**SAN RAFAEL ROCK QUARRY VIBRATION REPORT**

**Location:** PB-72  
**Max. Charge Weight:** 160  
**Date of Blast:** 6-27-13

**Northing:** 37°59'14" N  
**Time of Blast:** 12:05

**Easting:** 122°27'06" W  
**Blast Number:** 1595

<table>
<thead>
<tr>
<th>Seismograph Model</th>
<th>micro</th>
<th>Micro</th>
<th>Micro</th>
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<tbody>
<tr>
<td>Serial Number</td>
<td>2481</td>
<td>4550</td>
<td>4527</td>
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<tr>
<td>Last Calibration Date</td>
<td>5 3 13</td>
<td>5 3 13</td>
<td>5 3 13</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Location</th>
<th>Marin Ave</th>
<th>Via Montebello</th>
<th>San Marino Dr</th>
<th>McNear Park</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northing</td>
<td>37°59'18&quot; N</td>
<td>37°59'18&quot; N</td>
<td>37°59'31&quot; N</td>
<td>37°59'30&quot; N</td>
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<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>
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<tr>
<td>Distance from Blast</td>
<td>1928</td>
<td>3801</td>
<td>2587</td>
<td>1796</td>
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</tbody>
</table>

| Scaled Distance | 112 | 300 | 204 | 141 |

| Longitudinal Peak Particle Velocity (ips) | 0.05 |
| Longitudinal Peak Frequency (Hz) | 13.5 |
| Transverse Peak Particle Velocity (ips) | 0.04 |
| Transverse Peak Frequency (Hz) | 14.7 |
| Vertical Peak Particle Velocity (ips) | 0.04 |
| Vertical Peak Frequency (Hz) | 20.0 |
| Peak Vector Sum (ips) | 0.6 |
| Peak Air Overpressure (db) | 109 |

**Seismograph Operator:** Deron Lopes  
**Signature:** [Signature]
AN RAFAEL ROCK QUARRY BASTE REPORT

BASE DATA:

Location: PB-74
Northing: 37°59'14" N
Easting: 122°27'06" W
Designed Bench Height (ft): 21
Rock Density (l/yd³): 2.33
Relative Rock Hardness: 7
Date: 62713
Time: 12:05
Blast Number: 1895

DESIGN DATA:

Number of Holes Shot: 40
Hole Dia.(in.): 4¾
Stemming (ft): 15
Ave. Hole Depth (ft): 29
Burden(ft): 14
Stem Type: ¾" Stone
Staggered Pattern (y or n): N
Length (ft):
Relative Confinement:
Spacing (ft): 14
Subdrill (ft): 3
Number of Lost Holes: 0
Tons Shot: 13,578
Deck Type:

EXPLOSIVES DATA:

Bulk Explosive Weight Boosters Units Delays Units Misc. Units
Titan 1000 5060 4509 40 5042 40
41 ms 8
Max (lb/hole): 160
Blast Duration (sec): 436 ms

VIBRATION DATA:

Nearest Structure: Marin Ag Seismograph Loc.: Same
Northing: 37°59'19" N
Eastings: 122°27'22" W
Temperature: 81° Max. Chrg. (lb/8ms): 160
Sky Condition: Clear
RPPV: 0.6
Wind Direction: SE
Frequency: 20.0

PERFORMANCE DATA:

Powder Factor (lb/ton): 1.1
Lb/yd³: 1.01
Displacement: Great
Vibration: Great
Fragmentation: Great
Dig ability:
Crushability:
Fines:
Comments:
Airblast: 109
Blaster in Charge: D. Lopez
40 Holes
40: 5062 det
8: 42ms32TL
40: 950 grain
5060 lbs titan

depth 24
160 lbs max
15 stemming

× 60# per big void
Powder never came up

1 - 2 = Lt. load 20#
Hole thin at bottom

6-27-13
PB 7¼
1595

Main 14-28
Vgmt 3801
Sth 2580
Nth 1795

37° 59' 14" N
122° 27' 06" W
Seismic Analysis
Velocity Waveform Analysis

Serial Number: 9808
Firmware Version: 08-03-23
Event Date: 06/27/2013 12:06:14 (UTC -07:00)
Event number: 18
Recording Time: 5 s
Client: COUNTY OF MARIN
Operation: SAN RAFAEL ROCK QRY
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

Summary Data

<table>
<thead>
<tr>
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<th>V</th>
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</thead>
<tbody>
<tr>
<td>PPV (in/s):</td>
<td>0.0425</td>
<td>0.0225</td>
<td>0.0625</td>
</tr>
<tr>
<td>FREQ (HZ):</td>
<td>31.3</td>
<td>38.5</td>
<td>41.7</td>
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<tr>
<td>PD (001°):</td>
<td>0.3225</td>
<td>0.1975</td>
<td>0.2525</td>
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<tr>
<td>PPA (g):</td>
<td>0.03906</td>
<td>0.02604</td>
<td>0.04557</td>
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</table>

Peak Vector Sam: 0.07 in/s
Peak Air Pressure: 103.2 DB
0.0004812 psi @ 4.3 HZ

Shaketable Calibrated
On: 02/20/2013 (UTC -07:00)
By: Vibe-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: 9808 Event: 18

Printed: June 28, 2013 File: 0000083533_201306.g3k (GeoSonics Inc. PDFGenerator v 1.0)
The seismograph located at 16 Marin Bay Park Court (S/N 9591) did not trigger during the shot on June 27, 2013 at approximately 12:06 indicating the ground vibrations produced were below the ground trigger level of 0.030 in/sec.