## SAN RAFAEL ROCK QUARRY VIBRATION REPORT

**Location:** 39°7' North  
**Max. Charge Weight:** 300  
**Date of Blast:** 12/12/11

**Northing:** 37°59'4.1 N  
**Time of Blast:** 11:42

**Easting:** 122°27'15 W  
**Blast Duration:** 251 ms

**Blast Number:** 1563

### 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>2317</td>
<td>2317</td>
<td>2317</td>
</tr>
<tr>
<td>Last Calibration Date</td>
<td>5/24/11</td>
<td>5/26/11</td>
<td>5/26/11</td>
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</tbody>
</table>

### Location Information

<table>
<thead>
<tr>
<th>Location</th>
<th>North/West</th>
<th>East/North</th>
<th>East/West</th>
</tr>
</thead>
<tbody>
<tr>
<td>39°7' N</td>
<td>37°59'4.1 N</td>
<td>37°59'4.1 N</td>
<td>37°59'4.1 N</td>
</tr>
<tr>
<td>122°27'15 W</td>
<td>122°27'15 W</td>
<td>122°27'15 W</td>
<td>122°27'15 W</td>
</tr>
</tbody>
</table>

### Distance from Blast

<table>
<thead>
<tr>
<th>Distance from Blast</th>
<th>Scaled Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>950</td>
<td>54</td>
</tr>
<tr>
<td>3062</td>
<td>126</td>
</tr>
<tr>
<td>2376</td>
<td>137</td>
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<tr>
<td>1901</td>
<td>109</td>
</tr>
</tbody>
</table>

### Vibration Information

<table>
<thead>
<tr>
<th>Longitudinal Peak Particle Velocity (ips)</th>
<th>0.12</th>
<th>0.09</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longitudinal Peak Frequency (Hz)</td>
<td>23.8</td>
<td>11.6</td>
</tr>
<tr>
<td>Transverse Peak Particle Velocity (ips)</td>
<td>0.08</td>
<td>0.05</td>
</tr>
<tr>
<td>Transverse Peak Frequency (Hz)</td>
<td>2.57</td>
<td>1.8</td>
</tr>
<tr>
<td>Vertical Peak Particle Velocity (ips)</td>
<td>0.09</td>
<td>0.04</td>
</tr>
<tr>
<td>Vertical Peak Frequency (Hz)</td>
<td>21.7</td>
<td>6.0</td>
</tr>
<tr>
<td>Peak Vector Sum (ips)</td>
<td>1.3</td>
<td>0</td>
</tr>
<tr>
<td>Peak Air Overpressure (db)</td>
<td>114</td>
<td>0</td>
</tr>
</tbody>
</table>

### General Comments

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

BASE DATA:

Location: 7B.7 Lower
Northing: 3295914, N
Easting: 1252715, W

Desired Bench Height (ft): 3.2
Rock Density (lb/ft³): 2.7
Relative Rock Hardness: 7

Date: 12-12-11
Time: 11:42

Design:

Number of Holes Shot: 35
Hole Dia. (in.): 3 1/4 to 3 1/2
Stemming (ft): 10
Loading Time Required (man hrs): 7

Ave. Hole Depth (ft): 34.1
Burden (ft): 11
Stem Type: 3/4 to 3/5
Staggered Pattern (y or n): Y

Deck Type:
Length (ft):

Relative Confinement: Spacing (ft): 15 4
Subdrill (ft):

Number of Lost Holes: 0
Tons Shot: 11985

EXPLOSIVES DATA:

Bulk Explosive

Titan:

Weight: 4436
Boosters: 54
Units: 26.64, 10
Misc.:

Units:

Dyno AL:

Weight: 478
 Boosters: 350
Units: 23
Misc.:

Units:

42.5, 3

Total Charge Wt.: 2570

VIBRATION DATA:

Nearest Structure: Mining Rig
Seismograph Loc.: Same
Temperature: 52°F
Max. Chrg. (lb/ft): 300

Northing: 3295914, N
Easting: 1252715, W

Sky Condition: Overcast
RPPV: 13

Distance Away: 450

Wind Direction: NW
Frequency: 23.8
Airblast: 114

PERFORMANCE DATA:

Powder Factor (lb/ton): .5
Displacement: Good
Crushability:

Lb/yd³: 1.2
Vibration: Good
Fines:

Fragmentation: Good
Digability:

Comments: 8 x 3 1/2" salvage holes on left side

Blaster in Charge: Ron Lopez
3½ in shot holes 40° NE
8 shots

1: 80° E2
2: 16° N
3: 17.5° E2
78: 12.5° N 30 ft per 9
3 sticks per hole
23: 350 gram

7420 Titan 1000

12.12.11
787 lower
* 1563

Face 32

14 x 15

37 hole
27: 80° E2
22: 50° E2
3: 42 m/s
1: 17 m/s
54: 45.5 year

Depth 84'
5' spacing
300 lbs max per

main 9.50
Via M 3062
SM 2876
MN 1401
37°59'N
122°27'15"W
Seismic Analysis
Velocity Waveform Analysis

Serial No: 9856 v3.23
Date: 12/12/2011 11:44:59 (UTC-8)
Event No: 9
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

Summary Data

<table>
<thead>
<tr>
<th></th>
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<th>T</th>
<th>V</th>
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</thead>
<tbody>
<tr>
<td>PPV (in/s)</td>
<td>0.033</td>
<td>0.040</td>
<td>0.040</td>
</tr>
<tr>
<td>FREQ (Hz)</td>
<td>62.5</td>
<td>23.8</td>
<td>41.7</td>
</tr>
<tr>
<td>PD (801&quot;)</td>
<td>0.18</td>
<td>0.35</td>
<td>0.27</td>
</tr>
<tr>
<td>PPA (g)</td>
<td>0.039</td>
<td>0.026</td>
<td>0.039</td>
</tr>
<tr>
<td>Peak Vector Sum</td>
<td>0.050 in/s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak Air Pressure</td>
<td>107 dB</td>
<td>0.00070 PSI @ 2.6 Hz</td>
<td></td>
</tr>
</tbody>
</table>

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

Shakeable 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: +/- 0.150 in/s
Sound Scale: +/- 0.102 PSI

Printed: December 12, 2011  File: 978306492.g3k (GeoSonic Inc. AnalysisNET v8.1.35)
The seismograph at 114 San Marino Drive (S/N 9669) did not trigger during the shot on December 12, 2011 at approximately 11:44 indicating the ground vibrations produced were below the ground trigger level of 0.030 in/sec.