### SAN RAFAEL ROCK QUARRY VIBRATION REPORT

**Location:** 78-2  
**Max. Charge Weight:** 420  
**Date of Blast:** 2/5/12

**Northing:** 37°59'12"N  
**Blast Duration:** 2.92 ms  
**Time of Blast:** 11:31

**Easting:** 122°27'15"W  
**Blast Number:** 1569

### Seismograph Information

<table>
<thead>
<tr>
<th>Seismograph Model</th>
<th>256-1000</th>
<th>Micro</th>
<th>Micro</th>
<th>Micro</th>
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</thead>
<tbody>
<tr>
<td>Serial Number</td>
<td>341-181</td>
<td>25-95</td>
<td>4567</td>
<td>4570</td>
</tr>
<tr>
<td>Last Calibration Date</td>
<td>5.29.11</td>
<td>5.29.11</td>
<td>5.29.11</td>
<td>5.29.11</td>
</tr>
</tbody>
</table>

### Location Information

| Location | West  
|----------|------|
| Northing | 37°59'19" N  
| Easting  | 122°27'27" W  
| Distance from Blast | 950  
| Scaled Distance | 46  |

### Vibration Information

|  
| Longitudinal Peak Particle Velocity (ips) | 0.17 | 0.8 | 1.3 |
| Longitudinal Peak Frequency (Hz) | 16.6 | 19 | 18.5 |
| Transverse Peak Particle Velocity (ips) | 0.1 | 0.09 | 0.09 |
| Transverse Peak Frequency (Hz) | 15.1 | 16.1 | 20.0 |
| Vertical Peak Particle Velocity (ips) | 0.1 | 0.09 | 0.09 |
| Vertical Peak Frequency (Hz) | 22.7 | 15.1 | 31.2 |
| Peak Vector Sum (ips) | 0.21 | 0.17 | 0.15 |
| Peak Air Overpressure (db) | 112 | 106 | 112 |

### General Comment

Ground was wet.

Seismograph Operator: [Signature]

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

BASE DATA:

Location: PB-7
North: 37° 59' 12" N
East: 122° 22' 15" W
Designed Bench Height (ft): 40
Rock Density (t/yd³): 2.23
Relative Rock Hardness: 7
Date: 3.5.12
Time: 11:31
Blast Number: 1541

DESIGN DATA:

Number of Holes Shot: 21
Hole Dia. (in.): 3
Hole Dia. (mm): 76
Stemming (ft): 18
Load Time Required (man hrs): 6
Deck Type:
Ave. Hole Depth (ft): 13
Burden (ft): 15
Stem Type: 3/4
Staggered Pattern (y or n): y
Length (ft):
Relative Containment:
Spacing (ft):
Subdrill (ft):
Number of Lost Holes: 0
Tons Shot: 130.9

EXPLOSIVES DATA:

Bulk Explosive
Weight
Boosters
Units
Delays
Units
Misc.
Units

Max (lb/hole): 920
Blast Duration (sec): 12

VIBRATION DATA:

Nearest Structure:
Seismograph Loc.: 50' SE
Temperature: 8°
Max. Chrg. (lb/8ms): 420
Northing: 37° 59' 12" N
Northing:
Sky Condition:
RPPV:
Easting: 122° 22' 15" W
Easting:
Wind Direction: SE
Frequency: 2
Distance Away: 950
Distance Away:
Wind Speed: 15 mph
Airblast: 112

PERFORMANCE DATA:

Powder Factor (lb/ton): 5
Displacement: good
Crushability:
Lb/yd³: 1.18
Vibration: good
Fines:
Fragmentation: good
Dig ability:
Comments:
Blaster in Charge: [Signature]

[]
21 Holes  
21: 90.5% 
21: 50.6% 
1: 91%  
1: 17%  
1: 9%  
8,780 lbs titan

Depth: 43'  
420 lbs per  
18 stem

main: 950 
W: N: 311.5 
S: N: 2323 
W: N: 179.5

37° 59' 12" N/  
122° 27' 15" W
Seismic Analysis
Velocity Waveform Analysis

Serial Number: 7257
Firmware Version: 06-03-23
Event Date: 03/05/2012 11:31:17 (UTC -08:00)
Event number: 6
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 Residency
Seismic Trigger: 0.03 in/s
Sound Trigger: 76 DB
Additional Info: j-G6D-01252
N37 59.524, W122 27.373

Summary Data

<table>
<thead>
<tr>
<th>PPV (in/s)</th>
<th>L</th>
<th>T</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.045</td>
<td>0.035</td>
<td>0.05</td>
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</tr>
<tr>
<td>FREQ (Hz):</td>
<td>26.3</td>
<td>29.4</td>
<td>35.7</td>
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<tr>
<td>PD (,.001&quot;)</td>
<td>0.38</td>
<td>0.32</td>
<td>0.37</td>
</tr>
<tr>
<td>PPA (g):</td>
<td>0.033</td>
<td>0.02</td>
<td>0.059</td>
</tr>
</tbody>
</table>

Peak Vector Sum: 0.058 in/s
Peak Air Pressure: 110 DB

Shaketable Calibrated On: 01/13/2012 (UTC -08:00)
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: 6
Seismic Analysis
Velocity Waveform Analysis

Serial Number: 7179
Firmware Version: 08-03-23
Event Date: 03/05/2012 11:31:16 (UTC -08:00)
Event number: 6
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: 76 DB

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

Summary Data

<table>
<thead>
<tr>
<th></th>
<th>L</th>
<th>T</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPV (in/s):</td>
<td>0.06</td>
<td>0.045</td>
<td>0.07</td>
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<tr>
<td>FREQ (HZ):</td>
<td>31.3</td>
<td>21.7</td>
<td>38.5</td>
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<tr>
<td>PD (.001&quot;)</td>
<td>0.46</td>
<td>0.33</td>
<td>0.48</td>
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<tr>
<td>PPA (g):</td>
<td>0.052</td>
<td>0.033</td>
<td>0.059</td>
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<tr>
<td>Peak Vector Sum:</td>
<td>0.08 in/s</td>
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<tr>
<td>Peak Air Pressure:</td>
<td>109 DB</td>
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<tr>
<td>Shackable Calibrated</td>
<td>0.0008 psi @ 1.4 HZ</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

On: 01/13/2012 (UTC -08:00)
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: 6

Printed: March 05, 2012 File: 0000013561_201203.g3k (GeoSonics Inc. PDFGenerator v 1.0)
The seismograph at 114 San Marino Drive (S/N 7334) did not trigger during the shot on March 5, 2012 at approximately 11:31 indicating the ground vibrations produced were below the ground trigger level of 0.030 in/sec.