

OPERATOR

Company: TDI, INC.
 Address: 1310 BISON ROAD
 HAYS, KANSAS 67601-9696

Contact Geologist: TOM DENNING
 Contact Phone Nbr: 785-628-2593
 Well Name: ENGEL SOUTH # 2
 Location: N2 SE NE SE SEC.21-T15S-R18W
 API: 15-051-26,879-00-00
 Pool: INFIELD
 State: KANSAS

Field: SCHOENCHEN
 Country: USA



Scale 1:240 Imperial

Well Name: ENGEL SOUTH # 2
 Surface Location: N2 SE NE SE SEC.21-T15S-R18W
 Bottom Location:
 API: 15-051-26,879-00-00
 License Number: 4787
 Spud Date: 7/27/2017 Time: 1:00 PM
 Region: ELLIS COUNTY Time: 5:35 AM
 Drilling Completed: 8/3/2017
 Surface Coordinates: 1725' FSL & 330' FEL
 Bottom Hole Coordinates:
 Ground Elevation: 2009.00ft
 K.B. Elevation: 2019.00ft
 Logged Interval: 2800.00ft To: 3670.00ft
 Total Depth: 3670.00ft
 Formation: ARBUCKLE
 Drilling Fluid Type: CHEMICAL/FRESH WATER GEL

SURFACE CO-ORDINATES

Well Type: Vertical
 Longitude: -99.3206734
 Latitude: 38.7306177
 N/S Co-ord: 1725' FSL
 E/W Co-ord: 330' FEL

LOGGED BY

Company: SOLUTIONS CONSULTING, INC.
 Address: 108 W 35TH
 HAYS, KS 67601

Phone Nbr: (785) 639-1337
 Logged By: GEOLOGIST

Name: HERB DEINES

CONTRACTOR

Contractor: SOUTHWIND DRILLING INC.
 Rig #: 1
 Rig Type: MUD ROTARY
 Spud Date: 7/27/2017
 TD Date: 8/3/2017

Time: 1:00 PM
 Time: 5:35 AM

ELEVATIONS

K.B. Elevation: 2019.00ft
 K.B. to Ground: 10.00ft

Ground Elevation: 2009.00ft

NOTES

RECOMMENDATION TO RUN PRODUCTION CASING TO FURTHER TEST THE CONGLOMERATE SAND SECTION.

OPEN HOLE LOGGING BY PIONEER ENERGY SERVICES: DUAL INDUCTION LOG, DUAL COMPENSATED POROSITY LOG, MICRORESISTIVITY LOG

DRILL STEM TESTING BY TRILOBITE TESTING INC: THREE (3) CONVENTIONAL TESTS AND ONE (1) STRADDLE TEST

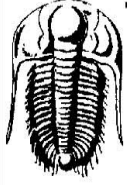
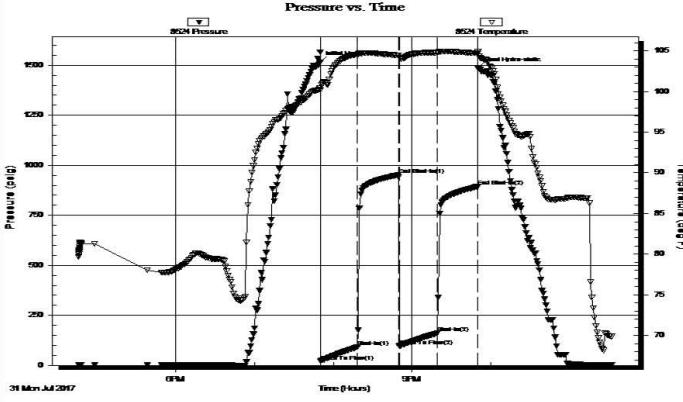
ENGEL SOUTH #2	ENGEL SOUTH # 1	ENGEL # 1A
N2 SE NE SE	SE NE SW SE	NE NE SE
SEC.21-15S-18W	SEC.21-15-18W	SEC.21-15-18W
2019'KB	KB 1998'	KB 2020'

<u>FORMATION</u>	<u>LOG TOPS</u>	<u>LOG TOPS</u>	<u>LOG TOPS</u>
Anhydrite	1168 +851	+ 855	+ 852
B-Anhydrite	1203 +816	+ 821	
Topeka	2982 - 963	- 958	
Heebner Sh.	3245-1226	-1223	-1228
Toronto	3265-1246	-1243	-1247
LKC	3294-1275	-1272	-1276
BKC	3530-1511	-1512	-1501
Arbuckle	3614-1595	-1604	-1551
RTD	3670-1651	-1652	-1556

SUMMARY OF DAILY ACTIVITY

- 7-27-17 RU, Spud 1:00 PM,
- 7-28-17 985', drilling, set 8 5/8" surface casing to 1172' w/ 450 sxs SMD, WOC 12 hrs, slope 1 degree @1193'.
- 7-29-17 1173', drill plug at 8:00 AM
- 7-30-17 2248', drilling
- 7-31-17 3020', drilling, displaced 2914' to 2946', CFS 3199', short trip, DST #1 3182'-3199' Topeka-Oread
- 8-01-17 3312' TIWB, drilling, mud pump bearing issue
- 8-02-17 3590', drilling, CFS 3590', TOWB, DST # 2 3529' to 3590', Cong. Sand, TIWB, CFS 3599', TOWB, DST # 3 3508' to 3599', Cong. Sand

8-03-17 3670', TIWB after DST # 3, drilling, RTD 3670' @5:35AM, TOWB,
 logs, Straddle test # 4 3299' to 3345' "C" and "D" of LKC, TIWB,
 LDDP
 8-04-17 3670', run production casing and cement bottom stage, RD

 <p>TRILOBITE TESTING, INC.</p>	<h3>DRILL STEM TEST REPORT</h3> <p>TDI, Inc. 21-15S-18W Ellis, KS 1310 Bison Rd. Engel South #2 Hays, KS 67601 Job Ticket: 63285 DST#: 1 ATTN: Herb Deines Test Start: 2017.07.31 @ 16:46:05</p>																																								
<p>GENERAL INFORMATION:</p> <p>Formation: Topeka & Oread Deviated: No Whipstock: ft (KB) Time Tool Opened: 19:50:11 Time Test Ended: 23:32:41</p> <p>Interval: 3182.00 ft (KB) To 3199.00 ft (KB) (TVD) Total Depth: 3199.00 ft (KB) (TVD) Hole Diameter: 7.88 inches Hole Condition: Fair</p> <p style="text-align: right;">Test Type: Conventional Bottom Hole (Initial) Tester: Brannan Lonsdale Unit No: 73 Reference Elevations: 2019.00 ft (KB) 2009.00 ft (CF) KB to GR/CF: 10.00 ft</p>																																									
<p>Serial #: 8524 Outside</p> <p>Press@RunDepth: 160.70 psig @ 3183.00 ft (KB) Capacity: 8000.00 psig Start Date: 2017.07.31 End Date: 2017.07.31 Last Calib.: 2017.07.31 Start Time: 16:46:06 End Time: 23:32:41 Time On Btm: 2017.07.31 @ 19:49:41 Time Off Btm: 2017.07.31 @ 21:50:11</p> <p>TEST COMMENT: 30- IF- BOB 13mins 30- IS- No blow 30- FF- BOB 17mins 30- FS- No blow</p>																																									
 <p style="text-align: center;">Pressure vs. Time</p>	<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th colspan="4" style="text-align: center;">PRESSURE SUMMARY</th> </tr> <tr> <th>Time (Min.)</th> <th>Pressure (psig)</th> <th>Temp (deg F)</th> <th>Annotation</th> </tr> </thead> <tbody> <tr><td>0</td><td>1515.87</td><td>100.38</td><td>Initial Hydro-static</td></tr> <tr><td>1</td><td>19.88</td><td>100.13</td><td>Open To Flow (1)</td></tr> <tr><td>29</td><td>92.95</td><td>104.55</td><td>Shut-In(1)</td></tr> <tr><td>60</td><td>951.41</td><td>104.43</td><td>End Shut-In(1)</td></tr> <tr><td>61</td><td>96.91</td><td>104.15</td><td>Open To Flow (2)</td></tr> <tr><td>90</td><td>160.70</td><td>104.76</td><td>Shut-In(2)</td></tr> <tr><td>120</td><td>892.76</td><td>104.69</td><td>End Shut-In(2)</td></tr> <tr><td>121</td><td>1485.52</td><td>104.88</td><td>Final Hydro-static</td></tr> </tbody> </table>	PRESSURE SUMMARY				Time (Min.)	Pressure (psig)	Temp (deg F)	Annotation	0	1515.87	100.38	Initial Hydro-static	1	19.88	100.13	Open To Flow (1)	29	92.95	104.55	Shut-In(1)	60	951.41	104.43	End Shut-In(1)	61	96.91	104.15	Open To Flow (2)	90	160.70	104.76	Shut-In(2)	120	892.76	104.69	End Shut-In(2)	121	1485.52	104.88	Final Hydro-static
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TRILOBITE TESTING, INC.

DRILL STEM TEST REPORT

TDI, Inc.
1310 Bison Rd.
Hays, KS 67601
ATTN: Herb Deines

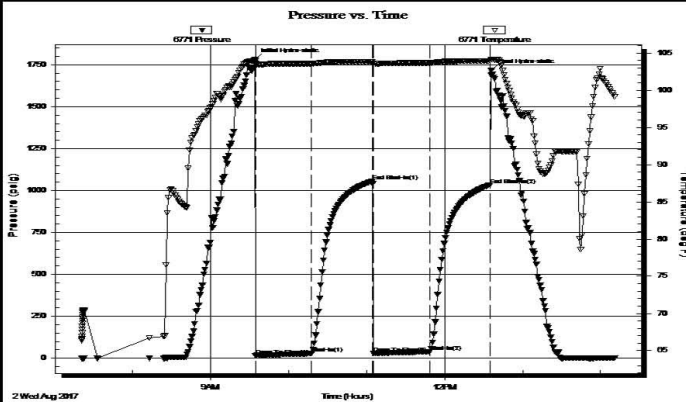
21-15S-18W Ellis, KS
Engel South #2
Job Ticket: 63286 **DST#: 2**
Test Start: 2017.08.02 @ 07:20:55

GENERAL INFORMATION:

Formation: **Cong. Sand**
Deviated: No Whipstock: ft (KB)
Time Tool Opened: 09:34:31
Time Test Ended: 14:11:16
Test Type: Conventional Bottom Hole (Reset)
Tester: Brannan Lonsdale
Unit No: 73
Interval: **3529.00 ft (KB) To 3590.00 ft (KB) (TVD)**
Reference Elevations: 2019.00 ft (KB)
Total Depth: 3590.00 ft (KB) (TVD) 2009.00 ft (CF)
Hole Diameter: 7.88 inches Hole Condition: Fair KB to GR/CF: 10.00 ft

Serial #: 6771 Inside
Press@RunDepth: 37.96 psig @ 3530.00 ft (KB) Capacity: 8000.00 psig
Start Date: 2017.08.02 End Date: 2017.08.02 Last Calib.: 2017.08.02
Start Time: 07:20:56 End Time: 14:11:16 Time On Btm: 2017.08.02 @ 09:34:16
Time Off Btm: 2017.08.02 @ 12:36:01

TEST COMMENT: 45- IF- Built very slowly to 2.5"
45- IS- No blow
45- FF- No blow
45- FS- No blow



PRESSURE SUMMARY

Time (Min.)	Pressure (psig)	Temp (deg F)	Annotation
0	1782.41	103.95	Initial Hydro-static
1	16.04	103.56	Open To Flow (1)
44	27.54	103.56	Shut-In(1)
91	1056.08	103.85	End Shut-In(1)
92	28.40	103.59	Open To Flow (2)
135	37.96	103.67	Shut-In(2)
181	1033.75	103.93	End Shut-In(2)
182	1716.98	104.13	Final Hydro-static

Recovery

Length (ft)	Description	Volume (bbt)
15.00	M	0.07
55.00	OO	0.64

* Recovery from multiple tests

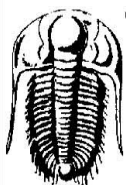
Gas Rates

Choke (inches)	Pressure (psig)	Gas Rate (Mcf/d)

Trilobite Testing, Inc

Ref. No: 63286

Printed: 2017.08.02 @ 14:32:12



TRILOBITE TESTING, INC.

DRILL STEM TEST REPORT

TDI, Inc.
1310 Bison Rd.
Hays, KS 67601
ATTN: Herb Deines

21-15S-18W Ellis, KS
Engel South #2
Job Ticket: 63287 **DST#: 3**
Test Start: 2017.08.02 @ 18:27:58

GENERAL INFORMATION:

Formation: **Cong. Sand**

Formation: Cong. Sand
 Deviated: No Whipstock: ft (KB)
 Time Tool Opened: 19:57:19
 Time Test Ended: 00:34:19

Test Type: Conventional Bottom Hole (Reset)
 Tester: Brannan Lonsdale
 Unit No: 73

Interval: 3508.00 ft (KB) To 3599.00 ft (KB) (TVD)
 Total Depth: 3599.00 ft (KB) (TVD)
 Hole Diameter: 7.88 inches Hole Condition: Fair

Reference Elevations: 2019.00 ft (KB)
 2009.00 ft (CF)
 KB to GR/CF: 10.00 ft

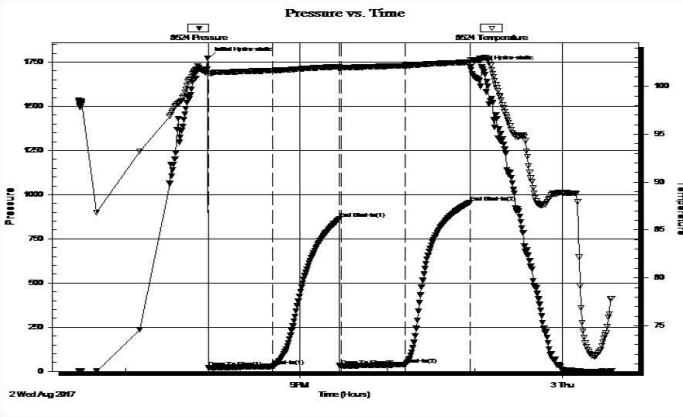
Serial #: 8524

Outside

Press@RunDepth: 39.72 psig @ 3509.00 ft (KB)
 Start Date: 2017.08.02 End Date: 2017.08.03
 Start Time: 18:27:59 End Time: 00:34:19

Capacity: 8000.00 psig
 Last Calib.: 2017.08.03
 Time On Btm: 2017.08.02 @ 19:56:49
 Time Off Btm: 2017.08.02 @ 22:57:04

TEST COMMENT: 45- IF- Built very slow ly to 2.5"
 45- IS- No blow
 45- FF- Built very slow ly to 1.5"
 45- FS- No blow



PRESSURE SUMMARY

Time (Min.)	Pressure (psig)	Temp (deg F)	Annotation
0	1772.83	101.84	Initial Hydro-static
1	21.32	101.42	Open To Flow (1)
45	27.79	101.66	Shut-In(1)
91	862.76	102.06	End Shut-In(1)
92	28.34	101.95	Open To Flow (2)
136	39.72	102.17	Shut-In(2)
180	955.64	102.53	End Shut-In(2)
181	1721.87	102.74	Final Hydro-static

Recovery

Length (ft)	Description	Volume (bbl)
30.00	M	0.43
40.00	OO	0.57

* Recovery from multiple tests

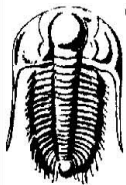
Gas Rates

Choke (inches)	Pressure (psig)	Gas Rate (Mcf/d)

Trilobite Testing, Inc

Ref. No: 63287

Printed: 2017.08.03 @ 07:20:19



TRILOBITE TESTING, INC.

DRILL STEM TEST REPORT

TDI, Inc.
 1310 Bison Rd.
 Hays, KS 67601
 ATTN: Herb Deines

21-15S-18W Ellis, KS
Engel South #2
 Job Ticket: 63288 **DST#: 4**
 Test Start: 2017.08.03 @ 12:30:26

GENERAL INFORMATION:

Formation: LKC "C&D"
 Deviated: No Whipstock: ft (KB)
 Time Tool Opened: 14:48:17
 Time Test Ended: 18:28:02

Test Type: Conventional Straddle (Reset)
 Tester: Brannan Lonsdale
 Unit No: 73

Interval: 3299.00 ft (KB) To 3345.00 ft (KB) (TVD)
 Total Depth: 3670.00 ft (KB) (TVD)
 Hole Diameter: 7.88 inches Hole Condition: Fair

Reference Elevations: 2019.00 ft (KB)
 2009.00 ft (CF)
 KB to GR/CF: 10.00 ft

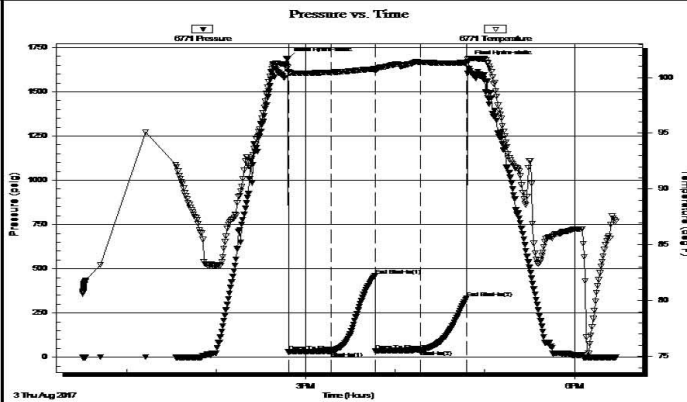
Serial #: 6771

Inside

Press@RunDepth: 39.24 psig @ 3300.00 ft (KB)
 Start Date: 2017.08.03 End Date: 2017.08.03
 Start Time: 12:30:27 End Time: 18:28:02

Capacity: 8000.00 psig
 Last Calib.: 2017.08.03
 Time On Btm: 2017.08.03 @ 14:48:02
 Time Off Btm: 2017.08.03 @ 16:48:47

TEST COMMENT: 30- IF- Surface blow died in 7mins
 30- IS- No blow
 30- FF- No blow
 30- FS- No blow



PRESSURE SUMMARY			
Time (Min.)	Pressure (psig)	Temp (deg F)	Annotation
0	1688.92	100.90	Initial Hydro-static
1	29.57	100.53	Open To Flow (1)
29	33.70	100.47	Shut-In(1)
59	460.46	100.77	End Shut-In(1)
59	35.18	100.57	Open To Flow (2)
89	39.24	101.36	Shut-In(2)
120	334.75	101.34	End Shut-In(2)
121	1671.01	101.65	Final Hydro-static

Recovery		
Length (ft)	Description	Volume (bbl)
3.00	M w / few oil spots	0.01

Gas Rates			
	Choke (inches)	Pressure (psig)	Gas Rate (Mcf/d)

* Recovery from multiple tests

Trilobite Testing, Inc

Ref. No: 63288

Printed: 2017.08.03 @ 20:53:01

ROCK TYPES

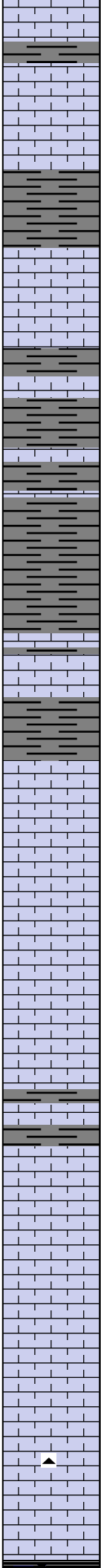
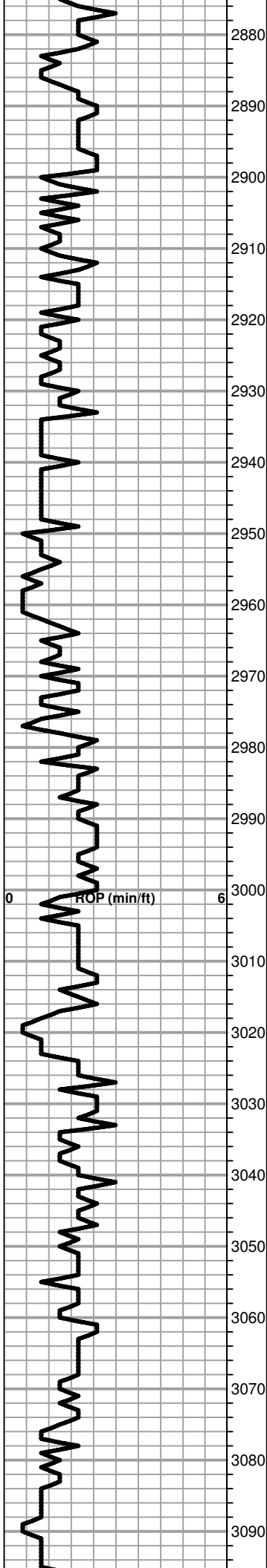
	Chtcngl		Lmst fw7>		shale, gry		Ss
	Dolprim		Lscong1		Carbon Sh		
	Dol Lime		shale, grn		shale, red		

ACCESSORIES

MINERAL	FOSSIL
▲ Chert, dark	○ Oolite
△ Chert White	⊕ Oomoldic

Printed by GEOstrip VC Striplog version 4.0.8.15 (www.grsi.ca)

Curve Track #1	Depth Intervals	DST	Lithology	Oil Show	Geological Descriptions	Curve Track #3
ROP (min/ft)	Cored Interval DST Interval					
1:240 Imperial ROP (min/ft)	6					1:240 Imperial
	2850 2860 2870				<p>BEGIN 1' DRILL TIME FROM 2850' TO RTD BEGIN 10' WET AND DRY SAMPLES FROM 2950' TO RTD</p> <p>ANHYDRITE TOP 1168+851 ANHYDRITE BASE 1203+816</p>	<p>8 5/8" SURFACE CASING SET TO 1172' W/375 SXS SMD. DID NOT CIRCULATE. RAN 1" AND TAGGED TOP OF CEMENT AT 85'. PUMPED 75 SXS WITH CEMENT TO SURFACE</p> <p>SLOPE 1 DEGREE @1173'</p>



Shale, lt-med gray, soft blocky

Lime, lt-med brn, fnxln

Shale, lt gray, soft sticky clumping

Shale, lt gray, soft sticky clumping

Lime, med-dark brn, fnxln

TOPEKA 2982-963

Lime, med brn, fnxln, slightly fossiliferous

Lime, lt-med brn, fnxln, slightly fossiliferous-fusulinids

Lime, lt-med brn-med grayish brn, fn-vfxln, slightly fossiliferous

Lime, lt-med brn, fnxln-granular with bedded chalk, NS

Lime, lt brn, fnxln

Lime, lt-med brn-gray, fnxln

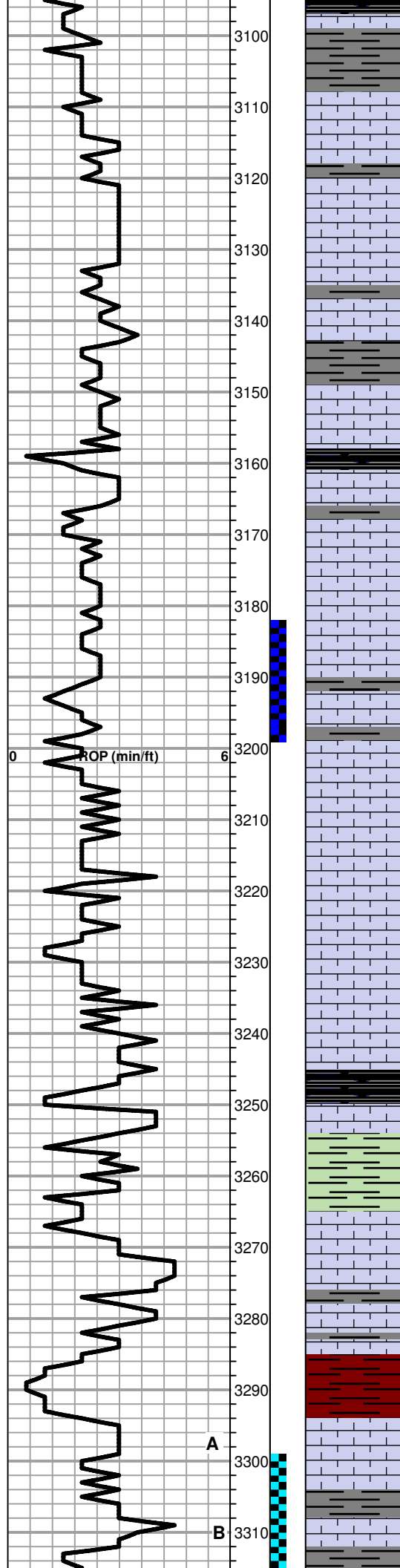
Lime, lt brn-lt grayish brn, fn-vfxln

Lime, lt-med brn, fn-micro xln

Lime, lt-med brn, fn-vfxln, slightly fossiliferous

Lime, crm-lt brn, fnxln-granular in chalky matrix, slightly fossiliferous

Lime, lt brn, granular with bedded chalk



Shale, black carbonaceous, blocky

Shale, lt gray, soft mud

Lime, crm-lt brn, fn-micro xln

Lime, crm-lt brn, fn-micro xln

Lime, lt brn, fn-micro xln

Lime, lt brn, fn-micro xln, slightly fossiliferous

Shale, lt gray, soft sticky
Lime, lt-med brn, fn-micro xln

Shale, black carbonaceous, fissile, blocky

* Lime, lt brn, mostly fn-micro xln, lt gassy odor, NFO or staining noted

Lime, lt brn, fnxln-granular in part, slightly fossiliferous with bedded chalk

○ Lime, lt brn, fnxln with a zone of fine oolites and fossil fragments with scattered vugs with sparry recrystallization in vugs. Lt odor with saturated lt brn staining, NFO

Lime, lt brn, fnxln

Lime, lt brn, fnxln

Lime, lt brn, fnxln

Lime, lt brn, fnxln with bedded chalk

Lime, lt-med brn, fn-vfxln

HEEBNER SHALE 3245-1226

Shale, black carbonaceous, fissile, blocky
Lime, lt-med brn, fn-micro xln

Shale, dove gray-lime green, soft sticky mud

TORONTO 3265-1246

Lime, white-crm, fn-vfxln, firm bedded chalk, NS

Lime, crm-lt brn, vfxln

Shale, reddish brn-lt gray, soft blocky

LKC 3294-1275

Lime, crm, fn-micro xln, slight bedded chalk, NS

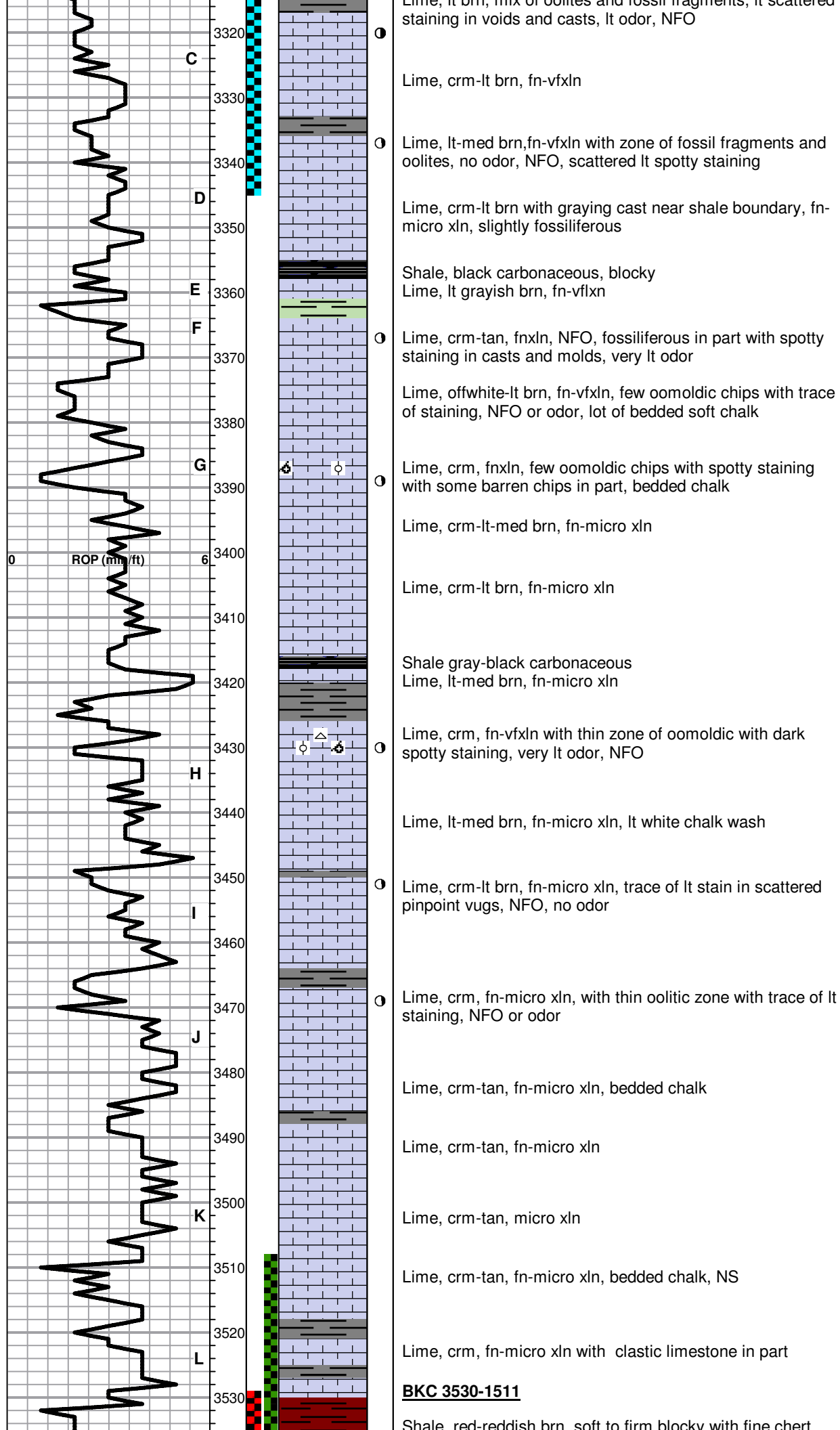
Lime, lt-med brn-med grayish brn, fn-micro xln, slightly fossiliferous

Lime, lt brn, mix of oolites and fossil fragments, lt scattered

DST # 1 3182' TO 3199' SEE
HEADER FOR TEST
SUMMARY

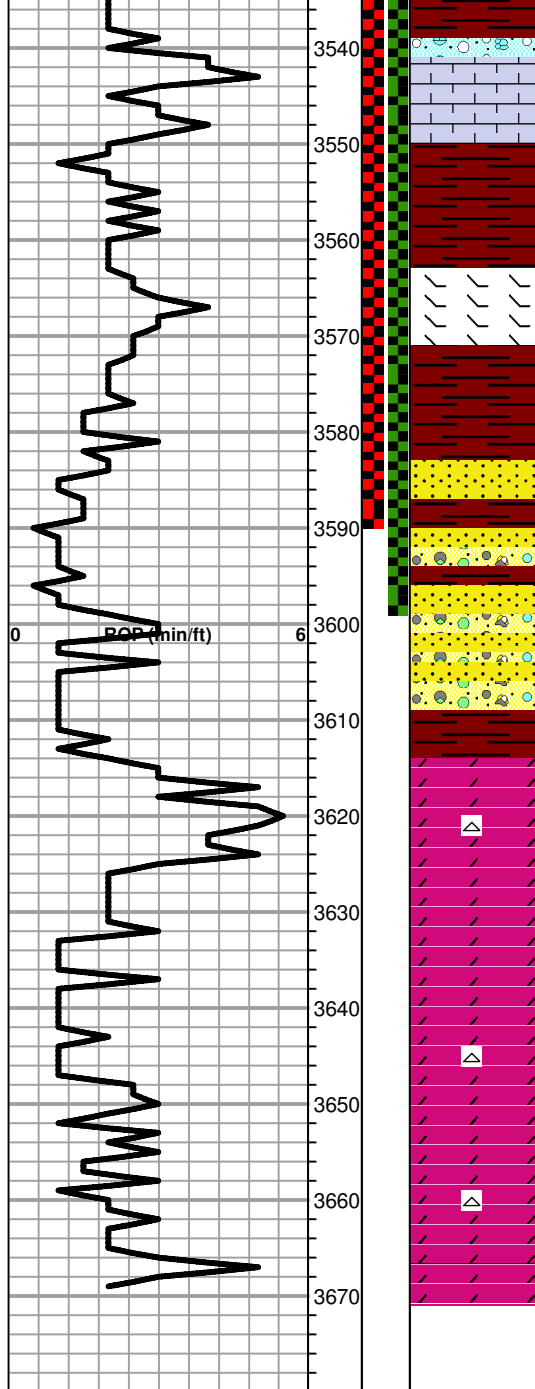
CFS 3199', SHORT TRIP
SURVEY 2 DRGREES @3199'

A
B



BKC 3530-1511

Shale, red-reddish brn, soft to firm blocky with fine chert



Shale, red reddish brn, soft to firm blocky with fine chert residual in part

Lime, crm-tan, fn-micro xln

Shale, tan-red, soft sticky

Lime, crm-tan, fn-micro xln, few chips orange chert, fresh

Shale red wash, soft mud with lt odor, source unknown

● SS, quartz, poor-good sorting cemented in part with little reaction to acid but improving with depth and grain size, saturated staining, lt odor and SFO

○ SS, as above with increasing chert and grain size, lt dolomitic cementing in part

○ SS and vari colored cherts as above

ARBUCKLE 3614-1595

D Dolomite, white-crm, fnxln with fine gilsonitic flakes, NFO or odor

D Dolomite, crm-tan, fnxln-fine granular, fine gilsonitic flakes in part

Dolomite, crm-lt brn, fnxln-granular, lt sulfur odor

Dolomite, white-crm, fnxln-fine granular, NS

Dolomite, crm, fnxln-granular, NS

Dolomite, white-crm, fnxln-fine granular

RTD 3670-1651 LTD 3670-1651

DST # 2 3529' TO 3590' SEE HEADER FOR TEST SUMMARY

DST # 3 3508' TO 3599' SEE HEADER FOR TEST SUMMARY

SLOPE 1 DEGREE @3590'

SLOPE 1 DEGREE @3670'