**SAN RAFAEL ROCK QUARRY VIBRATION REPORT**

**Blast Information**

- Location: P.B 7
- Max. Charge Weight: 150
- Date of Blast: 8.27.13
- Northing: 37° 59.14' N
- Time of Blast: 11:33
- Easting: 122° 22.22' E
- Blast Duration: 4.5 sec
- Blast Number: 1597

**Seismograph Information**

<table>
<thead>
<tr>
<th>Seismograph Model</th>
<th>Unit 1</th>
<th>Unit 2</th>
<th>Unit 3</th>
<th>Unit 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
</tr>
<tr>
<td>Serial number</td>
<td>1234</td>
<td>5678</td>
<td>9012</td>
<td>3456</td>
</tr>
<tr>
<td>Last Calibration Date</td>
<td>5/3/12</td>
<td>5/3/13</td>
<td>5/3/12</td>
<td>5/3/12</td>
</tr>
</tbody>
</table>

**Location Information**

- Location: 37° 59.14' N, 122° 22.22' E
- Northing: 37° 59.14' N
- Easting: 122° 22.22' E
- Distance from Blast: 1320 mum, 3643 mum, 2574 mum, 1742 mum
- Scaled Distance: 98, 221, 188, 129

**Vibration Information**

<table>
<thead>
<tr>
<th>Type</th>
<th>Unit 1</th>
<th>Unit 2</th>
<th>Unit 3</th>
<th>Unit 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longitudinal Peak Particle Velocity (ips)</td>
<td>0.06</td>
<td>0.06</td>
<td>0.07</td>
<td>0.07</td>
</tr>
<tr>
<td>Longitudinal Peak Frequency (Hz)</td>
<td>23.8</td>
<td>23.8</td>
<td>20.0</td>
<td>20.0</td>
</tr>
<tr>
<td>Transverse Peak Particle Velocity (ips)</td>
<td>0.06</td>
<td>0.07</td>
<td>0.06</td>
<td>0.06</td>
</tr>
<tr>
<td>Transverse Peak Frequency (Hz)</td>
<td>15.0</td>
<td>12.1</td>
<td>20.0</td>
<td>20.0</td>
</tr>
<tr>
<td>Vertical Peak Particle Velocity (ips)</td>
<td>0.06</td>
<td>0.06</td>
<td>0.11</td>
<td>0.11</td>
</tr>
<tr>
<td>Vertical Peak Frequency (Hz)</td>
<td>15.3</td>
<td>12.5</td>
<td>41.6</td>
<td>41.6</td>
</tr>
<tr>
<td>Peak Vector Sum (ips)</td>
<td>0.08</td>
<td>0.09</td>
<td>0.11</td>
<td>0.11</td>
</tr>
<tr>
<td>Peak Air Overpressure (db)</td>
<td>114</td>
<td>106</td>
<td>106</td>
<td>106</td>
</tr>
</tbody>
</table>

Seismograph Operator: Deon Lopes

Signature: Deon Lopes
SAN RAFAEL ROCK QUARRY BLAST REPORT

BASE DATA:
Location: PB-7
Northing: 37°59'41.6 N
Easting: 122°37'52.4 W
Designed Bench Height (ft): 21
Rock Density (lb/ft³): 2.23
Relative Rock Hardness: 2
Date: 8-27-13
Time: 11:33
Blast Number: 189

DESIGN DATA:
Number of Holes Shot: 18
Hole Dia.(in.): 2\frac{1}{4}
Stemming (ft): 13
Loading Time Required (man hrs): 7
Deck Type:
Ave. Hole Depth (ft): 25
Burden (ft): 20
 stemming (ft): 20
Staggered Pattern (y or n): Y
Length (ft):
Relative Confinement:
Spacing (ft):
Subdrift (ft):
Number of Lost Holes: 0
Tons Shot: 14,217

EXPLOSIVES DATA:

<table>
<thead>
<tr>
<th>Bulk Exp.</th>
<th>Weight</th>
<th>Boosters</th>
<th>Units</th>
<th>Delays</th>
<th>Units</th>
<th>Misc.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emulsion</td>
<td>7,800</td>
<td>400gpm</td>
<td>18</td>
<td>50 12</td>
<td>1.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Max (lb/hole): 1,800
Blast Duration (sec): 476

VIBRATION DATA:
Nearest Structure: Masonry
Seismograph Loc.: 4.0 mi
Temperature: 79°
Max. Chrg. (lb/8ms): 360

Northing: 37°59'41.6 N
Northing: 122°37'52.4 W
Sky Condition: cloudy
RPPV: 0.8
Wind Direction: S\frac{1}{8} E
Frequency: 20

Distance Away: 1320
Distance Away: 1320
Wind Speed: 5.8 mph
Airblast: 11

PERFORMANCE DATA:
Powder Factor (lb/ton): 5
Displacement: Great
Crushability:
Lb/ft³: 118
Vibration: Great
Fines:
Fragmentation: Great
Dig ability:
Comments: 45° 20' Angle

Blaster in Charge: [Signature]
Seismic Analysis
Velocity Waveform Analysis

Serial Number: 9808
Firmware Version: 08-03.23
Event Date: 08/27/2013 11:32:44 (UTC -07:00)
Event number: 20
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>
<th>PPV (in/s)</th>
<th>L</th>
<th>T</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.0575</td>
<td>0.0425</td>
<td>0.06</td>
</tr>
<tr>
<td>FREQ (HZ):</td>
<td>45.5</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>PD (400&quot;)</td>
<td>0.33</td>
<td>0.2575</td>
<td>0.25</td>
</tr>
<tr>
<td>PPA (g):</td>
<td>0.05208</td>
<td>0.03906</td>
<td>0.05208</td>
</tr>
</tbody>
</table>

Peak Vector Sum: 0.0725 in/s
Peak Air Pressure: 105.8 DB
0.0006416 psi @ 2.1 HZ

Shaketable Calibrated
On: 02/20/2013 (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: 9808 Event: 20

Printed: August 28, 2013 File: 000068400_201308_g3k (GeoSonic Inc. PDFGenerator v 1.0)
Vibra-Tech Inc. Seismic Analysis
Stop Event Report

Serial No: 9591 v3.23
Client: COUNTY OF MARIN
Operation: SAN RAFAEL ROCK QRY
Location: 16 MARIN BAY PARK CT.
Distance: 
Operator: VIBRA-TECH GSM
Comment: WILLIAM HOSKEN RES.

Begin Date: 08/27/2013 07:00:50 (UTC-7)
End Date: 08/27/2013 20:00:00 (UTC-7)
Events over Trigger: 0 (3-2)
Record Time: 5.0 s
Seismic Trigger: 0.030 in/sec
Sound Trigger: N/A
Battery Level: 8.6

Shaketable Calibrated: 02/20/2013
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 located at 16 Marin Bay Park Court (S/N 9591) did not trigger during the shot on August 27, 2013 at approximately 11:32 indicating the ground vibrations produced were below the ground trigger level of 0.030 in/sec.