COMPANY: NORTHWEST NATURAL GAS

WELL: OM-32-22-65

FIELD: CALVIN CREEK GAS STORAGE

COUNTY: COLUMBIA STATE: OREGON

COUNTY: COLUMBIA
Field: CALVIN CREEK GAS STORAGE
Location: 1884.04' S & 1261.26' E FROM THE
Well: OM-32-22-65
Company: NORTHWEST NATURAL GAS

2" = 100'

Schlumberger

PLATFORM EXPRESS
COMPENSATED NEUTRON
LITHO-DENSITY

LOCATION: 1884.04' S & 1261.26' E FROM THE NE CORNER OF SECTION 22

Elev.: K.B. 762 F; G.L. 753 F; D.F.

Permanent Datum: GROUND LEVEL — Elev.: 753 F
Log Measured From: KELLY BUSHING — 9.0 F above Perm. Datum
Drilling Measured From: KELLY BUSHING

API Serial No.	SECTION	TOWNSHIP	RANGE
	22	6N	5W

Logging Date	22-JUL-1998	
Run Number	ONE	
Depth Driller	2365 F	
Schlumberger Depth	2365 F	
Bottom Log Interval	2357 F	
Top Log Interval	425 F	
Casing Driller Size @ Depth	8.625 IN	@ 425 F
Casing Schlumberger	425 F	
Bit Size	7.875 IN	
Type Fluid In Hole	CYPAN	
MUD Density / Viscosity	9.5 LB/G	45 S
Fluid Loss / PH	7.8 C3	8
Source Of Sample	FLOWLINE	
RM @ Measured Temperature	1.870 OHMM	@ 80 DEGF
RMF @ Measured Temperature	1.910 OHMM	@ 70 DEGF
RMC @ Measured Temperature	1.650 OHMM	@ 70 DEGF
Source RMF / RMC	PRESS	PRESS
RM @ MRT / RMF @ MRT	1.579 @ 96	1.427 @ 96
Maximum Recorded Temperatures	96 DEGF	
Circulation Stopped / Time	22-JUL-1998	2:30
Logger On Bottom / Time	22-JUL-1998	5:30
Unit Number / Location	3152	SACRAMENTO
Recorded By	JASON GENDUR	
Witnessed By	JACK MEYER	

ALL INTERPRETATIONS ARE OPINIONS BASED ON INFERENCES FROM ELECTRICAL OR OTHER MEASUREMENTS AND WE CANNOT, AND DO NOT GUARANTEE THE ACCURACY OR CORRECTNESS OF ANY INTERPRETATIONS, AND WE SHALL NOT, EXCEPT IN THE CASE OF GROSS OR WILLFUL NEGLIGENCE ON OUR PART, BE LIABLE OR RESPONSIBLE FOR ANY LOSS, COSTS, DAMAGES OR EXPENSES INCURRED OR SUSTAINED BY ANYONE RESULTING FROM ANY INTERPRETATION MADE BY ANY OF OUR OFFICERS, AGENTS OR EMPLOYEES. THESE INTERPRETATIONS ARE ALSO SUBJECT TO CLAUSE 4 OF OUR GENERAL TERMS AND CONDITIONS AS SET OUT IN OUR CURRENT PRICE SCHEDULE.

OTHER SERVICES1
OS1:
OS2:
OS3:
OS4:
OS5:

REMARKS: RUN NUMBER 1
Thank you for choosing Schlumbeger!
AIT run with 1" standoffs.
CNL run with bowspring for eccentralization.
Log run on sandstone matrix = 2.65 g/c3.
Your crew today is Forehand & Tye.

OTHER SERVICES2
OS1:
OS2:
OS3:
OS4:
OS5:

REMARKS: RUN NUMBER 2

RUN 1: SERVICE ORDER #: 122172; PROGRAM VERSION: 8C1-205; FLUID LEVEL; LOGGED INTERVAL START / STOP

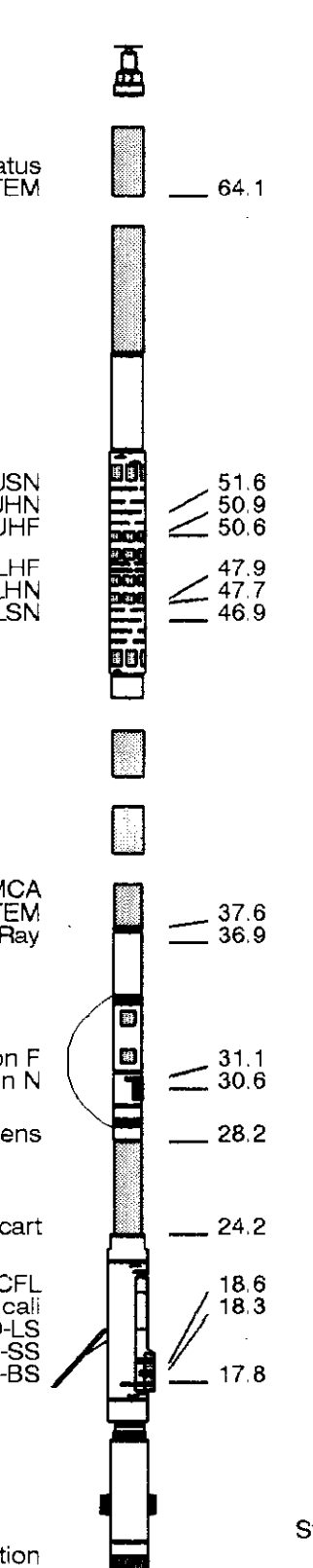
RUN 2: SERVICE ORDER #; PROGRAM VERSION; FLUID LEVEL; LOGGED INTERVAL START / STOP

EQUIPMENT DESCRIPTION

RUN 1 RUN 2

SURFACE EQUIPMENT
GSR-U/Y, NCT-B, CNB-AB, NCS-VB

DOWNHOLE EQUIPMENT
LEH-Q (LEH-Q 3052) — 69.3
TCC-B (ECH-KC 2891, TCC-B) — TelStatus, CTEM — 67.1
DSLT-TCC (DSLC-BA 8235, ECH-KH, SLS-WA 1556) — 64.1
AH-FLX (AH-FLX 82) — 43.5
AH-FLX (AH-FLX 771) — 41.5
HILTB-DTB (HTBCC, HMCA, HGNS-CAN-B, HGNS-H, NLS-KL 2284, 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, BOW-SPR, NPV-N) — 39.5



MAXIMUM STRING DIAMETER 5.88 IN
MEASUREMENTS RELATIVE TO TOOL ZERO
ALL LENGTHS IN FEET

Input DLIS Files

DEFAULT	HILTB .037	FN:1	FIELD	22-Jul-1998 12:54	2370.0 FT	249.7 FT

Output DLIS Files

DEFAULT	HILTB .038	FN:31	FIELD	22-Jul-1998 13:19	2370.0 FT	250.0 FT

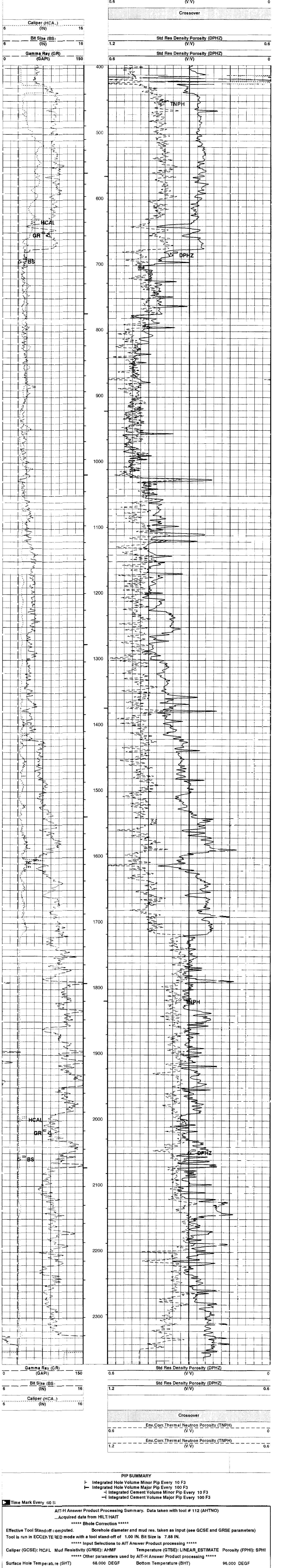
OP System Version: 8C1-205

MCM

HILTB-DTB	APCW-98Q1	DSLT-TCC	8C1-205
TCC-B	APCW-98Q1		

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



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

AIT-H Answer Product Processing Summary. Data taken with tool # 112 (AHTNO)
...Acquired data from HILT/HAIT
***** Bhole 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 1.00 IN. Bit Size is 7.88 IN.
***** Input Selections to AIT Answer Product processing *****
Caliper (GCSE): HCAL Mud Resistivity (GRSE): AHMF Temperature (GTSE): LINEAR_ESTIMATE Porosity (FPHI): SPHI
***** Other parameters used by AIT-H Answer Product processing *****

Surface Hole Temperature (SHT)	68.000 DEGF	Bottom Temperature (BHT)	96.000 DEGF
Total Depth (TD)	2365.000 FT		
Form Factor Exponent (FEXP)	2.000	Form Factor Numerator (FNUM)	1.000
Mud Filtrate Sample Resistivity (RMFS)	1.910 OHMM	Mud Filtrate Sample Temperature (MFST)	70.000 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	Bore Hole Status	OPEN	
BS	Bit Size	7.875	IN
BSAL	Borehole Salinity	-50000.00	PPM
BSCO	Borehole Salinity Correction Option	NO	
CCCO	Casing & Cement Thickness Correction Option	NO	
CWEI	Casing Weight	-50000.00	LB/F
DFD	Drilling Fluid Density	9.50	LB/G
DHC	Density Hole Correction	BS	
DO	Depth Offset	0.0	FT
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	TSCD_SPEED_CORRECTION	
HSCO	Hole Size Correction Option	YES	
HSTI	STI Uses HILT Acceleration	YES	
MATR	Rock Matrix Type	SANDSTONE	
MCCO	Mud Cake Correction Option	NO	
MCOR	Mud Correction	NATU	
MDEN	Matrix Density	2.65	G/C3
MST	Mud Sample Temperature	80.00	DEGF
MWCO	Mud Weight Correction Option	NO	
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	1.9100	OHMM
SDAT	Standoff Data Source	SOCN	
SHT	Surface Hole Temperature	68	DEGF
SOCN	Standoff Distance	0.125	IN
SOCO	Standoff Correction Option	NO	
TDL	Total Depth - Logger	2365.00	FT

Format: PORO_2 Vertical Scale: 2" per 100' Graphics File Created: 22-Jul-1998 13:19

OP System Version: 8C1-205

MCM

HILTB-DTB	APCW-98Q1	DSLT-TCC	8C1-205
TCC-B	APCW-98Q1		

Speed Corrected - Depth Matched LOG

Input DLIS Files

DEFAULT	HILTB .037	FN:1	FIELD	22-Jul-1998 12:54	2370.0 FT	249.7 FT

Output DLIS Files

DEFAULT	HILTB .038	FN:31	FIELD	22-Jul-1998 13:19

COMPANY: NORTHWEST NATURAL GAS
WELL: OM-32-22-65
FIELD: CALVIN CREEK GAS STORAGE
COUNTY: COLUMBIA
STATE: OREGON

BOTTOM LOG INTERVAL	2357 F
SCHLUMBERGER DEPTH	2365 F
DEPTH DRILLER	2365 F
KELLY BUSHING	762 F
DRILL FLOOR	
GROUND LEVEL	753 F

Schlumberger

PLATFORM EXPRESS
COMPENSATED NEUTRON
LITHO-DENSITY