HALLIBURTON LOGGING SERVICES, INC.

FINAL PRINT

SPECTRAL DENSITY DUAL SPACED NEUTRON LOG

5" = 100'

COMPANY ______________
WELL ______________
FIELD ______________
COUNTY __________ ST __

COMPANY ARCO OIL AND GAS COMPANY
WELL BANANA SLUG PROSPECT C.E.R. 13-1-55
FIELD MIST
COUNTY COLUMBIA STATE OR
API NO. N/A
LOCATION : WWM
1522 FEET NORTH AND
289 FEET EAST FROM THE
SOUTHWEST CORNER OF:
SEC. 1 TWP 5N RGE 5W

OTHER SERVICES
DIG/AVL
DIPMETER

PERMANENT DATUM G.L. ELEV. 729.75
LOG MEASURED FROM K.B. 11.5FT.ABOVE PERM.DATUM
DRILLING MEASURED FROM KELLY BUSHING
ELEV.:K.B. 741.25
D.F. -----
G.L. 729.75

DATE	11/05/89			
RUN NO.	ONE			
DEPTH-DRILLER	1480			
DEPTH-LOGGER	1480			
BTM. LOG INTER.	1477			
TOP LOG INTER.	465			
CASING-DRILLER	9 5/8@465	@	@	@
CASING-LOGGER	465			
BIT SIZE	6 1/4			
TYPE FLUID IN HOLE	POLYMER			
DENS. : VISC.	11.1 :47	--	--	--
PH : FLUID LOSS	10.0 :6.4	--	--	--
SOURCE OF SAMPLE	CIRCULATED			
RM @ MEAS. TEMP.	1.73 @75	@	@	@
RMF @ MEAS. TEMP.	1.41 @75	@	@	@
RMC @ MEAS. TEMP.	1.80 @72	@	@	@
SOURCE RMF : RMC	MEAS :MEAS.	--	--	--
RM @ BHT	1.35 @ 98	@	@	@
TIME SINCE CIRC.	7.5 HOURS			
TIME ON BOTTOM	3:30 AM			
MAX. REC. TEMP.	98 @BHT	@	@	@
EQUIP. : LOCATION	2890 :WDLND	--	--	--
RECORDED BY	B.JOHNSON			
WITNESSED BY	JIM EASTES			

Fold Here

Service Ticket No.: 12312 API Serial No.: N/A PGM Version: 1.31 PC

Change in Mud Type or Additional Samples		
Date/Sample No.	11/04/89: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	1.35 @98	@
Rmf @ BHT	1.10 @98	@
Rmc @ BHT	1.35 @98	@

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
ONE	DUAL W109432	N/A	1.5"S.O.	M412
ONE	SGRD W108932	N/A	1.5"S.O.	M416

EQUIPMENT DATA

GAMMA		ACOUSTIC		DENSITY		NEUTRON	
Run No.	ONE	Run No.	ONE	Run No.	ONE	Run No.	ONE
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.	118	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 No.	Depth From	Depth To	Speed Ft/Min	Scale L	Scale R	Scale L	Scale R	Matrix	Scale L	Scale R	Matrix	Scale L	Scale R	Matrix
ONE	1480	465	30	0	150	150	50	57US	1.65	2.65	2.65	60	0	SAND
					API						G/CC		PU	

Remarks: REPEAT RUN OVER INTERVAL FROM 1200 TO 1000 AT CUSTOMERS REQUEST.

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GAMMA SHOP CALIBRATION SUMMARY
PERFORMED: 23:05:22 11/04/89 LAST SHOP CALIBRATION: 14:46:48 10/12/89
SERIAL NUMBER: 108581 PROGRAM VERSION: 1.31 PC
MODEL: #432 FIELD CALIBRATOR: #2141
PERFORMED BY: JOHNSON

	MEASURED	CALIBRATED	UNITS
BACKGROUND	25	23	API-CPS
BACKGROUND+CALIBRATOR	299	281	API-CPS
CALIBRATOR	274	258	API-CPS

GAMMA BEFORE SURVEY FIELD CHECK SUMMARY
PERFORMED: 23:13:22 11/04/89 LAST SHOP CALIBRATION: 23:05:22 11/04/89
FIELD CALIBRATOR: #2141

	SHOP	FIELD	UNITS
BACKGROUND	23	24	API-CPS
BACKGROUND+CALIBRATOR	281	280	API-CPS
CALIBRATOR	258	256	API-CPS

GAMMA AFTER SURVEY FIELD CHECK SUMMARY
PERFORMED: 05:02:38 11/05/89 LAST SHOP CALIBRATION: 23:05:22 11/04/89

	BEFORE	AFTER	UNITS
BACKGROUND	24	25	API-CPS
BACKGROUND+CALIBRATOR	280	272	API-CPS
CALIBRATOR	256	246	API-CPS

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DUAL SPACE NEUTRON SHOP CALIBRATION SUMMARY
PERFORMED: 15:07:51 10/12/89 LAST SHOP CALIBRATION: 10:57:07 09/29/89
SERIAL NUMBER: 108749 PROGRAM VERSION: 1.31 PC
MODEL: #434 FIELD CALIBRATOR: #4916 SOURCE: #66
PERFORMED BY: JOHNSON

PRIMARY CALIBRATOR

	MEASURED	CALIBRATED	UNITS
RATIO	6.350	6.371	
POROSITY	23.864	23.962	%

FIELD CHECK BLOCK

	MEASURED	DEFINED	UNITS
CHECK RATIO	7.015	7.039	
CHECK POROSITY	26.965	27.074	%

DUAL SPACE NEUTRON BEFORE SURVEY FIELD CHECK SUMMARY
PERFORMED: 02:39:04 11/05/89 LAST SHOP CALIBRATION: 15:07:51 10/12/89
FIELD CALIBRATOR: #4916 SOURCE: #66

	SHOP	FIELD	UNITS
CHECK RATIO	7.039	7.071	
CHECK POROSITY	27.074	27.223	%

DUAL SPACE NEUTRON AFTER SURVEY FIELD CHECK SUMMARY
PERFORMED: 05:14:46 11/05/89 LAST SHOP CALIBRATION: 15:07:51 10/12/89

	BEFORE	AFTER	UNITS
CHECK RATIO	7.071	7.085	
CHECK POROSITY	27.223	27.292	%

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SDL CALIPER SHOP CALIBRATION SUMMARY
PERFORMED: 16:06:58 10/12/89 LAST SHOP CALIBRATION: 16:03:15 10/12/89
SERIAL NUMBER: 63 PROGRAM VERSION: 1.31 PC
MODEL: #465
PERFORMED BY: JOHNSON

	MEASURED	CALIBRATED	UNITS
VALUE 1	7.975	8.000	INCHES
VALUE 2	16.019	16.000	INCHES

SDL CALIPER BEFORE SURVEY FIELD CHECK SUMMARY
PERFORMED: 02:42:06 11/05/89 LAST SHOP CALIBRATION: 16:06:58 10/12/89

	SHOP	FIELD	UNITS
VALUE 1	8.000	7.685	INCHES

SDL CALIPER AFTER SURVEY FIELD CHECK SUMMARY
PERFORMED: 05:18:36 11/05/89 LAST SHOP CALIBRATION: 16:06:58 10/12/89

	BEFORE	AFTER	UNITS
VALUE 1	7.685	7.556	INCHES

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SPECTRAL DENSITY SHOP CALIBRATION SUMMARY
PERFORMED: 15:56:28 10/12/89 LAST SHOP CALIBRATION: 11:54:31 09/29/89
SERIAL NUMBER: 109740 PROGRAM VERSION: 1.31 PC
MODEL: #465 FIELD CALIBRATOR: #AL SOURCE: #118
PERFORMED BY: JOHNSON

PRIMARY CALIBRATOR

	MEASURED	CALIBRATED	UNITS
ALUMINUM BLOCK			
ALUMINUM DENSITY	2.599	2.595	gm/cc
ALUMINUM CORRECTION	.037	.039	gm/cc
ALUMINUM Pe SHORT	3.168	3.209	
AUMMINUM Pe LONG	3.155	3.179	
ALUMINUM BLOCK W/SLEEVE			
ALUMINUM DENSITY	2.600	2.595	gm/cc
ALUMINUM CORRECTION	-.057	-.056	gm/cc
ALUMINUM Pe SHORT	5.974	6.000	
AUMMINUM Pe LONG	6.087	6.169	
MAGNESIUM BLOCK			
MAGNESIUM DENSITY	1.678	1.672	gm/cc
MAGNESIUM CORRECTION	.011	.010	gm/cc
MAGNESIUM Pe SHORT	3.152	3.193	
MAGNESIUM Pe LONG	2.796	2.813	

FIELD CHECK BLOCK

	MEASURED	DEFINED	UNITS
ALUMINUM SLIDE			
ALUMINUM DENSITY	1.657	1.654	gm/cc
ALUMINUM CORRECTION	-.050	-.053	gm/cc
ALUMINUM Pe SHORT	4.391	4.425	
ALUMINUM Pe LONG	4.167	4.212	
ALUMINUM SLIDE IN			
ALUMINUM DENSITY	2.158	2.152	gm/cc
ALUMINUM CORRECTION	-.005	-.007	gm/cc
ALUMINUM Pe SHORT	4.602	4.635	
ALUMINUM Pe LONG	3.814	3.852	
BRASS SLIDE			
BRASS DENSITY	2.362	2.360	gm/cc
BRASS CORRECTION	-.376	-.370	gm/cc
BRASS Pe SHORT	5.756	5.783	
BRASS Pe LONG	3.505	3.537	

SPECTRAL DENSITY BEFORE SURVEY FIELD CHECK SUMMARY
PERFORMED: 02:47:20 11/05/89 LAST SHOP CALIBRATION: 15:56:28 10/12/89
FIELD CALIBRATOR: #AL SOURCE: #118

ALUMINUM SLIDE IN	SHOP	FIELD	UNITS
ALUMINUM DENSITY	2.152	2.155	gm/cc
ALUMINUM CORRECTION	-.007	-.005	gm/cc
ALUMINUM PE SHORT	4.635	4.830	
ALUMINUM PE LONG	3.852	4.105	

SPECTRAL DENSITY AFTER SURVEY FIELD CHECK SUMMARY
PERFORMED: 05:27:35 11/05/89 LAST SHOP CALIBRATION: 15:56:28 10/12/89

ALUMINUM SLIDE IN	BEFORE	AFTER	UNITS
ALUMINUM DENSITY	2.155	2.141	gm/cc
ALUMINUM CORRECTION	-.005	-.005	gm/cc
ALUMINUM PE SHORT	4.830	4.861	
ALUMINUM PE LONG	4.105	4.014	

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TENSION SHOP CALIBRATION SUMMARY
PERFORMED: 22:37:06 11/04/89 LAST SHOP CALIBRATION: 17:45:54 10/31/89
SERIAL NUMBER: TOP PROGRAM VERSION: 1.31 PC

H L S CALIBRATION SUMMARY TABLE

SERVICE or SIGNAL	SHOP	BEFORE	AFTER	CHANGE	TOLERANCE
GAMMA	258	256	246	9	+/- 9.0
DSN POROSITY	27.074	27.223	27.292	-.069	+/-.90
CALIPER VALUE 1	8.000	7.685	7.556	.129	+/- 0.50
BULK DENSITY	2.152	2.155	2.141	.014	+/-.015
DENSITY CORRECTION	-.007	-.005	-.005	-.000	+/-.015
DENSITY PE SHORT	4.635	4.830	4.861	-.030	+/-.30
DENSITY PE LONG	3.852	4.105	4.014	.091	+/-.30

EVENTS

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 1  2: 7:14 00000 >DATE OF LOG: MMDD               11 5
 2  2:28:30 01000 >PLS SOFTWARE REVISION           1.31
 3  2:28:30 01000 >CURRENT REVISION UPDATE NUMBER PC
 4  3:11:35 00553 >IS THIS A CASED HOLE? (Y/N)     N
 5  3:11:36 00553 >CASING SIZE O.D. (INCHES)       5.500+0
 6  3:11:36 00553 >CASING WEIGHT? (POUNDS/FT)      1.700+1
 7  3:11:37 00553 >CASING SIZE O.D. (INCHES)       5.500+0
 8  3:11:39 00553 >BIT SIZE? (INCHES)              7.875+0
 9  3:11:40 00553 >MATRIX DENSITY? (1.5<RHOM<4.5)  2.710+0
10  3:11:40 00553 >FLUID DENSITY (.10<RHOF<1.2)    1.000+0
11  3:11:40 00553 >MUD DENSITY (#/GAL)             9.500+0
12  3:11:41 00553 >ANY BARITE IN THE MUD? (Y/N)    Y
13  3:11:41 00553 >UN-FILTERED PE DATA? (Y/N)      N
14  3:11:42 00553 >DSN BAD HOLE CORRECTION? (Y/N)  Y
15  3:11:42 00553 >DSN STANDOFF? (INCHES)          0.000+0
16  3:11:42 00553 >LITHOLOGY:L=1,S=2,D=3,LS=4,LD=5     1
17  3:11:43 00553 >FOR "F": DSN=1, DEN=2, CROSS=3      2
18  3:11:43 00553 >FOR "F" USE: (.5<A<2.5)         1.000+0
19  3:11:43 00553 >FOR "F" USE: (1.2<M<2.5)        2.000+0
20  3:12: 8 00553 >BIT SIZE? (INCHES)              6.250+0
21  3:12:17 00553 >MATRIX DENSITY? (1.5<RHOM<4.5)  2.650+0
22  3:12:22 00553 >MUD DENSITY (#/GAL)             1.110+1
23  3:12:32 00553 >LITHOLOGY:L=1,S=2,D=3,LS=4,LD=5     2
24  3:12:39 00553 >FOR "F" USE: (.5<A<2.5)         8.100-1
25  3:12:40 00553 >>LOG PARAMETERS UPDATED HERE
26  3:22:12 00455 > SDL OPEN MANDREL.
27  3:23:18 01200 >LOGGING SECTION NO.                 2
28  3:31:14 00991 >"HALTING" END OF SECTION
29  3:31:43 00976 > SDL CLOSE MANDREL.
30  3:37:38 00947 > SDL OPEN MANDREL.
31  3:39: 1 01482 >LOGGING SECTION NO.                 3
32  4:13:44 00458 >"HALTING" END OF SECTION
33  4:13:44 00458 >"HALTING" END OF SECTION
34  4:14:18 00443 > SDL CLOSE MANDREL.
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