# SAN RAFAEL ROCK QUARRY VIBRATION REPORT

**Location:** PB-1  |  **Max. Charge Weight:** 444  |  **Date of Blast:** 5/7/12  
**Northing:** 37°59'19" N  |  **Blast Duration:** 235 m.s  |  **Time of Blast:** 11:30  
**Easting:** 122°27'10" W  |  **Blast Number:** 1574  

## Seismograph Information

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Serial Number</td>
<td>2481</td>
<td>4550</td>
<td>4567</td>
<td>4570</td>
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<tr>
<td>Last Calibration Date</td>
<td>5/24/11</td>
<td>5/26/11</td>
<td>5/26/11</td>
<td>5/26/11</td>
</tr>
</tbody>
</table>

## Location Information

<table>
<thead>
<tr>
<th>Location</th>
<th>Rafael A</th>
<th>Via Miraflores</th>
<th>San Martin</th>
<th>Mt. Neal Park</th>
</tr>
</thead>
<tbody>
<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>
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<tr>
<td>Easting</td>
<td>122°27'10&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>950</td>
<td>3430</td>
<td>2096</td>
<td>1181</td>
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<tr>
<td>Scaled Distance</td>
<td>45</td>
<td>162</td>
<td>95</td>
<td>56</td>
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## Vibration Information

<table>
<thead>
<tr>
<th>Component</th>
<th>Value 1</th>
<th>Value 2</th>
<th>Value 3</th>
<th>Value 4</th>
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</thead>
<tbody>
<tr>
<td>Longitudinal Peak Particle Velocity (ips)</td>
<td>0.13</td>
<td>0.07</td>
<td>0.16</td>
<td></td>
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<tr>
<td>Longitudinal Peak Frequency (Hz)</td>
<td>9.1</td>
<td>0.4</td>
<td>17.2</td>
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<tr>
<td>Transverse Peak Particle Velocity (ips)</td>
<td>0.09</td>
<td>0.08</td>
<td>0.08</td>
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</tr>
<tr>
<td>Transverse Peak Frequency (Hz)</td>
<td>10.8</td>
<td>0.5</td>
<td>9.0</td>
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<tr>
<td>Vertical Peak Particle Velocity (ips)</td>
<td>0.07</td>
<td>0.07</td>
<td>0.05</td>
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</tr>
<tr>
<td>Vertical Peak Frequency (Hz)</td>
<td>10.8</td>
<td>10.8</td>
<td>11.3</td>
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</tr>
<tr>
<td>Peak Vector Sum (ips)</td>
<td>14</td>
<td></td>
<td>10</td>
<td>17</td>
</tr>
<tr>
<td>Peak Air Overpressure (db)</td>
<td>118</td>
<td>109</td>
<td>116</td>
<td></td>
</tr>
</tbody>
</table>

## General Comments:

Signed: [Signature]

Seismograph Operator:

De rou Lopes

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SAN RAFAEL ROCK QUARRY BLAST REPORT

BASE DATA:

Location: PB-1
North: 37° 59' 49" N
East: 122° 02' 22" W

Designed Bench Height (ft): 50

Rock Density (yd³): 2.23
Relative Rock Hardness: 7

Date: 5, 7, 12
Time: 11:30
Blast Number: 1574

DESIGN DATA:

Number of Holes Shot: 15
Hole Dia. (in.): 6 3/4
Stemming (ft): 24
Loading Time Required (man hrs): 6

Ave. Hole Depth (ft): 50
Burden (ft): 15
Stem Type: 3/4 in.

Staggered Pattern (y or n): Y

Deck Type:

Length (ft):

Relative Confinement:
Spacing (ft): 12
Subdrill (ft): 12
Number of Lost Holes: D

Explosives Data:

Bulk Explosive Weight

Boosters Units Delays: Units Misc. Units

L-Cap 6.76 450 38 80.42 15

Chub 5 x 304 900 — — 50.42 15

Total Charge Wt.: 1190

VIBRATION DATA:

Nearest Structure: Racine G5
Seismograph Loc.: S4 M6

Temperature: 79° Max. Chrg. (lb/8ms): 414

Northing: 37° 59' 49" N
Easting: 122° 02' 22" W

Sky Condition: Cleary
RPPV: .14

Wind Direction: W
Frequency: 10, 6

Distance Away: 150

Wind Speed: 0-1
Airblast: 118

PERFORMANCE DATA:

Powder Factor (lb/ton): .3
Displacement: Good
Crushability:

Lb/yard³: .3
Vibration: Great
Fines:

Fragmentation: Good
Digability:

Comments: Swed Holes

Blaster in Charge:
15 holes.
15: 80 E
15: 50 E
5: 42 ns
1: 17 ns
30: 450 gpm Booster
30: 6 x 30" Chub
5760 Frac Max

Depth 50'
Geological:
444 lbs per
5 Holes Wet...

Main 950
Wigmont 3432
San M 2006
MNP 1181
37° 59' 19" N
122° 27' 10" W

Ramp Down

Pit
Face 50'
POS

14 Face
Seismic Analysis
Velocity Waveform Analysis

Serial Number: 7179
Firmware Version: 08-03-23
Event Date: 05/07/2012 11:31:13 (UTC -07:00)
Event number: 11
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

Summary Data

PPV (in/s):
FREQ (Hz):
PD (.001°):
PPA (g):
Peak Vector Sum:
Peak Air Pressure:

0.1 0.055 0.06
6.7 7.5 6.8
2.232 0.985 1.31
0.03906 0.01302 0.03255
0.1 in/s
119.6 DB
0.002976 psi @ 2.8 Hz

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: +/- 0.2 in/s
Sound Scale: +/- 0.002976 psi

Velocity Waveform
SSN: 7179 Event: 11
Seismic Analysis
Velocity Waveform Analysis

Serial Number: 7257
Firmware Version: 08-03.23
Event Date: 05/07/2012 11:31:15 (UTC -07:00)
Event number: 11
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: 75.9 DB

Additional Info:
j-GEO-01252
N37 59.524, W122 27.373

**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>0.0575</td>
<td>0.04</td>
<td>0.03</td>
</tr>
<tr>
<td>FREQ (HZ):</td>
<td>8.1</td>
<td>6.5</td>
<td>6</td>
</tr>
<tr>
<td>PD (0.001&quot;)</td>
<td>1.135</td>
<td>0.875</td>
<td>0.7925</td>
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<tr>
<td>PPA (g):</td>
<td>0.01302</td>
<td>0.01302</td>
<td>0.02604</td>
</tr>
</tbody>
</table>

Peak Vector Sum: 0.07 in/s
Peak Air Pressure: 115.3 DB
0.001782 psi @ 2.3 HZ

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: 7257 Event: 11

Printed: May 07, 2012 File: 0000020128_201205.g3k (GeoSonic Inc. PDFGenerator v 1.0)
The seismograph at 114 San Marino Drive (S/N 7178) did not trigger during the shot on May 7, 2012 at approximately 11:31 indicating the ground vibrations produced were below the ground trigger level of 0.030 in/sec.