

# SGS Expertest Seismic Services



## VELOCITY SURVEY

**WOMBAT#3  
OTWAY BASIN  
VICTORIA**

for

**LAKES OIL**

recorded by

**EXPERTEST Pty. Ltd.**

processed by

**SGS EXPERTEST Pty. Ltd.**

Adelaide, Australia

21-11-2004

**Velpro 1.0**

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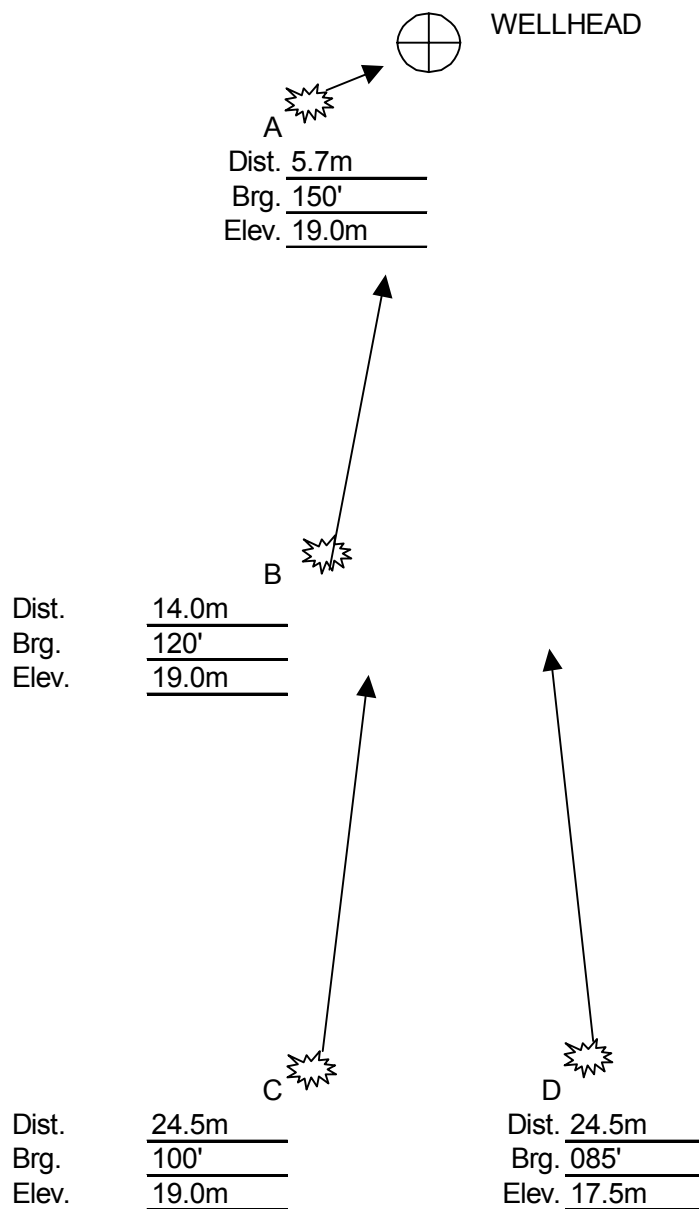
**SGS EXPERTEST Pty. Ltd.**  
**Seismic Services: - Location Sketch**

WELL

CLIENT : Lakes Oil

NAME : Wombat#3

DATE : 4/11/04



Comments :

**WOMBAT#3**

**SHOT POINT LOCATION SKETCH**  
**LAKES OIL**

**Figure 1**

## SUMMARY

Expertest Pty. Ltd. conducted a velocity survey for LAKES OIL in the WOMBAT#3 well, Otway Basin, Victoria. The date of the survey was the Thursday, 4 November 2004.

The results of the survey were used to calibrate the Sonic Log.

The energy source used was an explosive (Powergel).

## GENERAL INFORMATION

Name of Well	: WOMBAT#3
Coordinates	: Latitude 147° 08' 57" E : Longitude 38° 21' 28" S
Location	: Otway Basin, Victoria
Date of Survey	: Thursday, 4 November 2004
Wireline Logging	: Reeves Wireline
Weather	: FINE
Operational Base	: Brisbane
Operator	: DON BLICK
Shooter	: GEOFF CLIFFORD
Client Representative	: TIM O'BRIEN

## **EQUIPMENT**

### **Downhole Tool**

Veldata Camlock Tool 100 (90 mm dia.)

Sensors:

6 HIS 4.5Hz, 215 ohm, high temperature (300° F)  
detectors, connected in series – parallel.  
Frequency response, 8 – 300 Hz, within 3 dB

Preamplifier:

48 dB fixed gain.  
Frequency response, 8 – 200 Hz, within 3 dB

Reference Geophone:

Mark Products L1, 4.5 Hz

### **Recording Instrument**

System ID, VDLS 16 Recording system

Windows based high resolution seismic acquisition system

Computer	: Pentium™ portable computer
Resolution	: A/D conversion, 16 bit
Dynamic Range	: 96 dB
Total Gain	: 134.dB
Data Channels	: 8 maximum
Display	: A4 inkjet printer, 300 DPI

## **RECORDING**

Energy Source : POWERGEL

Shot Location : Mud Pit

Charge Size : 1.0

D & E Shot Depth : 1

Mud Pit Shot Offset : 0 METRES

Recording Geometry : see Figure 1 "Shot Point Location Sketch"

Shots were recorded on 3 ½ " floppy disk. Print outs of the shots used are included with this report.

The sample rate was 500 uSec across the entire survey.

### **Channel Allocation**

Channel 1 : Auxiliary ch.1, surface channel

Channel 2 : Auxiliary ch. 2, surface channel

Channel 3 : Time Break Confirmation

Channel 4 : Downhole Geophone

## PROCESSING

### Elevation Data

Elevation of KB : 22.6 METRES above sea level  
Elevation of Ground : 19 METRES above sea level  
Elevation of Datum : 0 METRES above sea level  
Depth Surveyed : 2142 METRES below KB  
Depth of Casing : 2180 METRES below KB  
Sonic Log Interval : 1348 to 2142 METERS below KB

### Shot Location Data

Shot A : Elevation	19.0	Offset	5.7	Units	METRES
Shot B : Elevation	19.0	Offset	14.0	Units	METRES
Shot C : Elevation	19.0	Offset	24.5	Units	METRES
Shot D : Elevation	17.5	Offset	24.5	Units	METRES

Instrument Delay : 6.5 MSec  
Surface Velocity : 1000 m/sec

### Recorded Data

Number of shots recorded	:29
Number of shots processed	:29
Number of levels recorded	:20
Data quality	:good
Noise levels	:moderate

### **Correction for Instrument Delay and Shot Offset**

The first arrival times from the auxiliary surface channels were used to calculate pit fatigue corrections, which were then applied to the times recorded for the downhole channel. These pit fatigue corrections are shown in TABLE 1.

TABLE 2 shows the corrections for instrument delay and for shot offset. The one-way vertical datum to geophone times ( $T_{gd}$ ) shown in TABLE 2 were used to calibrate the sonic log. The corrected times ( $T_{corr}$ ) shown in TABLE 2 are the recorded times plus any corrections for pit fatigue. The one-way vertical surface to geophone times ( $T_{vert}$ ) in TABLE 2 have been obtained by

- Subtraction of the instrument delay from the corrected first arrival time
- Geometric corrections to give vertical times, and correct for shot offset
- Shot static correction to correct for the depth of the shot below ground level at the wellhead using a correction velocity of 600 m/sec

The one-way vertical geophone to datum time ( $T_{gd}$ ) was then obtained by subtracting the surface to datum time of 11.3 msec from  $T_{vert}$ . A velocity of 2000 m/sec was used to calculate the offset. As the well had been cased a datum shot was not available. The one-way vertical geophone to datum times were used to plot the Time – Depth Curve, Figure 2.

### **Calibration of Sonic Log – Method**

Sonic times were adjusted to checkshot times using a polynomial derived least squares fit correction to the sonic transient times. The section of sonic log inside casing was excluded from the calibration.

Differences between the shot and sonic times occur as the sonic tool measures the local velocity characteristics of the formation with a relatively high frequency signal, whereas the downhole geophone records the bulk velocity with a signal of significantly lower frequency.



## **Calibration of Sonic Log – Results**

The Sonic data used was the 3'-5' Compensated Sonic measured in  $\mu\text{sec} / \text{ft}$  from the Sonic Log run by Reeves Wireline before the well was cased. The discrepancies between shot and sonic interval velocities were generally small. Checkshot intervals of less than 15 or 20m tend to yield anomalous interval times, but there is no evidence of that, as can be seen in TABLE 3. The largest discrepancy of  $-5.17\mu\text{sec} / \text{m}$  occurred over the interval to 1510.4m.

The total sonic drift over the well was 5.4 msec.

The calibrated sonic times were then used to calculate the average, Interval and RMS velocities and to plot the velocity curves. TABLE 4 shows the velocities calculated from the calibrated sonic times, and these velocities are plotted in figure 3. The interval velocities at TD are extremely high.

## **Trace Playouts**

Figure 4A is a shot order plot of all raw data traces used

Figure 4B is a depth order plot of selected data traces

Figure 4C is a plot of the auxiliary surface channels 1 & 2

Figure 4D is a plot of the Time Break Confirmation, Channel 3.

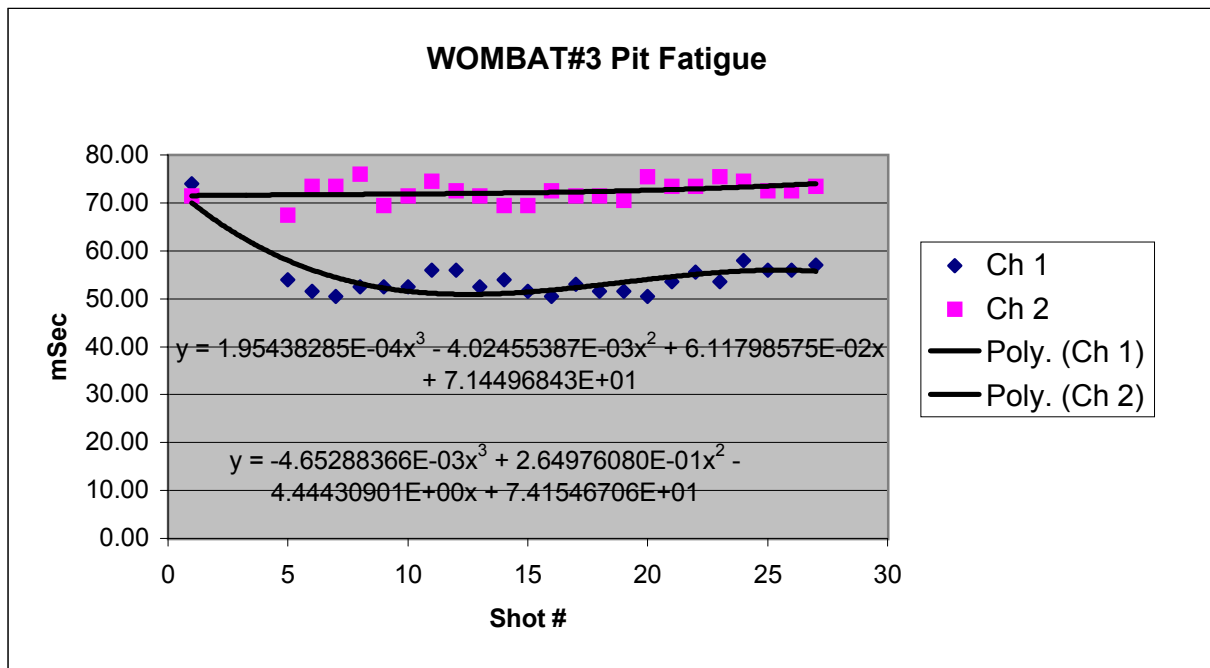
TABLE 1

## Corrections for Pit Fatigue

WELL: WOMBAT#3

CLIENT: LAKES OIL

Shot #	First break Ch 1	First break Ch 2	Ch 1 Correction	Ch 2 Correction	Correction, msec
1	74.00	71.50	-4.03	0.01	<b>-2.00</b>
5	54.00	67.50	3.98	4.18	<b>4.00</b>
6	51.50	73.50	4.52	-1.79	<b>1.50</b>
7	50.50	73.50	3.93	-1.75	<b>1.00</b>
8	52.50	76.00	0.68	-4.22	<b>-2.00</b>
9	52.50	69.50	-0.27	2.32	<b>1.00</b>
10	52.50	71.50	-0.94	0.35	<b>-0.50</b>
11	56.00	74.50	-4.86	-2.60	<b>-3.50</b>
12	56.00	72.50	-5.06	-0.56	<b>-3.00</b>
13	52.50	71.50	-1.56	0.49	<b>-0.50</b>
14	54.00	69.50	-2.90	2.55	<b>0.00</b>
15	51.50	69.50	-0.09	2.62	<b>1.50</b>
16	50.50	72.50	1.32	-0.30	<b>0.50</b>
17	53.00	71.50	-0.68	0.79	<b>0.00</b>
18	51.50	71.50	1.37	0.89	<b>1.00</b>
19	51.50	70.50	1.96	2.00	<b>2.00</b>
20	50.50	75.50	3.54	-2.87	<b>0.50</b>
21	53.50	73.50	1.09	-0.73	<b>0.00</b>
22	55.50	73.50	-0.42	-0.57	<b>-0.50</b>
23	53.50	75.50	2.00	-2.39	<b>0.00</b>
24	58.00	74.50	-2.20	-1.20	<b>-1.50</b>
25	56.00	72.50	-0.04	1.02	<b>0.50</b>
26	56.00	72.50	-0.05	1.25	<b>0.50</b>
27	57.00	73.50	-1.26	0.51	<b>-0.50</b>



**COMPANY : LAKES OIL**

**WELL : WOMBAT#3**

**SURVEY DATE : Thursday, 4 November 2004**

**Velocity Data Pty. Ltd.**

Elevations :      datum      0.0  
   gl      19.0  
   kb      22.6

Latitude:                      147 08 57 E  
Longitude:                    38 21 28 S

Shot Data :                    elevation    offset  
                 shot a           19.0        5.7  
                 shot b           19.0        14.0  
                 shot c           19.0        24.5  
                 shot d           17.5        24.5

Survey units :                METRES  
Times:                        mSec

Energy source :              POWERGEL  
Rig identification :          HUNT 2  
Logger :                      DON BLICK

Instrument delay:            6.50  
Surface velocity:            1000.00

Time to datum:              11.30

TABLE 2

Corrections for shot offset

WELL: WOMBAT#3

CLIENT:

LAKES OIL

Time to Datum : 11.30 mSec

shot #	shot		geophone depth		T(rec)	T(corr)	T(ver)	T(gd)	T(gd) Average	Check shot interval		Velocities	
	location	depth	kb	datum						distance	time	Average	Interval
2	A	1.00	1348.0	1325.4	590.0	590.0	583.5	575.2					
3	B	1.00	1348.0	1325.4	590.0	590.0	583.5	575.2					
4	C	1.00	1348.0	1325.4	591.5	591.5	584.9	576.6					
27	D	1.00	1348.0	1325.4	596.5	596.5	589.4	581.1					
5	D	1.00	1348.0	1325.4	593.0	597.0	590.4	582.1					
1	D	1.00	1348.0	1325.4	591.0	589.0	582.4	574.1	577.4	1325.4	577.4	2295.6	2295.6
26	D	1.00	1364.0	1341.4	597.0	597.5	590.9	582.6	582.6	16.0	5.2	2302.4	3062.5
25	D	1.00	1373.0	1350.4	600.5	601.0	594.4	586.1	586.1	9.0	3.5	2304.0	2570.9
24	D	1.00	1442.0	1419.4	624.5	623.0	616.4	608.1	608.1	69.0	22.0	2334.1	3135.5
23	D	1.00	1513.0	1490.4	645.0	645.0	638.4	630.1	630.1	71.0	22.0	2365.3	3226.5
22	D	1.00	1533.0	1510.4	647.0	646.5	639.9	631.6	631.6	20.0	1.5	2391.3	13314.9
21	D	1.00	1569.0	1546.4	661.5	661.5	654.9	646.6	646.6	36.0	15.0	2391.5	2399.7
20	D	1.00	1668.0	1645.4	688.5	689.0	682.4	674.1	674.1	99.0	27.5	2440.8	3599.1
19	D	1.00	1712.0	1689.4	700.0	702.0	695.4	687.1	687.1	44.0	13.0	2458.6	3384.0
18	D	1.00	1760.0	1737.4	717.0	718.0	711.4	703.1					
6	D	1.00	1760.0	1737.4	718.0	719.5	712.9	704.6	703.9	48.0	16.8	2468.3	2865.3
17	D	1.00	1811.0	1788.4	729.5	729.5	722.9	714.6	714.6	51.0	10.8	2502.5	4742.9
16	D	1.00	1833.0	1810.4	732.0	732.5	725.9	717.6	717.6	22.0	3.0	2522.7	7330.0
15	D	1.00	1900.0	1877.4	748.0	749.5	742.9	734.6	734.6	67.0	17.0	2555.5	3940.4
14	D	1.00	1913.0	1890.4	751.5	751.5	744.9	736.6	736.6	13.0	2.0	2566.3	6497.7
13	D	1.00	1961.0	1938.4	762.5	762.0	755.4	747.1	747.1	48.0	10.5	2594.4	4570.5
12	D	1.00	2017.0	1994.4	779.0	776.0	769.4	761.1	761.1	56.0	14.0	2620.3	3999.3
11	D	1.00	2042.0	2019.4	788.5	785.0	778.4	770.1	770.1	25.0	9.0	2622.1	2777.5
10	D	1.00	2083.0	2060.4	796.0	795.5	788.9	780.6	780.6	41.0	10.5	2639.4	3904.2
9	D	1.00	2104.0	2081.4	798.0	799.0	792.4	784.1	784.1	21.0	3.5	2654.4	5998.5
8	D	1.00	2142.0	2119.4	805.0	803.0	796.4	788.1					
7	D	1.00	2142.0	2119.4	804.5	805.5	798.9	790.6	789.4	38.0	5.3	2684.8	7235.9
													2843.1

TABLE 3

## Checkshot / Sonic Deviation Data

WELL :

WOMBAT#3

CLIENT:

LAKES OIL

Depth m(datum)	T(Sonic) datum, mSec	T(Checkshot) datum, mSec	Deviation Shot-Sonic	Sonic Interval mSec	Shot Interval mSec	Interval Correction mSec	Cumulated Correction
1325.4	577.4	577.4	0.0				0.0
1341.4	581.4	582.6	1.2	4.0	5.2	1.2	1.2
1350.4	583.4	586.1	2.7	2.0	3.5	1.5	2.7
1419.4	612.7	608.1	-4.6	29.3	22.0	-7.3	-4.6
1490.4	634.1	630.1	-4.0	21.5	22.0	0.5	-4.0
1510.4	639.4	631.6	-7.8	5.3	1.5	-3.8	-7.8
1546.4	649.6	646.6	-3.0	10.2	15.0	4.8	-3.0
1645.4	677.5	674.1	-3.4	27.9	27.5	-0.4	-3.4
1689.4	689.8	687.1	-2.6	12.3	13.0	0.7	-2.6
1737.4	702.3	703.9	1.5	12.6	16.8	4.2	1.5
1788.4	715.2	714.6	-0.5	12.8	10.8	-2.1	-0.5
1810.4	720.6	717.6	-3.0	5.4	3.0	-2.4	-3.0
1877.4	736.8	734.6	-2.2	16.2	17.0	0.8	-2.2
1890.4	739.8	736.6	-3.1	3.0	2.0	-1.0	-3.1
1938.4	751.3	747.1	-4.2	11.5	10.5	-1.0	-4.2
1994.4	765.2	761.1	-4.1	13.9	14.0	0.1	-4.1
2019.4	771.5	770.1	-1.4	6.3	9.0	2.7	-1.4
2060.4	781.5	780.6	-0.8	9.9	10.5	0.6	-0.8
2081.4	786.5	784.1	-2.4	5.0	3.5	-1.5	-2.4
2119.4	794.7	789.4	-5.4	8.2	5.3	-3.0	-5.4

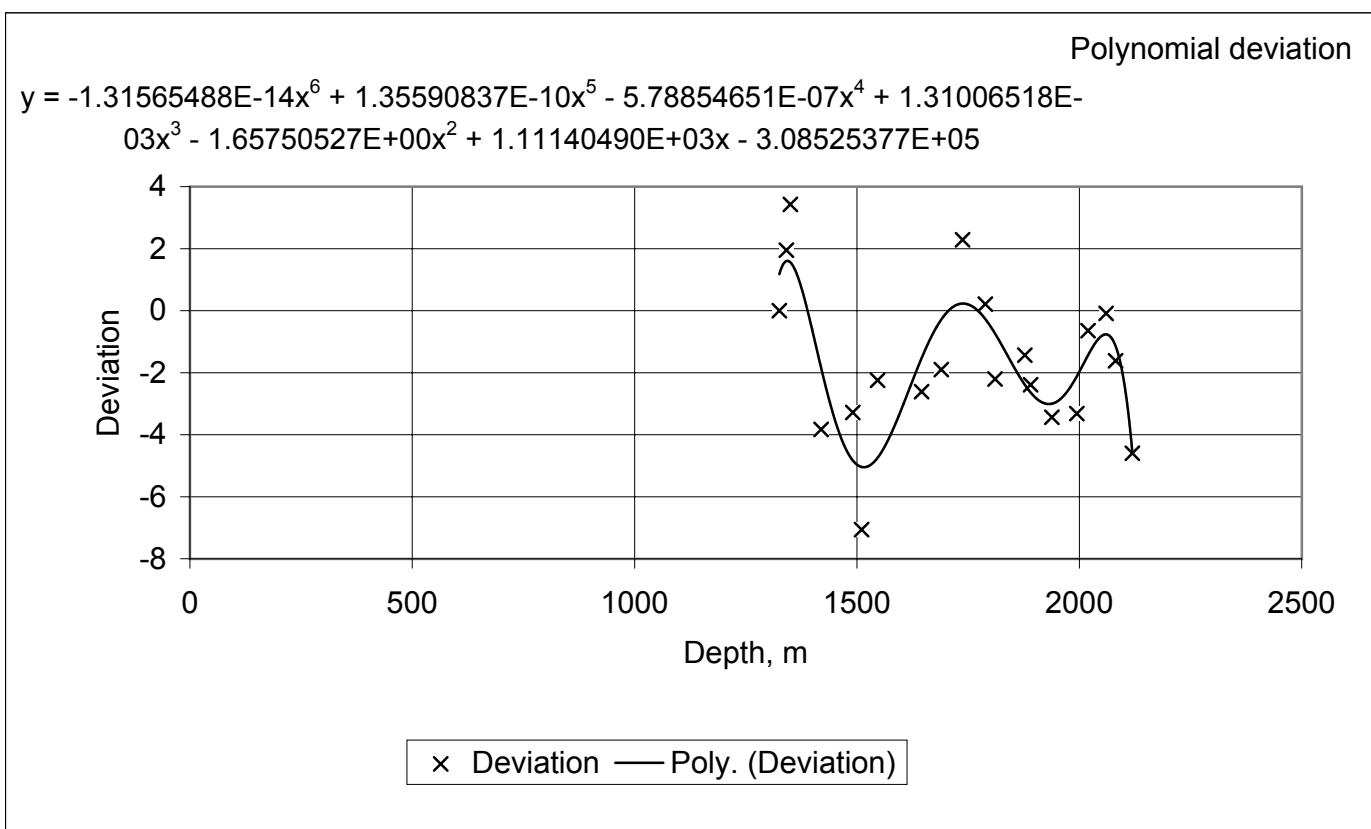


Table 4.1

## Time Depth Curve Values

WELL:

WOMBAT#3

CLIENT :

LAKES OIL

Calibrated Sonic Velocities used for calculations

Depth m(datum)	T(sonic) datum, msec	Interval	Velocities Average	RMS
<b>1325.4</b>	<b>578.6</b>	<b>2291</b>	<b>2291</b>	<b>2291</b>
1330.0	579.8	3680	2294	2295
1335.0	581.2	3475	2297	2298
1340.0	582.7	3466	2300	2302
<b>1341.4</b>	<b>583.0</b>	<b>4410</b>	<b>2301</b>	<b>2304</b>
1345.0	583.8	4613	2304	2308
1350.0	584.9	4472	2308	2314
<b>1350.4</b>	<b>585.0</b>	<b>4851</b>	<b>2308</b>	<b>2315</b>
1355.0	586.3	3496	2311	2318
1360.0	589.4	1587	2307	2315
1365.0	592.0	1980	2306	2314
1370.0	594.0	2498	2306	2314
1375.0	595.9	2639	2308	2315
1380.0	597.5	3125	2310	2318
1385.0	599.3	2694	2311	2319
1390.0	600.9	3120	2313	2322
1395.0	602.6	2960	2315	2324
1400.0	604.3	2933	2317	2326
1405.0	606.0	3056	2319	2328
1410.0	607.7	2822	2320	2330
1415.0	609.4	2990	2322	2332
<b>1419.4</b>	<b>610.8</b>	<b>3072</b>	<b>2324</b>	<b>2334</b>
1420.0	611.0	3671	2324	2334
1425.0	612.3	3836	2327	2338
1430.0	613.6	3766	2330	2342
1435.0	614.9	3979	2334	2347
1440.0	616.1	4147	2337	2352
1445.0	617.5	3687	2340	2356
1450.0	618.8	3754	2343	2359
1455.0	620.1	3862	2346	2364
1460.0	621.4	3917	2350	2368
1465.0	622.6	3875	2353	2372
1470.0	624.0	3791	2356	2376
1475.0	625.2	3936	2359	2380
1480.0	626.5	3868	2362	2384
1485.0	627.9	3763	2365	2388
1490.0	629.2	3671	2368	2391
<b>1490.4</b>	<b>629.3</b>	<b>4071</b>	<b>2368</b>	<b>2392</b>
1495.0	630.4	4165	2371	2396
1500.0	631.6	4074	2375	2400
1505.0	632.9	3938	2378	2404
1510.0	634.3	3731	2381	2408
<b>1510.4</b>	<b>634.4</b>	<b>3105</b>	<b>2381</b>	<b>2408</b>
1515.0	635.8	3346	2383	2411
1520.0	637.2	3504	2385	2414
1525.0	638.6	3562	2388	2417
1530.0	640.0	3536	2391	2420
1535.0	641.5	3440	2393	2423
1540.0	642.9	3415	2395	2425
1545.0	644.4	3277	2397	2428

Depth m(datum)	T(sonic) datum, msec	Interval	Velocities Average	RMS
<b>1546.4</b>	<b>644.9</b>	<b>3319</b>	<b>2398</b>	<b>2428</b>
1550.0	646.0	3208	2399	2430
1555.0	647.6	3173	2401	2432
1560.0	649.0	3389	2404	2435
1565.0	650.6	3189	2405	2437
1570.0	652.2	3231	2407	2439
1575.0	653.7	3295	2409	2441
1580.0	655.2	3368	2412	2444
1585.0	656.7	3163	2413	2446
1590.0	658.3	3272	2415	2448
1595.0	659.8	3270	2417	2450
1600.0	661.4	3104	2419	2452
1605.0	663.0	3182	2421	2454
1610.0	664.6	3134	2423	2456
1615.0	666.1	3191	2424	2458
1620.0	667.7	3128	2426	2460
1625.0	669.3	3194	2428	2462
1630.0	670.9	3125	2430	2463
1635.0	672.5	3138	2431	2465
1640.0	674.2	2942	2433	2466
1645.0	675.8	3069	2434	2468
<b>1645.4</b>	<b>676.0</b>	<b>3142</b>	<b>2434</b>	<b>2468</b>
1650.0	677.4	3165	2436	2470
1655.0	678.9	3334	2438	2472
1660.0	680.5	3219	2440	2474
1665.0	682.0	3321	2441	2476
1670.0	683.5	3266	2443	2478
1675.0	685.0	3294	2445	2481
1680.0	686.6	3152	2447	2482
1685.0	688.1	3236	2449	2484
<b>1689.4</b>	<b>689.5</b>	<b>3294</b>	<b>2450</b>	<b>2486</b>
1690.0	689.7	3254	2450	2486
1695.0	691.1	3452	2453	2489
1700.0	692.5	3490	2455	2491
1705.0	694.0	3548	2457	2494
1710.0	695.3	3660	2459	2497
1715.0	696.7	3728	2462	2500
1720.0	698.0	3813	2464	2503
1725.0	699.4	3606	2467	2505
1730.0	700.7	3797	2469	2508
1735.0	702.0	3782	2472	2511
<b>1737.4</b>	<b>702.6</b>	<b>4225</b>	<b>2473</b>	<b>2513</b>
1740.0	703.2	3987	2474	2515
1745.0	704.5	4002	2477	2518
1750.0	705.7	3971	2480	2522
1755.0	707.0	4096	2482	2525
1760.0	708.1	4322	2485	2529
1765.0	709.3	4353	2489	2533
1770.0	710.5	4090	2491	2537
1775.0	711.7	3989	2494	2540

### Time Depth Curve Values

LAKES OIL

### Calibrated Sonic Velocities used for calculations

Depth m(datumn)	T(sonic) datum, msec	Velocities		
		Interval	Average	RMS
1780.0	713.0	4040	2497	2544
1785.0	714.1	4342	2500	2547
<b>1788.4</b>	<b>714.9</b>	<b>4370</b>	<b>2502</b>	<b>2550</b>
1790.0	715.3	4027	2502	2551
1795.0	716.5	4075	2505	2555
1800.0	717.6	4484	2508	2559
1805.0	718.7	4779	2512	2563
1810.0	719.8	4687	2515	2568
<b>1810.4</b>	<b>719.8</b>	<b>4164</b>	<b>2515</b>	<b>2568</b>
1815.0	720.9	4319	2518	2572
1820.0	722.1	4366	2521	2575
1825.0	723.2	4427	2524	2579
1830.0	724.2	4763	2527	2584
1835.0	725.3	4849	2530	2588
1840.0	726.3	4709	2533	2593
1845.0	727.4	4683	2536	2597
1850.0	728.4	4835	2540	2602
1855.0	729.5	4864	2543	2606
1860.0	730.5	4872	2546	2611
1865.0	731.6	4671	2549	2615
1870.0	732.7	4364	2552	2619
1875.0	733.9	4265	2555	2622
<b>1877.4</b>	<b>734.4</b>	<b>4339</b>	<b>2556</b>	<b>2624</b>
1880.0	734.9	4997	2558	2626
1885.0	736.0	4953	2561	2631
1890.0	737.0	4617	2564	2635
<b>1890.4</b>	<b>737.1</b>	<b>4379</b>	<b>2565</b>	<b>2635</b>
1895.0	738.2	4239	2567	2638
1900.0	739.3	4746	2570	2642
1905.0	740.3	5023	2573	2647
1910.0	741.5	4120	2576	2650
1915.0	742.7	4117	2578	2653
1920.0	743.9	4205	2581	2656
1925.0	745.1	4210	2584	2660
1930.0	746.3	3929	2586	2662
1935.0	747.5	4308	2589	2666
<b>1938.4</b>	<b>748.3</b>	<b>4171</b>	<b>2590</b>	<b>2668</b>
1940.0	748.7	4050	2591	2669
1945.0	750.0	3798	2593	2671
1950.0	751.3	3904	2595	2674
1955.0	752.6	3908	2598	2676
1960.0	753.9	3856	2600	2679
1965.0	755.2	3824	2602	2681
1970.0	756.5	3753	2604	2683
1975.0	757.9	3641	2606	2685
1980.0	759.3	3584	2608	2687
1985.0	760.6	3945	2610	2690
1990.0	761.9	3689	2612	2692
<b>1994.4</b>	<b>763.1</b>	<b>3761</b>	<b>2614</b>	<b>2694</b>
1995.0	763.3	3685	2614	2694

[illegible]

Figure 2

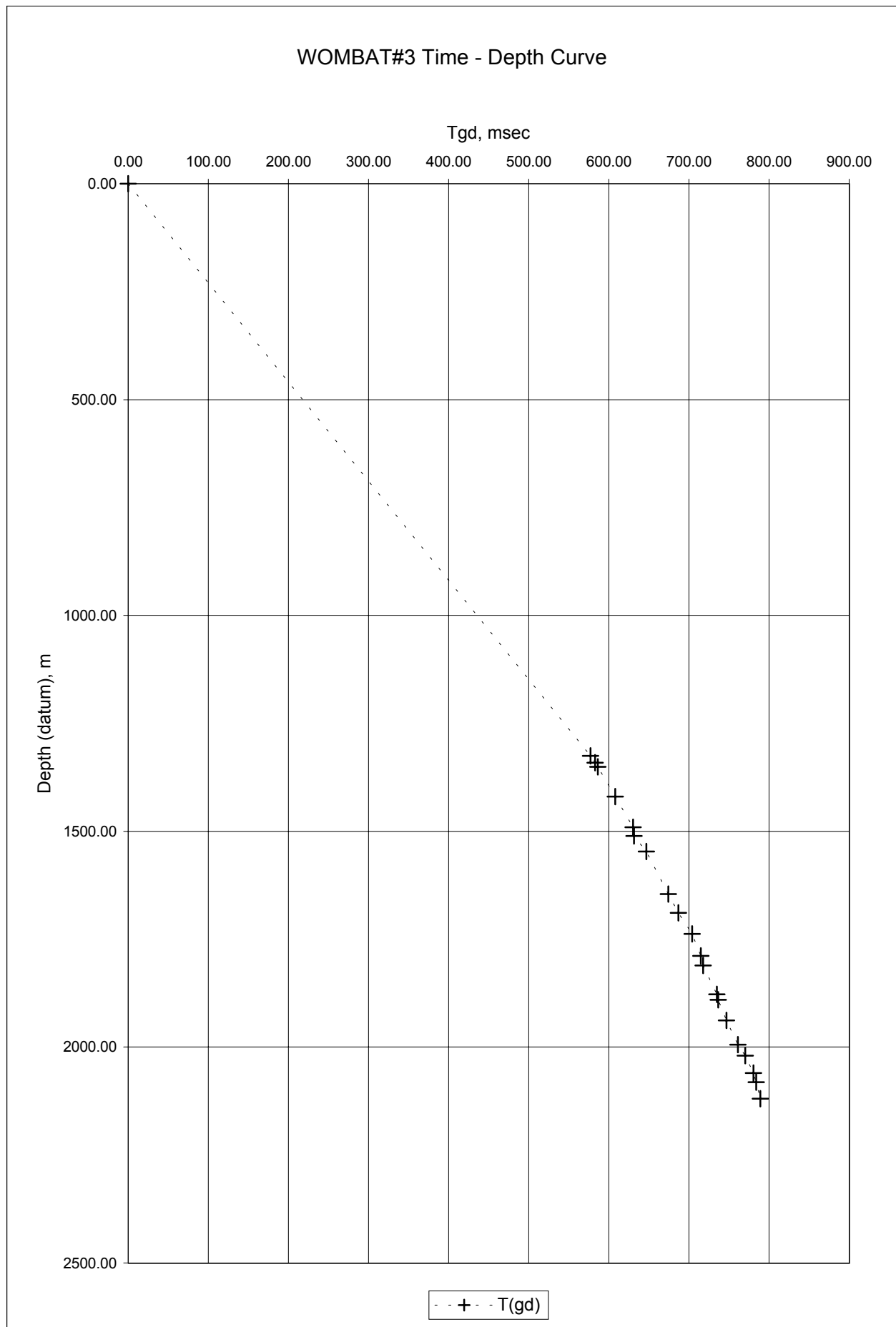
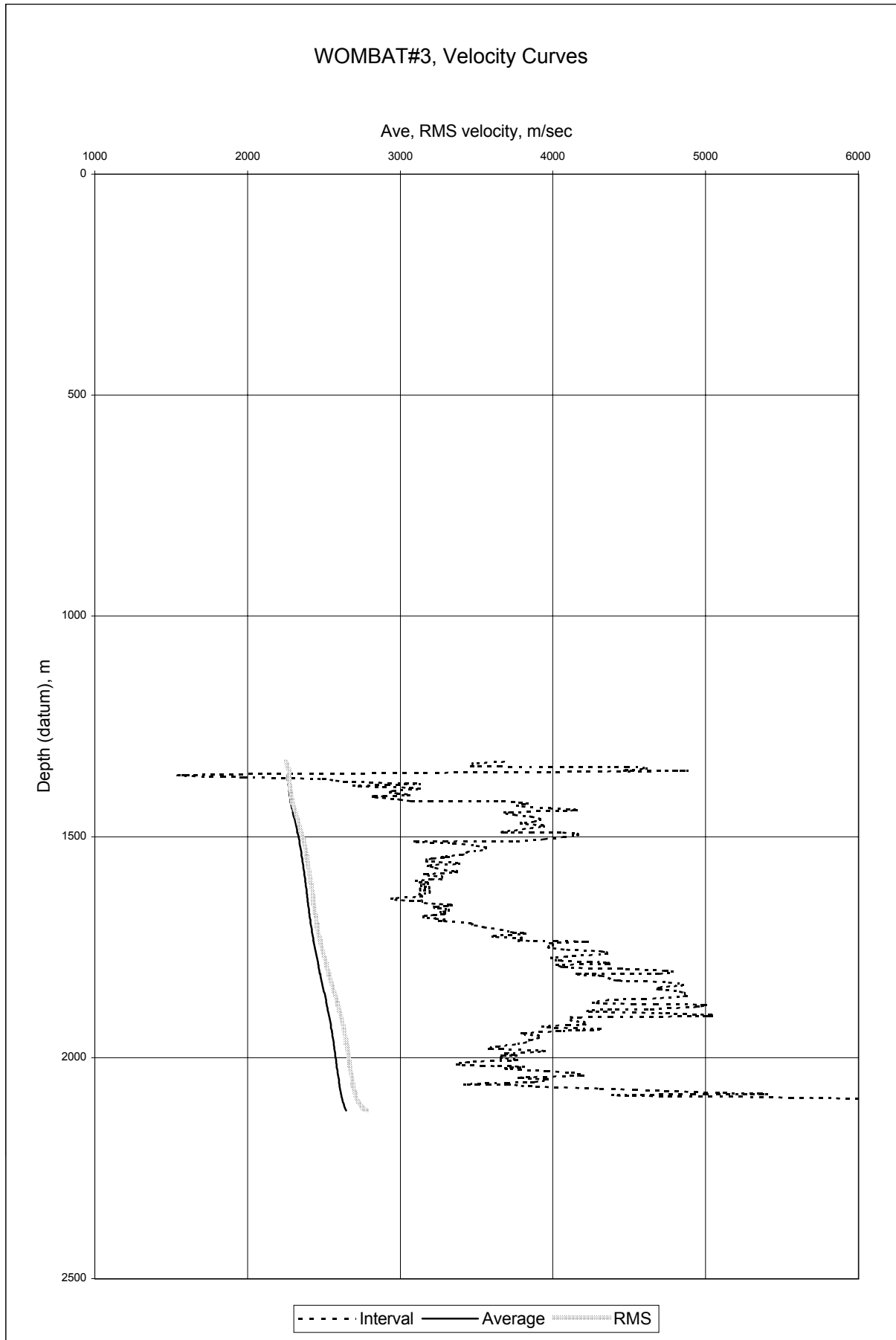
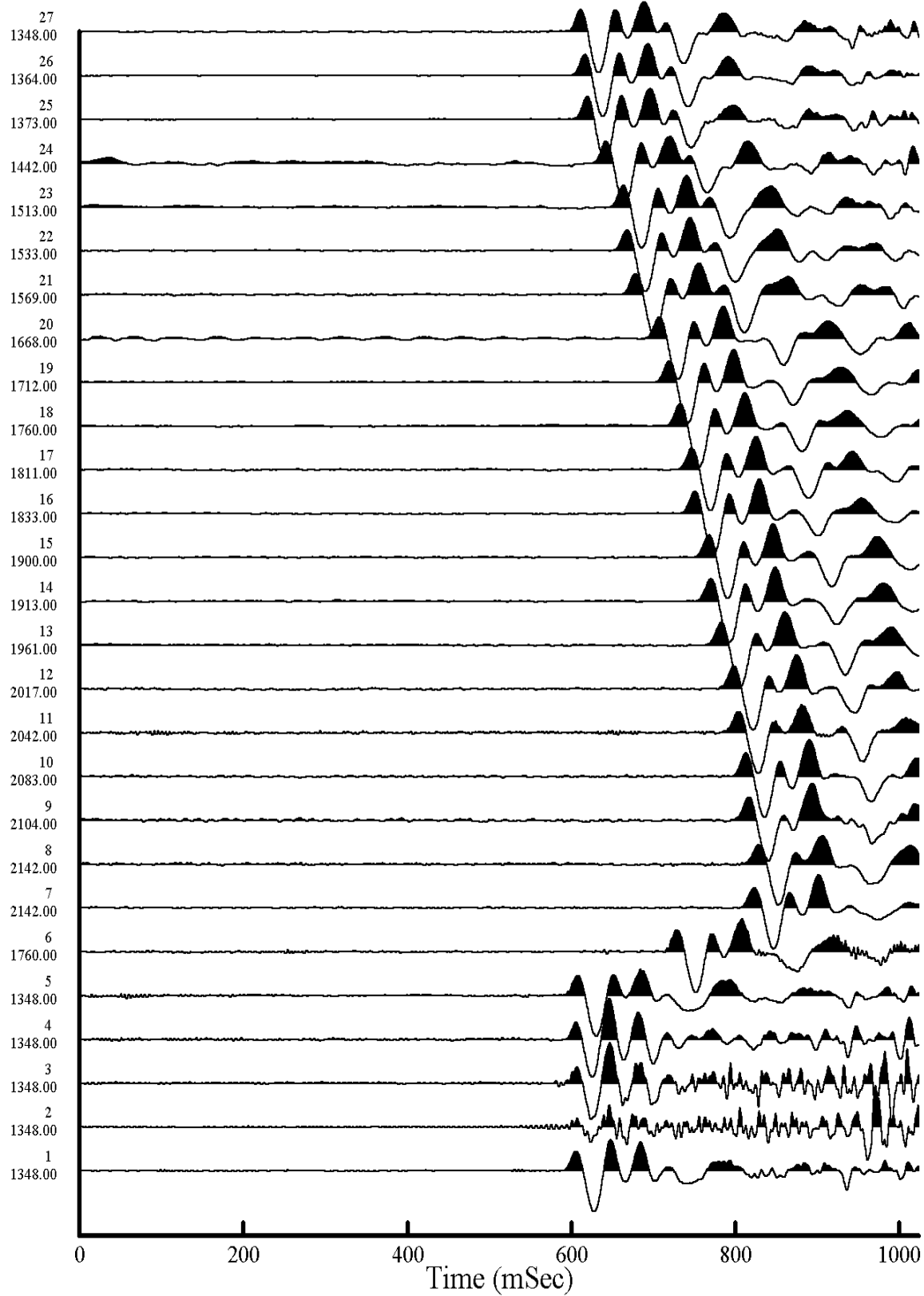




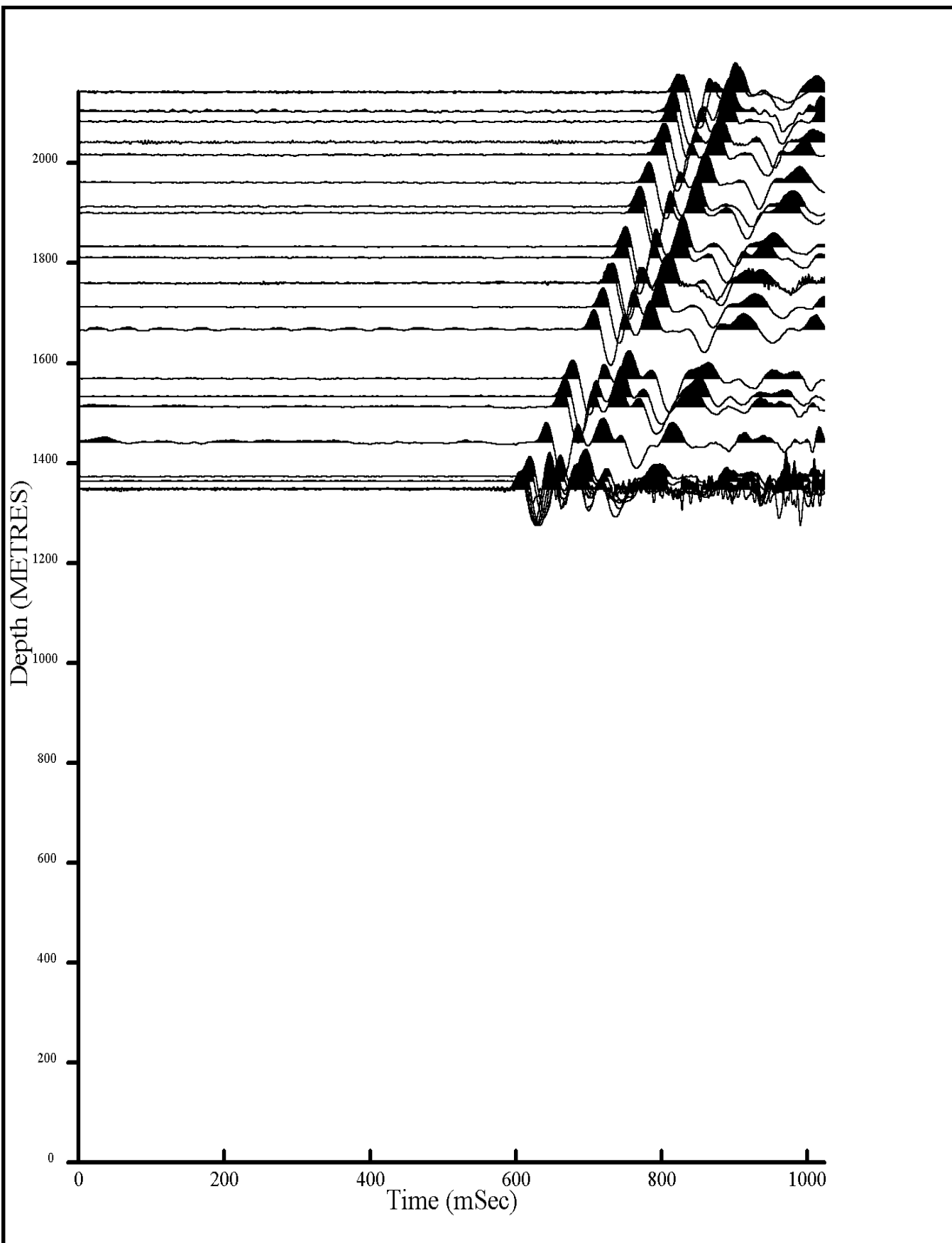
Figure 3





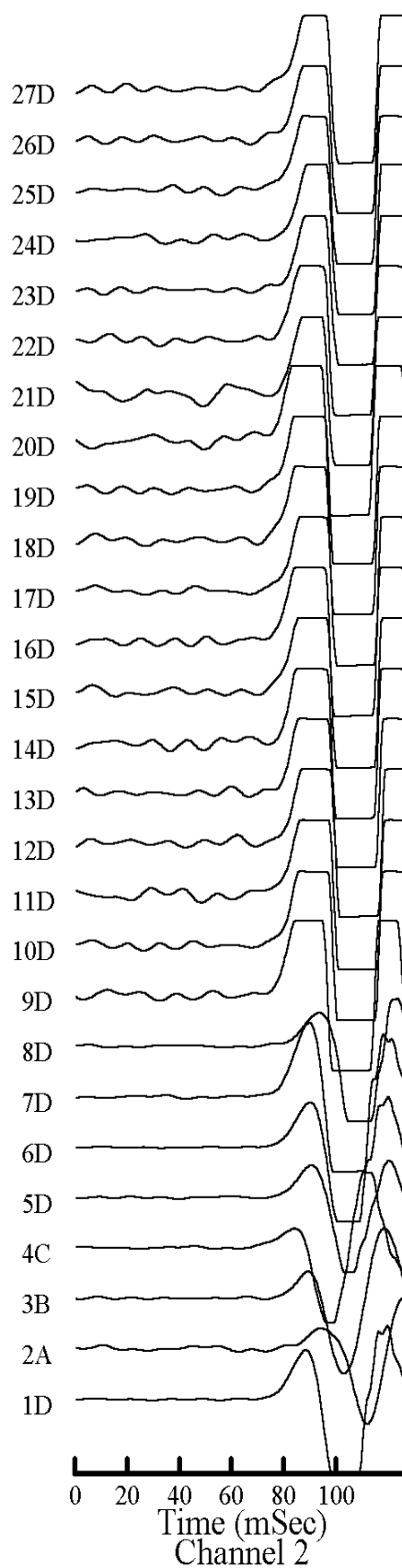
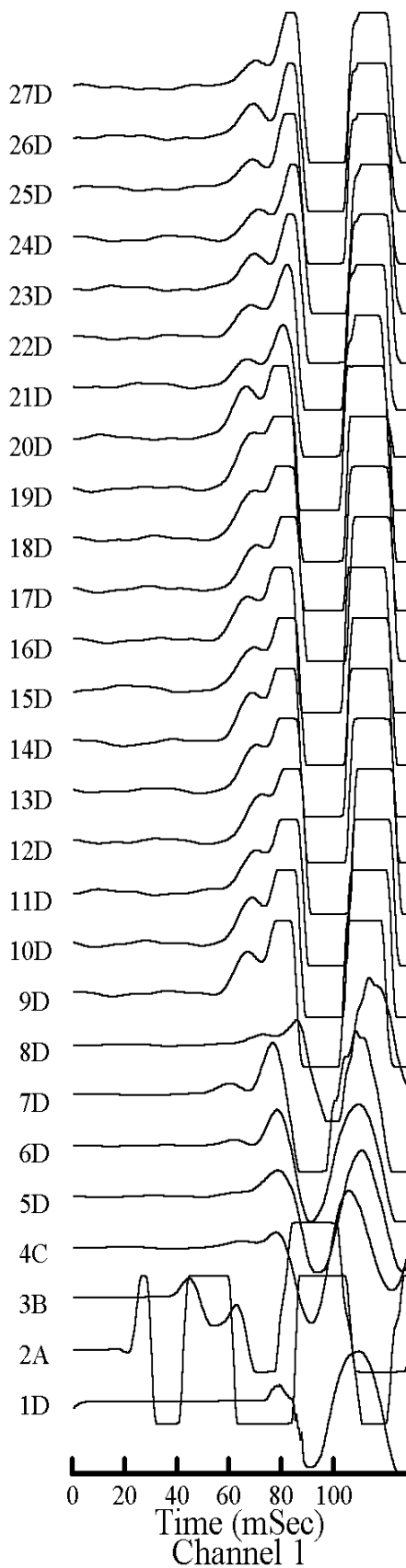
WOMBAT#3

VELOCITY SURVEY TRACE DISPLAY



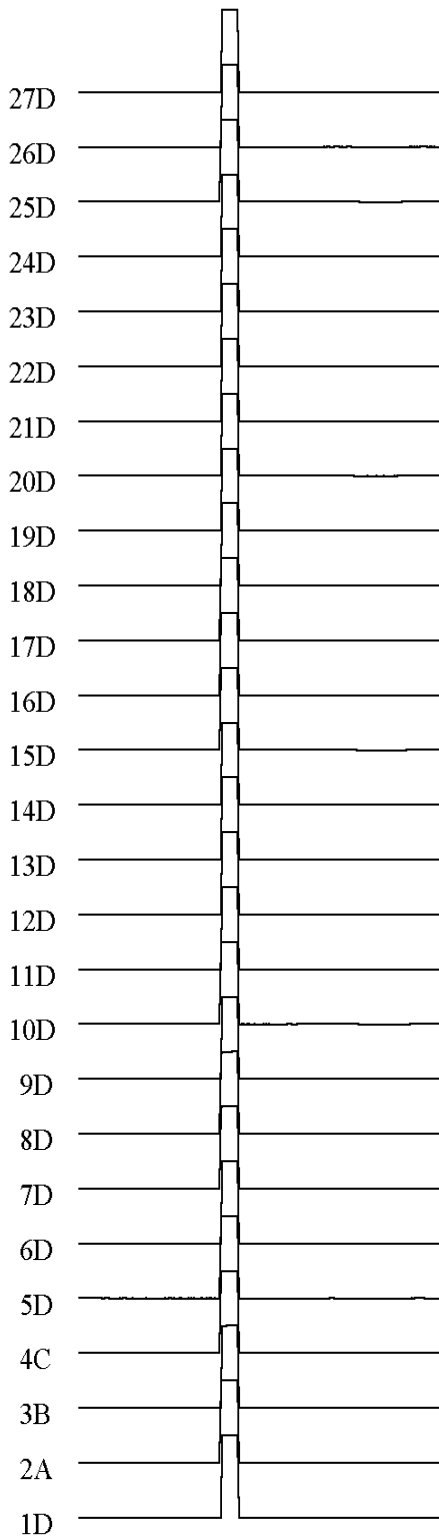
WOMBAT#3

VELOCITY SURVEY TRACE DISPLAY

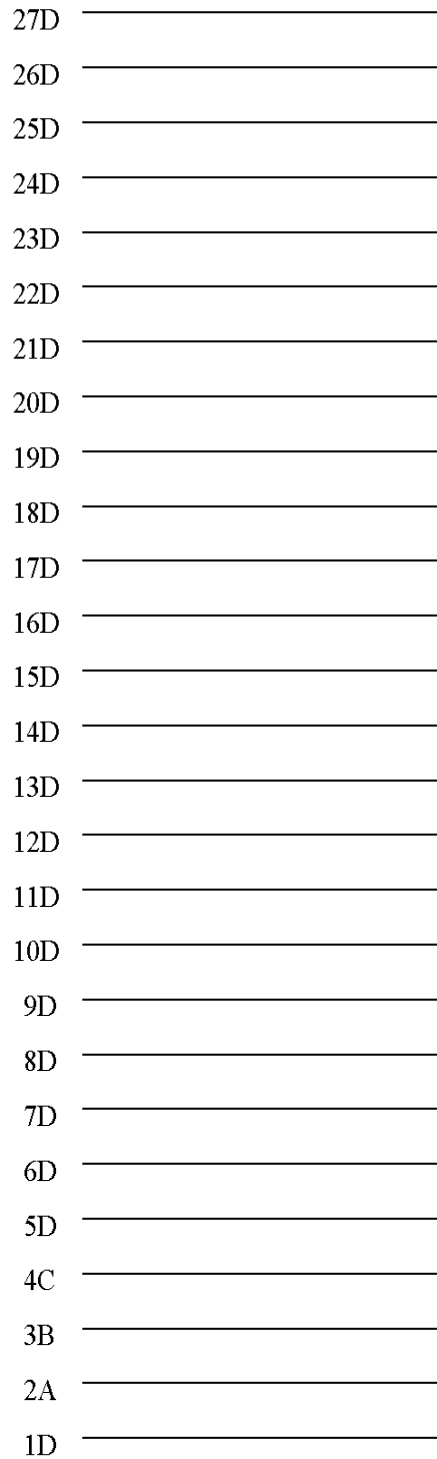


## WOMBAT#3

VELOCITY SURVEY TRACE DISPLAY  
AUXILIARY CHANNELS



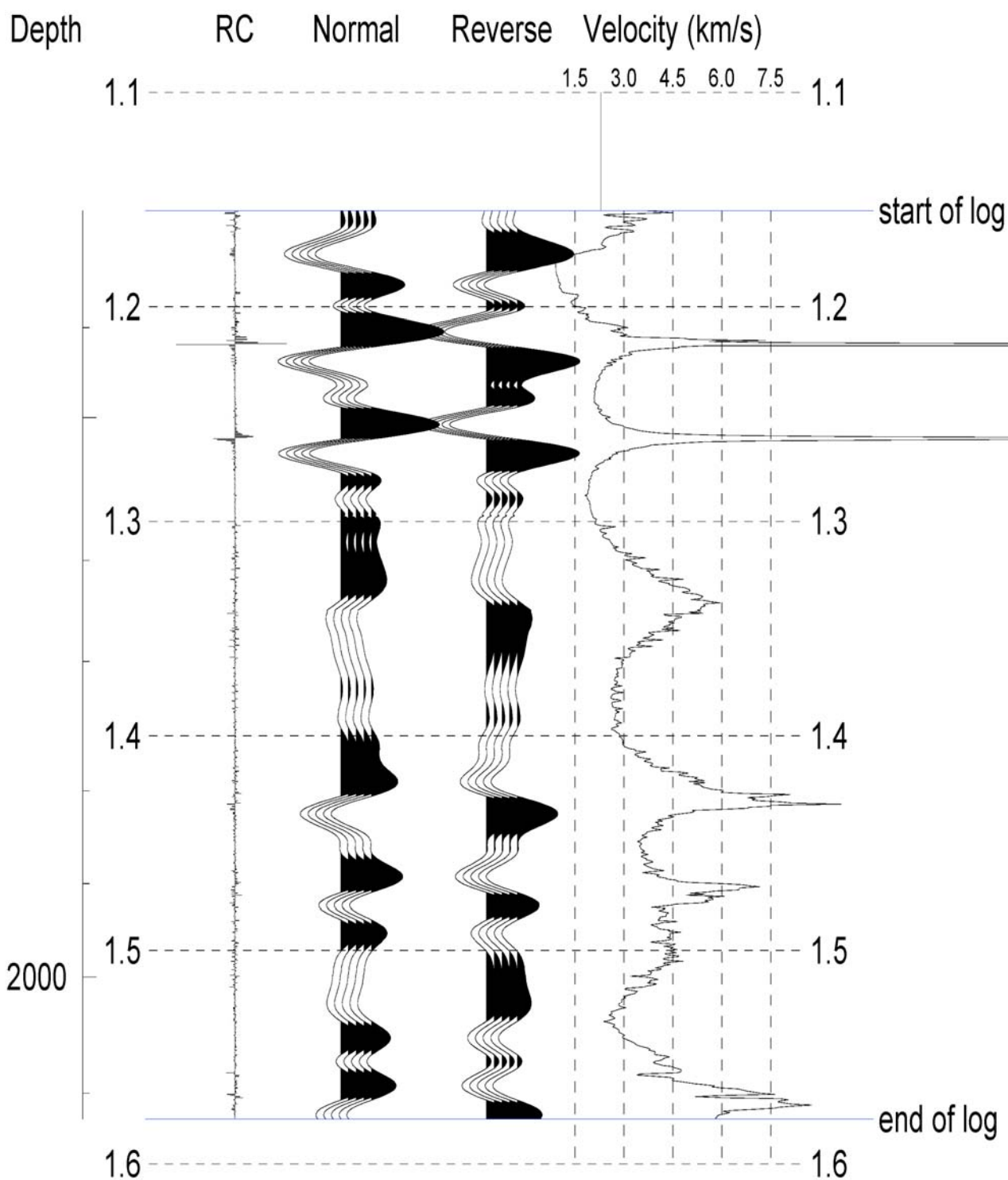
0 20 40 60 80 100  
Time (mSec)  
Channel 3



0 20 40 60 80 100  
Time (mSec)  
Channel 4

## WOMBAT#3

VELOCITY SURVEY TRACE DISPLAY  
AUXILIARY CHANNELS



## WOMBAT#3

VELOCITY SURVEY TRACE DISPLAY  
SYNTHETIC SEISMOGRAM