SAN RAFAEL ROCK QUARRY VIBRATION REPORT

Location: South Hill
Max. Charge Weight: 240
Date of Blast: 6.19.12
Northing: 37°59'02" N
Blast Duration: 42.8 ms
Easting: 122°27'23" W
Time of Blast: 11:32
Blast Number: 1580

Seismograph Model     Micro  Micro  Micro  Micro
Serial Number         2481    4550    4567    4570
Last Calibration Date 5/17/12  5/17/12  5/17/12  5/17/12

Location
Marien-Ex  Via Montecello  San Marinos  McNear Park
Northing     37°59'10" N  37°59'18" N  37°59'21" N  37°59'36" N
Easting      122°27'22" W  122°27'25" W  122°27'32" W  122°27'16" W
Distance from Blast 1690    2851    2810    2351
Scaled Distance 109     184     194     184

VIBRATION INFORMATION
Longitudinal Peak Particle Velocity (ips)    .05
Longitudinal Peak Frequency (Hz)          20.0
Transverse Peak Particle Velocity (ips)    .09
Transverse Peak Frequency (Hz)           23.8
Vertical Peak Particle Velocity (ips)    .04
Vertical Peak Frequency (Hz)             38.7

Peak Vector Sum (ips) .08
Peak Air Overpressure (db) 117

Seismograph Operator: [Signature]
Signature: [Signature]
**BASE DATA:**

Location: **South Hill**  
Nortthing: **37°59' 02"N**  
Easting: **122°27' 23"W**  
Designed Bench Height (ft): **26**  
Rock Density (yd³/ft³): **7**  
Relative Rock Hardness: **2.23**  
Date: **6-19-12**  
Time: **11:37**  
Blast Number: **1580**

**DESIGN DATA:**

Number of Holes Shot: **31**  
Hole Dia. (in.): **31/4**  
Stemming (ft): **15**  
Loading Time Required (min hrs): **5**  
Deck Type: **-**  
Ave. Hole Depth (ft): **25**  
Burden (ft): **14**  
Stem Type: **3/4+**  
Staggered Pattern (y or n): **N**  
Length (ft): **-**

Relative Confinement: **-**  
Spacing (ft): **3**  
Subdrift (ft): **3**  
Number of Lost Holes: **0**  
Tons Shot: **13,047**

**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>
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<tbody>
<tr>
<td>Titan 1000G</td>
<td>720</td>
<td>45.9</td>
<td>31</td>
<td>86.2</td>
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<td>42.2</td>
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<td></td>
<td>17.3</td>
<td>2</td>
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</tbody>
</table>

Max (lb/hole): **240**  
Blast Duration (sec): **428 m/s**

**VIBRATION DATA:**

Nearest Structure: **Marina**  
Seismograph Loc: **50 m**  
Temperature: **78°**  
Mon. Chg. (lb/ft³): **240**

Northing: **37°59' 14.6"N**  
Easting: **122°27' 22.4"W**  
Sky Condition: **Clear**  
Wind Direction: **66°**  
Frequency: **35.7**

**PERFORMANCE DATA:**

Powder Factor (ft³/ton): **5**  
Displacement: **Great**  
Crushability: **-**

1 lb/yd³: **1.2**  
Vibration: **Great**  
Fines: **-**

Fragmentation: **Good**  
Digability: **-**  
Blaster in Charge: **[Signature]**

Comments: **-**
31 holes
9:42 m
2:17 m
31° 450 gram

Depth: 2.8

15 stem
240 lbs per

Main: 169.0
West: 285.1
South: 301.0
MNP: 285.1

31° 59' 02" N
122° 27' 23" W

6.19.12
South Hill
#1580

14 x 14
The seismograph located across the street from 16 Marin Bay Park Court (S/N 8056) did not trigger during the blast on June 19, 2012 at approximately 11:32 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: 8021 v3.23
Client: COUNTY OF MARIN
Operation: SAN RAFAEL ROCK QUARRY
Location: 114 SAN MARINO DRIVE
Distance: 
Operator: VIBRA-TECH GSM
Comment: VERONIQUE RASKIN*

Begin Date: 06/19/2012 06:00:50 (UTC-7)
End Date: 06/19/2012 11:47:52 (UTC-7)
Events over Trigger: 0 (15-14)
Record Time: 5.0 s
Seismic Trigger: 0.030 in/s
Sound Trigger: N/A
Battery Level: 8.8

Shaketable Calibrated: 05/11/2012
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 8021) did not trigger during the shot on June 19, 2012 at approximately 11:32 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: 8030 v3.23
Client: COUNTY OF MARIN
Operation: SAN RAFAEL ROCK QUARRY
Location: ON QUARRY PROPERTY
Distance:  
Operator: VIBRA-TECH GSM
Comment:  

Begin Date: 06/19/2012 06:00:50 (UTC-7)
End Date: 06/19/2012 11:47:43 (UTC-7)
Events over Trigger: 0 (3-2)
Record Time: 5.0 s
Seismic Trigger: 0.030 in/s
Sound Trigger: N/A
Battery Level: 9.1

Shaketable Calibrated: 05/14/2012
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 on Quarry Property (S/N 8030) did not trigger during the shot on June 19, 2012 at approximately 11:32 indicating the ground vibrations produced were below the ground trigger level of 0.030 in/sec.