#504

Schlumberger

FORMATION DENSITY COMPENSATED NEUTRON GAMMA RAY 5"

COUNTY	COLUMBIA
FIELD	MIST GAS STORAGE
LOCATION	N 03-03 15 E 2280.65 & S 86-56-45 E
WELL	IW 23a-22-65
COMPANY	NORTHWEST NATURAL GAS

COMPANY NORTHWEST NATURAL GAS

WELL IW 23a-22-65

FIELD MIST GAS STORAGE

COUNTY COLUMBIA **STATE** OREGON

LOCATION
N 03-03 15 E 2280.65' & S 86 56 45 E
1923.76' FROM THE SW COR. OF SEC 22

API SERIAL NO.	SECT.	TWP.	RANGE
36-009-00304	22	T 6N	R6 5W

Other Services:
SONIC
INDUCTION
FMS
DENSITY
NEUTRON
GAMMA RAY

Permanent Datum GROUND LEVEL **Elev.** 580.5 F
Log Measured From KELLY BUSHING 16.0 F **above Perm. Datum**
Drilling Measured From KELLY BUSHING

Elev.: K.B. 596.5 F
D.F.
G.L. 580.5 F

Date	27-SEPT-1997		03-OCT-1997			
Run No.	ONE		TWO			
Depth Driller	1402.0 F		2299.0 F			
Depth Logger (Schl.)	1399.0 F		2292.0 F			
Btm. Log Interval	1389.0 F		2282.0 F			
Top Log Interval	0.0 F		1350.0 F			
Casing-Driller	13 3/8" @ 359.0 F		8 5/8" @ 1395.0 F		@	
Casing-Logger	355.0 F		1394.0 F			
Bit Size	@		@		@	
Type Fluid in Hole	GEL/CYPAN		KCL/XCD			
Dens. | Visc.	9.50 LB/G	60.0 S	8.60 LB/G	36.0 S		
pH | Fld. Loss	8.0		9.0			
Source of Sample	FLOWLINE					
Rm @ Meas. Temp.	2.310 OHMM @ 69.0 DEGF		.328 OHMM @ 72.0 DEGF			
Rmf @ Meas. Temp.	3.720 OHMM @ 66.0 DEGF		.382 OHMM @ 69.0 DEGF			
Rmc @ Meas. Temp.	3.550 OHMM @ 66.0 DEGF		.662 OHMM @ 69.0 DEGF			
Source: Rmf | Rmc	CELL	CELL				
Rm @ BHT	1.611 OHMM @ 102. DEGF		.247 OHMM @ 98.0 DEGF			
TIME Circulation Ended	08:30 9-27-97		19:30 10-3-97			
TIME Logger on Bottom	SEE LOG					
Max. Rec. Temp.	102. DEGF		98.0 DEGF			
Equip. | Location	8303	BAKERSFIELD				
Recorded By	GREG PERRY					
Witnessed By	MR. MEYER / MR. THOMAS					

The well name, location and borehole reference data were furnished by the customer

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 wilful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretations 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.

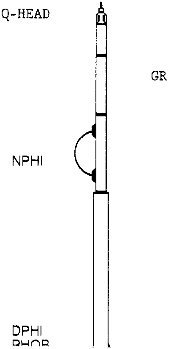
Run No.	ONE			TWO		
Service Order No.						
Drilling Fluid Level	0.0 F					
Salinity						
Rmf @ BHT	2.491 OHMM	@	102. DEGF	.276 OHMM	@	98.0 DEGF
Rmc @ BHT	2.378 OHMM	@	102. DEGF	.479 OHMM	@	98.0 DEGF
Logging Speed	1800.0 F/HR					
EQUIPMENT DATA						
Tool Number 1	DIS 151					
Tool Number 2	DIC 159					
Tool Number 3	SLS WA					
Tool Number 4	SLC UA					
Tool Number 5	SGCSA 483					
Tool Number 6	TCCB 1289					
Tool Number 7						
Tool Number 8						
Tool Number 9						
Tool Number 10						
Tool Number 11						
Tool Number 12						

REMARKS:

RAN INDUCTION AND SONIC IN COMBO. RAN FMS LDT CNL IN COMBO.
CENTRALIZERS RAN ON INDUCTION TOOL AND SONIC TOOL.
RAN REPEAT AT CASING DEPTH DUE TO PULLING TIGHT AT BOTTOM. RAN REPEAT AT BOTTOM AT CLIENTS REQUEST

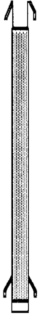
CREW: DAN LEE.
THANKS FOR USING SCHLUMBERGER

LOGGING TOOL STRING SKETCH



TCCB,	3 3/8" OD	59.6 F
SGTL,	3 3/8" OD	56.6 F
		55.7 F
CNTH,	3 3/8" OD	51.1 F
LDTD,	4 1/2" OD	43.8 F

MESTC, 5" OD



CALI 29.2 F

26.5 F

GPIT

EV C2 C1 2.2 F
AZ 1.1 F 1.1 F
TOOL ZERO

TOTAL TOOL STRING LENGTH IS 61.6 F.
TOTAL TOOL STRING WEIGHT IS 1115. LB IN AIR.

MAIN PASS

FILES SPLICED	SPLICE DEPTH
55 TO 48	1398.0 F

SPEED CORRECTION NOT APPLIED

DRHO(G/C3)
-.2500 .25000

TENS(LBF)
10000. 0.0
GR(GAPI)
0.0 150.00
CALI(IN)
6.0000 16.000

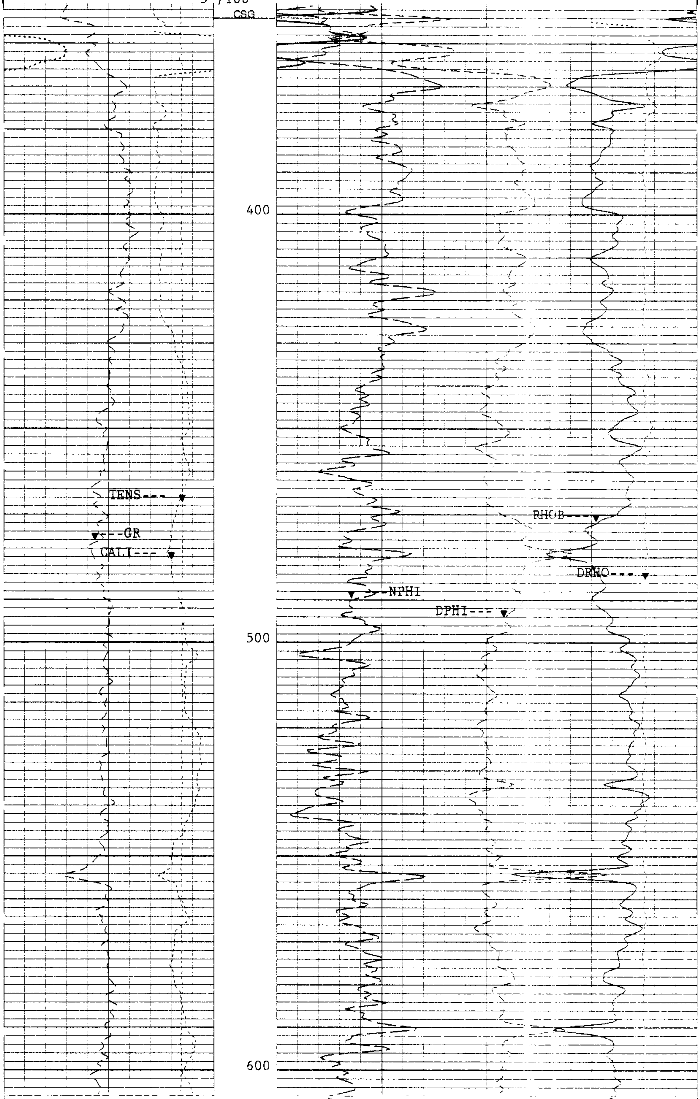
RHOB(G/C3)
3.0000 2.0000
NPHI(V/V)
.60000 0.0
DPHI(V/V)
.60000 0.0

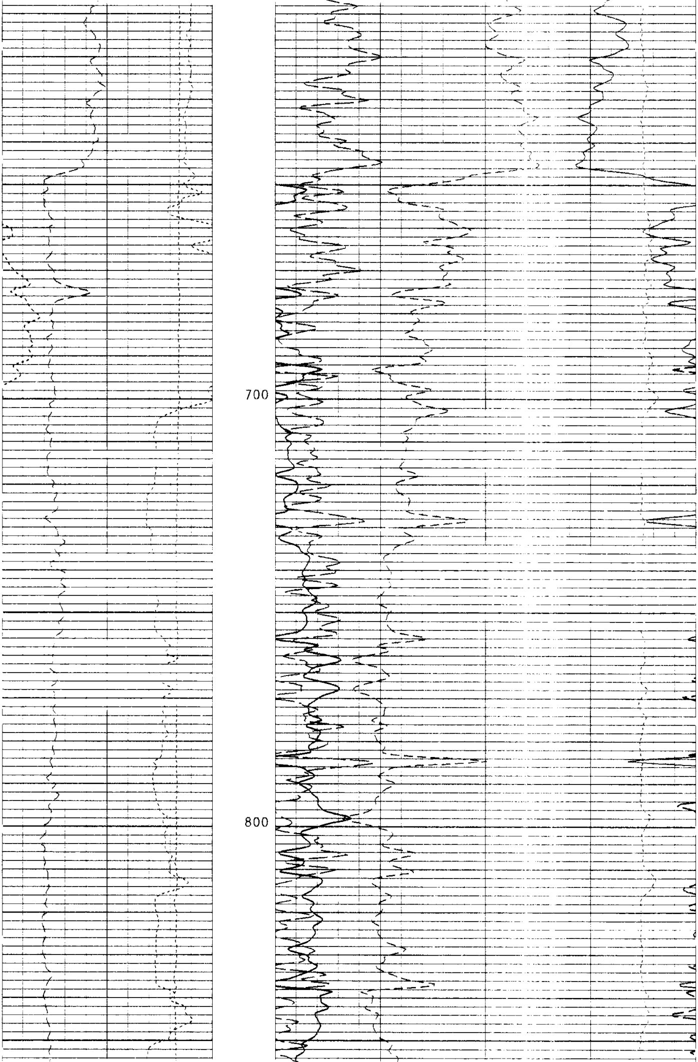
CROSSOVER

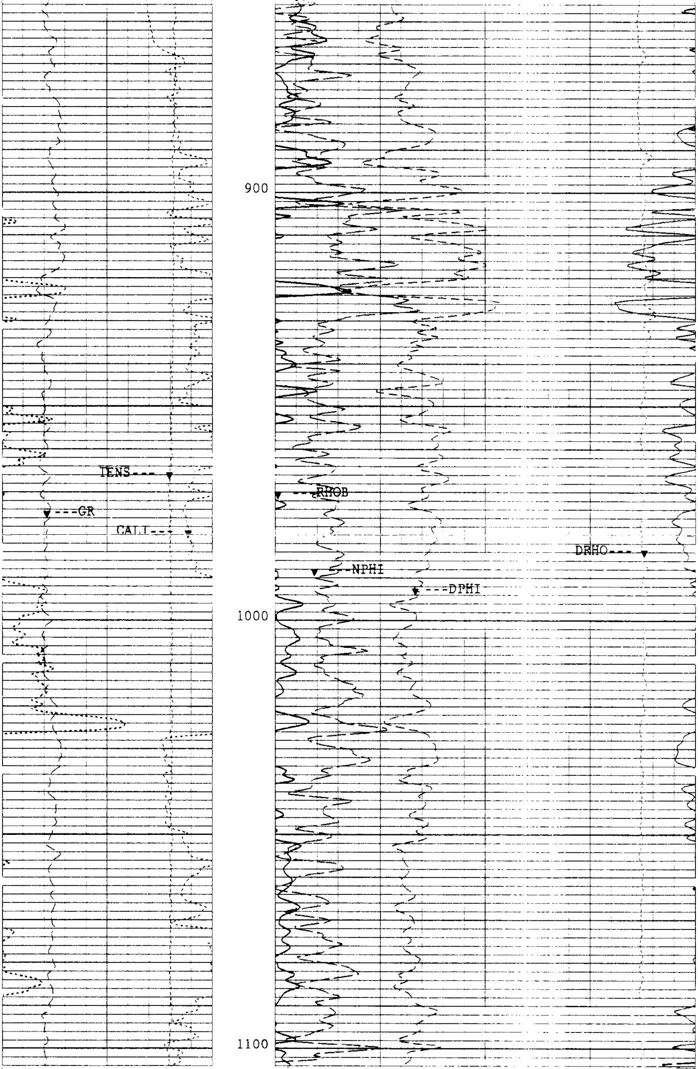
CP 44.2 FILE 61 04-OCT-1997 18:38

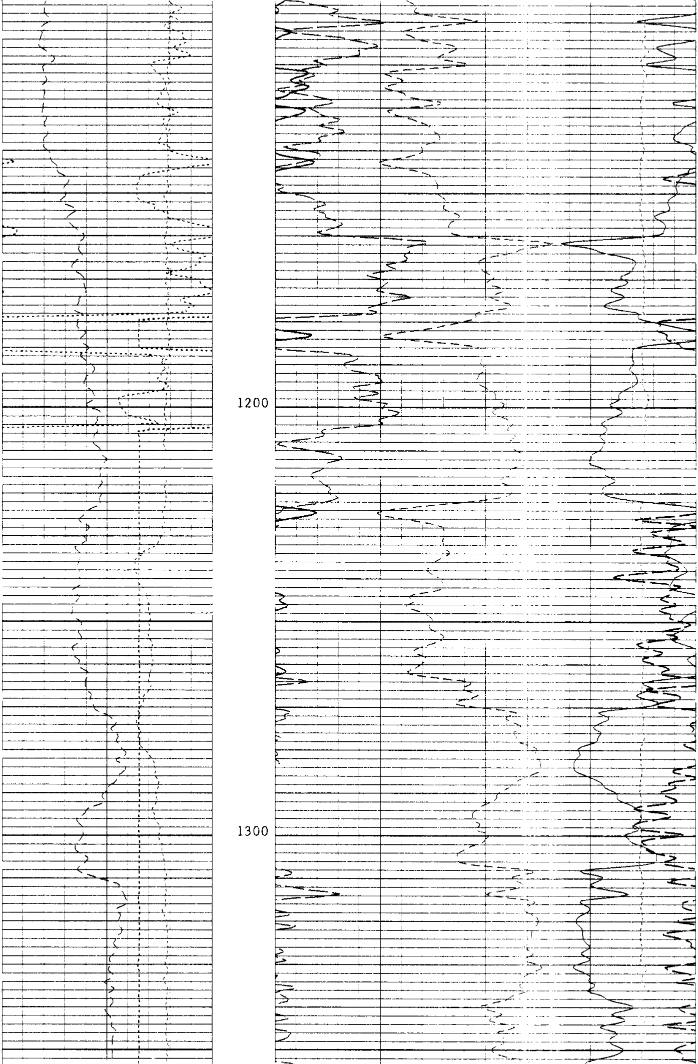
INPUT FILE(S) CREATION DATE
48 01-OCT-1997 09:12

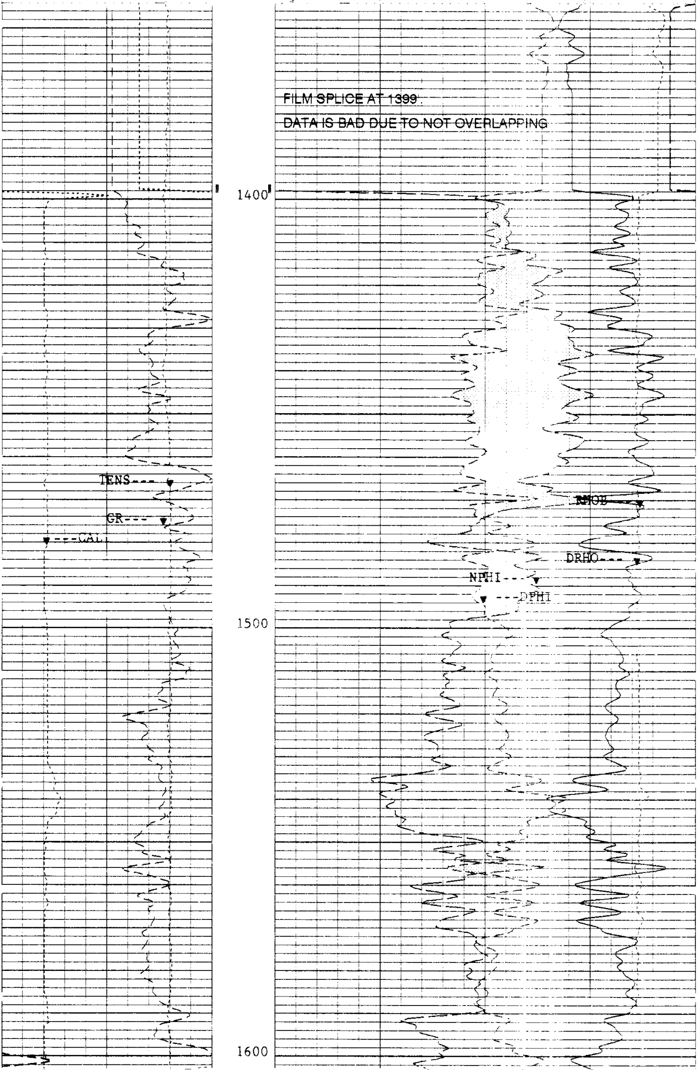
5"/100'





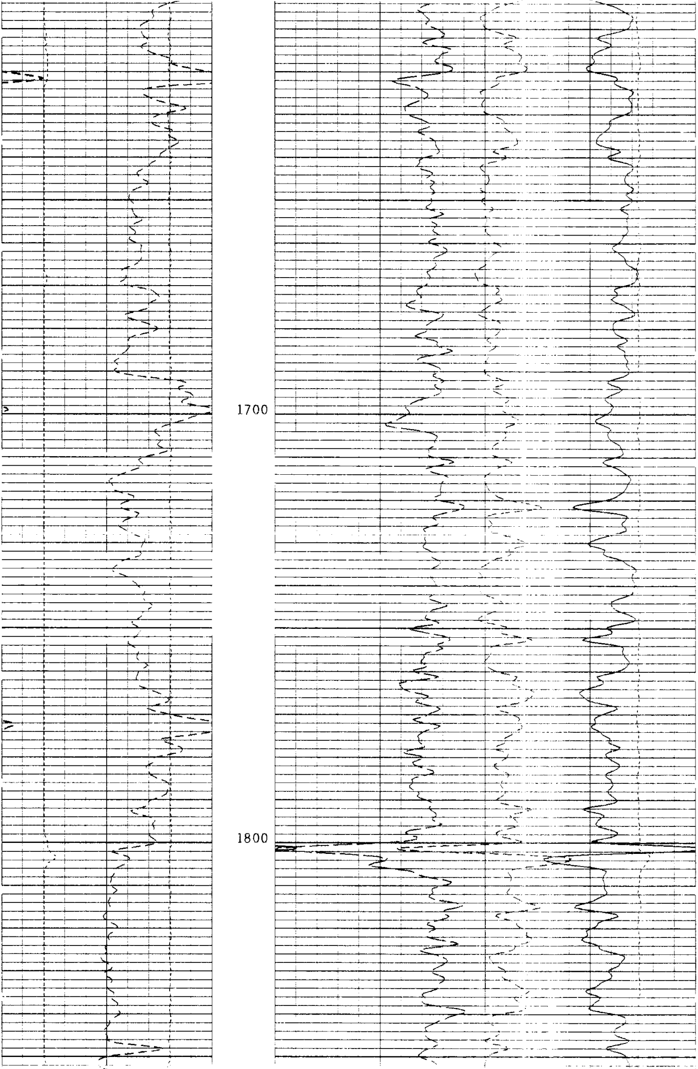


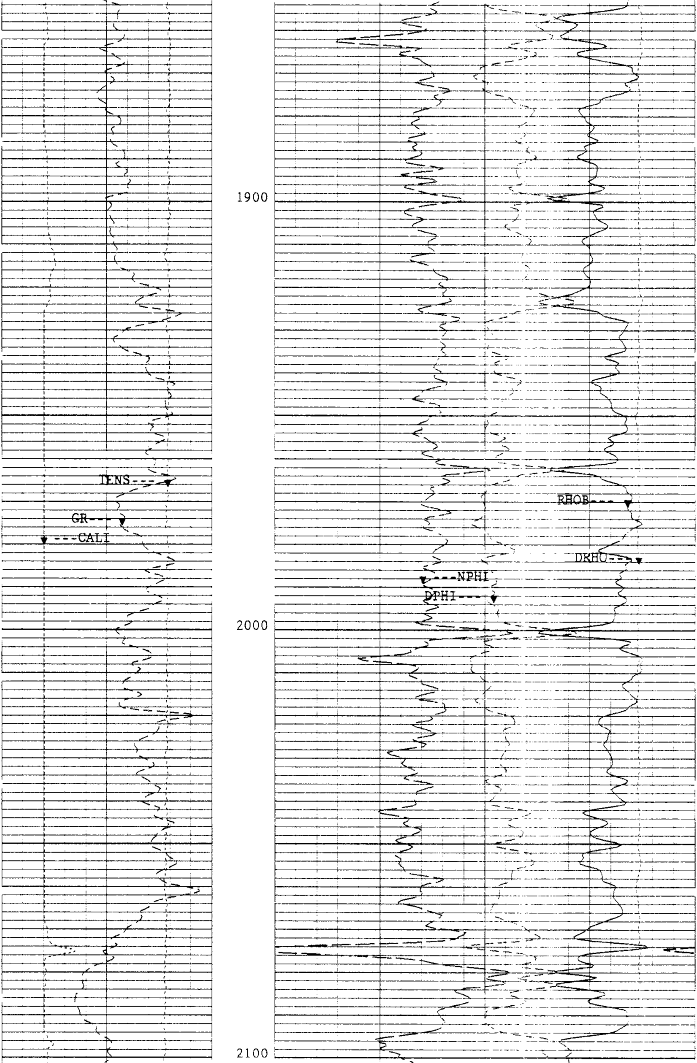


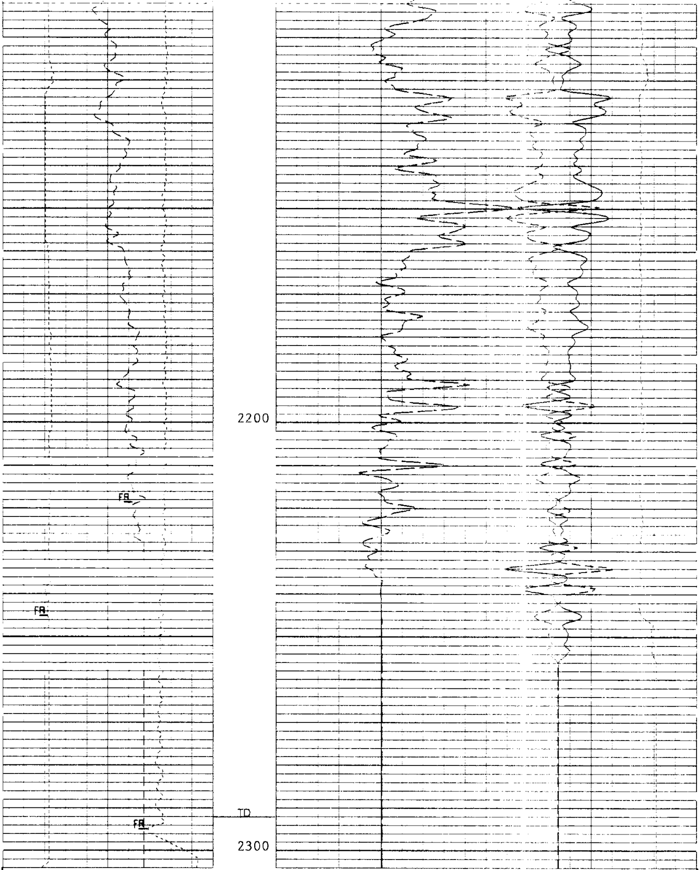


FILM SPLICE AT 1399.

DATA IS BAD DUE TO NOT OVERLAPPING







5"/100'

CP 44.2 FILE 61 04-OCT-1997 17:37

INPUT FILE(S) CREATION DATE
55 04-OCT-1997 09:05

CROSSOVER

DRHO(G/C3)
-.2500 .25000

TENS(LBF)
10000. 0.0

GR(GAPI)
0.0 150.00

CALI(IN)
6.0000 16.000

RHOB(G/C3)
3.0000 2.0000

NPHI(V/V)
.60000 0.0

DPHI(V/V)
.60000 0.0

```
                 SENSOR MEASURE POINT TO TOOL ZERO

        LDTD 46.9   FEET                   SGTL 73.4   FEET
        MESTC  2.2   FEET                   DTT   -2.9   FEET
        CNTH 64.9   FEET                   GPIT   1.1   FEET
```

```
                              PARAMETERS

      NAME   VALUE        UNIT                NAME   VALUE        UNIT

      PADT .500000        DEG                 PP    NORM
      DO    1.00000       F                   WMUD 8.60000        LB/G
      NCJT GSRY                               DHC   BS
      BFM   LIQU                              NPDC 0
      HSCO YES                                SOCO NO
      MCCO NO                                 BSCO NO
      FSCO NO                                 MWCO NO
      PTCO NO                                 CCCO NO
      SDAT SOCN                               MCOR NATU
      SOCN .500000        IN                  FSAL -50000.0       PPM
      ANGL 0.0            DEG                 GGRD .0100000       DF/F
      BHFL WATE                               MDEN 2.65000        G/C3
      FD    1.00000       G/C3                FCSR 0.1"
      AFMO HAMM                               ICMO AUTO
      MDEC 19.5000        DEG                 GLM   DIPM
      ICSD -50000.0       F                   RBS   AUTO
      PTYP MEC                                MLM   1800
      SOFF -1.00000       IN                  CSR   .6"
      ODFO LIS                                XMOD AUTO
      XGAI 2                                  XOFF 0
      DPPM STAN                               MATR SAND
      HC    CALI                              FCD   5.50000       IN
      SPCR DISA                               TDL   1399.00       F
      MRT   102.000       DEGF                DFD   9.50000       LB/G
      RMFS 3.72000        OHMM                RMS   2.31000       OHMM
      MST   69.0000       DEGF                MFST 66.0000        DEGF
      BS    7.87500       IN                  BHS   OPEN
```

REPEAT SECTION

```
          SPEED CORRECTION NOT APPLIED
```

```
   ACCUMULATED INTEGRATION VALUES SUMMARY:

   Integrated Hole Volume:     110.316 F3    FROM 1704.00 F    TO 1395.00 F
   Integrated Cement Volume: 59.4997 F3    FROM 1704.00 F    TO 1395.00 F
     (ASSUMING 5.50000 IN    O.D. CASING)
```

```
   EVENT MARK SUMMARY:

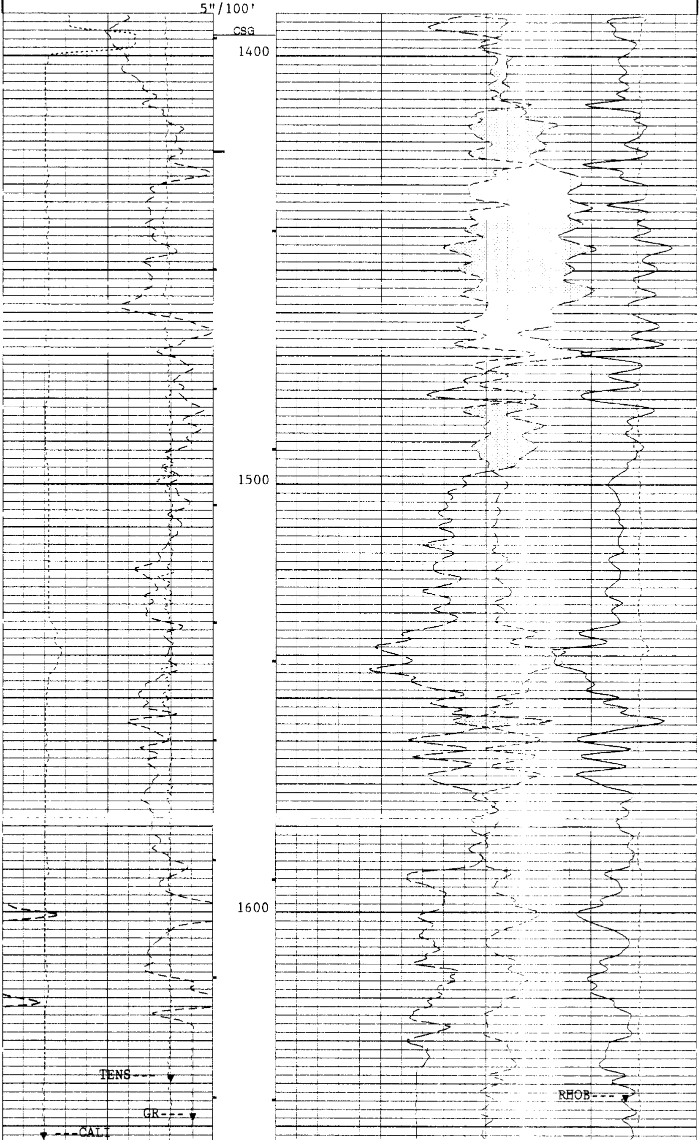
   OUTPUT                        INTERVAL        DEPTH TRACK
                                 BETWEEN PIPS    EDGE

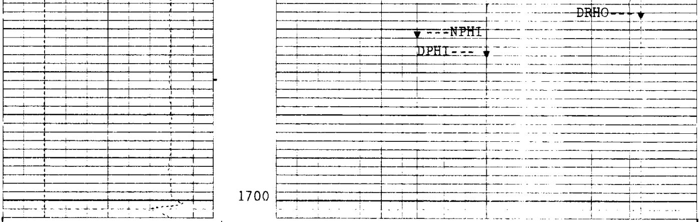
   Integrated Hole Volume        10.0000 F3      LEFT EDGE
   Integrated Cement Volume      10.0000 F3      RIGHT EDGE
```

```
                                                                   DRHO(G/C3)
                                                                   -.2500     .25000
          TENS(LBF)                                  RHOB(G/C3)
10000.                  0.0        3.0000                                     2.0000
          GR(GAPI)                                   NPHI(V/V)
0.0                  150.00        .60000                                     0.0
          CALI(IN )                                  DPHI(V/V)
6.0000               16.000        .60000                                     0.0

                                                     CROSSOVER
```

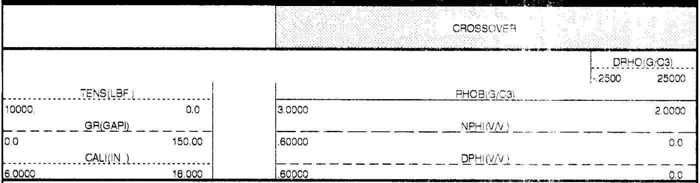
CP 44.2 FILE 56 04-OCT-1997 10:15 (UP)





5"/100'

CP 44.2 FILE 56 04-OCT-1997 10:01 (UP



SENSOR MEASURE POINT TO TOOL ZERO

CNTC	63.9	FEET	CFTC	64.4	FEET
LL	46.8	FEET	LITH	46.8	FEET
LU	46.8	FEET	LS	46.8	FEET
SS1	46.3	FEET	PARI	46.3	FEET
GR	73.4	FEET	SS2	46.3	FEET
TENS	-2.9	FEET	CALI	46.9	FEET
C2	2.2	FEET	C1	2.2	FEET
MRPD	2.2	FEET	MDRB	2.2	FEET
MRPB	2.2	FEET	MRPC	2.2	FEET
AX	1.1	FEET	MRPA	2.2	FEET
AZ	1.1	FEET	AY	1.1	FEET
FY	1.1	FEET	FX	1.1	FEET
FCAX	1.1	FEET	FZ	1.1	FEET
FCAZ	1.1	FEET	FCAY	1.1	FEET
TNRA	64.9	FEET	FTIM	1.1	FEET

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
PADT	0.0	DEG	WMUD	8.60000	LB/G
NCJT	GSRY		DHC	BS	
BFM	LIQU		NPDC	0	
HSCO	YES		SOCO	NO	
MCCO	NO		BSCO	NO	
FSCO	NO		MWCO	NO	
PTCO	NO		CCCO	NO	
SDAT	SOCN		MCOR	NATU	
SOCN	.500000	IN	FSAL	-50000.0	PPM
ANGL	0.0	DEG	GGRD	.0100000	DF/F
BHFL	WATE		MDEN	2.65000	G/C3
FD	1.00000	G/C3	FCSR	0.1"	
AFMO	HAMM		ICMO	AUTO	
MDEC	19.5000	DEG	GLM	DIPM	
ICSD	-50000.0	F	RBS	AUTO	
PTYP	MEC		MLM	1800	
SOFF	-1.00000	IN	CSR	.6"	
ODFO	RAW		XMOD	AUTO	
XGAI	2		XOFF	0	
DPPM	STAN		MATR	SAND	
HC	CALI		FCD	5.50000	IN
SPCR	DISA		TDL	1399.00	F
MRT	102.000	DEGF	DFD	9.50000	LB/G
RMFS	3.72000	OHMM	RMS	2.31000	OHMM
MST	69.0000	DEGF	MFST	66.0000	DEGF
BS	7.87500	IN	BHS	OPEN	

CALIBRATIONS

```
                  BEFORE SURVEY CALIBRATION Summary


  Performed:    04-OCT-1997 08:32
  Program File: NSDIP  (Version    44.2    95/07/25  95/07/25)


MEST            Caliper Calibration Summary

             MEASURED                     CALIBRATED
           Small   Large               Small     Large        UNITS
    C1     8.75    12.75               8.00      11.88         IN
    C2     8.50    12.53               8.00      11.88         IN

Small: 04-OCT-1997 08:27 Large: 27-SEP-1997 15:58 Comp: 04-OCT-1997 08:29


GPIC            Calibration Summary

 MAGNETOMETER MANUFACTURER CODE:              3
 MAGNETOMETER SERIAL NUMBER:                228
 MAGNETOMETER REFERENCE TEMPERATURE :         20.0  DEGC


GPIC            Calibration Summary

 ACCELEROMETER MANUFACTURER CODE:              3
 ACCELEROMETER SERIAL NUMBER:                520
 ACCELEROMETER REFERENCE TEMPERATURE :         20.0  DEGC


CNTH            Detector Calibration Summary

      Neutron Cartridge Number     : 1345
      Neutron Source Number        : 2576
      Thermal Housing Number       : 4431
      Alpha detectors              : Yes

          Input     Plus       Shop    Gain     Shop     Before     Tol.
                 Reference     Tank              Bkg      Bkg       Bkg
                   Counts     Counts            Counts   Counts    Counts

          CNTC    6031.00    5998.75   1.005    24.754   25.260     3.713
          CFTC    2793.00    2640.31   1.058    30.245   31.886     4.537

          Ratio      2.159      2.272


Before Survey Calibrations done: 27-SEP-1997 15:39


LDTD            Detector Calibration Summary

        Density Resistivity Sonde Number    :    4768
        Nuclear Services Cartridge Number   :    2979
        Powered Detector Housing Number     :    1989
        Powered Gamma-Gamma Detector Number :    1989
        LDT Logging Source Number           :    1925
        LDT Calibration Mode                :    WATE

                 Measured        Shop  Values
                   Bkgd         Al+Fe    Al      Units
          LL       19.8          91.5  100.0      CPS
          LU       76.0         137.2  150.3      CPS
          LS       57.8         160.1  175.1      CPS
         LITH       5.5          42.3   66.5      CPS
          SS1      18.0         174.5  191.0      CPS
          SS2      12.3         250.6  271.1      CPS

           HV Settings         Detector Resolutions
          HV LS:  1232.6 V          LS:  8.7 %
          HV SS:  1206.0 V          SS:  8.7 %
```

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Wellsite Calibration done: 27-SEP-1997 15:44


SGTL            Detector Calibration Summary

             MEASURED
           BKGD     JIG         CALIBRATED          UNITS
    GR       0        0              0              GAPI

Back:                       Jig:                        Comp:


LDTD            Caliper Calibration Summary

             MEASURED                      CALIBRATED
           Small    Large             Small      Large         UNITS
  CALI      .80      .80              2.59       2.59            IN

Small: 27-SEP-1997 15:47 Large: 27-SEP-1997 15:46 Comp: 27-SEP-1997 15:46

   CP 44.2           FILE     0       04-OCT-1997 08:30
```

COMPANY	NORTHWEST NATURAL GAS			**SCHL.**	**FR**	2282.0 F
				SCHL.	**TD**	2292.0 F
WELL	IW 23a-22-65			**DRLR.**	**TD**	2299.0 F
FIELD	MIST GAS STORAGE			**Elev:**	**KB**	596.5 F
					DF	
COUNTY	COLUMBIA	**STATE**	OREGON		**GL**	580.5 F

Schlumberger

FORMATION DENSITY
COMPENSATED NEUTRON
GAMMA RAY 5"