Western Atlas International

ATLAS WIRELINE SERVICES

DUAL INDUCTION FOCUSED LOG

FILE NO. 3960

API NO. 36-009-00269

5" = 100'

COMPANY NORTHWEST NATURAL GAS COMPANY

WELL I. W. 23d - 3

FIELD MIST

COUNTY COLUMBIA STATE OREGON

LOCATION:
2475.11' EAST & 299.39' SOUTH
FROM THE WEST 1/4 CORNER OF:

SEC 3 TWP 6N RGE 5W

OTHER SERVICES
BHC AL-GR-CAL
CDLC-CN-GR
DIPLOG

PERMANENT DATUM GROUND LEVEL ELEV. 1187.8

LOGGING MEASURED FROM K. B. 11.4 FT. ABOVE P.D.

DRILLING MEASURED FROM K. B.

ELEVATIONS
KB 1199.25'
DF ---
GL 1187.85'

FINAL PRINT

DATE	15-OCT-91		20-OCT-91					
RUN	1		2					
SERVICE ORDER	66915		66917					
DEPTH-DRILLER	2730'		3079'					
DEPTH-LOGGER	2725'		3072'					
BOTTOM LOGGED INTERVAL	2723'		3070'					
TOP LOGGED INTERVAL	684'		2708'					
CASING - DRILLER	13 3/8"	@ 684'	8 5/8"	@ 2715'		@		@
CASING - LOGGER	684'		2708'					
BIT SIZE	12 1/4"		7 7/8"					
TYPE FLUID IN HOLE	GEL/POLYMER		GEL/CACL/HEC 10					
DENSITY / VISCOSITY	9.6+	40	8.6	38				
PH / FLUID LOSS	8.7	5.6	11.5	15.0				
SOURCE OF SAMPLE	FLOWLINE		FLOWLINE					
RM AT MEAS. TEMP.	2.72	@ 79 F	.297	@ 72F		@		@
RMF AT MEAS. TEMP.	2.97	@ 79 F	.286	@ 72F		@		@
RMC AT MEAS. TEMP.	2.29	@ 79 F	.315	@ 72F		@		@
SOURCE OF RMF / RMC	MEASURED	MEASURED	MEASURED	MEASURED				
RM AT BHT	2.13	@ 101 F	.212	@ 101 F		@		@
TIME SINCE CIRCULATION	2 HRS.		5 1/2 HRS.					
MAX. REC. TEMP. DEG. F	101 F		101 F					
EQUIP. NO. / LOC.	HL 6399	BAKRSFLD	HL 6399	BAKRSFLD				
RECORDED BY	TORGERSON		TORGENSON					
WITNESSED BY	CLAYTON ROTH		CLAYTON ROTH					

FOLD HERE

IN MAKING INTERPRETATIONS OF LOGS OUR EMPLOYEES WILL GIVE CUSTOMER THE BENEFIT OF THEIR BEST JUDGEMENT, BUT SINCE ALL INTERPRETATIONS ARE OPINIONS BASED ON INFERENCES FROM ELECTRICAL OR OTHER MEASUREMENTS WE CANNOT, AND WE DO NOT GUARANTEE THE ACCURACY OR CORRECTNESS OF ANY INTERPRETATION. WE SHALL NOT BE LIABLE OR RESPONSIBLE FOR ANY LOSS, COST, DAMAGES, OR EXPENSES WHATSOEVER INCURRED OR SUSTAINED BY THE CUSTOMER RESULTING FROM ANY INTERPRETATION MADE BY ANY OF OUR EMPLOYEES.

REMARKS RUN (1)

TAYLOR RIG NO. 4
BHT 101 F & 101 F
VOLUME COMPUTED FOR 8 5/8" CASING ≈ 950 FT3

REMARKS RUN (2)

TAYLOR RIG NO. 4
BHT 101 F & 101 F
TOTAL BOREHOLE VOLUME RECORDED

EQUIPMENT DATA

RUN	TRIP	TOOL	SERIAL NO.	SERIES NO.	POSITION
1	1	DIFL	72370	1503XA	1.5" S. O.
1	1	AC	79731-79726	1609-1603	CENTRALIZED
1	1	GR	60519	1309XA	CENTRALIZED
1	1	CAL	55718	4209XA	CENTRALIZED

EQUIPMENT DATA

RUN	TRIP	TOOL	SERIAL NO.	SERIES NO.	POSITION
2	1	DIFL	72370	1503XA	1.5" S. O.
2	1	AC	79731-79726	1609-1603	CENTRALIZED
2	1	GR	60519	1309XA	CENTRALIZED
2	1	CAL	55718	4209XA	CENTRALIZED

5" = 100'

```
**********************************************************************************************

                              FILE:   4


CURVE   DELAY   REPORT
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                        PHYS.
                CURVE   DELAY   UNITS
                -----   -----   -----

                CFOC        0   FT,IN
                CILM      6,0   FT,IN
                CILD      9,3   FT,IN
                SP        9,3   FT,IN
                GR       48,3   FT,IN
                CAL      58,0   FT,IN
                ACQ      31,9   FT,IN
                AC       31,9   FT,IN



PARAMETERS
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             NAME       DEPTH INTERVAL     VALUE      UNITS
```

A	2745 TO 608	1.000	
DEL-T F	2745 TO 608	189.000	MICS/FT
DEL-T M	2745 TO 608	55.500	MICS/FT
DEL-T S	2745 TO 608	100.000	MICS/FT
M	2745 TO 608	2.000	
O.D.	2745 TO 608	8.625	INCH
PORA	2745 TO 608	WYLLIE	

DISPLAY SCALE CHANGES

*** NONE ***

COMPANY: NORTHWEST NATURAL GAS COMPANY

RUN: 1

WELL NAME: I. W. 23d - 3

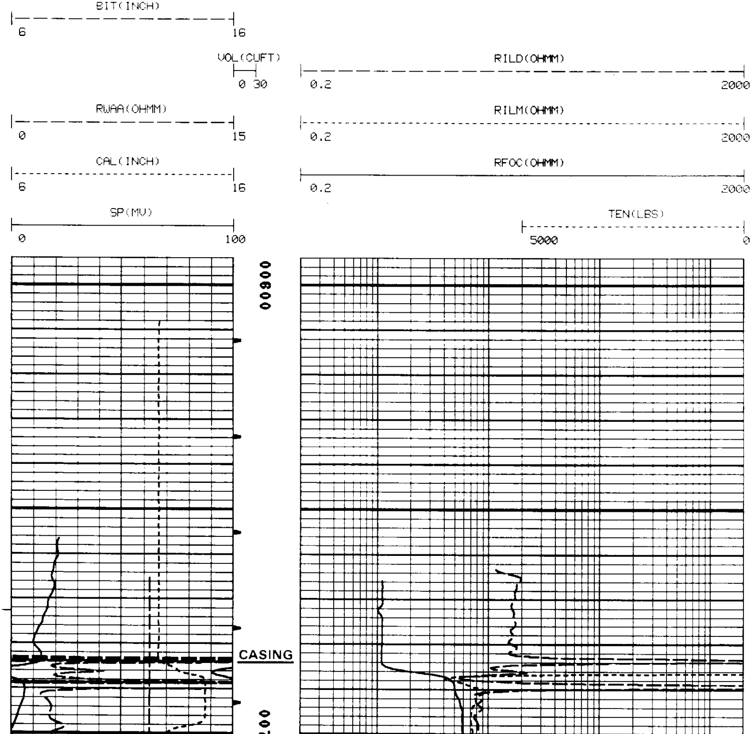
TRIP: 1

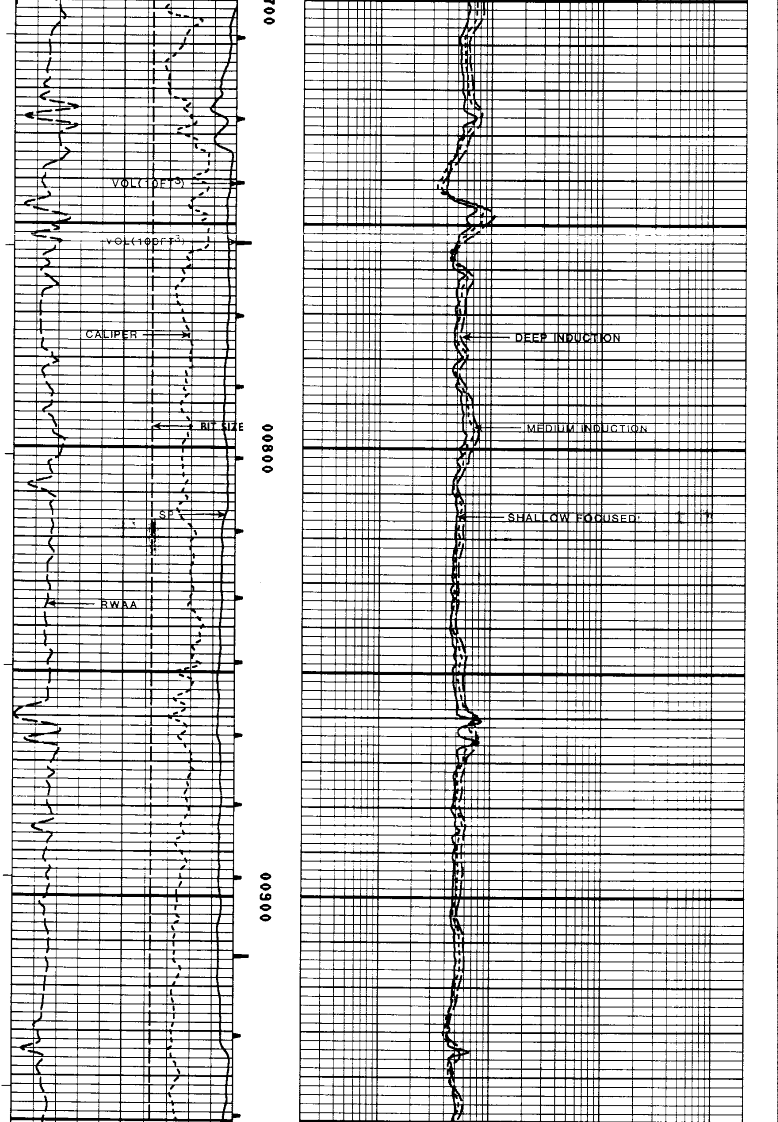
SERVICE: BK214M FILE: 4 DATE: 10/15/91

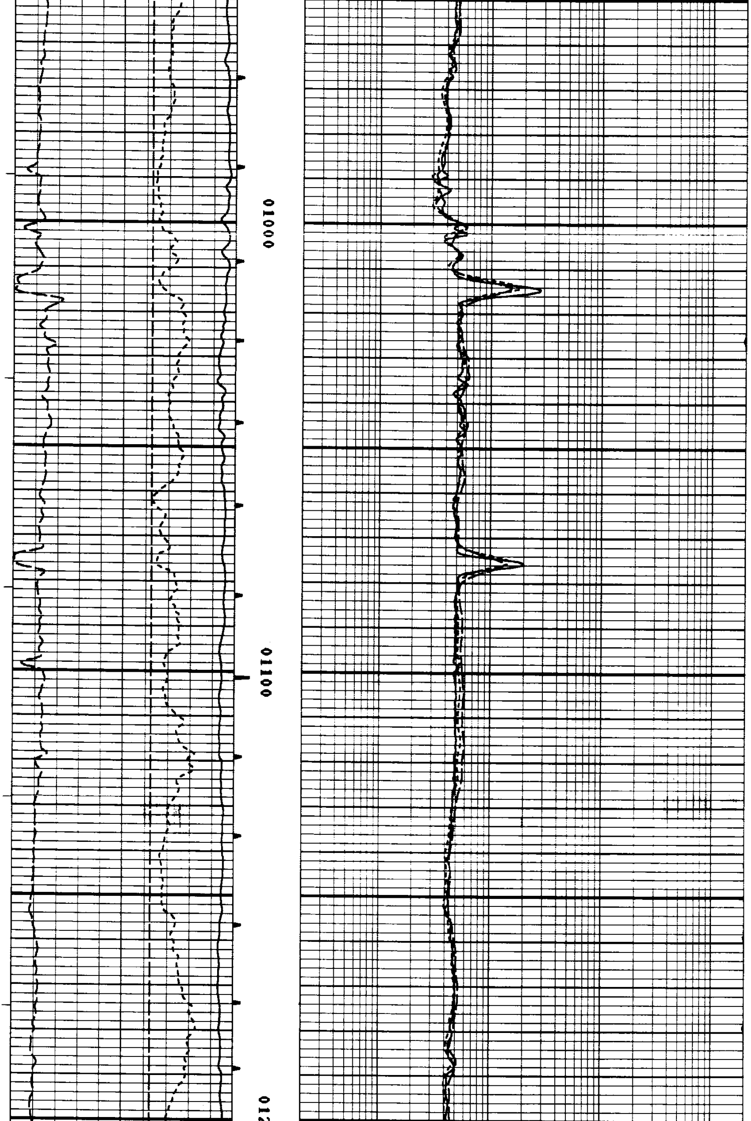
TIME: 00:39:57

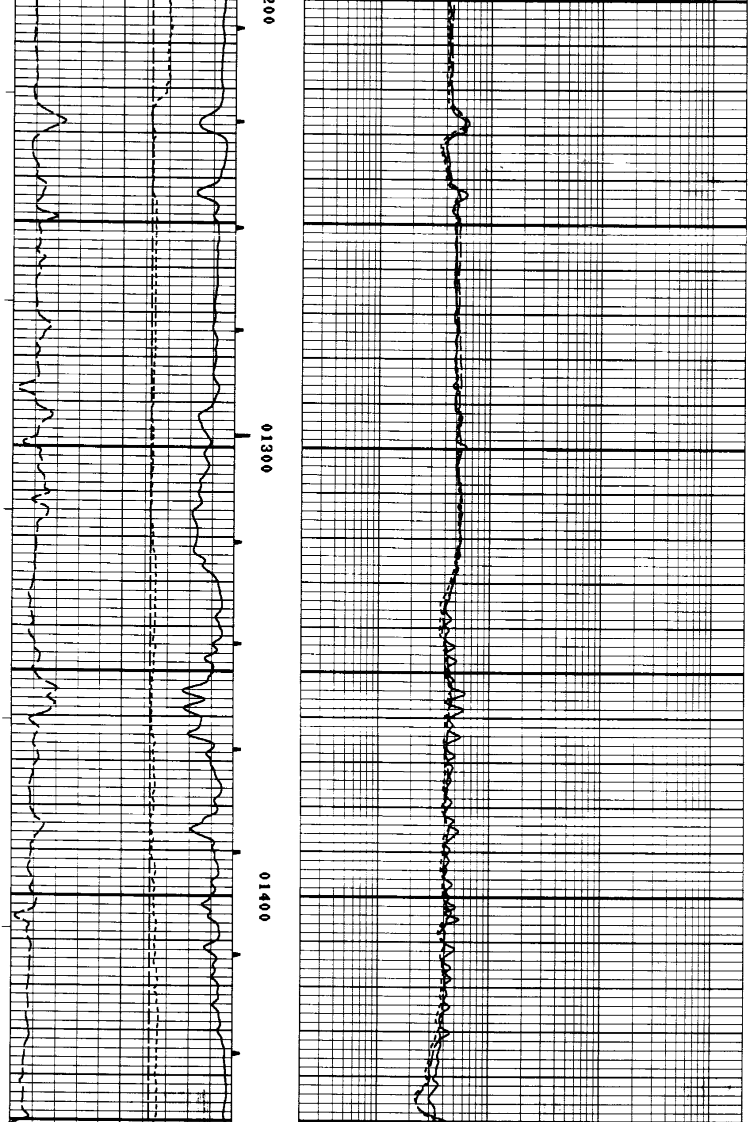
REVISION: FSYS256 REV:G002 VER:2.0

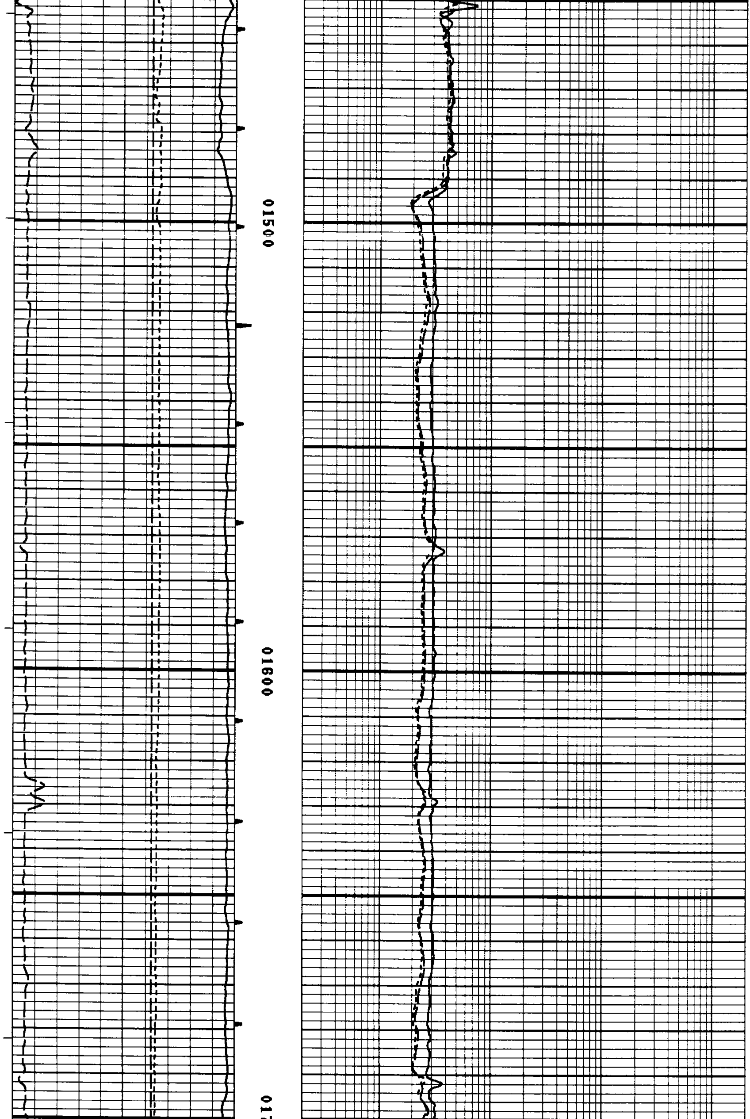
MODE: RECORD

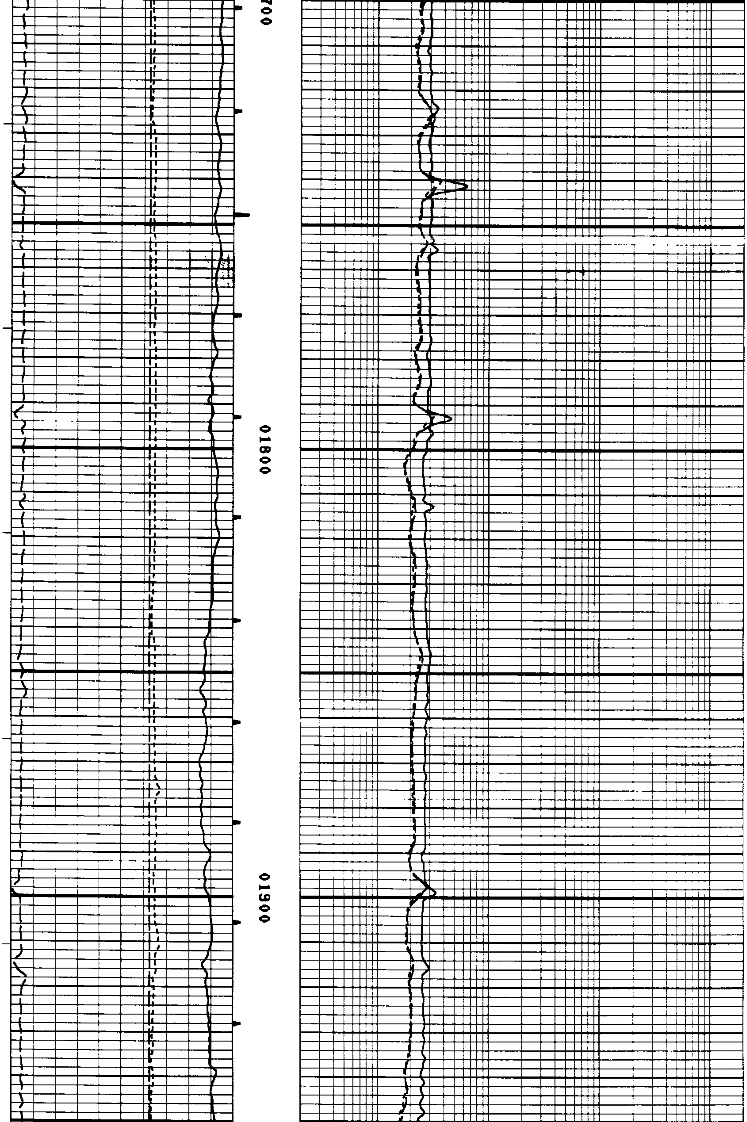


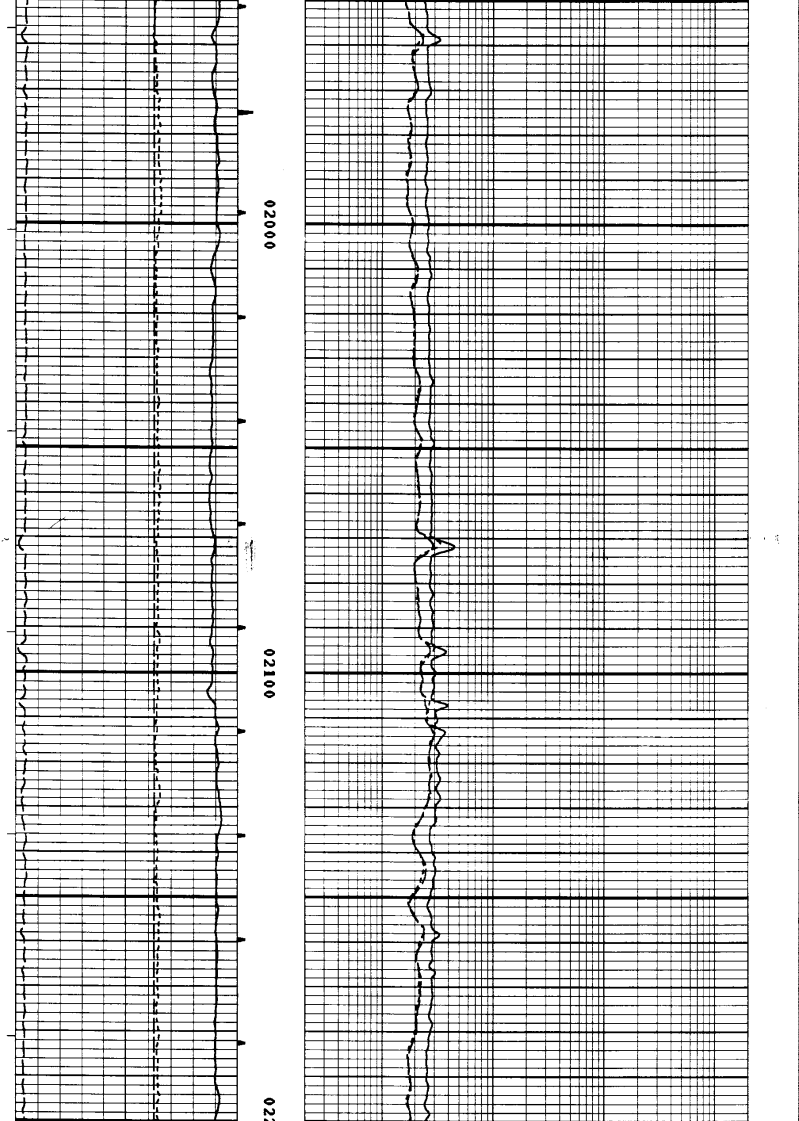


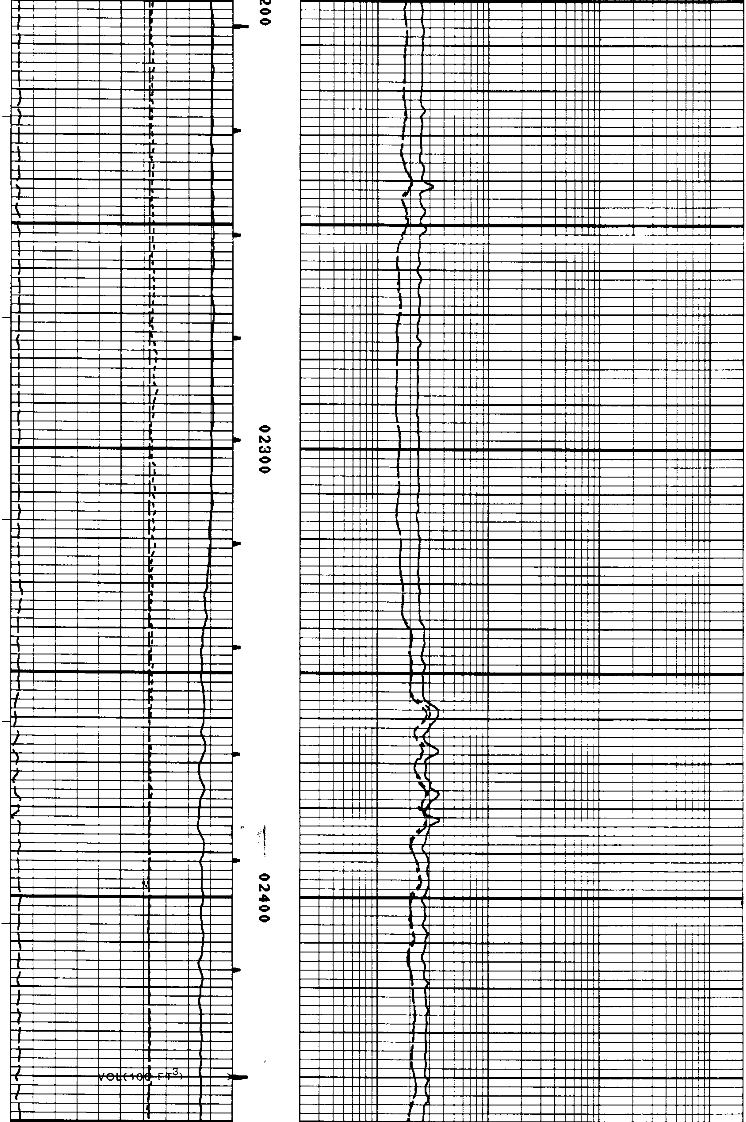


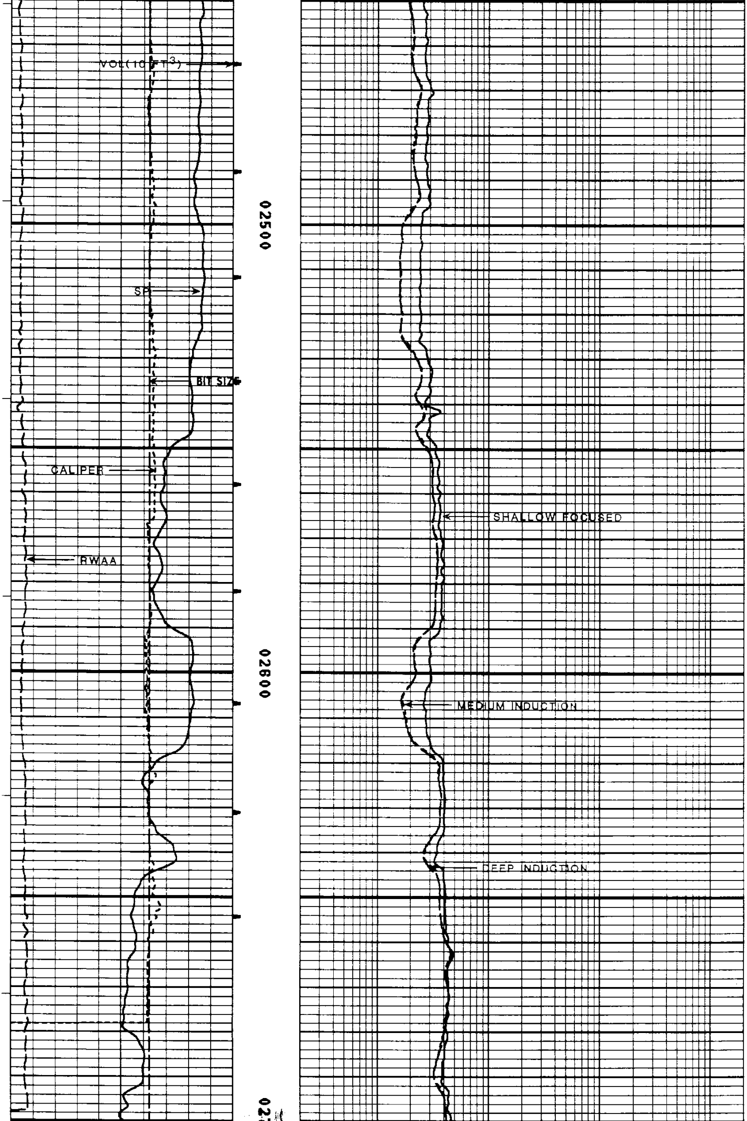


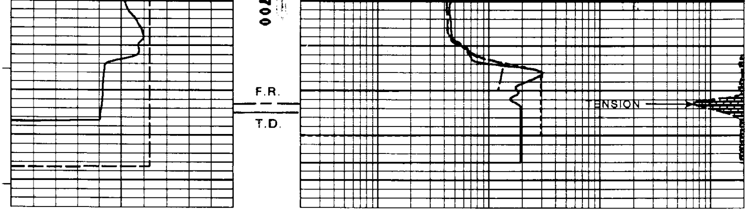












BIT(INCH)
6 16

VOL(CUFT)
0 30

RILD(OHMM)
0.2 2000

RWAA(OHMM)
0 15

RILM(OHMM)
0.2 2000

CAL(INCH)
6 16

RFOC(OHMM)
0.2 2000

SP(MV)
0 100

TEN(LBS)
5000 0

FILE: 4

****

5" = 100'

****

RUN # 2

FILE: 3

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CURVE DELAY REPORT
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          PHYS.
CURVE     DELAY    UNITS
-----     -----    -----

[illegible]    [illegible]    FT,IN
[illegible]    [illegible]    FT,IN
[illegible]    [illegible]    FT,IN
[illegible]    [illegible]    FT,IN
SP        [illegible]    FT,IN
GR        46.3     FT,IN
CAL       58.0     FT,IN
ACQ       31.9     FT,IN
AC        31.9     FT,IN
```

PARAMETERS

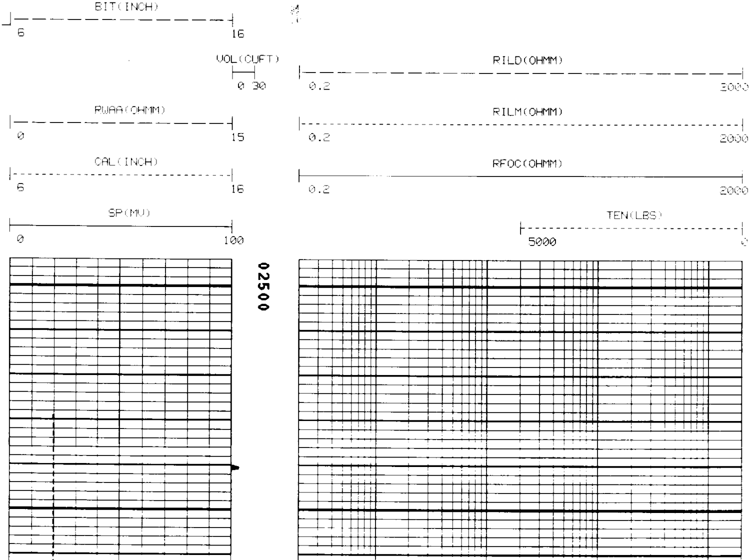
NAME	DEPTH INTERVAL	VALUE	UNITS
A	3087 TO 2530	1.000	
DEL-T F	3087 TO 2530	189.000	MICS/FT
DEL-T M	3087 TO 2530	55.500	MICS/FT
DEL-T S	3087 TO 2530	100.000	MICS/FT
M	3087 TO 2530	2.000	
O.D.	3087 TO 2530	0.000	INCH
PORA	3087 TO 2530	WYLLIE	

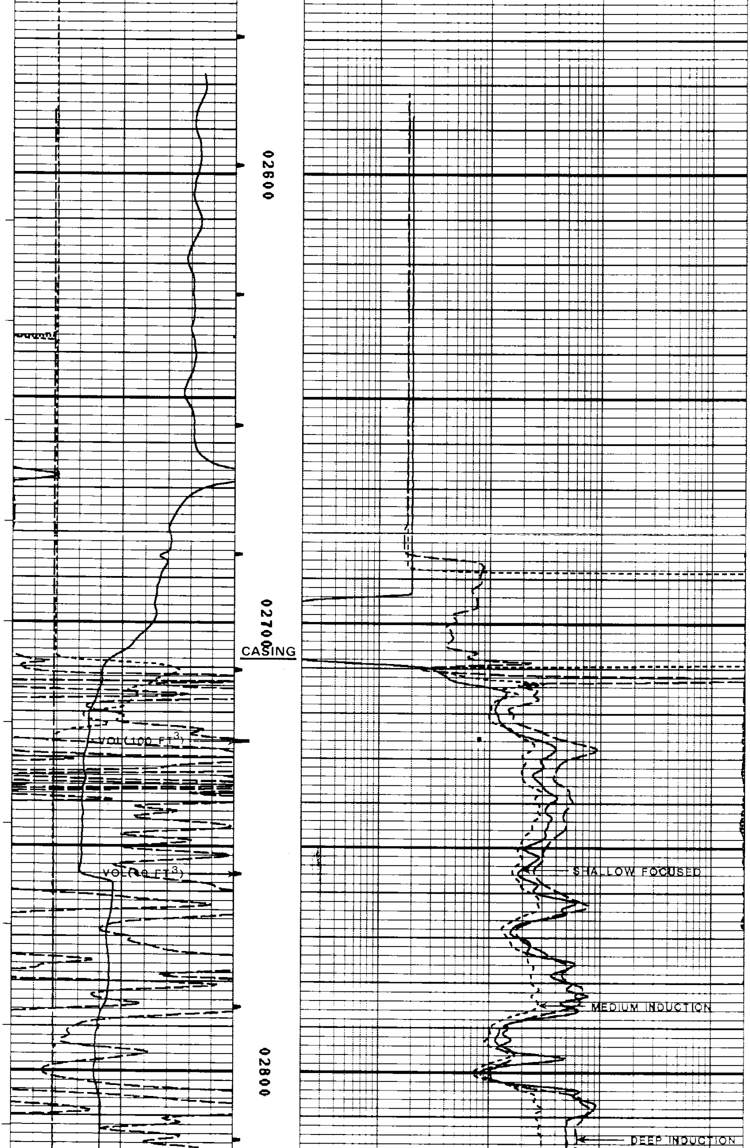
DISPLAY SCALE CHANGES

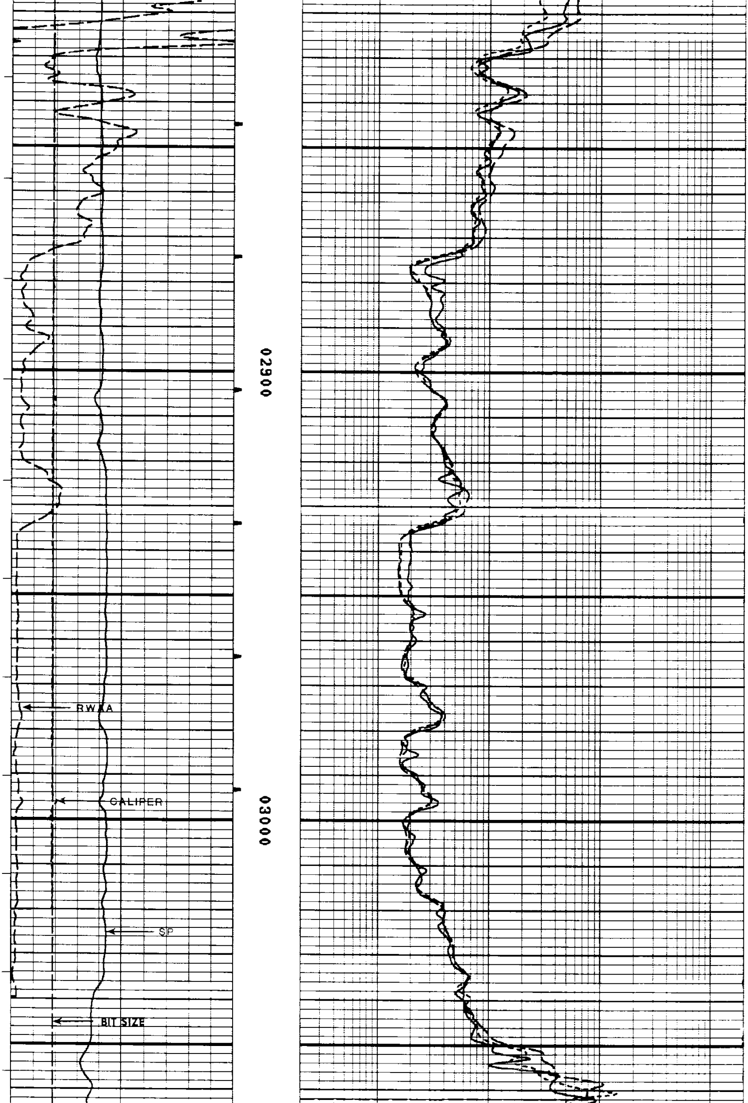
*** NONE ***

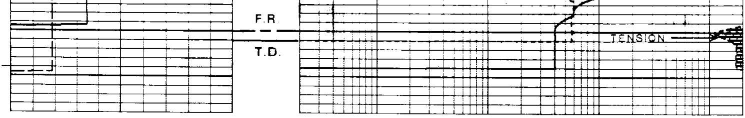
COMPANY:	NORTHWEST NATURAL GAS COMPANY		RUN: 2
WELL NAME:	I. W. 23d - 3		TRIP: 1
SERVICE:	BK214M	FILE: 3	DATE: 10/20/91
REVISION:	FSYS256 REV:G002 VER:2.0		MODE: RECORD

TIME: 18:52:12









```
        BIT(INCH)
|-----------------------------|
6                            16

                           VOL(CUFT)                    RILD(OHMM)
                           |--|      |----------------------------------------------------|
                           0 30      0.2                                               2000

       RWAA(OHMM)                                       RILM(OHMM)
|-----------------------------|      |----------------------------------------------------|
0                            15      0.2                                               2000

        CAL(INCH)                                       RFOC(OHMM)
|-----------------------------|      |----------------------------------------------------|
6                            16      0.2                                               2000

         SP(MV)                                                       TEN(LBS)
|-----------------------------|                            |------------------------------|
0                           100                            5000                           0
```

FILE: 3

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REPEAT SECTION

****

RUN # 1

FILE: 2

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CURVE  DELAY  REPORT
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                           PHYS.
                  CURVE    DELAY    UNITS
                  -----    -----    -----

                  CFOC         0    FT.IN
                  CILM       6.0    FT.IN
                  CILD       9.3    FT.IN
                  SP         9.3    FT.IN
                  GR        48.3    FT.IN
                  CAL       58.0    FT.IN
                  ACQ       31.9    FT.IN
                  AC        31.9    FT.IN



PARAMETERS
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             NAME        DEPTH INTERVAL       VALUE       UNITS
           --------      --------------    -----------    -----
           A              2744 TO  2449          1.000
           DEL-T F        2744 TO  2449        189.000    MICS/FT
           DEL-T M        2744 TO  2449         55.500    MICS/FT
           DEL-T S        2744 TO  2449        100.000    MICS/FT
           M              2744 TO  2449          2.000
           O.D.           2744 TO  2449          8.625    INCH
           PORA           2744 TO  2449         WYLLIE


DISPLAY SCALE CHANGES
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                       *** NONE ***
```

COMPANY: NORTHWEST NATURAL GAS COMPANY

WELL NAME: I. W. 23d - 3

SERVICE: BK214M FILE: 2 DATE: 10/15/91

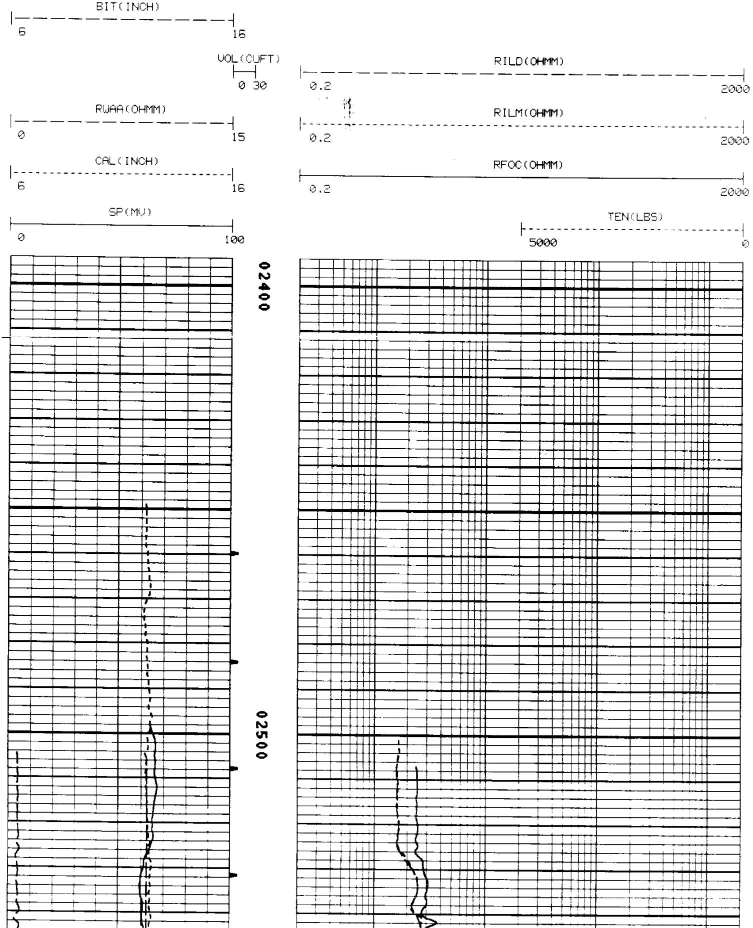
REVISION: FSYS256 REV:G002 VER:2.0

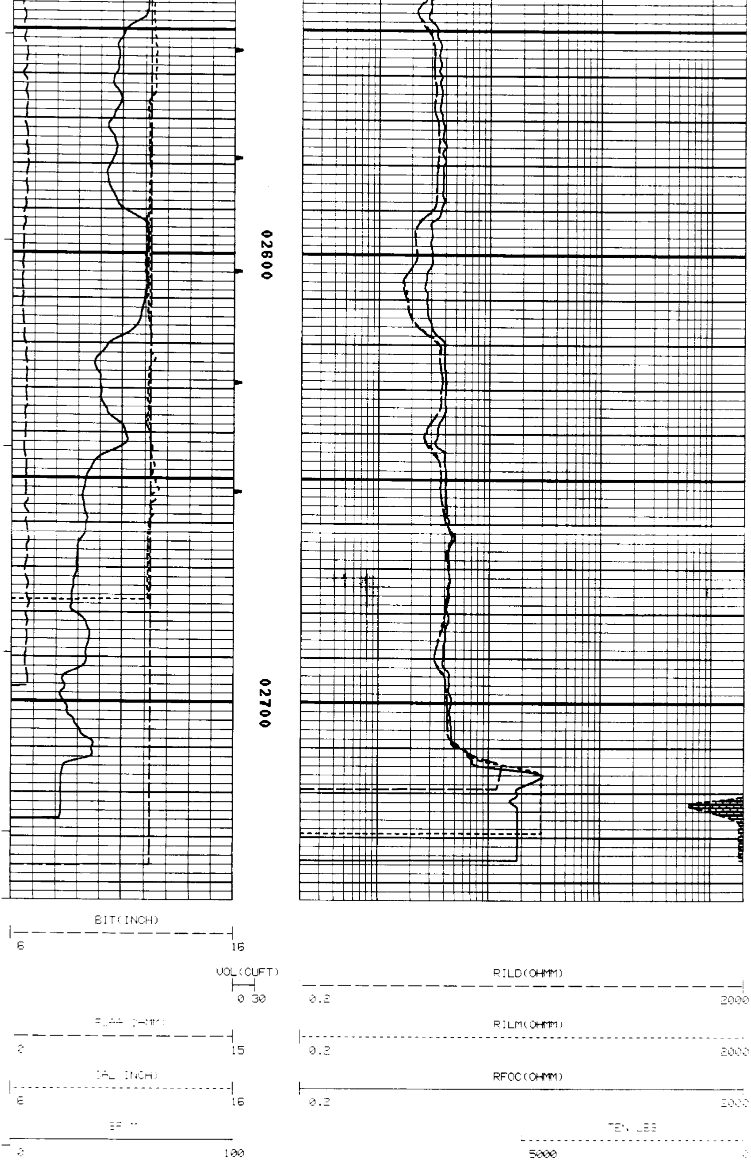
RUN: 1

TRIP: 1

TIME: 00:22:14

MODE: RECORD





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REPEAT SECTION

****

RUN # 2 FILE: 2

CURVE DELAY REPORT

```
                PHYS.
      CURVE     DELAY    UNITS
      -----     -----    -----

      CFOC          0    FT,IN
      CILM        6,0    FT,IN
      CILD        9,3    FT,IN
      SP          9,3    FT,IN
      GR         48,3    FT,IN
      CAL        58,0    FT,IN
      ACQ        31,9    FT,IN
      AC         31,9    FT,IN
```

PARAMETERS

```
     NAME       DEPTH INTERVAL     VALUE      UNITS
   --------    ---------------   ----------   -----
   A            3087  TO  2804       1.000
   DEL-T F      3087  TO  2804     189.000    MICS/FT
   DEL-T M      3087  TO  2804      55.500    MICS/FT
   DEL-T S      3087  TO  2804     100.000    MICS/FT
   M            3087  TO  2804       2.000
   O.D.         3087  TO  2804       0.000    INCH
   PORA         3087  TO  2804      WYLLIE
```

DISPLAY SCALE CHANGES

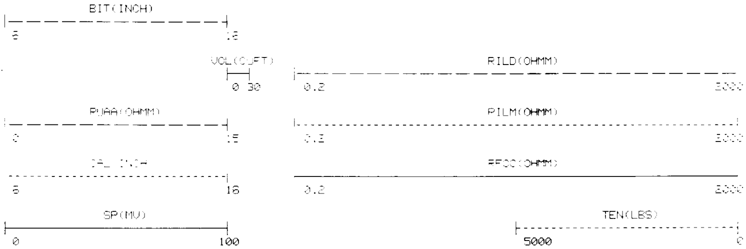
*** NONE ***

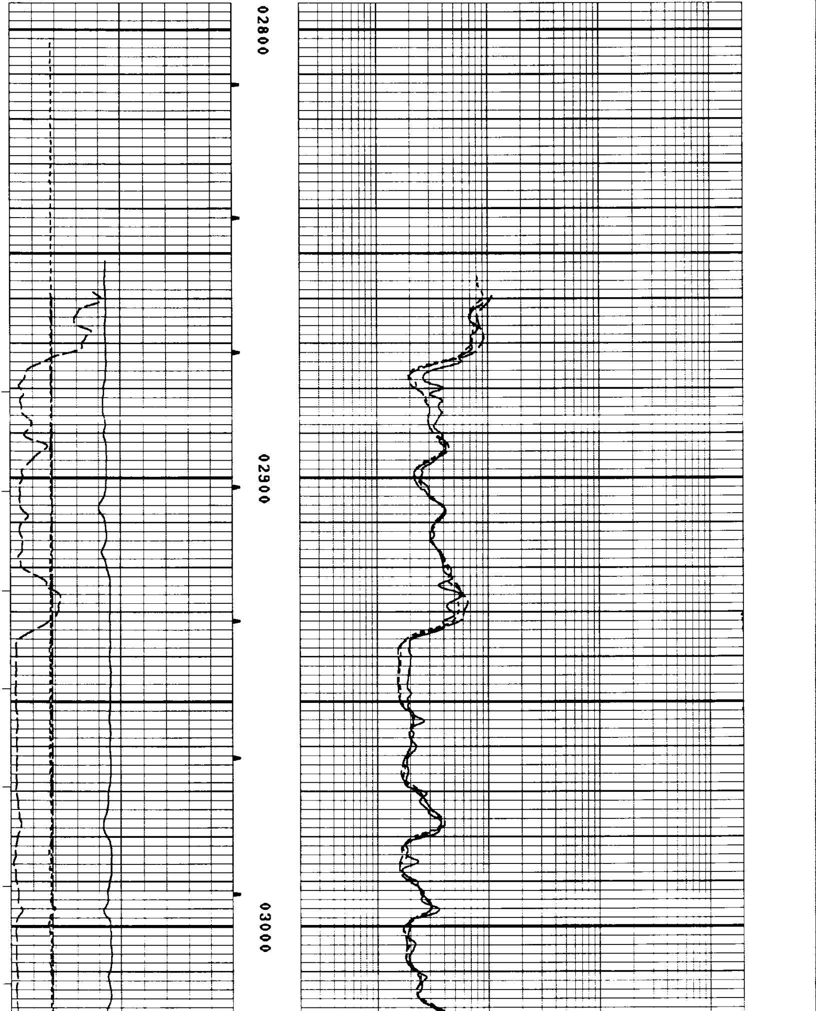
COMPANY: NORTHWEST NATURAL GAS COMPANY RUN: 2

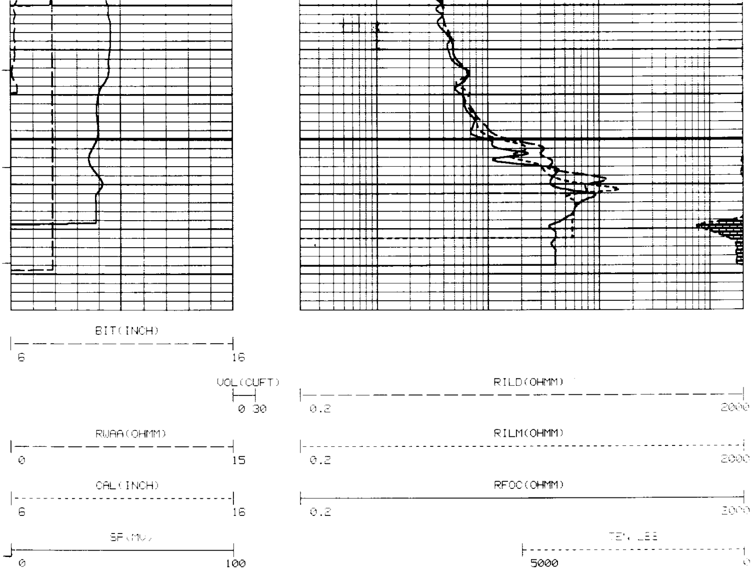
WELL NAME: I. W. 23d - 3 TRIP: 1

SERVICE: BK214M FILE: 2 DATE: 10/20/91 TIME: 18:36:06

REVISION: FSYS256 REV:G002 VER:2.0 MODE: RECORD







FILE: 2

RUN # 1

```
****************************************************************************************************

           *****************************************
           *                                       *
           *  CALIBRATION/VERIFICATION SUMMARIES   *
           *  DATE 10/15/91         TIME 02:55:20  *
           *  RUN  1                TRIP 1         *
           *                                       *
           *****************************************


      LOG NAME DIFL   ASSET NO. 72370    UNIT NO. HL 6320
   CALIBRATION ENTERED ON  10/14/91 AT 21:19:01

CURVE   MILLIVOLTS     SCALING FACTORS    ENGINEERING VALUES   UNITS
          LOW   HIGH    ADD.     MULT.       LOW        HIGH
----   ------------- ----------------  ------------------- -----

     DATE 10/11/91         CALIBRATION         TIME 16:39:32

CILD      -2.1   483.8    2.193     2.0063     0.500     500.000 MMHO
CILM      -0.0   524.5    0.524     2.1494     0.500     500.000 MMHO
CFOC       3.9   485.6   -3.056     2.5276     1.000     500.000 MMHO

     DATE 10/11/91    PRIMARY VERIFICATION     TIME 16:45:22

CILD      -0.0   488.1    2.193     2.0063     2.193     504.529 MMHO
CILM      -0.2   527.2    0.524     2.1494     0.309     502.685 MMHO
CFOC       4.7   481.7   -3.056     2.5276     1.766     495.893 MMHO

     DATE 10/15/91   BEFORE LOG VERIFICATION    TIME 00:01:12

CILD       0.2   488.9    1.370     2.0039     2.193     504.529 MMHO
CILM       0.2   527.0    0.171     2.1516     0.309     502.685 MMHO
CFOC       4.5   468.4   -2.997     2.5987     1.766     495.893 MMHO

     DATE 10/15/91    AFTER LOG VERIFICATION    TIME 01:31:13

CILD       0.3   489.2    1.970     2.0039     2.296     504.906 MMHO
CILM      -0.1   527.0    0.171     2.1516     0.076     502.622 MMHC
CFOC       4.3   463.5   -2.997     2.5987     1.808     490.695 MMHO
```

```
          LOG NAME GR      ASSET NO. 60519    UNIT NO. HL 6399
      CALIBRATION ENTERED ON  10/14/91 AT 21:20:36

CURVE   COUNTS/SEC.    SCALING FACTORS    ENGINEERING VALUES   UNITS
          LOW    HIGH   ADD.     MULT.        LOW        HIGH
----  --------------- ----------------- -------------------- -----

      DATE 09/19/91          CALIBRATION          TIME 16:43:20

GR         63.2   257.2    0.000     0.7729      0.000     150.000 API

      DATE 09/19/91    PRIMARY VERIFICATION       TIME 16:47:12

GR         63.0   254.1    0.000     0.7729     48.673     196.355 API

      DATE 10/14/91   BEFORE LOG VERIFICATION     TIME 21:31:21

GR         52.1   246.7    0.000     0.7729     40.268     190.712 API

      DATE 10/15/91    AFTER LOG VERIFICATION     TIME 01:56:06

GR         79.9   278.0    0.000     0.7729     61.735     214.885 API


          LOG NAME CAL     ASSET NO. 55718    UNIT NO. HL 6399
      CALIBRATION ENTERED ON  10/14/91 AT 21:21:16

CURVE   MILLIVOLTS     SCALING FACTORS    ENGINEERING VALUES   UNITS
          LOW    HIGH   ADD.     MULT.        LOW        HIGH
----  --------------- ----------------- -------------------- -----

      DATE 09/19/91          CALIBRATION          TIME 16:14:46

CAL     4591.9 11166.3    1.412     0.0089      7.000      15.000 INCH

                       PRIMARY VERIFICATION              NOT DONE

      DATE 10/14/91   BEFORE LOG VERIFICATION     TIME 23:57:55

CAL        E     9682.0    0.862     0.0089       E          12.644 INCH

      DATE 10/15/91    AFTER LOG VERIFICATION     TIME 01:36:53

CAL        E     9679.8    0.862     0.0089       E          12.641 INCH
```

RUN # 2

```
                 ******************************************
                 *                                        *
                 *  CALIBRATION/VERIFICATION SUMMARIES    *
                 *  DATE 10/20/91         TIME 20:18:55   *
                 *  RUN  2                TRIP 1          *
                 *                                        *
                 ******************************************


          LOG NAME DIFL    ASSET NO. 72370    UNIT NO. HL 6320
      CALIBRATION ENTERED ON  10/20/91 AT 17:59:49

CURVE   MILLIVOLTS     SCALING FACTORS    ENGINEERING VALUES   UNITS
          LOW    HIGH   ADD.     MULT.        LOW        HIGH
----  --------------- ----------------- -------------------- -----

      DATE 10/11/91          CALIBRATION          TIME 16:39:32

CILD      -2.1   483.8    2.193     2.0063      0.500     500.000 MMHO
CILM      -0.0   524.5    0.524     2.1494      0.500     500.000 MMHO
CFOC       3.9   485.6   -3.056     2.5276      1.000     500.000 MMHO

      DATE 10/11/91    PRIMARY VERIFICATION       TIME 16:45:22

CILD      -0.0   488.1    2.193     2.0063      2.193     504.529 MMHO
CILM      -0.2   527.2    0.524     2.1494      0.309     502.685 MMHO
CFOC       4.7   491.7   -3.056     2.5276      1.766     495.893 MMHO

      DATE 10/20/91   BEFORE LOG VERIFICATION     TIME 18:29:15

CILD       0.3   488.4    1.923     2.0062      2.193     504.529 MMHO
CILM       0.0   525.6    0.292     2.1568      0.309     502.685 MMHO
CFOC       4.7   486.4   -3.079     2.5030      1.766     495.893 MMHO

      DATE 10/20/91    AFTER LOG VERIFICATION     TIME 19:20:48
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```
ILD      0.2   488.6    1.333    1.0083       1.151    504.758 MMHO
ILM      0.1   526.1    0.222    1.1583       0.400    503.124 MMHO
[illegible]     4.8   481.3   -3.079    2.5030       1.325    490.636 MMHO


      LOG NAME GR      ASSET NO. 60519    UNIT NO. HL 6399
   CALIBRATION ENTERED ON  10/20/91 AT 18:00:59

CURVE  COUNTS/SEC.    SCALING FACTORS    ENGINEERING VALUES    UNITS
        LOW    HIGH    ADD.    MULT.        LOW        HIGH
----  -------------- ----------------- -------------------- -----

     DATE 09/19/91          CALIBRATION          TIME 16:43:20

GR        63.2   257.2    0.000    0.7729      0.000     150.000 API

     DATE 09/19/91    PRIMARY VERIFICATION       TIME 16:47:12

GR        63.0   254.1    0.000    0.7729     48.673     196.355 API

     DATE 10/20/91   BEFORE LOG VERIFICATION     TIME 16:58:10

GR       206.3   398.5    0.000    0.7729    159.429     308.019 API

     DATE 10/20/91    AFTER LOG VERIFICATION     TIME 19:56:25

GR       169.2   361.4    0.000    0.7729    130.794     279.286 API


      LOG NAME CAL     ASSET NO. 55718    UNIT NO. HL 6399
   CALIBRATION ENTERED ON  10/20/91 AT 18:01:59

CURVE  MILLIVOLTS     SCALING FACTORS    ENGINEERING VALUES    UNITS
        LOW    HIGH    ADD.    MULT.        LOW        HIGH
----  -------------- ----------------- -------------------- -----

     DATE 09/19/91          CALIBRATION          TIME 16:14:46

CAL    4591.9 11166.3    1.412    0.0089      7.000      15.000 INCH

                      PRIMARY VERIFICATION             NOT DONE

     DATE 10/20/91   BEFORE LOG VERIFICATION     TIME 18:26:00

CAL       E     5244.7    1.537    0.0089      E           7.919 INCH

     DATE 10/20/91    AFTER LOG VERIFICATION     TIME 19:25:02

CAL       E     5283.5    1.537    0.0089      E           7.967 INCH
```