COMPANY: NORTHWEST NATURAL GAS

WELL: IW-24BH-23-65

FIELD: MIST

COUNTY: COLUMBIA **STATE:** OREGON

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

Schlumberger

ARRAY INDUCTION
BHC SONIC / SP/ GR
TVD LOG

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		14-JUN-2000		
Run Number		1		
Depth Driller		1838 ft		
Schlumberger Depth		1828 ft		
Bottom Log Interval		1818 ft		
Top Log Interval		429 ft		
Casing Driller Size @ Depth		13.375 in @ 429 ft		@
Casing Schlumberger		429 ft		
Bit Size		9.875 in		
Type Fluid In Hole		DMA		
MUD Density	Viscosity	8.8 lbm/gal	42 s	
MUD Fluid Loss	PH	6.4 cm3	8.5	
MUD Source Of Sample		FLOWLINE		
RM @ Measured Temperature		1.193 ohm.m @ 57 degF		@
RMF @ Measured Temperature		1.492 ohm.m @ 62 degF		@
RMC @ Measured Temperature		1.402 ohm.m @ 60 degF		@
Source RMF	RMC	PRESS	PRESS	
RM @ MRT	RMF @ MRT	1.017 @ 68	1.380 @ 68	@ @
Maximum Recorded Temperatures		68 degF	68	68
Circulation Stopped	Time	14-JUN-2000	3:00	
Logger On Bottom	Time	14-JUN-2000	7:00	
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		
MUD Fluid Loss / PH		
MUD 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: FMI	OS1:
OS2:	OS2:
OS3:	OS3:
OS4:	OS4:
OS5:	OS5:

REMARKS: RUN NUMBER 1	REMARKS: RUN NUMBER 2
Maximum Deviation: 72 Deg at 1828 ft	

RUN 1

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

RUN 2

SERVICE ORDER #:
PROGRAM VERSION
FLUID LEVEL:

LOGGED INTERVAL	START	STOP	LOGGED INTERVAL	START	STOP

EQUIPMENT DESCRIPTION

RUN 1

RUN 2

SURFACE EQUIPMENT

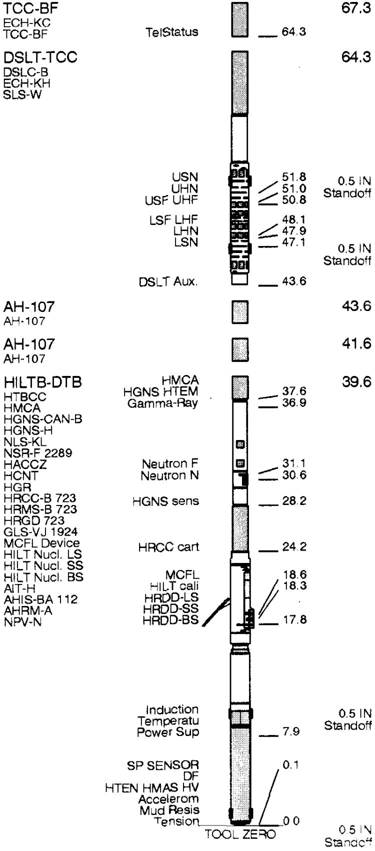
GSR-U/Y
NCT-B
CNB-AB
NCS-VB

WITM (CTS)-A

DOWNHOLE EQUIPMENT

LEH-QT
LEH-QT

70.2



MAXIMUM STRING DIAMETER 4.88 IN
MEASUREMENTS RELATIVE TO TOOL ZERO
ALL LENGTHS IN FEET

Input DLIS Files

DEFAULT	HILTB .007	FN:6	PRODUCER	14-Jun-2000 05:52	1829.0 FT	312.5 FT

Output DLIS Files

DEFAULT	HILTB .008	FN:7	PRODUCER	14-Jun-2000 05:58	1558.5 FT	312.5 FT

Indexed to True Vertical Depth in this Playback

Integrated Hole/Cement Volume Summary

Hole Volume = 1104.14 F3

Cement Volume = 598.82 F3 (assuming 8.63 IN casing O.D.)

Computed from 1558.5 FT to 313.5 FT using data channel(s) HCAL

OP System Version: 9C1-303

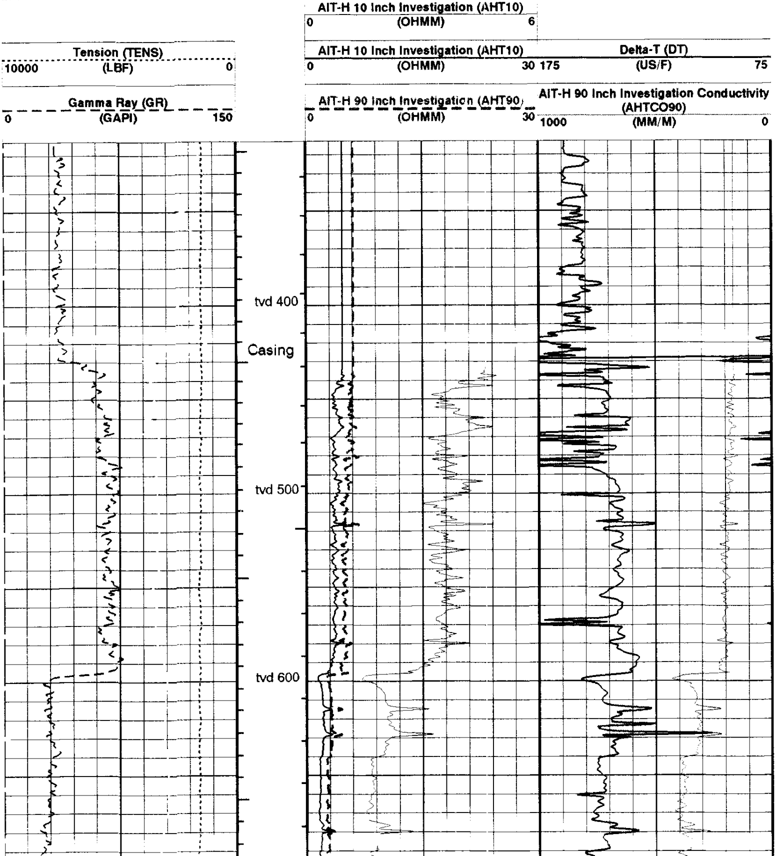
MCM

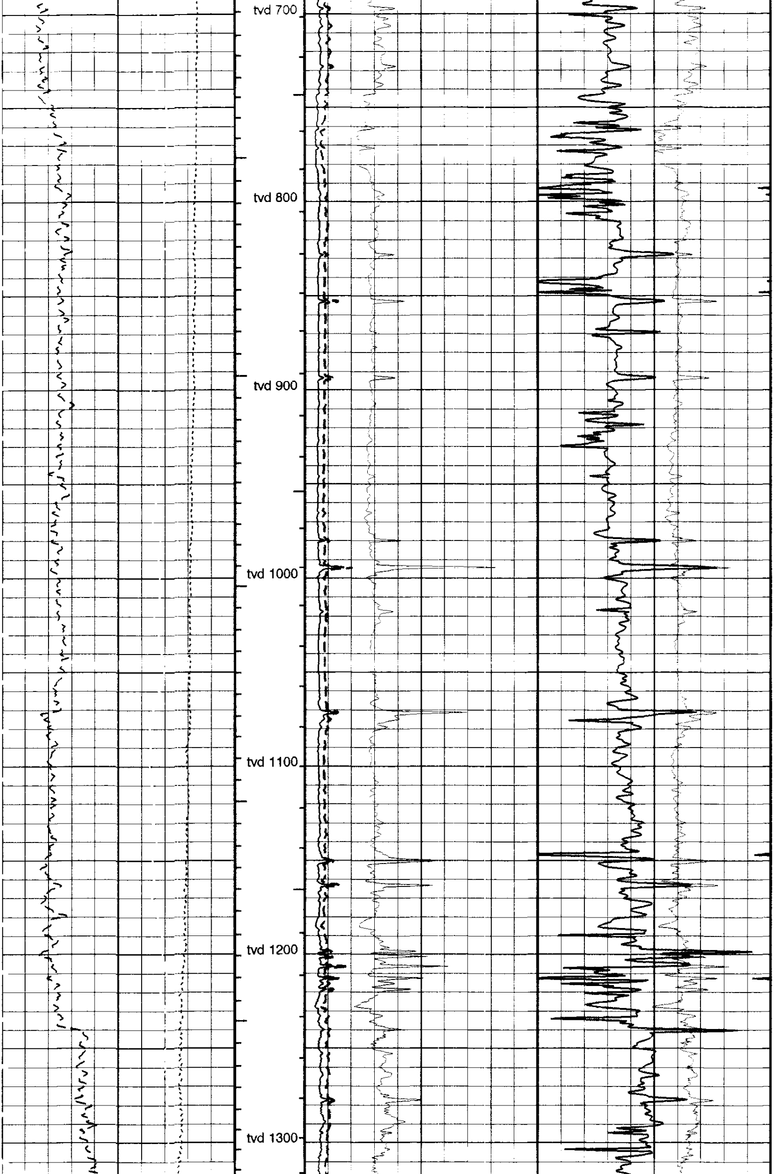
HILTB-DTB	OP91-KP1a	DSLT-TCC	OP91-KP1a
TCC-BF	OP91-KP1a		

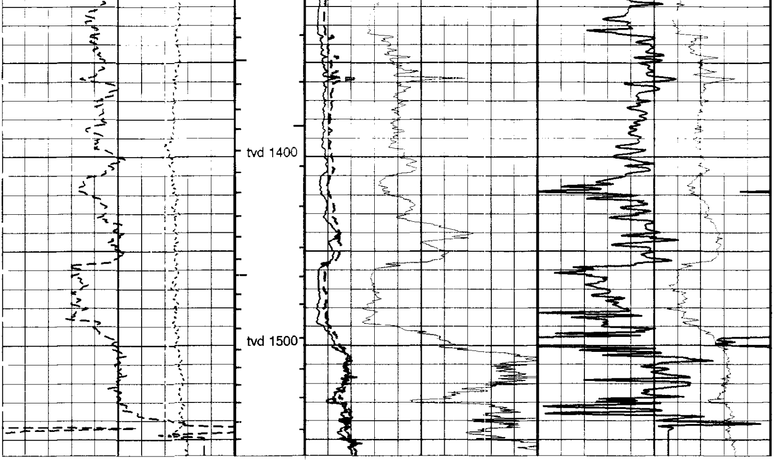
PIP SUMMARY

⊢ Integrated Hole Volume Minor Pip Every 10 F3
⊢ Integrated Hole Volume Major Pip Every 100 F3
⊣ Integrated Cement Volume Minor Pip Every 10 F3
⊣ Integrated Cement Volume Major Pip Every 100 F3

▶ Time Mark Every 60 S







Gamma Ray (GR)			AIT-H 90 Inch Investigation (AHT90)			AIT-H 90 Inch Investigation Conductivity (AHTCO90)		
0	(GAPI)	150	0	(OHMM)	30	1000	(MM/M)	0
Tension (TENS)			**AIT-H 10 Inch Investigation (AHT10)**			**Delta-T (DT)**		
10000	(LBF)	0	0	(OHMM)	30	175	(US/F)	75
			AIT-H 10 Inch Investigation (AHT10)					
			0	(OHMM)	6			

PIP SUMMARY

⊢ Integrated Hole Volume Minor Pip Every 10 F3
⊢ Integrated Hole Volume Major Pip Every 100 F3
⊣ Integrated Cement Volume Minor Pip Every 10 F3
⊣ Integrated Cement Volume Major Pip Every 100 F3

■ 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	6_One_Two_and_Four	
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	
AHCSED	Array Induction Casing Shoe Estimated Depth	-50000	FT
AHFRSV	Array Induction Response Set Version for Four ft Resolution	30.66.23.11	
AHMRF	Array Induction Mud Resistivity Factor	1	
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	
AHSTA	Array Induction Tool Standoff	0.5	IN
AHTRSV	Array Induction Response Set Version for Two ft Resolution	30.66.23.11	
ALTDPCHAN	Name of alternate depth channel	TrueVerticalDepth	
BHT	Bottom Hole Temperature (used in calculations)	212	DEGF
BS	Bit Size	9.875	IN
DFD	Drilling Fluid Density	8.80	LB/G
DO	Depth Offset for Logical Unit 1	0.0	FT
DTCM	Delta-T Computation Mode	FULL	

FEXP	Form Factor Exponent	2	
FNUM	Form Factor Numerator	1	
GCSE	Generalized Caliper Selection	HCAL	
GDEV	Average Angular Deviation of Borehole from Normal	0	DEG
GGRD	Geothermal Gradient	0.01	DF/F
GRSE	Generalized Mud Resistivity Selection	AITH_RESIST	
GTSE	Generalized Temperature Selection	LINEAR_ESTIMATE	
HSCM	HILT Speed Correction Mode	NO_SC	
HSTI	STI Uses HILT Acceleration	YES	
MODE	Sonic Firing Mode	BHC	
MST	Mud Sample Temperature	57.00	DEGF
PBVSADP	Use alternate depth channel for playback	YES	
PP	Playback Processing	NORMAL	
SHT	Surface Hole Temperature	68	DEGF
SPNV	SP Next Value	0	MV
SPVD	TVD of Starting Point	0	FT
TD	Total Depth	1838	FT
TIMD	Along-hole depth of Tie-in Point	429	FT
TIVD	TVD of Tie-in Point	429	FT

Format: AITSONS2 Vertical Scale: 2" per 100' Graphics File Created: 14-Jun-2000 05:58

OP System Version: 9C1-303

MCM

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

Indexed to True Vertical Depth in this Playback

Input DLIS Files

DEFAULT	HILTB .007	FN:6	PRODUCER	14-Jun-2000 05:52	1829.0 FT	312.5 FT

Output DLIS Files

DEFAULT	HILTB .008	FN:7	PRODUCER	14-Jun-2000 05:58		

Input DLIS Files

DEFAULT	HILTB .007	FN:6	PRODUCER	14-Jun-2000 05:52	1829.0 FT	312.5 FT

Output DLIS Files

DEFAULT	HILTB .008	FN:7	PRODUCER	14-Jun-2000 05:58	1558.5 FT	312.5 FT

Indexed to True Vertical Depth in this Playback

OP System Version: 9C1-303

MCM

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

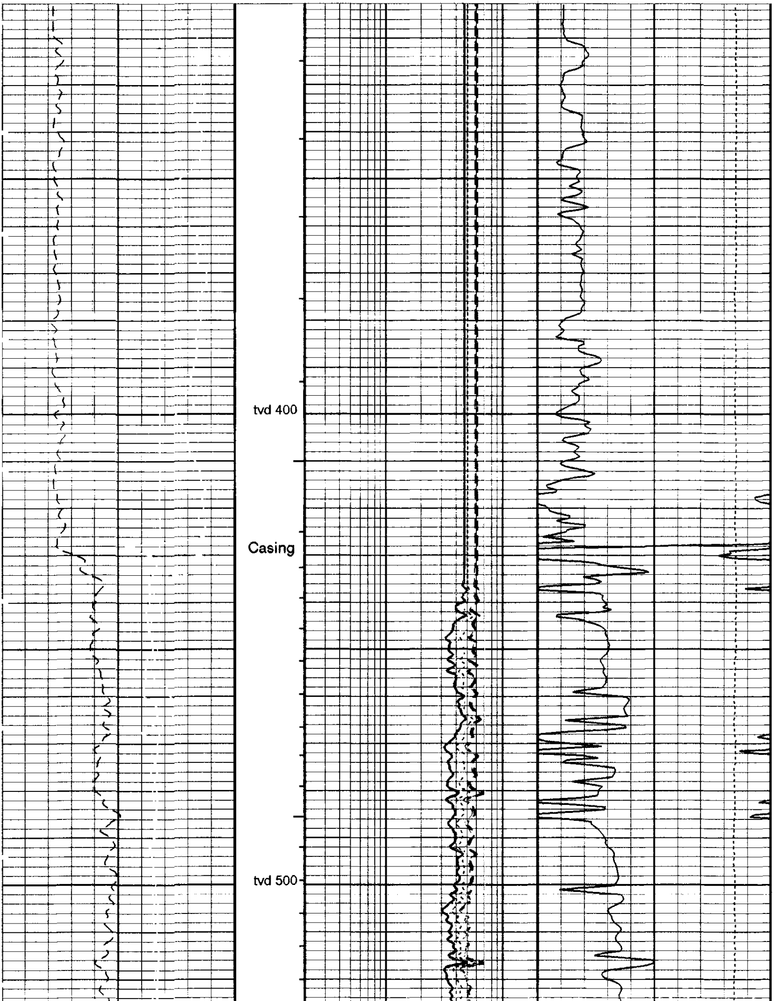
AIT-H 10 Inch Investigation (AHT10)
0.2 (OHMM) 20

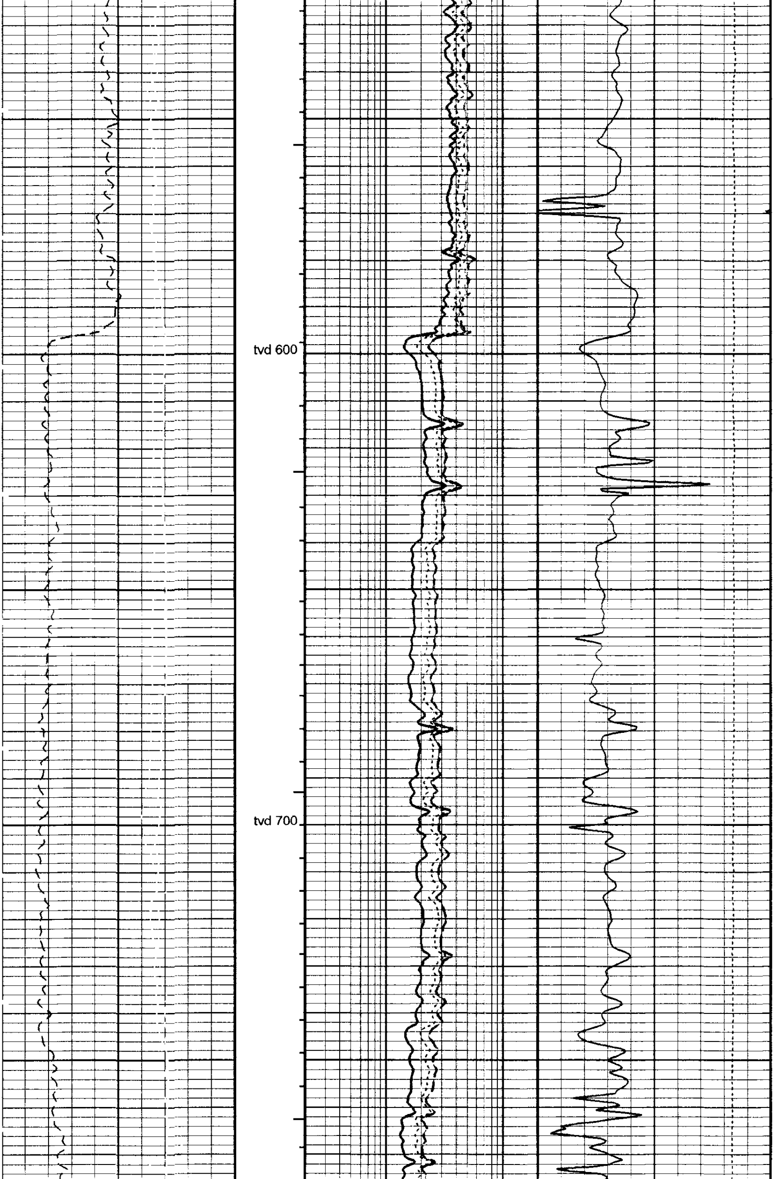
AIT-H 90 Inch Investigation (AHT90)
0.2 (OHMM) 20

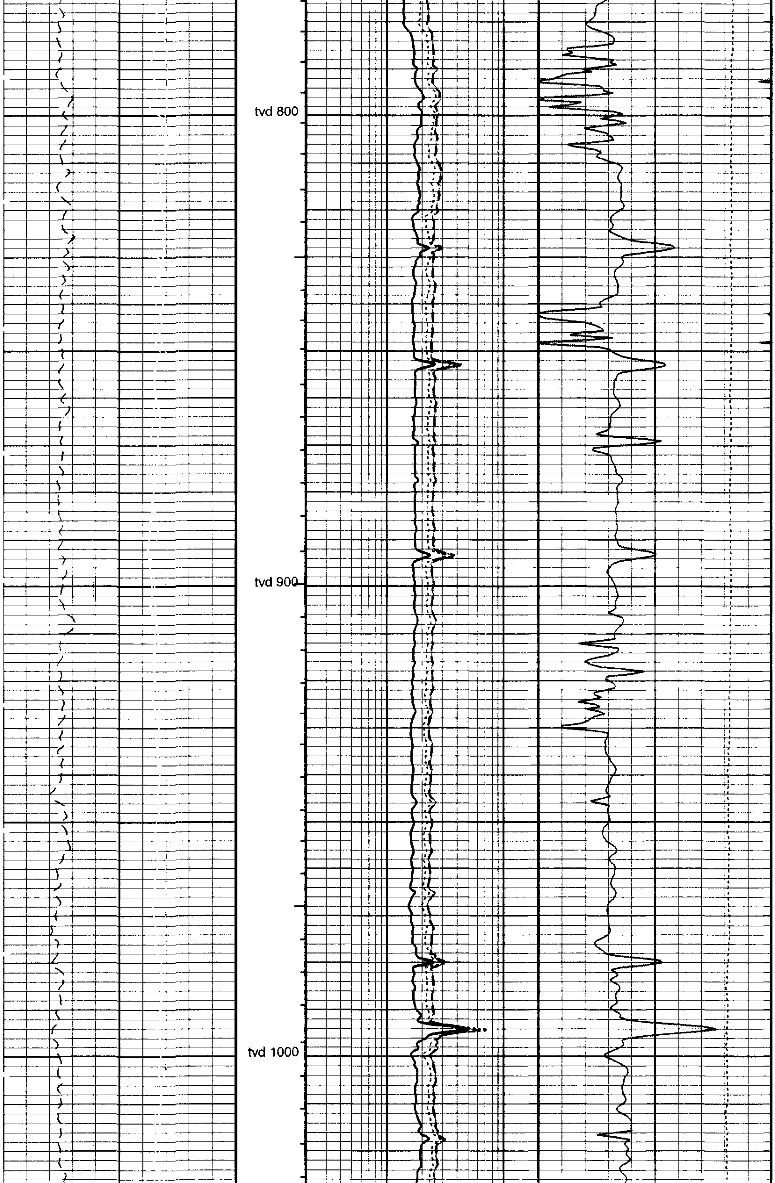
Tension (TENS)
10000 (LBF) 0

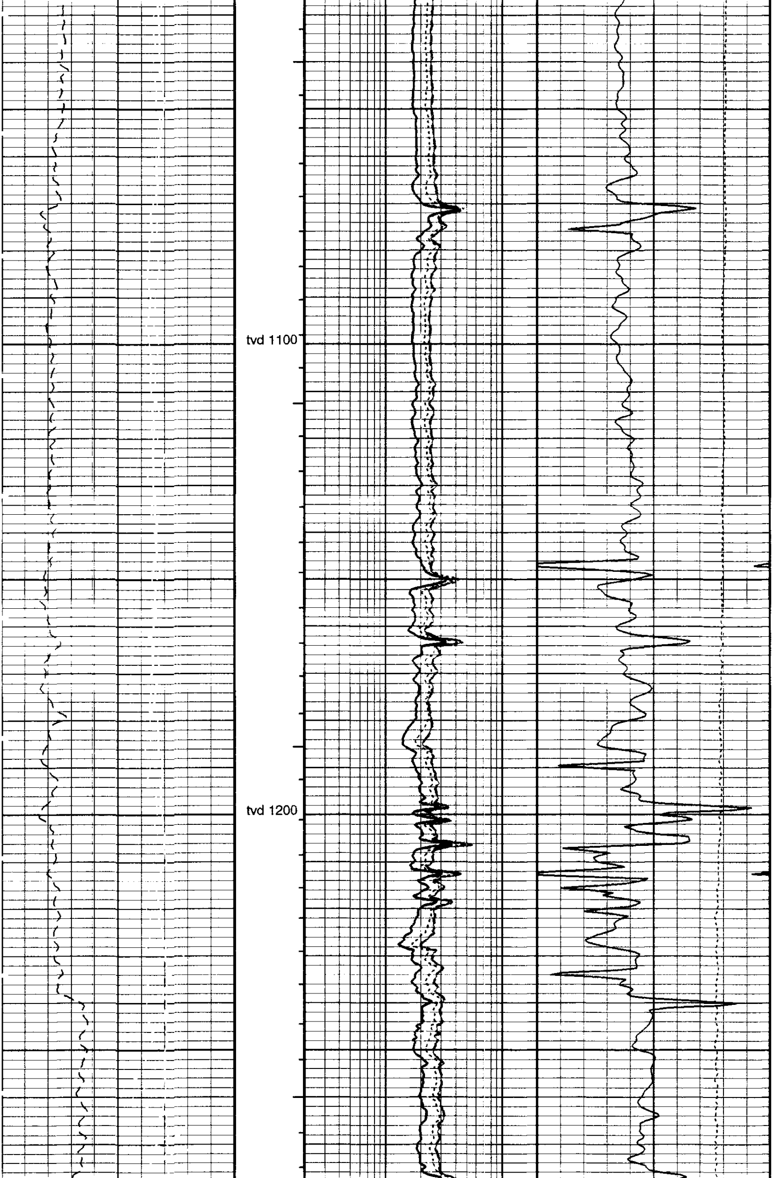
Bit Size (BS)
6 (IN) 16

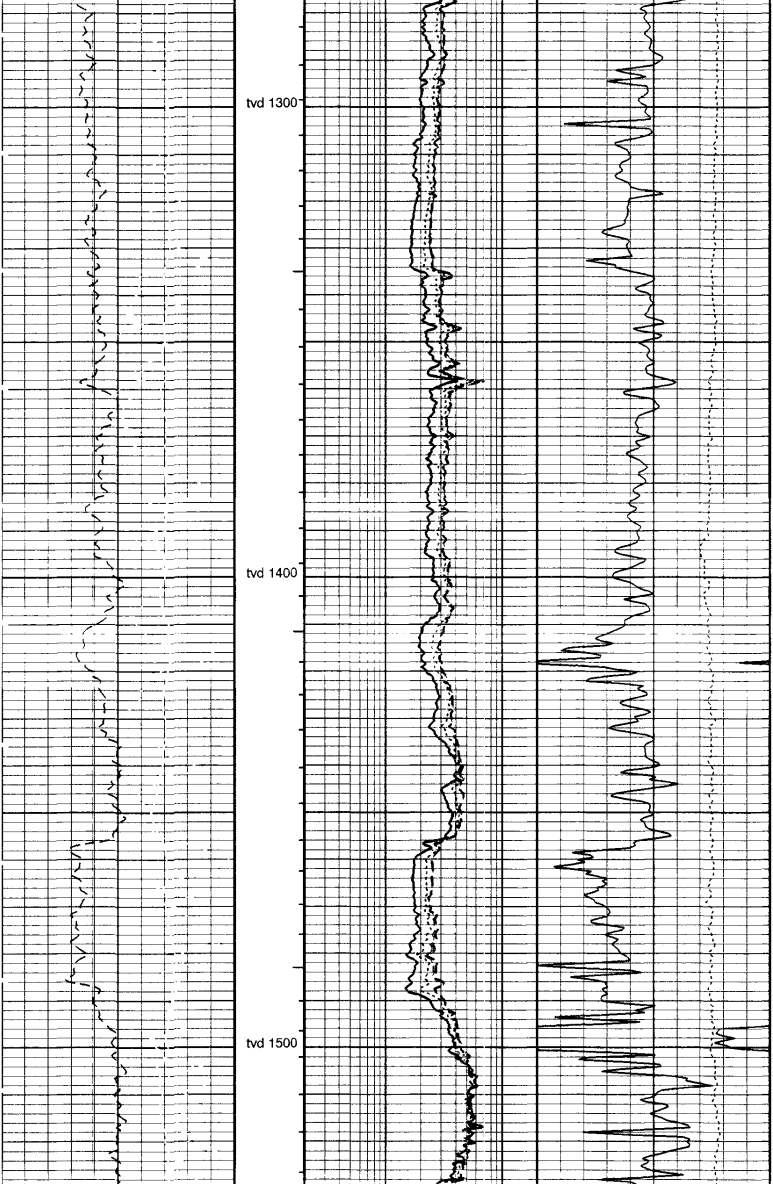
Delta-T (DT)
175 (US/F) 75

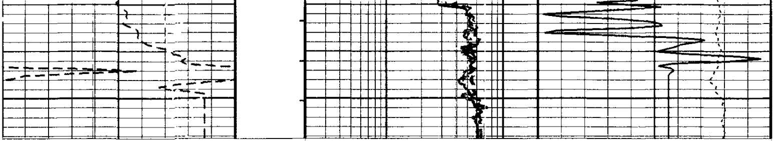












Bit Size (BS)
6 (IN) 16

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

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

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AHCDE	Array Induction Casing Detection Enable	Yes	
AHCEN	Array Induction Tool Centering Flag (in Borehole)	Eccentered	
AHCSED	Array Induction Casing Shoe Estimated Depth	-50000	FT
AHFRSV	Array Induction Response Set Version for Four ft Resolution	30.66.23.11	
AHMRF	Array Induction Mud Resistivity Factor	1	
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	
AHSTA	Array Induction Tool Standoff	0.5	IN
AHTRSV	Array Induction Response Set Version for Two ft Resolution	30.66.23.11	
ALTDPCHAN	Name of alternate depth channel	TrueVerticalDepth	
BHT	Bottom Hole Temperature (used in calculations)	212	DEGF
BS	Bit Size	9.875	IN
DFD	Drilling Fluid Density	8.80	LB/G
DO	Depth Offset for Logical Unit 1	0.0	FT
DTCM	Delta-T Computation Mode	FULL	
FEXP	Form Factor Exponent	2	
FNUM	Form Factor Numerator	1	
GCSE	Generalized Caliper Selection	HCAL	
GDEV	Average Angular Deviation of Borehole from Normal	0	DEG
GGRD	Geothermal Gradient	0.01	DF/F
GRSE	Generalized Mud Resistivity Selection	AITH_RESIST	
GTSE	Generalized Temperature Selection	LINEAR_ESTIMATE	
HSCM	HILT Speed Correction Mode	NO_SC	
HSTI	STI Uses HILT Acceleration	YES	
MODE	Sonic Firing Mode	BHC	
MST	Mud Sample Temperature	57.00	DEGF
PBVSADP	Use alternate depth channel for playback	YES	
PP	Playback Processing	NORMAL	
SHT	Surface Hole Temperature	68	DEGF
SPNV	SP Next Value	0	MV
SPVD	TVD of Starting Point	0	FT
TD	Total Depth	1838	FT
TIMD	Along-hole depth of Tie-in Point	429	FT
TIVD	TVD of Tie-in Point	429	FT

Format: AITSON Vertical Scale: 5" per 100' Graphics File Created: 14-Jun-2000 05:58

OP System Version: 9C1-303

MCM

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

Indexed to True Vertical Depth in this Playback

Input DLIS Files

DEFAULT	HILTB .007	FN:6	PRODUCER	14-Jun-2000 05:52	1829.0 FT	312.5 FT

Output DLIS Files

DEFAULT HILTB .008 FN:7 PRODUCER 14-Jun-2000 05:58

Directional Survey Manually-Entered Inclinometry Summary

Tie In Point :	Measured Depth	True Vertical Depth	North Departure	East Departure
	429.00 FT	429.00 FT	0.00 FT	0.00 FT

Depth	Deviation	Azimuth	True Vertical Depth	North Departure	East Departure
661.00 FT	1.60 DEG	247.10 DEG	660.91 FT	-2.52 FT	-5.97 FT
689.00 FT	1.40 DEG	258.00 DEG	688.90 FT	-2.74 FT	-6.67 FT
718.00 FT	1.50 DEG	172.90 DEG	717.89 FT	-3.29 FT	-7.05 FT
748.00 FT	4.00 DEG	137.70 DEG	747.85 FT	-4.55 FT	-6.40 FT
778.00 FT	6.80 DEG	123.00 DEG	777.72 FT	-6.35 FT	-4.23 FT
807.00 FT	8.30 DEG	113.80 DEG	806.47 FT	-8.15 FT	-0.88 FT
838.00 FT	9.70 DEG	108.40 DEG	837.08 FT	-9.89 FT	3.65 FT
868.00 FT	11.20 DEG	105.20 DEG	866.58 FT	-11.46 FT	8.86 FT
898.00 FT	12.10 DEG	94.80 DEG	895.97 FT	-12.50 FT	14.82 FT
928.00 FT	13.30 DEG	87.10 DEG	925.23 FT	-12.60 FT	21.41 FT
958.00 FT	15.40 DEG	85.20 DEG	954.29 FT	-12.10 FT	28.82 FT
989.00 FT	18.20 DEG	86.20 DEG	983.97 FT	-11.43 FT	37.76 FT
1019.00 FT	21.20 DEG	88.10 DEG	1012.21 FT	-10.93 FT	47.86 FT
1049.00 FT	23.70 DEG	91.70 DEG	1039.93 FT	-10.92 FT	59.31 FT
1079.00 FT	26.50 DEG	93.10 DEG	1067.10 FT	-11.46 FT	72.02 FT
1108.00 FT	29.50 DEG	93.90 DEG	1092.70 FT	-12.29 FT	85.61 FT
1138.00 FT	32.20 DEG	95.20 DEG	1118.45 FT	-13.51 FT	100.94 FT
1169.00 FT	33.90 DEG	96.20 DEG	1144.44 FT	-15.19 FT	117.77 FT
1199.00 FT	34.60 DEG	98.90 DEG	1169.23 FT	-17.41 FT	134.50 FT
1229.00 FT	35.50 DEG	100.50 DEG	1193.79 FT	-20.31 FT	151.48 FT
1260.00 FT	36.00 DEG	103.80 DEG	1218.95 FT	-24.13 FT	169.19 FT
1291.00 FT	37.00 DEG	107.70 DEG	1243.87 FT	-29.13 FT	186.93 FT
1322.00 FT	39.30 DEG	110.80 DEG	1268.25 FT	-35.45 FT	205.00 FT
1353.00 FT	41.00 DEG	114.15 DEG	1291.94 FT	-43.09 FT	223.47 FT
1385.00 FT	43.00 DEG	116.30 DEG	1315.72 FT	-52.22 FT	242.84 FT
1416.00 FT	45.10 DEG	118.19 DEG	1338.00 FT	-62.09 FT	262.00 FT
1447.00 FT	47.30 DEG	121.60 DEG	1359.46 FT	-73.24 FT	281.39 FT
1478.00 FT	49.30 DEG	123.00 DEG	1380.08 FT	-85.61 FT	300.95 FT
1510.00 FT	50.80 DEG	124.20 DEG	1400.62 FT	-99.18 FT	321.38 FT
1541.00 FT	52.40 DEG	124.40 DEG	1419.88 FT	-112.87 FT	341.45 FT
1571.00 FT	54.30 DEG	125.60 DEG	1437.79 FT	-126.68 FT	361.16 FT
1603.00 FT	56.20 DEG	127.20 DEG	1456.03 FT	-142.28 FT	382.32 FT
1634.00 FT	58.20 DEG	129.60 DEG	1472.82 FT	-158.47 FT	402.74 FT
1665.00 FT	59.30 DEG	132.50 DEG	1488.90 FT	-175.87 FT	422.72 FT
1695.00 FT	61.00 DEG	134.60 DEG	1503.83 FT	-193.80 FT	441.58 FT
1727.00 FT	62.60 DEG	137.40 DEG	1518.95 FT	-214.08 FT	461.17 FT
1758.00 FT	64.70 DEG	138.40 DEG	1532.71 FT	-234.69 FT	479.79 FT
1788.00 FT	68.40 DEG	139.70 DEG	1544.65 FT	-255.48 FT	497.82 FT
1838.00 FT	73.00 DEG	139.70 DEG	1561.17 FT	-291.46 FT	528.34 FT

COMPANY:	NORTHWEST NATURAL GAS
WELL:	IW-24BH-23-65
FIELD:	MIST
COUNTY:	COLUMBIA
STATE:	OREGON

BOTTOM LOG INTERVAL	1818 ft
SCHLUMBERGER DEPTH	1828 ft
DEPTH DRILLER	1838 ft
KELLY BUSHING	923 ft
DRILL FLOOR	923 ft
GROUND LEVEL	905 ft

Schlumberger

ARRAY INDUCTION
BHC SONIC / SP/ GR
TVD LOG