COMPANY: **NORTHWEST NATURAL GAS**

WELL: **I.W. 24C-23-65**

FIELD: **CALVIN CREEK GAS STORAGE**

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

COUNTY: COLUMBIA
Field: CALVIN CREEK GAS STORAGE
Location: 985.3' N & 1258.4' E FROM THE
Well: I.W. 24C-23-65
Company: NORTHWEST NATURAL GAS

Schlumberger

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

LOCATION

985.3' N & 1258.4' E FROM THE
FROM THE SW CORNER OF 23

Elev.: K.B. 922.5 ft
G.L. 905 ft
D.F. 922.3 ft

Permanent Datum: GROUND LEVEL — Elev.: 905 ft
Log Measured From: K.B — 17.5 ft above Perm. Datum
Drilling Measured From: K.B

API Serial No.	SECTION	TOWNSHIP	RANGE
36-009-00350	23	6N	5W

Logging Date		28-APR-2000		7-MAY-2000	
Run Number		1		2	
Depth Driller		1746 ft		2591 ft	
Schlumberger Depth		1748 ft		2590 ft	
Bottom Log Interval		1740 ft		2581 ft	
Top Log Interval		400 ft		1724 ft	
Casing Driller Size @ Depth		13.375 in	@ 445 ft	8.625 in	@ 1724 ft
Casing Schlumberger		445 ft		1721 ft	
Bit Size		9.875 in		7.875 in	
Type Fluid In Hole		DMA		DMA	
MUD Density	Viscosity	9 lbm/gal	39 s	8.8 lbm/gal	38 s
Fluid Loss	PH	4.8 cm3	9	6.6 cm3	10.5
Source Of Sample		FLOWLINE		FLOWLINE	
RM @ Measured Temperature		1.830 ohm.m	@ 65 degF	0.914 ohm.m	@ 68 degF
RMF @ Measured Temperature		2.520 ohm.m	@ 51 degF	1.250 ohm.m	@ 52 degF
RMC @ Measured Temperature		1.650 ohm.m	@ 51 degF	1.325 ohm.m	@ 52 degF
Source RMF	RMC	PRESS	PRESS	PRESS	PRESS
RM @ MRT	RMF @ MRT	1.463 @ 83	1.622 @ 83	0.692 @ 92	0.744 @ 92
Maximum Recorded Temperatures		83 degF	83 82	92 degF	92 92
Circulation Stopped	Time	28-APR-2000	17:00	7-MAY-2000	0:30
Logger On Bottom	Time	28-APR-2000	22:30	7-MAY-2000	
Unit Number	Location	3152	SACRAMENTO	3152	SACRAMENTO
Recorded By		M.KHAN		M.KHAN	
Witnessed By		JACK MEYER		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.

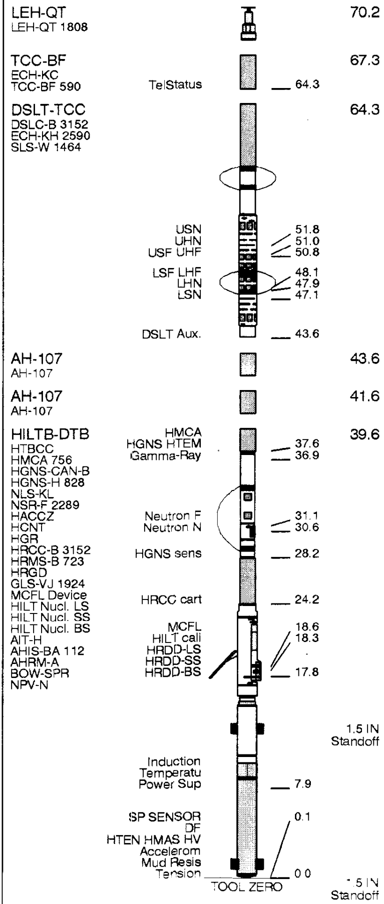
OTHER SERVICES1	OTHER SERVICES2
OS1: FMI GR	OS1: FMI GR
OS2:	OS2:
OS3:	OS3:
OS4:	OS4:
OS5:	OS5:
REMARKS: RUN NUMBER 1	REMARKS: RUN NUMBER 2

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

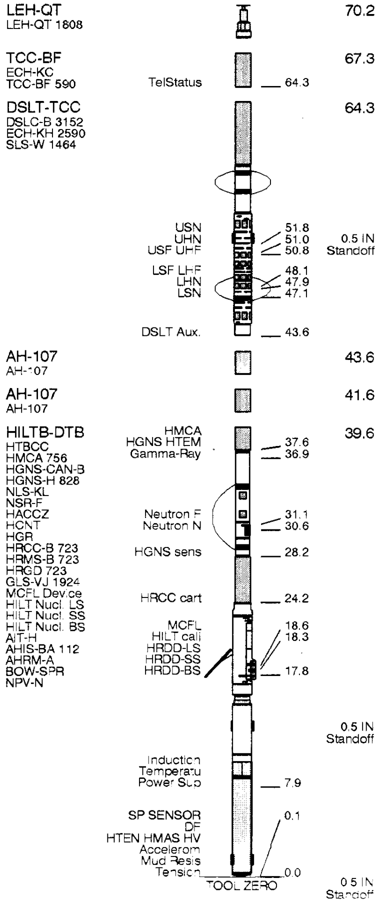
LOGGED INTERVAL	START	STOP	LOGGED INTERVAL	START	STOP

EQUIPMENT DESCRIPTION

RUN 1	RUN 2
SURFACE EQUIPMENT	SURFACE EQUIPMENT
GSR-U/Y WITM (CTS)-A NCT-B CNB-AB NCS-VB	GSR-U/Y WITM (CTS)-A NCT-B CNB-AB NCS-VB
DOWNHOLE EQUIPMENT	DOWNHOLE EQUIPMENT


LEH-QT
LEH-QT 1808
70.2
TCC-BF
ECH-KC
TCC-BF 590
67.3
TelStatus
64.3
DSLT-TCC
DSLC-B 3152
ECH-KH 2590
SLS-W 1464
64.3
USN
UHN
USF UHF
51.8
51.0
50.8
LSF LHF
LHN
LSN
48.1
47.9
47.1
DSLT Aux.
43.6
AH-107
AH-107
43.6
AH-107
AH-107
41.6
HILTB-DTB
HTBCC
HMCA 756
HGNS-CAN-B
HGNS-H 828
NLS-KL
NSR-F 2289
HACCZ
HCNT
HGR
HRCC-B 3152
HRMS-B 723
HRGD
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
HMCA
HGNS HTEM
Gamma-Ray
37.6
36.9
Neutron F
Neutron N
31.1
30.6
HGNS sens
28.2
HRCC cart
24.2
MCFL
HILT cali
HRDD-LS
HRDD-SS
HRDD-BS
18.6
18.3
17.8
1.5 IN
Standoff
Induction
Temperatu
Power Sup
7.9
SP SENSOR
DF
HTEN HMAS HV
Accelerom
Mud Resis
Tension
0.1
0.0
TOOL ZERO
1.5 IN
Standoff

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


LEH-QT
LEH-QT 1808
70.2
TCC-BF
ECH-KC
TCC-BF 590
67.3
TelStatus
64.3
DSLT-TCC
DSLC-B 3152
ECH-KH 2590
SLS-W 1464
64.3
USN
UHN
USF UHF
51.8
51.0
50.8
0.5 IN
Standoff
LSF LHF
LHN
LSN
48.1
47.9
47.1
DSLT Aux.
43.6
AH-107
AH-107
43.6
AH-107
AH-107
41.6
HILTB-DTB
HTBCC
HMCA 756
HGNS-CAN-B
HGNS-H 828
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
HMCA
HGNS HTEM
Gamma-Ray
37.6
36.9
Neutron F
Neutron N
31.1
30.6
HGNS sens
28.2
HRCC cart
24.2
MCFL
HILT cali
HRDD-LS
HRDD-SS
HRDD-BS
18.6
18.3
17.8
0.5 IN
Standoff
Induction
Temperatu
Power Sup
7.9
SP SENSOR
DF
HTEN HMAS HV
Accelerom
Mud Resis
Tension
0.1
0.0
TOOL ZERO
0.5 IN
Standoff

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

Input DLIS Files

DEFAULT	HILTB .036	FN:1	PRODUCER	07-May-2000 13:15	2607.0 FT	300.0 FT

Output DLIS Files

DEFAULT	HILTB .037	FN:32	PRODUCER	07-May-2000 13:18	2607.0 FT	1879.5 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

Caliper (HCAL)
6 (IN) 16

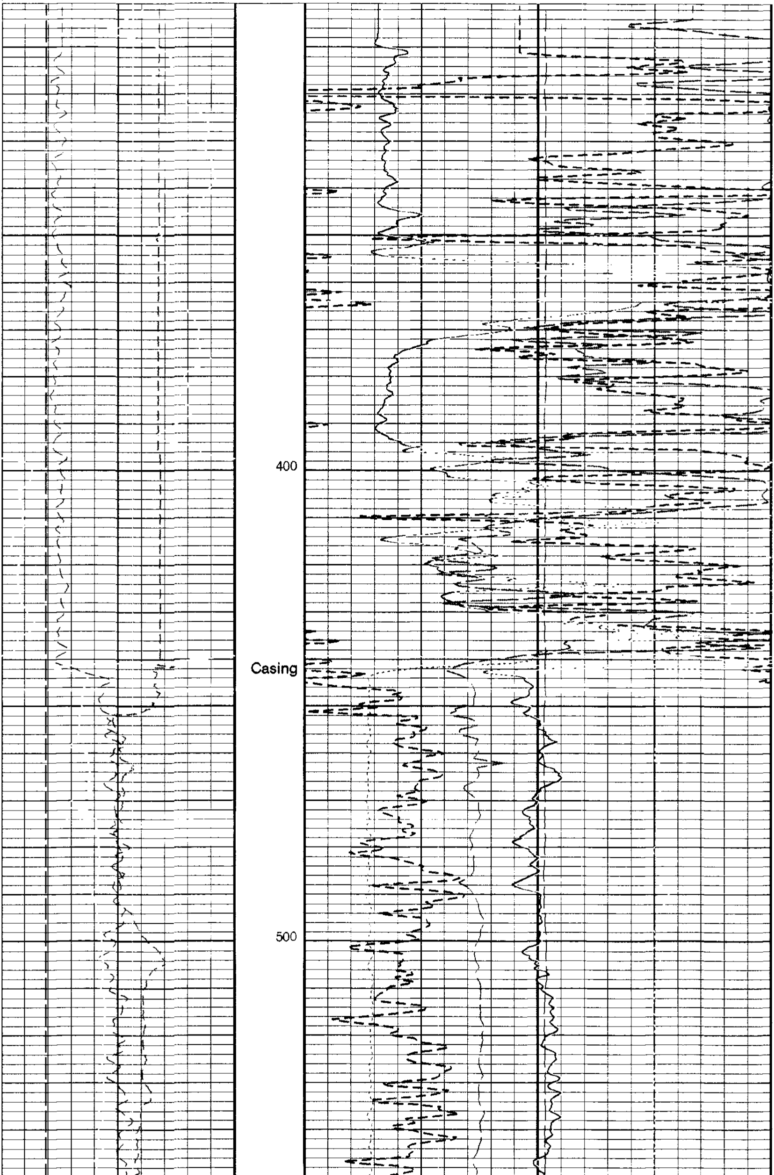
Formation Pe (PEFZ)
0 (----) 10

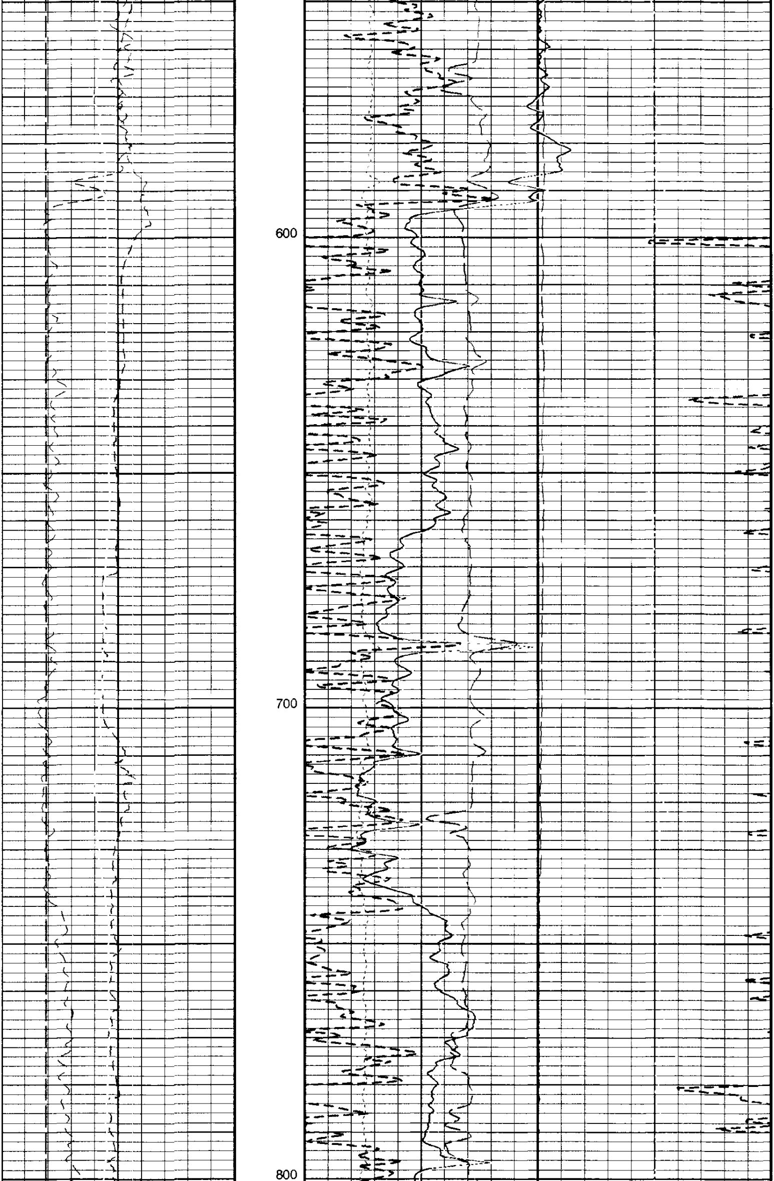
Bit Size (BS)
6 (IN) 16

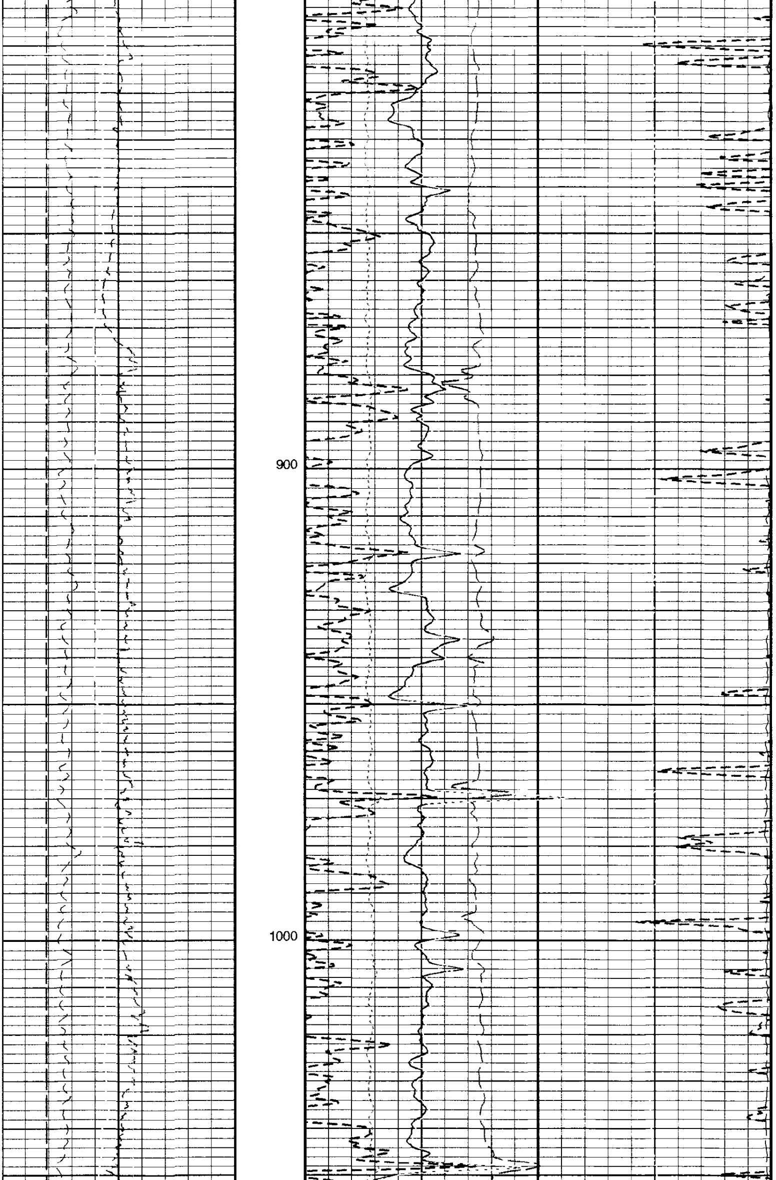
Alpha Processed Neutron Porosity (NPOR)
0.6 (V/V) 0

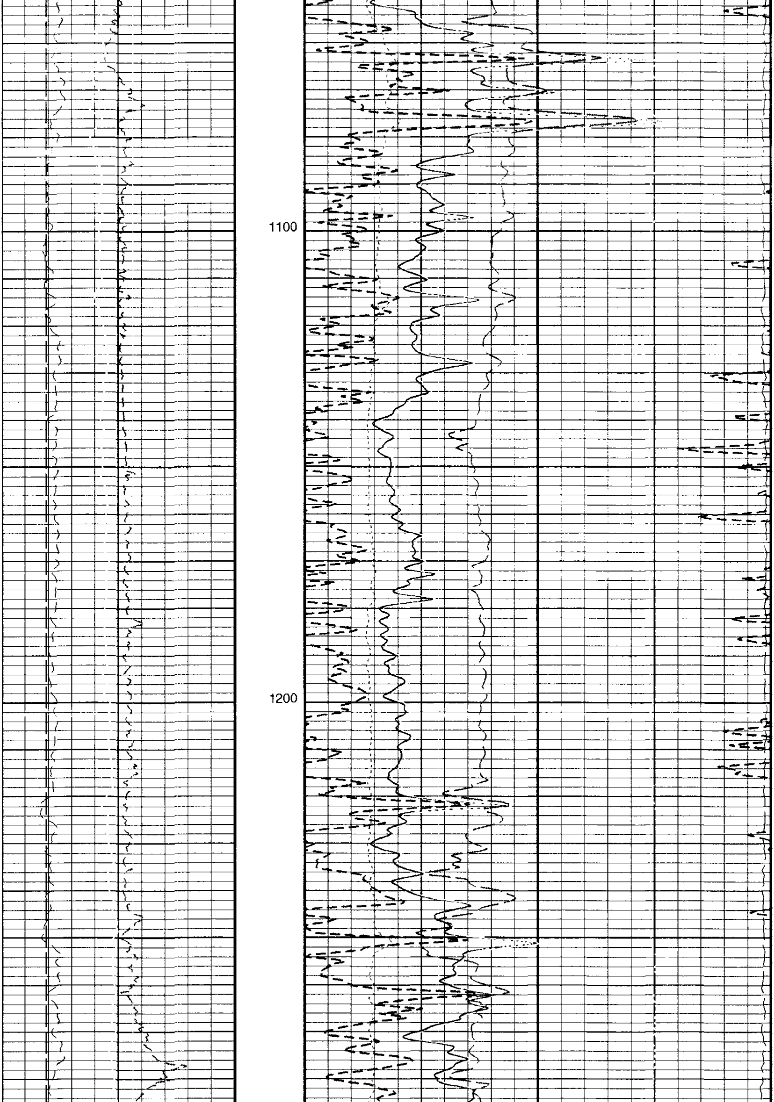
Gamma Ray (GR)
0 (GAPI) 150

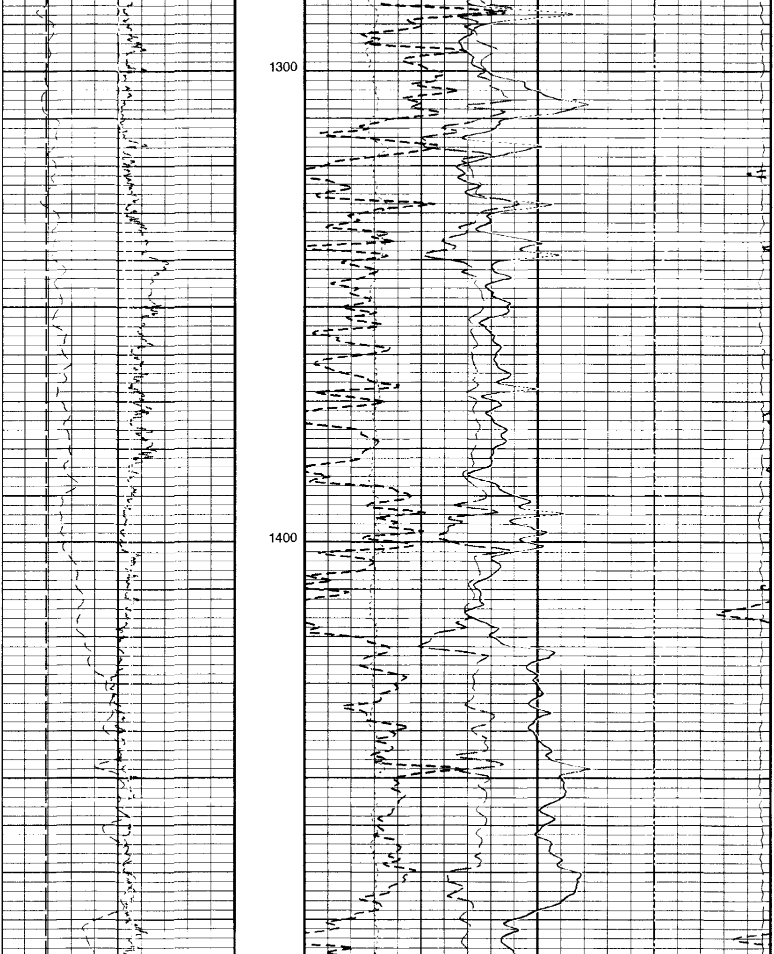
Std Res Density Porosity (DPHZ)
0.6 (V/V) 0

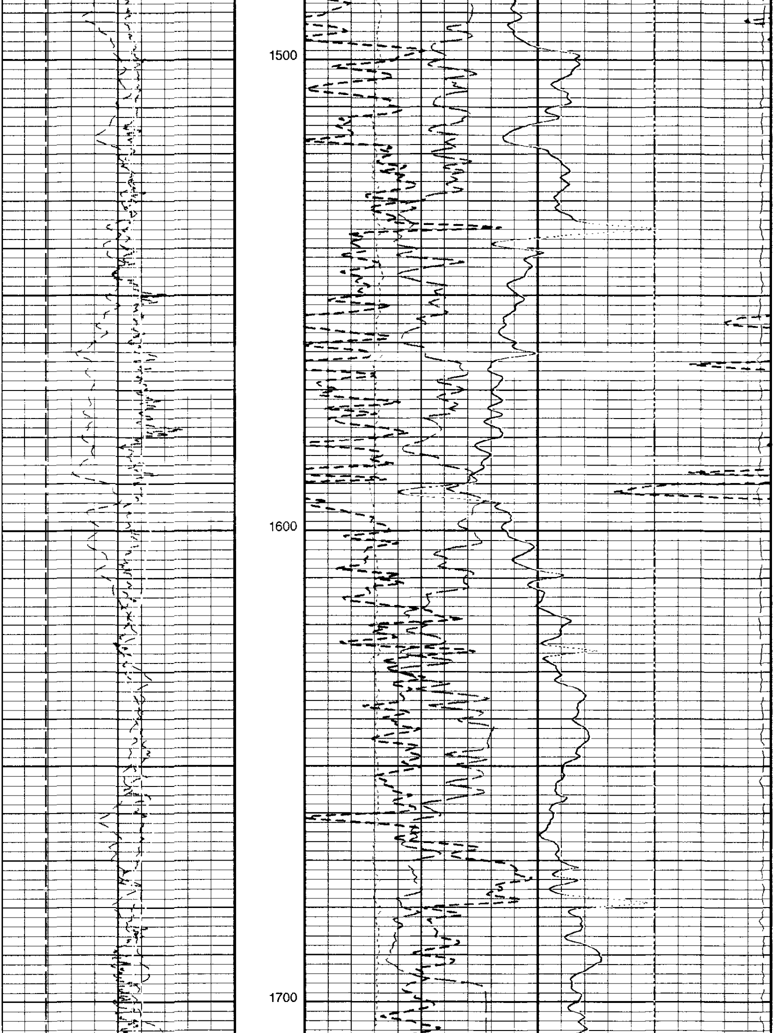


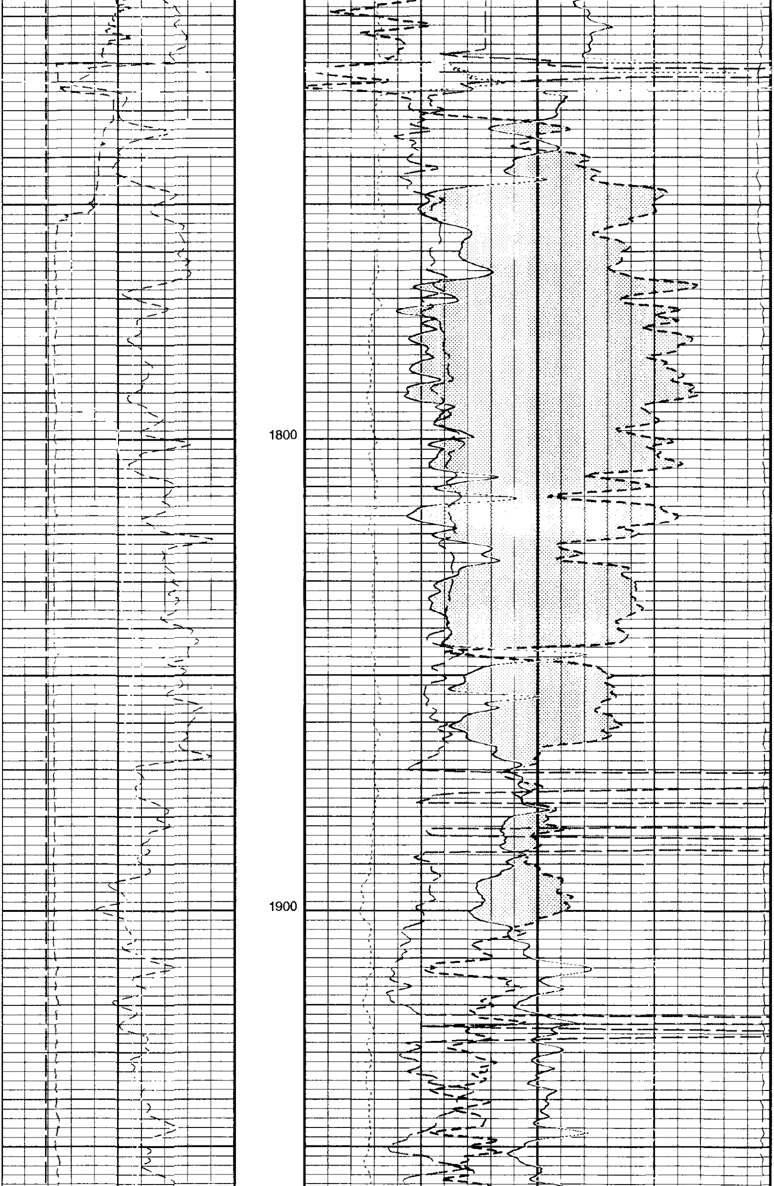


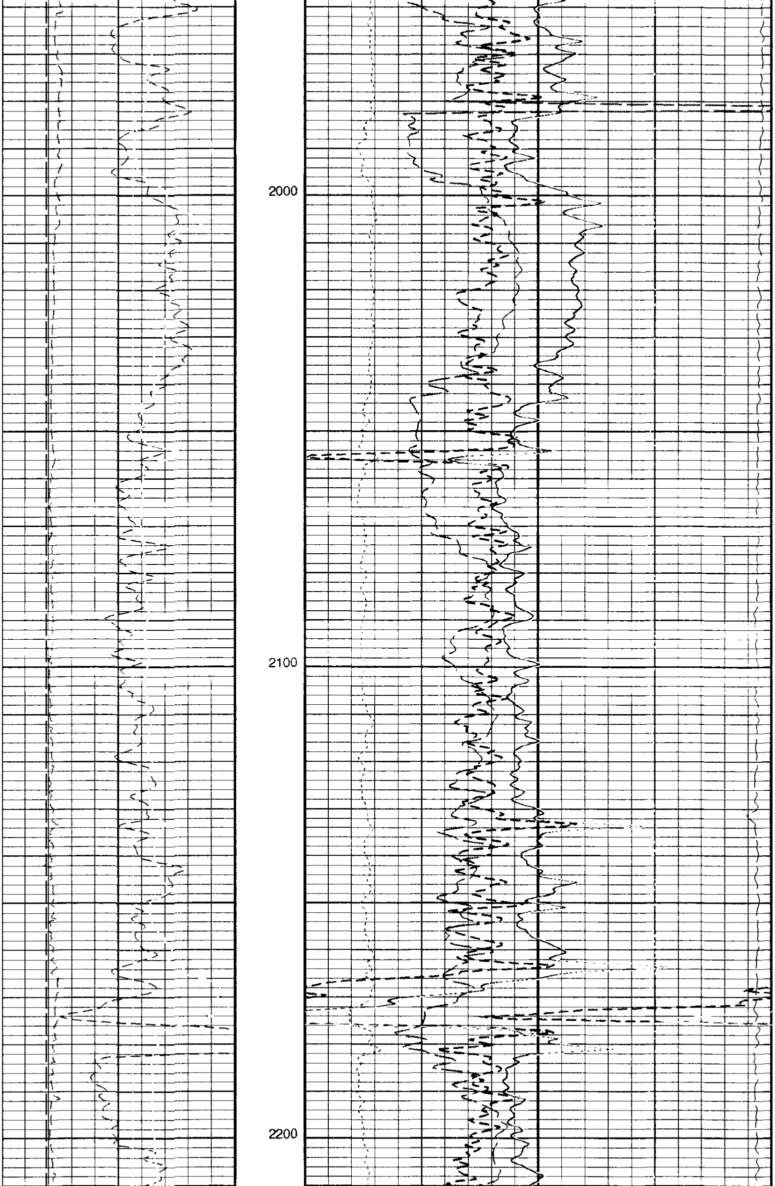


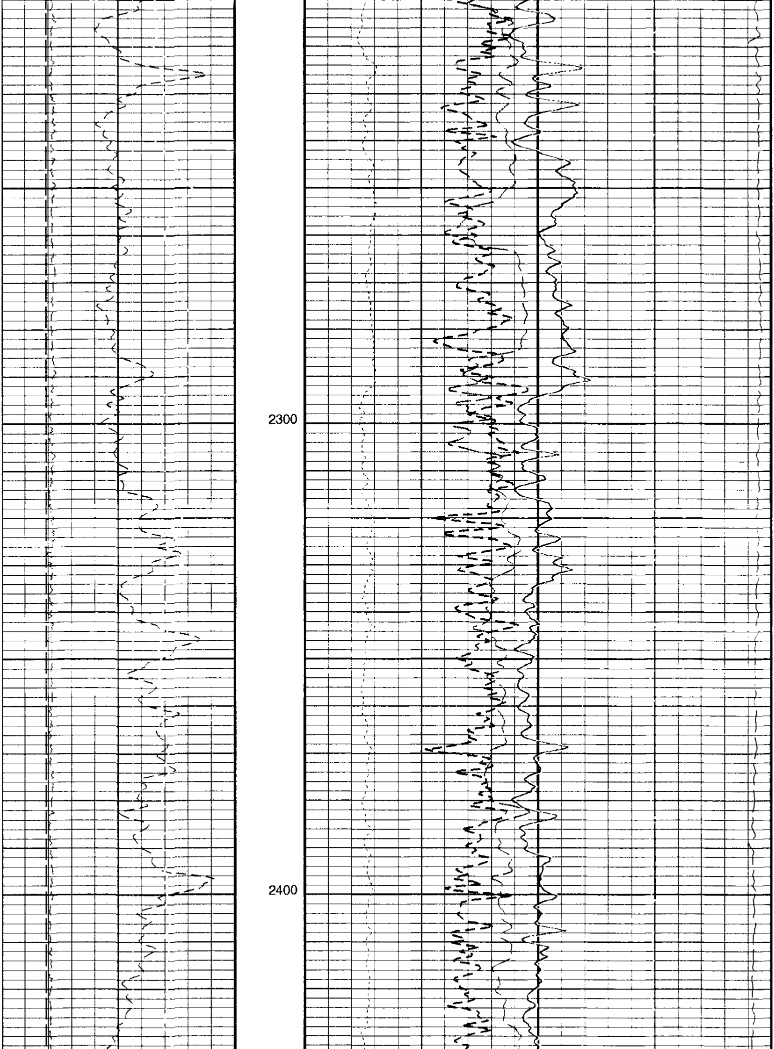


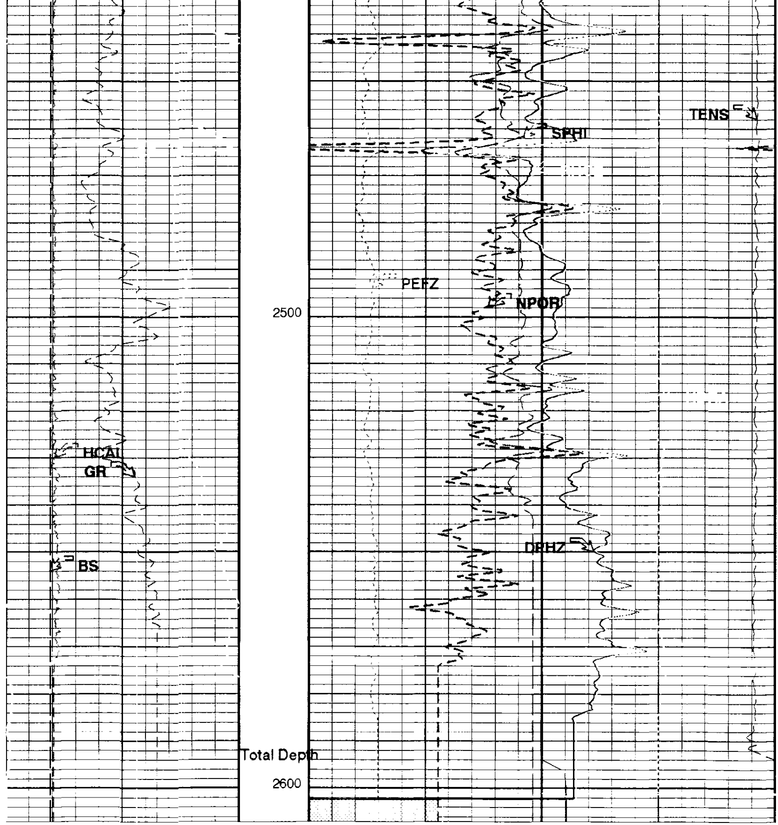












Gamma Ray (GR)
0 (GAPI) 150

Bit Size (BS)
6 (IN) 16

Caliper (HCAL)
6 (IN) 16

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)	92.000 DEGF
Total Depth (TD)	2591.000 FT		
Form Factor Exponent (FEXP)	2.000	Form Factor Numerator (FNUM)	1.000
Mud Filtrate Sample Resistivity (RMFS)	1.250 OHMM	Mud Filtrate Sample Temperature (MFST)	52.000 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	1400.00	PPM
BSCO	Borehole Salinity Correction Option	NO	
CCCO	Casing & Cement Thickness Correction Option	NO	
CDTS	C-Delta-T Shale	100	US/F
CWEI	Casing Weight	34.00	LB/F
DHC	Density Hole Correction	BS	
DO	Depth Offset for Logical Unit 1	0.0	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	35	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	YES	
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
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	
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	
SPVD	TVD of Starting Point	500	FT
TDL	Total Depth - Logger	2590.00	FT
TIMD	Along-hole depth of Tie-in Point	500	FT
TIVD	TVD of Tie-in Point	500	FT

Format: PORO Vertical Scale: 5" per 100' Graphics File Created: 07-May-2000 13:18

OP System Version: 9C1-303

MCM

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

TCC-BF OP91-KP1a

Input DLIS Files

DEFAULT HILTB .036 FN:1 PRODUCER 07-May-2000 13:15 2607.0 FT 300.0 FT

Output DLIS Files

DEFAULT HILTB .037 FN:32 PRODUCER 07-May-2000 13:18

COMPANY: **NORTHWEST NATURAL GAS**

WELL: **I.W. 24C-23-65**

FIELD: **CALVIN CREEK GAS STORAGE**

COUNTY: **COLUMBIA**

STATE: **OREGON**

BOTTOM LOG INTERVAL	1740 ft
SCHLUMBERGER DEPTH	1748 ft
DEPTH DRILLER	1746 ft
KELLY BUSHING	922.5 ft
DRILL FLOOR	922.3 ft
GROUND LEVEL	905 ft

Schlumberger

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