### SAN RAFAEL ROCK QUARRY VIBRATION REPORT

**Location:** PB-8  
**Max. Charge Weight:** 500  
**Date of Blast:** 8-1-12  
**Northing:** 37°59’10”N  
**Time of Blast:** 11:53  
**Easting:** 122°22’18”W  
**Blast Number:** 1587  
**Blast Duration:** 445ms

<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>2481</td>
<td>4550</td>
<td>4667</td>
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<tr>
<td>Last Calibration Date</td>
<td>5-17-12</td>
<td>5-17-12</td>
<td>5-17-12</td>
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</tbody>
</table>

### Location

<table>
<thead>
<tr>
<th>Location</th>
<th>Marin Way</th>
<th>Via Mant</th>
<th>San Marino</th>
<th>McNear Park</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northing</td>
<td>37°59’19”N</td>
<td>37°59’18”N</td>
<td>37°59’31”N</td>
<td>37°59’30”N</td>
</tr>
<tr>
<td>Easting</td>
<td>122°22’22”W</td>
<td>122°22’53”W</td>
<td>122°23’30”W</td>
<td>122°22’16”W</td>
</tr>
<tr>
<td>Distance from Blast</td>
<td>950</td>
<td>2904</td>
<td>2587</td>
<td>1953</td>
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<tr>
<td>Scaled Distance</td>
<td>42</td>
<td>130</td>
<td>115</td>
<td>1953</td>
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### Measurements

<table>
<thead>
<tr>
<th>Measured Value</th>
<th>Marin Way</th>
<th>Via Mant</th>
<th>San Marino</th>
<th>McNear Park</th>
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<tbody>
<tr>
<td>Longitudinal Peak Particle Velocity (ips)</td>
<td>0.23</td>
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<td>0.10</td>
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<tr>
<td>Longitudinal Peak Frequency (Hz)</td>
<td>14.7</td>
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<td>7.5</td>
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<td>Transverse Peak Particle Velocity (ips)</td>
<td>0.17</td>
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<td>0.08</td>
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<tr>
<td>Transverse Peak Frequency (Hz)</td>
<td>29.4</td>
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<td>8.3</td>
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<tr>
<td>Vertical Peak Particle Velocity (ips)</td>
<td>0.30</td>
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<td>0.09</td>
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<tr>
<td>Vertical Peak Frequency (Hz)</td>
<td>38.4</td>
<td></td>
<td>5.9</td>
<td></td>
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<tr>
<td>Peak Vector Sum (ips)</td>
<td>0.31</td>
<td></td>
<td>0</td>
<td>0.12</td>
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<tr>
<td>Peak Air Overpressure (dB)</td>
<td>119</td>
<td></td>
<td>112</td>
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</tbody>
</table>

**Seismograph Operator:** Denn 10/20/3  
**Signature:** Denn L"uehr
SAN RAFAEL ROCK QUARRY BLAST REPORT

Location: PB-8
Northing: 37°59'10" N
Easting: 122°29'18" W

Designed Bench Height (ft): 45
Rock Density (lb/ft³): 2.23
Relative Rock Hardness: 7

Date: 8-1-17
Time: 11:53
Blast Number: 1583

Number of Holes Shot: 24
Hole Dia.(in.): 6\(\frac{3}{4}\)
Stemming (ft): 18
Loading Time Required (min hrs): 7
Deck Type: -

Ave. Hole Depth (ft): 48
Burden (ft): 15
Sneck Type: \(\frac{3}{4}\) stem
Staggered Pattern (y or n): N
Length (ft): -

Relative Confinement: -
Spacing (ft): 15
Subdrill (ft): 3
Number of Last Holes: 0
Tons Shot: 20,070

Bulk Explosive Weight Boosters Units Delays Units Misc. Units
Titan 1000 11,100 450 gram 48 80E2 24 -
- - - 50E2 24 -
- - - 42ms 10 -
- - - 17ms 1 -
Max (lb/hole): 500
Blast Duration (sec): 445 ms
Total Charge Wt.: 11,148

VIBRATION DATA

Nearest Structure: Marin Ag
Seismograph Loc.: 500 yds
Temperature: 28°
Max. Chrg. (lb/ft³): 500

Northing: 37°59'19" N
Northing: -
Sky Condition: Clear
RPPV: 31

Easting: 122°27'22" W
Easting: -
Wind Direction: SE
Frequency: 38 Hz
Distance Away: 950
Distance Away: -
Wind Speed: 2.4 MPH
Airblast: 119

PERFORMANCE DATA

Powder Factor (lb/ton): .5
Displacement: Great
Crushability: -
Lb/ft³: 1.3
Vibration: Good
Fines:
Fragmentation: Great
Dig ability:
Comments: holes very wet, water came out while loading
Blaster in Charge: D.M. Lay
Ramp to PB 9

8/11/2
PB 18

15 ft.

29 Holes
24: 80 E 2
24: 80 E 2
19: Staining
500 lbs per max
All holes very west

Depth 48'
main 950
Via 2909
51N 2587
N4W 953

48' - 450
11: 100 lbs
Seismic Analysis
Velocity Waveform Analysis

Serial Number: 8030
Firmware Version: 08-03-23
Event Date: 08/01/2012 11:51:44 (UTC -07:00)
Event number: 5
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

<table>
<thead>
<tr>
<th>Summary Data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td>PPV (in/s):</td>
</tr>
<tr>
<td>L: 0.06</td>
</tr>
<tr>
<td>T: 0.0425</td>
</tr>
<tr>
<td>V: 0.0725</td>
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<tr>
<td>FREQ (HZ):</td>
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<tr>
<td>83.3</td>
</tr>
<tr>
<td>29.4</td>
</tr>
<tr>
<td>55.6</td>
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<td>PD (.001&quot;):</td>
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<tr>
<td>0.4325</td>
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<td>0.2725</td>
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<tr>
<td>0.4125</td>
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<td>PPA (g):</td>
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<td>0.07812</td>
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<td>0.04557</td>
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<tr>
<td>0.07161</td>
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<tr>
<td>Peak Vector Sum:</td>
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<tr>
<td>0.09 in/s</td>
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<tr>
<td>Peak Air Pressure:</td>
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<tr>
<td>113.3 DB</td>
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<tr>
<td>0.001461 psi @ 2.4 HZ</td>
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</table>

Shaketable Calibrated
On: 05/14/2012 (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: 8030 Event: 5
Seismic Analysis
Velocity Waveform Analysis

Serial Number: 8021
Firmware Version: 08-03.23
Event Date: 08/01/2012 11:51:45 (UTC -07:00)
Event number: 15
Recording Time: 5 s
Client: COUNTY OF MARIN
Operation: SAN RAFAEL ROCK QUARRY
Location: 114 SAN MARINO DRIVE
Distance: VIBRA-TECH GSM
Operator: VERONIQUE RASKIN*
Comment: 0.03 in/s
Seismic Trigger: 75.9 DB
Sound Trigger: Additional Info: *RESIDENCE

j-GEO-01254
N37 59.395, W122 27.700

Summary Data

<table>
<thead>
<tr>
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<tr>
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<table>
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<th>FREQ (HZ):</th>
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<th>38.5</th>
<th>31.3</th>
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<tbody>
<tr>
<td>DI (0.01&quot;)</td>
<td>0.2075</td>
<td>0.185</td>
<td>0.2575</td>
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<tr>
<td>PPA (g):</td>
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<td>0.02604</td>
<td>0.03255</td>
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</table>

Peak Vector Sum: 0.04 in/s
Peak Air Pressure: 111.2 DB
0.001105 psi @ 2.1 HZ

Shaketable Calibrated
On: 05/11/2012 (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: 8021 Event: 15

Printed: August 01, 2012 File: 0000001244_201208_93k (GeoSonics Inc. PDFGenerator v 1.0)
Seismic Analysis
Velocity Waveform Analysis

Serial Number: 8056
Firmware Version: 08-03.23
Event Date: 08/01/2012 11:51:44 (UTC -07:00)
Event number: 4
Recording Time: 5 s
Client: COUNTY OF MARIN
Operation: SAN RAFAEL ROCK QUARRY
Location: 16 MARIN BAY PARK CT.
Distance: VIBRA-TECH GSM
Comment: WILLIAM HOSKEN RES.
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>PPV (in/s)</th>
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<th>T</th>
<th>V</th>
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</thead>
<tbody>
<tr>
<td>0.0475</td>
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<td>FREQ (HZ):</td>
<td>27.8</td>
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<td>PD (.001&quot;)</td>
<td>0.4275</td>
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<td>PPA (g):</td>
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</table>

Peak Vector Sum: 0.065 in/s
Peak Air Pressure: 112.9 DB
0.00139 psi @ 2.5 HZ

Shaketable Calibrated
On: 05/16/2012 (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: 8056 Event: 4

Printed: August 01, 2012 File: 0000001247_201208.g3k (GeoSonics Inc. PDFGenerator v 1.0)