

RECEIVED

JAN 04 1983

COLORADO & GAS COMPANY, DENVER



A GEOSCIENCE EXTENSION OF XCO



910 Sixteenth Street, #522, Denver, Colorado 80202 (303) 893-8138

TXO PRODUCTION COMPANY
ARNOLD C-1
SECTION 18 - T19S - R44W
KIOWA COUNTY, COLORADO

GEOLOGIST: Danny Wyckoff
GX Consultants

TABLE OF CONTENTS

	<u>PAGE</u>
Resume.	1
Summary and Conclusions	2
Formation Tops.	3
Well History.	4
Mud Record.	5
Drilling Functions.	6
Directional Surveys	7
Bit Record.	8
Drill Stem Test	9
Log Strips.	10
Lithology	13

2

23

RESUME

OPERATOR: TXO Production Company
(Texas Oil & Gas)

WELL NAME & NUMBER: Arnold C-1

LOCATION: Section 18 - T19S - R44W

COUNTY & STATE: Kiowa County, Colorado

SPUD DATE: December 9, 1982

COMPLETION DATE (TD): December 19, 1982

ELEVATIONS: 3,997' GL 4,007' KB

TOTAL DEPTH: 4,960' DRLR 4,951' LOGS

CONTRACTOR: Kissinger

RIG: #3

TYPE RIG: Challenger 360 Double Drive Double

PUMPS: Duplex 6 x 14

GEOLOGIST: Danny Wyckoff, GX Consultants

ENGINEER: Jerry Dameron

TOOL PUSHER: Jerry Roland

MUD COMPANY: Service Mud, Inc.

TYPE MUD: Fresh water gel

MUD ENGINEER: Lloyd Wells

HOLE SIZES: 12-1/4" to 462'
7-7/8" to TD

CASING: 8-5/8" @ 435', 448' from Kelly Bushing

MUD LOGGING BY: Analex

TYPE UNIT: 1-Man

CORE INTERVALS: None

DST COMPANY: Halliburton

DST: #1: 4,023' - 4,137'

ELECTRIC LOGS BY: Gearhart

TYPE LOGS RUN: CNL-FDC-Gamma
SP-DIL

LOGGING ENGINEER: Dean Harris

BOTTOM FORMATION: Mississippian

WELL STATUS: Plugged & Abandoned

SUMMARY AND CONCLUSIONS

The Arnold C-1 was drilled to a total depth of 4,960' to test the Marmaton and Morrow formations. No major engineering problems were encountered. To prevent lost circulation, as in the Lexicon #1, LCM was circulated from 2,900' to 3,300' and from 3,567' to total depth. 80 barrels of drilling fluid were lost at 3,567'.

The section of the Arnold C-1 is thick by 70' to the Lexicon #1. 40' of thickening occurs between 2,950' and the top of the Topeka at 3,489'. This thickening probably put the possible pay zones too low structurally to produce.

Marmaton

A show of oil and gas was seen in the Marmaton "A" porosity zone. It was tested in DST #1 along with a porosity zone in the lower Lansing-Kansas City. The intent was to test the "A" and "B" porosity zones together, but an error in correlation prevented this. Recovery of DST #1 was 1,800' of muddy water and 850' of water. No drilling break or gas show occurred in the "B" zone, however, there was a minor show of oil in the samples. Logs show the "A" to have 12% density porosity and the "B" to be tight.

Morrow

There was very poor development of the Morrow sands here. Several thin lenses of siltstone with minor very fine grained sandstone were seen between 4,814' and TD. Where there is sand, porosities range from 18-23%, however, no shows were seen.

A 2' thick limestone at the top of the Morrow (4,731'-4,733') has 21% porosity and water saturation of 32%. There was a gas show here, but no oil was observed.

The Arnold C-1 was plugged and abandoned.

FORMATION TOPS

<u>FORMATIONS</u>	<u>ARNOLD C-1</u>		<u>LEXICON #1</u>		<u>STATE #1-16</u>	
	<u>KB: 4,007'</u>		<u>KB: 3,999'</u>		<u>KB: 4,048'</u>	
Base Stone Corral	2,260	+1,747	2,230	+1,769	2,245	+1,803
Topeka	3,489	+ 518	3,420	+ 579	3,438	+ 610
Lansing-Kansas City	3,766	+ 241	3,695	+ 304	3,738	+ 310
Marmaton A	4,105	- 98	4,039	- 40	4,110	- 62
Marmaton B	4,184	- 177	4,111	- 112	--	--
Cherokee	4,270	- 263	4,200	- 201	--	--
Atoka	4,458	- 451	4,384	- 385	4,428	- 380
Morrow	4,730	- 723	4,644	- 645	4,678	- 630
Mississippian	--	--	--	--	4,971	- 923

WELL HISTORY

1982

DATE

DAILY ACTIVITY

12/8	Move and rig up.
12/9	Rig up, start drilling 12-1/4" hole, work on pump, drill, TOH for surface casing, run surface casing, cmt casing, wait on cmt.
12/10	Wait on cmt, drill plug, drill, trip out for bit.
12/11	Trip in, drill, survey (1-1/4° @ 2048'), bit trip, drill.
12/12	Drill, trip for bit, repair cathead (1-1/2 hrs.), drill, repair cathead (1/2 hr.), drill, repair pump (1-3/4 hrs.), drill, trip for bit.
12/13	Repair kelly hose (2 hrs.), trip, drill, repair pump (1/4 hr.), drill.
12/14	Drill, lost circ @ 3,567', 80 bbl, pull 4 std & mix pill, drill, repair chain drive (1-1/2 hrs.), drill.
12/15	Drill, cfs @ 4,060', drill, cfs @ 4,137', short trip 18 stds, circ to clean hole, TOH for DST #1.
12/16	TOH, pick up test tool, TIH, test, TOH, breakdown test tool, TIH, ream to bottom, drill.
12/17	Drill.
12/18	Drill, repair brakes (1-1/2 hrs), drill, cfs @ 4,740', wait on Drispac (1 hr), cond mud (1-1/2 hrs), drill, cfs, drill.
12/19	Drill, cfs, drill, cfs, drill, TD, circ for logs, TOH for logs, wait on orders, prepare to plug.

MUD RECORD

MUDDER UP AT 3,900' ON 12/15/82

[illegible]

DRILLING FUNCTIONS

(Include air pressure if air drilled hole)

DATE	DEPTH	W.O.B.	R.P.M.	P.P.
12/9/82	242	All	80/90	600
	400	All	120	600
12/10/82	478	All	120	600
12/11/82	1,455	32	70/80	900
	2,130	25/30	70/80	900
	2,460	30/35	70/80	900
12/12/82	2,529	30	75	1000
	2,759	30/38	60/85	900
	2,834	30/35	65/75	900
12/13/82	2,935	25/30	70	1000
	3,328	30/35	65/70	1000
12/14/82	3,517	30	70	1000
	3,633	30/35	65/70	1000
	3,802	35	60	1000
12/15/82	3,965	35	65	1000
	4,102	35	65/70	1000
12/16/82	4,137	35	65/70	1000
	4,254	35	65	1000

DIRECTIONAL SURVEYS

[illegible]

BIT RECORD

[illegible]

TEXAS OIL & GAS CORP.
DST REPORT FORM

Lease & Well # Arnold C-1 Date: 12/16/82

DST # 1, 4,023 ' - 4,137 ', (Marmaton Fm),

"B & " TC. -- ' WC.

IFP, TO w/ strong initial blow, off bottom of bucket in 2 minutes, initial shut-in
died in 5 minutes.

FFP, TO w/ open with 2" blow, blow throughout, very weak surface blow at end.

2nd shut-in dead when closed.

REC : 1800' muddy sulfur water, 850' sulfur water

Top Rw = 1.10 @ 42 °F, Cl ppm. Middle Rw = .850 @ 40 °F,

Cl ppm. Btm Rw = @ °F, Cl ppm. Mud Rw =

@ °F, Cl ppm.

IHHP 2035 #, "IFP 96 - 831 #, "ISIP 1213 #,

"FFP 831 - 1213 #, "FSIP 1213 #, FHHP 2035 #, BHT Misrun F.

BHSC @ #, To be opened at shop.

SIP Build-up indicates: (Normal) (Damaged) (Tight) (Depletion) (Other) . Rw = @ °F, Cl ppm.

Testing Company: Halliburton Tester: Larry Repphum

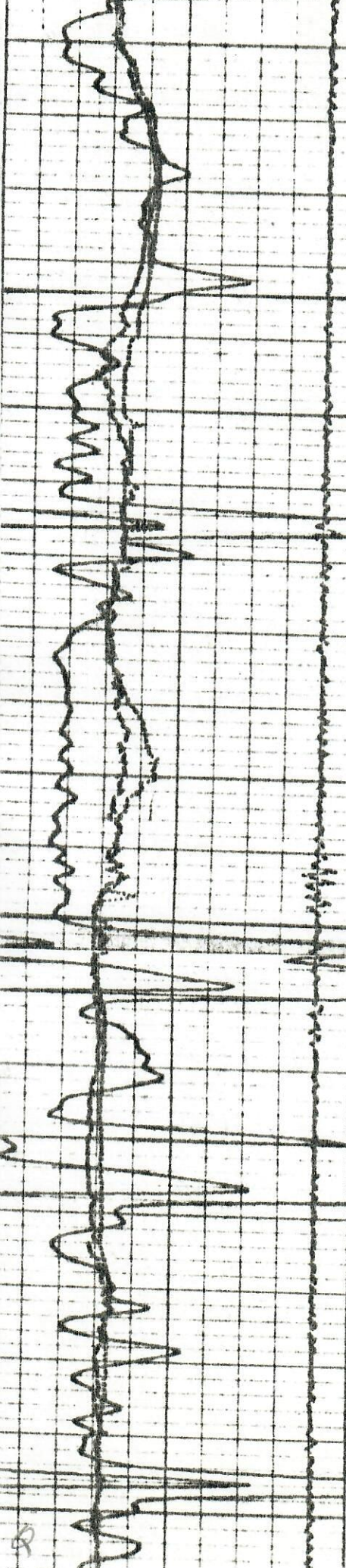
Test was mechanically: (Successful) (Unsuccessful)

04000

DST #1

04100

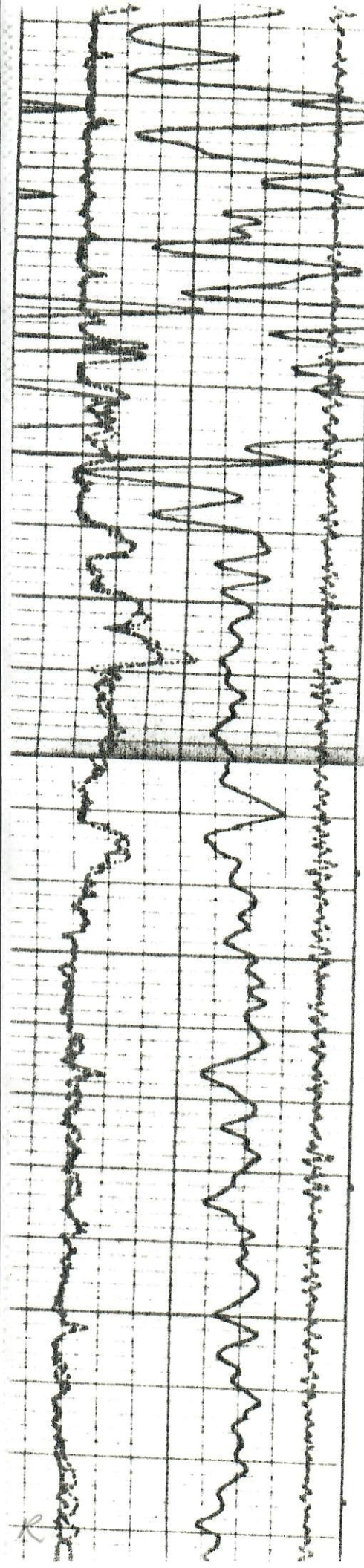
Maximum
↑
(-98)



Norman
8
(-177)
04200

Chorus
(-263)

04300



04700

morrow
(-723)

04800

LITHOLOGY

Drilling with water, poor sample quality.

- 2,700-2,710 SILTSTONE - red orng, red brn, blk, sl calc, sl anhy, carb pl rmns, sft.
- 2,710-2,720 SHALE - dk gy, lt-dk brn, red orng, gn, blk, n calc-calc, occ slty, sl dol, sl anhy, sft.
SILTSTONE - red orng, a/a.
- 2,720-2,730 SANDSTONE - gy, vf gr, w srt, ang, sil, slty, tr pyr, no vis Ø.
- 2,740-2,750 SANDSTONE - a/a.
SHALE - dk gy, lt-dk brn, red, gn, blk, n calc-calc, occ slty, sl dol, sl anhy, sft.
- 2,750-2,760 SHALE - dk gy, red orng, lt-dk brn, blk, n calc-calc, occ anhy, sl dol, tr BENT, sft.
SANDSTONE - gy, vfgr, w srt, ang, sil, slty, tr pyr, no vis Ø.
- 2,760-2,770 SILTSTONE - red orng, gy, sme lav, blk, n calc, occ sdy-vf gr, sft, grds to CLYST.
- 2,770-2,780 SILTSTONE - a/a.
- 2,780-2,790 SHALE - crm, gy-dkgy, red brn, gn, blk, sbplty, n-sl calc, occ slty, sft.
- 2,790-2,800 SHALE - a/a.
SANDSTONE - gy, vfgr, w srt, ang, sil, slty, tr pyr, arg, frm, no vis Ø.
- 2,800-2,810 SHALE - a/a.
SANDSTONE - a/a.
- 2,810-2,820 SHALE - dk gy, red brn, crm, lt gn, blk-sbfis, n calc, occ slty, tr carb pl rmns, tr BENT - crm, lt gy, yel mnrl flor, sft.
- 2,820-2,830 SHALE - a/a, tr carb pl rmns - grds to carb SH.
SILTSTONE - crm-lt gy, gygn, rust brn, n calc, occ sdy, sft.
- 2,830-2,840 SILTSTONE - crm-lt gy, gygn, rust brn, n calc, occ sdy-v sdy, sft.
- 2,840-2,850 SILTSTONE - a/a.
SHALE - dk gy, red orng, crm, lt gn, blk-sbplty, n-sl calc, occ slty, sft.

LITHOLOGY (Cont.)

- 2,850-2,860 SHALE - a/a.
- 2,860-2,870 SHALE - a/a.
- 2,870-2,880 SILTSTONE - red orng, gy, lav, blk, n calc, occ sdy, sft.
SHALE - dk gy, red brn, crm, lt gn, blk-plty, n-sl calc, occ slty, occ carb, sft-frm.
- 2,880-2,890 SHALE - a/a.
- 2,890-2,900 SHALE - a/a.
- 2,900-2,910 SHALE - a/a.
SANDSTONE - crm-gy, vfgr, w srt, ang, sil, slty, sft, sl fri, tr-f intxl Ø.
- 2,910-2,934 SANDSTONE - crm-red orng, vf-m gr, p srt, sbang, occ fros gr, sl arg, carb fos frag, occ slty, sil/qtz ovgr, no vis Ø, hd, grds to sdy SLTST.
- 2,934-2,940 SHALE - red orng, gy, crm, lt gn, blk-plty, n-sl calc, occ anhy, tr carb, frm.
- 2,940-2,950 SILTSTONE - red orng, gy, blk, n calc, occ sdy, sft.
SHALE - a/a.
- 2,950-2,960 SHALE - a/a.
- 2,960-2,970 SANDSTONE - gy, vfgr, w srt, ang, sil, slty, hd, tt, no vis Ø.
- 2,970-2,980 SHALE - dk gy-blk, fis-plty, n calc, carb pl rmns, sft.
- 2,980-2,990 LIMESTONE - crm-lt gy/dk mot, mic-crpxl, sbplty, sl arg, sl chky, psuedo ool, no vis Ø.
- 2,990-3,000 SHALE - a/a.
SILTSTONE - red orng, gy, blk, sil, sme anhy cmt, occ sdy-vf gr, sft.
- 3,000-3,010 SILTSTONE - a/a.
SHALE - dk gy, dk red brn, sme blk, blk-plty, occ slty, anhy, sft.
- 3,010-3,020 SILTSTONE - red orng, gy, blk, sil, sme anhy cmt, occ sdy, sft.
- 3,020-3,030 SHALE - dk red orng, dk red, gy, blk, crm, lt gn, sme lav, blk-plty, occ wxy, sl-n calc, tr anhy incl, sft, occ slty, NOTE: red & red orng SH grds to CLYST.

LITHOLOGY (Cont.)

- 3,030-3,040 LIMESTONE - crm-bf, mic-crpxl, blk-pty, frm, no vis
Ø.
- 3,040-3,050 SHALE - a/a.
- 3,050-3,060 SILTSTONE - a/a.
SHALE - a/a.
- 3,060-3,070 LIMESTONE - crm-bf, mic crpxl, blk-pty, frm, no vis
Ø.
SHALE - dk gy-blk, red orng, dk brn, crm-lt gn, blk-
pty, sl-n calc, tr anhy sft, tr BENT.
- 3,070-3,080 SHALE - a/a.
- 3,080-3,090 SILTSTONE - red orng, lt gy, blk, calc, sft.
Tr LIMESTONE - a/a.
- 3,090-3,100 SILTSTONE - a/a.
- 3,100-3,120 SHALE - red, gy, blk, blk, n-sl calc, carb pl rmns,
occ slty, grds to SLTST.
- 3,120-3,130 SANDSTONE - gy, crm, vfgr, ang, w srt, slty, arg, sl
calc, no vis Ø.
- 3,130-3,140 SHALE - dk gy-blk, red, dk brn, sme lav, blk-pty, n-
sl calc, occ bent, tr carb pl rmns, sft-frm.
Tr LIMESTONE - crm-bf, mic-crpxl, blk, sl chky, frm,
no vis Ø.
- 3,140-3,150 SHALE - a/a.
- 3,150-3,160 SHALE - a/a.
LIMESTONE - a/a.
- 3,160-3,170 SILTSTONE - red orng, blk, calc, sft, tr sdy-vf gr.
SHALE - dk gy-blk, red, dk brn, blk-pty, n-sl calc,
occ BENT, tr carb, sft.
- 3,170-3,330 SHAKER BYPASS - NO SAMPLES.
- 3,330-3,340 SHALE - gy-dkgy, red orng, dk red brn, lt gn, crm, sme
lav, blk-pty, earthy-wxy, n-sl calc, tr pyr, gen
sft/sme frm.
Thn intbd LIMESTONE - a/a.
- 3,340-3,350 SHALE - a/a.
- 3,350-3,360 Tr LIMESTONE - crm-bf-ltgy, blk, mic-crpxl, fos (crin),
tt, no vis Ø, frm.
SILTSTONE - red orng, orng-brn, calc-v calc, blk,
sft-frm.

LITHOLOGY (Cont.)

- 3,360-3,370 SHALE - v col a/a, blkyl-pty, earthy-wxy, n-sl calc, tr pyr, sft-frm.
- 3,370-3,380 LIMESTONE - crm-bf-ltgy, blkyl, mic-crpxl, fos, tt, no vis Ø, frm.
SHALE - a/a.
- 3,380-3,390 LIMESTONE - a/a.
- 3,390-3,400 SILTSTONE - red orng-brn, blkyl, calc-v calc, sft, tr carb pl rmns, tr sdy-vf gr.
- 3,400-3,410 SILTSTONE - a/a.
- 3,410-3,420 LIMESTONE - crm-bf, lt gy, blkyl, mic-crpxl, fos, tt, tr pyr.
SHALE - gy-dkgy, red orng, dk brn, blkyl-pty, n-sl calc, tr pyr, occ carb, frm.
- 3,420-3,430 SHALE - gy-dkgy, red orng, dk brn, blkyl-pty, n-sl calc, tr pyr, occ carb, frm.
LIMESTONE - crm-bf, lt gy, blkyl, mic-crpxl, fos (crin), tt, no vis Ø, frm.
- 3,430-3,440 SHALE - a/a.
- 3,440-3,450 LIMESTONE - crm-bf-ltgy, blkyl, mic-crpxl, fos (crin), tt, no vis Ø, frm.
- 3,450-3,460 SHALE - brn-choc brn, gy-dkgy, blkyl, sl calc, wxy, tr carb, frm.
- 3,460-3,480 LIMESTONE - crm-bf, lt gy, mic-crpxl, blkyl, fos (crin), ool in part, no vis Ø, no flor or stn.
SHALE - gy-dkgy, blkyl, carb, n-sl calc, occ slty, sme grds to SLTST, frm.
- 3,480-3,490 SHALE - a/a.
- 3,490-3,500 LIMESTONE - crm-bf-lt brn/sme dk gy mot, blkyl, mic-crpxl, fos, ool, tt, no vis Ø, frm.
Thn intbd SHALE - a/a.
- 3,500-3,510 SHALE - pred gy-dkgy, red, crm, lt gn, lav, red orng, blkyl-fis, n calc-calc, sft-frm.
- 3,510-3,520 LIMESTONE - crm-bf, lt gy, brn, mic-crpxl, blkyl, fos, occ qtz vug and frac fill, chky, dull yel mnrl flor, frm, tt, no vis Ø.
- 3,520-3,530 LIMESTONE - a/a.
SHALE - a/a.

LITHOLOGY (Cont.)

- 3,530-3,540 SHALE - pred gy-dkgy, v col, blk-y-fis, n-sl calc, frm.
- 3,540-3,550 LIMESTONE - crm-bf, lt gy, brn, mic-crpxl, blk-y, fos, chky, dull yel mnrl flor, frm, tt.
- 3,550-3,560 LIMESTONE - a/a.
SHALE - a/a.
- 3,560-3,570 LIMESTONE - a/a.
SHALE - gy-dkgy, blk-y-fis, n-sl calc, frm.
- 3,570-3,580 LIMESTONE - crm-bf, lt gy, brn, mic-crpxl, blk-y, fos, chky, dull yel mnrl flor, frm, tt.
- 3,580-3,590 SHALE - gy-dkgy, dk brn, red brn, sme crm-lt gn, blk-y-plty, n-sl calc, frm.
- 3,590-3,610 LIMESTONE - crm-gy, sme brn, blk-y, mic-crpxl, fos, chky, frm, no vis Ø.
- 3,610-3,620 SHALE - dk gy-blk, blk-y-plty, carb, calc, frm.
- 3,620-3,630 SHALE - a/a.
LIMESTONE - a/a.
SILTSTONE - dk red, blk-y, calc, carb, frm.
- 3,630-3,650 LIMESTONE - crm-gy, lt brn, blk-y, mic-crpxl, fos (Brac, Crin), ool, occ carb fos rmns, frm, tt.
- 3,650-3,670 SHALE - dk gy-blk, blk-y-plty, carb, calc, frm.
- 3,670-3,680 LIMESTONE - crm-gy, lt brn, blk-y, mic-crpxl, chky, fos, occ carb fos, no vis Ø.
- 3,680-3,690 SILTSTONE - dk red, gy, blk-y, calc, carb, frm.
SHALE - a/a.
- 3,690-3,710 LIMESTONE - crm-bf, blk-y, mic-crpxl, chky, fos, hd, dns, no vis Ø.
- 3,710-3,720 LIMESTONE - a/a.
SILTSTONE - dk red, blk-y, calc, carb, frm.
- 3,720-3,730 LIMESTONE - a/a.
SILTSTONE - a/a.
- 3,730-3,750 LIMESTONE - a/a.
SHALE - dk gy, choc brn, dk red, blk-y-plty, n calc-calc, occ wxy, frm.
- 3,750-3,760 SILTSTONE - dk red, blk-y, calc, carb, frm.

LITHOLOGY (Cont.)

- 3,760-3,770 LIMESTONE - crm-bf, sme lt brn, blk, mic-crpxl, chky,
occ fos, ool, frm, tt.
SHALE - gy-dkgy, choc brn, red brn, blk-sbfis, sl
calc-calc, sme wxy, frm.
- 3,770-3,780 LIMESTONE - a/a.
SHALE - a/a.
- 3,780-3,790 LIMESTONE - crm-bf, sme gygn, blk, mic-crpxl, chky,
fos, ool, tt, frm.
- 3,790-3,800 LIMESTONE - a/a.
SHALE - gy-dkgy, choc brn, red brn, blk-sbfis, sl
calc-calc, occ wxy, frm.
- 3,800-3,810 LIMESTONE - a/a.
SHALE - a/a.
- 3,810-3,820 SHALE - a/a.
LIMESTONE - crm-bf, sme dk gygn, blk, mic-crpxl,
chky, fos, ool, tt, frm.
- 3,820-3,830 SHALE - gy-dkgy, choc brn, red brn, blk-sbfis, sl
calc-calc, occ wxy, frm.
- 3,830-3,840 LIMESTONE - a/a, tr ool moldic Ø.
- 3,840-3,850 LIMESTONE - a/a.
SHALE - pred dk gy, sme dk brn, blk, occ sbfis, n
calc-calc, wxy, frm.
- 3,850-3,870 LIMESTONE - crm-bf-gy-occ brn, mic-crpxl, blk,
chky, fos, ool, tt, no vis Ø.
- 3,870-3,880 LIMESTONE - a/a.
SHALE - dk gy-blk, sbfis, carb, calc, frm, occ slty.
- 3,880-3,890 LIMESTONE - crm-bf-gy, occ brn, mic-crpxl, blk, chky,
fos, ool, tt, hd, no vis Ø.
- 3,890-3,900 SHALE - gy-dkgy, dk red brn, sl calc, blk-plty, frm,
occ wxy.
- 3,900-3,910 LIMESTONE - a/a, dull yel mnrl flor.
- 3,910-3,920 SHALE - gy-dkgy, dk red brn, sl calc, plty-blk, frm,
occ wxy, sme carb.
LIMESTONE - a/a.
- 3,920-3,930 LIMESTONE - a/a.
SHALE - a/a.
- 3,930-3,950 LIMESTONE - a/a.
SHALE - gy-dkgy, dk red, brn, sl calc-calc, blk-plty,
frm, occ wxy, blk is carb.

LITHOLOGY (Cont.)

- 3,950-3,960 LIMESTONE - crm-gy-dkgy, occ lt-dk brn, mic-crpxl, blky, fos, ool, chky, tt, frm, dull yel mnrl flor.
- 3,960-3,970 LIMESTONE - a/a.
- 3,970-3,990 LIMESTONE - a/a.
- 3,990-4,000 SHALE - gy-dkgy, occ dk red-dk red brn, sl calc-calc, blky-plty, sme carb, frm.
LIMESTONE - a/a.
- 4,000-4,010 SHALE - a/a.
- 4,010-4,020 LIMESTONE - crm-lt brn, gy, sme dk brn, mic-crpxl, blky, chky, ool, fos, gen tt, rr vug Ø, frm.
Occ CHERT - lt-dk brn.
- 4,020-4,030 LIMESTONE - a/a.
SHALE - gy-dkgy, plty, calc, carb, frm.
- 4,030-4,050 SHALE - gy-dkgy, plty, calc, carb, frm.
- 4,050-4,060 LIMESTONE - crm-lt gy, lt-dk brn, mic-crpxl, chky, sl fos, ool, tr lt stn/f-g strm cut, tr pyr, tr vug Ø, frm-sft.
- 4,060-4,070 SHALE - dk gy, plty, sl calc-calc, carb, frm, slty/occ rr SLTST.
- 4,070-4,080 LIMESTONE - crm-lt gy, lt brn, mic-crpxl, blky, chky, fos, ool, tr pyr, frm.
- 4,080-4,100 SHALE - dk gy, blky, sl calc-calc, carb, occ slty, frm.
LIMESTONE - a/a.
- 4,100-4,110 LIMESTONE - crm-bf-lt gy, sme lt brn, mic-crpxl, blky, chky, fos, sl ool, occ lt stn/yel flor, bri yel strm cut, gen tt/occ f vug Ø, f-g odor, oil stn in 25% cuttings.
SHALE - a/a.
- 4,110-4,124 LIMESTONE - a/a.
- 4,124-4,130 SHALE - dk gy-gy, dk brn, plty, sl calc, frm, carb.
- 4,130-4,140 SHALE - dk gy-gy, dk brn, plty, sl calc, frm, occ carb.
- 4,138-4,151 STRAP CORRECTION.
- 4,151-4,170 LIMESTONE - crm-bf-lt brn, sme dk brn, dk gy mot in part, mic-crpxl, blky, occ chky, ool, tr vug Ø, tr oil stn/p cut, frm.

LITHOLOGY (Cont.)

- 4,170-4,180 LIMESTONE - a/a.
SHALE - a/a.
- 4,180-4,190 LIMESTONE - crm-bf-lt brn, mic-crpxl, blk, occ chky,
fos, ool, frm, no vis Ø.
- 4,190-4,200 LIMESTONE - a/a, tr CHERT - blk.
- 4,200-4,210 LIMESTONE - a/a.
SHALE - dk gy-blk, blk-sbfis, sl calc-calc, carb, frm.
- 4,210-4,220 SHALE - a/a.
LIMESTONE - a/a.
- 4,220-4,230 LIMESTONE - crm-lt gy, sme brn, mic-crpxl, blk, fos,
occ chky, tr pyr, tr CHERT - blk.
SHALE - a/a.
- 4,230-4,260 LIMESTONE - crm-gy, lt-dk brn, mic-crpxl, blk, fos,
occ chky, frm, tt, tr lt stn/wk yel flor & cut, no odor.
- 4,260-4,280 SHALE - dk gy-blk, blk-fis, sl calc, sl-mod carb, tr
slt, tr pyr, frm.
LIMESTONE - a/a.
- 4,280-4,290 SHALE - a/a.
LIMESTONE - crm-tan, lt-dk brn, sme dk gy, crpxl, chky,
tr fos, tr ool, frm.
- 4,290-4,300 SHALE - dk gy-blk, blk-fis, sl calc, sl-mod carb, tr
pyr, frm.
- 4,300-4,310 SHALE - a/a.
LIMESTONE - crm-tan-lt gy, crpxl, sme chky, fos, tr ool,
sl yel-yel blue flor/wk cut, no vis stn, no vis Ø, no
odor.
- 4,310-4,320 SHALE - dk gy-gy, blk-sbfis, sl calc, frm.
- 4,320-4,330 SHALE - a/a.
LIMESTONE - a/a.
- 4,330-4,340 SHALE - a/a.
LIMESTONE - a/a.
- 4,340-4,350 SHALE - dk gy-blk, blk-plty, sl calc-calc, carb, frm.
- 4,350-4,360 LIMESTONE - crm-bf-lt brn, sme gy, mic-crpxl, blk-
plty, sme chky, tr suc, tr intxl Ø, fos, sl ool, rr
yel flor/wk blue yel cut, no odor.
- 4,360-4,370 LIMESTONE - a/a.
SHALE - gy-dkgy, blk-sbfis, sl calc, frm.

LITHOLOGY (Cont.)

- 4,370-4,380 LIMESTONE - a/a.
SHALE - a/a.
- 4,380-4,390 SHALE - dk gy-blk, blk-y-fis, sl calc-calc, carb, frm.
LIMESTONE - crm-bf-lt brn, crpxl, chky, frm.
- 4,390-4,400 SHALE - dk gy-blk, blk-y, sl calc-calc, carb, frm.
- 4,400-4,410 SHALE - dk gy-gy, blk-y-fis, sl calc-calc, carb, frm,
occ carb.
- 4,410-4,420 SHALE - a/a.
- 4,420-4,430 LIMESTONE - bf-brn, gy-dkgy, sme crm, mic-crpxl, blk-y-
plty, sme chk, fos, tr ool, tr bioclastic Ø, tr yel flor/
wk strm crush cut, frm.
- 4,430-4,450 SHALE - dk gy-blk, dk red brn, blk-y, n calc-calc, occ
slty, blk is carb, red is wxy, frm.
LIMESTONE - crm-lt gy, brn, mic-crpxl, blk-y, chky, sl
fos, sl ool, tt, occ bri yel flor/f strm cut-yel.
- 4,450-4,460 LIMESTONE - a/a.
SHALE - a/a.
- 4,460-4,470 SHALE - dk gy-blk, blk-y-fis, sl calc, carb, frm.
- 4,470-4,480 SHALE - a/a.
LIMESTONE - crm-gy, lt-dk brn, mic-crpxl, blk-y, chky,
occ fos, sl ool, rr lt yel flor/wk cut, tr pyr.
- 4,480-4,490 LIMESTONE - a/a.
- 4,490-4,500 LIMESTONE - a/a.
SHALE - a/a.
- 4,500-4,510 SHALE - dk gy-blk, blk-y-fis, sl calc, frm.
- 4,510-4,520 SHALE - dk gy-blk, blk-y-sbfis, sl calc, occ carb,
frm.
- 4,520-4,530 SHALE - a/a.
LIMESTONE - pred gy, crm, lt brn, mic-crpxl, blk-y, fos,
sl ool, occ chky, tt, frm.
- 4,530-4,540 LIMESTONE - a/a.
SHALE - gy-blk, fis-splty, calc, carb, frm.
- 4,540-4,550 SHALE - a/a.
- 4,550-4,560 SHALE - a/a.
- 4,560-4,570 SHALE - gy-blk, fis-splty, calc, sl carb-carb, frm.
LIMESTONE - crm-brn, sme dk brn, mic-crpxl, blk-y, tr
fos, frm, no vis Ø.

LITHOLOGY (Cont.)

- 4,570-4,580 SHALE - gy-dkgy, sme blk, fis-splty, calc, occ carb, frm.
- 4,580-4,600 LIMESTONE - a/a.
- 4,600-4,630 SHALE - dk gy-blk, fis-splty, calc, occ carb, frm.
LIMESTONE - a/a.
- 4,630-4,640 LIMESTONE - crm-gy, lt-dk brn, mic-crpxl, blk, tr fos, tr pyr, frm, tt, no vis \emptyset , tr CHERT - blk.
- 4,640-4,650 SHALE - dk gy-blk, fis, calc, occ carb, frm.
- 4,650-4,660 LIMESTONE - a/a.
SHALE - a/a.
- 4,660-4,670 LIMESTONE - a/a.
SHALE - a/a.
- 4,670-4,680 SHALE - gy, blk, fis, calc, frm, tr pyr.
- 4,680-4,690 SHALE - a/a, occ carb.
- 4,690-4,700 SHALE - a/a.
- 4,700-4,710 LIMESTONE - crm, gy, lt-dk brn, mot in part, mic-crpxl, blk, fos (Crin, Brac), occ chky, frm, tt, no vis \emptyset .
SHALE - a/a.
- 4,710-4,720 LIMESTONE - a/a.
SHALE - a/a.
- 4,720-4,740 SHALE - dk gy-blk, fis-splty, calc, carb, frm.
- 4,740-4,750 SHALE - a/a.
LIMESTONE - crm, gy, sme lt-dk brn, mic-crpxl, blk, fos, occ chky, frm, no vis \emptyset .
- 4,750-4,820 SHALE - gy, sme dk gy-blk, blk, fis, calc, occ-rr carb, frm.
- 4,820-4,830 SILTSTONE - dk gy, sme crm, sil, blk, v sl calc, hd, mod cln.
- 4,830-4,840 SHALE - gy-dkgy, sme blk, fis-plty, occ carb, calc, frm.
- 4,840-4,860 SHALE - a/a, occ slt.
- 4,860-4,870 SILTSTONE - dk gy, rr crm, blk, sil, g cln/f vis \emptyset , rr sdy-vf gr, ang, hd.

LITHOLOGY (Cont.)

4,870-4,880 SHALE - a/a.

4,880-4,890 Pred SHALE - a/a.

Tr SANDSTONE - gy-dkgy, vfgr, w srt, ang, sil, sl
s&p, cln, f vis Ø, hd.

4,890-4,900 SHALE - gy-dkgy, sme blk, fis, calc, occ carb, frm.

4,900-4,910 SHALE - a/a.

4,910-4,920 SANDSTONE - gy-dkgy, rr crm, vfgr, ang, w srt, slty,
sil, gen cln, f vis Ø, hd.

SHALE - dk gy-gy, sme blk, fis-plty, calc, sme carb,
frm.

4,920-4,930 Pred SHALE - a/a.

Tr SANDSTONE - a/a.

4,930-4,940 SHALE - a/a.

4,940-4,950 SHALE - a/a.

Tr SANDSTONE - a/a, abnt glauc.

4,950-4,960 SANDSTONE - a/a.

SHALE - a/a.

LIMESTONE - lt brn, sme crm, crpxl, blk, chky, ool,
tr yel flor/wk yel cut, frm.