DOGAMI #508

Schlumberger

SONIC / SP
GAMMA RAY
5" LOG

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

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:

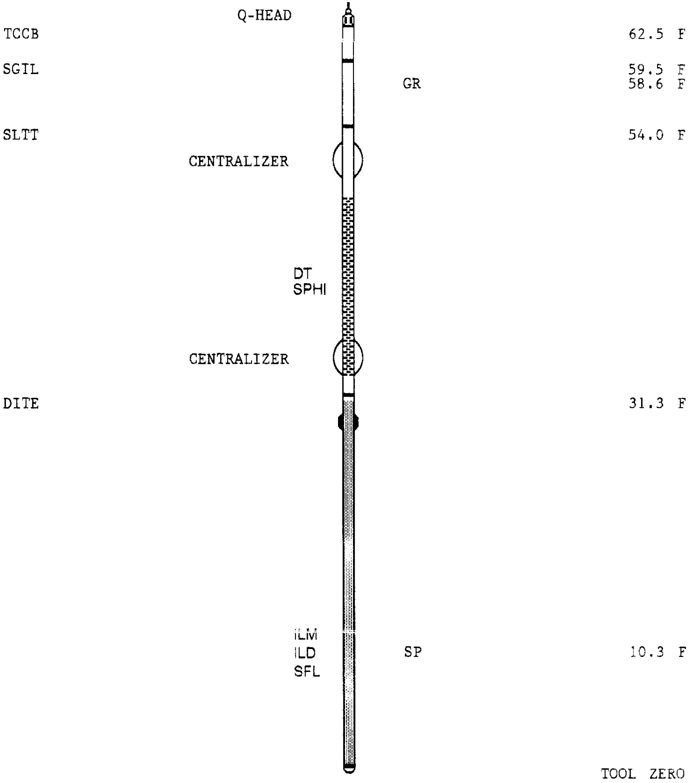
RAN FLEX JOINTS ON INDUCTION AND SONIC. .

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.

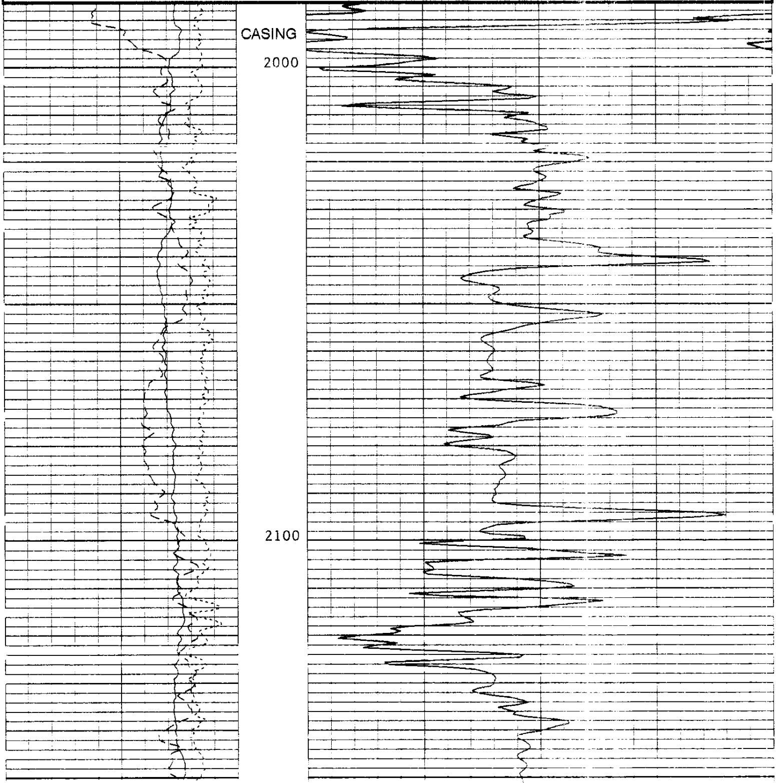
THANKS FOR CHOOSING SCHLUMBERGER!!!!!

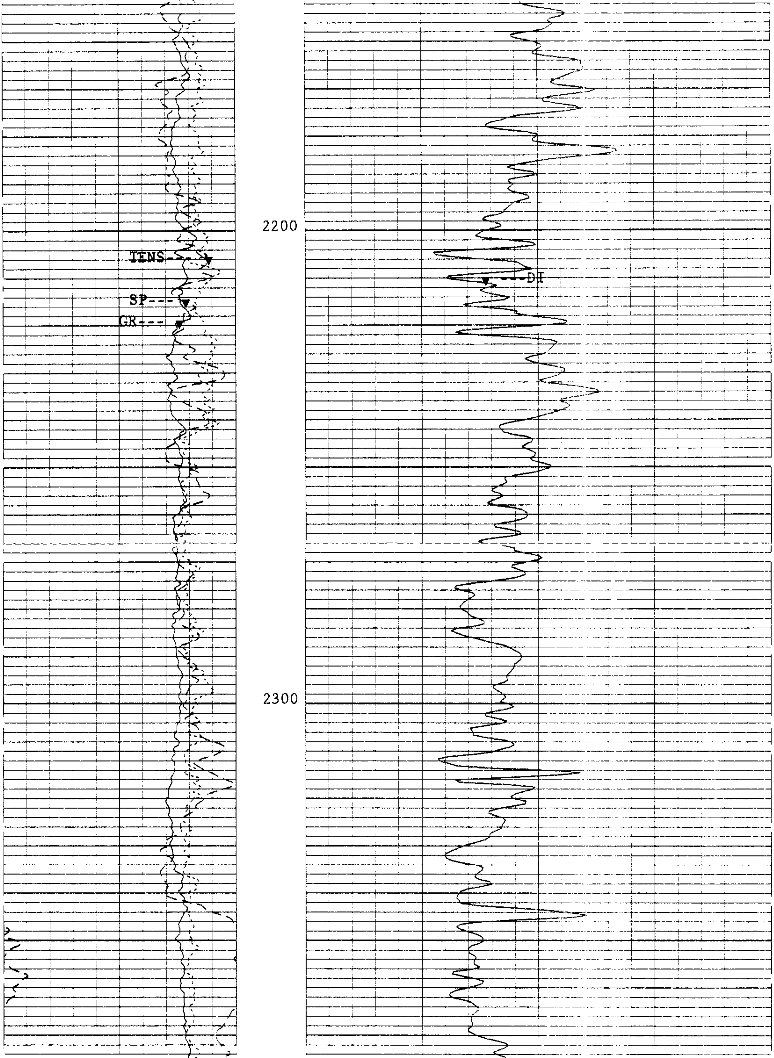
LOGGING TOOL STRING SKETCH

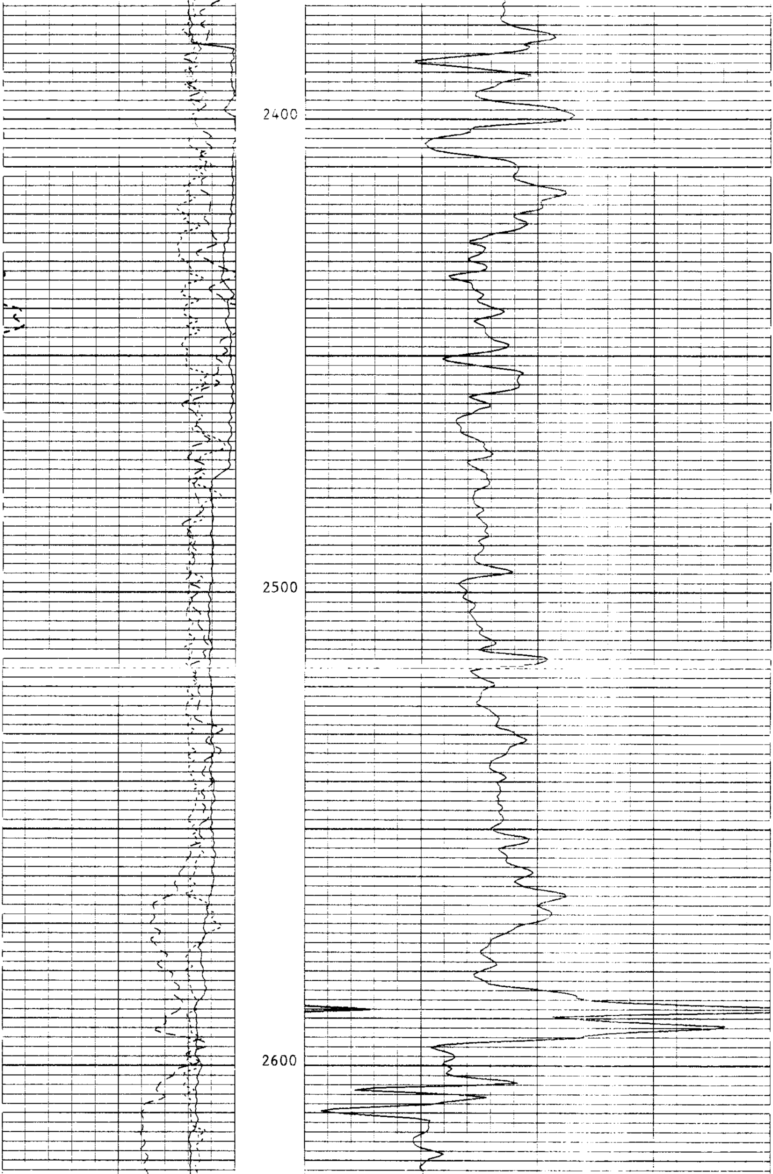


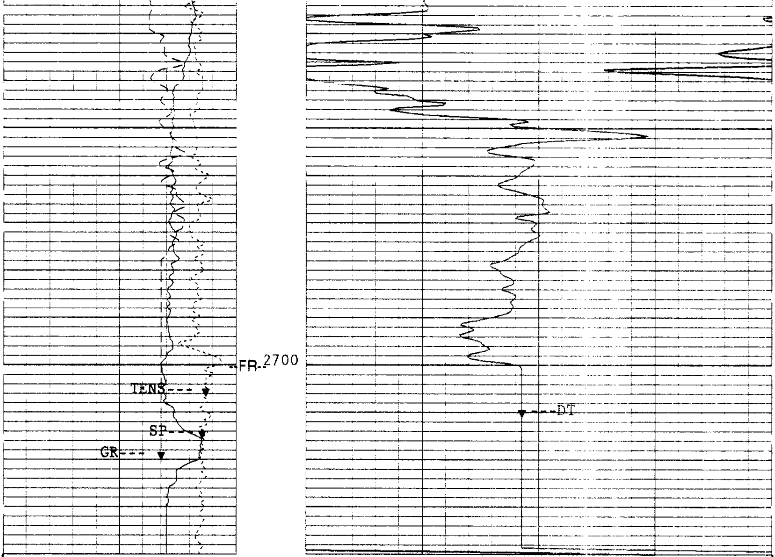
TOTAL TOOL STRING LENGTH IS 64.7 F.
TOTAL TOOL STRING WEIGHT IS 1032. LB IN AIR.

MAIN PASS









5"/100'

CP 44.2 FILE 95 23-JAN-1998 07:57

INPUT FILE(S) CREATION DATE
93 23-JAN-1998 06:47

TENS(LBF)
10000. 0.0
SP(MV)
-50.00 50.000
GR(GAPI)
0.0 150.00

DT(US/F)
175.00 75.000

SENSOR MEASURE POINT TO TOOL ZERO

DITE 10.3 FEET
AMS 71.8 FEET
SLTT 41.6 FEET

SGTL 62.6 FEET
DTT 0.0 FEET

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT

```
SMB  DISA                           VDLR 2IN
TOCA DISA                           RATE 15          HZ
DG   AUTO                           DETE E2
NMSG 180         US                 CBLG 35          US
AMPL 2                              CBL  2
WFM  1                              SS   FAST
TOD  DISA                           SLC  UA
DTF  189.000     US/F               DTM  56.0000     US/F
CDTS 100.000                        SPFS R-H
PP   NORM                           DO   4.00000     F
WMUD 8.50000     LB/G               TD   32768.0     F
IFRS 20          KHZ                SBR  1.00000     OHMM
MXE2 39.0062     MM/M               DXE2 124.493     MM/M
MRE2 17.0971     MM/M               DRE2 11.5626     MM/M
MPH2 -1.08185    DEG                DPH2 -.001757    DEG
MGF2 1.05831                        DGF2 1.00935
DESP DISA                           SFLE ALLO
DCAS -50000.0    F                  ITEN ALLO
DEVI 85.0000     DEG                DSES H48
IPRO STAN                           IPHA NORM
DWCO 512                            DSIN 5           US
DDEL 200         US                 NCJT GSRY
GTSE TEMP                           SHT  45.0000     DEGF
BHT  85.0000     DEGF               DTCI 0.0         F
SPAE DISA                           BS   7.87500     IN
BHS  OPEN
```

CALIBRATIONS

```
              BEFORE SURVEY CALIBRATION Summary


  Performed:     16-JAN-1998 05:19
  Program File:  TOH     (Version    44.2    95/07/25  95/07/25)


SGTL              Detector Calibration Summary

           MEASURED
          BKGD     JIG         CALIBRATED         UNITS
    GR     35      192            165             GAPI

Back: 29-AUG-1997 10:04   Jig: 29-AUG-1997 10:08  Comp: 29-AUG-1997 10:08


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    7.8 -117. => 133.     .992   .84 => 1.18
  IXD   21.2 -105. => 145.    1.001   .84 => 1.19     7.96  -5.89 => 24.11
  IRM   25.6 -199. => 251.    1.000   .85 => 1.20
  IXM    -.5 -224. => 226.     .960   .81 => 1.15     7.53  -6.49 => 23.51

SFL Electronics:

       Offset  Valid Range     Units       Gain   Valid Range

  SFV    .4   -14.5 => 15.5     MV          .98   .84 => 1.19
```

```
  SFC    -.0    -.6 =>  .6    MA          .98   .84 => 1.18

Plus Measurement performed at: 16-JAN-1998 05:18

Shop cals used were performed: 29-AUG-1997 11:39

   CP 44.2          FILE    0      16-JAN-1998 05:18
```

```
                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  -5.39 => 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

SONIC / SP GAMMA RAY 5" LOG