# SAN RAFAEL ROCK QUARRY VIBRATION REPORT

## Blast Information:
- **Location:** P157
- **Max. Charge Weight:** 380
- **Date of Blast:** 1-23-14
- **Blast Duration:** 5
- **Time of Blast:** 11:34
- **Blast Number:** 4

## Seismography Information:

<table>
<thead>
<tr>
<th>Seismograph Model</th>
<th>UNIT #1</th>
<th>UNIT #2</th>
<th>UNIT #3</th>
<th>UNIT #4</th>
<th>UNIT #5</th>
</tr>
</thead>
<tbody>
<tr>
<td>3208</td>
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<tr>
<td>Serial number</td>
<td>642</td>
<td>642</td>
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<tr>
<td>Last Calibration Date</td>
<td>6-3-12</td>
<td>5-3-12</td>
<td>6-7-12</td>
<td>5-3-12</td>
<td>6-3-12</td>
</tr>
</tbody>
</table>

## Location Information:
- **Location:** 41° 59' 14" N, 117° 40' 30" W
- **Northing:** 305201 N
- **Easting:** 1223151 W
- **Distance from Blast:** 16.86, 7.90, 3.09, 8.11, 7.90, 3.09, 8.11, 7.90, 3.09, 8.11
- **Scaled Distance:** 83, 200, 148, 108

## Vibration Information:

<table>
<thead>
<tr>
<th>Vibration Information</th>
<th>UNIT #1</th>
<th>UNIT #2</th>
<th>UNIT #3</th>
<th>UNIT #4</th>
<th>UNIT #5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longitudinal Peak Particle Velocity (ips)</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
</tr>
<tr>
<td>Longitudinal Peak Frequency (Hz)</td>
<td>1.6</td>
<td>1.6</td>
<td>1.6</td>
<td>1.6</td>
<td>1.6</td>
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<tr>
<td>Transverse Peak Particle Velocity (ips)</td>
<td>0.06</td>
<td>0.04</td>
<td>0.04</td>
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<tr>
<td>Transverse Peak Frequency (Hz)</td>
<td>6.6</td>
<td>6.6</td>
<td>6.6</td>
<td>6.6</td>
<td>6.6</td>
</tr>
<tr>
<td>Vertical Peak Particle Velocity (ips)</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
</tr>
<tr>
<td>Vertical Peak Frequency (Hz)</td>
<td>4.6</td>
<td>4.6</td>
<td>4.6</td>
<td>4.6</td>
<td>4.6</td>
</tr>
<tr>
<td>Peak Vector Sum (ips)</td>
<td>0.08</td>
<td>0.00</td>
<td>0.02</td>
<td>0.00</td>
<td>0.02</td>
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<tr>
<td>Peak Air Overpressure (db)</td>
<td>112</td>
<td>109</td>
<td>109</td>
<td>109</td>
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</tr>
</tbody>
</table>

## General Comments:
- **Seismograph Operator:** M. Brown
- **Signature:** [Signature]
SAN RAFAEL ROCK QUARRY BLAST REPORT

BASE DATA:
- Location: 
- Designed Bench Height (ft): 85
- Northing: 37° 59' 11" N
- Rock Density (lb/ft³): 2.25
- Easting: 125° 19' 21" W
- Relative Rock Hardness: 
- Date: 8-14
- Time: 11:24
- Blast Number: 14-35

DESIGN DATA:
- Number of Holes Shot: 24
- Hole Dia. (in.): 4
- Stemming (ft): 2.5
- Loading Time Required (man hrs): 
- Ave. Hole Depth (ft): 
- Burden (ft): 
- Stem Type: 
- Staggered Pattern (y or n): 
- Deck Type: 
- Length (ft): 
- Relative Confinement: 
- Spacing (ft): 
- Subdrill (ft): 
- Number of Lost Holes: 0
- Tons Shot: 5,477

EXPLOSIVES DATA:
- Bulk Explosive
  - Weight
  - Boosters
  - Units
  - Delays
  - Univ.
  - Misc.
  - Units
  - Max. lb/hold: 3.25
  - Blast Duration (sec): 17.7

VIBRATION DATA:
- Nearest Structure: 
- Seismograph Loc.: 
- Temperature: 61°F
- Max. Chrg. lb/sq.m: 120
- Northing: 37° 59' 19" N
- Sky Condition: Overcast
- RPPV: 1.17
- Easting: 125° 19' 21" W
- Wind Direction: 
- Frequency: 41 Hz
- Distance Away: 1,562
- Wind Speed: 5-3 MPH
- Airblast: 

PERFORMANCE DATA:
- Powder Factor (lb/ton): 4.2
- Displacement: 
- Vibration: 
- Crushability: 
- Fines: 
- Fragmentation: 40%
- Dig ability: 
- Blaster in Charge: 

Comments:
34 holes
34 = 83 EZ
34 = 83 EZ
6° 42' E27.2
6° 15' 8.4' grain
12,100 lb

Depth 41'
no stemming
3.60 kip per max

Main 1636
Via M 39.07
S na M 29.04
Main 21.12

37° 15' NW
12° 27' 05'W

O = Thin on the Face
Lt. Load 160 165 - 200
<table>
<thead>
<tr>
<th>SEIS#</th>
<th>RESIDENCE</th>
<th>COORDINATES</th>
<th>DISTANCE IN METERS</th>
<th>DISTANCE IN FEET</th>
</tr>
</thead>
<tbody>
<tr>
<td>9591</td>
<td>16 Marin Bay</td>
<td>N 37 59 31.92</td>
<td>725.3764283</td>
<td>2379</td>
</tr>
<tr>
<td></td>
<td></td>
<td>W 122 27 18.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9808</td>
<td>Quarry Property</td>
<td>N 37 59 29.28</td>
<td>586.4415896</td>
<td>1924</td>
</tr>
<tr>
<td></td>
<td></td>
<td>W 122 27 11.64</td>
<td></td>
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</tr>
</tbody>
</table>

Multiply by 3.28

| Blast Coordinates | 37°     | 59' | 11.000" |
|                   | -122°   | 27' | 7.000"  |

Revised April 13, 2004
The seismograph located at 16 Marin Bay Park Court (S/N 9591) did not trigger during the shot on January 28, 2014 at approximately 11:33 indicating the ground vibrations produced were below the ground trigger level of 0.030 in/sec.
Seismic Analysis
Velocity Waveform Analysis

Serial Number: 9808
Firmware Version: 08-03,23
Event Date: 01/28/2014 11:33:19 (UTC -08:00)
Event number: 25
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>0.045</td>
<td>0.0225</td>
<td>0.045</td>
</tr>
<tr>
<td>FFREQ (HZ):</td>
<td>17.9</td>
<td>38.5</td>
<td>29.4</td>
</tr>
<tr>
<td>PD (.001°):</td>
<td>0.3675</td>
<td>0.21</td>
<td>0.27</td>
</tr>
<tr>
<td>PPA (g):</td>
<td>0.03255</td>
<td>0.01953</td>
<td>0.03255</td>
</tr>
<tr>
<td>Peak Vector Sum:</td>
<td>0.0475 in/s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak Air Pressure:</td>
<td>110.7 DB</td>
<td>0.001034 psi @ 5.1 HZ</td>
<td></td>
</tr>
</tbody>
</table>

Shaketable Calibrated
On: 02/20/2013 (UTC -08:00)
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: 25
Attached please find the seismic analysis for the blast at the San Rafael Quarry. Unfortunately, the instrument at the William Hosken residence is not communicating and I am unable to retrieve the data from it. I apologize for any inconvenience. Should you have any questions please feel free to contact me.

Thank you,

Maggie Heffelfinger
Administrative Assistant

570-455-5861 Office
570-455-6783 Fax

Vibra-Tech
109 E. 1st Street
PO Box 577
Hazleton, PA 18201
www.vibratechinc.com

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