## SAN RAFAEL ROCK QUARRY VIBRATION REPORT

**Location:** PB-7  
**Max. Charge Weight:** 920  
**Date of Blast:** 9/2/12  
**Northing:** 37°59'12"N  
**Easting:** 122°37'12"W  
**Blast Duration:** 310.8s  
**Time of Blast:** 11:33  
**Blast Number:** 15816

### Seismograph Information

<table>
<thead>
<tr>
<th>Model</th>
<th>Velocity</th>
<th>Impedance</th>
<th>Contact Type</th>
<th>Serial Number</th>
<th>Last Calibration Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>D000</td>
<td>micro</td>
<td>micro</td>
<td>micro</td>
<td>8881 1850 9270</td>
<td>5/17/12 5/17/12 5/17/12</td>
</tr>
</tbody>
</table>

### Location Information

<table>
<thead>
<tr>
<th>Location</th>
<th>Northing</th>
<th>Easting</th>
<th>Distance from Blast</th>
<th>Scaled Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>PB-7</td>
<td>37°59'12&quot;N</td>
<td>122°37'12&quot;W</td>
<td>106 237 115 115</td>
<td>51 42 78 87</td>
</tr>
</tbody>
</table>

### Vibration Information

<table>
<thead>
<tr>
<th>Wave Type</th>
<th>Peak Particle Velocity (ips)</th>
<th>Peak Particle Velocity (ips)</th>
<th>Peak Particle Velocity (ips)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longitudinal</td>
<td>0.07</td>
<td>0.06</td>
<td>0.06</td>
</tr>
<tr>
<td>Transverse</td>
<td>0.08</td>
<td>0.06</td>
<td>0.06</td>
</tr>
<tr>
<td>Vertical</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
</tr>
</tbody>
</table>

### General Information

- **Seismograph Operator:** [Signature]
- **Signature:** [Signature]
SAN RAFAEL ROCK QUARRY BLAST REPORT

BASE DATA:

Location: T38-7
Northing: 37°59'12"N
Easting: 122°27'12"W
Designed Beach Height (ft): 40
Rock Density (yd^3): 2.33
Relative Rock Hardness: 2
Date: 9.7.12
Time: 11:33
Blast Number: 586

DESIGN DATA:

Number of Holes Shot: 24
Hole Dia. (in.): 3½
Steering (ft): 18
Loading Time Required (man hrs): 6
Deck Type: —
Ave. Hole Depth (ft): 43
Burden (ft): 15
Staggered Pattern (y or n): N
Length (ft): —
Relative Confinement: —
Spacing (ft): 16
Subdivision (ft): 2
Number of Lost Holes: 0
Tons Shot: 9,029

EXPLOSIVES DATA:

Bulk Explosive | Weight (lb) | Boosters | Units | Delays Units | Misc. Units | Max (lb/hole) | Blast Duration (sec):
--- | --- | --- | --- | --- | --- | --- | ---
| | | | | | | 720 | 361.5

VIBRATION DATA:

Nearest Structure: —
Seismograph Lon. | Lat.: | Temperature: 76°F
| | | Max. Chrg. rib/8ms: 420
Northing: 37°59'12"N
Easting: 122°27'12"W
Sky Condition: —
Wind Direction: —
Wind Speed: —
Frequency: 0.5
Airblast: —

PERFORMANCE DATA:

Powder Factor (lb/ton): 5
Lb/yd^3: 1.8
Vibration: —
Fragmentation: —
Displacement: —
Crushability: —
Fines: —
Digability: —
Comments: —
Blaster in Charge: —
Seismic Analysis
Velocity Waveform Analysis

Serial Number: 8030
Firmware Version: 08-03.23
Event Date: 09/07/2012 11:32:16 (UTC -07:00)
Event number: 7
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

\[
\begin{array}{ccc}
\text{PPV (in/s)} & \text{FREQ (HZ)} & \text{PD (0.001")} \\
L & 0.0975 & 27.8 \\
T & 0.045 & 29.4 \\
V & 0.09 & 45.5 \\
\end{array}
\]

PPA (g):

- Peak Vector Sum: 0.115 in/s
- Peak Air Pressure: 110.4 DB
- PPA (g): 0.009802 psi @ 3.4 HZ

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: +/- 0.195 in/s
- Sound Scale: +/- 0.0023 psi

Velocity Waveform
SSN: 8030 Event: 7

Printed: September 07, 2012 File: 0000017825_201209.g3k (GeoSonics Inc. PDFGenerator v 1.0)
Seismic Analysis
Velocity Waveform Analysis

Serial Number: 8056
Firmware Version: 06-03.23
Event Date: 09/07/2012 11:32:16 (UTC -07:00)
Event number: 5
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 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>
<thead>
<tr>
<th>Vector</th>
<th>PPV (in/s)</th>
<th>FREQ (Hz)</th>
<th>PD (°/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>0.0475</td>
<td>27.8</td>
<td>0.225</td>
</tr>
<tr>
<td>T</td>
<td>0.0325</td>
<td>31.3</td>
<td>0.38</td>
</tr>
<tr>
<td>V</td>
<td>0.0375</td>
<td>31.3</td>
<td>0.275</td>
</tr>
</tbody>
</table>

Peak Vector Sum: 0.0525 in/s
Peak Air Pressure: 110.4 DB
0.0009802 psi @ 2.8 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: 5
GeoSonics Inc. Seismic Analysis
Stop Event Report

Serial No: 8021 v3.23
Client: COUNTY OF MARIN
Operation: SAN RAFAEL ROCK QUARRY
Location: 114 SAN MARINO DRIVE
Distance: 
Operator: VIBRA-TECH GSM
Comment: VERONIQUE RASKIN*

Begin Date: 09/07/2012 06:00:50 (UTC-7)
End Date: 09/07/2012 12:31:49 (UTC-7)
Events over Trigger: 0 (16-15)
Record Time: 5.0 s
Seismic Trigger: 0.030 in/s
Sound Trigger: N/A
Battery Level: 8.8

Shaketable Calibrated: 05/11/2012
By: Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

Dynamic Calibration Graph:

Cal Test Results:

Longitudinal: Pass
Transverse: Pass
Vertical: Pass
Sound: Pass

The seismograph at 114 San Marino Drive (S/N 8021) did not trigger during the shot on September 7, 2012 at approximately 11:32 indicating the ground vibrations produced were below the ground trigger level of 0.030 in/sec.