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ESSO AUSTRALIA LTD.

DEVIATED WELL CHECKSHOT SURVEY

MARLIN A6

FIELD	:	MARLIN
COUNTRY	:	AUSTRALIA
COORDINATES	:	606755 mE 5767736 mN
DATE OF SURVEY	:	25-Sep-1996
INTERVAL	:	730 – 3200 metres MD
REFERENCE NO	:	SYJ-561235
DATE OF PROCESSING		6-Aug-1998

CONTENTS

1. Acquisition Summary

The aim of the Marlin A6 checkshot survey was to record the vertical transit time from the surface to the downhole tool at 21 levels in the well. To achieve this, the airgun was suspended from a boat that followed the deviated well trajectory and fired remotely over a radio link.

An SAT tool was used for downhole data acquisition. The AG10 offset shooting equipment (OSE) was used to remotely fire the airgun and return the hydrophone signal to Maxis logging unit. Pre-job checks at the West Tuna location on 5-Mar-1997 determined a 3 msec delay in the radio hydrophone over the OSE. A +3 msec correction has been applied to the raw stack break times to compensate for the radio delay. See appendix A for a summary of the West Tuna radio delay tests.

Problems on using the offset shooting equipment were encountered during the survey. These problems have not affected the final data quality.

A single 20 cuin bolt airgun was used as the energy source and charged from high pressure bottled nitrogen.

Navigation was supplied by EAL. The airgun was positioned within a tolerance of 5 metres, at the same horizontal co-ordinate as the downhole geophone.

2. Processing Sequence

1. Re-stack data using the AG10 radio hydrophone break as zero time reference.
2. Add 3 msec to stack times to compensate for radio delay.
3. Enter surface gun co-ordinates, gun depth and hydrophone depth. The gun depth was 7 metres below sea level and the hydrophone depth was 12 metres below sea level.
4. Enter well deviation and inclination data. The true vertical depths are recomputed using the "absolute radius of curvature" method. There is a slight (<0.5 metre) difference between these TVD's and the wellsite TVD's which were computed using the "minimum radius of curvature" method.
5. Compute vertical transit times based on the survey geometry. Interval velocities are derived from the vertical transit times and TVD's.
6. Compute sonic drift corrections.

The figures 1 following shows the Z component stacked data (radio delay correction is applied). The X and Y data was recorded but not required for checkshot processing so are not displayed. Figure 2 displays TWT, Vint. and Vaver. are computed from checkshot corrected transit times.

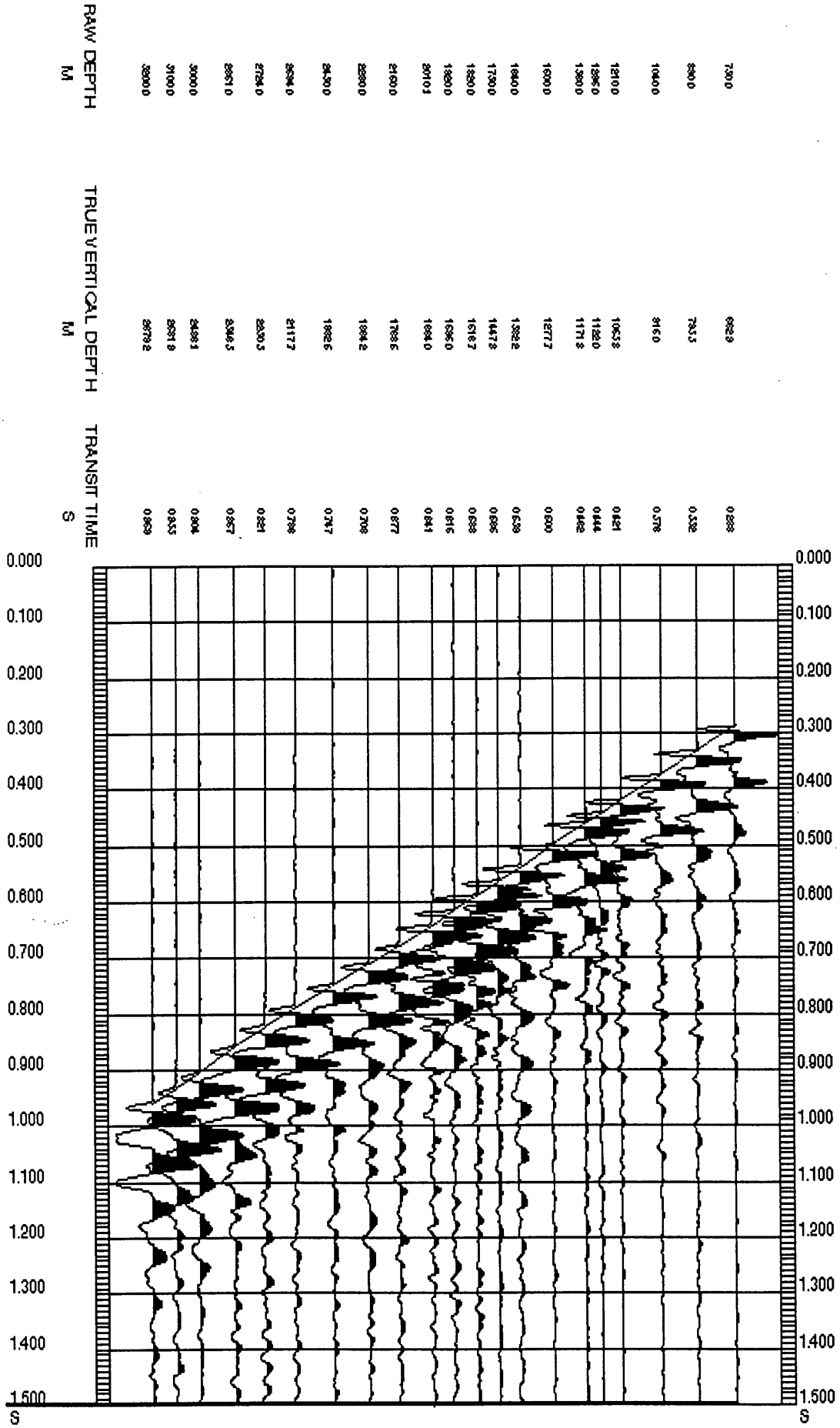


Figure 1. Stacked data, traces spaced by depth; (3 msec radio delay applied)

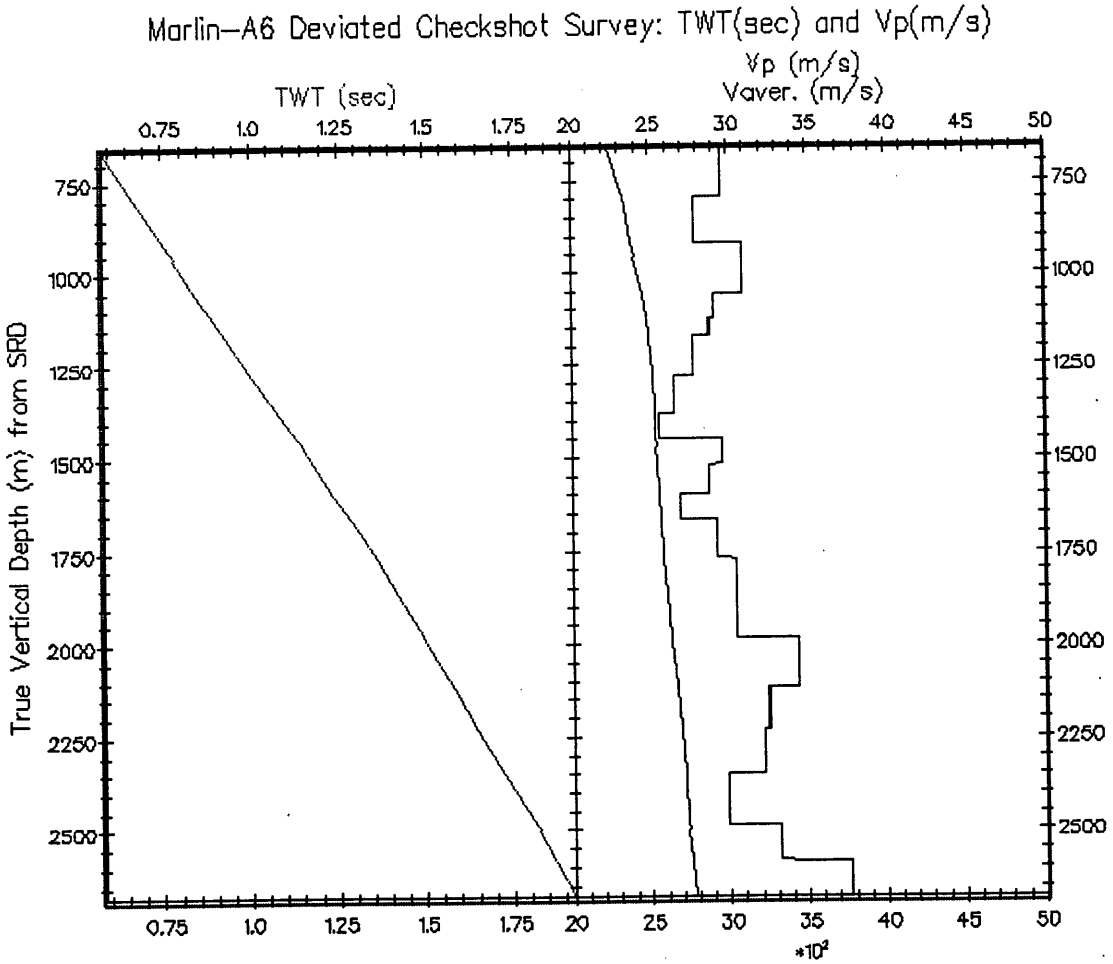


Figure 2. TWT, Vint. and Vaver. derived from corrected transit times.

A. Radio delay tests

The AG10 system was used to control the offset source during the Marlin A6 survey. Synchronisation tests were done on both the Macha and AG10 OSE prior to the recent deviated well survey at West Tuna W32. The tests were done by placing a geophone on top of an airgun solenoid. The geophone signal was sent to the Maxis via a hardwire link and also by each of the OSE's, and traces compared. Both the Macha and the AG10 systems have a 3 msec delay in the radio hydrophone signal.

Macha - West Tuna test

- Hardwire/radio geophone + airgun solenoid.
- 3 msec delay in radio hydrophone signal.
- GCU fire delay = 458 msec, TOFS = 0 msec.
- Macha system operational before testing

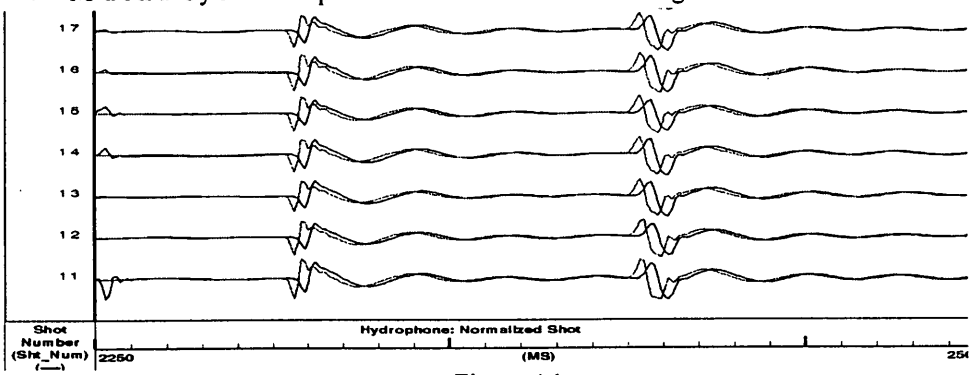


Figure A1

AG10 - West Tuna Test

- Hardwire / radio geophone + airgun solenoid.
- 3 msec delay in radio hydrophone signal.
- AG10 fire delay = 0 msec, TOFS = 1200 msec.
- Loose wires fixed in a cable plug at AG10 before testing.

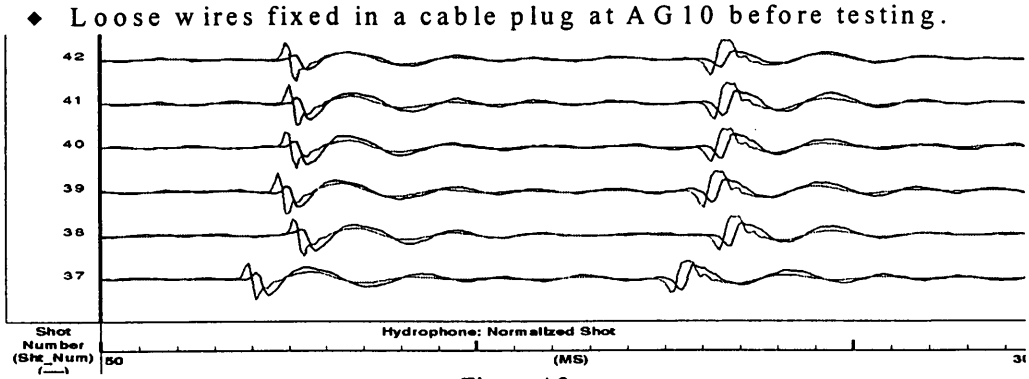


Figure A2

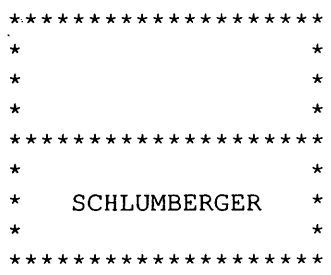
Small variations in the AG10 fire time arise, since the automatic arming occurs via a mechanical relay. This does not affect the stacked data, since a delay in the actual fire time will give the same delay to the hydrophone and the downhole geophone.

MARLIN-A6 Deviated Checkshot Survey: Well and Source locations

Well East	606755
Well North	5767736

raw_depth	level	source east	source north	source_x	source_y
3200	1	607989	5766794	1234	-942
3100	2	607977	5766814	1222	-922
3000	3	607960	5766837	1205	-899
2851	4	607927	5766876	1172	-860
2724	5	607891	5766913	1136	-823
2594	6	607844	5766957	1089	-779
2430	7	607775	5767020	1020	-716
2280	8	607706	5767081	951	-655
2150	9	607640	5767139	885	-597
2010	10	607571	5767201	816	-535
1920	11	607527	5767239	772	-497
1820	12	607481	5767281	726	-455
1730	13	607438	5767320	683	-416
1640	14	607392	5767360	637	-376
1500	15	607320	5767420	565	-316
1360	16	607249	5767478	494	-258
1295	17	607217	5767504	462	-232
1210	18	607175	5767533	420	-203
1040	19	607092	5767585	337	-151
890	20	607015	5767628	260	-108
730	21	606931	5767667	176	-69

ANALYST: S.TCHERKASHNEV 6-AUG-98 13:06:53 PROGRAM: GSHOT 007.E09



GEOPHYSICAL AIRGUN REPORT

COMPANY : ESSO AUSTRALIA LTD

WELL : A-6

FIELD : MARLIN

STATE : VICTORIA

COUNTRY : AUSTRALIA

REFERENCE: SYJ-561235

LOGGED : 26-SEP-1996

LONG DEFINITIONS

GLOBAL

KB - Elevation of the KELLY-BUSHING Above MSL or MWL
SRD - Elevation of the Seismic Reference Datum Above MSL or MWL
EKB - Elevation of Kelly Bushing
VELHYD - VELOCITY OF THE MEDIUM BETWEEN THE SOURCE AND THE HYDROPHONE
VELSUR - VELOCITY OF THE MEDIUM BETWEEN THE SOURCE AND THE SRD

MATRIX

GUNELZ - SOURCE ELEVATION ABOVE SRD (ONE FOR THE WHOLE JOB; OR ONE PER SHOT)
GUNEWZ - SOURCE DISTANCE FROM THE BOREHOLE AXIS IN EW DIRECTION (CF. GUNELZ)
GUNNSZ - SOURCE DISTANCE FROM THE BOREHOLE AXIS IN NS DIRECTION (CF. GUNELZ)
HYDELZ - HYDROPHONE ELEVATION ABOVE SRD (CF. GUNELZ)
HYDEWZ - HYDROPHONE DISTANCE FROM THE BOREH AXIS IN EW DIRECTION (CF GUNELZ)
HYDNSZ - HYDROPHONE DISTANCE FROM THE BOREH AXIS IN NS DIRECTION (CF GUNELZ)
TRTHYD - TRAVEL TIME FROM THE HYDROPHONE TO THE SOURCE
TRTSRD - TRAVEL TIME FROM THE SOURCE TO THE SRD
DEVWEL - DEVIATED WELL DATA PER SHOT : MEAS. DEPTH, VERT. DEPTH, EW, NS

SAMPLED

SHOT.GSH - Shot number
DKB.GSH - Measured Depth from Kelly-Bushing
DSRD.GSH - Depth from SRD
TIMO.GSH - Tie In Memorized Output
TIMV.GSH - Vertical Travel Time from the Source to the Geophone
SHTM.GSH - Shot time (WST)
AVGV.GSH - Average Seismic Velocity
DELZ.GSH - Depth Interval between Successive Shots
DELT.GSH - Travel Time Interval between Successive Shots
INTV.GSH - Internal Velocity, Average

(GLOBAL PARAMETERS)		(VALUE)	
ELEV OF KB AB. MSL (WST)	KB	: 24.7000	M
ELEV OF SRD AB. MSL(WST)	SRD	: 0	M
Elevation of Kelly Bushi	EKB	: 24.7000	M
VEL SOURCE-HYDRO(WST)	VELHYD	: 1502.00	M/S
VEL SOURCE-SRD (WST)	VELSUR	: 1502.00	M/S

(MATRIX PARAMETERS)

	SOURCE ELV M	SOURCE EW M	SOURCE NS M	HYDRO ELEV M	HYDRO EW M	HYDRO NS M
1	-7.0	176.0	-69.0	-12.0	176.0	-69.0
2	-7.0	260.0	-108.0	-12.0	260.0	-108.0
3	-7.0	337.0	-151.0	-12.0	337.0	-151.0
4	-7.0	420.0	-203.0	-12.0	420.0	-203.0
5	-7.0	462.0	-232.0	-12.0	462.0	-232.0
6	-7.0	494.0	-258.0	-12.0	494.0	-258.0
7	-7.0	565.0	-316.0	-12.0	565.0	-316.0
8	-7.0	637.0	-376.0	-12.0	637.0	-376.0
9	-7.0	683.0	-415.9	-12.0	683.0	-415.9
10	-7.0	726.0	-455.0	-12.0	726.0	-455.0
11	-7.0	772.0	-497.0	-12.0	772.0	-497.0
12	-7.0	816.0	-535.0	-12.0	816.0	-535.0
13	-7.0	885.0	-597.0	-12.0	885.0	-597.0
14	-7.0	951.0	-655.0	-12.0	951.0	-655.0
15	-7.0	1020.0	-716.0	-12.0	1020.0	-716.0
16	-7.0	1089.0	-779.0	-12.0	1089.0	-779.0
17	-7.0	1136.0	-823.0	-12.0	1136.0	-823.0
18	-7.0	1172.0	-860.0	-12.0	1172.0	-860.0
19	-7.0	1204.9	-899.1	-12.0	1204.9	-899.1
20	-7.0	1222.1	-921.9	-12.0	1222.1	-921.9
21	-7.0	1233.9	-942.1	-12.0	1233.9	-942.1

TRT	HYD-SC MS	TRT	SC-SRD MS
1	3.33		4.66
2	3.33		4.66
3	3.33		4.66
4	3.33		4.66
5	3.33		4.66
6	3.33		4.66
7	3.33		4.66
8	3.33		4.66
9	3.33		4.66
10	3.33		4.66
11	3.33		4.66
12	3.33		4.66
13	3.33		4.66
14	3.33		4.66
15	3.33		4.66
16	3.33		4.66
17	3.33		4.66
18	3.33		4.66
19	3.33		4.66
20	3.33		4.66
21	3.33		4.66

	MD @ KB M	VD @ KB M	VD @ SRD M	E-W COORD M	N-S COORD M
1	730.0	687.7	663.0	176.5	-69.3
2	890.0	818.2	793.5	260.2	-108.7
3	1040.0	939.9	915.2	337.1	-150.9
4	1210.0	1078.7	1054.0	420.3	-203.1
5	1295.0	1146.8	1122.1	461.7	-232.5
6	1360.0	1196.6	1171.9	494.4	-258.4
7	1500.0	1302.5	1277.8	565.4	-316.1
8	1640.1	1407.1	1382.4	636.8	-376.1
9	1730.0	1472.7	1448.0	683.0	-416.7
10	1820.0	1541.5	1516.8	726.1	-455.4
11	1920.0	1619.8	1595.1	772.4	-496.9
12	2010.1	1688.8	1664.1	815.6	-535.5
13	2150.0	1793.4	1768.7	885.3	-596.9
14	2280.0	1889.1	1864.4	951.4	-654.9
15	2430.0	2007.4	1982.7	1020.0	-716.5
16	2594.0	2142.5	2117.8	1088.8	-778.9
17	2724.0	2255.2	2230.5	1136.0	-823.0
18	2851.0	2371.2	2346.5	1171.8	-860.1
19	3000.0	2510.9	2486.2	1205.0	-899.8
20	3100.0	2606.8	2582.1	1221.5	-922.8
21	3200.0	2704.1	2679.4	1233.6	-942.7

LEVEL NUMBER	MEASUR DEPTH FROM KB M	VERTIC DEPTH FROM SRD M	OBSERV TRAVEL TIME HYD/GEO MS	VERTIC TRAVEL TIME SRC/GEO MS	VERTIC TRAVEL TIME SRD/GEO MS	AVERAGE VELOC SRD/GEO M/S	DELTA DEPTH BETWEEN SHOTS M	DELTA TIME BETWEEN SHOTS MS	INTERV VELOC BETWEEN SHOTS M/S
1	730.0	663.0	288.20	291.53	296.19	2238			
							130.5	44.10	2959
2	890.0	793.5	332.30	335.63	340.29	2332			
							121.7	43.70	2784
3	1040.0	915.2	376.00	379.33	383.99	2383			
							138.8	44.80	3098
4	1210.0	1054.0	420.80	424.13	428.79	2458			
							68.1	23.40	2912
5	1295.0	1122.1	444.20	447.53	452.19	2482			
							49.8	17.30	2880
6	1360.0	1171.9	461.50	464.83	469.49	2496			
							105.9	38.20	2772
7	1500.0	1277.8	499.70	503.03	507.69	2517			
							104.5	39.40	2653
8	1640.1	1382.4	539.10	542.43	547.09	2527			
							65.6	25.70	2553
9	1730.0	1448.0	564.80	568.13	572.79	2528			
							68.9	23.30	2955
10	1820.0	1516.8	588.10	591.43	596.09	2545			
							78.3	27.30	2869
11	1920.0	1595.1	615.40	618.73	623.39	2559			
							69.0	25.70	2684
12	2010.1	1664.1	641.10	644.43	649.09	2564			
							104.6	35.80	2921
13	2150.0	1768.7	676.90	680.23	684.89	2582			
							95.7	31.40	3048
14	2280.0	1864.4	708.30	711.63	716.29	2603			
							118.3	38.90	3041
15	2430.0	1982.7	747.20	750.53	755.19	2625			
							135.1	39.30	3438
16	2594.0	2117.8	786.50	789.83	794.49	2666			
							112.7	34.70	3248
17	2724.0	2230.5	821.20	824.53	829.19	2690			
							116.0	36.10	3214
18	2851.0	2346.5	857.30	860.63	865.29	2712			
							139.7	46.80	2985

19	3000.0	2486.2	904.10	907.43	912.09	2726	95.9	28.90	3318
20	3100.0	2582.1	933.00	936.33	940.99	2744	97.2	25.80	3769
21	3200.0	2679.4	958.80	962.13	966.79	2771			