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**GEOLOGIST'S REPORT**  
 DRILLING TIME AND SAMPLE LOG

OPERATOR Murfin Drilg. Co. Inc.  
 LEASE Culwell "B" WELL NO. 1-11  
 FIELD Jones Canyon Southeast  
 LOCATION 850' FSL & 700' FWL  
 SEC. 11 TWP. 1S RGE 37W  
 COUNTY Cheyenne STATE Kansas.

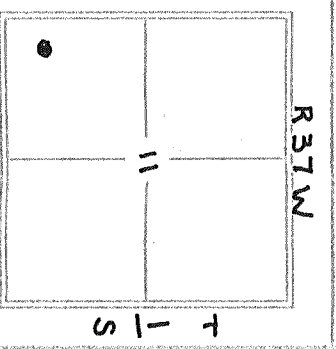
CONTRACTOR Murfin Drilg. Co. Inc. Rig # 14  
 COMM. 6-5-2013 COMP. 6-15-2013  
 RND 4900' LOG TO 4902  
 SAMPLES SAVED FROM 3450' TO RTD  
 DRILLING TIME REPT FROM 3450' TO RTD  
 SAMPLES OBTAINED FROM 3450' TO RTD  
 GEOLOGICAL SUPERVISION FROM 3450' TO RTD  
 MUD UP 3237' TYPE MUD CHEMICAL

FORMATION	TOP	LOG	DEPTH	TOP	SAMPLE	DEPTH	STATUS
Anhydrite	3081		+65	3682	+64	+9	
Neva	3539		-393	3547	-401	+2	
Foraker	3651		-505	3696	-510	+2	
Topoka	3873		-727	3874	-728	-1	
Lansing	4088		-942	4087	-941	-1	
Lansing	4304		-1158	4306	-1160	-1	
BKc	4360		-1214	4362	-1216	+1	
Pawnee	4480		-1334	4476	-1330	-6	
Cherokee sh.	4568		-1422	4568	-1422	-	
Miss OS	4788		-1642	4797	-1651	N/A	
MLSS KH	4840		-1694	4840	-1694	N/A	

ELEVATION  
 KB 3146'  
 DF 3136'  
 Measurements Are All From KB.

CASING RECORD  
 SURFACE 8 5/8" @ 223'  
 PRODUCTION 5 1/2"

ELECTRICAL SURVEYS  
 Pioneer Energy  
 Dual Induction  
 Dse-Neutron  
 Sonic-Microlog



DATE	DEPTH	NO	SIZE	TYPE	NO	DEPTH CT
6-5-13	MIRT					226
6-6-13	226' surf.	A	12 1/4	RR	-	4900
6-7-13	1875' drlg	1	7 7/8	HRC	GX20C	4900
6-8-13	3100' drlg					
6-9-13	3680' dst 1					
6-10-13	4025' dst-1+2 3					
6-11-13	4160' dst 2+3 4					
6-12-13	4250' dst 4 5					
6-13-13	4400' dst 5 6					
6-14-13	4575' drlg 7					
6-15-13	4900' RTD 8					
	Running Pipe					
				Surveys		22
						120
						402
						450

**oread**  
 4001-10  
 Limestone, tan, fine xln, foss, w/3-3.5 pc's / tray w/ dark brown free oil in poor foss. Sp'd Sat & Free oil in limestone cream, fine xln, sli brn w/ 4 to 5 pc's w/ med to dark brn stain + REFO in PR. fr pp. of 2 odo sat stain + cream fine xln sli foss w/ 4-5 pc's w/ drk FO. and spotted stain in scath pinpoint of. No odor ls. tan - lt. gray sp xln & foss w/ 5-6 F w/ drk brn sat stn + foss. in fair

**Lansing D**  
 4149-4153  
 Limestone, cream, fine xln, sli foss w/ 4-5 pc's w/ drk FO. and spotted stain in scath pinpoint of. No odor ls. tan - lt. gray sp xln & foss w/ 5-6 F w/ drk brn sat stn + foss. in fair

**Lansing G**  
 4200-08  
 Limestone, cream, fine xln, sli foss w/ 4-5 pc's w/ drk FO. and spotted stain in scath pinpoint of. No odor ls. tan - lt. gray sp xln & foss w/ 5-6 F w/ drk brn sat stn + foss. in fair

**Lansing J**  
 4289-4294  
 Limestone, tan-cream, small ool ls. sui foss, w/ 4-5 pc's w/ drk FO. and spotted stain in fair ool & NO odor C4-5 pc's/t

**Pawnee**  
 4480-4484  
 Limestone, tan-cream, small ool ls. sui foss, w/ 4-5 pc's w/ drk FO. and spotted stain in fair ool & NO odor C4-5 pc's/t

REFERENCE WELL FOR STRUCTURAL COMPARISON: M.D.C. Culwell C-1-10 2190' FSL & 1680' FWL Sec. 10-1s-37W, 3150' K.B.

DRIIL STEM TESTS

226	-	
4674	w/a	
0.80		
3.35		
2.45	long	
1 1/2°		
7 3/4°		
5 1/2°		
00 2°		
1-1-		
3-		
4-		
5-		

No.	Interval	SP/Min	IS/Min	MP/Min	RP/Min	RT-10	RT-100	Remarks
1	3958'-4025' 17'-20'	30"	60"	40"	60"	2043 #	1960 #	2' mud
2	4103'-4160' 11'-318'	30"	60"	75"	90"	1973 # 1969 #	441' smco 2% m 12% oil 286' stocum 3% oil 333' stocum 2% oil	
3	4169'-4220' 17'-39'	30"	60"	60'	90"	2043 # 1982 #	45' gmo 6% m - 84% oil 30' gmo 22% m - 76% oil 60' gmo 36% oil + 51% m 135' fluid 29°	
4	4213'-4320' 20'-23'	30"	60"	30"	60"	2115 # 2087 #	10' mud	
5	4454'-4500' 17'-20'	30"	60"	30"	60"	2294 # 2284 #	5' gmo 7% m - 16% m - 83% o 30' gmo 3% m - 16% m - 81% o 35' fluid	

with the success of dst's 2+3, 5 1/2" production casing will be set to further evaluate.

Respectfully

Jerry K. McLeod  
6/15-2013

LEGEND

Anhydrite	Salt	Sandstone	Shale	Carb sh	Limestone	ool.Limo	Chert	Dolomite

SCALE " = 100'

DRILLING TIME IN MINUTES PER FOOT  
Rate of Penetration increases



LITHOLOGY

SAMPLE DESCRIPTIONS

REMARKS

DEPTH

3070

80

Anhydrite  
3082 (+64)

90

3100

10

Base Anhydrite  
3115 (+31)

20

30

40

50

60

3450

60

sh. gry-mar. red, - silty  
qms of sh. n.s.

70

80

90

sh. mar - gry. silty + sdy  
N.S.

3500

10

sh. mar - gry.

20

30

sh. mar - gry - silty + sdy  
N.S.

40

E-Log

sh. mar - gry - silty - dirty  
N.S.

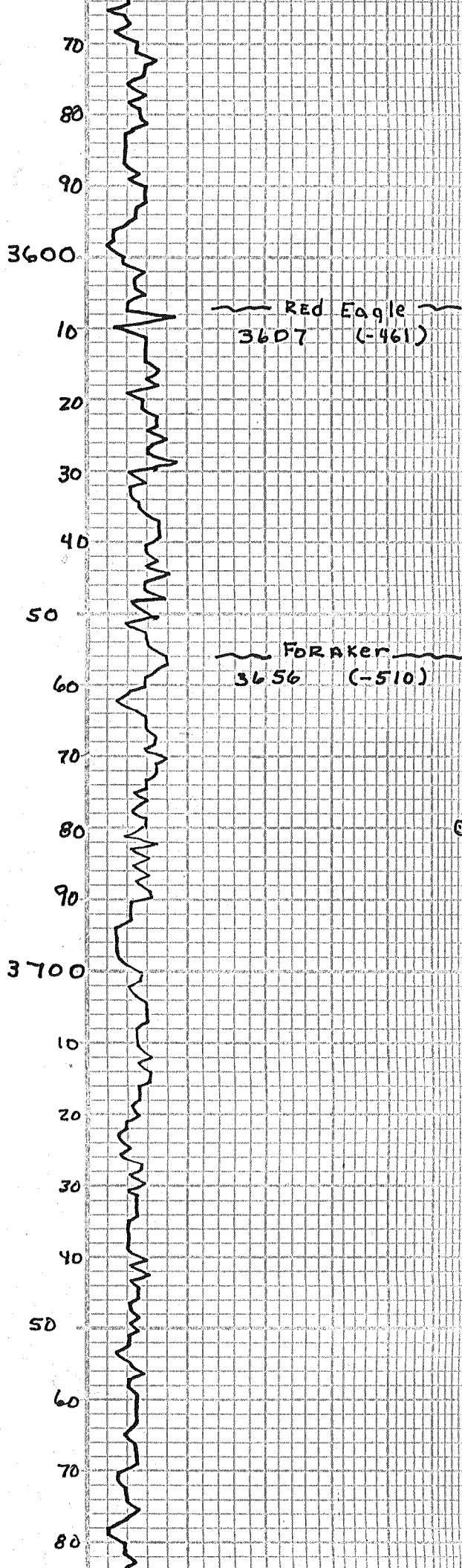
50

NEVA  
3547 (-401)

Ls. Crm. fn - xln. sil. foss  
chey - N.S.

60

Ls. Crm. gry. fn - yln, fn -  
xln + sil foss -> DNS, pr - NVA  
N.S.



sh. mar-gry

sh. mar-gry

ls. Gry, fn-xln, sli foss  
pr φ, chky, N.S.

ls. brn, fn-xln-dse, N.V.φ  
N.S.

sh. MAR-gry

sh. MAR-gry

ls. gry, fn-xln-arg, tight  
N.V.φ N.S. (2 pds. edge  
str) N.F.O. No odor

ls. brn, fn-xln + sli foss -  
tight, RX, pr φ. N.S.

ls. tan-brn, fn-xln +  
sli foss - dse, pr φ N.S.

ls. tan-brn, fn-xln - sli foss  
pr φ. N.S.

ls. tan-brn, fn-xln + sli  
foss. N.S. - chky

ls. tan, fn-xln, foss w/  
fair foss φ. N.S.

sh. med-drk Gry. + ls  
a/a

sh. MAR-gry

ls. Brn-H Gry, sli foss  
scatt φ, sli chky N.S.

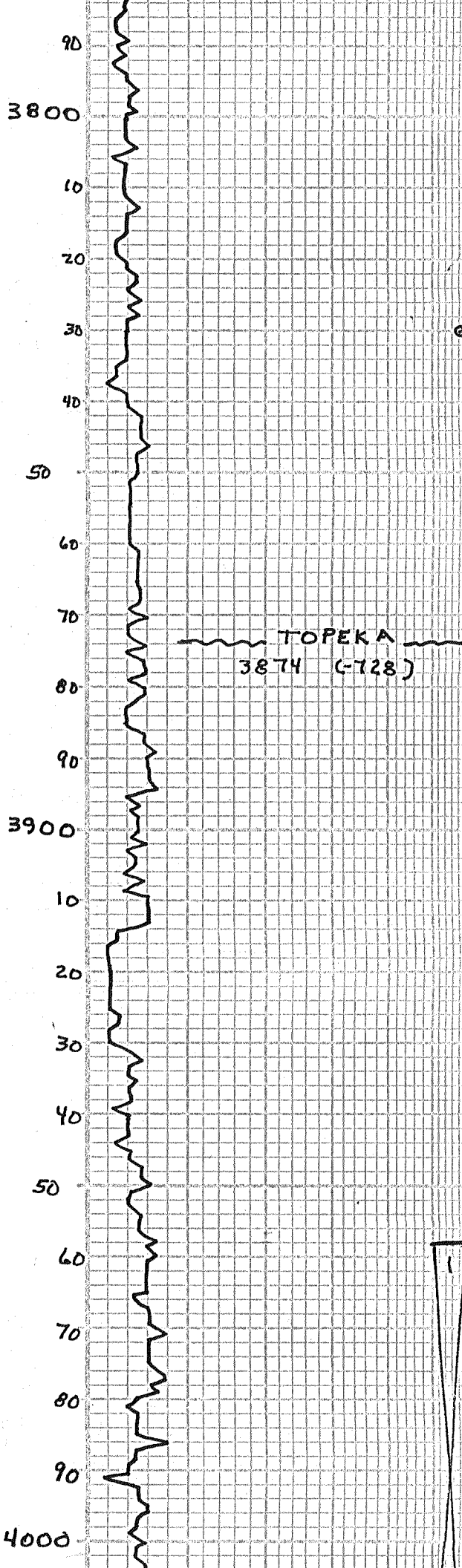
sh. MAR-gry

ls. wh-crm, fn-xln, foss  
w/ pr foss φ N.S.

ls. wh-crm, foss - U.S.

sh. gry-mar

sh. DRK Gry - BK



sh. gry - mar

Ls. Crm, fn-xln, sli foss  
w/ 4-5 pcls w/ dead asph.  
strn in poor foss  $\phi$   
NFO + No odor

Ls. H. tan, fn-xln + sli foss  
toool, w/ scatt foss  $\rightarrow$   
ool  $\phi$ . N.S. - No odor

Ls. H. tan, fn-xln, sli foss  
poor foss  $\phi$ . N.S. No odor

sh. gry - red, Mucky.

Ls. H. tan - H. gry, fn-xln  
- sli foss - N.S.

sh. red + gry. sdy-silty  
mar

sh. red + gry - silty, N.S.  
mar

Ls. H. tan  $\rightarrow$  H. Gry, fn-xln  $\rightarrow$   
dse, tight rx, N.S.

Ls. H. tan  $\rightarrow$  H. Gry, fn-xln  
Foss w/ scatt foss  $\phi$ .  
N.S.

Ls. H. tan - Crm - Gry, fn-xln  
sli foss poor  $\phi$  N.S.

Ls. H. tan - crm - Gry, sli foss  
pr  $\phi$ . N.S.

sh. mar-gry.

Ls. H. tan - Crm, fn-xln -  
sli foss - pr  $\phi$ . N.S.

Ls. H. tan - Gry, fn-xln -  
sli foss - scatt  $\phi$ . N.S.  
CHKY

sh. drk Gry - blk + Ls.  $\phi$  N.S.

sh. mar-gry

sh. mar-gry

sh. mar-gry

sh. drk Gry, Gry - rd.

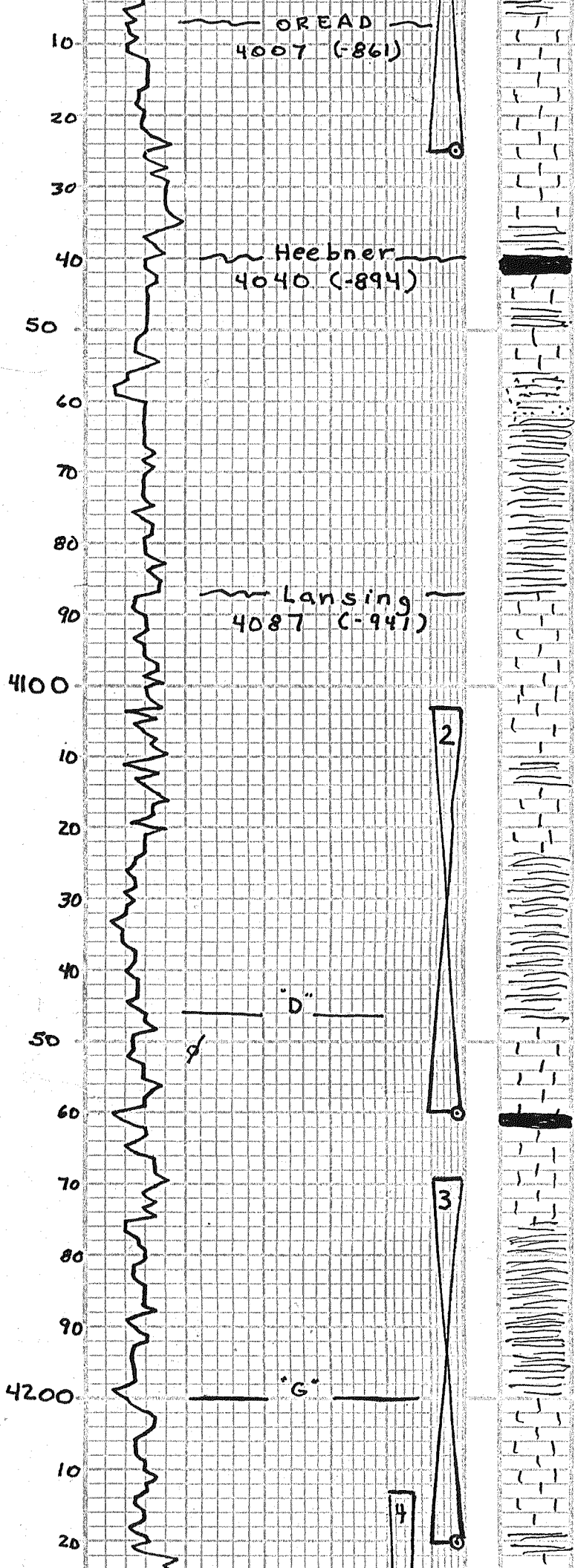
DST No. 1 3958' - 4025'

wk blow died 21 min  
36" 60" 40" 60"

Rec 2' mud

SIP 314\* - 221\*  
FP 17\* - 20\* + 20 - 23  
HP 2043\* - 1960\*





OREAD  
4007 (-861)

Heebner  
4040 (-894)

Lansing  
4087 (-941)

D

G

Ls. tan. fn-xln, foss w/  
3-4 pc's w/ dark sat stn  
+ S DRK F.O. in poor foss  
p. ? odor.

Ls. H. tan. fn-xln-dse,  
PR-NVØ. N.S. SLI CHKY

Ls. H. tan. fn-xln-dse, NVØ  
N.S.

sh., blk., carb

Ls. H. tan-H. gry, fn-xln +  
SLI foss -> dse, pr Ø N.S.

sdstone + silt stone. v. fn. gr. fine  
tight, pr. NVØ. N.S.

sh., mar - gry

sh. mar - gry

Ls. Crm. - H. Gry, fn-xln  
v. SLI foss, tight + RX.  
pr Ø. N.S.

Ls. tan. H. Gry, dse, NVØ  
N.S., SLI CHKY.

Ls. tan, dse, And, SLI CHKY  
N.S.

Ls. tan-dse, tight RX, NVØ  
N.S.

sh. gry - red.

sh. gry - red - mar

Ls. Crm. - fn-xln. SLI foss  
w/ 4-5 pc's w/ med. drk sat  
stn + F.S.F.O. in pr. fr. foss  
-> pinpoint Ø. v. faint odor.

Ls. Crm, fn-xln, SLI foss  
tight, poor Ø. N.S.

sh. drk Gry - mar

Ls. Crm. fn-xln, v. SLI foss,  
2-3 pc's w/ drk brw stn in  
poor xln Ø. NFB, NO odor

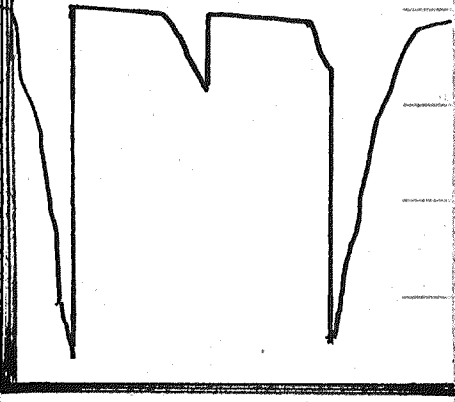
sh. Gry - mar

sh. gry - mar

Ls. Crm. fn-xln + SLI foss,  
w/ 4-5 pc's w/ drk Hvy FO  
and sp'd sat stn in sect  
pp Ø. NO odor.

Ls. Crm, fn-xln, SLI foss,  
2 pc's w/ SFO + sp'd sat  
stn in pp Ø., NO odor

sh - gry - mar



DST NO. 2 4103' - 4160'

1/2" Bridge 10' from bottom, tool  
opened - pulled tool + reset.  
packer held - Test OK

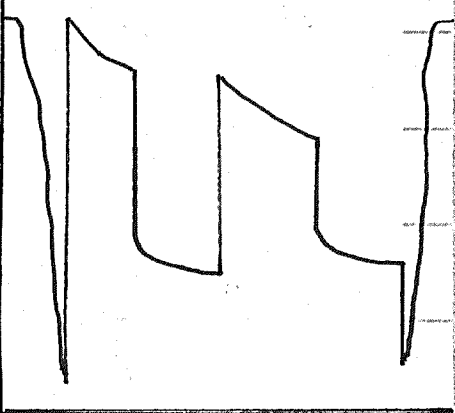
BOB 9" 1st open > Blow  
Backs SI  
BOB 8 1/2" 2nd open

30" 60" 75" 90"

Rec: 441 sm+GC oil 72%  
1260 Fluid 286' GC0+ w/m 7%  
533' SGCO+ mw 2%

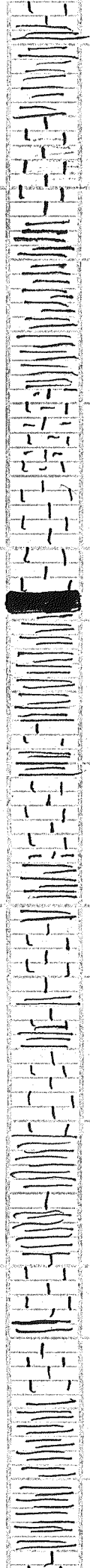
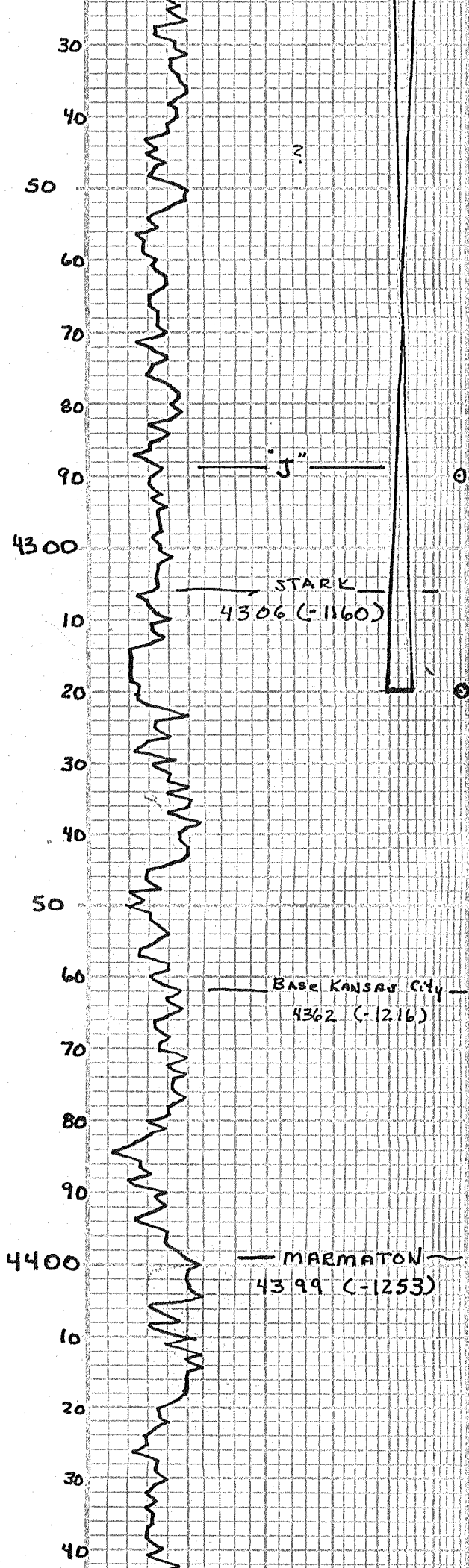
SIP: 1292# - 1289#  
FP: 111# 318" + 344" - 556"  
HP: 1973# - 1969#

DST - No. 2



DST NO. 3 4169' - 4220'

wk blow -> 3 3/4" 1st open  
wk inc blow TO 7 1/4" 2nd op



sh. gry-mar. rd + drk  
gry ls. tight rx + pyrite

sh, gry-mar

ls. tan. fn. xln -dse pr  
N.V. N.S. No odor

ls. tan. Gry. fn. xln. sli. foss w/  
3-4 pcs w/ drk dead asph. stn  
in poor pp-foss p. N.F.O  
No odor

sh. mar-Gry

ls. tan. Gry, fn. xln, 2pc's  
w/ dead oil spots stn on  
edges, N.F.O No Odor

ls. lt tan + lt Gry, fn. xln +  
foss 5-6 pc's w/ drk sat  
stn + f.s.o. in fr - pp -  
foss p. No odor.

ls. gla tighter rx 2-3  
pc's w/pr stn. N.F.O No  
odor

sh. black carb

sh. gry's-mar-blk.

sh, sh-mar

ls. tan-Gry, fn. xln +  
dse, N.V. N.S

sh. gry-mar

ls. tan-Gry, V. fn. xln. -dse  
sli foss, N.V. N.S

sh. gry-mar

ls. tan. fn. xln. tight rx  
N.S.

sh. gry-mar

sh, mar-gry

ls. tan-gry, fn. xln. tight  
sli foss N.S.

ls. tan. Gry, fn. xln. sli. foss  
to dse, N.V. N.S.

sh. gry-mar

sh. gry-mar

30 60 60 70

Rec: 45' 9mo 84% oil  
30' 9mo 76% oil  
135' < 60' 9om 36% oil

SIP: 1323\* - 1321\* HP 2043\*  
1982\*

FP: 17\* - 39\* + 42\* - 70\*  
DST No. 3

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DST No. 4 4213' - 4320'

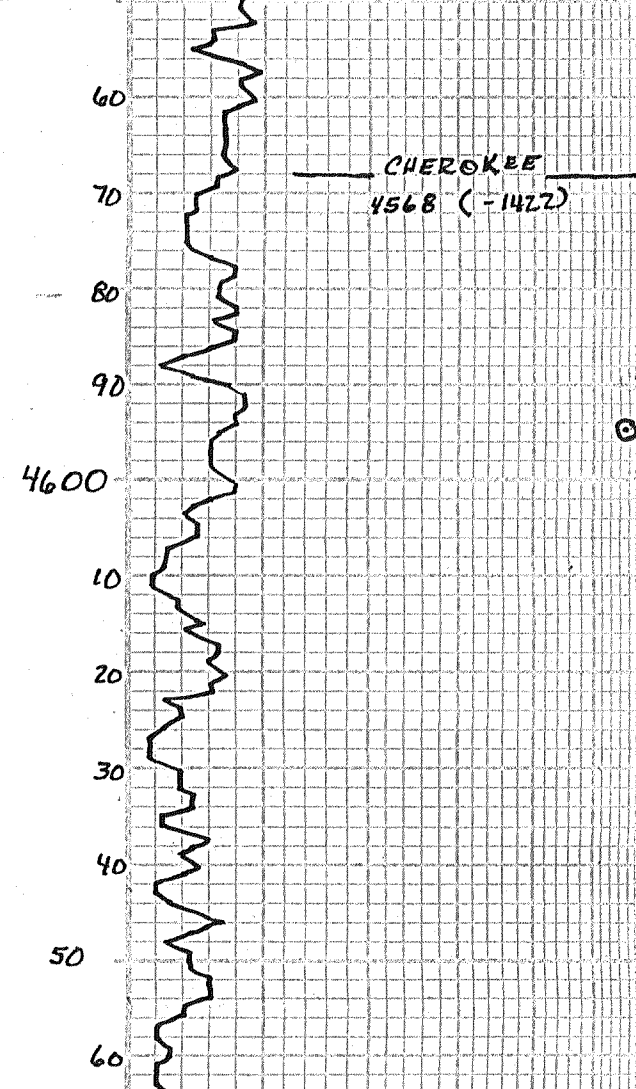
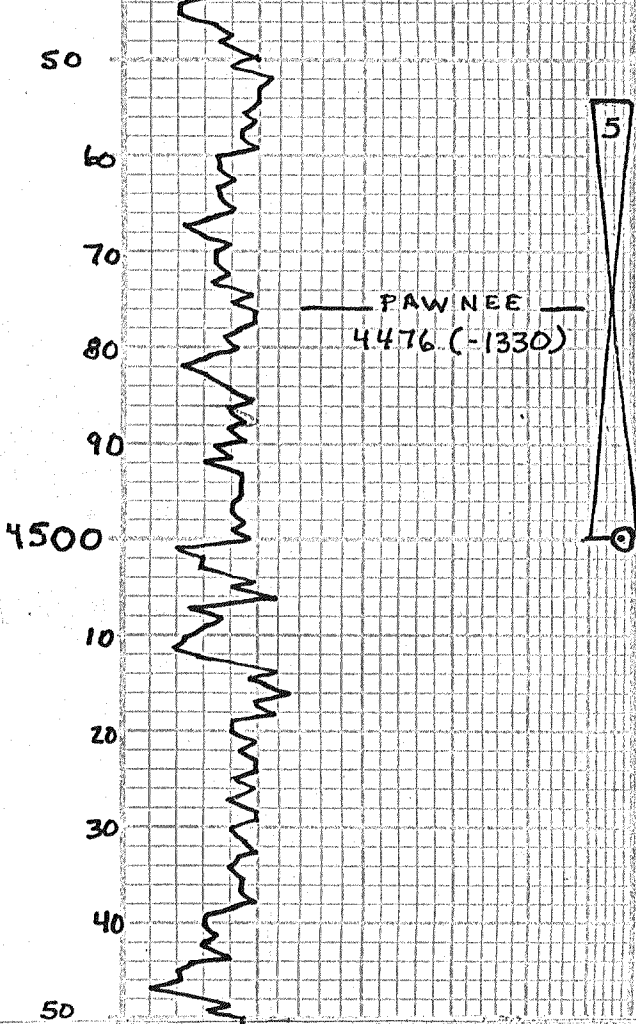
wk blow died 9"  
No blow 2nd open

30" 60" 30" 60"

Rec: 10' mud

SIP: 409\* - 222\*  
FP: 20\* - 23\* + 23\* - 25\*  
HP: 2115\* - 2087\*

dst No 4



sh. blk carb

Ls. tan - Gry, fn-xln. SU foss  
TIGHT- PR- NVØ. N.S.

Ls. tan - Gry. fn-xln. foss.  
TIGHT RX. NVØ N.S.

SH. DRK Gry - blk carb.

Ls. tan - Crm, ool. foss - w/  
17. brn spt'd sat str +  
sto in pr. fr ool Ø. (4.5 pct)

Ls. tan - Crm - ool - and fn-xln  
2-3 pct. w/ ssfo. in pr. ool Ø.

Ls. Gry, fn-xln - dse, NVØ  
N.S. - SH - GRYS -

SH - BLK Carb

tr tan ls. fn-xln - dse, N.S.

sh. Gry's - blk - mar

Ls. tan - brn, dse, Hrd  
tight RX, NVØ N.S.

Ls. tan - brn, dse, NVØ.  
N.S.

Ls. tan - Gry - dse, Hrd,  
NVØ N.S.

sh. drk Gry. Gry - blk, mar

Ls. H tan - tan - fn-xln +  
foss w/ fair foss Ø N.S.  
sl. clay

Ls. H tan, fn-xln - dse NVØ  
N.S.

SH - DRK GRY - BLK

5

Ls. tan. dse, Hrd, NVØ. N.S.

sh. Gry's

Ls. tan, fn-xln, foss. tight  
RX. pr. NVØ N.S.

sh - gry - red + ss. cl. red  
ØRETIC sub-anq - clusters  
N.S.

sh. gry - rd. mar

Ls. tan - Gry, fn-xln, tight  
RX - Hrd - NVØ N.S.

ss. cl. fn-grnd, clusters -  
tightly cem w/ wh calc.  
N.S.

sh. gry - mar + ss. q/a

Ls. gry - tan, fn-xln - tight rx  
NVØ. N.S.

Ls. gry - tan - fn-xln, NVØ N.S.

sh - gry's - mar, grn.

sh + ss. tan - cl. ØRETIC

DST NO. 5 4454' - 4500'

wk blow 1/8" died 15 min 1st op  
No blow - 2nd open -

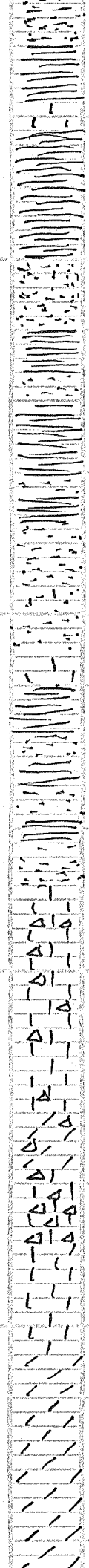
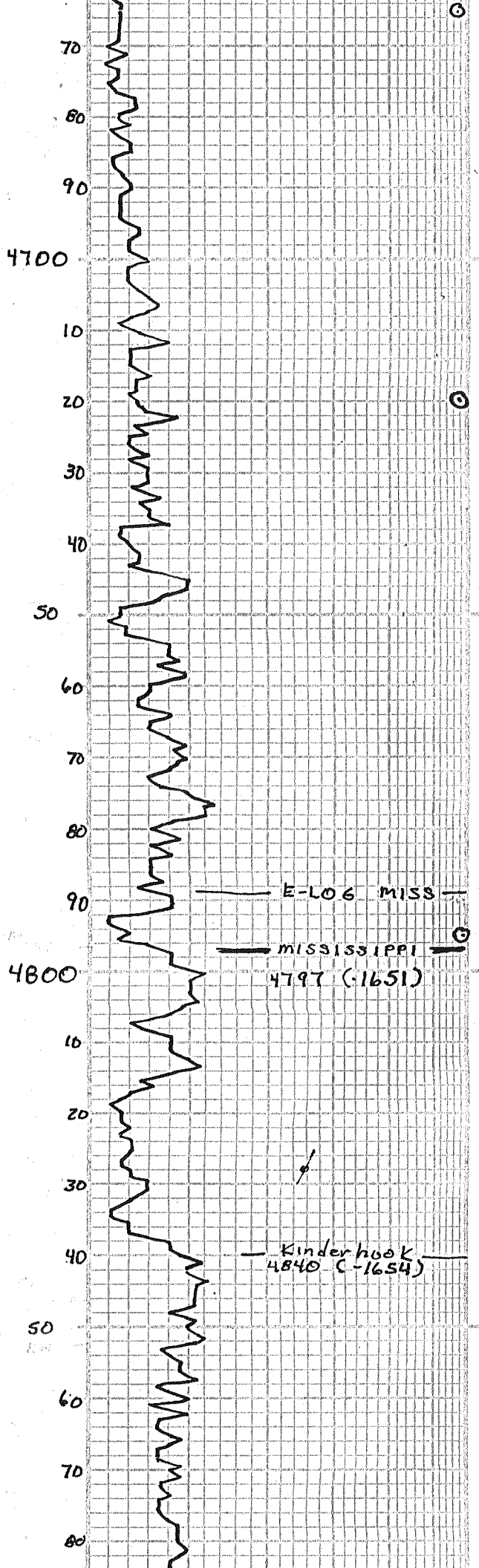
30" 60" 30" 60"

Rec: 5' gmco 83% oil  
30' 9 ocm 81% mud

SIP: 322<sup>#</sup> - 85<sup>#</sup>  
FP: 17<sup>#</sup> - 20<sup>#</sup> + 20<sup>#</sup> - 24<sup>#</sup>  
HP: 2294<sup>#</sup> - 2284<sup>#</sup>

DST No. 5





fn grnd N.S.

sh. gry-mar

tr, tan fn-xln ls, N.S.

sh gry-MAR.

sh. gry-MAR - some scatt  
ss. cl. fn-grnd w/calc cem  
N.S.

s.s. cl. fn-grnd, clusters -  
Biotite, tight rx, N.S.

SH- Gry-mar

sh gry-mar, gry mudstone  
NVØ, N.S.

s.s. cl., fn-xln, grnd, clusters  
tight-N.S. - Ls. Cem-tan  
fn-xln. NVØ N.S.

QTZ PC's. wh. Gry Hrd.

Ls. Gry - fn-xln - dse,  
HRD - tight rx, NVØ.  
N.S. Pyrite

QTZ PC's. GRy - wh -  
sh - varicolor; pyrite

Qtz, pc's + sh varicolorad  
pyrite N.S.

tr QTZ, Pyrite + sh.  
varicolorad  
ss. cl. sh-grnd, tightly  
cem - sh. varicolor

scatt ss., tan Δ, op, N.S.  
Ls-dol, tan, fn-xln. sli foss  
N.S.

Ls. tan, fn-xln sli chky,  
TRACE Δ, N.S.

Ls. tan, fn-xln, tight rx,  
pr-NVØ., N.S.

dol. tan, fn-xln + gry-wh  
op Δ - N.S.

Ls + dol, tan, fn-xln, tight  
rx, pr-NVØ., gry op fresh  
foss Δ. N.S.

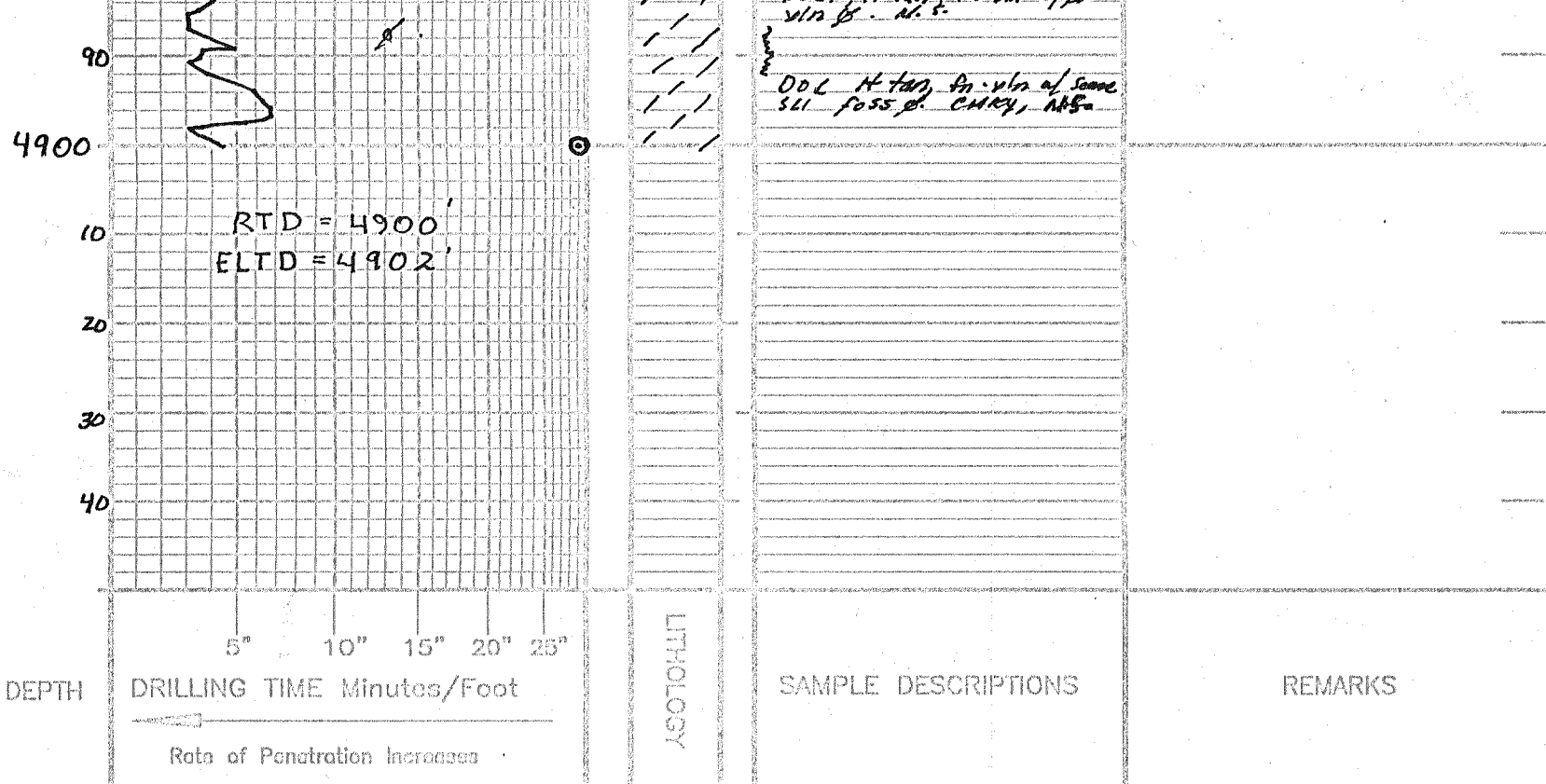
Ls. tan-brn, dse, NVØ N.S.

Ls. brn, dse, NVØ, N.S.

DOL. lt tan, fn-xln, poor xln  
Ø. N.S. Brn dse ls. N.S.

DOL. lt tan, fn-xln, pr  
xln Ø. N.S.

DOL. lt tan, fn-xln w/pr



COMPANY MURFIN Drlg. Co. Inc.  
 LEASE Culwell "B"  
 LOCATION 850' FSL + 700' FWL SEC. 11 TWP 1s. RNG 37W  
 COUNTY Cheyenne STATE Kansas

ELEVATION: 3146 K.B.