SAN RAFAEL ROCK QUARRY VIBRATION REPORT

Location: PB-7  Max. Charge Weight: 470  Date of Blast: 4/12/17
Northing: 37°59'11" W  Blast Duration: 428.8 ms
Easting: 122°27'44.9" W  Time of Blast: 11:53

<table>
<thead>
<tr>
<th>Seismograph Model</th>
<th>MICRO</th>
<th>MICRO</th>
<th>MICRO</th>
<th>MICRO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial Number</td>
<td>2153</td>
<td>2153</td>
<td>4562</td>
<td>4570</td>
</tr>
<tr>
<td>Last Calibration Date</td>
<td>5/19/14</td>
<td>5/26/14</td>
<td>5/26/14</td>
<td>5/26/14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location: Morin Ag, San Marino, San Marino, CA</td>
</tr>
<tr>
<td>Northing: 37°54'19&quot; N 37°51'18&quot; N 37°54'51&quot; N 37°51'30&quot; N</td>
</tr>
<tr>
<td>Easting: 122°27'20&quot; W 122°27'53&quot; W 122°27'30&quot; W 122°27'16&quot; W</td>
</tr>
<tr>
<td>Distance from Blast: 1056 322.0 2483 1901</td>
</tr>
<tr>
<td>Scaled Distance: 51 157 121 97</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vibration Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longitudinal Peak Particle Velocity (ips)</td>
</tr>
<tr>
<td>Longitudinal Peak Frequency (Hz)</td>
</tr>
<tr>
<td>Transverse Peak Particle Velocity (ips)</td>
</tr>
<tr>
<td>Transverse Peak Frequency (Hz)</td>
</tr>
<tr>
<td>Vertical Peak Particle Velocity (ips)</td>
</tr>
<tr>
<td>Vertical Peak Frequency (Hz)</td>
</tr>
<tr>
<td>Peak Vector Sum (ips)</td>
</tr>
<tr>
<td>Peak Air Overpressure (db)</td>
</tr>
</tbody>
</table>

Ground Very Wet.

Seismograph Operator: lion Lopes  Signature: lion Lopes
# SAN RAFAEL ROCK QUARRY BLAST REPORT

**BASE DATA:**
- Location: 28-7
- Designed Bench Height (ft): 40
- Date: 4/12/18
- Northing: 37,611 N
- Rock Density (yd³/ft³): 2.23
- Time: 11:31
- Easting: 122,714 W
- Relative Rock Hardness: 7
- Blast Number: 1517

**DESIGN DATA:**
- Number of Holes Shot: 25
- Hole Dia (in.): 4
- Stemming (ft): 1/2:12
- Loading Time Required (min hrs): 5
- Deck Type: __________
- Ave. Hole Depth (ft): 14
- Burden (ft): 15
- Stem Type: __________
- Staggered Pattern (y or n): y
- Length (ft):
- Relative Confinement: Spacing (ft): 15
- Subdrill (ft): 1
- Number of Lost Holes: 0
- Tons Shot: 12,523

**EXPLOSIVES DATA:**

<table>
<thead>
<tr>
<th>Bulk Explosive</th>
<th>Weight</th>
<th>Boosters</th>
<th>Units</th>
<th>Delay:</th>
<th>Units</th>
<th>Misc.</th>
<th>Units</th>
<th>Max (lb/hole):</th>
<th>Blast Duration (sec):</th>
</tr>
</thead>
<tbody>
<tr>
<td>PETN 100%</td>
<td>1,800</td>
<td>950</td>
<td>50</td>
<td>86.82</td>
<td>1.5</td>
<td></td>
<td></td>
<td>400</td>
<td>428.00</td>
</tr>
</tbody>
</table>

|                  |        |          |       |        |       |       |       |                |                       |
|                  | 42.65  | 1       |       |        |       |       |       |                |                       |

|                  | 42.65  | 1       |       |        |       |       |       |                |                       |

Total Charge Wt.: 9850

**VIBRATION DATA:**
- Nearest Structure: Martin
- Seismograph Loc.: Same
- Temperature (°F): __________
- Max. Chrg. (lb/8ms): 42.0
- Northing: 37,611 N
- Sky Condition: __________
- RPPV: 2.5
- Easting: 122,714 W
- Wind Direction: SW
- Frequency: 26.3
- Distance Away: 1056

**PERFORMANCE DATA:**
- Powder Factor (lb/ton): __________
- Displacement: __________
- Crushability: 
- lbf/yrd³: 12.6
- Vibration: __________
- Fines: 
- Fragmentation: __________
- Dig ability: 
- Blaster in Charge: __________

Comments: __________
Ramp to PB 8

Depth: 38.43

25 Hole
25: 80 E2 det
25: 50 E2 det
9: 42 m
1: 17 m
58: 450 gram

main 1056
via 3220
Sam 2488
mf: 1901
37° 59' 11" N
122° 27' 19" W
The seismograph at 114 San Marino Drive (S/N 7178) did not trigger during the shot on April 12, 2012 at approximately 11:31 indicating the ground vibrations produced were below the ground trigger level of 0.030 in/sec.
Seismic Analysis
Velocity Waveform Analysis

Serial Number: 7257
Firmware Version: 08-03-23
Event Date: 04/12/2012 11:31:25 (UTC -07:00)
Event number: 9
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 Residenc
Seismic Trigger: 0.03 in/s
Sound Trigger: 75.9 DB

Additional Info:
j-GEO-01252
N37 59.524, W122 27.573

Summary Data

| L   | 0.035 | 0.0275 | 0.05 |
| T   | 29.4  | 33.3   | 31.3 |
| V   | 0.21  | 0.2625 | 0.31 |
| PPA (g): | 0.02604 | 0.01953 | 0.04557 |

Peak Vector Sum: 0.055 in/s
Peak Air Pressure: 111 DB

Shaketable Calibrated
On: 01/13/2012 (UTC -07:00)
By: Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40203 U.S.A.

USBM Safe Blasting Levels
SSN: 7257 Event: 9

Waveform Graph Scale
Time Scale: 0.1 s
Seismic Scale: +/- 0.16 in/s
Sound Scale: +/- 0.0023 psi

Velocity Waveform
SSN: 7257 Event: 9
Seismic Analysis
Velocity Waveform Analysis

Serial Number: 7179
Firmware Version: 08-03-23
Event Date: 04/12/2012 11:31:25 (UTC -07:00)
Event number: 9
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: 75.9 DB

Additional Info:
j-GEO-01253
N37 59.481, W122 27.256

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>0.07</td>
<td>0.0375</td>
<td>0.0825</td>
</tr>
<tr>
<td>FREQ (HZ):</td>
<td>50</td>
<td>16.1</td>
<td>50</td>
</tr>
<tr>
<td>PD (.001°):</td>
<td>0.265</td>
<td>0.5025</td>
<td>0.37</td>
</tr>
<tr>
<td>PPA (g):</td>
<td>0.05208</td>
<td>0.02604</td>
<td>0.08464</td>
</tr>
</tbody>
</table>

Peak Vector Sum: 0.1125 in/s
Peak Air Pressure: 111 DB
0.001087 psi @ 4.3 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: +/- 0.165 in/s
Sound Scale: +/- 0.0023 psi

Velocity Waveform
SSN: 7179 Event: 9

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