SCANNED

**COMPANY:** NORTHWEST NATURAL GAS

**WELL:** OM 43A-22-65

**FIELD:** MIST

**COUNTY:** COLUMBIA **STATE:** OREGON

COUNTY: COLUMBIA
Field: MIST
Location: 2441.82' North, 122.17' West
Well: OM 43A-22-65
Company: NORTHWEST NATURAL GAS

**Schlumberger**

## PLATFORM EXPRESS
## BHC SONIC/ GR /SP
## SCALE: 5" = 100'

LOCATION
2441.82' North, 122.17' West
From the SW Section 23

Elev.: K.B. 872.23 ft
G.L. 862.23 ft
D.F. 871.23 ft

Permanent Datum: GROUND LEVEL Elev.: 621 ft
Log Measured From: K.B 10.0 ft above Perm. Datum
Drilling Measured From: K.B

| API Serial No. | SECTION | TOWNSHIP | RANGE |
|---|---|---|---|
| 36-009-00352 | 22 | 6N | 5W |

| | | | | |
|---|---|---|---|---|
| Logging Date | 3-JUN-2000 | | | |
| Run Number | 1 | | | |
| Depth Driller | 2317 ft | | | |
| Schlumberger Depth | 2317 ft | | | |
| Bottom Log Interval | 2309 ft | | | |
| Top Log Interval | 444 ft | | | |
| Casing Driller Size @ Depth | 8.625 in @ 444 ft | | @ | |
| Casing Schlumberger | 444 ft | | | |
| Bit Size | 7.875 in | | | |
| Type Fluid In Hole | DMA | | | |
| MUD Density / Viscosity | 8.8 lbm/gal | 38 s | | |
| Fluid Loss / PH | 6.6 cm3 | 8 | | |
| Source Of Sample | FLOWLINE | | | |
| RM @ Measured Temperature | 1.175 ohm.m @ 99 degF | | @ | |
| RMF @ Measured Temperature | 0.869 ohm.m @ 90 degF | | @ | |
| RMC @ Measured Temperature | 0.904 ohm.m @ 92 degF | | @ | |
| Source RMF / RMC | PRESS | PRESS | | |
| RM @ MRT / RMF @ MRT | 1.221 @ 95 | 0.826 @ 95 | @ | @ |
| Maximum Recorded Temperatures | 95 degF | 95 / 95 | | |
| Circulation Stopped / Time | 3-JUN-2000 | 16:10 | | |
| Logger On Bottom / Time | 3-JUN-2000 | 23:00 | | |
| Unit Number / Location | 3152 | SACRAMENTO | | |
| Recorded By | M.KHAN | | | |
| Witnessed By | JACK MEYER | | | |

| | Run 1 | Run 2 |
|---|---|---|
| Logging Date | | |
| Run Number | | |
| Depth Driller | | |
| Schlumberger Depth | | |
| Bottom Log Interval | | |
| Top Log Interval | | |
| Casing Driller Size @ Depth | @ | |
| Casing Schlumberger | | |
| Bit Size | | |
| Type Fluid In Hole | | |
| MUD Density / Viscosity | | |
| Fluid Loss / PH | | |
| Source Of Sample | | |
| RM @ Measured Temperature | @ | |
| RMF @ Measured Temperature | @ | |
| RMC @ Measured Temperature | @ | |
| Source RMF / RMC | | |
| RM @ MRT / RMF @ MRT | @ | @ |
| Maximum Recorded Temperatures | | |
| Circulation Stopped / Time | | |
| Logger On Bottom / Time | | |
| Unit Number / Location | | |
| Recorded By | | |
| Witnessed By | | |

@ @ @ @ @ @

Run 3

Run 4

DISCLAIMER
THE USE OF AND RELIANCE UPON THIS RECORDED-DATA BY THE HEREIN NAMED COMPANY (AND ANY OF ITS AFFILIATES, PARTNERS, REPRESENTATIVES, AGENTS, CONSULTANTS AND EMPLOYEES) IS SUBJECT TO THE TERMS AND CONDITIONS AGREED UPON BETWEEN SCHLUMBERGER AND THE COMPANY, INCLUDING: (a) RESTRICTIONS ON USE OF THE RECORDED-DATA; (b) DISCLAIMERS AND WAIVERS OF WARRANTIES AND REPRESENTATIONS REGARDING COMPANY'S USE OF AND RELIANCE UPON THE RECORDED-DATA; AND (c) CUSTOMER'S FULL AND SOLE RESPONSIBILITY FOR ANY INFERENCE DRAWN OR DECISION MADE IN CONNECTION WITH THE USE OF THIS RECORDED-DATA.

| OTHER SERVICES1 | OTHER SERVICES2 |
|---|---|
| OS1: FMS GR | OS1: |
| OS2: | OS2: |
| OS3: | OS3: |
| OS4: | OS4: |
| OS5: | OS5: |
| REMARKS: RUN NUMBER 1 | REMARKS: RUN NUMBER 2 |
| CASING 8 5/8" 32 LB/FT | |

RUN 1

SERVICE ORDER #:
PROGRAM VERSION: 9C1-303
FLUID LEVEL: 0 ft

| LOGGED INTERVAL | START | STOP |
|---|---|---|
| | | |

RUN 2

SERVICE ORDER #:
PROGRAM VERSION:
FLUID LEVEL:

| LOGGED INTERVAL | START | STOP |
|---|---|---|
| | | |

# EQUIPMENT DESCRIPTION

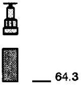
## RUN 1

## RUN 2

### SURFACE EQUIPMENT

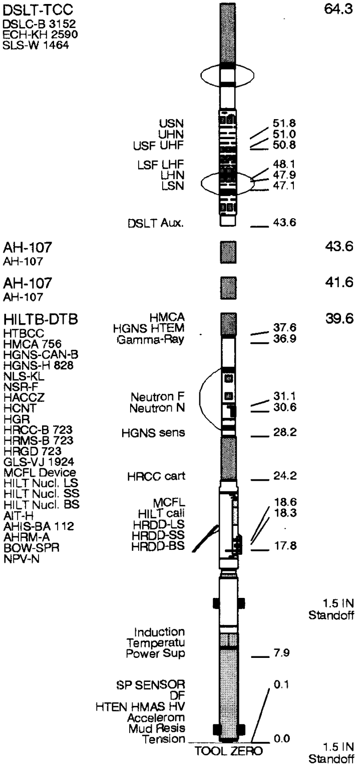
GSR-U/Y WITM (CTS)-A
NCT-B
CNB-AB
NCS-VB

### DOWNHOLE EQUIPMENT



LEH-QT
LEH-QT 1808

TCC-BF
ECH-KC
TCC-BF 590 TelStatus



MAXIMUM STRING DIAMETER 6.88 IN
MEASUREMENTS RELATIVE TO TOOL ZERO
ALL LENGTHS IN FEET

## Input DLIS Files

| | | | | | | |
|---|---|---|---|---|---|---|
| DEFAULT | HILTB .011 | FN:1 | PRODUCER | 03-Jun-2000 20:59 | 2328.0 FT | 305.0 FT |

## Output DLIS Files

| | | | | | | |
|---|---|---|---|---|---|---|
| DEFAULT | HILTB .013 | FN:10 | PRODUCER | 03-Jun-2000 21:06 | 2336.0 FT | 313.5 FT |

## OP System Version: 9C1-303

MCM

| | | | |
|---|---|---|---|
| HILTB-DTB | OP91-KP1a | DSLT-TCC | OP91-KP1a |
| TCC-BF | OP91-KP1a | | |

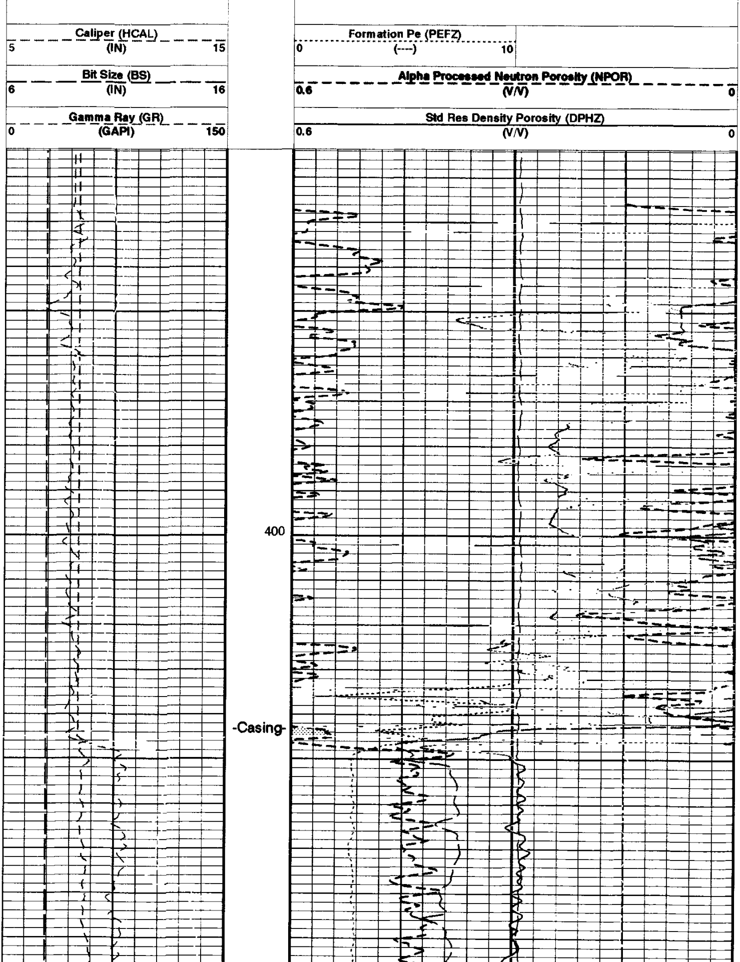
Tension (TENS)

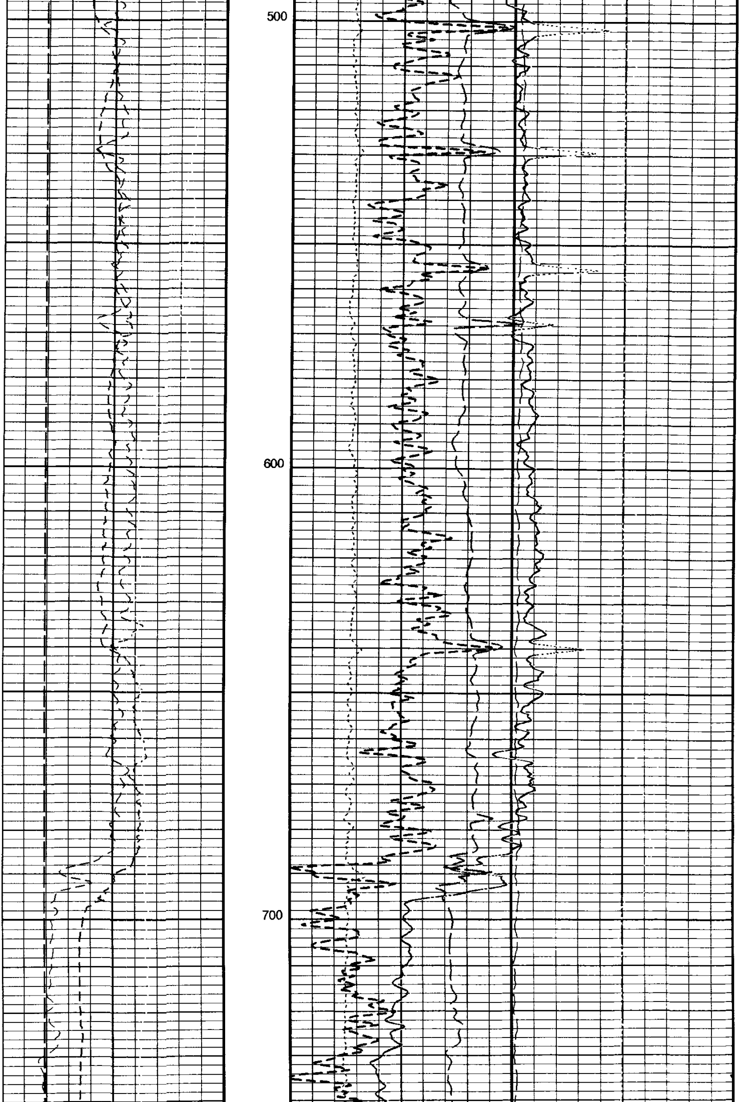
12000 (LBF) 2000

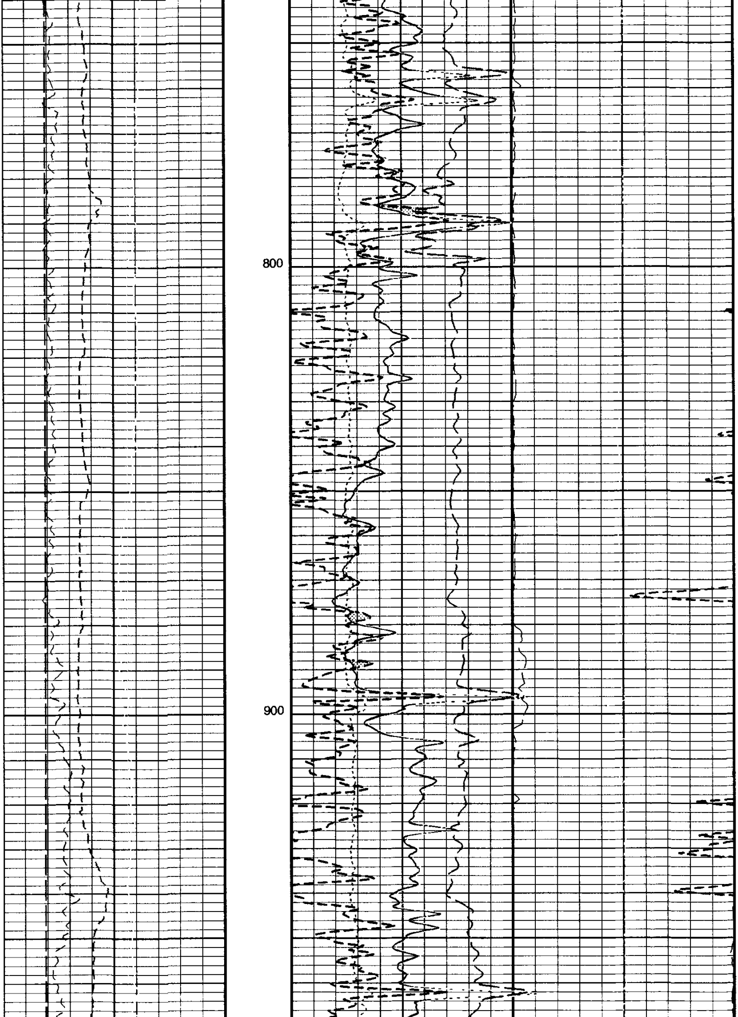
Sonic Porosity (SPHI)

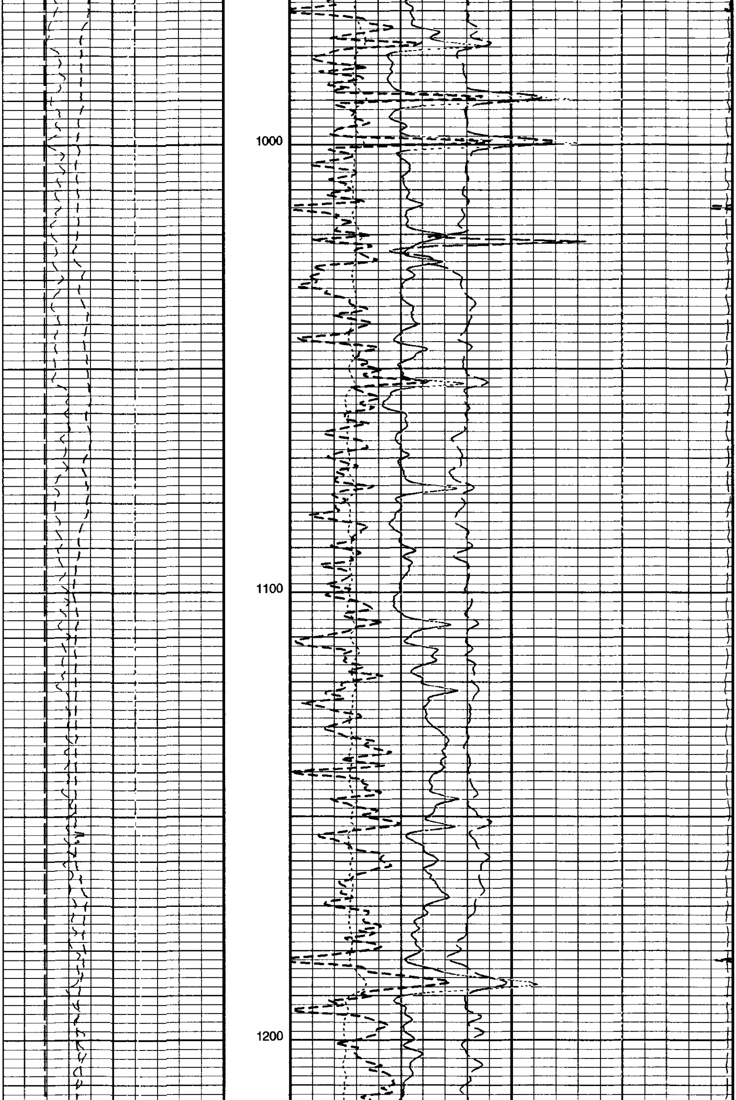
0.6 (V/V) 0

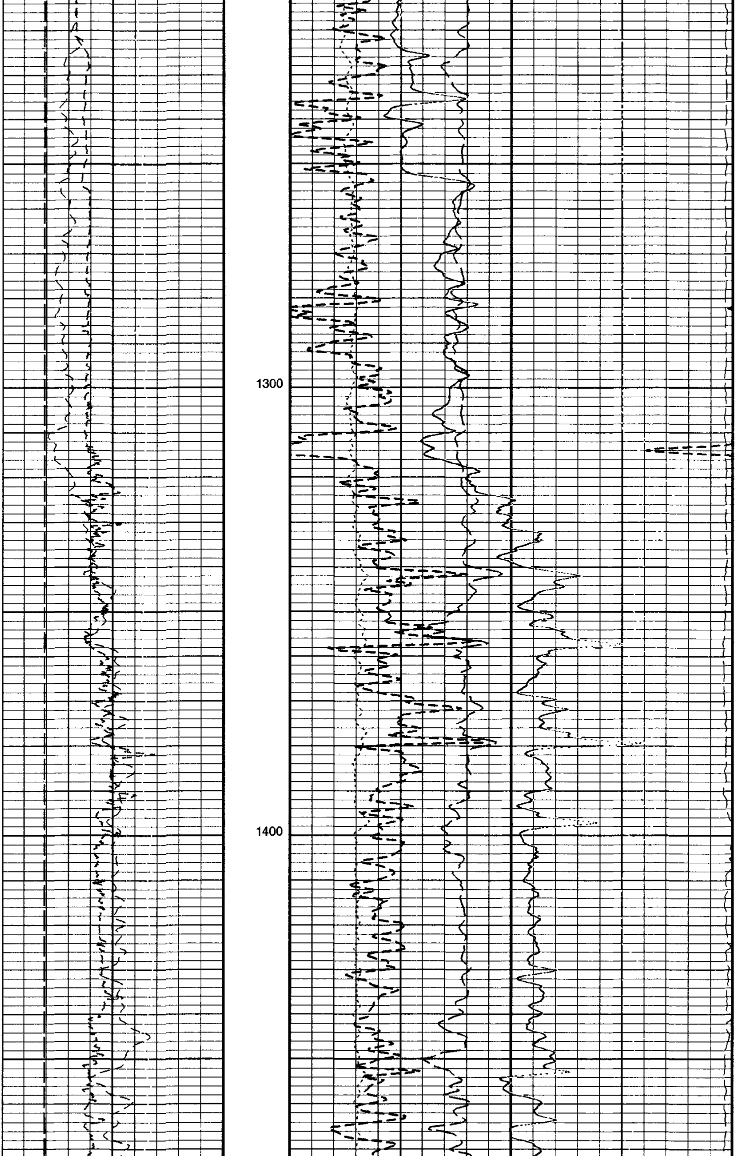
▨ Crossover

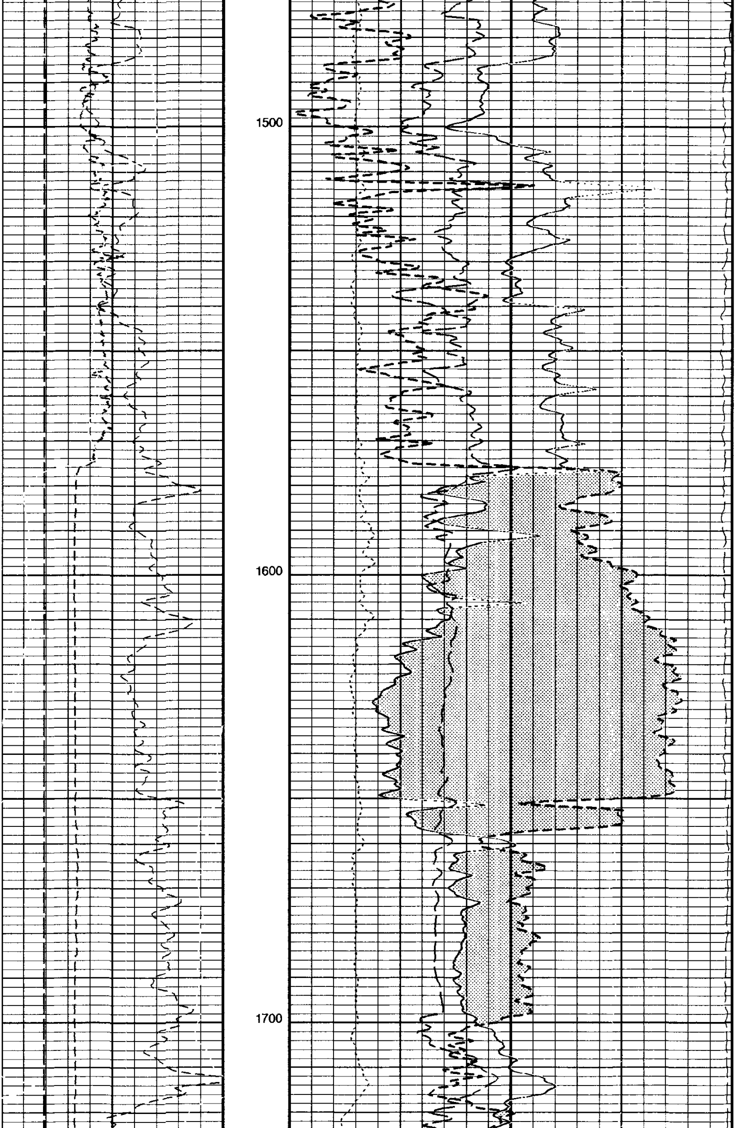


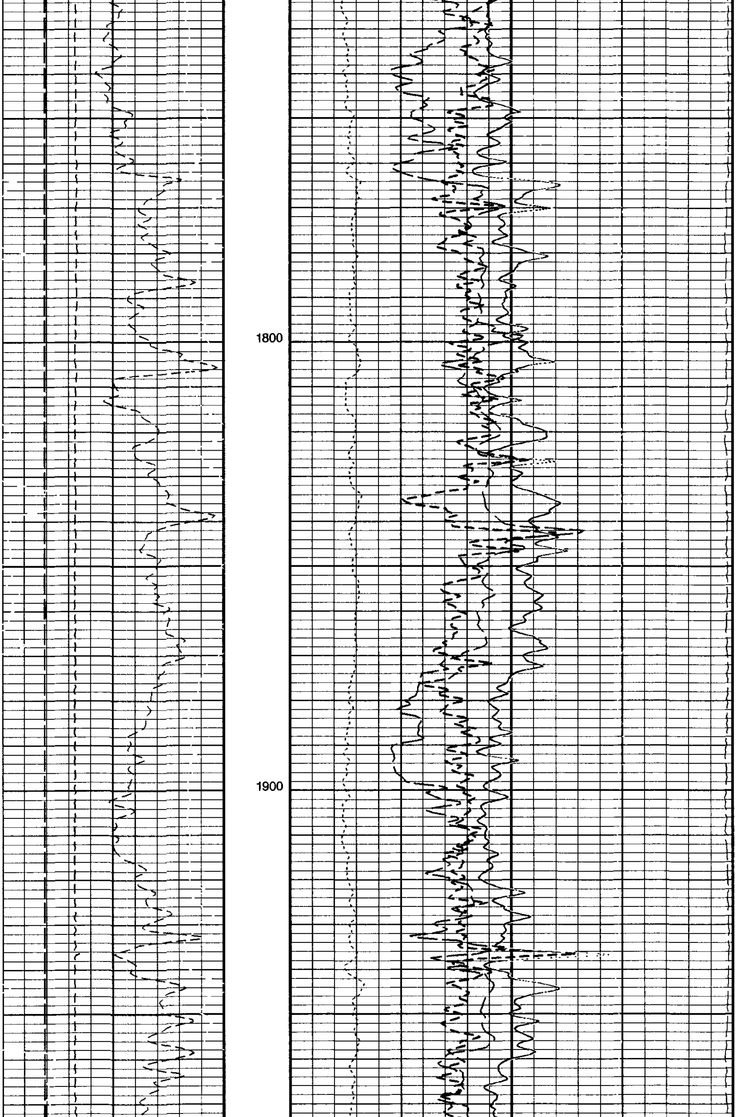


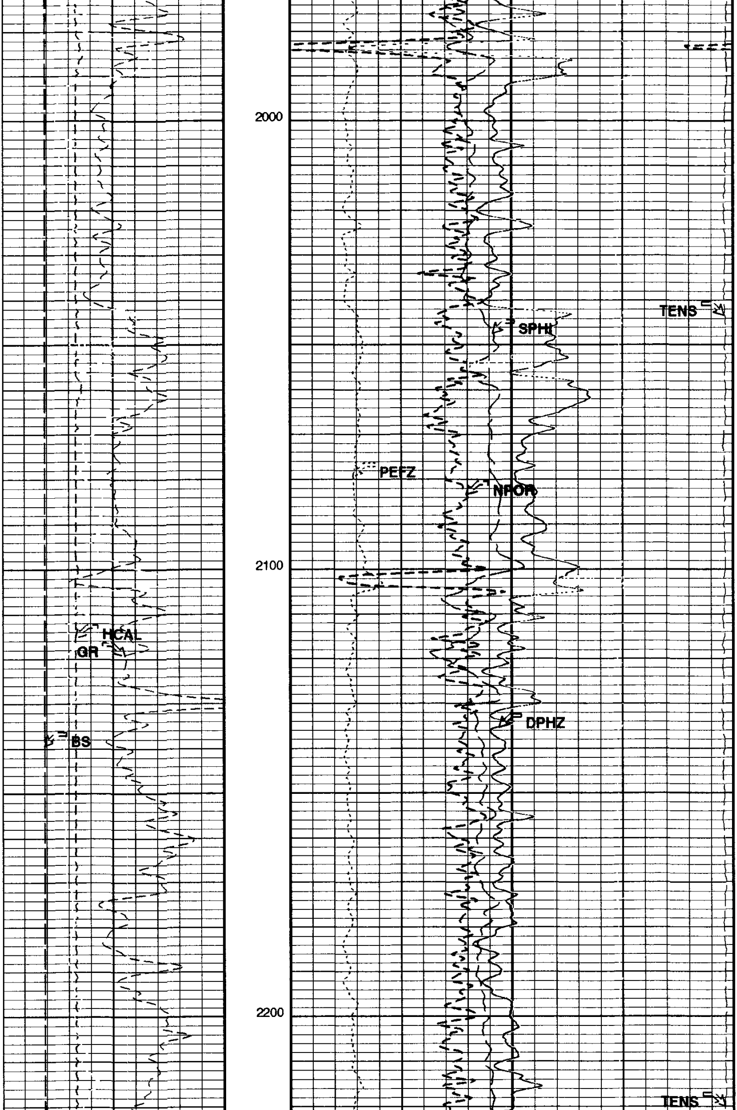


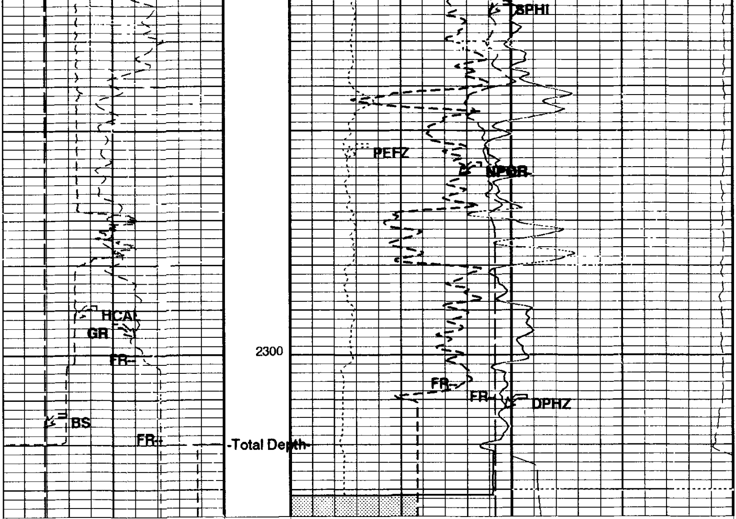












Gamma Ray (GR)
0 (GAPI) 150

Bit Size (BS)
6 (IN) 16

Caliper (HCAL)
5 (IN) 15

Std Res Density Porosity (DPHZ)
0.6 (V/V) 0

Alpha Processed Neutron Porosity (NPOR)
0.6 (V/V) 0

Formation Pe (PEFZ)
0 (----) 10

Crossover

Sonic Porosity (SPHI)
0.6 (V/V) 0

Tension (TENS)
12000 (LBF) 2000

AIT-H Answer Product Processing Summary. Data taken with Tool # 112 (AHTNO)

...Acquired data from HILT/HAIT

***** Borehole Correction *****

Effective Tool Standoff computed. Borehole diameter and mud res. taken as input (see GCSE and GRSE parameters)

Tool is run in ECCENTERED mode with a tool stand-off of 1.50 IN. Bit Size is 7.88 IN.

***** Input Selections to AIT-H Answer Product Processing *****

Caliper (GCSE): HCAL Mud Resistivity (GRSE): AHMF Temperature (GTSE): LINEAR_ESTIMATE Porosity (FPHI): DPHZ

***** Other Parameters used by AIT-H Answer Product Processing *****

| | | | |
|---|---|---|---|
| Surface Hole Temperature (SHT) | 68.000 DEGF | Bottom Temperature (BHT) | 212.000 DEGF |
| Total Depth (TD) | 2317.000 FT | | |
| Form Factor Exponent (FEXP) | 2.000 | Form Factor Numerator (FNUM) | 1.000 |
| Mud Filtrate Sample Resistivity (RMFS) | -50000.000 OHMM | Mud Filtrate Sample Temperature (MFST) | -50000.000 DEGF |
| Resitivity Connate Water (RW) | 1.000 OHMM | | |

***** AIT-H Answer Product Processing Control Parameters *****

Playback Mode: NORMAL

## Parameters

| DLIS Name | Description | Value | |
|---|---|---|---|
| BHFL | Borehole Fluid Type | WATER | |
| BHS | Borehole Status | OPEN | |
| BS | Bit Size | 7.875 | IN |
| BSAL | Borehole Salinity | 2100.00 | PPM |
| BSCO | Borehole Salinity Correction Option | NO | |
| CCCO | Casing & Cement Thickness Correction Option | NO | |
| CDTS | C-Delta-T Shale | 100 | US/F |
| CSIZ | Current Casing Size | 8.625 | IN |
| CWEI | Casing Weight | 32.00 | LB/F |
| DFD | Drilling Fluid Density | 8.80 | LB/G |
| DHC | Density Hole Correction | BS | |
| DO | Depth Offset for Logical Unit 1 | 8.0 | FT |
| DORL | Depth Offset Repeat Analysis | 8.0 | FT |
| DTF | Delta-T Fluid | 189 | US/F |
| DTM | Delta-T Matrix | 56 | US/F |
| FD | Fluid Density | 1 | G/C3 |
| FSAL | Formation Salinity | -50000 | PPM |
| FSCO | Formation Salinity Correction Option | NO | |
| GCSE | Generalized Caliper Selection | HCAL | |
| GDEV | Average Angular Deviation of Borehole from Normal | 0 | DEG |
| GGRD | Geothermal Gradient | 0.01 | DF/F |
| HSCM | HILT Speed Correction Mode | NO_SC | |
| HSCO | Hole Size Correction Option | YES | |
| HSTI | STI Uses HILT Acceleration | NO | |
| MATR | Rock Matrix for Neutron Porosity Corrections | SANDSTONE | |
| MCCO | Mud Cake Correction Option | NO | |
| MCOR | Mud Correction | NATU | |
| MDEN | Matrix Density | 2.65 | G/C3 |
| MST | Mud Sample Temperature | 99.00 | DEGF |
| MWCO | Mud Weight Correction Option | NO | |
| NAAC | HRDD APS Activation Correction | OFF | |
| NMT | HILT Nuclear Mud Type | NOBARITE | |
| NPRM | HRDD Processing Mode | StdRes | |
| NSAR | HRDD Depth Sampling Rate | 1 | IN |
| PP | Playback Processing | NORMAL | |
| PTCO | Pressure/Temperature Correction Option | NO | |
| RMFS | Resistivity of Mud Filtrate Sample | -50000.0000 | OHMM |
| SDAT | Standoff Data Source | SOCN | |
| SHT | Surface Hole Temperature | 68 | DEGF |
| SOCN | Standoff Distance | 0.125 | IN |
| SOCO | Standoff Correction Option | NO | |
| SPFS | Sonic Porosity Formula | RAYMER_HUNT | |
| SPNV | SP Next Value | 0 | MV |
| SPSO | Sonic Porosity Source | DT | |
| TDL | Total Depth - Logger | 2317.00 | FT |

Format: PORO Vertical Scale: 5" per 100' Graphics File Created: 03-Jun-2000 21:06

## OP System Version: 9C1-303

MCM

| | | | |
|---|---|---|---|
| HILTB-DTB | OP91-KP1a | DSLT-TCC | OP91-KP1a |
| TCC-BF | OP91-KP1a | | |

## Input DLIS Files

| | | | | | | |
|---|---|---|---|---|---|---|
| DEFAULT | HILTB .011 | FN:1 | PRODUCER | 03-Jun-2000 20:59 | 2328.0 FT | 305.0 FT |

## Output DLIS Files

| | | | | |
|---|---|---|---|---|
| DEFAULT | HILTB .013 | FN:10 | PRODUCER | 03-Jun-2000 21:06 |

Schlumberger

# REPEAT ANALYSIS

MAXIS 500 Field Log

## Input DLIS Files

| | | | | | | |
|---|---|---|---|---|---|---|
| DEFAULT | HILTB .011 | FN:1 | PRODUCER | 03-Jun-2000 20:59 | 2328.0 FT | 305.0 FT |
| DEFAULT | HILTB .005 | FN:4 | PRODUCER | 03-Jun-2000 18:31 | 2316.0 FT | 1980.0 FT |

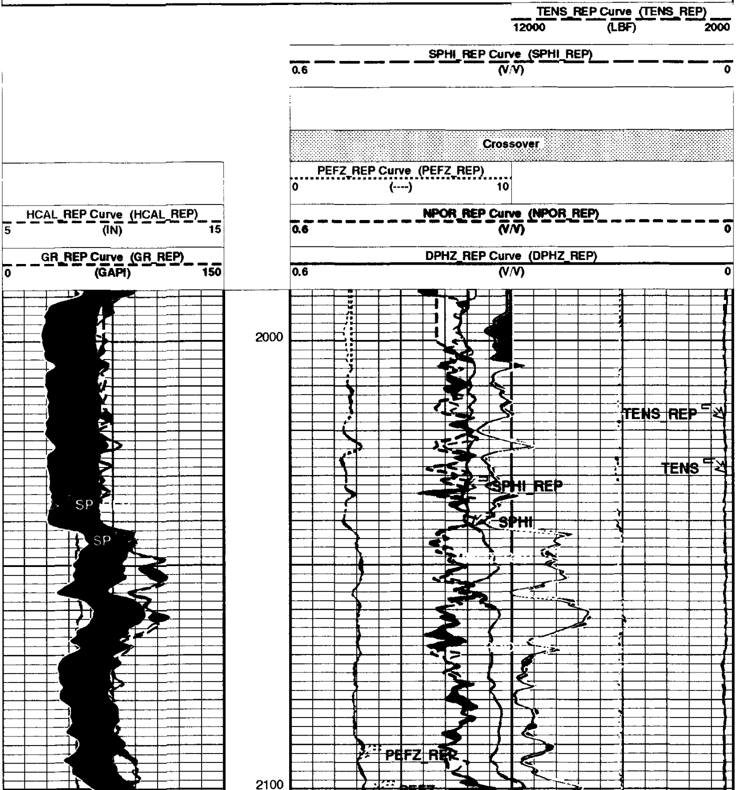
## Output DLIS Files

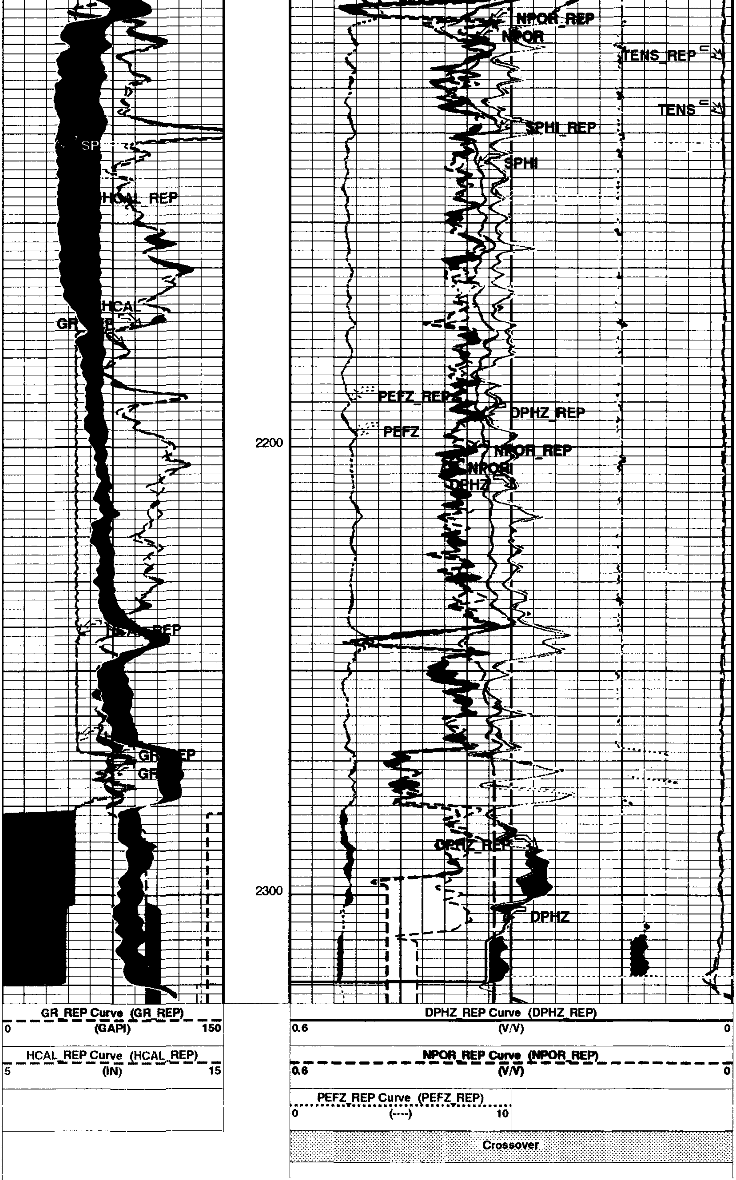
| | | | | |
|---|---|---|---|---|
| DEFAULT | HILTB .013 | FN:10 | PRODUCER | 03-Jun-2000 21:06 |

## OP System Version: 9C1-303

MCM

| | | | |
|---|---|---|---|
| HILTB-DTB | OP91-KP1a | DSLT-TCC | OP91-KP1a |
| TCC-BF | OP91-KP1a | | |





SPHI_REP Curve (SPHI_REP)
0.6 (V/V) 0

TENS_REP Curve (TENS_REP)
12000 (LBF) 2000

AIT-H Answer Product Processing Summary. Data taken with Tool # 112 (AHTNO)
...Acquired data from HILT/HAIT

***** Borehole Correction *****

Effective Tool Standoff computed. Borehole diameter and mud res. taken as input (see GCSE and GRSE parameters)
Tool is run in ECCENTERED mode with a tool stand-off of 1.50 IN. Bit Size is 7.88 IN.

***** Input Selections to AIT-H Answer Product Processing *****

Caliper (GCSE): HCAL Mud Resistivity (GRSE): AHMF Temperature (GTSE): LINEAR_ESTIMATE Porosity (FPHI): DPHZ

***** Other Parameters used by AIT-H Answer Product Processing *****

| | | | |
|---|---|---|---|
| Surface Hole Temperature (SHT) | 68.000 DEGF | Bottom Temperature (BHT) | 212.000 DEGF |
| Total Depth (TD) | 2317.000 FT | | |
| Form Factor Exponent (FEXP) | 2.000 | Form Factor Numerator (FNUM) | 1.000 |
| Mud Filtrate Sample Resistivity (RMFS) | -50000.000 OHMM | Mud Filtrate Sample Temperature (MFST) | -50000.000 DEGF |
| Resitivity Connate Water (RW) | 1.000 OHMM | | |

***** AIT-H Answer Product Processing Control Parameters *****

Playback Mode: NORMAL

## Parameters

| DLIS Name | Description | Value | |
|---|---|---|---|
| BHFL | Borehole Fluid Type | WATER | |
| BHS | Borehole Status | OPEN | |
| BS | Bit Size | 7.875 | IN |
| BSAL | Borehole Salinity | 2100.00 | PPM |
| BSCO | Borehole Salinity Correction Option | NO | |
| CCCO | Casing & Cement Thickness Correction Option | NO | |
| CDTS | C-Delta-T Shale | 100 | US/F |
| CSIZ | Current Casing Size | 8.625 | IN |
| CWEI | Casing Weight | 32.00 | LB/F |
| DFD | Drilling Fluid Density | 8.80 | LB/G |
| DHC | Density Hole Correction | BS | |
| DO | Depth Offset for Logical Unit 1 | 8.0 | FT |
| DORL | Depth Offset Repeat Analysis | 8.0 | FT |
| DTF | Delta-T Fluid | 189 | US/F |
| DTM | Delta-T Matrix | 56 | US/F |
| FD | Fluid Density | 1 | G/C3 |
| FSAL | Formation Salinity | -50000 | PPM |
| FSCO | Formation Salinity Correction Option | NO | |
| GCSE | Generalized Caliper Selection | HCAL | |
| GDEV | Average Angular Deviation of Borehole from Normal | 0 | DEG |
| GGRD | Geothermal Gradient | 0.01 | DF/F |
| HSCM | HILT Speed Correction Mode | NO_SC | |
| HSCO | Hole Size Correction Option | YES | |
| HSTI | STI Uses HILT Acceleration | NO | |
| MATR | Rock Matrix for Neutron Porosity Corrections | SANDSTONE | |
| MCCO | Mud Cake Correction Option | NO | |
| MCOR | Mud Correction | NATU | |
| MDEN | Matrix Density | 2.65 | G/C3 |
| MST | Mud Sample Temperature | 99.00 | DEGF |
| MWCO | Mud Weight Correction Option | NO | |
| NAAC | HRDD APS Activation Correction | OFF | |
| NMT | HILT Nuclear Mud Type | NOBARITE | |
| NPRM | HRDD Processing Mode | StdRes | |
| NSAR | HRDD Depth Sampling Rate | 1 | IN |
| PP | Playback Processing | NORMAL | |
| PTCO | Pressure/Temperature Correction Option | NO | |
| RMFS | Resistivity of Mud Filtrate Sample | -50000.0000 | OHMM |
| SDAT | Standoff Data Source | SOCN | |
| SHT | Surface Hole Temperature | 68 | DEGF |
| SOCN | Standoff Distance | 0.125 | IN |
| SOCO | Standoff Correction Option | NO | |
| SPFS | Sonic Porosity Formula | RAYMER_HUNT | |
| SPNV | SP Next Value | 0 | MV |
| SPSO | Sonic Porosity Source | DT | |
| TDL | Total Depth - Logger | 2317.00 | FT |

Format: PORO_REP Vertical Scale: 5" per 100' Graphics File Created: 03-Jun-2000 21:06

## OP System Version: 9C1-303

MCM

| | | | |
|---|---|---|---|
| HILTB-DTB | OP91-KP1a | DSLT-TCC | OP91-KP1a |
| TCC-BF | OP91-KP1a | | |

## Input DLIS Files

| | | | | | | |
|---|---|---|---|---|---|---|
| DEFAULT | HILTB .011 | FN:1 | PRODUCER | 03-Jun-2000 20:59 | 2328.0 FT | 305.0 FT |

| DEFAULT | HILTB .005 | FN:4 | PRODUCER | 03-Jun-2000 18:31 | 2316.0 FT | 1980.0 FT |
|---|---|---|---|---|---|---|

## Output DLIS Files

| DEFAULT | HILTB .013 | FN:10 | PRODUCER | 03-Jun-2000 21:06 |
|---|---|---|---|---|

Schlumberger

# CALIBRATIONS

MAXIS 500 Field Log

Calibration and Check Summary

| Measurement | Nominal | Master | Before | After | Change | Limit | Units |
|---|---|---|---|---|---|---|---|
| High resolution Integrated Logging Tool-CTS Wellsite Calibration - Electronics Calibration Check - Thru Cal Mag. & Phase | | | | | | | |
| Master: Calibration out of date 20-JAN-2000 11:39 Before: 3-JUN-2000 17:59 | | | | | | | |
| Thru Cal Magnitude - 0 | 0 | 0.6214 | 0.6302 | N/A | N/A | N/A | V |
| Thru Cal Magnitude - 1 | 0 | 1.274 | 1.292 | N/A | N/A | N/A | V |
| Thru Cal Magnitude - 2 | 0 | 0.6329 | 0.6419 | N/A | N/A | N/A | V |
| Thru Cal Magnitude - 3 | 0 | 0.7152 | 0.7254 | N/A | N/A | N/A | V |
| Thru Cal Magnitude - 4 | 0 | 1.335 | 1.354 | N/A | N/A | N/A | V |
| Thru Cal Magnitude - 5 | 0 | 1.943 | 1.971 | N/A | N/A | N/A | V |
| Thru Cal Magnitude - 6 | 0 | 1.947 | 1.975 | N/A | N/A | N/A | V |
| Thru Cal Magnitude - 7 | 0 | 1.371 | 1.392 | N/A | N/A | N/A | V |
| Phase - 0 | 0 | 64.91 | 65.43 | N/A | N/A | N/A | DEG |
| Phase - 1 | 0 | 63.80 | 64.32 | N/A | N/A | N/A | DEG |
| Phase - 2 | 0 | 60.03 | 60.55 | N/A | N/A | N/A | DEG |
| Phase - 3 | 0 | 59.25 | 59.77 | N/A | N/A | N/A | DEG |
| Phase - 4 | 0 | 52.91 | 53.44 | N/A | N/A | N/A | DEG |
| Phase - 5 | 0 | 50.96 | 51.50 | N/A | N/A | N/A | DEG |
| Phase - 6 | 0 | 50.92 | 51.46 | N/A | N/A | N/A | DEG |
| Phase - 7 | 0 | 47.08 | 47.66 | N/A | N/A | N/A | DEG |
| High resolution Integrated Logging Tool-CTS Wellsite Calibration - Electronics Calibration Check - Auxilliary | | | | | | | |
| Master: Calibration out of date 20-JAN-2000 11:39 Before: 3-JUN-2000 17:59 | | | | | | | |
| Array Induction SPA Plus | 990.5 | 989.8 | 990.1 | N/A | N/A | N/A | MV |
| Array Induction SPA Zero | 0 | 0.1083 | 0.1029 | N/A | N/A | N/A | MV |
| Array Induction Temperature Pl | 0.9150 | 0.9169 | 0.9172 | N/A | N/A | N/A | V |
| Array Induction Temperature Ze | 0 | 0.0001095 | 0.0001047 | N/A | N/A | N/A | V |
| High resolution Integrated Logging Tool-CTS Wellsite Calibration - Test Loop Gain Correction | | | | | | | |
| Master: Calibration out of date 20-JAN-2000 11:39 | | | | | | | |
| Test Loop Gain Magnitude - 0 | 0 | 1.042 | N/A | N/A | N/A | N/A | V |
| Test Loop Gain Magnitude - 1 | 0 | 1.011 | N/A | N/A | N/A | N/A | V |
| Test Loop Gain Magnitude - 2 | 0 | 1.012 | N/A | N/A | N/A | N/A | V |
| Test Loop Gain Magnitude - 3 | 0 | 1.010 | N/A | N/A | N/A | N/A | V |
| Test Loop Gain Magnitude - 4 | 0 | 0.9940 | N/A | N/A | N/A | N/A | V |
| Test Loop Gain Magnitude - 5 | 0 | 0.9835 | N/A | N/A | N/A | N/A | V |
| Test Loop Gain Magnitude - 6 | 0 | 0.9934 | N/A | N/A | N/A | N/A | V |
| Test Loop Gain Magnitude - 7 | 0 | 0.9945 | N/A | N/A | N/A | N/A | V |
| Phase - 0 | 0 | 0.3672 | N/A | N/A | N/A | N/A | DEG |
| Phase - 1 | 0 | -0.6191 | N/A | N/A | N/A | N/A | DEG |
| Phase - 2 | 0 | -0.01578 | N/A | N/A | N/A | N/A | DEG |
| Phase - 3 | 0 | 0.1871 | N/A | N/A | N/A | N/A | DEG |
| Phase - 4 | 0 | 0.1325 | N/A | N/A | N/A | N/A | DEG |
| Phase - 5 | 0 | -0.1680 | N/A | N/A | N/A | N/A | DEG |
| Phase - 6 | 0 | 0.2889 | N/A | N/A | N/A | N/A | DEG |
| Phase - 7 | 0 | -0.2642 | N/A | N/A | N/A | N/A | DEG |
| High resolution Integrated Logging Tool-CTS Wellsite Calibration - Sonde Error Correction | | | | | | | |
| Master: Calibration out of date 20-JAN-2000 11:39 | | | | | | | |
| R Sonde Error Correction - 0 | 0 | -121.4 | N/A | N/A | N/A | N/A | MM/M |
| R Sonde Error Correction - 1 | 0 | 149.7 | N/A | N/A | N/A | N/A | MM/M |
| R Sonde Error Correction - 2 | 0 | 113.9 | N/A | N/A | N/A | N/A | MM/M |
| R Sonde Error Correction - 3 | 0 | 58.40 | N/A | N/A | N/A | N/A | MM/M |
| R Sonde Error Correction - 4 | 0 | 24.16 | N/A | N/A | N/A | N/A | MM/M |
| R Sonde Error Correction - 5 | 0 | 11.87 | N/A | N/A | N/A | N/A | MM/M |
| R Sonde Error Correction - 6 | 0 | 7.431 | N/A | N/A | N/A | N/A | MM/M |
| R Sonde Error Correction - 7 | 0 | -3.605 | N/A | N/A | N/A | N/A | MM/M |
| X Sonde Error Correction - 0 | 0 | 34.14 | N/A | N/A | N/A | N/A | MM/M |
| X Sonde Error Correction - 1 | 0 | -240.4 | N/A | N/A | N/A | N/A | MM/M |
| X Sonde Error Correction - 2 | 0 | 67.33 | N/A | N/A | N/A | N/A | MM/M |
| X Sonde Error Correction - 3 | 0 | 81.72 | N/A | N/A | N/A | N/A | MM/M |
| X Sonde Error Correction - 4 | 0 | -1.172 | N/A | N/A | N/A | N/A | MM/M |
| X Sonde Error Correction - 5 | 0 | -10.09 | N/A | N/A | N/A | N/A | MM/M |
| X Sonde Error Correction - 6 | 0 | 10.78 | N/A | N/A | N/A | N/A | MM/M |
| X Sonde Error Correction - 7 | 0 | 0.3313 | N/A | N/A | N/A | N/A | MM/M |

High resolution Integrated Logging Tool-CTS Wellsite Calibration - Mud Gain Correction
Master: Calibration out of date 20-JAN-2000 11:39

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Coarse - Mag, Real, Imag - 0 | 0 | 1.013 | N/A | N/A | N/A | N/A | |
| Coarse - Mag, Real, Imag - 1 | 0 | 1.013 | N/A | N/A | N/A | N/A | |
| Coarse - Mag, Real, Imag - 2 | 0 | 1.013 | N/A | N/A | N/A | N/A | |
| Fine - Mag, Real, Imag - 0 | 0 | 1.011 | N/A | N/A | N/A | N/A | |
| Fine - Mag, Real, Imag - 1 | 0 | 1.011 | N/A | N/A | N/A | N/A | |
| Fine - Mag, Real, Imag - 2 | 0 | 1.011 | N/A | N/A | N/A | N/A | |

High resolution Integrated Logging Tool-CTS Wellsite Calibration - Stab Measurement Summary
Before: 3-JUN-2000 18:06

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| BS Window Ratio | 1.033 | N/A | 1.036 | N/A | N/A | N/A | |
| BS Window Sum | 14310 | N/A | 14290 | N/A | N/A | N/A | CPS |
| SS Window Ratio | 0.5004 | N/A | 0.5048 | N/A | N/A | N/A | |
| SS Window Sum | 11490 | N/A | 11420 | N/A | N/A | N/A | CPS |
| LS Window Ratio | 0.2862 | N/A | 0.2861 | N/A | N/A | N/A | |
| LS Window Sum | 1163 | N/A | 1154 | N/A | N/A | N/A | CPS |

High resolution Integrated Logging Tool-CTS Wellsite Calibration - Photo-multiplier High Voltages Calibrations
Before: 3-JUN-2000 18:06

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| BS PM High Voltage (Command) | 1614 | N/A | 1660 | N/A | N/A | N/A | V |
| SS PM High Voltage (Command) | 1916 | N/A | 1964 | N/A | N/A | N/A | V |
| LS PM High Voltage (Command) | 1966 | N/A | 1958 | N/A | N/A | N/A | V |

High resolution Integrated Logging Tool-CTS Wellsite Calibration - Crystal Quality Resolutions Calibration
Before: 3-JUN-2000 18:06

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| BS Crystal Resolution | 12.26 | N/A | 12.35 | N/A | N/A | N/A | % |
| SS Crystal Resolution | 11.63 | N/A | 11.76 | N/A | N/A | N/A | % |
| LS Crystal Resolution | 10.59 | N/A | 10.72 | N/A | N/A | N/A | % |

High resolution Integrated Logging Tool-CTS Wellsite Calibration - MCFL Calibration
Before: 3-JUN-2000 18:01

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Raw B0 Resistivity | 3875 | N/A | 3846 | N/A | N/A | N/A | OHMM |
| Raw B1 Resistivity | 3830 | N/A | 3802 | N/A | N/A | N/A | OHMM |
| Raw B2 Resistivity | 3830 | N/A | 3817 | N/A | N/A | N/A | OHMM |

High resolution Integrated Logging Tool-CTS Wellsite Calibration - HILT Caliper Calibration
Before: 21-MAY-2000 12:17

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| HILT Caliper Zero Measurement | 8.000 | N/A | 7.179 | N/A | N/A | N/A | IN |
| HILT Caliper Plus Measurement | 16.00 | N/A | 15.34 | N/A | N/A | N/A | IN |

High resolution Integrated Logging Tool-CTS Wellsite Calibration - Detector Calibration
Before: 7-MAY-2000 6:47

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Gamma Ray Background | 30.00 | N/A | 23.06 | N/A | N/A | N/A | GAPI |
| Gamma Ray (Jig - Bkg) | 193.6 | N/A | 193.6 | N/A | N/A | 17.60 | GAPI |
| Gamma Ray (Calibrated) | 165.0 | N/A | 173.7 | N/A | N/A | 15.00 | GAPI |

High resolution Integrated Logging Tool-CTS Wellsite Calibration - Zero Measurement
Master: 6-APR-2000 4:31 Before: 3-JUN-2000 18:05

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| CNTC Background | 27.31 | 27.31 | 27.34 | N/A | N/A | 4.096 | CPS |
| CFTC Background | 28.31 | 28.31 | 29.66 | N/A | N/A | 4.247 | CPS |

High resolution Integrated Logging Tool-CTS Wellsite Calibration - Accelerometer Calibration
Before: 3-JUN-2000 18:07

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Z-Axis Acceleration | 32.19 | N/A | 32.15 | N/A | N/A | N/A | F/S2 |

The GLS-VJ source activity is acceptable.

The HGNS Neutron Master Calibration was done with the following parameters :

| | | |
|---|---|---|
| NCT-B Water Temperature | 90.0 | DEGF. |
| Thermal Housing Size | 3.375 | IN. |

High resolution Integrated Logging Tool-CTS / Equipment Identification

Primary Equipment:

| | | |
|---|---|---|
| Array Induction Tool - H | AIT - H | |
| Rm/SP Bottom Nose | AHRM - A | |
| Array Induction Sonde | AHIS - BA | 112 |
| HILT high-Resolution Mechanical Sonde | HRMS - B | 723 |
| HILT Rxo Gamma-ray Device | HRGD - | 723 |
| HILT Nuclear Back-Scatter Detector | HILT - | |
| HILT Nuclear Short-Spacing Detector | HILT - | |
| HILT Nuclear Long-Spacing Detector | HILT - | |

Auxiliary Equipment:

## High resolution Integrated Logging Tool-CTS Wellsite Calibration

### Electronics Calibration Check - Thru Cal Mag. & Phase

| Idx | Phase | Value | Thru Cal Magnitude V | Nominal | Value | Phase DEG | Nominal |
|---|---|---|---|---|---|---|---|
| 0 | Master | 0.6214 | | 0.6050 | 64.91 | | 71.00 |
| | Before | 0.6302 | | | 65.43 | | |
| 1 | Master | 1.274 | | 1.270 | 63.80 | | 70.00 |
| | Before | 1.292 | | | 64.32 | | |
| 2 | Master | 0.6329 | | 0.6230 | 60.03 | | 66.00 |
| | Before | 0.6419 | | | 60.55 | | |
| 3 | Master | 0.7152 | | 0.7040 | 59.25 | | 65.00 |
| | Before | 0.7254 | | | 59.77 | | |
| 4 | Master | 1.335 | | 1.337 | 52.91 | | 59.00 |
| | Before | 1.354 | | | 53.44 | | |
| 5 | Master | 1.943 | | 1.955 | 50.96 | | 57.00 |
| | Before | 1.971 | | | 51.50 | | |
| 6 | Master | 1.947 | | 1.955 | 50.92 | | 57.00 |
| | Before | 1.975 | | | 51.46 | | |
| 7 | Master | 1.371 | | 1.415 | 47.08 | | 53.00 |
| | Before | 1.392 | | | 47.66 | | |
| | | | 60.00 % (Minimum) (Nominal) 140.0 % (Maximum) | | | Nom -60.00 (Minimum) (Nominal) Nom + 60.00 (Maximum) | |

Master: Calibration out of date 20-JAN-2000 11:39 Before: 3-JUN-2000 17:59

## High resolution Integrated Logging Tool-CTS Wellsite Calibration

### Electronics Calibration Check - Auxilliary

| Phase | Array Induction SPA Plus MV | Value | Phase | Array Induction SPA Zero MV | Value |
|---|---|---|---|---|---|
| Master | | 989.8 | Master | | 0.1083 |
| Before | | 990.1 | Before | | 0.1029 |
| | 941.0 (Minimum) 990.5 (Nominal) 1040 (Maximum) | | | -50.00 (Minimum) 0 (Nominal) 50.00 (Maximum) | |

| Phase | Array Induction Temperature Plus V | Value | Phase | Array Induction Temperature Zero V | Value |
|---|---|---|---|---|---|
| Master | | 0.9169 | Master | | 0.0001095 |
| Before | | 0.9172 | Before | | 0.0001047 |
| | 0.8700 (Minimum) 0.9150 (Nominal) 0.9600 (Maximum) | | | -0.05000 (Minimum) 0 (Nominal) 0.05000 (Maximum) | |

Master: Calibration out of date 20-JAN-2000 11:39 Before: 3-JUN-2000 17:59

## High resolution Integrated Logging Tool-CTS Wellsite Calibration

### Test Loop Gain Correction

| Idx | Value | Test Loop Gain Magnitude V | Value | Phase DEG |
|---|---|---|---|---|
| 0 | 1.042 | | 0.3672 | |
| | | 0.9500 (Minimum) 1.000 (Nominal) 1.050 (Maximum) | | -3.000 (Minimum) 0 (Nominal) 3.000 (Maximum) |
| 1 | 1.011 | | -0.6191 | |
| | | 0.9500 (Minimum) 1.000 (Nominal) 1.050 (Maximum) | | -3.000 (Minimum) 0 (Nominal) 3.000 (Maximum) |
| 2 | 1.012 | | -0.01578 | |
| | | 0.9500 (Minimum) 1.000 (Nominal) 1.050 (Maximum) | | -3.000 (Minimum) 0 (Nominal) 3.000 (Maximum) |
| 3 | 1.010 | | 0.1871 | |
| | | 0.9500 (Minimum) 1.000 (Nominal) 1.050 (Maximum) | | -3.000 (Minimum) 0 (Nominal) 3.000 (Maximum) |
| 4 | 0.9940 | | 0.1325 | |
| | | 0.9500 (Minimum) 1.000 (Nominal) 1.050 (Maximum) | | -3.000 (Minimum) 0 (Nominal) 3.000 (Maximum) |
| 5 | 0.9835 | | -0.1680 | |
| | | 0.9500 (Minimum) 1.000 (Nominal) 1.050 (Maximum) | | -3.000 (Minimum) 0 (Nominal) 3.000 (Maximum) |
| 6 | 0.9934 | | 0.2889 | |
| | | 0.9500 (Minimum) 1.000 (Nominal) 1.050 (Maximum) | | -3.000 (Minimum) 0 (Nominal) 3.000 (Maximum) |
| 7 | 0.9945 | | -0.2642 | |
| | | 0.9500 (Minimum) 1.000 (Nominal) 1.050 (Maximum) | | -3.000 (Minimum) 0 (Nominal) 3.000 (Maximum) |

Master: Calibration out of date 20-JAN-2000 11:39

## High resolution Integrated Logging Tool-CTS Wellsite Calibration

### Sonde Error Correction

| Idx | Value | R Sonde Error Correction MM/M | Value | X Sonde Error Correction MM/M |
|---|---|---|---|---|
| 0 | -121.4 | | 34.14 | |
| | | -231.0 (Minimum) -56.00 (Nominal) 119.0 (Maximum) | | -2250 (Minimum) 0 (Nominal) 2250 (Maximum) |
| 1 | 149.7 | | -240.4 | |
| | | 114.0 (Minimum) 159.0 (Nominal) 204.0 (Maximum) | | -625.0 (Minimum) 0 (Nominal) 625.0 (Maximum) |
| 2 | 113.9 | | 67.33 | |
| | | 66.00 (Minimum) 111.0 (Nominal) 156.0 (Maximum) | | -350.0 (Minimum) 0 (Nominal) 350.0 (Maximum) |
| 3 | 58.40 | | 81.72 | |
| | | 39.00 (Minimum) 64.00 (Nominal) 89.00 (Maximum) | | -250.0 (Minimum) 0 (Nominal) 250.0 (Maximum) |
| 4 | 24.16 | | -1.172 | |
| | | 15.00 (Minimum) 25.00 (Nominal) 35.00 (Maximum) | | -63.00 (Minimum) 0 (Nominal) 63.00 (Maximum) |
| 5 | 11.87 | | -10.09 | |
| | | 4.000 (Minimum) 14.00 (Nominal) 24.00 (Maximum) | | -50.00 (Minimum) 0 (Nominal) 50.00 (Maximum) |
| 6 | 7.431 | | 10.78 | |
| | | 5.000 (Minimum) 10.00 (Nominal) 15.00 (Maximum) | | -30.00 (Minimum) 0 (Nominal) 30.00 (Maximum) |
| 7 | -3.605 | | 0.3313 | |
| | | -5.000 (Minimum) 0 (Nominal) 5.000 (Maximum) | | -30.00 (Minimum) 0 (Nominal) 30.00 (Maximum) |

Master: Calibration out of date 20-JAN-2000 11:39

## High resolution Integrated Logging Tool-CTS Wellsite Calibration

### Mud Gain Correction

| Idx | Value | Coarse - Mag, Real, Imag | Value | Fine - Mag, Real, Imag |
|---|---|---|---|---|
| 0 | 1.013 | | 1.011 | |
| | | 0.8000 (Minimum) 1.000 (Nominal) 1.200 (Maximum) | | 0.8000 (Minimum) 1.000 (Nominal) 1.200 (Maximum) |
| 1 | 1.013 | | 1.011 | |
| | | 0.8000 (Minimum) 1.000 (Nominal) 1.200 (Maximum) | | 0.8000 (Minimum) 1.000 (Nominal) 1.200 (Maximum) |
| 2 | 1.013 | | 1.011 | |
| | | 0.8000 (Minimum) 1.000 (Nominal) 1.200 (Maximum) | | 0.8000 (Minimum) 1.000 (Nominal) 1.200 (Maximum) |

Master: Calibration out of date 20-JAN-2000 11:39

## High resolution Integrated Logging Tool-CTS Wellsite Calibration

### Stab Measurement Summary

| Phase | BS Window Ratio | Value | Phase | SS Window Ratio | Value | Phase | LS Window Ratio | Value |
|---|---|---|---|---|---|---|---|---|
| Before | | 1.036 | Before | | 0.5048 | Before | | 0.2861 |
| | 0.9818 (Minimum) 1.033 (Nominal) 1.085 (Maximum) | | | 0.4754 (Minimum) 0.5004 (Nominal) 0.5255 (Maximum) | | | 0.2719 (Minimum) 0.2862 (Nominal) 0.3005 (Maximum) | |
| Phase | BS Window Sum CPS | Value | Phase | SS Window Sum CPS | Value | Phase | LS Window Sum CPS | Value |
| Before | | 14290 | Before | | 11420 | Before | | 1154 |
| | 13590 (Minimum) 14310 (Nominal) 15020 (Maximum) | | | 10920 (Minimum) 11490 (Nominal) 12070 (Maximum) | | | 1105 (Minimum) 1163 (Nominal) 1221 (Maximum) | |

Before: 3-JUN-2000 18:06

## High resolution Integrated Logging Tool-CTS Wellsite Calibration

### Photo-multiplier High Voltages Calibrations

| Phase | BS PM High Voltage (Command) V | Value | Phase | SS PM High Voltage (Command) V | Value | Phase | LS PM High Voltage (Command) V | Value |
|---|---|---|---|---|---|---|---|---|
| Before | | 1660 | Before | | 1964 | Before | | 1958 |
| | 1514 (Minimum) 1614 (Nominal) 1714 (Maximum) | | | 1816 (Minimum) 1916 (Nominal) 2016 (Maximum) | | | 1866 (Minimum) 1966 (Nominal) 2066 (Maximum) | |

Before: 3-JUN-2000 18:06

## High resolution Integrated Logging Tool-CTS Wellsite Calibration

### Crystal Quality Resolutions Calibration

| Phase | BS Crystal Resolution % | Value | Phase | SS Crystal Resolution % | Value | Phase | LS Crystal Resolution % | Value |
|---|---|---|---|---|---|---|---|---|
| Before | | 12.35 | Before | | 11.76 | Before | | 10.72 |
| | 11.26 (Minimum) 12.26 (Nominal) 13.26 (Maximum) | | | 10.63 (Minimum) 11.63 (Nominal) 12.63 (Maximum) | | | 9.591 (Minimum) 10.59 (Nominal) 11.59 (Maximum) | |

Before: 3-JUN-2000 18:06

## High resolution Integrated Logging Tool-CTS Wellsite Calibration

### MCFL Calibration

| Phase | Raw B0 Resistivity OHMM | Value | Phase | Raw B1 Resistivity OHMM | Value | Phase | Raw B2 Resistivity OHMM | Value |
|---|---|---|---|---|---|---|---|---|
| Before | | 3846 | Before | | 3802 | Before | | 3817 |
| | 3565 (Minimum) 3875 (Nominal) 4185 (Maximum) | | | 3524 (Minimum) 3830 (Nominal) 4136 (Maximum) | | | 3524 (Minimum) 3830 (Nominal) 4136 (Maximum) | |

Before: 3-JUN-2000 18:01

High resolution Integrated Logging Tool-CTS Wellsite Calibration

HILT Caliper Calibration

| Phase | HILT Caliper Zero Measurement IN | Value | Phase | HILT Caliper Plus Measurement IN | Value |
|---|---|---|---|---|---|
| Before | | 7.179 | Before | | 15.34 |
| | 6.000 (Minimum) 8.000 (Nominal) 10.00 (Maximum) | | | 12.00 (Minimum) 16.00 (Nominal) 20.00 (Maximum) | |

Before: 21-MAY-2000 12:17

High resolution Integrated Logging Tool-CTS Wellsite Calibration

Detector Calibration

| Phase | Gamma Ray Background GAPI | Value | Phase | Gamma Ray (Jig - Bkg) GAPI | Value | Phase | Gamma Ray (Calibrated) GAPI | Value |
|---|---|---|---|---|---|---|---|---|
| Before | | 23.06 | Before | | 193.6 | Before | | 173.7 |
| | 0 (Minimum) 30.00 (Nominal) 120.0 (Maximum) | | | 176.0 (Minimum) 193.6 (Nominal) 211.2 (Maximum) | | | 150.0 (Minimum) 165.0 (Nominal) 180.0 (Maximum) | |

Before: 7-MAY-2000 6:47

High resolution Integrated Logging Tool-CTS Wellsite Calibration

Zero Measurement

| Phase | CNTC Background CPS | Value | Phase | CFTC Background CPS | Value |
|---|---|---|---|---|---|
| Master | | 27.31 | Master | | 28.31 |
| Before | | 27.34 | Before | | 29.66 |
| | 5.000 (Minimum) 27.31 (Nominal) 40.00 (Maximum) | | | 5.000 (Minimum) 28.31 (Nominal) 40.00 (Maximum) | |

Master: 6-APR-2000 4:31 Before: 3-JUN-2000 18:05

High resolution Integrated Logging Tool-CTS Wellsite Calibration

Accelerometer Calibration

| Phase | Z-Axis Acceleration F/S2 | Value |
|---|---|---|
| Before | | 32.15 |
| | 31.53 (Minimum) 32.19 (Nominal) 32.84 (Maximum) | |

Before: 3-JUN-2000 18:07

COMPANY: NORTHWEST NATURAL GAS

WELL: OM 43A-22-65

FIELD: MIST

COUNTY: COLUMBIA

STATE: OREGON

| | |
|---|---|
| BOTTOM LOG INTERVAL | 2309 ft |
| SCHLUMBERGER DEPTH | 2317 ft |
| DEPTH DRILLER | 2317 ft |
| KELLY BUSHING | 872.23 ft |
| DRILL FLOOR | 871.23 ft |
| GROUND LEVEL | 862.23 ft |

Schlumberger

**PLATFORM EXPRESS**
**BHC SONIC/ GR /SP**
**SCALE: 5" = 100'**