HALLIBURTON

EXCELL 2000

SPECTRAL DENSITY
DUAL SPACED NEUTRON
GAMMA

5"=100'

COMPANY NORTHWEST NATURAL GAS
WELL IW 13B-23-65
FIELD MIST (SCHLICKER POOL STORAGE)
COUNTY COLUMBIA STATE OR

COMPANY NORTHWEST NATURAL GAS

WELL IW 13B-23-65

FIELD MIST (SCHLICKER POOL STORAGE)

COUNTY COLUMBIA STATE OR

API No. 36-009-00357
Location 438.73' WEST AND
2424.34' SOUTH FROM
THE NORTHEAST CORNER
OF SECTION 22. WB&M
X: 1293755.179
Y: 859503.800
Sect 22 Twp 6N Rge 5W

Other Services
HRI/BCS/FIAC
EMI

Permanent Datum G.L. Elev 759.4'
Log measured from K.B. , 19.0 ft. above perm. datum
Drilling measured from K.B.

Elev.: K B 778.4
D F ----
G L 759.4'

Date	09-29-2004			
Run No.	ONE			
Depth – Driller	2234'			
Depth – Logger	2234'			
Bottom – Logged Interval	2231'			
Top – Logged Interval	441'			
Casing – Driller	13.4" @ 442'	@	@	@
Casing – Logger	441'			
Bit Size	8.750"			
Type Fluid in Hole	GEL			
Dens. | Visc.	9.3 | 42	|	|	|
Ph | Fluid Loss	9.5 | 6.8	|	|	|
Source of Sample	FLOWLINE			
Rm @ Meas. Temp.	1.170 @ 66 F	@	@	@
Rmf @ Meas. Temp.	1.460 @ 61 F	@	@	@
Rmc @ Meas. Temp.	.820 @ 64 F	@	@	@
Source Rmf | Rmc	MEAS | MEAS	|	|	|
Rm @ BHT	0.748 @ 107 F	@	@	@
Time Since Circ	2000 09-28			
Time on Bottom	0600 09-29			
Max. Rec. Temp	107 F @ TD	@	@	@
Equip. | Location	49599 | WDLD	|	|	|
Recorded By	G. ROUSSEAU			
Witnessed By	J. MEYERS	E. VADER		

Fold Here

Service Ticket No 3310704 API Serial No 36-009-00357 PGM Version: XL v5.0

CHANGE IN MUD TYPE OR ADDITIONAL SAMPLES		
Date | Sample No.	|	|
Depth – Driller		
Type Fluid in Hole		
Dens. | Visc.	|	|
Ph | Fluid Loss	|	|
Source of Sample		
Rm @ Meas. Temp.	1.170 @ 66 F	@
Rmf @ Meas. Temp.	1.460 @ 61 F	@
Rmc @ Meas. Temp.	.820 @ 64 F	@
Source Rmf | Rmc	MEAS | MEAS	|
Rm @ BHT	0.748 @ 107 F	@
Rmf @ BHT	0.870 @ 107 F	@
Rmc @ BHT	0.510 @ 107 F	@

RESISTIVITY SCALE CHANGES

Type Log	Depth	Scale Up Hole	Scale Down Hole

RESISTIVITY EQUIPMENT DATA

Run No.	Tool Type & No.	Pad Type	Tool Pos.	Other

EQUIPMENT DATA

GAMMA		ACOUSTIC		DENSITY		NEUTRON	
Run No.	ONE	Run No.		Run No.	ONE	Run No.	ONE
Serial No.	A180	Serial No.		Serial No.	1741M741	Serial No.	005
Model No.	NGRT	Model No.		Model No.	SDLT-DA	Model No.	DSNT-X
Diameter	3.625"	No. of Cent.		Diameter	5.500"	Diameter	3.625"
Detector Model No.	432	Spacing		Log Type	GAM-GAM	Log Type	NEU-NEU
Type	SCINT.			Source Type	CS137	Source Type	AM241BE
Length	4.00"	LSA [Y / N]	NO	Serial No.	2694 GW	Serial No.	DSN-16
Distance to Source	8.0'	FWDA [Y / N]	NO	Strength	1.5 CI	Strength	18.5 CI

LOGGING DATA

GENERAL				GAMMA		ACOUSTIC			DENSITY			NEUTRON		
Run	Depth		Speed	Scale		Scale			Scale			Scale		
No.	From	To	Ft / Min	L	R	L	R	Matrix	L	R	Matrix	L	R	Matrix
ONE	2234'	411'	40	0	150				1.65	2.65	2.65	.60	0	SAND
				API	API		C		GMCC	GMCC	GMCC	%	%	

DIRECTIONAL INFORMATION

Maximum Deviation	54.32	deg. @	1755'	KOP	192'

Remarks:

SDLT-DSNT-NGRT RUN IN COMBINATION.

CREW: D. ROSENSTEEL, D. BRIGHT, K. CHAN.   RIG: TAYLOR DRILLING NO. 9.

HALLIBURTON DOES NOT GUARANTEE THE ACCURACY OF ANY INTERPRETATION OF THE LOG DATA, CONVERSION OF LOG DATA TO PHYSICAL ROCK PARAMETERS OR RECOMMENDATIONS WHICH MAY BE GIVEN BY HALLIBURTON PERSONNEL OR WHICH APPEAR ON THE LOG OR IN ANY OTHER FORM. ANY USER OF SUCH DATA, INTERPRETATIONS, CONVERSIONS, OR RECOMMENDATIONS AGREES THAT HALLIBURTON IS NOT RESPONSIBLE EXCEPT WHERE DUE TO GROSS NEGLIGENCE OR WILLFUL MISCONDUCT, FOR ANY LOSS, DAMAGES, OR EXPENSES RESULTING FROM THE USE THEREOF

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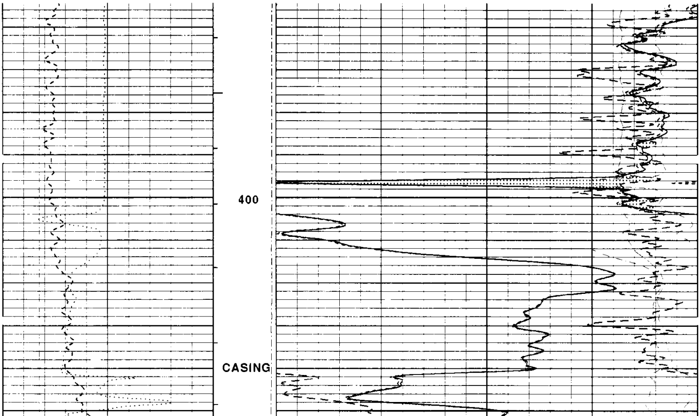
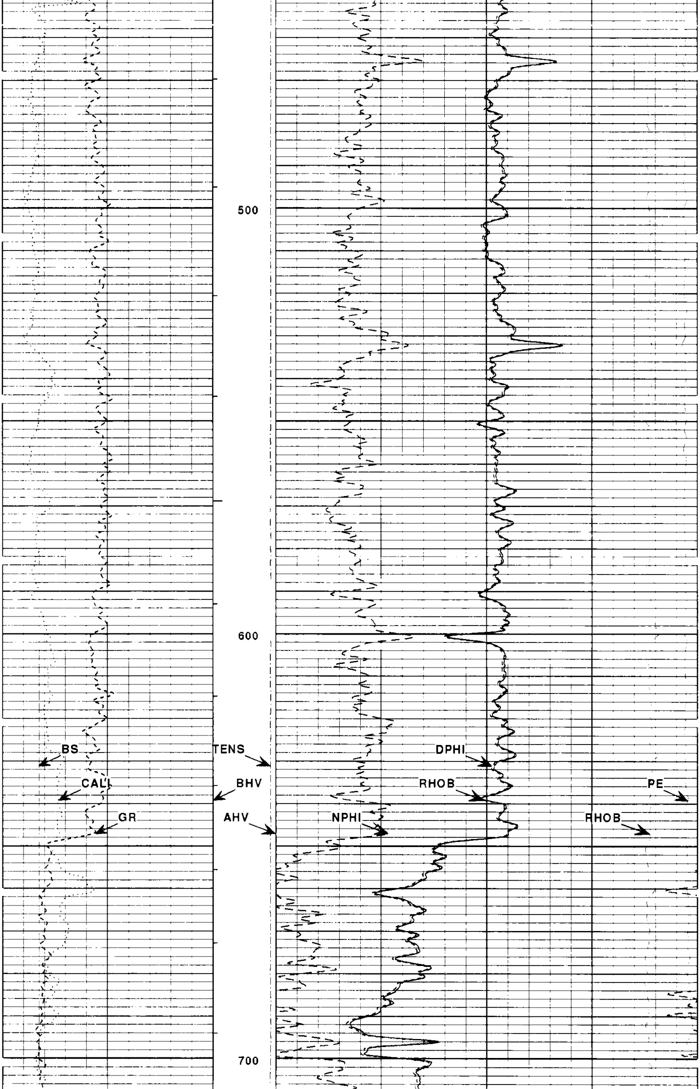
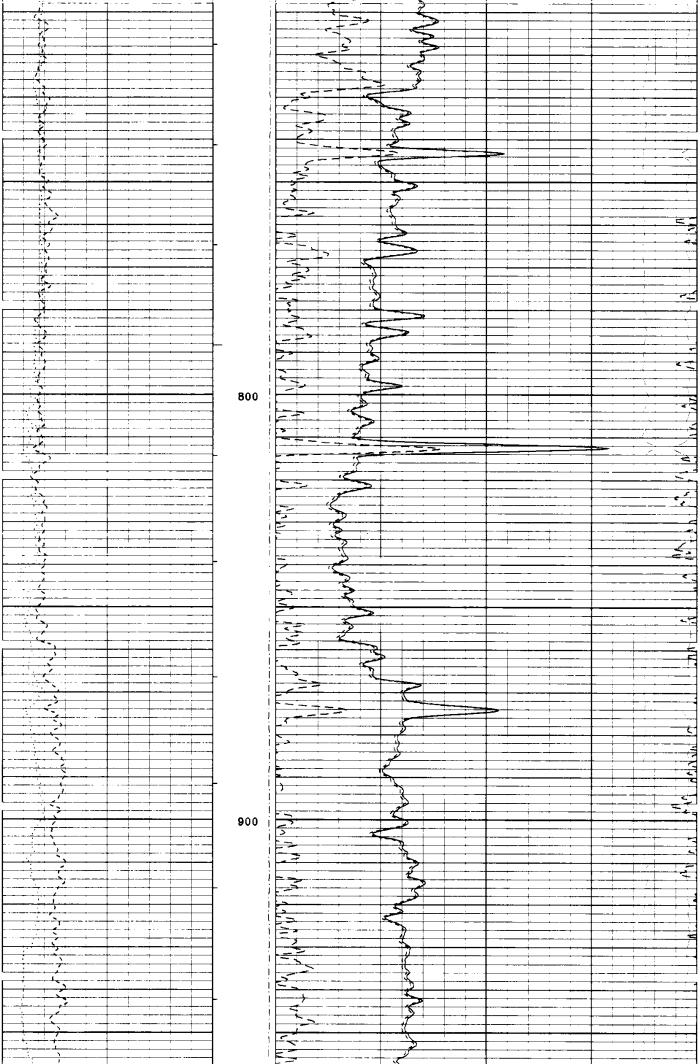
EXCELL

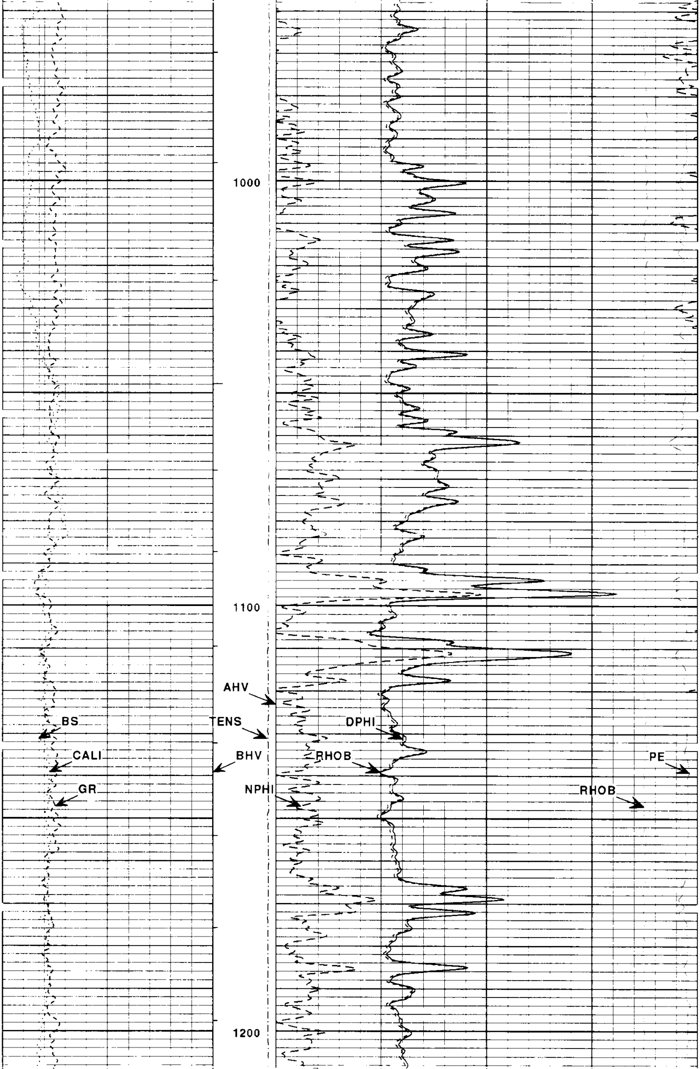
Version No: 5.0 | hc:3.0
Data File: 1001_1617_r2241.2.cls
Format File: plot_01_1.spc
Plot Time: 2004-10-02 07:59:31
Log Time: 2004-09-29 06:02:37
Top Depth: 354.08
Bottom Depth: 2238.00

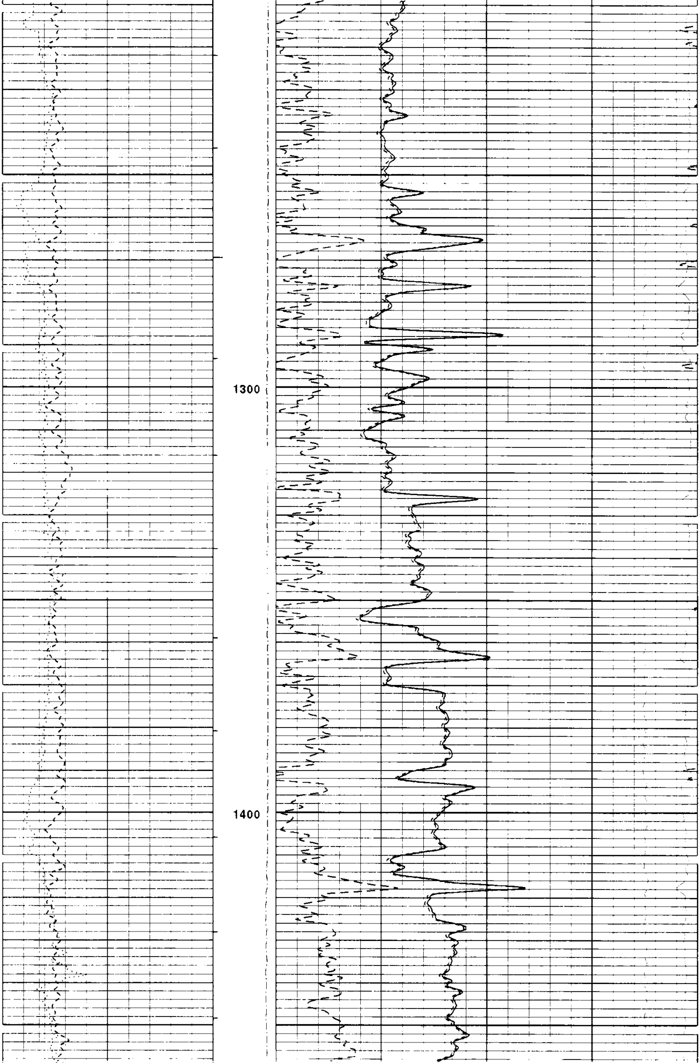
GR	AHV	NPHI
0 API 150	FT3 →	60. % 0
CALI	BHV	RHOB
7 INCH 17	← FT3	1.65 G/CC 2.65
BS	TENS	DPHI
7 INCH 17	10500 500	60. % 0
	1:240 FT.	RHOB -.5 GM/CC .5 PE 12 2

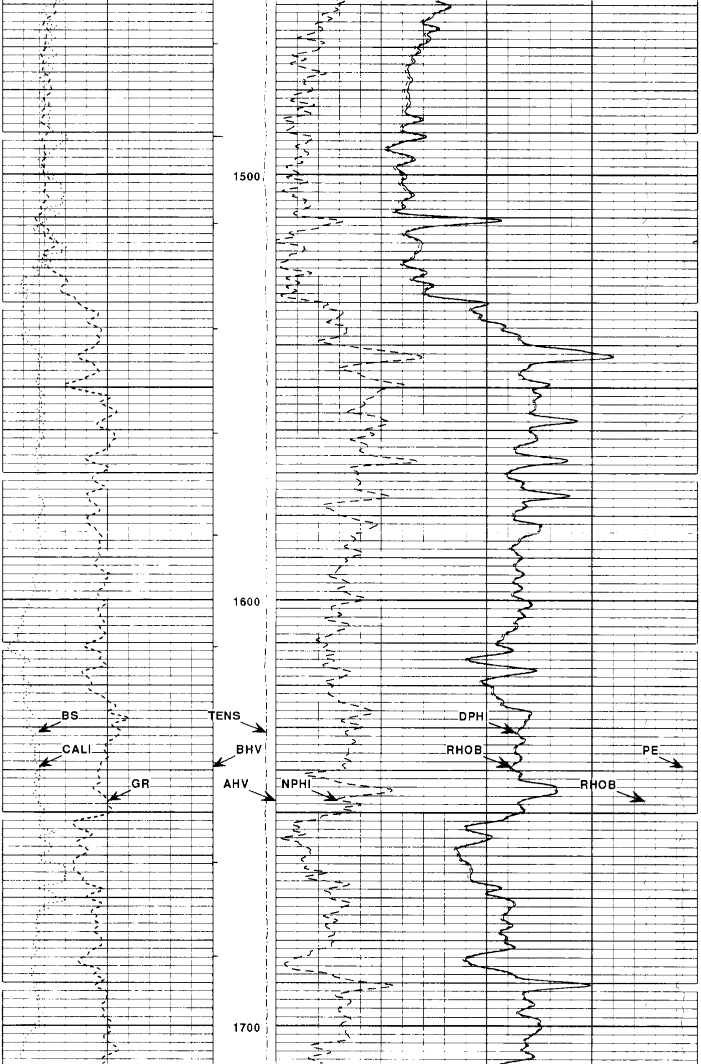


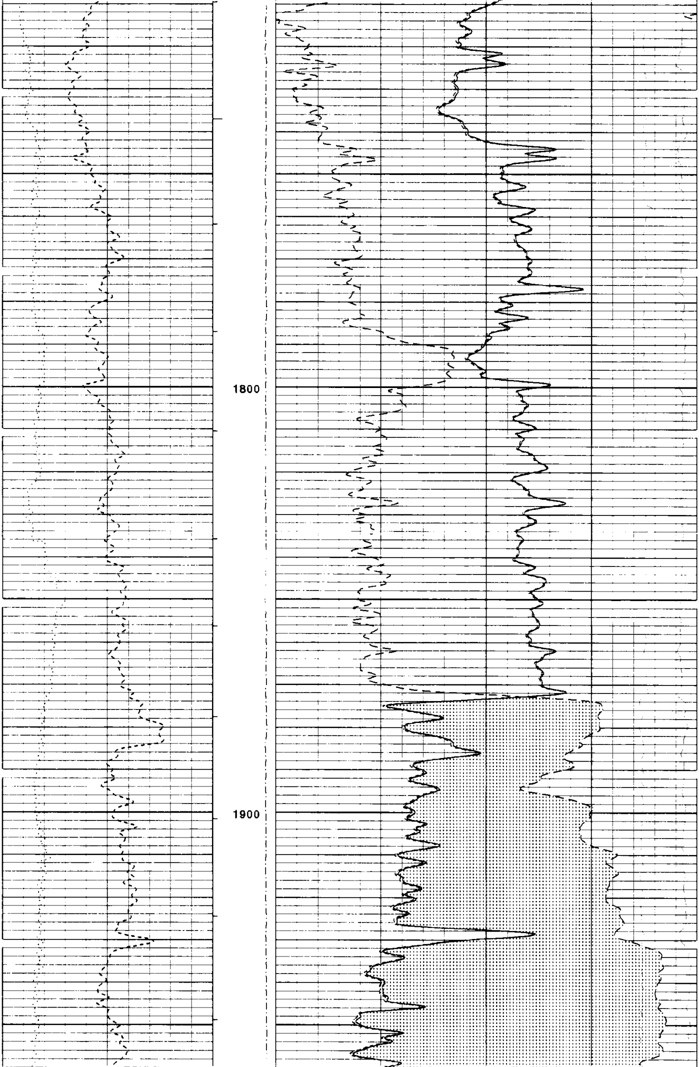


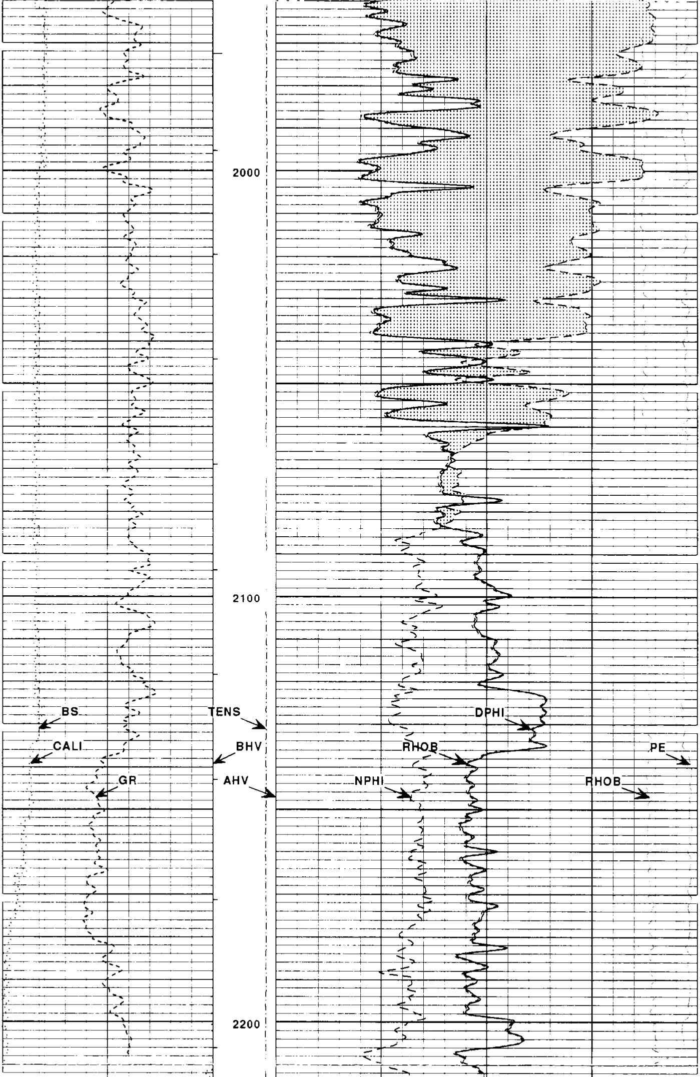


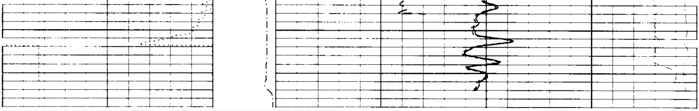












			PE 12 2
	1:240 FT.		RHOB -.5 GM/CC .5
BS 7 INCH 17	TENS 10500 500	DPHI 60. % 0	
CALI 7 INCH 17	BHV ← FT3	RHOB 1.65 G/CC 2.65	
GR 0 API 150	AHV FT3 →	NPHI 60. % 0	

HALLIBURTON

EXCELL 2000

Version No: 5.0 | hc:3.0
Data File: 1001_1617_r2241.2.cls
Format File: plot_01_1.spc
Plot Time: 2004-10-02 07:58:04
Log Time: 2004-09-29 06:02:37
Top Depth: 354.08
Bottom Depth: 2238.00

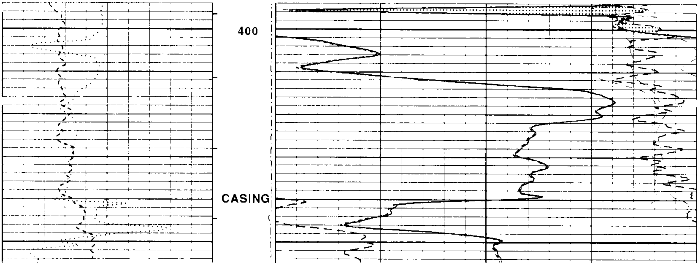
REPEAT SECTION

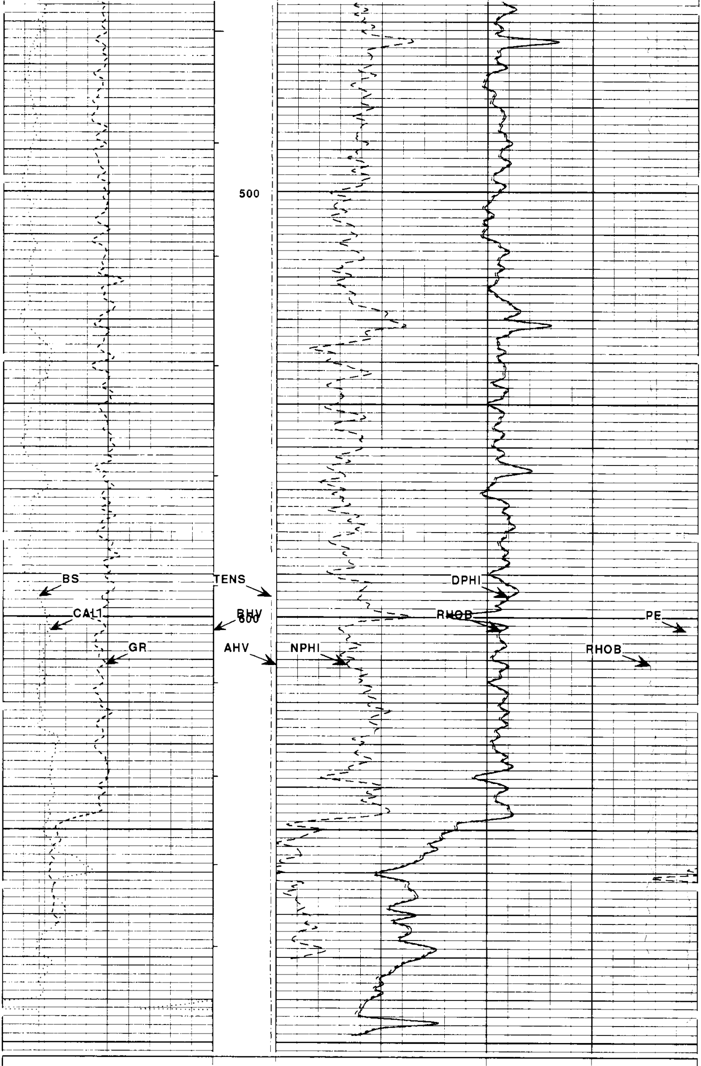
HALLIBURTON

EXCELL 2000

Version No: 5.0 | hc:3.0
Data File: 1001_1617_r2241.1.cls
Format File: plot_01_1.spc
Plot Time: 2004-10-02 07:57:47
Log Time: 2004-09-29 05:38:08
Top Depth: 393.58
Bottom Depth: 702.25

GR 0 API 150	AHV FT3 →	NPHI 60. % 0	
CALI 7 INCH 17	BHV ← FT3	RHOB 1.65 G/CC 2.65	
BS 7 INCH 17	TENS 10500 500	DPHI 60. % 0	
	1:240 FT.		RHOB -.5 GM/CC .5
			PE 12 2





			PE 12 2 RHOB -.5 GM/CC .5
BS 7 INCH 17	1:240 FT. TENS 10500 500	DPHI 60. % 0	
CALI 7 INCH 17	BHV ← FT3	RHOB 1.65 G/CC 2.65	
GR 0 API 150	AHV FT3 →	NPHI 60. % 0	

HALLIBURTON

EXCELL 2000

Version No: 5.0 | hc:3.0
Data File: 1001_1617_r2241.1.cls
Format File: plot_01_1.spc
Plot Time: 2004-10-02 07:57:29
Log Time: 2004-09-29 05:38:08

Top Depth: 393.58
Bottom Depth: 702.25

Current EXCELL-2000 Parameter Values
Depth: 4055.083
Date: 26-Jul-2004 14:07
Service Number: 2334
Software Version: 5.6

Mnemonic	Tool	Parameter Description	Value	Units
PERF	DITSHD	PERFORATED INTERVAL	NO	
TD	DITSHD	TOTAL DEPTH	4048.	FT
CS_ANT	DITSHD	CASING DEPTH (FOR ANNOTATION)	0.	FT
CCLSEL	CCLD2	CCL PROCESSING SELECTION	RAW	
CCLOFS	CCLD2	CCL PERFORATION OFFSET	0	
DSN_OK	DSNT_X	DO DSNT_X CALCULATIONS?	YES	
DRILL	DSNT_X	TPL - NEUTRON IN SLEEVE?	NO	
BADHOL	DSNT_X	DSNT_X BAD HOLE CORRECTION	NO	
CASED	SHARED	IS THE HOLE CASED?	YES	
NLITH	DSNT_X	NEUTRON LITHOLOGY	SAND	
CASEWT	SHARED	CASING WEIGHT	11.6	Lbs/Ft.
CASEOD	SHARED	CASING DIAMETER (OD)	4.5	Inches
DSNSO	DSNT_X	DSNT_X STANDOFF	0.	Inches
BS	DSNT_X	BIT SIZE	6.75	Inches
DSNTMP	DSNT_X	DSNT_X TEMPERATURE CORRECTION	NONE	
DSNPRS	DSNT_X	DSNTX PRESSURE CORRECTION	NONE	
MUDWT	SHARED	BOREHOLE FLUID WEIGHT	8.3	Pounds/Gal.
VLDTMP	DSNT_X	IS DSNT_X TEMPERATURE VALID?	YES	
FWSTOK	CBL_DB	DO FWST CALCULATIONS?	YES	
MSGAIN	CBL_DB	MSG GAIN FACTOR	42	
S_GATE	CBL_DB	SHOW PIPE GATE ON MSG ?	YES	
CSTR	CBL_DB	COMPRESSIVE STRENGTH	1000.	PSI
ISFOAM	CBL_DB	IS THE CEMENT TYPE FOAM	NO	
TTLVL	CBL_DB	TRAVEL TIME THRESHOLD MV.?	20.	
TDU_OK	TDUB	USE TDU DISPLAY CONTROLS?	YES	

EXCELL-2000 Calibration Report
Date: 02-Oct-2004 08:01

GAMMA RAY TOOL SHOP CALIBRATION SUMMARY

PERFORMED: 27-Aug-2004 14:30 LAST SHOP CALIBRATION: 20-Jul-2004 12:48
SERIAL NUMBER: A180 MODEL: NGRT-A
BLANKET #: TB-67
TRUCK UNIT NUMBER: 49599 PROGRAM VERSION: 5.0
PERFORMED BY: G. ROUSSEAU

	MEASURED	CALIBRATED	UNITS
BACKGROUND	16	16	GAPI
BACKGROUND+CALIBRATOR	225	221	GAPI
CALIBRATOR	209	205	GAPI
GAPI CONVERSION FACTOR	0.472		GAPI/CPS

GAMMA RAY TOOL BEFORE SURVEY FIELD CHECK SUMMARY

PERFORMED: 29-Sep-2004 01:15 LAST SHOP CALIBRATION: 27-Aug-2004 14:30

	SHOP	FIELD	UNITS
BACKGROUND	16	21	GAPI
BACKGROUND+CALIBRATOR	221	228	GAPI
CALIBRATOR	205	206	GAPI

GAMMA RAY TOOL AFTER SURVEY FIELD CHECK SUMMARY

PERFORMED: 29-Sep-2004 03:35 LAST SHOP CALIBRATION: 27-Aug-2004 14:30

	BEFORE	AFTER	UNITS
BACKGROUND	21	21	GAPI
BACKGROUND+CALIBRATOR	228	225	GAPI
CALIBRATOR	206	204	GAPI

DUAL SPACED NEUTRON--GIBRALTAR SHOP CALIBRATION SUMMARY

PERFORMED: 27-Aug-2004 15:38 LAST SHOP CALIBRATION: 21-Jul-2004 18:45
SERIAL NUMBER: 05 MODEL: DSNT-X
SOURCE NUM: DSN-16
TRUCK UNIT NUMBER: 49599 PROGRAM VERSION: 5.0
PERFORMED BY: G. ROUSSEAU

** NEUTRON CALIBRATION SUMMARY **

CALIBRATION CONSTANTS

	Prev. Value	New Value	Control Limit On New Value
Gain	1.006	1.006	0.90 - 1.10

WATER TANK SUMMARY
(Horizontal Water Tank)

	Current Reading (Previous Coef.)	Calib. (New Coef.)	Change	Control Limit On Change
Porosity	23.81	23.83	0.02	+/- 0.20
Calibrated Ratio	9.762	9.769	0.006	+/- 0.050

Reference value assigned to tank: 52.720

VERIFIER

	Value	Control Limits
Snow-block porosity	5.08	2.0 - 9.0

PASS/FAIL SUMMARY

Background Check:	PASSED
Gain-Range Check:	PASSED
Snow-block Check:	PASSED

DUAL SPACED NEUTRON--GIBRALTAR BEFORE SURVEY FIELD CHECK SUMMARY

PERFORMED: 29-Sep-2004 05:05 LAST SHOP CALIBRATION: 27-Aug-2004 15:38

** NEUTRON FIELD-CHECK SUMMARY **

	Shop	Before	Change	Control Limit On Change

Snow-Block Por.(pu)	5.08	5.46	0.38	+/- 1.50

PASS/FAIL SUMMARY

Snow Block Change: PASSED
Snow Block Stats: PASSED

DUAL SPACED NEUTRON--GIBRALTAR AFTER SURVEY FIELD CHECK SUMMARY

PERFORMED: 29-Sep-2004 05:09 LAST SHOP CALIBRATION: 27-Aug-2004 15:38

** NEUTRON POST-CHECK SUMMARY **

	Before	After	Change	Control Limit On Change
Snow-Block Por.(pu)	5.46	5.44	-0.02	+/- 1.50

PASS/FAIL SUMMARY

Snow Block Change: PASSED
Snow Block Stats: PASSED

SDL (D) WITH (A) MANDREL SHOP CALIBRATION SUMMARY

PERFORMED: 28-Aug-2004 08:08 LAST SHOP CALIBRATION: 28-Aug-2004 07:42
SERIAL NUMBER: I741M741 MODEL: SDL_DA
SOURCE NUM: 2694GW
TRUCK UNIT NUMBER: 49599 PROGRAM VERSION: 5.0
PERFORMED BY: G. ROUSSEAU

DENSITY CALIBRATION SUMMARY

	PREV VALUE	NEW VALUE	CONTROL LIMIT ON NEW VALUES
NEAR BAR GAIN	1.0032	1.0014	0.90 - 1.10
NEAR DENS GAIN	1.0037	0.9995	0.90 - 1.10
NEAR PEAK GAIN	0.9825	0.9890	0.90 - 1.10
NEAR LITH GAIN	0.9857	0.9822	0.90 - 1.10
FAR BAR GAIN	1.0071	1.0074	0.90 - 1.10
FAR DENS GAIN	1.0049	1.0040	0.90 - 1.10
FAR PEAK GAIN	1.0073	1.0091	0.90 - 1.10
FAR LITH GAIN	1.0048	1.0025	0.90 - 1.10
NEAR BAR OFFSET	0.0128	0.0296	NONE
NEAR DENS OFFSET	-0.0247	0.0159	NONE
NEAR PEAK OFFSET	0.1420	0.0826	NONE
NEAR LITH OFFSET	0.1252	0.1572	NONE
FAR BART OFFSET	0.0826	0.0781	NONE
FAR DENS OFFSET	0.1016	0.1085	NONE
FAR PEAK OFFSET	0.0407	0.0245	NONE
FAR LITH OFFSET	-0.1017	-0.0821	NONE
NEAR BART BKG	1106.0	1101.1	700 -1500
NEAR DENS BKG	452.6	455.1	290 - 600
NEAR PEAK BKG	200.3	199.3	130 - 280
NEAR LITH BKG	189.3	187.7	125 - 270
FAR BART BKG	560.1	561.3	350 - 750
FAR DENS BKG	229.4	228.7	140 - 300
FAR PEAK BKG	101.7	102.0	50 - 130
FAR LITH BKG	98.5	98.5	50 - 130

CALIBRATION-BLOCK SUMMARY

	CURRENT READING (PREVIOUS COEF.)	CALIB. (NEW COEF.)	CHANGE	CONTROL LIMIT ON CHANGE
MAGNESIUM				
Density g/cc	1.678	1.678	0.000	+/- 0.015
Pe	2.595	2.594	-0.001	+/- 0.15
ALUMINUM				
Density g/cc	2.601	2.603	0.002	+/- 0.015
Pe	3.207	3.200	-0.007	+/- 0.15

TOOL SUMMARY

NEAR DETECTOR FAR DETECTOR

```
                        VALUE     CONTROL LIMITS       VALUE     CONTROL LIMITS

Quality
   Background           0.0015     +/- 0.0110         -0.0070     +/- 0.0140
   Mag Block           -0.0009     +/- 0.0110          0.0006     +/- 0.0140
   Alum Block           0.0005     +/- 0.0110         -0.0018     +/- 0.0140

Resolution                 9.1    6.0  - 11.0             9.6     6.0 - 11.0
Verifier (B+D+P+L)        1943   1250  - 2700             990     600 - 1300

Pad temperature =  25.0


                   PASS/FAIL SUMMARY

            Bkg Quality Check:              PASSED
            Bkg Range Check:                PASSED
            Bkg Resolution Check:           PASSED
            Bkg Verification Check:         PASSED
            Magnesium Quality Check:        PASSED
            Aluminum Quality Check:         PASSED
            Gains Check:                    PASSED
            Changes in Cal. Block:          PASSED
```

SDL (D) WITH (A) MANDREL BEFORE SURVEY FIELD CHECK SUMMARY

PERFORMED: 29-Sep-2004 04:54 LAST SHOP CALIBRATION: 28-Aug-2004 08:08

```
                                                          CONTROL LIMIT
                            SHOP      BEFORE     CHANGE    ON CHANGE

     Near (B+D+P+L) cps    1943.2     1933.4      -9.8     +/-  17.6
     Far  (B+D+P+L) cps     990.5      984.4      -6.0     +/-  16.9
     Near Resolution         9.11       9.09     -0.02     +/-   0.5
     Far  Resolution         9.57       9.71      0.14     +/-   1.0

Pad temperature =  14.5


                   PASS/FAIL SUMMARY

            Bkg Quality Check:              PASSED
            Bkg Resolution Check:           PASSED
            Bkg Verification Check:         PASSED
```

SDL (D) WITH (A) MANDREL AFTER SURVEY FIELD CHECK SUMMARY

PERFORMED: 29-Sep-2004 04:58 LAST SHOP CALIBRATION: 28-Aug-2004 08:08

```
                                                          CONTROL LIMIT
                           BEFORE     AFTER     CHANGE     ON CHANGE

     Near (B+D+P+L) cps    1933.4     1935.8       2.4     +/-  19.6
     Far  (B+D+P+L) cps     984.4      982.6      -1.9     +/-  18.3
     Near Resolution          9.1        9.1       0.0     +/-   0.5
     Far  Resolution          9.7        9.6      -0.1     +/-   1.0
Pad temperature =  14.5


                   PASS/FAIL SUMMARY

            Bkg Quality Check:              PASSED
            Bkg Resolution Check:           PASSED
            Bkg Verification Check:         PASSED
```

SDL-D CALIPER: A MANDREL SHOP CALIBRATION SUMMARY

PERFORMED: 28-Aug-2004 08:25
SERIAL NUMBER: I741M741
TRUCK UNIT NUMBER: 49599
PERFORMED BY: G. ROUSSEAU

LAST SHOP CALIBRATION: 28-Aug-2004 08:24
MODEL: SDL-DA
PROGRAM VERSION: 5.0

	MEASURED	CALIBRATED	UNITS
VALUE 1	8.178	8.000	INCH
VALUE 2	16.012	16.000	INCH
GAIN	0.00810		
OFFSET	-11.303		

SDL-D CALIPER: A MANDREL BEFORE SURVEY FIELD CHECK SUMMARY

PERFORMED: 29-Sep-2004 05:02 LAST SHOP CALIBRATION: 28-Aug-2004 08:25

	SHOP	FIELD	UNITS
VALUE 1	8.000	7.731	INCH

SDL-D CALIPER: A MANDREL AFTER SURVEY FIELD CHECK SUMMARY

PERFORMED: 29-Sep-2004 05:02 LAST SHOP CALIBRATION: 28-Aug-2004 08:25

	BEFORE	AFTER	UNITS
VALUE 1	7.731	7.747	INCH

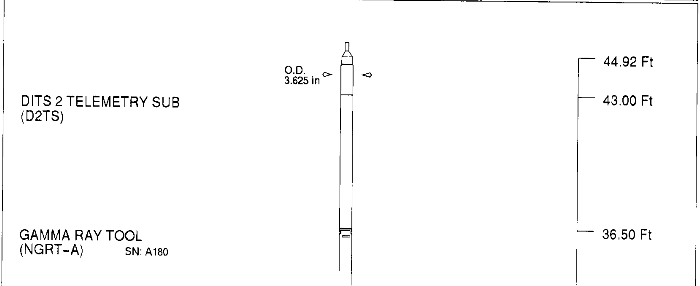
EXCELL-2000 Calibration Summary Table

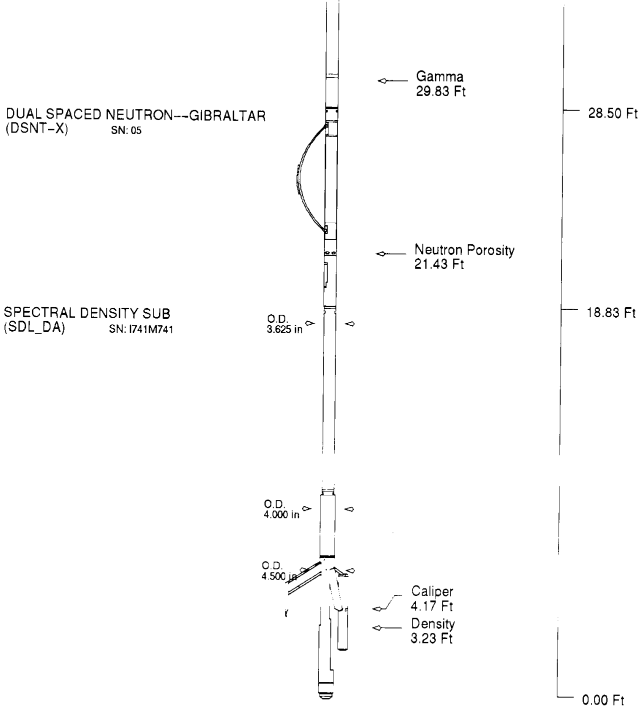
Date: 02-Oct-2004 08:01

Service or Signal	Shop	Before	After	Change	Tolerance
GAMMA	205	206	204	3	+/- 9.0
Snow-Block Por.(pu)	5.08	5.46	5.44	-0.02	+/- 1.50
DENSITY NEAR(B-D-P-L)	1943.2	1933.4	1935.8	2.4	+/- 19.6
DENSITY FAR (B+D+P+L)	990.5	984.4	982.6	-1.9	+/- 18.3
CALIPER VALUE 1	8.000	7.731	7.747	-0.015	+/-0.5

Excell 2000 Tool String Diagram

SPECTRAL DENSITY
DUAL SPACED NEUTRON
GAMMA





Tool Mnemonic	Length (Ft)	Weight In Air (lbs)	Logging Speed (Ft/min)
D2TS	6.50	100.00	N/A
NGRT-A	8.00	151.80	60.00
DSNT-X	9.67	150.00	60.00
SDL_DA	18.83	475.00	60.00
Tool String	43.00	876.80	60.00

COMPANY

WELL

FIELD

COUNTY **STATE**

HALLIBURTON

EXCELL