Appendix A

Vibration Monitoring Methods and Results

Ground Motions Measurements Adjacent to Domestic Water Wells

Ground motions adjacent to nine domestic water wells were recorded during blasting events to determine the ground motion variation with depth below the ground surface. At each well selected for study, one tri-axial transducer was buried 0.42 ft. from the surface near each wellhead. A second transducer was buried at depth.

Two abandoned well casings and one hand-dug well were used to place transducers at depths between 9 and 20 ft. At four wells, an attempt was made to hand-dig holes as deep as possible to record ground motions. At most sites, the subsurface soils contained large gravels and cobbles, making it difficult to dig holes deeper than 3.5 ft. from the surface. At two sites, it was not possible to dig into the ground any deeper than 0.42 ft from the surface. Therefore, no second transducer was used at these two wells.

During the initial monitoring period in 2000, detailed information on the blasting activities were obtained from the mine operators. The distances from the blasting site to the wells ranged 1293 ft. to 5140 ft. away and averaged 2607 ft. Charge weights used for blasting ranged from 126 to 2076 lbs. per 8 ms (milliscond) delay. The scaled distances ranged from 56 to 343 ft./lbs.$^{1/2}$.

Seismograph Equipment

Blasting-type seismographs, manufactured by LARCOR or Dallas, Texas, were used to monitor ground motions near wells. Sensors were embedded in epoxy within a water-tight housing for long-term survivability. Fifty-foot cables were used and attached to the housing aligned with the vertical geophone for ease of inserting at depth. Airblast was recorded using the surface seismograph.

Figure (1) shows the locations of geophones placed in or adjacent to wells. Geophones placed in abandoned wells were either grouted in place or encapsulated in crushed stone. Geophones placed within the ground adjacent to wells were tamped with pressure to ensure good coupling.

The following settings were used:

Ground trigger level	0.02 ips
Air trigger level	125 dB
Sample rate	1248 samples/sec.
Record length	5 to 10 sec.
Range	2.5 ips
Lowest velocity detected	0.005 ips

Results

Vibration Data from Blasting

Full waveform vibration data are shown in Volume II for all blast events that were recorded. Tables (1) through (4) summarize the seismographs data recorded during fall-winter 2000, spring 2001, fall 2001, and winter 2001, respectively. Peak particle velocity (PPV), in ips (inches per

second), the frequency at the PPV, in Hz (Hertz), and the airblast, in dB (decibels) are given. Detailed blasting records were available only during the fall-winter 2000 monitoring period. Hence, Table (1) provides information on distances from the blast to the seismographs, maximum pounds per 8 ms delay and scaled distance. This data set is the most complete with 54 shots recorded at nine wells. Subsequent monitoring periods were not as complete due to the loss of in Kentucky site KY-1 and Virginia **as previously explained**. Difficulties fielding equipment contributed to smaller data sets in the 2001 monitoring periods. Additionally, mine blasting was being conducted at farther distances from the wells during 2001, compared to the distances involved during the initial 2000 monitoring period, as mining moved away from the study sites. As such, many of the mine blasts did not trigger the seismographs.

The extensive 2000 data set shows average near-surface (0.42 ft.) and at depth (from 1.1 to 20 ft.) peak particle velocities (PPV) of 0.043 ips and 0.033 ips, respectively. In the spring of 2001 as mining progressed away from the well site, the average PPV values were 0.038 ips and 0.029 ips for the near-surface and at depth locations, respectively. The maximum ground motion recorded at the surface was 0.125 ips. In the fall of 2001, only surface measurements were taken. These averaged 0.026 ips, less than the average in 2000. In all cases, a decrease in average ground motions with depth was measured. In no case did ground motions at depth exceed those measured at the surface.

Frequencies at the PPV also tended to decrease with depth as the degree of confinement increased. Similarly, average frequencies decreased with successive monitoring periods. The average frequencies near the ground surface and at depth in 2000 were 17.5 Hz and 14.8 Hz. In the spring of 2001, an average surface frequency of 18.8 Hz was measured. The ground motion data at depth fell within the resolution of the instrumentation and frequencies could not be reliably calculated.

Average values for PPV and frequency at the PPV by well site are given in Tables (5) through (8). The dominant waveform frequency obtained from the Fast Fourier Transform (FFT) is also shown. The FFT frequency is a measure of the predominant frequency over the entire waveform and indicates the frequency containing most of the ground motion energy. In contrast, the frequency at the PPV (or peak frequency) is the frequency calculated from the zone-crossings for the cycle containing the PPV.

Data contained in these tables are plotting in Figures (1) through (5). The decrease in ground motion with depth is shown in Figure (1) for the initial monitoring season (2000) and Figures (2) and (3) for 2000 and spring 2001 combined. The linear trend for the averaged combined data is

$$V \text{ (average)} = - 0.0015\ D + 0.0421 \qquad (\ )$$

where V is the average PPV, in ips, and D is the burial distance, in ft. The correlation coefficient (R^2) for the data is 0.38. The best-fit line through the data indicates that an average decrease in ground motion velocity of 0.0015 ips occurs per foot of depth below the ground surface. The rate of decrease is dependent on geology and coupling. Individual well site rates are given in Figure (1). For well-coupled burials depths (2 ft. and below), this rate ranges between -0.002 and -0.0026 (the negative indicating a decrease with depth) ips per ft. of burial.

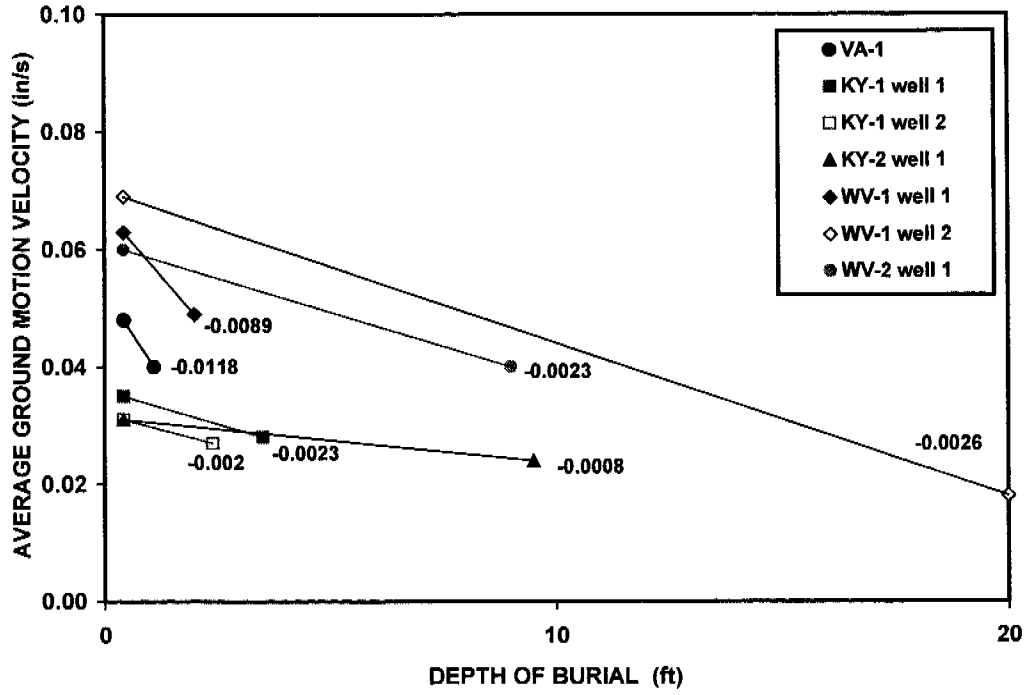


Figure (1) Average ground motion velocity versus depth of burial for fall-winter 2000 data showing the rate of decrease in ground motion velocity with depth

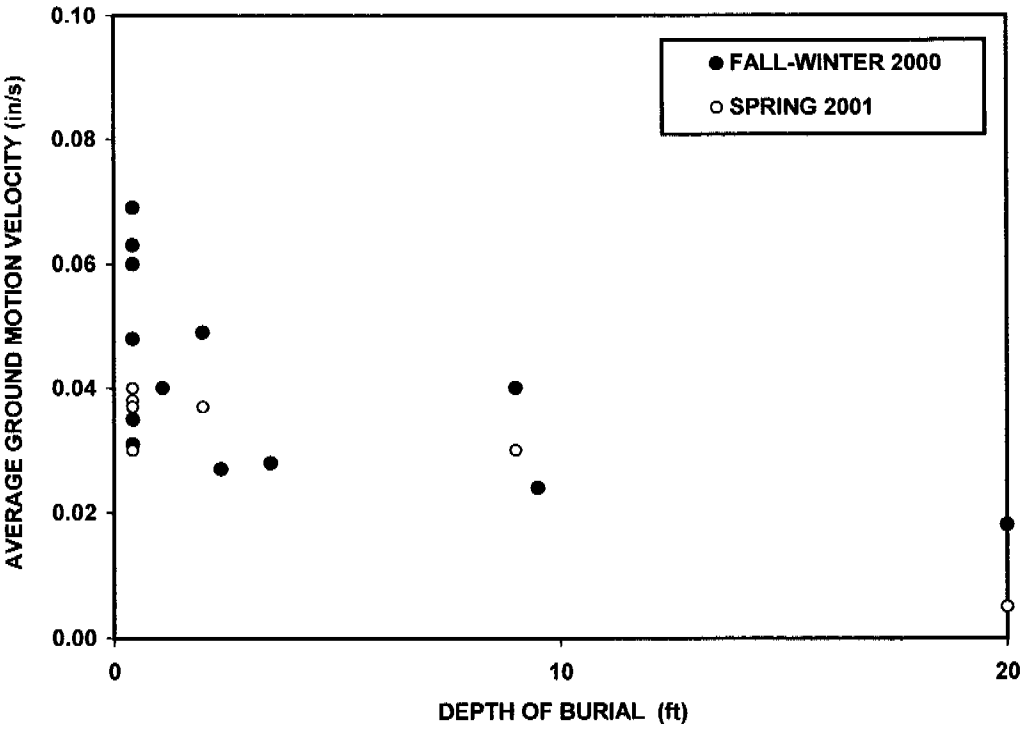


Figure (2) Average ground motion velocity versus depth of burial for fall-winter 2000 and spring 2001

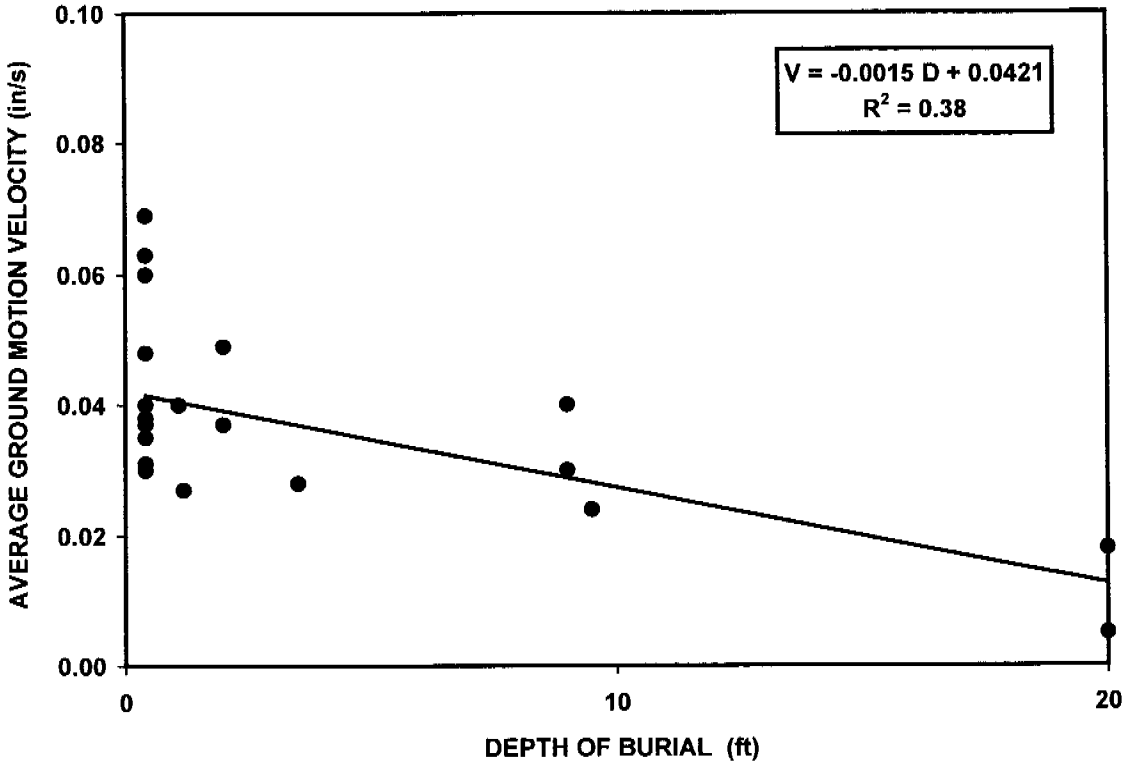


Figure (2) Average ground motion velocity versus depth of burial for fall-winter 2000 and spring 2001

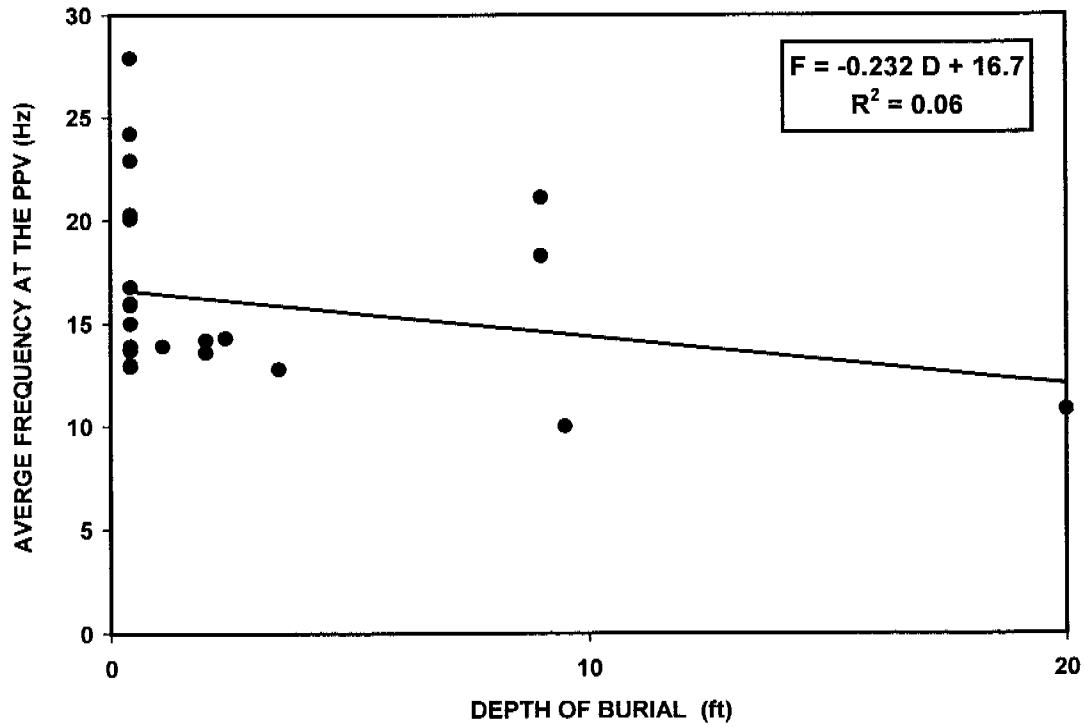


Figure (4) Average peak frequency versus depth of burial for fall-winter 2000 and spring 2001

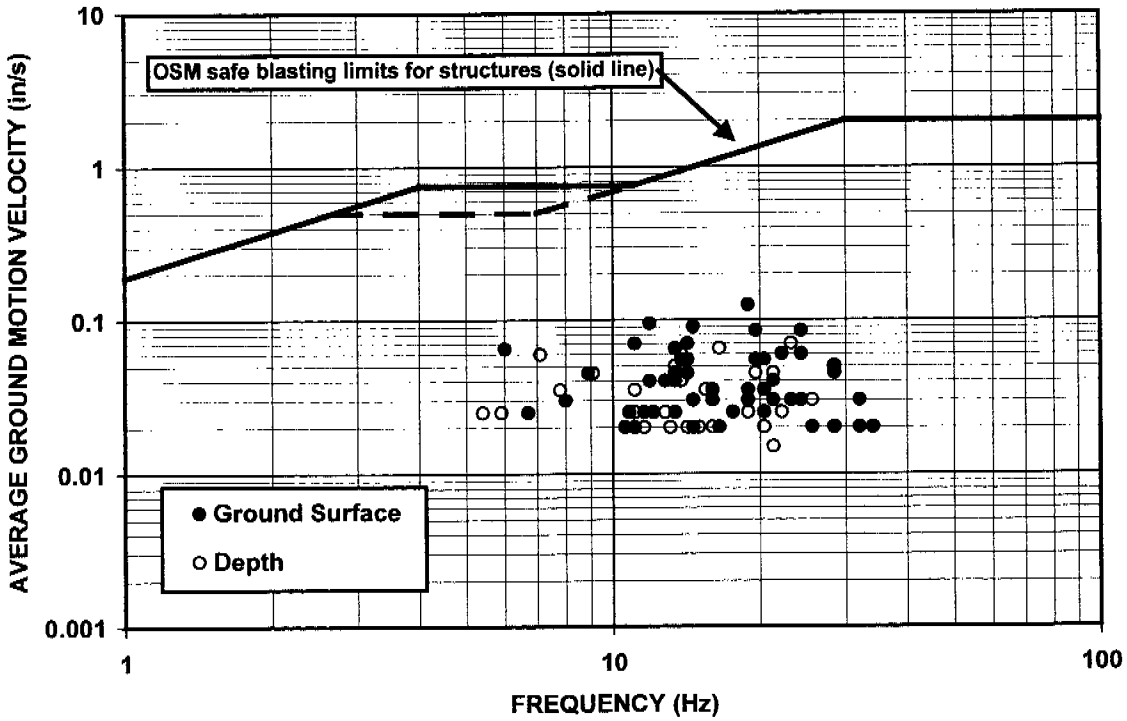


Figure (5) Peak particle velocity versus peak frequency for 2000 data

The best-fit trend line giving the decrease in frequency at the PPV with burial depth, shown in Figure (4), is

$$F\ (average) = -\ 0.232\ D + 16.7 \qquad (\ )$$

where F is the average peak frequency, in Hz, and D is the burial distance, in ft.

Figure (5) shows the relationship between peak particle velocity and frequency at the peak for 2000 data, plotted on the Office of Surface Mining (OSM) blasting- level chart (1986). It is difficult to distinguish the frequency differences between surface and buried ground motions. All data fell between 5.4 Hz and 34.1 Hz

Vibration Data from Well Pumping

Well pumping did not produce detectable ground motions. The geophone placed in WV-1 well 2 at 20 ft. depth did not trigger during the 2000 monitoring period. All other geophones at depth were placed in dry (abandoned) wells or in the ground near the pumping well. It is expected that ground water pumping may produce localized ground motions that are well below the detectable limits of blasting seismographs. Hence no motion data was recorded.

References

Office of Surface Mining, (1986) Federal Register Cite: 51 FR 19444 (19461)

Table Summary of shot records and vibration and airblast monitoring at wells during the fall and winter of 2000

Well location	Shot Date	Time	Distance	Charge Weight per Delay	Scaled Distance	GROUND MOTION AND AIRBLAST				AT DEPTH			
						UNIT	Peak Particle Velocity	Peak Frequency	Airblast	Geophone Depth	UNIT	Peak Particle Velocity	Peak Frequency
			(ft)	(lb)	($ft/lb^{1/2}$)		(in/sec)	(Hz)	(dB)	(ft)		(in/sec)	(Hz)
VA-1	11/6/00	16:57	1293	337	70.4	1181	0.04	12.8	118	1.1	1180	0.04	11.9
	11/7/00	16:41	1380	361	72.6	1181	NO	TRIGGER			1180	0.02	15
	11/8/00	16:45	1293	361	68.1	1181	0.045	13.4	117		1180	0.04	13.8
	11/9/00	12:55	1380	313	78.0	1181	0.055	19.6	119		1180	0.045	19.6
	11/10/00	13:20	1353	361	71.2	1181	0.055	13.8	118		1180	0.055	13.8
	11/11/00	14:48	1298	361	68.3	1181	0.045	8.9	126		1180	0.045	9.1
KY-1 well 1	11/13/00	16:04	4800	684	183.5	804	0.030	24.3	100	3.5	809	NO	TRIGGER
	11/14/00	16:18	5000	936	163.4	804	0.025	13.4	106		809	0.020	16
	11/15/00	11:49	2020	828	70.2	804	0.055	20.4	112		809	NO	TRIGGER
	11/16/00	9:07	5140	1026	160.5	804	0.020	10.6	106		809	0.020	14.2
	11/16/00	16:00	2240	414	110.1	804	0.025	10.8	110		809	0.020	15
	11/17/00	12:15	1830	936	59.8	804	0.025	12.1	110		809	0.020	11.6
	11/17/00	12:34	2020	1044	62.5	804	0.065	6.0	120		809	0.060	7.1
KY-1 well 2	11/13/00	16:04	4760	684	182.0	849	0.03	21.3	<100	2.4	853	0.025	22.2
	11/14/00	16:18	4880	936	159.5	849	0.035	16.0	106		853	0.025	12.8
	11/15/00	11:49	2200	828	76.5	849	0.04	11.9	112		853	0.035	11.1
	11/16/00	9:07	5020	1026	156.7	849	0.025	17.6	100		853	0.02	20.4
	11/16/00	16:00	2420	414	118.9	849	0.025	11.6	106		853	0.025	11.1
	11/17/00	12:15	1720	936	56.2	849	0.025	20.4	110		853	0.02	15
	11/17/00	12:34	2310	1044	71.5	849	0.04	18.9	118		853	0.035	7.8
KY-2 well 1	11/20/00	13:03	2000	274	120.8	849	0.025	6.7	114	9.5	809	0.025	5.9
	11/20/00	16:08	2010	495	90.3	849	0.030	23.2	119		809	0.02	16.5
	11/20/00	16:45	2380	211	163.8	849	0.020	28.4	100		809	NO	TRIGGER
	11/21/00	14:37	2110	274	127.5	849	0.020	32.0	114		809	NO	TRIGGER
	11/21/00	15:35	1560	211	107.4	849	0.045	14.2	110		809	0.025	12.1
	11/21/00	16:43	3720	807	131.0	849	0.045	28.4	100		809	NO	TRIGGER
	11/22/00	10:13	1960	678	75.3	849	0.030	8	110		809	0.025	5.4
KY-2 well 2	11/20/00	10:32	4640	183	343.0	804	0.02	14.6	100	NOT MONITORED			
	11/20/00	16:09	1810	495	81.4	804	0.035	16	120				
	11/21/00	14:38	1960	274	118.4	804	0.03	16	118				
	11/21/00	15:35	1740	211	119.8	804	0.04	13.4	116				
	11/21/00	16:41	3810	808	134.0	804	0.03	14.6	110				
	11/21/00	16:43	2500	209	172.9	804	0.04	21.3	110				
	11/22/00	10:14	2210	678	84.9	804	0.02	11.1	114				
WV-1 well 1	11/27/00	16:56	2500	1037	77.6	1782	0.07	11.1	117	2.0	1781	0.065	16.5
	11/28/00	17:03	2230	126	198.7	1782	NO	TRIGGER			1781	0.02	13.1
	11/29/00	9:51	4300	2076	94.4	1782	0.055	14.2	110		1781	0.05	13.4
	11/30/00	11:53	3880	2076	85.2	1782	0.065	13.4	110		1781	0.06	13.8
WV-1 well 2	11/27/00	16:01	2600	1037	80.7	1780	0.095	11.9	122	20.0	1779	0.025	10.8
	11/28/00	17:05	2310	126	205.8	1780	0.020	14.6	114		1779	NO	TRIGGER
	11/29/00	9:56	3960	2076	86.9	1780	0.090	14.6	110		1779	0.015	
	11/30/00	11:58	3980	2076	87.4	1780	0.070	14.2	112		1779	0.015	
WV-2 well 1	12/4/00	12:23	1710	481	78.0	1782	0.125	18.9	112	9.0	1780	0.07	23.2
	12/4/00	17:01	2240	415	110.0	1782	0.085	24.3	112		1780	0.045	21.3
	12/5/00	12:05	2440	973	78.2	1782	0.05	28.4	116		1780	0.03	25.6
	12/5/00	16:51	2070	625	82.8	1782	0.06	22.2	116		1780	0.035	15.5
	12/5/00	16:52	2520	901	84.0	1782	0.02	34.1	112		1780	NO	TRIGGER
	12/6/00	12:22	2460	901	82.0	1782	0.02	25.6	112		1780	0.015	21.3
	12/6/00	16:48	1560	452	73.4	1782	0.085	19.6	114		1780	0.06	22.2
	12/7/00	12:13	2460	793	87.4	1782	0.035	20.4	106		1780	0.025	18.9
WV-2 well 2	12/5/00	12:05	2520	973	80.8	1779	0.030	18.9	117	NOT MONITORED			
	12/5/00	16:53	2130	625	85.2	1779	0.030	32	116				
	12/6/00	16:50	1630	452	76.7	1779	0.060	24.3	117				
	12/7/00	12:13	2520	793	89.5	1779	0.020	16.5	110				

Table Summary of vibration and airblast monitoring at wells during the spring of 2001

Well location	Shot Date	Time	GROUND MOTION AND AIRBLAST				AT DEPTH			
			UNIT	Peak Particle Velocity	Peak Frequency	Airblast	Geophone Depth	UNIT	Peak Particle Velocity	Peak Frequency
				(in/sec)	(Hz)	(dB)	(ft)		(in/sec)	(Hz)
VA-1	resident on city water - no longer using well									
KY-1	site flooded from sediment pond overflow - no access to wells									
KY-2	seismographs did not trigger for 15 shots (trigger level not indicated)									
WV-1 well 1	4/3/01	8:41	1781	0.03	12.1	114	2.0	1782	0.025	12.4
	4/3/01	13:51	1781	0.03	15	110		1782	0.03	15
	4/3/01	17:06	1781	0.025	10.8	114		1782	NO	TRIGGER
	4/4/01	11:20	1781	0.05	12.8	110		1782	0.045	13.1
	4/5/01	10:34	1781	0.055	16	106		1782	0.05	15
	4/6/01	10:22	1781	0.05	12.1	106		1782	0.05	12.4
	4/6/01	15:43	1781	0.06	13.8	112		1782	0.06	13.4
	4/9/01	12:41	1781	0.04	14.2	114		1782	0.03	15.5
	4/9/01	16:35	1781	0.025	12.8	110		1782	NO	TRIGGER
	4/10/01	15:45	1781	0.045	14.2	116		1782	0.04	13.8
	4/10/01	16:53	1781	0.035	13.4	100		1782	0.035	14.2
	4/11/01	9:57	1781	0.025	8.6	116		1782	NO	TRIGGER
	4/12/01	10:37	1781	0.035	11.6	114		1782	0.03	13.8
	4/12/01	12:22	1781	0.03	14.2	114		1782	0.03	12.4
	4/13/01	10:30	1781	0.035	11.9	112		1782	0.03	12.1
WV-1 well 2	4/2/01	8:38	1779	0.025	15.5	114	20.0	1780	NO	TRIGGER
	4/3/01	13:48	1779	0.035	14.2	110		1780	NO	TRIGGER
	4/3/01	17:03	1779	0.025	13.1	118		1780	0.005	
	4/4/01	11:18	1779	0.045	11.9	110		1780	NO	TRIGGER
	4/5/01	10:31	1779	0.080	14.2	106		1780	NO	TRIGGER
	4/6/01	10:19	1779	0.055	13.8	106		1780	NO	TRIGGER
	4/6/01	15:40	1779	0.055	14.6	114		1780	NO	TRIGGER
	4/9/01	12:39	1779	0.035	13.1	116		1780	NO	TRIGGER
	4/10/01	15:42	1779	0.035	18.2	118		1780	0.005	
	4/11/01	9:54	1779	0.005		119		1780	0.005	
	4/12/01	10:35	1779	0.030	12.8	119		1780	0.005	
	4/12/01	12:20	1779	0.030	14.2	116		1780	NO	TRIGGER
	4/12/01	17:02	1779	0.025	13.4	118		1780	0.005	
	4/13/01	10:27	1779	0.040	12.8	114		1780	NO	TRIGGER
WV-2 well 1	4/16/01	16:50	1781	0.075	32	110	9.0	1782	0.04	22.2
	4/18/01	16:51	1781	0.035	10.8	116		1782	NO	TRIGGER
	4/18/01	16:54	1781	0.03	22.2	106		1782	0.025	10.4
	4/19/01	8:55	1781	0.035	24.3	110		1782	0.025	22.2
	4/19/01	16:52	1781	0.025	12.4	106		1782	NO	TRIGGER
WV-2 well 2	4/16/01	16:49	1779	0.035	30.1	112	na	1780	0.03	34.1
	4/18/01	16:50	1779	0.025	25.6	118		1780	NO	TRIGGER

na not available

Table Summary of vibration and airblast monitoring at wells during the fall of 2001

Well location	Shot Date	Time	GROUND MOTION AND AIRBLAST				AT DEPTH			
			UNIT	Peak Particle Velocity	Peak Frequency	Airblast	Geophone Depth	UNIT	Peak Particle Velocity	Peak Frequency
				(in/sec)	(Hz)	(dB)	(ft)		(in/sec)	(Hz)
VA-1	resident on city water - no longer using well									
KY-1	site flooded from sediment pond overflow - no access to wells									
KY-2 well 2	9/21/01	14:25	809	0.020	14.2	125	NOT MONITORED			
	9/24/01	13:53	809	0.030	14.6	100				
	9/25/01	12:37	809	0.030	11.6	<100				
	9/25/01	15:44	809	0.025	23.2	116				
KY-2 well 3	9/21/01	10:32	813	0.03	9.4	118	NOT MONITORED			
	9/22/01	11:43	813	0.02	16.5	106				
			ave	0.026	14.917	113.000				

Table Summary of vibration and airblast monitoring at wells during the winter of 2001

Well location	Shot Date	Time	GROUND MOTION AND AIRBLAST				AT DEPTH			
			UNIT	Peak Particle Velocity	Peak Frequency	Airblast	Geophone Depth	UNIT	Peak Particle Velocity	Peak Frequency
				(in/sec)	(Hz)	(dB)	(ft)		(in/sec)	(Hz)
VA-1	resident on city water - no longer using well									
KY-1	site flooded from sediment pond overflow - no access to wells									
KY-2	seismographs did not trigger for 15 shots (trigger level not indicated)									
WV-1 well 1	well not monitored - transducer at depth missing (NOTHING IN BUDROW'S NOTES!!)									
WV-1 well 2	12/4/01	16:44	1769	0.033	13.4	106	20.0	1905	NO	TRIGGER
	12/5/01	16:46	1769	0.033	15.5	110		1905	NO	TRIGGER
	12/5/01	16:50	1769	0.053	16	114		1905	NO	TRIGGER
WV-2 well 1	well not monitored									
WV-2 well 2	well not monitored									

Table Average ground motion, airblast and frequency values for wells measured during the fall of 2001

SITE	WELL	FALL 2001						
		Surface				At Depth		
		Peak Particle Velocity	Peak Frequency	FFT Frequency	Airblast	Peak Particle Velocity	Peak Frequency	FFT Frequency
		(ips)	(Hz)	(Hz)	(dB)	(ips)	(Hz)	(Hz)
VA-1	well 1	resident on city water - no longer using well						
KY-1	well 1	site flooded from sediment pond overflow - no access to wells						
	well 2							
KY-2	well-1	deep transducer cable cut						
	well-2	0.026	15.9	8.7	114	not monitored		
	well 3	0.025	13.0	NA	112	not monitored		
WV-1	well 1	not monitored						
	well 2	not monitored						
WV-2	well 1	not monitored						
	well-2	not monitored						

NA not available; data within the resolution of the seismograph and frequencies cannot be reliably calculated

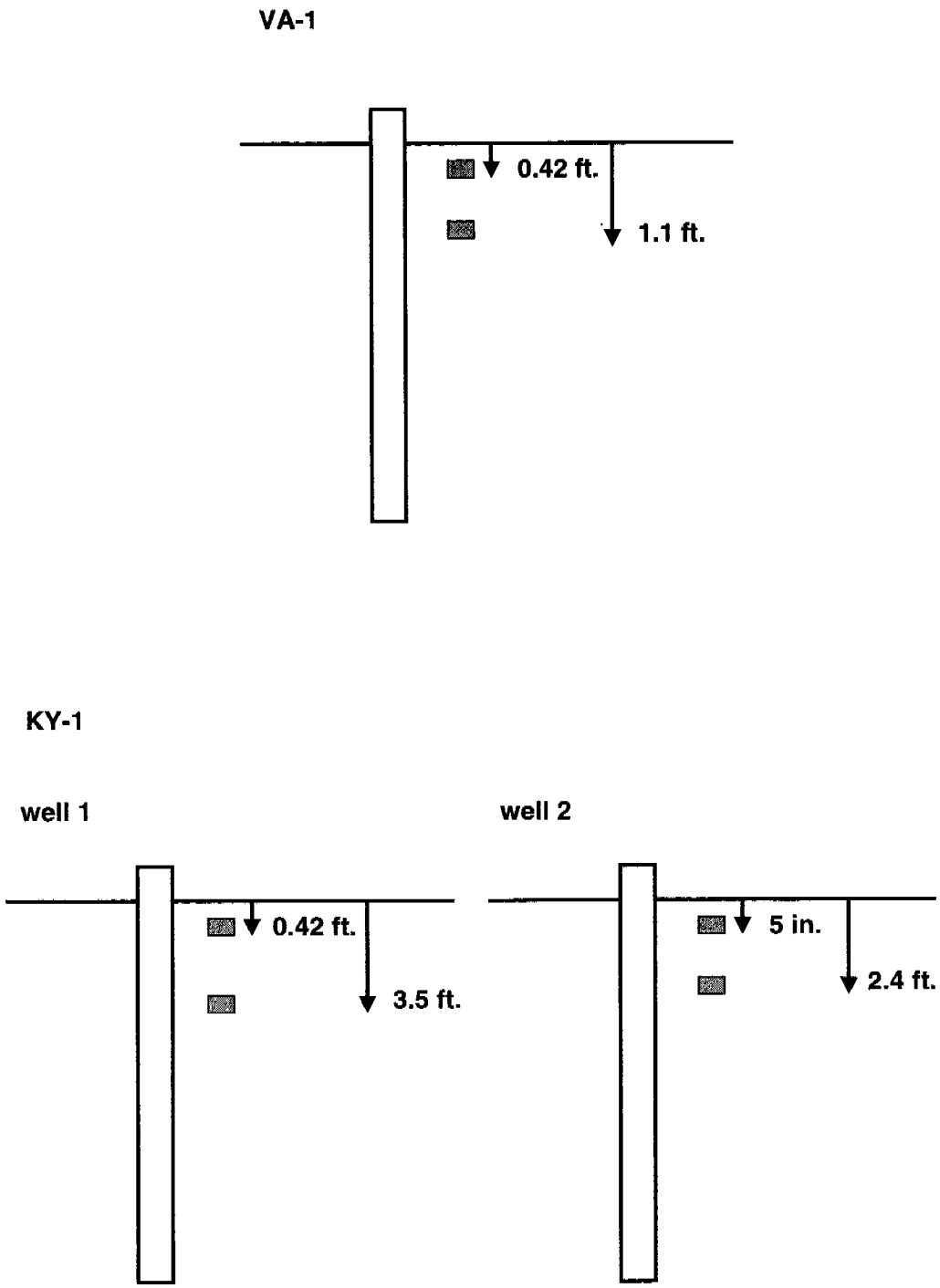
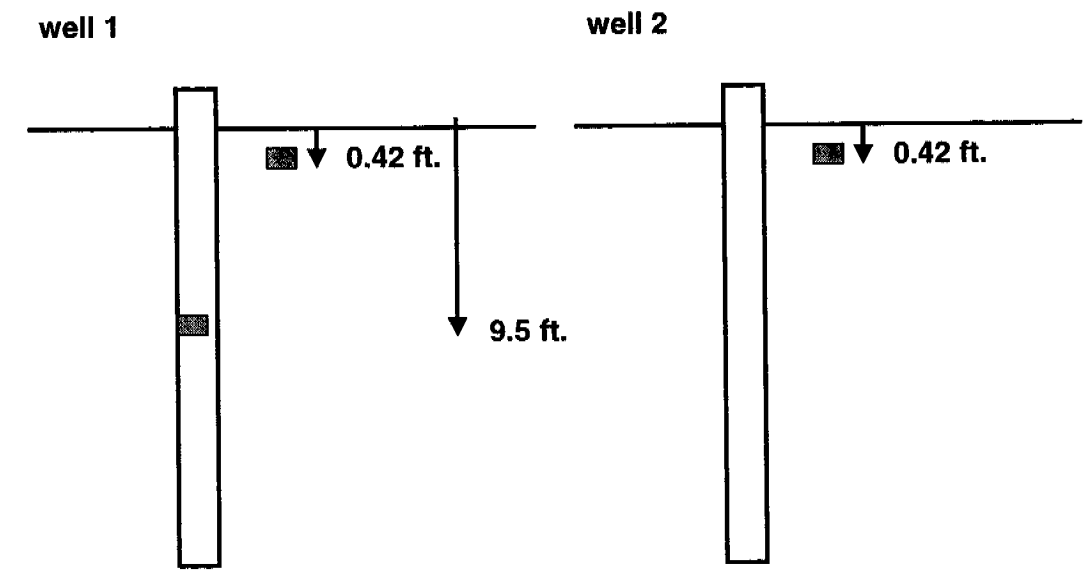


Figure 1 Geophone locations within or adjacent to wells



WV-1

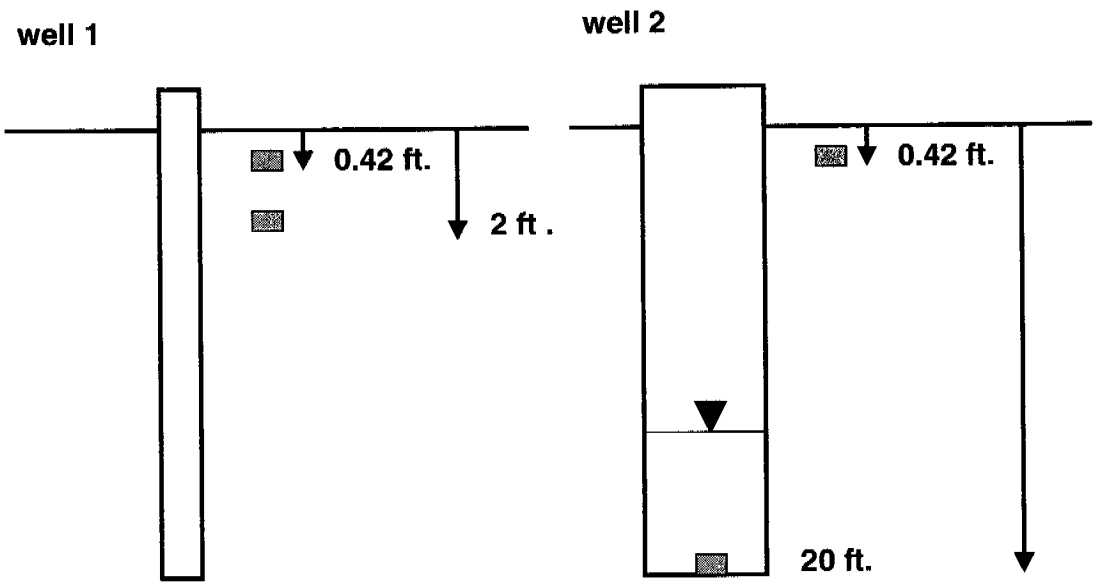


Figure 1 (cont.)

WV-2

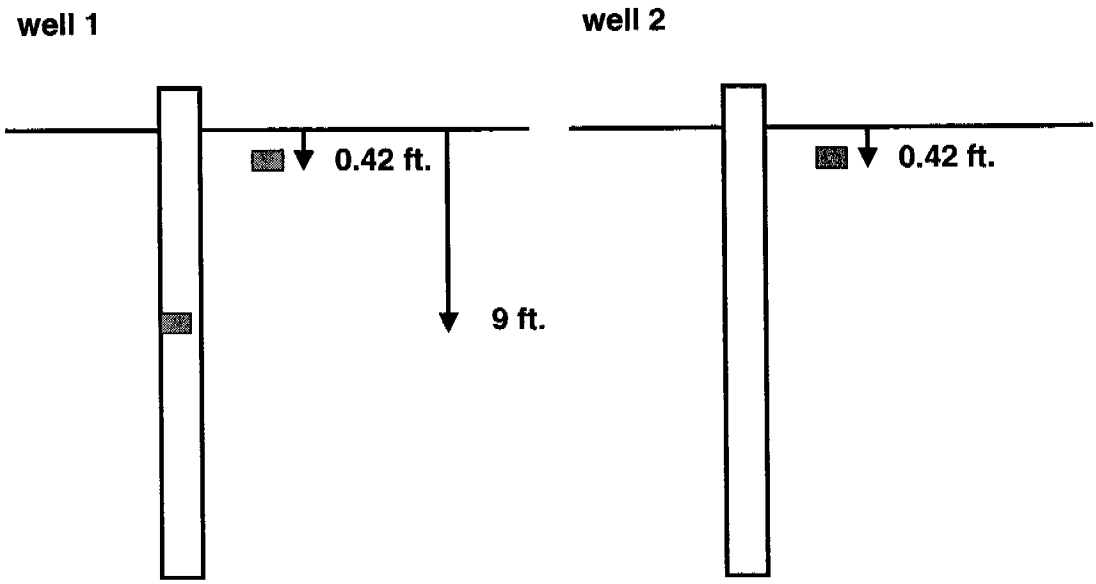


Figure 1 (cont.)

Volume II

Full Waveform Vibration Data

FALL-WINTER 2000

Hylton Well

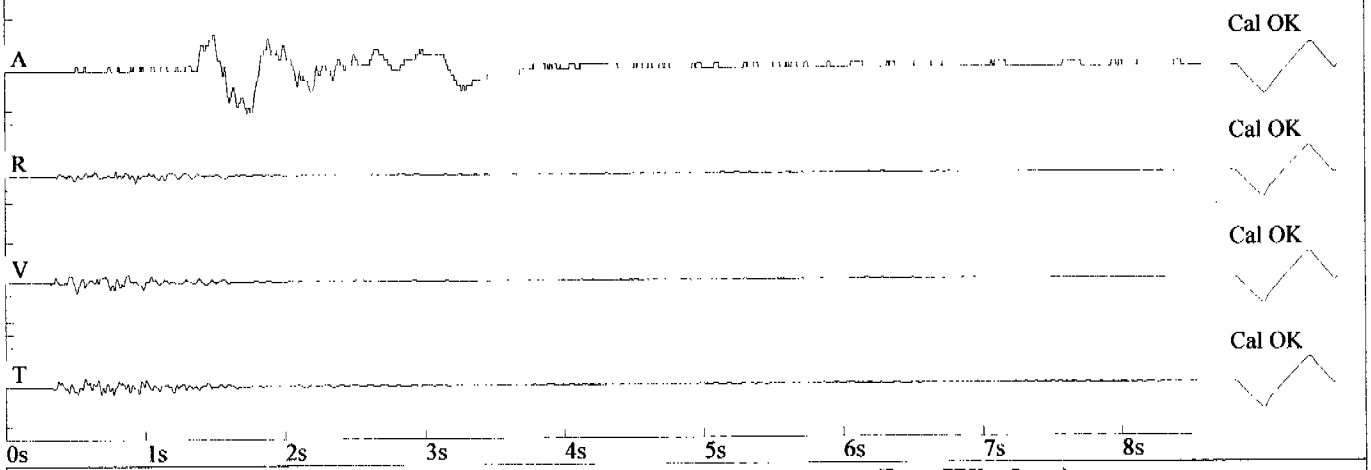
File: 01181062.DTB Event Number: 062 Date: 11/06/2000 Time: 16:57
Acoustic Trigger: 126 dB Seismic Trigger: 0.03in/s 0.762mm/s Serial Number: 1181

Amplitudes and Frequencies

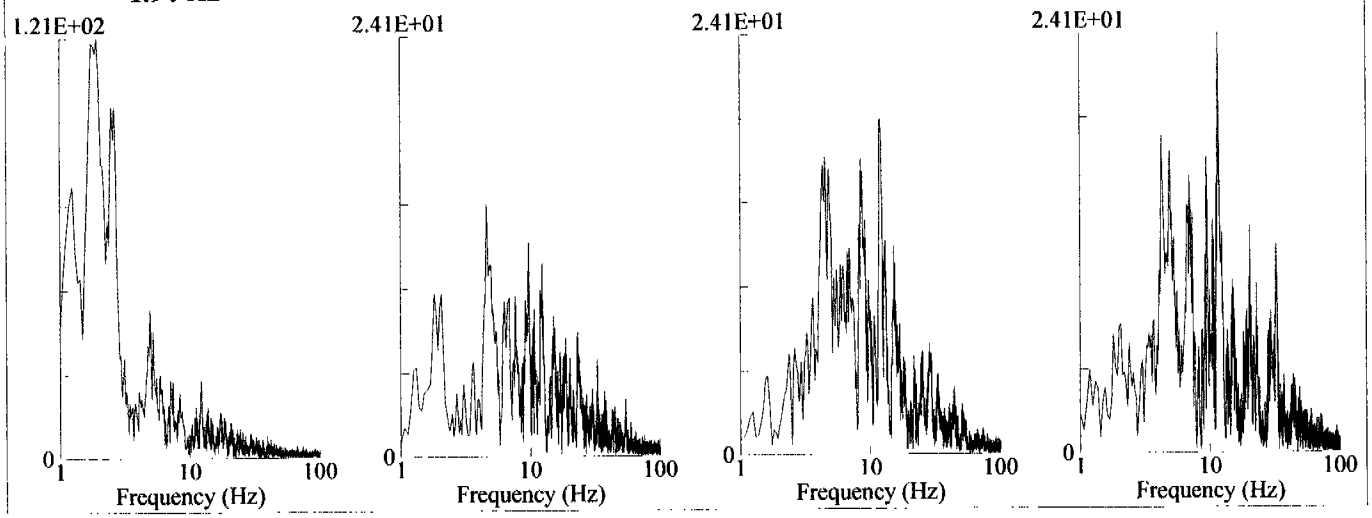
Acoustic (A): 118 dB @ 2.1 Hz
(0.16Mb 0.0023psi 0.0160kPa)
Radial (R): 0.025in/s 0.635mm/s @ 21.3Hz
***Vertical (V):* 0.04in/s 1.016mm/s @ 12.8Hz**
Transverse (T): 0.035in/s 0.889mm/s @ 10.6Hz

Graph Information

Duration: 0.000 sec To: 8.500 sec
Acoustic Scale:
120dB 0.20Mb (0.050Mb/div)
Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)
Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Hylton Well
26 in. deep

File: 01180000.DTB Event Number: 000 Date: 11/06/2000 Time: 16:57
Acoustic Trigger: 142 dB Seismic Trigger: 0.03in/s 0.762mm/s Serial Number: 1180

Amplitudes and Frequencies

Radial (R): 0.03in/s 0.762mm/s @ 11.1Hz

***Vertical (V):* 0.04in/s 1.016mm/s @ 11.9Hz**

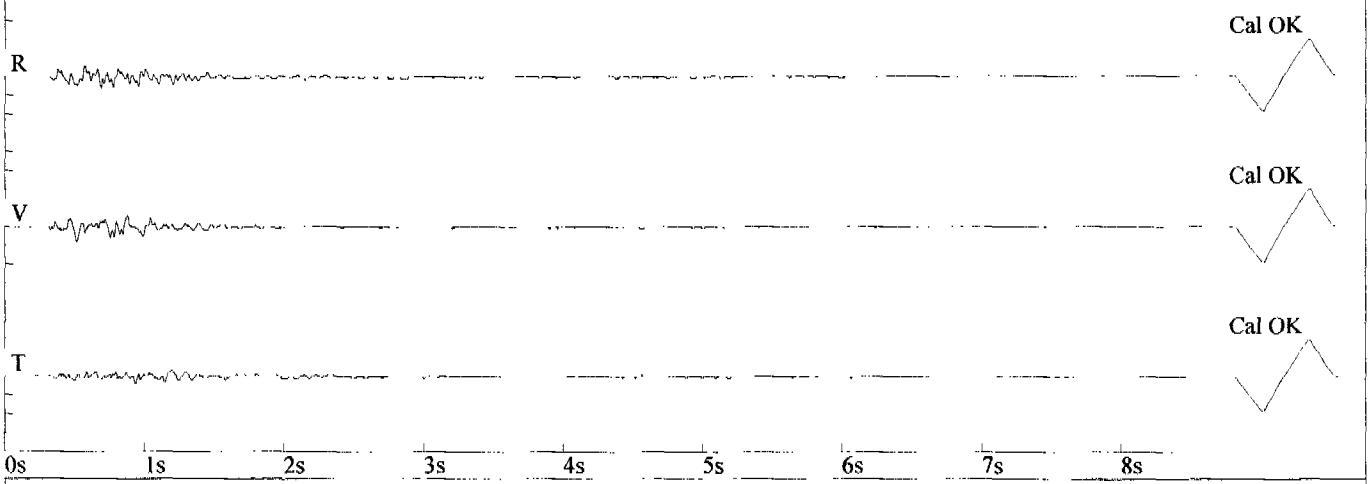
Transverse (T): 0.02in/s 0.508mm/s @ 20.4Hz

Graph Information

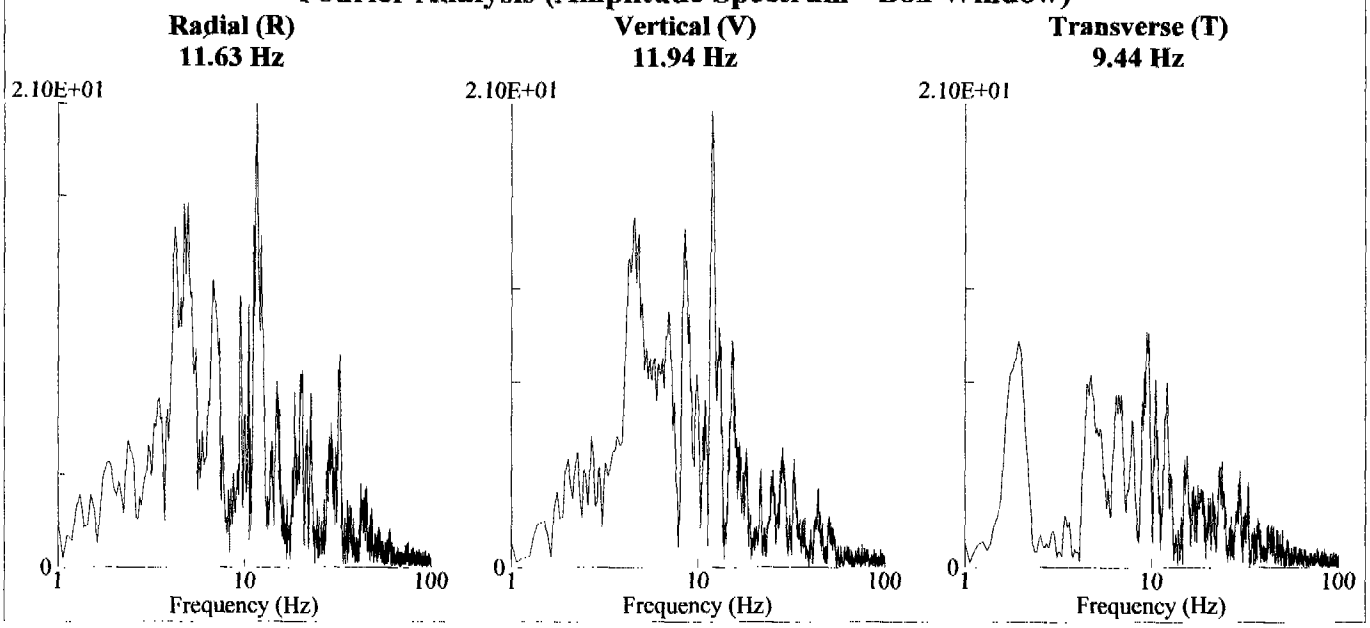
Duration: 0.000 sec To: 8.500 sec

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Hylton Well
26 in. deep

File: 01180001.DTB Event Number: 001 Date: 11/07/2000 Time: 16:41
Acoustic Trigger: 142 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 1180

Amplitudes and Frequencies

Radial (R): 0.015in/s 0.381mm/s @ 11.9Hz

***Vertical (V):* 0.02in/s 0.508mm/s @ 15.0Hz**

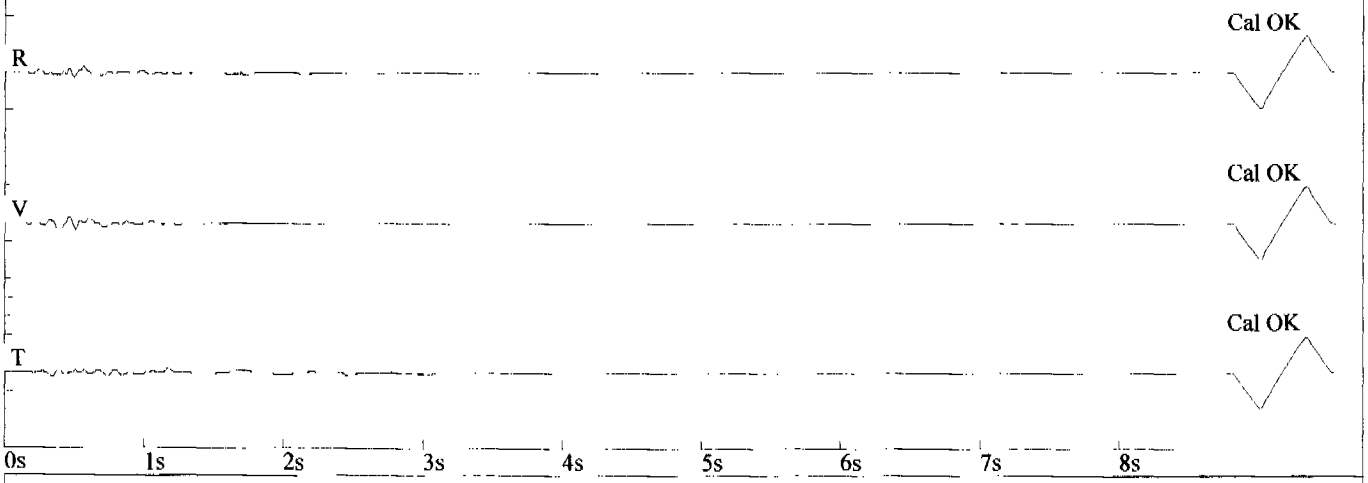
Transverse (T): 0.01in/s 0.254mm/s @ 10.0Hz

Graph Information

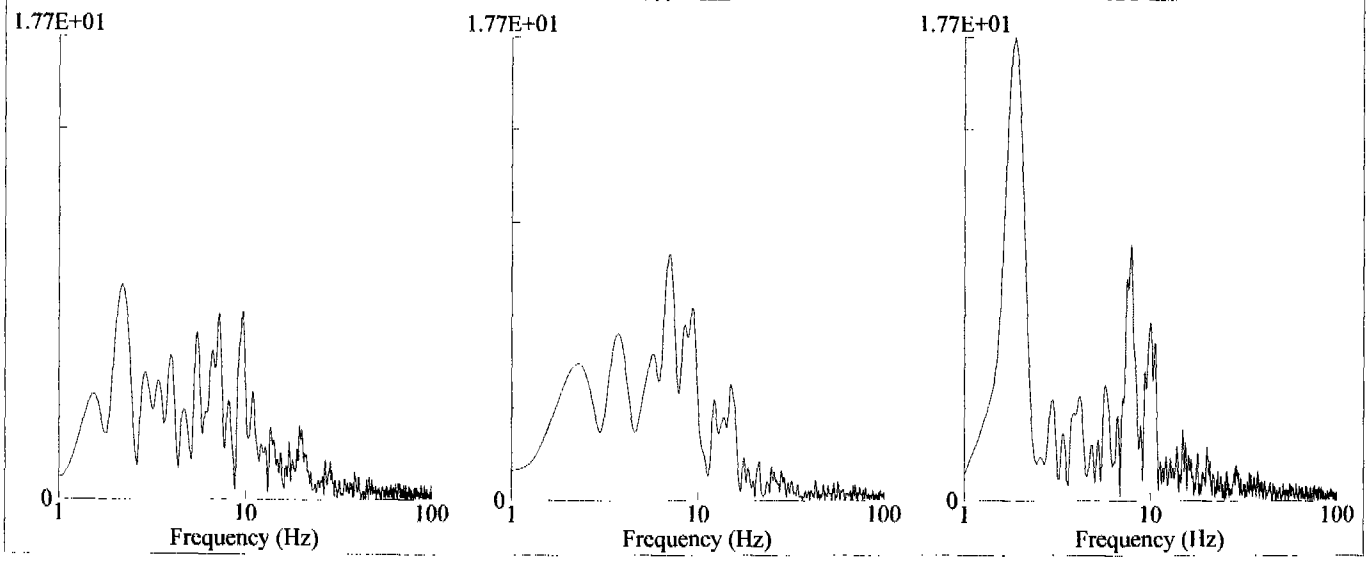
Duration: 0.000 sec To: 8.500 sec

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Hylton Well

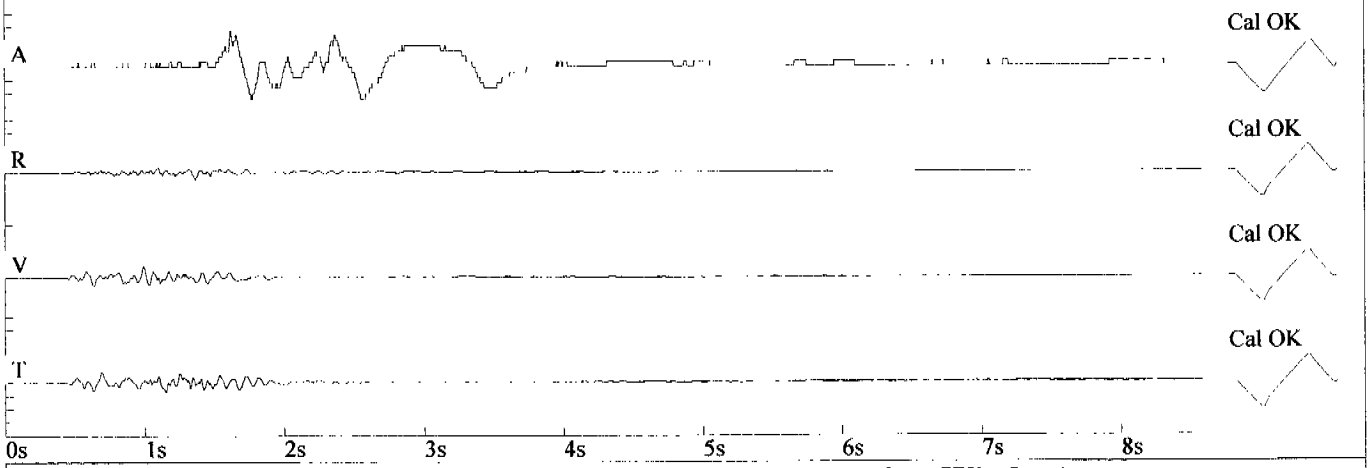
File: 01181063.DTB Event Number: 063 Date: 11/08/2000 Time: 16:45
Acoustic Trigger: 126 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 1181

Amplitudes and Frequencies

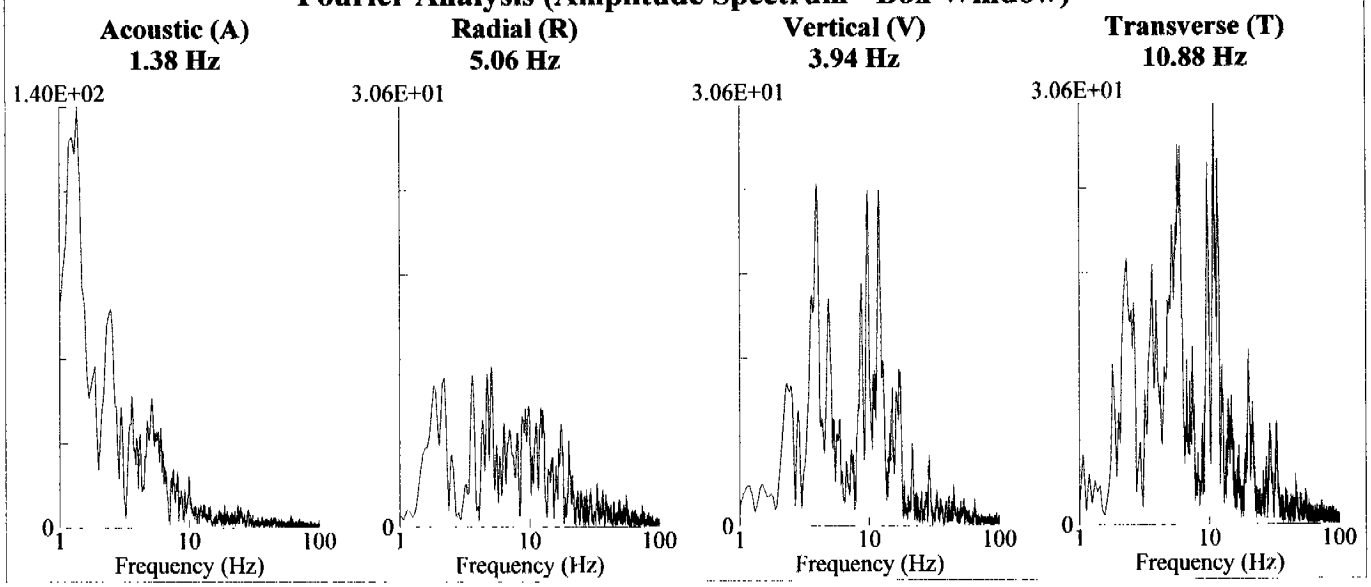
Acoustic (A): 117 dB @ 2.9 Hz
(0.14Mb 0.0020psi 0.0140kPa)
Radial (R): 0.025in/s 0.635mm/s @ 12.4Hz
***Vertical (V):* 0.045in/s 1.143mm/s @ 13.4Hz**
Transverse (T): 0.04in/s 1.016mm/s @ 8.2Hz

Graph Information

Duration: 0.000 sec To: 8.500 sec
Acoustic Scale:
120dB 0.20Mb (0.050Mb/div)
Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)
Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Hylton Well
26 in. deep

File: 01180002.DTB Event Number: 002 Date: 11/08/2000 Time: 16:45
Acoustic Trigger: 142 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 1180

Amplitudes and Frequencies

Radial (R): 0.035in/s 0.889mm/s @ 9.4Hz

***Vertical (V):* 0.04in/s 1.016mm/s @ 13.8Hz**

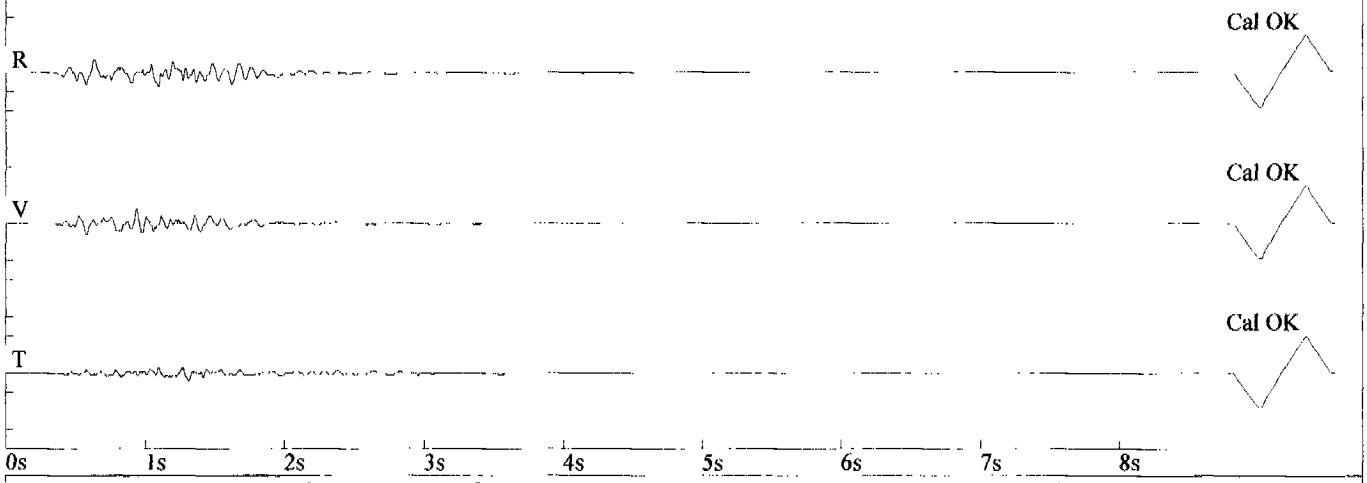
Transverse (T): 0.02in/s 0.508mm/s @ 11.6Hz

Graph Information

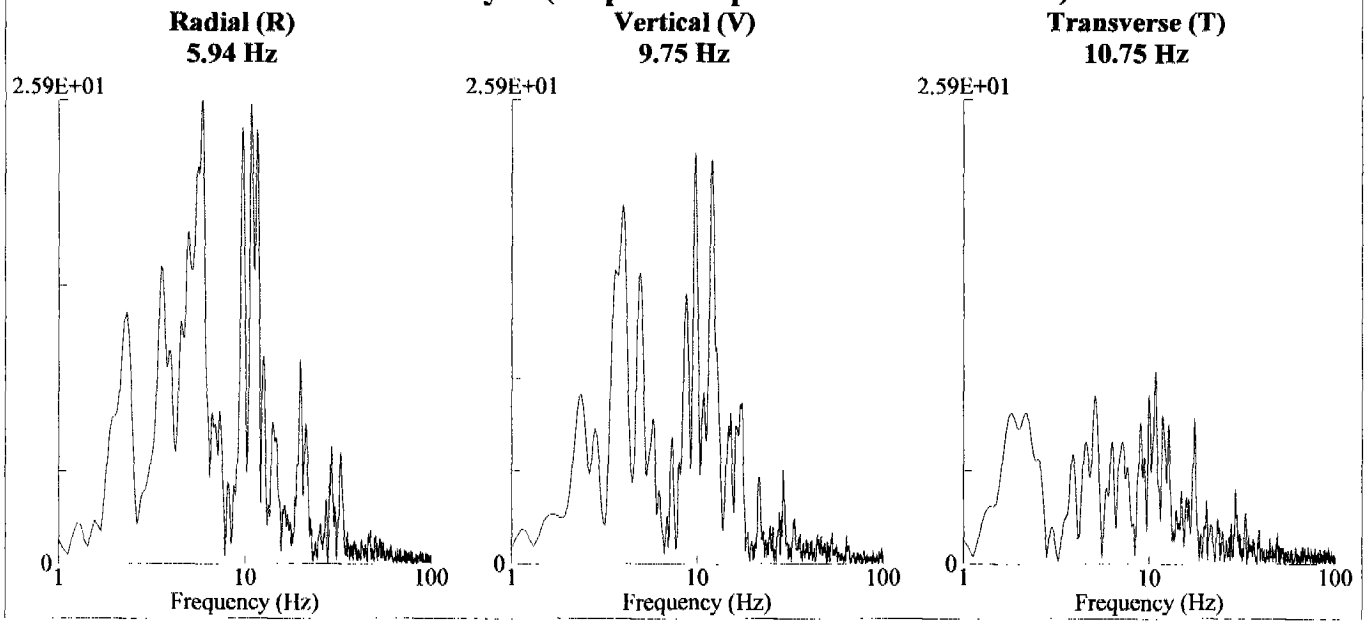
Duration: 0.000 sec To: 8.500 sec

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Hylton Well

File: 01181064.DTB Event Number: 064 Date: 11/09/2000 Time: 12:55
Acoustic Trigger: 126 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 1181

Amplitudes and Frequencies

Acoustic (A): 119 dB @ 6.5 Hz
(0.18Mb 0.0026psi 0.0180kPa)

Radial (R): 0.025in/s 0.635mm/s @ 8.2Hz

Vertical (V): 0.04in/s 1.016mm/s @ 10.6Hz

***Transverse (T):* 0.055in/s 1.397mm/s @ 19.6Hz**

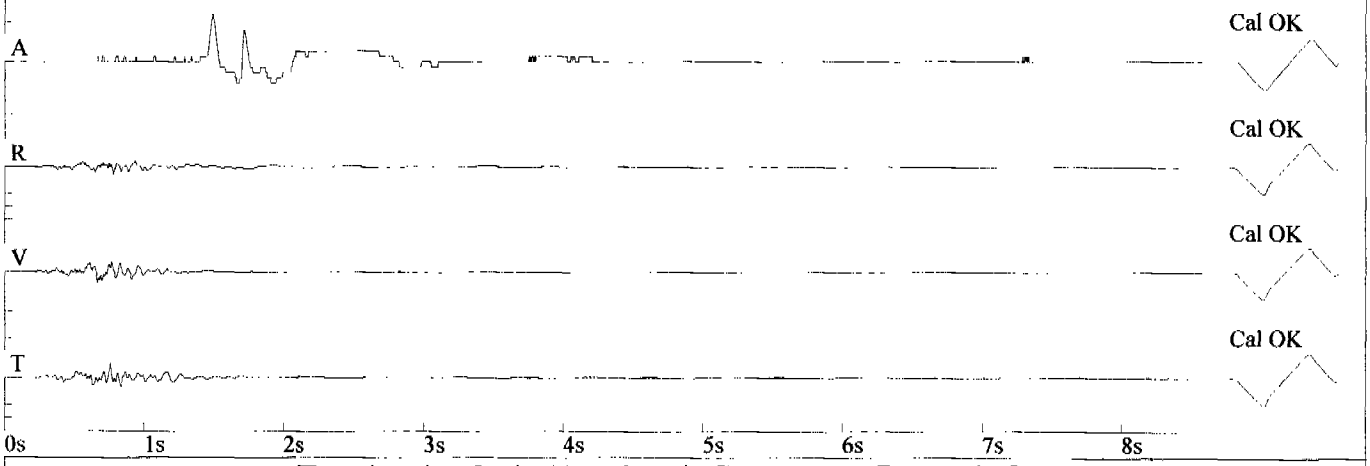
Graph Information

Duration: 0.000 sec To: 8.500 sec

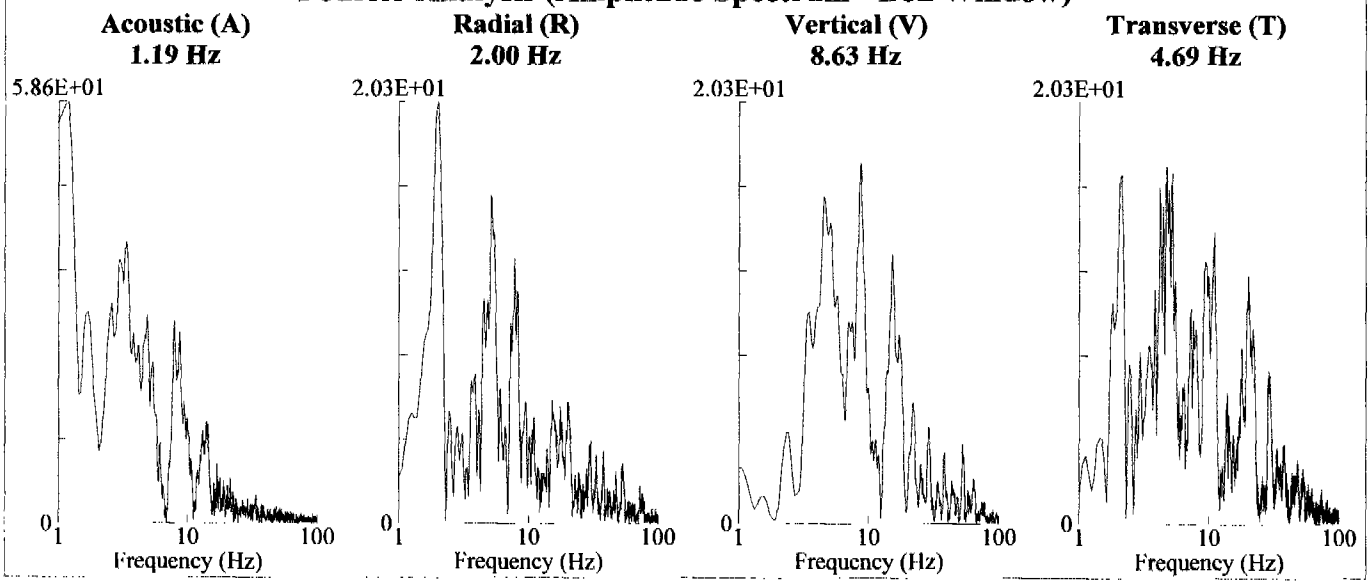
Acoustic Scale:
120dB 0.20Mb (0.050Mb/div)

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Hylton Well
26 in. deep

File: 01180003.DTB Event Number: 003 Date: 11/09/2000 Time: 12:55
Acoustic Trigger: 142 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 1180

Amplitudes and Frequencies

***Radial (R):* 0.045in/s 1.143mm/s @ 19.6Hz**

Vertical (V): 0.04in/s 1.016mm/s @ 6.4Hz

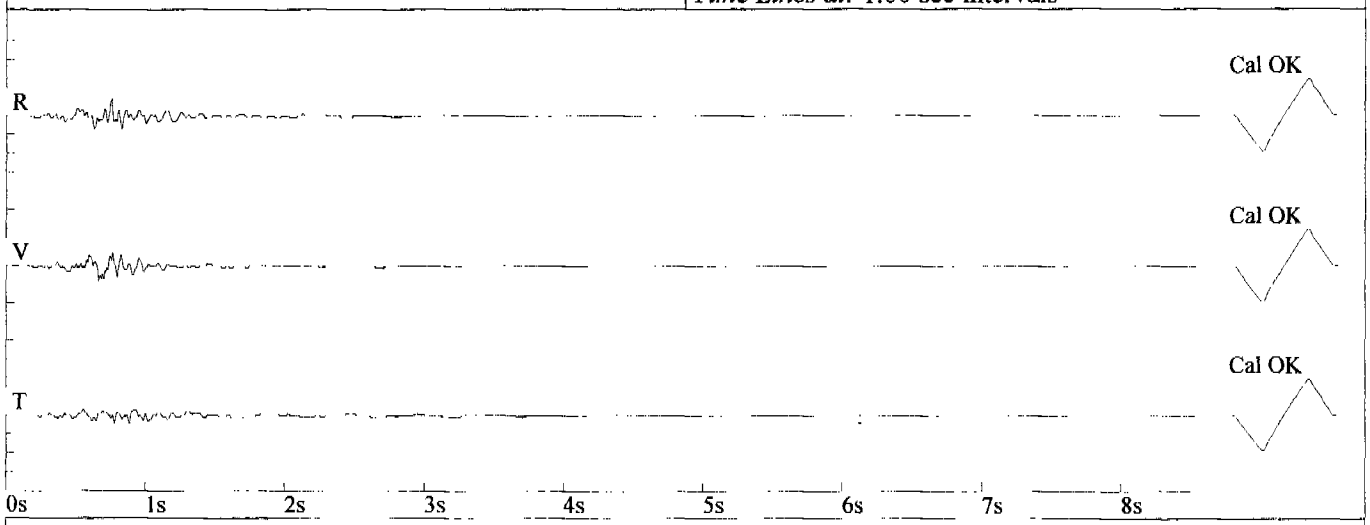
Transverse (T): 0.02in/s 0.508mm/s @ 26.9Hz

Graph Information

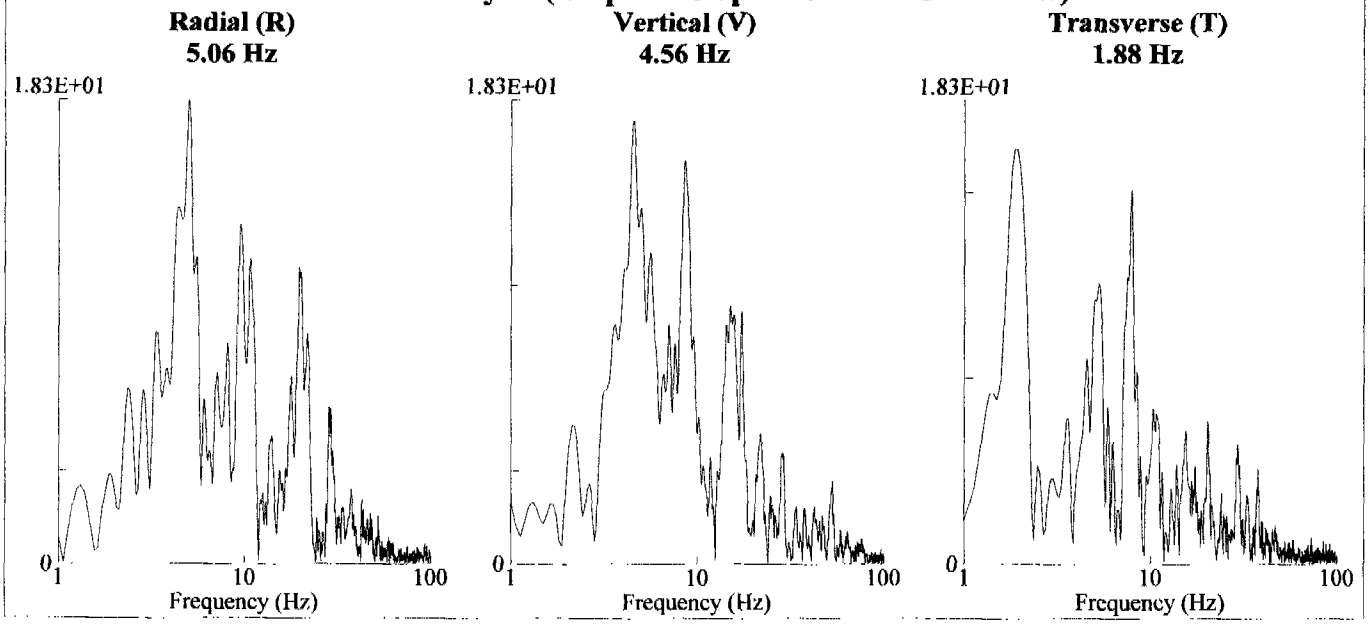
Duration: 0.000 sec To: 8.500 sec

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Hylton Well

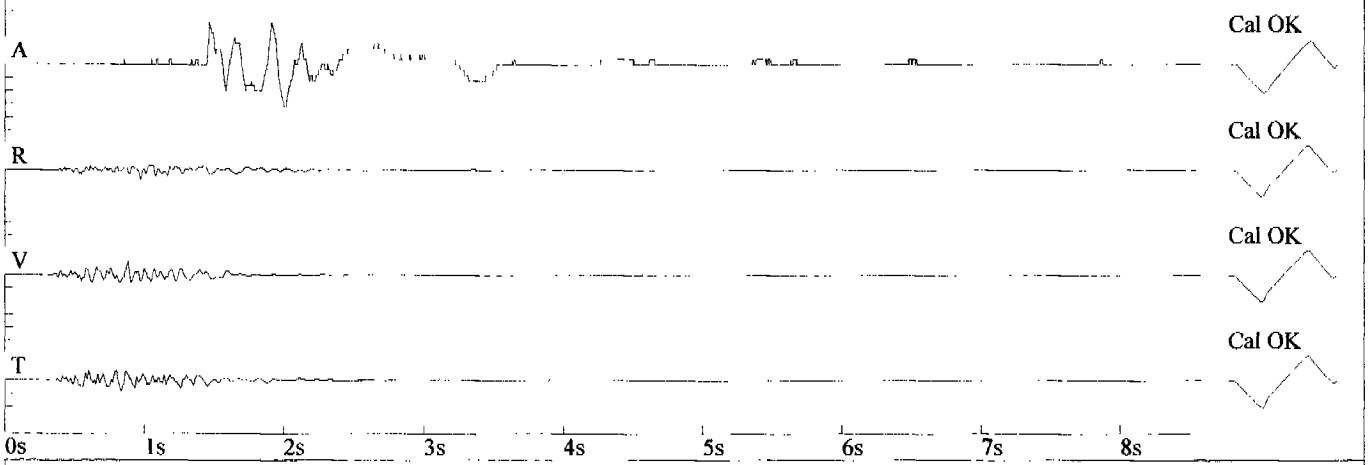
File: 01181066.DTB Event Number: 066 Date: 11/10/2000 Time: 13:20
Acoustic Trigger: 126 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 1181

Amplitudes and Frequencies

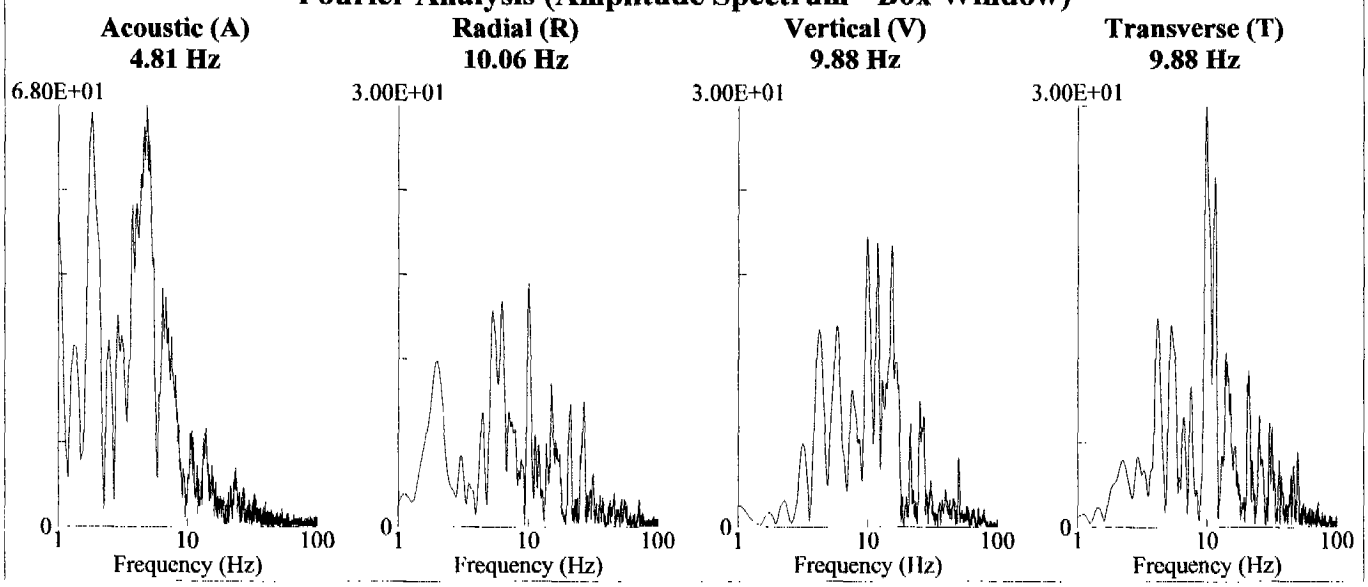
Acoustic (A): 118 dB @ 4.6 Hz
(0.16Mb 0.0023psi 0.0160kPa)
Radial (R): 0.035in/s 0.889mm/s @ 18.2Hz
***Vertical (V):* 0.055in/s 1.397mm/s @ 13.8Hz**
Transverse (T): 0.04in/s 1.016mm/s @ 14.6Hz

Graph Information

Duration: 0.000 sec To: 8.500 sec
Acoustic Scale:
120dB 0.20Mb (0.050Mb/div)
Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)
Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Hylton Well
26 in. deep

File: 01180004.DTB Event Number: 004 Date: 11/10/2000 Time: 13:20
Acoustic Trigger: 142 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 1180

Amplitudes and Frequencies

Radial (R): 0.04in/s 1.016mm/s @ 12.4Hz

***Vertical (V):* 0.05in/s 1.27mm/s @ 14.6Hz**

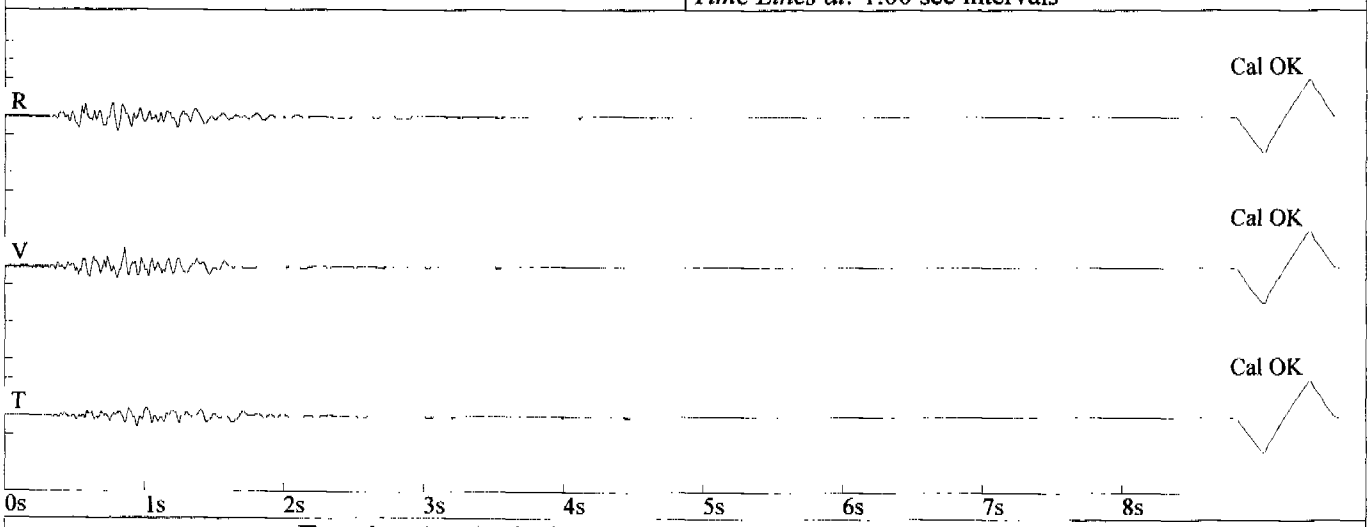
Transverse (T): 0.03in/s 0.762mm/s @ 8.2Hz

Graph Information

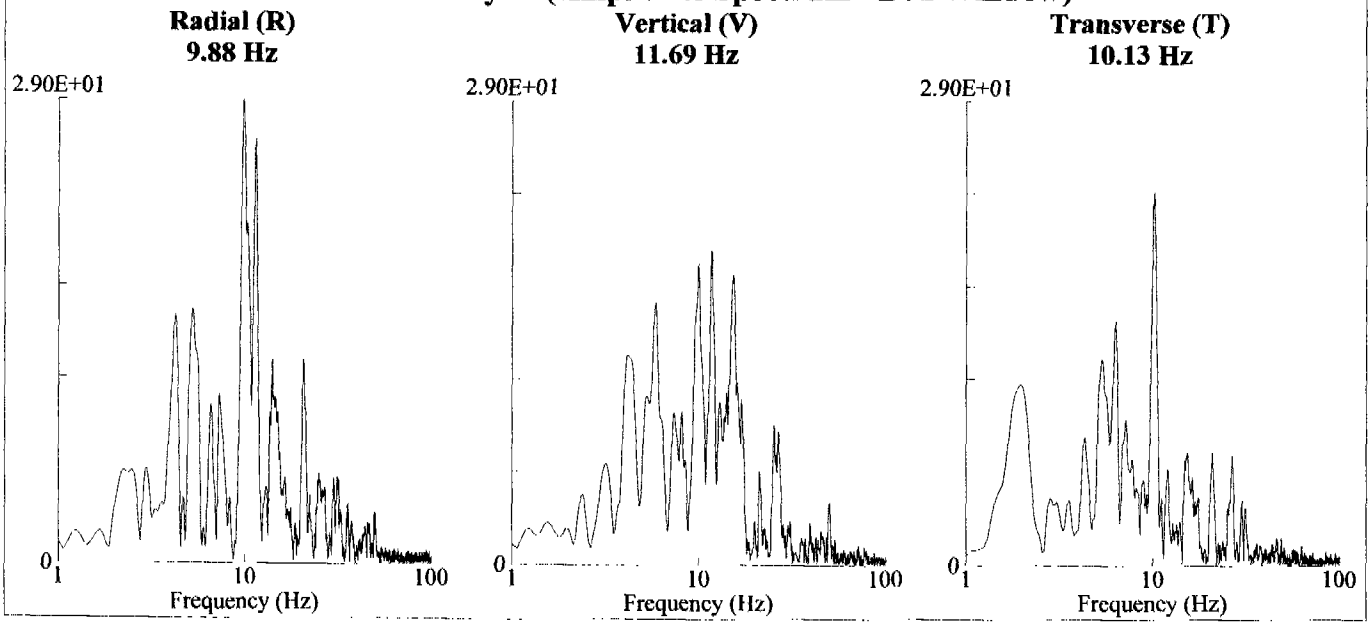
Duration: 0.000 sec To: 8.500 sec

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Hylton Well
26 in. deep

File: 01180005.DTB Event Number: 005 Date: 11/11/2000 Time: 14:48
Acoustic Trigger: 142 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 1180

Amplitudes and Frequencies

Radial (R): **0.045in/s 1.143mm/s @ 10.0Hz**

Vertical (V): **0.045in/s 1.143mm/s @ 9.1Hz**

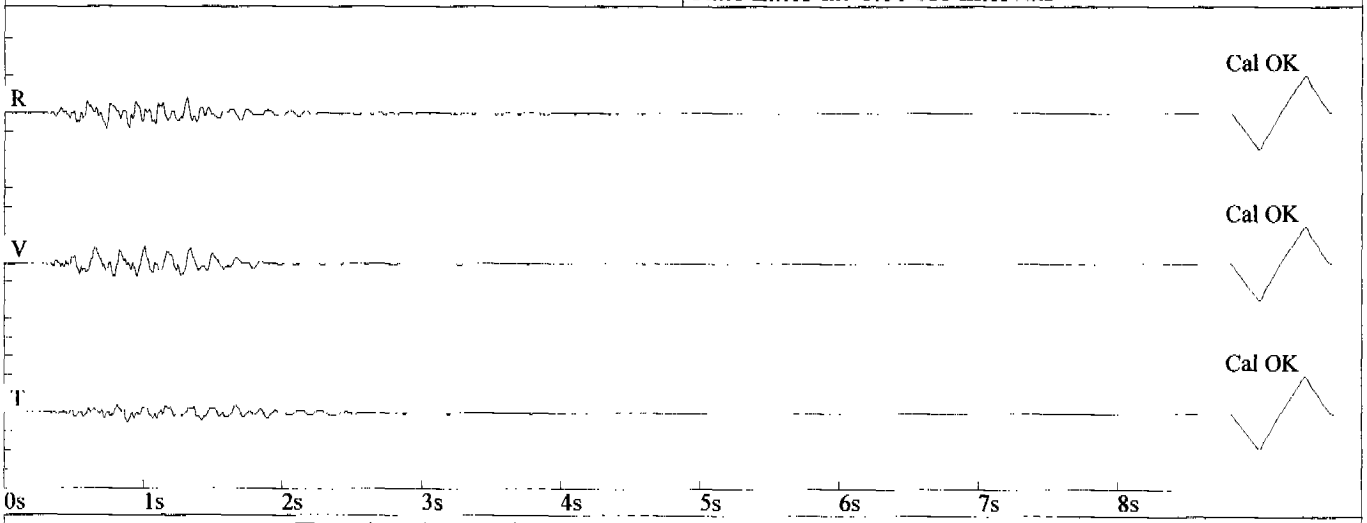
Transverse (T): 0.025in/s 0.635mm/s @ 10.8Hz

Graph Information

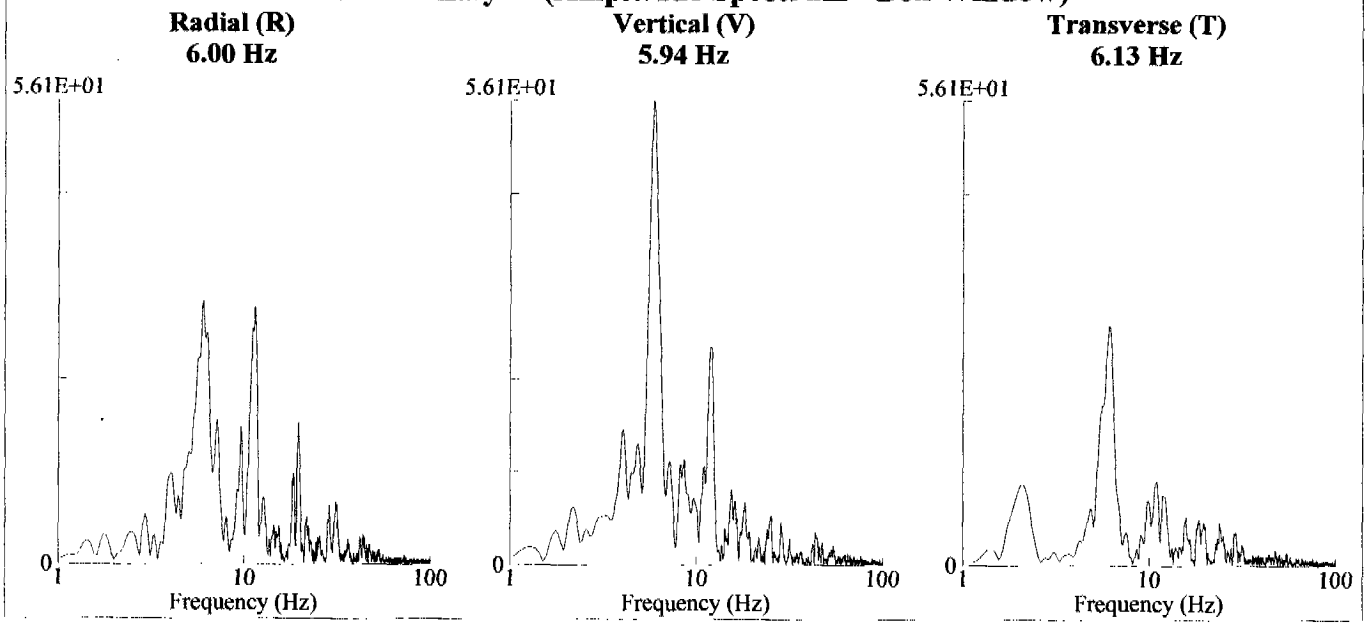
Duration: 0.000 sec To: 8.500 sec

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Hylton Well

File: 01181067.DTB Event Number: 067 Date: 11/11/2000 Time: 14:48
Acoustic Trigger: 126 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 1181

Amplitudes and Frequencies

Acoustic (A): 126 dB @ 5.5 Hz
(0.42Mb 0.0061psi 0.0420kPa)

Radial (R): 0.035in/s 0.889mm/s @ 11.6Hz

***Vertical (V):* 0.045in/s 1.143mm/s @ 8.9Hz**

Transverse (T): 0.04in/s 1.016mm/s @ 11.3Hz

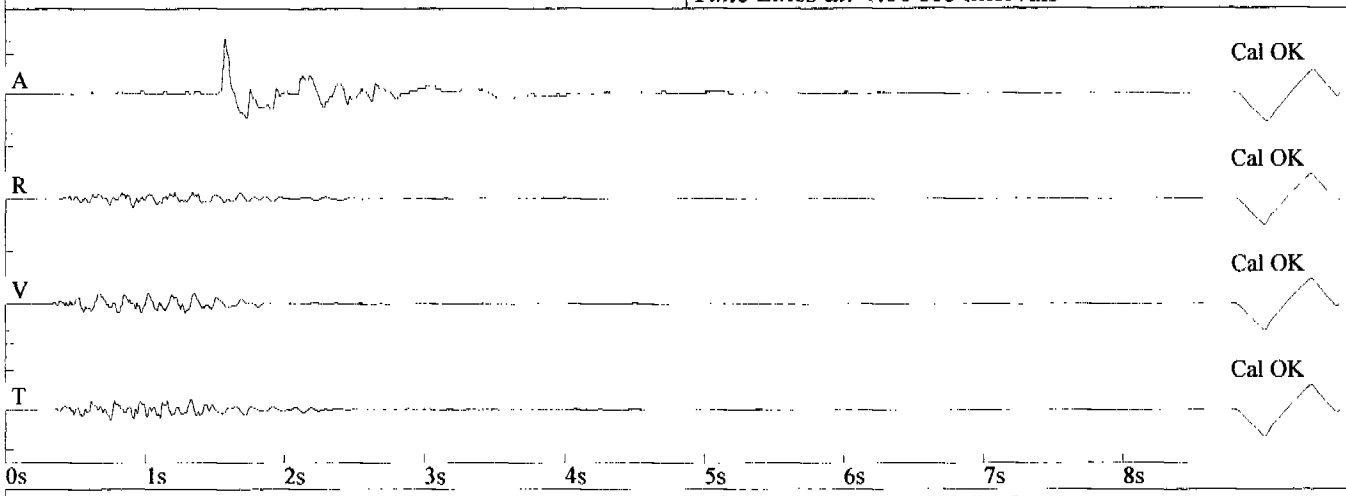
Graph Information

Duration: 0.000 sec To: 8.500 sec

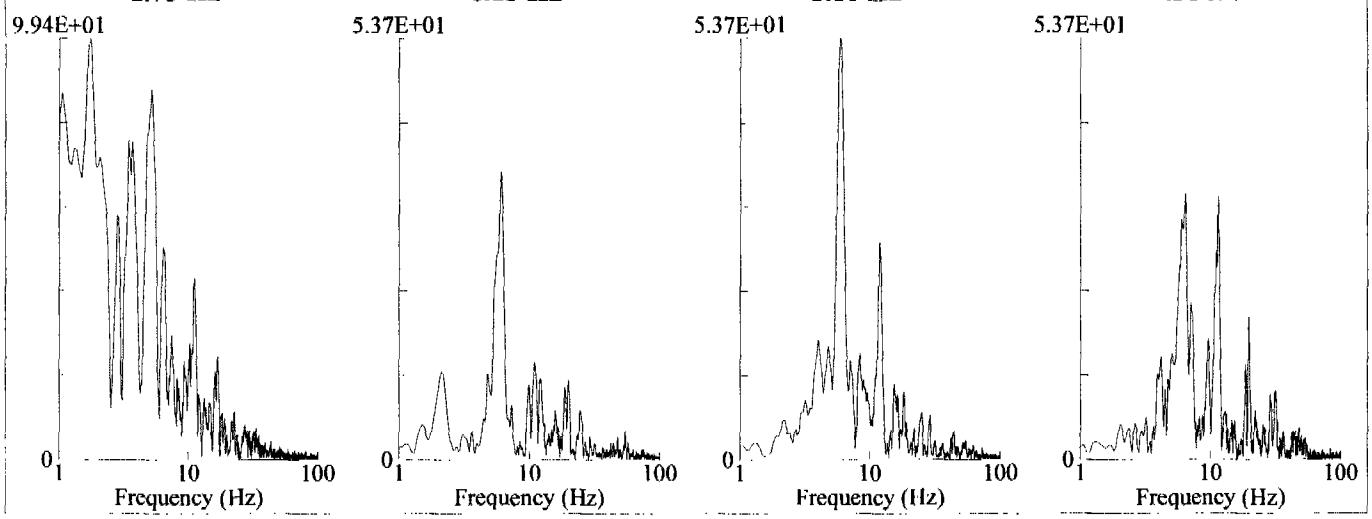
Acoustic Scale:
126dB 0.40Mb (0.100Mb/div)

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Banks Well

File: 00804032.DTB Event Number: 032 Date: 11/13/2000 Time: 16:04
Acoustic Trigger: 126 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 804

Amplitudes and Frequencies

Acoustic (A): 100 dB @ 0.0 Hz
(0.02Mb 0.0003psi 0.0020kPa)

***Radial (R):* 0.03in/s 0.762mm/s @ 24.3Hz**

Vertical (V): 0.015in/s 0.381mm/s @ 0.0Hz

Transverse (T): 0.025in/s 0.635mm/s @ 18.2Hz

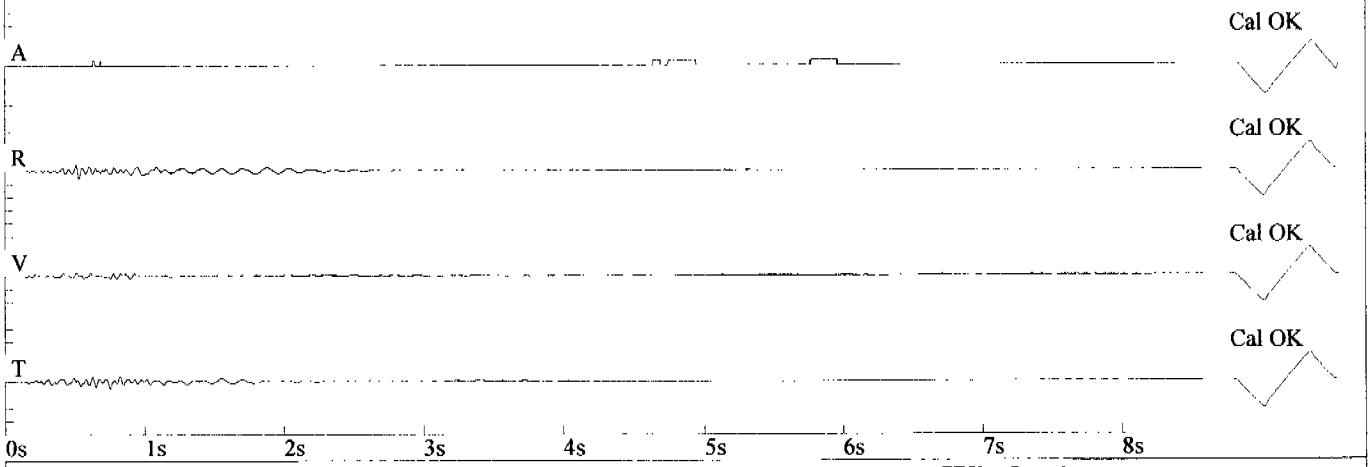
Graph Information

Duration: 0.000 sec To: 8.500 sec

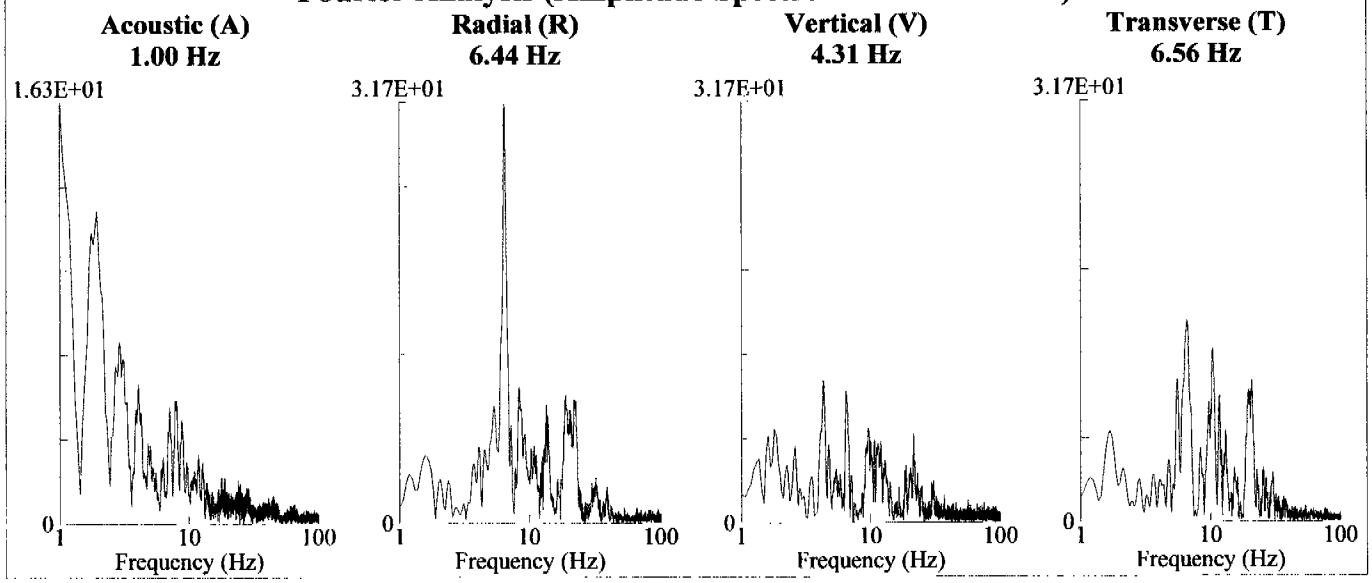
Acoustic Scale:
120dB 0.20Mb (0.050Mb/div)

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Banks Well

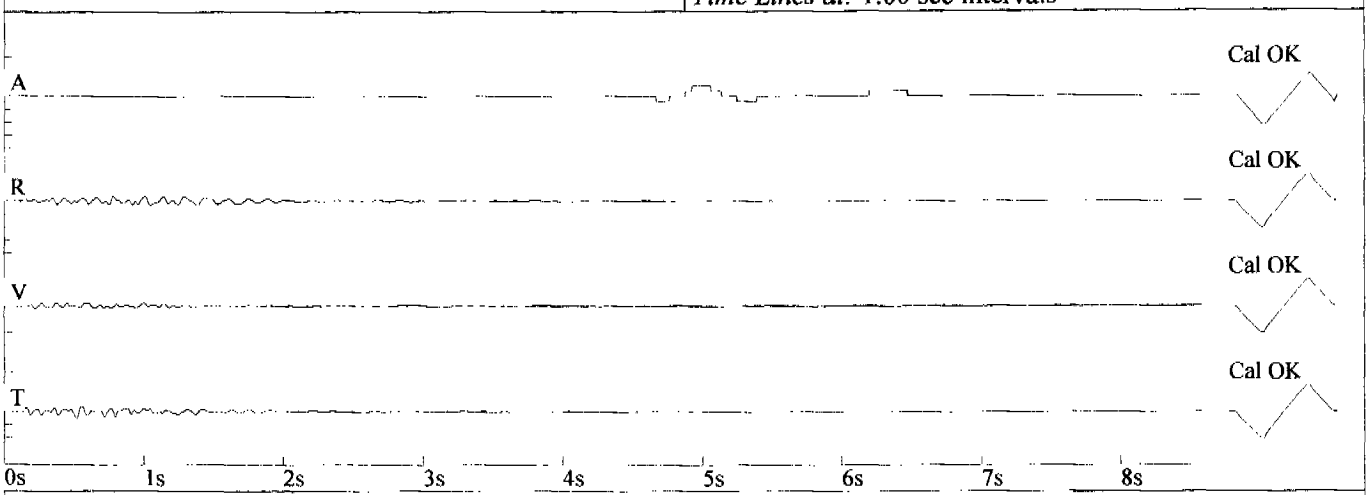
File: 00804040.DTB Event Number: 040 Date: 11/14/2000 Time: 16:18
Acoustic Trigger: 126 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 804

Amplitudes and Frequencies

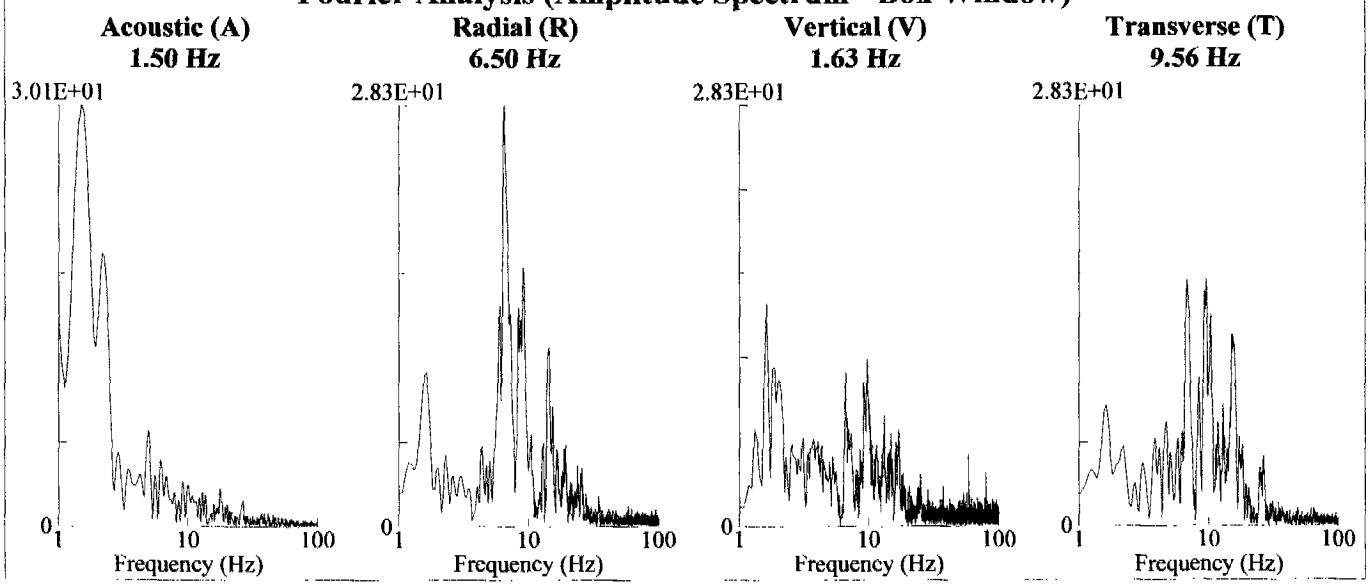
Acoustic (A): 106 dB @ 0.0 Hz
(0.04Mb 0.0006psi 0.0040kPa)
Radial (R): 0.02in/s 0.508mm/s @ 8.3Hz
Vertical (V): 0.015in/s 0.381mm/s @ 0.0Hz
***Transverse (T):* 0.025in/s 0.635mm/s @ 13.4Hz**

Graph Information

Duration: 0.000 sec To: 8.500 sec
Acoustic Scale:
120dB 0.20Mb (0.050Mb/div)
Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)
Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Banks Well
3.5 ft. deep

File: 00809081.DTB Event Number: 081 Date: 11/14/2000 Time: 15:15
Acoustic Trigger: 142 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 809

Amplitudes and Frequencies

***Radial (R):* 0.02in/s 0.508mm/s @ 16.0Hz**

Vertical (V): 0.01in/s 0.254mm/s @ 0.0Hz

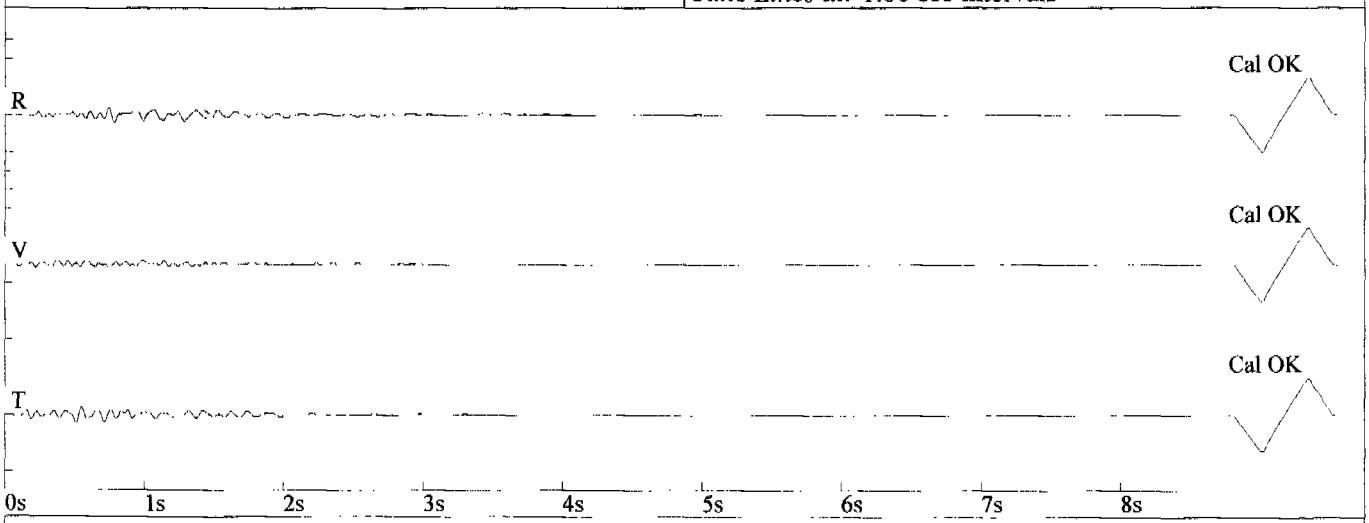
***Transverse (T):* 0.02in/s 0.508mm/s @ 14.2Hz**

Graph Information

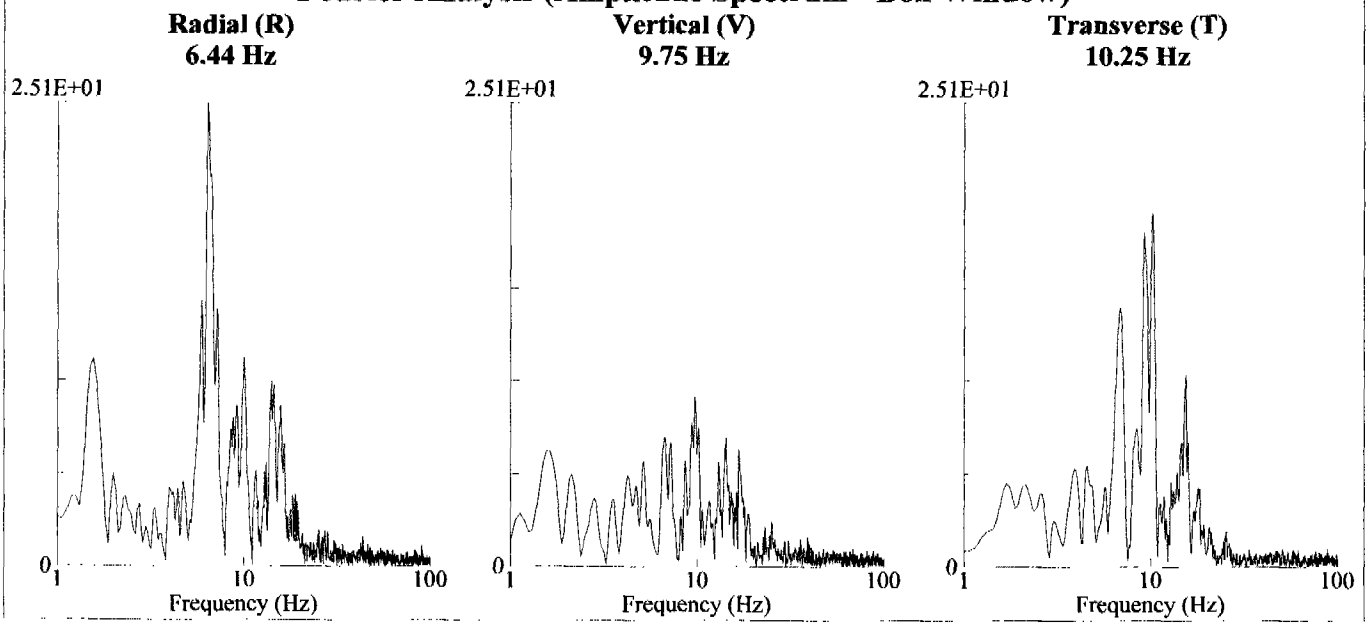
Duration: 0.000 sec To: 8.500 sec

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Banks Well
(no depth)

File: 00804042.DTB Event Number: 042 Date: 11/15/2000 Time: 11:49
Acoustic Trigger: 126 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 804

Amplitudes and Frequencies

Acoustic (A): 112 dB @ 2.1 Hz
(0.08Mb 0.0012psi 0.0080kPa)

***Radial (R):* 0.055in/s 1.397mm/s @ 20.4Hz**

Vertical (V): 0.025in/s 0.635mm/s @ 11.9Hz

Transverse (T): 0.025in/s 0.635mm/s @ 7.0Hz

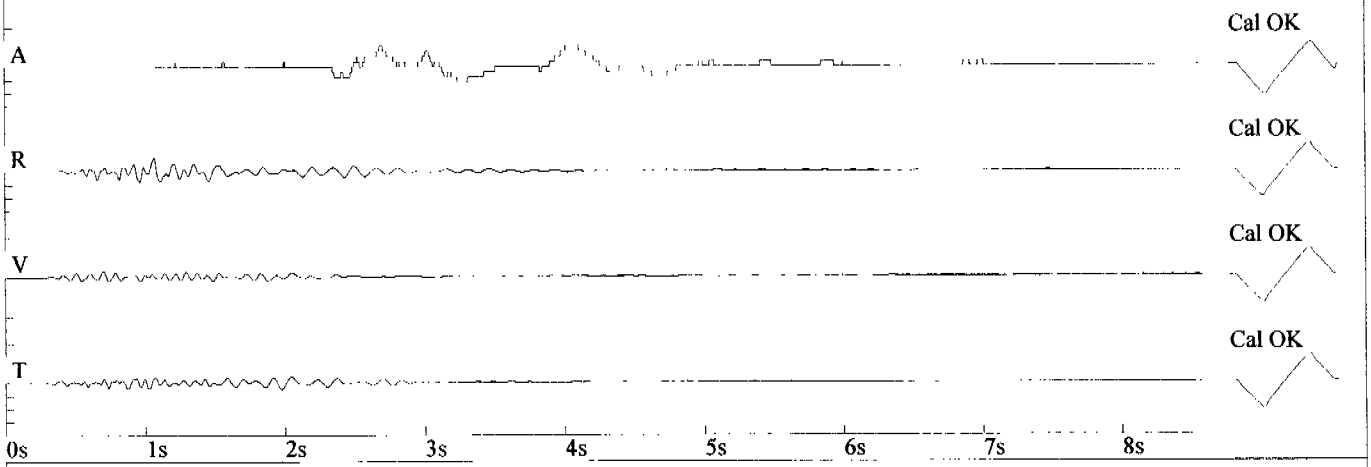
Graph Information

Duration: 0.000 sec To: 8.500 sec

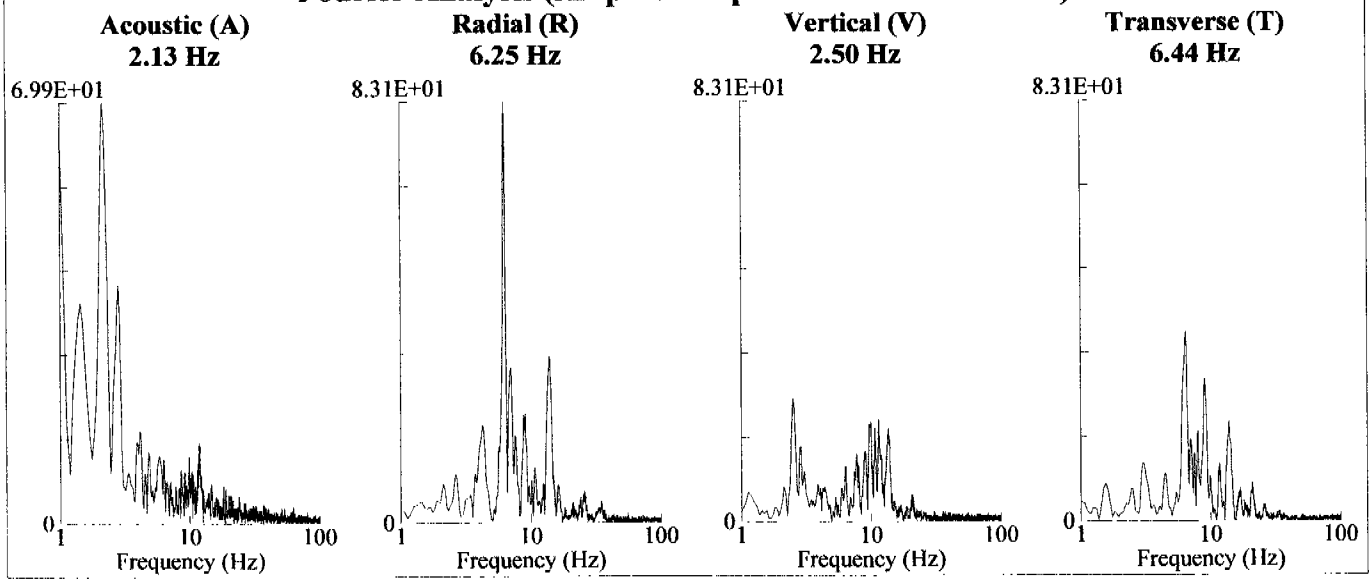
Acoustic Scale:
120dB 0.20Mb (0.050Mb/div)

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Banks Well

File: 00804045.DTB Event Number: 045 Date: 11/16/2000 Time: 09:07
Acoustic Trigger: 106 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 804

Amplitudes and Frequencies

Acoustic (A): 106 dB @ 0.0 Hz
(0.04Mb 0.0006psi 0.0040kPa)

***Radial (R):* 0.02in/s 0.508mm/s @ 10.6Hz**

Vertical (V): 0.015in/s 0.381mm/s @ 0.0Hz

***Transverse (T):* 0.02in/s 0.508mm/s @ 16.0Hz**

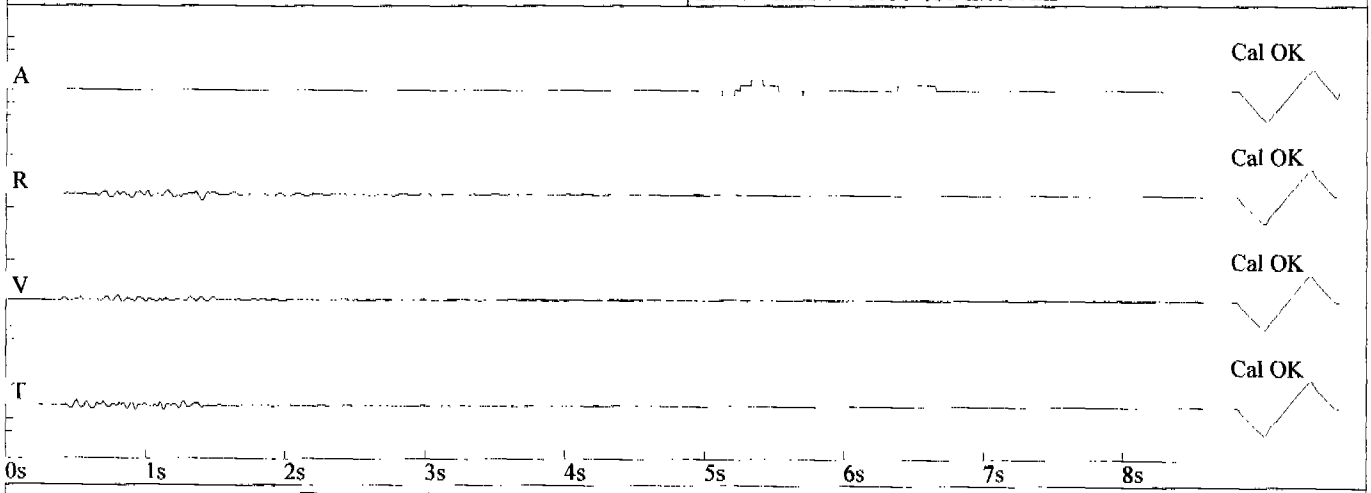
Graph Information

Duration: 0.000 sec To: 8.500 sec

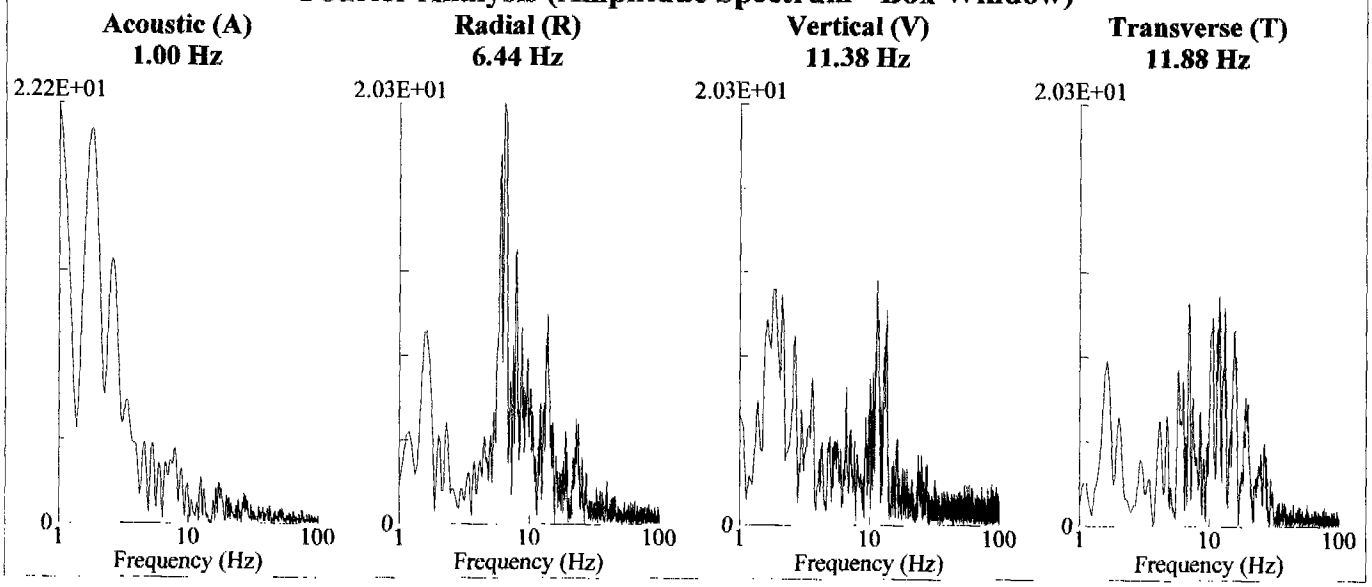
Acoustic Scale:
120dB 0.20Mb (0.050Mb/div)

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Banks Well
3.5 ft. deep

File: 00809083.DTB Event Number: 083 Date: 11/16/2000 Time: 09:06
Acoustic Trigger: 142 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 809

Amplitudes and Frequencies

***Radial (R):* 0.02in/s 0.508mm/s @ 14.2Hz**

Vertical (V): 0.01in/s 0.254mm/s @ 0.0Hz

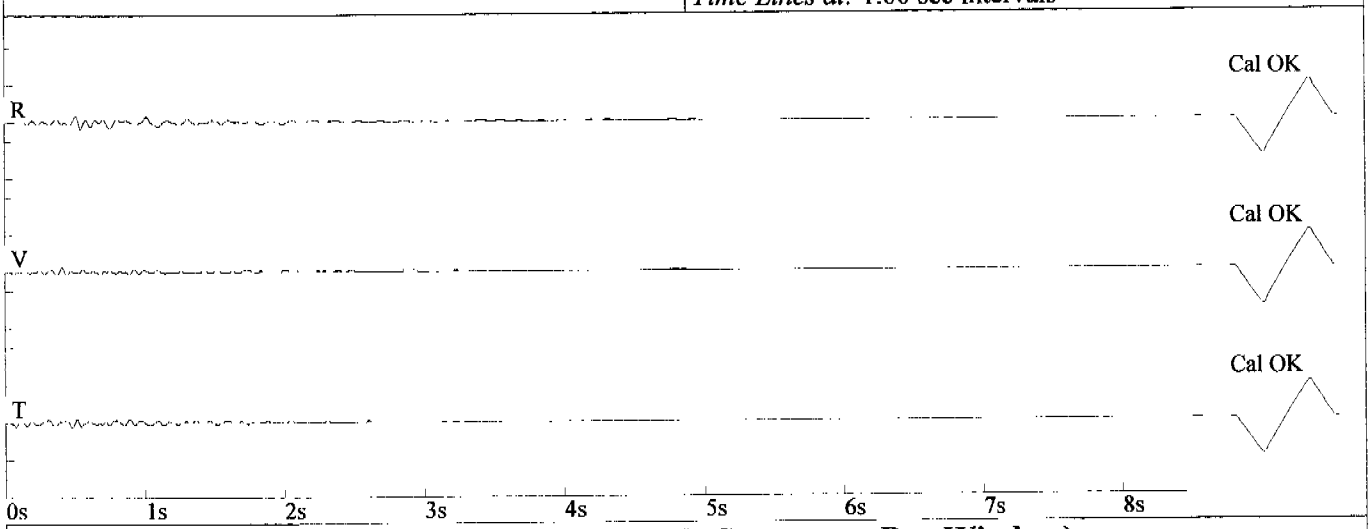
Transverse (T): 0.01in/s 0.254mm/s @ 0.0Hz

Graph Information

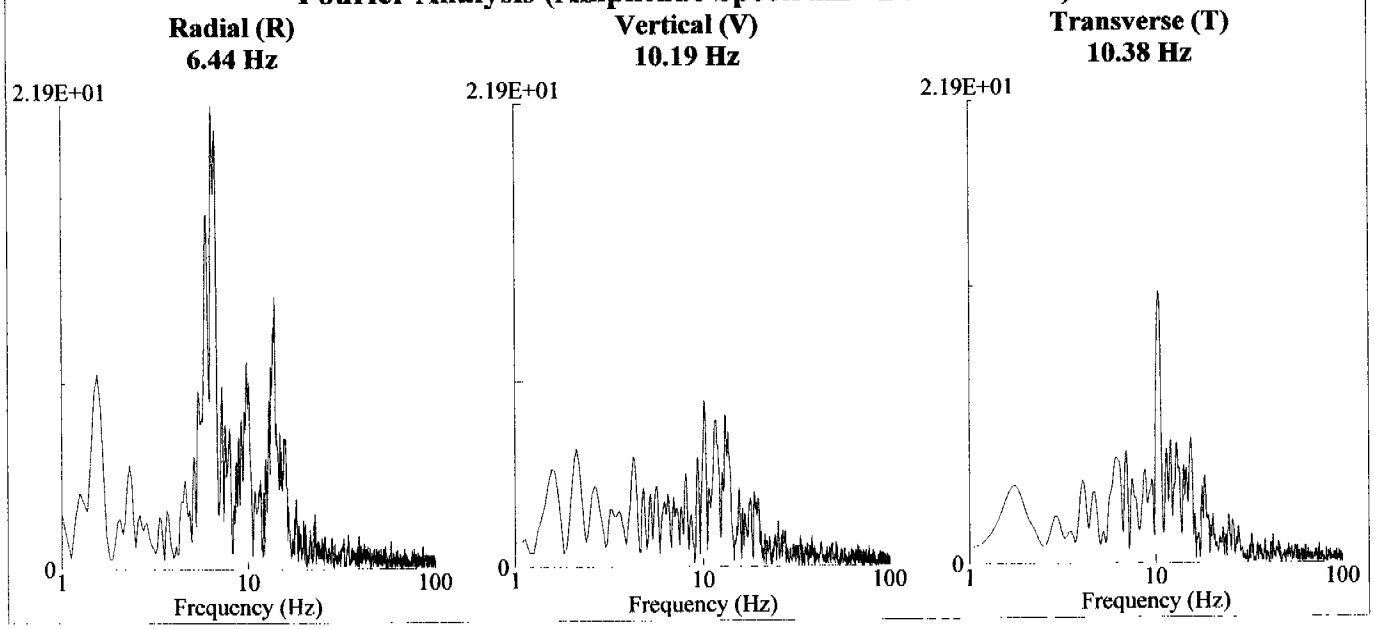
Duration: 0.000 sec To: 8.500 sec

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Banks Well

File: 00804048.DTB Event Number: 048 Date: 11/16/2000 Time: 16:00
Acoustic Trigger: 106 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 804

Amplitudes and Frequencies

Acoustic (A): 110 dB @ 0.0 Hz
(0.06Mb 0.0009psi 0.0060kPa)

***Radial (R):* 0.025in/s 0.635mm/s @ 10.8Hz**

Vertical (V): 0.02in/s 0.508mm/s @ 11.6Hz

Transverse (T): 0.02in/s 0.508mm/s @ 13.8Hz

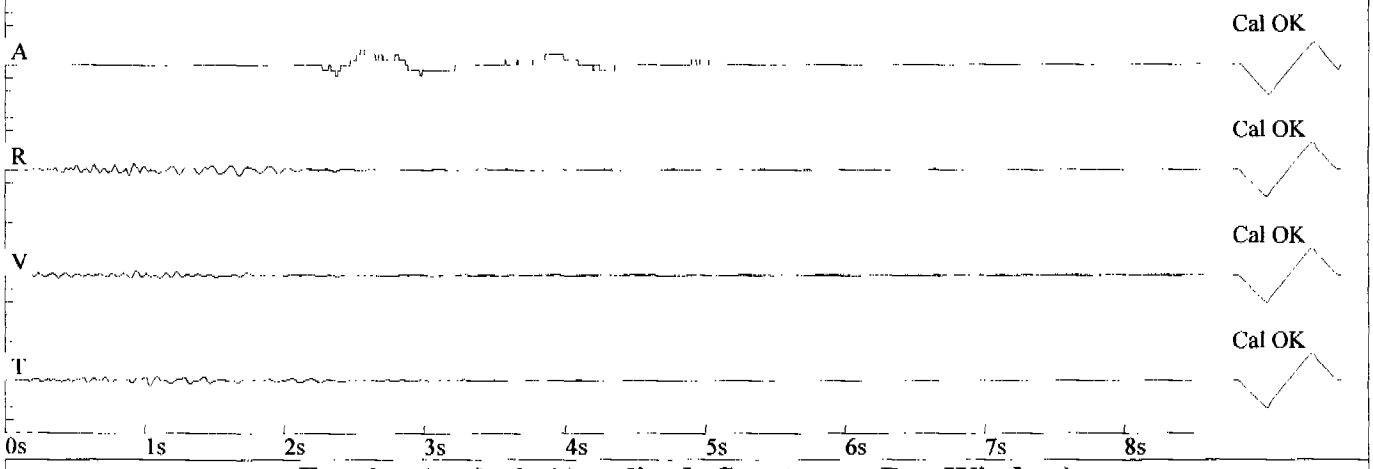
Graph Information

Duration: 0.000 sec To: 8.500 sec

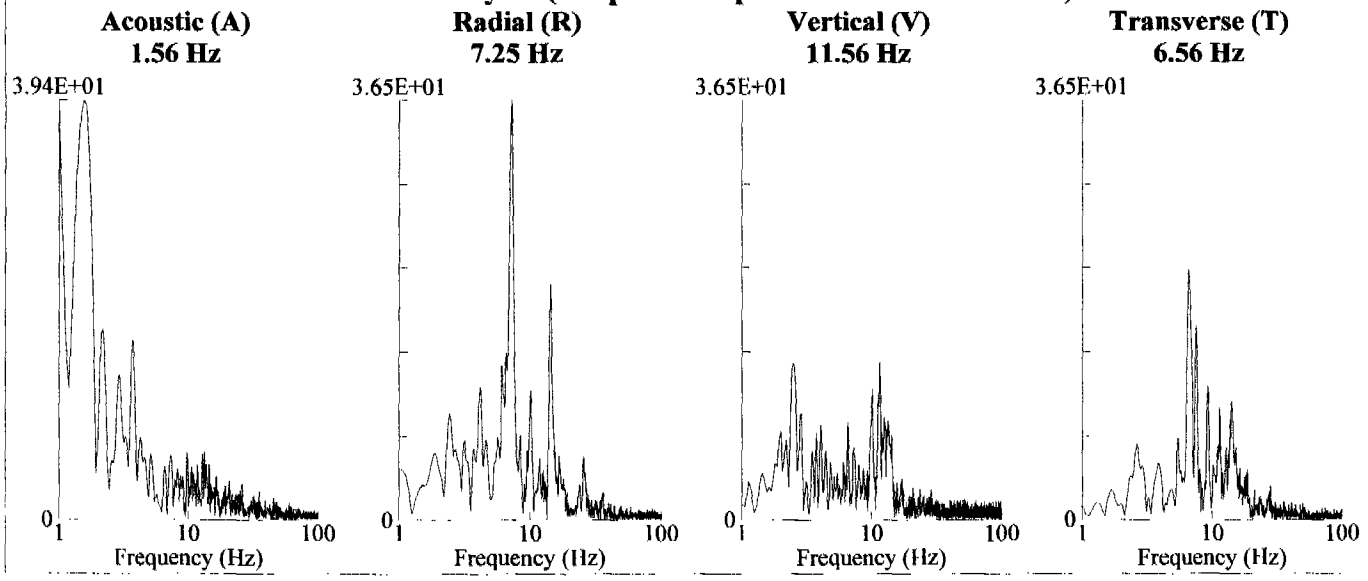
Acoustic Scale:
120dB 0.20Mb (0.050Mb/div)

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Banks Well

File: 00809084.DTB Event Number: 084 Date: 11/16/2000 Time: 15:59
Acoustic Trigger: 142 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 809

Amplitudes and Frequencies

***Radial (R):* 0.02in/s 0.508mm/s @ 15.0Hz**

Vertical (V): 0.015in/s 0.381mm/s @ 0.0Hz

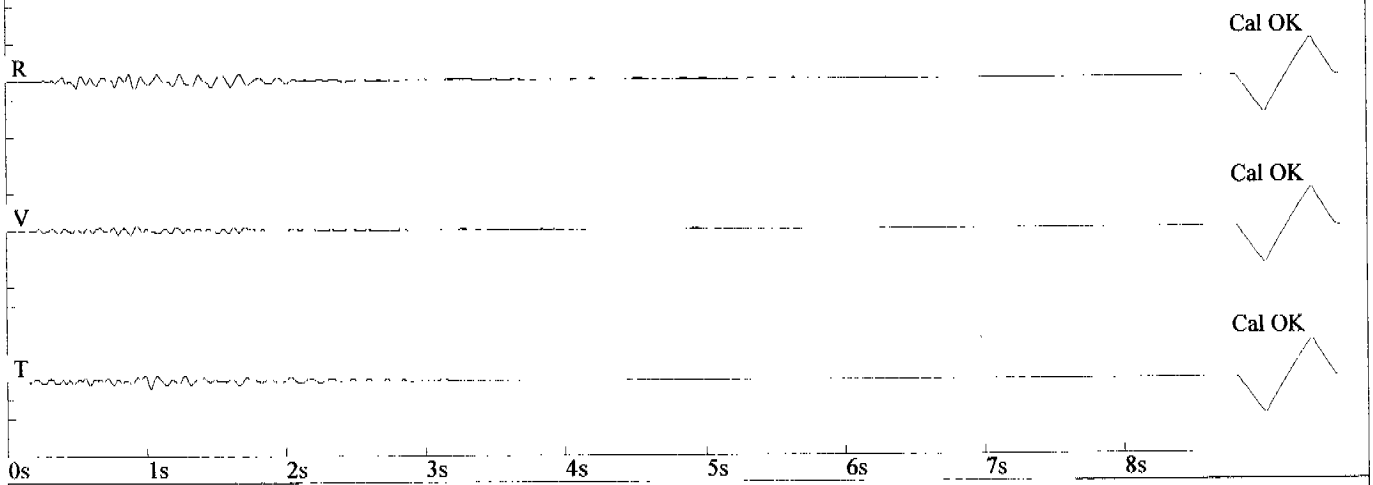
***Transverse (T):* 0.02in/s 0.508mm/s @ 14.2Hz**

Graph Information

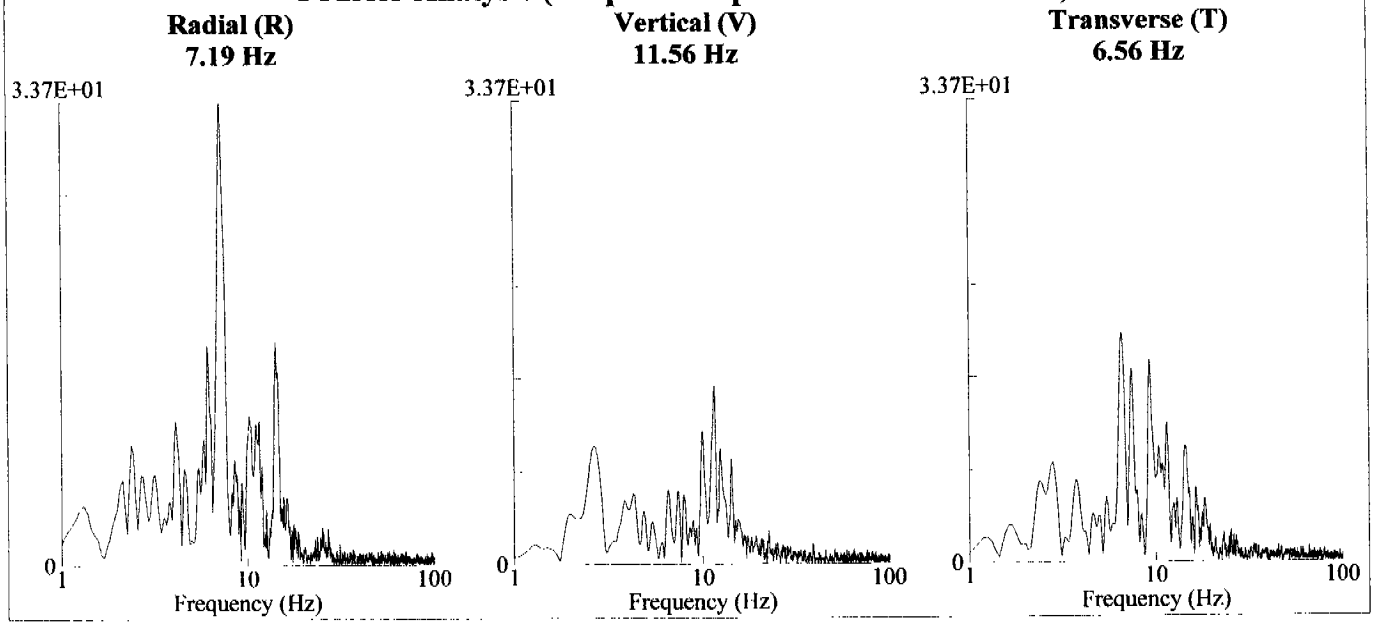
Duration: 0.000 sec To: 8.500 sec

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Banks Well

File: 00804056.DTB Event Number: 056 Date: 11/17/2000 Time: 12:15
Acoustic Trigger: 106 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 804

Amplitudes and Frequencies

Acoustic (A): 110 dB @ 0.0 Hz
(0.06Mb 0.0009psi 0.0060kPa)

***Radial (R):* 0.025in/s 0.635mm/s @ 12.1Hz**

Vertical (V): 0.01in/s 0.254mm/s @ 0.0Hz

Transverse (T): 0.015in/s 0.381mm/s @ 0.0Hz

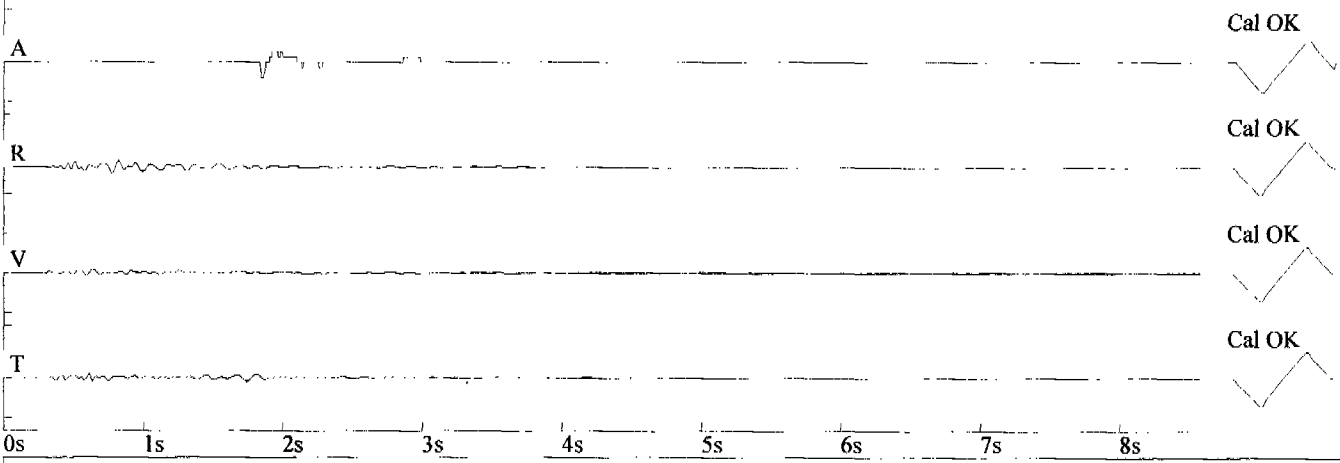
Graph Information

Duration: 0.000 sec To: 8.500 sec

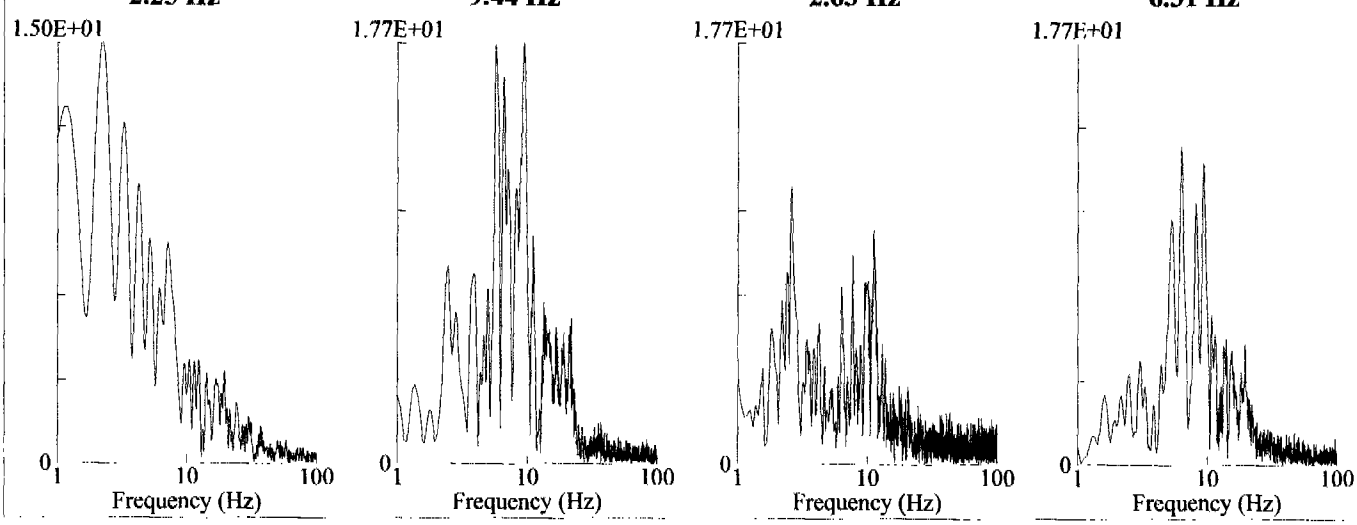
Acoustic Scale:
120dB 0.20Mb (0.050Mb/div)

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Banks Well
3.5 ft. deep

File: 00809085.DTB Event Number: 085 Date: 11/17/2000 Time: 12:14
Acoustic Trigger: 142 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 809

Amplitudes and Frequencies

***Radial (R):* 0.02in/s 0.508mm/s @ 11.6Hz**

Vertical (V): 0.01in/s 0.254mm/s @ 0.0Hz

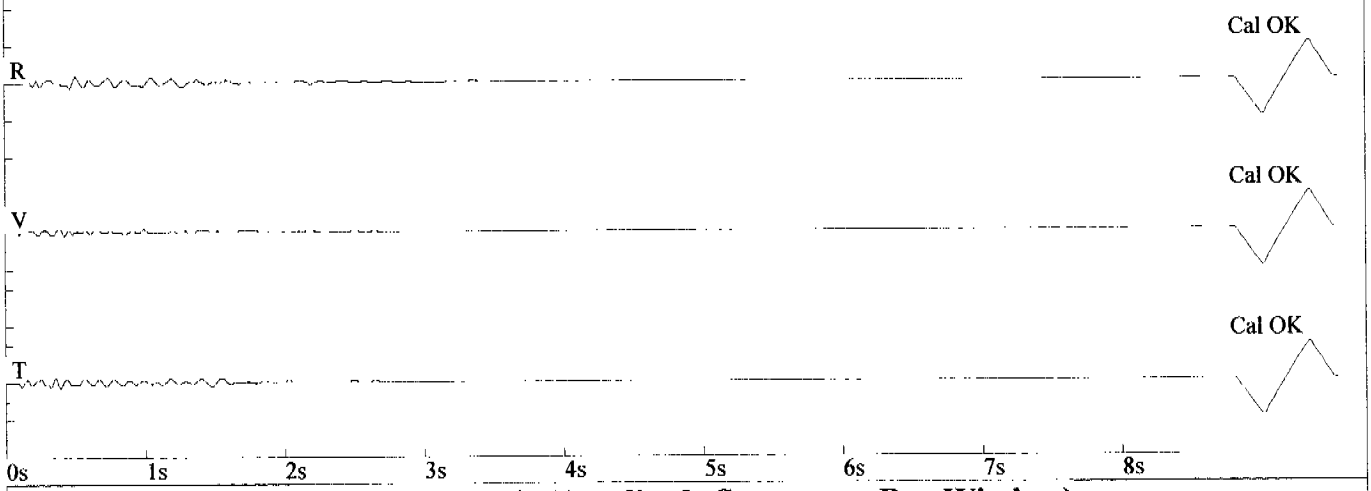
Transverse (T): 0.01in/s 0.254mm/s @ 0.0Hz

Graph Information

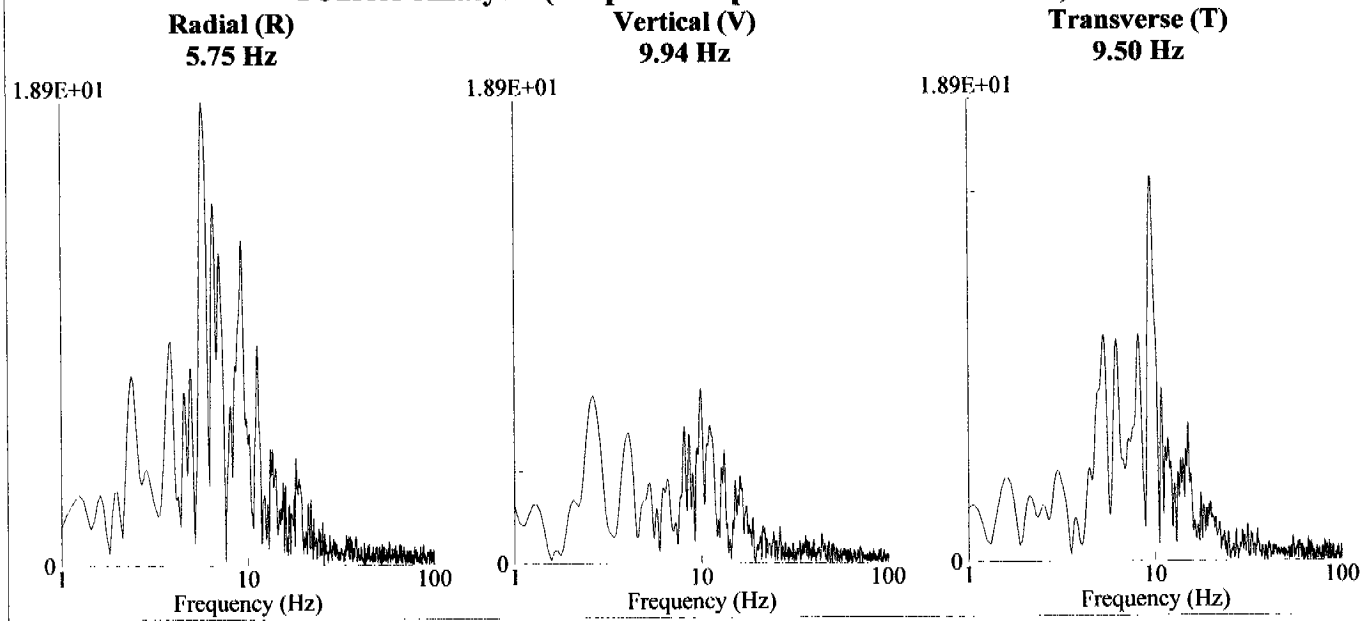
Duration: 0.000 sec To: 8.500 sec

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Banks Well

File: 00804058.DTB Event Number: 058 Date: 11/17/2000 Time: 12:34
Acoustic Trigger: 106 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 804

Amplitudes and Frequencies

Acoustic (A): 120 dB @ 2.0 Hz
(0.20Mb 0.0029psi 0.0200kPa)

***Radial (R):* 0.065in/s 1.651mm/s @ 6.0Hz**

Vertical (V): 0.025in/s 0.635mm/s @ 12.4Hz

Transverse (T): 0.04in/s 1.016mm/s @ 15.0Hz

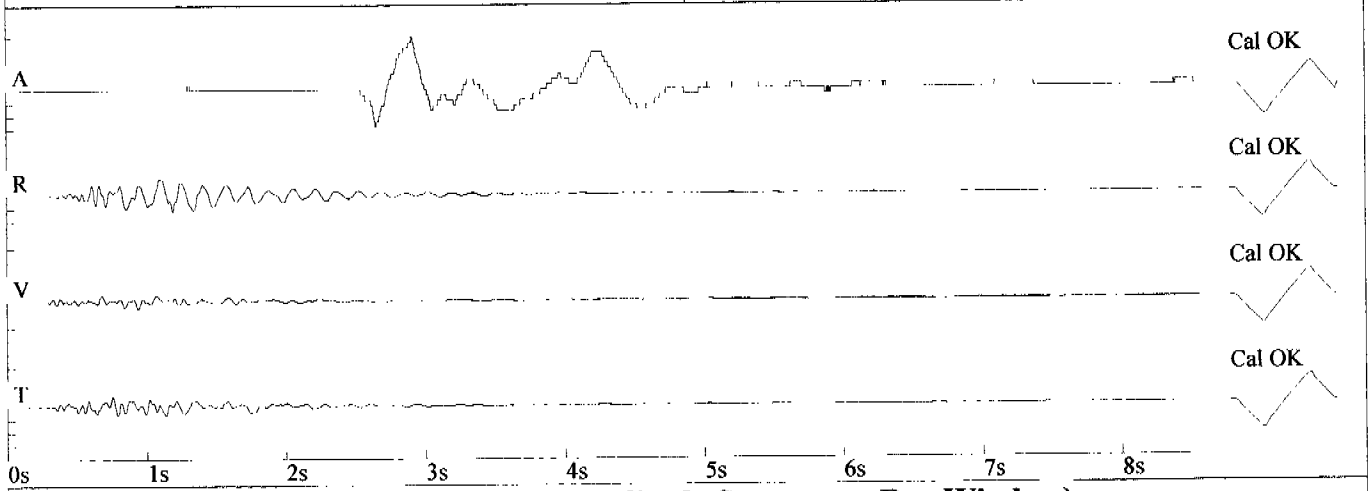
Graph Information

Duration: 0.000 sec To: 8.500 sec

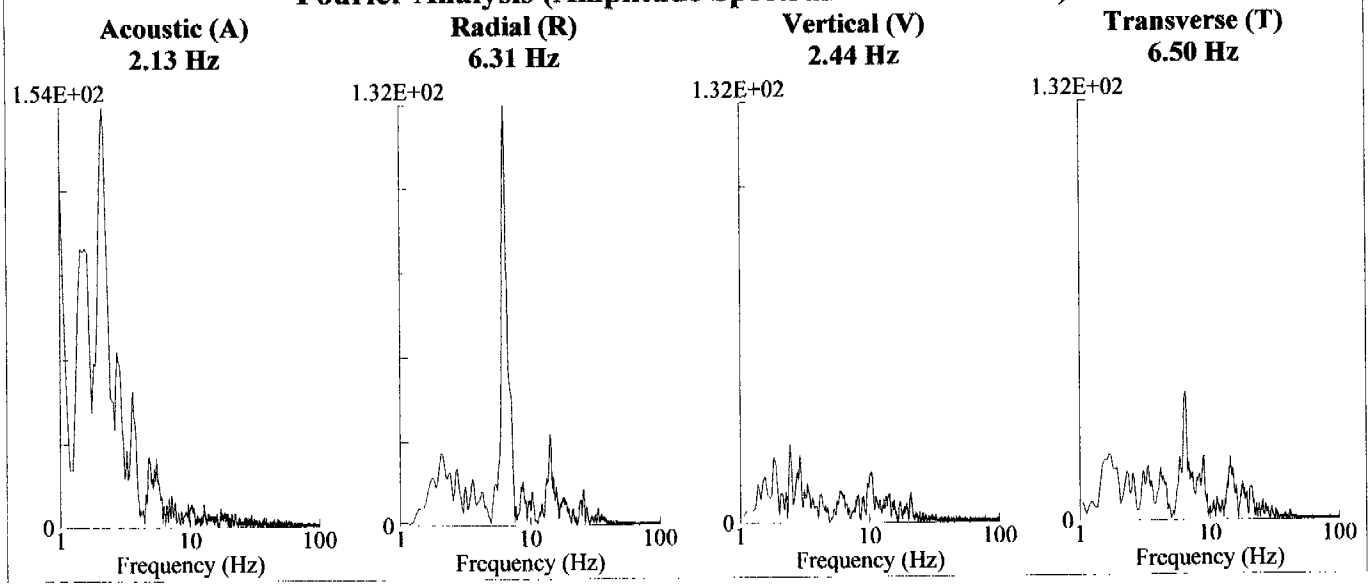
Acoustic Scale:
120dB 0.20Mb (0.050Mb/div)

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Banks Well
3.5 ft. deep

File: 00809086.DTB Event Number: 086 Date: 11/17/2000 Time: 12:33
Acoustic Trigger: 142 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 809

Amplitudes and Frequencies

***Radial (R):* 0.06in/s 1.524mm/s @ 7.1Hz**

Vertical (V): 0.025in/s 0.635mm/s @ 8.8Hz

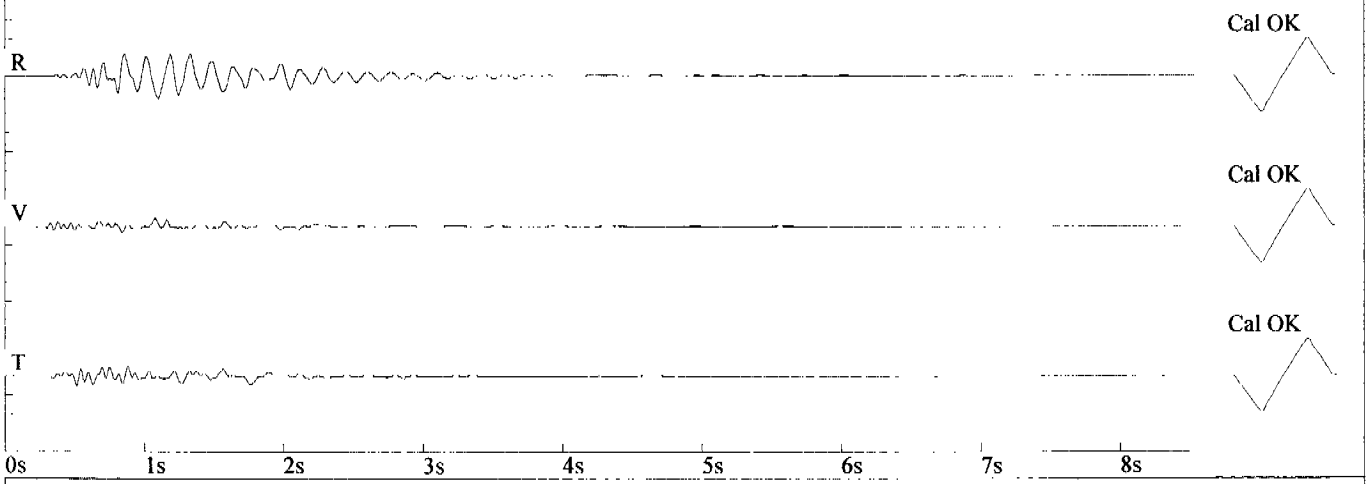
Transverse (T): 0.03in/s 0.762mm/s @ 13.4Hz

Graph Information

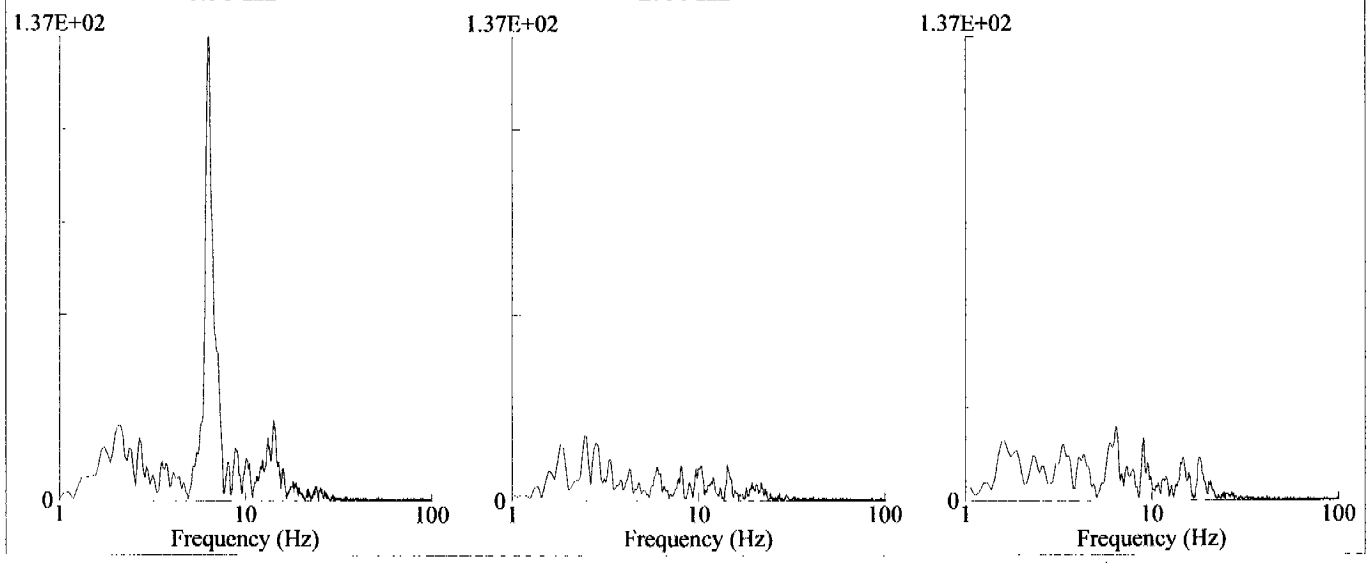
Duration: 0.000 sec To: 8.500 sec

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Ratliff Well
(surface - no airblast)

File: 00849025.DTB Event Number: 025 Date: 11/13/2000 Time: 16:04
Acoustic Trigger: 126 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 849

Amplitudes and Frequencies

Acoustic (A): <100 dB

***Radial (R):* 0.03in/s 0.762mm/s @ 21.3Hz**

Vertical (V): 0.02in/s 0.508mm/s @ 26.9Hz

Transverse (T): 0.025in/s 0.635mm/s @ 20.4Hz

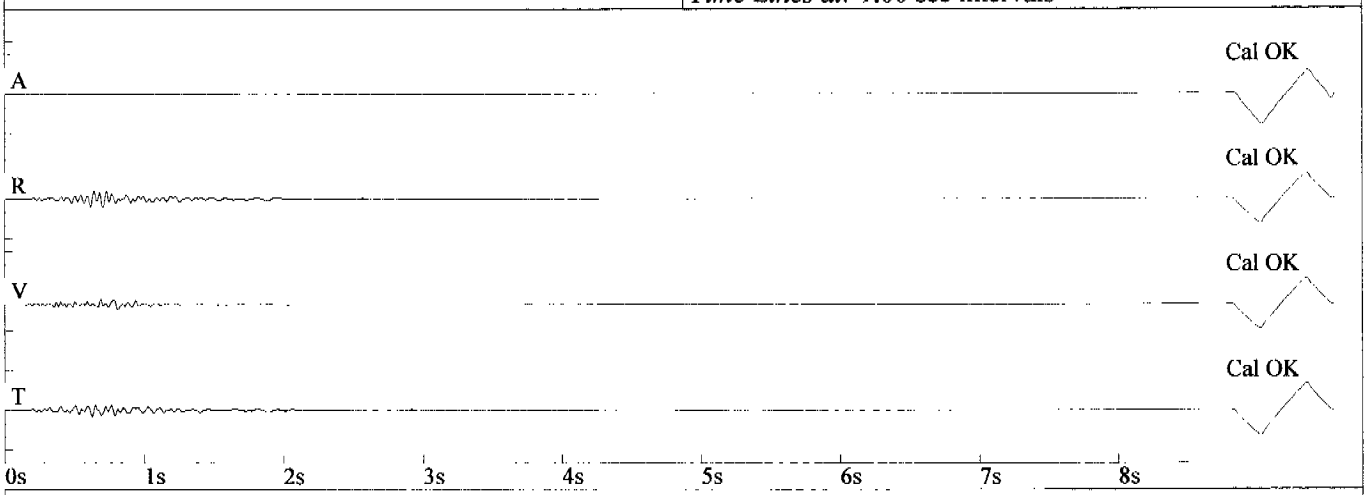
Graph Information

Duration: 0.000 sec To: 8.500 sec

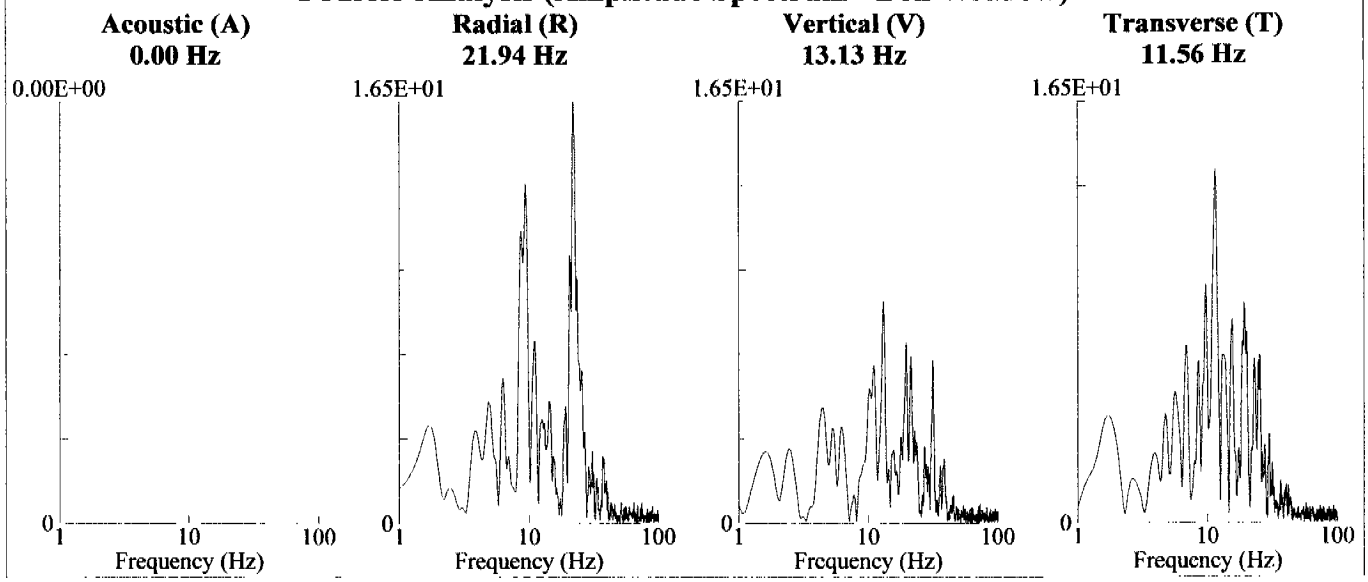
Acoustic Scale:
120dB 0.20Mb (0.050Mb/div)

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Ratliff Well
29 in. deep

File: 00849025.DTB Event Number: 025 Date: 11/13/2000 Time: 16:04
Acoustic Trigger: 126 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 849

Amplitudes and Frequencies

***Radial (R):* 0.03in/s 0.762mm/s @ 21.3Hz**

Vertical (V): 0.02in/s 0.508mm/s @ 26.9Hz

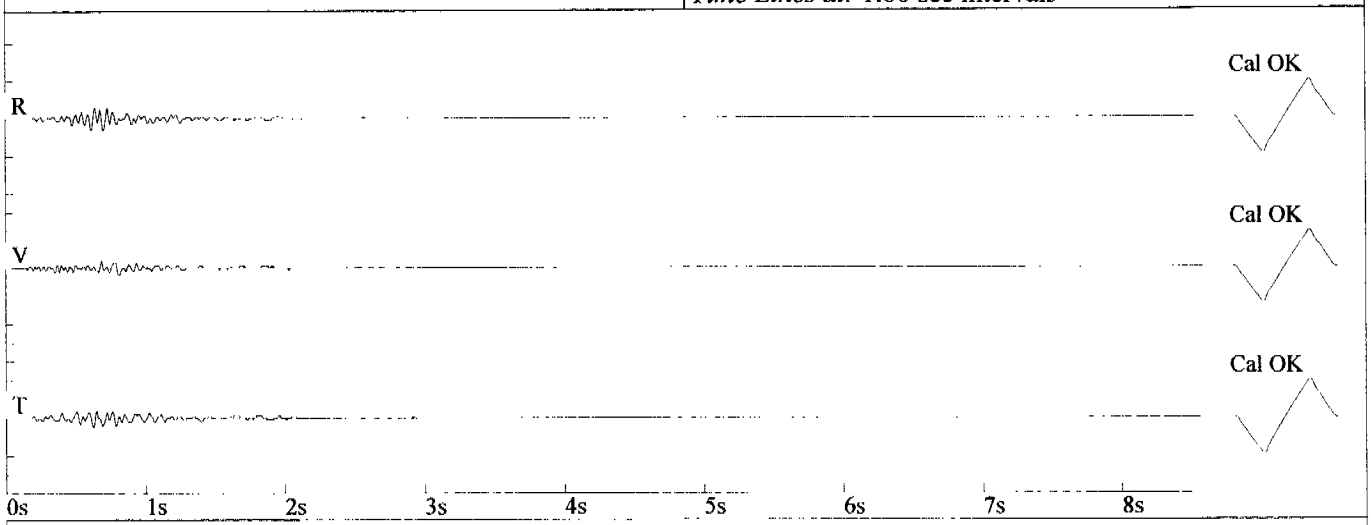
Transverse (T): 0.025in/s 0.635mm/s @ 20.4Hz

Graph Information

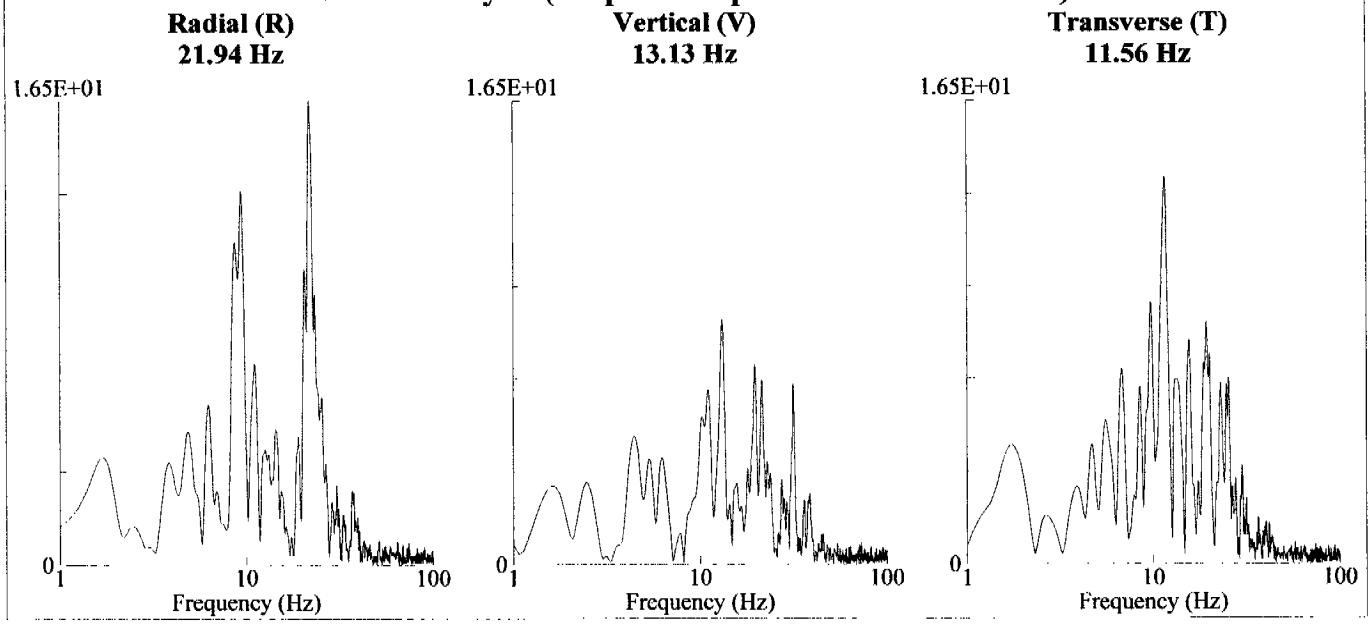
Duration: 0.000 sec To: 8.500 sec

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Ratliff Well

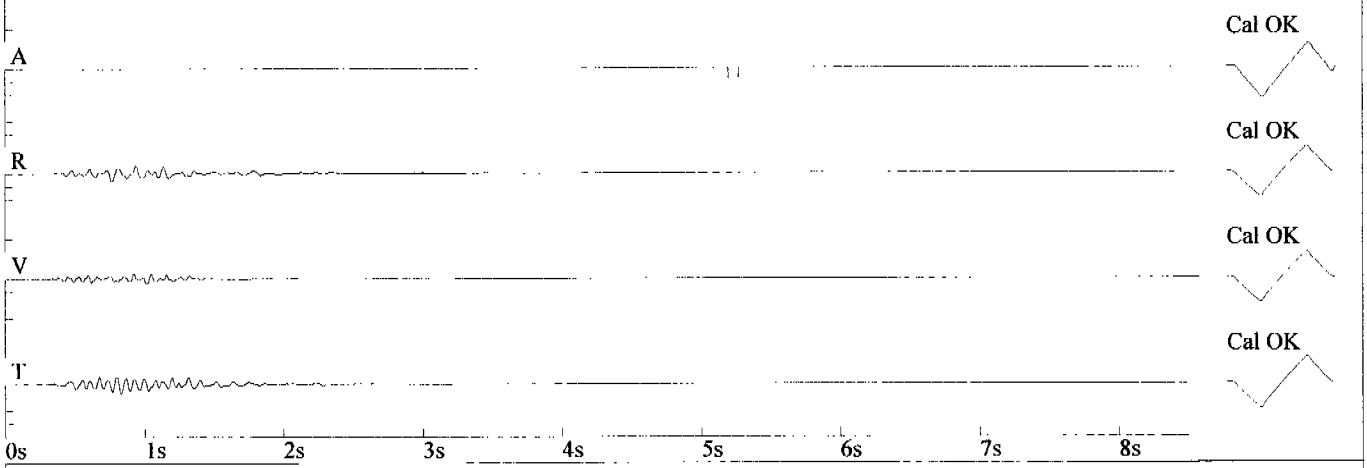
File: 00849026.DTB Event Number: 026 Date: 11/14/2000 Time: 16:18
Acoustic Trigger: 126 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 849

Amplitudes and Frequencies

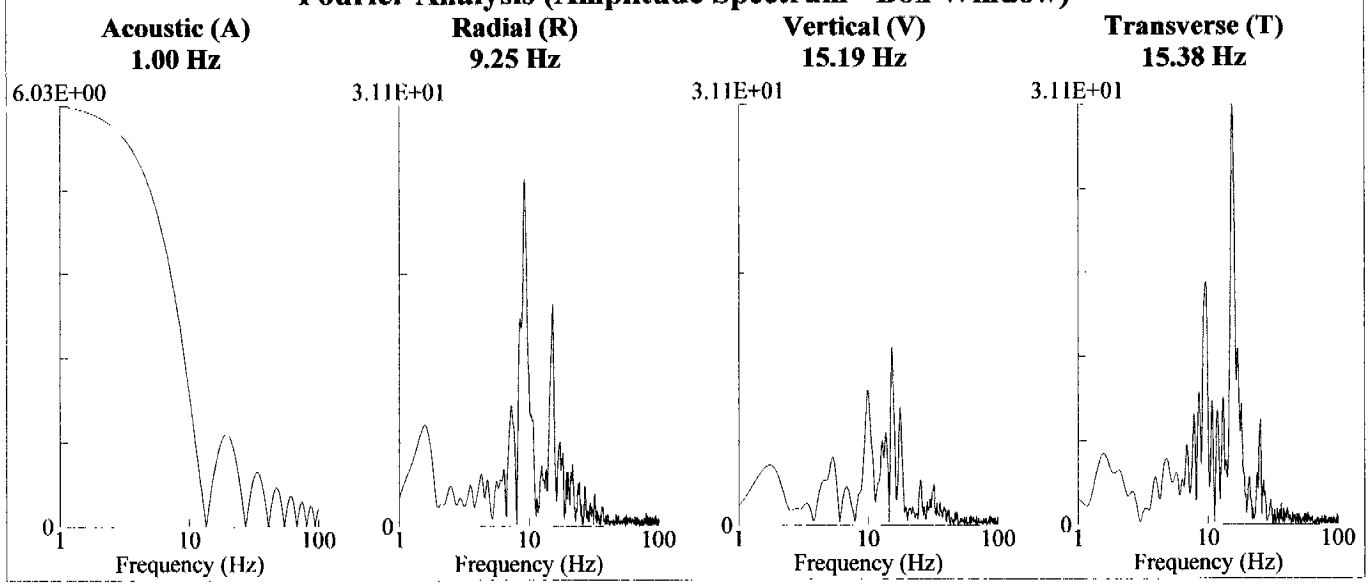
Acoustic (A): 106 dB @ 0.0 Hz
(0.04Mb 0.0006psi 0.0040kPa)
Radial (R): 0.03in/s 0.762mm/s @ 13.1Hz
Vertical (V): 0.02in/s 0.508mm/s @ 19.6Hz
***Transverse (T):* 0.035in/s 0.889mm/s @ 16.0Hz**

Graph Information

Duration: 0.000 sec To: 8.500 sec
Acoustic Scale:
120dB 0.20Mb (0.050Mb/div)
Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)
Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Ratliff Well
29 in. deep

File: 00853078.DTB Event Number: 078 Date: 11/14/2000 Time: 16:18
Acoustic Trigger: 142 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 853

Amplitudes and Frequencies

***Radial (R):* 0.025in/s 0.635mm/s @ 12.8Hz**

Vertical (V): 0.015in/s 0.381mm/s @ 14.6Hz

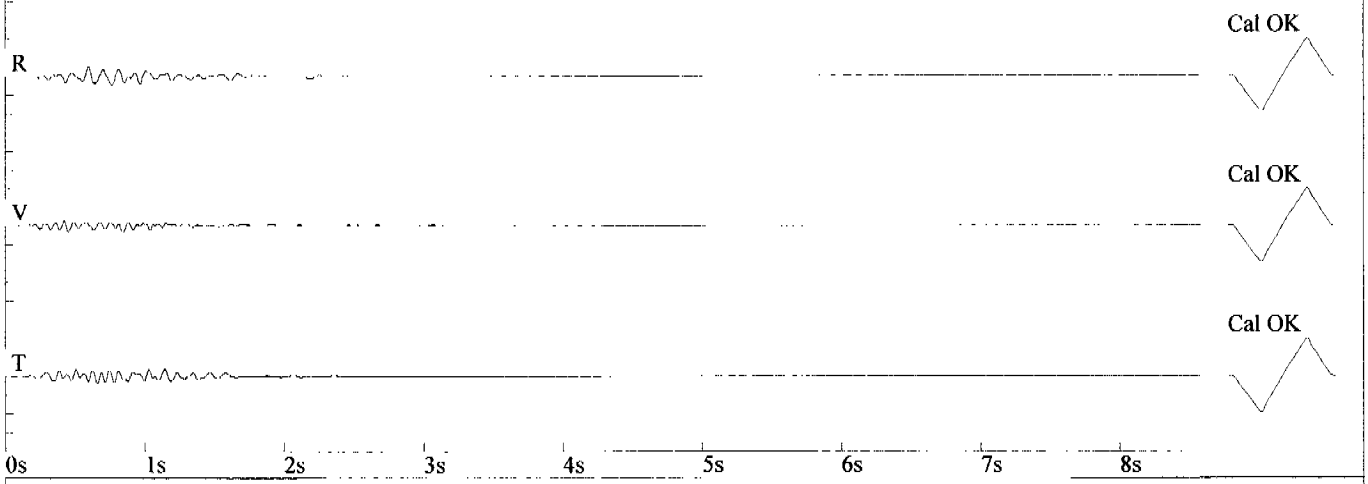
Transverse (T): 0.02in/s 0.508mm/s @ 16.0Hz

Graph Information

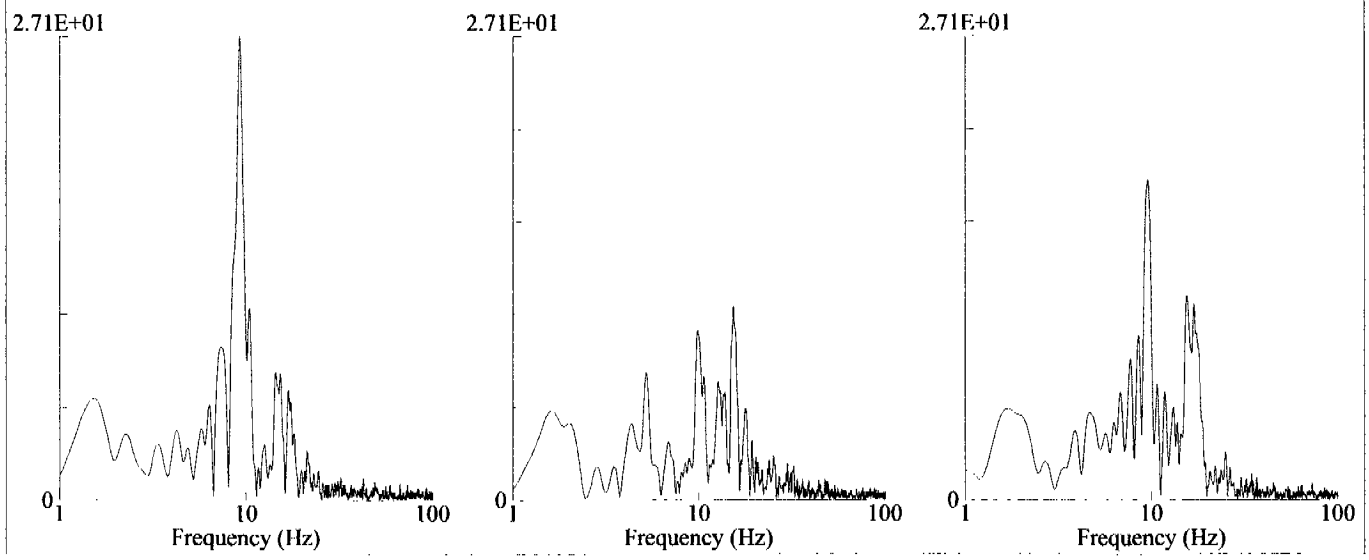
Duration: 0.000 sec To: 8.500 sec

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Ratliff Well

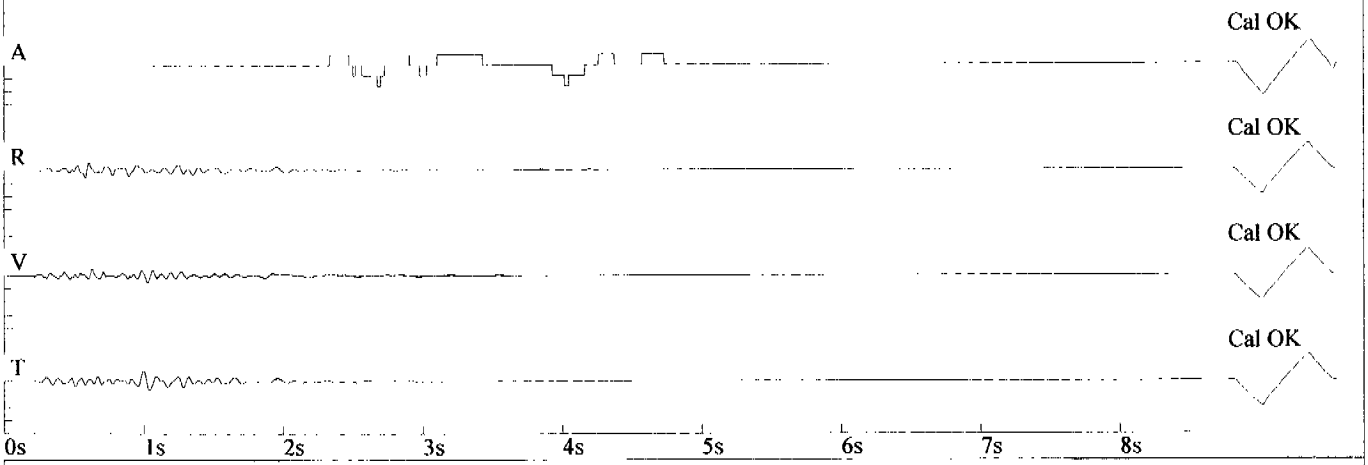
File: 00849027.DTB Event Number: 027 Date: 11/15/2000 Time: 11:49
Acoustic Trigger: 126 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 849

Amplitudes and Frequencies

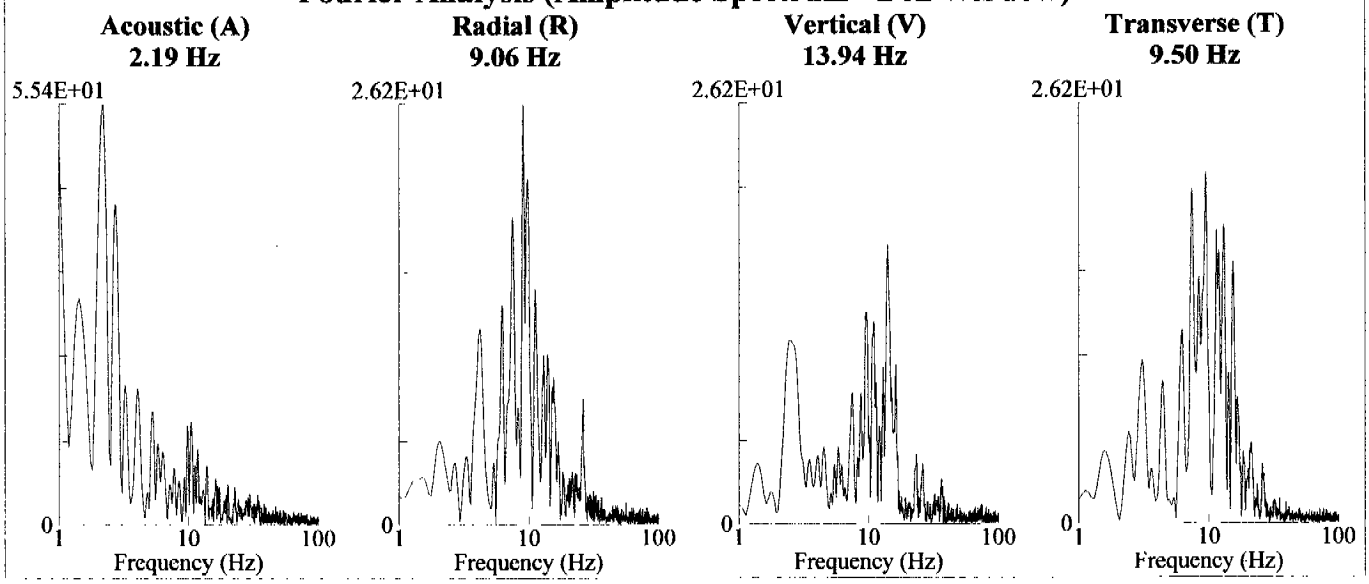
Acoustic (A): 112 dB @ 0.0 Hz
(0.08Mb 0.0012psi 0.0080kPa)
Radial (R): 0.03in/s 0.762mm/s @ 12.1Hz
Vertical (V): 0.025in/s 0.635mm/s @ 15.5Hz
***Transverse (T):* 0.04in/s 1.016mm/s @ 11.9Hz**

Graph Information

Duration: 0.000 sec To: 8.500 sec
Acoustic Scale:
120dB 0.20Mb (0.050Mb/div)
Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)
Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Ratliff Well
29 in. deep

File: 00853079.DTB Event Number: 079 Date: 11/15/2000 Time: 11:48
Acoustic Trigger: 142 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 853

Amplitudes and Frequencies

Radial (R): 0.025in/s 0.635mm/s @ 13.4Hz

Vertical (V): 0.02in/s 0.508mm/s @ 15.5Hz

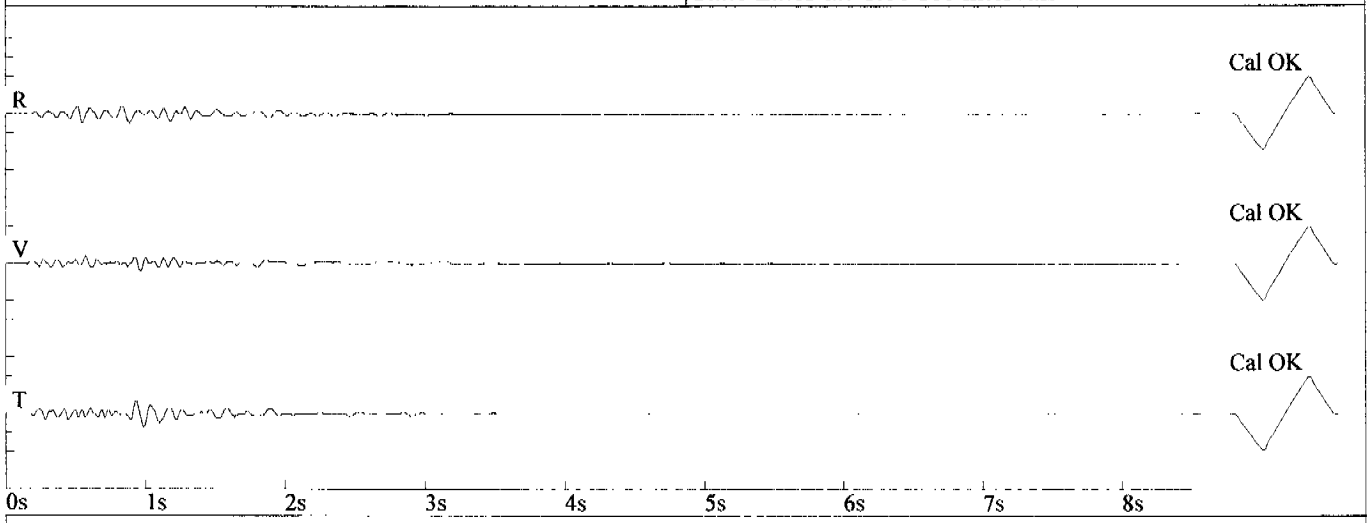
***Transverse (T):* 0.035in/s 0.889mm/s @ 11.1Hz**

Graph Information

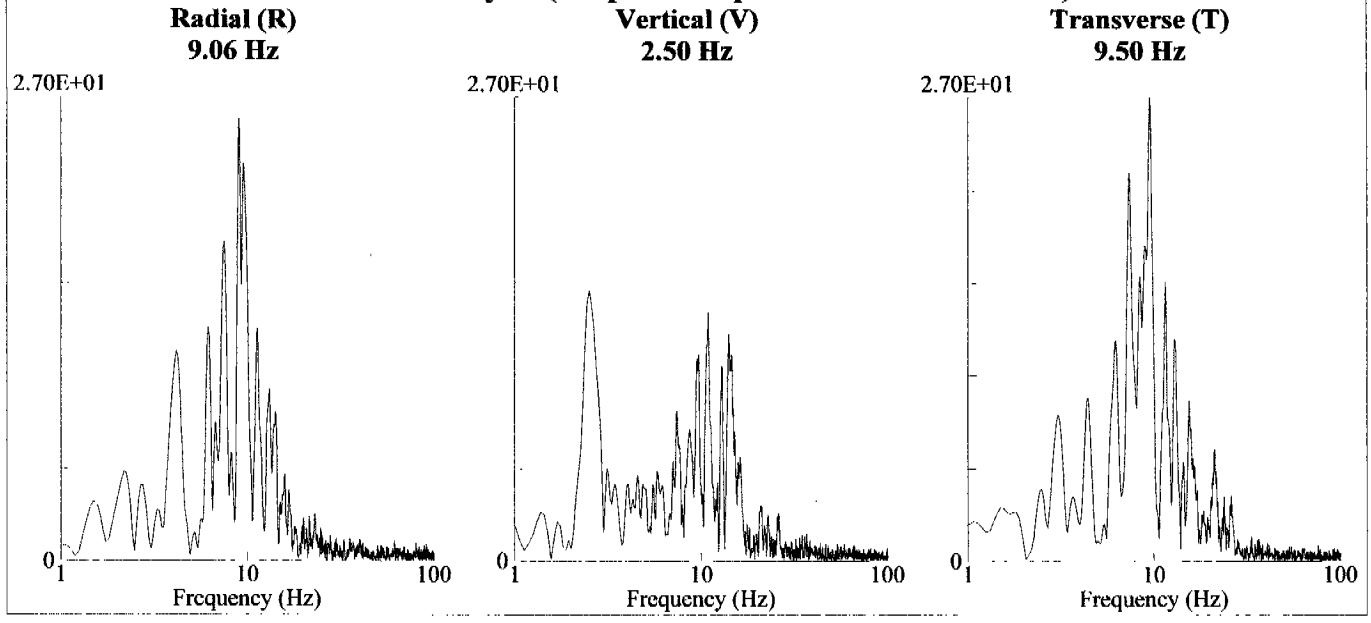
Duration: 0.000 sec To: 8.500 sec

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Ratliff Well

File: 00849028.DTB Event Number: 028 Date: 11/16/2000 Time: 09:07
Acoustic Trigger: 106 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 849

Amplitudes and Frequencies

Acoustic (A): 100 dB @ 0.0 Hz
(0.02Mb 0.0003psi 0.0020kPa)

***Radial (R):* 0.025in/s 0.635mm/s @ 17.6Hz**

Vertical (V): 0.02in/s 0.508mm/s @ 19.6Hz

***Transverse (T):* 0.025in/s 0.635mm/s @ 18.2Hz**

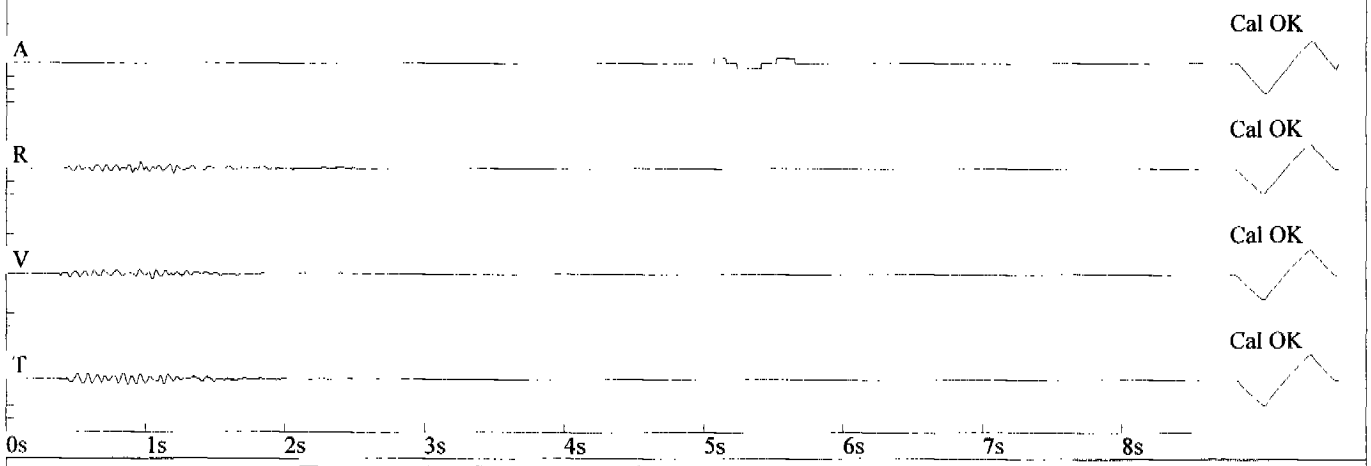
Graph Information

Duration: 0.000 sec To: 8.500 sec

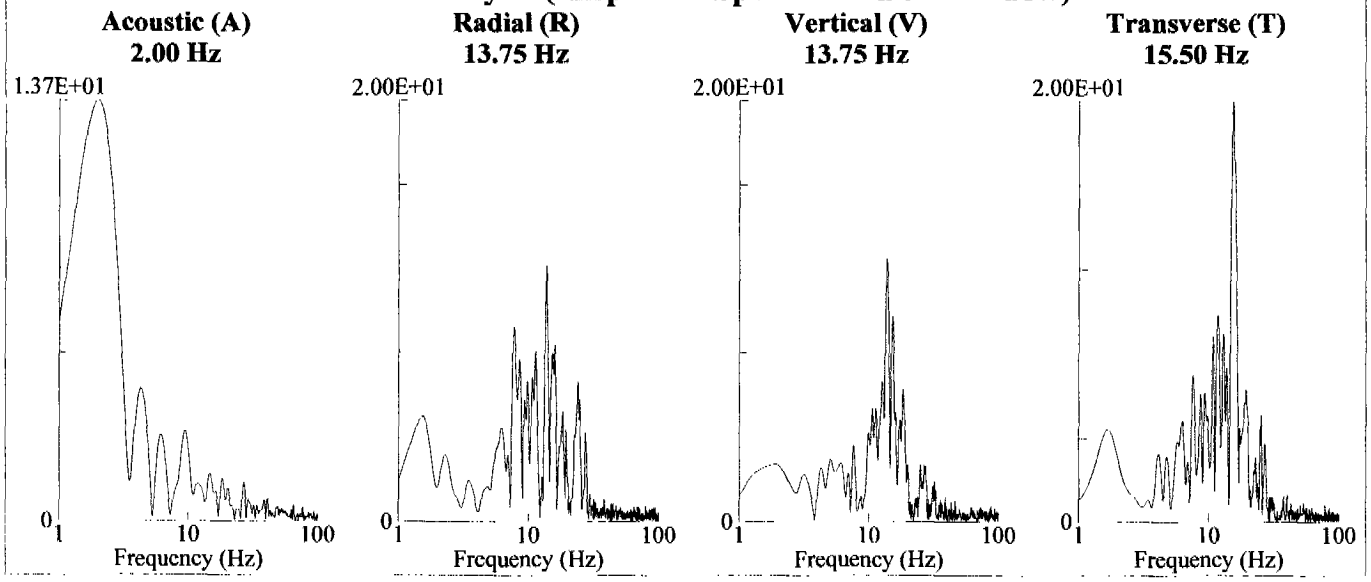
Acoustic Scale:
120dB 0.20Mb (0.050Mb/div)

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Ratliff Well
29 in. deep

File: 00853080.DTB Event Number: 080 Date: 11/16/2000 Time: 09:06
Acoustic Trigger: 142 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 853

Amplitudes and Frequencies

Radial (R): 0.015in/s 0.381mm/s @ 20.4Hz

Vertical (V): 0.015in/s 0.381mm/s @ 16.5Hz

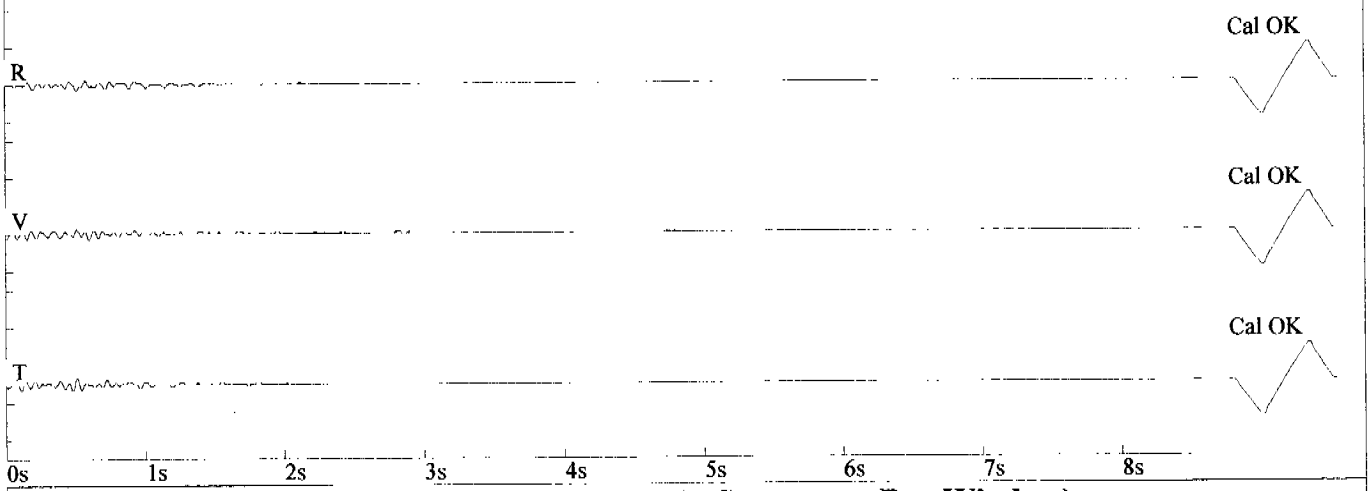
***Transverse (T):* 0.02in/s 0.508mm/s @ 20.4Hz**

Graph Information

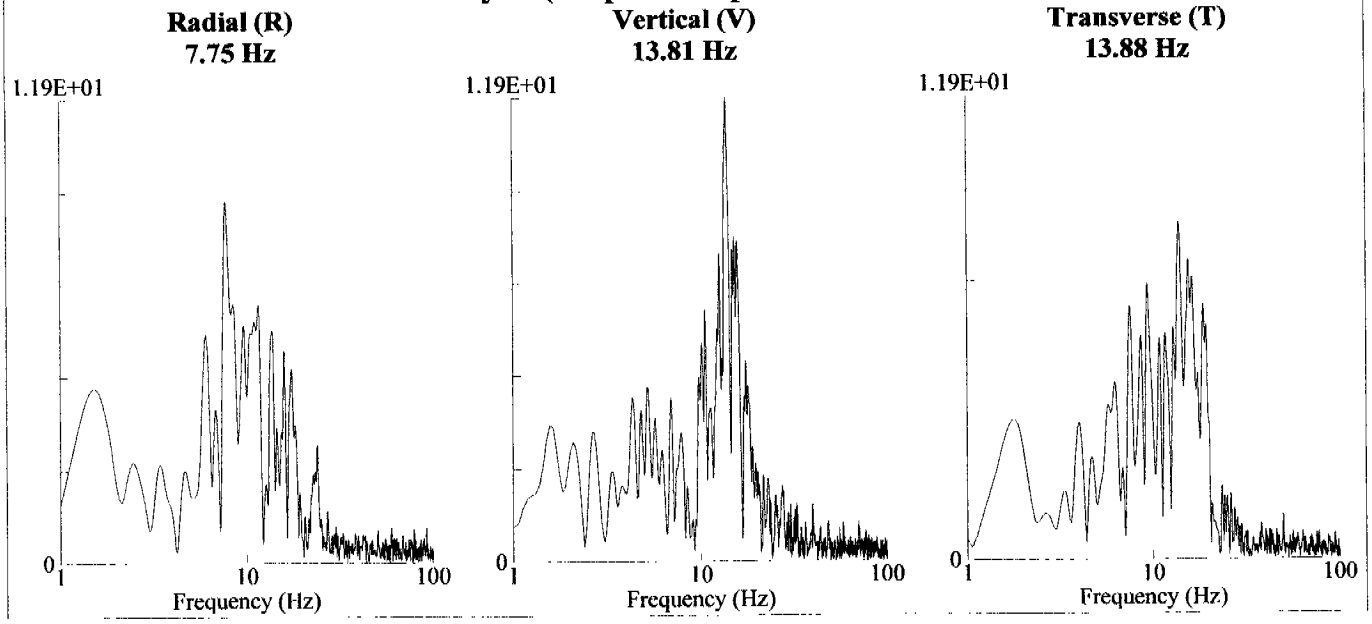
Duration: 0.000 sec To: 8.500 sec

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Ratliff Well

File: 00849029.DTB Event Number: 029 Date: 11/16/2000 Time: 16:00
Acoustic Trigger: 106 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 849

Amplitudes and Frequencies

Acoustic (A): 106 dB @ 0.0 Hz
(0.04Mb 0.0006psi 0.0040kPa)

***Radial (R):* 0.025in/s 0.635mm/s @ 11.6Hz**

Vertical (V): 0.015in/s 0.381mm/s @ 19.6Hz

***Transverse (T):* 0.025in/s 0.635mm/s @ 17.0Hz**

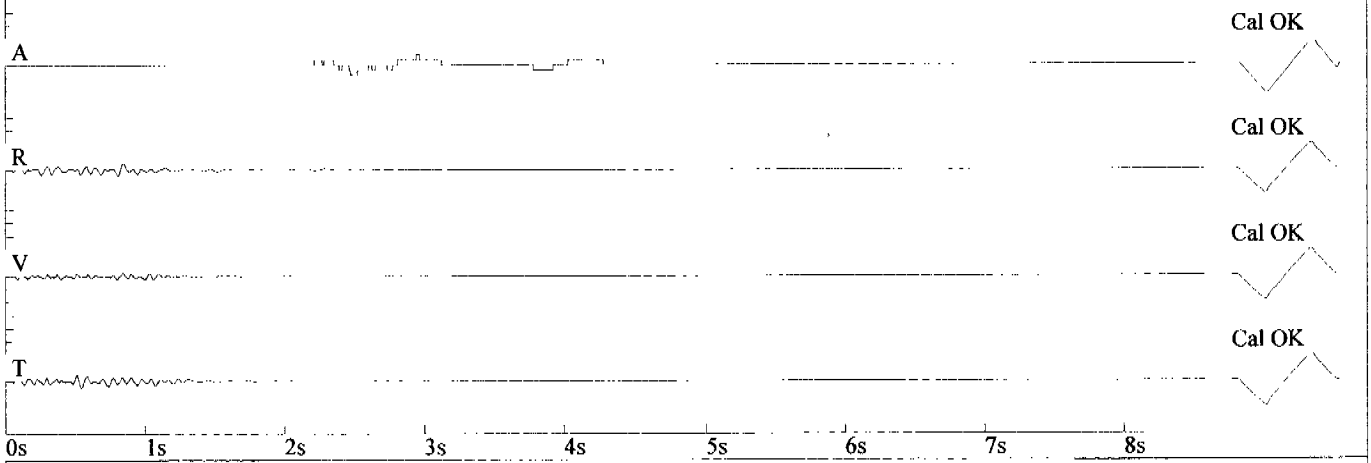
Graph Information

Duration: 0.000 sec To: 8.500 sec

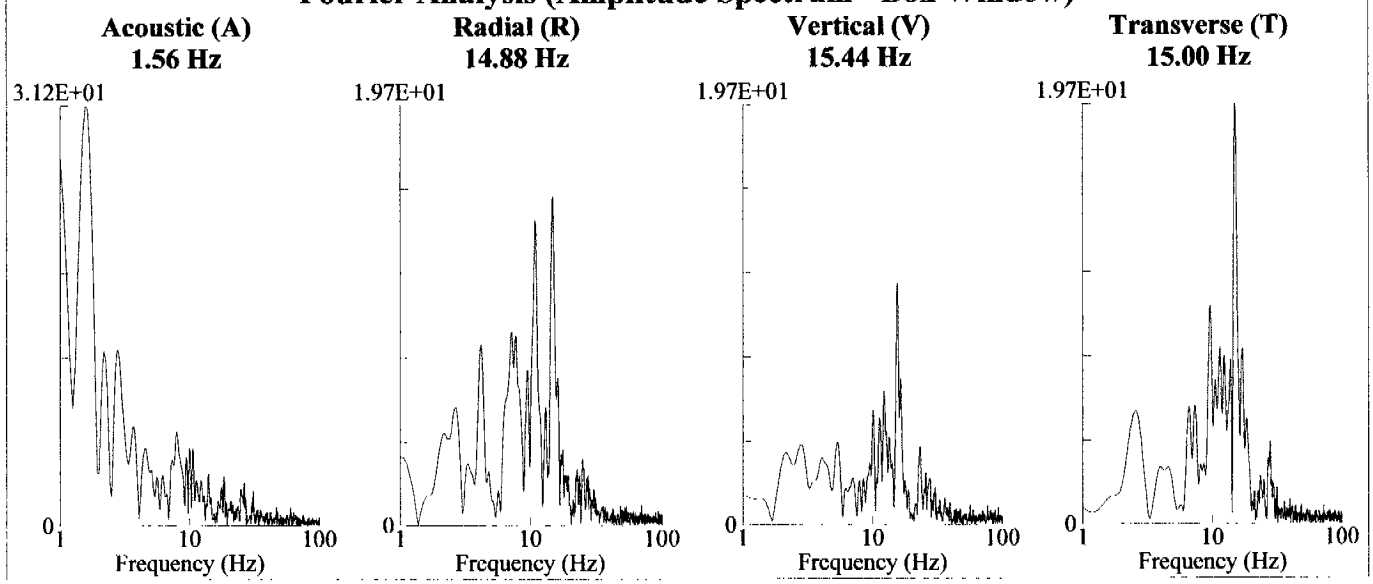
Acoustic Scale:
120dB 0.20Mb (0.050Mb/div)

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Ratliff Well

File: 00853081.DTB Event Number: 081 Date: 11/16/2000 Time: 15:59
Acoustic Trigger: 142 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 853

Amplitudes and Frequencies

***Radial (R):* 0.025in/s 0.635mm/s @ 11.1Hz**

Vertical (V): 0.01in/s 0.254mm/s @ 14.6Hz

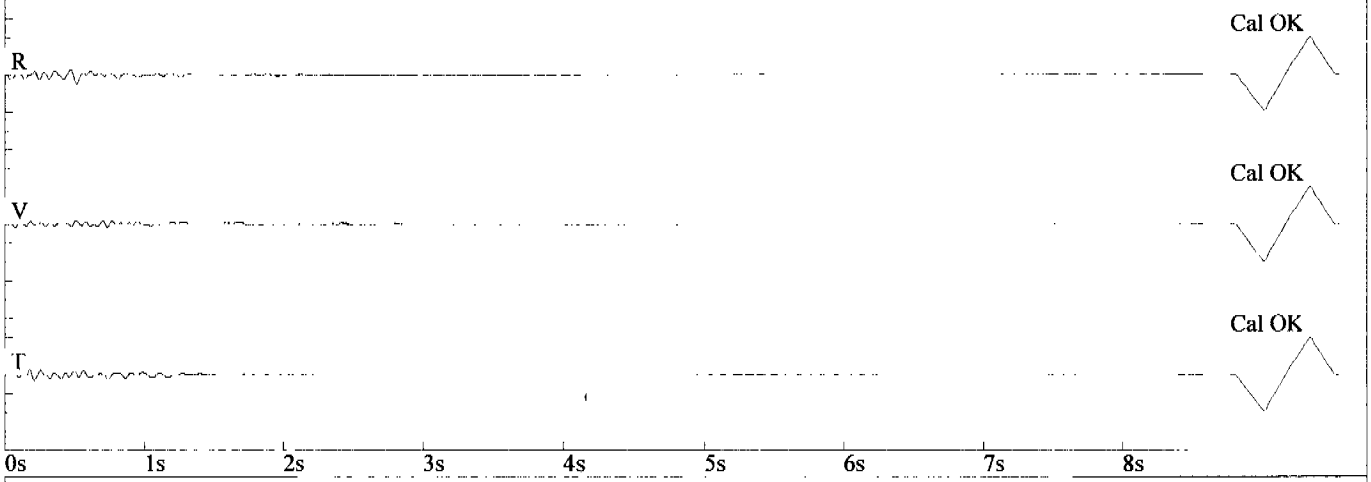
Transverse (T): 0.015in/s 0.381mm/s @ 17.0Hz

Graph Information

Duration: 0.000 sec To: 8.500 sec

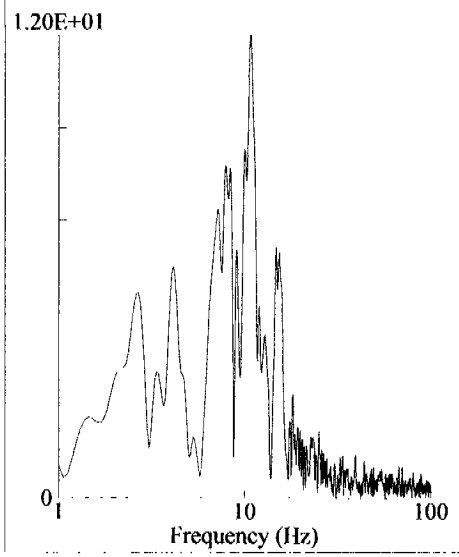
Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals

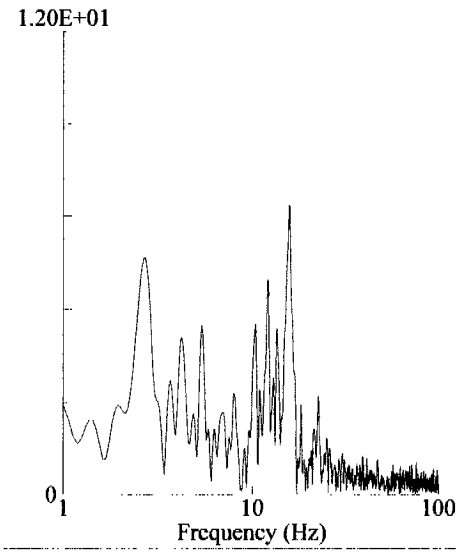


Fourier Analysis (Amplitude Spectrum - Box Window)

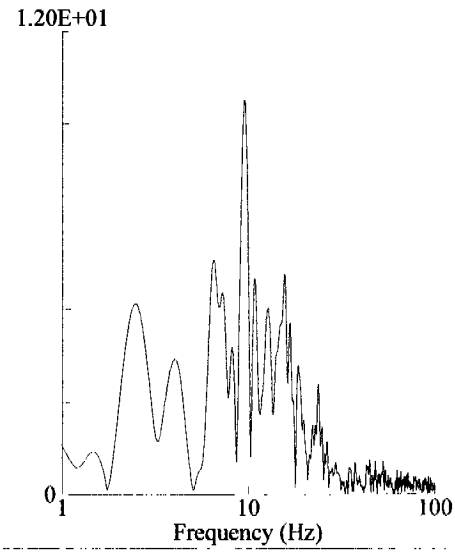
Radial (R)
10.75 Hz



Vertical (V)
15.75 Hz



Transverse (T)
9.56 Hz



Ratliff Well

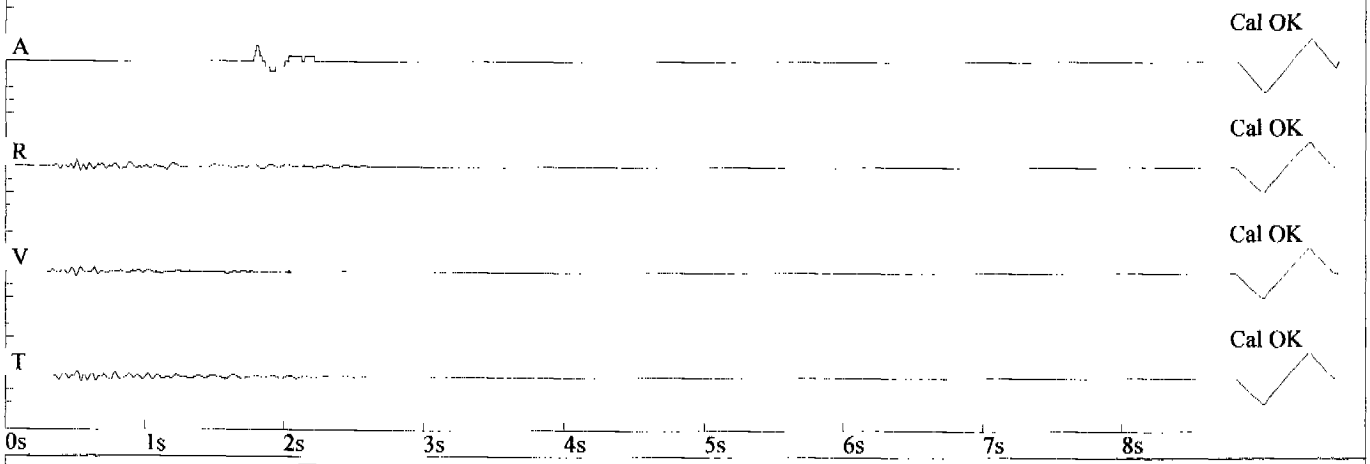
File: 00849033.DTB Event Number: 033 Date: 11/17/2000 Time: 12:15
Acoustic Trigger: 106 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 849

Amplitudes and Frequencies

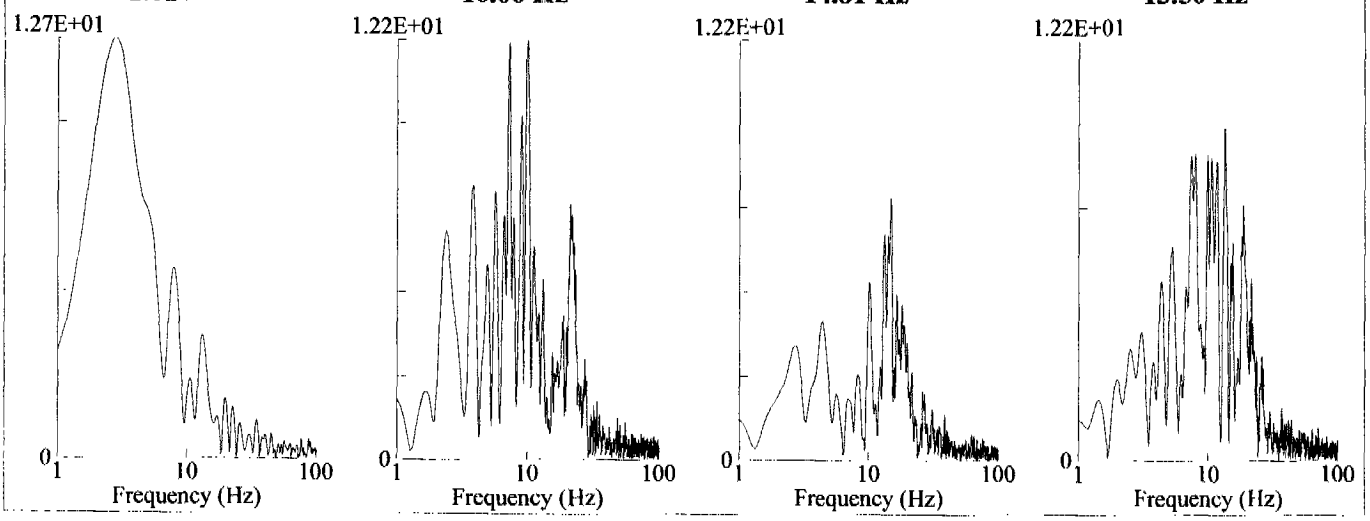
Acoustic (A): 110 dB @ 10.2 Hz
(0.06Mb 0.0009psi 0.0060kPa)
***Radial (R):* 0.025in/s 0.635mm/s @ 20.4Hz**
Vertical (V): 0.02in/s 0.508mm/s @ 20.4Hz
Transverse (T): 0.02in/s 0.508mm/s @ 15.5Hz

Graph Information

Duration: 0.000 sec To: 8.500 sec
Acoustic Scale:
120dB 0.20Mb (0.050Mb/div)
Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)
Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Ratliff Well
29 in. deep

File: 00853082.DTB Event Number: 082 Date: 11/17/2000 Time: 12:14
Acoustic Trigger: 142 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 853

Amplitudes and Frequencies

Radial (R): 0.015in/s 0.381mm/s @ 22.2Hz

Vertical (V): 0.015in/s 0.381mm/s @ 15.5Hz

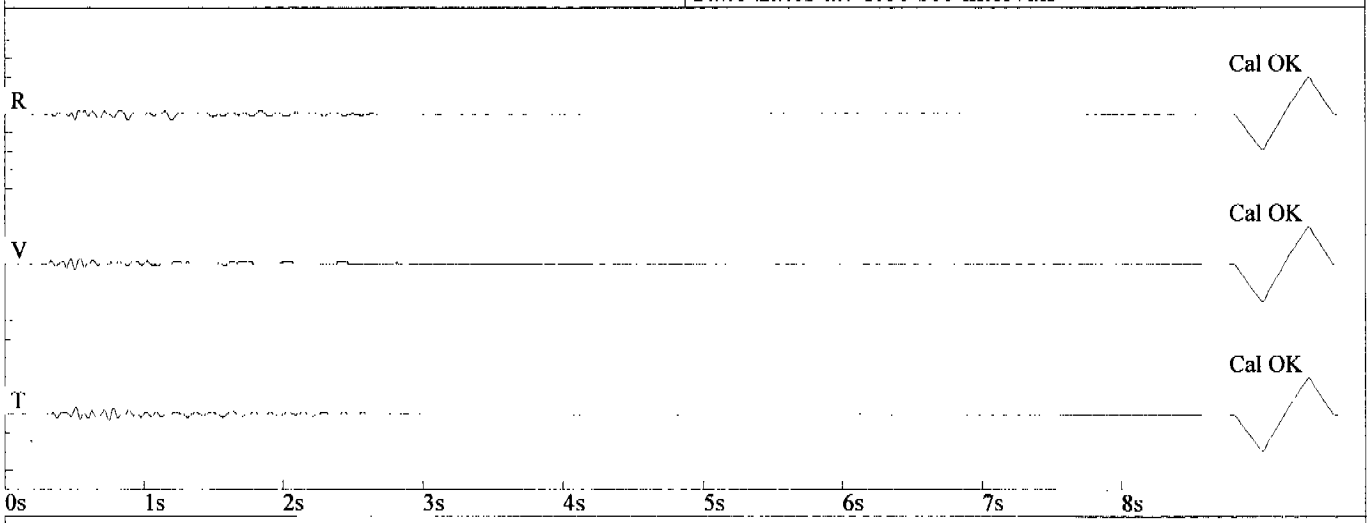
***Transverse (T):* 0.02in/s 0.508mm/s @ 15.0Hz**

Graph Information

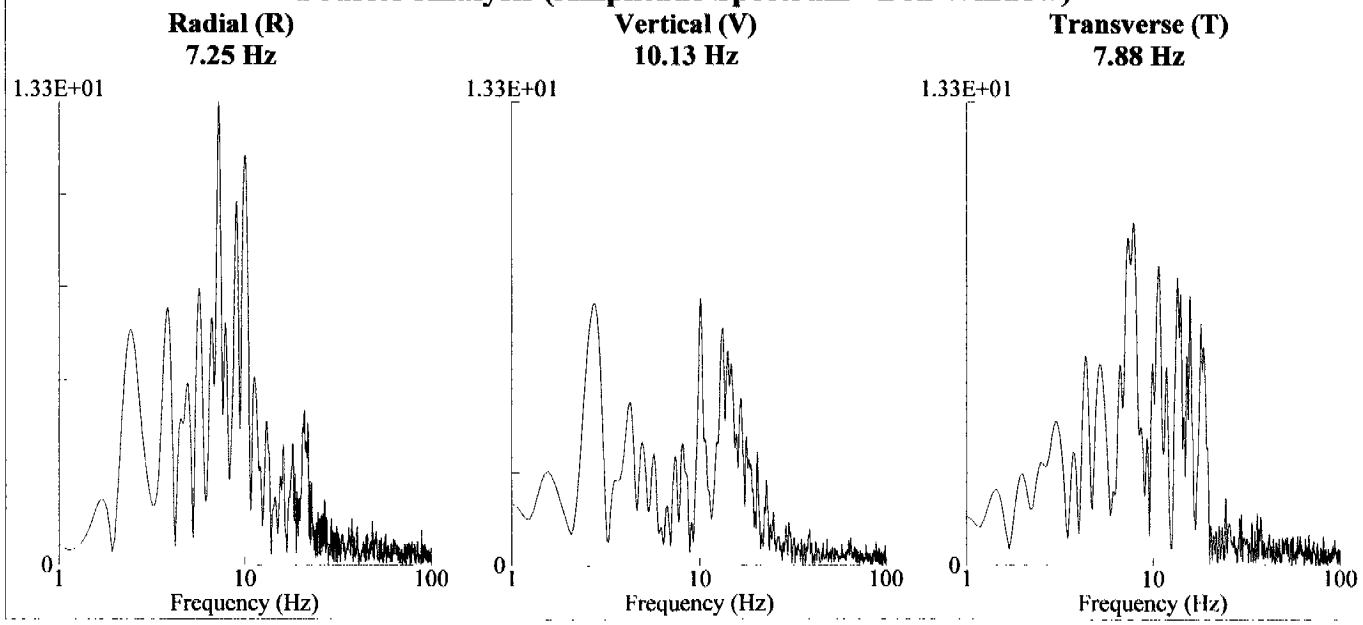
Duration: 0.000 sec To: 8.500 sec

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Ratliff Well

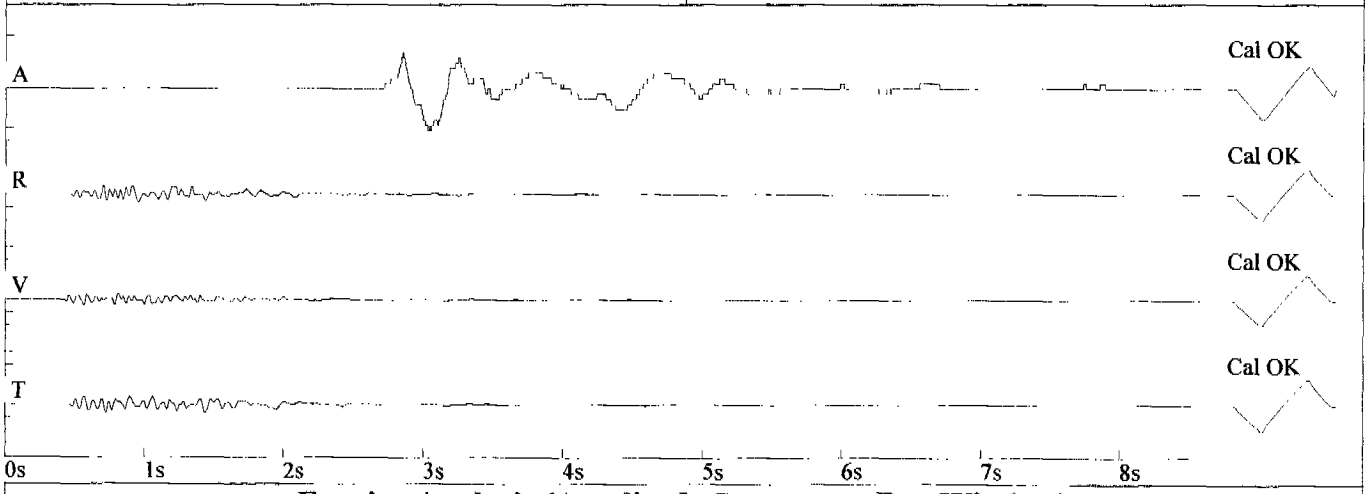
File: 00849034.DTB Event Number: 034 Date: 11/17/2000 Time: 12:34
Acoustic Trigger: 106 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 849

Amplitudes and Frequencies

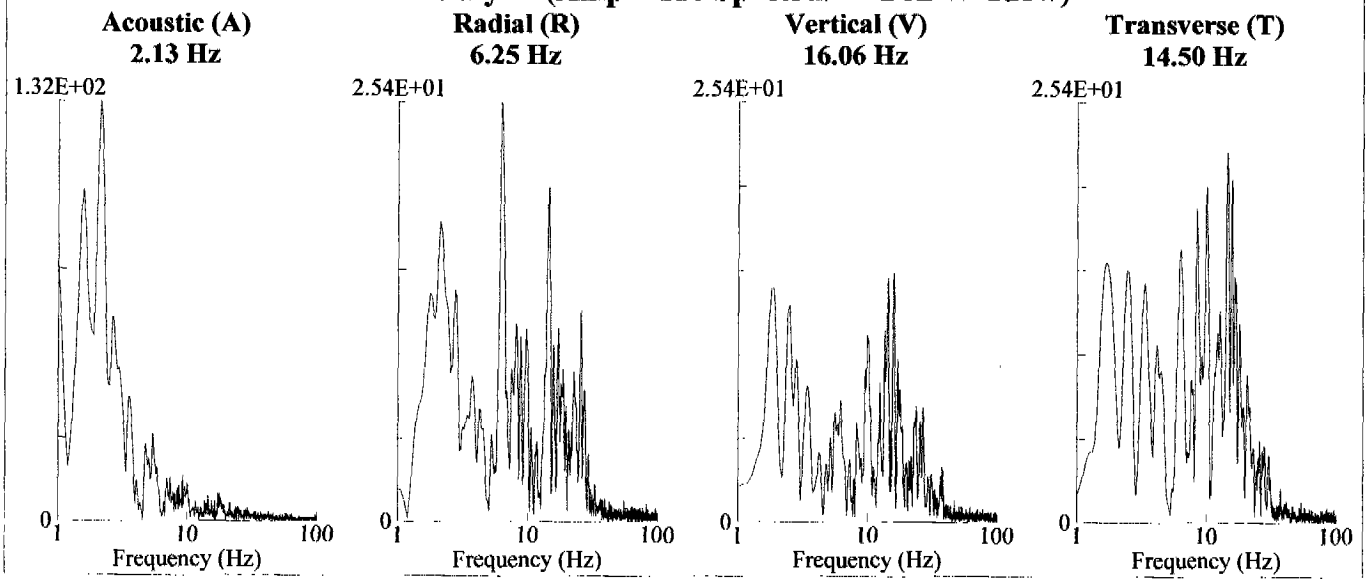
Acoustic (A): 118 dB @ 2.0 Hz
(0.16Mb 0.0023psi 0.0160kPa)
Radial (R): 0.03in/s 0.762mm/s @ 21.3Hz
Vertical (V): 0.025in/s 0.635mm/s @ 20.4Hz
***Transverse (T):* 0.035in/s 0.889mm/s @ 18.9Hz**

Graph Information

Duration: 0.000 sec To: 8.500 sec
Acoustic Scale:
120dB 0.20Mb (0.050Mb/div)
Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)
Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



Ratliff Well
29 in. deep

File: 00853083.DTB Event Number: 083 Date: 11/17/2000 Time: 12:34
Acoustic Trigger: 142 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 853

Amplitudes and Frequencies

***Radial (R):* 0.035in/s 0.889mm/s @ 7.8Hz**

Vertical (V): 0.02in/s 0.508mm/s @ 22.2Hz

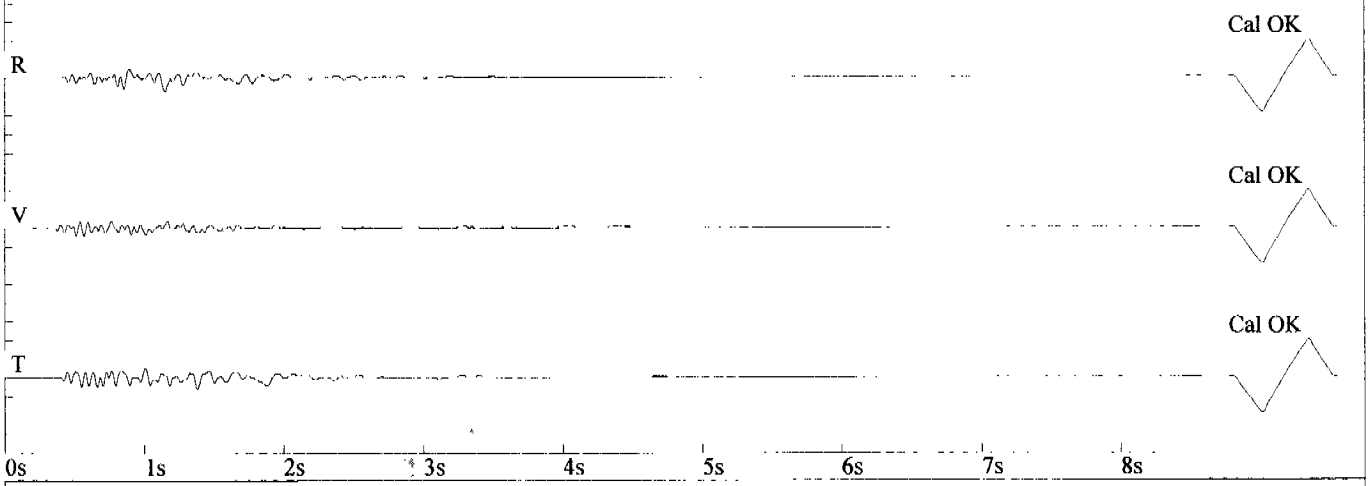
Transverse (T): 0.03in/s 0.762mm/s @ 12.4Hz

Graph Information

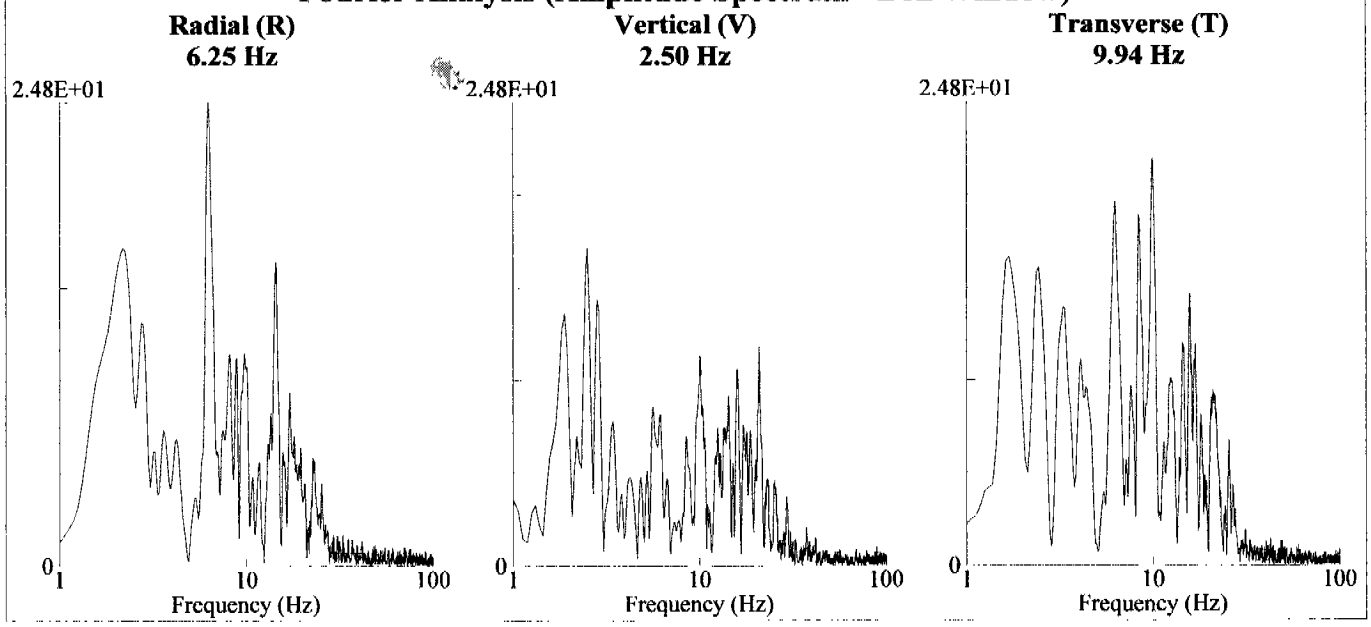
Duration: 0.000 sec To: 8.500 sec

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



G. Hurley Well

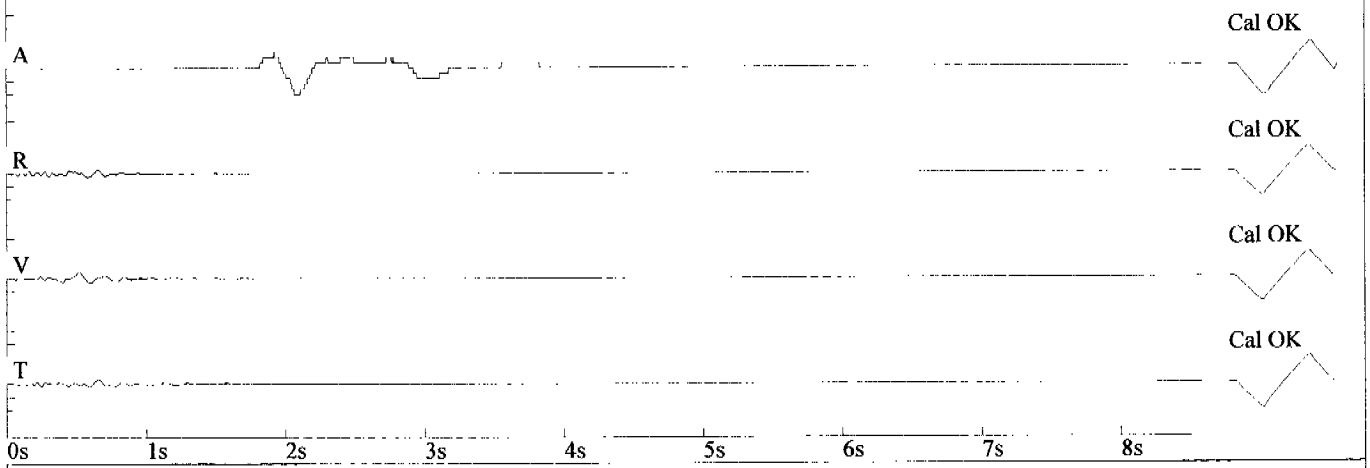
File: 00849036.DTB Event Number: 036 Date: 11/20/2000 Time: 13:03
Acoustic Trigger: 120 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 849

Amplitudes and Frequencies

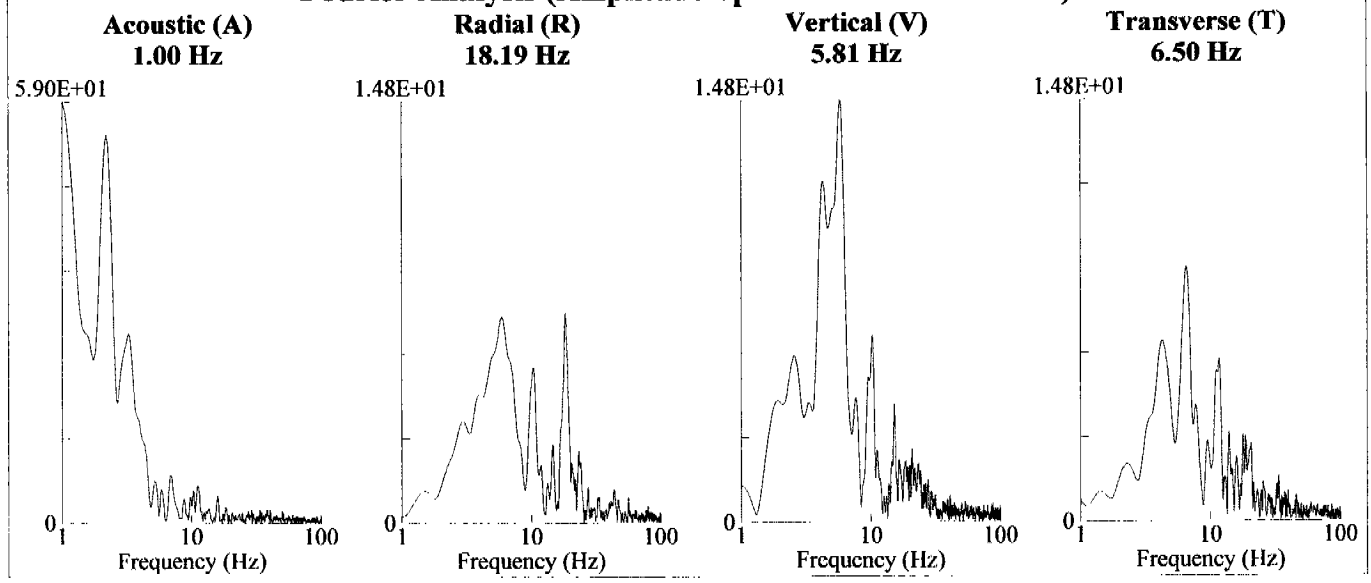
Acoustic (A): 114 dB @ 2.6 Hz
(0.10Mb 0.0015psi 0.0100kPa)
Radial (R): 0.015in/s 0.381mm/s @ 11.3Hz
***Vertical (V):* 0.025in/s 0.635mm/s @ 6.7Hz**
Transverse (T): 0.015in/s 0.381mm/s @ 8.6Hz

Graph Information

Duration: 0.000 sec To: 8.500 sec
Acoustic Scale:
120dB 0.20Mb (0.050Mb/div)
Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)
Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



G. Hurley Well
9.5 ft. deep

File: 00809090.DTB Event Number: 090 Date: 11/20/2000 Time: 13:03
Acoustic Trigger: 142 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 809

Amplitudes and Frequencies

Radial (R): 0.01in/s 0.254mm/s @ 0.0Hz

***Vertical (V):* 0.025in/s 0.635mm/s @ 5.9Hz**

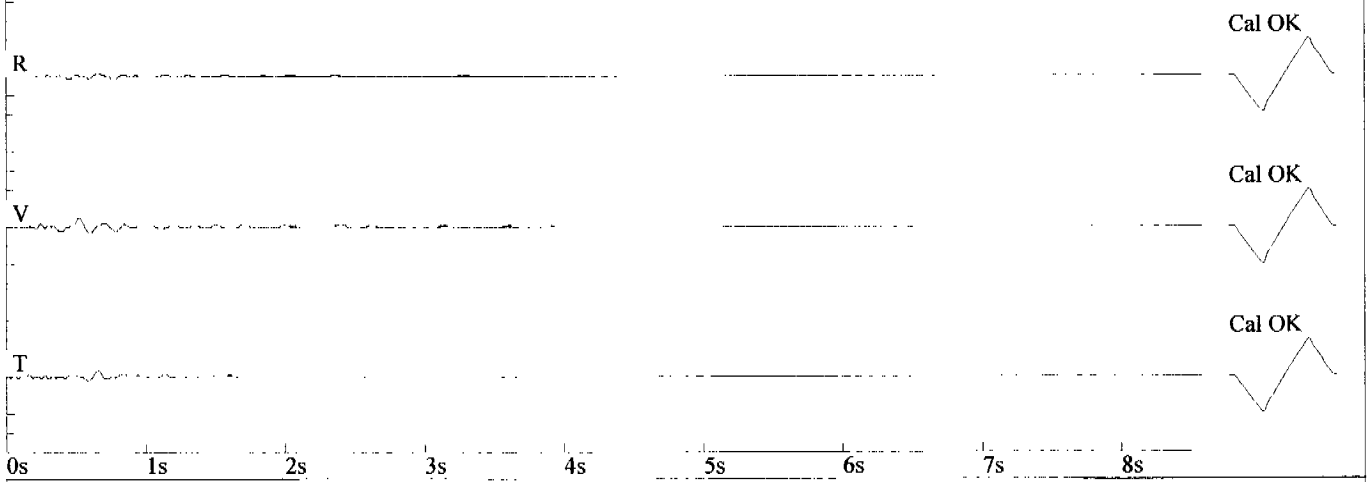
Transverse (T): 0.02in/s 0.508mm/s @ 9.1Hz

Graph Information

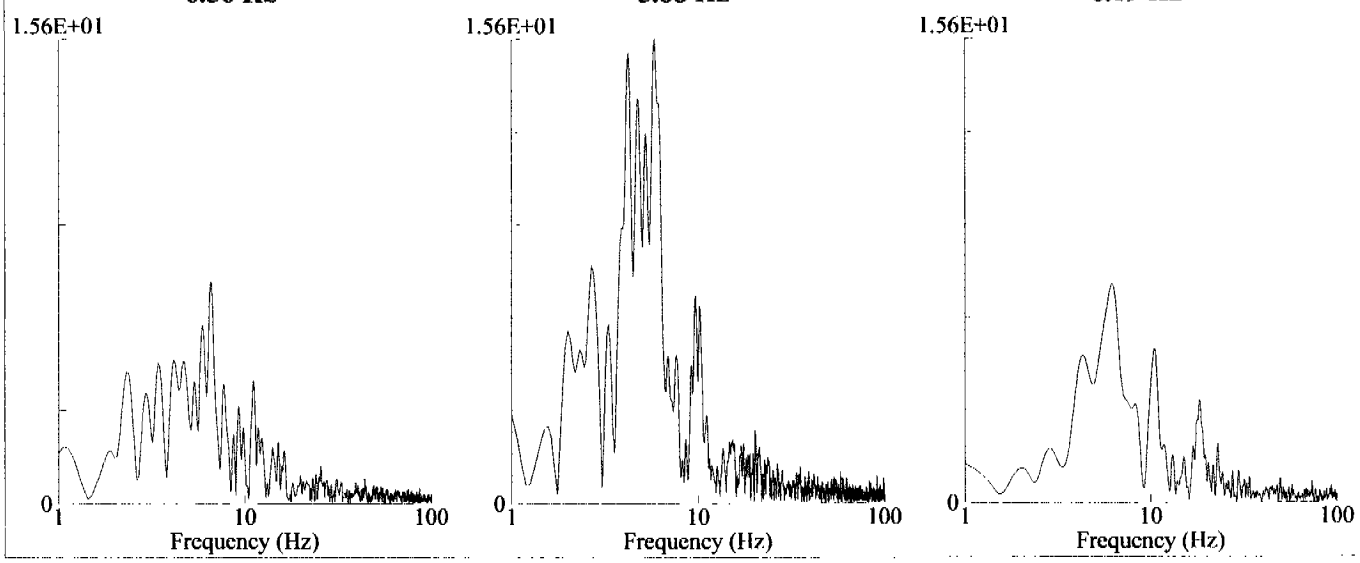
Duration: 0.000 sec To: 8.500 sec

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



G. Hurley Well

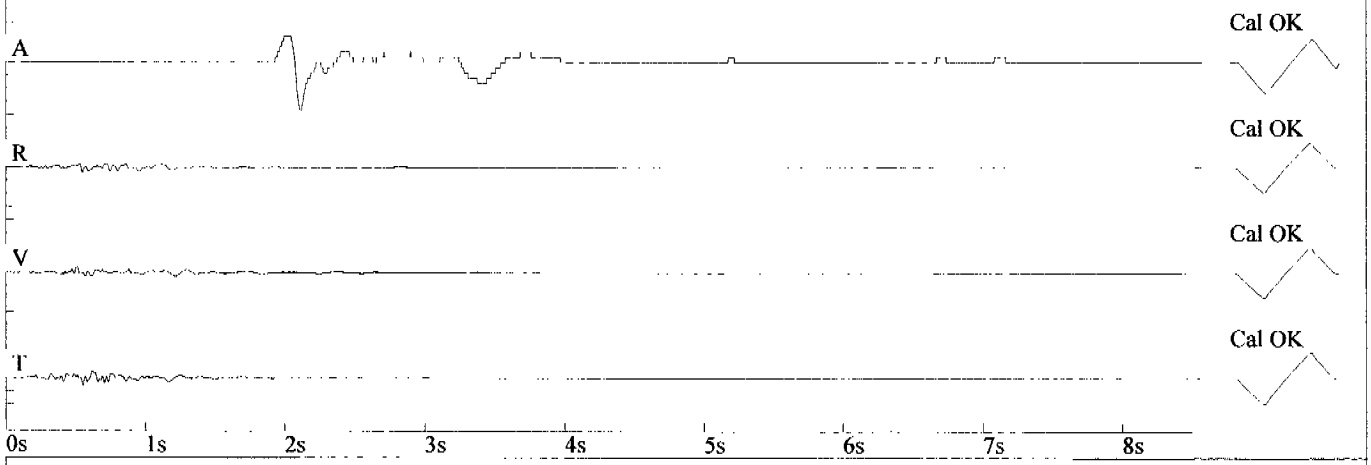
File: 00849037.DTB Event Number: 037 Date: 11/20/2000 Time: 16:08
Acoustic Trigger: 120 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 849

Amplitudes and Frequencies

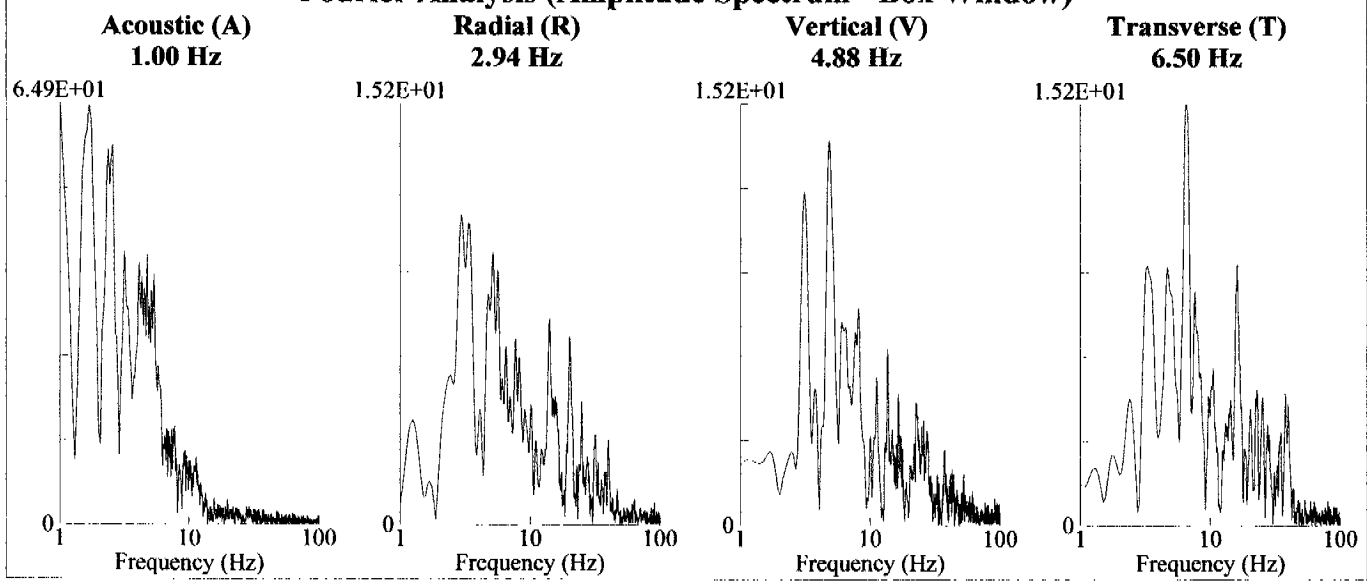
Acoustic (A): 119 dB @ 3.3 Hz
(0.18Mb 0.0026psi 0.0180kPa)
Radial (R): 0.02in/s 0.508mm/s @ 23.2Hz
Vertical (V): 0.02in/s 0.508mm/s @ 19.6Hz
***Transverse (T):* 0.03in/s 0.762mm/s @ 23.2Hz**

Graph Information

Duration: 0.000 sec To: 8.500 sec
Acoustic Scale:
120dB 0.20Mb (0.050Mb/div)
Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)
Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)



G. Hurley Well
9.5 ft. deep

File: 00809091.DTB Event Number: 091 Date: 11/20/2000 Time: 16:08
Acoustic Trigger: 142 dB Seismic Trigger: 0.02in/s 0.508mm/s Serial Number: 809

Amplitudes and Frequencies

Radial (R): 0.015in/s 0.381mm/s @ 0.0Hz

***Vertical (V):* 0.02in/s 0.508mm/s @ 16.5Hz**

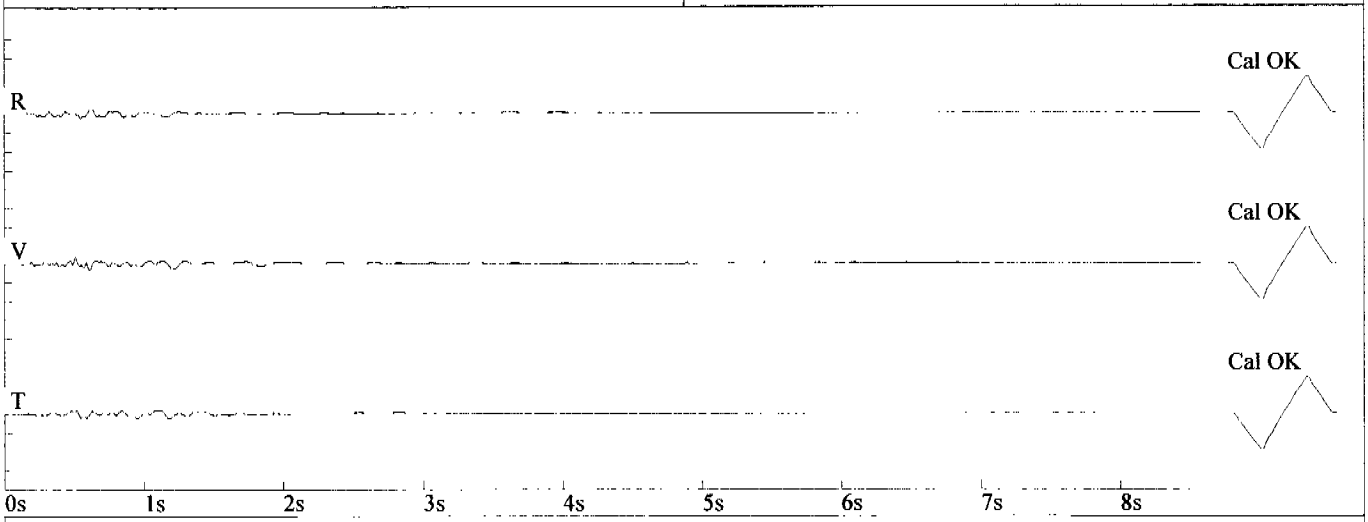
Transverse (T): 0.01in/s 0.254mm/s @ 0.0Hz

Graph Information

Duration: 0.000 sec To: 8.500 sec

Seismic Scale:
0.20in/s (0.050in/s/div) 5.08mm/s (1.270mm/s/div)

Time Lines at: 1.00 sec intervals



Fourier Analysis (Amplitude Spectrum - Box Window)