Vibra-Tech

September 7, 2016

4818 E. Ben White Blvd.
Suite 202
Austin, TX 78741

**Phone** 512.442.6464
**Fax** 512.442.6552

Mr. Mike Shands
Garden Ridge Quarry Commission
9400 Municipal Parkway
Garden Ridge, Texas 78266

Dear Mr. Shands,

Enclosed is the analysis for the blasting conducted during the month of August 2016 at the Hanson Aggregates Quarry in Garden Ridge, Texas. Please place this information in your 2016 Blast Data Management Book.

At the request of the Garden Ridge Quarry Commission, Vibra-Tech, Inc. personnel used seismographs each day of blasting at various locations.

The attached report contains the original seismograph records obtained from the blasting along with a comparison of the recorded vibrations to the latest recommended U.S. Bureau of Mines (USBM) Variable Partic le Velocity vs. Frequency Limits Report of Investigations (RI)-8507 (Nov. 1980).

The recorded ground vibrations **satisfy** the Variable Particle Velocity vs. Frequency Limits recommended by the USBM RI-8507 (Nov. 1980), and the levels set forth in Garden Ridge City Ordinance 34.

The recorded air-borne effects **satisfy** the recommended levels set forth in the USBM RI-8485 (Nov. 1980), and the levels set forth in Garden Ridge City Ordinance 34.

If there are any additional questions, please contact the Quarry Commission, Mike Shands at 210-257-0868, or attend the Quarry Commission meeting held the 2nd Monday of each month at 7:00 p.m.

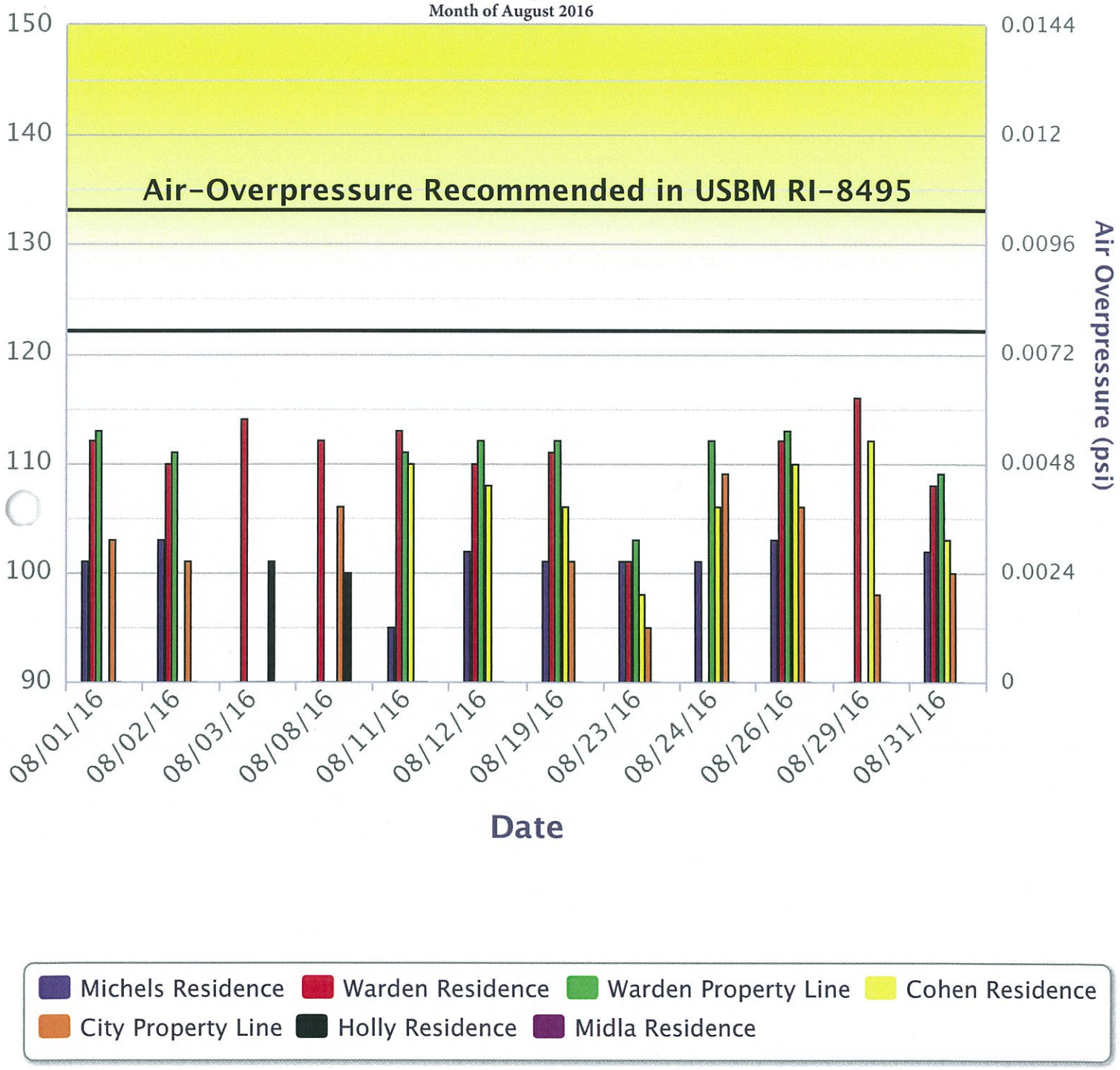
Respectfully submitted,

VIBRA-TECH, INC.

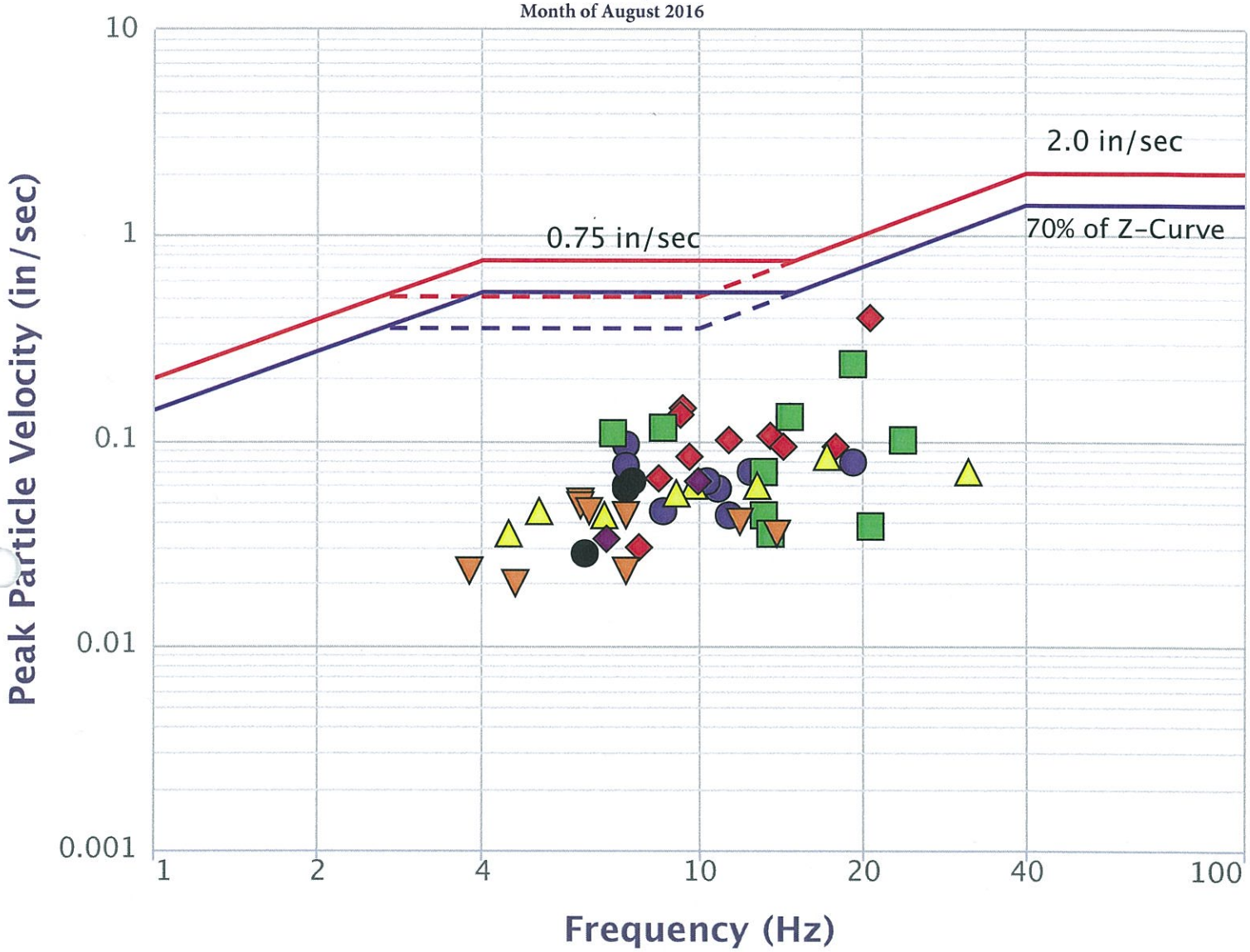
Geoffrey Rigsby
Southwest Regional Manager

cc: Jacob Scherer, Hanson – Servtex

Garden Ridge Quarry Commission
Garden Ridge, Texas
AO Graph
Month of August 2016



Garden Ridge Quarry Commission
Garden Ridge, Texas
USBM Graph
Month of August 2016




Michels Residence
Warden Residence
Warden Property Line
Cohen Residence
City Property Line
Holly Residence
Midla Residence

08-24-16 4B
08-26-16 4A
08-12-16 4A
08-23-16 3E
08-02-16 3D
08-19-16 3D
08-31-16 3D
08-11-16 Lower 6
08-01-16 1B
08-29-16 S Wall 0
08-03-16 S Wall B
08-08-16 S Wall A
Michels
Midla
Cohen
Warden
Warden Property Line
City Property Line
Holly
Cinnabar Ct
Via Posada Ct
Las Cimas Dr
Deer Canyon
Hampton Oak
Liguria Dr
Verano Ct
Fairview Cir
Forest Waters Cir
Sumac Ln
Teakwood Dr
Teakwood Ln
Bluebell Dr
Timber Rose
Sorrell Ln
Grass Creek Rd
Glen Cove
Balcave Rd
Cinchona Trail
Gloxinia Dr
Primrose
Azalea Gate
Buckhead Ln
Kurre Way
Trophy Oaks Dr
Wahl Ln
Michelle Hill
Regency Run
Schneider Ln
Levey Blvd
3009
1337
2252
© 2016 Google
Google earth

# GARDEN RIDGE QUARRY COMMISSION
## GARDEN RIDGE, TEXAS
## MONTH OF AUGUST
## 2016

| DATE | SHOT # LOCATION | SHOT LOCATION GPS READING | WEATHER | TIME | PPV (in/sec) | FREQ (Hz) | AIR (dB) | SHOT DURATION (MS) | MAX LBS/ DELAY | DISTANCE FROM BLAST | SEISMOGRAPH LOCATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 08/01/16 | 08-01-16 1B | N 29° 38' 34.6" W 098° 17' 33.8" | CLEAR 91° S 10 | 13:30 | 0.050 | 6.1 | 103.0 | 968 | 250.00 | 2,151 | City Property Line |
| 08/01/16 | 08-01-16 1B | N 29° 38' 34.6" W 098° 17' 33.8" | CLEAR 91° S 10 | 13:30 | 0.060 | 7.4 | 101.0 | 968 | 250.00 | 4,388 | Michels - 9118 Tuscan Hills |
| 08/01/16 | 08-01-16 1B | N 29° 38' 34.6" W 098° 17' 33.8" | CLEAR 91° S 10 | 13:30 | 0.033 | 6.8 | 84.0 | 968 | 250.00 | 6,806 | Midla - 8724 Verano Drive |
| 08/01/16 | 08-01-16 1B | N 29° 38' 34.6" W 098° 17' 33.8" | CLEAR 91° S 10 | 13:30 | 0.395 | 20.8 | 112.0 | 968 | 250.00 | 1,296 | Warden - 21375 Gunther Grove |
| 08/01/16 | 08-01-16 1B | N 29° 38' 34.6" W 098° 17' 33.8" | CLEAR 91° S 10 | 13:30 | 0.235 | 19.2 | 113.0 | 968 | 250.00 | 1,075 | Warden Property Line |
| 08/02/16 | 08-02-16 3D | N 29° 38' 50.2" W 098° 17' 37.5" | CLEAR 91° S 8 | 11:52 | 0.048 | 6.1 | 101.0 | 990 | 923.00 | 3,148 | City Property Line |
| 08/02/16 | 08-02-16 3D | N 29° 38' 50.2" W 098° 17' 37.5" | CLEAR 91° S 8 | 11:52 | 0.095 | 7.4 | 103.0 | 990 | 923.00 | 3,696 | Michels - 9118 Tuscan Hills |
| 08/02/16 | 08-02-16 3D | N 29° 38' 50.2" W 098° 17' 37.5" | CLEAR 91° S 8 | 11:52 | 0.063 | 10.0 | 84.0 | 990 | 923.00 | 6,696 | Midla - 8724 Verano Drive |
| 08/02/16 | 08-02-16 3D | N 29° 38' 50.2" W 098° 17' 37.5" | CLEAR 91° S 8 | 11:52 | 0.143 | 9.4 | 110.0 | 990 | 923.00 | 2,765 | Warden - 21375 Gunther Grove |
| 08/02/16 | 08-02-16 3D | N 29° 38' 50.2" W 098° 17' 37.5" | CLEAR 91° S 8 | 11:52 | 0.108 | 7.0 | 111.0 | 990 | 923.00 | 2,557 | Warden Property Line |
| 08/03/16 | 08-03-16 S Wall B | N 29° 38' 13.5" W 098° 16' 43.8" | PT CLOUDY 87° SW 8 | 11:21 | NT | NT | NT | 637 | 1053.00 | 6,249 | City Property Line |
| 08/03/16 | 08-03-16 S Wall B | N 29° 38' 13.5" W 098° 16' 43.8" | PT CLOUDY 87° SW 8 | 11:21 | 0.063 | 7.6 | 101.0 | 637 | 1053.00 | 3,720 | Holly - 9916 Trophy Oaks |
| 08/03/16 | 08-03-16 S Wall B | N 29° 38' 13.5" W 098° 16' 43.8" | PT CLOUDY 87° SW 8 | 11:21 | NT | NT | NT | 637 | 1053.00 | 9,282 | Michels - 9118 Tuscan Hills |
| 08/03/16 | 08-03-16 S Wall B | N 29° 38' 13.5" W 098° 16' 43.8" | PT CLOUDY 87° SW 8 | 11:21 | NT | NT | NT | 637 | 1053.00 | 11,392 | Midla - 8724 Verano Drive |
| 08/03/16 | 08-03-16 S Wall B | N 29° 38' 13.5" W 098° 16' 43.8" | PT CLOUDY 87° SW 8 | 11:21 | 0.065 | 8.5 | 114.0 | 637 | 1053.00 | 5,043 | Warden - 21375 Gunther Grove |

NT = No Trigger, <0.020 ips.
NT = No Trigger, <122dB

# GARDEN RIDGE QUARRY COMMISSION
## GARDEN RIDGE, TEXAS
## MONTH OF AUGUST
## 2016

| DATE | SHOT # LOCATION | SHOT LOCATION GPS READING | WEATHER | TIME | PPV (in/sec) | FREQ (Hz) | AIR (dB) | SHOT DURATION (MS) | MAX LBS/ DELAY | DISTANCE FROM BLAST | SEISMOGRAPH LOCATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 08/08/16 | 08-08-16 S Wall A | N 29° 38' 14.3" W 098° 16' 40.3" | CLEAR 96° SW 5 | 12:56 | 0.023 | 3.8 | 11.9 | 610 | 1001.00 | 6,543 | City Property Line |
| 08/08/16 | 08-08-16 S Wall A | N 29° 38' 14.3" W 098° 16' 40.3" | CLEAR 96° SW 5 | 12:56 | 0.058 | 7.4 | 100.0 | 610 | 1001.00 | 4,026 | Holly - 9916 Trophy Oaks |
| 08/08/16 | 08-08-16 S Wall A | N 29° 38' 14.3" W 098° 16' 40.3" | CLEAR 96° SW 5 | 12:56 | NT | NT | NT | 610 | 1001.00 | 9,529 | Michels - 9118 Tuscan Hills |
| 08/08/16 | 08-08-16 S Wall A | N 29° 38' 14.3" W 098° 16' 40.3" | CLEAR 96° SW 5 | 12:56 | NT | NT | NT | 610 | 1001.00 | 11,682 | Midla - 8724 Verano Drive |
| 08/08/16 | 08-08-16 S Wall A | N 29° 38' 14.3" W 098° 16' 40.3" | CLEAR 96° SW 5 | 12:56 | 0.105 | 13.5 | 112.0 | 610 | 1001.00 | 5,232 | Warden - 21375 Gunther Grove |
| 08/11/16 | 08-11-16 Lower 6 | N 29° 38' 51.2" W 098° 17' 09.9" | PT CLOUDY 95° S 6 | 13:19 | NT | NT | NT | 1000 | 480.00 | 4,842 | City Property Line |
| 08/11/16 | 08-11-16 Lower 6 | N 29° 38' 51.2" W 098° 17' 09.9" | PT CLOUDY 95° S 6 | 13:19 | 0.043 | 6.7 | 110.0 | 1000 | 480.00 | 4,414 | Cohen - 10041 Trophy Oaks |
| 08/11/16 | 08-11-16 Lower 6 | N 29° 38' 51.2" W 098° 17' 09.9" | PT CLOUDY 95° S 6 | 13:19 | 0.078 | 19.2 | 95.0 | 1000 | 480.00 | 6,123 | Michels - 9118 Tuscan Hills |
| 08/11/16 | 08-11-16 Lower 6 | N 29° 38' 51.2" W 098° 17' 09.9" | PT CLOUDY 95° S 6 | 13:19 | 0.093 | 17.9 | 113.0 | 1000 | 480.00 | 3,898 | Warden - 21375 Gunther Grove |
| 08/11/16 | 08-11-16 Lower 6 | N 29° 38' 51.2" W 098° 17' 09.9" | PT CLOUDY 95° S 6 | 13:19 | 0.043 | 13.2 | 111.0 | 1000 | 480.00 | 3,690 | Warden Property Line |
| 08/12/16 | 08-12-16 4A | N 29° 38' 58.8" W 098° 17' 38.1" | CLEAR 98° S 6 | 14:03 | NT | NT | NT | 923 | 715.00 | 3,923 | City Property Line |
| 08/12/16 | 08-12-16 4A | N 29° 38' 58.8" W 098° 17' 38.1" | CLEAR 98° S 6 | 14:03 | 0.035 | 4.5 | 108.0 | 923 | 715.00 | 4,498 | Cohen - 10041 Trophy Oaks |
| 08/12/16 | 08-12-16 4A | N 29° 38' 58.8" W 098° 17' 38.1" | CLEAR 98° S 6 | 14:03 | 0.058 | 10.9 | 102.0 | 923 | 715.00 | 3,704 | Michels - 9118 Tuscan Hills |
| 08/12/16 | 08-12-16 4A | N 29° 38' 58.8" W 098° 17' 38.1" | CLEAR 98° S 6 | 14:03 | 0.093 | 14.3 | 110.0 | 923 | 715.00 | 3,632 | Warden - 21375 Gunther Grove |
| 08/12/16 | 08-12-16 4A | N 29° 38' 58.8" W 098° 17' 38.1" | CLEAR 98° S 6 | 14:03 | 0.035 | 13.5 | 112.0 | 923 | 715.00 | 3,426 | Warden Property Line |

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# GARDEN RIDGE QUARRY COMMISSION
## GARDEN RIDGE, TEXAS
## MONTH OF AUGUST
## 2016

| DATE | SHOT # LOCATION | SHOT LOCATION GPS READING | WEATHER | TIME | PPV (in/sec) | FREQ (Hz) | AIR (dB) | SHOT DURATION (MS) | MAX LBS/ DELAY | DISTANCE FROM BLAST | SEISMOGRAPH LOCATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 08/19/16 | 08-19-16 3D | N 29° 38' 49.7" W 098° 17' 37.7" | CLOUDY 88° S 9 | 12:27 | 0.043 | 7.4 | 101.0 | 1200 | 923.00 | 3,095 | City Property Line |
| 08/19/16 | 08-19-16 3D | N 29° 38' 49.7" W 098° 17' 37.7" | CLOUDY 88° S 9 | 12:27 | 0.060 | 9.8 | 106.0 | 1200 | 923.00 | 3,575 | Cohen - 10041 Trophy Oaks |
| 08/19/16 | 08-19-16 3D | N 29° 38' 49.7" W 098° 17' 37.7" | CLOUDY 88° S 9 | 12:27 | 0.075 | 7.4 | 101.0 | 1200 | 923.00 | 3,682 | Michels - 9118 Tuscan Hills |
| 08/19/16 | 08-19-16 3D | N 29° 38' 49.7" W 098° 17' 37.7" | CLOUDY 88° S 9 | 12:27 | 0.133 | 9.3 | 111.0 | 1200 | 923.00 | 2,713 | Warden - 21375 Gunther Grove |
| 08/19/16 | 08-19-16 3D | N 29° 38' 49.7" W 098° 17' 37.7" | CLOUDY 88° S 9 | 12:27 | 0.115 | 8.6 | 112.0 | 1200 | 923.00 | 2,506 | Warden Property Line |
| 08/23/16 | 08-23-16 3E | N 29° 38' 54.4" W 098° 17' 38.3" | PT CLOUDY 88° S 14 | 12:06 | 0.023 | 7.4 | 95.0 | 1000 | 871.00 | 3,503 | City Property Line |
| 08/23/16 | 08-23-16 3E | N 29° 38' 54.4" W 098° 17' 38.3" | PT CLOUDY 88° S 14 | 12:06 | 0.070 | 31.3 | 98.0 | 1000 | 871.00 | 4,053 | Cohen - 10041 Trophy Oaks |
| 08/23/16 | 08-23-16 3E | N 29° 38' 54.4" W 098° 17' 38.3" | PT CLOUDY 88° S 14 | 12:06 | 0.043 | 11.4 | 101.0 | 1000 | 871.00 | 3,630 | Michels - 9118 Tuscan Hills |
| 08/23/16 | 08-23-16 3E | N 29° 38' 54.4" W 098° 17' 38.3" | PT CLOUDY 88° S 14 | 12:06 | 0.083 | 9.6 | 101.0 | 1000 | 871.00 | 3,185 | Warden - 21375 Gunther Grove |
| 08/23/16 | 08-23-16 3E | N 29° 38' 54.4" W 098° 17' 38.3" | PT CLOUDY 88° S 14 | 12:06 | 0.038 | 20.8 | 103.0 | 1000 | 871.00 | 2,980 | Warden Property Line |
| 08/24/16 | 08-24-16 4B | N 29° 39' 02.5" W 098° 17' 36.4" | PT CLOUDY 84° S 11 | 11:38 | 0.035 | 13.9 | 109.0 | 470 | 860.00 | 4,326 | City Property Line |
| 08/24/16 | 08-24-16 4B | N 29° 39' 02.5" W 098° 17' 36.4" | PT CLOUDY 84° S 11 | 11:38 | 0.083 | 17.2 | 106.0 | 470 | 860.00 | 4,871 | Cohen - 10041 Trophy Oaks |
| 08/24/16 | 08-24-16 4B | N 29° 39' 02.5" W 098° 17' 36.4" | PT CLOUDY 84° S 11 | 11:38 | 0.063 | 10.4 | 101.0 | 470 | 860.00 | 3,935 | Michels - 9118 Tuscan Hills |
| 08/24/16 | 08-24-16 4B | N 29° 39' 02.5" W 098° 17' 36.4" | PT CLOUDY 84° S 11 | 11:38 | 0.105 | 16.1 | 112.0 | 470 | 860.00 | 4,015 | Warden - 21375 Gunther Grove |
| 08/24/16 | 08-24-16 4B | N 29° 39' 02.5" W 098° 17' 36.4" | PT CLOUDY 84° S 11 | 11:38 | 0.100 | 23.8 | 112.0 | 470 | 860.00 | 3,807 | Warden Property Line |

NT = No Trigger, <0.020 ips.
NT = No Trigger, <122dB

# GARDEN RIDGE QUARRY COMMISSION
## GARDEN RIDGE, TEXAS
## MONTH OF AUGUST
## 2016

| DATE | SHOT # LOCATION | SHOT LOCATION GPS READING | WEATHER | TIME | PPV (in/sec) | FREQ (Hz) | AIR (dB) | SHOT DURATION (MS) | MAX LBS/ DELAY | DISTANCE FROM BLAST | SEISMOGRAPH LOCATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 08/26/16 | 08-26-16 4A | N 29° 38' 59.6" W 098° 17' 38.1" | PT CLOUDY 87° SE 1 | 11:58 | 0.040 | 11.9 | 106.0 | 923 | 630.00 | 3,999 | City Property Line |
| 08/26/16 | 08-26-16 4A | N 29° 38' 59.6" W 098° 17' 38.1" | PT CLOUDY 87° SE 1 | 11:58 | 0.060 | 12.8 | 110.0 | 923 | 630.00 | 4,579 | Cohen - 10041 Trophy Oaks |
| 08/26/16 | 08-26-16 4A | N 29° 38' 59.6" W 098° 17' 38.1" | PT CLOUDY 87° SE 1 | 11:58 | 0.070 | 12.5 | 103.0 | 923 | 630.00 | 3,720 | Michels - 9118 Tuscan Hills |
| 08/26/16 | 08-26-16 4A | N 29° 38' 59.6" W 098° 17' 38.1" | PT CLOUDY 87° SE 1 | 11:58 | 0.100 | 11.4 | 112.0 | 923 | 630.00 | 3,713 | Warden - 21375 Gunther Grove |
| 08/26/16 | 08-26-16 4A | N 29° 38' 59.6" W 098° 17' 38.1" | PT CLOUDY 87° SE 1 | 11:58 | 0.070 | 13.2 | 113.0 | 923 | 630.00 | 3,507 | Warden Property Line |
| 08/29/16 | 08-29-16 S Wall 0 | N 29° 38' 17.6" W 098° 16' 36.9" | CLOUDY 84° NE 13 | 14:39 | 0.020 | 4.6 | 98.0 | 432 | 988.00 | 6,807 | City Property Line |
| 08/29/16 | 08-29-16 S Wall 0 | N 29° 38' 17.6" W 098° 16' 36.9" | CLOUDY 84° NE 13 | 14:39 | 0.045 | 5.1 | 112.0 | 432 | 988.00 | 5,283 | Cohen - 10041 Trophy Oaks |
| 08/29/16 | 08-29-16 S Wall 0 | N 29° 38' 17.6" W 098° 16' 36.9" | CLOUDY 84° NE 13 | 14:39 | 0.028 | 6.2 | 84.0 | 432 | 988.00 | 4,333 | Holly - 9916 Trophy Oaks |
| 08/29/16 | 08-29-16 S Wall 0 | N 29° 38' 17.6" W 098° 16' 36.9" | CLOUDY 84° NE 13 | 14:39 | NT | NT | NT | 432 | 988.00 | 9,679 | Michels - 9118 Tuscan Hills |
| 08/29/16 | 08-29-16 S Wall 0 | N 29° 38' 17.6" W 098° 16' 36.9" | CLOUDY 84° NE 13 | 14:39 | 0.030 | 7.8 | 116.0 | 432 | 988.00 | 5,585 | Warden - 21375 Gunther Grove |
| 08/31/16 | 08-31-16 3D | N 29° 38' 49.2" W 098° 17' 37.8" | PT CLOUDY 89° E 6 | 13:40 | 0.045 | 6.3 | 100.0 | 990 | 923.00 | 3,046 | City Property Line |
| 08/31/16 | 08-31-16 3D | N 29° 38' 49.2" W 098° 17' 37.8" | PT CLOUDY 89° E 6 | 13:40 | 0.055 | 9.1 | 103.0 | 990 | 923.00 | 3,525 | Cohen - 10041 Trophy Oaks |
| 08/31/16 | 08-31-16 3D | N 29° 38' 49.2" W 098° 17' 37.8" | PT CLOUDY 89° E 6 | 13:40 | 0.045 | 8.6 | 102.0 | 990 | 923.00 | 3,676 | Michels - 9118 Tuscan Hills |
| 08/31/16 | 08-31-16 3D | N 29° 38' 49.2" W 098° 17' 37.8" | PT CLOUDY 89° E 6 | 13:40 | 0.130 | 14.7 | 108.0 | 990 | 923.00 | 2,662 | Warden - 21375 Gunther Grove |
| 08/31/16 | 08-31-16 3D | N 29° 38' 49.2" W 098° 17' 37.8" | PT CLOUDY 89° E 6 | 13:40 | 0.130 | 14.7 | 109.0 | 990 | 923.00 | 2,455 | Warden Property Line |

NT = No Trigger, <0.020 ips.
NT = No Trigger, <122dB

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8-1-16 Blast No. 8-1-16 1B Time 13:30

Exact Blast Location FACE 1B

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N 29° 38' 34.60"
W 98° 17' 33.80"

MONITOR GPS

N 29 38' 22.63
W 98 18' 53.97

---

**SEISMOGRAPH DATA**

Seismograph No. 6366 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-05-16 Microphone Calibration 07-05-16

Exact Seismograph Location City Property Line: outside city water tower gate
30' from gate at the property line

Seismograph Distance from Blast 2,151'

Peak Overpressure 103 dB Scaled Distance ------

Peak Particle Velocity .050 ips Operator DAVID LARNER

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: D. [signature] Date: 8-1-16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6366 v6.5 |
| **Date:** | 08/01/2016 13:30:22 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 10.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | City Property Line |
| **Distance:** | 2151 |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.038 | 0.050 | 0.025 |
| **FREQ (Hz)** | 5.8 | 6.1 | 8.3 |
| **PD (.001")** | 1.02 | 1.29 | 0.43 |
| **PPA (g)** | 0.013 | 0.013 | 0.007 |

**Peak Vector Sum :** 0.050 in/s
**Peak Air Pressure:** 103 db
0.00046 PSI @ 17.9 Hz

**Additional Info:**

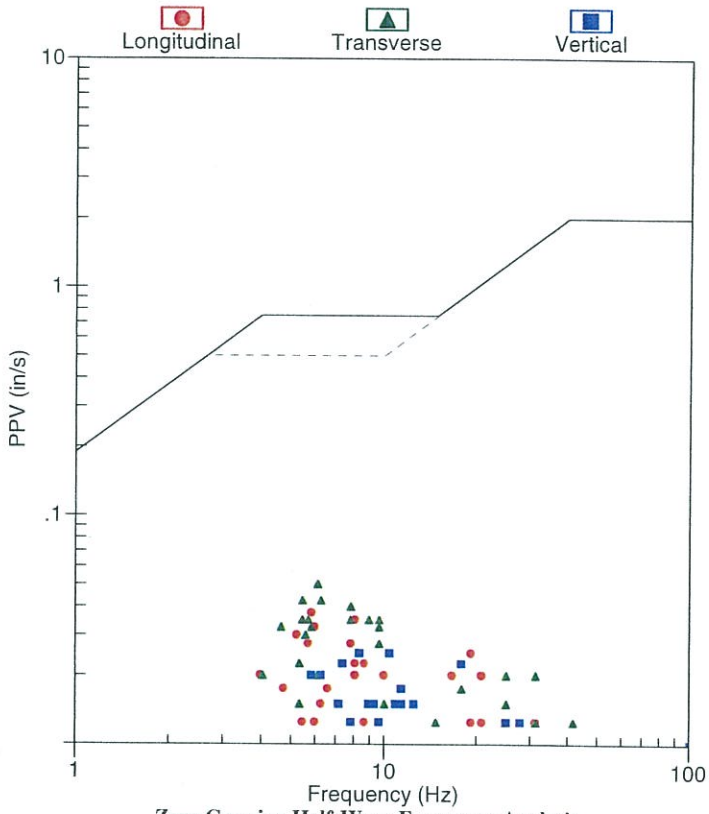
j-GEO-16386
N29 38 22.63W98 18 53.9

**Shaketable Calibrated:** 07/05/2016
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

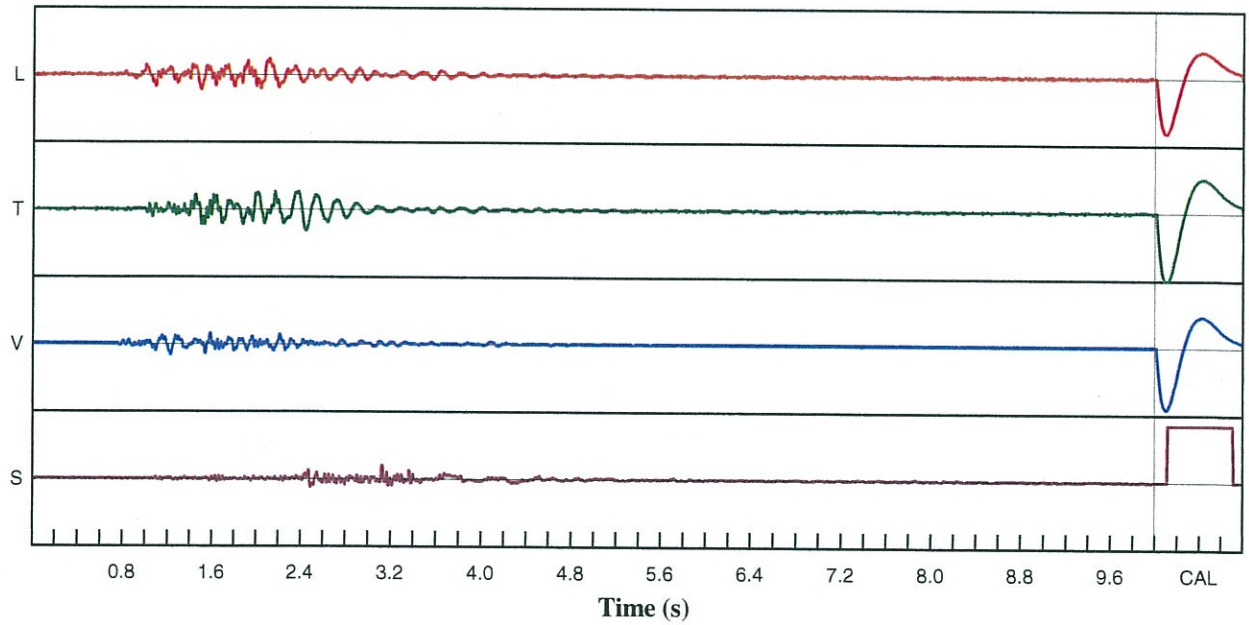
| | |
|---|---|
| **Time Scale:** | 0.200 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6366 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6366 Event: 1**




**Printed:** August 01, 2016 **File:** 65_6366_20160801_133022_4bk81ud.g3k (GeoSonics Inc. AnalysisNET v8.1.49)

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8-1-16 Blast No. 8-1-16 1B Time 13:30

Exact Blast Location FACE 1B

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N 29° 38' 34.60"
W 98° 17' 33.80"

MONITOR GPS

N 29 38' 52"
W 98 18' 19"

---

**SEISMOGRAPH DATA**

Seismograph No. 6245 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-07-16 Microphone Calibration 07-07-16

Exact Seismograph Location Michels Residence: 9118 Tuscan Hills Drive, Georg Ranch Subdivision
10' E of NE corner of house

Seismograph Distance from Blast 4,388'

Peak Overpressure 101 dB Scaled Distance ------

Peak Particle Velocity .060 ips Operator DAVID LARNER

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: [signature] Date: 8-1-16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6245 v6.5 |
| **Date:** | 08/01/2016 13:30:24 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 10.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Michels |
| **Distance:** | 4388 |
| **Operator:** | Vibratech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.060 | 0.028 | 0.025 |
| **FREQ (Hz)** | 7.4 | 14.7 | 22.7 |
| **PD (.001")** | 1.09 | 0.50 | 0.34 |
| **PPA (g)** | 0.013 | 0.013 | 0.013 |

**Peak Vector Sum :** 0.063 in/s
**Peak Air Pressure:** 101 db
0.00032 PSI @ 1.6 Hz

**Additional Info:**

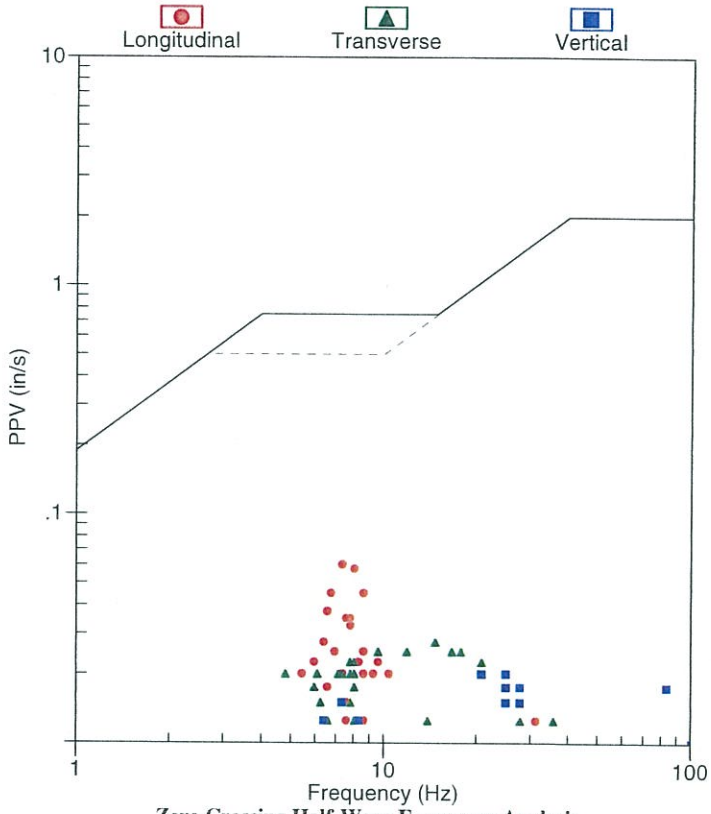
j-GEO-16396
N29 38 52 W98 18 19

**Shaketable Calibrated:** 07/07/2016
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

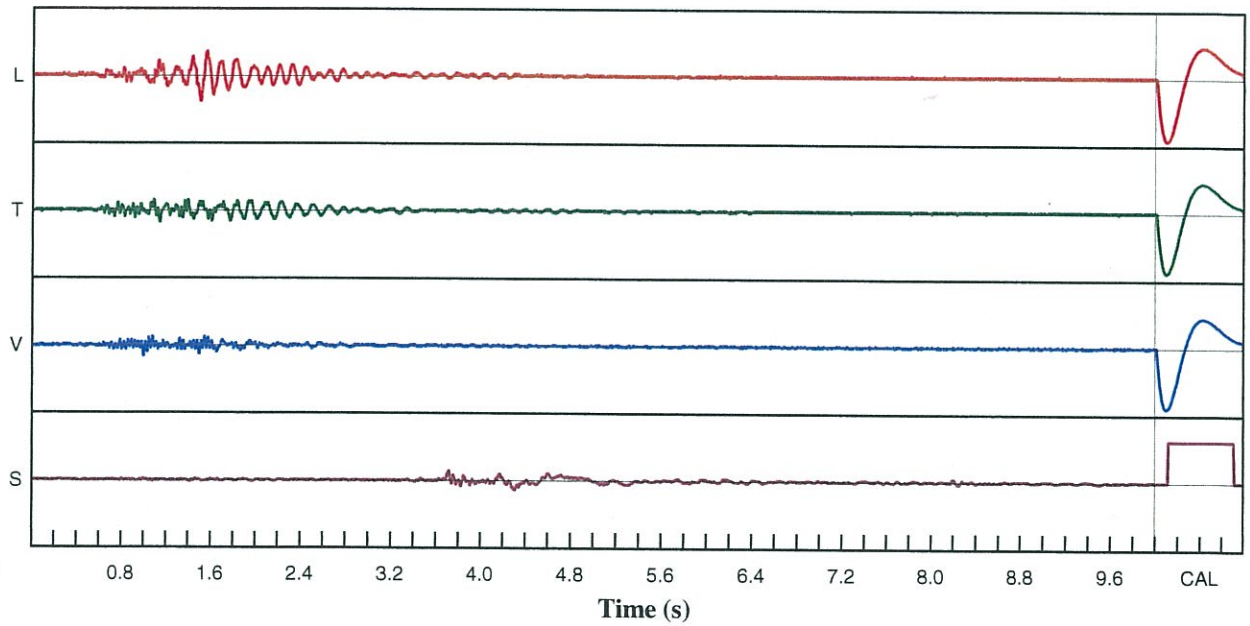
| | |
|---|---|
| **Time Scale:** | 0.200 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

## USBM Safe Blasting Levels
**SN: 6245 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

## Velocity Waveform
**SN: 6245 Event: 1**




**Printed:** August 01, 2016 **File:** 65_6245_20160801_133024_4bk81uw.g3k (GeoSonics Inc. AnalysisNET v8.1.49)

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8-1-16 Blast No. 8-1-16 1B Time 13:30

Exact Blast Location FACE 1B

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N 29° 38' 34.60"
W 98° 17' 33.80"

MONITOR GPS

N 29° 38' 33.55"
W98° 18' 51.07"

---

**SEISMOGRAPH DATA**

Seismograph No. 6342 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-07-16 Microphone Calibration 07-07-16

Exact Seismograph Location Midla Residence – 8724 Verano Drive – Georg Ranch Subdivision 15 ft NW of NW corner of the house, near the garage.

Seismograph Distance from Blast 6,806'

Peak Overpressure 84 dB Scaled Distance ------

Peak Particle Velocity .033 ips Operator DAVID LARNER

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: _____ Date 8-1-16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6342 v6.5 |
| **Date:** | 08/01/2016 13:30:23 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 10.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Midla Res |
| **Distance:** | 6806 |
| **Operator:** | Vibratech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.028 | 0.033 | 0.015 |
| **FREQ (Hz)** | 8.9 | 6.8 | 16.7 |
| **PD (.001")** | 0.44 | 0.43 | 0.22 |
| **PPA (g)** | 0.013 | 0.013 | 0.007 |

**Peak Vector Sum :** 0.035 in/s
**Peak Air Pressure:** 84 db
0.00011 PSI @ 1.0 Hz

**Additional Info:**

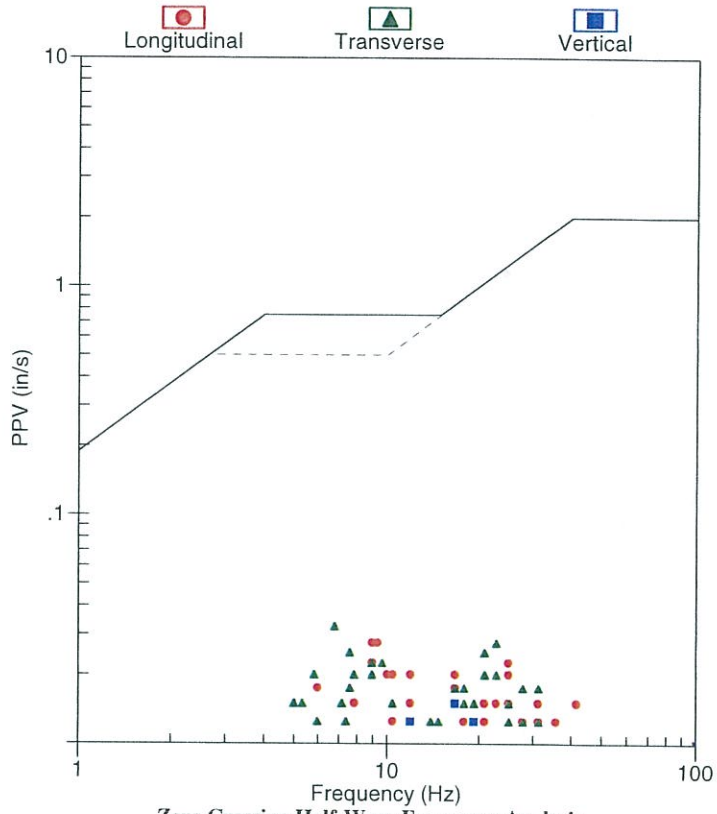
j-GEO-16702
N29 38 49 W98 17 35

**Shaketable Calibrated:** 07/07/2016
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

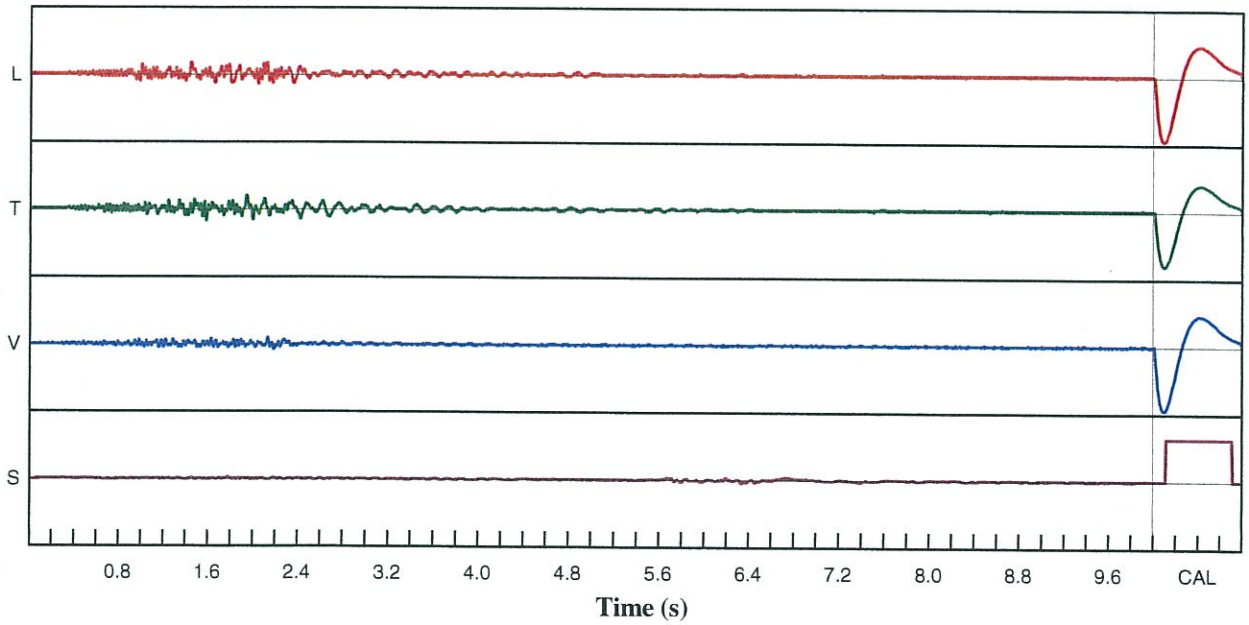
| | |
|---|---|
| **Time Scale:** | 0.200 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

## USBM Safe Blasting Levels
**SN: 6342 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

## Velocity Waveform
**SN: 6342 Event: 1**




**Printed:** August 01, 2016 **File:** 65_6342_20160801_133023_4bk81uc.g3k (GeoSonics Inc. AnalysisNET v8.1.49)

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8-1-16 Blast No. 8-1-16 1B Time 13:30

Exact Blast Location FACE 1B

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N 29° 38' 34.60"
W 98° 17' 33.80"

MONITOR GPS

N 29 38' 23"
W 98 17' 40"

---

**SEISMOGRAPH DATA**

Seismograph No. 6319 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 12-21-15 Microphone Calibration 12-21-15

Exact Seismograph Location Warden Residence: 21375 Gunther Grove Drive, Trophy Oaks Subdivision

10' N of NE corner of pool at the rock wall

Seismograph Distance from Blast 1,296'

Peak Overpressure 112 dB Scaled Distance ------

Peak Particle Velocity .395 ips Operator DAVID LARNER

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: _____ Date: 8-1-16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6319 v6.5 |
| **Date:** | 08/01/2016 13:30:22 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 5.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Warden Residence |
| **Distance:** | 1296 |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.248 | 0.395 | 0.193 |
| **FREQ (Hz)** | 20.8 | 20.8 | 21.7 |
| **PD (.001")** | 2.71 | 3.19 | 1.40 |
| **PPA (g)** | 0.091 | 0.143 | 0.065 |

**Peak Vector Sum :** 0.453 in/s
**Peak Air Pressure:** 112 db
0.00119 PSI @ 11.4 Hz

**Additional Info:**

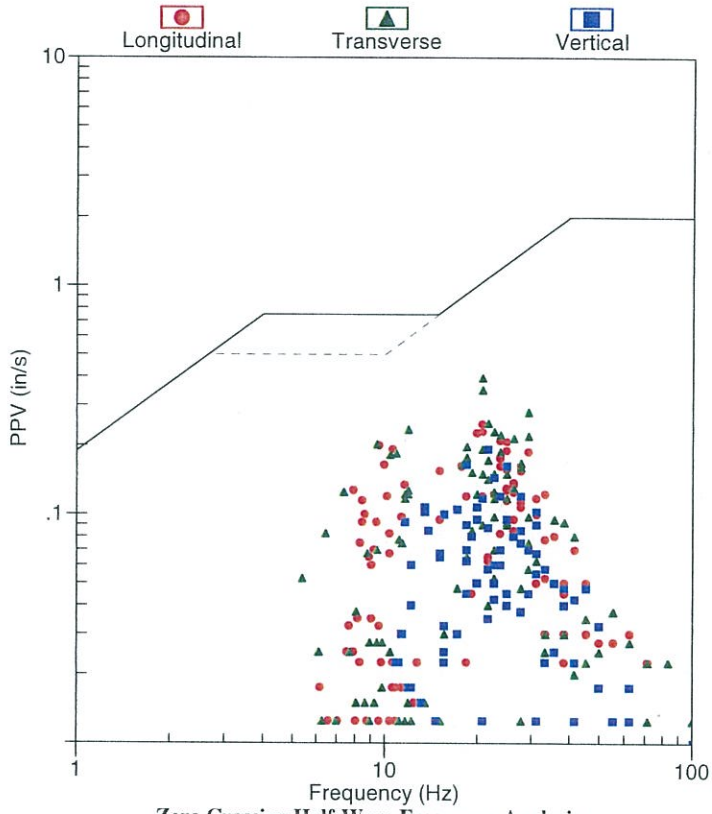
j-GEO-16404
N29 38 23 W98 17 40

**Shaketable Calibrated:** 12/21/2015
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

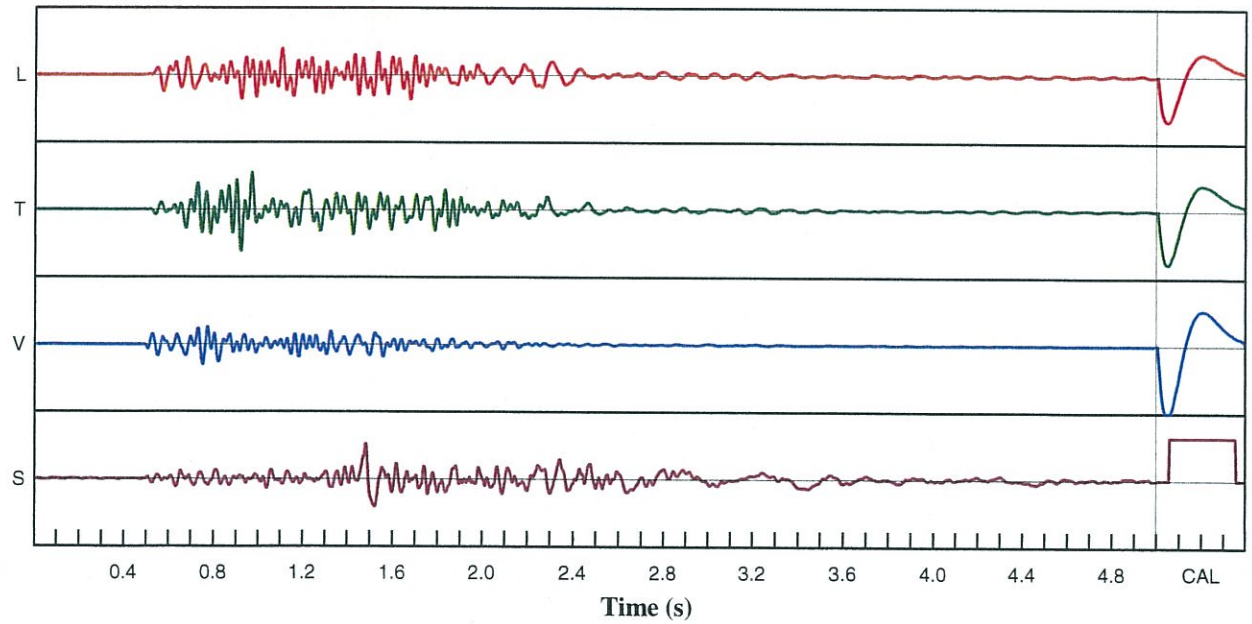
| | |
|---|---|
| **Time Scale:** | 0.100 s |
| **Seismic Scale:** | +/- 0.640 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

## USBM Safe Blasting Levels
**SN: 6319 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

## Velocity Waveform
**SN: 6319 Event: 1**




**Printed:** August 01, 2016 **File:** 65_6319_20160801_133022_4bk81ug.g3k (GeoSonics Inc. AnalysisNET v8.1.49)

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8-1-16 Blast No. 8-1-16 1B Time 13:30

Exact Blast Location FACE 1B

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N 29° 38' 34.60"
W 98° 17' 33.80"

MONITOR GPS

N 29 38' 25"
W 98 17' 39"

---

**SEISMOGRAPH DATA**

Seismograph No. 6277 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 12-22-15 Microphone Calibration 12-22-15

Exact Seismograph Location Warden Property Line: 21375 Gunther Grove Drive, Trophy Oaks Subdivision North East corner of the property, at the pink pin flag

Seismograph Distance from Blast 1,075'

Peak Overpressure 113 dB Scaled Distance ------

Peak Particle Velocity .235 ips Operator DAVID LARNER

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: [signature] Date: 8-1-16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6277 v6.5 |
| **Date:** | 08/01/2016 13:30:23 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 5.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Warden Property Line |
| **Distance:** | 1075 |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.203 | 0.235 | 0.180 |
| **FREQ (Hz)** | 20.8 | 19.2 | 20.8 |
| **PD (.001")** | 1.78 | 1.89 | 1.29 |
| **PPA (g)** | 0.078 | 0.085 | 0.072 |

**Peak Vector Sum :** 0.300 in/s
**Peak Air Pressure:** 113 db
0.00146 PSI @ 5.8 Hz

**Additional Info:**

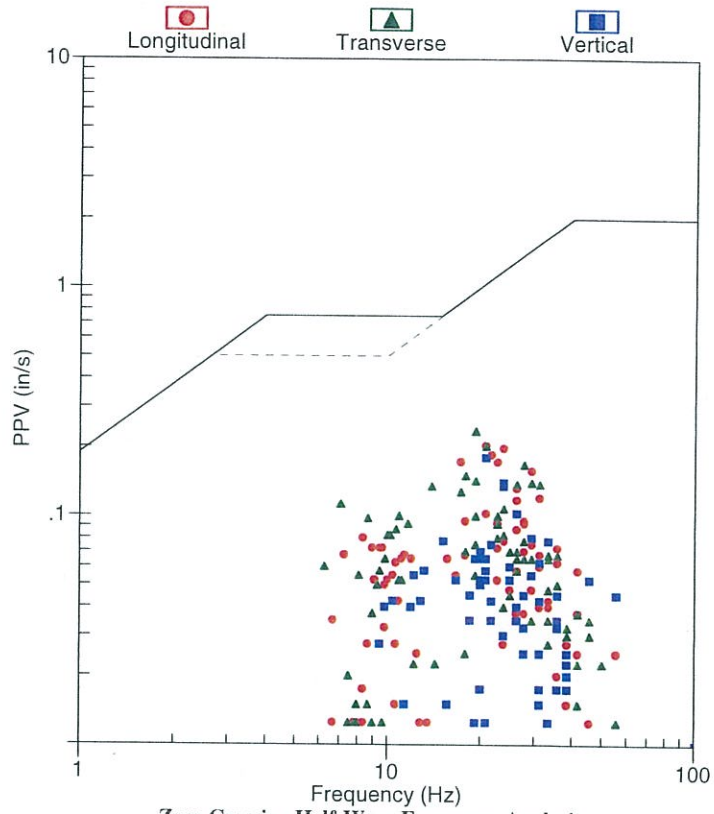
j-GEO-16406
N29 38 25 W98 17 39

**Shaketable Calibrated:** 12/22/2015
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

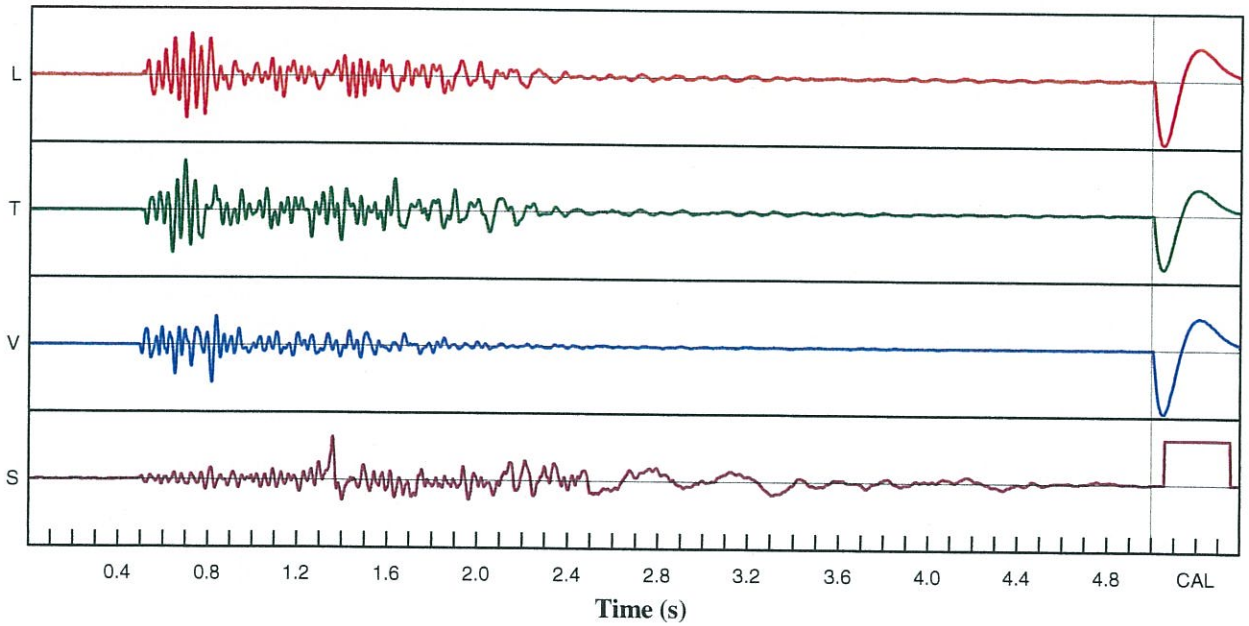
| | |
|---|---|
| **Time Scale:** | 0.100 s |
| **Seismic Scale:** | +/- 0.320 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6277 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6277 Event: 1**




**Printed:** August 01, 2016 **File:** 65_6277_20160801_133023_4bk81uf.g3k (GeoSonics Inc. AnalysisNET v8.1.49)

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 08-02-16 Blast No. 08-02-16 3D Time 11:52

Exact Blast Location 3D

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N 29° 36' 50.2"
W 98° 17' 37.5"

MONITOR GPS

N 29 38' 22.63
W 98 18' 53.97

---

**SEISMOGRAPH DATA**

Seismograph No. 6366 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-05-16 Microphone Calibration 07-05-16

Exact Seismograph Location City Property Line: outside city water tower gate

30' from gate at the property line

Seismograph Distance from Blast 3148'

Peak Overpressure 101 dB Scaled Distance ------

Peak Particle Velocity 0.048 ips Operator M. Marks

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: M. Marks Date: 08-02-16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6366 v6.5 |
| **Date:** | 08/02/2016 11:52:35 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 10.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | City Property Line |
| **Distance:** | 3148 |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.035 | 0.048 | 0.025 |
| **FREQ (Hz)** | 6.9 | 6.1 | 8.1 |
| **PD (.001")** | 0.83 | 1.33 | 0.44 |
| **PPA (g)** | 0.007 | 0.013 | 0.013 |

**Peak Vector Sum :** 0.053 in/s
**Peak Air Pressure:** 101 db
0.00034 PSI @ 1.0 Hz

**Additional Info:**

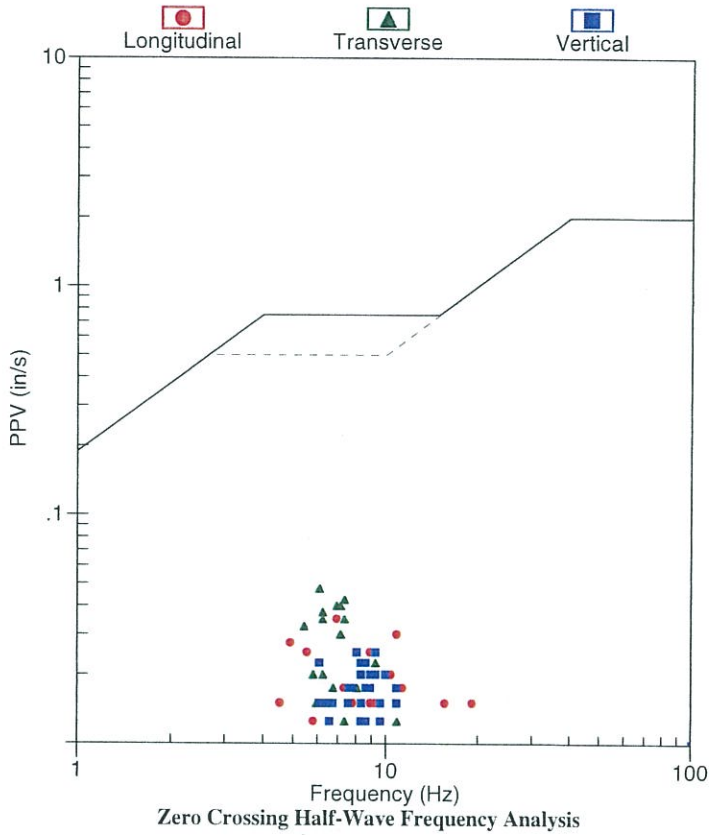
j-GEO-16386
N29 38 22.63W98 18 53.9

**Shaketable Calibrated:** 07/05/2016
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

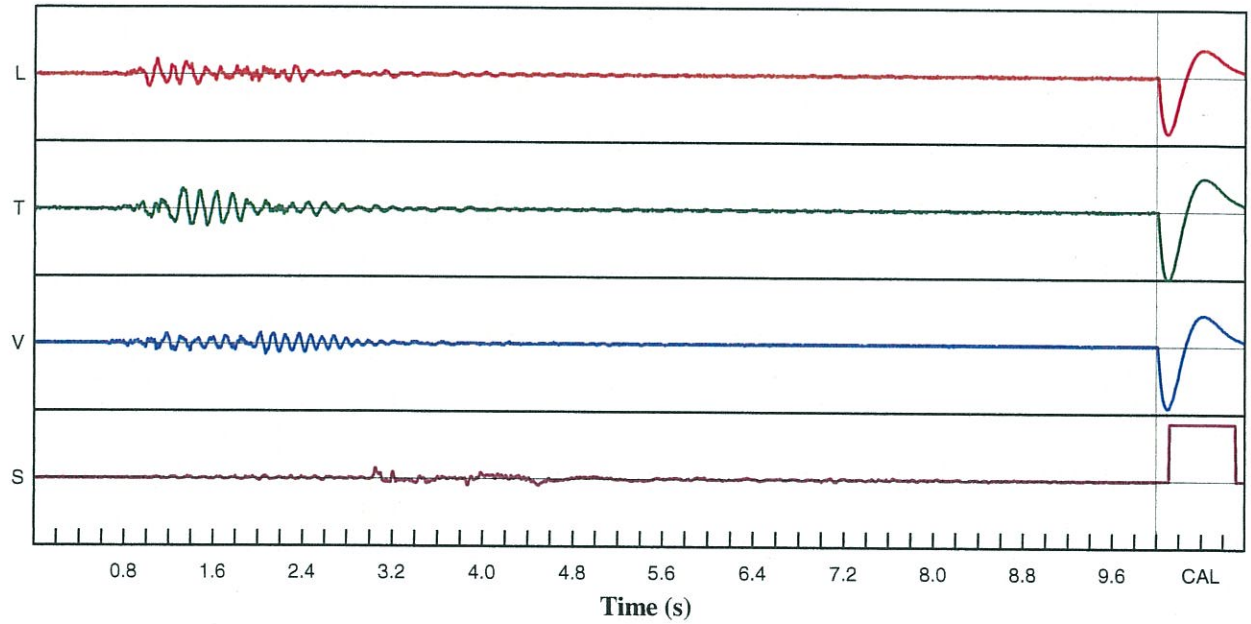
| | |
|---|---|
| **Time Scale:** | 0.200 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6366 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6366 Event: 1**




**Printed:** August 02, 2016 **File:** 65_6366_20160802_115235_4bk8513.g3k (GeoSonics Inc. AnalysisNET v8.1.49)

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 08-02-16 Blast No. 08-02-16 3D Time 11:52

Exact Blast Location 3D

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N 29° 38' 50.2"
W 98° 17' 37.2"

MONITOR GPS

N 29 38' 52"
W 98 18' 19"

---

**SEISMOGRAPH DATA**

Seismograph No. 6245 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-07-16 Microphone Calibration 07-07-16

Exact Seismograph Location Michels Residence: 9118 Tuscan Hills Drive, Georg Ranch Subdivision
10' E of NE corner of house

Seismograph Distance from Blast 3696'

Peak Overpressure 103 dB Scaled Distance ------

Peak Particle Velocity 0.095 ips Operator M. Marks

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: M. Marks Date: 08-02-16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6245 v6.5 |
| **Date:** | 08/02/2016 11:52:36 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 10.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Michels |
| **Distance:** | 3696 |
| **Operator:** | Vibratech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.095 | 0.055 | 0.023 |
| **FREQ (Hz)** | 7.4 | 7.1 | 20.8 |
| **PD (.001")** | 1.93 | 1.08 | 0.41 |
| **PPA (g)** | 0.020 | 0.020 | 0.013 |

**Peak Vector Sum :** 0.095 in/s
**Peak Air Pressure:** 103 db
0.00046 PSI @ 4.1 Hz

**Additional Info:**

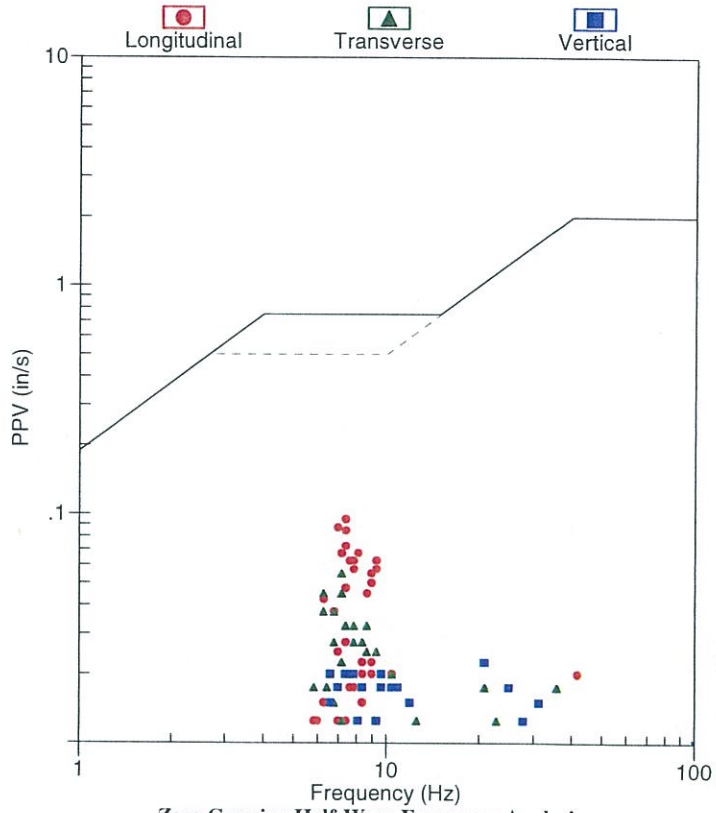
j-GEO-16396
N29 38 52 W98 18 19

**Shaketable Calibrated:** 07/07/2016
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

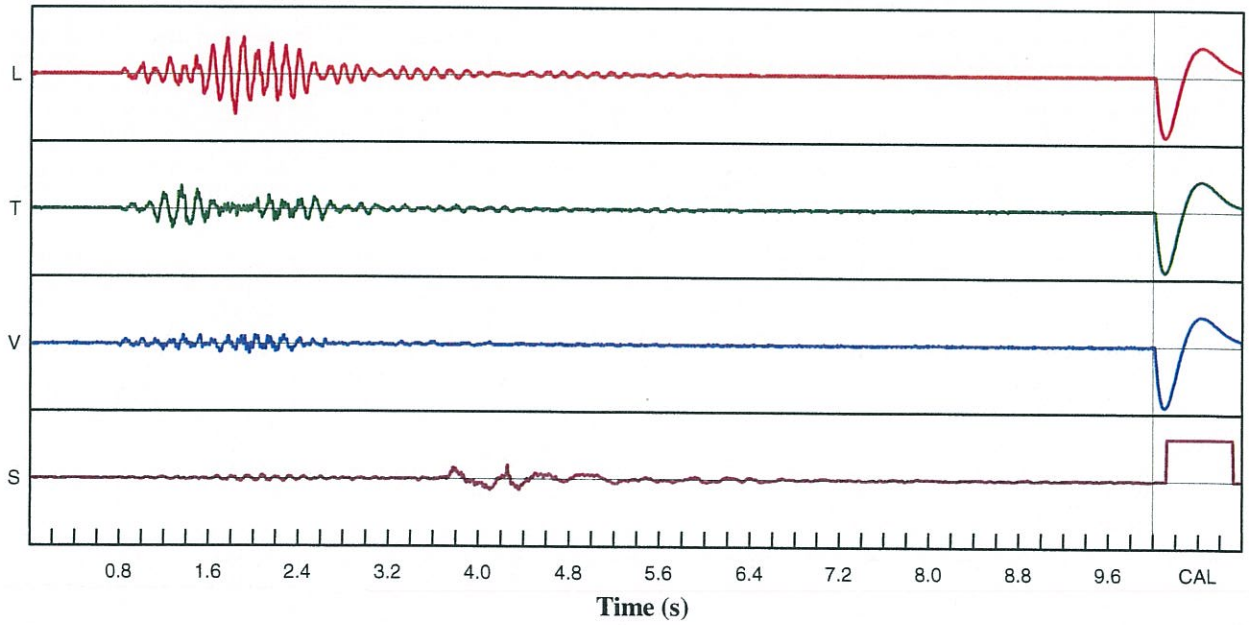
| | |
|---|---|
| **Time Scale:** | 0.200 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

## USBM Safe Blasting Levels
**SN: 6245 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

## Velocity Waveform
**SN: 6245 Event: 1**




**Printed:** August 02, 2016 **File:** 65_6245_20160802_115236_4bk85l5.g3k (GeoSonics Inc. AnalysisNET v8.1.49)

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 08-02-16 Blast No. 08-02-16 3D Time 11:52

Exact Blast Location 3D

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N 29° 38' 50.2"
W 98° 17' 37.5"

MONITOR GPS

N 29° 38' 33.55"
W98° 18' 51.07"

---

**SEISMOGRAPH DATA**

Seismograph No. 6342 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-07-16 Microphone Calibration 07-07-16

Exact Seismograph Location Midla Residence – 8724 Verano Drive – Georg Ranch Subdivision 15 ft NW of NW corner of the house, near the garage.

Seismograph Distance from Blast 6696'

Peak Overpressure 84 dB Scaled Distance ------

Peak Particle Velocity 0.063 ips Operator M. Marks

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: M. Marks Date 08-02-16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6342 v6.5 |
| **Date:** | 08/02/2016 11:52:36 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 10.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Midla Res |
| **Distance:** | 6696 |
| **Operator:** | Vibratech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.063 | 0.045 | 0.028 |
| **FREQ (Hz)** | 10.0 | 7.6 | 19.2 |
| **PD (.001")** | 0.96 | 0.71 | 0.39 |
| **PPA (g)** | 0.020 | 0.020 | 0.013 |

**Peak Vector Sum :** 0.065 in/s
**Peak Air Pressure:** 84 db
0.00011 PSI @ 31.3 Hz

**Additional Info:**

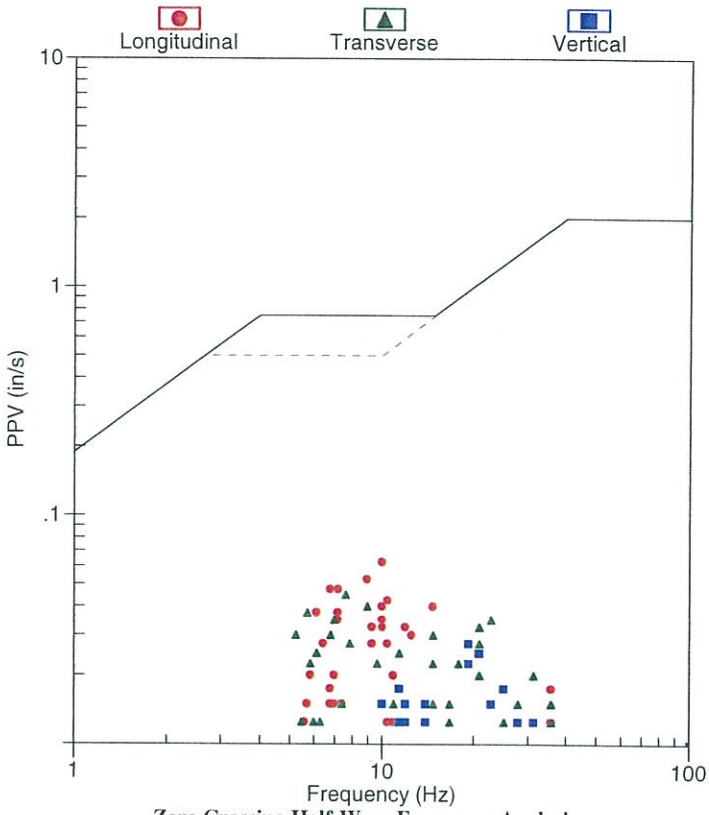
j-GEO-16702
N29 38 49 W98 17 35

**Shaketable Calibrated:** 07/07/2016
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

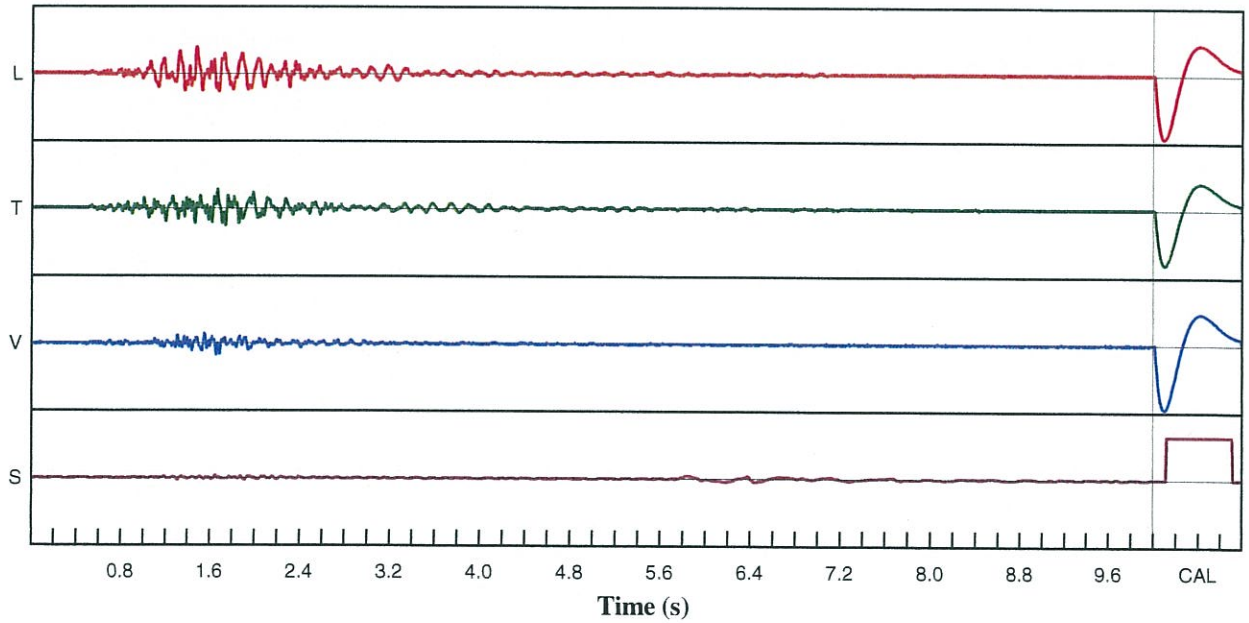
| | |
|---|---|
| **Time Scale:** | 0.200 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6342 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6342 Event: 1**




**Printed:** August 02, 2016 **File:** 65_6342_20160802_115236_4bk85np.g3k (GeoSonics Inc. AnalysisNET v8.1.49)

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 08-02-16 Blast No. 08-02-16 3D Time 11:52

Exact Blast Location 3D

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N 29° 38' 50.2"
W 98° 17' 37.5"

MONITOR GPS

N 29 38' 23"
W 98 17' 40"

---

**SEISMOGRAPH DATA**

Seismograph No. 6319 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 12-21-15 Microphone Calibration 12-21-15

Exact Seismograph Location Warden Residence: 21375 Gunther Grove Drive, Trophy Oaks Subdivision

10' N of NE corner of pool at the rock wall

Seismograph Distance from Blast 2765'

Peak Overpressure 110 dB Scaled Distance ------

Peak Particle Velocity 0.143 ips Operator M. Marks

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: M. Marks Date: 08-02-16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6319 v6.5 |
| **Date:** | 08/02/2016 11:52:31 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 5.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Warden Residence |
| **Distance:** | 2765 |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.133 | 0.143 | 0.033 |
| **FREQ (Hz)** | 7.6 | 9.4 | 14.7 |
| **PD (.001")** | 2.25 | 2.45 | 0.42 |
| **PPA (g)** | 0.033 | 0.033 | 0.020 |

**Peak Vector Sum :** 0.163 in/s
**Peak Air Pressure:** 110 db
0.00091 PSI @ 2.3 Hz

**Additional Info:**

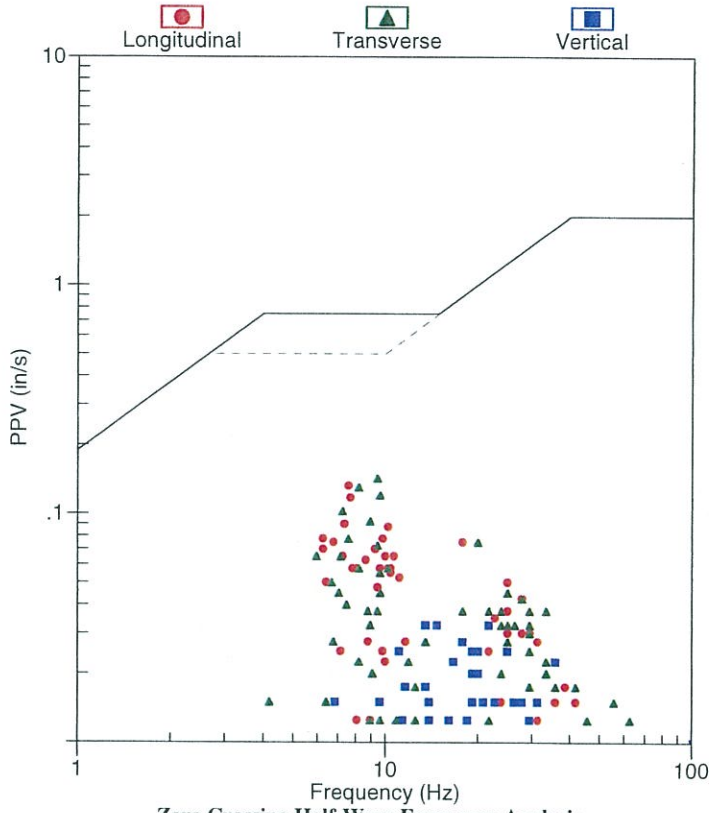
j-GEO-16404
N29 38 23 W98 17 40

**Shaketable Calibrated:** 12/21/2015
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

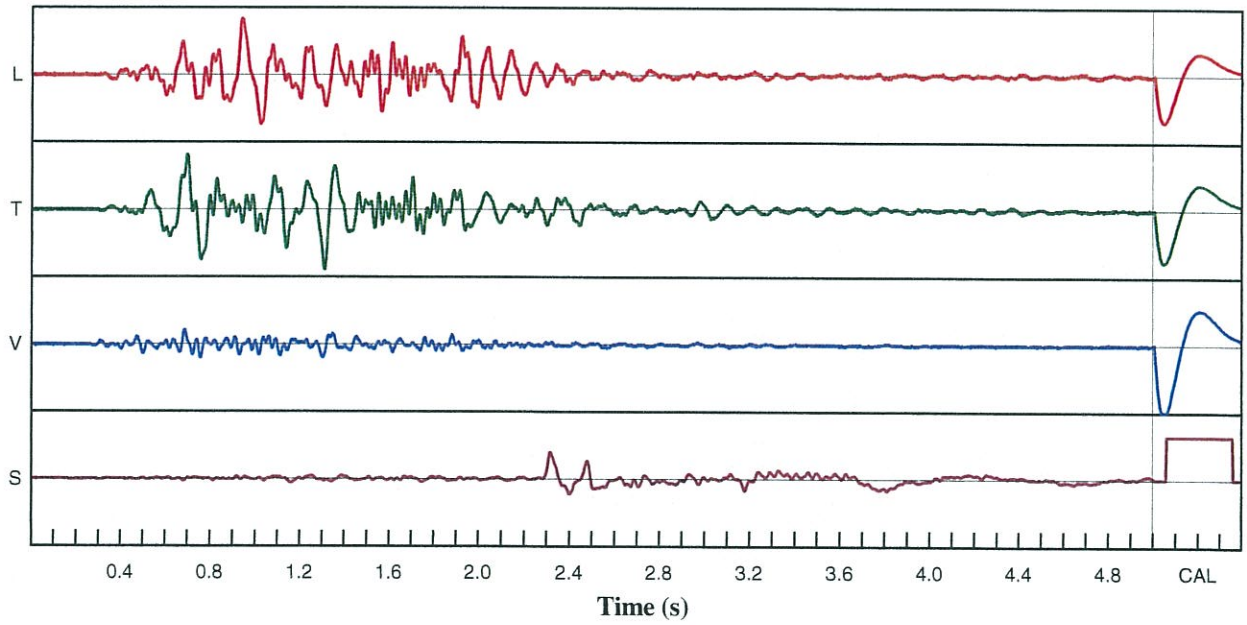
| | |
|---|---|
| **Time Scale:** | 0.100 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6319 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6319 Event: 1**




**Printed:** August 02, 2016 **File:** 65_6319_20160802_115231_4bk85l4.g3k (GeoSonics Inc. AnalysisNET v8.1.49)

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 08-02-16 Blast No. 08-02-16 3D Time 11:52

Exact Blast Location 3D

No. of Holes _____ Diameter _____in. Avg. Depth _____ Subgrade _____ft.

Spacing _____ft. Burden _____ft. Avg. Stemming _____ft.

Make & Type of Explosives:

_____ _____lbs.

_____ _____lbs.

_____ _____lbs.

_____ _____lbs.

_____ _____lbs.

_____ _____lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ms.

Max. lbs/delay period _____lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N 29° 38' 50.2"
W 98° 17' 37.5"

MONITOR GPS

N 29 38' 25"
W 98 17' 39"

---

**SEISMOGRAPH DATA**

Seismograph No. 6277 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 12-22-15 Microphone Calibration 12-22-15

Exact Seismograph Location Warden Property Line: 21375 Gunther Grove Drive, Trophy Oaks Subdivision North East corner of the property, at the pink pin flag

Seismograph Distance from Blast 2557'

Peak Overpressure 111 dB Scaled Distance ------

Peak Particle Velocity 0.108 ips Operator M. Marks

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: M. Marks Date: 08-02-16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6277 v6.5 |
| **Date:** | 08/02/2016 11:52:35 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 5.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Warden Property Line |
| **Distance:** | 2557 |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.060 | 0.108 | 0.025 |
| **FREQ (Hz)** | 7.1 | 7.0 | 29.4 |
| **PD (.001")** | 1.29 | 1.79 | 0.34 |
| **PPA (g)** | 0.020 | 0.026 | 0.013 |

**Peak Vector Sum :** 0.110 in/s
**Peak Air Pressure:** 111 db
0.00110 PSI @ 2.1 Hz

**Additional Info:**

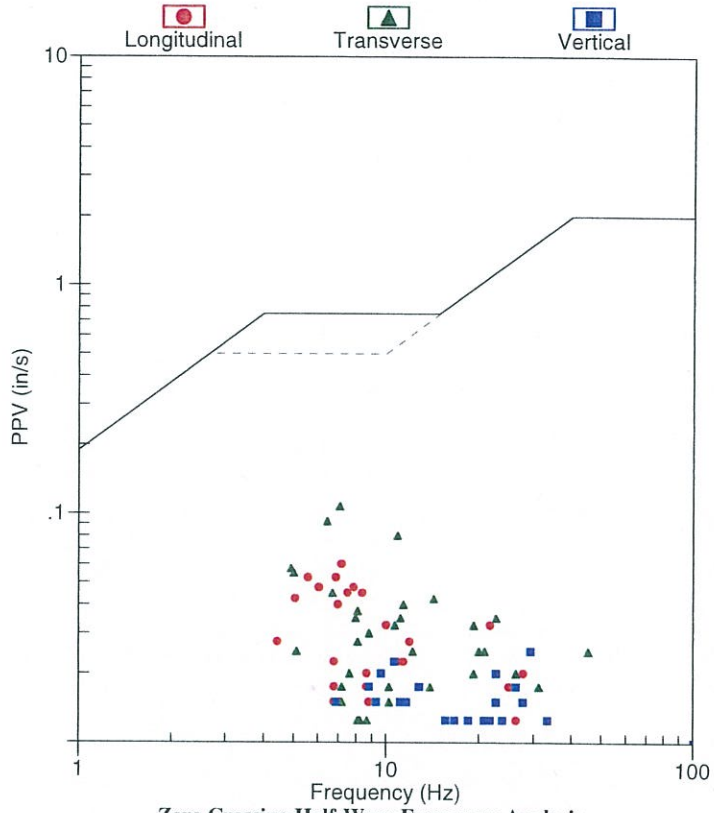
j-GEO-16406
N29 38 25 W98 17 39

**Shaketable Calibrated:** 12/22/2015
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

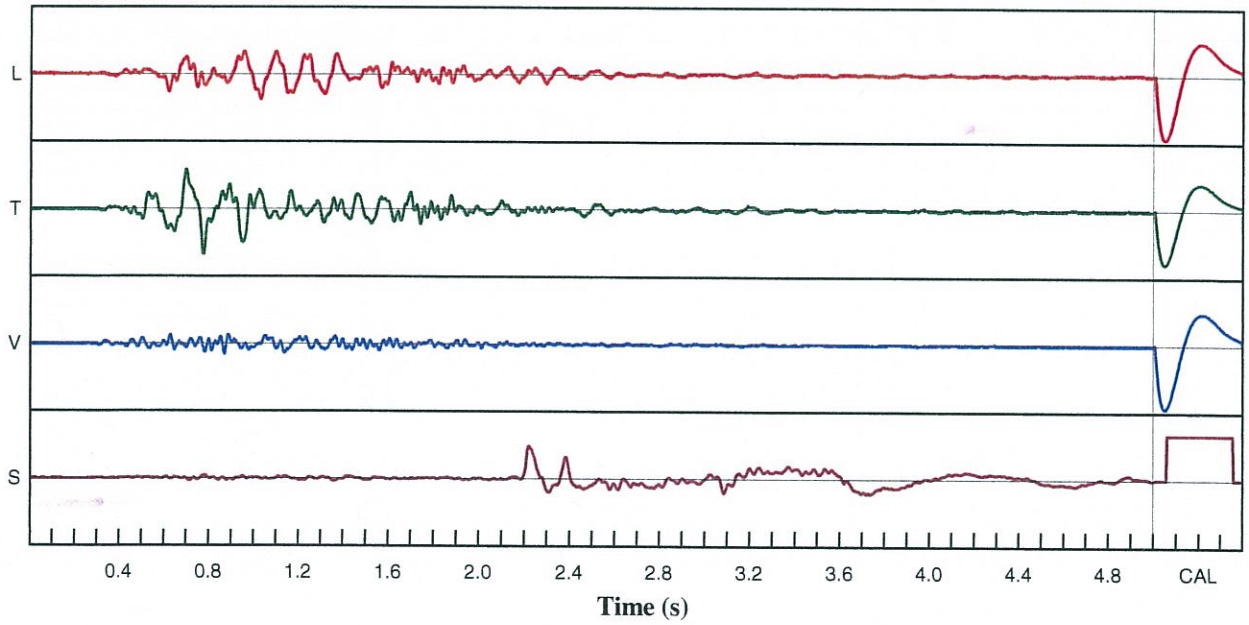
| | |
|---|---|
| **Time Scale:** | 0.100 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6277 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6277 Event: 1**




**Printed:** August 02, 2016 **File:** 65_6277_20160802_115235_4bk85l2.g3k (GeoSonics Inc. AnalysisNET v8.1.49)

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8-3-16 Blast No. 8-3-16 S.WALL B Time 11:21

Exact Blast Location SOUTH WALL B

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N 29° 38' 13.50"

W 98° 16' 43.80"

MONITOR GPS

N 29 38' 22.63

W 98 18' 53.97

---

**SEISMOGRAPH DATA**

Seismograph No. 6366 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-05-16 Microphone Calibration 07-05-16

Exact Seismograph Location City Property Line: outside city water tower gate

30' from gate at the property line

Seismograph Distance from Blast 6,249'

Peak Overpressure NT dB Scaled Distance ------

Peak Particle Velocity NT ips Operator DAVID LARNER

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: [signature] Date: 8-3-16

# Summary Data Report

| | | | |
|---|---|---|---|
| **Serial No:** | 6366 v6.5 | **Begin Date:** | 08/03/2016 10:47:01 (UTC-5) |
| **Client:** | Hanson | **End Date:** | 08/03/2016 12:00:50 (UTC-5) |
| **Operation:** | Servtex | **Events over Trigger:** | 0 (1-0) |
| **Location:** | City Property Line | **Record Time:** | 10.0 s |
| **Distance:** | 6249 | **Seismic Trigger:** | 0.020 in/s |
| **Operator:** | Vibra-Tech | **Sound Trigger:** | 122 db |
| **Comment:** | Garden Ridge, Texas | **Battery Level:** | 8.5 |

**Additional Info:**
NoTtrigger
j-GEO-16386
N29 38 22.63W98 18 53.9

**Shaketable Calibrated:** 07/05/2016
**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** |

CITY PROPERTY LINE

NO TRIGGER at 11:21

SOUTH WALL TB: 8-3-16

DISTANCE = 6,249'

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8-3-16 Blast No. 8-3-16 S.WALL TR Time 11:21

Exact Blast Location SOUTH WALL TR

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N 29° 38' 13.50"

W 98° 16' 43.80"

MONITOR GPS

N 29 38' 15"

W 98 17' 26"

---

**SEISMOGRAPH DATA**

Seismograph No. 6241 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 5-24-16 Microphone Calibration 5-24-16

Exact Seismograph Location Holly Residence: 9916 Trophy Oaks Drive, Trophy Oaks Subdivision backyard along the quarry property line at the barbed wire fence

Seismograph Distance from Blast 3,720'

Peak Overpressure 101.0 dB Scaled Distance ------

Peak Particle Velocity .063 ips Operator: DAVID LARNER

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: [signature] Date: 8-3-16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6241 v6.5 |
| **Date:** | 08/03/2016 11:21:24 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 5.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Holly Residence |
| **Distance:** | 3720 |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.063 | 0.040 | 0.030 |
| **FREQ (Hz)** | 7.6 | 8.8 | 6.5 |
| **PD (.001")** | 1.52 | 0.71 | 0.39 |
| **PPA (g)** | 0.020 | 0.020 | 0.013 |

**Peak Vector Sum :** 0.068 in/s
**Peak Air Pressure:** 101 db
0.00037 PSI @ 1.0 Hz

**Additional Info:**

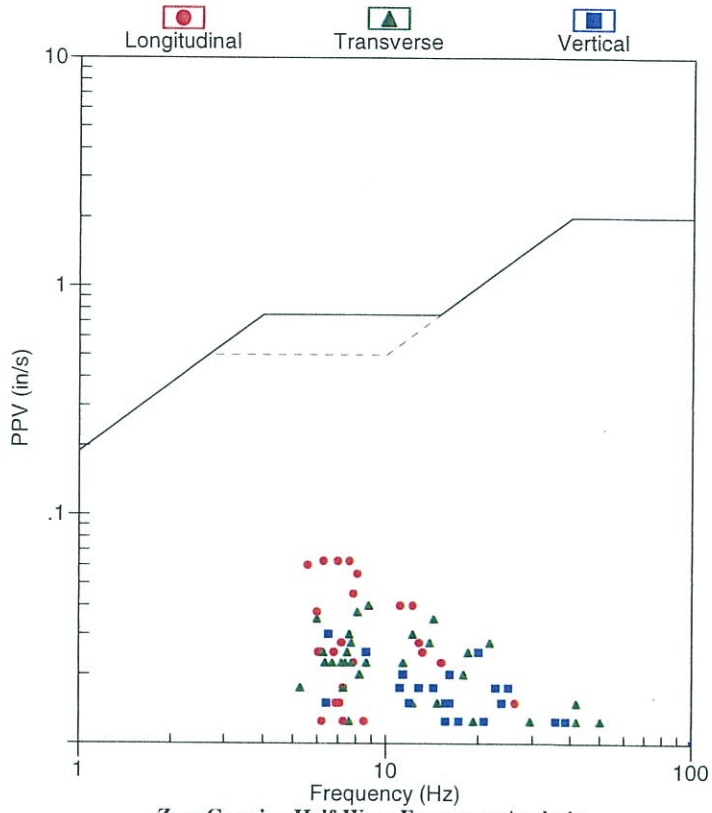
j-GEO-16392
N29 38 15 W98 17 26

**Shaketable Calibrated:** 05/25/2016
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

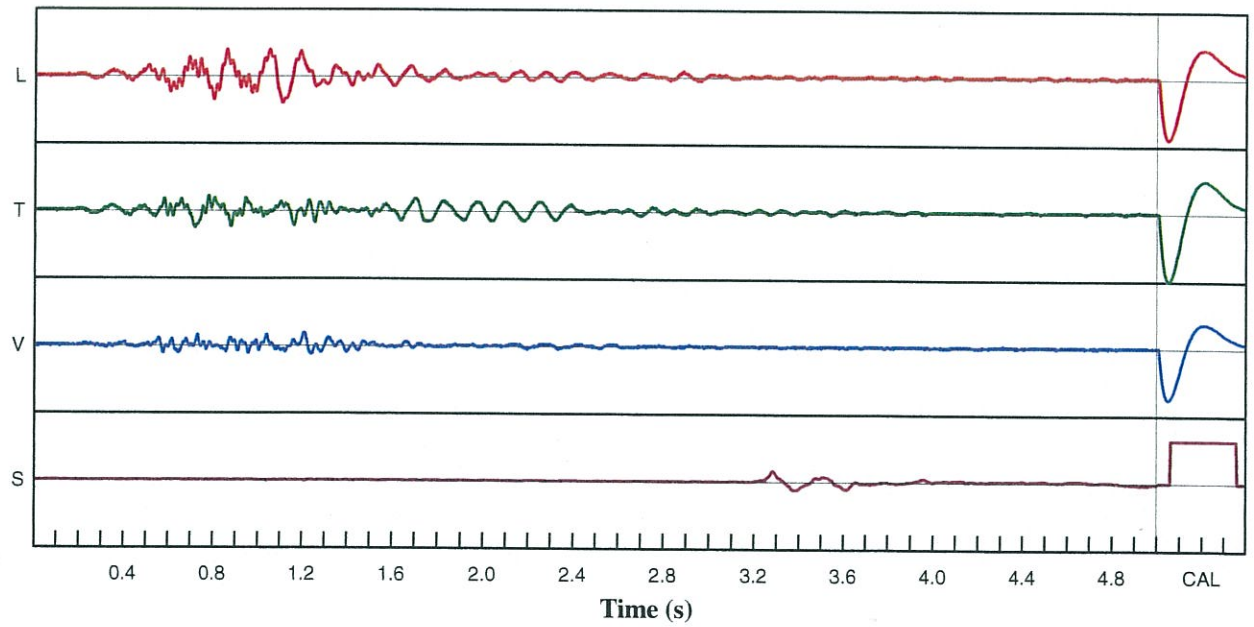
| | |
|---|---|
| **Time Scale:** | 0.100 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6241 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6241 Event: 1**




**Printed:** August 03, 2016 **File:** 65_6241_20160803_112124_4bk89oc.g3k (GeoSonics Inc. AnalysisNET v8.1.49)

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8-3-16 Blast No. 8-3-16 S. WALL Time 11:21

Exact Blast Location SOUTH WALL B

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N 29° 38' 13.50"

W 98° 16' 43.80"

MONITOR GPS

N 29 38' 52"

W 98 18' 19"

---

**SEISMOGRAPH DATA**

Seismograph No. 6245 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-07-16 Microphone Calibration 07-07-16

Exact Seismograph Location Michels Residence: 9118 Tuscan Hills Drive, Georg Ranch Subdivision

10' E of NE corner of house

Seismograph Distance from Blast 9,282'

Peak Overpressure NT dB Scaled Distance ------

Peak Particle Velocity NT ips Operator DAVID LARMER

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: [signature] Date: 8-3-16

# Summary Data Report

| | | | |
|---|---|---|---|
| **Serial No:** | 6245 v6.5 | **Begin Date:** | 08/03/2016 10:42:30 (UTC-5) |
| **Client:** | Hanson | **End Date:** | 08/03/2016 11:55:13 (UTC-5) |
| **Operation:** | Servtex | **Events over Trigger:** | 0 (1-0) |
| **Location:** | Michels | **Record Time:** | 10.0 s |
| **Distance:** | 9282 | **Seismic Trigger:** | 0.020 in/s |
| **Operator:** | Vibratech | **Sound Trigger:** | N/A |
| **Comment:** | Garden Ridge, Texas | **Battery Level:** | 8.5 |

**Additional Info:**
No Trigger
j-GEO-16396
N29 38 52 W98 18 19

**Shaketable Calibrated:** 07/07/2016
**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** |

MICHELS RESIDENCE

NO TRIGGER at 11:21

SOUTH WALL TB : 8-3-16

DISTANCE = 9,282'

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8-3-16 Blast No. 8-3-16 S. WALL Time 11:21

Exact Blast Location SOUTH WALL B

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N 29° 38' 13.50"
W 98° 16' 43.80"

MONITOR GPS

N 29° 38' 33.55"
W98° 18' 51.07"

---

**SEISMOGRAPH DATA**

Seismograph No. 6342 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-07-16 Microphone Calibration 07-07-16

Exact Seismograph Location Midla Residence – 8724 Verano Drive – Georg Ranch Subdivision 15 ft NW of NW corner of the house, near the garage.

Seismograph Distance from Blast 11,392'

Peak Overpressure NT dB Scaled Distance ------

Peak Particle Velocity NT ips Operator DAVID WARNER

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: [signature] Date 8-3-16

# Summary Data Report

| | | | |
|---|---|---|---|
| **Serial No:** | 6342 v6.5 | **Begin Date:** | 08/03/2016 10:35:59 (UTC-5) |
| **Client:** | Hanson | **End Date:** | 08/03/2016 11:48:13 (UTC-5) |
| **Operation:** | Servtex | **Events over Trigger:** | 0 (1-0) |
| **Location:** | Midla Res | **Record Time:** | 10.0 s |
| **Distance:** | 11392 | **Seismic Trigger:** | 0.020 in/s |
| **Operator:** | Vibratech | **Sound Trigger:** | 122 db |
| **Comment:** | Garden Ridge, Texas | **Battery Level:** | 8.5 |

**Additional Info:**
No Trigger
j-GEO-16702
N29 38 49 W98 17 35

**Shaketable Calibrated:** 07/07/2016
**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** |

MIDLA RESIDENCE

NO TRIGGER at 11:21

SOUTH WALL ☐ : 8-3-16

DISTANCE = 11,392'

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8-3-16 Blast No. 8-3-16 S-WALL Time 11:21

Exact Blast Location SOUTH WALL TB

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N 29° 38' 13.50"

W 98° 16' 43.80"

MONITOR GPS

N 29 38' 23"

W 98 17' 40"

**SEISMOGRAPH DATA**

Seismograph No. 6319 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 12-21-15 Microphone Calibration 12-21-15

Exact Seismograph Location Warden Residence: 21375 Gunther Grove Drive, Trophy Oaks Subdivision

10' N of NE corner of pool at the rock wall

Seismograph Distance from Blast 5,043'

Peak Overpressure 114.0 dB Scaled Distance ------

Peak Particle Velocity .065 ips Operator DAVID LARMER

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: _____ Date: 8-3-16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6319 v6.5 |
| **Date:** | 08/03/2016 11:21:25 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 5.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Warden Residence |
| **Distance:** | 5043 |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.065 | 0.043 | 0.018 |
| **FREQ (Hz)** | 8.5 | 9.1 | 8.6 |
| **PD (.001")** | 1.20 | 0.96 | 0.35 |
| **PPA (g)** | 0.020 | 0.020 | 0.013 |

**Peak Vector Sum :** 0.068 in/s
**Peak Air Pressure:** 114 db
0.00151 PSI @ 1.0 Hz

**Additional Info:**

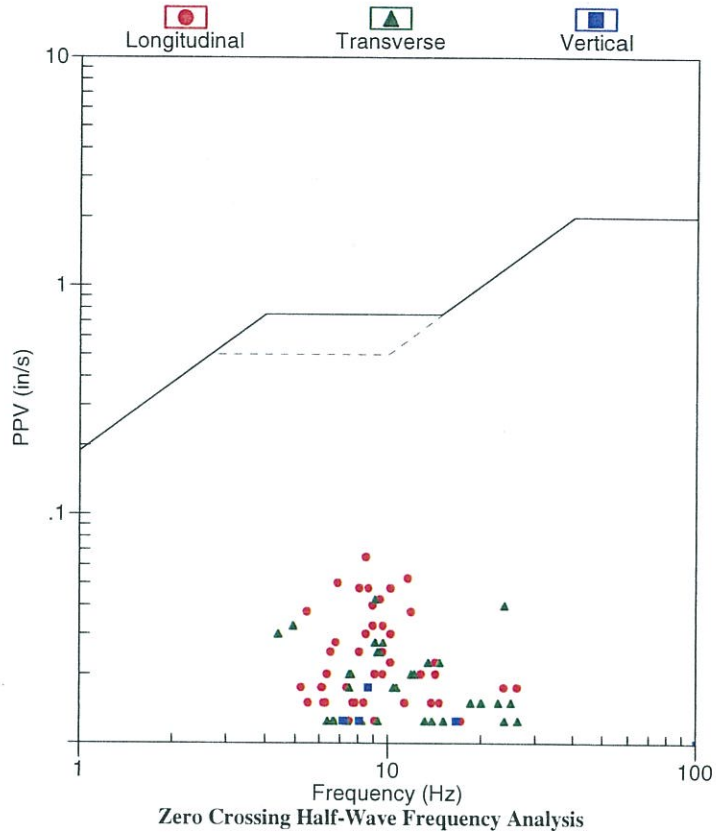
j-GEO-16404
N29 38 23 W98 17 40

**Shaketable Calibrated:** 12/21/2015
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

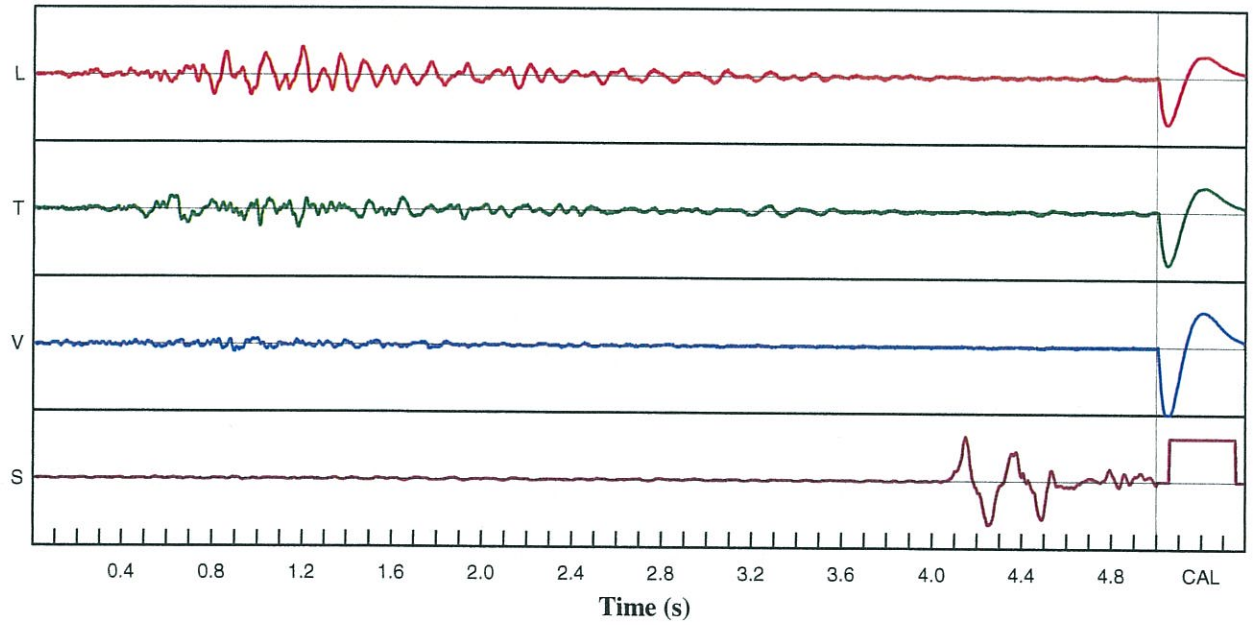
| | |
|---|---|
| **Time Scale:** | 0.100 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

## USBM Safe Blasting Levels
**SN: 6319 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

## Velocity Waveform
**SN: 6319 Event: 1**




**Printed:** August 03, 2016 **File:** 65_6319_20160803_112125_4bk89of.g3k (GeoSonics Inc. AnalysisNET v8.1.49)

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date August 8, 2016 Blast No. 08-08-16 S Wall A Time 13:19

Exact Blast Location _____

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N: 29° 38' 14.3"
W: 98° 16' 40.3"

MONITOR GPS

N 29 38' 22.63
W 98 18' 53.97

---

**SEISMOGRAPH DATA**

Seismograph No. 6366 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-05-16 Microphone Calibration 07-05-16

Exact Seismograph Location City Property Line: outside city water tower gate

30' from gate at the property line

Seismograph Distance from Blast 6543 ft.

Peak Overpressure 106 dB Scaled Distance ------

Peak Particle Velocity 0.023 ips Operator Clayton Smith

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: _____ Date: 8/8/16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6366 v6.5 |
| **Date:** | 08/08/2016 12:56:56 (UTC-5) |
| **Event No:** | 2 |
| **Record Time:** | 10.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | City Property Line |
| **Distance:** | 6543 |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.010 | 0.023 | 0.013 |
| **FREQ (Hz)** | 11.9 | 3.8 | 15.6 |
| **PD (.001")** | 0.29 | 0.62 | 0.24 |
| **PPA (g)** | 0.007 | 0.007 | 0.007 |

**Peak Vector Sum :** 0.025 in/s
**Peak Air Pressure:** 106 db
0.00068 PSI @ 1.0 Hz

**Additional Info:**

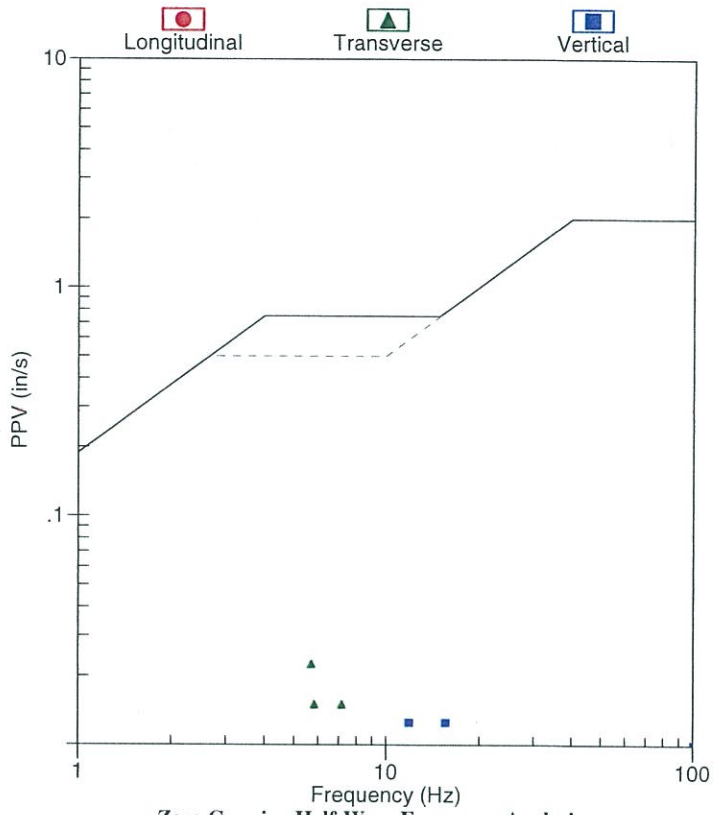
j-GEO-16386
N29 38 22.63W98 18 53.9

**Shaketable Calibrated:** 07/05/2016
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

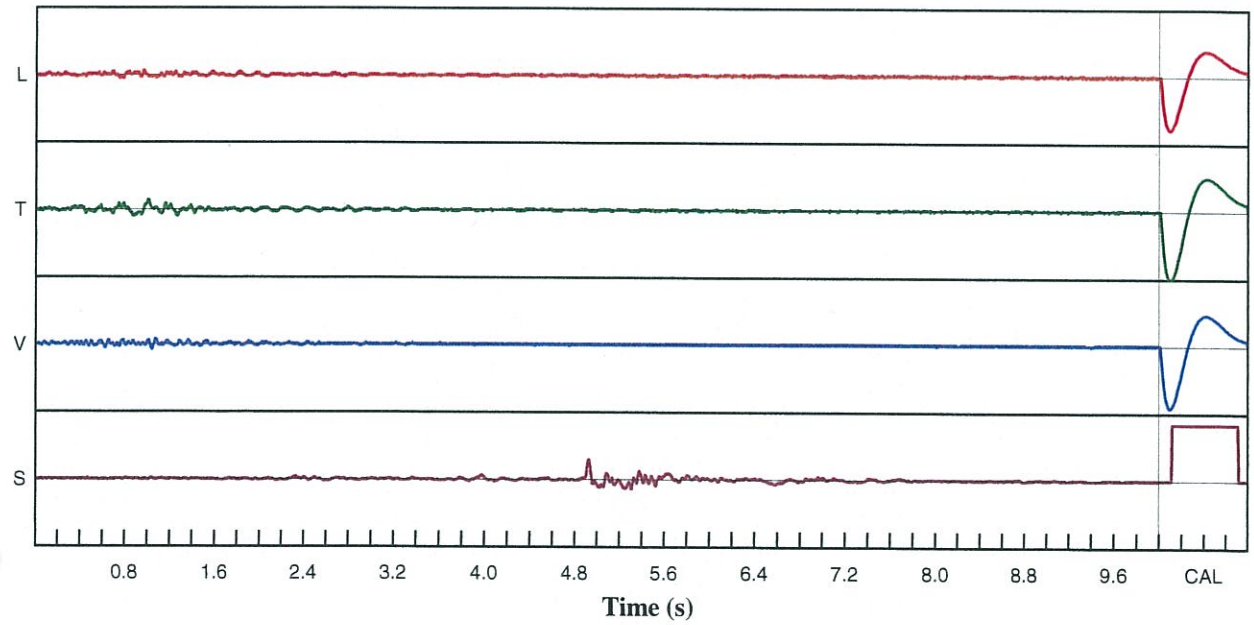
| | |
|---|---|
| **Time Scale:** | 0.200 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6366 Event: 2**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6366 Event: 2**




**Printed:** August 08, 2016 **File:** 65_6366_20160808_125656_4bk8q7k.g3k (GeoSonics Inc. AnalysisNET v8.1.49)

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date August 8, 2016 Blast No. 08-08-16 S Wall A Time 13:19

Exact Blast Location South Wall A

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N: 29° 38' 14.3"
W: 98° 16' 40.3"

MONITOR GPS

N 29 38' 15"
W 98 17' 26"

---

**SEISMOGRAPH DATA**

Seismograph No. 6241 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 5-24-16 Microphone Calibration 5-24-16

Exact Seismograph Location Holly Residence: 9916 Trophy Oaks Drive, Trophy Oaks Subdivision backyard along the quarry property line at the barbed wire fence

Seismograph Distance from Blast 4026 ft.

Peak Overpressure 100 dB Scaled Distance ------

Peak Particle Velocity 0.078 ips Operator: Clayton Smith

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: [signature] Date: 8/8/16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6241 v6.5 |
| **Date:** | 08/08/2016 12:56:57 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 5.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Holly Residence |
| **Distance:** | 4026 |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.058 | 0.058 | 0.033 |
| **FREQ (Hz)** | 7.4 | 17.9 | 16.7 |
| **PD (.001")** | 0.92 | 1.01 | 0.35 |
| **PPA (g)** | 0.020 | 0.026 | 0.013 |
| **Peak Vector Sum :** | 0.070 in/s | | |
| **Peak Air Pressure:** | 100 db | | |
| | 0.00030 PSI @ 1.0 Hz | | |

**Additional Info:**

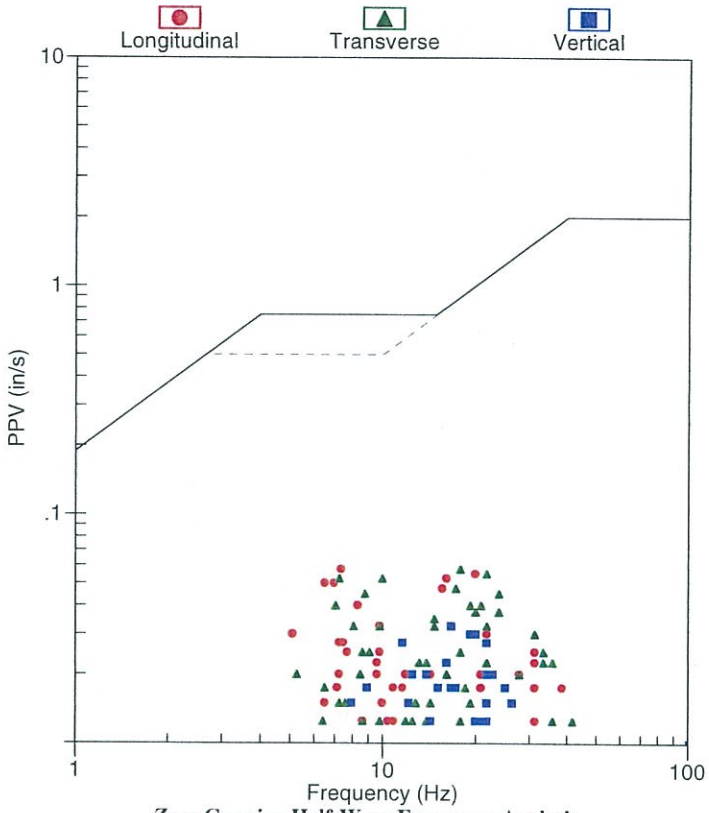
j-GEO-16392
N29 38 15 W98 17 26

**Shaketable Calibrated:** 05/25/2016
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

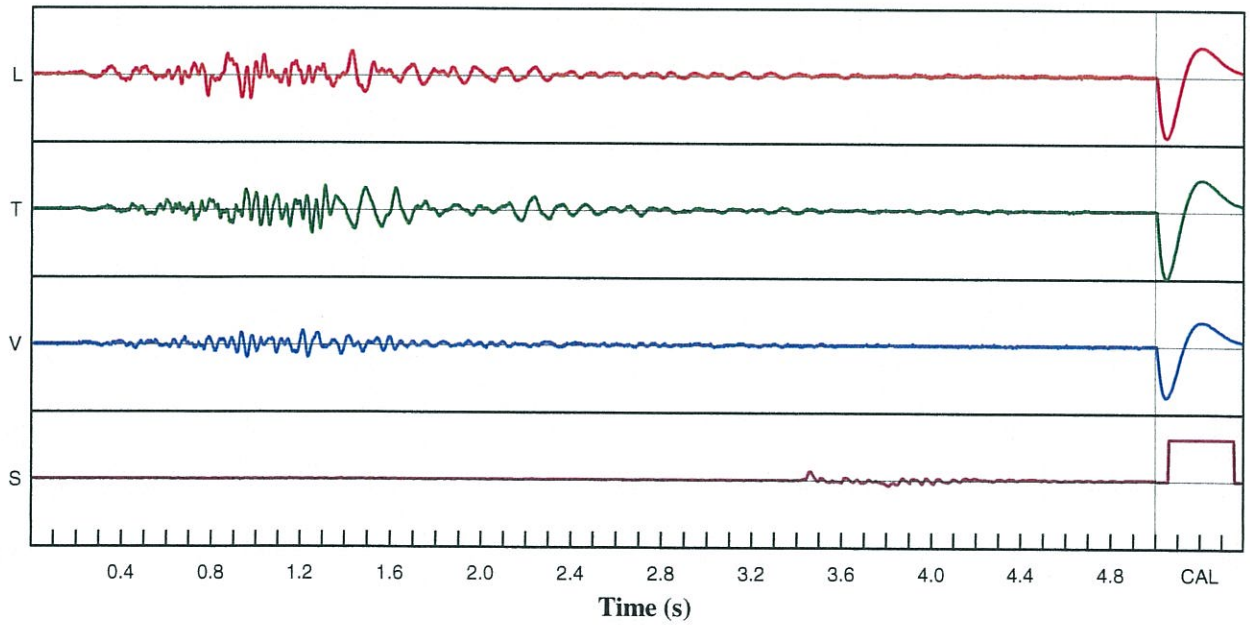
| | |
|---|---|
| **Time Scale:** | 0.100 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6241 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6241 Event: 1**




**Printed:** August 08, 2016 **File:** 65_6241_20160808_125657_4bk8q7n.g3k (GeoSonics Inc. AnalysisNET v8.1.49)

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date August 8, 2016 Blast No. 08-08-16 S Wall A Time 13:19

Exact Blast Location South Wall A

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N: 29° 38' 14.3"
W: 98° 16' 40.3"

MONITOR GPS

N 29 38' 52"
W 98 18' 19"

---

**SEISMOGRAPH DATA**

Seismograph No. 6245 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-07-16 Microphone Calibration 07-07-16

Exact Seismograph Location Michels Residence: 9118 Tuscan Hills Drive, Georg Ranch Subdivision

10' E of NE corner of house

Seismograph Distance from Blast 9529 ft.

Peak Overpressure NT dB Scaled Distance ------

Peak Particle Velocity NT ips Operator Clayton Smith

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: _____ Date: 8/8/16

# Summary Data Report

| | | | |
|---|---|---|---|
| **Serial No:** | 6245 v6.5 | **Begin Date:** | 08/08/2016 10:24:45 (UTC-5) |
| **Client:** | Hanson | **End Date:** | 08/08/2016 13:06:59 (UTC-5) |
| **Operation:** | Servtex | **Events over Trigger:** | 0 (0--1) |
| **Location:** | Michels | **Record Time:** | 10.0 s |
| **Distance:** | 9529 | **Seismic Trigger:** | 0.020 in/s |
| **Operator:** | Vibratech | **Sound Trigger:** | N/A |
| **Comment:** | Garden Ridge, Texas | **Battery Level:** | 8.5 |

**Additional Info:**
No Trigger
j-GEO-16396
N29 38 52 W98 18 19

**Shaketable Calibrated:** 07/07/2016
**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** |

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date August 8, 2016 Blast No. 08-08-16 S Wall A Time 13:19

Exact Blast Location South Wall A

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N: 29° 38' 14.3"
W: 98° 16' 40.3"

MONITOR GPS

N 29° 38' 33.55"
W98° 18' 51.07"

---

**SEISMOGRAPH DATA**

Seismograph No. 6342 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-07-16 Microphone Calibration 07-07-16

Exact Seismograph Location Midla Residence – 8724 Verano Drive – Georg Ranch Subdivision 15 ft NW of NW corner of the house, near the garage.

Seismograph Distance from Blast 11682 ft.

Peak Overpressure NT dB Scaled Distance ------

Peak Particle Velocity NT ips Operator Clayton Smith

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: [signature] Date 8/8/16

# Summary Data Report

| | | | |
|---|---|---|---|
| **Serial No:** | 6342 v6.5 | **Begin Date:** | 08/08/2016 10:01:17 (UTC-5) |
| **Client:** | Hanson | **End Date:** | 08/08/2016 14:08:13 (UTC-5) |
| **Operation:** | Servtex | **Events over Trigger:** | 1 (1-1) |
| **Location:** | Midla Res | **Record Time:** | 10.0 s |
| **Distance:** | 11682 | **Seismic Trigger:** | 0.020 in/s |
| **Operator:** | Vibratech | **Sound Trigger:** | 122 db |
| **Comment:** | Garden Ridge, Texas | **Battery Level:** | 8.5 |

**Additional Info:**
No Trigger
j-GEO-16702
N29 38 49 W98 17 35

**Shaketable Calibrated:** 07/07/2016
**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** |

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date August 8, 2016 Blast No. 08-08-16 S Wall A Time 13:19

Exact Blast Location South Wall A

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N: 29° 38' 14.3"
W: 98° 16' 40.3"

MONITOR GPS

N 29 38' 23"
W 98 17' 40"

---

**SEISMOGRAPH DATA**

Seismograph No. 6319 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 12-21-15 Microphone Calibration 12-21-15

Exact Seismograph Location Warden Residence: 21375 Gunther Grove Drive, Trophy Oaks Subdivision

10' N of NE corner of pool at the rock wall

Seismograph Distance from Blast 5332 ft.

Peak Overpressure 112 dB Scaled Distance ------

Peak Particle Velocity 0.105 ips Operator Clayton Smith

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: _____ Date: 8/8/16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6319 v6.5 |
| **Date:** | 08/08/2016 12:56:56 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 5.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Warden Residence |
| **Distance:** | 5332 |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.083 | 0.105 | 0.043 |
| **FREQ (Hz)** | 17.9 | 13.5 | 17.9 |
| **PD (.001")** | 0.94 | 1.18 | 0.37 |
| **PPA (g)** | 0.026 | 0.033 | 0.013 |

**Peak Vector Sum :** 0.110 in/s
**Peak Air Pressure:** 112 db
0.00127 PSI @ 1.0 Hz

**Additional Info:**

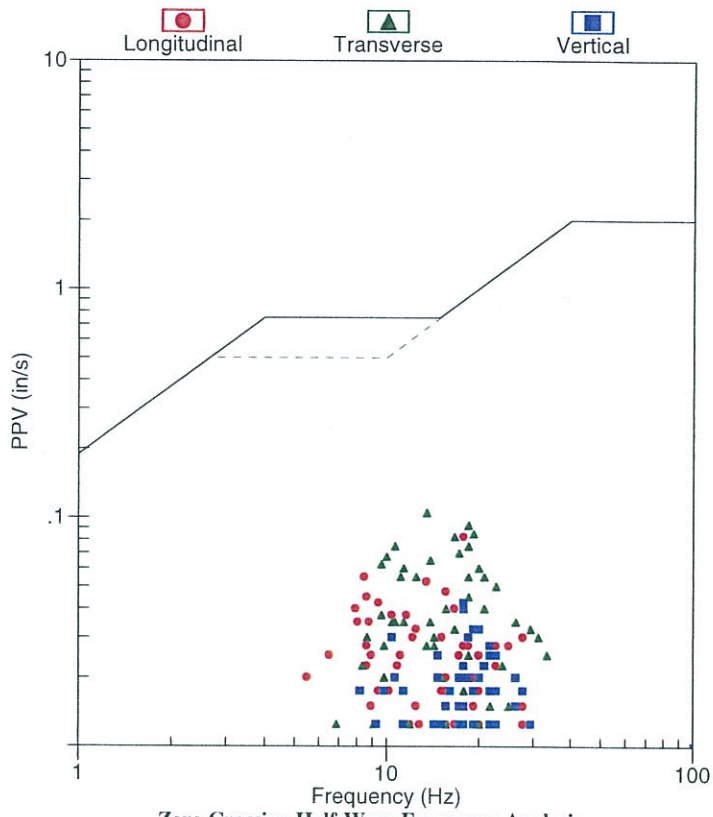
j-GEO-16404
N29 38 23 W98 17 40

**Shaketable Calibrated:** 12/21/2015
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

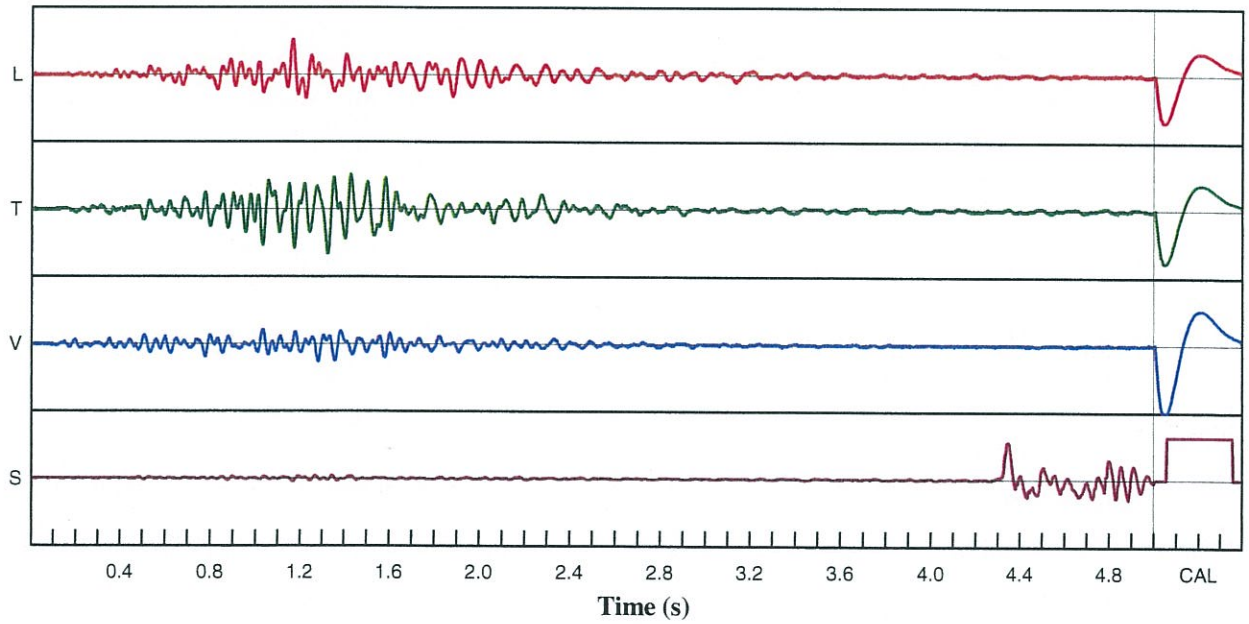
| | |
|---|---|
| **Time Scale:** | 0.100 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6319 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6319 Event: 1**




**Printed:** August 08, 2016 **File:** 65_6319_20160808_125656_4bk8q8n.g3k (GeoSonics Inc. AnalysisNET v8.1.49)

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date August 11, 2016 Blast No. 08-11-16 Lower 6 Time 17:19

Exact Blast Location Lower 6

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N: 29° 38' 51.2"
W: 98° 17' 09.9"

MONITOR GPS

N 29 38' 22.63
W 98 18' 53.97

---

**SEISMOGRAPH DATA**

Seismograph No. 6366 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-05-16 Microphone Calibration 07-05-16

Exact Seismograph Location City Property Line: outside city water tower gate

30' from gate at the property line

Seismograph Distance from Blast 4842 ft.

Peak Overpressure NT dB Scaled Distance ------

Peak Particle Velocity NT ips Operator Clayton Smith

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: [signature] Date: 8/11/16

# Summary Data Report

| | | | |
|---|---|---|---|
| **Serial No:** | 6366 v6.5 | **Begin Date:** | 08/11/2016 10:29:01 (UTC-5) |
| **Client:** | Hanson | **End Date:** | 08/11/2016 13:38:57 (UTC-5) |
| **Operation:** | Servtex | **Events over Trigger:** | 0 (0--1) |
| **Location:** | City Property Line | **Record Time:** | 10.0 s |
| **Distance:** | 4822 | **Seismic Trigger:** | 0.020 in/s |
| **Operator:** | Vibra-Tech | **Sound Trigger:** | 122 db |
| **Comment:** | Garden Ridge, Texas | **Battery Level:** | 8.4 |

**Additional Info:**
No Trigger
j-GEO-16386
N29 38 22.63W98 18 53.9

**Shaketable Calibrated:** 07/05/2016
**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** |

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date August 11, 2016 Blast No. 08-11-16 Lower 6 Time 17:29

Exact Blast Location Lower 6

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N: 29° 38' 51.2"
W: 98° 17' 05.9"

MONITOR GPS

N 29° 38' 14.48"
W98° 18' 36.74"

---

**SEISMOGRAPH DATA**

Seismograph No. 6342 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-07-16 Microphone Calibration 07-07-16

Exact Seismograph Location Cohen Residence – 10041 Trophy Oaks Dr – Trophy Oaks Subdivision 20 ft N of NE corner of the house, off the driveway.

Seismograph Distance from Blast 4414 ft.

Peak Overpressure 110 dB Scaled Distance ------

Peak Particle Velocity 0.043 ips Operator Clayton Smith

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: [signature] Date 8/11/16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6342 v6.5 |
| **Date:** | 08/11/2016 13:19:03 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 5.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Cohen Res |
| **Distance:** | 4414 |
| **Operator:** | Vibra - Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 133 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.043 | 0.043 | 0.028 |
| **FREQ (Hz)** | 6.7 | 11.6 | 16.7 |
| **PD (.001")** | 0.73 | 0.66 | 0.29 |
| **PPA (g)** | 0.020 | 0.020 | 0.013 |

**Peak Vector Sum :** 0.048 in/s

**Peak Air Pressure:** 110 db
0.00091 PSI @ 6.8 Hz

**Additional Info:**

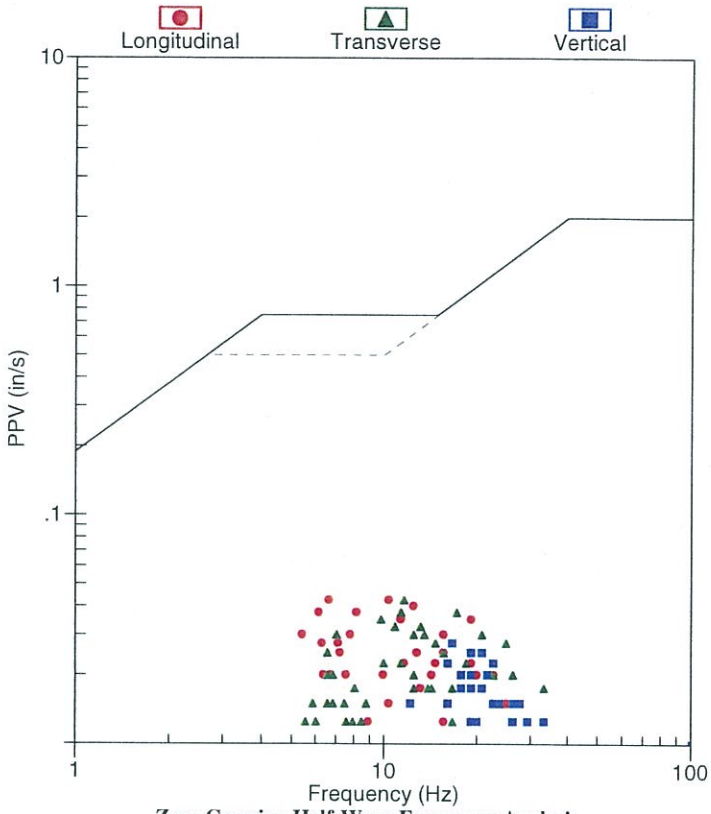
j-GEO-17298
N29 38 14.4 W98 17 36.7

**Shaketable Calibrated:** 07/07/2016
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

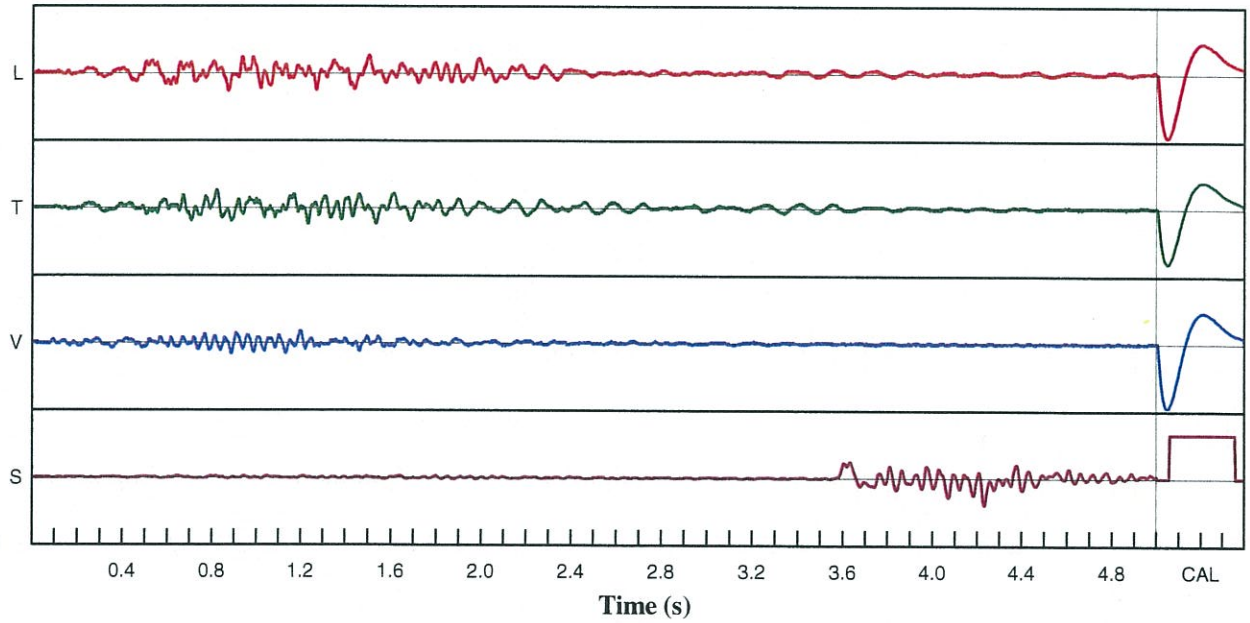
| | |
|---|---|
| **Time Scale:** | 0.100 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6342 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6342 Event: 1**




**Printed:** August 11, 2016 **File:** 65_6342_20160811_131903_4bk8zb0.g3k (GeoSonics Inc. AnalysisNET v8.1.49)

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date August 11, 2016 Blast No. 08-11-16 Lower 6 Time 13:19

Exact Blast Location Lower 6

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N: 29° 38' 51.2"
W: 98° 17' 09.9"

MONITOR GPS

N 29 38' 52"
W 98 18' 19"

---

**SEISMOGRAPH DATA**

Seismograph No. 6245 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-07-16 Microphone Calibration 07-07-16

Exact Seismograph Location Michels Residence: 9118 Tuscan Hills Drive, Georg Ranch Subdivision

10' E of NE corner of house

Seismograph Distance from Blast 6123 ft.

Peak Overpressure 95 dB Scaled Distance ------

Peak Particle Velocity 0.078 ips Operator Clayton Smith

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: [signature] Date: 8/11/16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6245 v6.5 |
| **Date:** | 08/11/2016 13:19:03 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 10.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Michels |
| **Distance:** | 6123 |
| **Operator:** | Vibratech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.078 | 0.068 | 0.025 |
| **FREQ (Hz)** | 19.2 | 15.6 | 20.8 |
| **PD (.001")** | 0.71 | 1.41 | 0.27 |
| **PPA (g)** | 0.026 | 0.078 | 0.020 |

**Peak Vector Sum :** 0.080 in/s
**Peak Air Pressure:** 95 db
0.00023 PSI @ 1.0 Hz

**Additional Info:**

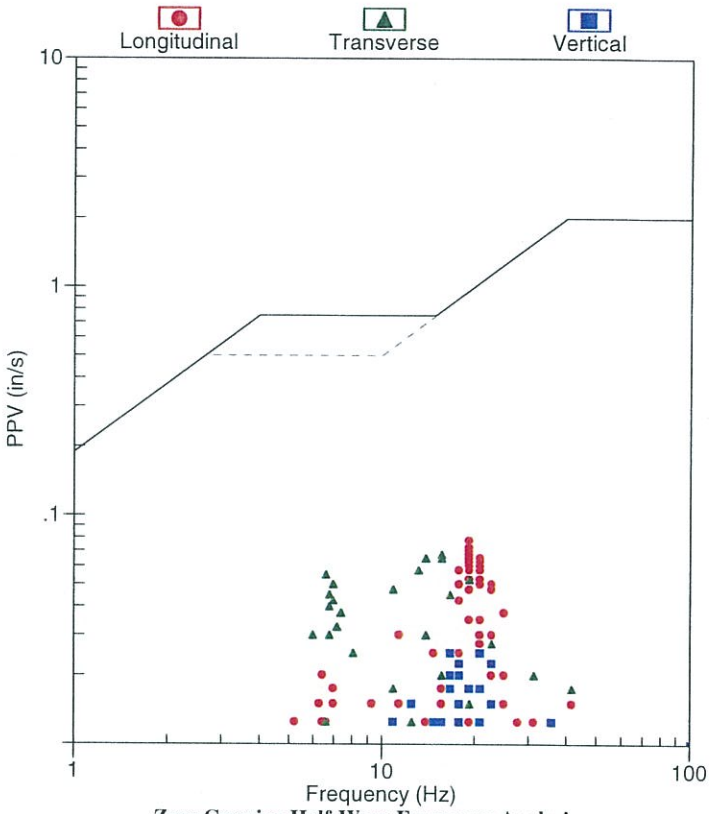
j-GEO-16396
N29 38 52 W98 18 19

**Shaketable Calibrated:** 07/07/2016
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

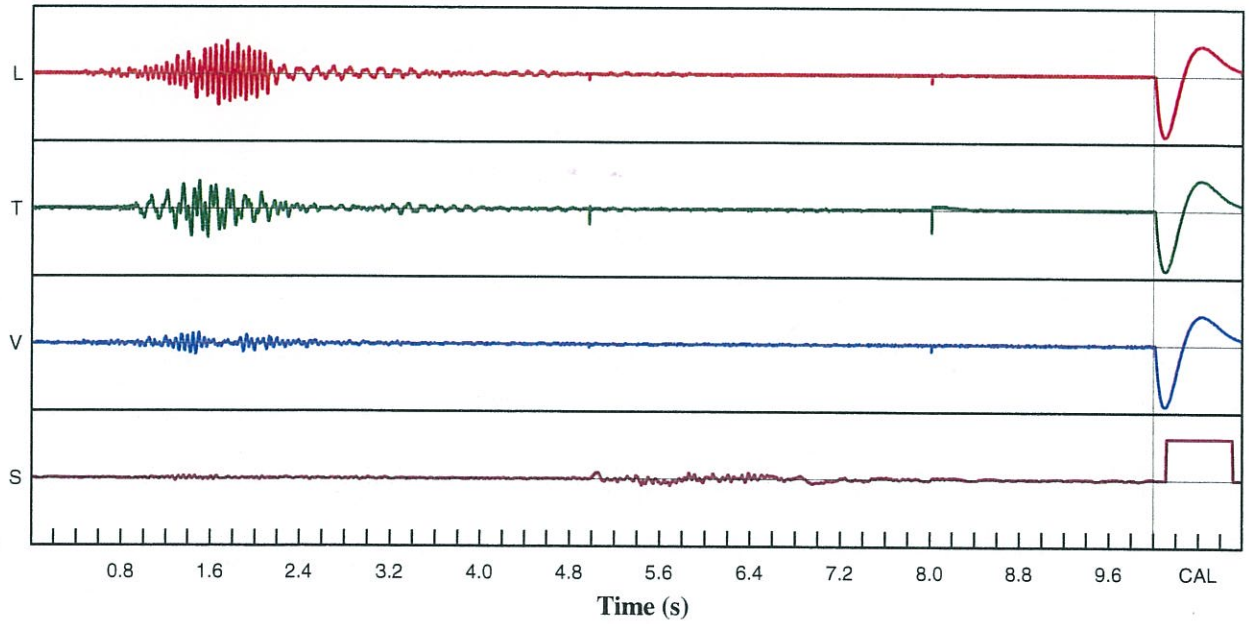
| | |
|---|---|
| **Time Scale:** | 0.200 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6245 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6245 Event: 1**




**Printed:** August 11, 2016 **File:** 65_6245_20160811_131903_4bk8zbe.g3k (GeoSonics Inc. AnalysisNET v8.1.49)

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date August 11, 2016 Blast No. 08-11-16 Lower 6 Time 13:19

Exact Blast Location Lower 6

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N: 29° 38' 57.2"

W: 98° 17' 09.9"

MONITOR GPS

N 29 38' 23"

W 98 17' 40"

---

**SEISMOGRAPH DATA**

Seismograph No. 6319 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 12-21-15 Microphone Calibration 12-21-15

Exact Seismograph Location Warden Residence: 21375 Gunther Grove Drive, Trophy Oaks Subdivision

10' N of NE corner of pool at the rock wall

Seismograph Distance from Blast 3898 ft.

Peak Overpressure 113 dB Scaled Distance ------

Peak Particle Velocity 0.093 ips Operator Clayton Smith

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: [signature] Date: 8/11/16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6319 v6.5 |
| **Date:** | 08/11/2016 13:19:02 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 5.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Warden Residence |
| **Distance:** | 3898 |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.093 | 0.085 | 0.055 |
| **FREQ (Hz)** | 17.9 | 14.3 | 17.2 |
| **PD (.001")** | 1.32 | 1.05 | 0.53 |
| **PPA (g)** | 0.039 | 0.026 | 0.026 |

**Peak Vector Sum :** 0.093 in/s
**Peak Air Pressure:** 113 db
0.00143 PSI @ 16.1 Hz

**Additional Info:**

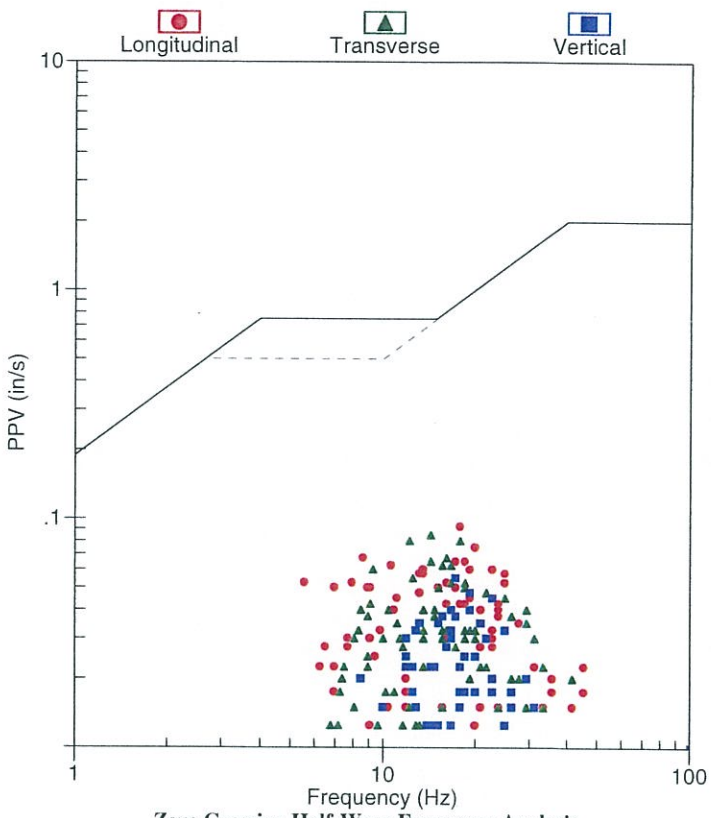
j-GEO-16404
N29 38 23 W98 17 40

**Shaketable Calibrated:** 12/21/2015
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

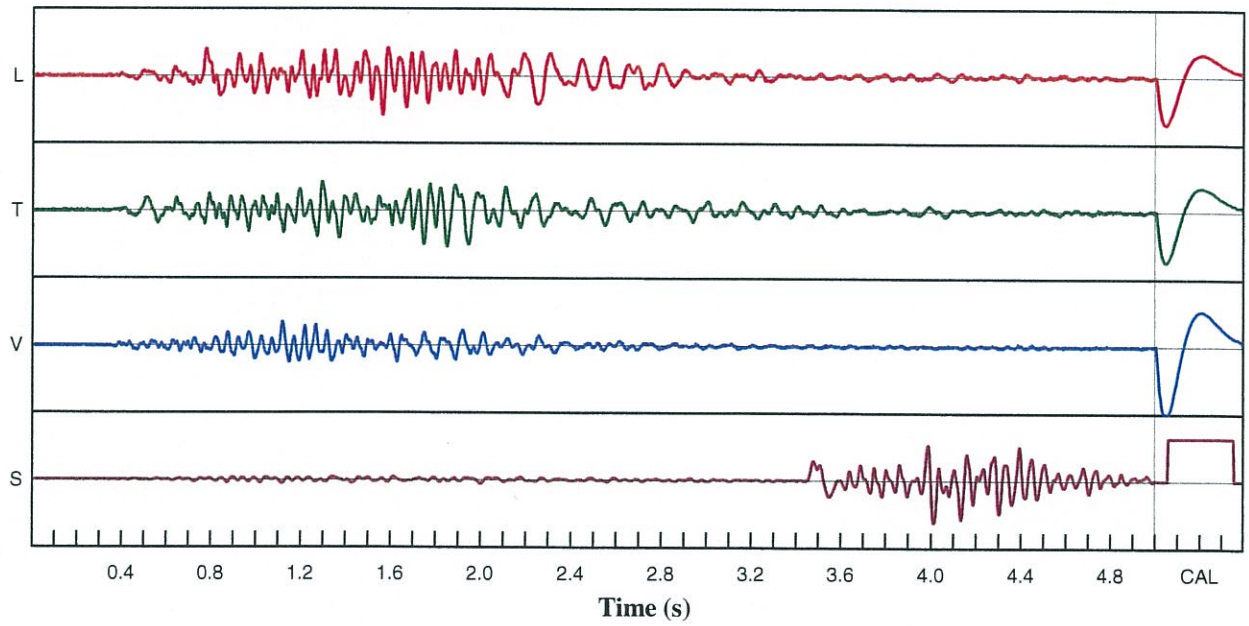
| | |
|---|---|
| **Time Scale:** | 0.100 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6319 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6319 Event: 1**




**Printed:** August 11, 2016 **File:** 65_6319_20160811_131902_4bk8zb2.g3k (GeoSonics Inc. AnalysisNET v8.1.49)

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date August 11, 2016 Blast No. 08-11-16 Lower 6 Time 13:19

Exact Blast Location Lower 6

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N: 29° 38' 57.2"
W: 98° 17' 09.9"

MONITOR GPS

N 29 38' 25"
W 98 17' 39"

---

**SEISMOGRAPH DATA**

Seismograph No. 6277 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 12-22-15 Microphone Calibration 12-22-15

Exact Seismograph Location Warden Property Line: 21375 Gunther Grove Drive, Trophy Oaks Subdivision North East corner of the property, at the pink pin flag

Seismograph Distance from Blast 3690

Peak Overpressure 111 dB Scaled Distance ------

Peak Particle Velocity 0.043 ips Operator Clayton Smith

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: [signature] Date: 8/11/16

# Vibra Tech Seismic Analysis

## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6277 v6.5 |
| **Date:** | 08/11/2016 13:19:03 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 5.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Warden Property Line |
| **Distance:** | 3690 |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.043 | 0.038 | 0.040 |
| **FREQ (Hz)** | 13.2 | 10.9 | 17.9 |
| **PD (.001")** | 0.62 | 0.60 | 0.44 |
| **PPA (g)** | 0.020 | 0.013 | 0.020 |

**Peak Vector Sum :** 0.055 in/s

**Peak Air Pressure:** 111 db
0.00100 PSI @ 3.2 Hz

**Additional Info:**

j-GEO-16406
N29 38 25 W98 17 39

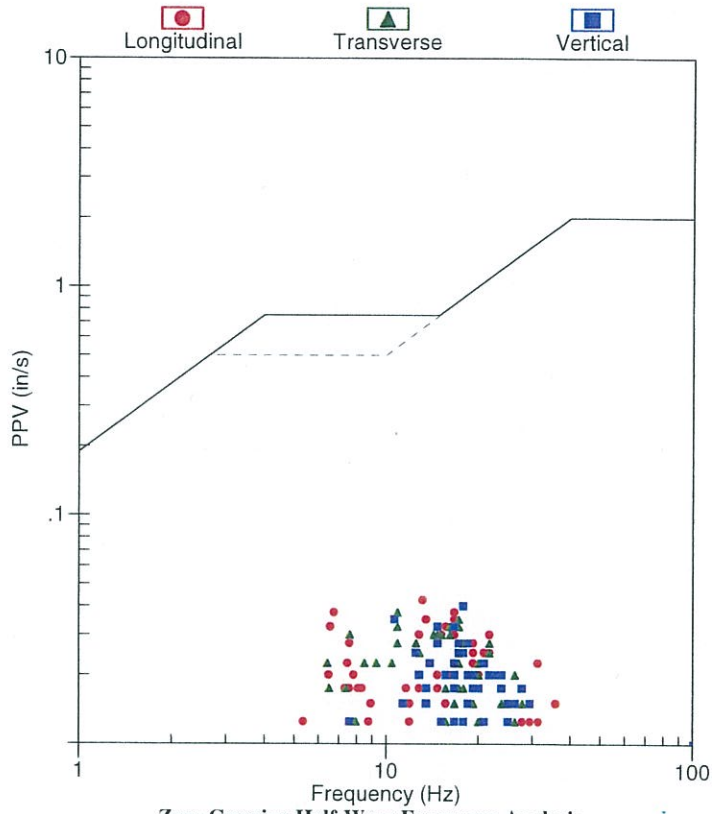
**Shaketable Calibrated:** 12/22/2015
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

| | |
|---|---|
| **Time Scale:** | 0.100 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels

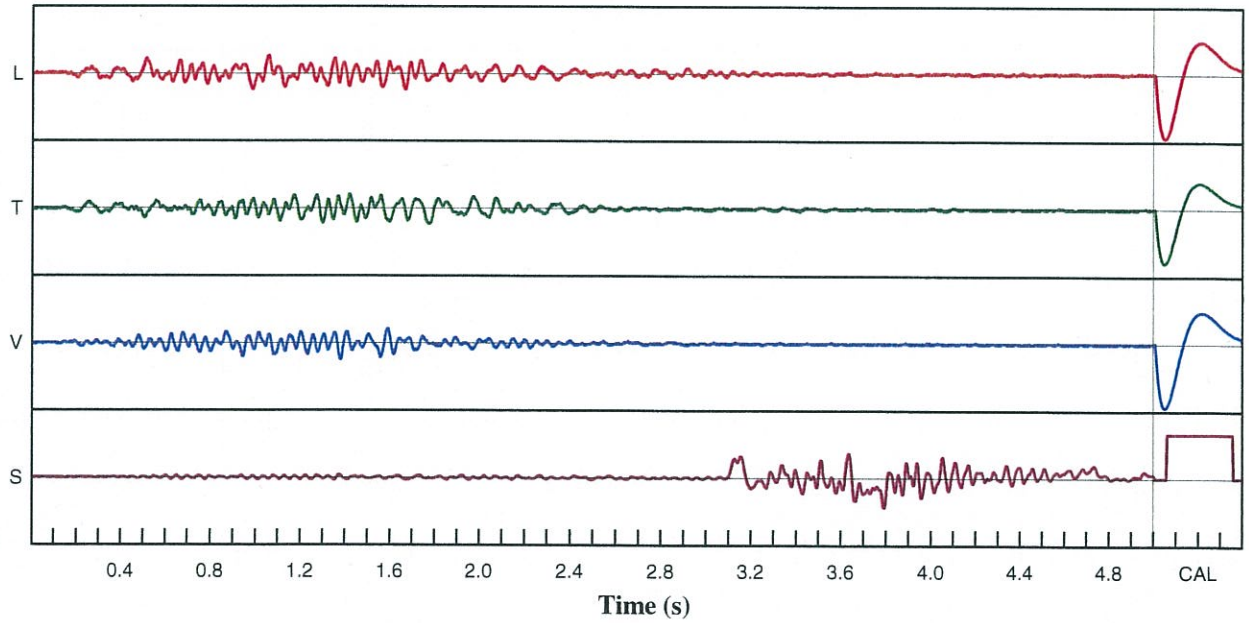
**SN: 6277 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform

**SN: 6277 Event: 1**




**Printed:** August 11, 2016 **File:** 65_6277_20160811_131903_4bk8zb1.g3k (GeoSonics Inc. AnalysisNET v8.1.49)

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8-12-16 Blast No. 08-12-16 4A Time 14:03

Exact Blast Location 4A

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N29° 38' 58.80"
W 98° 17' 38.10"

MONITOR GPS

N 29 38' 22.63
W 98 18' 53.97

---

**SEISMOGRAPH DATA**

Seismograph No. 6366 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-05-16 Microphone Calibration 07-05-16

Exact Seismograph Location City Property Line: outside city water tower gate

30' from gate at the property line

Seismograph Distance from Blast 3923'

Peak Overpressure N.T. dB Scaled Distance ------

Peak Particle Velocity N.T ips Operator Nick Reitinger

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: [signature] Date: 8-12-16

# Summary Data Report

| | | | |
|---|---|---|---|
| **Serial No:** | 6366 v6.5 | **Begin Date:** | 08/12/2016 10:11:45 (UTC-5) |
| **Client:** | Hanson | **End Date:** | 08/12/2016 14:12:58 (UTC-5) |
| **Operation:** | Servtex | **Events over Trigger:** | 0 (1-0) |
| **Location:** | City Property Line | **Record Time:** | 10.0 s |
| **Distance:** | 3923 | **Seismic Trigger:** | 0.020 in/s |
| **Operator:** | Vibra-Tech | **Sound Trigger:** | 122 db |
| **Comment:** | Garden Ridge, Texas | **Battery Level:** | 8.5 |

**Additional Info:**
No Trigger
j-GEO-16386
N29 38 22.63W98 18 53.9

**Shaketable Calibrated:** 07/05/2016
**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** |

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8-12-16 Blast No. 0812-16 4A Time 14:03

Exact Blast Location 4A

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N29°38' 58.80"
W 98° 17' 38.10"

MONITOR GPS

N 29° 38' 14.48"
W98° 18' 36.74"

---

**SEISMOGRAPH DATA**

Seismograph No. 6342 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-07-16 Microphone Calibration 07-07-16

Exact Seismograph Location Cohen Residence – 10041 Trophy Oaks Dr – Trophy Oaks Subdivision 20 ft N of NE corner of the house, off the driveway.

Seismograph Distance from Blast 4498'

Peak Overpressure 108 dB Scaled Distance ------

Peak Particle Velocity 0.035 ips Operator Nick Zeilinger

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: _____ Date 8-12-16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6342 v6.5 |
| **Date:** | 08/12/2016 14:03:39 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 5.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Cohen Res |
| **Distance:** | 4498 |
| **Operator:** | Vibra - Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 133 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.033 | 0.035 | 0.015 |
| **FREQ (Hz)** | 6.5 | 4.5 | 12.8 |
| **PD (.001")** | 0.73 | 0.86 | 0.25 |
| **PPA (g)** | 0.013 | 0.013 | 0.013 |

**Peak Vector Sum :** 0.043 in/s
**Peak Air Pressure:** 108 db
0.00077 PSI @ 1.0 Hz

**Additional Info:**

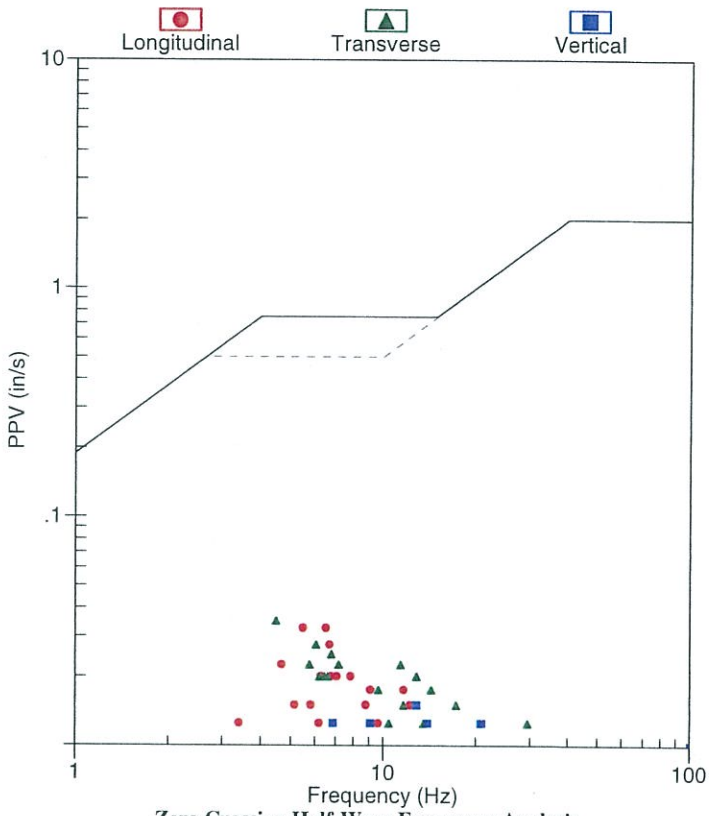
j-GEO-17298
N29 38 14.4 W98 17 36.7

**Shaketable Calibrated:** 07/07/2016
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

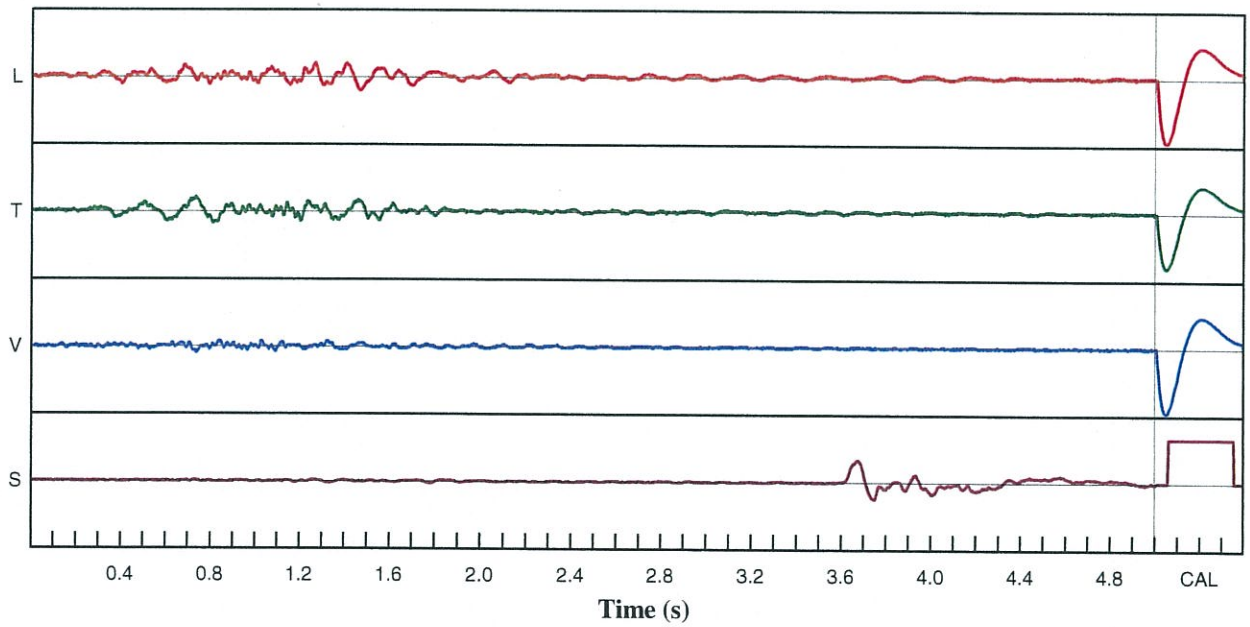
| | |
|---|---|
| **Time Scale:** | 0.100 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6342 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6342 Event: 1**



# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8-12-16 Blast No. 08-12-16-4A Time 14:03

Exact Blast Location 4A

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N29° 38' 58.80"
W 98° 17" 38.10"

MONITOR GPS

N 29 38' 52"
W 98 18' 19"

---

**SEISMOGRAPH DATA**

Seismograph No. 6245 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-07-16 Microphone Calibration 07-07-16

Exact Seismograph Location Michels Residence: 9118 Tuscan Hills Drive, Georg Ranch Subdivision

10' E of NE corner of house

Seismograph Distance from Blast 3704

Peak Overpressure 102 dB Scaled Distance ------

Peak Particle Velocity 0.058 ips Operator Nick Reitling

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: Date: 8-12-16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6245 v6.5 |
| **Date:** | 08/12/2016 14:03:40 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 10.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Michels |
| **Distance:** | 3704 |
| **Operator:** | Vibratech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.058 | 0.050 | 0.030 |
| **FREQ (Hz)** | 10.9 | 11.9 | 12.5 |
| **PD (.001")** | 0.92 | 0.64 | 0.32 |
| **PPA (g)** | 0.020 | 0.026 | 0.013 |

**Peak Vector Sum :** 0.073 in/s
**Peak Air Pressure:** 102 db
0.00041 PSI @ 1.0 Hz

**Additional Info:**

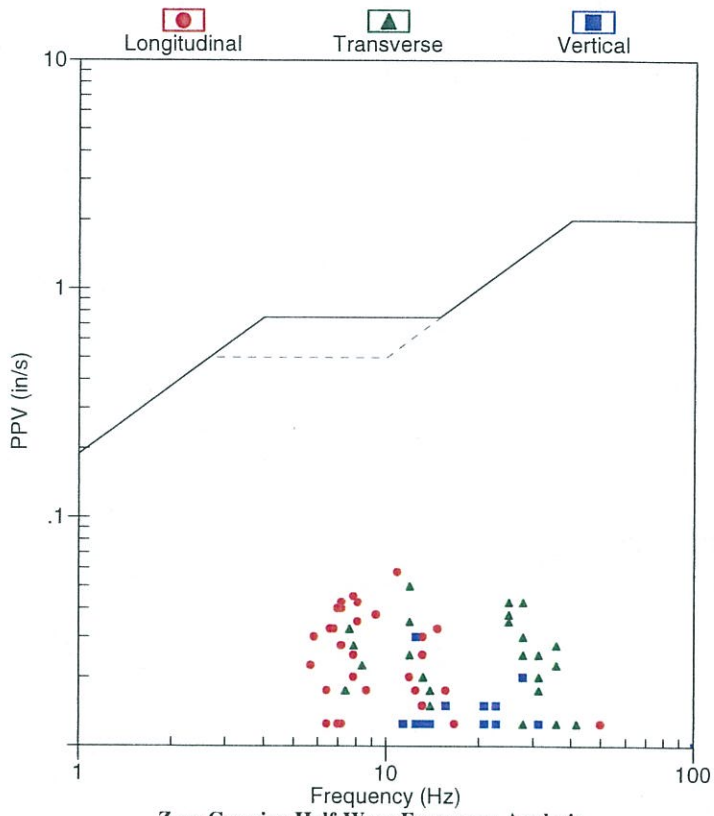
j-GEO-16396
N29 38 52 W98 18 19

**Shaketable Calibrated:** 07/07/2016
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

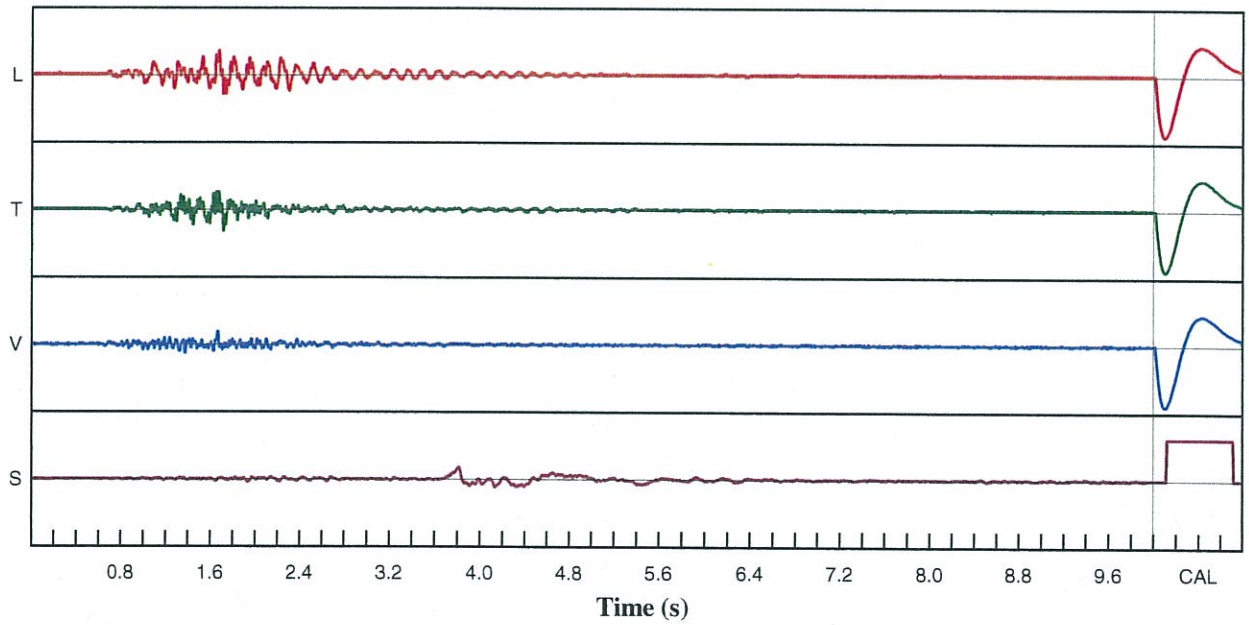
| | |
|---|---|
| **Time Scale:** | 0.200 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

## USBM Safe Blasting Levels
**SN: 6245 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

## Velocity Waveform
**SN: 6245 Event: 1**



# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8-12-16 Blast No. 08-12-16 4A Time 14:03

Exact Blast Location 4A

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N29° 38' 58.80"
W98° 17' 38.10"

MONITOR GPS

N 29 38' 23"
W 98 17' 40"

---

**SEISMOGRAPH DATA**

Seismograph No. 6319 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 12-21-15 Microphone Calibration 12-21-15

Exact Seismograph Location Warden Residence: 21375 Gunther Grove Drive, Trophy Oaks Subdivision

10' N of NE corner of pool at the rock wall

Seismograph Distance from Blast 3632'

Peak Overpressure 110 dB Scaled Distance ------

Peak Particle Velocity 0.093 ips Operator Nick Reitinger

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: Date: 8-12-16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6319 v6.5 |
| **Date:** | 08/12/2016 14:03:39 (UTC-5) |
| **Event No:** | 3 |
| **Record Time:** | 5.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Warden Residence |
| **Distance:** | 3632 |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.093 | 0.070 | 0.028 |
| **FREQ (Hz)** | 14.3 | 16.1 | 20.0 |
| **PD (.001")** | 1.30 | 0.90 | 0.25 |
| **PPA (g)** | 0.026 | 0.026 | 0.013 |

**Peak Vector Sum :** 0.095 in/s
**Peak Air Pressure:** 110 db
0.00094 PSI @ 1.0 Hz

**Additional Info:**

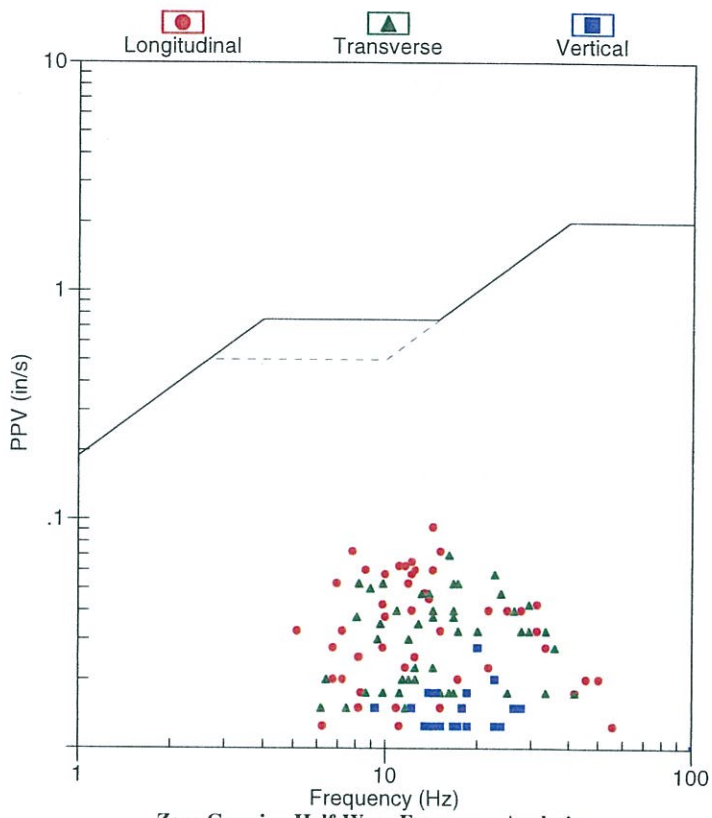
j-GEO-16404
N29 38 23 W98 17 40

**Shaketable Calibrated:** 12/21/2015
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

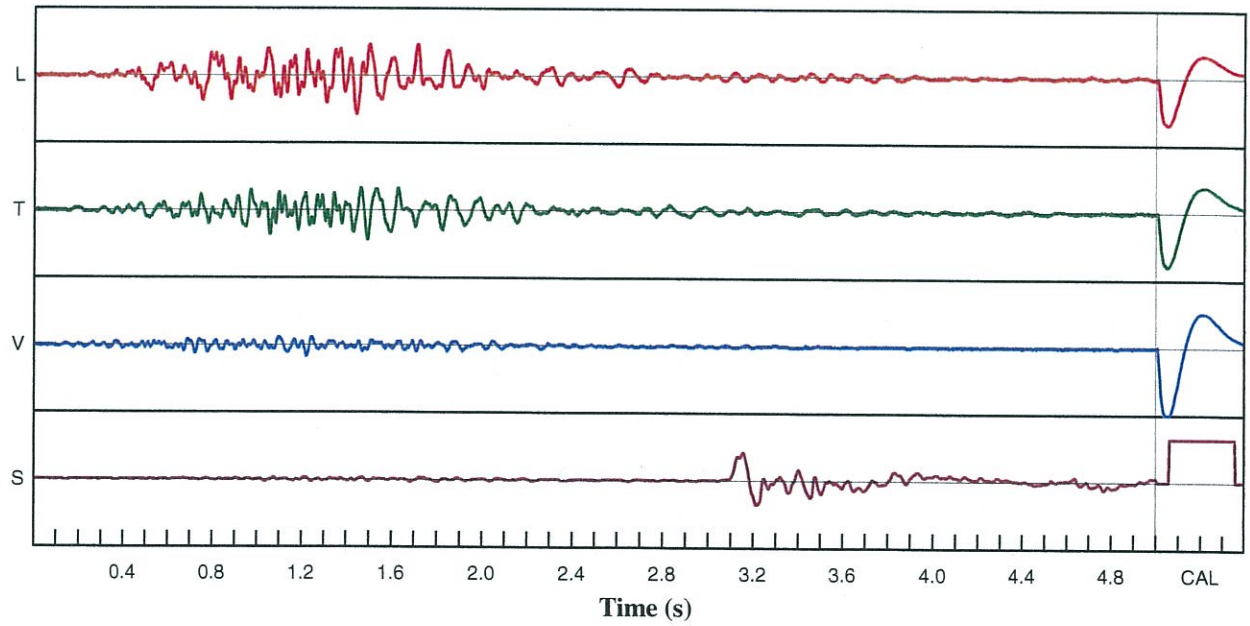
| | |
|---|---|
| **Time Scale:** | 0.100 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6319 Event: 3**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6319 Event: 3**



# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8-12-16 Blast No. 08-12-16 4A Time 14:03

Exact Blast Location 4A

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N29° 38' 58.80"
W 98° 17' 38.10"

MONITOR GPS

N 29 38' 25"
W 98 17' 39"

---

**SEISMOGRAPH DATA**

Seismograph No. 6277 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 12-22-15 Microphone Calibration 12-22-15

Exact Seismograph Location Warden Property Line: 21375 Gunther Grove Drive, Trophy Oaks Subdivision North East corner of the property, at the pink pin flag

Seismograph Distance from Blast 3426'

Peak Overpressure 112 dB Scaled Distance ------

Peak Particle Velocity 0.035 ips Operator Nick Reitling

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: Date: 8-12-16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6277 v6.5 |
| **Date:** | 08/12/2016 14:03:40 (UTC-5) |
| **Event No:** | 2 |
| **Record Time:** | 5.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Warden Property Line |
| **Distance:** | 3426 |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.035 | 0.033 | 0.025 |
| **FREQ (Hz)** | 13.5 | 16.7 | 23.8 |
| **PD (.001")** | 0.48 | 0.77 | 0.26 |
| **PPA (g)** | 0.013 | 0.013 | 0.013 |

**Peak Vector Sum :** 0.040 in/s
**Peak Air Pressure:** 112 db
0.00118 PSI @ 1.0 Hz

**Additional Info:**

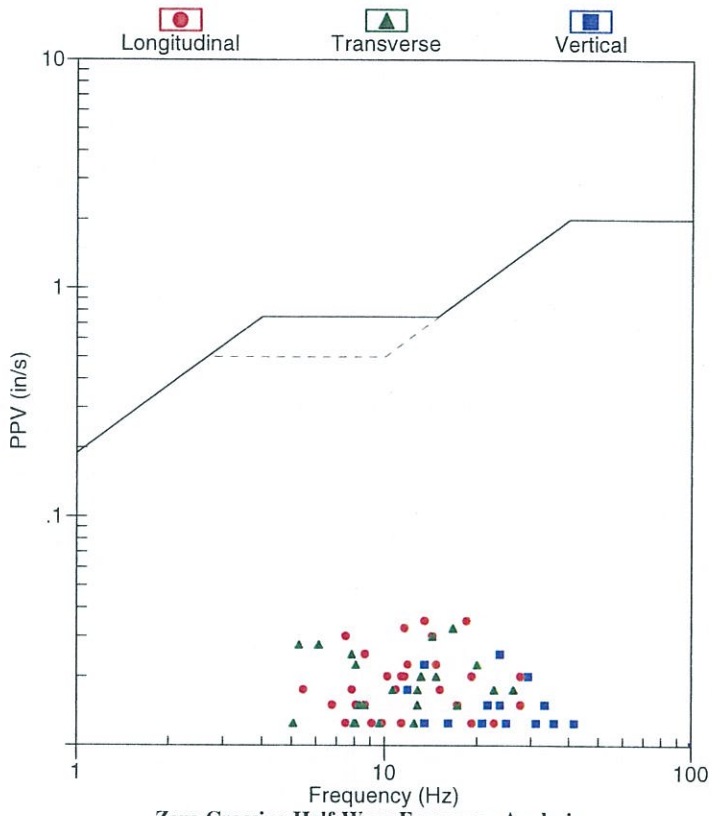
j-GEO-16406
N29 38 25 W98 17 39

**Shaketable Calibrated:** 12/22/2015
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

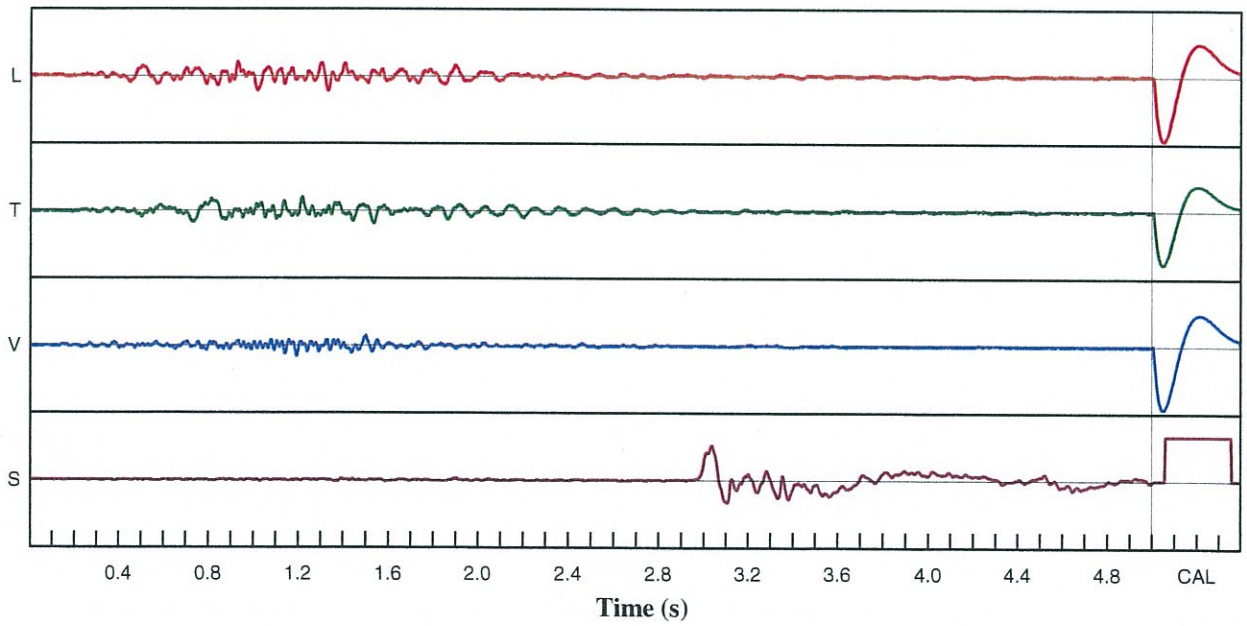
| | |
|---|---|
| **Time Scale:** | 0.100 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

## USBM Safe Blasting Levels
**SN: 6277 Event: 2**




**Zero Crossing Half-Wave Frequency Analysis**

## Velocity Waveform
**SN: 6277 Event: 2**




**Printed:** August 12, 2016 **File:** 65_6277_20160812_140340_4bk812c1.g3k (GeoSonics Inc. AnalysisNET v8.1.49)

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date August 19, 2016 Blast No. 08-19-2016 3D Time 12:27

Exact Blast Location 3D

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N: 29° 38' 49.7"

W: 98° 17' 37.7"

MONITOR GPS

N 29 38' 22.63

W 98 18' 53.97

---

**SEISMOGRAPH DATA**

Seismograph No. 6366 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-05-16 Microphone Calibration 07-05-16

Exact Seismograph Location City Property Line: outside city water tower gate

30' from gate at the property line

Seismograph Distance from Blast 3095 ft.

Peak Overpressure 101 dB Scaled Distance ------

Peak Particle Velocity 0.043 ips Operator Clayton Smith

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: [signature] Date: 8/19/16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6366 v6.5 |
| **Date:** | 08/19/2016 12:27:17 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 10.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | City Property Line |
| **Distance:** | 3095 |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.038 | 0.043 | 0.020 |
| **FREQ (Hz)** | 5.4 | 7.4 | 8.9 |
| **PD (.001")** | 0.83 | 0.99 | 0.44 |
| **PPA (g)** | 0.013 | 0.013 | 0.007 |

**Peak Vector Sum :** 0.045 in/s
**Peak Air Pressure:** 101 db
0.00037 PSI @ 1.4 Hz

**Additional Info:**

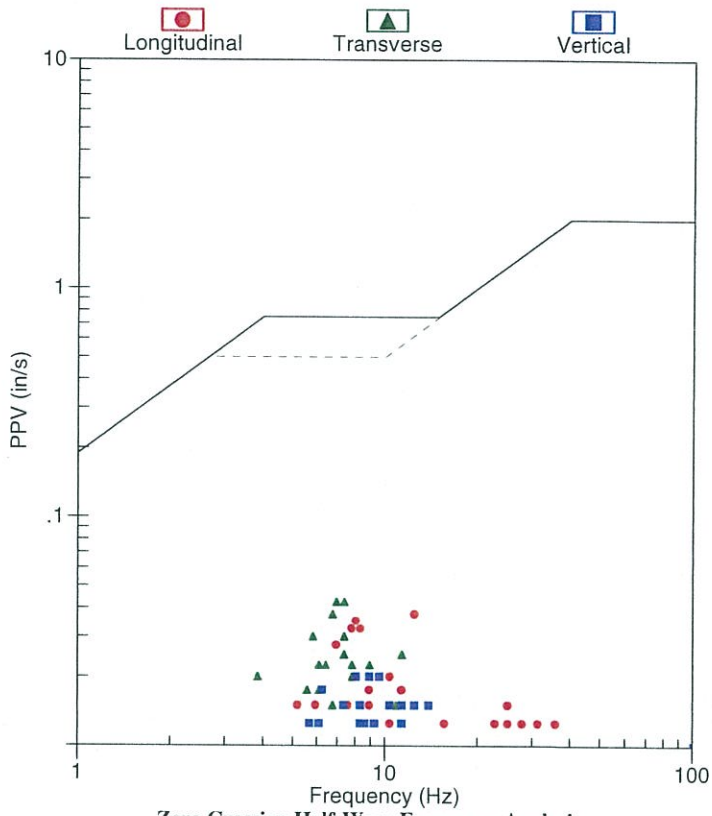
j-GEO-16386
N29 38 22.63W98 18 53.9

**Shaketable Calibrated:** 07/05/2016
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

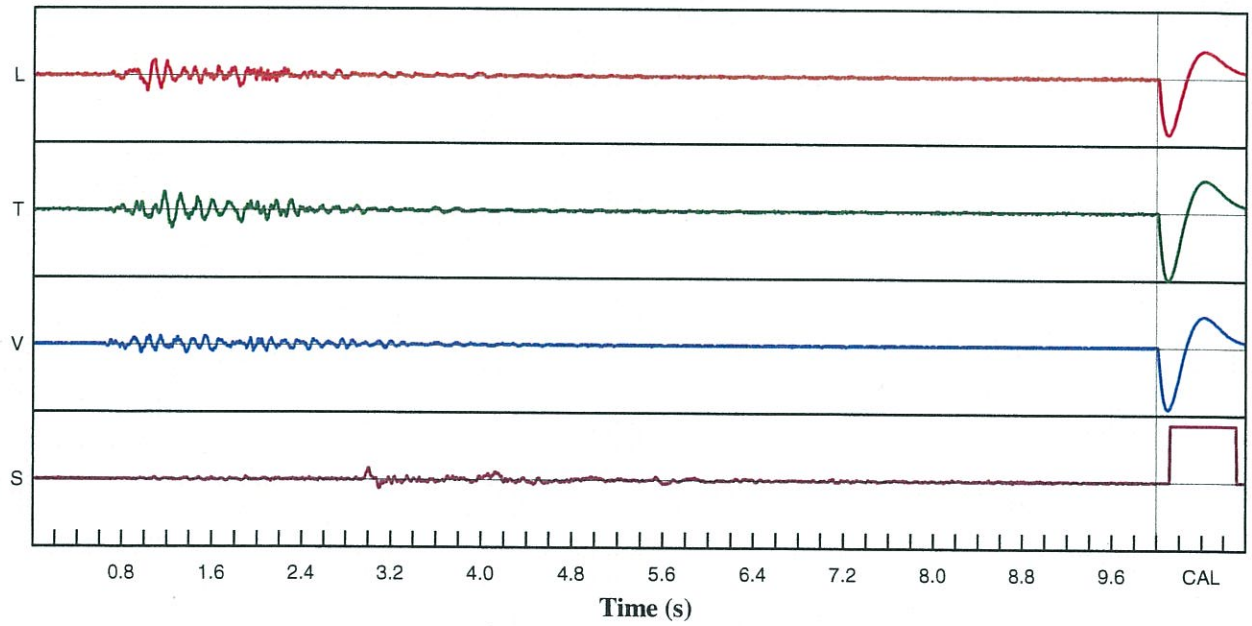
| | |
|---|---|
| **Time Scale:** | 0.200 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6366 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6366 Event: 1**




**Printed:** August 19, 2016 **File:** 65_6366_20160819_122717_4bk81njv.g3k (GeoSonics Inc. AnalysisNET v8.1.49)

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date August 19, 2016 Blast No. 08-19-2016 SD Time 12:27

Exact Blast Location 3D

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N: 29° 38' 49.7"

W: 98° 17' 37.7"

MONITOR GPS

N 29° 38' 14.48"

W98° 18' 36.74"

---

**SEISMOGRAPH DATA**

Seismograph No. 6342 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-07-16 Microphone Calibration 07-07-16

Exact Seismograph Location Cohen Residence – 10041 Trophy Oaks Dr – Trophy Oaks Subdivision 20 ft N of NE corner of the house, off the driveway.

Seismograph Distance from Blast 3575 ft.

Peak Overpressure 106 dB Scaled Distance ------

Peak Particle Velocity 0.060 ips Operator Clayton Smith

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: [signature] Date 8/19/16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6342 v6.5 |
| **Date:** | 08/19/2016 12:27:17 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 5.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Cohen Res |
| **Distance:** | 3575 |
| **Operator:** | Vibra - Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 133 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.058 | 0.060 | 0.030 |
| **FREQ (Hz)** | 9.1 | 9.8 | 27.8 |
| **PD (.001")** | 0.93 | 0.97 | 0.39 |
| **PPA (g)** | 0.026 | 0.026 | 0.020 |

**Peak Vector Sum :** 0.073 in/s
**Peak Air Pressure:** 106 db
0.00064 PSI @ 2.7 Hz

**Additional Info:**

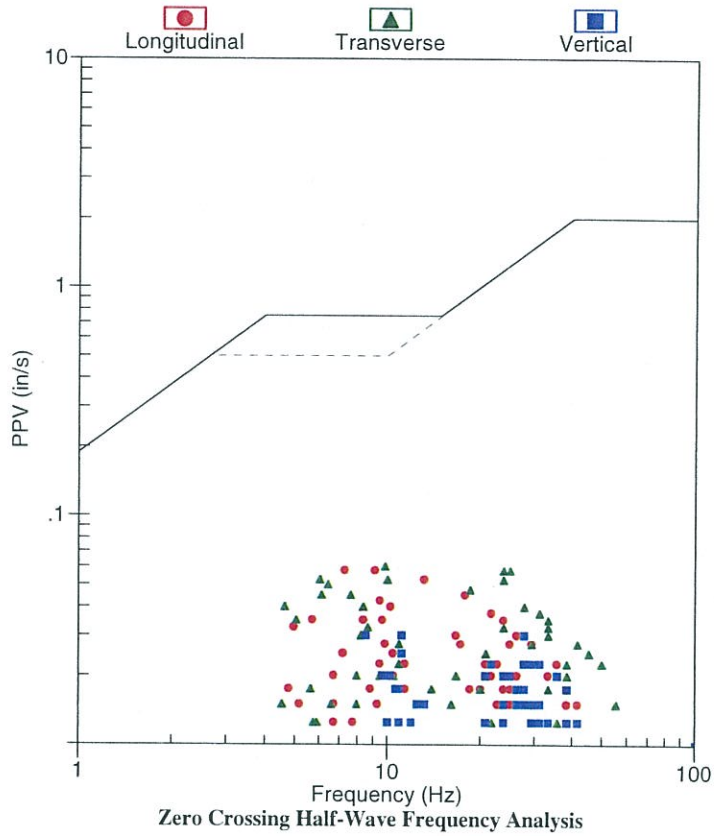
j-GEO-17298
N29 38 14.4 W98 17 36.7

**Shaketable Calibrated:** 07/07/2016
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

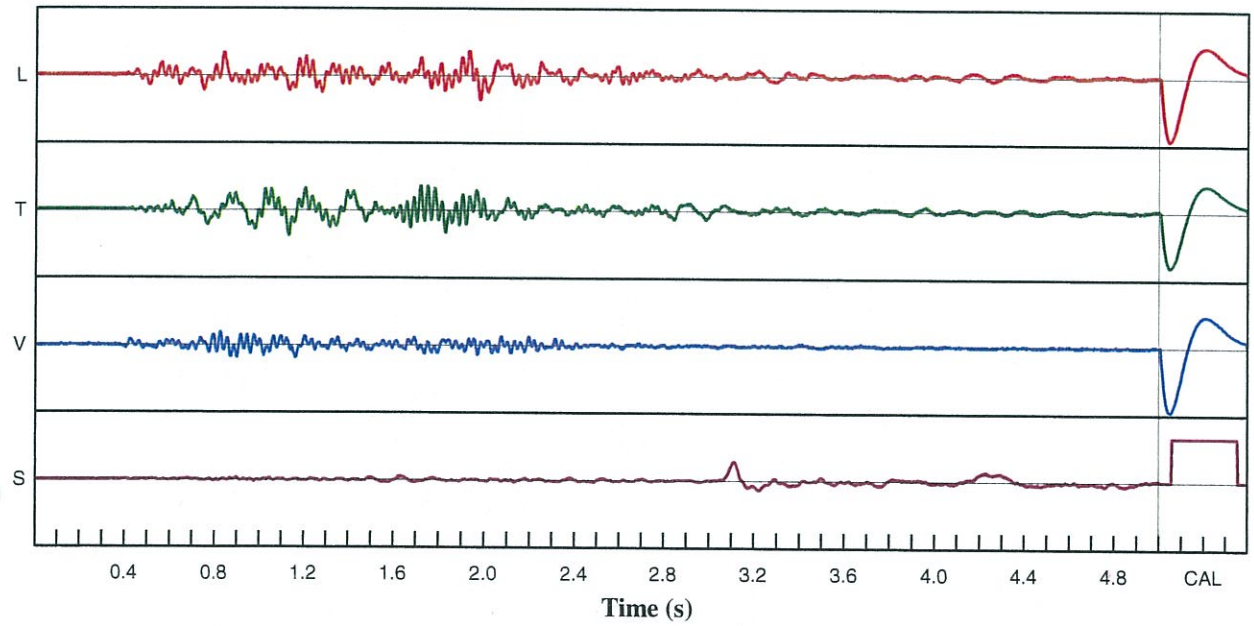
| | |
|---|---|
| **Time Scale:** | 0.100 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6342 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6342 Event: 1**



# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date August 15, 2016 Blast No. 08-15-2016 3D Time 12:27

Exact Blast Location 3D

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N: 29° 38' 49.7"

W: 98° 17' 37.7"

MONITOR GPS

N 29 38' 52"

W 98 18' 19"

---

**SEISMOGRAPH DATA**

Seismograph No. 6245 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-07-16 Microphone Calibration 07-07-16

Exact Seismograph Location Michels Residence: 9118 Tuscan Hills Drive, Georg Ranch Subdivision

10' E of NE corner of house

Seismograph Distance from Blast 3632 ft.

Peak Overpressure 101 dB Scaled Distance ------

Peak Particle Velocity 0.075 ips Operator Clayton Smith

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: [signature] Date: 8/19/16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6245 v6.5 |
| **Date:** | 08/19/2016 12:27:17 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 10.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Michels |
| **Distance:** | 3682 |
| **Operator:** | Vibratech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.075 | 0.043 | 0.025 |
| **FREQ (Hz)** | 7.4 | 6.6 | 6.9 |
| **PD (.001")** | 1.60 | 0.70 | 0.36 |
| **PPA (g)** | 0.020 | 0.013 | 0.013 |

**Peak Vector Sum :** 0.075 in/s
**Peak Air Pressure:** 101 db
0.00032 PSI @ 3.1 Hz

**Additional Info:**

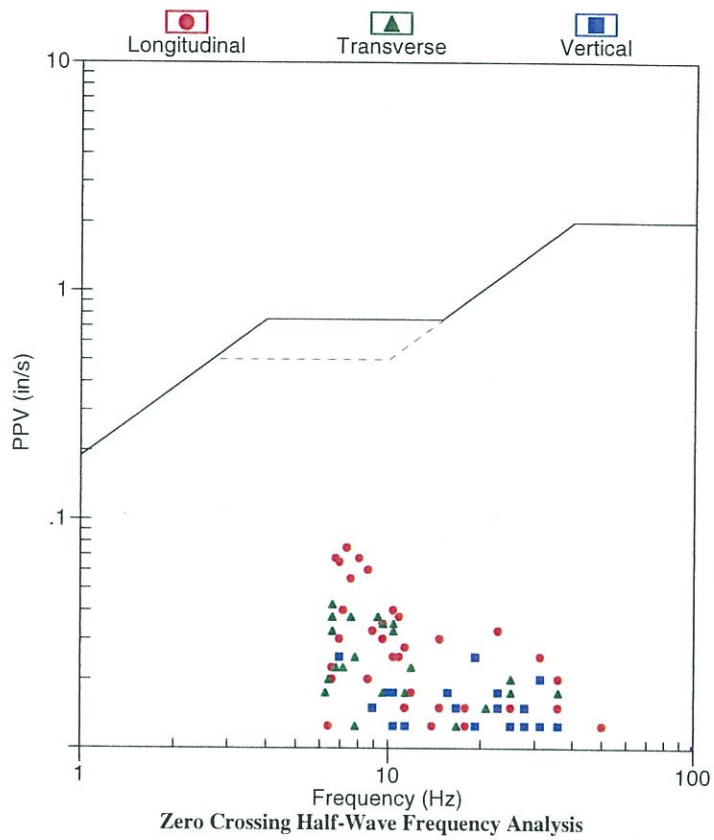
j-GEO-16396
N29 38 52 W98 18 19

**Shaketable Calibrated:** 07/07/2016
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

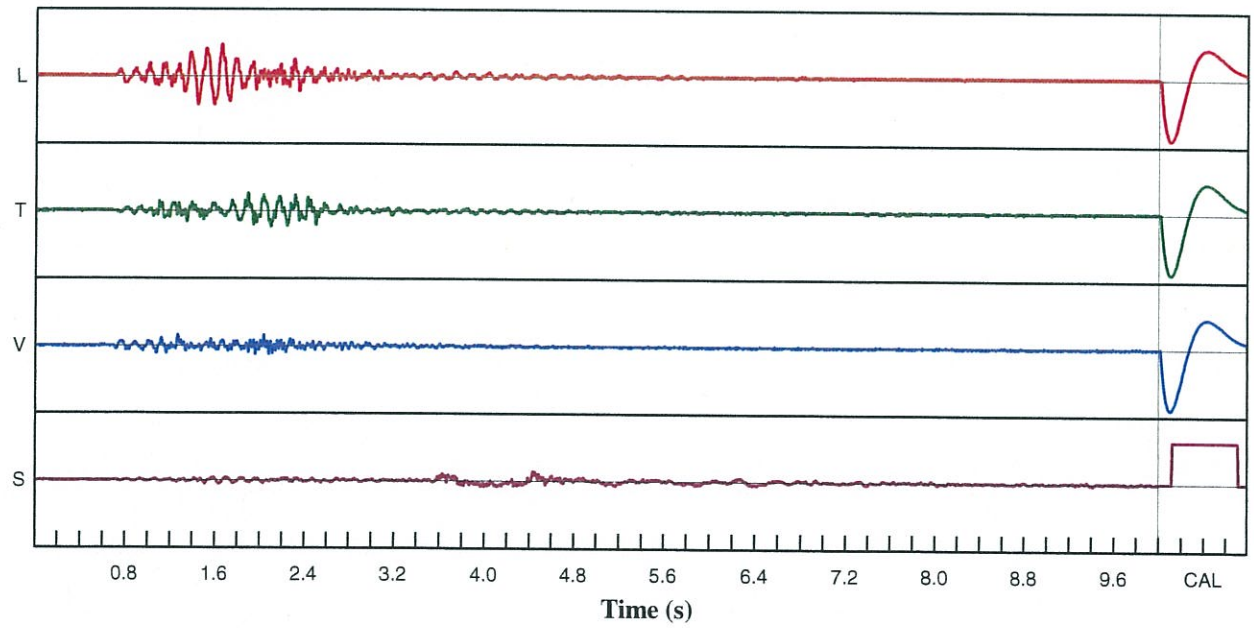
| | |
|---|---|
| **Time Scale:** | 0.200 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6245 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6245 Event: 1**




**Printed:** August 19, 2016 **File:** 65_6245_20160819_122717_4bk81njy.g3k (GeoSonics Inc. AnalysisNET v8.1.49)

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date August 19, 2016 Blast No. 08-19-2016 3D Time 12:27

Exact Blast Location 3D

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N: 29° 38' 49.7"
W: 98° 17' 37.7"

MONITOR GPS

N 29 38' 23"
W 98 17' 40"

---

**SEISMOGRAPH DATA**

Seismograph No. 6319 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 12-21-15 Microphone Calibration 12-21-15

Exact Seismograph Location Warden Residence: 21375 Gunther Grove Drive, Trophy Oaks Subdivision

10' N of NE corner of pool at the rock wall

Seismograph Distance from Blast 2713 ft.

Peak Overpressure 111 dB Scaled Distance ------

Peak Particle Velocity 0.133 ips Operator Clayton Smith

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: [signature] Date: 8/19/16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6319 v6.5 |
| **Date:** | 08/19/2016 12:27:17 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 5.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Warden Residence |
| **Distance:** | 2713 |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.133 | 0.130 | 0.043 |
| **FREQ (Hz)** | 9.3 | 9.4 | 25.0 |
| **PD (.001")** | 1.97 | 2.44 | 0.54 |
| **PPA (g)** | 0.039 | 0.033 | 0.026 |

**Peak Vector Sum :** 0.173 in/s
**Peak Air Pressure:** 111 db
0.00110 PSI @ 3.9 Hz

**Additional Info:**

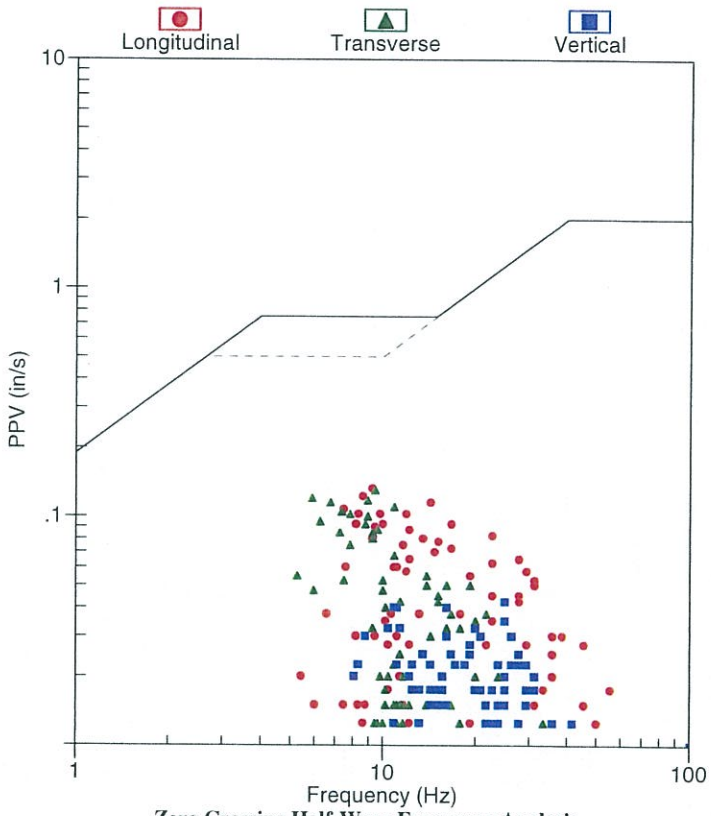
j-GEO-16404
N29 38 23 W98 17 40

**Shaketable Calibrated:** 12/21/2015
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

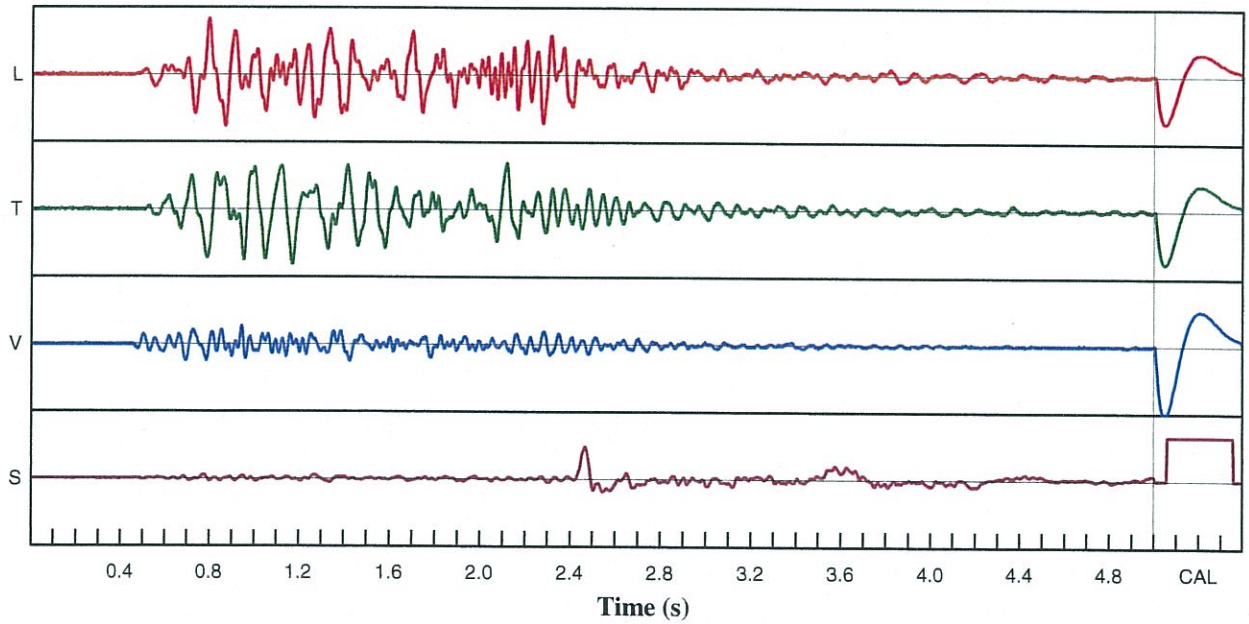
| | |
|---|---|
| **Time Scale:** | 0.100 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6319 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6319 Event: 1**




**Printed:** August 19, 2016 **File:** 65_6319_20160819_122717_4bk81njz.g3k (GeoSonics Inc. AnalysisNET v8.1.49)

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date August 19, 2016 Blast No. 08-19-2016 3D Time 12:27

Exact Blast Location 3D

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N: 29° 38' 49.7"
W: 98° 17' 37.7"

MONITOR GPS

N 29 38' 25"
W 98 17' 39"

---

**SEISMOGRAPH DATA**

Seismograph No. 6277 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 12-22-15 Microphone Calibration 12-22-15

Exact Seismograph Location Warden Property Line: 21375 Gunther Grove Drive, Trophy Oaks Subdivision

North East corner of the property, at the pink pin flag

Seismograph Distance from Blast 2506 ft.

Peak Overpressure 112 dB Scaled Distance ------

Peak Particle Velocity 0.115 ips Operator Clayton Smith

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: [signature] Date: 8/16/16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6277 v6.5 |
| **Date:** | 08/19/2016 12:27:17 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 5.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Warden Property Line |
| **Distance:** | 2506 |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.115 | 0.095 | 0.030 |
| **FREQ (Hz)** | 8.6 | 10.4 | 23.8 |
| **PD (.001")** | 1.46 | 1.55 | 0.32 |
| **PPA (g)** | 0.026 | 0.026 | 0.013 |
| **Peak Vector Sum :** | 0.143 in/s | | |
| **Peak Air Pressure:** | 112 db | | |
| | 0.00127 PSI @ 4.5 Hz | | |

**Additional Info:**

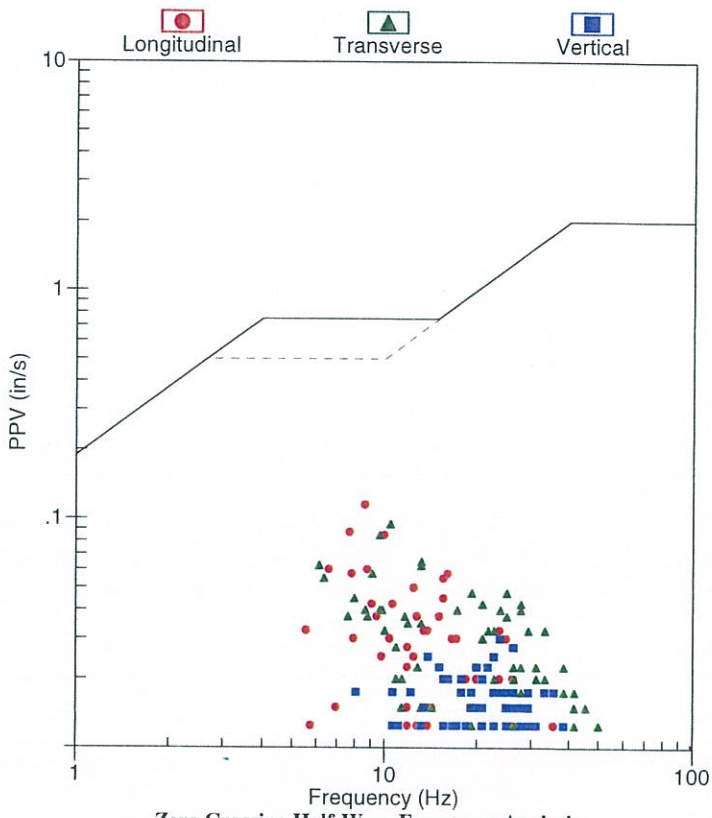
j-GEO-16406
N29 38 25 W98 17 39

**Shaketable Calibrated:** 12/22/2015
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

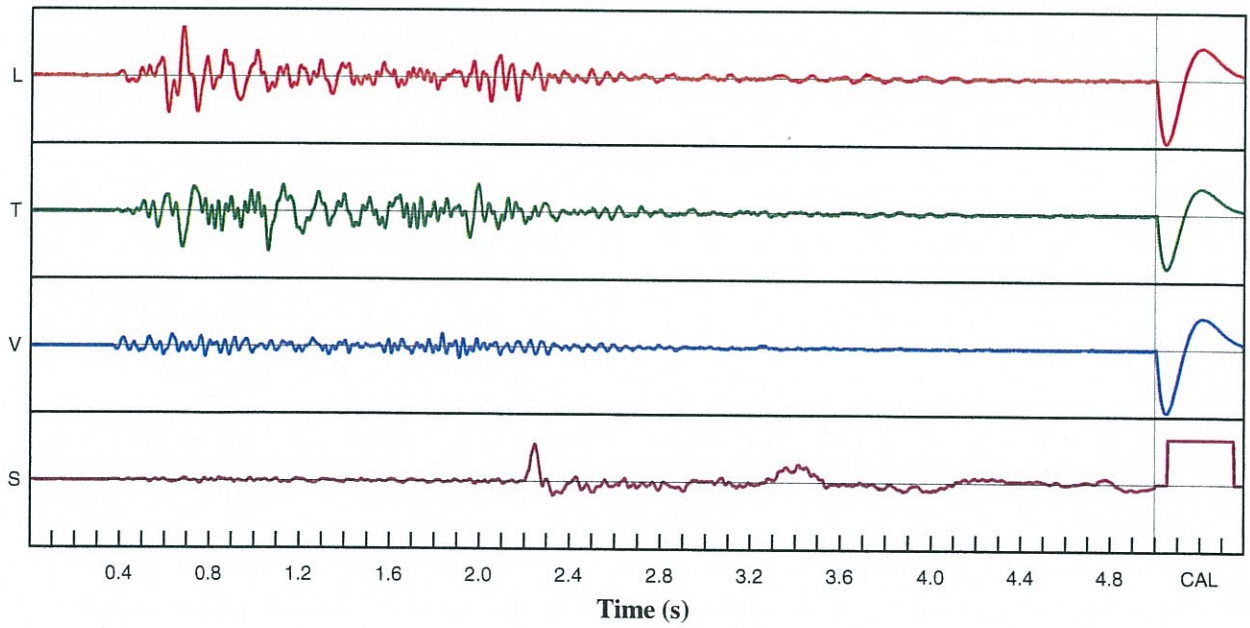
| | |
|---|---|
| **Time Scale:** | 0.100 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

## USBM Safe Blasting Levels
**SN: 6277 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

## Velocity Waveform
**SN: 6277 Event: 1**



# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8-23-16 Blast No. 8-23-16 3E Time 12:06

Exact Blast Location FACE 3E

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N 29° 38' 54.4"
W 98° 17' 38.3"

MONITOR GPS

N 29 38' 22.63
W 98 18' 53.97

---

**SEISMOGRAPH DATA**

Seismograph No. 6366 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-05-16 Microphone Calibration 07-05-16

Exact Seismograph Location City Property Line: outside city water tower gate

30' from gate at the property line

Seismograph Distance from Blast 3,503'

Peak Overpressure 95 dB Scaled Distance ------

Peak Particle Velocity .023 ips Operator DAVID LARMER

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: [signature] Date: 8-23-16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6366 v6.5 |
| **Date:** | 08/23/2016 12:06:41 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 10.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | City Property Line |
| **Distance:** | 3503 |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.013 | 0.023 | 0.023 |
| **FREQ (Hz)** | 4.6 | 7.4 | 10.0 |
| **PD (.001")** | 0.31 | 0.38 | 0.34 |
| **PPA (g)** | 0.007 | 0.013 | 0.013 |

**Peak Vector Sum :** 0.025 in/s
**Peak Air Pressure:** 95 db
0.00023 PSI @ 1.6 Hz

**Additional Info:**

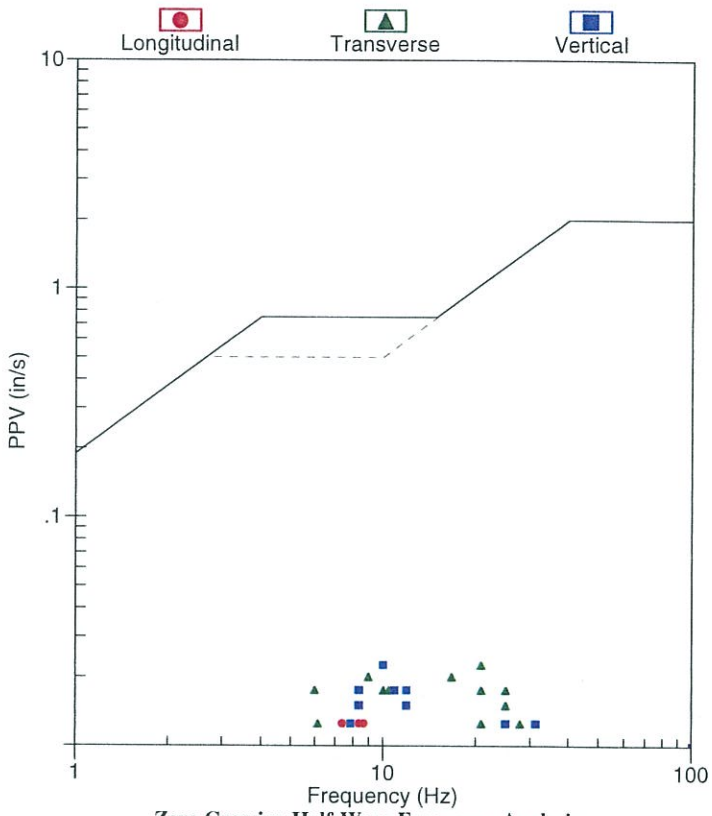
j-GEO-16386
N29 38 22.63W98 18 53.9

**Shaketable Calibrated:** 07/05/2016
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

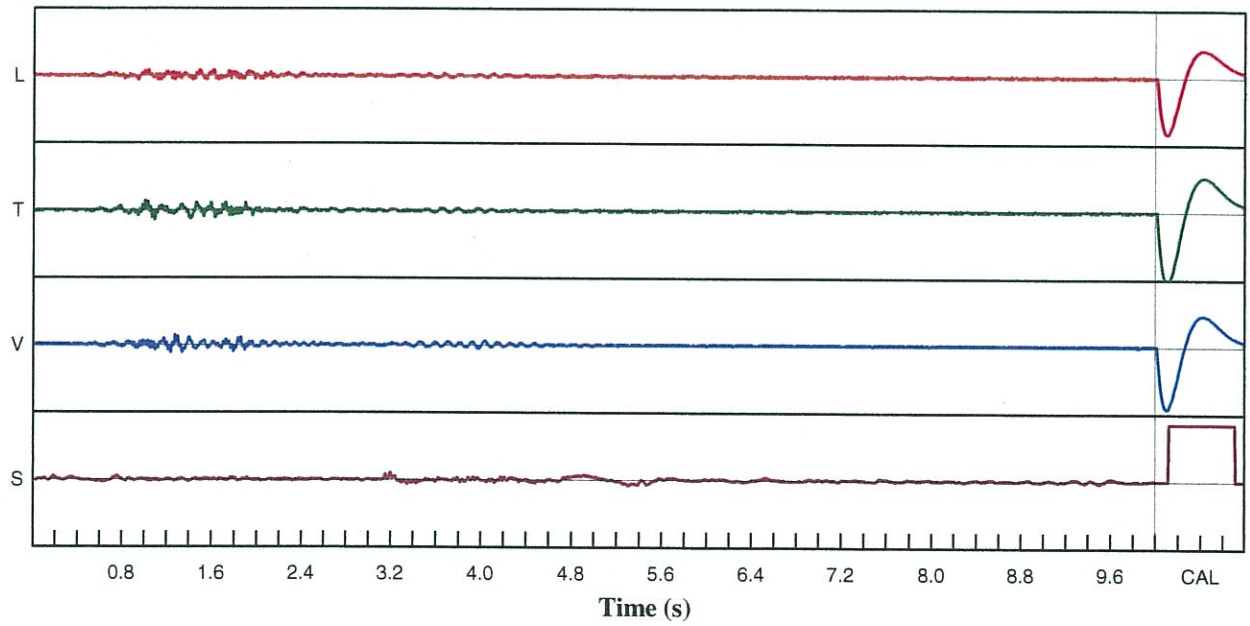
| | |
|---|---|
| **Time Scale:** | 0.200 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

## USBM Safe Blasting Levels
**SN: 6366 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

## Velocity Waveform
**SN: 6366 Event: 1**




**Printed:** August 23, 2016 **File:** 65_6366_20160823_120641_4bk81yux.g3k (GeoSonics Inc. AnalysisNET v8.1.49)

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8-23-16 Blast No. 8-23-16 3E Time 12:06

Exact Blast Location FACE 3E

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N 29° 38' 54.4"
W 98° 17' 38.3"

MONITOR GPS

N 29° 38' 14.48"
W98° 18' 36.74"

---

**SEISMOGRAPH DATA**

Seismograph No. 6342 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-07-16 Microphone Calibration 07-07-16

Exact Seismograph Location Cohen Residence – 10041 Trophy Oaks Dr – Trophy Oaks Subdivision 20 ft N of NE corner of the house, off the driveway.

Seismograph Distance from Blast 4,053'

Peak Overpressure 98 dB Scaled Distance ------

Peak Particle Velocity .070 ips Operator DAVID LARNER

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: D. L. Date 8-23-16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6342 v6.5 |
| **Date:** | 08/23/2016 12:06:50 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 5.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Cohen Res |
| **Distance:** | 4053 |
| **Operator:** | Vibra - Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 133 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.058 | 0.070 | 0.023 |
| **FREQ (Hz)** | 33.3 | 31.3 | 38.5 |
| **PD (.001")** | 0.45 | 0.56 | 0.17 |
| **PPA (g)** | 0.039 | 0.039 | 0.020 |

**Peak Vector Sum :** 0.075 in/s
**Peak Air Pressure:** 98 db
0.00027 PSI @ 1.0 Hz

**Additional Info:**

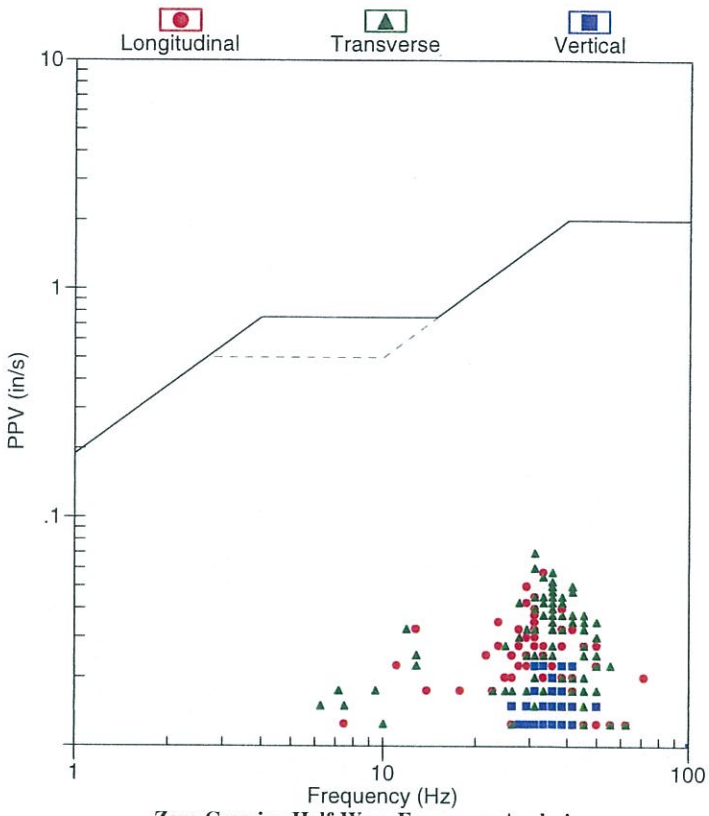
j-GEO-17298
N29 38 14.4 W98 17 36.7

**Shaketable Calibrated:** 07/07/2016
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

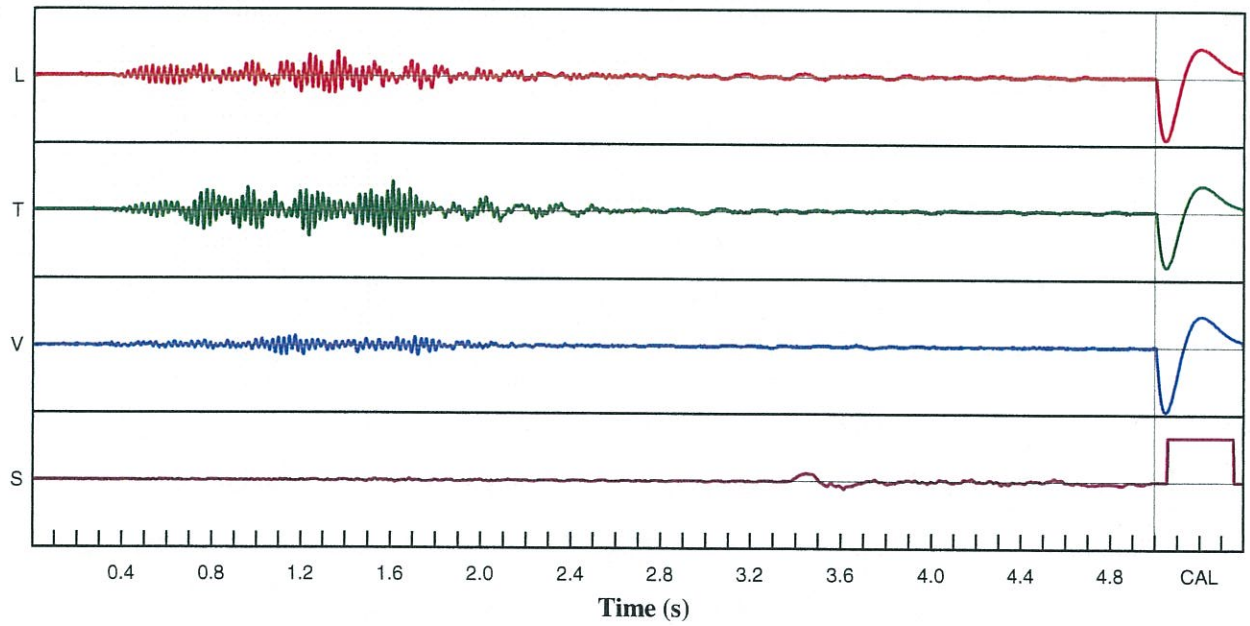
| | |
|---|---|
| **Time Scale:** | 0.100 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6342 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6342 Event: 1**



# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8-23-16 Blast No. 8-23-16 3E Time 12:06

Exact Blast Location FACE 3E

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N 29° 38' 54.4"
W 98° 17' 38.3"

MONITOR GPS

N 29 38' 52"
W 98 18' 19"

---

**SEISMOGRAPH DATA**

Seismograph No. 6245 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-07-16 Microphone Calibration 07-07-16

Exact Seismograph Location Michels Residence: 9118 Tuscan Hills Drive, Georg Ranch Subdivision

10' E of NE corner of house

Seismograph Distance from Blast 3,630'

Peak Overpressure 101.0 dB Scaled Distance ------

Peak Particle Velocity .043 ips Operator DAVID LARNER

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: [signature] Date: 8-23-16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6245 v6.5 |
| **Date:** | 08/23/2016 12:06:45 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 10.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Michels |
| **Distance:** | 3630 |
| **Operator:** | Vibratech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.043 | 0.035 | 0.018 |
| **FREQ (Hz)** | 11.4 | 31.3 | 31.3 |
| **PD (.001")** | 0.53 | 0.42 | 0.28 |
| **PPA (g)** | 0.020 | 0.026 | 0.013 |

**Peak Vector Sum :** 0.048 in/s
**Peak Air Pressure:** 101 db
0.00034 PSI @ 4.3 Hz

**Additional Info:**

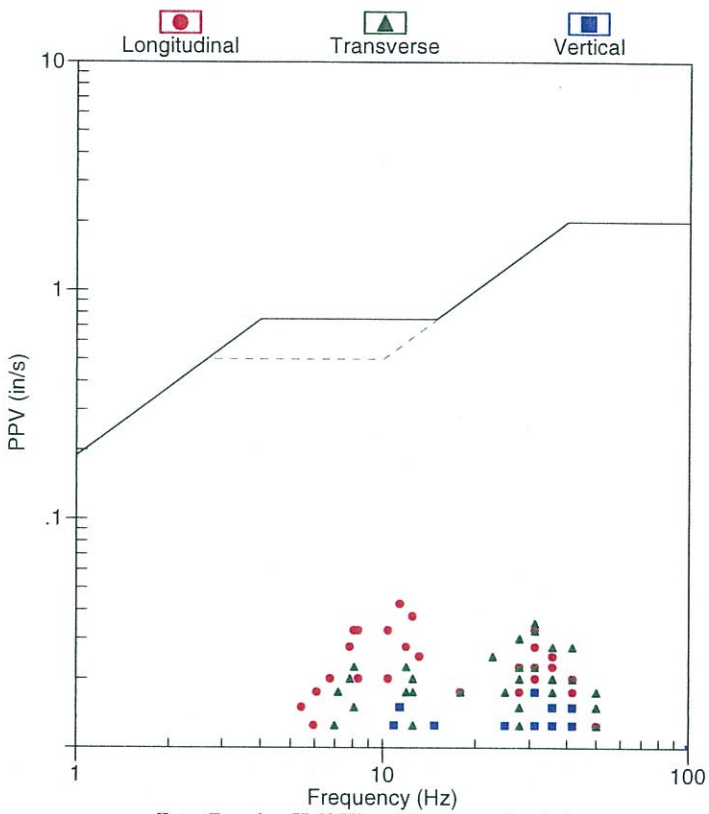
j-GEO-16396
N29 38 52 W98 18 19

**Shaketable Calibrated:** 07/07/2016
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

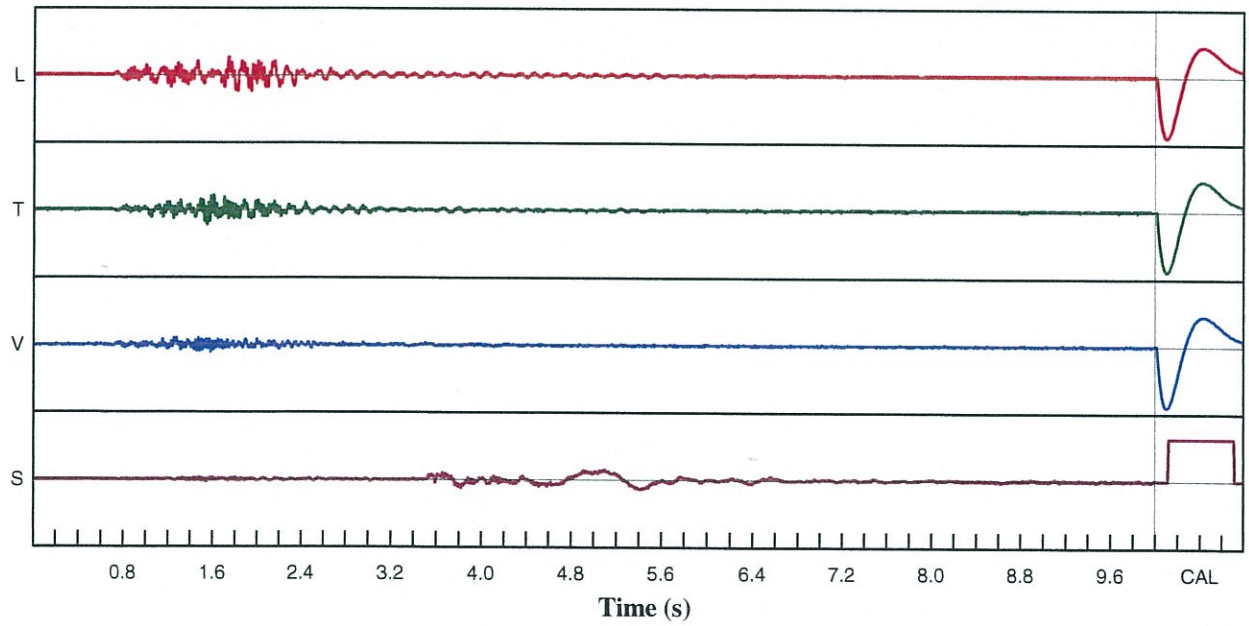
| | |
|---|---|
| **Time Scale:** | 0.200 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6245 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6245 Event: 1**




**Printed:** August 23, 2016 **File:** 65_6245_20160823_120645_4bk81yuw.g3k (GeoSonics Inc. AnalysisNET v8.1.49)

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8-23-16 Blast No. 8-23-16 3E Time 12:06

Exact Blast Location FACE 3E

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N 29° 38' 54.4"
W 98° 17' 38.3"

MONITOR GPS

N 29 38' 23"
W 98 17' 40"

---

**SEISMOGRAPH DATA**

Seismograph No. 6319 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 12-21-15 Microphone Calibration 12-21-15

Exact Seismograph Location Warden Residence: 21375 Gunther Grove Drive, Trophy Oaks Subdivision

10' N of NE corner of pool at the rock wall

Seismograph Distance from Blast 3,185'

Peak Overpressure 101.0 dB Scaled Distance ------

Peak Particle Velocity .083 ips Operator DAVID LARMER

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: [signature] Date: 8-23-16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6319 v6.5 |
| **Date:** | 08/23/2016 12:06:48 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 5.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Warden Residence |
| **Distance:** | 3185 |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.083 | 0.048 | 0.028 |
| **FREQ (Hz)** | 9.6 | 11.6 | 29.4 |
| **PD (.001")** | 1.22 | 0.61 | 0.22 |
| **PPA (g)** | 0.026 | 0.026 | 0.026 |

**Peak Vector Sum :** 0.083 in/s
**Peak Air Pressure:** 101 db
0.00037 PSI @ 1.0 Hz

**Additional Info:**

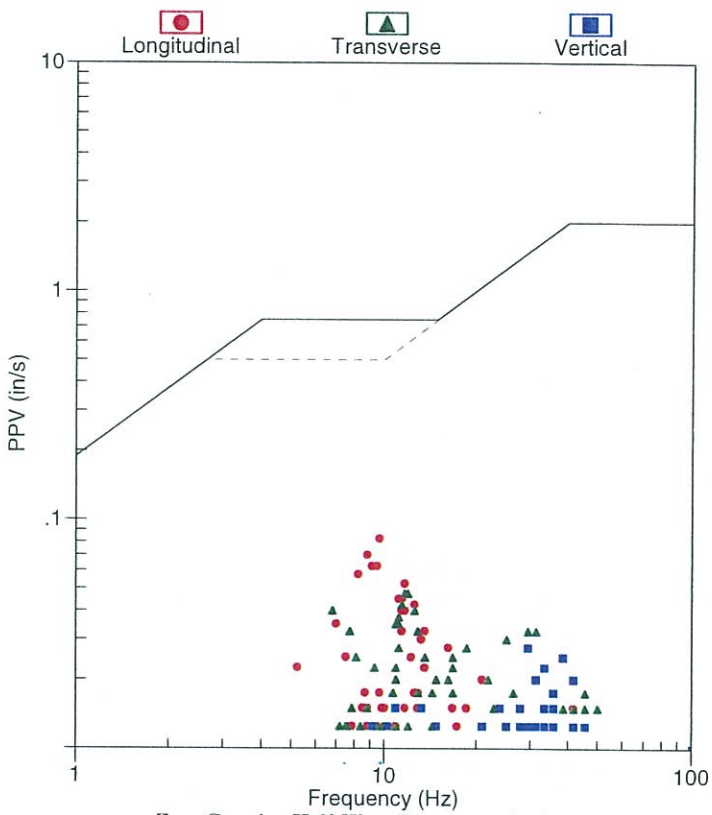
j-GEO-16404
N29 38 23 W98 17 40

**Shaketable Calibrated:** 12/21/2015
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

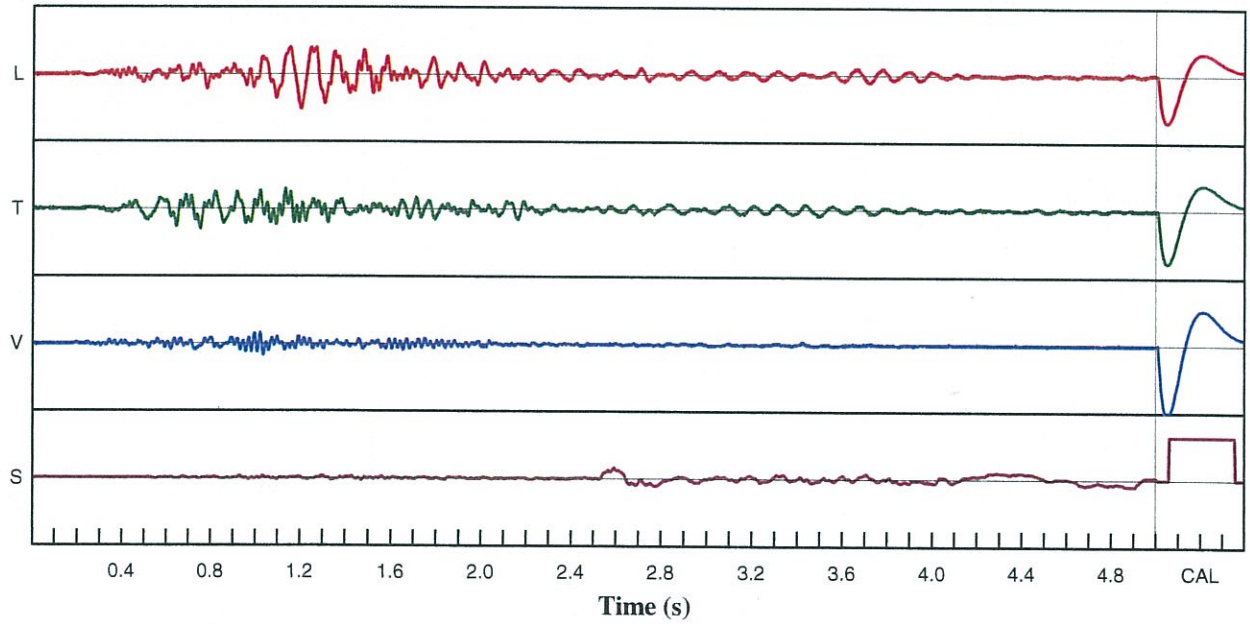
| | |
|---|---|
| **Time Scale:** | 0.100 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6319 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6319 Event: 1**




**Printed:** August 23, 2016 **File:** 65_6319_20160823_120648_4bk81yuz.g3k (GeoSonics Inc. AnalysisNET v8.1.49)

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8-23-16 Blast No. 8-23-16 3E Time 12:06

Exact Blast Location FACE 3E

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N 29° 38' 54.4"
W 98° 17' 38.3"

MONITOR GPS

N 29 38' 25"
W 98 17' 39"

---

**SEISMOGRAPH DATA**

Seismograph No. 6277 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 12-22-15 Microphone Calibration 12-22-15

Exact Seismograph Location Warden Property Line: 21375 Gunther Grove Drive, Trophy Oaks Subdivision North East corner of the property, at the pink pin flag

Seismograph Distance from Blast 2,980'

Peak Overpressure 107 dB Scaled Distance ------

Peak Particle Velocity 1038 ips Operator DAVID LARNER

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: [signature] Date: 8-23-16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6277 v6.5 |
| **Date:** | 08/23/2016 12:06:47 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 5.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Warden Property Line |
| **Distance:** | 2980 |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.035 | 0.038 | 0.023 |
| **FREQ (Hz)** | 26.3 | 20.8 | 35.7 |
| **PD (.001")** | 0.38 | 0.54 | 0.24 |
| **PPA (g)** | 0.020 | 0.020 | 0.020 |

**Peak Vector Sum :** 0.040 in/s
**Peak Air Pressure:** 103 db
0.00048 PSI @ 1.0 Hz

**Additional Info:**

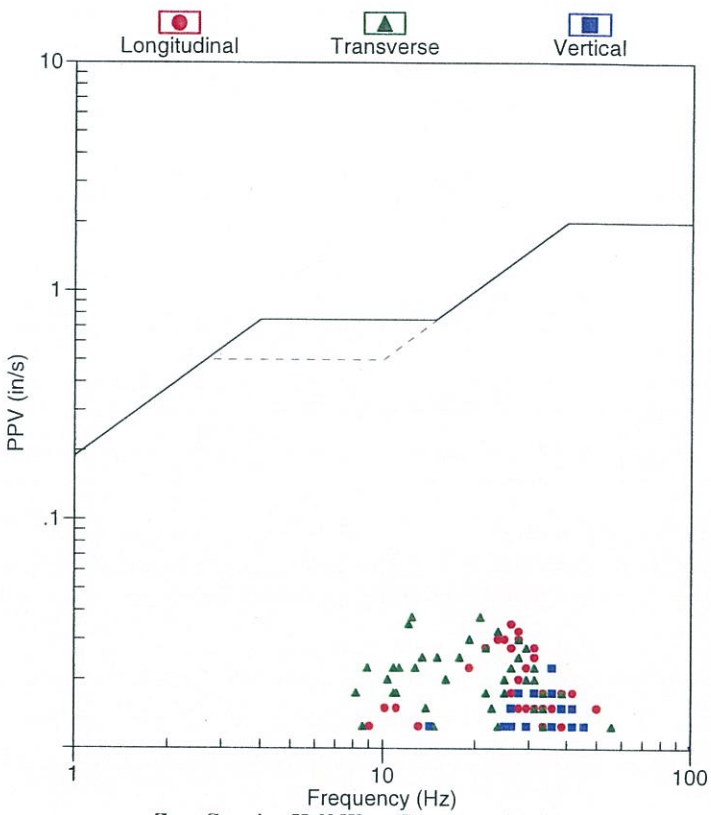
j-GEO-16406
N29 38 25 W98 17 39

**Shaketable Calibrated:** 12/22/2015
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

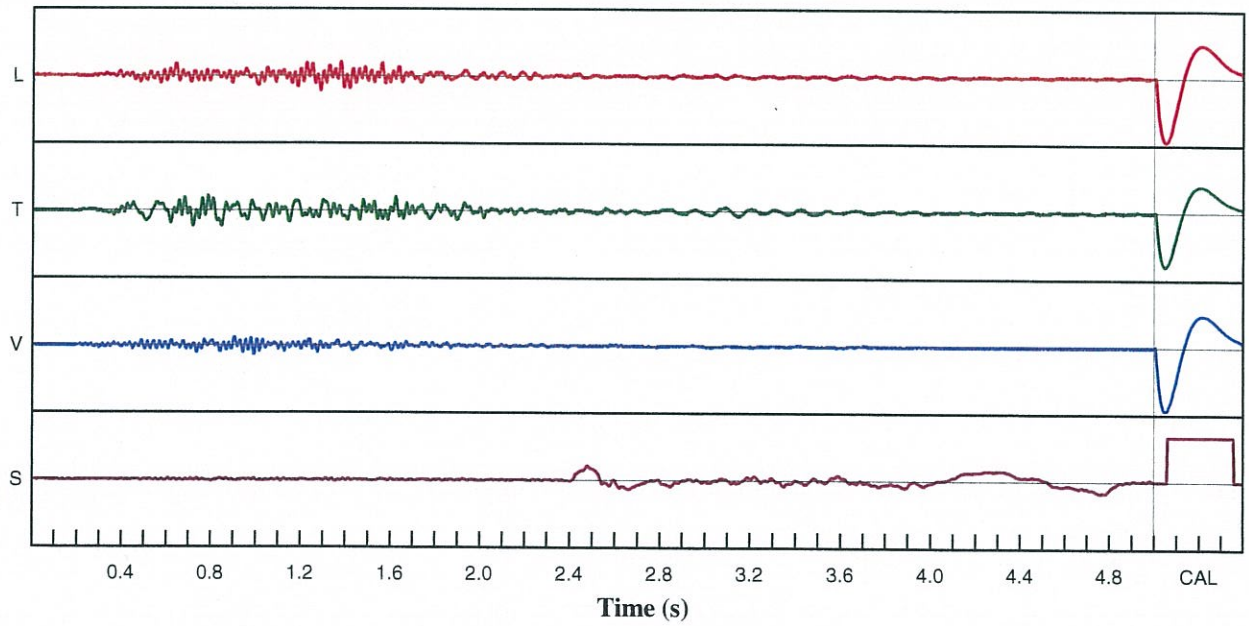
| | |
|---|---|
| **Time Scale:** | 0.100 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

## USBM Safe Blasting Levels
**SN: 6277 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

## Velocity Waveform
**SN: 6277 Event: 1**




**Printed:** August 23, 2016 **File:** 65_6277_20160823_120647_4bk81yuy.g3k (GeoSonics Inc. AnalysisNET v8.1.49)

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8/24/16 Blast No. 08-24-16 4B Time 11:38

Exact Blast Location FACE 4B

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N29°39'02.50"
W98°17'36.40"

MONITOR GPS

N 29 38' 22.63
W 98 18' 53.97

---

**SEISMOGRAPH DATA**

Seismograph No. 6366 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-05-16 Microphone Calibration 07-05-16

Exact Seismograph Location City Property Line: outside city water tower gate

30' from gate at the property line

Seismograph Distance from Blast 4326'

Peak Overpressure ~~.035~~ 109 dB Scaled Distance ------

Peak Particle Velocity .035 ips Operator Jack Stackberger

Remarks: GEOPHONE SPIKED AND SANDBAGGED

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6366 v6.5 |
| **Date:** | 08/24/2016 11:38:24 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 10.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | City Property Line |
| **Distance:** | 4326 |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.025 | 0.035 | 0.020 |
| **FREQ (Hz)** | 15.6 | 13.9 | 17.9 |
| **PD (.001")** | 0.36 | 0.42 | 0.33 |
| **PPA (g)** | 0.013 | 0.013 | 0.013 |

**Peak Vector Sum :** 0.038 in/s
**Peak Air Pressure:** 109 db
0.00084 PSI @ 4.2 Hz

**Additional Info:**

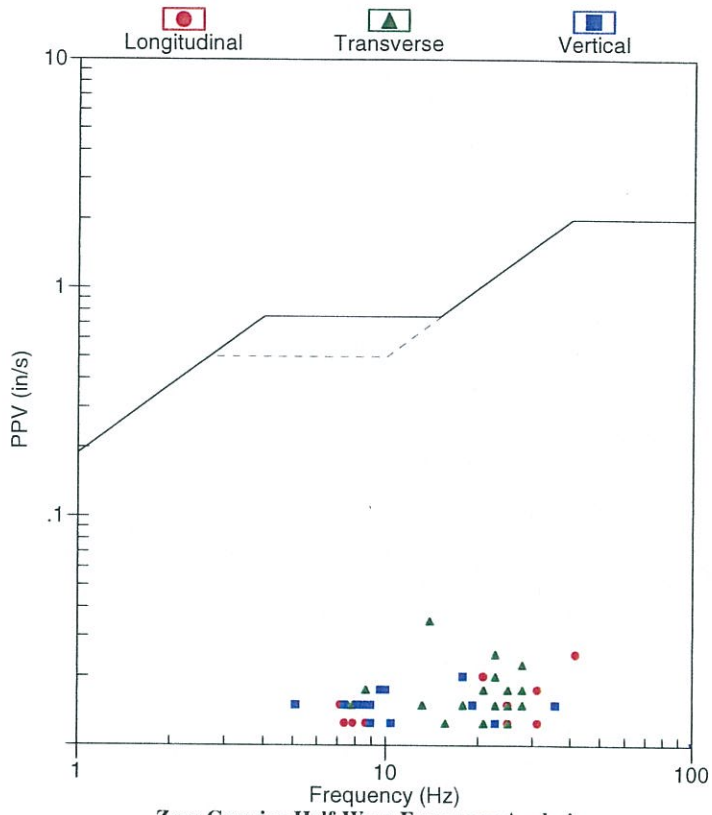
j-GEO-16386
N29 38 22.63W98 18 53.9

**Shaketable Calibrated:** 07/05/2016
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

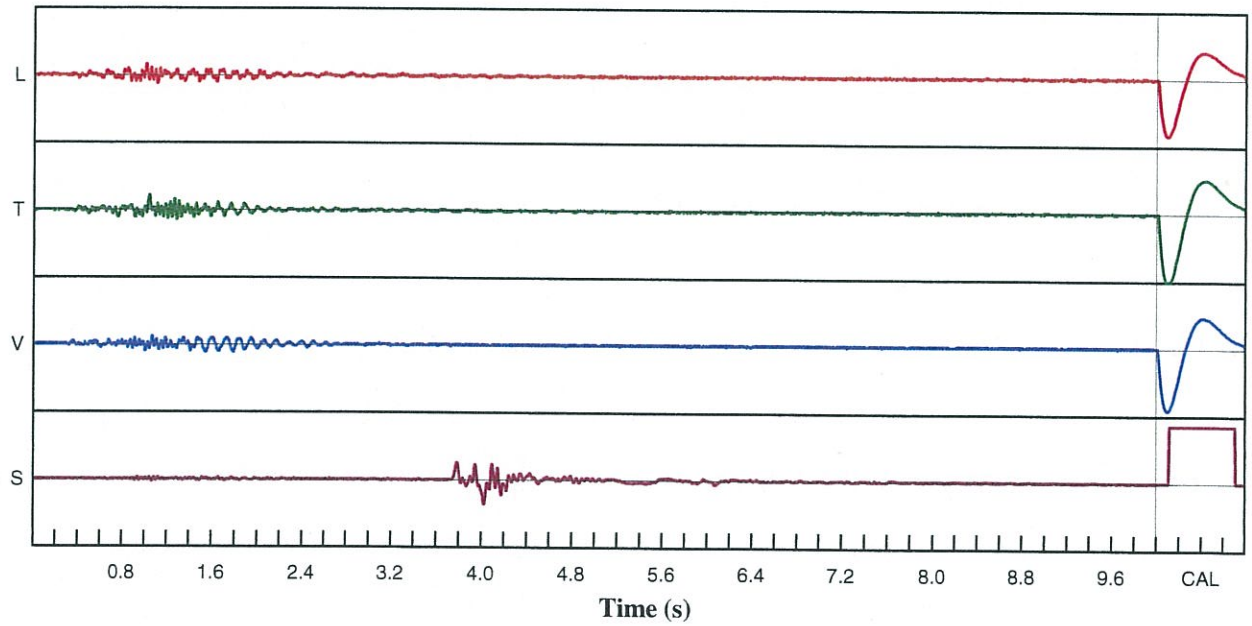
| | |
|---|---|
| **Time Scale:** | 0.200 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6366 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6366 Event: 1**




**Printed:** August 24, 2016 **File:** 65_6366_20160824_112824_4bk8227b_e2b (GeoSeries Long Analysis NFTa 8.1.42)

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8/24/16 Blast No. 08-24-16 4B Time 11:38

Exact Blast Location FACE 4B

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N29° 39′ 02.50″
W98° 17′ 36.40″

MONITOR GPS

N 29° 38′ 14.48″
W98° 18′ 36.74″

---

**SEISMOGRAPH DATA**

Seismograph No. 6342 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-07-16 Microphone Calibration 07-07-16

Exact Seismograph Location Cohen Residence – 10041 Trophy Oaks Dr – Trophy Oaks Subdivision 20 ft N of NE corner of the house, off the driveway.

Seismograph Distance from Blast 4871′

Peak Overpressure 106 dB Scaled Distance ------

Peak Particle Velocity 0.083 ips Operator Jack Stockberger

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: Jack Stockberger Date 8/24/16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6342 v6.5 |
| **Date:** | 08/24/2016 11:38:24 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 5.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Cohen Res |
| **Distance:** | 4871 |
| **Operator:** | Vibra - Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 133 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.083 | 0.053 | 0.028 |
| **FREQ (Hz)** | 17.2 | 26.3 | 23.8 |
| **PD (.001")** | 0.86 | 0.69 | 0.24 |
| **PPA (g)** | 0.033 | 0.026 | 0.020 |

**Peak Vector Sum :** 0.090 in/s
**Peak Air Pressure:** 106 db
0.00066 PSI @ 1.0 Hz

**Additional Info:**

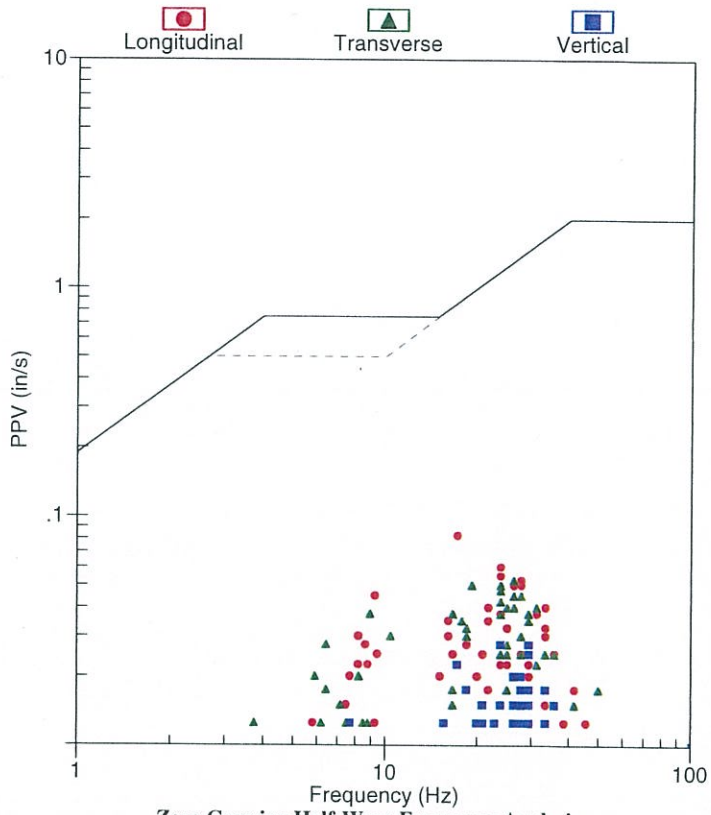
j-GEO-17298
N29 38 14.4 W98 17 36.7

**Shaketable Calibrated:** 07/07/2016
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

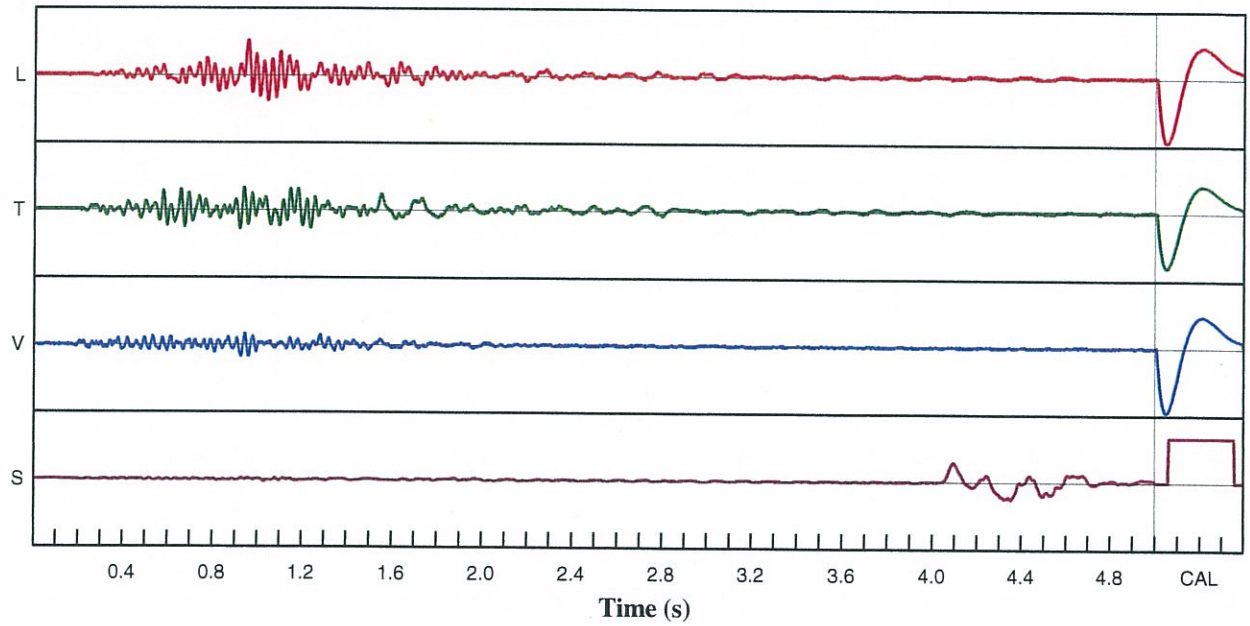
| | |
|---|---|
| **Time Scale:** | 0.100 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6342 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6342 Event: 1**



# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8/24/16 Blast No. 08-24-16 4B Time 11:38

Exact Blast Location FACE 4B

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N29° 39' 02.50"
W98° 17' 36.40"

MONITOR GPS

N 29 38' 52"
W 98 18' 19"

---

**SEISMOGRAPH DATA**

Seismograph No. 6245 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-07-16 Microphone Calibration 07-07-16

Exact Seismograph Location Michels Residence: 9118 Tuscan Hills Drive, Georg Ranch Subdivision

10' E of NE corner of house

Seismograph Distance from Blast 3935'

Peak Overpressure 101 dB Scaled Distance ------

Peak Particle Velocity 0.063 ips Operator Jack Stockberger

Remarks: GEOPHONE SPIKED AND SANDBAGGED

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6245 v6.5 |
| **Date:** | 08/24/2016 11:38:25 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 10.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Michels |
| **Distance:** | 3935 |
| **Operator:** | Vibratech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.063 | 0.045 | 0.028 |
| **FREQ (Hz)** | 10.4 | 8.3 | 20.8 |
| **PD (.001")** | 0.76 | 0.63 | 0.38 |
| **PPA (g)** | 0.020 | 0.020 | 0.013 |

**Peak Vector Sum :** 0.065 in/s
**Peak Air Pressure:** 101 db
0.00037 PSI @ 1.6 Hz

**Additional Info:**

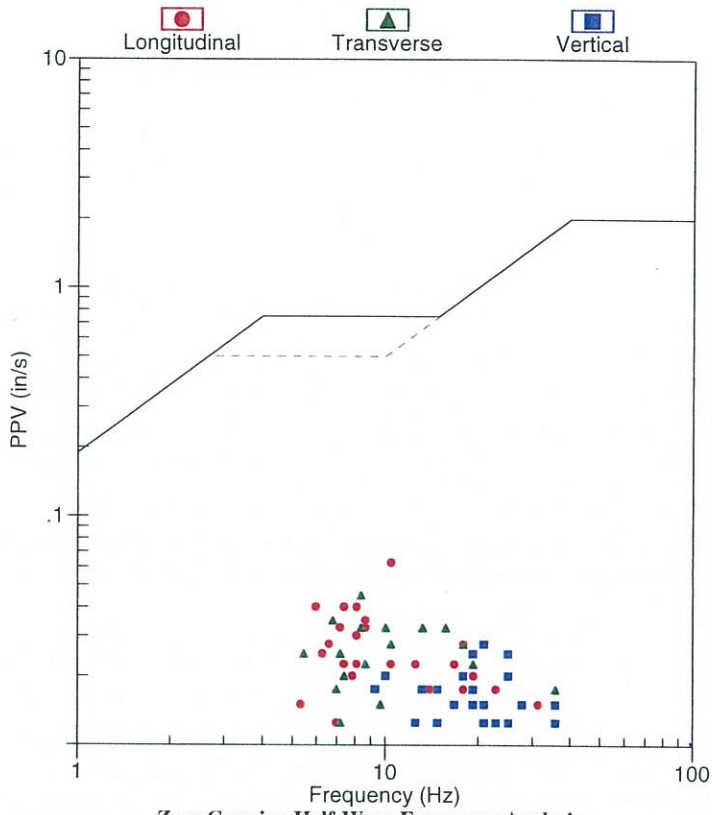
j-GEO-16396
N29 38 52 W98 18 19

**Shaketable Calibrated:** 07/07/2016
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

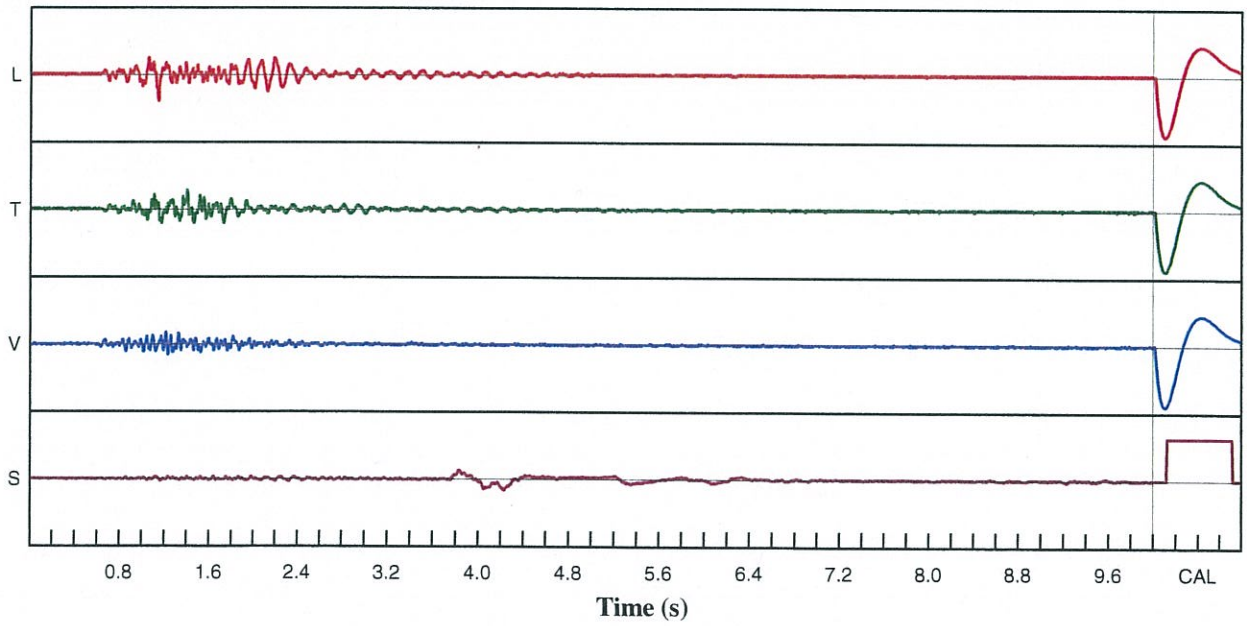
| | |
|---|---|
| **Time Scale:** | 0.200 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6245 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6245 Event: 1**



# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8/24/16 Blast No. 08-24-16 4B Time 11:38

Exact Blast Location FACE 4B

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N29° 39' 02.50"

W98° 17' 36.40"

MONITOR GPS

N 29 38' 23"

W 98 17' 40"

---

**SEISMOGRAPH DATA**

Seismograph No. 6319 (Bode Circle) instrument Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 12-28-15 ~~12-21-15~~ Microphone Calibration 12-21-15

Exact Seismograph Location Warden Residence: 21375 Gunther Grove Drive, Trophy Oaks Subdivision

10' N of NE corner of pool at the rock wall

Seismograph Distance from Blast 4015'

Peak Overpressure 112 dB Scaled Distance ------

Peak Particle Velocity 0.105 ips Operator Jack Stockberger

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by [illegible] 8/24/16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6340 v6.5 |
| **Date:** | 08/24/2016 11:38:24 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 5.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Bode Cir |
| **Distance:** | 4015 |
| **Operator:** | Vibratech |
| **Comment:** | Warden Residence |
| **Seismic Trigger:** | 0.020 in/s |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.088 | 0.105 | 0.038 |
| **FREQ (Hz)** | 8.8 | 16.1 | 20.8 |
| **PD (.001")** | 1.40 | 1.19 | 0.39 |
| **PPA (g)** | 0.033 | 0.039 | 0.020 |
| **Peak Vector Sum :** | 0.113 in/s | | |
| **Peak Air Pressure:** | 112 db | | |
| | 0.00116 PSI @ 1.0 Hz | | |

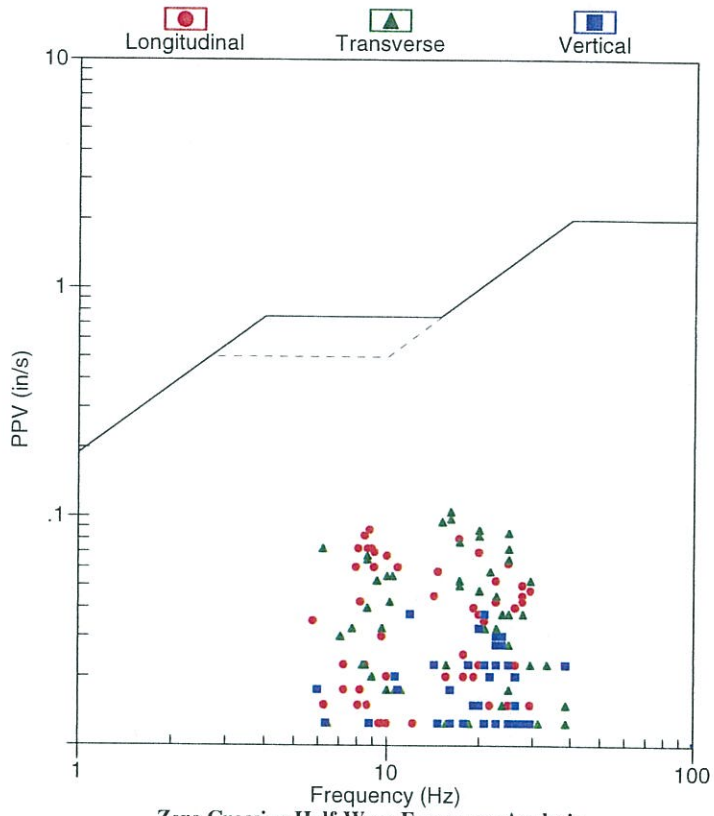
**Additional Info:**
Location incorrect
see comment
N29 38 23 W98 17 40

**Shaketable Calibrated:** 12/28/2015
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

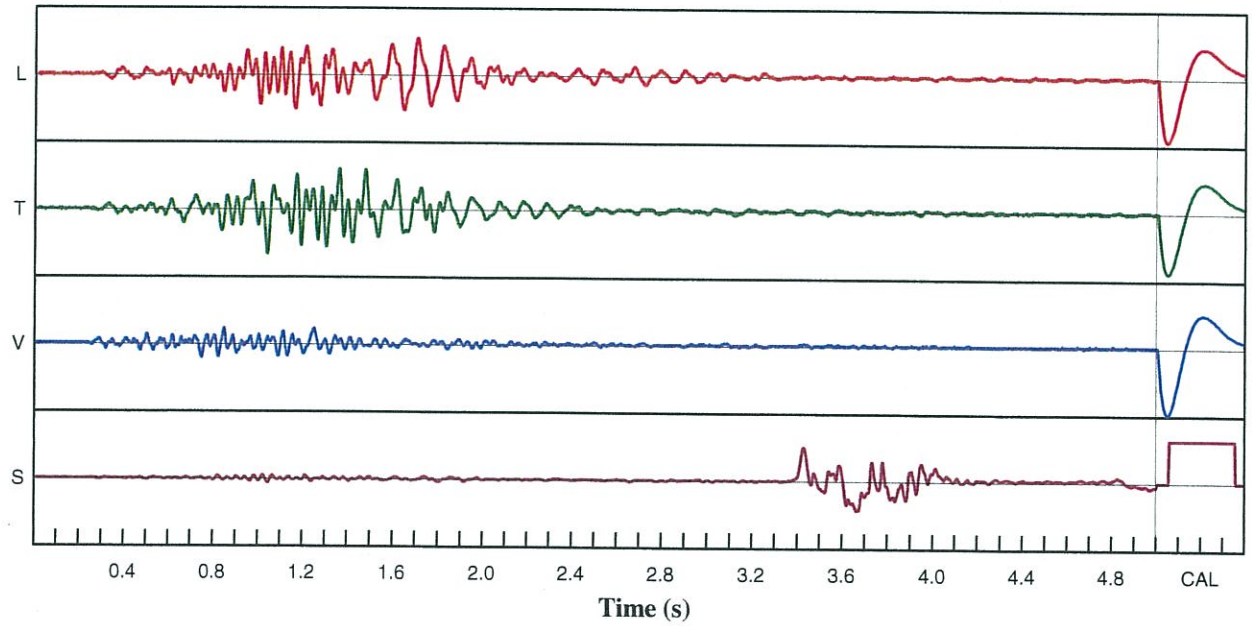
| | |
|---|---|
| **Time Scale:** | 0.100 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6340 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6340 Event: 1**



# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8/24/16 Blast No. 08-24-16 4B Time 11:38

Exact Blast Location FACE 4B

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS
N29°39'02.50"
W98°17'36.40"

MONITOR GPS
N 29 38' 25"
W 98 17' 39"

---

**SEISMOGRAPH DATA**

Seismograph No. 6277 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 12-22-15 Microphone Calibration 12-22-15

Exact Seismograph Location Warden Property Line: 21375 Gunther Grove Drive, Trophy Oaks Subdivision North East corner of the property, at the pink pin flag

Seismograph Distance from Blast 3807'

Peak Overpressure 112 dB Scaled Distance ------

Peak Particle Velocity 0.10 ips Operator Jack Stockberger

Remarks: GEOPHONE SPIKED AND SANDBAGGED

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6277 v6.5 |
| **Date:** | 08/24/2016 11:38:24 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 5.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Warden Property Line |
| **Distance:** | 3807 |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.065 | 0.100 | 0.045 |
| **FREQ (Hz)** | 23.8 | 23.8 | 20.8 |
| **PD (.001")** | 0.64 | 1.03 | 0.35 |
| **PPA (g)** | 0.033 | 0.039 | 0.026 |
| **Peak Vector Sum :** | 0.108 in/s | | |
| **Peak Air Pressure:** | 112 db | | |
| | 0.00125 PSI @ 1.0 Hz | | |

**Additional Info:**

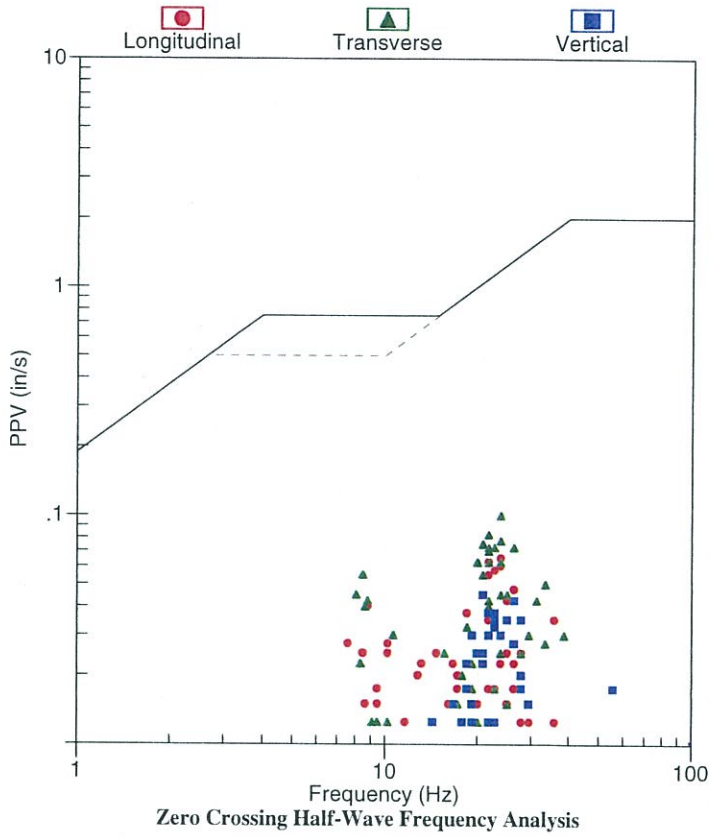
j-GEO-16406
N29 38 25 W98 17 39

**Shaketable Calibrated:** 12/22/2015
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

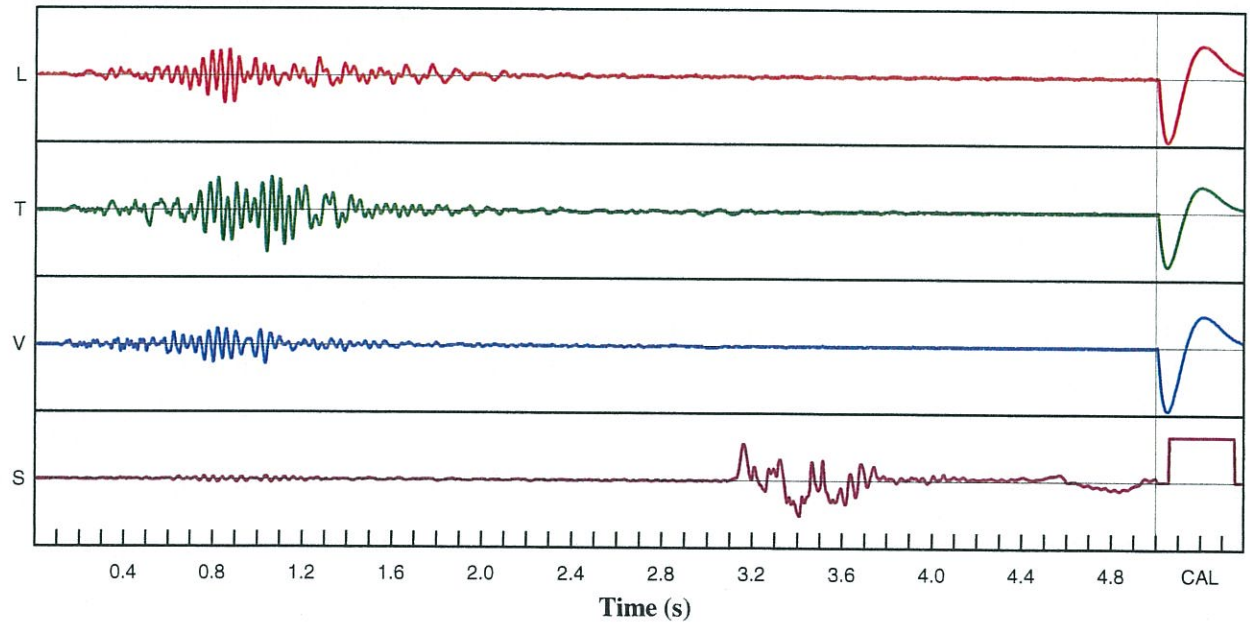
| | |
|---|---|
| **Time Scale:** | 0.100 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6277 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6277 Event: 1**



# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8-26-16 Blast No. 8-26-16 4A Time 11:58

Exact Blast Location FACE 4A

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N 29° 38' 59.60"
W 98° 17' 38.10"

MONITOR GPS

N 29 38' 22.63
W 98 18' 53.97

---

**SEISMOGRAPH DATA**

Seismograph No. 6366 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-05-16 Microphone Calibration 07-05-16

Exact Seismograph Location City Property Line: outside city water tower gate

30' from gate at the property line

Seismograph Distance from Blast 3,999'

Peak Overpressure 106 dB Scaled Distance ------

Peak Particle Velocity .04 ips Operator DAVID LARNER

Remarks: GEOPHONE SPIKED AND SANDBAGGED

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6366 v6.5 |
| **Date:** | 08/26/2016 11:58:53 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 10.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | City Property Line |
| **Distance:** | 3999 |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.023 | 0.040 | 0.018 |
| **FREQ (Hz)** | 9.6 | 11.9 | 7.4 |
| **PD (.001")** | 0.38 | 0.46 | 0.32 |
| **PPA (g)** | 0.013 | 0.020 | 0.007 |

**Peak Vector Sum :** 0.045 in/s
**Peak Air Pressure:** 106 db
0.00062 PSI @ 1.0 Hz

**Additional Info:**

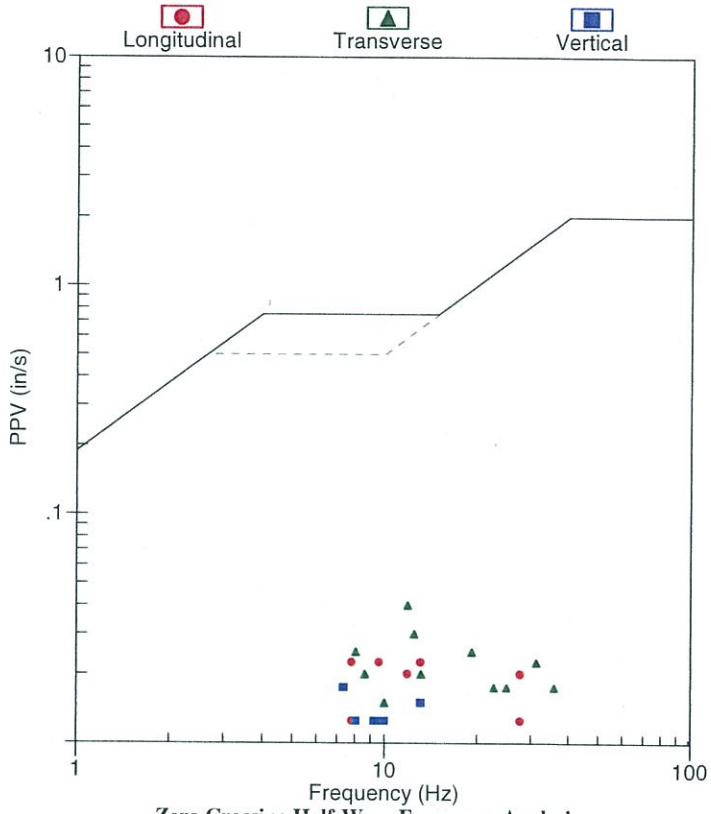
j-GEO-16386
N29 38 22.63W98 18 53.9

**Shaketable Calibrated:** 07/05/2016
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

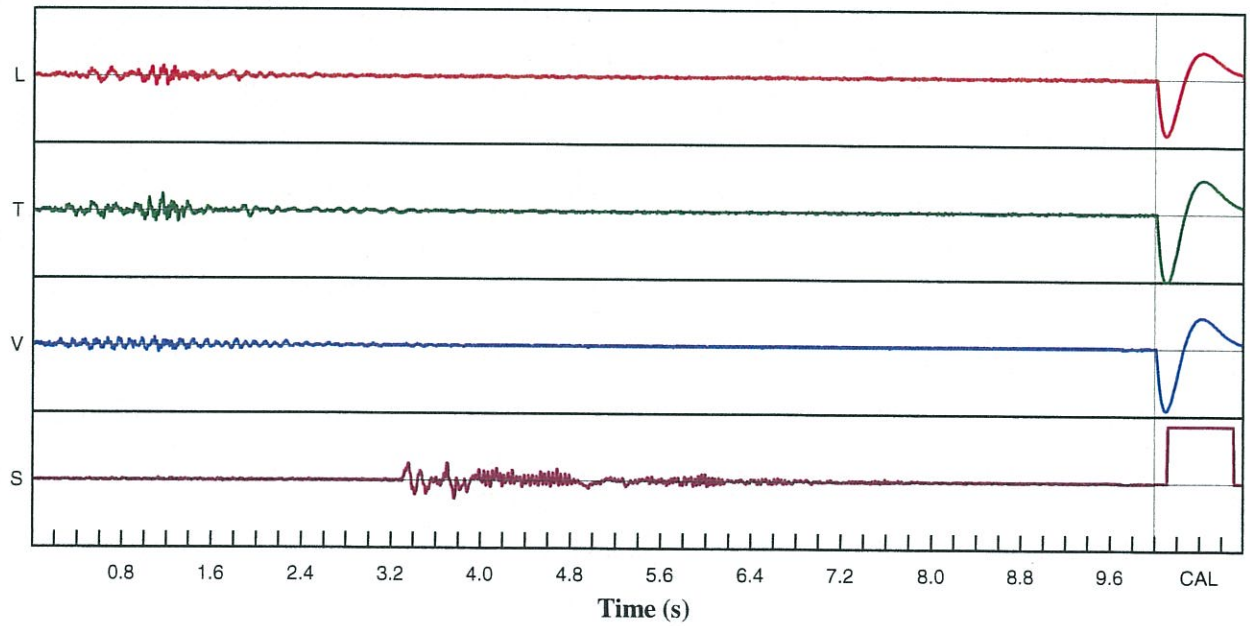
| | |
|---|---|
| **Time Scale:** | 0.200 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6366 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6366 Event: 1**



# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8-26-16 Blast No. 8-26-16 4A Time 11:58

Exact Blast Location FACE 4A

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N 29° 38' 59.60"
W 98° 17' 38.10"

MONITOR GPS

N 29° 38' 14.48"
W98° 18' 36.74"

---

**SEISMOGRAPH DATA**

Seismograph No. 6342 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-07-16 Microphone Calibration 07-07-16

Exact Seismograph Location Cohen Residence – 10041 Trophy Oaks Dr – Trophy Oaks Subdivision 20 ft N of NE corner of the house, off the driveway.

Seismograph Distance from Blast 4,579'

Peak Overpressure 110 dB Scaled Distance ------

Peak Particle Velocity .06 ips Operator DAVID LARNER

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: D. L. Date 8-26-16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6342 v6.5 |
| **Date:** | 08/26/2016 11:58:52 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 5.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Cohen Res |
| **Distance:** | 4579 |
| **Operator:** | Vibra - Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 133 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.060 | 0.053 | 0.025 |
| **FREQ (Hz)** | 12.8 | 6.9 | 7.6 |
| **PD (.001")** | 0.58 | 0.93 | 0.28 |
| **PPA (g)** | 0.026 | 0.026 | 0.013 |
| **Peak Vector Sum :** | 0.063 in/s | | |
| **Peak Air Pressure:** | 110 db | | |
| | 0.00091 PSI @ 1.0 Hz | | |

**Additional Info:**

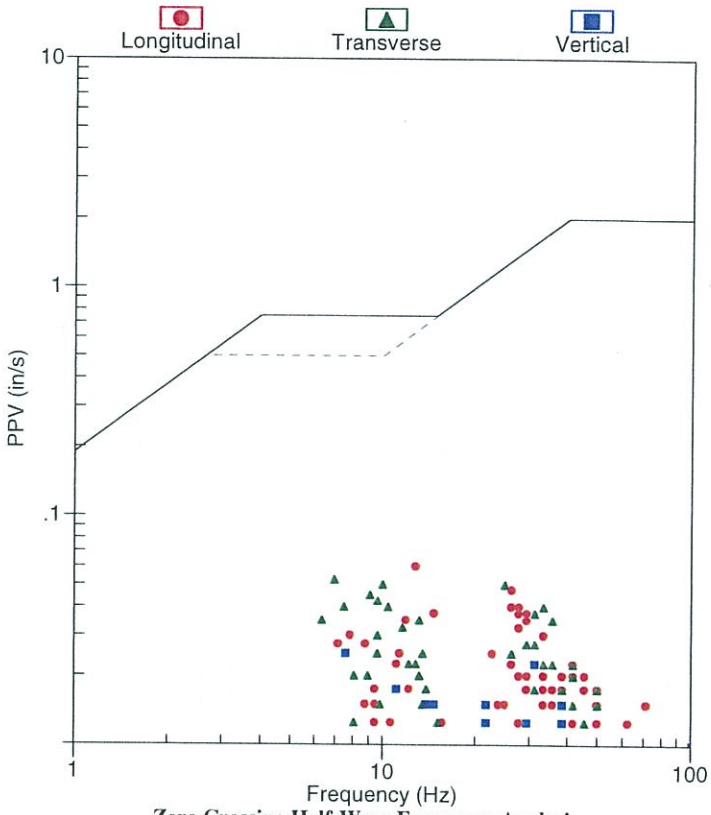
j-GEO-17298
N29 38 14.4 W98 17 36.7

**Shaketable Calibrated:** 07/07/2016
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

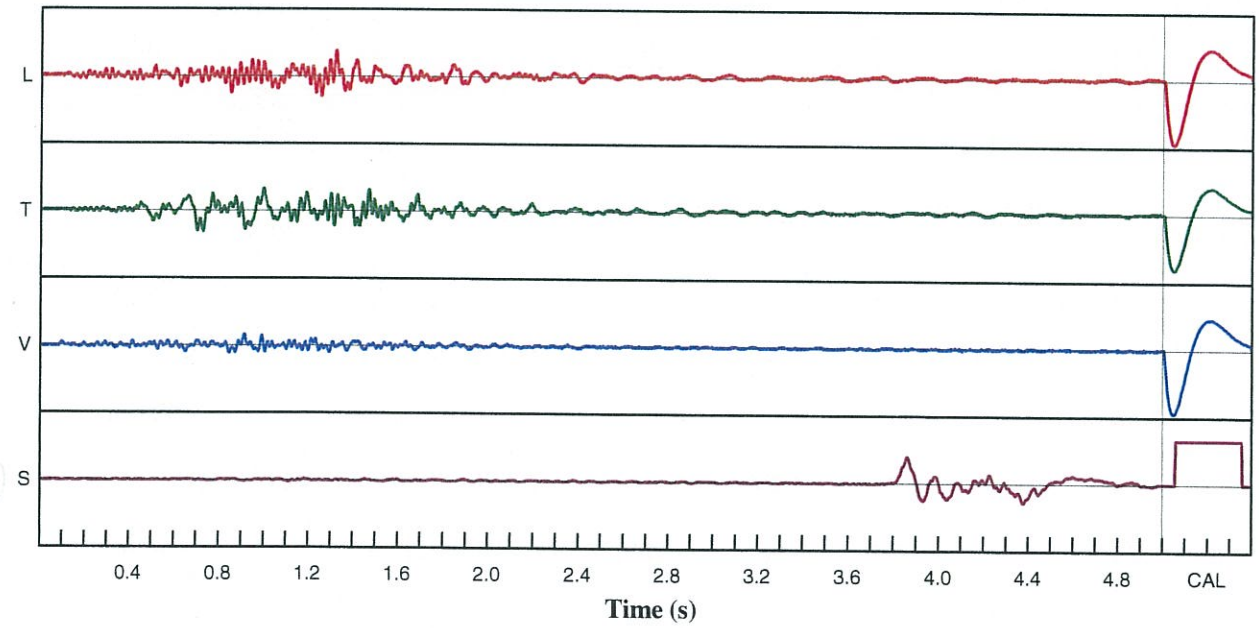
| | |
|---|---|
| **Time Scale:** | 0.100 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6342 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6342 Event: 1**



# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8-26-16 Blast No. 8·26-16 4A Time 11:58

Exact Blast Location FACE 4A

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N 29° 38' 59.60"

W 98° 17' 38.10"

MONITOR GPS

N 29 38' 52"

W 98 18' 19"

**SEISMOGRAPH DATA**

Seismograph No. 6245 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-07-16 Microphone Calibration 07-07-16

Exact Seismograph Location Michels Residence: 9118 Tuscan Hills Drive, Georg Ranch Subdivision

10' E of NE corner of house

Seismograph Distance from Blast 3,720'

Peak Overpressure 103 dB Scaled Distance ------

Peak Particle Velocity .07 ips Operator DAVID LARNER

Remarks: GEOPHONE SPIKED AND SANDBAGGED

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6245 v6.5 |
| **Date:** | 08/26/2016 11:58:52 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 10.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Michels |
| **Distance:** | 3720 |
| **Operator:** | Vibratech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.070 | 0.048 | 0.035 |
| **FREQ (Hz)** | 12.5 | 31.3 | 20.8 |
| **PD (.001")** | 1.00 | 0.55 | 0.33 |
| **PPA (g)** | 0.033 | 0.026 | 0.020 |

**Peak Vector Sum :** 0.078 in/s
**Peak Air Pressure:** 103 db
0.00048 PSI @ 3.7 Hz

**Additional Info:**

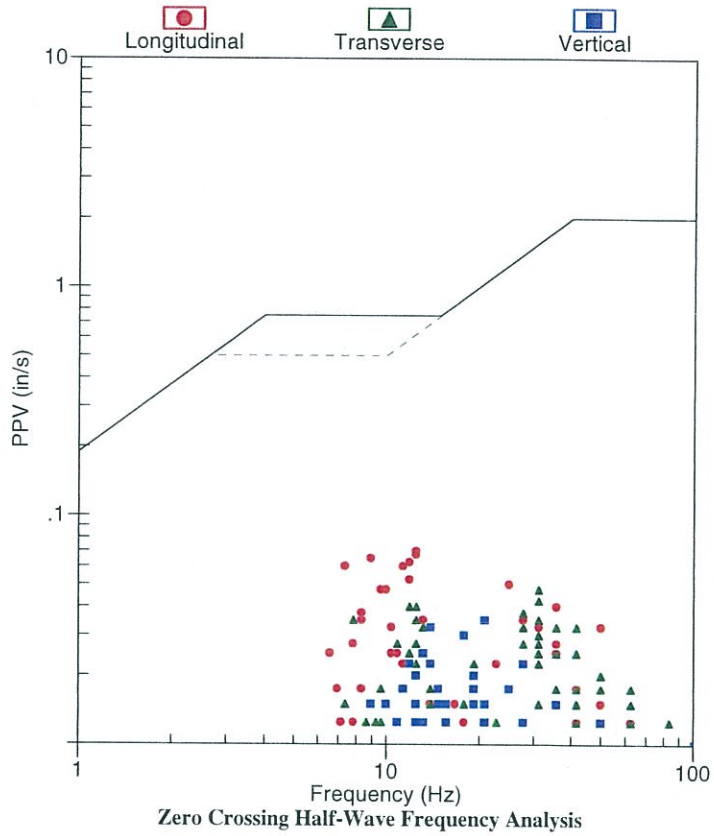
j-GEO-16396
N29 38 52 W98 18 19

**Shaketable Calibrated:** 07/07/2016
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

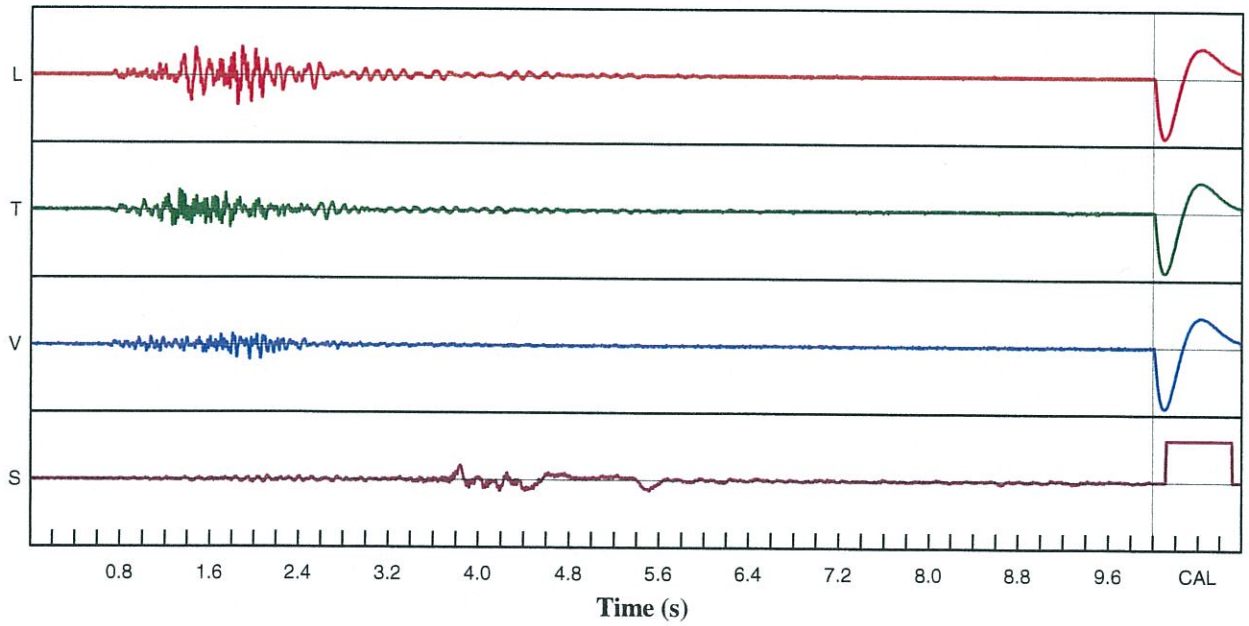
| | |
|---|---|
| **Time Scale:** | 0.200 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6245 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6245 Event: 1**



# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8-26-16 Blast No. 8-26-16 4A Time 11:58

Exact Blast Location FACE 4A

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N 29° 38' 59.60"
W 98° 17' 38.10"

MONITOR GPS

N 29 38' 23"
W 98 17' 40"

---

Seismograph No. 6319 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 12-21-15 Microphone Calibration 12-21-15

Exact Seismograph Location Warden Residence: 21375 Gunther Grove Drive, Trophy Oaks Subdivision

Ofho 10' N of NE corner of pool at the rock wall

Seismograph Distance from Blast 3,713

Peak Overpressure 112 dB Scaled Distance ------

Peak Particle Velocity .10 ips Operator DAVID LARNER

Remarks: GEOPHONE SPIKED AND SANDBAGGED

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6319 v6.5 |
| **Date:** | 08/26/2016 11:58:52 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 5.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Warden Residence |
| **Distance:** | 3713 |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.098 | 0.100 | 0.043 |
| **FREQ (Hz)** | 10.4 | 11.4 | 12.8 |
| **PD (.001")** | 1.46 | 1.28 | 0.53 |
| **PPA (g)** | 0.026 | 0.033 | 0.020 |

**Peak Vector Sum :** 0.118 in/s
**Peak Air Pressure:** 112 db
0.00119 PSI @ 1.0 Hz

**Additional Info:**

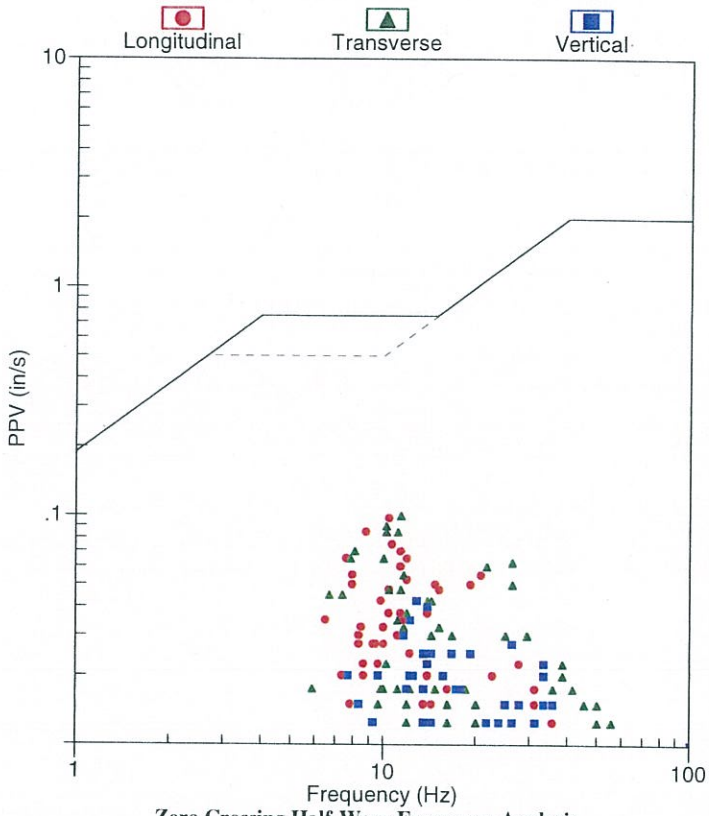
j-GEO-16404
N29 38 23 W98 17 40

**Shaketable Calibrated:** 12/21/2015
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

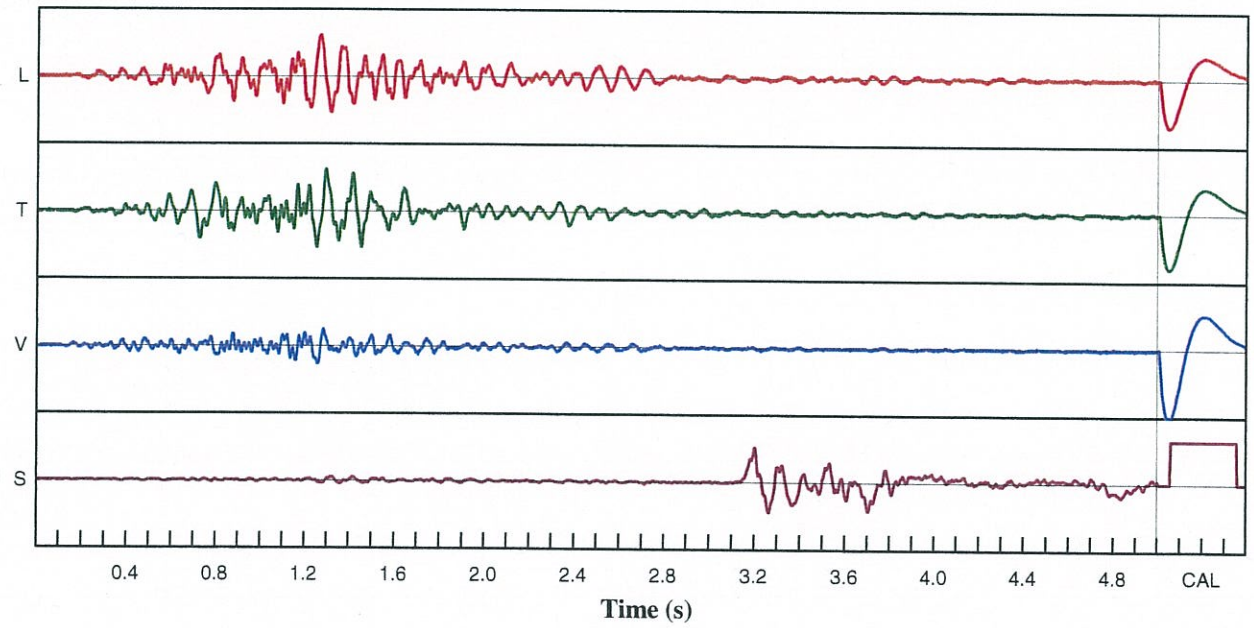
| | |
|---|---|
| **Time Scale:** | 0.100 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6319 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6319 Event: 1**



# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date 8-26-16 Blast No. 8-26-16 4A Time 11:58

Exact Blast Location FACE 4A

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N 29° 38' 59.60"
W 98° 17' 38.10"

MONITOR GPS

N 29 38' 25"
W 98 17' 39"

**SEISMOGRAPH DATA**

Seismograph No. 6277 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 12-22-15 Microphone Calibration 12-22-15

Exact Seismograph Location Warden Property Line: 21375 Gunther Grove Drive, Trophy Oaks Subdivision

North East corner of the property, at the pink pin flag

Seismograph Distance from Blast 3,507'

Peak Overpressure 113 dB Scaled Distance ------

Peak Particle Velocity .07 ips Operator DAVID LARNER

Remarks: GEOPHONE SPIKED AND SANDBAGGED

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6277 v6.5 |
| **Date:** | 08/26/2016 11:58:53 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 5.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Warden Property Line |
| **Distance:** | 3507 |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.040 | 0.070 | 0.023 |
| **FREQ (Hz)** | 27.8 | 13.2 | 22.7 |
| **PD (.001")** | 0.57 | 1.00 | 0.25 |
| **PPA (g)** | 0.020 | 0.026 | 0.013 |

**Peak Vector Sum :** 0.078 in/s
**Peak Air Pressure:** 113 db
0.00146 PSI @ 1.0 Hz

**Additional Info:**

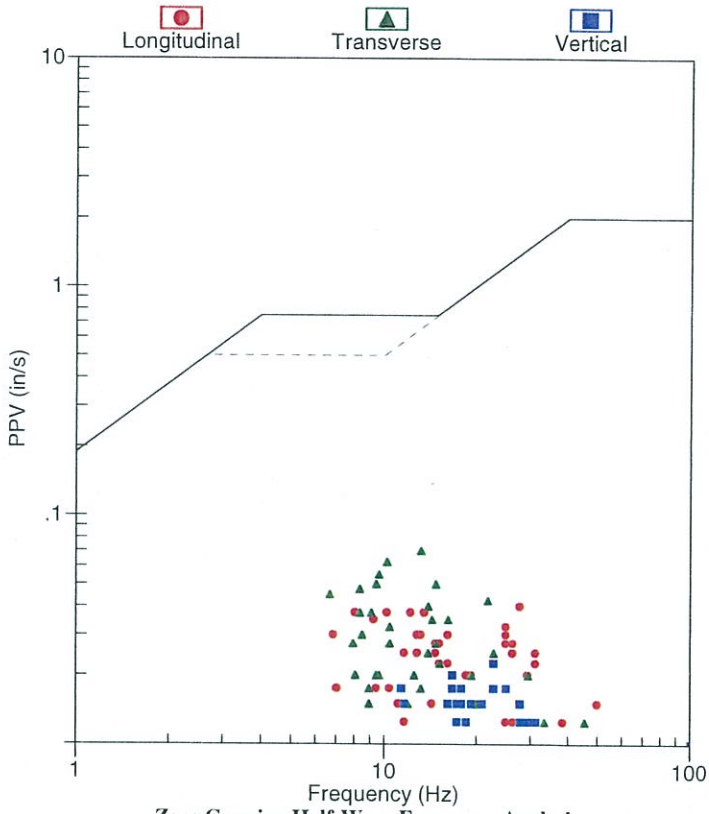
j-GEO-16406
N29 38 25 W98 17 39

**Shaketable Calibrated:** 12/22/2015
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

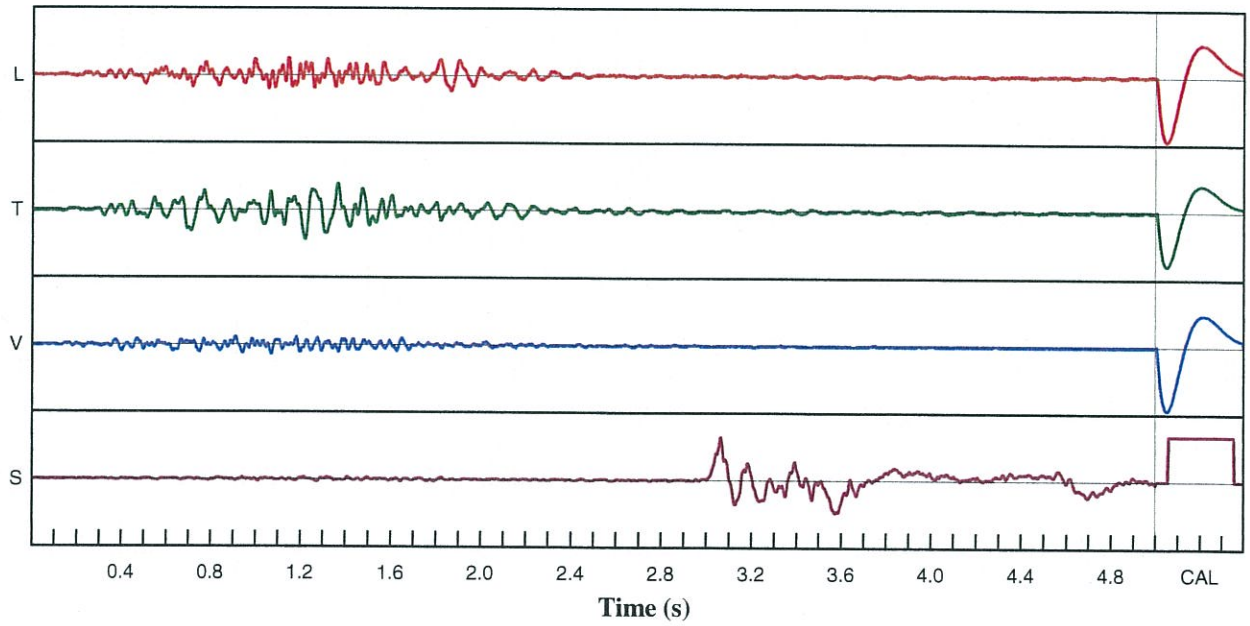
| | |
|---|---|
| **Time Scale:** | 0.100 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6277 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6277 Event: 1**



# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date Aug 29, 2016 Blast No. 08-29-2016 S Wall O Time 14:39

Exact Blast Location South Wall O

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N: 29° 38' 17.6"
W: 98° 16' 36.9"

MONITOR GPS

N 29 38' 22.63
W 98 18' 53.97

---

**SEISMOGRAPH DATA**

Seismograph No. 6366 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-05-16 Microphone Calibration 07-05-16

Exact Seismograph Location City Property Line: outside city water tower gate
30' from gate at the property line

Seismograph Distance from Blast 6807 ft.

Peak Overpressure 98 dB Scaled Distance ------

Peak Particle Velocity 0.020 ips Operator Clayton Smith

Remarks: GEOPHONE SPIKED AND SANDBAGGED

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6366 v6.5 |
| **Date:** | 08/29/2016 14:39:25 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 10.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | City Property Line |
| **Distance:** | 6807 |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.013 | 0.020 | 0.010 |
| **FREQ (Hz)** | 4.6 | 4.6 | 3.8 |
| **PD (.001")** | 0.43 | 0.63 | 0.25 |
| **PPA (g)** | 0.007 | 0.007 | 0.007 |

**Peak Vector Sum :** 0.025 in/s
**Peak Air Pressure:** 98 db
0.00027 PSI @ 1.0 Hz

**Additional Info:**

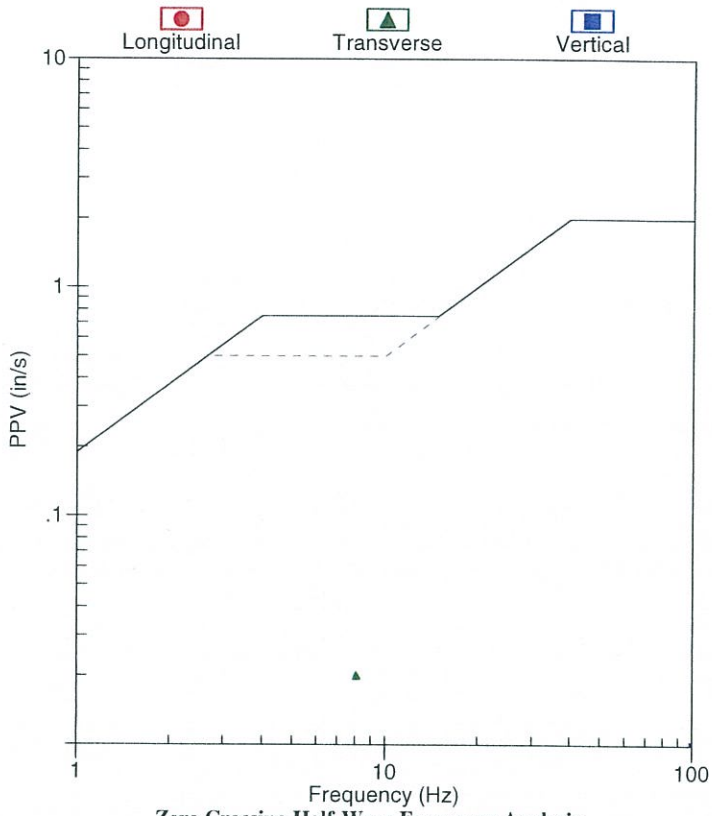
j-GEO-16386
N29 38 22.63W98 18 53.9

**Shaketable Calibrated:** 07/05/2016
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

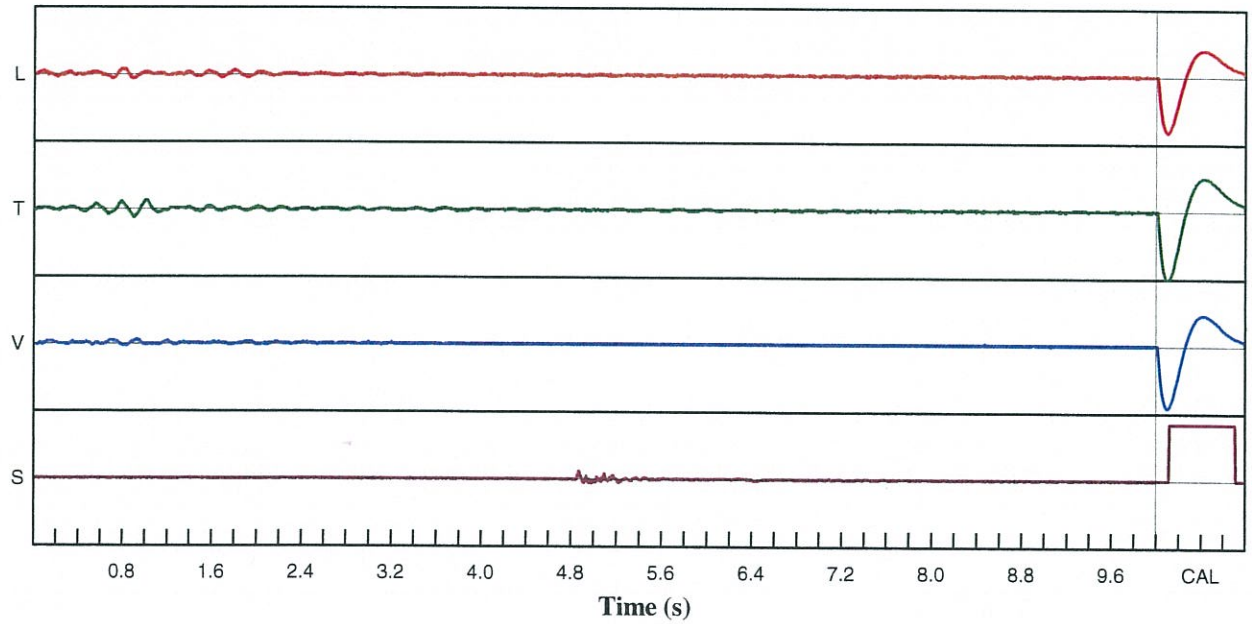
| | |
|---|---|
| **Time Scale:** | 0.200 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6366 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6366 Event: 1**



## VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date Aug. 29, 2016 Blast No. 08-29-2016 S Wall O Time 14:39

Exact Blast Location South Wall O

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N: 29° 38' 17.6"
W: 98° 16' 36.9"

MONITOR GPS

N 29° 38' 14.48"
W98° 18' 36.74"

**SEISMOGRAPH DATA**

Seismograph No. 6342 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-07-16 Microphone Calibration 07-07-16

Exact Seismograph Location Cohen Residence – 10041 Trophy Oaks Dr – Trophy Oaks Subdivision 20 ft N of NE corner of the house, off the driveway.

Seismograph Distance from Blast 5233 ft.

Peak Overpressure 112 dB Scaled Distance ------

Peak Particle Velocity 0.045 ips Operator Clayton Smith

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: [signature] Date 8/30/16

# Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial Number:** | 6342 |
| **Firmware Version:** | 0C-06.05 |
| **Event Date:** | 08/29/2016 14:39:27 (UTC -05:00) |
| **Event number:** | 2 |
| **Recording Time:** | 5 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Cohen Res |
| **Distance:** | 5,283' |
| **Operator:** | Vibra - Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.02 in/s |
| **Sound Trigger:** | 133 dB |

**Additional Info:**

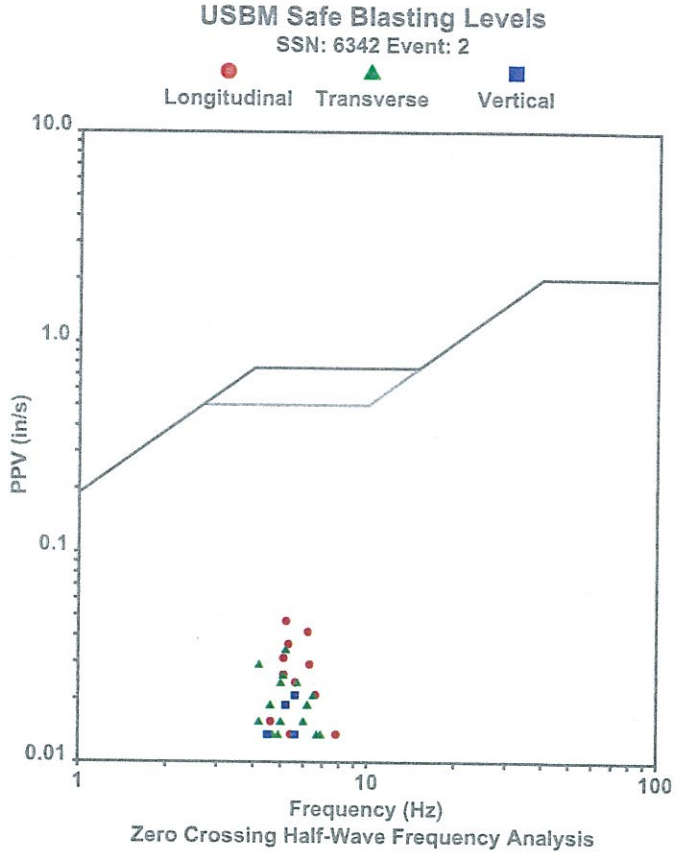
j-GEO-17298
N29 38 14.4 W98 17 36.7

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s):** | 0.045 | 0.033 | 0.02 |
| **FREQ (HZ):** | 5.1 | 5.2 | 5.6 |
| **PD (.001"):** | 1.25 | 0.94 | 0.58 |
| **PPA (g):** | 0.013 | 0.013 | 0.013 |

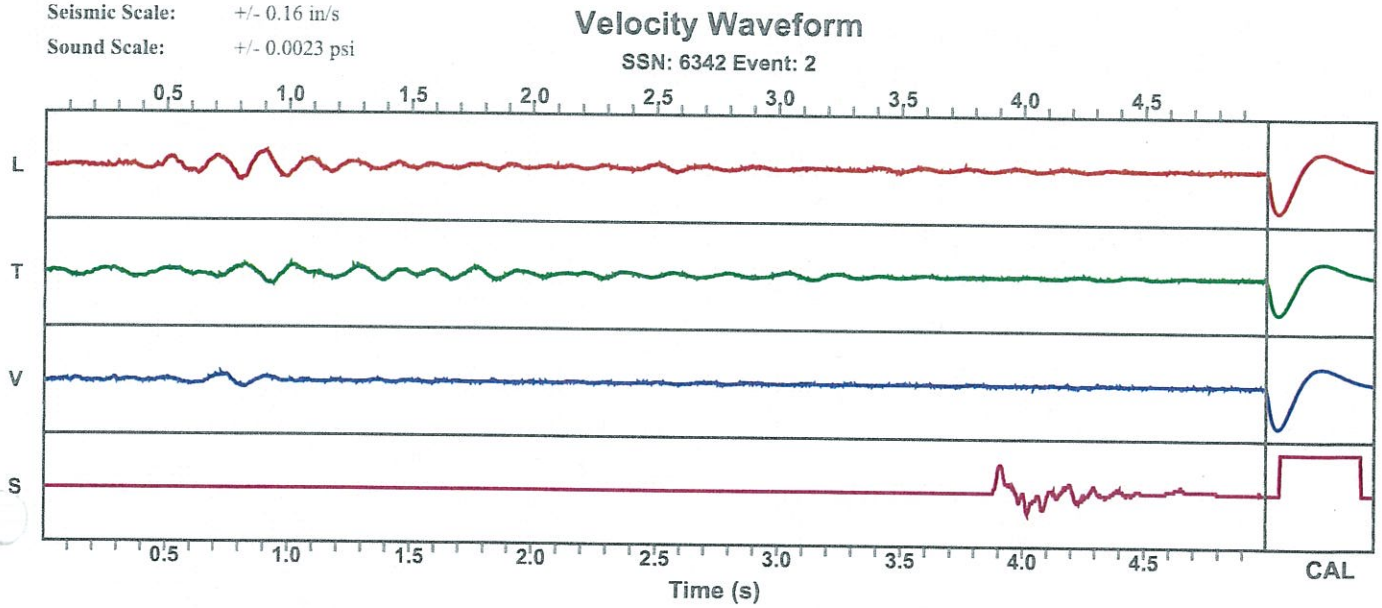
**Peak Vector Sum:** 0.053 in/s
**Peak Air Pressure:** 112 dB
0.0012 psi @ 5.3 HZ

**Shaketable Calibrated**
**On:** 07/07/2016 (UTC -05:00)
**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



# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date August 29, 2016 Blast No. 08-29-2016 S Wall O Time 14:39

Exact Blast Location S. Wall O

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N: 29° 38' 17.6"
W: 98° 16' 36.9"

MONITOR GPS

N 29 38' 15"
W 98 17' 26"

**SEISMOGRAPH DATA**

Seismograph No. 6241 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 5-24-16 Microphone Calibration 5-24-16

Exact Seismograph Location Holly Residence: 9916 Trophy Oaks Drive, Trophy Oaks Subdivision backyard along the quarry property line at the barbed wire fence

Seismograph Distance from Blast 4333 ft.

Peak Overpressure 84 dB Scaled Distance ------

Peak Particle Velocity 0.028 ips Operator: Clayton Smith

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: [signature] Date: 8/30/16

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6241 v6.5 |
| **Date:** | 08/29/2016 14:39:25 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 5.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Holly Residence |
| **Distance:** | 4333 |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.025 | 0.028 | 0.023 |
| **FREQ (Hz)** | 8.2 | 6.2 | 4.7 |
| **PD (.001")** | 0.44 | 0.56 | 0.53 |
| **PPA (g)** | 0.013 | 0.013 | 0.013 |

**Peak Vector Sum :** 0.030 in/s
**Peak Air Pressure:** 84 db
0.00011 PSI @ 1.0 Hz

**Additional Info:**

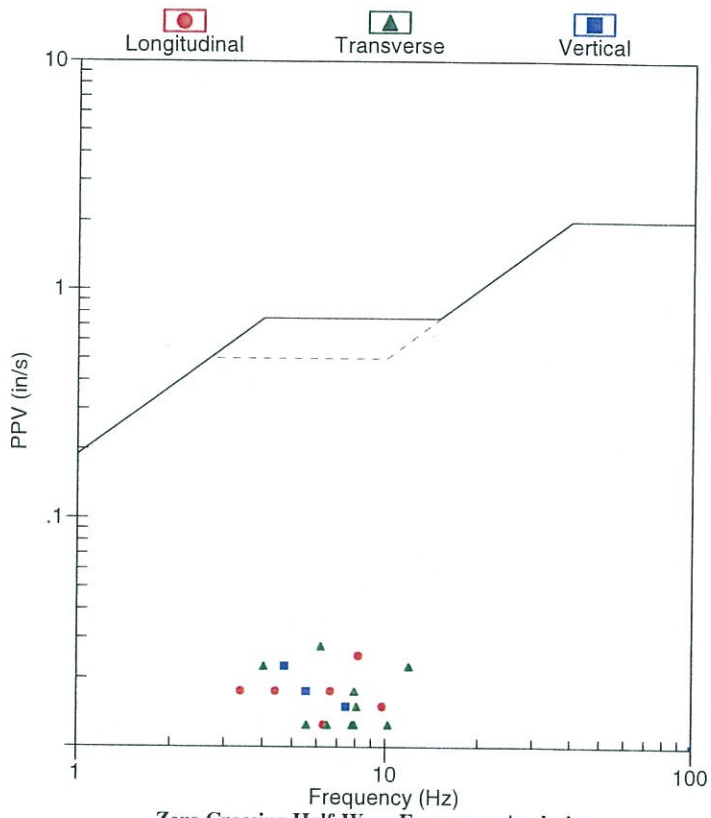
j-GEO-16392
N29 38 15 W98 17 26

**Shaketable Calibrated:** 05/25/2016
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

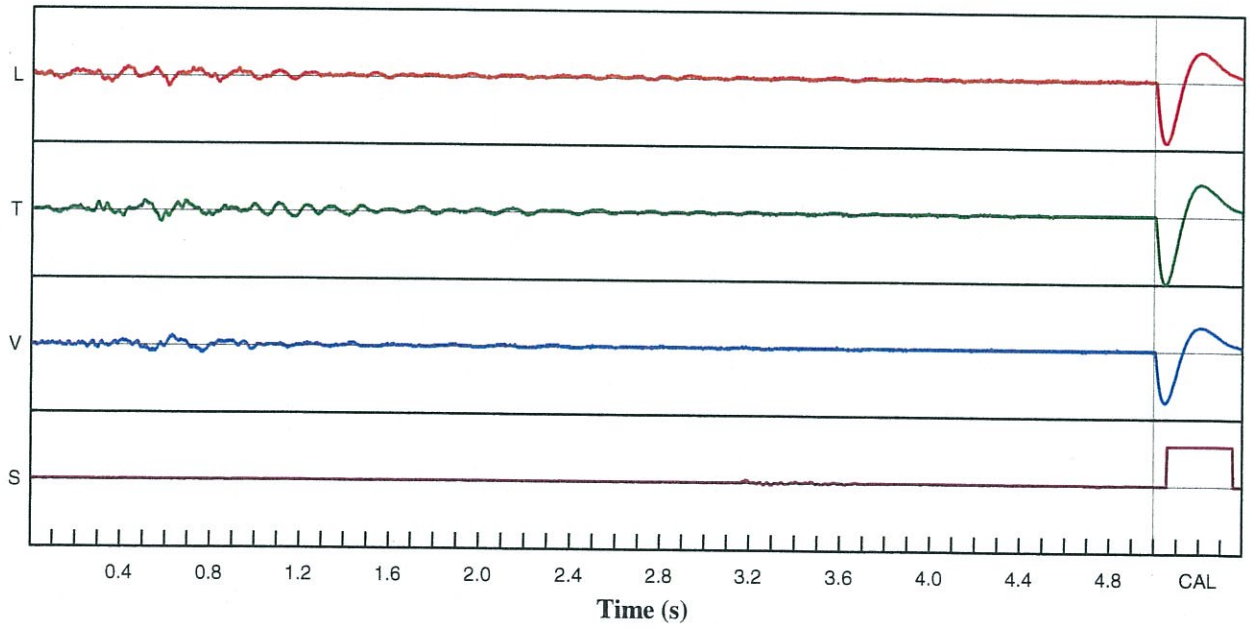
| | |
|---|---|
| **Time Scale:** | 0.100 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6241 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6241 Event: 1**



# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date Aug 29, 2016 Blast No. 08-29-2016 S Wall O Time 14:39

Exact Blast Location South Wall O

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

| | | |
|---|---|---|
| _____ | _____ lbs. | Delay Make _____ |
| _____ | _____ lbs. | Delay Type & Nos. _____ |
| _____ | _____ lbs. | Min. delay period _____ ms. |
| _____ | _____ lbs. | Max. lbs/delay period _____ lbs. |
| _____ | _____ lbs. | Blaster: Adam Nichols, ORICA |
| _____ | _____ lbs. | Weather _____ |
| _____ | _____ lbs. | Wind Direction & Speed _____ |

Total Explosives _____ lbs.

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N: 29° 38' 17.6"

W: 98° 16' 36.9"

MONITOR GPS

N 29 38' 52"

W 98 18' 19"

---

**SEISMOGRAPH DATA**

Seismograph No. 6245 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-07-16 Microphone Calibration 07-07-16

Exact Seismograph Location Michels Residence: 9118 Tuscan Hills Drive, Georg Ranch Subdivision

10' E of NE corner of house

Seismograph Distance from Blast 9679 ft.

Peak Overpressure NT dB Scaled Distance ------

Peak Particle Velocity NT ips Operator Clayton Smith

Remarks: GEOPHONE SPIKED AND SANDBAGGED

# Summary Data Report

| | |
|---|---|
| **Serial No:** | 6245 v6.5 |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Michels |
| **Distance:** | 9679 |
| **Operator:** | Vibratech |
| **Comment:** | Garden Ridge, Texas |

| | |
|---|---|
| **Begin Date:** | 08/29/2016 11:01:46 (UTC-5) |
| **End Date:** | 08/29/2016 14:47:49 (UTC-5) |
| **Events over Trigger:** | 0 (0--1) |
| **Record Time:** | 10.0 s |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | N/A |
| **Battery Level:** | 8.4 |

**Additional Info:**
No Trigger
j-GEO-16396
N29 38 52 W98 18 19

**Shaketable Calibrated:** 07/07/2016
**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** |

# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date Aug 29, 2016 Blast No. 08-29-2016 S Wall 0 Time 14:39

Exact Blast Location South Wall 0

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N: 29° 38' 17.6"
W: 98° 16' 36.9"

MONITOR GPS

N 29 38' 23"
W 98 17' 40"

---

**SEISMOGRAPH DATA**

Seismograph No. 6319 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 12-21-15 Microphone Calibration 12-21-15

Exact Seismograph Location Warden Residence: 21375 Gunther Grove Drive, Trophy Oaks Subdivision

10' N of NE corner of pool at the rock wall

Seismograph Distance from Blast 5585 ft.

Peak Overpressure 116 dB Scaled Distance ------

Peak Particle Velocity 0.030 ips Operator Clayton Smith

Remarks: GEOPHONE SPIKED AND SANDBAGGED

# Vibra Tech Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial No:** | 6319 v6.5 |
| **Date:** | 08/29/2016 14:39:25 (UTC-5) |
| **Event No:** | 1 |
| **Record Time:** | 5.0 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Warden Residence |
| **Distance:** | 5585 |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.020 in/s |
| **Sound Trigger:** | 122 db |

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s)** | 0.030 | 0.025 | 0.015 |
| **FREQ (Hz)** | 7.8 | 6.2 | 6.0 |
| **PD (.001")** | 0.70 | 0.49 | 0.37 |
| **PPA (g)** | 0.013 | 0.013 | 0.013 |

**Peak Vector Sum :** 0.035 in/s

**Peak Air Pressure:** 116 db
0.00182 PSI @ 7.6 Hz

**Additional Info:**

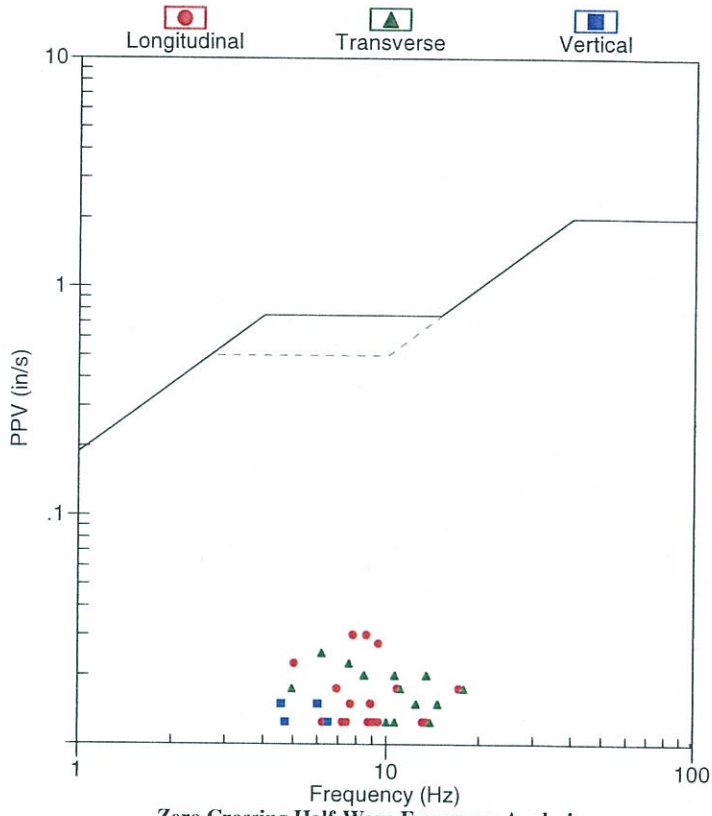
j-GEO-16404
N29 38 23 W98 17 40

**Shaketable Calibrated:** 12/21/2015
**By:** Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40299 U.S.A.
TEL: 502.240.9900 FAX: 502.240.9902

**Velocity Waveform Graph Scale**

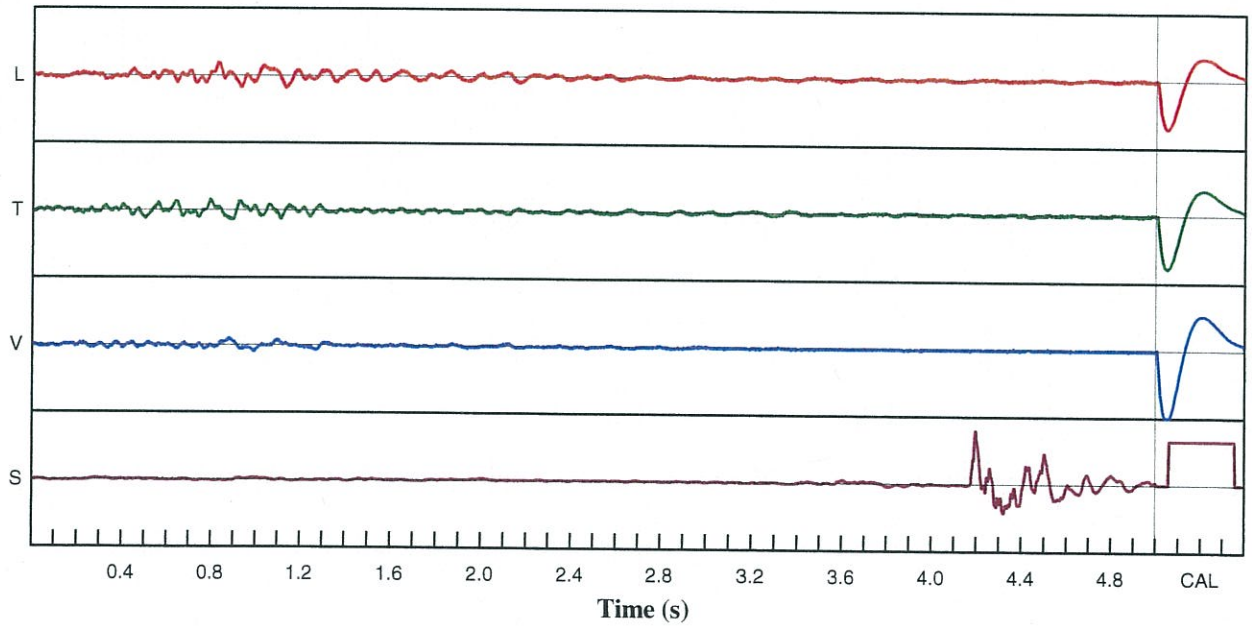
| | |
|---|---|
| **Time Scale:** | 0.100 s |
| **Seismic Scale:** | +/- 0.160 in/s |
| **Sound Scale:** | +/- 0.0023 PSI |

### USBM Safe Blasting Levels
**SN: 6319 Event: 1**




**Zero Crossing Half-Wave Frequency Analysis**

### Velocity Waveform
**SN: 6319 Event: 1**



# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date Aug 31, 2016 Blast No. 08·31·2016 3D Time 13:40

Exact Blast Location 3D

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N: 29° 38' 49.2"
W: 98° 17' 37.8"

MONITOR GPS

N 29 38' 22.63
W 98 18' 53.97

---

**SEISMOGRAPH DATA**

Seismograph No. 6366 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-05-16 Microphone Calibration 07-05-16

Exact Seismograph Location City Property Line: outside city water tower gate

30' from gate at the property line

Seismograph Distance from Blast 3046 ft.

Peak Overpressure 100 dB Scaled Distance ------

Peak Particle Velocity 0.045 ips Operator Clayton Smith

Remarks: GEOPHONE SPIKED AND SANDBAGGED

# Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial Number:** | 6366 |
| **Firmware Version:** | 0C-06.05 |
| **Event Date:** | 08/31/2016 13:40:37 (UTC -05:00) |
| **Event number:** | 1 |
| **Recording Time:** | 10 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | City Property Line |
| **Distance:** | |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.02 in/s |
| **Sound Trigger:** | 122 dB |

**Additional Info:**

3046 ft.

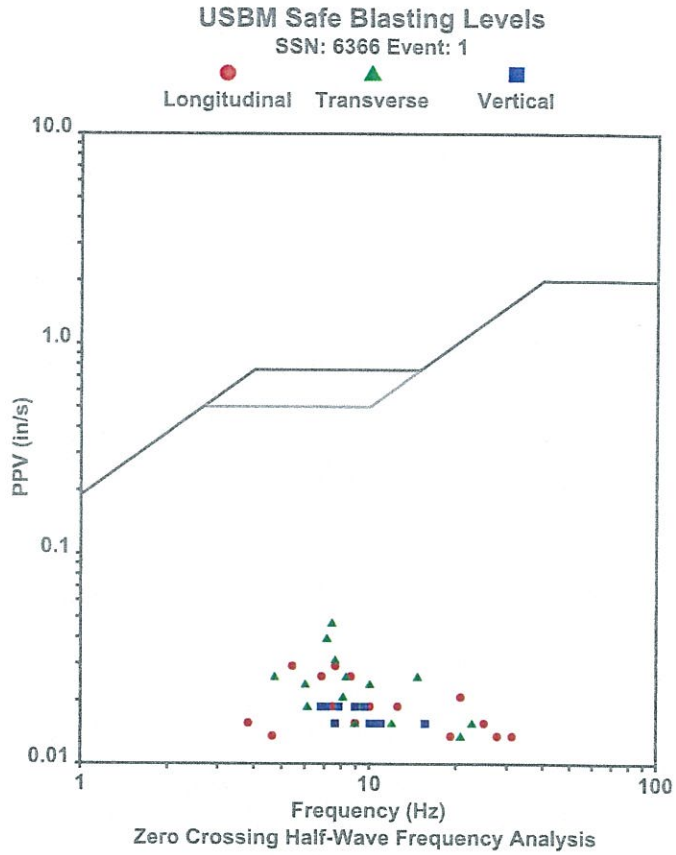
j-GEO-16386
N29 38 22.63W98 18 53.9

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s):** | 0.028 | 0.045 | 0.018 |
| **FREQ (HZ):** | 5.4 | 6.3 | 5.7 |
| **PD (.001"):** | 0.65 | 0.84 | 0.36 |
| **PPA (g):** | 0.013 | 0.007 | 0.007 |

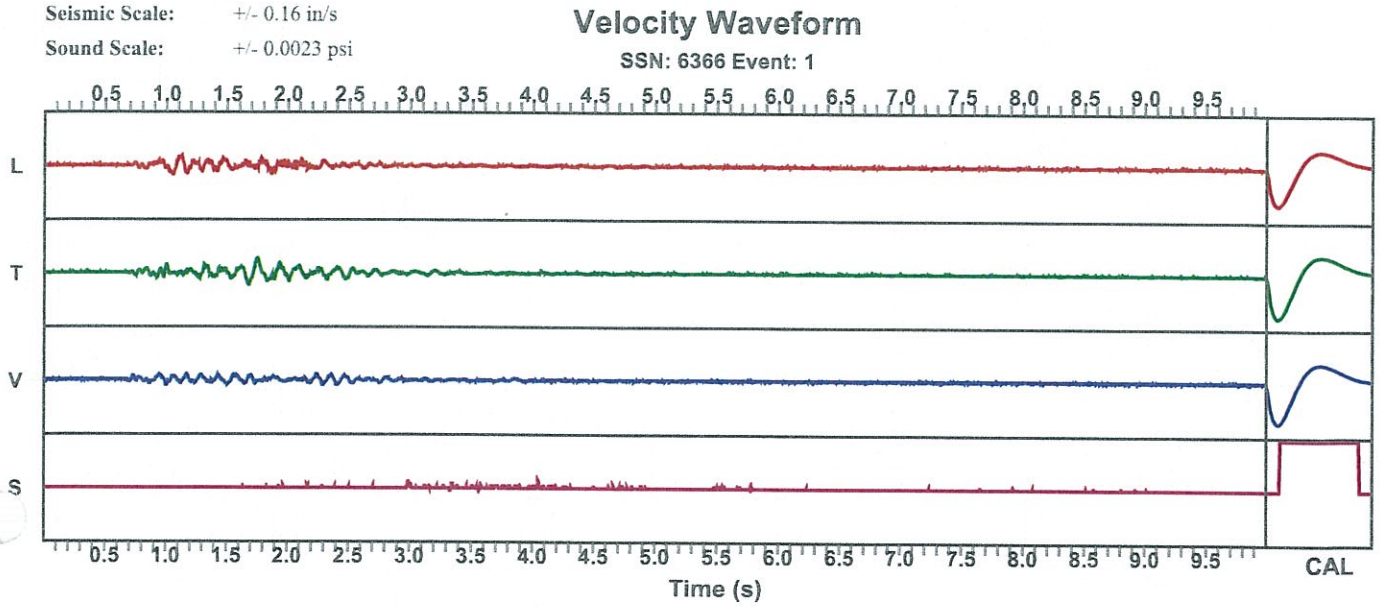
**Peak Vector Sum:** 0.045 in/s
**Peak Air Pressure:** 100 dB
0.0003 psi @ 10 HZ

**Shaketable Calibrated**
**On:** 07/05/2016 (UTC -05:00)
**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



# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date Aug 31, 2016 Blast No. 08-31-2016 3D Time 13:40

Exact Blast Location 3D

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N: 29° 38' 49.2"

W: 98° 17' 37.8"

MONITOR GPS

N 29° 38' 14.48"

W98° 18' 36.74"

---

**SEISMOGRAPH DATA**

Seismograph No. 6342 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-07-16 Microphone Calibration 07-07-16

Exact Seismograph Location Cohen Residence – 10041 Trophy Oaks Dr – Trophy Oaks Subdivision 20 ft N of NE corner of the house, off the driveway.

Seismograph Distance from Blast 3525 ft.

Peak Overpressure 103 dB Scaled Distance ------

Peak Particle Velocity 0.055 ips Operator Clayton Smith

Remarks: GEOPHONE SPIKED AND SANDBAGGED

Vibration Analysis by: [signature] Date 8/31/16

# Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial Number:** | 6342 |
| **Firmware Version:** | 0C-06.05 |
| **Event Date:** | 08/31/2016 13:40:38 (UTC -05:00) |
| **Event number:** | 1 |
| **Recording Time:** | 5 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Cohen Res |
| **Distance:** | |
| **Operator:** | Vibra - Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.02 in/s |
| **Sound Trigger:** | 133 dB |

**Additional Info:**

3525 ft.

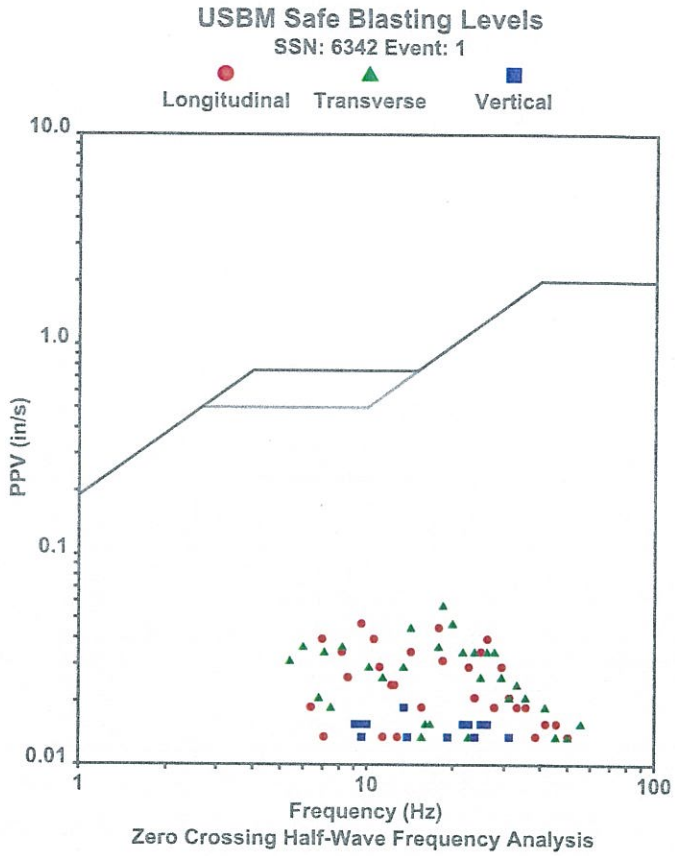
j-GEO-17298
N29 38 14.4 W98 17 36.7

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s):** | 0.045 | 0.055 | 0.018 |
| **FREQ (HZ):** | 6.5 | 9.1 | 12.2 |
| **PD (.001"):** | 0.67 | 0.91 | 0.35 |
| **PPA (g):** | 0.02 | 0.02 | 0.013 |

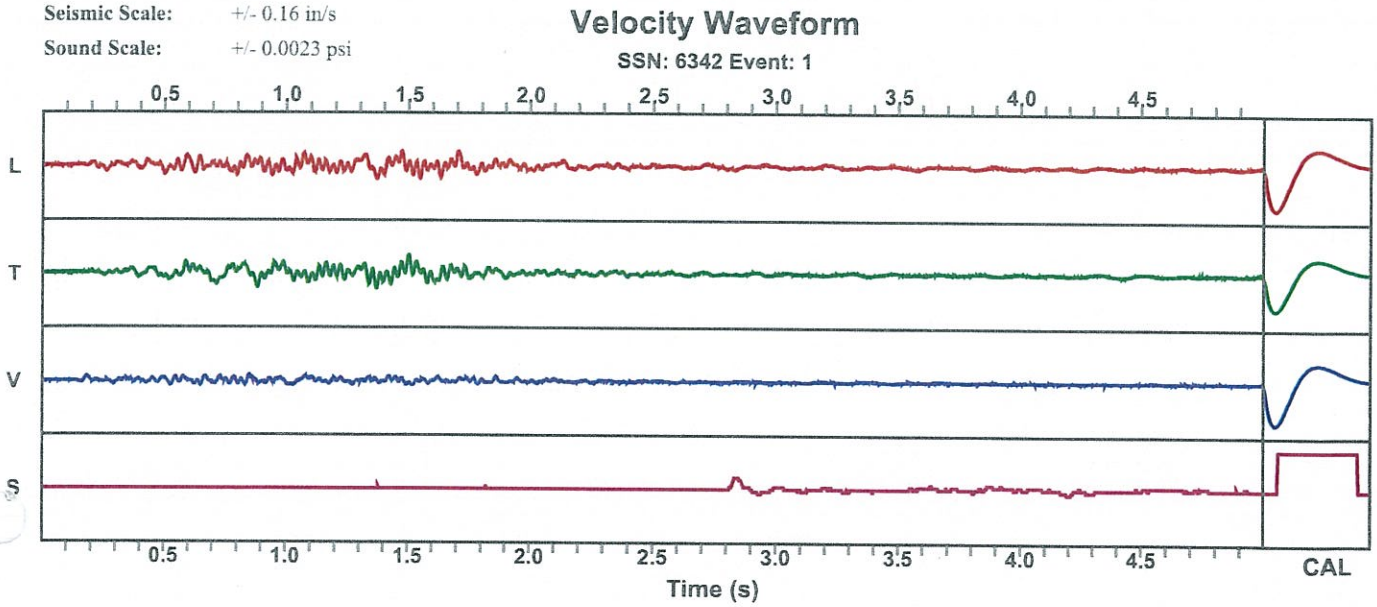
**Peak Vector Sum:** 0.06 in/s
**Peak Air Pressure:** 103 dB
0.0005 psi @ 5.3 HZ

**Shaketable Calibrated**
**On:** 07/07/2016 (UTC -05:00)
**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



# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date Aug 31, 2016 Blast No. 08-31-2016 3D Time 13:40

Exact Blast Location 3D

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N: 29° 38' 49.2"
W: 98° 17' 37.8

MONITOR GPS

N 29 38' 52"
W 98 18' 19"

**SEISMOGRAPH DATA**

Seismograph No. 6245 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 07-07-16 Microphone Calibration 07-07-16

Exact Seismograph Location Michels Residence: 9118 Tuscan Hills Drive, Georg Ranch Subdivision

10' E of NE corner of house

Seismograph Distance from Blast 3676 ft.

Peak Overpressure 102 dB Scaled Distance ------

Peak Particle Velocity 0.045 ips Operator Clayton Smith

Remarks: GEOPHONE SPIKED AND SANDBAGGED

# Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial Number:** | 6245 |
| **Firmware Version:** | 0C-06.05 |
| **Event Date:** | 08/31/2016 13:40:39 (UTC -05:00) |
| **Event number:** | 1 |
| **Recording Time:** | 10 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Michels |
| **Distance:** | |
| **Operator:** | Vibratech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.02 in/s |
| **Sound Trigger:** | OFF |

**Additional Info:**

3676 ft.

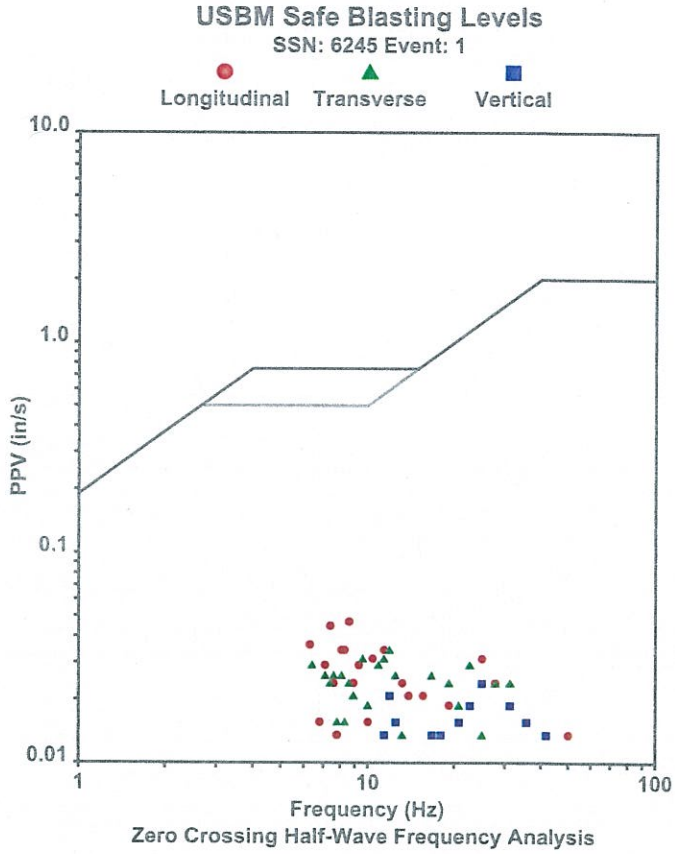
j-GEO-16396
N29 38 52 W98 18 19

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s):** | 0.045 | 0.033 | 0.023 |
| **FREQ (HZ):** | 8.6 | 10.9 | 22.7 |
| **PD (.001"):** | 0.69 | 0.6 | 0.33 |
| **PPA (g):** | 0.013 | 0.013 | 0.013 |

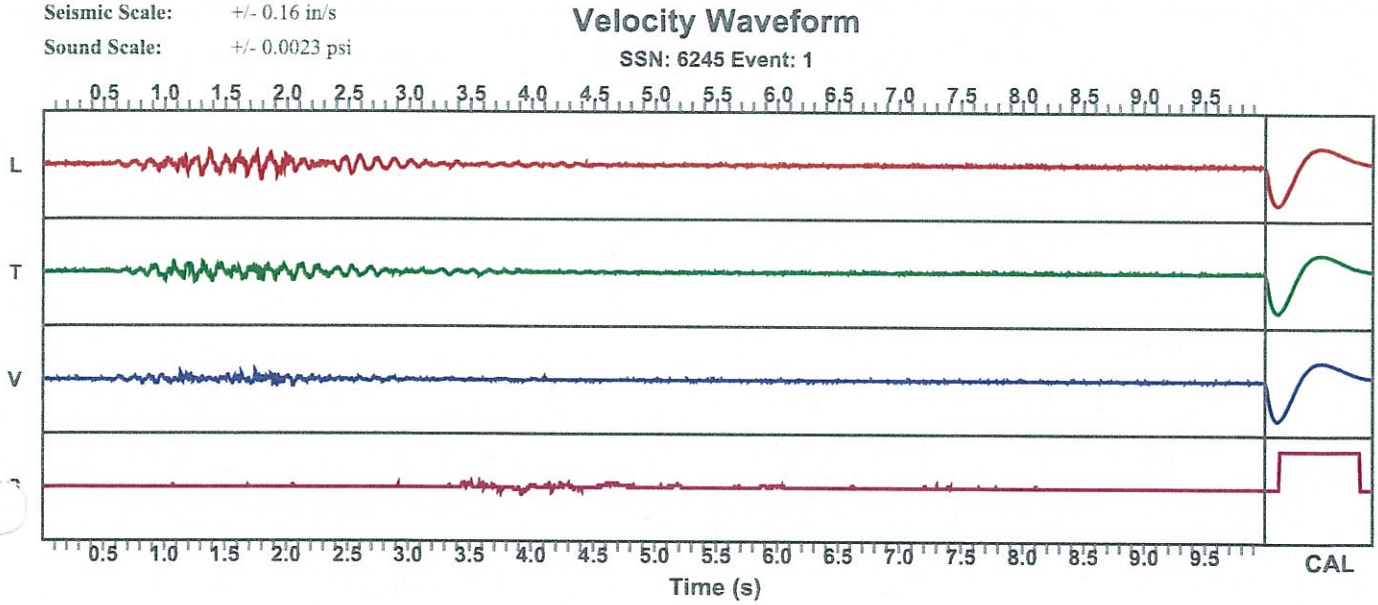
**Peak Vector Sum:** 0.045 in/s
**Peak Air Pressure:** 102 dB
0.0004 psi @ 2.5 HZ

**Shaketable Calibrated**
**On:** 07/07/2016 (UTC -05:00)
**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



# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date Aug 31, 2016 Blast No. 08·31·2016 3D Time 13:40

Exact Blast Location 3D

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N: 29° 38' 49.2"
W: 98° 17' 37.8"

MONITOR GPS

N 29 38' 23"
W 98 17' 40"

---

**SEISMOGRAPH DATA**

Seismograph No. 6319 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 12-21-15 Microphone Calibration 12-21-15

Exact Seismograph Location Warden Residence: 21375 Gunther Grove Drive, Trophy Oaks Subdivision
10' N of NE corner of pool at the rock wall

Seismograph Distance from Blast 2662 ft.

Peak Overpressure 108 dB Scaled Distance ------

Peak Particle Velocity 0.13 ips Operator Clayton Smith

Remarks: GEOPHONE SPIKED AND SANDBAGGED

# Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial Number:** | 6319 |
| **Firmware Version:** | 0C-06.05 |
| **Event Date:** | 08/31/2016 13:40:39 (UTC -05:00) |
| **Event number:** | 1 |
| **Recording Time:** | 5 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Warden Residence |
| **Distance:** | |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.02 in/s |
| **Sound Trigger:** | 122 dB |

**Additional Info:**

2662 ft.

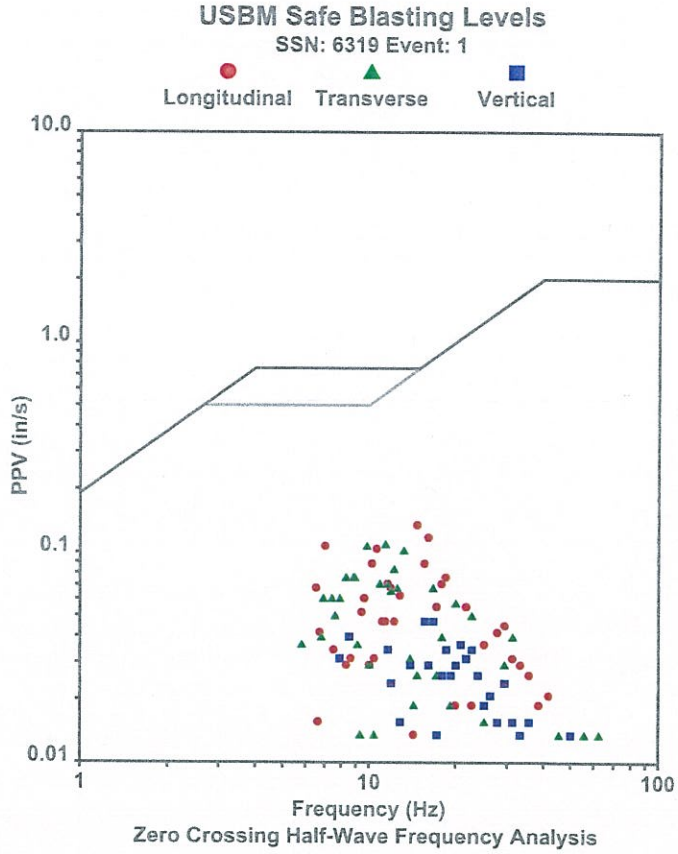
j-GEO-16404
N29 38 23 W98 17 40

**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s):** | 0.13 | 0.105 | 0.045 |
| **FREQ (HZ):** | 14.7 | 10.4 | 16.7 |
| **PD (.001"):** | 2.01 | 1.59 | 0.52 |
| **PPA (g):** | 0.033 | 0.026 | 0.02 |

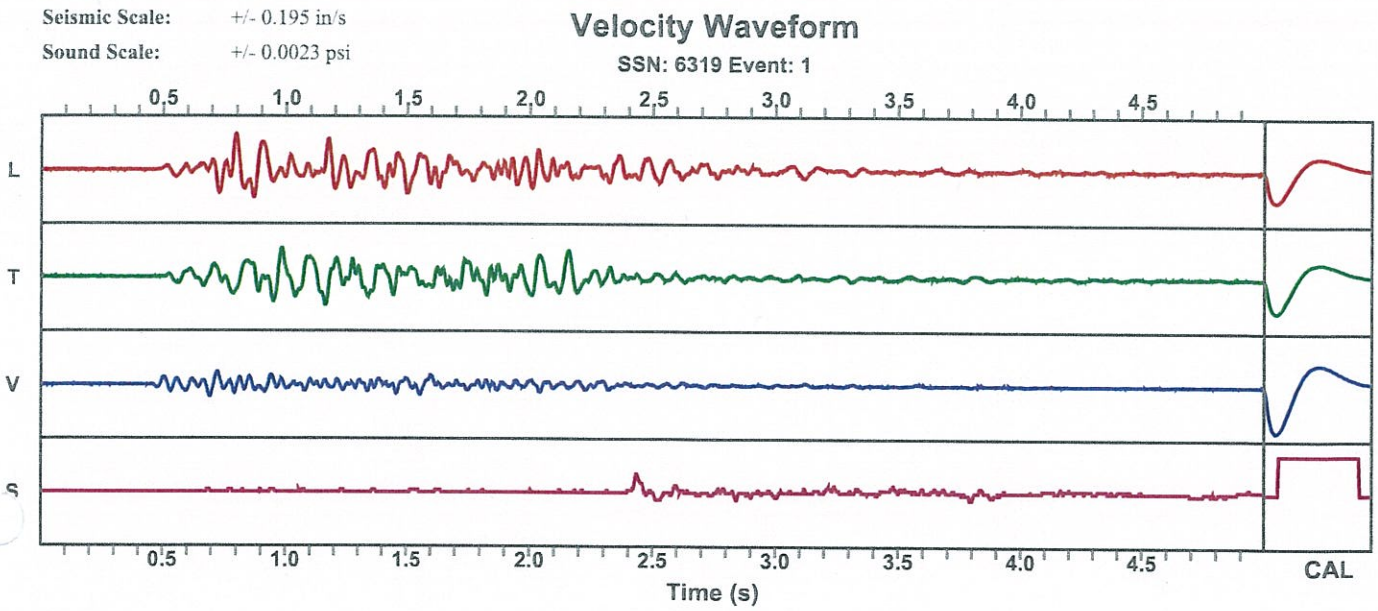
**Peak Vector Sum:** 0.143 in/s
**Peak Air Pressure:** 108 dB
0.0008 psi @ 5.6 HZ

**Shaketable Calibrated**
**On:** 12/21/2015 (UTC -05:00)
**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:** +/- 0.195 in/s
**Sound Scale:** +/- 0.0023 psi



# VIBRA-TECH BLAST AND SEISMOGRAPHIC REPORT

**BLAST DATA**

Client HANSON SERVTEX

Job Location GARDEN RIDGE, TEXAS QUARRY

Date Aug 31, 2016 Blast No. 08-31-2016 3D Time 13:40

Exact Blast Location 3D

No. of Holes _____ Diameter _____ in. Avg. Depth _____ Subgrade _____ ft.

Spacing _____ ft. Burden _____ ft. Avg. Stemming _____ ft.

Make & Type of Explosives:

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

_____ _____ lbs.

Total Explosives _____ lbs.

Delay Make _____

Delay Type & Nos. _____

Min. delay period _____ ms.

Max. lbs/delay period _____ lbs.

Blaster: Adam Nichols, ORICA

Weather _____

Wind Direction & Speed _____

---

**BLAST LAYOUT**

Detail or Diagram Blast Layout: Number of rows; Number of holes in each row; Number of decks per hole; amount of stemming between powder columns; nominal delay time between decks, holes and rows. (Use reverse side if necessary.)

See attached for blast diagram and above Information

FACE GPS

N: 29° 38' 49.2"
W: 98° 17' 37.8"

MONITOR GPS

N 29 38' 25"
W 98 17' 39"

---

**SEISMOGRAPH DATA**

Seismograph No. 6277 Range Setting 10.00 ips Trigger Level 0.020 ips

Date of last: Geophone Calibration 12-22-15 Microphone Calibration 12-22-15

Exact Seismograph Location Warden Property Line: 21375 Gunther Grove Drive, Trophy Oaks Subdivision

North East corner of the property, at the pink pin flag

Seismograph Distance from Blast 2455 ft.

Peak Overpressure 109 dB Scaled Distance ------

Peak Particle Velocity 0.13 ips Operator Clayton Smith

Remarks: GEOPHONE SPIKED AND SANDBAGGED

# Seismic Analysis
## Velocity Waveform Analysis

| | |
|---|---|
| **Serial Number:** | 6277 |
| **Firmware Version:** | 0C-06.05 |
| **Event Date:** | 08/31/2016 13:40:39 (UTC -05:00) |
| **Event number:** | 1 |
| **Recording Time:** | 5 s |
| **Client:** | Hanson |
| **Operation:** | Servtex |
| **Location:** | Warden Property Line |
| **Distance:** | |
| **Operator:** | Vibra-Tech |
| **Comment:** | Garden Ridge, Texas |
| **Seismic Trigger:** | 0.02 in/s |
| **Sound Trigger:** | 122 dB |

**Additional Info:**

2455 ft.

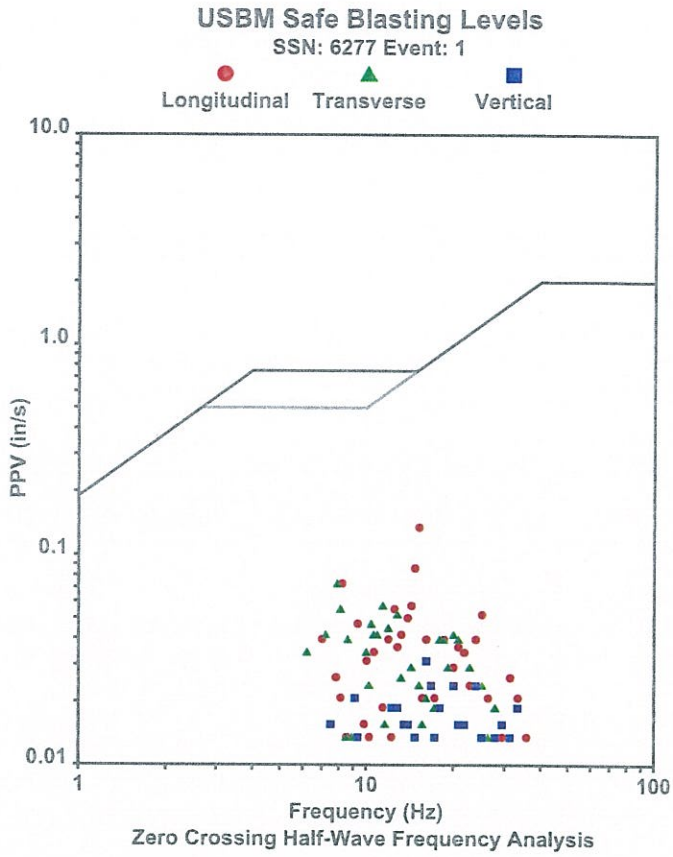
j-GEO-16406
N29 38 25 W98 17 39

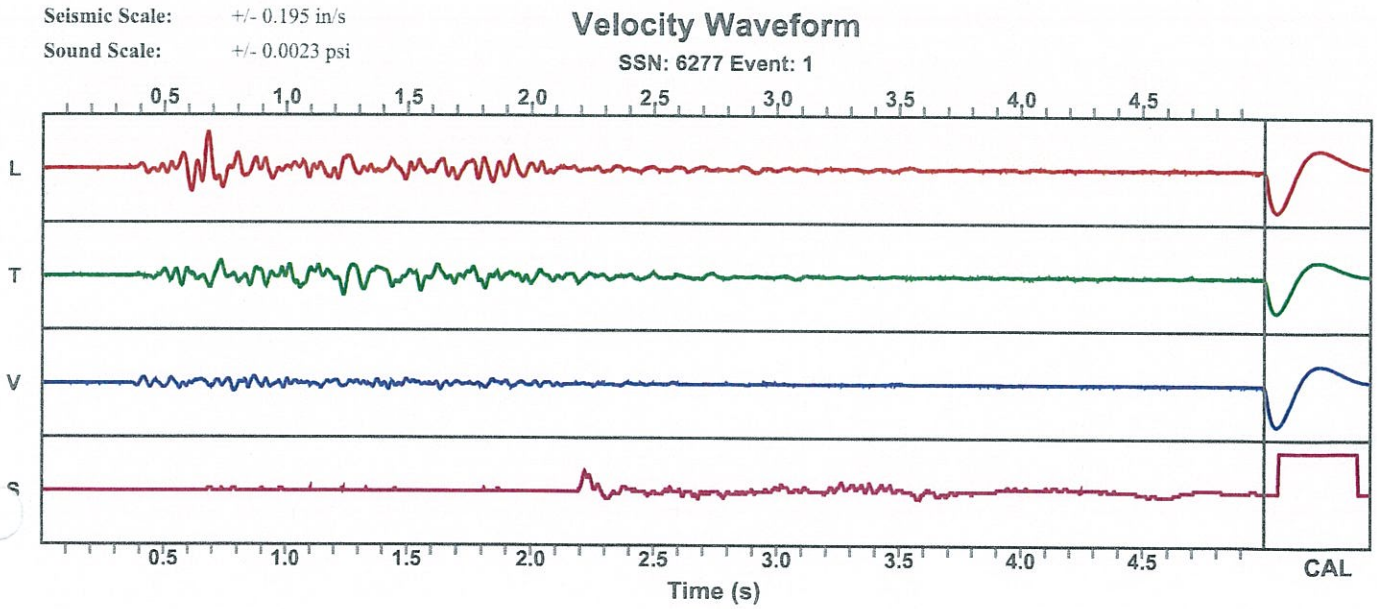
**Summary Data**

| | L | T | V |
|---|---|---|---|
| **PPV (in/s):** | 0.13 | 0.07 | 0.03 |
| **FREQ (HZ):** | 14.7 | 7.9 | 16.1 |
| **PD (.001"):** | 1.37 | 0.95 | 0.33 |
| **PPA (g):** | 0.033 | 0.02 | 0.013 |

**Peak Vector Sum:** 0.135 in/s
**Peak Air Pressure:** 109 dB
0.0009 psi @ 5.2 HZ

**Shaketable Calibrated**
**On:** 12/22/2015 (UTC -05:00)
**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:** | +/- 0.195 in/s |
| **Sound Scale:** | +/- 0.0023 psi |