HALLIBURTON
LOGGING SERVICES, INC.

FINAL PRINT

DUAL INDUCTION SHORT GUARD LOG

5" = 100'

COMPANY ______________
WELL ______________
FIELD ______________
COUNTY __________ ST __

COMPANY ARCO OIL AND GAS CO.

WELL HAMLIN 33-17-65

FIELD MIST

COUNTY COLUMBIA

STATE OR

API NO.
LOCATION :
1637.77 FEET NORTH AND
1583.61 FEET WEST FROM THE
SOUTHEAST CORNER OF:
SEC. 17 TWP 6N RGE 5W

OTHER SERVICES
NONE

PERMANENT DATUM G.L. ELEV. 535.65
LOG MEASURED FROM K.B. 11.5FT.ABOVE PERM.DATUM
DRILLING MEASURED FROM KELLY BUSHING

ELEV.:K.B. 547.15
D.F. ------
G.L. 535.65

DATE	10/08/89			
RUN NO.	ONE			
DEPTH-DRILLER	3150.			
DEPTH- LOGGER	3157.			
BTM. LOG INTER.	3154.			
TOP LOG INTER.	450.			
CASING-DRILLER	9 5/8@450.	@	@	@
CASING- LOGGER	450.			
BIT SIZE	6 1/4			
TYPE FLUID IN HOLE	LS,ND POLY.			
DENS. : VISC	10.3 :46.	:	:	:
PH : FLUID LOSS	9.0 :5.0	:	:	:
SOURCE OF SAMPLE	CIRCULATED			
RM @ MEAS. TEMP.	2.20 @75.	@	@	@
RMF @ MEAS. TEMP.	2.38 @75.	@	@	@
RMC @ MEAS. TEMP.	2.42 @75.	@	@	@
SOURCE RMF : RMC	MEAS.:MEAS.	:	:	:
RM @ BHT	1.53 @111.	@	@	@
TIME SINCE CIRC.	4.50 HOURS			
TIME ON BOTTOM	11:30 PM			
MAX. REC. TEMP.	111. @BHT	@	@	@
EQUIP. : LOCATION	2890 :WDLND	:	:	:
RECORDED BY	D.MCDANIEL			
WITNESSED BY	J.EASTES			

Service Ticket No.: 12330 API Serial No.: PGM Version: 1.31 PC

Change in Mud Type or Additional Samples		
Date/Sample No.	10/08/89:ONE	/ / :
Depth-Driller		
Type Fluid in Hole		
Dens. : Visc.	:	:
pH. : Fluid Loss	:	:
Source of Sample		
Rm @ Meas.Temp.	@	@
Rmf @ Meas.Temp.	@	@
Rmc @ Meas.Temp.	@	@
Source: Rmf:Rmc	:	:
Rm @ BHT	1.53 @111.	@
Rmf @ BHT	1.65 @111.	@
Rmc @ BHT	1.68 @111.	@

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
N/A	DUAL W109437	N/A	1.5"S.O.	M412
N/A	SGRD W108946	N/A	1.5"S.O.	M416

EQUIPMENT DATA

GAMMA		ACOUSTIC		DENSITY		NEUTRON	
Run No.	ONE	Run No.	ONE	Run No.	N/A	Run No.	N/A
Serial No.	W108581	Serial No.	W112458	Serial No.	W109740	Serial No.	W108749
Model No.	432	Model No.	305	Model No.	465	Model No.	434
Diameter	3 5/8	No.of Cent.	FOUR	Diameter	4 1/2	Diameter	3 3/8
Detector Model No.	N/A	Spacing	1 FOOT	Log Type	SDL	Log Type	DSN
Type	SCINT.			Source Type	CS 137	Source Type	AM241BE
Length	4 IN.	LSA	YES	Serial No.	129	Serial No.	66
Distance To Source	N/A	FWDA	NO	Strength	1.5 CU	Strength	19. CU

LOGGING DATA

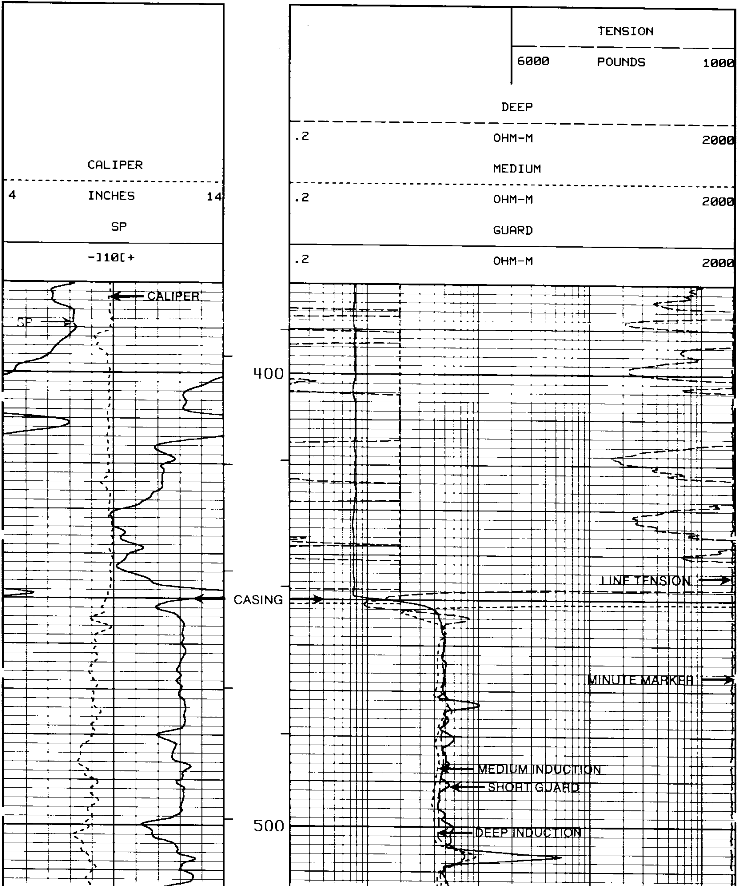
GENERAL				GAMMA		ACOUSTIC			DENSITY			NEUTRON		
Run	Depth		Speed	Scale		Scale			Scale			Scale		
No.	From	To	Ft/Min	L	R	L	R	Matrix	L	R	Matrix	L	R	Matrix
ONE	3154.	450.	30.	0.	150.	150.	50.	57.						
					API			US/FT						

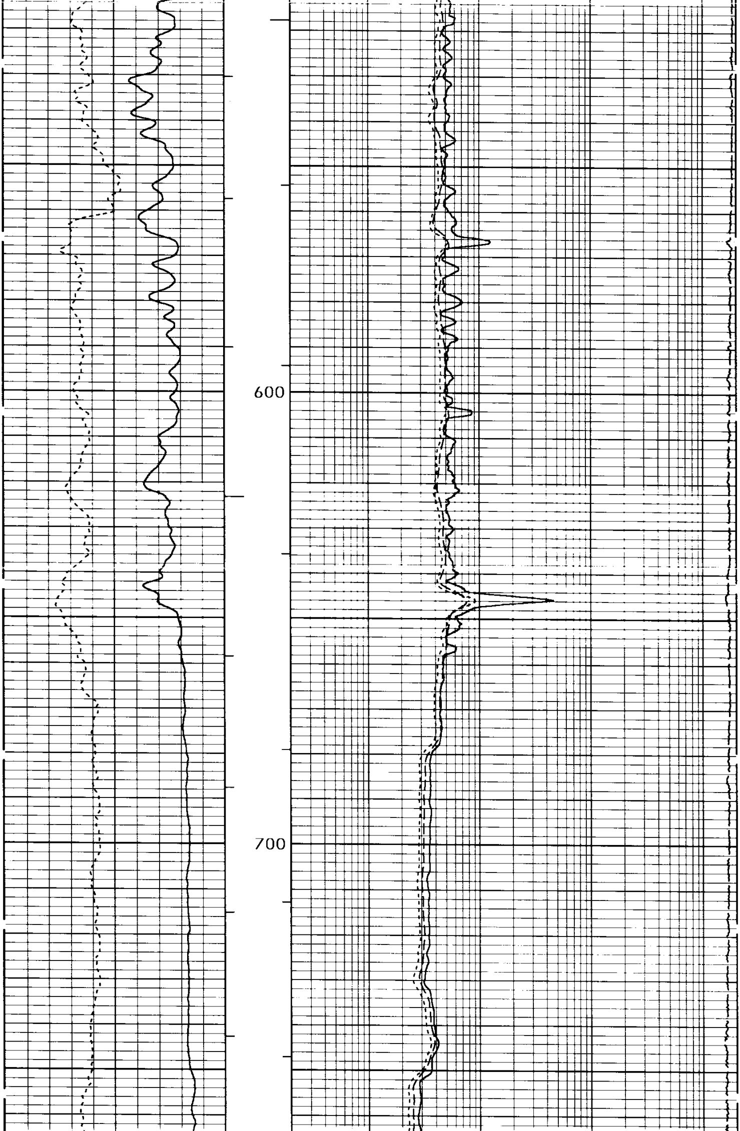
Remarks: REPEAT RUN OVER ZONE OF INTEREST AT CUSTOMER REQUEST.
ANNULAR HOLE VOLUME CALCULATED FOR 3 1/2 INCH CASING.

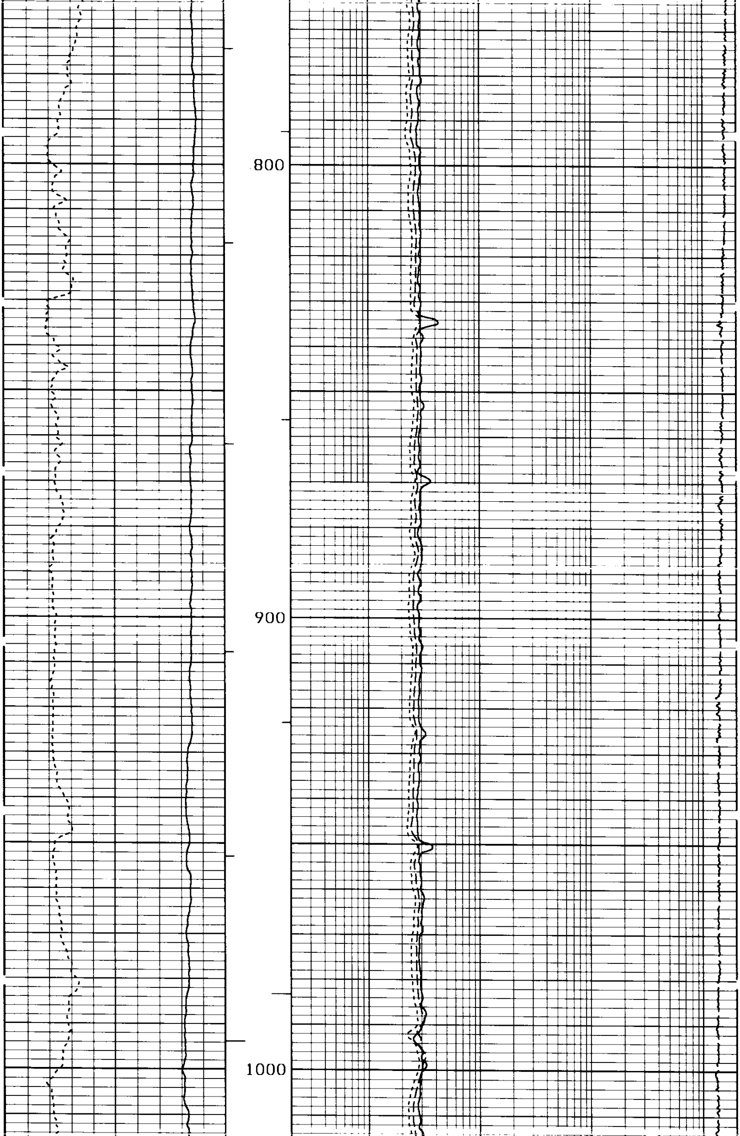
CREW ON LOCATION: EMERSON AND JEFFREY

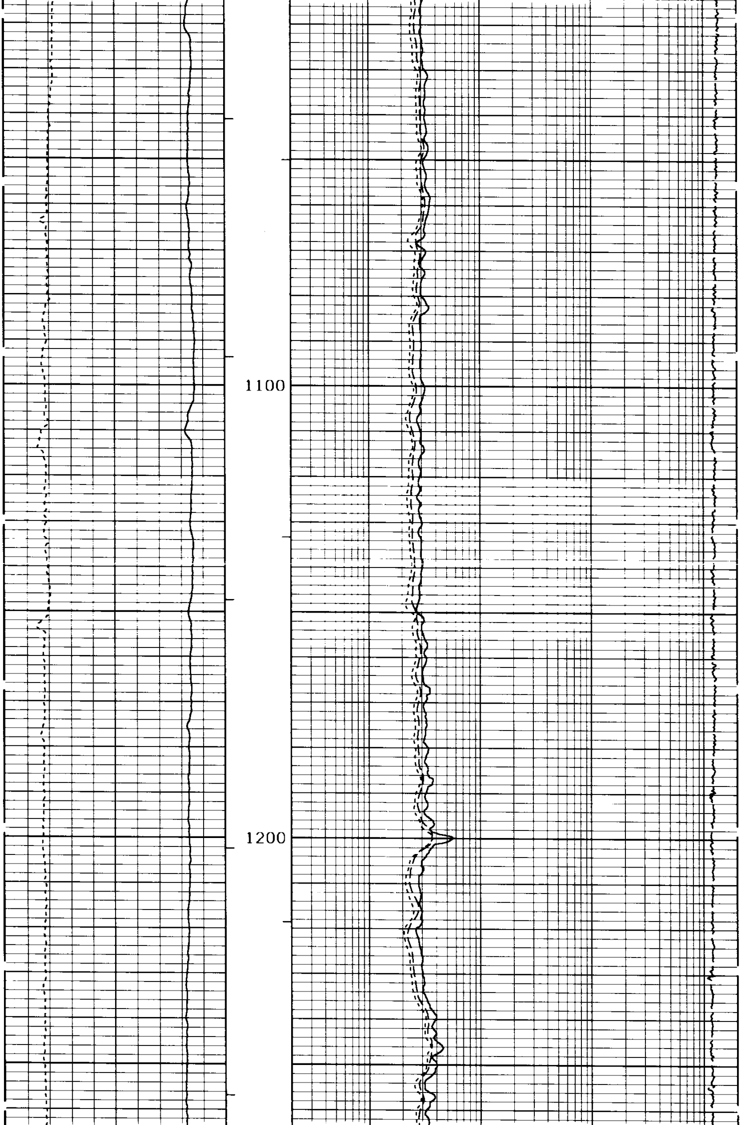
THANK YOU FOR USING HALLIBURTON LOGGING SERVICES!!

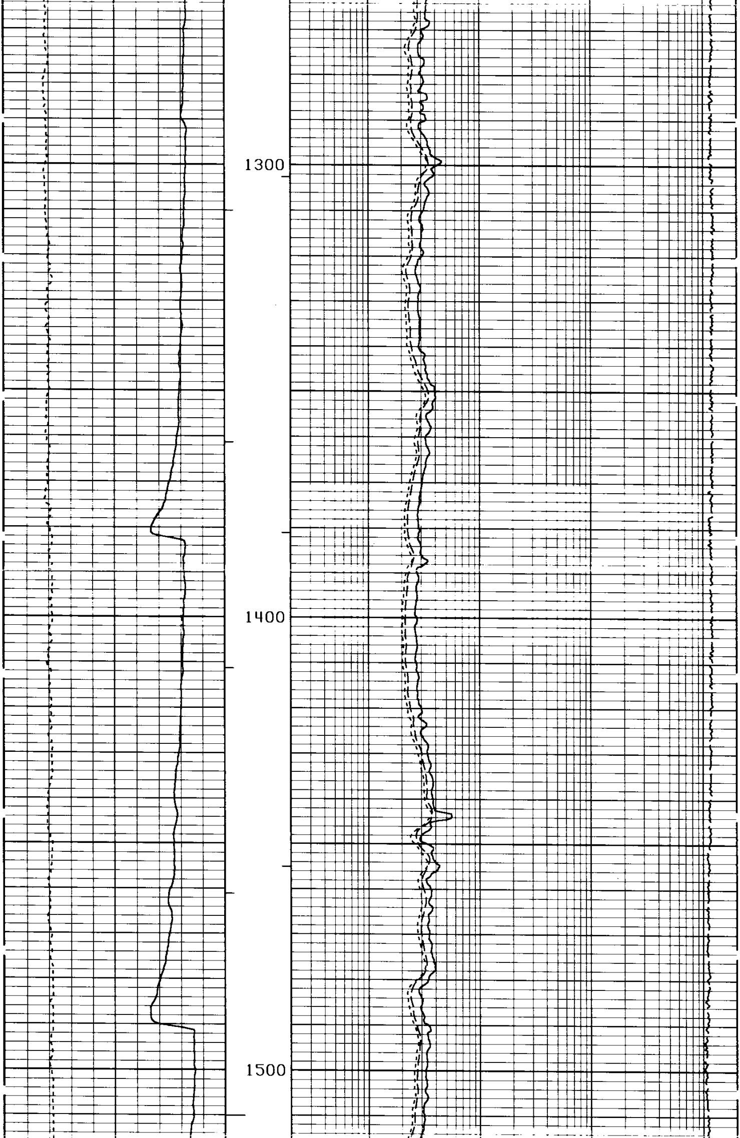
Halliburton Logging Services, Inc. does not guarantee the accuracy of any interpretation of log data, conversion of log data to physical rock parameters or recommendations which may be given by HLS personnel or which may appear on the log or in any other form. Any user of such data, interpretations, conversions or recommendations agrees that HLS is not responsible except where due to gross negligence or wilful misconduct, for any loss, damages, or expenses resulting from the use thereof.

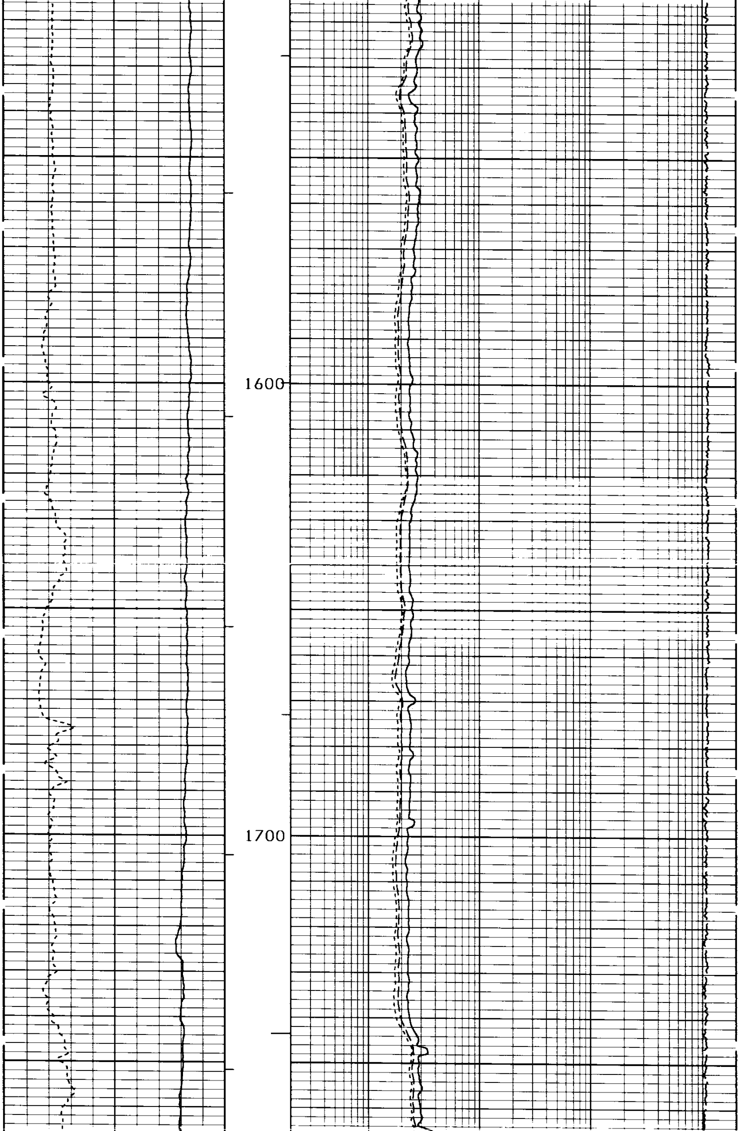


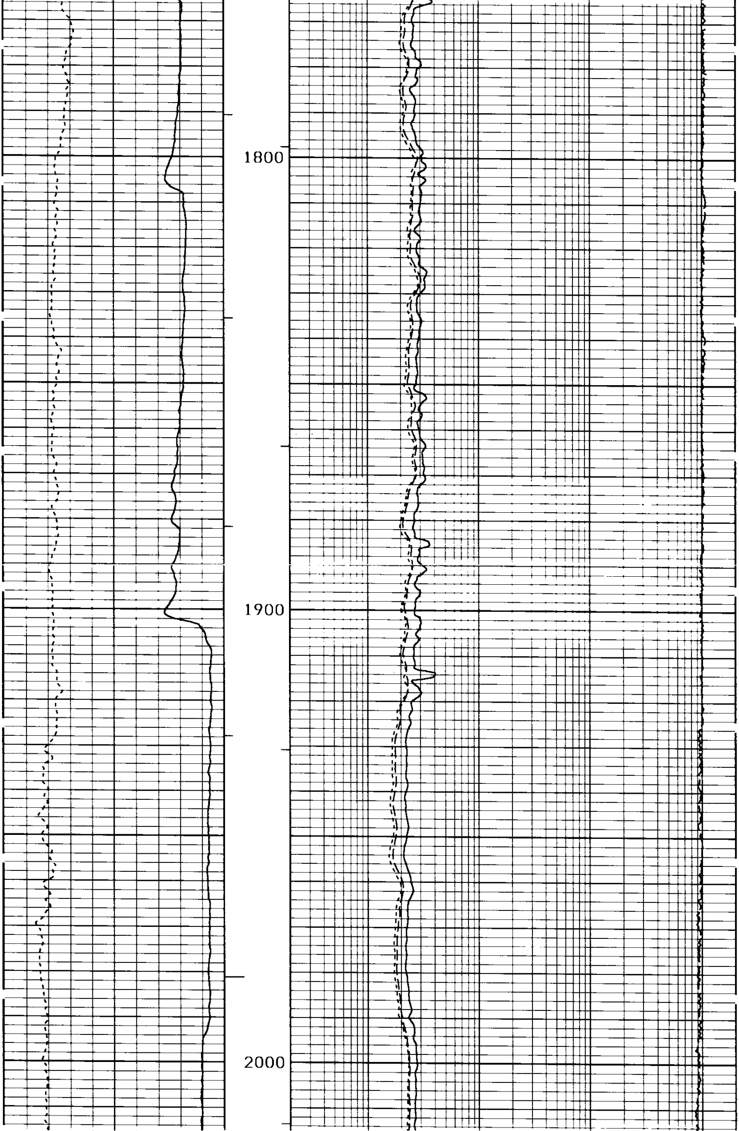


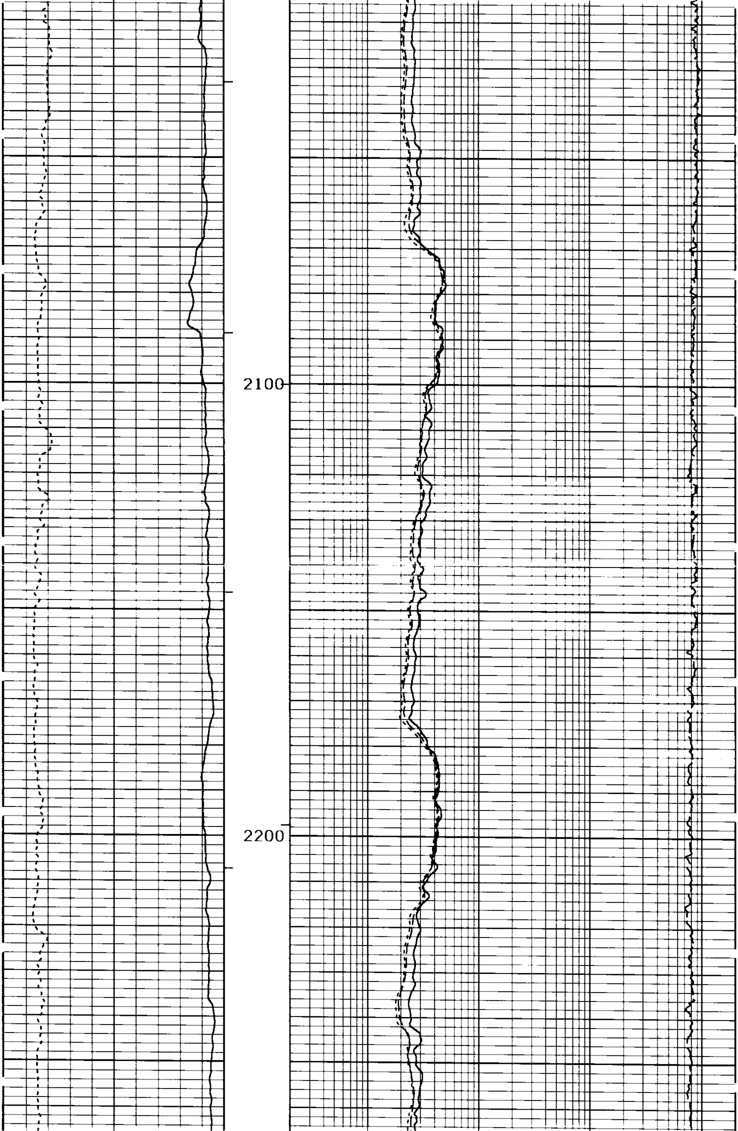


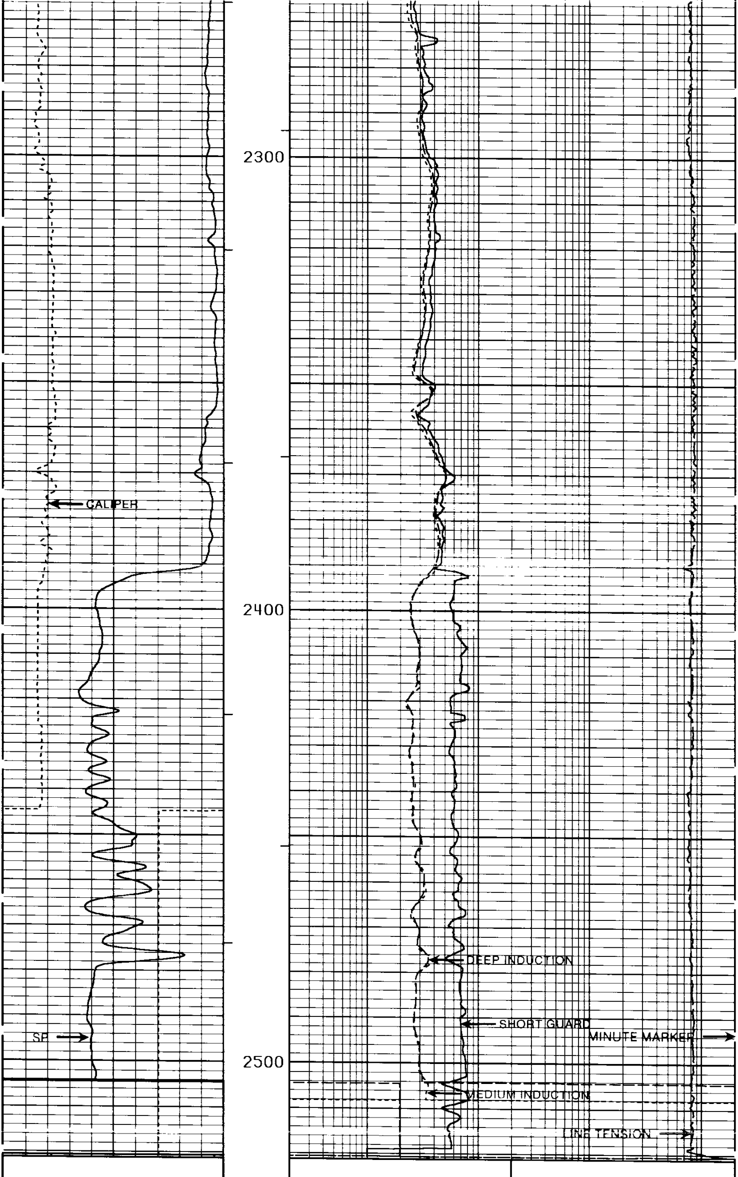




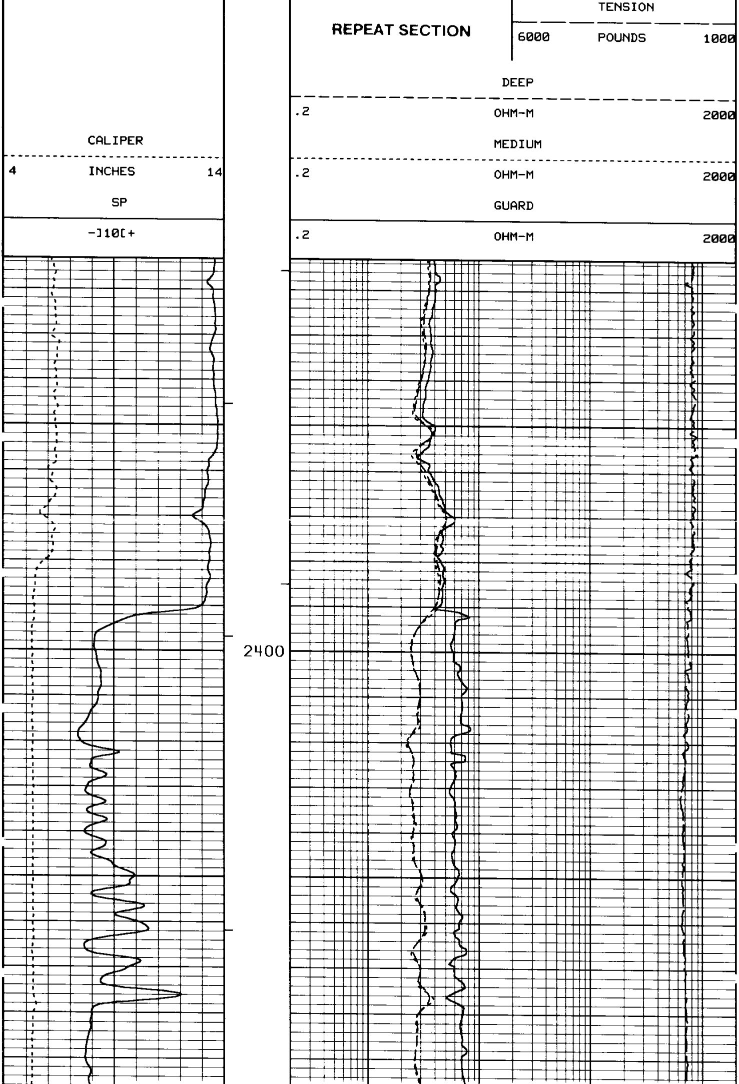


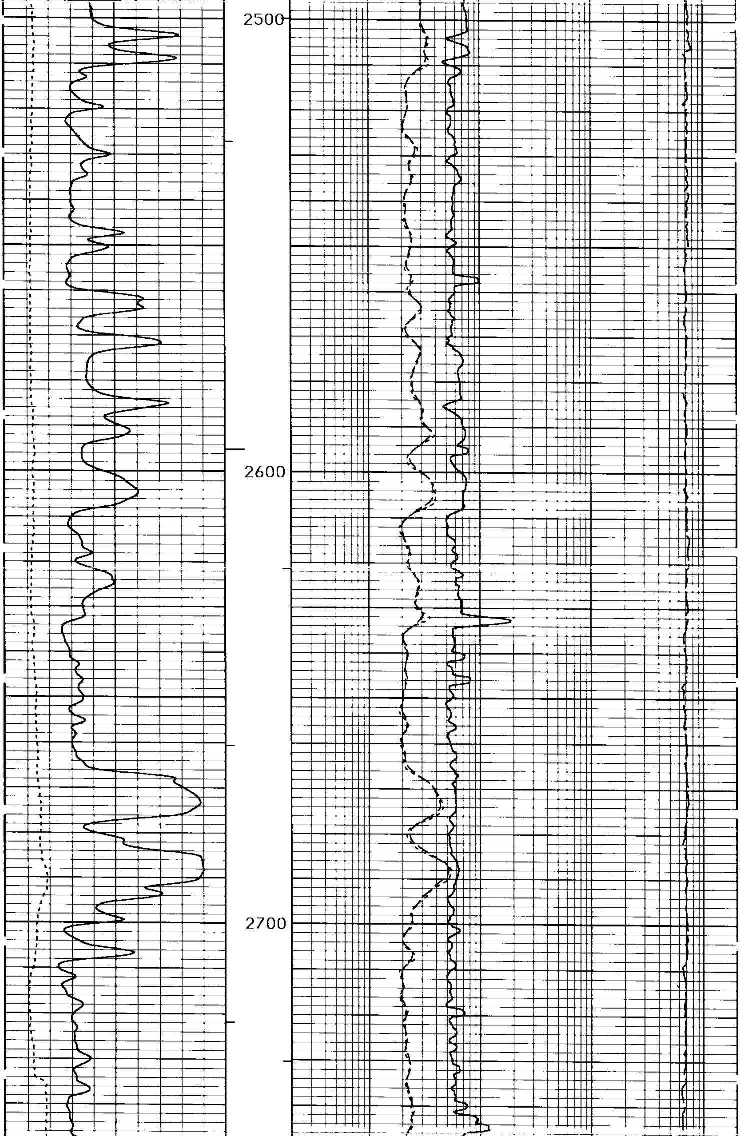


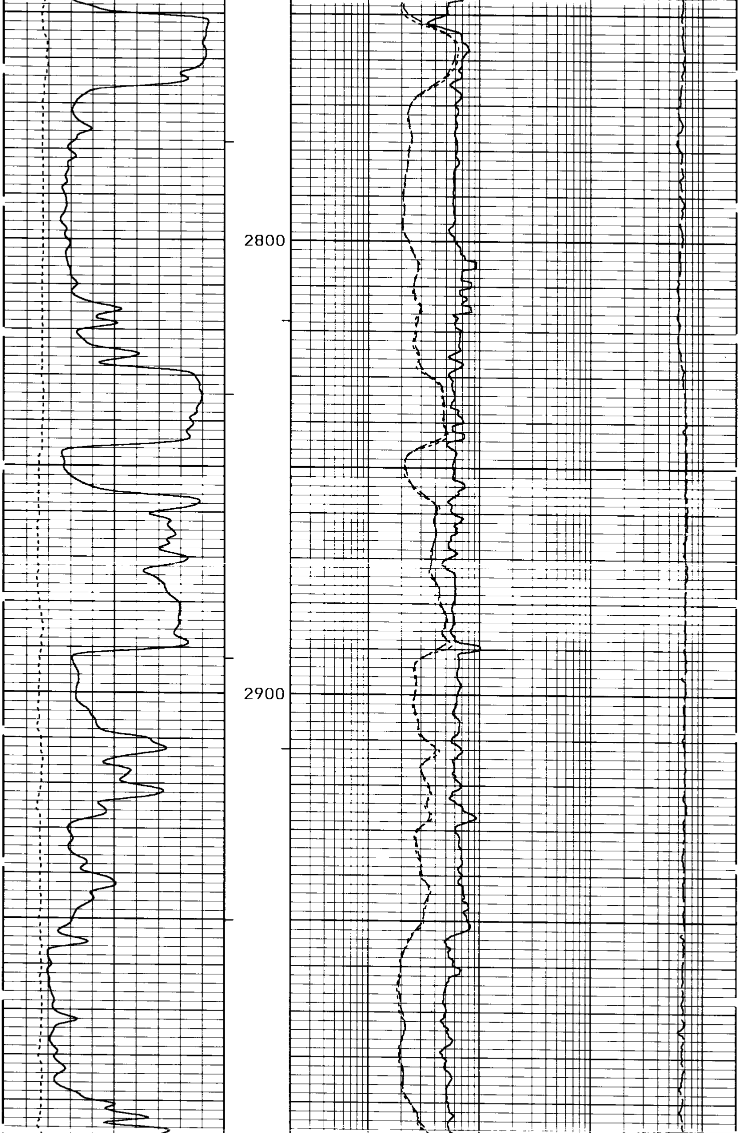


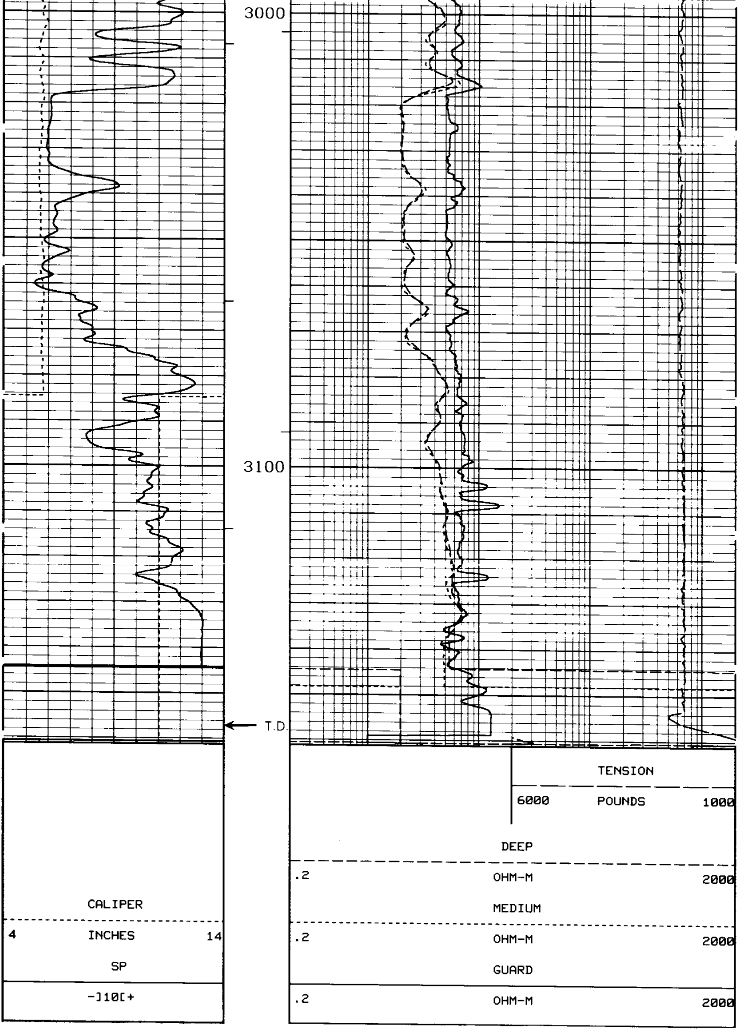


REPEAT SECTION









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                    SHORT GUARD   SHOP CALIBRATION SUMMARY
PERFORMED:   10:32:27  09/29/89    LAST SHOP CALIBRATION:   10:45:39  08/31/89
SERIAL NUMBER: 108946              PROGRAM VERSION: 1.31 PC
MODEL: #405
PERFORMED BY: MCDANIEL
                         MEASURED        CALIBRATED          UNITS
                         --------        ----------          -----
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EXT. CAL. POINT #1          1.996           2.000           OHM-M
EXT. CAL. POINT #2         19.842          20.000           OHM-M
EXT. CAL. POINT #3        197.900         200.000           OHM-M
INTERNAL REFERENCE         19.667          19.823           OHM-M

                  SHORT GUARD  BEFORE SURVEY FIELD CHECK SUMMARY
PERFORMED:  22:46:03  10/08/89    LAST SHOP CALIBRATION:   10:32:27  09/29/89

                            SHOP            FIELD           UNITS
                          --------        ---------         ------
INTERNAL REFERENCE         19.823          19.823           OHM-M


                  SHORT GUARD  AFTER SURVEY FIELD CHECK SUMMARY
PERFORMED:  01:10:07  10/09/89    LAST SHOP CALIBRATION:   10:32:27  09/29/89

                           BEFORE           AFTER           UNITS
                          --------        ---------         -----
INTERNAL REFERENCE         19.823          19.810           OHM-M


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                 DUAL INDUCTION  SHOP CALIBRATION SUMMARY
PERFORMED:  10:18:34  09/29/89    LAST SHOP CALIBRATION:   11:01:10  08/31/89
SERIAL NUMBER: 109437             PROGRAM VERSION: 1.31 PC
MODEL: #412
PERFORMED BY: MCDANIEL

                               DEEP INDUCTION         MEDIUM INDUCTION
                          MEASURED   CALIBRATED   MEASURED   CALIBRATED     UNITS
                          --------------------    --------------------     -------
TOOL ZERO                     .039        .000      -.197        .000     MMHOS/M
INTERNAL REFERENCE         500.688     497.321    498.308     498.855     MMHOS/M
WHEEL                      503.217     500.000    498.431     500.000     MMHOS/M
MANDREL BASE                 2.262       2.192      1.866       1.079     MMHOS/M

                 DUAL INDUCTION BEFORE SURVEY FIELD CHECK SUMMARY
PERFORMED:  22:47:54  10/08/89    LAST SHOP CALIBRATION:   10:18:34  09/29/89

                               DEEP INDUCTION         MEDIUM INDUCTION
                             SHOP      FIELD         SHOP       FIELD        UNITS
                          --------------------    --------------------     -------
TOOL ZERO                     .000        .128       .000        .148     MMHOS/M
INTERNAL REFERENCE         497.320     498.797    498.854     503.194     MMHOS/M
MANDREL BASE                 2.192       2.192      1.079       1.079     MMHOS/M

                 DUAL INDUCTION AFTER SURVEY FIELD CHECK SUMMARY
PERFORMED:  01:11:35  10/09/89    LAST SHOP CALIBRATION:   10:18:34  09/29/89

                               DEEP INDUCTION         MEDIUM INDUCTION
                            BEFORE     AFTER        BEFORE       AFTER       UNITS
                          --------------------    --------------------     -------
TOOL ZERO                     .128        .128       .148        .148     MMHOS/M
INTERNAL REFERENCE         498.796     500.205    503.193     504.880     MMHOS/M
MANDREL BASE                 2.192       2.192      1.079       1.079     MMHOS/M


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                    GAMMA   SHOP CALIBRATION SUMMARY
PERFORMED:  09:48:44  09/29/89    LAST SHOP CALIBRATION:   10:32:11  09/03/89
SERIAL NUMBER: 108581             PROGRAM VERSION: 1.31 PC
MODEL: #432         FIELD CALIBRATOR: #2141
PERFORMED BY: MCDANIEL

                          MEASURED        CALIBRATED        UNITS
                          --------        ----------        -----
BACKGROUND                   17               17            API-CPS
BACKGROUND+CALIBRATOR       273              275            API-CPS
CALIBRATOR                  257              258            API-CPS

                    GAMMA  BEFORE SURVEY FIELD CHECK SUMMARY
PERFORMED:  22:43:57  10/08/89    LAST SHOP CALIBRATION:   09:48:44  09/29/89
FIELD CALIBRATOR: #2141
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                              SHOP            FIELD           UNITS
                            --------        ----------        -----
BACKGROUND                     17              28            API-CPS
BACKGROUND+CALIBRATOR         275             294            API-CPS
CALIBRATOR                    258             266            API-CPS

                    GAMMA  AFTER SURVEY FIELD CHECK SUMMARY
PERFORMED:  01:22:00  10/09/89    LAST SHOP CALIBRATION:   09:48:44  09/29/89

                             BEFORE           AFTER           UNITS
                            --------        ----------        -----
BACKGROUND                     28              28            API-CPS
BACKGROUND+CALIBRATOR         294             299            API-CPS
CALIBRATOR                    266             271            API-CPS


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                   CALIPER   SHOP CALIBRATION SUMMARY
PERFORMED:  12:00:42  10/05/89    LAST SHOP CALIBRATION:   14:00:58  08/07/89
SERIAL NUMBER: TAN                PROGRAM VERSION: 1.31 PC
MODEL: #202
PERFORMED BY: MCDANIEL

                            MEASURED        CALIBRATED         UNITS
                            --------        ----------         -----
VALUE 1                       8.590           8.000            INCHES
VALUE 2                      17.414          16.000            INCHES

                   CALIPER  BEFORE SURVEY FIELD CHECK SUMMARY
PERFORMED:  21:48:11  10/08/89    LAST SHOP CALIBRATION:   12:00:42  10/05/89

                              SHOP            FIELD            UNITS
                            --------        ---------          -----
VALUE 1                       8.000           7.884            INCHES

                   CALIPER  AFTER SURVEY FIELD CHECK SUMMARY
PERFORMED:  01:15:13  10/09/89    LAST SHOP CALIBRATION:   12:00:42  10/05/89

                             BEFORE           AFTER            UNITS
                            --------        ---------          -----
VALUE 1                       7.884           8.008            INCHES


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                   TENSION   SHOP CALIBRATION SUMMARY
PERFORMED:  22:35:01  10/08/89    LAST SHOP CALIBRATION:   12:04:29  10/05/89
SERIAL NUMBER: TOP                PROGRAM VERSION: 1.31 PC


                       H L S CALIBRATION SUMMARY TABLE
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   SERVICE or SIGNAL          SHOP       BEFORE      AFTER      CHANGE    TOLERANCE
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GUARD                        19.823      19.823      19.810       .012     +/-.80
DEEP INDUCTION              497.320     498.796     500.205     -1.409     +/- 20
MEDIUM INDUCTION            498.854     503.193     504.880     -1.686     +/- 20
GAMMA                       258         266         271         -5         +/- 9.0
CALIPER VALUE 1               8.000       7.884       8.008      -.124     +/- 0.50
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EVENTS

```
   1 21: 6: 7 00000 >DATE OF LOG: MMDD                   10 8
   2 21:22:45 00000 >PLS SOFTWARE REVISION               1.31
   3 21:22:45 00000 >CURRENT REVISION UPDATE NUMBER PC
   4 21:50:15 01248 >CASING SIZE O.D. (INCHES)             5.500+0
   5 21:50:15 01248 >BIT SIZE? (INCHES)                    7.875+0
   6 21:50:17 01248 >DT-MATRIX(40=DOL<DT<70=SHALY)         5.700+1
   7 21:50:17 01248 >DT-SHALE (100=MIN<DT<160=MAX)         1.000+2
   8 21:50:18 01248 >FOR FORMATION FACTOR(.5<A<2.5)        1.000+0
   9 21:50:18 01248 >FOR FORMATION FACTOR(1.2<M<2.5)       2.000+0
  10 21:50:25 01248 >CASING SIZE O.D. (INCHES)             3.500+0
  11 21:50:32 01248 >BIT SIZE? (INCHES)                    6.250+0
  12 21:50:44 01248 >FOR FORMATION FACTOR(.5<A<2.5)        8.100-1
  13 21:51:10 01248 >>LOG PARAMETERS UPDATED HERE
  14 23:10:38 02522 >LOGGING SECTION NO.                        2
  15 23:18:59 02272 >"HALTING" END OF SECTION
  16 23:25:34 03161 >LOGGING SECTION NO.                        3
  17 23:54:43 02312 >"HALTING" END OF SECTION
  18 23:54:43 02312 >"HALTING" END OF SECTION
  19 23:57:18 02521 >LOGGING SECTION NO.                        4
  20  0: 0: 1 02445 >DATE OF LOG: MMDD                    10 9
  21  1: 4:21 00379 >"HALTING" END OF SECTION
  22  1: 4:21 00379 >"HALTING" END OF SECTION
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