# SAN RAFAEL ROCK QUARRY VIBRATION REPORT

**Location:** PB-2  
**Max. Charge Weight:** 200  
**Date of Blast:** 8.30.11  
**Northing:** 37°51'10"N  
**Easting:** 122°27'17"W  
**Blast Number:** 1554  
**Blast Duration:** 343 ms  
**Time of Blast:** 12:11

<table>
<thead>
<tr>
<th>Seismograph Model</th>
<th>Micro 00</th>
<th>Micro 10</th>
<th>Micro 60</th>
<th>Micro 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial Number</td>
<td>4801</td>
<td>4850</td>
<td>4860</td>
<td>4870</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>
<td>5.26.11</td>
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</tbody>
</table>

## LOCATION INFORMATION

<table>
<thead>
<tr>
<th>Location</th>
<th>Martin Ave</th>
<th>Via Mollanita</th>
<th>San Martin</th>
<th>Middletown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northing</td>
<td>37°59'14&quot;N</td>
<td>37°59'16&quot;N</td>
<td>37°59'31&quot;N</td>
<td>37°59'30&quot;N</td>
</tr>
<tr>
<td>Easting</td>
<td>122°27'18&quot;W</td>
<td>122°27'13&quot;W</td>
<td>122°27'20&quot;W</td>
<td>122°27'16&quot;W</td>
</tr>
<tr>
<td>Distance from Blast</td>
<td>1050</td>
<td>2456</td>
<td>2428</td>
<td>2060</td>
</tr>
<tr>
<td>Scaled Distance</td>
<td>74</td>
<td>209</td>
<td>171</td>
<td>145</td>
</tr>
</tbody>
</table>

## VIBRATION INFORMATION

<table>
<thead>
<tr>
<th>Longitudinal Peak Particle Velocity (ips)</th>
<th>.12</th>
<th>.06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longitudinal Peak Frequency (Hz)</td>
<td>16.6</td>
<td>13.5</td>
</tr>
<tr>
<td>Transverse Peak Particle Velocity (ips)</td>
<td>.13</td>
<td>.05</td>
</tr>
<tr>
<td>Transverse Peak Frequency (Hz)</td>
<td>14.2</td>
<td>3.9</td>
</tr>
<tr>
<td>Vertical Peak Particle Velocity (ips)</td>
<td>.11</td>
<td>.05</td>
</tr>
<tr>
<td>Vertical Peak Frequency (Hz)</td>
<td>32.4</td>
<td>13.1</td>
</tr>
<tr>
<td>Peak Vector Sum (ips)</td>
<td>.16</td>
<td>.08</td>
</tr>
<tr>
<td>Peak Air Overpressure (db)</td>
<td>112</td>
<td>106</td>
</tr>
</tbody>
</table>

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

BASE DATA:

Location: 1B-2
Northing: 39° 54' 10" N
Easting: 12° 39' 17" W

Designed Bench Height (ft): 40
Rock Density (lb/ft^3): 2.7
Relative Rock Hardness: 7

Date: 8.30.11
Time: 12:11

Blast Number: 1554

DESIGN DATA:

Number of Holes Shot: 20
Hole Dia.(in.): 6 3/4
Stemming (ft): 15
Loading Time Required (min hrs): 9
Deck Type: 3/4" plywood

Ave. Hole Depth (ft): 4 1/2
Burden (ft): 15
Stem Type 3/4" standoff
Staggered Pattern (y or n): Y
Length (R): 50 ft Ave.

Relative Confine ment:
Spacing (ft):
Subdrill (ft): 1
Number of Lost Holes: 0
Tons Shot: 19.200

EXPLOSIVES DATA:

Bulk Explosive
Weight
Boosters
Units
Delays
Units
Misc.
Units

1.1
.4
41.6
40
35.5
20

50.6
20

49.6
27.2
4

Max (lb/hole): 240
Blast Duration (sec): 343 m s

VIBRATION DATA:

Nearest Structure: Martin
Seismograph Loc.: S. Ave.
Northing: 39° 54' 10" N
Easting: 12° 39' 17" W

Temperature: 70°
Max. Chrg. (lb/ft^3): 300

Sky Condition: Overcast
RPPV: 16

Wind Direction: S. E.
Frequency: 38.4

Total Charge Wt.: 6,540

PERFORMANCE DATA:

Powder Factor (lb/ton): .3
Lb/ft^3: .9

Displacement: 60.0
Vibration: Great

Fragmentation: Good
Digability: Good

Comments: Deck loaded
Blaster in Charge: J. J. Lea
<table>
<thead>
<tr>
<th>Serial No:</th>
<th>9856 v3.23</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client:</td>
<td>COUNTY MARIN</td>
</tr>
<tr>
<td>Operation:</td>
<td>SAN RAFAEL ROCK QUARRY</td>
</tr>
<tr>
<td>Location:</td>
<td>ON QUARRY PROPERTY</td>
</tr>
<tr>
<td>Distance:</td>
<td></td>
</tr>
<tr>
<td>Operator:</td>
<td>VIBRA-TECH GSM</td>
</tr>
<tr>
<td>Comment:</td>
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</tr>
<tr>
<td>Begin Date:</td>
<td>08/30/2011 06:00:50 (UTC-7)</td>
</tr>
<tr>
<td>End Date:</td>
<td>08/30/2011 12:50:42 (UTC-7)</td>
</tr>
<tr>
<td>Events over Trigger:</td>
<td>0 (4-3)</td>
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<tr>
<td>Record Time:</td>
<td>5.0 s</td>
</tr>
<tr>
<td>Seismic Trigger:</td>
<td>0.030 in/s</td>
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<tr>
<td>Sound Trigger:</td>
<td>N/A</td>
</tr>
<tr>
<td>Battery Level:</td>
<td>8.7</td>
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<tr>
<td>Shaketable Calibrated:</td>
<td>01/27/2011</td>
</tr>
<tr>
<td>By:</td>
<td>Vibra-Tech, Inc.</td>
</tr>
<tr>
<td>Address:</td>
<td>2700 Holloway Road - Suite 113</td>
</tr>
<tr>
<td>City:</td>
<td>Louisville, KY 40299 U.S.A.</td>
</tr>
<tr>
<td>TEL:</td>
<td>502.240.9900</td>
</tr>
<tr>
<td>FAX:</td>
<td>502.240.9902</td>
</tr>
</tbody>
</table>

**Dynamic Calibration Graph:**

**Cal Test Results:**

<table>
<thead>
<tr>
<th>Category</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longitudinal</td>
<td>Pass</td>
</tr>
<tr>
<td>Transverse</td>
<td>Pass</td>
</tr>
<tr>
<td>Vertical</td>
<td>Pass</td>
</tr>
<tr>
<td>Sound</td>
<td>Pass</td>
</tr>
</tbody>
</table>

The seismograph on Quarry Property (S/N 9856) did not trigger during the shot on **August 30, 2011** at approximately **12:11** indicating the ground vibrations produced were below the ground trigger level of **0.030 in/sec.**
The seismograph located across the street from 16 Marin Bay Park Court (S/N 7155) did not trigger during the blast on August 30, 2011 at approximately 12:11 indicating the ground vibrations produced were below the ground trigger level of 0.030 in/sec.
GeoSonics Inc. Seismic Analysis
Stop Event Report

Serial No: 9669 v3.23
Client: COUNTY MARIN
Operation: SAN RAFAEL ROCK QUARRY
Location: 114 SAN MARINO DRIVE
Distance: 
Operator: VIBRA-TECH GSM
Comment: VERONIQUE RASKIN

Begin Date: 08/30/2011 07:00:50 (UTC-7)
End Date: 08/30/2011 12:54:01 (UTC-7)
Events over Trigger: 0 (2-1)
Record Time: 5.0 s
Seismic Trigger: 0.030 in/s
Sound Trigger: N/A
Battery Level: 8.9

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

Dynamic Calibration Graph:

Cal Test Results:
Longitudinal: Pass
Transverse: Pass
Vertical: Pass
Sound: Pass

The seismograph at 114 San Marino Drive (S/N 9669) did not trigger during the shot on August 30, 2011 at approximately 12:11 indicating the ground vibrations produced were below the ground trigger level of 0.030 in/sec.