# SAN RAFAEL ROCK QUARRY VIBRATION REPORT

**Location:** PR-7  
**Max. Charge Weight:** 40.0  
**Date of Blast:** 5/10/12  
**Northing:** 37°55'12" N  
**Time of Blast:** 11:31  
**Easting:** 122°27'13" W  
**Blast Duration:** 398 ms  
**Blast Number:** #1525

## 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>
<th>UNIT #5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial Number</td>
<td>1608</td>
<td>2147</td>
<td>2474</td>
<td>2348</td>
<td>2348</td>
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<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 Information

<table>
<thead>
<tr>
<th>Location</th>
<th>UNIT #1</th>
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<th>UNIT #3</th>
<th>UNIT #4</th>
<th>UNIT #5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Ration</td>
<td>Vicinity</td>
<td>Santa Maria</td>
<td>Mt. Vernon Park</td>
<td></td>
</tr>
<tr>
<td>Northing</td>
<td>37°59'19&quot; N</td>
<td>37°59'19&quot; N</td>
<td>37°59'31&quot; N</td>
<td>37°59'30&quot; N</td>
<td></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°27'16&quot; W</td>
<td></td>
</tr>
<tr>
<td>Distance from Blast</td>
<td>1003</td>
<td>822</td>
<td>8376</td>
<td>1795</td>
<td></td>
</tr>
<tr>
<td>Scaled Distance</td>
<td>50</td>
<td>161</td>
<td>118</td>
<td>89</td>
<td></td>
</tr>
</tbody>
</table>

## Vibration Information

| Longitudinal Peak Particle Velocity (ips) | 1.0 | 0.06 | 0.09 |
| Longitudinal Peak Frequency (Hz) | 26.3 | 15.5 | 19.2 |
| Transverse Peak Particle Velocity (ips) | 1.16 | 0.06 | 0.04 |
| Transverse Peak Frequency (Hz) | 17.2 | 16.1 | 19.4 |
| Vertical Peak Particle Velocity (ips) | 1.0 | 0.04 | 0.07 |
| Vertical Peak Frequency (Hz) | 45.4 | 22.7 | 29.4 |
| Peak Vector Sum (ips) | 0.17 | 0.07 | 0.11 |
| Peak Air Overpressure (db) | 109 | 106 | 106 |

## General Comments

Seismographs out for Calibration 5/8 2012  
Using Geomatics rental units

Seismograph Operator: [Signature]

Seismograph Operator: [Signature]
SAN RAFAEL ROCK QUARRY BLAST REPORT

BASE DATA:

Location: 7
Designed Bench Height (ft): 40
Date: 5.10.12

Northing: 37°54'12" N
Rock Density (lb/ft³): 2.23
Time: 11:31

Easting: 122°22'13" W
Relative Rock Hardness: 7
Blast Number: 1525

DESIGN DATA:

Number of Holes Shot: 30
Hole Dia (in.): 6 3/4
Stemming (ft): 18
Loading Time Required (man hrs): 7
Deck Type: __

Ave. Hole Depth (ft): 4 3/5
Burden (ft): 1 5/8
Stem Type: 3/4".. Stem
Staggered Pattern (y or n): N
Length (ft): __

Relative Confinement:
Spacing (ft): 16
Subdrill (ft): 5
Number of Lost Holes: 0
Tons Shot: 23,786

EXPLOSIVES DATA:

<table>
<thead>
<tr>
<th>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</td>
<td>1240</td>
<td>11.5</td>
<td>8.0</td>
<td>45.0</td>
<td>3</td>
<td>5.0</td>
<td>40 ± 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
| Max (lb/hole): | 400 | Blast Duration (sec): | 39 & 3.
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| Total Charge Wt.: | 11,410 |

VIBRATION DATA:

Nearest Structure: Main 0
Seismograph Loc.: Same
Temperature: 81°
Max. Chrg. (lb/8ms): 40 0

Northing: 37°54'14" N
Northing: __
Sky Condition: Linear
RPPV: 1.2

Easting: 122°22'14" W
Easting: __
Wind Direction: 5
Frequency: 45.4

Distance Away: 100 ft
Distance Away: __
Wind Speed: 0-2
Airblast: 169

PERFORMANCE DATA:

Powder Factor (lb/ton): 5
Displacement: Clean
Crushability: __

Lb/ft³: 1.12
Vibration: Clean
Fines: __

Fragmentation: Clean
Dig ability: __

Comments: __
The seismograph at 114 San Marino Drive (S/N 7178) did not trigger during the shot on May 10, 2012 at approximately 11:30 indicating the ground vibrations produced were below the ground trigger level of 0.030 in/sec.
Seismic Analysis
Velocity Waveform Analysis

Serial Number: 7179
Firmware Version: 08-03.23
Event Date: 05/10/2012 11:30:44 (UTC -07:00)
Event number: 12
Recording Time: 5 s
Client: COUNTY OF MARIN
Operation: SAN RAFAEL ROCK QUARRY
Location: ON QUARRY PROPERTY
Distance: VIBRA-TECH GSM
Comment: Seismic Trigger: 0.03 m/s
Sound Trigger: 75.9 DB

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

Summary Data

<table>
<thead>
<tr>
<th>PPV (m/s)</th>
<th>L</th>
<th>T</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>FREQ (Hz)</td>
<td>50</td>
<td>17.9</td>
<td>35.7</td>
</tr>
<tr>
<td>Dist (kft)</td>
<td>0.3375</td>
<td>0.48</td>
<td>0.4625</td>
</tr>
<tr>
<td>PPA (g)</td>
<td>0.04557</td>
<td>0.03906</td>
<td>0.04557</td>
</tr>
</tbody>
</table>

Peak Vector Sum: 0.0625 m/s
Peak Air Pressure: 105.5 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: +/- 0.0023 psi

Velocity Waveform
SSN: 7179 Event: 12

Printed: May 11, 2012 File: 0000032559_201205.g3k (GeoSonic Inc. PDFGenerator v 1.0)
The seismograph located across the street from 16 Marin Bay Park Court (S/N 7257) did not trigger during the blast on May 10, 2012 at approximately 11:30 indicating the ground vibrations produced were below the ground trigger level of 0.030 in/sec.