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GEOLOGIST'S REPORT
DRILLING TIME AND SAMPLE LOG

OPERATOR Imperial American
LEASE Sonde WELL NO. 1-15
FIELD Sonderegger
LOCATION 354' ENL + 124' FEL
SEC. 15 TWP. 22S RGE 31W
COUNTY Finney STATE Kansas

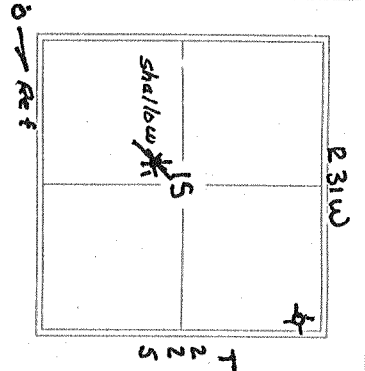
CONTRACTOR H₂ Drilling Rig # 2
COMMIT. 10-9-12 COMD. 10-17-12
RTD 5035' LOG TD 5029.
SAMPLES SAVED FROM 2600-2850 + 3500 TO RTD
DRILLING TIME KEPT FROM 3400 TO RTD
SAMPLES EXAMINED FROM 2600-2850 + 3500 TO RTD
GEOLOGICAL SUPERVISION FROM 2500 TO RTD
MUD UP 3500' TYPE MUD Chemical

FORMATION	LOG	TOP	DATE	SAMPLE	STRUCT.
				TOP	DATE
Krider	2720	+176	2730	+176	-35
Winfield	2714	+132	2781	+125	-34
Heebner	3499	-1093	3497	-1091	-29
Lansing	4044	-1138	4045	-1139	-30
Starke Shale	4354	-1448	4362	-1456	-30
Base K.C.	4489	-1533	4495	-1537	-26
Marathon	4508	-1602	4514	-1610	-20
Cherokee Sh.	4630	-1724	4635	-1741	-28
Morrow Sh	4779	-1873	4785	-1879	-28
Sand	None	None	None	None	-28
Mississippi	4788	-1882	4797	-1891	-21
St. Louis	-	-	-	-	-

ELEVATION
KB 2906'
DF 2895'
Measurements Are All From KB.

CASING RECORD
SURFACE 8 5/8" @ 350'
w/ 225 SX
PRODUCTION None

ELECTRICAL SURVEYS
Nabors
DSC-Neutron
Dual Induction
Sonic



REFERENCE WELL FOR STRUCTURAL COMPARISON
Sonderegger A-1 NE NE NE 21-22S-31W
Coor Refrig Assoc No 1
2013 K10

DATE	DEPTH	NO	SIZE	WGE	TYPE	DEPTH CUT
10-9-12	512T	A	12 1/4	Varrel		352
10-10-12	352' Surface woc					
10-11-12	1583' on Loc shallow	1	7 7/8	Varrel		5035'
10-12-12	2800' d1g	2)				
10-13-12	3498' d1g	3)				
10-14-12	4094' d1g	4)				
10-15-12	4530' d1g	5)				
10/16-12	4785' d1g	6)				
10/17-12	5035' RTD log	7)				
FORMATION	INTERVAL	DESCRIPTION OF SHOW				
		none. - No Good Gas Kicks to be noted, V-low structure				
		NO DSTS, No sand.				

[illegible]

Anhydrite	Salt	Sandstone	Shale	Carb sh	Limestone	Ool. Lime	Chert	Dolomite

SCALE 100

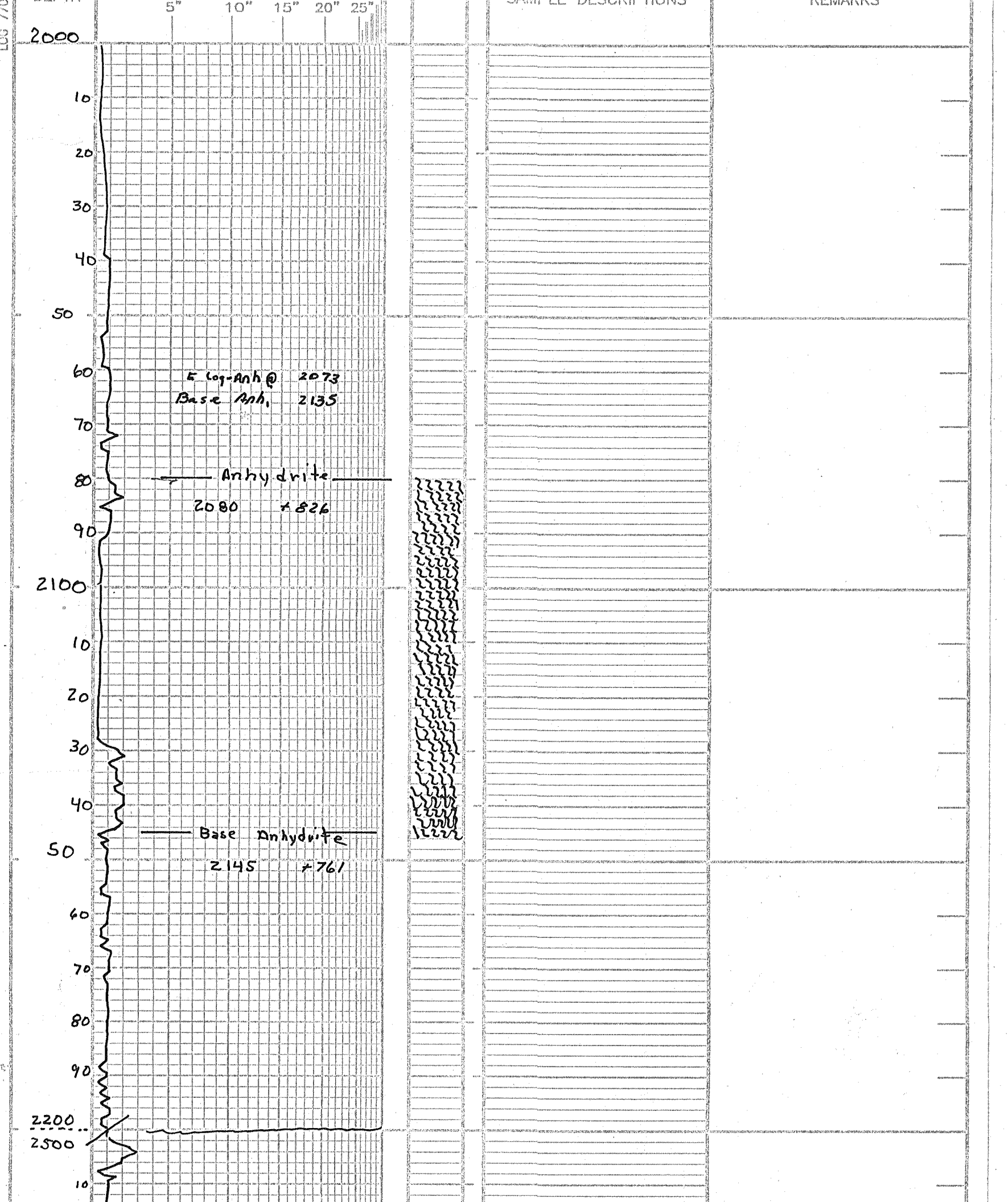
DRILLING TIME IN MINUTES
PER FOOT
Rate of Penetration Increases

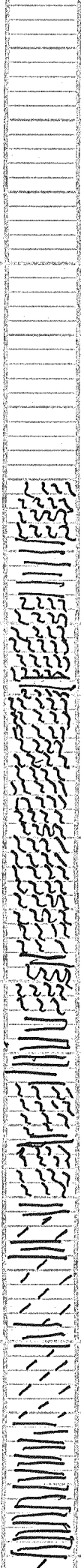
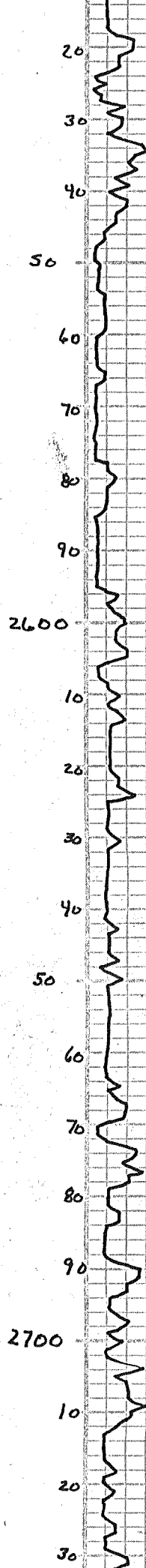
PHOTOLOGY

SAMPLE DESCRIPTIONS

DEMANDS

DEPTH





anh. gry - op, sh
red - gr

SAMPLES START @ 2600'
TO 2850' + 3400' RTD

anh. gry-wh op
sh red - gr

anh. gry-wh op
sh red-gr

anh. gry-wh op.
sh. gry-red-gr

del. gry-fan-t anhy
wh-gry - shly N.S.

sh. gry-red

2730 + 176

Krider

20 UK

dol. tan. fr. xln. sl. foss
N.S. dull fhr - 20 UK

dol. ls. tan. fr. xln.
foss, scott p. N.S.

2781 +125

Winfield

dol. ls. tan. fr. xln.
sl. ool. mott. N.S.

N.K.

ls. wh. crm. fr. xln. slc
w/ fr. p. N.S. N.S.

ls. wh. crm. fr. xln.
sl. foss N.S.

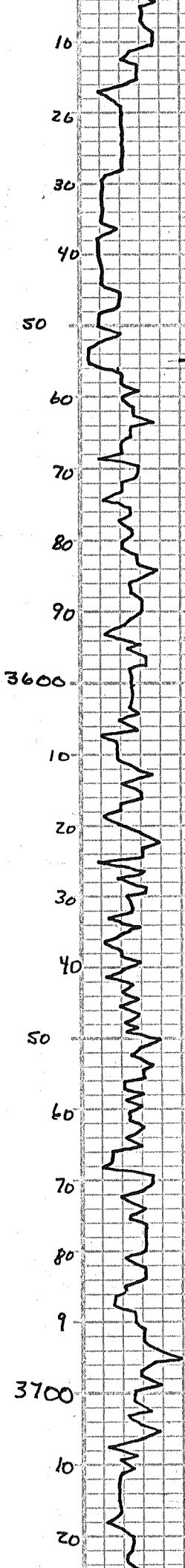
V. shly

ls. wh. crm. a/a - shly

V-shly

mud up

Good Samples.



STOTLER
3555' (-649)

ls. tan. Crm. fn. xln.
SLI foss N.S.

sh. gry's

sh. gry's

ls. tan. fn. xln. foss - SLI
col. mott. N.S., Scatt. P.
N.K.

ls. tan. fn. xln. foss -
SLI mott. N.S. pr. P.
N.K.

ls. tan - gry. fn. xln + SLI
mott. foss - to gry + dse
w/ NV P. N.S. N.K.

ls. tan - gry - drk gry
SLI foss - dse, pr - NV P.
N.S. N.K.

ls. tan - krm, fn. xln.
foss - matrix, tight rx.
N.S.

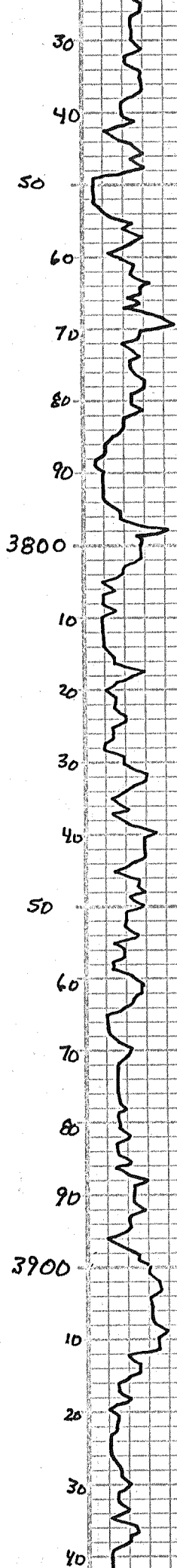
ls. tan. fn. xln. foss
SLI mott. N.S.

sh. drk gry

ls. gry, fn. xln - dse,
tight rx N.S.

sh. lt gry

ls. Crm - lt tan. fn. xln
Chk. y - N.S.



Ls. tan. H. brn, fn-xln -
foss - chky. N.S.

sh. drk gry

Ls. tan, fn-xln + v. foss
w/ qd foss p. chky N.S.

sh. med gry

Ls. tan, fn-xln - foss w/
qd foss p. N.S. chky

Ls. tan, foss w/ qd foss
p. N.S.

Ls. tan, fn-xln - foss w/ qd
foss p. SLI chky N.S.

Ls. tan, fn-xln - foss w/
qd foss p. N.S.

sh med - drk G

Ls. tan, fn-xln, foss w qd
foss p. N.S.

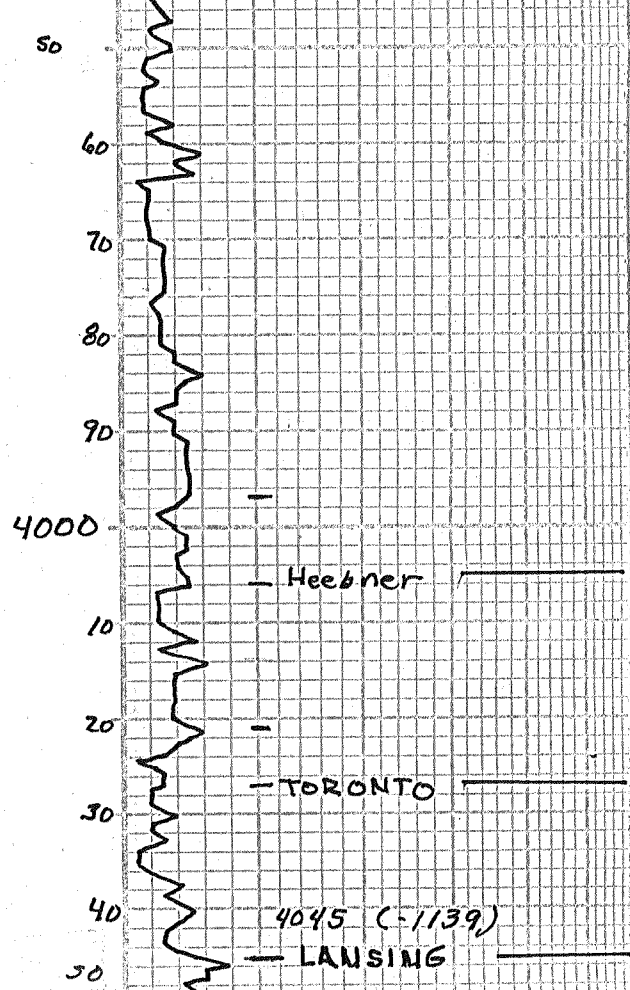
Ls. a/n. N.S.

sh. med. drk gry

Ls. tan - H. brn, fn-yln-dse
SLI foss - tight rx N.S.

sh. drk gry

Ls. tan - G. brn, fn-xln
SLI, foss - w/ qd
SLI - foss p. N.S.



Ls. tan. Gry, fn-xln
foss w/ 9d foss B. chky
N.S.

Ls. tan. Gry, V. foss w/ 9d
foss B. chky. N.S.

sh. blk-carb (4030 sp)

ti tan dse ls.

shly

Ls. brn-tan, fn-xln +
foss fr foss B, chky
wh op fr B

sh. brn-med gr

Ls. fn-xln, foss, +nd
PR B N.S.

Ls. tan, fn-xln. sli fos
+ dty, chky. N.S.

Ls. tan. Gry, fn-xln, + high
rx. N.S. dty

Ls. tan. Gry, dty. N.S.

sh. gry-mar

Ls. tan-brn, fn-xln, foss
fr foss B. chky. N.S.

shly. med gry

Ls. tan-H brn, fn-xln-dp
sli foss + high rx N.S.

shly med gry

Ls. tan-brn, fn-xln + sli
foss, scatt B N.S. sli chky

4200

4300

4300

70

80

90

10

20

30

40

50

60

70

80

90

10

20

30

40

50

60

70

80

Muncie Creek

4248 - 1342

STARK SH

ls. lt tan, fn-xln, foss
w/ scatt p. N.S. + r Δ

ls. tan-H brn, fn-xln
sl. foss. scatt p. chky
N.S.

ls. tan-H brn, sl
foss chky N.S.

ls. Crm-Gry, fn-xln-
dse, chky, N.S.

ls. Crm-Gry- fn-xln
tight, chky - N.S.

ls. tan-H brn-Gry, dse
sl. foss - N.S.

SH BIK Carb

ls. lt tan, fn-xln, foss
w/ scatt foss. pp. p.
wh. Gry op Δ. N.S.

ls. lt tan, fn-xln, foss
w/ wh. Gry op Δ N.S.

SH. med-drk Gry

ls. tan-H brn, fn-xln
- GRN + foss w/ fair
foss-GRN p. N.S. Δty

ls. tan-H brn xln
N.S. PR p.

ls. tan-H brn, ool w/
fair small oolitic p.
N.S. V-CHKY. N.K

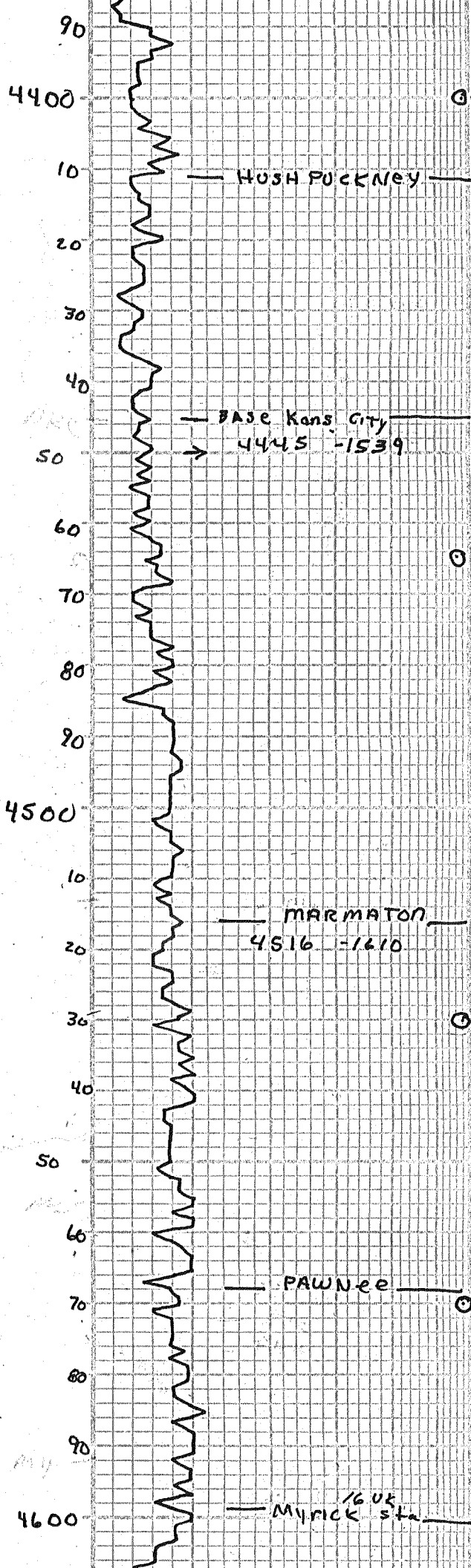
ls. tan-H brn ool-ool
w/ gd ool-ool p. chky
N.S.

ls. tan-brn ool-xln, gd
p. tight RX - N.S.

SH. BIK Gry-mar

ls. tan-Gry, ool-ool -
pr-gd ool p. N.S. N.K.
CHKY

ls. tan-Gry, ool w/ fr-
gd ool p. N.S.



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

Ls. Crm. lt tan fn-xln
foss, scatt Ø N.S.

SH-BLK Carb

Ls. Crm. H tan, foss -
sl. vug Ø. N.S. chky

Ls. Crm. H tan, foss -
vug Ø. N.S. chky

SH-GRY-MAR

Ls. tan, fn-xln, foss w/
fr-foss Ø N.S.

Ls. Crm. H tan, foss
mott. scatt Δ, N.S.

Ls. Brn, fn-xln-dse, foss
w/ scatt foss-vug Ø N.S.
NO odor NO kick

SHLY

Ls. Brn-Gry, fn-xln -
-dse, SLI foss, prpr N.S.

Ls. tan-brn, fn-xln-dse
SLI foss, NVØ N.S.

SH - med gry

Ls. tan-fn-xln, SLI foss
tight, pr-NVØ. Veri-
colored op Δ. N.S.

Ls. Brn, fn-xln-dse
NVØ N.S.

Ls. tan-H brn, fn-xln
foss-scatt fr Ø. N.S.

shale - GRY-drk GRY

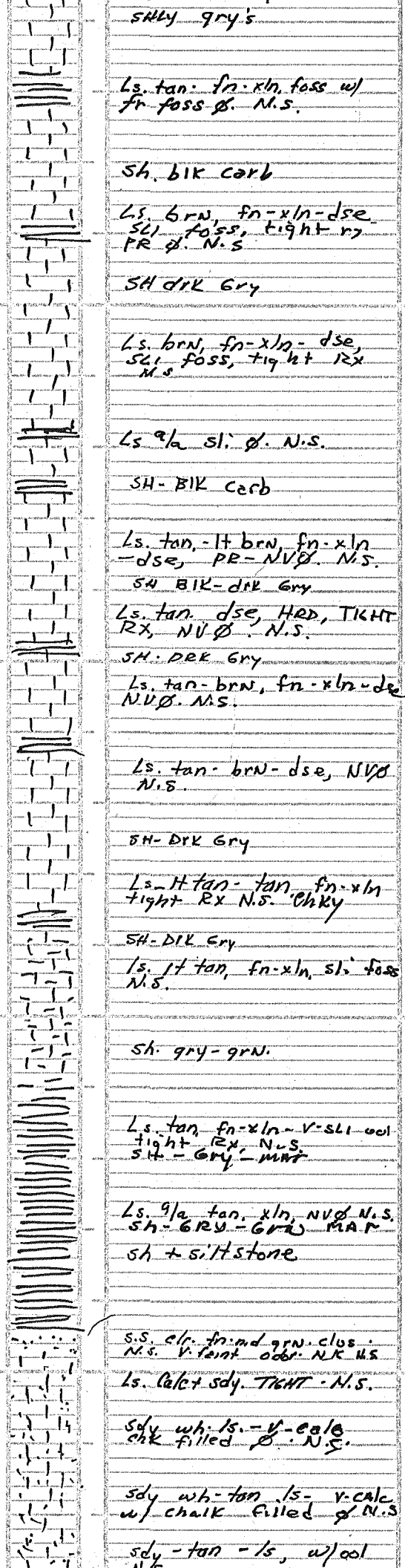
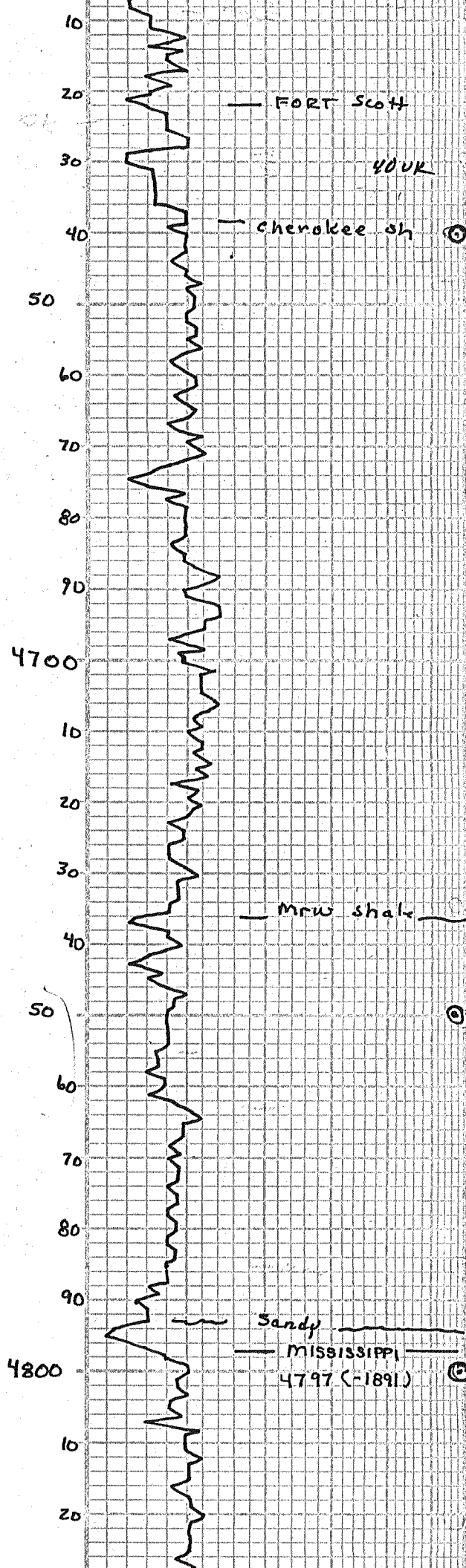
Ls. tan-brn, fn-xln, foss
mott. scatt Ø N.S. cty

Ls. tan-brn, fn-xln-dse
SLI foss. pr - NVØ N.S.

Ls. tan-brn, dse,
SLI foss, NVØ N.S.

shale - Black Carb

Ls. tan-H brn, fn-xln
SLI foss - tight rx N.S.



shly gry's

Ls. tan. fn. xln. foss w/
fr. foss. N.S.

sh. blk carb

Ls. brn. fn. xln. dse
sl. foss, tight rx
PR. N.S.

SH drk gry

Ls. brn. fn. xln. dse
sl. foss, tight rx
N.S.

Ls. g/a. sl. N.S.

SH-BLK carb

Ls. tan. -lt. brn. fn. xln.
-dse, PR-NV. N.S.

SH-BLK-drk gry

Ls. tan. dse, HED, TIGHT
RX, NV. N.S.

SH-DRK gry

Ls. tan-brn. fn. xln. dse
NV. N.S.

Ls. tan-brn. dse, NV
N.S.

SH-DRK gry

Ls. -lt. tan. tan. fn. xln.
tight RX N.S. chky

SH-DRK gry

Ls. lt. tan. fn. xln. sl. foss
N.S.

sh. gry-grn.

Ls. tan. fn. xln. v. sl. cool
tight rx, N.S.
sh - gry - mnt

Ls. g/a. tan. xln. NV. N.S.
sh - GRN - GRN MAR
sh + siltstone

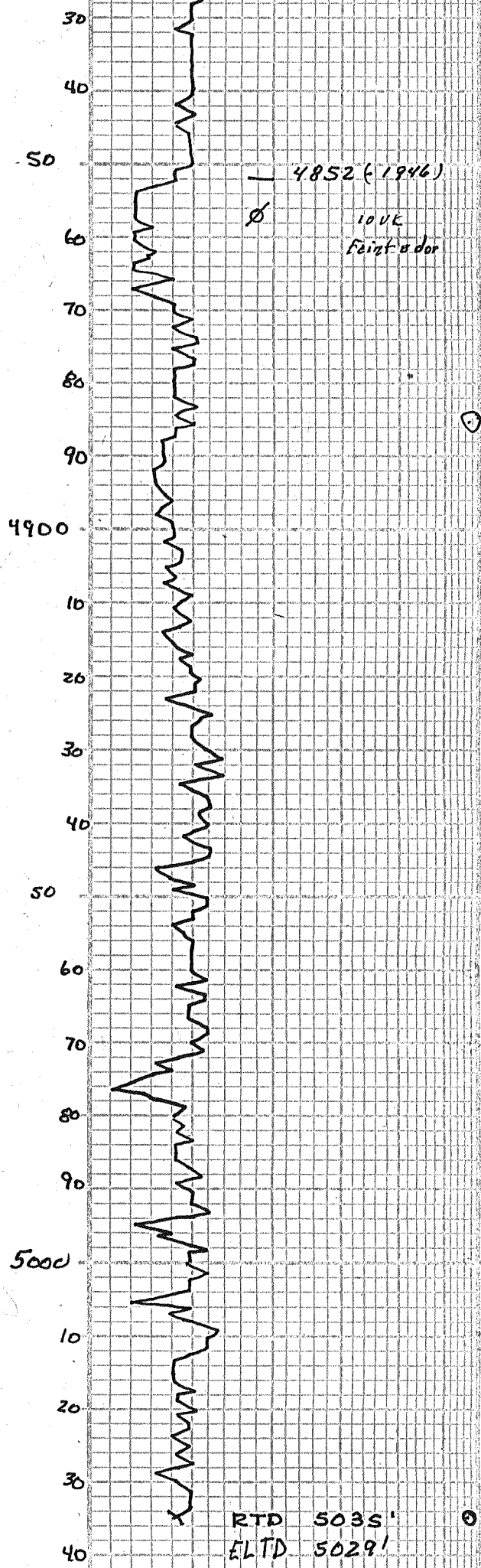
S.S. c/a. fr. md. grn. clus.
N.S. v. faint ool. NK N.S.

Ls. calc. sdy. TIGHT. N.S.

sd. wh. ls. - v. calc.
chk filled. N.S.

sd. wh. tan. ls. - v. calc.
w/ chalk filled. N.S.

sd. - tan - ls. w/ool



- N.S.
- sdv - tan ls. w/ sm ool
chk filled pl. N.S.
- sdv tan ls. chk filled
N.S.
- ls. sdv, w/ fair xln -
grn. pl. small gas
KICK 100 + faint odor
NO floor
- ls. sdv - ool w/ gd grn. ool
pl. v. faint odor, NO floor
- ls. tan, sdv - w/ calc filled
pl. N.S.
- ls. tan, fn - xln - dse.
NVP, N.S. - some ool
ls. tight pr - NVP N.S.
- ls. tan, dse - ool, tight
rx - NVP N.S.
- ls. tan, fn - xln - tight
NVP N.S.
- ls. tan, fn - xln - dse
NVP N.S.
- ls. tan, fn - xln - dse
NVP N.S.
- ls. tan - brn, dse, NVP
N.S.
- ls. gla dse, NVP N.S.
- ls. tan - H brn, fn - xln -
foss. mott. N.S. fr pl.
ONLY
- ls. tan - H brn, fn - xln -
dse NVP N.S.
- ls. tan - H brn, fn - xln
V SLI foss. inc to dty.
N.S.
- ls. tan - brn, SLI foss -
Scott pl. N.S.
- ls. tan - brn - fn - xln - dse
NVP N.S.
- ls. tan - brn, fn - xln - dse
NVP N.S.

DEPTH

DRILLING TIME Minutes/Foot

5" 10" 15" 20" 25"

Rate of Penetration Increases

LITHOLOGY

SAMPLE DESCRIPTIONS

REMARKS

COMPANY _____

LEASE _____

ELEVATION: _____

LOCATION _____

SEC _____

TWP _____

RNG _____

COUNTY _____

STATE _____