# SAN RAFAEL ROCK QUARRY VIBRATION REPORT

<table>
<thead>
<tr>
<th>Location: PB-7</th>
<th>Max. Charge Weight: 220</th>
<th>Date of Blast: 8-18-11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northing: 32°59'12&quot; N</td>
<td>Time of Blast: 12:20</td>
<td></td>
</tr>
<tr>
<td>Easting: 122°27'16&quot; W</td>
<td>Blast Duration: 351 ms</td>
<td></td>
</tr>
<tr>
<td>Blast Number: 1552</td>
<td></td>
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</tbody>
</table>

### 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>Type</td>
<td>V000</td>
<td>M10.0</td>
<td>M10.0</td>
<td>M10.0</td>
</tr>
<tr>
<td>Serial Number</td>
<td>5688</td>
<td>5688</td>
<td>5688</td>
<td>5688</td>
</tr>
<tr>
<td>Last Calibration Date</td>
<td>5.21.10</td>
<td>5.30.11</td>
<td>5.26.11</td>
<td>5.26.11</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>Mission 3</td>
<td>37°58'49&quot; N</td>
<td>122°27'32&quot; W</td>
<td>29.8</td>
<td>60</td>
</tr>
<tr>
<td>Via Marina</td>
<td>37°59'32&quot; N</td>
<td>122°27'39&quot; W</td>
<td>29.57</td>
<td>199</td>
</tr>
<tr>
<td>San Pablo</td>
<td>37°59'30&quot; N</td>
<td>122°27'30&quot; W</td>
<td>22.70</td>
<td>153</td>
</tr>
<tr>
<td>AF Water 2-1K</td>
<td>37°59'31&quot; N</td>
<td>122°27'16&quot; W</td>
<td>19.54</td>
<td>131</td>
</tr>
</tbody>
</table>

### Vibration Information

<table>
<thead>
<tr>
<th>Longitudinal Peak Particle Velocity (ips)</th>
<th>0.09</th>
<th>0.05</th>
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</thead>
<tbody>
<tr>
<td>Longitudinal Peak Frequency (Hz)</td>
<td>35.7</td>
<td>35.7</td>
</tr>
<tr>
<td>Transverse Peak Particle Velocity (ips)</td>
<td>0.07</td>
<td>0.05</td>
</tr>
<tr>
<td>Transverse Peak Frequency (Hz)</td>
<td>12.8</td>
<td>16.1</td>
</tr>
<tr>
<td>Vertical Peak Particle Velocity (ips)</td>
<td>0.04</td>
<td>0.06</td>
</tr>
<tr>
<td>Vertical Peak Frequency (Hz)</td>
<td>20.8</td>
<td>11.3</td>
</tr>
<tr>
<td>Peak Vector Sum (ips)</td>
<td>0.1</td>
<td>-</td>
</tr>
<tr>
<td>Peak Air Overpressure (db)</td>
<td>109</td>
<td>-</td>
</tr>
</tbody>
</table>

### Deck Load

- Deck loaded

Seismograph Operator: Deron Lopes
Signature: [Signature]
### SAN RAFAEL ROCK QUARRY BLAST REPORT

**BASE DATA:**
- **Location:** PB-7
- **Designed Bench Height (ft):** 40
- **Rock Density (lb/ft³):** 2.7
- **Relative Rock Hardness:** 7
- **Date:** 8-18-11
- **Time:** 12:30
- **Blast Number:** 165.3

**DESIGN DATA:**
- **Number of Holes Shot:** 19
- **Hole Dia. (in.):** 3.4
- **Stemming (ft):** 1.5
- **Loading Time Required (man hrs):** 8
- **Deck Type:** 3/8 in.
- **Ave. Hole Depth (ft):** 43
- **Burden (ft):** 1.5
- **Stem Type:**
- **Staggered Pattern (y or n):** Y
- **Length (ft):** 5
- **Relative Confinement:**
- **Spacing (ft):** 15
- **Subdrill (ft):** 5
- **Number of Lost Holes:** 0
- **Tons Shot:** 18.240

**EXPLOSIVES DATA:**

<table>
<thead>
<tr>
<th>Bulk Explosive</th>
<th>Weight</th>
<th>Boosters</th>
<th>Units</th>
<th>Delays</th>
<th>Units</th>
<th>Misc.</th>
<th>Units</th>
<th>Max (lb/hole): 380</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.08 lbs</td>
<td>1.64</td>
<td>3.16k</td>
<td>3.0</td>
<td>2.5</td>
<td>11</td>
<td></td>
<td></td>
<td>Blast Duration (sec): 25.18</td>
</tr>
</tbody>
</table>

**VIBRATION DATA:**
- **Nearest Structure:** Market St
- **Seismograph Loc.:** Same
- **Temperature:** 77°F
- **Max. Chrg. (lb/8ms):** 200
- **Nothing:** 37° 59' 19.4 N
- **Nothing:**
- **Sky Condition:** Cloudy
- **RPPV:** 0.11
- **Easting:** 121° 20' 2.2 W
- **Easting:**
- **Wind Direction:** E 65.1
- **Frequency:** 35.7
- **Airblast:** 14
- **Distance Away:** 824 ft
- **Distance Away:**

**PERFORMANCE DATA:**
- **Powder Factor (lb/ton):** 0.3
- **Displacement:** Good
- **Crushability:**
- **Lb/yard³:** 1.06
- **Vibration:** Good
- **Fines:**
- **Fragmentation:** Fair
- **Dig ability:**

**Comments:** Decksed

**Blaster in Charge:** [Signature]
A holes
19°30' 62 Jet
11°50' 62 Jct
9°40' 65 El. Jct
6°20' 65 Top

Depth 13 ft
Main 89 ft
Min. Prod 2937
Soil H 2270
MW 1954
37°59' 12 W
122° 17' 18 E

Production Hole
160 ft
220 ft

(Production)

(A)

(C)

(BYD)
Seismic Analysis
Velocity Waveform Analysis

Serial No: 7155 v3.23
Date: 08/18/2011 12:21:20 (UTC-7)
Event No: 4
Record Time: 5.0 s
Client: COUNTY OF MARIN
Operation: SAN RAFAEL ROCK QUARRY
Location: 16 MARIN BAY PARK CT.
Distance: 
Operator: VIBRA-TECH GSM
Comment: WILLIAM HOSKEN RESIDENC
Seismic Trigger: 0.030 in/s

### 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>0.025</td>
<td>0.023</td>
<td>0.033</td>
</tr>
<tr>
<td>FREQ (Hz)</td>
<td>41.7</td>
<td>45.5</td>
<td>29.4</td>
</tr>
<tr>
<td>PD (.001&quot;)</td>
<td>0.20</td>
<td>0.19</td>
<td>0.20</td>
</tr>
<tr>
<td>PPA (g)</td>
<td>0.020</td>
<td>0.020</td>
<td>0.026</td>
</tr>
<tr>
<td>Peak Vector Sum</td>
<td>0.035 in/s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak Air Pressure</td>
<td>103 db</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.00045 PSI @ 3.3 Hz</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Additional Info:

j-GEO-01252
N37.59.524, W122.27.373

Shaketable Calibrated: 01/26/2011
By: Vibra-Tech, Inc
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

Velocity Waveform Graph Scale

- Time Scale: 0.100 s
- Seismic Scale: +/- 0.160 in/s
- Sound Scale: +/- 0.0023 PSI

Velocity Waveform
SN: 7155 Event: 4

Printed: August 18, 2011 File: 949180977.g3k (GeoSonic Inc. AnalysisNET v8.1.35)
The seismograph on Quarry Property (S/N 9856) did not trigger during the shot on August 18, 2011 at approximately 12:21 indicating the ground vibrations produced were below the ground trigger level of 0.030 in/sec.
The seismograph at 114 San Marino Drive (S/N 9669) did not trigger during the shot on August 18, 2011 at approximately 12:21 indicating the ground vibrations produced were below the ground trigger level of 0.030 in/sec.