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DRILLING TIME AND SAMPLE LOGS

OPERATOR: **Murfin Drilling Co., Inc.**
 LEASE: **Bethoff** WELL NO.: **1-4**
 FIELD: **Jones Canyon**
 LOCATION: **2100' FNL, 500' FWL**
 SEC.: **4** TWP: **15** RANGE: **37W**
 COUNTY: **Cherokee** STATE: **KS**
 API NO.: **15-023-21381-00-00**

CONTRACTOR: **Murfin Drilling Co., Rig #20**
 DRAINED: **Feb. 19, 2014** COMPLETED: **3/3/14**
 ROTARY TOTAL DEPTH: **4660'** LOG TOTAL DEPTH: **4660'**
 GEOLOGICAL SUPERVISION FROM: **3440'** TO: **T.D.**
 HO-UP DEPTH: **3308'** HO-TYPE: **Chemical Polymer**

FORMATION	DEPTH	LOG	THICKNESS
Stone Corns/Anhy.	3096 (+26')	3094 (+38)	-7'
Base of Anhydrite	3127 (-5')	3126 (-4)	-5'
Newer Ls.	3546 (-424)	3544 (-422)	-3'
Red Eagle Ls.	3610 (-488)	3609 (-487)	-3'
Forker Ls.	3658 (-536)	3656 (-534)	-4'
Stoelker Ls.	3800 (-678)	3799 (-677)	+2'
Toparkg. fm.	3875 (-753)	3875 (-753)	-5'
Oread Ls.	4005 (-883)	4008 (-886)	-3'
Lensing group	4088 (-966)	4086 (-964)	-3'
Stark shale	4304 (-1182)	4304 (-1182)	-2'
Base of Clayg.	4362 (-1240)	4364 (-1242)	-5'
Rawnee Ls.	4476 (-1354)	4478 (-1356)	-3'
Cherokee Sh.	4567 (-1445)	4566 (-1444)	-2'
Total Depth	4660	4660	

ELEVATIONS
 KB **3122'**
 GL **3111'**
 Measurements are all from KB

CASING RECORD
 SERVICE: **8 5/8", 23#**
@ 223' w/ 2 1/2" SK. PVC.
 PRODUCTION: **11 1/4", 5 1/2"**
15.50# @ 4652' w/
500 SK. PVC.

WIRELINE SERVICES
 Pioneer Energy
 Services: BHC Sonic,
 Micro-sis, Turbidity, Dual
 Compensated Porosity
 and Dual Induction logs
 Ward Run.

LOCATION MAP

Location	
0 MDC Bethoff	
4 #1-4	

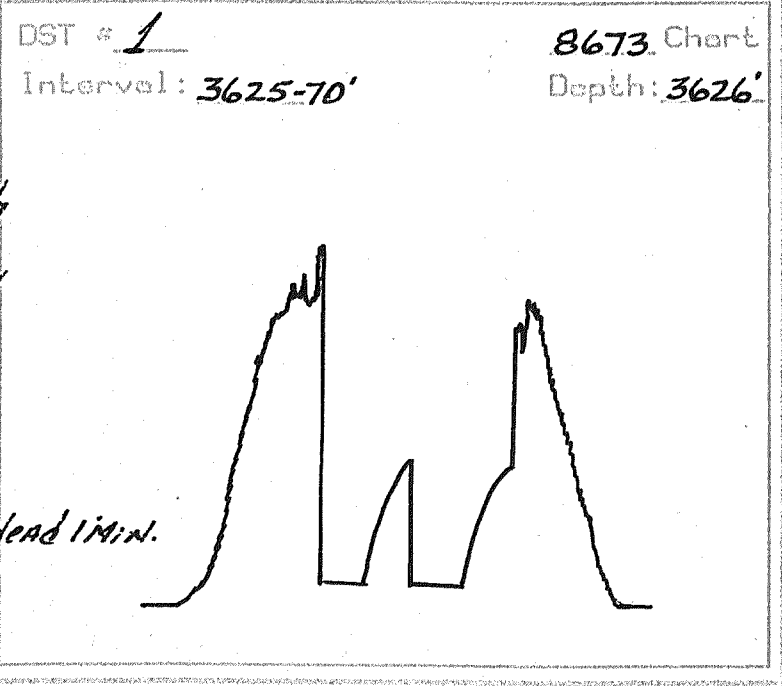
Reference Well for Structural Comparison: **MDC Shares Well #1-5, Exp. El. El. 2 5-15-37W**
 Comments and Recommendations: **Recommended LRE J' Zone completion.**

DST # 1 ZONE: Forker Ls.
 INTERVAL: 3625'-3670'

Pressures:	Time	Press.	RECOVERY
1. Initial Hydrostatic		2079 psi	180' Mud with
2. Initial Flow: Start	0	106 psi	Dil specks
3. Initial Flow: End	30	107 psi	Note: Tool slid
4. Initial Shut-in: End	30	818 psi	12' to bottom,
5. Final Flow: Start	0	107 psi	opened last
6. Final Flow: End	30	107 psi	2'.
7. Final Shut-in: End	30	797 psi	Blow Desc:
8. Final Hydrostatic		1714 psi	I.F. - Surf. blow - dead 1 Min.

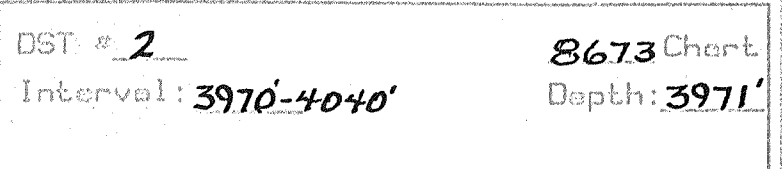
BHT: 118°F
 Rv: _____

IST. - No blow
 F.F. - No blow
 F.S.I. - No blow



DST # 2 ZONE: Oread Ls.
 INTERVAL: 3970'-4040'

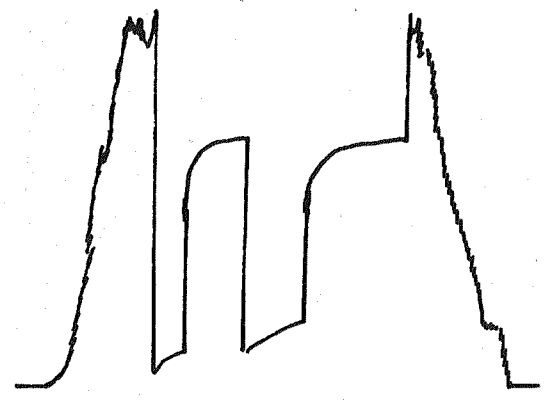
Pressures:	Time	Press.	RECOVERY
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1. Initial Hydrostatic		2064	psi	156' Mud
2. Initial Flow: Start	0	55	psi	189' water cut Mud
3. Initial Flow: End	30	190	psi	(25% water)
4. Initial Shut-in: End	60	1352	psi	255' Mud cut water
5. Final Flow: Start	0	198	psi	(25% Mud)
6. Final Flow: End	60	372	psi	184' Mud cut water
7. Final Shut-in: End	90	1345	psi	(5% Mud)
8. Final Hydrostatic		2021	psi	Blow Desc.

BHT: 136°F
 Rv: Chlorides 19,000 ppm
 (titrated by Morgan Mud)

I.F. - BOB 18 Min.
 I.S.I. - No blow
 F.F. - BOB 15 Min.
 F.S.I. - No Blow

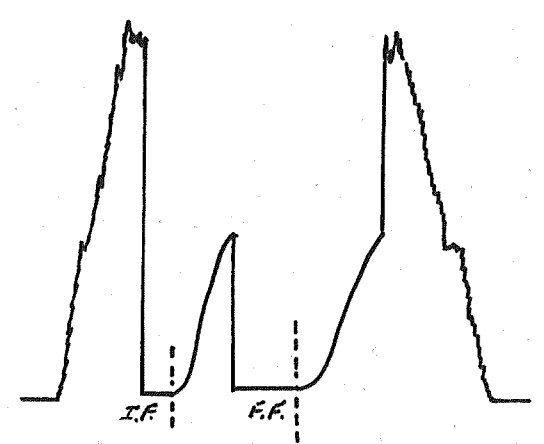


DST # 3 ZONE: Lansing 'A' and 'D' Zones
 INTERVAL: 4043'-4165'

Pressures:	Time	Press.	RECOVERY	
1. Initial Hydrostatic		2041	psi	68' Gas + Oil Cut Mud
2. Initial Flow: Start	0	19	psi	(5% gas, 15% oil)
3. Initial Flow: End	30	27	psi	
4. Initial Shut-in: End	60	927	psi	Blow Desc:
5. Final Flow: Start	0	34	psi	I.F. - built to 2"
6. Final Flow: End	60	43	psi	I.S.I. - No blow
7. Final Shut-in: End	90	936	psi	F.F. - built to 1/2"
8. Final Hydrostatic			psi	F.S.I. - No blow

BHT: 127°F
 Rv: _____

DST # 3 8673 Chart
 Interval: 4043'-4165' Depth: 4044'

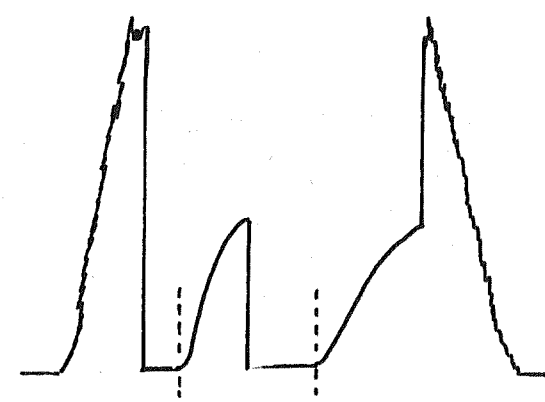


DST # 4 ZONE: L-KC 'G' Zone
 INTERVAL: 4157'-4235'

Pressures:	Time	Press.	RECOVERY	
1. Initial Hydrostatic		2081	psi	75' Oil Cut Mud
2. Initial Flow: Start	0	19	psi	(10% Oil)
3. Initial Flow: End	30	37	psi	
4. Initial Shut-in: End	60	922	psi	Blow Desc:
5. Final Flow: Start	0	43	psi	I.F. - built to 1 1/2"
6. Final Flow: End	60	60	psi	I.S.I. - No blow
7. Final Shut-in: End	90	890	psi	F.F. - built to 1"
8. Final Hydrostatic		2055	psi	F.S.I. - No blow

BHT: 128°F
 Rv: _____

DST # 4 8673 Chart
 Interval: 4157'-4235' Depth: 4158'

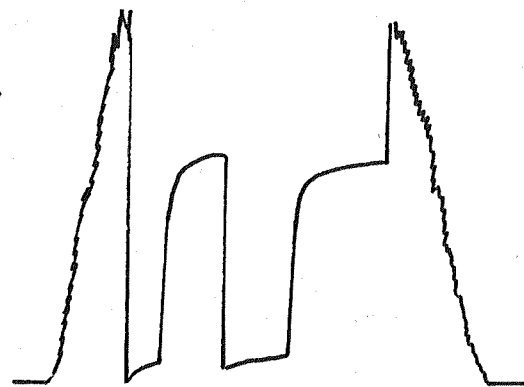


DST # 5 ZONE: K.S. City 'H', 'I' & 'J' Zones
 INTERVAL: 4214'-4309'

Pressures:	Time	Press.	RECOVERY
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DST # 5 8673 Chart
 Interval: 4214'-4309' Depth: 4215'

1. Initial Hydrostatic _____ 2157 psi 642' Gas
 2. Initial Flow: Start 0 30 psi 40' clean Oil
 3. Initial Flow: End 30 108 psi (1% gas)
 4. Initial Shut-in: End 60 1326 psi 308' Gas + Oil cut Mud
 5. Final Flow: Start 0 109 psi (20% gas, 28% oil)
 6. Final Flow: End 60 155 psi 38° gravity oil
 7. Final Shut-in: End 90 1287 psi Blow Desc:
 8. Final Hydrostatic _____ 2121 psi I.F. - BOB 23 min.
 I.S.I. - 1/2" blow
 F.F. - BOB - 15 min.
 F.S.I. - built to 2"



DST # 6 ZONE: UPPER Pawnee Ls.

INTERVAL: 4455'-4510'

Pressures:	Time	Press.	RECOVERY
1. Initial Hydrostatic		2298 psi	2' Drilling Mud
2. Initial Flow: Start	0	18 psi	
3. Initial Flow: End	30	19 psi	
4. Initial Shut-in: End	60	104 psi	Blow Desc:
5. Final Flow: Start	0	20 psi	I.F. - 1/8"
6. Final Flow: End	30	21 psi	ISI - No blow
7. Final Shut-in: End	60	56 psi	F.F. - No blow
8. Final Hydrostatic		2265 psi	F.S.I. - No blow

BHT: 132°F

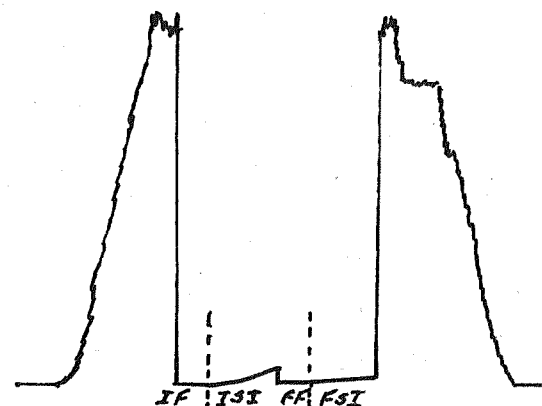
Rv: _____

DST # 6

8673 Chert.

Interval: 4455'-4510'

Depth: 4456'



ABBREVIATIONS USED

ROCK TYPES:

La - Limestone
 Sh - Shale
 Sand - Sandstone
 Silt - Siltstone
 Cong - Conglomerate
 Chert - Chert
 Qtz - Quartzite
 Gran - Granite
 Dol - Dolomite
 Chalk - chalky

COLOR:

Wh - White
 Crm - Cream
 Clr - Clear
 Rd - Red
 Grn - Green
 Bru - Brown
 Blk - Black
 Mott - Mottled

HARDNESS:

Sft - Soft
 M.Sft - Moderately soft
 Hrd - Hard
 V.Hrd - Very hard

FAERIC:

Fn.grn - Finegrained
 VFG - Very fine grained
 Med - Medium
 Co - Coarse
 Det - Detrital
 Foss - Fossiliferous
 Cr - Crystalline
 M - Microcrystalline
 Gal - Galitic
 Op - Opaloid
 Mat - Matrix

OTHER TERMS:

Fl - Fluorescence (of oil)
 min fl - mineral fluorescence
 pyr - pyritic
 glauc - glauconitic
 carb - carbonaceous
 stn - stain (of oil)
 cut - oil cut
 AA - as above
 sp - sparsity
 NEFOC - no stain, fluorescence, odor, or cut (of oil)
 nopl - sample
 perm - permeability
 F.O. - free oil
 vug - vugular
 tr - trace
 w/ - with

MODIFIERS:

gd - Good
 fr - Fair
 pr - Poor
 ex - excellent
 v - very
 w - wall
 tr - trace
 occ - occasional
 vis - visible
 N - no
 gran - granular
 Intgran - intergranular
 pp - pinpoint
 dd - dead
 gey - gassy

OIL SHOWS

○ Weak Oil Show
 ⊙ Fair Oil Show
 ⊕ Good Oil Show
 ⊗ Excellent Oil Show

TEXTURE:

Dns - Dense
 Gly - Gummy
 Fri - Friable
 Earth - Earthy
 Bkck - Blocky
 Fib - Fibrous
 Vit - Vitreous
 Vug - Vugular
 Mic - Micritic

ROCK TYPE SYMBOLS

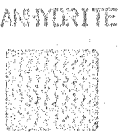
SHALE

CARBONACEOUS

QUARTZITE

SANDSTONE

LIMESTONE



LITHOLOGY

DRILLING TIME



GAS SHOWS



Oil Shows

SAMPLE DESCRIPTIONS

REMARKS

3050

3100

3150

Drilling with PDC bit.

Stone Corral Anhydrite (+26')

Base of Anhydrite (-5')

Mudcheck @ 3400' M.w. 8.9 lb. / gal.

Vis. 77 sec. 19².
 W.L. 5.2 cc/30 min.
 Chl. 700 ppm
 Solids 4.3%
 LCM 4 lb/166l.

Displace. Native Mud @ 3308'

Start 10' wet and dry samples
 and 1' drilling time at 3400'

Bit trip for button bit @ 3400'

Pipe strap
 - 89' long
 Deviation 1/2°

3400

Sh: rd-gry. grn.-grn. m. sft. sft. dns.,
 occ. sandy-silty earthy
 Ss: gry-wht. sh. std., tan-vfg., w. cmtd.
 tr. fr. n., w. ind. tr. pr. ϕ NSFOC

Sh: rd. brn.-tr. dk. gry. m. sft. dns.
 sndy.-v. sndy., earthy. tr.
 ls. pebbles

Sh: sfts. rd. brn. tr. gry. grn.-gry.
 sndy.-v. sndy., earthy
 tr. Ss: rd. brn.-gry. m. hrd. vfg-
 w. cmtd. w. ind. N ϕ NSFOC

Sh: v. sndy., A.A. tr. ls. & ch.
 pebbles

tr. Ss: gry-tan, m. hrd. dns., vfg-
 sub. ang. w. cmtd. N ϕ NSFOC

Sh: rd. brn., m. sft., sndy., earthy
 Ss: gry.-rd. brn., m. sft., m. hrd.,
 dns., tan-vfg., sub. ind., v. w.
 cmtd. calc. N ϕ NSFOC

Sh: rd. brn., m. sft., v. sndy., earthy
 occ. ls. & ch. pebbles

tr. Ss: A.A., tan-vfg., sub. ind., w.
 cmtd., 1-2 pr. pr. ϕ NSFOC

Ss: crm., m. sft., tan-vfg., mod. sand,
 sub. ind. ang. w. cmtd. v. pr. vis. ϕ

tr. Ss: dd. oil stn., occ. brn. stn.,
 tr. cut. sft., N ϕ F.O., no odor, ? perm

tr. Ss: A.A. occ. blk. stn., N ϕ

Sh: sfts. Ss: rd., m. sft., dns.,
 v. pr. sftd., clay matrix,
 earthy

Sh: sfts. rd.-rd. brn., m. hrd.-
 m. sft., dns., sndy.-v. sndy.
 earthy

Sh: rd.-rd. brn., m. hrd.-m. sft.,
 sndy.-v. sndy., tr. ls. pebb.
 occ. silty., earthy

Sh: A.A., v. sndy., tr. ch. & ls. pebb.
 tr. Ss: gry.-gry. grn., sft., tan-vfg.,
 sh. matrix. N ϕ NSFOC

Sh: rd. brn., m. hrd.-sft., dns.,
 sndy.-v. sndy., tr. gry. grn.-
 dk. gry. sndy., earthy, occ.
 ls. & ch. pebbles

Sh: A.A., occ. v. sft. v. clayey, rare
 sndy., earthy-clayey

Sh: sfts. rd.-rd. brn., m. sft.-
 sft. clayey, sndy., occ.
 ls. pebb., earthy

Sh: sfts. A.A.
 Ss: gry., sft., tan-vfg., pr. sftd.,
 ang. sub. ind., w. cmtd., no vis.
 ϕ occ. mica. N ϕ NSFOC.

Sndy. Sh: A.A.,
 Ls: crm., hrd., dns., vfg.-mx. ln.,
 foss.-v. foss. N ϕ NSFOC

Ls: crm., hrd., dns., vfg.-mx. ln.
 foss. & occ. ool., tr. sndy.
 N ϕ NSFOC

Sh: rd., sndy., earthy
 Sh: A.A., m. sft.

tr. Ss: gry., hrd., dns., vfg., N ϕ NSFOC
 Ls: crm., hrd., dns., vfg.-mx. ln.
 mic., occ. foss., tr. sndy. N ϕ NSFOC

tr. Ls: A.A., N ϕ NSFOC
 Sh: rd.-rd. brn., sft. clay.-m.
 hrd., dns., sndy.-v. sndy.
 earthy

Sh: Ss: rd. brn., m. hrd.-hrd.,
 dns., v. sndy.-ch. ls. Ss:

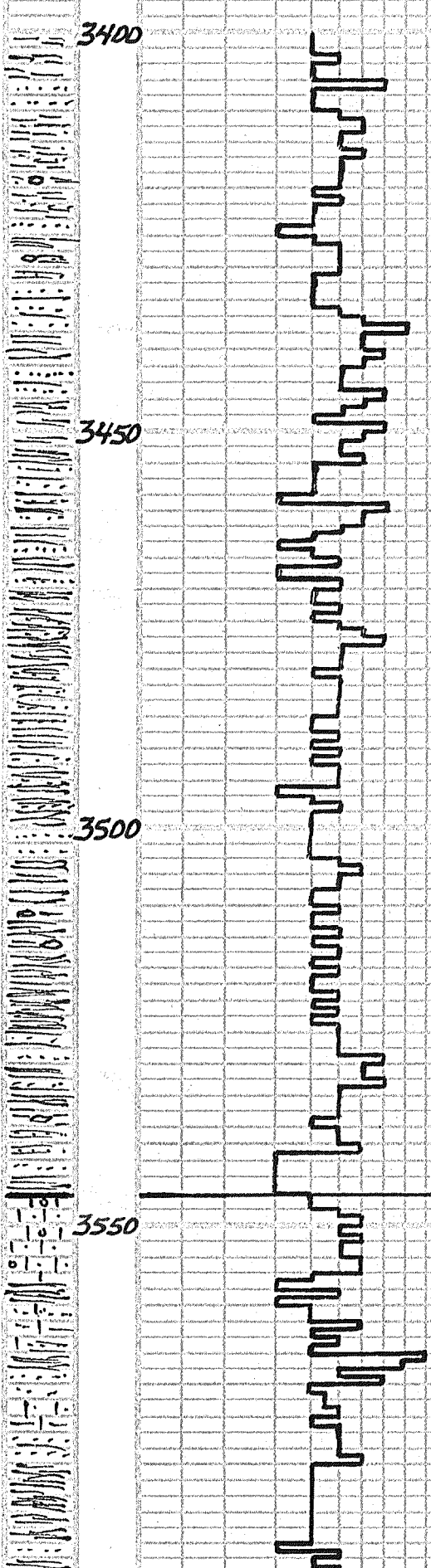
Very weak show

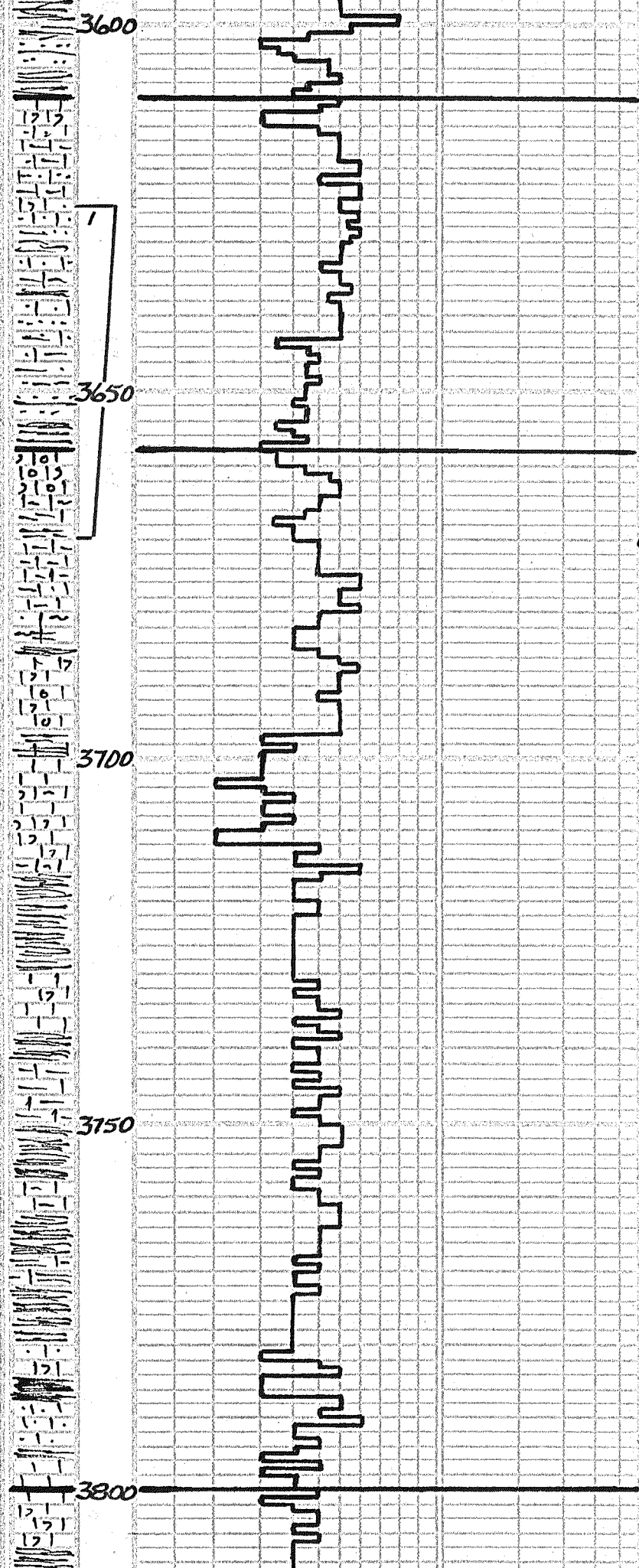
Neve Ls.
 (-424')

3450

3500

3550





Sh: rd. brn., sft. clayey - hrd.,
dns., sndy - v. sndy, earthy

Red Eagle Ls.
(-408')

Sh: A.A.
Ls: crm - lt. gry., hrd, dns., VFG -
mxln., occ. sndy., occ. foss.
NONSFOC

Ls: crm - lt. gry., hrd, dns., VFG -
mxln., foss. + ool., sndy - v.
sndy - calc. ss: gry., hrd, VFG
v. w. cm to. NONSFOC
Ls: A.A., sh. stnd. NONSFOC

DST #1
3625'-3670'
Rec. 180°DSM
(Tool slid 12' to
bottom, open last
2')

Sh: rd. brn - mar., m. hrd - sft.,
sndy., earthy

Sh: A.A.
Ls: crm - lt. gry., hrd, dns., VFG -
mxln., sndy - v. sndy, occ.
foss. NONSFOC

Sh: rd. brn., sft. clay. - m. sft. +
earth., occ. sndy - sly.

Foraker Ls.
(-536')
Falt Show

Ls: crm - wh., hrd, dns., VFG, mxln.
foss. + ool. w/ pr. fr. int. part. var.
Q. fr. lgr. open vms perm. grns.
dk. brn. stn., wk. odor, wk. sp. show
lt. brn. F.O. 1 qd. - ex. cut + fl.

Mudcheck @ 3670'
M.W. 8.9
W.L. 5.6
Vis. 57
chl. 700PPM
Solids 4.3%
LCM 4#

Ls: gry., hrd, dns., VFG, mxln.,
foss., abun. sh. stnd. NONSFOC

Sh: gry. - dk. gry., m. hrd - m. sft.
fr. chl. pebb. earthy - hackly

Ls: gry - dk. gry., hrd, dns., VFG -
mxln., mic., fr. foss., abun.
sh. stnd. NONSFOC

Sh: dk. gry., m. sft., dns., hack.
Sh: A.A.

Ls: crm - gry., hrd - m. hrd, dns.,
VFG - mxln., foss. + ool. w/ dd. oil
stn. around grns., No F.O. No odor

Ls: crm - m. sft. - m. hrd, dns.,
VFG, mxln., occ. foss., fr. sh. stnd.
NONSFOC

Ls: A.A., fr. dd. stn. around
foss. grns., No odor, No F.O.
No live oil, v. perm.

Ls: A.A., fr. dd. oil A.A.

Sh: dk. gry - gry., m. hrd, dns.,
hackly.

Sh: A.A. w/ sh. sft. rd. brn.,
sly., clayey

Ls: crm., hrd, dns., mxln. mic.
fr. foss. NONSFOC

Ls: A.A., occ. sndy. NONSFOC

Sh: gry - mar., m. sft. - m. hrd, dns.
hackly - earthy

Ls: crm - lt. gry., hrd - m. hrd, dns.,
VFG - mxln., occ. sndy., fr. foss.
fr. sh. stnd. NONSFOC

Sh: rd. brn., sly., earthy, sly.

Ls: A.A., occ. rd. sh. stnd. NONSFOC

Sh: rd. brn. - dk. gry., m. sft.,
occ. sndy., earthy

Sh: rd. brn., sft., occ. sndy. +
m. sft., earthy.

Ls: crm - rd. sh. stnd. VFG, mxln.
rare foss., show NONSFOC

Ls: crm - rd. brn., hrd - m. hrd.,
VFG, mxln., rare foss., occ. sndy.
NONSFOC

Sh: rd. brn - dk. gry., m. sft., earthy

Stotler Ls.
(-678')
V. Very weak show

Sh: crm, hrd, dns., VFG - mxln.,
fr. foss., occ. sndy. NONSFOC

Sh: rd. brn. m. sft., sndy, earthy

Sh: gry - gry. grn., m. sft., hackly

Sh: A.A.
Ls: crm., hrd, dns., VFG - mxln., mic.
occ. foss. w/ pr. pp. var. q. dd. oil
stn., v. wk. cut., No odor, No F.O.

Ls: A.A. w/ dd. oil stn. A.A. 1-2pc.
sl. better, occ. sndy

sh: d. brn. - gry., sft., earthy,
hackly, tr. sandy.
sh: A.A.
Ls: crm., hrd., dns., VEG-mxln.,
mic., rare foss., NΦ NSFOC

sh: A.A.
Ls: crm-wh., hrd., dns., VEG-mxln., mic.
occ. foss. w/ pr. pp. w/ pp. around gn's
bik. stn., No odor, No F.O. wk. cut + fl. Very weak show
Ls: crm., hrd., dns., VEG-mxln.,
mic., occ. sandy, tr. foss., tool.
NΦ NSFOC

Ls: A.A., tr. w/ pp. vug. φ, dk. dk.
oil stn., wk. cut + fl., No odor
No. F.O., v. perm.
sh: rd. brn., sft.-m. sft., earthy
tr. Ls: A.A. NΦ NSFOC
sh: rd. brn., tr. gry., m. sft., dns.
sandy - v. sandy, earthy

sh: rd. brn. - lt. dk. gry., m. sft.,
dns., sandy - slty., earthy
Ls: crm.-tan, hrd., dns., occ. sft. +
chiky, occ. foss. + sandy, NΦ NSFOC
Ls: crm.-tan-lt. gry., hrd., dns.,
VEG-mxln., mic., tr. chiky, tr.
foss., occ. sandy + sh. stn., NΦ NSFOC

**Topeka Fm.
(-753')**

sh: d. brn., m. sft., earthy, sandy
sh: A.A., tr. gry.-dk. gry.
Ls: crm.-lt. gry., hrd., dns., VEG-mxln.,
mic., tr. foss., tr. sh. stn., occ.
sandy NΦ NSFOC
tr. sh: A.A.
Ls: crm.-lt. gry., hrd., dns., VEG-
mxln., mlf., tr. chiky, a bun. rd.
sh. stn., tr. sandy, tr. foss., NΦ NSFOC
Ls: crm., hrd., dns., VEG-mxln., mic.
tr. chiky, rare foss., tr. pp.
vug. moldic φ NSFOC

Mud Check @ 3966'
M.W. 9.3
Vis. 70
W.L. 6.0
CHI 700
Solids 7.1 %
LCM 4#

Ls: crm. sft.-hrd., dns., VEG-mxln.,
occ. chik., foss., sandy - v. sandy -
calc., ss. wh. itn. grade. NΦ NSFOC
sh: rd. brn. - gry., sft., earthy, sandy
sh: rd. brn. - tr. gry., sft. - v. sft. +
clayey, tr. sandy, earthy

Deviation @ 3928'
1°

sh: A.A. more sandy
Ls: crm., hrd., dns., mxln., mic.
occ. foss. NΦ NSFOC

Ls: crm.-lt. gry., hrd., dns., VEG-
mxln., mic., foss., tr. sh.
stn. NΦ NSFOC

Ls: A.A., more gry. NΦ NSFOC
sh: rd. brn. - may., m. sft. - m. hrd.
dns., occ. slty., earthy

sh: rd. brn., m. sft. - m. hrd., dns.,
occ. slty., earthy

DST #2
3970'-4040'
Rec. 784'
Mud + MCW

sh: A.A., tr. gry., earthy
tr. Ls: crm., hrd., dns., foss.,
mxln., pass casing NΦ NSFOC

Ls: A.A., occ. tan, foss. dns., VEG-
mxln. NΦ NSFOC
sh: rd. brn., m. sft., dns., earthy
sandy

Dread Ls. (-883')

Ls: crm.-tan, hrd., dns., VEG-mxln.,
mic., foss. w/ pr. pp., w/ part φ
tr. pr. vug. moldic φ, dk. brn. stn.,
No F.O., No. wk. odor, qd. cut + fl. ? perm
Very weak show
Ls: wh.-crm., m. sft. - m. hrd., VEG-mxln.,
foss., tool. w/ pr. tr. moldic vug φ
occ. lgr. vugs, bik. pan. stn., No odor
tr. pr. sft., qd. cut + fl., ? perm.

Fair-weak show

Ls: A.A., tr. sft., chiky, dk. bik. pil
stn. w/ gn. stn., tr. F.O., No odor
tr. cut + fl., occ. lgr. vugs, tr.
pr. VEG-mxln. perm.

Weak show

Ls: crm.-gry., hrd.-m. sft., VEG-mxln.,
occ. foss. w/ VEG, pp φ. Around gn's
Haebner Sh. (-914')



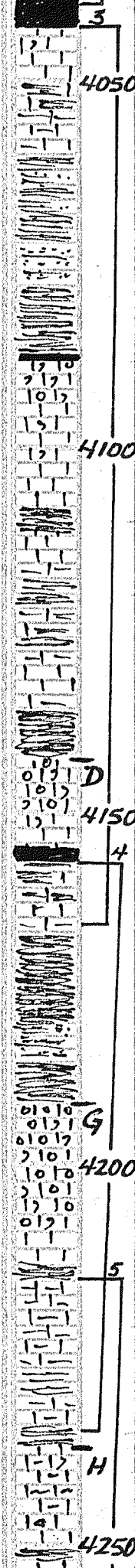
3850

3900

3950

2

4000



occ. lrg. vug, moldic ϕ , dk. oil stn.
No odor, No F.O. iff. cut + fl.
Ls: erm. gry., hrd., dns., vfg, m.,
mic., rare foss. N ϕ NSFOC
Sh: dk. gry. - blk., m. stf., carb.
earthy

Ls: erm. - tan, hrd., dns., vfg, m., foss.
wl pr. - fr. pp. vug. ϕ , th. lrg. vugs,
dk. brn. stn., moldic ϕ , stn. th. blk. oil
wk. SFO, tr. odor, qd. cut + fl., ? perm.
Ls: A.A., tr. moldic ϕ wl stn. AA
? perm., V. wk. show
Sh: gry. - rd. brn., m. stf., dns.,
earthy - hackly
Ss: erm. - blk., m. stf., vfg., w. cm th.
calc., blk. dd. oil stn., wk. cut +
fl., No odor., No F.O. No live oil
Sh: A.A. rd. brn. - gry. qn., stf. clayey
Sh: A.A.

Ls: erm. - wh., hrd., vfg, m., foss. + ool.
wl pr. - fr. vug. ϕ , moldic ϕ around qns.
dk. brn. stn., qd. cut + fl., wk. odor, tr. F.O.
Ls: wh. - tan. A.A., occ. tn. - vfg. pp.
vug. ϕ , th. qd. pp. vug. ϕ , dk. pr. oil
stn., blk. oil, v. wk. odor, No F.O.
qd. cut + fl., v. ? perm.

Ls: tan, hrd., dns., mxln., mic.,
rare foss., rare pp. moldic vug
dk. brn. stn., No odor, wk. cut + fl.
No F.O., No perm. V. Very wk. show
Ls: tan - gry., hrd., dns., mic., th. pr.
- v. pr. vug. ϕ , blk. tarry stn., tr.
cut + fl., No perm., No F.O., No odor.
V. Very wk. show

Sh: gry. - rd. brn. stf., earthy - clayey
Ls: wh. - m. hrd., vfg, m., foss. w. lrg.
int. part. vug. ϕ , blk. live stn., wk.
odor, SFO, ex. cut + fl., v. thin zone
Sh: A.A.

Ls: A.A., qd. vug. ϕ , qd. blk. live stn.
blk. oil, wk. odor, SFO, ex.
cut + fl., thin zone

Ls: A.A., SFO, sh. better ϕ
tr. dd. oil stn.
Sh: rd. brn., m. stf., earthy

Ls: wh., hrd., vfg, m., foss. + ool. wl
tn. vug. ϕ around foss. qns. tr.
lrg. vugs, blk. stn., blk. dk. gry.
oil, SFO, wk. odor, ex. cut + fl.
Ls: tr. ϕ + show. A.A., No F.O., No odor

Sh: gry. - rd. brn., m. hrd., hack - earth.
Sh: rd. brn. - dk. gry., m. hrd. - stf.
+ clay, occ. snod., earthy - hackly
Sh: rd. brn. - gry. qn. - dk. gry.,
tr. nlw., occ. snod., v. snod.
stf. - m. hrd., dns., earthy -
hackly

Sh: rd. - rd. brn., qn., qn., matt.,
m. hrd. - stf. + clayey, hackly -
earthy

Ls: erm. - wh., hrd. - m. stf. + sh. chiky
vfg. - mxln., foss. + ool. - occ. qn. stn.
qd. int. part. vug. ϕ w. dk. - brn. stn.,
SFO, wk. odor, ex. cut + fl.

Ls: erm. - lt. gry., vfg. - mxln., tr. mic.,
tr. chik., rare foss. wl ϕ + show
A.A., tr. F.O. shen, No odor. poss.
earnings or v. thin zone

Ls: erm. - lt. gry., hrd., dns., vfg. - mxln.
mic., tr. chiky, rare pc. - poss.
earnings, wl pr. - fr. moldic vug. ϕ ,
dk. brn. - blk. stn., No odor, No F.O.

Ls: A.A., rare pc. wl pr. vug.
moldic ϕ , blk. oil stn., No
odor, No F.O. V. thin zone, perm

Ls: A.A. wl 1-2 pc. wl ϕ + show. A.A.
Sh: rd. brn. - gry. qn., m. stf., earthy
Sh: rd. brn. - gry. - dk. gry., m. stf.
- m. hrd., dns., occ. snod., earthy
Ls: erm. - tan - lt. gry., hrd., dns.,
vfg. - mxln., mic. - abun., sh. stn.
- rd. sh. - rare foss., tr. pebble
surface. N ϕ NSFOC

Ls: A.A., 1 pc. wl pr. pp. vug. int. part. ϕ .
blk. tarry. stn., No odor, No F.O.

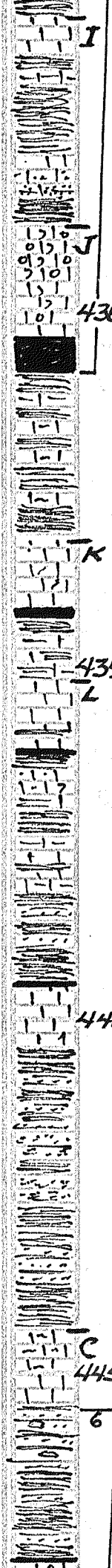
Weak show
Weak show
Mud Check @ 4040'
M.W. 9.4 Chl. 400
Vis. 80 Solids 7.9%
W.L. 4.8 LCM 4#

Weak show
Lansing Group
(-966')
Very weak show
DST #3
Rec. 68' G + OCM
4043'-4165'

Weak show
Fair-weak show
Fair show
Fair show
Mud Check @ 4165'
M.W. 9.4 Solids 7.8
Vis. 54 Chl. 600
W.L. 5.2 LCM 4

DST #4
4157'-4235'
Rec. 75' OCM
Good show
Very weak show
V. Very weak show
Mud Check @ 4235'
M.W. 9.3
Vis. 65
W.L. 6.0
Chl. 1000
Solids 7.1
LCM 4.0

V. Very weak show



Sh: rd. brn. - gry., m. sft., dns.,
 occ. sandy, earthy - hackly
 Ls: wh. - crm., hrd., dns., vfg - mxln., tr.
 chiky., occ. foss. topl. w/ pr. vfg. pp.
 φ bet w. foss. grns., tr. vfg. moldic φ dk
 brn. - blk. tarry stn., no f.o., no odor.
 Ls: A.A., 1-2 pc. w/ φ show A.A.

Sh: rd. brn. - gry., sft. - m. sft., dns.,
 earthy - clayey, occ. sandy
 Sh: A.A., occ. ls. pebble
 tr. ss: gry. - tan, m. hrd., dns., fn - vfg
 w. emtd., no vis. φ. NSFOC

Ls: tan, hrd., dns., mxln., mic., occ. vfg
 xln., foss. dool. w/ pr. - tr. vfg φ, occ.
 moldic, dk. brn. stn., wk. odor, if sfo
 ex. cut fl., blq. oil.
 Ls: A.A. w/ vfg pp. φ. dk. stn.,
 no odor, no f.o., wk. cut fl., abun.
 chiky.

Sh: dk. gry. - blk., m. hrd., dns., hackly
 Sh: A.A., occ. carb., earthy - hackly
 Sh: rd. brn., m. sft., sandy, earthy
 Ls: wh. - crm., hrd., dns., Nφ NSFOC

Sh: rd. brn. - lt. dk. gry., m. sft. - sft. clay.
 tr. sandy, tr. Ls: pebb., earthy
 Ls: crm. - lt. gry., hrd., dns., mxln., mic.
 rare foss. Nφ NSFOC
 Ls: crm. - gry., hrd., dns., vfg - mxln.,
 mic., occ. foss., sh. stnd. Nφ NSFOC
 Sh: rd. brn. - dk. gry., m. sft., earthy
 occ. ls. pebbles
 Sh: A.A.
 Ls: lt. gry., hrd., dns., fn xln. - mxln., mic.
 tr. fac. φ w/ lt. brn. stn. in tracs.
 wk. cut fl., no odor, no f.o. (2-3 pc.)
 Ls: crm., hrd., dns., vfg xln., occ.
 foss., tr. v. pr. pp. moldic φ
 NSFOC

Sh: rd. brn. - dk. gry., m. sft., dns.,
 occ. sandy, tr. Ls: pebb., earthy
 Ls: crm. - gry., hrd., dns., vfg - mxln.
 occ. chiky., sandy, tr. foss. Nφ NSFOC
 occ. Sh: A.A.
 Ls: crm. - gry., hrd., dns., vfg -
 mxln., tr. chik., occ. sandy, rare
 foss. Nφ NSFOC
 Ls: A.A. Nφ NSFOC
 Sh: rd. - rd. brn. - dk. gry., sft. clayey
 - m. hrd., dns., hackly, occ. sandy

Sh: A.A., abun. Ls. pebbles, earthy

tr. Ls: crm. - gry., hrd., dns., sh. stnd.
 mxln. - poss. pebb. Nφ NSFOC
 Ls: crm. - gry., hrd., dns., vfg - mxln.,
 mic., occ. sandy, sh. stnd. Nφ NSFOC
 Sh: rd. brn. - gry. - mar., m. sft. - m. hrd.
 sandy - st. y., earthy - hackly
 occ. Ls: A.A. Nφ NSFOC
 Sh: rd. brn. - gry., m. hrd. - sft., sandy
 - y. sandy, tr. ss: tan, hrd., dns.,
 vfg., w. crtd., no vis. φ NSFOC

Sh: rd. brn., sft. clayey - m. hrd.,
 sandy, earthy, occ. ls. pebbles,
 tr. ss: A.A. Nφ NSFOC

Sh: - sfts. rd. brn., sft. clayey -
 m. hrd., earthy, sandy - v. sandy

Sh: A.A.
 Ls: crm. - gry., hrd., dns., med xln. - abun.
 foss. tr. sh. stnd. Nφ NSFOC

Ls: A.A., abun. sh. stnd., 1 pc. w/ pr.
 pp. φ, lt. stn., wk. cut fl., no odor
 no f.o. V. very weak show
 Sh: rd. brn. - mar. sandy, earthy

Sh: rd. brn. - mar. - gry., m. sft., dns.,
 earthy, sandy, occ. ls. pebb., tr. ss.
 tan, hrd., dns., vfg, v. w. crtd., Nφ
 Sh: A.A., occ. sandy, earthy - hackly
 Ls: crm. - gry., hrd., dns., mxln., mic.
 tr. foss. occ. sh. stnd. Nφ NSFOC

Very weak show

DST #5
4214'-4309'
Roc: 642' GIP
40' CO
308' G+DCM

Fair show
Very weak show

Stark shale
(-1182')

Mud Check @ 4344'
M.W. 9.4
Vis. 70
W.L. 6.2
Chl. 800
Solids 7.8
LCM 2.0

V. Very weak show

Base of
Kansas City
Group (-1240')

Marmaton
Group (-1273')

DST #6
4455'-4510'
Roc. 2' Mud
Deviation 1/4°



Ls: wh.-crm., hrd.-m. hrd., VF₄ xln., foss.
 ool. w/ fr. -gd. int part. φ, occ. Yug. φ
 dk brn. stn. 1gd. cut. x fl., wk. SF₀.
 wk. odor
 Ls: A. A., occ. ph.-fr. int. ool φ w/
 fr.-gd. stn. A. A., occ. int part. Yug
 φ, No F. O., No odor, fr. cut fl.
 ? perm. Sh. gry., hrd. dns. hack.
 sh. gry.-dk gry., m. sft.-m. hrd., hack.
 Ls: crm.-gry., hrd. dns., VF₄-mxln.,
 mic., occ. foss. N φ NSFOC

Ls: crm.-gry., hrd., dns., VF₄ xln., foss.-
 V. foss. N φ NSFOC
 Sh. gry.-rd. brn. m. sft.-m. hrd., dns.
 hack. x. -earthy

Ls: crm.-ft. gry. tr. mar., hrd., dns.,
 VF₄ xln., occ. sandy, rare foss.
 N φ NSFOC
 Ls: gry.-ft. gry.-tan, hrd., dns., VF₄
 xln., occ. sandy. N φ NSFOC
 Sh: dk. gry.-blk., m. hrd., carb., earthy

Ls: gry.-tan, hrd., dns., VF₄-mxln.,
 occ. foss., occ. sandy. N φ NSFOC

Ls: crm.-tan-gry., hrd., dns., VF₄-
 mxln., tr. chky., occ. sandy.-V. sandy
 occ. foss. N φ NSFOC
 Sh: dk. gry., m. hrd., dns., earthy

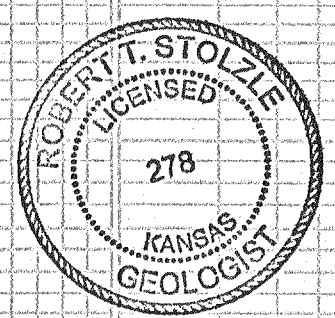
Ls: crm.-gry., hrd., dns., VF₄-mxln.,
 mic., occ. V. foss., tr. sh. stnd.
 N φ NSFOC
 Ls: A. A. N φ NSFOC

Sh: dk. gry.-blk., m. hrd.-hrd., dns.
 carb., earthy-hackly
 Sh: A. A., occ. m. sft., occ. gry. qn.
 Ls: tan, hrd., dns., VF₄-mxln., mic
 tr. chky., rare foss., tr. sandy,
 tr. sh. stnd. N φ NSFOC
 Ls: crm.-tan, hrd., dns., VF₄-mxln.,
 mic., occ. sft. chky., foss.,
 rd. + qn. sh. stnd. N φ NSFOC
 tr. calc. ss: wh.-crm. ft. qn. in cmtd. No
 Ls: A. A. N φ NSFOC, occ. ss: gry.-rd.
 qn. sh. stnd. in qn. med.-w. stnd.
 w. rd., w. cmtd. No vis φ NSFOC
 Cg: sh. varicolored, sft., earthy
 Cg: sh: rd. brn.-gry. qn.-mar.-ylw., sft.
 m. sft.-m. hrd., dns., earthy
 tr. ss: A. A., tr. Ls: A. A. N φ NSFOC
 Cg: sh: A. A., abun. lg. sd. qns.
 ss: tan-grs. wh.-cl. med.-tr. sftd.,
 w. rd.-subrd., w. cmtd. No vis φ
 NSFOC
 Cg: sh: A. A.
 ss: A. A., occ. ang. N φ NSFOC
 Ls: crm., hrd., dns., mxln., mic.
 occ. foss., tr. sh. stnd. N φ NSFOC
 Cg: sh: + ss: dk. gry.-qn.-rd. brn.
 med.-VF₄, pr. sftd., w. cmtd.,
 ang.-subrd. No vis φ NSFOC
 tr. dk. gry. sh.
 Cg: sh: rd. brn.-qn.-dk. gry., sft.
 sftay.-m. sft., earthy, sandy
 ss: wh.-varic. sh. stnd., m. sft.-
 hrd., pr. sftd., w/ cmtd., N φ NSFOC

Pawnee Ls.
 (-1354')
 Fair Show
 Weak Show
 Mud Chack @ 4510'
 M. W. 9.3 lb. 1 gal.
 V. s. 65 sec. 19t.
 W. L. 5.6 ml. 130 min.
 chl. 900 ppm.
 Solids 7.190
 L.C.M. 6.0 lb. / bbl.

Ft. Scott Ls.
 (-1435')
 Cherokee Shale
 (-1445')
 Verdigris Ls.
 (-1454')

D.T.D. 4660'
 L.T.D. 4660'



Robert Stolzie
 3/2/14

