# SAN RAFAEL ROCK QUARRY VIBRATION REPORT

## Blasting Information
- **Location:** PB-7
- **Max. Charge Weight:** 400
- **Data of Blast:** 6/20/11
- **Nothing:** 37°59'60''N
- **Time of Blast:** 11:59
- **Easting:** 122°57'15''W
- **Blast Duration:** 349.5s
- **Blast Number:** 1550

## Seismograph Information
<table>
<thead>
<tr>
<th>Seismograph Model</th>
<th>UNIT #1</th>
<th>UNIT #2</th>
<th>UNIT #3</th>
<th>UNIT #4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Micro</td>
<td>Micro</td>
<td>Micro</td>
<td>Micro</td>
</tr>
<tr>
<td>Serial Number</td>
<td>2481</td>
<td>4550</td>
<td>4567</td>
<td>4671</td>
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<tr>
<td>Last Calibration Date</td>
<td>5/24/11</td>
<td>5/26/11</td>
<td>5/26/11</td>
<td>5/26/11</td>
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</table>

## Location Information
<table>
<thead>
<tr>
<th>Location</th>
<th>UNIT #1</th>
<th>UNIT #2</th>
<th>UNIT #3</th>
<th>UNIT #4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maria</td>
<td>Via Mont</td>
<td>San Marco</td>
<td>Maker Park</td>
<td></td>
</tr>
<tr>
<td>Nothing</td>
<td>37°59'60''N</td>
<td>37°59'31''N</td>
<td>37°59'30''N</td>
<td></td>
</tr>
<tr>
<td>Easting</td>
<td>122°57'15''W</td>
<td>122°27'20''W</td>
<td>122°27'30''W</td>
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<tr>
<td>Distance from Blast</td>
<td>1109</td>
<td>3168</td>
<td>3481</td>
<td>214</td>
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<tr>
<td>Scaled Distance</td>
<td>65</td>
<td>158</td>
<td>124</td>
<td>108</td>
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</table>

## Vibration Information
<table>
<thead>
<tr>
<th>Longitudinal Peak Particle Velocity (ips)</th>
<th>UNIT #1</th>
<th>UNIT #2</th>
<th>UNIT #3</th>
<th>UNIT #4</th>
</tr>
</thead>
<tbody>
<tr>
<td>.01</td>
<td>.07</td>
<td>.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Longitudinal Peak Frequency (Hz)</td>
<td>33.3</td>
<td>12.3</td>
<td>12.7</td>
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<tr>
<td>Transverse Peak Particle Velocity (ips)</td>
<td>.13</td>
<td>.08</td>
<td>.07</td>
<td></td>
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<tr>
<td>Transverse Peak Frequency (Hz)</td>
<td>19.2</td>
<td>12.1</td>
<td>12.1</td>
<td></td>
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<tr>
<td>Vertical Peak Particle Velocity (ips)</td>
<td>.10</td>
<td>.07</td>
<td>.07</td>
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<tr>
<td>Vertical Peak Frequency (Hz)</td>
<td>19.2</td>
<td>13.8</td>
<td>13.5</td>
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<tr>
<td>Peak Vector Sum (ips)</td>
<td>11</td>
<td>.09</td>
<td>.09</td>
<td></td>
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<tr>
<td>Peak Air Overpressure (ab)</td>
<td>106</td>
<td>106</td>
<td>106</td>
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</tbody>
</table>

## General Comments
- Unit #4 did not trigger

Seismograph Operator: Devon Lopez

Signature: [Signature Image]
**SAN RAFAEL ROCK QUARRY BLAST REPORT**

**BASE DATA:**
- Location: RB-7
- Designed Bench Height (ft): 40
- Date: 6-20-4
- Northing: 37°59'10" N
- Rock Density (lb/ft^3): 2.7
- Time: 11:59
- Easting: 12°27'15" W
- Relative Rock Hardness: 7
- Blast Number: 1550

**DESIGN DATA:**
- Number of Holes Shot: 13
- Hole Dia. (in.): 6\(\frac{1}{2}\)
- Stemming (ft): 17
- Loading Time Required (min hrs): 2
- Deck Type: __________
- Ave. Hole Depth (ft): 33
- Burden (ft): 15
- Stem Type: \(\frac{3}{8}\)
- 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:**

<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>
</tr>
</thead>
<tbody>
<tr>
<td>Titan 1000x6</td>
<td>6,200</td>
<td>450, green</td>
<td>38</td>
<td>30 vip</td>
<td>10</td>
<td>______</td>
<td>______</td>
</tr>
<tr>
<td>__________</td>
<td>__________</td>
<td>__________</td>
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</tbody>
</table>

- Max (lb/hole): 460
- Total Charge Wt.: 323

**VIBRATION DATA:**
- Nearest Structure: __________
- Seismograph Loc.: __________
- Temperature: 87°F
- Max. Chrg. (lb/ft^3): \(\frac{2}{3} \frac{10^{-9}}{t}\)
- Northing: 37°59'10" N
- Northing: __________
- Sky Condition: __________
- RPPV: __________
- Easting: 12°27'15" W
- Easting: __________
- Wind Direction: 111°
- Frequency: 33°
- Distance Away: 1100 ft
- Distance Away: __________
- Wind Speed: 5.1
- Airblast: 10.5

**PERFORMANCE DATA:**
- Powder Factor (lb/ton): 4
- Displacement: ______
- Crushability: ______
- Lb/cu yd: 1.12
- Vibration: __________
- Fines: ______
- Fragmentation: 60
- Dig ability: ______
- Comments: ______

Blaster in Charge: [Signature]
Face 40

19 H. dets
10'80'2.10 dets
9' 80' E2 dets
19'60' ZP dets
7'42'ms E2d'a
38'450'3mm

6,200 ft/sec

Depth 40-43'
400 lb max per
18' stemming

All Holes Wet

6.20.11
PB-7
$1550

37°59'10"N
122°20'15"W
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: VHRA-TECH GES
Comment: 
Seismic Trigger: 0.030 in/s

Summary Data

<table>
<thead>
<tr>
<th>L</th>
<th>T</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPV (in/s)</td>
<td>0.033</td>
<td>0.030</td>
</tr>
<tr>
<td>FRQ (Hz)</td>
<td>16.7</td>
<td>20.0</td>
</tr>
<tr>
<td>PD (0.01&quot;)</td>
<td>0.24</td>
<td>0.24</td>
</tr>
<tr>
<td>PPA (g)</td>
<td>0.026</td>
<td>0.020</td>
</tr>
<tr>
<td>Peak Vector Sum</td>
<td>0.050 in/s</td>
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<tr>
<td>Peak Air Pressure</td>
<td>108 db</td>
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</tr>
<tr>
<td></td>
<td>0.00080 PSI @ 7.6 Hz</td>
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</tr>
</tbody>
</table>

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

Shaketable Calibrated: 01/27/2011
By: Vibra-Teck, 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 1.000 s
Seismic Scale: ±/ 0.160 in/s
Sound Scale: ±/ 0.002 PSI

Printed: June 20, 2011 File: 109668492 g3k (Geosonics inc. AnalysisNET v8.1 35)
Seismic Analysis
Velocity Waveform Analysis

Serial No: 7155 v3.23
Date: 06/20/2011 11:58:44 (UTC-7)
Event No: 2
Record Time: 16.0 s
Client: COUNTY OF MARIN
Operation: SAN RAFAEL ROCK QUARRY
Location: 16 MARIN BAY PARK CT
Distance:
Operator: VIBRA-TECH GSM
Comment: WILLIAM HOSKEN RESIDENCE
Seismic Trigger: 0.039 m/s

<table>
<thead>
<tr>
<th>Summary Data</th>
<th>L</th>
<th>T</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPV (in/s)</td>
<td>0.025</td>
<td>0.028</td>
<td>0.035</td>
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<tr>
<td>FREQ (Hz)</td>
<td>15.2</td>
<td>20.0</td>
<td>38.5</td>
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<tr>
<td>PD (d01)**</td>
<td>0.25</td>
<td>0.23</td>
<td>0.24</td>
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<tr>
<td>PPA (g)</td>
<td>0.020</td>
<td>0.020</td>
<td>0.033</td>
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<tr>
<td>Peak Vector Sum:</td>
<td>0.040 m/s</td>
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<tr>
<td>Peak Air Pressure:</td>
<td>103 db</td>
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<tr>
<td></td>
<td>0.00048 PSI @ 7.7 Hz</td>
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</tbody>
</table>

Additional Info:
- GEO-01252
- N37 59.524, W122 27.373
- Shakeable 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 m/s
- Sound Scale: +/- 0.0023 PSI

Printed: June 20, 2011  File: 495678402.g3k (GeoSonic Inc. AnalysisNET v8.1.55)
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.