# SAN RAFAEL ROCK QUARRY VIBRATION REPORT

**Location:** PB-8  
**Max. Charge Weight:** 48.0  
**Date of Blast:** 4.5.12  
**Northing:** 37°59'10"N  
**Blast Duration:** 403  
**Easting:** 122°27'16"W  
**Time of Blast:** 11:38:58  
**Blast Number:** 1571

### Seismograph Information

<table>
<thead>
<tr>
<th>Seismograph Model</th>
<th>Micro</th>
<th>Micro</th>
<th>Micro</th>
<th>Micro</th>
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<tbody>
<tr>
<td>Serial Number</td>
<td>2481</td>
<td>4550</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>
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</tbody>
</table>

### Location Information

<table>
<thead>
<tr>
<th>Location</th>
<th>Maria Ag</th>
<th>Via Mont</th>
<th>San Marino</th>
<th>McNear Park</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northing</td>
<td>37°59'19&quot;N</td>
<td>37°59'18&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°27'22&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>1056</td>
<td>3062</td>
<td>2929</td>
<td>2006</td>
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<tr>
<td>Scaled Distance</td>
<td>48</td>
<td>139</td>
<td>110</td>
<td>91</td>
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### Vibration Information

<table>
<thead>
<tr>
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<th>Maria Ag</th>
<th>Via Mont</th>
<th>San Marino</th>
<th>McNear Park</th>
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</thead>
<tbody>
<tr>
<td>Longitudinal Peak Particle Velocity (ips)</td>
<td>.19</td>
<td>.09</td>
<td>.08</td>
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<tr>
<td>Longitudinal Peak Frequency (Hz)</td>
<td>30.8</td>
<td>16.1</td>
<td>19.2</td>
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<tr>
<td>Transverse Peak Particle Velocity (ips)</td>
<td>.22</td>
<td>10</td>
<td>.10</td>
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<tr>
<td>Transverse Peak Frequency (Hz)</td>
<td>19.2</td>
<td>13.5</td>
<td>12.7</td>
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<tr>
<td>Vertical Peak Particle Velocity (ips)</td>
<td>.17</td>
<td>.11</td>
<td>.10</td>
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<tr>
<td>Vertical Peak Frequency (Hz)</td>
<td>25.0</td>
<td>14.2</td>
<td>29.4</td>
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<tr>
<td>Peak Vector Sum (ips)</td>
<td>.8</td>
<td>.3</td>
<td>.13</td>
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<tr>
<td>Peak Air Overpressure (db)</td>
<td>10.6</td>
<td>10.6</td>
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</tbody>
</table>

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Seismograph Operator: **Deron Lopes**  
Signature: **Deron Lopes**
SAN RAFAEL ROCK QUARRY BLAST REPORT

BASE DATA:

Location: PB 8
Northing: 37°59'10" N
Easting: 122°27'10" W
Designed Bench Height (ft): 45'
Rock Density (ft/ft³): 2.23
Relative Rock Hardness: 7
Date: 4-5-12
Time: 11:38
Blast Number: 1571

DESIGN DATA:

Number of Holes Shot: 18
Hole Dia. (in.): 6(3/4)
Stemming (ft): 19
Loading Time Required (man hrs): 7
Deck Type:
Ave. Hole Depth (ft): 47
Burden (ft): 15
Stem Type: 3/4
Spacing (ft): 15
Subdrill (ft): 2
Number of Lost Holes: 2
Tons Shot: 15721

EXPLOSIVES DATA:

Bulk Explosive Weight:

<table>
<thead>
<tr>
<th>Material</th>
<th>Weight (lbs)</th>
<th>Boosters</th>
<th>Units</th>
<th>Delays</th>
<th>Units</th>
<th>Misc.</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>T-Tam, 100</td>
<td>79.60</td>
<td>450</td>
<td>36</td>
<td>80</td>
<td>18</td>
<td></td>
<td>Max (lb/hole): 480</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>50.02</td>
<td>18</td>
<td></td>
<td>Blast Duration (sec): 403</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>43.03</td>
<td>9</td>
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</tbody>
</table>

VIBRATION DATA:

Seismograph Loc.: Somewhere
Temperature: 61°
Max. Cling. (lbs/ft): 456
RPPV: 126
Sky Condition: Clear
Frequency: 23 HZ
Distance Away: 1056 ft

PERFORMANCE DATA:

Powder Factor (lb/ton): .5
Displacement: 
Crushability:

Lb/ft³: 12
Vibration: GREAT
Fines:

Fragmentation: Good
Dig ability:

Comments: Swap shot all holes. Very wet. Hole caved in. Hole unstable to land
Blaster in Charge: Dan Lofe
Sump Shot

High Wall

4.5.12
P.B. 8
#1571

18 Holes
18: 80 E2
18: 50 E2
1: 42 m
1: 17 m
3: 480 g

Depth: 47
19 stemming
480 lbs max

all holes vertical!!

Main: 1056
Walls: 2062
SuMo: 2429
19' W 2066

37° 59' 10 N
122° 27' 16 W
Seismic Analysis
Velocity Waveform Analysis

Serial Number: 7178
Firmware Version: 08-03.23
Event Date: 04/05/2012 11:38:31 (UTC -07:00)
Event number: 3
Recording Time: 5 s
Client: COUNTY OF MARIN
Operation: SAN RAFAEL ROCK QUARRY
Location: 114 SAN MARINO DRIVE
Distance: 
Operator: VIBRA-TECH GSM
Comment: VERONIQUE RASKIN
Seismic Trigger: 0.03 m/s
Sound Trigger: 76 DB
Additional Info: RESIDENCE
j-GEO-01254
N37 59.395, W122 27.700

Summary Data

<table>
<thead>
<tr>
<th>PPV (in/s)</th>
<th>L</th>
<th>T</th>
<th>V</th>
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<tbody>
<tr>
<td></td>
<td>0.018</td>
<td>0.023</td>
<td>0.038</td>
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<tr>
<td>FREQ (HZ)</td>
<td>33.3</td>
<td>29.4</td>
<td>41.7</td>
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<tr>
<td>PD (.001&quot;)</td>
<td>0.16</td>
<td>0.18</td>
<td>0.25</td>
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<tr>
<td>PPA (g)</td>
<td>0.013</td>
<td>0.02</td>
<td>0.026</td>
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</tbody>
</table>

Peak Vector Sum: 0.04 in/s
Peak Air Pressure: 79 DB
Shaketable Calibrated
On: 01/16/2012 (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: 7178 Event: 3

Printed: April 05, 2012 File: 0000015262_201204.g3k (GeoSonics Inc. PDFGenerator v 1.0)
Seismic Analysis
Velocity Waveform Analysis

Serial Number: 7179
Firmware Version: 08-03.23
Event Date: 04/05/2012 11:38:31 (UTC-07:00)
Event number: 8
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: 76 DB
Additional Info:
j-Geo-01253
N37 59.481, W122 27.256

Summary Data

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<tr>
<th></th>
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<th>PD (.001&quot;)</th>
<th>PPA (g)</th>
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<tr>
<td>L</td>
<td>0.033</td>
<td>11.4</td>
<td>0.3</td>
<td>0.026</td>
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<td>T</td>
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<td>45.5</td>
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<tr>
<td>V</td>
<td>0.053</td>
<td>33.3</td>
<td>0.44</td>
<td>0.046</td>
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</tbody>
</table>

Peak Vector Sum: 0.06 in/s
Peak Air Pressure: 101 DB
0.0004 psi @ 4.1 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: 7179 Event: 8

Printed: April 05, 2012 File: 0000015251_201204.g3k (GeoSonics Inc. PDFGenerator v 1.0)
Seismic Analysis
Velocity Waveform Analysis

Serial Number: 7257
Firmware Version: 05-03.23
Event Date: 04/05/2012 11:38:33 (UTC -07:00)
Event number: S
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 Residene
Seismic Trigger: 0.03 in/s
Sound Trigger: 76 DB

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

Summary Data

<table>
<thead>
<tr>
<th></th>
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<th>T</th>
<th>V</th>
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<tbody>
<tr>
<td>PPV (in/s)</td>
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<td>FREQ (HZ)</td>
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<td>PD (0.01&quot;)</td>
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<tr>
<td>PPA (g)</td>
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</table>

Peak Vector Sum: 0.055 in/s
Peak Air Pressure: 100 DB
0.0003 psi @ 2.4 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: 8

Printed: April 05, 2012 File: 0000015269_201204.g3k (GeoSonics Inc. PDFGenerator v 1.0)