DOGAMI #508

Schlumberger

FORMATION DENSITY COMPENSATED NEUTRON GAMMA RAY 2"

COUNTY:	COLUMBIA
FIELD	MIST GAS STORAGE
LOCATION	N 03-03-15 E 2286.41' & S 86-56-45
WELL	IW 22DH-22-65
COMPANY	NORTHWEST NATURAL GAS CO.

COMPANY NORTHWEST NATURAL GAS CO.

WELL IW 22DH-22-65

FIELD MIST GAS STORAGE

SCANNED

COUNTY: COLUMBIA **STATE:** OREGON

LOCATION
N 03-03-15 E 2286.41' & S 86-56-45
1915.16' FROM THE SW CORNER OF SEC. 22

API SERIAL NO.	SECT.	TWP.	RANGE
36-009-00328	22	6N	5W

Other Services:
INDUCTION
SONIC
FMS
DENSITY
NEUTRON
GAMMA RAY

Permanent Datum	GROUND LEVEL	**Elev.** 579.7 F		**Elev.:** K.B.595.7 F
Log Measured From	KELLY BUSHING	16.0 F	**above Perm. Datum**	**D.F.**
Drilling Measured From	KELLY BUSHING			**G.L.**579.7 F

Date	16-JAN-1998		23-JAN-1998			
Run No.	ONE		TWO			
Depth Driller	1995.0 F		2746.0 F			
Depth Logger (Schl.)	1990.0 F		2735.0 F			
Btm. Log Interval	1980.0 F		2725.0 F			
Top Log Interval	0.0 F		1990.0 F			
Casing-Driller	13 3/8" @ 426.0 F		8 5/8" @ 1992.0 F		@	
Casing-Logger	422.0 F		1992.0 F			
Bit Size	@		@		@	
Type Fluid in Hole	LSND		FLO-PRO			
Dens. / **Visc.**	9.80 LB/G	47.0 S	8.50 LB/G			
pH / **Fld. Loss**	8.5		10.0			
Source of Sample	FLOWLINE		FLOWLINE			
Rm @ Meas. Temp.	2.620 OHMM @ 64.0 DEGF		.245 OHMM @ 69.0 DEGF			
Rmf @ Meas. Temp.	1.560 OHMM @ 62.0 DEGF		.122 OHMM @ 67.0 DEGF			
Rmc @ Meas. Temp.	1.320 OHMM @ 62.0 DEGF		.134 OHMM @ 67.0 DEGF			
Source: Rmf / **Rmc**	CELL	CELL	CELL	CELL		
Rm @ BHT	1.806 OHMM @ 96.0 DEGF		.176 OHMM @ 99.0 DEGF			
TIME **Circulation Ended**	2:00 16-JAN-98		18:30 22-JAN-98			
TIME **Logger on Bottom**	SEE LOG					
Max. Rec. Temp.	96.0 DEGF		99.0 DEGF			
Equip. / **Location**	8303	BAKERSFIELD	8303	BAKERSFIELD		
Recorded By	GREG PERRY		GREG PERRY			
Witnessed By	MR. MEYER / MR. THOMAS		MR. ROTH			

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 willful 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	1.045 OHMM @ 96.0 DEGF	.085 OHMM @ 99.0 DEGF
Rmc @ BHT	.884 OHMM @ 96.0 DEGF	.094 OHMM @ 99.0 DEGF
Logging Speed	1800.0 F/HR	
EQUIPMENT DATA		
Tool Number 1	DIS 151	
Tool Number 2	DIC 159	
Tool Number 3	SLSWA	
Tool Number 4	SLC 432	
Tool Number 5	SGC 483	
Tool Number 6	TCCB 1289	
Tool Number 7	.	
Tool Number 8	AMS	
Tool Number 9	SHE	
Tool Number 10		
Tool Number 11		
Tool Number 12		

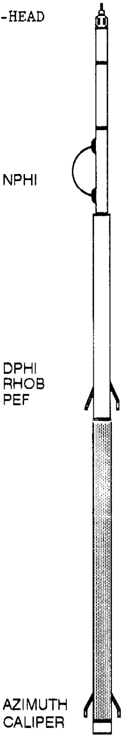
REMARKS:

RAN FLEX JOINTS ON INDUCTION AND SONIC.
RAN 6 ARM FINS ON SONIC.
RAN FLEX JOINTS ABOVE FMS AND ABOVE AMS.
DID NOT TAG TD DUE TO PUSH DOWN TOOLS.

CREW: DAN LEE.

THANKS FOR CHOOSING SCHLUMBERGER!!!!!!

LOGGING TOOL STRING SKETCH



TCCB, 3 3/8" OD		59.6 F
SGTL, 3 3/8" OD		56.6 F
	GR	55.7 F
CNTH, 3 3/8" OD		51.1 F
LDTD, 4 1/2" OD		43.8 F
	CALI	29.2 F
MESTC, 5" OD		26.5 F
	EV C2 C1	2.2 F
GPIT	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
101 TO 102	2319.0 F
102 TO 91	1985.0 F

ACCUMULATED INTEGRATION VALUES SUMMARY:

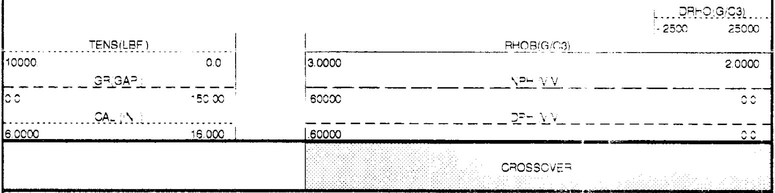
Integrated Hole Volume: 1906.53 F3 FROM 2750.50 F TO 410.000 F
Integrated Cement Volume: 1520.37 F3 FROM 2750.50 F TO 410.000 F
(ASSUMING 5.50000 IN O.D. CASING)

EVENT MARK SUMMARY:

OUTPUT	INTERVAL BETWEEN PIPS	DEPTH TRACK EDGE
Integrated Hole Volume	10.0000 F3	LEFT EDGE
Integrated Cement Volume	10.0000 F3	RIGHT EDGE

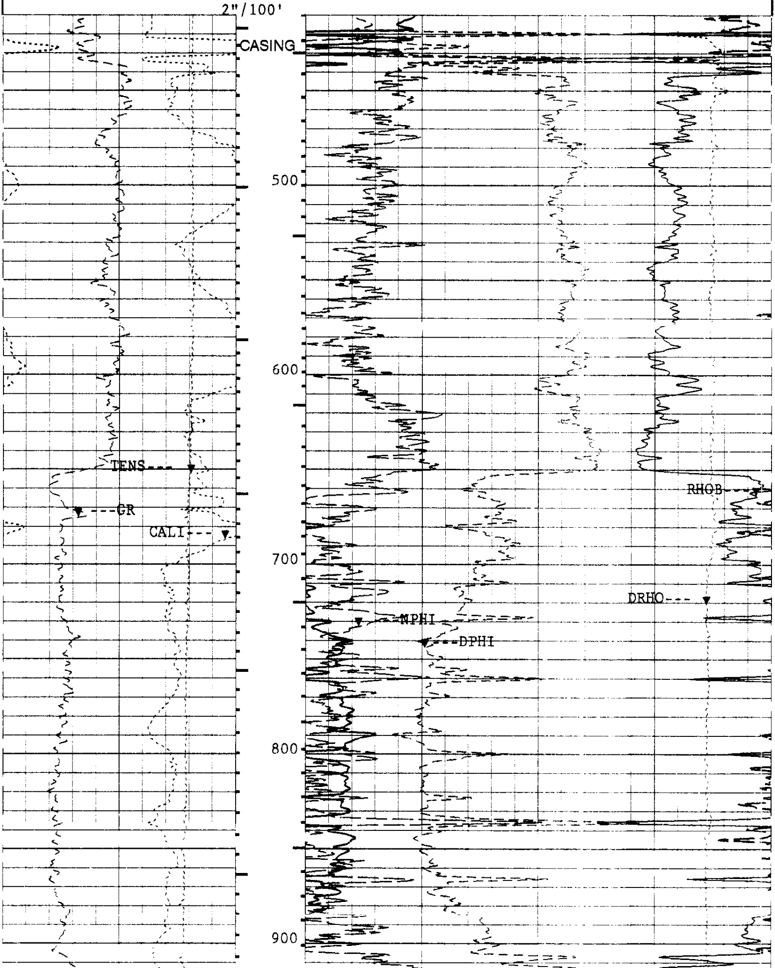
CHANGED PARAMETERS

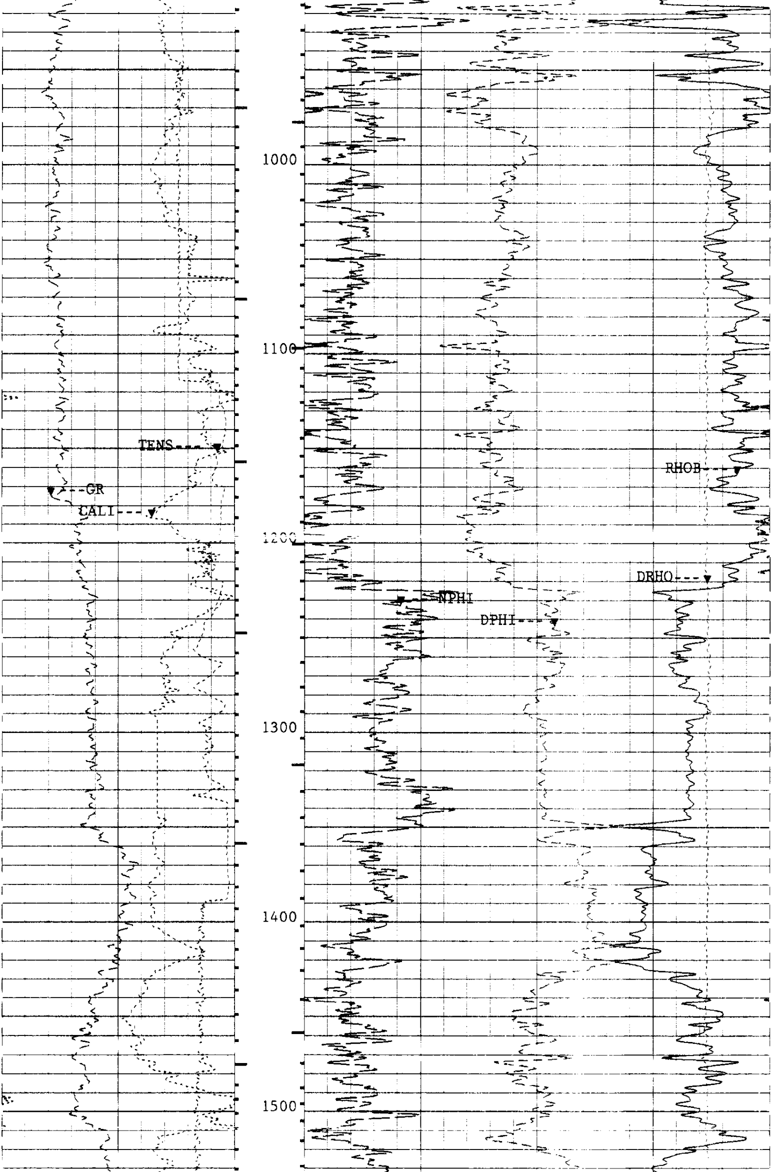
NAME	VALUE	UNIT	DEPTH (F)	NAME	VALUE	UNIT	DEPTH (F)
DO	0.0	F	1986.0				

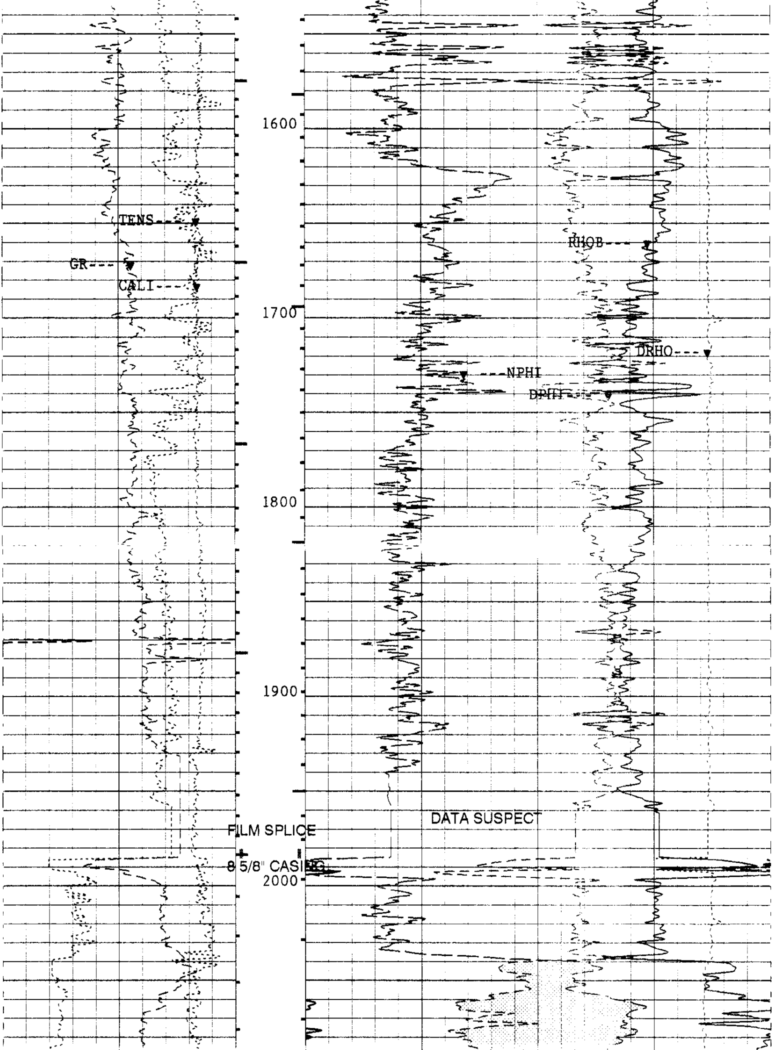


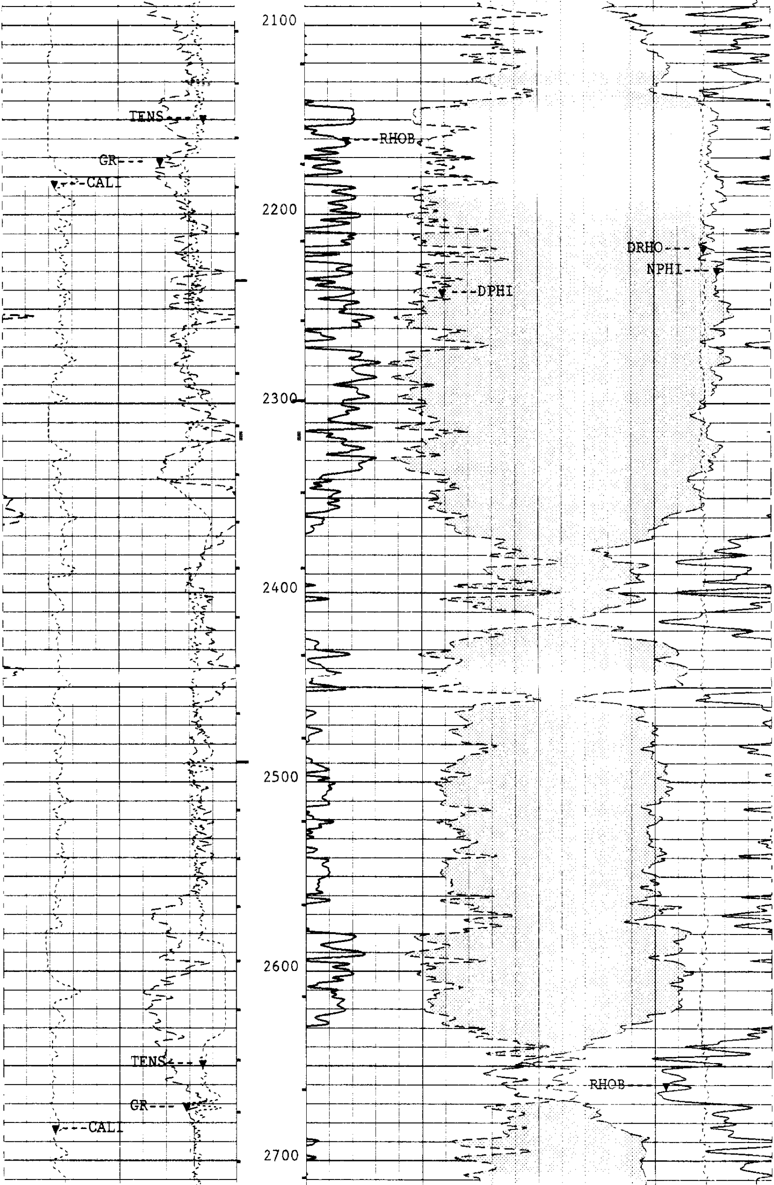
CP 44.2 FILE 105 23-JAN-1998 16:31

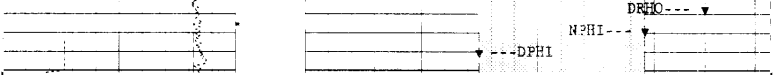
INPUT FILE(S) CREATION DATE
91 17-JAN-1998











2"/100'

CP 44.2   FILE 105   23-JAN-1998 16:21

INPUT FILE(S)   CREATION DATE
101   23-JAN-1998 13:32

CROSSOVER

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

SENSOR MEASURE POINT TO TOOL ZERO

LDTD	2.7	FEET	SGTL	31.2	FEET
CNTH	20.7	FEET	DTT	-2.9	FEET
AMS	40.4	FEET			

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
PP	NORM		DO	4.00000	F
WMUD	8.50000	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
DPPM	STAN		MATR	SAND	
HC	CALI		DTCI	0.0	F
FCD	5.50000	IN	DFD	9.80000	LB/G
RMFS	1.56000	OHMM	MFST	62.0000	DEGF
BS	7.87500	IN	BHS	OPEN	

REPEAT SECTION

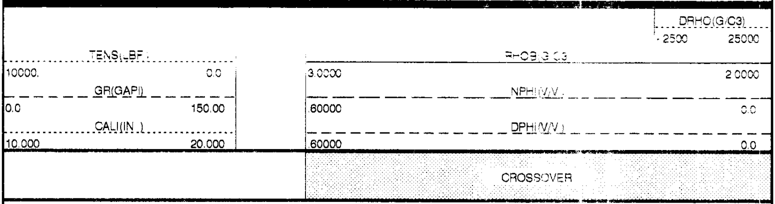
SPEED CORRECTION NOT APPLIED

ACCUMULATED INTEGRATION VALUES SUMMARY:

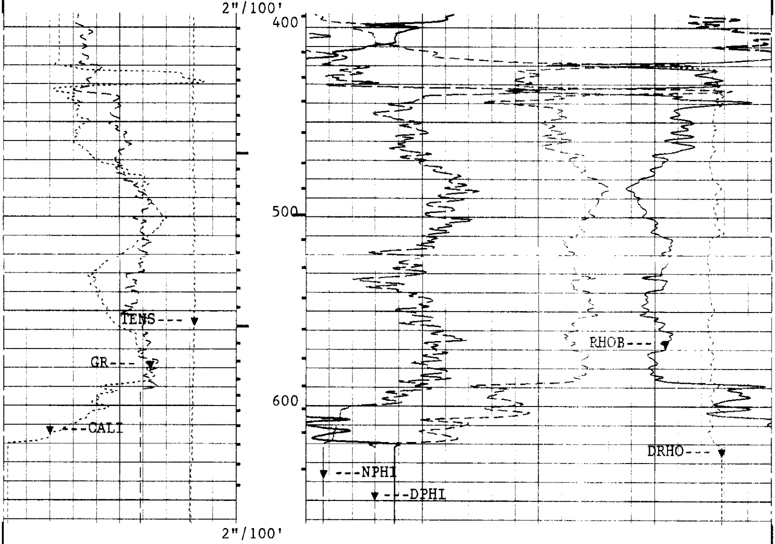
```
Integrated Hole Volume:   278.351 F3    FROM 654.000 F    TO 392.500 F
Integrated Cement Volume: 171.222 F3    FROM 654.000 F    TO 392.500 F
  (ASSUMING 8.67500 IN   O.D. CASING)
```

EVENT MARK SUMMARY:

OUTPUT	INTERVAL BETWEEN PIPS	DEPTH TRACK EDGE
Integrated Hole Volume	10.0000 F3	LEFT EDGE
Integrated Cement Volume	10.0000 F3	RIGHT EDGE



CP 44.2 FILE 64 16-JAN-1998 07:58 (UP)



CP 44.2 FILE 64 16-JAN-1998 07:43 (UP)

CROSSOVER

DRHO(G/C3)	-.2500	.25000
TENS(LBF)	10000.	0.0
GR(GAPI)	0.0	150.00
CALI(IN)	10.000	20.000
RHOB(G/C3)	3.0000	2.0000
NPH (V/V)	.60000	0.0
DPH (V/V)	.60000	0.0

SENSOR MEASURE POINT TO TOOL ZERO

CNTC	48.2	FEET	CFTC	48.7	FEET
LL	31.1	FEET	LITH	31.1	FEET
LU	31.1	FEET	LS	31.1	FEET
SS1	30.6	FEET	PARI	30.6	FEET
GR	59.7	FEET	SS2	30.6	FEET
TENS	-10.9	FEET	CALI	31.2	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	49.2	FEET	FTIM	1.1	FEET

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
PADT	0.0	DEG	WMUD	9.80000	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	18.6240	DEG	GLM	DIPM	
ICSD	-50000.0	F	RBS	AUTO	
PTYP	MEC		MLM	1800	
SOFF	-1.00000	IN	CSR	.6"	
ODFO	RAW		XMOD	AUTO	
XGAI	3		XOFF	0	
DPPM	STAN		MATR	SAND	
HC	CALI		FCD	8.67500	IN
SPCR	DISA		DSCA	40	DEG
SBUT	8		INT	4.00000	F
STEP	2.00000	F	SPAN	4	
SANG	35.0000		DPAD	AUTO	
DMAX	90	DEG	ELRA	.500000	IN
SDFA	.900000		HQUA	14	
LQUA	6		STDI	0.0	DEG
STDA	0.0	DEG	CSBL	2	
STEM	45.0000	DEGF	DFD	10.0000	LB/G
RMFS	.880000	OHMM	RMS	1.51000	OHMM
MST	85.0000	DEGF	MFST	68.0000	DEGF
BS	12.2500	IN	BHS	OPEN	

CALIBRATIONS

```
                 SHOP Summary

   Performed:    20-OCT-1997 09:46
   Program File: CCSHOP (Version    44.2    95/07/25  95/07/25)

DITE             Calibration Summary

Sonde Serial Number: 151
Cartridge Serial Number: 159

                        SHOP CONSTANTS

Test Loop Calibration:  Calibration of internal reference
                        to test loop standard

        Cons.   Gain     Valid Range     Cons.   Phase   Valid Range
               (---)       (---)                ( DEG )    ( DEG )

10KHz:
   ILD:  DGF1    .999   .900 => 1.100   DPH1      .15  -1.50 =>  1.50
   ILM:  MGF1   1.054   .900 => 1.100   MPH1     -.32  -1.50 =>  1.50

20KHz:
   ILD:  DGF2   1.009   .900 => 1.100   DPH2     -.00  -2.00 =>  2.00
   ILM:  MGF2   1.058   .900 => 1.100   MPH2    -1.08  -3.00 =>  1.00

40KHz:
   ILD:  DGF4   1.023   .900 => 1.100   DPH4    -1.09  -4.00 =>  2.00
   ILM:  MGF4   1.083   .900 => 1.100   MPH4    -2.65  -5.00 =>  1.00

Sonde Error Corrections:  Correction for sonde response in Zero
                          Conductivity Environments

              Cons.  Sonde Error    Valid Range
                     Correction
                       (MM/M )        (MM/M )

10KHz:
   IRD SEC:  DRE1       31.60      -50.0 => 125.0
   IXD SEC:  DXE1      221.33     -250.0 => 350.0
   IRM SEC:  MRE1       63.89      -50.0 => 140.0
   IXM SEC:  MXE1       27.25    -1300.0 =>1300.0

20KHz:
   IRD SEC:  DRE2       11.56      -30.0 =>  30.0
   IXD SEC:  DXE2      124.49     -125.0 => 200.0
   IRM SEC:  MRE2       17.10      -50.0 =>  50.0
   IXM SEC:  MXE2       39.01     -650.0 => 650.0

40KHz:
   IRD SEC:  DRE4        1.24      -15.0 =>  15.0
   IXD SEC:  DXE4       79.27      -75.0 => 125.0
   IRM SEC:  MRE4        3.45      -30.0 =>  30.0
   IXM SEC:  MXE4       46.63     -350.0 => 350.0

NOTE: All Sonde Error Corrections have been normalized to 25 DegC.

                 Shop Electronic Calibration Summary
```

```
Electronic Calibration:  Calibration of System Electronics
                         using the internal reference

Induction Electronics:

     Offset   Valid Range    Gain  Valid Range    Phase   Valid Range
     (MM/M )   (MM/M )       (--)     (---)       (DEG.)    (DEG.)

10 KHz:
  IRD    20.1 -375. => 375.    .936   .75 => 1.25
  IXD    47.4 -375. => 375.    .942   .75 => 1.25   10.99  -5.00 => 20.00
  IRM    64.2 -900. => 900.    .954   .75 => 1.25
  IXM     1.5 -900. => 900.    .917   .75 => 1.25    8.98  -5.00 => 20.00

20 KHz:
  IRD     8.0 -150. => 150.    .983   .75 => 1.25
  IXD    19.6 -150. => 150.    .989   .75 => 1.25    9.11  -5.00 => 20.00
  IRM    26.2 -350. => 350.    .997   .75 => 1.25
  IXM      .7 -350. => 350.    .958   .75 => 1.25    8.51  -5.00 => 20.00

40 KHz:
  IRD     5.2 -100. => 100.    .979   .75 => 1.25
  IXD    13.1 -100. => 100.    .984   .75 => 1.25   24.78 -10.00 => 35.00
  IRM    17.0 -200. => 200.   1.003   .75 => 1.25
  IXM      .5 -200. => 200.    .964   .75 => 1.25   25.13 -10.00 => 35.00

SFL Electronics:

      Offset  Valid Range    Units      Gain   Valid Range

  SFV     .5  -16.0 => 16.0   MV         .988   .75 => 1.25
  SFC    -.0     -.7 =>   .7  MA         .987   .75 => 1.25


DITE            Electronics Calibration Summary

Sonde SN#: 151
Cartridge SN#: 159
Induction Freq: 20  KHz

Induction Electronics:

     Offset   Valid Range    Gain  Valid Range    Phase   Valid Range
     (MM/M )   (MM/M )       (--)     (---)       (DEG.)    (DEG.)

  IRD     8.0 -117. => 133.    .982   .84 => 1.18
  IXD    19.6 -105. => 145.    .988   .84 => 1.19    9.13  -5.89 => 24.11
  IRM    26.2 -199. => 251.    .995   .85 => 1.20
  IXM      .7 -224. => 226.    .956   .81 => 1.15    8.57  -6.49 => 23.51

SFL Electronics:

      Offset  Valid Range    Units      Gain   Valid Range

  SFV     .5  -14.5 => 15.5   MV         .99   .84 => 1.19
  SFC    -.0     -.6 =>   .6  MA         .99   .84 => 1.18

   CP 44.2           FILE     0       20-OCT-1997 09:45



                SHOP Summary


  Performed:     12-AUG-1997 11:13
  Program File: CCSHOP (Version    44.2    95/07/25  95/07/25)


CNTH            Detector Calibration Summary

     CNC #                 : 4431
     Neutron Source #      : 2576
     Thermal Housing #     : 4431
     Alpha detectors       : Yes
```

```
          Input     Plus       Shop     Gain      Shop
                 Reference     Tank               Bkg
                   Counts     Counts             Counts

          CNTC    6031.00   5998.75   1.005      24.754
          CFTC    2793.00   2640.31   1.058      30.245

          RATIO     2.159     2.272

          Shop Counts temperature and housing size corrected

Shop Tank Calibration done: 12-AUG-1997 11:13

   CP 44.2             FILE     0       12-AUG-1997 11:13



                SHOP Summary


  Performed:    12-AUG-1997 14:06
  Program File: CCSHOP (Version    44.2    95/07/25  95/07/25)


LDTD            Detector Calibration Summary

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

                     Master Calibrated
                    Bkgd   Al+Fe     Al  Units
              LL    19.9    91.5   100.0   CPS
              LU    76.0   137.2   150.3   CPS
              LS    58.0   160.1   175.1   CPS
            LITH     5.6    42.3    66.5   CPS
             SS1    18.2   174.5   191.0   CPS
             SS2    12.4   250.6   271.1   CPS

          HV Settings            Detector Resolutions
        HV LS:  1230.1 V              LS:  8.7 %
        HV SS:  1201.1 V              SS:  8.7 %

                  Spectrum Quality Ratios
          Computed Value         Nominal Value    Tolerance
   QRLS          .666                 0.65         +/- 0.05
   QRSS          .704                 0.72         +/- 0.10
   QRLI          .380                 0.39         +/- 0.06
   QLIR         1.436                 1.39         +/- 0.06
   QR           1.000                 1.00         +/- 0.02

Shop Block Calibration done: 12-AUG-1997 13:57

   CP 44.2             FILE     0       12-AUG-1997 14:06
```

COMPANY	NORTHWEST NATURAL GAS CO.
WELL	IW 22DH-22-65
FIELD	MIST GAS STORAGE
COUNTY:	COLUMBIA
STATE:	OREGON

SCHL.	**FR**	2725.0 F
SCHL.	**TD**	2735.0 F
DRLR.	**TD**	2746.0 F
Elev:	**KB**	595.7 F
	DF	
	GL	579.7 F

Schlumberger

FORMATION DENSITY
COMPENSATED NEUTRON
GAMMA RAY 2"