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

FORMATION MICRO IMAGER
LQC
SCALE: 5" = 100'

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

Elev.: K.B. 917.5 ft
G.L. 905 ft
D.F. 917.3 ft

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

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

Logging Date	7-MAY 2000			
Run Number	1			
Depth Driller	2591 ft			
Schlumberger Depth	2591 ft			
Bottom Log Interval	2581 ft			
Top Log Interval	1724 ft			
Casing Driller Size @ Depth	8.625 in @ 1727 ft		@	
Casing Schlumberger	1725 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	10.5		
Source Of Sample	FLOWLINE			
RM @ Measured Temperature	0.914 ohm.m @ 68 degF		@	
RMF @ Measured Temperature	1.250 ohm.m @ 52 degF		@	
RMC @ Measured Temperature	1.325 ohm.m @ 52 degF		@	
Source RMF / RMC	PRESS	PRESS		
RM @ MRT / RMF @ MRT	0.692 @ 92	0.744 @ 92	@	@
Maximum Recorded Temperatures	92 degF	92 92		
Circulation Stopped / Time	7-MAY-2000	0:30		
Logger On Bottom / Time	7-MAY-2000			
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
OS1: FMI GR
OS2:
OS3:
OS4:
OS5:

OTHER SERVICES2
OS1
OS2:
OS3:
OS4:
OS5:

REMARKS: RUN NUMBER 1

REMARKS: RUN NUMBER 2

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

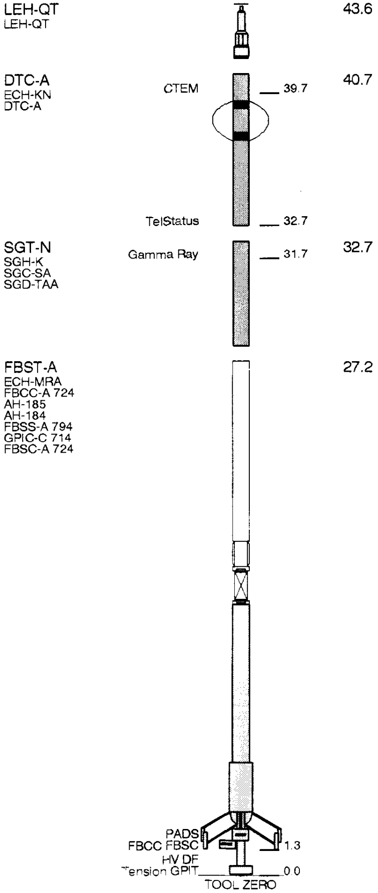
RUN 1

SURFACE EQUIPMENT

GSR-U/Y
WITM (DTS)-A

DOWNHOLE EQUIPMENT

RUN 2



MAXIMUM STRING DIAMETER 5.00 IN
MEASUREMENTS RELATIVE TO TOOL ZERO
ALL LENGTHS IN FEET

Input DLIS Files

DEFAULT	FBSTA .016	FN:15 PRODUCER	07-May-2000 08:25	2604.0 FT	1681.5 FT

Output DLIS Files

DEFAULT	FBSTA .018	FN:17 PRODUCER	07-May-2000 09:10	2607.0 FT	1684.5 FT

OP System Version: 9C1-303

MCM

FBST-A	9C1-303	SGT-N	OP91-KP1a
DTC-A	OP91-KP1a		

PIP SUMMARY

■ Time Mark Every 60 S

FMI Correlation Resistance (LOG) (FBCR)
2 (KOHM) 2000

Relative Bearing (RB_FBST)
-40 (DEG) 360

Pad One Azimuth (P1AZ_FBST)
-40 (DEG) 360

Hole Azimuth (HAZIM)
-40 (DEG) 360

Gamma Ray (GR)
0 (GAPI) 150

Deviation (DEVIM)
0 (DEG) 10

Caliper 2 (C2)
6 (IN) 16

Tension (TENS)
10000 (LBF) 0

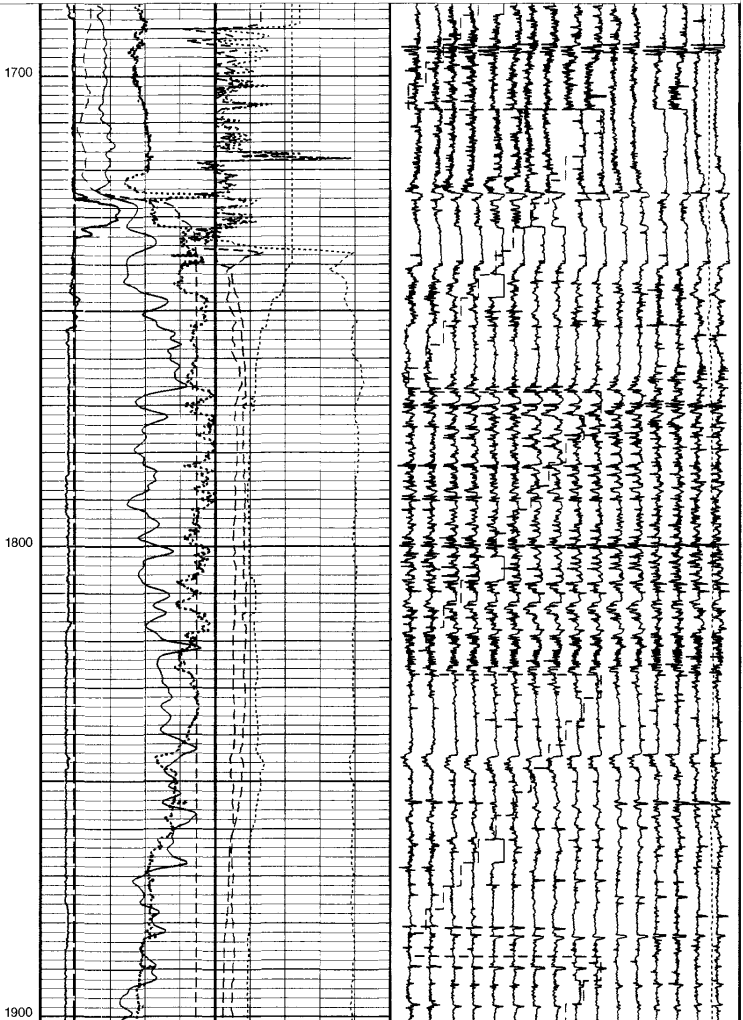
EMEX Intensity (EI)
0 (AMPS) 10

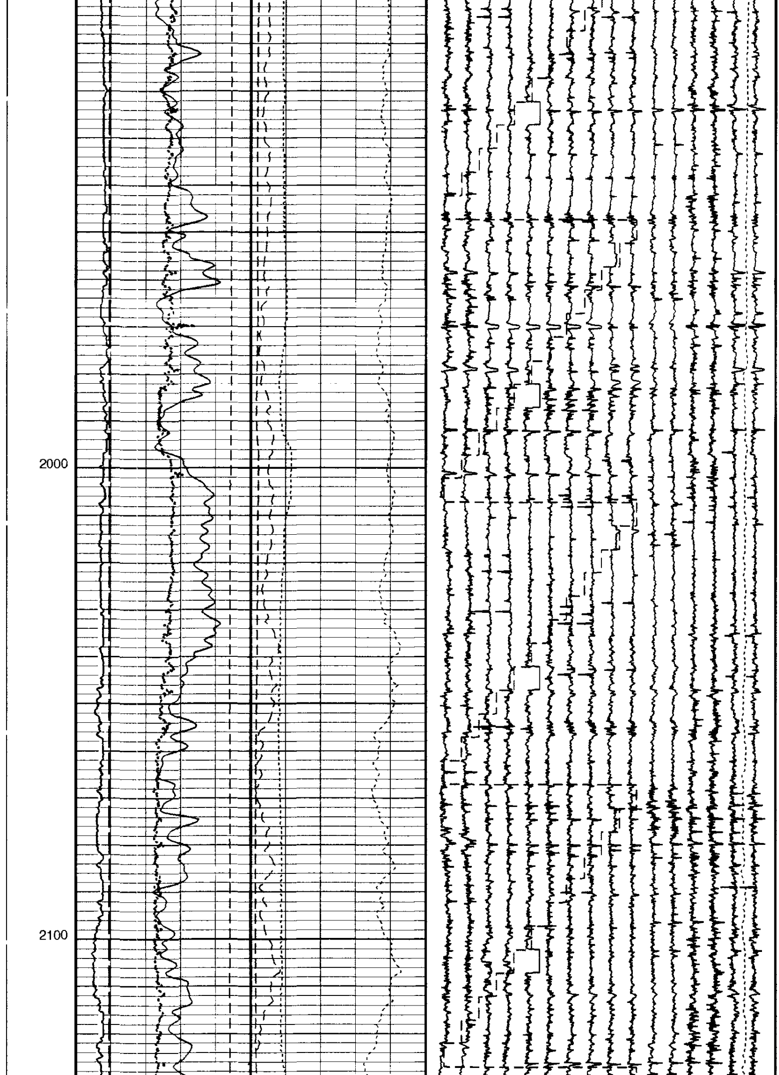
FMI resistivity buttons #1 to 16
RB16 RB15 RB14 RB13 RB12 RB11 RB10 RB9 RB8 RB7 RB6 RB5 RB4 RB3 RB2 RB1

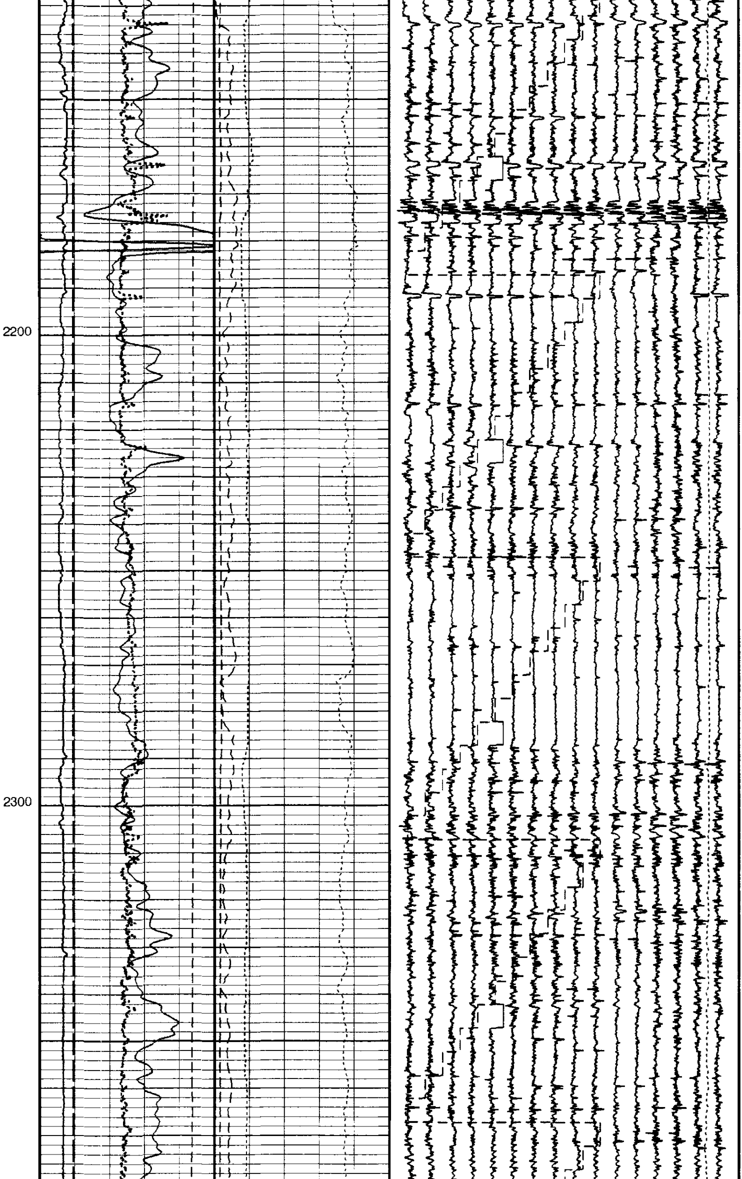
Bit Size (BS)
6 (IN) 16

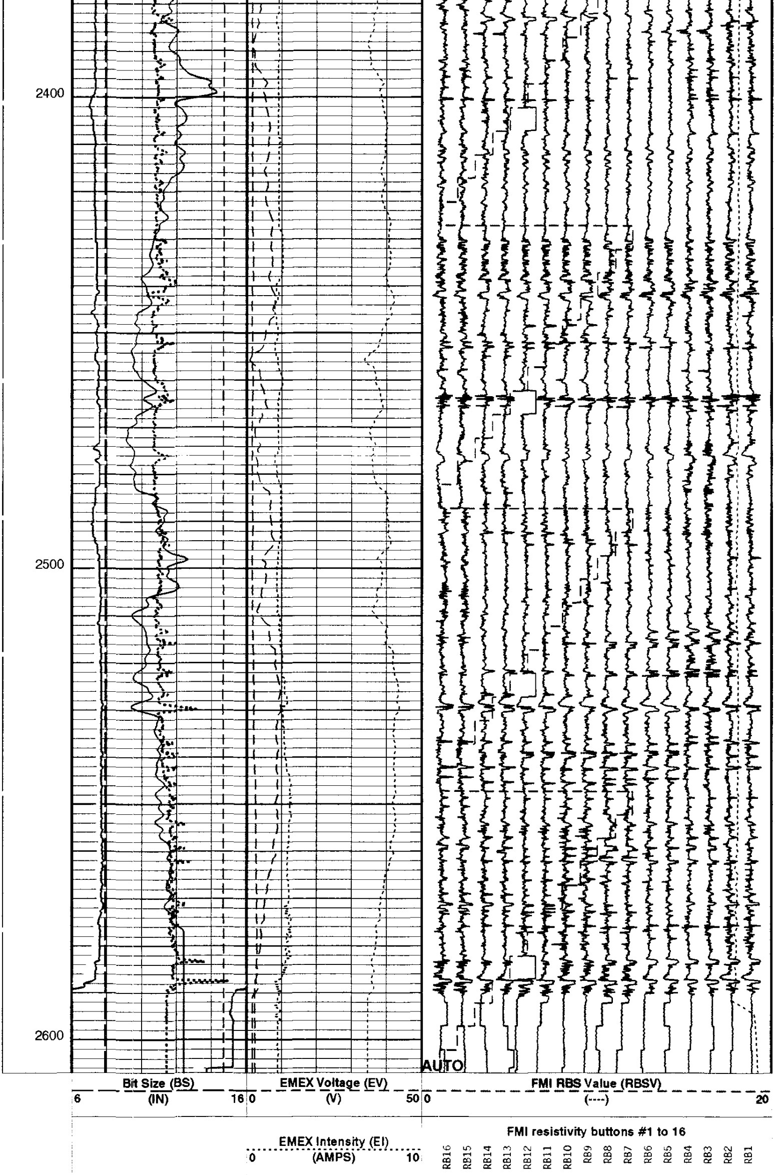
EMEX Voltage (EV)
0 (V) 50

FMI RBS Value (RBSV)
0 (----) 20









Caliper 2 (C2)
6 (IN) 16

Tension (TENS)
10000 (LBF) 0

Deviation (DEVIM)
0 (DEG) 10

Gamma Ray (GR)
0 (GAPI) 150

Hole Azimuth (HAZIM)
-40 (DEG) 360

Pad One Azimuth (P1AZ_FBST)
-40 (DEG) 360

Relative Bearing (RB_FBST)
-40 (DEG) 360

FMI Correlation Resistance (LOG) (FBCR)
2 (KOHM) 2000

PIP SUMMARY

Time Mark Every 60 S

Parameters

DLIS Name	Description	Value	
AFMO	Accelerometer Filtering Mode	MOVING_AVERAGE	
BS	Bit Size	7.875	IN
DO	Depth Offset for Logical Unit 1	3.0	FT
FBEF	Emex filtering activation	OFF	
FLM	FMI Logging Mode	8PAD	
ICMO	Inclinometry Computation Mode	AUTOMATIC_SELECTION	
MDEC	Magnetic Field Declination	-9.54999	DEG
PP	Playback Processing	NORMAL	
RBS	Resistivity Button Selection	AUTO	
RBSI	Auto RBS change interval	10	
SOFF	Stand-Off	0	IN
XGMO	Emex & Gain Modes	EmexManu_GainManu	
XVOL	Emex Voltage	0	V

Format: FMI_LQC **Vertical Scale: 5" per 100'** **Graphics File Created: 07-May-2000 09:10**

OP System Version: 9C1-303

MCM

FBST-A	9C1-303	SGT-N	OP91-KP1a
DTC-A	OP91-KP1a		

Input DLIS Files

DEFAULT	FBSTA .016	FN:15	PRODUCER	07-May-2000 08:25	2604.0 FT	1681.5 FT

Output DLIS Files

DEFAULT	FBSTA .018	FN:17	PRODUCER	07-May-2000 09:10

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REPEAT SECTION

MAXIS 500 Field Log

Input DLIS Files

DEFAULT	FBSTA .017	FN:16	PRODUCER	07-May-2000 08:55	2000.5 FT	1708.1 FT

Output DLIS Files

DEFAULT	FBSTA .019	FN:18	PRODUCER	07-May-2000 09:15	2000.5 FT	1708.5 FT

OP System Version: 9C1-303

MCM

FBST-A	9C1-303	SGT-N	OP91-KP1a
DTC-A	OP91-KP1a		

PIP SUMMARY

▣ Time Mark Every 60 S

FMI Correlation Resistance (LOG) (FBCR)
2 (KOHM) 2000

Relative Bearing (RB_FBST)
-40 (DEG) 360

Pad One Azimuth (P1AZ_FBST)
-40 (DEG) 360

Hole Azimuth (HAZIM)
-40 (DEG) 360

Gamma Ray (GR)
0 (GAPI) 150

Deviation (DEVIM)
0 (DEG) 10

Caliper 2 (C2)
6 (IN) 16

Tension (TENS)
10000 (LBF) 0

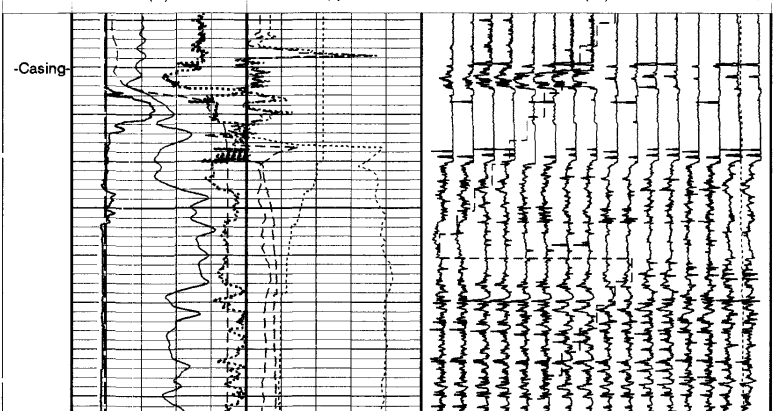
EMEX Intensity (EI)
0 (AMPS) 10

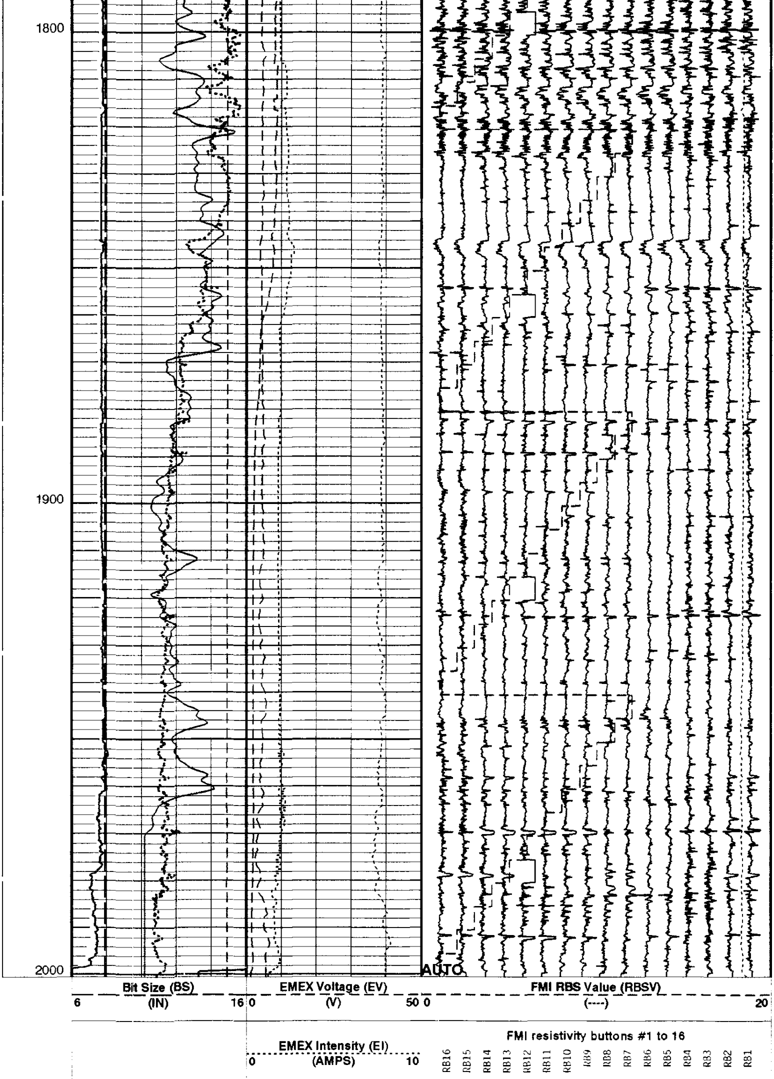
FMI resistivity buttons #1 to 16
RB16 RB15 RB14 RB13 RB12 RB11 RB10 RB9 RB8 RB7 RB6 RB5 RB4 RB3 RB2 RB1

Bit Size (BS)
6 (IN) 16

EMEX Voltage (EV)
0 (V) 50

FMI RBS Value (RBSV)
0 (----) 20





Caliper 2 (C2)
6 (IN) 16

Tension (TENS)
10000 (LBF) 0

Deviation (DEVIM)
0 (DEG) 10

Gamma Ray (GR)
0 (GAPI) 150

Hole Azimuth (HAZIM)
-40 (DEG) 360

Pad One Azimuth (P1AZ_FBST)
-40 (DEG) 360

Relative Bearing (RB_FBST)
-40 (DEG) 360

FMI Correlation Resistance (LOG) (FBCR)
2 (KOHM) 2000

PIP SUMMARY

■ Time Mark Every 60 S

Parameters

DLIS Name	Description	Value	
AFMO	Accelerometer Filtering Mode	MOVING_AVERAGE	
BS	Bit Size	7.875	IN
DO	Depth Offset for Logical Unit 1	0.0	FT
FBEF	Emex filtering activation	OFF	
FLM	FMI Logging Mode	8PAD	
ICMO	Inclinometry Computation Mode	AUTOMATIC_SELECTION	
MDEC	Magnetic Field Declination	-9.54999	DEG
PP	Playback Processing	NORMAL	
RBS	Resistivity Button Selection	AUTO	
RBSI	Auto RBS change interval	10	
SOFF	Stand-Off	0	IN
XGMO	Emex & Gain Modes	EmexManu_GainManu	
XVOL	Emex Voltage	0	V

Format: FMI_LQC Vertical Scale: 5" per 100' Graphics File Created: 07-May-2000 09:16

OP System Version: 9C1-303

MCM

FBST-A	9C1-303	SGT-N	OP91-KP1a
DTC-A	OP91-KP1a		

Input DLIS Files

DEFAULT	FBSTA .017	FN:16	PRODUCER	07-May-2000 08:55	2000.5 FT	1708.1 FT

Output DLIS Files

DEFAULT	FBSTA .019	FN:18	PRODUCER	07-May-2000 09:15

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CALIBRATIONS

MAXIS 500 Field Log

Calibration and Check Summary

Measurement	Nominal	Master	Before	After	Change	Limit	Units
Full-Bore Scanner - A Wellsite Calibration - Caliper Calibration							
Before: 7-MAY-2000 7:57							
Caliper #1 Small Jig	8.000	N/A	8.733	N/A	N/A	N/A	IN
Caliper #2 Small Jig	8.000	N/A	8.326	N/A	N/A	N/A	IN
Caliper #1 Large Jig	12.00	N/A	11.80	N/A	N/A	N/A	IN
Caliper #2 Large Jig	12.00	N/A	11.77	N/A	N/A	N/A	IN
Full-Bore Scanner - A Wellsite Calibration - CROUZET ACCELEROMETER PROM HAS BEEN READ CORRECTLY							
Before: 7-MAY-2000 7:55							
TEMPERATURE REFERENCE :	N/A	N/A	68	N/A	N/A	N/A	DEGF
YEAR OF CALIBRATION :	N/A	N/A	93	N/A	N/A	N/A	
MONTH OF CALIBRATION :	N/A	N/A	11	N/A	N/A	N/A	
SERIAL NUMBER :	N/A	N/A	470	N/A	N/A	N/A	
Full-Bore Scanner - A Wellsite Calibration - CROUZET MAGNETOMETER PROM HAS BEEN READ CORRECTLY							
Before: 7-MAY-2000 7:55							
TEMPERATURE REFERENCE :	N/A	N/A	75	N/A	N/A	N/A	DEGF
YEAR OF CALIBRATION :	N/A	N/A	93	N/A	N/A	N/A	
MONTH OF CALIBRATION :	N/A	N/A	12	N/A	N/A	N/A	
SERIAL NUMBER :	N/A	N/A	186	N/A	N/A	N/A	
Scintillation Gamma-Ray - N Wellsite Calibration - Detector Calibration							
Before: 7-MAY-2000 8:04							
Gamma Ray (Jig - Bkg)	165.1	N/A	165.1	N/A	N/A	15.01	GAPI
Gamma Ray (Calibrated)	165.0	N/A	165.0	N/A	N/A	15.00	GAPI

Full-Bore Scanner - A / Equipment Identification

Primary Equipment:

FullBore Scanner Sonde	FBSS - A
	-
FullBore Scanner Sonde Cartridge	FBSC - A
GPIT Cartridge - C	GPIC - C
Flex Joint	AH - 184
Insulating Sub	AH - 185
FullBore Scanner Control Cartridge	FBCC - A

Auxiliary Equipment:

Electronics Cartridge Housing	ECH - MRA

Full-Bore Scanner - A Wellsite Calibration

Caliper Calibration

Phase	Caliper #1 Small Jig IN	Value	Phase	Caliper #2 Small Jig IN	Value
Before		8.733	Before		8.326
	6.800 (Minimum) 8.000 (Nominal) 9.200 (Maximum)			6.800 (Minimum) 8.000 (Nominal) 9.200 (Maximum)	
Phase	**Caliper #1 Large Jig IN**	**Value**	**Phase**	**Caliper #2 Large Jig IN**	**Value**
Before		11.80	Before		11.77
	10.20 (Minimum) 12.00 (Nominal) 13.80 (Maximum)			10.20 (Minimum) 12.00 (Nominal) 13.80 (Maximum)	

Before: 7-MAY-2000 7:57

Scintillation Gamma-Ray - N / Equipment Identification

Primary Equipment:

Scintillation Gamma Cartridge	SGC - SA
Scintillation Gamma Detector	SGD - TAA

Auxiliary Equipment:

Scintillation Gamma Housing	SGH - K
Gamma Source Radioactive	GSR - U/Y

Scintillation Gamma-Ray - N Wellsite Calibration

Detector Calibration

Phase	Gamma Ray Background GAPI	Value	Phase	Gamma Ray (Jig - Bkg) GAPI	Value	Phase	Gamma Ray (Calibrated) GAPI	Value
Before		25.80	Before		165.1	Before		165.0
	0 (Minimum) 30.00 (Nominal) 120.0 (Maximum)			150.1 (Minimum) 165.1 (Nominal) 180.1 (Maximum)			150.0 (Minimum) 165.0 (Nominal) 180.0 (Maximum)	

Before: 7-MAY-2000 8:04

COMPANY: **NORTHWEST NATURAL GAS**

WELL: **I.W. 24C-23-65**
FIELD: **CALVIN CREEK GAS STORAGE**
COUNTY: **COLUMBIA**
STATE: **OREGON**

BOTTOM LOG INTERVAL	2581 ft
SCHLUMBERGER DEPTH	2591 ft
DEPTH DRILLER	2591 ft
KELLY BUSHING	917.5 ft
DRILL FLOOR	917.3 ft
GROUND LEVEL	905 ft

Schlumberger

FORMATION MICRO IMAGER
LQC
SCALE: 5" = 100'