



The Hague Log Interpretation Centre

Borehole Seismic Processing Summary
Sonic Calibration (WSC) - Geogram (GEO)

COMPANY: WINTERSHALL NOORDZEE BV
WELL: P/16-1
FIELD: P/16
COUNTRY: The Netherlands

Ref no: NEJ..N171697/98

Data processed and report prepared by: Hans Kuipers

SONIC CALIBRATION

The program uses VSP shot data to calibrate an edited input sonic log so that a transformation to two-way travel time from log depths can be made. The data are edited (rejecting bad shots and/or unwanted data) and then stacked using a median stacking routine. First break times are then reestablished and used to calibrate the sonic log.

The output of the program is a 'Seismic Calibrated Sonic Log' referred to Seismic Reference Datum. This log can then be used to generate a synthetic seismogram or 'Geogram'.

The program consists of four modules which are briefly described below.

1. Airgun Computation

First the observed travel time between source and downhole geophones is corrected to vertical time, taking into account the shooting geometry and the well deviation, if any. This vertical time is then corrected to Seismic Reference Datum (SRD=MSL) by adding or subtracting the vertical time from source to SRD. The velocity required to correct the times to the Seismic Reference Datum was 1524m/s. SRD is a reference level 0m above MSL. The source was positioned at 3.0m depth below sea level, the reference hydrophone at 4.5m depth below sea level. The source was positioned statically at 80m offset from the wellhead at 318° North.

The average velocity between SRD and each shot level as well as interval velocities between shot levels are then computed.

2. Drift Computation

The input sonic log (corrected to True Vertical Depth relative to MSL in case of significant deviation) is integrated and the integrated traveltime (TTI) is subtracted from the corrected vertical seismic time over the same depth interval to give a drift at each shot depth (shoulder drift). Thus,

$$Drift = Seismic_{time} - Sonic_{time(integrated)}$$

3. Sonic Adjustment

The sonic interval transit time (continuous velocity) is adjusted to compensate for the drift due to discrepancies between seismic times and sonic times. The main reasons for discrepancies are:

Invaded shaley zones	Drift is negative.
Washed-out zones:	Drift is negative.
Gassy sand:	Drift is positive.
Dispersion:	Drift is positive.

The program can use two methods to adjust the sonic:

a. *BlockShift* (whenever drift is positive).

Sonic transit time is increased by a constant block shift which is in fact the gradient of the drift curve over the zone.

b. *Delta - TMinimum* (whenever drift is negative).

This method is used in zones where the sonic interval transit times (*Delta-T, Dt*) are too large. The method reduces all interval transit time values higher than a selected minimum value (*Delta - TMinimum, Dt_{min}*) according to the formula,

$$Dt_{adjusted} = G(Dt_{measured} - Dt_{min}) + Dt_{min}$$

where *G* = Reduction coefficient.

Usually the drift correction is made over specific zones rather than continuously, so KNEES have to be defined (depth and drift) where computation parameters need to be changed. Depth of knees should correspond to lithological changes to avoid artificial events being created by drift slope changes at shot depths.

4. Velocity Report

This is a report summarising all previous computations and calculating at each shot level the residual drift, resulting from the drift curve being made to make changes of slope correspond to lithological changes (KNEE selection).

5. Depth to Time Conversion

The depth to time transformation is performed using shot interval velocity or user defined modelled interval velocities above top of sonic as well as adjusted sonic integrated time.

For every 2ms of two-way time, the program computes:

DKB	Depth from Schlumberger zero
DSRD	Depth from Seismic Reference Datum
AVGV	Average Velocity
RMSV	Root Mean Square Velocity
INTV	Interval Velocity (over interval of 2ms two-way time)

as well as moveout times at three specified distances from the well.

These values are listed in the Time Converted Velocity report.

GEOGRAM

The GEOGRAM, or synthetic seismogram, is constructed by convolving a chosen wavelet with the reflection coefficient series derived from the sonic and density logs. Where both the sonic and density logs are available, these are edited and corrected for bad hole and invasion effects. The sonic log is calibrated using the check shot data, and the acoustic impedance log is calculated as the product of velocity ($1/DT$) and bulk density ($RHOB$). For each pair of adjacent acoustic impedance values the reflection coefficient is calculated.

The convolution wavelet can be a minimum or zero phase Ricker, a Klauder, or a user defined wavelet. The latter could be the wavelet derived from the downgoing wavefield in VSP data, or one constructed using a special modelling program allowing phase rotation and matching of filter shape. A complete GEOGRAM consists of displays of primaries, primaries plus multiples, multiples only, and primaries with transmission losses. Since the purpose is to match the log data with the surface seismic section, frequency and wavelet control is very important. An alternative GEOGRAM presentation is a frequency test in which only primaries are displayed but different wavelet frequencies are used. A final complete GEOGRAM can then be produced with a time-variant filter, when necessary.

GEOGRAMS are displayed in both polarities, with time scales to match the surface seismic sections. Time indexed data normally presented with GEOGRAMs are sonic, density, acoustic impedance and reflection coefficient series. Any other logged data can also be presented with this time indexing.

The presented GEOGRAMS in the package contain frequency tests made from several frequency bands and phases. It contains presentations of primary reflections only and primary and multiple reflections. Both negative (increase in acoustic impedance with depth: white) and positive SEG polarity are presented. In addition a time indexed log-data display is available.

hk

October 8, 1991

SCHLUMBERGER
ZERO
MSL + 39.0



MSL

SRD

MSL + 0.0

80.0

3.0

4.5

GROUND LEVEL
MSL - 36.0



OFFSET (M) AZIMUTH (DEG)

WELL AT TO	0.0	0.0
SOURCE 1.	80.0	318.0

ELEVATIONS AND OFFSETS IN M

- ◇ -SOURCE
- △ -HYDROPHONE
- ⊙ -WELL, AT SURFACE
- + -WELL, AT TO

ANALYST: HK

26-SEP-91 16:30:59f PROGRAM: GSHOT 007.E08

ff

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*****
*                                     *
*                                     *
*                                     *
*                                     *
*****
*                                     *
* SCHLUMBERGER                       *
*                                     *
*                                     *
*****
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GEOPHYSICAL AIRGUN REPORT

COMPANY : WINTERSHALL NOORDZEE BV.

WELL : P/16-1

FIELD : P/16

COUNTRY : O/S HOLLAND

REFERENCE: NEJ..N171697

LOGGED : 18-SEP-91

LONG DEFINITIONS

GLOBAL

KB - Elevation of the KELLY-BUSHING Above MSL or MML
SRD - Elevation of the Seismic Reference Datum Above MSL or MML
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)
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
DEWEL - 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 (USERS Reference)
TIMO.GSH - Measured Travel Time from Hydrophone to Geophone
TIMV.GSH - Vertical Travel Time From the Source to the Geophone
SHIM.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

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(GLOBAL PARAMETERS)

(VALUE)

ELEV OF KB AB. MSL (WST)	KB	:	39.0000	M
ELEV OF SRD AB. MSL(WST)	SRD	:	0	M
Elevation of Kelly Bushi	EKB	:	39.0000	M
ELEV OF GL AB. SRD(WST)	GL	:	-36.0000	M
VEL SOURCE-HYDRO(WST)	VELHYD	:	1524.00	M/S
VEL SOURCE-SRD (WST)	VELSUR	:	1524.00	M/S

(MATRIX PARAMETERS)

	SOURCE ELV M	SOURCE EW M	SOURCE NS M	HYDRO ELEV M	HYDRO EW M	HYDRO NS M
1	-3.00	-53.53	59.45	-4.50	-53.53	59.45

	TRT HYD-SC MS	TRT SC-SRD MS
1	.98	1.97

	MD @ KB M	VD @ KB M	VD @ SRD M	E-W COORD M	N-S COORD M
1	500.01	500.01	461.01	0	0
2	600.01	600.01	561.01	0	0
3	700.02	700.02	661.02	0	0
4	800.03	800.03	761.03	0	0
5	900.04	900.04	861.04	0	0
6	925.00	925.00	886.00	0	0

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7	950.00	950.00	911.00	0	0
8	960.00	960.00	921.00	0	0
9	975.02	975.02	936.02	0	0
10	1000.01	1000.01	961.01	0	0
11	1025.04	1025.04	986.04	0	0
12	1049.97	1049.97	1010.97	0	0
13	1074.98	1074.98	1035.98	0	0
14	1099.97	1099.97	1060.97	0	0
15	1125.01	1125.01	1086.01	0	0
16	1149.98	1149.98	1110.98	0	0
17	1174.99	1174.99	1135.99	0	0
18	1199.98	1199.98	1160.98	0	0
19	1224.00	1224.00	1185.00	0	0
20	1249.97	1249.97	1210.97	0	0
21	1274.98	1274.98	1235.98	0	0
22	1299.99	1299.99	1260.99	0	0
23	1324.98	1324.98	1285.98	0	0
24	1349.98	1349.98	1310.98	0	0
25	1374.99	1374.99	1335.99	0	0
26	1389.98	1389.98	1350.98	0	0
27	1395.00	1395.00	1356.00	0	0
28	1399.98	1399.98	1360.98	0	0
29	1412.98	1412.98	1373.98	0	0
30	1424.99	1424.99	1385.99	0	0
31	1449.98	1449.98	1410.98	0	0
32	1475.00	1475.00	1436.00	0	0
33	1499.99	1499.99	1460.99	0	0
34	1524.98	1524.98	1485.98	0	0
35	1550.00	1550.00	1511.00	0	0
36	1574.99	1574.99	1535.99	0	0
37	1599.98	1599.98	1560.98	0	0
38	1625.00	1625.00	1586.00	0	0
39	1649.98	1649.98	1610.98	0	0
40	1674.99	1674.99	1635.99	0	0
41	1699.99	1699.99	1660.99	0	0
42	1724.98	1724.98	1685.98	0	0

43	1750.04	1750.04	1711.04	0	0
44	1775.00	1775.00	1736.00	0	0
45	1799.99	1799.99	1760.99	0	0
46	1824.99	1824.99	1785.99	0	0
47	1849.98	1849.98	1810.98	0	0
48	1875.00	1875.00	1836.00	0	0
49	1900.00	1900.00	1861.00	0	0
50	1925.00	1925.00	1886.00	0	0
51	1950.00	1950.00	1911.00	0	0
52	1975.00	1975.00	1936.00	0	0
53	1999.99	1999.99	1960.99	0	0
54	2009.00	2009.00	1970.00	0	0
55	2025.05	2025.05	1986.05	0	0
56	2050.00	2050.00	2011.00	0	0
57	2074.99	2074.99	2035.99	0	0
58	2100.00	2100.00	2061.00	0	0
59	2125.00	2125.00	2086.00	0	0
60	2150.00	2150.00	2111.00	0	0
61	2175.00	2175.00	2136.00	0	0
62	2200.04	2200.04	2161.04	0	0
63	2225.00	2225.00	2186.00	0	0
64	2250.00	2250.00	2211.00	0	0
65	2275.00	2275.00	2236.00	0	0
66	2300.00	2300.00	2261.00	0	0
67	2325.04	2325.04	2286.04	0	0
68	2350.00	2350.00	2311.00	0	0
69	2368.05	2368.05	2329.05	0	0
70	2378.05	2378.05	2339.05	0	0
71	2390.00	2390.00	2351.00	0	0
72	2400.00	2400.00	2361.00	0	0
73	2425.00	2425.00	2386.00	0	0
74	2436.50	2436.50	2397.50	0	0

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LEVEL NUMBER	MEASUR DEPTH FROM KB M	VERTIC DEPTH FROM SRD 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
1	500.01	461.01	425.01	252.00	249.21	251.18	1835	100.01	52.69	1898
2	600.01	561.01	525.01	304.00	301.90	303.87	1846	100.01	50.49	1981
3	700.02	661.02	625.02	354.00	352.39	354.36	1865	100.01	51.35	1947
4	800.03	761.03	725.03	405.00	403.74	405.71	1876	100.01	50.27	1989
5	900.04	861.04	825.04	455.00	454.02	455.98	1888	24.97	10.07	2480
6	925.00	886.00	850.00	465.00	464.08	466.05	1901	25.00	12.06	2074
7	950.00	911.00	875.00	477.00	476.14	478.11	1905	10.00	5.02	1992
8	960.00	921.00	885.00	482.00	481.16	483.13	1906	15.02	5.04	2980
9	975.02	936.02	900.02	487.00	486.20	488.17	1917	24.99	9.06	2759
10	1000.01	961.01	925.01	496.00	495.26	497.23	1933	25.02	10.05	2489
11	1025.04	986.04	950.04	506.00	505.31	507.28	1944	24.93	8.06	3095
12	1049.97	1010.97	974.97	514.00	513.37	515.34	1962	25.01	10.05	2489
13	1074.98	1035.98	999.98	524.00	523.42	525.39	1972	25.00	8.05	3105
14	1099.97	1060.97	1024.97	532.00	531.47	533.44	1989	25.04	8.05	3111
15	1125.01	1086.01	1050.01	540.00	539.51	541.48	2006	24.96	8.04	3103

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LEVEL NUMBER	MEASUR DEPTH FROM KB M	VERTIC DEPTH FROM SRD 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
16	1149.98	1110.98	1074.98	548.00	547.56	549.53	2022	25.01	7.04	3550
17	1174.99	1135.99	1099.99	555.00	554.60	556.57	2041	24.99	7.04	3549
18	1199.98	1160.98	1124.98	562.00	561.65	563.61	2060	24.02	6.04	3977
19	1224.00	1185.00	1149.00	568.00	567.69	569.65	2080	25.97	8.04	3231
20	1249.97	1210.97	1174.97	576.00	575.72	577.69	2096	25.01	7.04	3555
21	1274.98	1235.98	1199.98	583.00	582.76	584.73	2114	25.01	8.03	3114
22	1299.99	1260.99	1224.99	591.00	590.79	592.76	2127	24.99	7.03	3554
23	1324.98	1285.98	1249.98	598.00	597.82	599.79	2144	25.00	7.03	3555
24	1349.98	1310.98	1274.98	605.00	604.85	606.82	2160	25.01	8.03	3115
25	1374.99	1335.99	1299.99	613.00	612.88	614.85	2173	15.00	3.02	4967
26	1389.98	1350.98	1314.98	616.00	615.90	617.87	2187	5.02	1.01	4986
27	1395.00	1356.00	1320.00	617.00	616.91	618.88	2191	4.98	1.01	4950
28	1399.98	1360.98	1324.98	618.00	617.91	619.88	2196	13.00	3.02	4312
29	1412.98	1373.98	1337.98	621.00	620.93	622.90	2206	12.01	6.01	1999
30	1424.99	1385.99	1349.99	627.00	626.94	628.90	2204	24.99	7.03	3558
31	1449.98	1410.98	1374.98	634.00	633.96	635.93	2219			

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LEVEL NUMBER	MEASUR DEPTH FROM KB M	VERTIC DEPTH FROM SRD 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
								25.02	8.02	3118
32	1475.00	1436.00	1400.00	642.00	641.98	643.95	2230	24.99	7.02	3558
33	1499.99	1460.99	1424.99	649.00	649.01	650.98	2244	24.99	8.02	3116
34	1524.98	1485.98	1449.98	657.00	657.03	659.00	2255	25.02	8.02	3119
35	1550.00	1511.00	1475.00	665.00	665.05	667.02	2265	24.98	9.02	2771
36	1574.99	1535.99	1499.99	674.00	674.07	676.04	2272	24.99	7.02	3560
37	1599.98	1560.98	1524.98	681.00	681.09	683.06	2285	25.02	7.02	3565
38	1625.00	1586.00	1550.00	688.00	688.11	690.07	2298	24.98	7.02	3560
39	1649.98	1610.98	1574.98	695.00	695.12	697.09	2311	25.01	9.02	2774
40	1674.99	1635.99	1599.99	704.00	704.14	706.11	2317	24.99	6.02	4153
41	1699.99	1660.99	1624.99	710.00	710.16	712.13	2332	24.99	7.02	3562
42	1724.98	1685.98	1649.98	717.00	717.17	719.14	2344	25.06	7.02	3571
43	1750.04	1711.04	1675.04	724.00	724.19	726.16	2356	24.96	7.02	3559
44	1775.00	1736.00	1700.00	731.00	731.21	733.17	2368	24.99	7.01	3563
45	1799.99	1760.99	1724.99	738.00	738.22	740.19	2379	24.99	7.01	3563
46	1824.99	1785.99	1749.99	745.00	745.23	747.20	2390	24.99	6.01	4155

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LEVEL NUMBER	MEASUR DEPTH FROM KB M	VERTIC DEPTH FROM SRD 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
47	1849.98	1810.98	1774.98	751.00	751.25	753.22	2404	25.02	7.01	3567
48	1875.00	1836.00	1800.00	758.00	758.26	760.23	2415	25.00	7.01	3565
49	1900.00	1861.00	1825.00	765.00	765.28	767.24	2426	24.99	6.01	4157
50	1925.00	1886.00	1850.00	771.00	771.29	773.26	2439	25.00	7.01	3566
51	1950.00	1911.00	1875.00	778.00	778.30	780.27	2449	25.00	8.01	3121
52	1975.00	1936.00	1900.00	786.00	786.31	788.28	2456	24.99	6.01	4157
53	1999.99	1960.99	1924.99	792.00	792.32	794.29	2469	9.01	2.00	4494
54	2009.00	1970.00	1934.00	794.00	794.33	796.30	2474	16.05	4.01	4005
55	2025.05	1986.05	1950.05	798.00	798.33	800.30	2482	24.95	6.01	4150
56	2050.00	2011.00	1975.00	804.00	804.35	806.31	2494	24.99	7.01	3566
57	2074.99	2035.99	1999.99	811.00	811.36	813.32	2503	25.01	5.01	4990
58	2100.00	2061.00	2025.00	816.00	816.37	818.34	2519	25.00	7.01	3566
59	2125.00	2086.00	2050.00	823.00	823.38	825.35	2527	25.01	6.01	4161
60	2150.00	2111.00	2075.00	829.00	829.39	831.36	2539	25.00	7.01	3566
61	2175.00	2136.00	2100.00	836.00	836.40	838.36	2548	25.04	6.01	4167
62	2200.04	2161.04	2125.04	842.00	842.41	844.37	2559			

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LEVEL NUMBER	MEASUR DEPTH FROM KB M	VERTIC DEPTH FROM SRD M	VERTIC DEPTH FROM GL M	OBSERV TRAVEL TIME HYD/GBO MS	VERTIC TRAVEL TIME SRC/GBO MS	VERTIC TRAVEL TIME SRD/GBO MS	AVERAGE VELOC SRD/GBO M/S	DELTA DEPTH BETWEEN SHOTS M	DELTA TIME BETWEEN SHOTS MS	INTERV VELOC BETWEEN SHOTS M/S
								24.96	6.01	4154
63	2225.00	2186.00	2150.00	848.00	848.41	850.38	2571	25.00	5.01	4990
64	2250.00	2211.00	2175.00	853.00	853.42	855.39	2585	25.00	7.01	3567
65	2275.00	2236.00	2200.00	860.00	860.43	862.40	2593	25.00	7.01	3567
66	2300.00	2261.00	2225.00	867.00	867.44	869.41	2601	25.04	7.01	3573
67	2325.04	2286.04	2250.04	874.00	874.45	876.42	2608	24.96	7.01	3562
68	2350.00	2311.00	2275.00	881.00	881.45	883.42	2616	18.05	4.01	4506
69	2368.05	2329.05	2293.05	885.00	885.46	887.43	2624	10.00	3.00	3330
70	2378.05	2339.05	2303.05	888.00	888.46	890.43	2627	11.95	3.00	3980
71	2390.00	2351.00	2315.00	891.00	891.47	893.44	2631	10.00	2.00	4992
72	2400.00	2361.00	2325.00	893.00	893.47	895.44	2637	25.00	6.01	4162
73	2425.00	2386.00	2350.00	899.00	899.48	901.45	2647	11.50	2.00	5739
74	2436.50	2397.50	2361.50	901.00	901.48	903.45	2654			



DRIFT

ANALYST: HK

26-SEP-91 16:38:38ff PROGRAM: GDRIFT 007.E09

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*   SCHLUMBERGER                     *
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DRIFT COMPUTATION REPORT

COMPANY : WINTERSHALL NOORDZEE BV.

WELL : P/16-1

FIELD : P/16

COUNTRY : O/S HOLLAND

REFERENCE: NEJ..N171697

LOGGED : 18-SEP-91

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
 DKB - Measured Depth from Kelly-Bushing
 DSRD - Depth from SRD
 DGL - Vertical Depth Relative to GROUND Level (USERS Reference)
 SHIM - Shot time (WST)
 RAWs - Raw Sonic (WST)
 SHDR - Drift at Shot or Knee
 BLSH - Block Shift between Shots or Knee

(GLOBAL PARAMETERS)

(VALUE)

ELEV OF KB AB. MSL (WST)	KB	:	39.0000	M
ELEV OF SRD AB. MSL(WST)	SRD	:	0	M
Elevation of Kelly Bushi	EKB	:	39.0000	M
ELEV OF GL AB. SRD(WST)	GL	:	-36.0000	M
TOP OF ZONE PROCD (WST)	XSTART	:	0	M
BOT OF ZONE PROCD (WST)	XSTOP	:	0	M
RAW SONIC CH NAME (WST)	GAD001	:	DT.WST.F01.002.FLP.*#####	
UNIFORM DENSITY VALUE	UNFDEN	:	2.30000	G/C3

COMPANY : WINTERSHALL NOORDZEE BV.

WELL : P/16-1

PAGE 2

(ZONED PARAMETERS)	(VALUE)	(LIMITS)
LAYER OPTION FLAG DENS LOFDEN	: -1.000000	30479.7 - 0
USER SUPPLIED DENSITY DA LAYDEN	: 0 G/C3	0 - 0

LEVEL NUMBER	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	VERTICAL DEPTH FROM GL M	VERTICAL TRAVEL TIME SRD/GBD MS	INTEGRATED RAW SONIC TIME MS	COMPUTED DRIFT AT LEVEL MS	COMPUTED BLK-SHFT CORRECTION US/F
							0
1	500.01	461.01	425.01	251.18	251.18	0	-2.66
2	600.01	561.01	525.01	303.87	304.74	-.87	-14.89
3	700.02	661.02	625.02	354.36	360.11	-5.76	-12.66
4	800.03	761.03	725.03	405.71	415.62	-9.91	-11.44
5	900.04	861.04	825.04	455.98	469.65	-13.66	-14.22
6	925.00	886.00	850.00	466.05	480.88	-14.83	-5.99
7	950.00	911.00	875.00	478.11	493.43	-15.32	-7.45
8	960.00	921.00	885.00	483.13	498.69	-15.56	.51
9	975.02	936.02	900.02	488.17	503.71	-15.54	.53
10	1000.01	961.01	925.01	497.23	512.72	-15.50	13.90
11	1025.04	986.04	950.04	507.28	521.64	-14.35	-13.39
12	1049.97	1010.97	974.97	515.34	530.79	-15.45	15.63
13	1074.98	1035.98	999.98	525.39	539.55	-14.17	-4.12
14	1099.97	1060.97	1024.97	533.44	547.94	-14.50	.44
15	1125.01	1086.01	1050.01	541.48	555.95	-14.47	4.40

COMPANY : WINTERSHALL NOORDZEE BV.

WELL : P/16-1

PAGE 4

LEVEL NUMBER	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	VERTICAL DEPTH FROM GL M	VERTICAL TRAVEL TIME SRD/GEO MS	INTEGRATED RAW SONIC TIME MS	COMPUTED DRIFT AT LEVEL MS	COMPUTED BLK-SHFT CORRECTION US/F
16	1149.98	1110.98	1074.98	549.53	563.63	-14.11	-2.40
17	1174.99	1135.99	1099.99	556.57	570.88	-14.30	.96
18	1199.98	1160.98	1124.98	563.61	577.84	-14.23	-5.61
19	1224.00	1185.00	1149.00	569.65	584.32	-14.67	7.77
20	1249.97	1210.97	1174.97	577.69	591.70	-14.00	-2.76
21	1274.98	1235.98	1199.98	584.73	598.96	-14.23	9.85
22	1299.99	1260.99	1224.99	592.76	606.18	-13.42	2.35
23	1324.98	1285.98	1249.98	599.79	613.02	-13.23	-1.04
24	1349.98	1310.98	1274.98	606.82	620.14	-13.32	14.82
25	1374.99	1335.99	1299.99	614.85	626.95	-12.10	-14.00
26	1389.98	1350.98	1314.98	617.87	630.66	-12.79	-10.27
27	1395.00	1356.00	1320.00	618.88	631.83	-12.96	-15.93
28	1399.98	1360.98	1324.98	619.88	633.10	-13.22	-19.15
29	1412.98	1373.98	1337.98	622.90	636.93	-14.04	59.12
30	1424.99	1385.99	1349.99	628.90	640.61	-11.71	.29
31	1449.98	1410.98	1374.98	635.93	647.61	-11.68	

LEVEL NUMBER	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	VERTICAL DEPTH FROM GL M	VERTICAL TRAVEL TIME SRD/GBD MS	INTEGRATED RAW SONIC TIME MS	COMPUTED DRIFT AT LEVEL MS	COMPUTED BLK-SHFT CORRECTION US/F
							8.48
32	1475.00	1436.00	1400.00	643.95	654.94	-10.99	3.84
33	1499.99	1460.99	1424.99	650.98	661.65	-10.67	6.13
34	1524.98	1485.98	1449.98	659.00	669.17	-10.17	5.73
35	1550.00	1511.00	1475.00	667.02	676.72	-9.70	22.98
36	1574.99	1535.99	1499.99	676.04	683.85	-7.81	.59
37	1599.98	1560.98	1524.98	683.06	690.82	-7.77	1.28
38	1625.00	1586.00	1550.00	690.07	697.74	-7.66	1.28
39	1649.98	1610.98	1574.98	697.09	704.65	-7.56	24.49
40	1674.99	1635.99	1599.99	706.11	711.66	-5.55	-11.85
41	1699.99	1660.99	1624.99	712.13	718.65	-6.52	2.26
42	1724.98	1685.98	1649.98	719.14	725.48	-6.33	5.60
43	1750.04	1711.04	1675.04	726.16	732.03	-5.87	-2.22
44	1775.00	1736.00	1700.00	733.17	739.23	-6.06	.83
45	1799.99	1760.99	1724.99	740.19	746.18	-5.99	5.17
46	1824.99	1785.99	1749.99	747.20	752.77	-5.56	-.73

LEVEL NUMBER	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	VERTICAL DEPTH FROM GL M	VERTICAL TRAVEL TIME SRD/GEO MS	INTEGRATED RAW SONIC TIME MS	COMPUTED DRIFT AT LEVEL MS	COMPUTED BLK-SHIFT CORRECTION US/F
47	1849.98	1810.98	1774.98	753.22	758.84	-5.62	3.29
48	1875.00	1836.00	1800.00	760.23	765.58	-5.35	8.06
49	1900.00	1861.00	1825.00	767.24	771.94	-4.69	-5.42
50	1925.00	1886.00	1850.00	773.26	778.39	-5.14	8.00
51	1950.00	1911.00	1875.00	780.27	784.75	-4.48	10.76
52	1975.00	1936.00	1900.00	788.28	791.88	-3.60	-4.19
53	1999.99	1960.99	1924.99	794.29	798.23	-3.94	-7.98
54	2009.00	1970.00	1934.00	796.30	800.47	-4.18	3.14
55	2025.05	1986.05	1950.05	800.30	804.31	-4.01	-.49
56	2050.00	2011.00	1975.00	806.31	810.37	-4.05	5.93
57	2074.99	2035.99	1999.99	813.32	816.89	-3.57	-7.70
58	2100.00	2061.00	2025.00	818.34	822.53	-4.20	11.75
59	2125.00	2086.00	2050.00	825.35	828.58	-3.23	-7.56
60	2150.00	2111.00	2075.00	831.36	835.21	-3.85	8.03
61	2175.00	2136.00	2100.00	838.36	841.56	-3.20	3.83
62	2200.04	2161.04	2125.04	844.37	847.26	-2.88	

COMPANY : WINTERSHALL NOORDZEE BV.

WELL : P/16-1

PAGE 7

LEVEL NUMBER	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	VERTICAL DEPTH FROM GL M	VERTICAL TRAVEL TIME SRD/GEO MS	INTEGRATED RAW SONIC TIME MS	COMPUTED DRIFT AT LEVEL MS	COMPUTED BLK-SHFT CORRECTION US/F
							4.62
63	2225.00	2186.00	2150.00	850.38	852.89	-2.50	-11.32
64	2250.00	2211.00	2175.00	855.39	858.82	-3.43	6.04
65	2275.00	2236.00	2200.00	862.40	865.34	-2.93	.57
66	2300.00	2261.00	2225.00	869.41	872.30	-2.89	16.32
67	2325.04	2286.04	2250.04	876.42	877.96	-1.55	2.34
68	2350.00	2311.00	2275.00	883.42	884.78	-1.36	-10.31
69	2368.05	2329.05	2293.05	887.43	889.39	-1.97	14.97
70	2378.05	2339.05	2303.05	890.43	891.91	-1.47	5.97
71	2390.00	2351.00	2315.00	893.44	894.68	-1.24	-4.48
72	2400.00	2361.00	2325.00	895.44	896.83	-1.39	9.06
73	2425.00	2386.00	2350.00	901.45	902.09	-.64	-15.16
74	2436.50	2397.50	2361.50	903.45	904.67	-1.22	

ANALYST: HK

26-SEP-91 17:21:42f

PROGRAM: GADJST 008.E08

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SONIC ADJUSTMENT PARAMETER REPORT

COMPANY : WINTERSHALL NOORDZEE BV.

WELL : P/16-1

FIELD : P/16

COUNTRY : O/S HOLLAND

REFERENCE: NEJ..N171697

LOGGED : 18-SEP-91

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
 DSRD - Depth from SRD
 DGL - Vertical Depth Relative to GROUND Level (USERS Reference)
 KNEE - Knee
 BLSH - Block Shift between Shots or Knee
 DIMI - Value of Delta-T Minimum used
 COEF - Delta-T MIN Coefficient used in the Drift Zone
 DRGR - Gradient of Drift Curve

(GLOBAL PARAMETERS)

(VALUE)

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)

(VALUE)

(LIMITS)

USER DRIFT ZONE (WST)	ZDRIFT	:	-1.000000 MS	2436.50	-	2300.00
			-2.800000	2300.00		2163.00

COMPANY : WINTERSHALL NOORDZEE BV.

WELL : P/16-1

PAGE 2

-3.400000	2163.00	1870.00
-5.350000	1870.00	1590.00
-7.700000	1590.00	1400.00

-13.00000	1399.00	960.000
-15.50000	960.000	730.000
-7.000000	730.000	500.000

ADJUSMNT MODE (WST)	ADJOPZ	:	-999.2500	30479.7	-	0	
USER DELTA-T MIN (WST)	ADJUSZ	:	-999.2500	US/F	30479.7	-	0
LAYER OPTION FLAG VELOC	LOFVEL	:	-2.000000	30479.7	-	0	
USER VELOC (WST)	LAYVEL	:	0	M/S	0	-	0

COMPANY : WINTERSHALL NOORDZEE BV.

WELL : P/16-1

PAGE 3

KNEE NUMBER	VERTICAL DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	VERTICAL DEPTH FROM GL M	DRIPT AT KNEE MS	BLOCKSHIFT USED US/F	DELTA-T MINIMUM USED US/F	REDUCTION FACTOR G	EQUIVALENT BLOCKSHIFT US/F
1	500.00	461.00	425.00	0		149.16	.46	-9.28
2	730.00	691.00	655.00	-7.00		143.32	.44	-11.26
3	960.00	921.00	885.00	-15.50	1.74			1.74
4	1399.00	1360.00	1324.00	-13.00	8.46			8.46
5	1590.00	1551.00	1515.00	-7.70	2.56			2.56
6	1870.00	1831.00	1795.00	-5.35	2.03			2.03
7	2163.00	2124.00	2088.00	-3.40	1.33			1.33
8	2300.00	2261.00	2225.00	-2.80	4.02			4.02
9	2436.50	2397.50	2361.50	-1.00				

ANALYST: HK

26-SEP-91 17:22:02F PROGRAM: GADJST 008.E08

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* SCHLUMBERGER                 *  
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VELOCITY REPORT

COMPANY : WINTERSHALL NOORDZEE BV.

WELL : P/16-1

FIELD : P/16

COUNTRY : O/S HOLLAND

REFERENCE: NEJ...N171697

LOGGED : 18-SEP-91

LONG DEFINITIONS

GLOBAL

KB - Elevation of the KELLY-BUSHING Above MSL or MML
 SRD - Elevation of the Seismic Reference Datum Above MSL or MML
 EKB - Elevation of Kelly Bushing
 GL - Elevation of Users Reference (Generally Ground Level) Above SRD
 UNERTH - UNIFORM EARTH VELOCITY (GIRFRM)

ZONE

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

SAMPLED

SHOT - Shot number
 DKB - Measured Depth from Kelly-Bushing
 DSRD - Depth from SRD
 DGL - Vertical Depth Relative to GROUND Level (USERS Reference)
 SHTM - Shot time (WST)
 ADJS - Adjusted Sonic Travel Time
 SHDR - Drift at Shot or Knee
 REST - Residual Travel Time At Knee
 INTV - Internal Velocity, Average

(GLOBAL PARAMETERS)

(VALUE)

ELEV OF KB AB. MSL (WST)	KB	:	39.0000	M
ELEV OF SRD AB. MSL(WST)	SRD	:	0	M
Elevation of Kelly Bushi	EKB	:	39.0000	M
ELEV OF GL AB. SRD(WST)	GL	:	-36.0000	M
UNIFORM EARTH VELOCITY	UNERTH	:	2133.60	M/S

(ZONED PARAMETERS)

(VALUE)

(LIMITS)

LAYER OPTION FLAG VELOC	LOFVEL	:	-2.000000	30479.7	-	0
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COMPANY : WINTERSHALL NOORDZEE BV.

WELL : P/16-1

PAGE 5

USER VELOC (WST) LAYVEL : 0 M/S 0 - 0

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
								1835
1	500.01	461.01	425.01	251.18	251.18	0	0	1963
2	600.01	561.01	525.01	303.87	302.12	-.87	1.75	1928
3	700.02	661.02	625.02	354.36	353.99	-5.76	.37	1958
4	800.03	761.03	725.03	405.71	405.06	-9.91	.65	1997
5	900.04	861.04	825.04	455.98	455.13	-13.66	.85	2257
6	925.00	886.00	850.00	466.05	466.19	-14.83	-.14	2072
7	950.00	911.00	875.00	478.11	478.26	-15.32	-.15	2027
8	960.00	921.00	885.00	483.13	483.19	-15.56	-.06	2946
9	975.02	936.02	900.02	488.17	488.29	-15.54	-.12	2729
10	1000.01	961.01	925.01	497.23	497.45	-15.50	-.22	2764
11	1025.04	986.04	950.04	507.28	506.51	-14.35	.78	2683
12	1049.97	1010.97	974.97	515.34	515.80	-15.45	-.46	2808
13	1074.98	1035.98	999.98	525.39	524.71	-14.17	.68	2930
14	1099.97	1060.97	1024.97	533.44	533.24	-14.50	.20	3071
15	1125.01	1086.01	1050.01	541.48	541.39	-14.47	.09	3190

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
16	1149.98	1110.98	1074.98	549.53	549.21	-14.11	.31	3387
17	1174.99	1135.99	1099.99	556.57	556.60	-14.30	-.03	3518
18	1199.98	1160.98	1124.98	563.61	563.70	-14.23	-.09	3629
19	1224.00	1185.00	1149.00	569.65	570.32	-14.67	-.67	3452
20	1249.97	1210.97	1174.97	577.69	577.84	-14.00	-.15	3378
21	1274.98	1235.98	1199.98	584.73	585.25	-14.23	-.52	3395
22	1299.99	1260.99	1224.99	592.76	592.62	-13.42	.14	3580
23	1324.98	1285.98	1249.98	599.79	599.60	-13.23	.19	3443
24	1349.98	1310.98	1274.98	606.82	606.86	-13.32	-.03	3597
25	1374.99	1335.99	1299.99	614.85	613.81	-12.10	1.04	3954
26	1389.98	1350.98	1314.98	617.87	617.60	-12.79	.27	4168
27	1395.00	1356.00	1320.00	618.88	618.81	-12.96	.07	3779
28	1399.98	1360.98	1324.98	619.88	620.12	-13.22	-.24	3101
29	1412.98	1373.98	1337.98	622.90	624.32	-14.04	-1.42	2993
30	1424.99	1385.99	1349.99	628.90	628.33	-11.71	.58	3248
31	1449.98	1410.98	1374.98	635.93	636.02	-11.68	-.09	

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
								3119
32	1475.00	1436.00	1400.00	643.95	644.04	-10.99	-.09	3376
33	1499.99	1460.99	1424.99	650.98	651.45	-10.67	-.47	3043
34	1524.98	1485.98	1449.98	659.00	659.66	-10.17	-.66	3035
35	1550.00	1511.00	1475.00	667.02	667.90	-9.70	-.89	3192
36	1574.99	1535.99	1499.99	676.04	675.73	-7.81	.31	3345
37	1599.98	1560.98	1524.98	683.06	683.20	-7.77	-.15	3512
38	1625.00	1586.00	1550.00	690.07	690.33	-7.66	-.25	3507
39	1649.98	1610.98	1574.98	697.09	697.45	-7.56	-.36	3467
40	1674.99	1635.99	1599.99	706.11	704.66	-5.55	1.44	3471
41	1699.99	1660.99	1624.99	712.13	711.87	-6.52	.26	3550
42	1724.98	1685.98	1649.98	719.14	718.91	-6.33	.24	3703
43	1750.04	1711.04	1675.04	726.16	725.67	-5.87	.49	3370
44	1775.00	1736.00	1700.00	733.17	733.08	-6.06	.10	3493
45	1799.99	1760.99	1724.99	740.19	740.23	-5.99	-.05	3676
46	1824.99	1785.99	1749.99	747.20	747.03	-5.56	.17	3977

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
47	1849.98	1810.98	1774.98	753.22	753.32	-5.62	-.10	3602
48	1875.00	1836.00	1800.00	760.23	760.26	-5.35	-.03	3836
49	1900.00	1861.00	1825.00	767.24	766.78	-4.69	.46	3774
50	1925.00	1886.00	1850.00	773.26	773.41	-5.14	-.15	3834
51	1950.00	1911.00	1875.00	780.27	779.93	-4.48	.34	3427
52	1975.00	1936.00	1900.00	788.28	787.22	-3.60	1.06	3832
53	1999.99	1960.99	1924.99	794.29	793.74	-3.94	.55	3917
54	2009.00	1970.00	1934.00	796.30	796.04	-4.18	.25	4064
55	2025.05	1986.05	1950.05	800.30	799.99	-4.01	.31	4012
56	2050.00	2011.00	1975.00	806.31	806.21	-4.05	.10	3736
57	2074.99	2035.99	1999.99	813.32	812.90	-3.57	.42	4305
58	2100.00	2061.00	2025.00	818.34	818.71	-4.20	-.37	4023
59	2125.00	2086.00	2050.00	825.35	824.92	-3.23	.42	3680
60	2150.00	2111.00	2075.00	831.36	831.72	-3.85	-.36	3852
61	2175.00	2136.00	2100.00	838.36	838.21	-3.20	.16	4314
62	2200.04	2161.04	2125.04	844.37	844.01	-2.88	.36	

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
								4349
63	2225.00	2186.00	2150.00	850.38	849.75	-2.50	.63	4134
64	2250.00	2211.00	2175.00	855.39	855.80	-3.43	-.41	3775
65	2275.00	2236.00	2200.00	862.40	862.42	-2.93	-.02	3536
66	2300.00	2261.00	2225.00	869.41	869.49	-2.89	-.09	4176
67	2325.04	2286.04	2250.04	876.42	875.49	-1.55	.93	3494
68	2350.00	2311.00	2275.00	883.42	882.63	-1.36	.79	3718
69	2368.05	2329.05	2293.05	887.43	887.49	-1.97	-.06	3782
70	2378.05	2339.05	2303.05	890.43	890.13	-1.47	.30	4084
71	2390.00	2351.00	2315.00	893.44	893.06	-1.24	.38	4383
72	2400.00	2361.00	2325.00	895.44	895.34	-1.39	.10	4469
73	2425.00	2386.00	2350.00	901.45	900.93	-.64	.51	4223
74	2436.50	2397.50	2361.50	903.45	903.66	-1.22	-.21	