COMPANY: NORTHWEST NATURAL GAS

WELL: IW-24BH-23-65

FIELD: MIST

COUNTY: COLUMBIA STATE: OREGON

COUNTY: COLUMBIA
Field: MIST
Location: 976.5' NORTH, 1256.3' EAST
Well: IW-24BH-23-65
Company: NORTHWEST NATURAL GAS

Schlumberger

ARRAY INDUCTION
BHC SONIC / GR
SCALE: 5" = 100'

LOCATION

976.5' NORTH, 1256.3' EAST FROM THE SW SECTION CORNOR		Elev.:	K.B. 923 ft G.L. 905 ft D.F. 923 ft
Permanent Datum:	GROUND LEVEL	Elev.:	905 ft
Log Measured From:	KB	18.0 ft	above Perm. Datum
Drilling Measured From:	KB		

API Serial No.	SECTION	TOWNSHIP	RANGE
36-009-00351	23	6N	5W

Logging Date	20-JUN-2000			
Run Number	2			
Depth Driller	2770 ft			
Schlumberger Depth	2762ft			
Bottom Log Interval	2746 ft			
Top Log Interval	1870 ft			
Casing Driller Size @ Depth	8.625 in	@ 1870 ft		@
Casing Schlumberger	1870 ft			
Bit Size	7.875 in			
Type Fluid In Hole	XCD/KCL			
MUD Density / Viscosity	8.6 lbm/gal	38 s		
Fluid Loss / PH	6.4 cm3	8		
Source Of Sample	FLOWLINE			
RM @ Measured Temperature	0.266 ohm.m	@ 58 degF		@
RMF @ Measured Temperature	0.281 ohm.m	@ 19 degF		@
RMC @ Measured Temperature	0.145 ohm.m	@ 18 degF		@
Source RMF / RMC	PRESS	PRESS		
RM @ MRT / RMF @ MRT	0.230 @ 68	0.097 @ 68	@	@
Maximum Recorded Temperatures	68 degF	68 68		
Circulation Stopped / Time	19-JUN-2000	21:30		
Logger On Bottom / Time	20-JUN-2000	6:45		
Unit Number / Location	3152	SACRAMENTO		
Recorded By	M.KHAN			
Witnessed By	CLAYTON ROTH			

	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: PEX-AITH-BHC	OS1:
OS2:	OS2:
OS3:	OS3:
OS4:	OS4:
OS5:	OS5:
REMARKS: RUN NUMBER 1	REMARKS: RUN NUMBER 2
MAXIMUM HOLE DEVIATION: 92 DEG	
LOGGED WITH TLC EQUIPMENT	

RUN 1		RUN 2	
SERVICE ORDER #:	6266009	SERVICE ORDER #:	
PROGRAM VERSION:	9C1-303	PROGRAM VERSION:	
FLUID LEVEL:	0 ft	FLUID LEVEL:	

LOGGED INTERVAL	START	STOP	LOGGED INTERVAL	START	STOP

EQUIPMENT DESCRIPTION

RUN 1	RUN 2

SURFACE EQUIPMENT

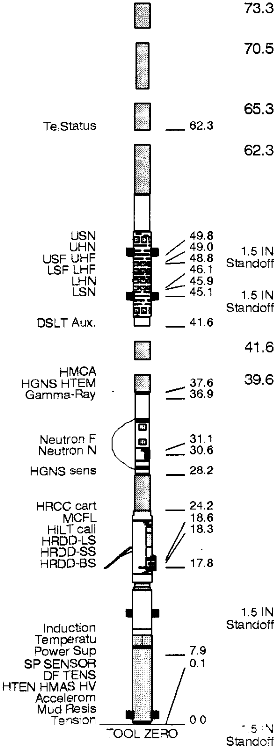
GSR-U/Y
NCT-B
CNB-AB
NCS-VB

WITM (CTS)-A

DOWNHOLE EQUIPMENT

DWCH-A DWCH-A	85.3
AH-107 AH-107	77.3
AH-107 AH-107	75.3

SAH-E	SAH-E	73.3
ACTS-D1	ACTM-B ACTE-B	70.5
TCC-BF	ECH-KC	65.3
DSLT-TCC	DSLC-B ECH-KH SLS-W	62.3
AH-107	AH-107	41.6
HILTB-DTB	HTBCC HMCA HGNS-CAN-B HGNS-H NLS-KL NSR-F HACCZ HCNT HGR HRCC-B 723 HRMS-B 723 HRGD 723 GLS-VJ 1924 MCFL Device HILT Nucl. LS HILT Nucl. SS HILT Nucl. BS AIT-H AHIS-BA 112 AHRM-A BOW-SPR NPV-N	39.6



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

Input DLIS Files

DEFAULT	HILTB .004	FN:3	PRODUCER	20-Jun-2000 23:15	2746.0 FT	1680.5 FT
DEFAULT	HILTB .016	FN:15	PRODUCER	20-Jun-2000 20:04	2076.0 FT	1612.5 FT

OP System Version: 9C1-303

MCM

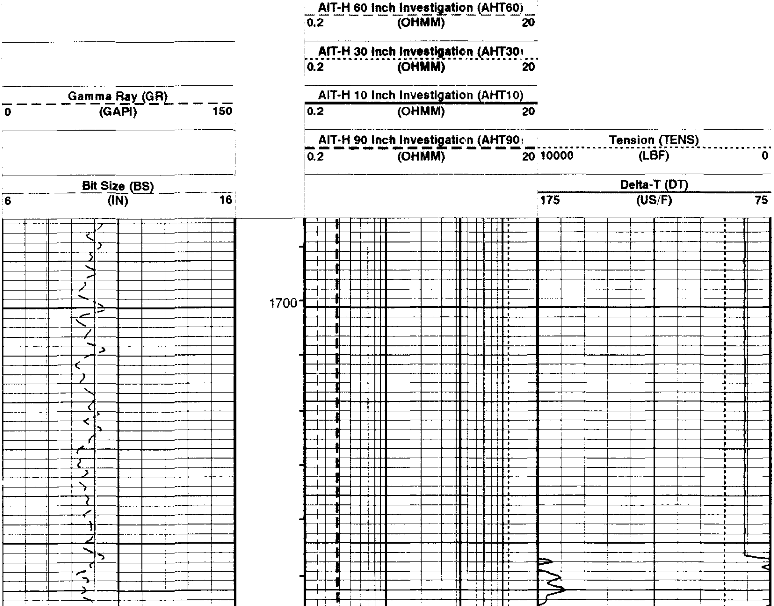
HILTB	OP91-KP1a	DSLT-BA	OP91-KP1a
TCCBF	OP91-KP1a	ACTS1	OP91-KP1a

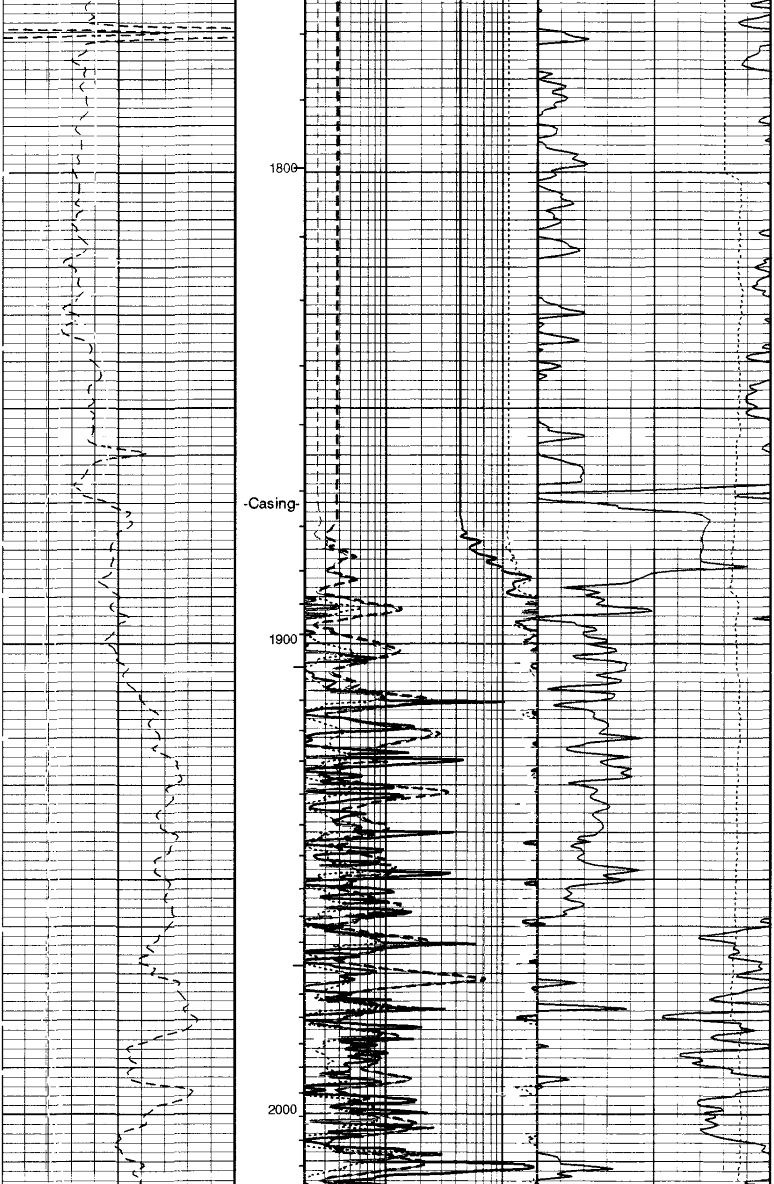
PIP SUMMARY

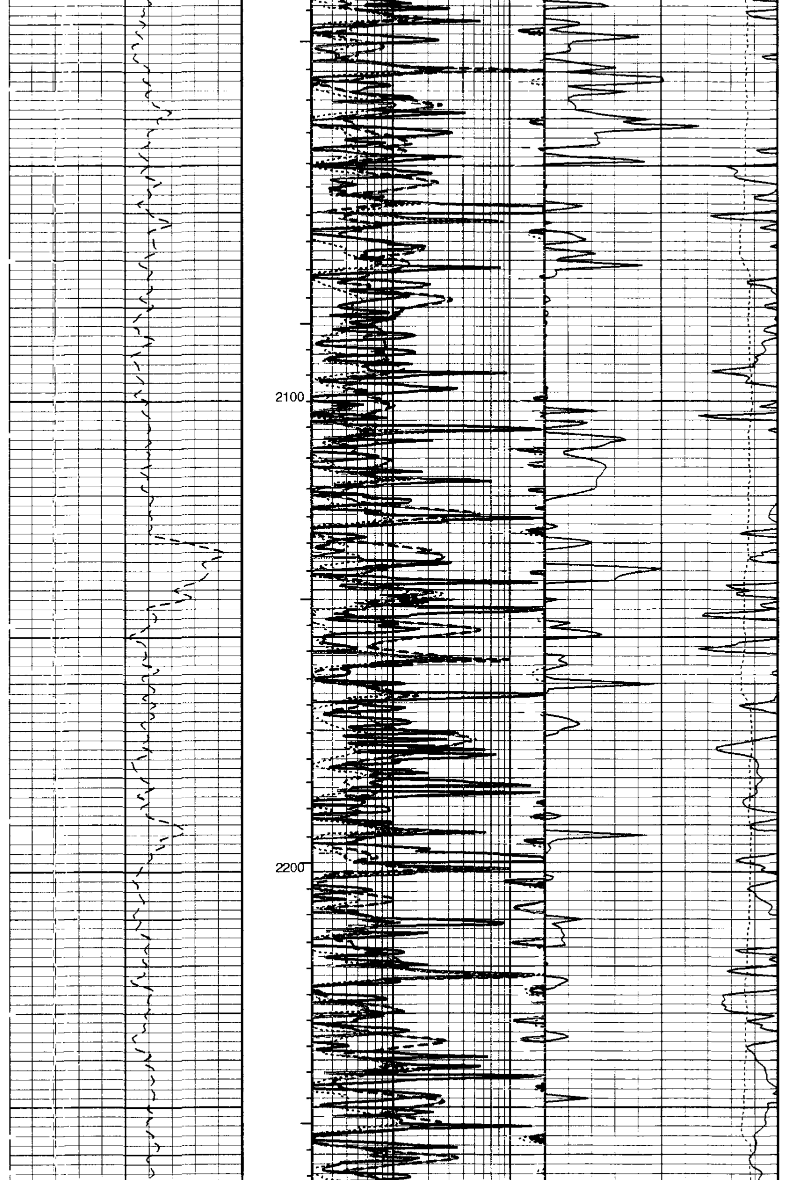
⊣ Integrated Transit Time Minor Pip Every 1 MS

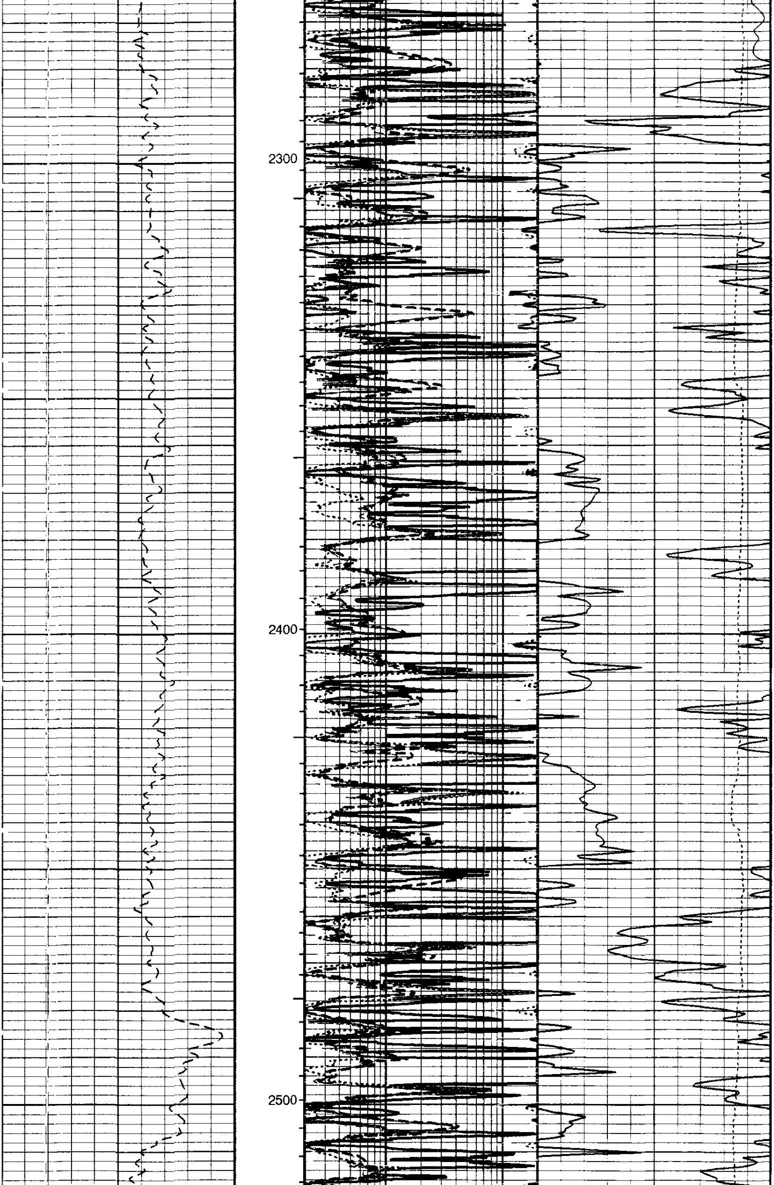
⊣ Integrated Transit Time Major Pip Every 10 MS

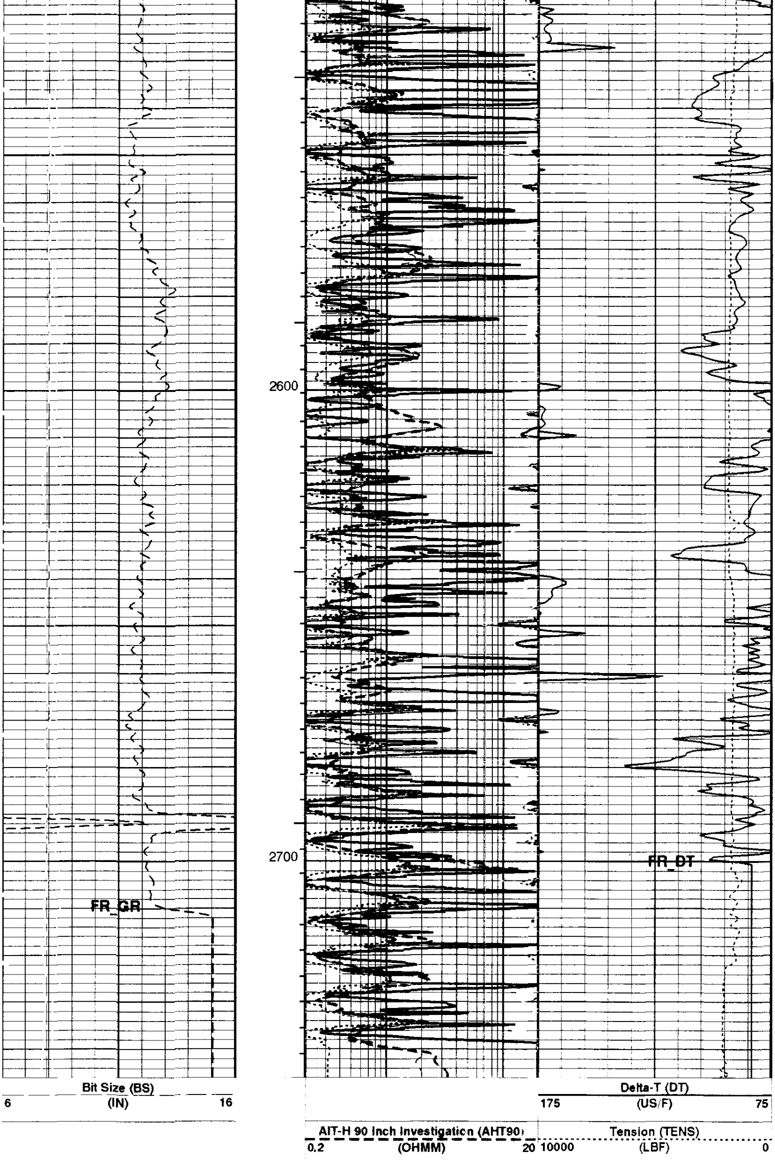
■ Time Mark Every 60 S











Gamma Ray (GR)		
0	(GAPI)	150

AIT-H 10 Inch Investigation (AHT10)		
0.2	(OHMM)	20

AIT-H 30 Inch Investigation (AHT30)		
0.2	(OHMM)	20

AIT-H 60 Inch Investigation (AHT60)		
0.2	(OHMM)	20

PIP SUMMARY

⊣ Integrated Transit Time Minor Pip Every 1 MS
⊣ Integrated Transit Time Major Pip Every 10 MS

▶ Time Mark Every 60 S

Parameters

DLIS Name	Description	Value	
AHBHM	Array Induction Borehole Correction Mode	2_COMPUTESTANDOFF	
AHBHV	Array Induction Borehole Correction Code Version Number	870	
AHBLM	Array Induction Basic Logs Mode	1_TWO	
AHBLV	Array Induction Basic Logs Code Version Number	973	
AHBPO	Array Induction Basic Logs Processing Option	STANDARD_PROCESSING	
AHCDE	Array Induction Casing Detection Enable	YES	
AHCEN	Array Induction Tool Centering Flag (in Borehole)	ECCENTERED	
AHFRSV	Array Induction Response Set Version for Four ft Resolution	30.66.23.11	
AHMRF	Array Induction Mud Resistivity Factor	1.000	
AHORSV	Array Induction Response Set Version for One ft Resolution	30.66.23.11	
AHRFV	Array Induction Radial Profiling Code Version Number	700	
AHRPV	Array Induction Radial Parametrization Code Version Number	710	
AHSAP	Array Induction Suspend Answer Product Processing	0_NOSUSPENSION	
AHSTA	Array Induction Tool Standoff	1.500	in
AHTRSV	Array Induction Response Set Version for Two ft Resolution	30.66.23.11	
BHT	Bottom Hole Temperature (used in calculations)	212.0	degF
BS	Bit Size	7.875	in
DTCM	Delta-T Computation Mode	FULL	
FEXP	Form Factor Exponent	2.000	
FNUM	Form Factor Numerator	1.000	
GCSE	Generalized Caliper Selection	HCAL	
GDEV	Average Angular Deviation of Borehole from Normal	0.000	deg
GGRD	Geothermal Gradient	0.010	degF/ft
GRSE	Generalized Mud Resistivity Selection	AHMF	
GTSE	Generalized Temperature Selection	TEMP	
HSCM	HILT Speed Correction Mode	NO_SC	
HSTI	STI Uses HILT Acceleration	YES	
MODE	Sonic Firing Mode	BHC	
SHT	Surface Hole Temperature	68.000	degF
SPDR	SP Drift	0.000	mV/ft
SPNV	SP Next Value	0.000	mV
TD	Total Depth	2762.0	ft

Format: AITSON Vertical Scale: 5" per 100' Graphics File Created: 20-Jun-2000 23:47

OP System Version: 9C1-303

MCM

HILTB	OP91-KP1a	DSLT-BA	OP91-KP1a
TCCBF	OP91-KP1a	ACTS1	OP91-KP1a

Input DLIS Files

DEFAULT	HILTB .004	FN:3	PRODUCER	20-Jun-2000 23:15	2746.0 FT	1680.5 FT
DEFAULT	HILTB .016	FN:15	PRODUCER	20-Jun-2000 20:04	2076.0 FT	1612.5 FT

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REPEAT SECTION

MAXIS 500 Field Log

Input DLIS Files

DEFAULT	HILTB .016	FN:15	PRODUCER	20-Jun-2000 20:04	2076.0 FT	1612.5 FT
DEFAULT	HILTB .016	FN:15	PRODUCER	20-Jun-2000 20:04	2076.0 FT	1612.5 FT

OP System Version: 9C1-303

MCM

HILTB	OP91-KP1a	DSLT-BA	OP91-KP1a
TCCBF	OP91-KP1a	ACTS1	OP91-KP1a

PIP SUMMARY

⊣ Integrated Transit Time Minor Pip Every 1 MS
⊣ Integrated Transit Time Major Pip Every 10 MS

▶ Time Mark Every 60 S

AIT-H 60 Inch Investigation (AHT60)
0.2 (OHMM) 20

AIT-H 30 Inch Investigation (AHT30)
0.2 (OHMM) 20

Gamma Ray (GR)
0 (GAPI) 150

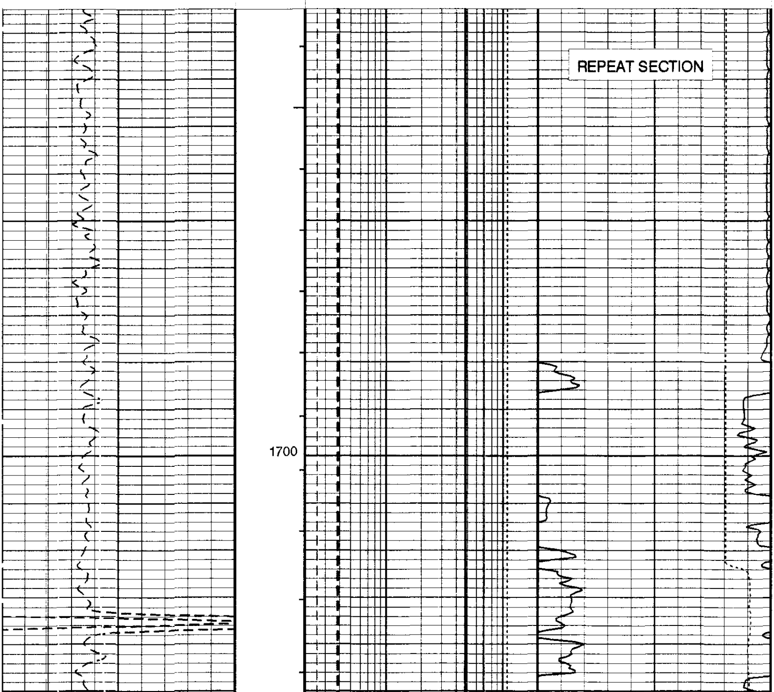
AIT-H 10 Inch Investigation (AHT10)
0.2 (OHMM) 20

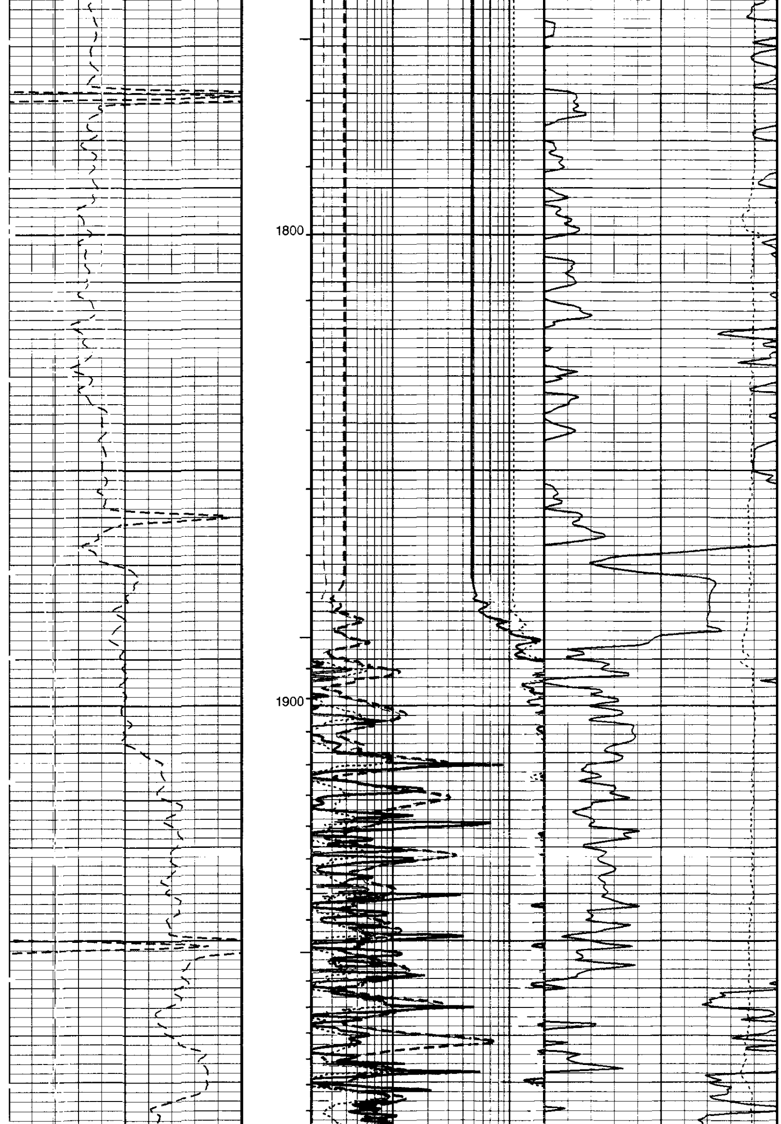
AIT-H 90 Inch Investigation (AHT90)
0.2 (OHMM) 20

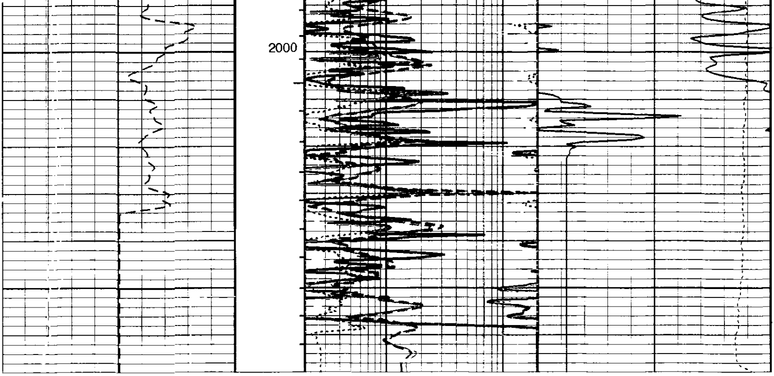
Tension (TENS)
10000 (LBF) 0

Bit Size (BS)
6 (IN) 16

Delta-T (DT)
175 (US/F) 75







Bit Size (BS)
6 (IN) 16

Delta-T (DT)
175 (US/F) 75

AIT-H 90 Inch Investigation (AHT90)
0.2 (OHMM) 20

Tension (TENS)
10000 (LBF) 0

Gamma Ray (GR)
0 (GAPI) 150

AIT-H 10 Inch Investigation (AHT10)
0.2 (OHMM) 20

AIT-H 30 Inch Investigation (AHT30)
0.2 (OHMM) 20

REPEAT SECTION

AIT-H 60 Inch Investigation (AHT60)
0.2 (OHMM) 20

PIP SUMMARY

⊣ Integrated Transit Time Minor Pip Every 1 MS
⊣ Integrated Transit Time Major Pip Every 10 MS

▶ Time Mark Every 60 S

Parameters

DLIS Name	Description	Value	
AHBHM	Array Induction Borehole Correction Mode	2_COMPUTESTANDOFF	
AHBHV	Array Induction Borehole Correction Code Version Number	870	
AHBLM	Array Induction Basic Logs Mode	1_TWO	
AHBLV	Array Induction Basic Logs Code Version Number	973	
AHBPO	Array Induction Basic Logs Processing Option	STANDARD_PROCESSING	
AHCDE	Array Induction Casing Detection Enable	YES	
AHCEN	Array Induction Tool Centering Flag (in Borehole)	ECCENTERED	
AHFRSV	Array Induction Response Set Version for Four ft Resolution	30.66.23.11	
AHMRF	Array Induction Mud Resistivity Factor	1.000	
AHORSV	Array Induction Response Set Version for One ft Resolution	30.66.23.11	
AHRFV	Array Induction Radial Profiling Code Version Number	700	
AHRPV	Array Induction Radial Parametrization Code Version Number	710	
AHSAP	Array Induction Suspend Answer Product Processing	0_NOSUSPENSION	
AHSTA	Array Induction Tool Standoff	1.500	in
AHTRSV	Array Induction Response Set Version for Two ft Resolution	30.66.23.11	
BHT	Bottom Hole Temperature (used in calculations)	212.0	degF
BS	Bit Size	7.875	in
DO	Depth Offset	-8.0	ft
DORL	Depth Offset Repeat Analysis	-8.0	ft
DTCM	Delta-T Computation Mode	FULL	
FEXP	Form Factor Exponent	2.000	
FNUM	Form Factor Numerator	1.000	
GCSE	Generalized Caliper Selection	HCAL	
GDEV	Average Angular Deviation of Borehole from Normal	0.000	deg
GGRD	Geothermal Gradient	0.010	degF/ft
GRSE	Generalized Mud Resistivity Selection	AHMF	
GTSE	Generalized Temperature Selection	TEMP	
HSCM	HILT Speed Correction Mode	NO_SC	
HSTI	STI Uses HILT Acceleration	YES	
MODE	Sonic Firing Mode	BHC	
SHT	Surface Hole Temperature	68.000	degF
SPDR	SP Drift	0.000	mV/ft
SPNV	SP Next Value	0.000	mV
TD	Total Depth	2762.0	ft

Format: AITSON Vertical Scale: 5" per 100' Graphics File Created: 20-Jun-2000 23:51

OP System Version: 9C1-303

MCM

HILTB	**OP91-KP1a**	**DSLT-BA**	**OP91-KP1a**
TCCBF	**OP91-KP1a**	**ACTS1**	**OP91-KP1a**

Input DLIS Files

DEFAULT	**HILTB .016**	**FN:15 PRODUCER**	**20-Jun-2000 20:04**	**2076.0 FT**	**1612.5 FT**
DEFAULT	**HILTB .016**	**FN:15 PRODUCER**	**20-Jun-2000 20:04**	**2076.0 FT**	**1612.5 FT**

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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 9:39 Before: 20-JUN-2000 14:42							
Thru Cal Magnitude - 0	0	0.6214	0.6374	N/A	N/A	N/A	V
Thru Cal Magnitude - 1	0	1.274	1.307	N/A	N/A	N/A	V
Thru Cal Magnitude - 2	0	0.6329	0.6492	N/A	N/A	N/A	V
Thru Cal Magnitude - 3	0	0.7152	0.7333	N/A	N/A	N/A	V
Thru Cal Magnitude - 4	0	1.335	1.369	N/A	N/A	N/A	V
Thru Cal Magnitude - 5	0	1.943	1.993	N/A	N/A	N/A	V
Thru Cal Magnitude - 6	0	1.947	1.997	N/A	N/A	N/A	V
Thru Cal Magnitude - 7	0	1.371	1.409	N/A	N/A	N/A	V
Phase - 0	0	64.91	65.88	N/A	N/A	N/A	DEG
Phase - 1	0	63.80	64.77	N/A	N/A	N/A	DEG
Phase - 2	0	60.03	61.01	N/A	N/A	N/A	DEG
Phase - 3	0	59.25	60.23	N/A	N/A	N/A	DEG
Phase - 4	0	52.91	53.92	N/A	N/A	N/A	DEG
Phase - 5	0	50.96	51.99	N/A	N/A	N/A	DEG
Phase - 6	0	50.92	51.95	N/A	N/A	N/A	DEG
Phase - 7	0	47.08	48.25	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 9:39 Before: 20-JUN-2000 14:42							
Array Induction SPA Plus	990.5	989.8	990.5	N/A	N/A	N/A	MV
Array Induction SPA Zero	0	0.1083	0.1162	N/A	N/A	N/A	MV
Array Induction Temperature Pl	0.9150	0.9169	0.9175	N/A	N/A	N/A	V
Array Induction Temperature Ze	0	0.0001095	0.00009983	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 9:39							
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 9:39

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 9:39

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: 20-JUN-2000 14:46

BS Window Ratio	1.033	N/A	1.031	N/A	N/A	N/A	
BS Window Sum	14310	N/A	14310	N/A	N/A	N/A	CPS
SS Window Ratio	0.5004	N/A	0.5044	N/A	N/A	N/A	
SS Window Sum	11490	N/A	11410	N/A	N/A	N/A	CPS
LS Window Ratio	0.2862	N/A	0.2873	N/A	N/A	N/A	
LS Window Sum	1163	N/A	1159	N/A	N/A	N/A	CPS

High resolution Integrated Logging Tool-CTS Wellsite Calibration - Photo-multiplier High Voltages Calibrations

Before 20-JUN-2000 14:46

BS PM High Voltage (Command	1614	N/A	1655	N/A	N/A	N/A	V
SS PM High Voltage (Command)	1916	N/A	1957	N/A	N/A	N/A	V
LS PM High Voltage (Command)	1966	N/A	1955	N/A	N/A	N/A	V

High resolution Integrated Logging Tool-CTS Wellsite Calibration - Crystal Quality Resolutions Calibration

Before: 20-JUN-2000 14:46

BS Crystal Resolution	12.26	N/A	12.34	N/A	N/A	N/A	%
SS Crystal Resolution	11.63	N/A	12.08	N/A	N/A	N/A	%
LS Crystal Resolution	10.59	N/A	10.85	N/A	N/A	N/A	%

High resolution Integrated Logging Tool-CTS Wellsite Calibration - MCFL Calibration

Before: 14-JUN-2000 3:55

Raw B0 Resistivity	3875	N/A	3844	N/A	N/A	N/A	OHMM
Raw B1 Resistivity	3830	N/A	3809	N/A	N/A	N/A	OHMM
Raw B2 Resistivity	3830	N/A	3822	N/A	N/A	N/A	OHMM

High resolution Integrated Logging Tool-CTS Wellsite Calibration - HILT Caliper Calibration

Before: 14-JUN-2000 3:45

HILT Caliper Zero Measurement	8.000	N/A	7.212	N/A	N/A	N/A	IN
HILT Caliper Plus Measurement	16.00	N/A	15.93	N/A	N/A	N/A	IN

High resolution Integrated Logging Tool-CTS Wellsite Calibration - Detector Calibration

Before: Calibration not done

Gamma Ray Background	30.00	N/A	N/A	N/A	N/A	N/A	GAPI
Gamma Ray (Jig - Bkg)	N/A	N/A	N/A	N/A	N/A	N/A	GAPI
Gamma Ray (Calibrated)	165.0	N/A	N/A	N/A	N/A	15.00	GAPI

High resolution Integrated Logging Tool-CTS Wellsite Calibration - Zero Measurement

Master: 6-APR-2000 4:31 Before: 20-JUN-2000 14:44

CNTC Background	27.31	27.31	26.34	N/A	N/A	4.096	CPS
CFTC Background	28.31	28.31	26.95	N/A	N/A	4.247	CPS

High resolution Integrated Logging Tool-CTS Wellsite Calibration - Accelerometer Calibration

Before: 20-JUN-2000 14:43

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	0.6374			65.88		
1	Master	1.274		1.270	63.80		70.00
	Before	1.307			64.77		
2	Master	0.6329		0.6230	60.03		66.00
	Before	0.6492			61.01		
3	Master	0.7152		0.7040	59.25		65.00
	Before	0.7338			60.23		
4	Master	1.335		1.337	52.91		59.00
	Before	1.369			53.92		
5	Master	1.943		1.955	50.96		57.00
	Before	1.993			51.99		
6	Master	1.947		1.955	50.92		57.00
	Before	1.997			51.95		
7	Master	1.371		1.415	47.08		53.00
	Before	1.409			48.25		
			60.00 % (Minimum) (Nominal) 140.0 % (Maximum)			Nom -60.00 (Minimum) (Nominal) Nom - 60.00 (Maximum)	

Master: Calibration out of date 20-JAN-2000 9:39 Before: 20-JUN-2000 14:42

High resolution Integrated Logging Tool-CTS Wellsite Calibration

Electronics Calibration Check - Auxiliary

Phase	Array Induction SPA Plus MV	Value
Master		989.8
Before		990.5
	941.0 (Minimum) 990.5 (Nominal) 1040 (Maximum)	

Phase	Array Induction SPA Zero MV	Value
Master		0.1083
Before		0.1162
	-50.00 (Minimum) 0 (Nominal) 50.00 (Maximum)	

Phase	Array Induction Temperature Plus V	Value
Master		0.9169
Before		0.9175
	0.8700 (Minimum) 0.9150 (Nominal) 0.9600 (Maximum)	

Phase	Array Induction Temperature Zero V	Value
Master		0.0001095
Before		9.983E-00
	-0.05000 (Minimum) 0 (Nominal) 0.05000 (Maximum)	

Master: Calibration out of date 20-JAN-2000 9:39 Before: 20-JUN-2000 14:42

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 9:39

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 9:39

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 9:39

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		1.031	Before		0.5044	Before		0.2873
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		14310	Before		11410	Before		1159
13590 (Minimum)	14310 (Nominal)	15020 (Maximum)	10920 (Minimum)	11490 (Nominal)	12070 (Maximum)	1105 (Minimum)	1163 (Nominal)	1221 (Maximum)

Before: 20-JUN-2000 14:46

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		1655	Before		1957	Before		1955
1514 (Minimum)	1614 (Nominal)	1714 (Maximum)	1816 (Minimum)	1916 (Nominal)	2016 (Maximum)	1866 (Minimum)	1966 (Nominal)	2066 (Maximum)

Before: 20-JUN-2000 14:46

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		12.34	Before		12.08	Before		10.85
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: 20-JUN-2000 14:46

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		3844	Before		3809	Before		3822
3565 (Minimum)	3875 (Nominal)	4185 (Maximum)	3524 (Minimum)	3830 (Nominal)	4136 (Maximum)	3524 (Minimum)	3830 (Nominal)	4136 (Maximum)

Before: 14-JUN-2000 3:55

High resolution Integrated Logging Tool-CTS Wellsite Calibration

HILT Caliper Calibration

Phase	HILT Caliper Zero Measurement IN	Value	Phase	HILT Caliper Plus Measurement N	Value
Before		7.212	Before		15.93
6.000 (Minimum)	8.000 (Nominal)	10.00 (Maximum)	12.00 (Minimum)	16.00 (Nominal)	20.00 (Maximum)

Before: 14-JUN-2000 3:45

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	NOT DONE	N/A	Before	NOT DONE	N/A	Before	NOT DONE	N/A
0 (Minimum)	30.00 (Nominal)	120.0 (Maximum)	N/A (Minimum)	N/A (Nominal)	N/A (Maximum)	150.0 (Minimum)	165.0 (Nominal)	180.0 (Maximum)

Before: Calibration not done

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		26.34	Before		26.95
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: 20-JUN-2000 14:44

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: 20-JUN-2000 14:43

COMPANY: **NORTHWEST NATURAL GAS**

WELL: **IW-24BH-23-65**
FIELD: **MIST**
COUNTY: **COLUMBIA**
STATE: **OREGON**

BOTTOM LOG INTERVAL	2740 ft
SCHLUMBERGER DEPTH	2762 ft
DEPTH DRILLER	2770 ft
KELLY BUSHING	923 ft
DRILL FLOOR	923 ft
GROUND LEVEL	905 ft

Schlumberger

ARRAY INDUCTION
BHC SONIC / GR / SP
SCALE: 5" = 100'