

Denne rapport
tilhører



LTEK DOK.SENTER

L.NR.: 95037019

KODE: W00 119-3 08-86

Returneres etter bruk

SONIC CALIBRATION
PROCESSING REPORT

COMPANY : CONOCO NORWAY INC.
OPERATOR : STATOIL
WELL : 1/9-3
FIELD : EXPLORATION
COUNTRY : NORWAY
COORDINATES : 56⁰ 24' 55.684" N
02⁰ 54' 15.216" E
JOB TYPE : WSC
DATE OF SURVEY : August 1978
JOB REFERENCE : S80425
ANALYST : G. V. Dahl/N. Smith

February 9, 1995

SCHLUMBERGER GEOQUEST
INTERPRETATION SERVICES
STAVANGER

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1 INTRODUCTION

Checkshot data were recorded in the vertical exploration well 1/9-3 operated by Statoil in August, 1978. The survey was shot from 4550.0 m measured depth from KB to 450.0 m by Seismograph Service Ltd (SSL).

This report contains the results of re-processing and re-displaying the Sonic Calibration as part of the Conoco Sonic Calibration project. The aim of this project is to calibrate all the 64 wells within the project consistently and output in (Charisma) workstation format. These data were originally processed by SSL in 1978 and the original calibrated velocity log is in the enclosures. This latest re-processing has been performed by Schlumberger GeoQuest under reference number S80425.

CONVENTION.

In the Plots, each processing step is displayed according to the *SEG normal polarity* convention (1976) whereby an upgoing compressional wave, reflected by an increase of acoustic impedance with depth, is displayed as a white trough.

2 ACQUISITION PARAMETERS

DOWNHOLE SURVEY PARAMETERS

Elevation SRD	MSL
Elevation KB	35.8 m above MSL
Elevation DF	35.4 m above MSL
Elevation GL	76.5 m below MSL
Number of Levels Processed	32
Total Depth	4570 m below KB
Contractor	Seismograph Service Ltd.
Energy Source	Airgun
Waveshaping kits	-
Source Offset	54.9 m
Source Depth	7.6 m
Source Azimuth	147
Reference Sensor	Hydrophone
Sensor Offset	54.9
Sensor Depth	10.7 m
Sensor Azimuth	147
Downhole Tool	-
Number of Axis	-
Decoupled Geophones	No
Shaker Fitted	No
Downhole Geophone	GCH102/GCH 100
	-
	-

A blank "-" inserted in the table above means that the information was not available when the processing was performed.

3 WELL SEISMIC EDIT

Waveforms were available on paper plots. Each shot of the raw geophone data was evaluated. Time depth pairs were extracted from the original Air gun well velocity survey plot; a copy is in the enclosures.

3.1 Data Quality

The overall quality of the data is good for checkshot purposes. The first breaks are clearly defined and straightforward to pick.

3.2 Transit Time Measurement

The transit times of the reference and downhole sensor traces were picked by SSL. They used first trough to first trough picks.

3.3 Correction to Datum

Seismic Reference Datum (SRD) is at Mean Sea Level (MSL).

The source was suspended 7.6 meters below the sea surface. A hydrophone was attached to the source 10.7 meters below the outlet ports and was used as the time reference.

A static correction of 7.24 msec (OWT) was thus applied to all data to correct it to SRD.

3.4 Geophysical Airgun Report

The Geophysical Airgun Report listing contains all downhole seismic measurements obtained by analysing stacked shots.

The level number, corresponding KB and SRD depth, observed (non-vertical) transit times and corrected (vertical) transit times from the source and from SRD are listed. Also included are average velocities between SRD and geophone together with level separation and corresponding transit times and finally interval velocities between levels.

Vertical transit times have been corrected for the effects of geometry. The interval velocities listed are those computed from corrected (ie. vertical) transit times.

4 SONIC CALIBRATION

The aim of sonic calibration is reconciliation of seismic (checkshot) times and integrated sonic times for any given depth in a well. In the presence of checkshot data with scatter, the calibration always adjusts the sonic integrated times to match smoothed checkshot times.

A drift curve is determined by comparing an integrated sonic log transit time and vertical checkshot times. The term drift is defined as the seismic time (from check shots) minus the sonic time (from integration of edited sonic). Commonly the word drift is used to identify the difference between sonic and seismic measurements either between two or more levels or over different zones in a well.

The gradient of drift, that is the slope of the drift curve, can be negative or positive.

For a negative drift $\frac{\Delta drift}{\Delta depth} < 0$, the sonic time is greater than the seismic time over a certain section of the log.

For a positive drift $\frac{\Delta drift}{\Delta depth} > 0$, the sonic time is less than the seismic time over a certain section of the log.

For a zero drift $\frac{\Delta drift}{\Delta depth} = 0$, the sonic time is equal to the seismic time over a certain section of the log.

The drift curve, between two levels, is then an indication of correction required on the sonic to have the TTI of the corrected sonic match the check shot times.

Two methods of correction to the sonic log are used.

1. Uniform or block shift.
2. ΔT Minimum .

4.1 Open Hole Logs

The sonic and density logs were available over the following intervals:

Sonic log interval : 414.0 m - 4519.0 m vertical depth from MSL

Density log interval : 414.0 m - 4519.0 m vertical depth from MSL

There is a gap in the sonic log between 1862.0 m and 2259.0 m vertical depth from MSL. A straight line has been drawn and the log has been treated as continuous. The sonic and density logs have been depth matched, spliced, edited and modelled to MSL.

The top sonic at 414.0 m TVD from MSL has been chosen as the origin of drift computation (ie. point of zero drift). Shot levels are added at MSL, the sea floor and the bottom of the sonic log.

4.2 Sonic Calibration Output

Drift Computation Report

The Drift Computation Report contains the basic comparison of raw seismic and edited sonic integrated times at checkshot levels.

The level number, measured depth and vertical depth for all levels, vertical checkshot times adjusted to SRD and corresponding integrated sonic times are compiled in the listing. The drift between two adjacent

checkshot levels is listed in milliseconds and the corrections to be applied to the sonic log in $\mu\text{sec}/\text{ft}$ are also listed for all intervals between two adjacent levels .

Sonic Adjustment Parameter Report

This listing shows the depth of selected knees from KB and SRD together with the measured drift. The amount of sonic adjustment and the type of correction (block shift or ΔT Minimum) plus the corresponding reduction factor G if applicable are all printed out.

Drift Curve Plot

The Drift Computation Report and Sonic Adjustment Report are graphically summarized on the Drift Curve Plot. The raw and selected (smoothed) drift curves, position of knees, and corresponding drift at all checkshots and knees are all indicated on the Drift Curve Plot.

Raw and Drift Corrected Sonic Plot

The effect of the shifts listed in the Sonic Adjustment Parameter Report on the edited sonic log and the results of sonic adjustment for drift are graphically displayed on the Raw and Corrected Sonic Plot.

Velocity Report

The interval velocities between two adjacent checkshot levels computed from corrected (adjusted) sonic log are listed in the Velocity Report.

The residual errors between checkshots and integrated sonic times *after* calibration (adjustment) are also listed in the Velocity Report for every checkshot level.

4.3 Time Depth Conversion

Time and Velocity vs Depth Plot

Four velocities - Average, Interval, Continuous and Root Mean Square together with Time vs Depth curve are computed for all checkshot levels. The results are plotted as a function of depth on the Time and Velocity vs Depth Plot.

Interval velocities (v_{int}) are those computed between two adjacent checkshot levels from corrected sonic logs and listed in the Velocity Report. Interval velocity is defined as

$$v_{int} = \frac{z_n - z_{n-1}}{t_n - t_{n-1}}$$

where z_n is the depth of n th layer and t_n its corresponding integrated sonic time.

Average velocities (v_{ave}) are computed by dividing SRD depth of checkshots and their corresponding integrated sonic times from corrected sonic log.

$$v_{ave} = \frac{\sum v_n t_n}{\sum t_n}$$

Continuous velocity curve is an inverse of sonic log displayed not as *slowness* in $\mu\text{sec}/\text{ft}$ but as velocity in meters/second.

Root Mean Square Velocity (v_{rms}) is computed from calibrated sonic logs by

$$v_{rms} = \sqrt{\frac{\sum v_n^2 t_n}{\sum t_n}}$$

where v_n is an interval velocity over some specific time increment Δt_n of calibrated sonic log.

Time vs Depth Curve is the result of integration of the calibrated sonic log and is plotted as one way time (OWT) against depth.

Time Converted Velocity Report

This listing is obtained from the calibrated sonic log. Average, RMS and Interval velocities are computed at one millisecond intervals one way time (OWT).

The results are listed against two way time (TWT) together with corresponding measured (KB) and seismic datum (SRD) depths.

Interval velocities are between two adjacent computations (two milliseconds TWT apart) whereas average and RMS are from SRD.

Depth Report

The Depth Report contains the listing of depth versus corresponding two way time every three meters.

Time Report

The Time Report contains the listing of two way time versus corresponding depth every one millisecond.

4.4 Sonic Calibration Results

The calculated drift starts out being positive down to around 2340 m SRD, and then it goes strongly negative down to around 3500 m. This results in a large correction to the sonic curve but care has been taken not to introduce a spurious jump in the corrected sonic. No caliper is available over this section so it is difficult to say why the sonic was measuring velocities too slow with respect to the checkshots. In the bottom part of the well the drift remains fairly constant (-26.2 ms at TD).

Knees are selected from the raw drift curve and lithological boundaries marked by the well logs. The depths of the knees define the zones for the adjustment. The selected drift at the knees, defines the amount of time adjustment to the sonic log in each zone.

The calibrated logs are presented in the WSC plot accompanying this package. The depths and times are referred to Mean Sea Level (MSL).

4.5 Other Correlation Logs

It was also part of the scope of work for this project to inspect the quality of associated calibration curves and comment.

Other Correlation Curves Available:

Gamma Ray, Caliper, Deep Resistivity, Neutron.

Comments on Quality:

The gamma ray curve is of good quality.

The caliper exists only in the upper part of the well and shows an enlarged borehole.

The resistivity data corresponds well with the trends of the porosity logs though there are gaps and spikes in the data.

The neutron data appears reasonable where it is available except near 4450 m TVDMSL where it appears to jump off scale.

5 FINAL PACKAGE

- Processing report
- WSC Enclosures
 - 1 - 11" Well Sonic Calibration Plot (WSC)
 - * Drift Curve Plot
 - * Raw and Drift Corrected Sonic Plot
 - * Time and Velocity versus depth
 - * Time versus Depth Curve
 - 1 - Copy of the Original Calibrated Velocity Log from SSL
 - Listings:
 - * Shots
 - Airgun Report
 - * Drift
 - Drift Computation Report
 - Sonic Adjustment Report
 - Velocity Report
 - * Time/Depth
 - Time Converted Velocity Report
 - Depth Report
 - Time Report
- Tapes
 - 1 - Depth indexed calibrated logs on 1600 BPI LIS formatted tape
 - 2 - Results on Exabyte cartridge in Charisma format.
 - 3 - Floppy in ASCII format of listings

Quality Control Check

- Final package checked by : G. V. Dahl/N.Smith
- Approved by Client : D. Stemler

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
 GL Elevation of Users Reference (Generally Ground Level) Above SRD
 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)
 GUNEMZ 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)
 HYDEMZ HYDROPHONE DISTANCE FROM THE BOREHOLE AXIS IN EW DIRECTION (CF. GUNELZ)
 HYDNSZ HYDROPHONE DISTANCE FROM THE BOREHOLE AXIS IN NS DIRECTION (CF. GUNELZ)
 TRTHYD TRAVEL TIME FROM THE HYDROPHONE TO THE SOURCE
 TRTSRD TRAVEL TIME FROM THE SOURCE TO THE SRD
 DEVMEL 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
 DGL.GSH Vertical Depth Relative to Ground Level (User's Reference)
 TIMD.GSH Tie In Memorized Output
 TIMV.GSH Vertical Travel Time from the Source to the Geophone
 SMTH.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	:	35.8000	M
ELEV OF SRD AB. MSL (WST)	SRD	:	0	M
ELEVATION OF KELLY BUSHING	EKB	:	35.8000	M
ELEV OF GL AB. SRD (WST)	GL	:	-76.5000	M
VEL SOURCE-HYDRD (WST)	VELHYD	:	1478.00	M/S
VEL SOURCE-SRD (WST)	VELSUR	:	1478.00	M/S

(MATRIX PARAMETERS)

	SOURCE ELV M	SOURCE EW M	SOURCE NS M	HYDRO ELEV M	HYDRO EW M	HYDRO NS M
1	-7.60	29.90	-46.04	-10.70	29.90	-46.04
TRT HYD--SC MS		TRT SC--SRD MS				
1	2.10		5.14			
	MD @ KB M	VD @ KB M	VD @ SRD M	E--W COORD M	N--S COORD M	
1	450.00	450.00	414.20	0	0	
2	650.00	650.00	614.20	0	0	
3	800.00	800.00	764.20	0	0	
4	1150.00	1150.00	1414.20	0	0	
5	1450.00	1450.00	1414.20	0	0	
6	2365.00	2365.00	2329.20	0	0	
7	2655.00	2655.00	2619.20	0	0	
8	2725.00	2725.00	2689.20	0	0	
9	2880.00	2880.00	2844.20	0	0	
10	2945.00	2945.00	2909.20	0	0	
11	3065.00	3065.00	3029.20	0	0	
12	3090.00	3090.00	3054.20	0	0	
13	3120.00	3120.00	3084.20	0	0	
14	3175.00	3175.00	3139.20	0	0	
15	3227.00	3227.00	3191.20	0	0	
16	3350.00	3350.00	3314.20	0	0	
17	3460.00	3460.00	3424.20	0	0	
18	3520.00	3520.00	3484.20	0	0	
19	3685.00	3685.00	3649.20	0	0	
20	3819.00	3819.00	3783.20	0	0	
21	3900.00	3900.00	3864.20	0	0	
22	3955.00	3955.00	3919.20	0	0	
23	4255.00	4255.00	4219.20	0	0	
24	4295.00	4295.00	4259.20	0	0	
25	4360.00	4360.00	4324.20	0	0	
26	4360.00	4360.00	4360.00	0	0	
27	4388.00	4388.00	4352.20	0	0	
28	4550.00	4550.00	4514.20	0	0	

COMPANY : STATOIL

Schlumberger

WELL : 1/9-3

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LEVEL NUMBER	MEASUR DEPTH FROM KB M	VERTIC DEPTH FROM SRD M	VERTIC DEPTH FROM GL M	ORSERV 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
2										
4										
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8										
10	1 450.00	414.20	337.70	235.00	234.97	240.11	1725	200.00	101.76	1965
12	2 650.00	614.20	537.70	336.00	336.72	341.86	1797	150.00	76.29	1966
14	3 800.00	764.20	687.70	412.00	413.01	418.15	1828	350.00	178.86	1957
16	4 1150.00	1114.20	1037.70	590.50	591.87	597.01	1866	300.00	144.67	2074
18	5 1450.00	1414.20	1337.70	735.00	736.54	741.68	1907	915.00	523.21	1749
20	6 2365.00	2329.20	2252.70	1258.00	1259.75	1264.89	1841	290.00	152.04	1907
22	7 2655.00	2619.20	2542.70	1410.00	1411.79	1416.93	1849	70.00	30.01	2333
24	8 2725.00	2689.20	2612.70	1440.00	1441.80	1446.94	1859	155.00	58.52	2649
26	9 2880.00	2844.20	2767.70	1498.50	1500.32	1505.46	1889	65.00	22.51	2888
28	10 2945.00	2909.20	2832.70	1521.00	1522.83	1527.97	1904	120.00	43.01	2790
30	11 3065.00	3029.20	2952.70	1564.00	1565.84	1570.98	1928	25.00	8.00	3124
32	12 3090.00	3054.20	2977.70	1572.00	1573.84	1578.98	1934	30.00	11.00	2727
34	13 3120.00	3084.20	3007.70	1583.00	1584.85	1589.99	1940	55.00	11.01	4997
36	14 3175.00	3139.20	3062.70	1594.00	1595.85	1600.99	1961	52.00	16.01	3249
38	15 3227.00	3191.20	3114.70	1610.00	1611.86	1617.00	1974	123.00	29.01	4239
40	16 3350.00	3314.20	3237.70	1639.00	1640.87	1646.01	2013	110.00	22.51	4886
42	17 3460.00	3424.20	3347.70	1661.50	1663.38	1668.52	2052	60.00	12.51	4798
44	18 3520.00	3484.20	3407.70	1674.00	1675.89	1681.03	2073	165.00	35.01	4712
46	19 3685.00	3649.20	3572.70	1709.00	1710.90	1716.05	2127	134.00	32.01	4186
48	20 3819.00	3783.20	3706.70	1741.00	1742.91	1748.06	2164	81.00	27.00	2999
50	21 3900.00	3864.20	3787.70	1768.00	1769.92	1775.06	2177	55.00	21.00	2619
52	22 3955.00	3919.20	3842.70	1789.00	1790.92	1796.06	2182	300.00	102.02	2941
54	23 4255.00	4219.20	4142.70	1891.00	1892.94	1898.08	2223	40.00	12.00	3333
56	24 4295.00	4259.20	4182.70	1903.00	1904.94	1910.08	2230			

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COMPAN : STATOIL

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WELL : 1/9-3

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LEVEL NUMBER	MEASUR DEPTH FROM K.B M	VERTIC DEPTH FROM SKD M	VERTIC DEPTH FROM GL 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
25	4360.00	4324.20	4247.70	1927.00	1928.94	1934.08	2236	65.00	24.00	2700
26	4388.00	4352.20	4275.70	1936.00	1937.94	1943.08	2240	28.00	9.00	3111
27	4550.00	4514.20	4437.70	1992.00	1993.95	1999.09	2258	162.00	56.01	2893

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Schlumberger

DRIFT COMPUTATION REPORT

COMPANY : STATOIL
WELL : 1/9-3
FIELD : WILDCAT
COUNTRY : NORWAY
REFERENCE: S80425
LOGGED : AUG-1978

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
 GL - Elevation of Users Reference (Generally Ground Level) Above SRD
 XSTART - TOP OF ZONE PROCESSED BY WST
 XSTOP - BOTTOM OF ZONE PROCESSED BY WST
 GAD001 - RAW SONIC CHANNEL NAME USED FOR WST SONIC ADJUSTMENT
 UNFDEN - UNIFORM DENSITY VALUE

ZONE
 LOFDEN - LAYER OPTION FLAG FOR DENSITY : --1=NONE; 0=UNIFORM; 1=UNIFORM+LAYER
 LAYDEN - USER SUPPLIED DENSITY DATA

SAMPLED
 SHOT - Shot number
 PKB - Measured Depth from Kelly-Bushing
 DSRD - Depth from SRD
 DGL - Vertical Depth Relative to Ground Level (User's Reference)
 SHTM - Shot time (WST)
 RAWMS - Raw Sonic (WST)
 SHDR - Drift at Shot or Knee
 BLSH - Block Shift between Shots or Knee

(GLOBAL PARAMETERS)

ELEV OF KB AB. MSL (WST)	KB	:	35.8000	M	
ELEV OF SRD AB. MSL (WST)	SRD	:	0	M	
Elevation of Kelly Bushing	EKB	:	35.8140	M	
ELEV OF GL AB. SRD (WST)	GL	:	-76.5000	M	
TOP OF ZONE PROC (WST)	XSTART	:	35.8140	M	
BOT OF ZONE PROC (WST)	XSTOP	:	4554.93	M	
RAW SONIC CH NAME (WST)	GAD001	:	DT.051.PAT.*		
UNIFORM DENSITY VALUE	UNFDEN	:	2.30000	G/C3	

(ZONED PARAMETERS)

LAYER OPTION FLAG DENS	LOFDEN	:			
USER SUPPLIED DENS DA	LAYDEN	:	-1.000000	G/C3	30479.7
		:	0		0

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LEVEL NUMBER	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	VERTICAL DEPTH FROM OL M	VERTICAL TRAVEL TIME SRD/GEOD MS	INTEGRATED RAW SONIC TIME MS	COMPUTED DRIFT AT LEVEL MS	COMPUTED BLK-SHIFT CORRECTION US/F
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Schlumberger

LEVEL NUMBER	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	VERTICAL DEPTH FROM GL M	VERTICAL TRAVEL TIME SRD/GE0 MS	INTEGRATED RAW SONIC TIME MS	COMPUTED DRIET AT LEVEL MS	COMPUTED BLK-SHIFT CORRECTION US/F
25	4255.00	4219.19	4142.70	1098.00	1924.30	--26.22	--1.31
26	4295.00	4259.28	4182.70	1910.00	1937.51	--27.43	--9.16
27	4360.00	4324.20	4247.70	1934.00	1960.00	--26.00	6.72
28	4388.00	4352.24	4275.70	1943.00	1969.37	--26.29	--3.16
29	4550.00	4514.24	4437.70	1999.09	2025.33	--26.24	.10
30	4554.93	4519.12	4442.61	2000.60	2026.92	--26.24	0
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VELOCITY REPORT

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COMPANY : STATOIL
WELL : 1/9--3
FIELD : WILDCAT
COUNTRY : NORWAY
REFERENCE: S80425
LOGGED : AUG-1978

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LONG DEFINITIONS

GLOBAL
 SRCDRF -- ORIGIN OF ADJUSTMENT DATA
 CONADJ -- CONSTANT ADJUSTMENT TO AUTOMATIC DELTA-T MINIMUM = 7.5 US/F
 UNERTH -- UNIFORM EARTH VELOCITY (GTRFRM)
 ZONE
 ZDRIFT -- USER DRIFT AT BOTTOM OF THE ZONE
 ADJOPZ -- TYPE OF ADJUSTMENT IN THE DRIFT ZONE : 0=DELTA-T MIN, 1=BLOCKSHIFT
 ADJUSZ -- DELTA-T MINIMUM USED FOR ADJUSTMENT IN THE DRIFT ZONE
 LOFVEL -- LAYER OPTION FLAG FOR VELOCITY: -1=NONE; 0=UNIFORM; 1=UNIFORM+LAYER
 LAYVEL -- USER SUPPLIED VELOCITY DATA

SAMPLED
 SHOT -- Shot number
 VDKB -- Vertical Depth Relative to KB
 DSKD -- Depth from SKD
 DGL -- Vertical Depth Relative to Ground Level (User's Reference)
 KNEE -- Knee
 BLSH -- Block Shift between Shots or Knee
 DTMI -- Value of Delta-T Minimum used
 COEF -- Delta-T MIN Coefficient used in the Drift Zone
 DRGR -- Gradient of Drift Curve

(GLOBAL PARAMETERS)

ORIG OF ADJ DATA (WST) SRCDRF : 2.00000
 CONS SONIC ADJST (WST) CONADJ : 7.50000 US/F
 UNIFORM EARTH VELOCITY UNERTH : 2133.60 M/S

(ZONED PARAMETERS)

USER DRIFT ZONE (WST)	ZDRIFT	(VALUE)	(LIMITS)
		26.20000	4555.00
		25.00000	3985.00
		27.90000	3683.00
		26.80000	3526.00
		15.00000	3074.00
		2.500000	2765.80
		0	2713.80
		3.900000	2637.00
		12.00000	2374.00
		2.000000	1156.00
		4.800000	798.000
		0	450.000
		999.2500	35.8000
ADJUSMT MODE (WST)	ADJOPZ		0
USER DELTA-T MIN (WST)	ADJUSZ		0
LAYER OPTION FLAG VELOC	LOFVEL		0
USER VELOC (WST)	LAYVEL		0

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SCHLUMBERGER

SONIC ADJUSTMENT PARAMETER REPORT

COMPANY : STATOIL
WELL : 1/9-3
FIELD : WILDCAT
COUNTRY : NORWAY
REFERENCE: SA0425
LOGGED : AUG-1978

LONG DEFINITIONS

GLOBAL
 Elevation of the KELLY-BUSHING Above MSL or MML
 the Seismic Reference Datum Above MSL or MML
 Elevation of Kelly Bushing
 Elevation of Users Reference (Generally Ground Level) Above SRD
 UNIFORM EARTH VELOCITY (GTRFRM)

ZONE
 LAYER OPTION FLAG FOR VELOCITY: -1=NONE; 0=UNIFORM; 1=UNIFORM+LAYER
 USER SUPPLIED VELOCITY DATA

SAMPLED
 Shot number
 Measured Depth from Kelly-Bushing
 Depth from SRD
 Vertical Depth Relative to Ground Level (User's Reference)
 Shot time (WST)
 Adjusted Sonic Travel Time
 Drift at Shot or Knee
 Residual Travel Time at Knee
 Internal Velocity, Average

(GLOBAL PARAMETERS)

ELEV OF KB AB. MSL (WST)	:	35.2000	M
ELEV OF SRD AB. MSL (WST)	:	0	M
Elevation of Kelly Bushi	:	35.8140	M
ELEV OF GL AB. SRD (WST)	:	-76.5000	M
UNIFORM EARTH VELOCITY	:	2133.60	M/S

(ZONED PARAMETERS)

LAYER OPTION FLAG VELOC	:	0	M/S	30479.7	-	0
USER VELOC (WST)	:	0	M/S	0	-	0

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COMPANY # STATOIL

WELL # 1/9-3

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Schlumberger

LEVEL NUMBER	MEASURED DEPTH		VERTICAL DEPTH		VERTICAL DEPTH		VERTICAL TRAVEL		INTEGRATED		DRIFT		RESIDUAL		ADJUSTED INTERVAL VELOCITY M/S
	FROM	TO	FROM	TO	FROM	TO	SRD/GEOPH	MS	ADJUSTED SONIC TIME	MS	SHOT RAW	TIME SON	SHOT ADJ	TIME SON	
1		35.81		0	-76.50		.02		.02		0		0		0
2		112.32		76.50		0	51.76		51.76		0		0		1479
3		450.00		414.22		337.70	240.11		240.02		.08		.09		1794
4		650.00		614.17		537.70	341.86		341.19		-1.75		.67		1976
5		800.00		764.29		687.70	418.15		418.17		-4.77		-.01		1950
6		1150.00		1114.20		1037.70	597.01		596.86		2.03		.15		1958
7		1450.00		1414.27		1337.70	741.68		743.58		2.51		-1.90		2045
8		2365.00		2329.28		2252.70	1264.89		1264.64		12.18		.25		1756
9		2655.00		2619.30		2542.70	1416.93		1416.53		2.90		.40		1909
10		2725.00		2689.25		2612.70	1446.94		1446.17		.06		.77		2360
11		2880.00		2844.24		2767.70	1505.46		1505.16		-7.67		.30		2627
12		2945.00		2909.16		2832.70	1527.97		1528.31		-10.60		-.34		2805
13		3065.00		3029.26		2952.70	1570.98		1570.88		-14.57		.10		2821
14		3090.00		3054.25		2977.70	1578.98		1578.55		-15.61		.43		3260
15		3120.00		3084.27		3007.70	1589.99		1588.36		-13.86		3.63		3844
16		3175.00		3139.29		3062.70	1600.99		1600.25		-18.95		.74		3960
17		3227.00		3191.26		3114.70	1617.00		1613.61		-18.62		3.39		3892
18		3350.00		3314.24		3237.70	1646.01		1642.54		-21.22		3.47		4250
19		3460.00		3424.28		3347.70	1668.52		1667.74		-25.56		.79		4368
20		3520.00		3484.17		3407.70	1681.03		1680.99		-26.74		.04		4517
21		3685.00		3649.22		3572.70	1716.05		1716.02		-27.85		.03		4712
22		3819.00		3783.18		3706.70	1748.06		1748.25		-26.79		-.19		4156
23		3900.00		3864.25		3787.70	1775.06		1775.63		-26.38		-.57		2961
24		3955.00		3919.27		3842.70	1796.06		1795.71		-24.93		.36		2740

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LEVEL NUMBER	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	VERTICAL DEPTH FROM GL M	VERTICAL TRAVEL TIME SRD/GEOPH MS	INTEGRATED ADJUSTED SONIC TIME MS	DRIFT SHOT TIME -- RAW SON MS	RESIDUAL SHOT TIME -- ADJ SON MS	ADJUSTED INTERVAL VELOCITY M/S
25	4255.00	4219.19	4142.70	1898.08	1898.78	--26.22	-.70	2910
26	4295.00	4259.28	4182.70	1910.08	1911.93	--27.43	-1.85	3047
27	4360.00	4324.20	4247.70	1934.08	1934.36	--26.00	-.28	2895
28	4388.00	4352.24	4275.70	1943.08	1943.63	--26.29	-.54	3027
29	4550.00	4514.24	4437.70	1999.09	1999.22	--26.24	-.13	2914
30	4554.93	4519.12	4442.61	2000.68	2000.81	--26.24	-.13	3071