/s
Sound Scale: +/- 0.0023 psi

Velocity Waveform
SSN: 7257 Event: 12

USBM Safe Blasting Levels
SSN: 7257 Event: 12

Printed: May 15, 2012 File: 0000044887_201205.g3k (GeoSonics Inc. PDFGenerator v 1.0)
Seismic Analysis
Velocity Waveform Analysis

Serial Number: 7179
Firmware Version: 08-03-23
Event Date: 05/15/2012 11:31:18 (UTC -07:00)
Event number: 13
Recording Time: 5 s
Client: COUNTY OF MARIN
Operation: SAN RAFAEL ROCK QUARRY
Location: ON QUARRY PROPERTY
Distance: 
Operator: VIBRA-TECH GSM
Comment: Seismic Trigger: 0.03 in/s
Sound Trigger: 75.9 DB

Additional Info:
j-GEO-01253
N37 59.481, W122 27.256

Summary Data

<table>
<thead>
<tr>
<th>PPV (in/s)</th>
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<th>V</th>
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</thead>
<tbody>
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<td>0.08</td>
<td>0.0425</td>
<td>0.0575</td>
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<td>6</td>
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<td>1.968</td>
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<tr>
<td>0.02604</td>
<td>0.01302</td>
<td>0.02604</td>
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</tr>
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</table>

Peak Vector Sum: 0.095 in/s
Peak Air Pressure: 118.5 DB

Shaketable Calibrated
On: 01/13/2012 (UTC -07:00)
By: Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40203 U.S.A.

Waveform Graph Scale
Time Scale: 0.1 s
Seismic Scale: +/- 0.16 in/s
Sound Scale: +/- 0.002549 psi

Velocity Waveform
SSN: 7179 Event: 13