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GEOLOGIC REPORT LOG

COMPANY MURFIN DRILLING CO.

WELL CULWELL 'C' #3-10

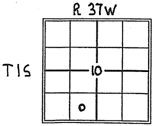
FIELD JONES CANYON SOUTHEAST

LOCATION 660' FSL, 1980' FWL

SEC 10 TWSP 1S RGE 37W

COUNTY CHEYENNE

STATE KANSAS



PRODUCTION:

ELEVATION: KB 3200 DF GL 3189

DRILLING MEASURED FROM KB

MUD COMPANY MORGAN MUD INC.

CONTRACTOR MURFIN DRILLING CO RIG #20

COMMENCED 5 FEB 2015 COMPLETED 15 FEB 2015

CASING RECORD:

SURFACE 8⅝ @ 225' PRODUCTION

TOTAL DEPTH DRLS. 4730

TOTAL DEPTH LOG 4728

SAMPLES SAVED FROM 10' - 3500' TO RTD

DRILLING TIME KEPT FROM 1' - 3500' TO RTD

SAMPLES EXAMINED FROM 3500' TO RTD

GEOLOGICAL SUPERVISION FROM 3400' TO TOTAL DEPTH

DRILL STEM TESTS TRILOBITE TESTING INC.

ELECTRICAL SURVEYS PIONEER ENERGY SER
DIL
CNL-CDL
BHCS / MEL

FORMATION TOPS & STRUCTURAL POSITION

FORMATION	SAMPLE TOP	ELECTRIC LOG TOP	SUB-SEA DATUM	STRUCTURAL POSITION
ANHYDRITE-TOP	3149	3146	+54	-1
ANHYDRITE-BASE	3181	3178	+22	-2
NEVA	3602	3598	-398	-1
RED EAGLE	3665	3664	-464	-4
FORAKER	3710	3708	-508	-3
TOPEKA	3934	3932	-732	-4
OREAD	4068	4064	-864	-2
LANSING	4149	4144	-944	-0
STARK	4366	4359	-1159	+1
BKC	4423	4414	-1214	-1
PAWNEE	4543	4336	-1336	-3
CHEROKEE	4627	4622	-1422	-2
TOTAL DEPTH	4730	4728	-1528	-11

REFERENCE WELL FOR STRUCTURE MURFIN DRILLING CO., THERON #2-10
660' FSL, 2310' FEL, SEC. 10-T1S-R37W, CHEYENNE CTY, KS

DRILL STEM TESTS

No.	Interval	IFP/Time	ISIP/Time	FFP/Time	FSIP/Time	IHH-FHH	RECOVERY
1	4106-4225 LANS 'A' & 'D'	80#-116# 30"	720# 60"	139#-148# 60"	789# 90"	2083#-2077# 135°F	93' FO (GR 30°) 126' MCO 121' HOCM
2	4230-4270 LANS 'G'	19#-30# 30"	1123# 60"	22#-27# 30"	1056# 60"	2048#-2015# 130°F	10' Oil Spotted Mud
3	4272-4365 LANS 'H-J'	15#-21# 30"	1026# 60"	23#-26# 30"	832# 60"	2111#-2046# 126°F	10' Oil Spotted Mud
4	4520-4565 PAWNEE	16#-26# 30"	95# 60"	26#-41# 60"	96# 90"	2250#-2185# 137°F	35' CD (GR 34°) 60' MCO

BIT RECORD

NO	SIZE	MAKE	TYPE	DEPTH OUT	FEET	HOURS
1	12¼	TC11P	TC11P	225	225	3
2	7⅞	HTC	DP506	3400	3175	40
3	7⅞	HTC	GX22	4730	1330	90

PIPE STRAPS & DEV. SURVEYS

PIPE STRAPS:
@ 3400: 0.26 LONG
DEVIATION SURVEYS:
@ 225': 0.1°, @ 1230: 1.0°
@ 2213': 0.8°, @ 3400: 0.0°
@ 4225: 0.5°, @ 4730: 1.0°

DAILY PENETRATION

DATE	DEPTH
2-5	MIRT / SPUD
2-6	225
2-7	2340
2-8	3400
2-9	3700
2-10	4045
2-11	4225
2-12	4270
2-13	4365
2-14	4565
2-15	4730

MUD RECORD

MUD TYPE: PUMP SIZE: BPS:

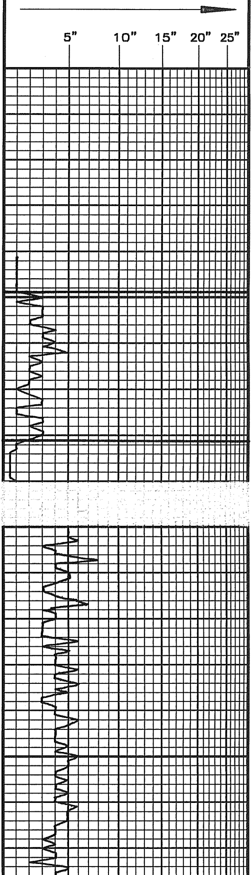
NO	DATE	DEPTH	ACTIVITY	WT	VIS	WL	VP	PH	GS	LCM	CHL
3	2-8	3400'	BIT TRIP	8.6	53	5.6	17	12.0	12/26	6.0	600
4	2-9	3703'	DRLG	8.9	55	6.0	18	10.5	14/33	12.0	600
5	2-10	4067'	DRLG	9.4	45	8.8	12	10.5	10/12	10.0	600
6	2-11	4225'	DST #1	9.4	60	6.8	20	10.0	10/16	10.0	600
7	2-12	4270'	DST #2	9.3	54	6.0	14	10.0	10/16	10.0	500
8	2-13	4411'	DRLG	9.3	60	7.2	20	10.5	12/18	10.0	500
9	2-14	4565'	DST #4	9.3	62	7.6	18	10.0	12/16	10.0	500

LEGEND

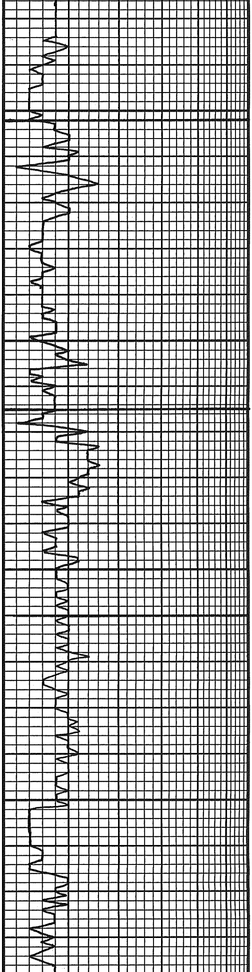
▥	▦	⛆	▤	■	▦	▦	△	▱
Anhydrite	Salt	Sandstone	Shale	Carb sh	Limestone	Ool.Lime	Chert	Dolomite

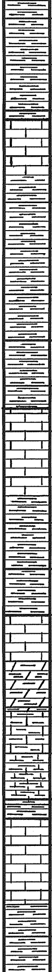
LOG 7710

DRILLING TIME IN MINUTES PER FOOT
Rate of Penetration Decreases



DEPTH	SAMPLE DESCRIPTIONS	OIL SHOWS	REMARKS
3100			
10			
20			
30			
40			ANHYDRITE - TOP
3150			3149 (+51)
60			
70			ANHYDRITE - BASE
80			3181 (+19)
90			
3500	sh: rust, vry silty/sandy; scat calc; few pcs tan, vfnxtln, dense ls:		
10	rust sh as above w/ ss: tan, lt gry vfn grained, calc, firm, no vis Ø, no show		
20	sh: rust, silty/sandy, w/ anhy inclusions; scat tan ss as above		
30	sh: rust silty/sandy → shaley ss; rust vfngrained, firm-friable, no vis Ø, N.S.		
40	sh: rust silty/sandy		
3550	sh: rust, silty/sandy → ss: rust, vfn grained, shaley, firm, no vis Ø, NS		
60	as above w/ scat anhy inclusions; scat grey sh		
70	as above w/ orange sh		





80

sh: as above; sli inc in anhy

90

sh: as above w/ scat ss: lt. grey, grey, greenish-grey, vfn grained, well-sorted, firm, sli calc, no vis ø, no show

3600

NEVA
3602 (-402)

ls: tan, lt grey, fn-some medxtln, v sli foss, granular in part, cpl pcs w/ pr interxtln ø, no show

10

ls: as above w/ sh: rust, silty; grey, few clusters ss: grey, fn grained, well-sorted, firm, no vis ø, no show

20

sh: rust, silty/sandy; some brown, grey

30

sh: as above

40

sh: rust, silty; some grey

3650

sh: as above
ls: tan, fnxtln, sli foss, sli granular, chlky in part, tr pr interxtln ø; no show; dolo: grey, brown, vfnxtln, dense, w/ sh: gry

60

RED EAGLE
3665 (-465)

ls: off wh, tan, vfn-fnxtln, vry sli foss, vry sli ool (vry fn), app pr interxtln ø, no show; considerable Δ; orange, brown, some grey, fresh, opaque

70

80

ls: as above, w/ dolo: brown, purple-brown, grey, vfnxtln, no vis ø; w/ sh: rust, silty, brown

90

sh: rust, brown, silty; some grey, lt. grey, pale green

3700

sh: as above

FORAKER
3710 (-510)

10

ls: lt. grey, tan, fn-medxtln, pelletal & oolitic in part; app pr interparticle/interxtln ø, spotty pr-fr st w/ scat pcs w/ full st & sat; S-FSFO, no odor
dolo: grey, brown, vfn-fnxtln, 'dirty', no vis ø, no show; sh: brown, dolo; grey

20

30

ls: dk grey, blk, dk brown, fn-medxtln, foss, mottled, dense; ls: tan, lt. grey, vfn-fnxtln, v sli foss, sli chalky, no vis ø, no show w/ sh: grey, dk grey

40

sh & ls: as above

3750

ls: tan, lt. brown, vfn-some medxtln, sli foss, sli granular, calcitic in part, scat pr interxtln ø, no show; w/ wh, fnxtln chalk

60

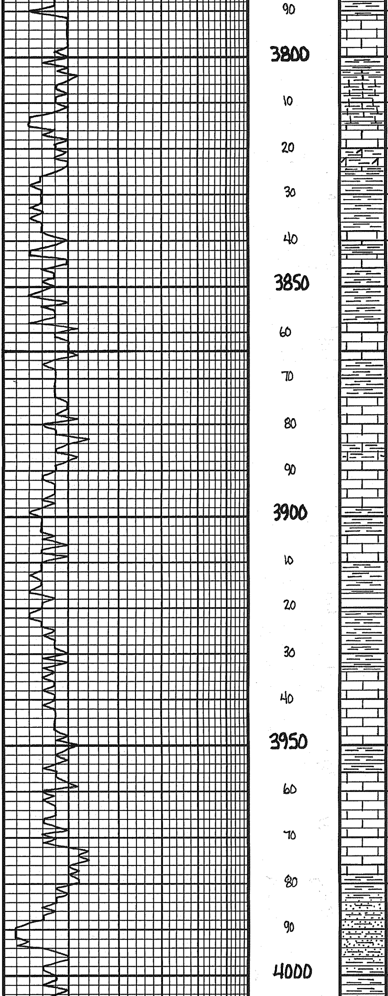
ls: as above, no show

70

sh: grey, w/ ls: fragments w/ dolo cement, dk grey, black

80

sh: orange, rust, soft "gummy"



ls: offwh, lt. grey, fn-some medxtln,
sli foss, no vis ø; no show

sh: rust, brown, grey
ls: offwh, lt. grey, pink (sh st.), fn-med
xtln, sli foss, no vis ø, no show

sh: rust, brown, grey, calc in part; w/
ls: as above

ls: lt. grey, pink, fnxtln, dolomitic in
part; no vis ø, no show; sh: rust, brown

sh: rust, brown, silty → sandy, scat
grey, mica; wh sandy chalk; w/
ls: brown, grey, fn-medxtln, v sli

ool, mottled in part, dense
sh: rust, brown, grey w/ ls: brown
grey, medxtln, dense, w/ rust sh contact

sh: rust, brown, grey, calc in part
sh: orange "gummy"
ls: lt. grey, tan, medxtln, mottled v

sli foss, tr pr interxtln ø; scat dd oil
residue, NS live oil

sh: brown, grey, some rust,
ls: lt. grey, fn-medxtln, pelletal, sli
ool, well cemented, scat pr interparticle

ø, considerable dd oil residue, no
show live oil
ls: as above; considerable dd oil

residue, no show live oil; sh: grey,
lt. grey, some brown
ls: as above; w/ grey, brown sh

sh: grey, brown, some rust; w/ ls: tan,
lt. brown, medxtln, oolitic in part; no
vis ø, no show

sh: rust, silty → sandy; sh: grey, sh:
rust-brown w/ scat ls frag inclusions
scat tan, brown, medxtln, sli ool, ls

sh: orange "gummy"; scat brown,
grey

ls: tan, lt. grey, vfn-fnxtln (few pcs
medxtln, no vis ø, no show

ls: offwh lt. grey tan fn-medxtln
tr foss scat interbedded rust sh;

sh: rust
ls: tan lt. grey fn-medxtln sli chalky
no vis ø no show

ls: as above w/ scat Δ tan fresh oo

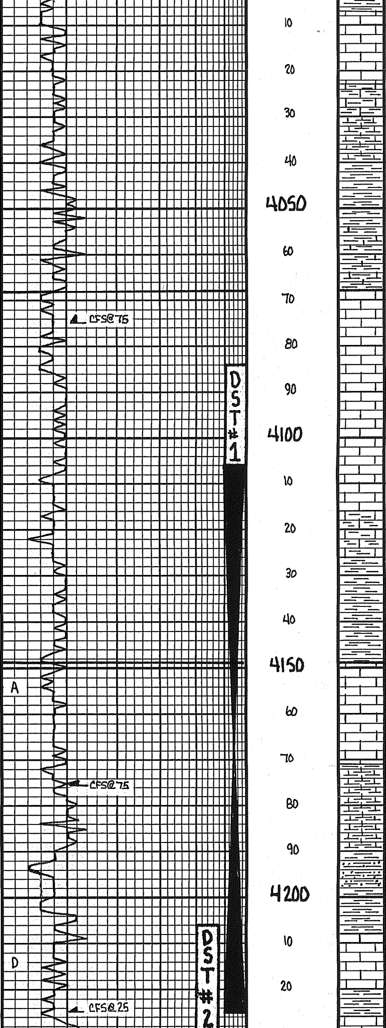
ls: tan lt. grey fn-medxtln v sli foss
pelletal in part no vis ø no show

sh: rust, silty → sandy; sh: grey,
orange

sh: rust, silty → sandy, scat ss/sltst:
lt grey, tan, vfngrained, well sorted,
friable, no vis ø, no show

sh & few clusters ss: as above; NS

STOTLER
3864 (-664)



ls: offwh, tan, lt. grey, micro - some medxtln, tr foss/ool, no vis ø, NS

ls: as above; few pcs sh stain (rust)

ls: as above; w/ inc. in sh: rust, grey, greenish-grey

sh: grey, lt grey, some brown, rust; scat ls: pale greenish-grey, (shaley) vfngrained, dense

sh: lt. grey, grey, calc in part; sh: rust, brown

sh: lt. grey, grey, calc → lt. grey ls: vry fnxtln, shaley, dense

ls & sh as above

ls: offwh, lt grey, some tan, fn-medxtln, pelletal in pt, v sli foss, app pr interxtln & vuggy ø (vry fine), fr-gd golden-dk brown st & sat, FSFO & G, fr crush odor

ls: as above, significant dec in show; w/ ls: offwh, lt grey, tan, fn-medxtln, sdy, in part, tr pr interxtln ø, scat dd oil residue, no show live oil

ls: tan, grey, dk grey, vfn-medxtln, dnse w/ ss: wh, lt. grey, fn grained, calc, firm app pr intergrnd ø, fr amount dd oil residue, no show live oil

ls: tan, grey, micro-fnxtln, dense, w/ scat ss as above, show dd oil, NSLO

ls: as above, dense; scat pyrite

ls: tan, lt grey, micro-fnxtln, dense; scat wh chalk; sh: pale green-grey, "gummy", scat dk grey, brown, rust

sh: dk grey, grey, brown, rust; tr pyr, scat ss: grey, vfn grained, friable, no vis ø, considerable dd oil residue, NSLO

sh: rust, grey, pale green-grey, w/ wh, tan ss: fn grained, calc, no vis ø, no show

ls: offwh, lt. grey, fn-medxtln, sli pelletal-ool, well cemented, pr interxtln ø, few pcs pr-med-dk brown st, tr live oil st, NSFO

3/4 pcs/tray ls; fn-medxtln, granular in part, sli chalky, foss (fusil) app pr interxtln & vuggy ø, pr-fr med brwn st w/ pr-fr sat, S-FS ppts FO & G on brk, no odor; most no vis ø, no show

sh: rust, brown, lt grey, considerable

ls: offwh, tan-grey, micro-fnxtln, dense

sh & ls: as above

sh: rust, silty; brown, lt. grey, scat ss: wh, lt. grey, vfn grnd, well sorted, firm-friable, tr pr intergrnd ø; considerable dd oil residue, no show live oil

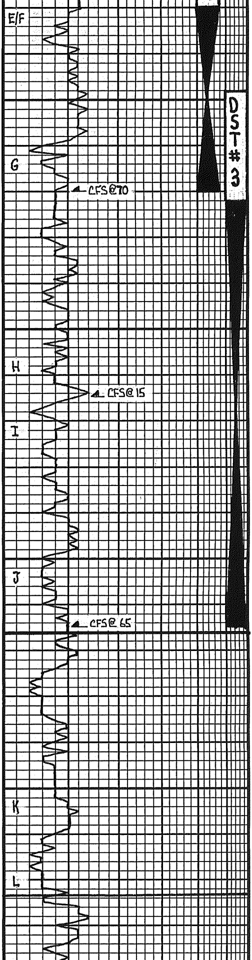
ls: offwh, lt. grey, some tan, fn-med xtln, sli foss, granular in part, app pr interxtln & vuggy ø, pr-fr spotty dk st, w/ patchy sat, S-few pcs FSFO (hvy), no odor

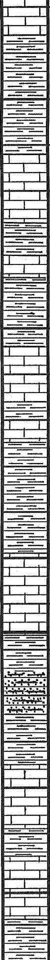
sh: rust, grey, some brown, orange

OREAD
4068 (-868)

LANSING
4149 (-949)

DST #1
(4106-4225)
30"- 60"- 60"- 90"
IFP: BOB IN 7"
ISIP: NO BLOW
FFP: SURF BLOW BLDG TO 10"
FSIP: NO BLOW
RECOVERED:
93' CO -(30° GR)
126' MO (50% M, 50% O)
121' HOCM (60% M, 40% O)
HSP: 2083# - 2077#
FP: 80#-116# / 139#-148#
SIP: 720# - 789#
BHT: 135° F





30
ls: tan, lt. brown, fn - some medxtln, no vis ø, no show

40
sh: mostly grey, some brown, rust, lt. green

4250
sh: as above

60
ls: offwh, lt. grey, fn-medxtln, sli foss, sli chalky, pr- some fr interxtln & vuggy ø (small), spotty pr-fr dk st w/sat, S-FSFO, no odor

70
ls: tan, lt grey, fn- some medxtln, chalky in part, no vis ø, tr dd oil residue

80
sh: rust, brown, some grey

ls: tan, lt grey, micro-fnxtln, dense; scat sh contact (rust)

90
sh: rust, silty in part, some brown, grey

4300
sh: as above

ls: offwh, tan, fn-medxtln, sli ool, chalky in part, vpr-pr interxtln ø,

10
few pcs w/pr spotty dk st, cpl pcs w/ few minute ppts FO on brk, no odor, scat dd oil residue

20
sh: brown, grey; w/ ls: tan, lt. grey, vfn-fnxtln, dense

30
sh: rust, sli silty; some brown, grey

40
sh: as above, w/ scat ls: grey, vfnxtln, sli chalky, dense

4350
ls: offwh, tan, fn-medxtln, sli ool, chalky, in part, pr-fr interxtln & vuggy ø (fine), pr- scat fr dk st w/ patchy sat, S-FSFO,

60
no odor, scat dd oil residue

ls: offwh, tan, fnxtln, chalky in part, no vis ø, scat dd oil residue, NSLO

70
sh: rust, brown, grey, green

siltstone, vfngrained ss: rust, brown, "pink," shaley, friable, no vis ø, no show

80
siltstone, vfngrained ss: as above, w/ sh: brown, rust, some grey

90
sh: rust, brown, silty, few pcs grey

4400
ls: tan, lt. grey, fn-med, ool in part, tr foss, sli mottled, sli chalky; no vis ø, no show

10
sh: brown, rust

20
ls: offwh, tan, fn-medxtln, chalky, scat wh chalk; no vis ø, no show

30
ls: as above

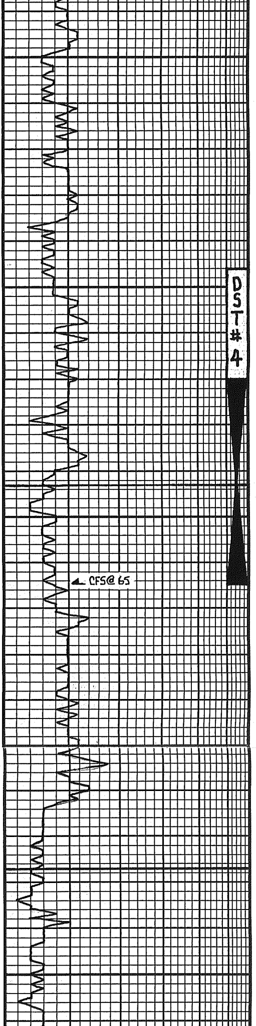
sh: brown, rust, some grey, green

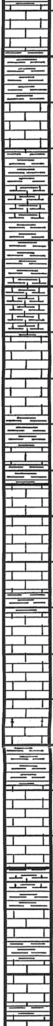
DST#2
(4230 - 4270)
30"-60"-80"-60"
IFP: WK SURF BLOW THRUOUT
FFP: NO BLOW
RECOVERED:
10' Oil Spotted Mud
HSP: 2048# - 2015#
FP: 19#-30# / 22#-27#
SIP: 1123# - 1056#
BHT: 130°F

DST#3
(4272 - 4365)
30"-60"-30"-60"
IFP: SURF BLOW BLDG TO 3/4"
FFP: NO BLOW
RECOVERED:
10' Oil Spotted Mud
HSP: 2111# - 2046#
FP: 15#-21# / 23#-26#
SIP: 1026# - 832#
BHT: 126° F

STARK
4366 (-1166)

BKC
4423 (-1223)





40

ls: lt. grey, tan, vfn-medxtln, chalky in part, tr vpr interxtln ø, no show; ls: brown, medxtln, ool, no vis ø, NS

4450

sh: rust, brown, purple-brown, some grey, green

60

ls: grey, dk grey, brown, micro-fnxtln, dense, sli chalky

70

sh: rust, brown, calc, sandy

80

sh: rust, brown, calc; scat ls: tan, fn-medxtln, scat rust sh laminations & rust sh contact

90

sh: brown, some rust, silty

4500

sh: as above w/ ls: offwh, tan, vfn-medxtln, sli chalky, w/ rust sh

10

ls: lt. → dk. grey, some tan, vfn-fnxtln, dense

20

ls: as above

30

sh: grey, some green, brown, rust; w/ scat ls: tan, brown, medxtln, sli ool, dense

40

sh: grey, some brown, rust
ls: offwh, tan, fnxtln, finely ool, pr-fr (cpl pcs gd) interool & interxtln ø, pr-fr, lt → med brown st, SSFO & G, no odor

4550

ls: lt. grey, grey, tan, fn-medxtln, v sli ool, no vis ø, no show

60

ls: as above; sli chalky, no vis ø, NS

sh: grey, dk grey, some brown

70

ls: tan, lt. brown, grey-brown, fn-med xtln, tr foss, dense

80

ls: as above, becoming sli chalky

90

ls: tan, brown, grey, micro-fnxtln, chalky in part, no vis ø NS

4600

sh: brown, grey, some rust; few pcs green

10

ls: tan, grey, vfn-fnxtln, dense ls: brown, fn-medxtln, sli foss, scat pcs ool, no vis ø, no show

20

ls: as above, becoming chalky w/ few pcs wh chalk

30

sh: grey, dk grey, some brown, green-grey

40

ls: tan, lt. brown, fn-medxtln, sli ool, chalky in part; sh: grey, brown, tr yellow

4650

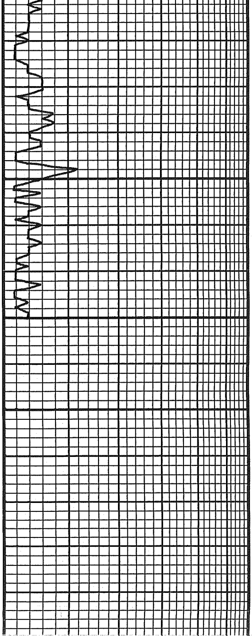
ls: offwh, tan, brown, fn-medxtln, sandy in part, chalky, no vis ø, NS
sh: grey, brown

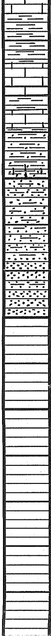
60

DST #4
(4520-4565)
30"-60"-60"-90"
IFP: SURF BLOW BLDG TO 2"
ISIP: FEW BUBBLES @ END OF ISIP
FFP: SURF BLOW BLDG TO 7½"
FSIP: SURF BLOW BLDG TO 2"
RECOVERED: 189' GIP
35' CO (GR 34°)
60' MCO (50% M, 50% O)
HSP: 2250#- 2185#
FP: 16#-26# / 26#-41#
SIP: 95#-96#
BHT: 137° F

PAWNEE
4543 (-1343)

CHEROKEE
4627 (-1427)





DEPTH	SAMPLE DESCRIPTIONS	OIL SHOWS	REMARKS
	sh: grey, green-grey, brown, w/ ls: as above		
70	sh: as above; w/ ls: tan, lt. brown, fn-medxtln, tr ool, sli sandy, chalky		
80	sh & ls: as above		
90	sh: brown, rust, sdy, grey, green, yellow-green; ss: wh fngrnd, well-sorted, hard, calc, no vis Ø, no show		
4700	sh: rust, brown, grey, green, sdy in part; ss: wh, tan, fngrained, well sorted, firm, scat pr intergrnd		
10	Ø, NS sh: as above; shly sd; rust, brown, fn-grained, well sorted, firm-friable,		
20	no vis Ø, no show; ss: clear, tan, lt. grey, fngrnd, well sorted, friable, scat pr intergrnd Ø; NS: few large, loose		
30	sand grains, clear, blue-wh, sub-rnd		RTD 4730 (-1530)