

GEOFRAME
PROCESSED
INTERPRETATION



WELL SEISMIC
REPORT

* A Mark of Schlumberger

Using the following logs:

CSI-VSP
DT, RHOB, GR, CALI
*** DATUM AT 400m ***

COMPANY: APACHE CANADA LTD.
WELL: APACHE PARAMOUNT NOGHA B-23
FIELD: NOGHA
COUNTY: NORTHWEST TERRITORIES
STATE: CANADA
COUNTRY: CANADA
Date Logged: 13-Mar-2004 Date Processed: Mar-2004
Well Location: UWID: 300B236640125450
LSD: B-23
Elevations: KB: 315.75 m DF: 315.45 m GL: 311.27 m
API Number: WID: 1998 Job Number: 04010

FOLD HERE The well name, location, borehole reference data were furnished by the customer.

All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretations made by any of our officers, agents or employees. These interpretations are also subject to Clause 4 of our General Terms and Conditions as set out in our current Price Schedule.

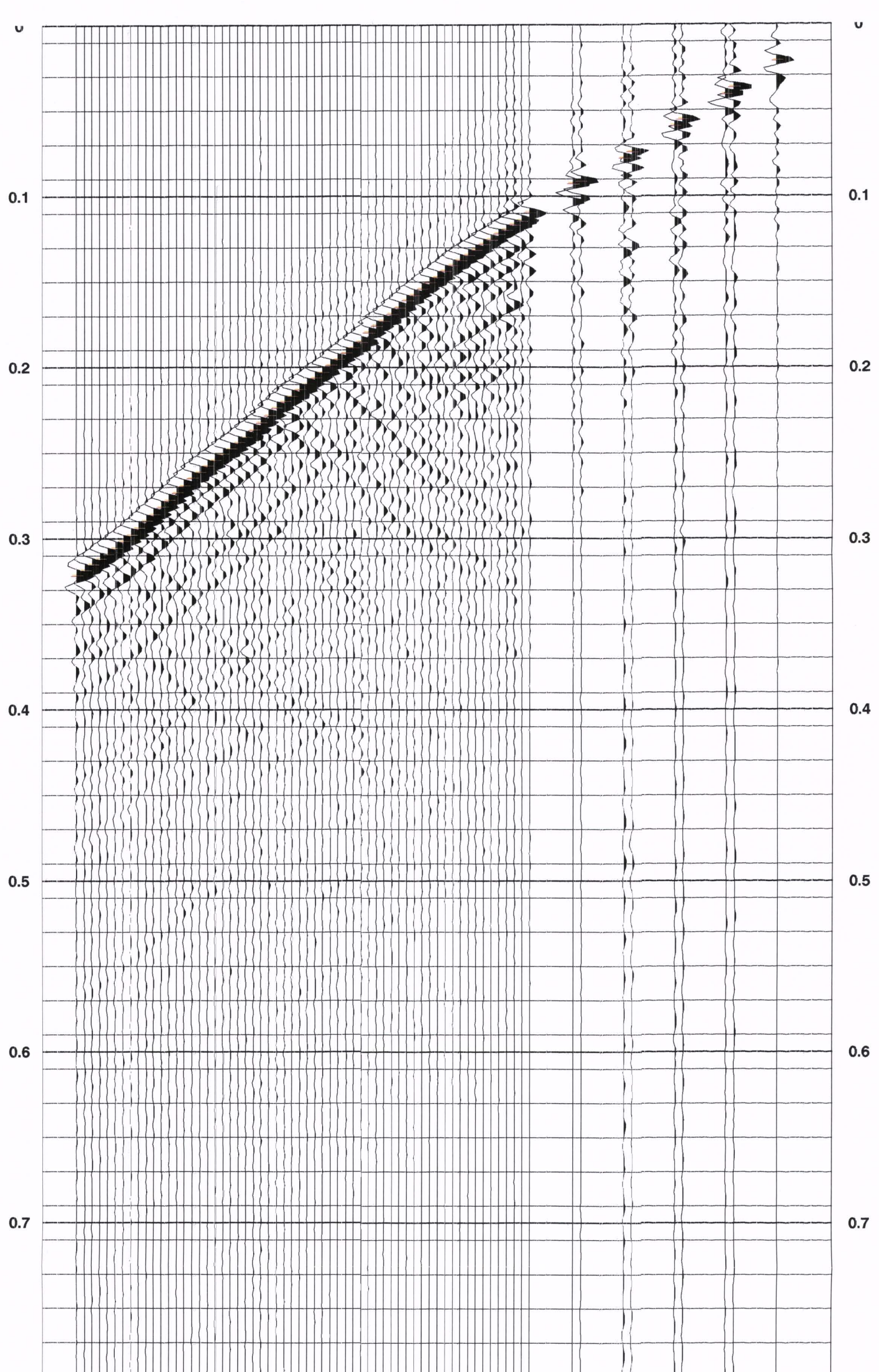
Field Recording:	Location: NORMAN WELLS	Software Version: 11C0-305	Engineer: KELLY RONCIN
Office Recording:	ICS Center: DCS... Calgary	Baseline: GF3.8.1	Log Analyst: R Parker

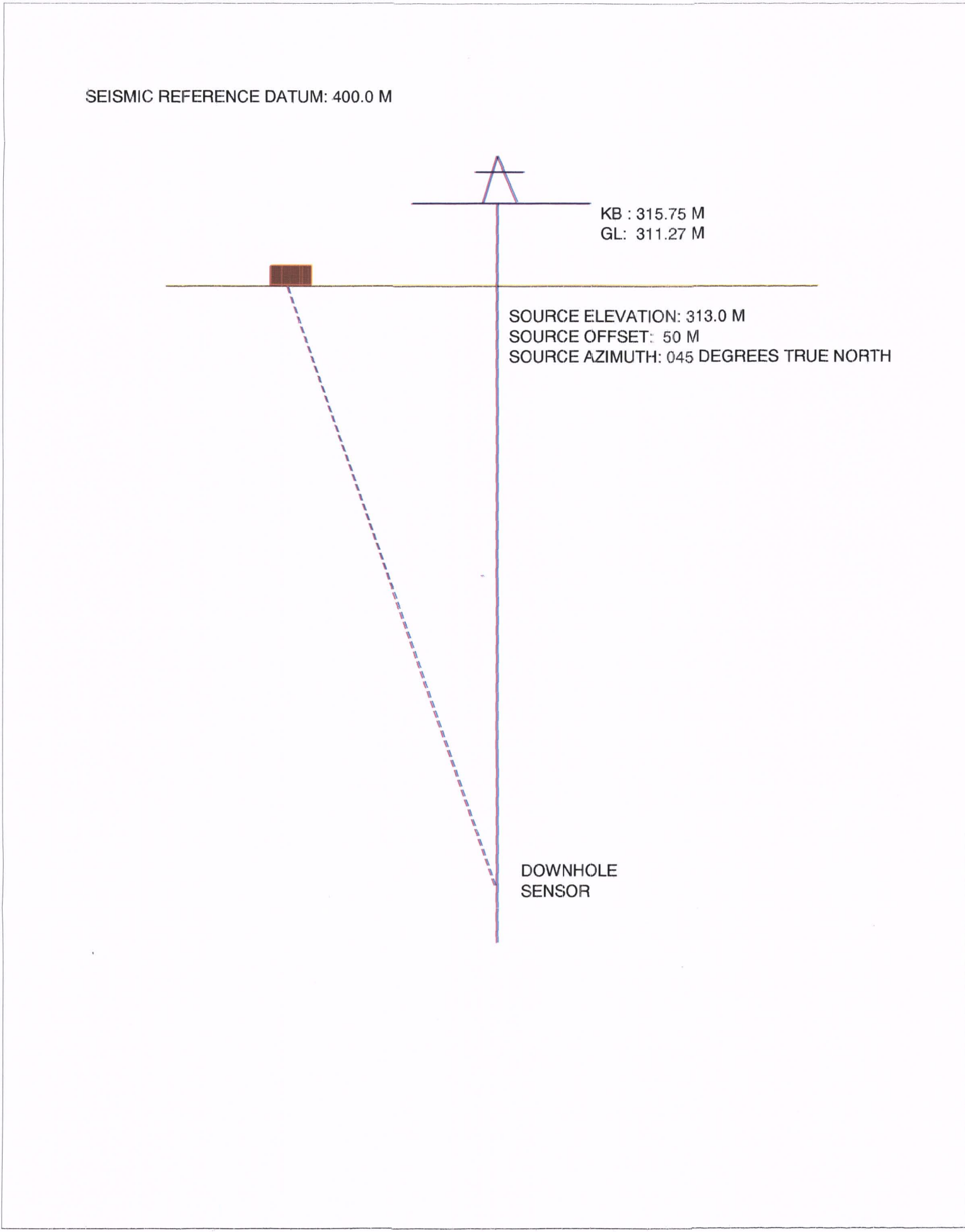
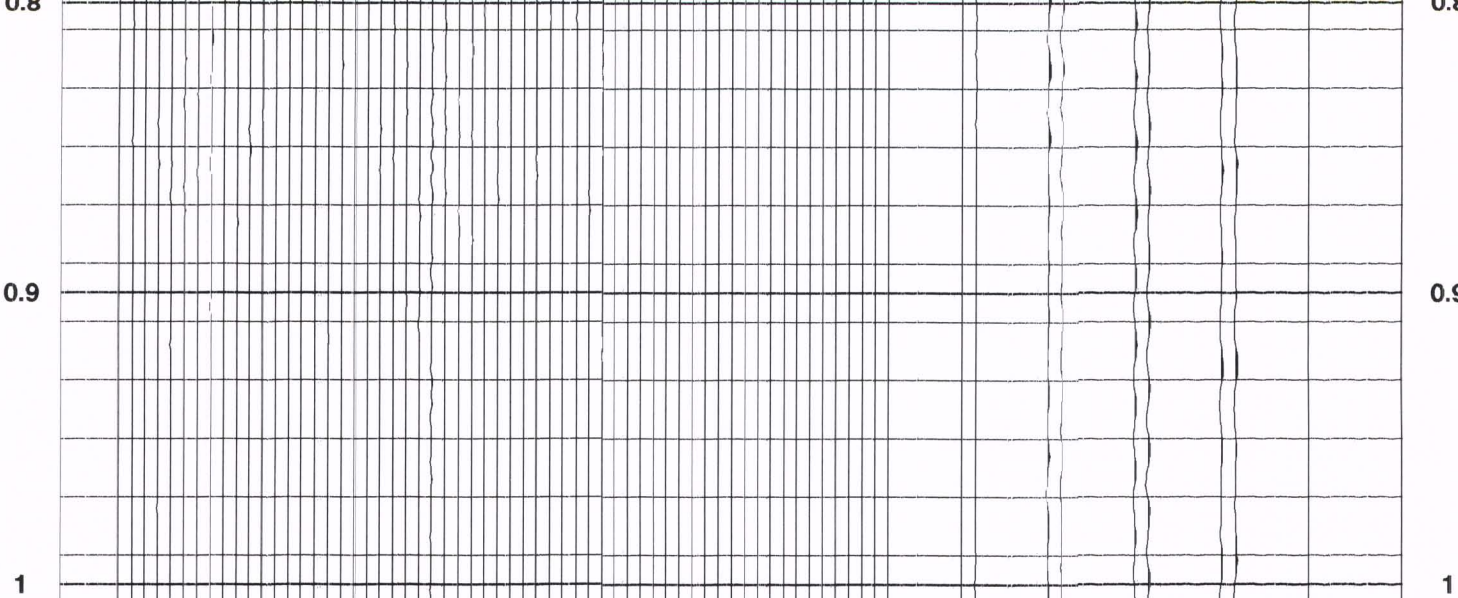
Mud and Borehole Measurements:			
Rm @ Measured temperature: -999.250 ? @ -999.2 ?	BHT: 21.0 degC	Bitsize: 216.0 mm	
Rmf @ Measured temperature: -999.250 ? @ -999.2 ?	Type Fluid in Hole	INVERT	
Rmc @ Measured temperature: -999.250 ? @ -999.2 ?	Mud Density: 1200.00 kg/m ³		

Remarks:
SOURCE: ONE TRACE LITTON 315 TRACKED VIBE
SWEEP : 6-130 HZ 24 SEC, LINEAR, 0.5 SEC TAPERS
SOURCE OFFSET : 50 m AT 045 DEGREES

COMPUTING CENTRE STACKS
VERTICAL COMPONENT

MAX. AMPLITUDE	MIN. AMPLITUDE	TRANSIT TIME	LEVEL NO.	RAW DEPTH
582.2	-422.5	0.021	2	100
516.8	-514.1	0.041	4	200
504.9	-363.1	0.059	6	300
446.1	-304.5	0.078	8	400
448.4	-480.8	0.093	10	500
414.5	-276.5	0.115	12	600
316.5	-231.8	0.120	14	630
283.7	-187.0	0.126	16	660
242.2	-160.1	0.132	18	690
205.5	-131.3	0.138	20	720
226.7	-140.5	0.144	22	750
238.7	-155.4	0.151	24	780
239.7	-140.3	0.158	26	810
257.0	-183.3	0.165	28	840
200.4	-151.9	0.173	30	870
289.7	-159.6	0.180	32	900
197.4	-131.4	0.189	34	930
176.9	-107.6	0.196	36	960
167.8	-113.5	0.203	38	990
175.6	-105.7	0.210	40	1020
183.4	-115.2	0.217	42	1050
194.5	-131.1	0.224	44	1080
178.6	-82.7	0.232	46	1110
128.0	-111.0	0.241	48	1140
129.7	-85.1	0.248	50	1170
116.9	-72.3	0.254	2	1200
111.3	-71.4	0.261	4	1230
118.1	-85.4	0.269	6	1260
121.8	-88.5	0.278	8	1290
126.6	-87.3	0.286	10	1320
111.1	-71.3	0.294	12	1350
114.1	-81.5	0.302	14	1380
77.2	-46.9	0.309	16	1410
85.7	-62.9	0.315	18	1440
75.0	-48.6	0.322	20	1470





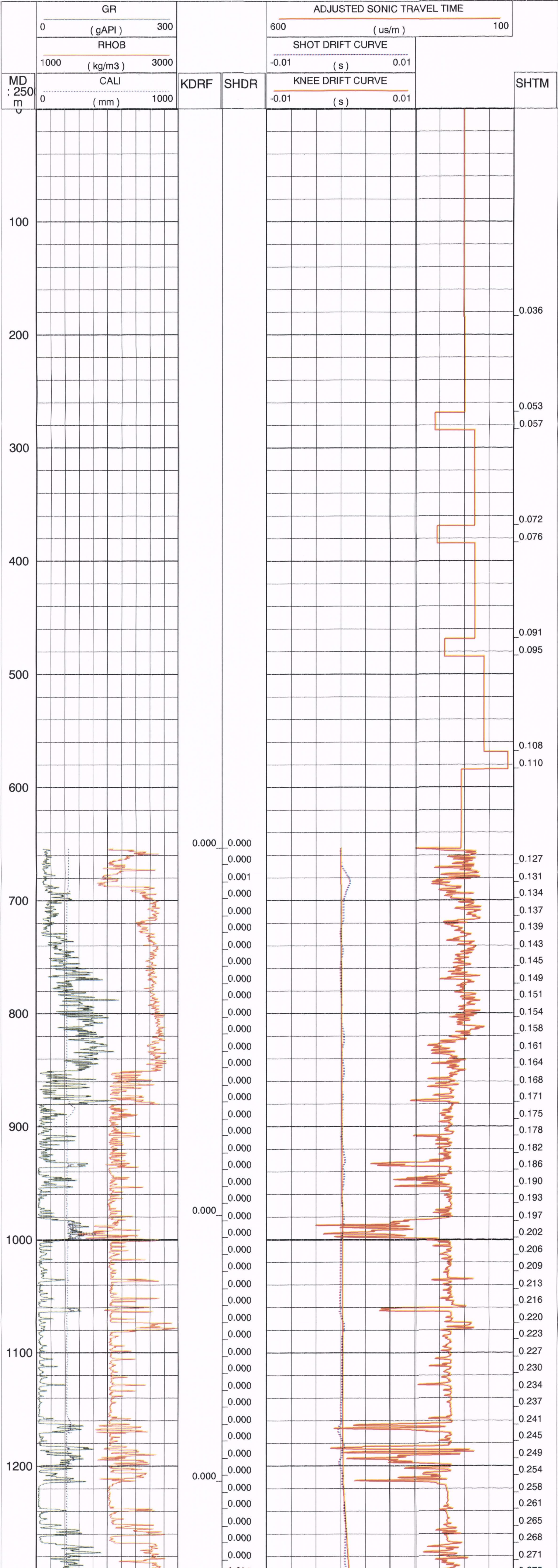
ELEVATIONS ARE POSITIVE UPWARDS
DEPTES ARE POSITIVE DOWNWARDS
DIRECTIONS ARE RELATIVE TO TRUE NORTH
MSL : MEAN SEA LEVEL
SRD : SEISMIC REFERENCE DATUM

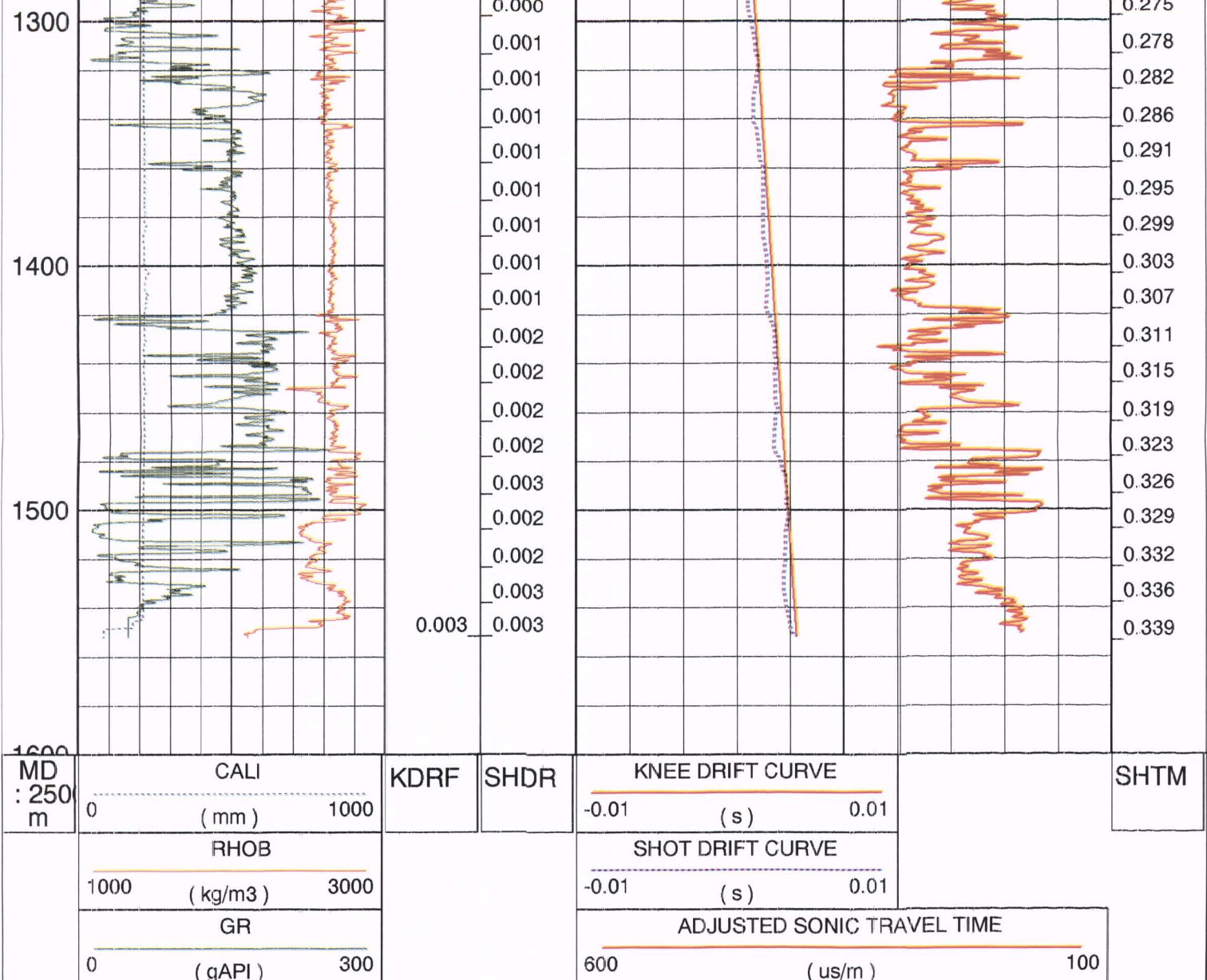
ELEVATION OF THE MEASURED DEPTH REFERENCE ABOVE MSL : 315.7 M
ELEVATION OF THE SRD ABOVE MSL : 400.0 M
ELEVATION OF THE MEASURED DEPTH REFERENCE ABOVE SRD : -84.3 M
ELEVATION OF GROUND ABOVE SRD : -88.7 M

VELOCITY BETWEEN SURFACE SENSOR AND SOURCE : 5000.0 M/S
VELOCITY BETWEEN SOURCE AND SRD : 5000.0 M/S

LEVEL NUMBER	VERTICAL DEPTH FROM SRD m	MEASURED DEPTH FROM KB m	OBSERVED TRAVEL TIME s	VERTICAL TRANSIT TIME s	DELTA DEPTH m	DELTA TIME s	ACOUSTIC AVERAGE VELOCITY m/s	ACOUSTIC INTERVAL VELOCITY m/s
1	0.0			0.0000				5019
2	184.2	100.0	0.0214	0.0367	84.5	0.0167	5019	5051
3	268.8	184.5	0.0370	0.0534	15.5	0.0040	5029	3876
4	284.2	200.0	0.0410	0.0574	84.5	0.0150	4949	5619
5	368.8	284.5	0.0556	0.0725	15.5	0.0039	5088	3946
6	384.2	300.0	0.0595	0.0764	84.5	0.0150	5029	5650
7	468.8	384.5	0.0743	0.0914	15.5	0.0037	5131	4193
8	484.2	400.0	0.0779	0.0951	84.4	0.0134	5094	6313
9	568.6	484.4	0.0912	0.1084	15.5	0.0017	5244	9017
10	584.2	499.9	0.0929	0.1101	84.6	0.0173	5303	4883
11	668.8	584.5	0.1101	0.1275	15.5	0.0045	5246	3473
12	684.2	600.0	0.1146	0.1319	14.5	0.0024	5186	6022
13	698.8	614.5	0.1170	0.1343	15.5	0.0029	5201	5379
14	714.2	630.0	0.1199	0.1372	14.5	0.0025	5205	5774
15	728.8	644.5	0.1224	0.1397	15.5	0.0034	5215	4523
16	744.2	660.0	0.1258	0.1432	14.5	0.0026	5199	5656
17	758.8	674.5	0.1283	0.1457	15.5	0.0033	5207	4702
18	774.2	690.0	0.1316	0.1490	14.5	0.0029	5195	4939
19	788.7	704.5	0.1346	0.1520	15.5	0.0030	5191	5203
20	804.2	720.0	0.1375	0.1549	14.5	0.0031	5191	4684
21	818.8	734.5	0.1406	0.1580	15.5	0.0033	5181	4630
22	834.3	750.0	0.1440	0.1614	14.5	0.0036	5169	4042
23	848.7	764.5	0.1475	0.1650	15.5	0.0032	5145	4782
24	864.2	780.0	0.1508	0.1682	14.5	0.0035	5138	4105
25	878.8	794.5	0.1543	0.1717	15.5	0.0036	5117	4333
26	894.2	810.0	0.1579	0.1753	14.5	0.0032	5101	4491
27	908.8	824.5	0.1611	0.1785	15.5	0.0041	5090	3795
28	924.2	840.0	0.1652	0.1826	14.5	0.0038	5061	3776
29	938.7	854.5	0.1690	0.1865	15.5	0.0039	5034	3943
30	954.2	870.0	0.1729	0.1904	14.5	0.0032	5012	4575
31	968.8	884.5	0.1761	0.1936	15.5	0.0039	5005	3935
32	984.3	900.0	0.1800	0.1975	14.5	0.0053	4983	2760
33	998.7	914.5	0.1853	0.2028	15.5	0.0036	4926	4314
34	1014.2	930.0	0.1889	0.2064	14.4	0.0033	4915	4414
35	1028.6	944.4	0.1921	0.2096	15.5	0.0036	4907	4347
36	1044.1	959.9	0.1957	0.2132	14.6	0.0033	4898	4461
37	1058.8	974.5	0.1990	0.2165	15.5	0.0044	4891	3533
38	1074.2	990.0	0.2034	0.2208	14.5	0.0028	4864	5125
39	1088.8	1004.5	0.2062	0.2237	15.5	0.0037	4868	4153
40	1104.2	1020.0	0.2099	0.2274	14.5	0.0032	4856	4469
41	1118.8	1034.5	0.2132	0.2307	15.5	0.0037	4850	4196
42	1134.2	1050.0	0.2168	0.2343	14.5	0.0031	4840	4687

43	1148.7	1064.5	0.2199	0.2374	15.5	0.0036	4838	4274
44	1164.2	1080.0	0.2236	0.2411	14.5	0.0043	4830	3349
45	1178.8	1094.5	0.2279	0.2454	15.5	0.0044	4803	3488
46	1194.2	1110.0	0.2323	0.2498	14.5	0.0043	4780	3341
47	1208.7	1124.5	0.2367	0.2542	15.5	0.0042	4756	3712
48	1224.2	1140.0	0.2408	0.2584	14.4	0.0031	4739	4589
49	1238.6	1154.4	0.2440	0.2615	15.5	0.0037	4737	4183
50	1254.1	1169.9	0.2477	0.2652	14.6	0.0031	4729	4642
51	1268.8	1184.5	0.2508	0.2683	15.5	0.0034	4728	4562
52	1284.2	1200.0	0.2542	0.2717	14.5	0.0034	4726	4253
53	1298.7	1214.5	0.2576	0.2751	15.5	0.0037	4720	4154
54	1314.2	1230.0	0.2614	0.2789	14.5	0.0034	4713	4210
55	1328.8	1244.5	0.2648	0.2823	15.5	0.0045	4706	3469
56	1344.2	1260.0	0.2693	0.2868	14.5	0.0042	4687	3437
57	1358.7	1274.5	0.2735	0.2910	15.5	0.0043	4669	3628
58	1374.2	1290.0	0.2777	0.2953	14.4	0.0038	4654	3753
59	1388.6	1304.4	0.2816	0.2991	15.5	0.0044	4642	3515
60	1404.1	1319.9	0.2860	0.3035	14.6	0.0038	4626	3807
61	1418.8	1334.5	0.2898	0.3074	15.5	0.0043	4616	3618
62	1434.2	1350.0	0.2941	0.3117	14.5	0.0039	4602	3763
63	1448.8	1364.5	0.2980	0.3155	15.5	0.0037	4592	4235
64	1464.2	1380.0	0.3016	0.3192	14.5	0.0039	4588	3717
65	1478.7	1394.5	0.3055	0.3231	15.5	0.0039	4577	3984
66	1494.2	1410.0	0.3094	0.3270	14.3	0.0027	4570	5252
67	1508.6	1424.3	0.3121	0.3297	15.5	0.0033	4576	4678
68	1524.1	1439.8	0.3154	0.3330	14.7	0.0032	4577	4612
69	1538.8	1454.5	0.3186	0.3362	15.5	0.0032	4577	4839
70	1554.3	1470.0	0.3218	0.3394			4580	





Knee and Zone Data

Raw Drift is computed at each shot level as
Shot Time - Sonic Time

From the raw drift curve, knees are selected. Knee depths define the zones for adjustment.
Selected drift values define the amount of time adjustment to the sonic log in each zone.

When the gradient versus depth of the selected drift is POSITIVE, sonic velocities are
deemed too fast. Sonic transit times are increased by a constant shift, the value of
the selected drift gradient :
Adjusted DT = DT + Shift

When the gradient is NEGATIVE, sonic velocities are deemed too low. The excess sonic transit
time over a threshold DT_Minimum is reduced by a constant reduction factor, G :

When DT < DT_Minimum Adjusted DT = DT
When DT > DT_Minimum Adjusted DT = G *(DT - DT_Minimum) + DT_Minimum

AFTER THE ADJUSTMENT OF THE SONIC LOG :

Residual is computed at each shot level as
Shot Time - Adjusted Sonic Time

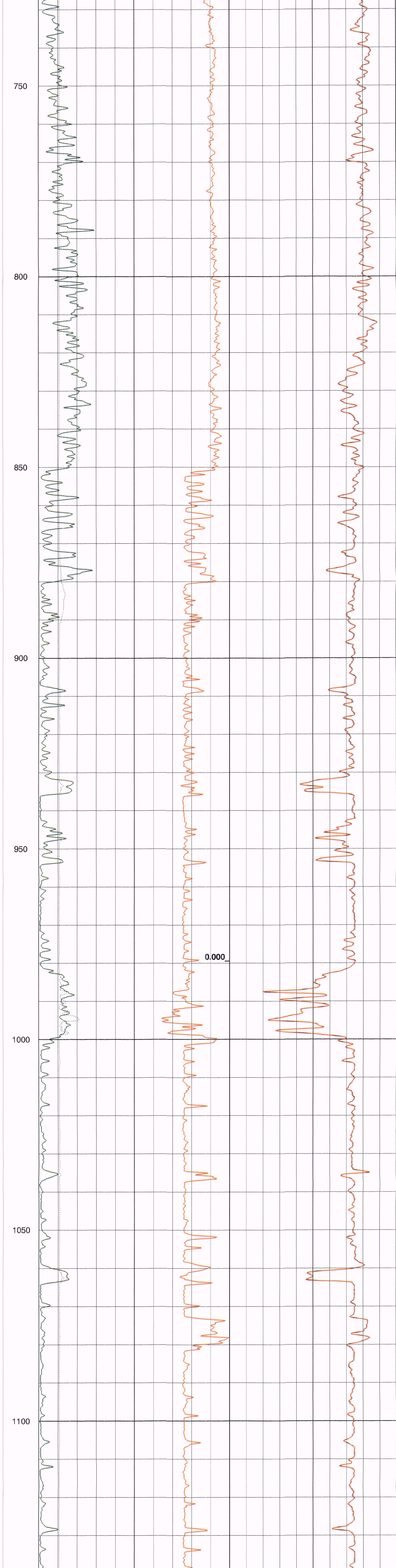
It indicates how closely the adjustment has followed the shot times

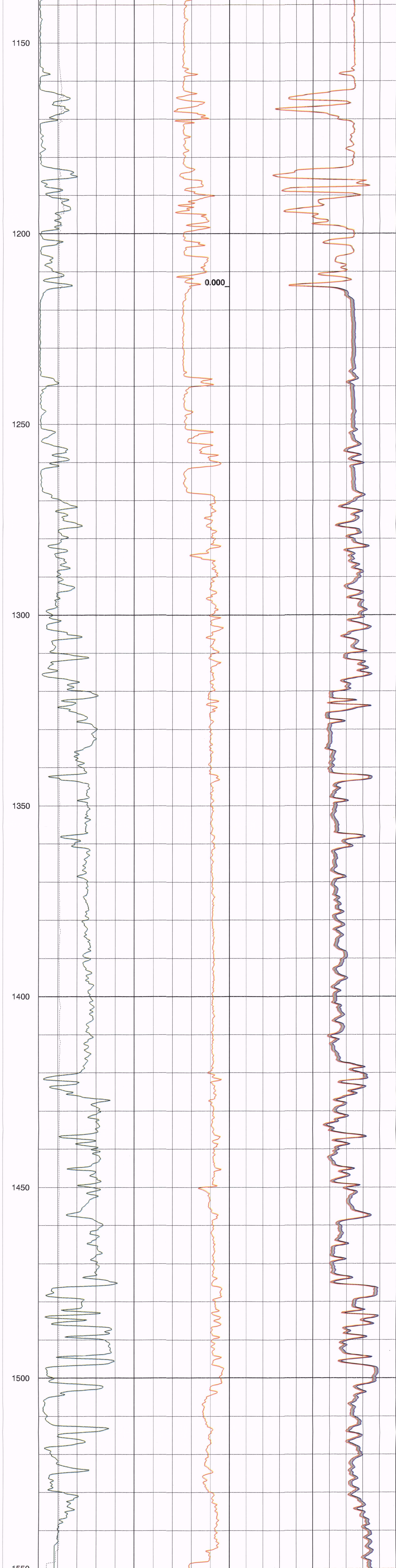
KNEE NUMBER	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	SELECTED DRIFT AT KNEE ms	SHIFT us/m	DELTA_T MINIMUM us/m	REDUCTION FACTOR G	SELECTED DRIFT GRADIENT us/m
1	570.0	654.3	-0.0001	0.7			0.7
2	895.3	979.6	0.0006	0.4			0.4
3	1129.8	1214.0	0.0010	10.0			10.0
4	1467.9	1552.2	0.0121				

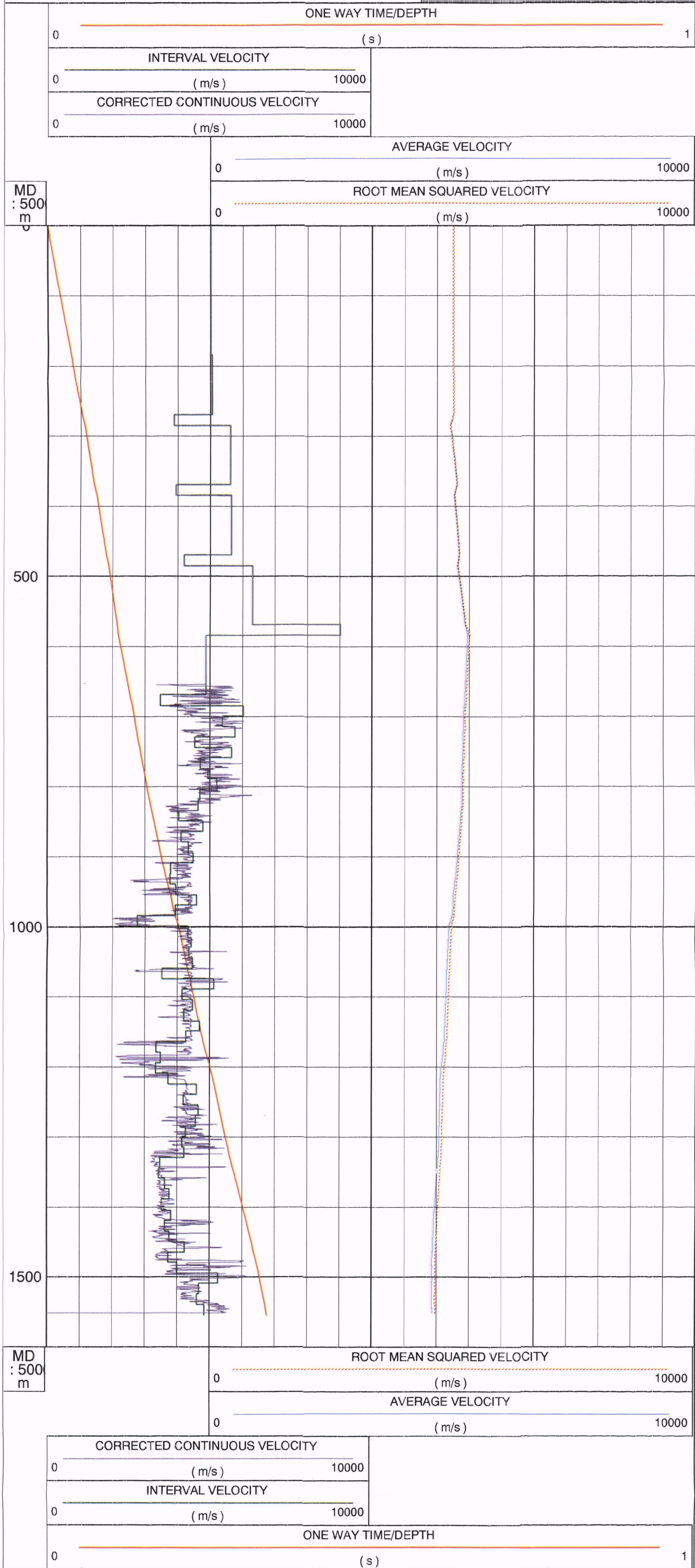
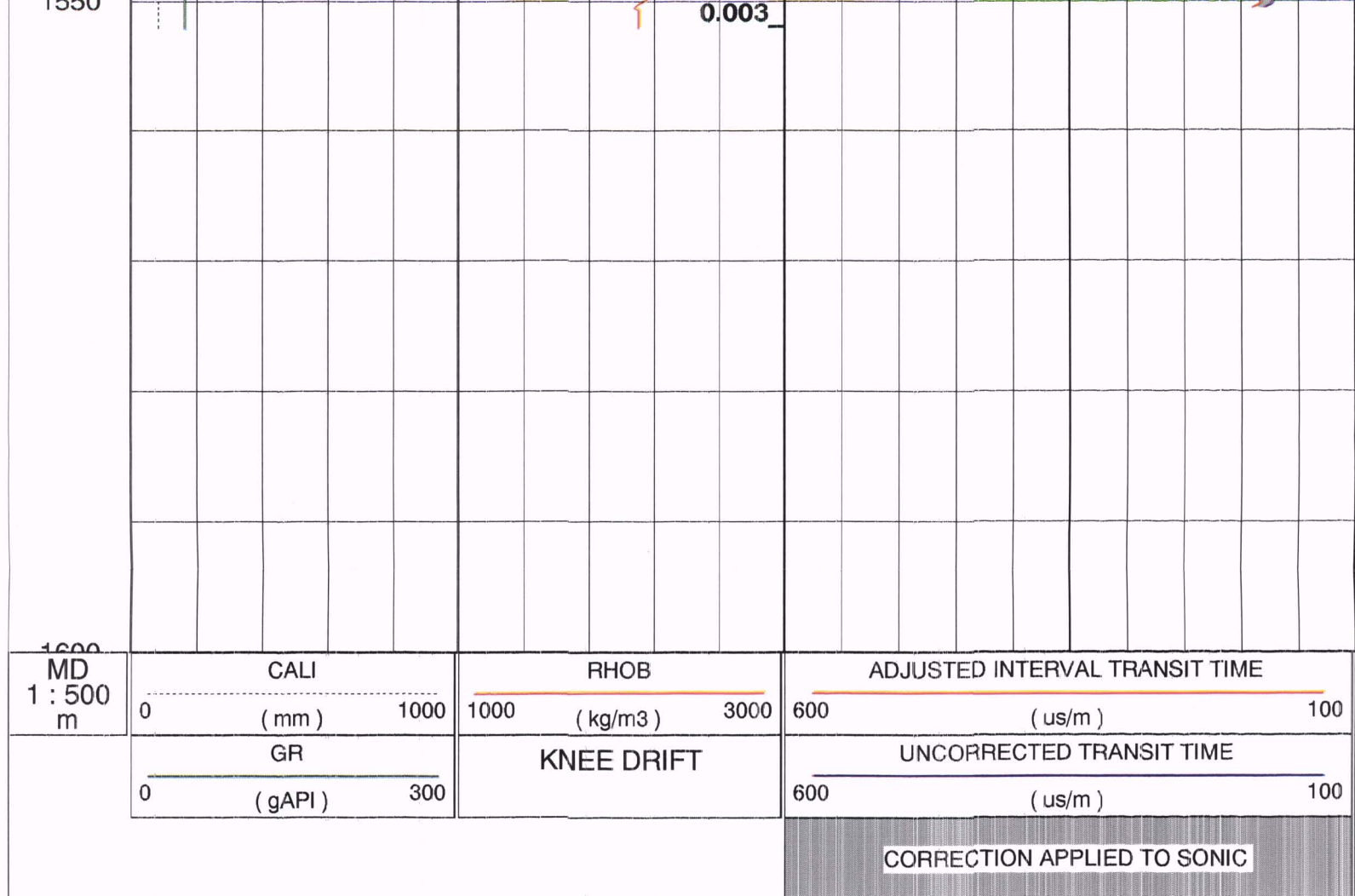
----- POST CALIBRATION VELOCITY TABULATION -----

MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	VERTICAL SHOT TIME ms	ADJUSTED SONIC TIME ms	RAW DRIFT SHOT - SONIC ms	RESIDUAL SHOT - ADJUSTED SONIC ms	ADJUSTED INTERVAL VELOCITY m/s	ADJUSTED RMS VELOCITY m/s	ADJUSTED AVERAGE VELOCITY m/s
	0.0	0.0	0.0			5019		
100.0	184.2	36.7	36.7			5051	5019	5019
184.5	268.8	53.4	53.4			3876	5029	5029
200.0	284.2	57.4	57.4			5619	4957	4949
284.5	368.8	72.5	72.5			3946	5102	5088
300.0	384.2	76.4	76.4			5650	5049	5029
384.5	468.8	91.4	91.4			4193	5152	5131
400.0	484.2	95.1	95.1			6313	5118	5094
484.4	568.6	108.4	108.4			9017	5280	5244
499.9	584.2	110.1	110.1			4879	5358	5303
584.5	668.8	127.5	127.5	0.0	-0.0	4789	5296	5246
600.0	684.2	131.9	130.7	1.2	1.2	4377	5284	5235
614.5	698.8	134.3	134.0	0.3	0.3	5311	5264	5214
630.0	714.2	137.2	136.9	0.3	0.3	4847	5265	5216
644.5	728.8	139.7	139.9	-0.2	-0.2	5098	5256	5208
660.0	744.2	143.2	143.0	0.2	0.2	4937	5253	5206
674.5	758.8	145.7	145.9	-0.1	-0.2	4850	5247	5200
690.0	774.2	149.0	149.1	-0.0	-0.1	5064	5239	5193
704.5	788.7	152.0	152.0	0.1	-0.0	5125	5235	5190
720.0	804.2	154.9	155.0	0.0	-0.1	5170	5233	5189
734.5	818.8	158.0	157.8	0.3	0.2	4275	5232	5189
750.0	834.3	161.4	161.4	0.1	-0.0	4400	5212	5168
764.5	848.7	165.0	164.7	0.4	0.3	4420	5197	5153
780.0	864.2	168.2	168.2	0.1	-0.0	4125	5182	5137
794.5	878.8	171.7	171.7	0.1	0.0	4331	5163	5117
810.0	894.2	175.3	175.3	0.2	0.0	4252	5147	5101
824.5	908.8	178.5	178.7	-0.0	-0.2	4174	5132	5085
840.0	924.2	182.6	182.4	0.4	0.2	3728	5114	5066
854.5	938.7	186.5	186.3	0.3	0.1	3842	5089	5038
870.0	954.2	190.4	190.4	0.2	0.0	4367	5066	5013
884.5	968.8	193.6	193.7	0.1	-0.1	4087	5055	5002
900.0	984.3	197.5	197.5	0.2	0.0	2653	5038	4984
914.5	998.7	202.8	202.9	0.0	-0.2	4182	4988	4921
930.0	1014.2	206.4	206.7	-0.1	-0.3	4339	4975	4908
944.4	1028.6	209.6	210.0	-0.1	-0.3	4332	4966	4899
959.9	1044.1	213.2	213.5	-0.1	-0.4	4399	4956	4890
974.5	1058.8	216.5	216.9	-0.2	-0.4	4049	4948	4882
990.0	1074.2	220.8	220.7	0.4	0.2	4543	4934	4868
1004.5	1088.8	223.7	223.9	0.0	-0.2	4341	4928	4863
1020.0	1104.2	227.4	227.5	0.2	-0.1	4258	4920	4855
1034.5	1118.8	230.7	230.9	0.1	-0.2	4256	4910	4846
1050.0	1134.2	234.3	234.5	0.1	-0.2	4399	4901	4837
1064.5	1148.7	237.4	237.8	-0.1	-0.4	4141	4894	4831
1080.0	1164.2	241.1	241.5	-0.2	-0.5	3650	4884	4820
1094.5	1178.8	245.4	245.5	0.2	-0.1	3259	4866	4801
1110.0	1194.2	249.8	250.3	-0.1	-0.4	3622	4840	4772
1124.5	1208.7	254.2	254.3	0.2	-0.1	3849	4824	4754
1140.0	1224.2	258.4	258.3	0.5	0.1	4310	4810	4740
1154.4	1238.6	261.5	261.6	0.4	-0.2	4271	4804	4734
1169.9	1254.1	265.2	265.3	0.6	-0.1	4346	4797	4728
1184.5	1268.8	268.3	268.6	0.6	-0.3	4267	4792	4723
1200.0	1284.2	271.7	272.3	0.5	-0.5	4423	4785	4717
1214.5	1298.7	275.1	275.5	0.8	-0.4	4463	4781	4713
1230.0	1314.2	278.9	279.0	1.2	-0.1	3853	4777	4710
1244.5	1328.8	282.3	282.8	1.0	-0.5	3484	4766	4699
1260.0	1344.2	286.8	287.2	1.2	-0.4		4749	4680









----- TIME/DEPTH LISTING -----					
ONE WAY SONIC TIME FROM SRD	DEPTH AT TIME	DEPTH AT TIME	DEPTH AT TIME	DEPTH AT TIME	DEPTH AT TIME
	+0 ms	+2 ms	+4 ms	+6 ms	+8 ms
	m	m	m	m	m
0	0.0	10.1	20.1	30.2	40.1
10	50.1	60.2	70.3	80.3	90.4
20	100.4	110.3	120.4	130.5	140.5
30	150.6	160.6	170.7	180.7	190.8
40	200.9	210.9	221.1	231.2	241.2
50	251.3	261.5	271.0	278.7	287.4
60	298.6	309.8	321.1	332.4	343.5
70	354.8	366.1	374.8	382.7	393.2
80	404.5	415.7	427.0	438.5	449.7
90	461.0	471.4	479.8	490.1	502.8
100	515.4	527.9	540.6	553.2	565.9
110	582.6	593.1	602.9	612.6	622.4
120	632.2	641.9	651.7	661.4	671.3
130	681.4	689.8	698.6	709.1	719.8
140	729.1	739.0	749.4	759.1	768.9
150	778.6	789.0	799.3	809.2	819.8
160	828.4	836.5	845.5	854.7	863.2
170	871.9	880.0	888.6	897.2	905.9
180	913.9	922.3	930.7	937.3	945.6
190	953.0	961.3	970.2	978.7	985.7
200	991.2	996.2	1002.9	1011.5	1020.2
210	1028.9	1037.4	1046.1	1054.8	1062.7
220	1071.1	1080.7	1089.2	1097.9	1106.4
230	1115.1	1123.6	1132.0	1140.9	1149.7
240	1158.4	1165.4	1172.3	1180.9	1187.3
250	1193.6	1199.8	1207.6	1214.6	1223.0
260	1231.5	1240.1	1248.8	1257.3	1266.0
270	1274.7	1283.2	1291.9	1300.9	1309.7
280	1318.6	1326.2	1332.7	1339.4	1346.9
290	1353.9	1361.5	1368.6	1375.6	1382.9
300	1390.2	1397.5	1404.5	1411.7	1419.1
310	1427.7	1434.7	1442.2	1449.5	1458.0
320	1465.5	1472.3	1481.2	1490.3	1499.2
330	1508.6	1517.3	1526.1	1535.0	1545.5

SYNTHETIC SEISMOGRAM FROM
CHECKSHOT CORRECTED SONIC

COMPANY:
WELL:
FIELD:
PROVINCE:
COUNTRY:

Apache Canada Ltd.
Apache Paramount Nogha B-23
Nogha
NWT
Canada

DATE COMPUTED:
JOB NUMBER:

March 2004
04009

REFERENCE DATUM:
ACOUSTIC IMPEDANCE:

KB
FROM SONIC & DENSITY

SAMPLING RATE:
WAVELET:

1 MSEC
ORMSBY ZERO PHASE BPF

SCALE:

15 IN/SECOND

POLARITY CONVENTION:
NORMAL POLARITY:

AN INCREASE OF ACOUSTIC IMPEDANCE APPEARS AS A BLACK PEAK

THE WAVELET IS DISPLAYED FOR A PRESSURE COEFFICIENT OF 0.2 (INCREASE IN IMPEDENCE)

