

OPERATOR

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

Contact Geologist: TOM DENNING
 Contact Phone Nbr: 785-628-2593
 Well Name: ROBBEN FAMILY # 1
 Location: NW NE SW NE, SEC.3-T15S-R16W
 API: 15-051-26,847-00-00
 Pool: WILDCAT
 State: KANSAS

Field: UNNAMED
 Country: USA



Scale 1:240 Imperial

Well Name: ROBBEN FAMILY # 1
 Surface Location: NW NE SW NE, SEC.3-T15S-R16W
 Bottom Location:
 API: 15-051-26,847-00-00
 License Number: 4787
 Spud Date: 11/22/2016 Time: 7:00 PM
 Region: ELLIS COUNTY
 Drilling Completed: 11/29/2016 Time: 3:05 PM
 Surface Coordinates: 1360' FNL & 1720' FEL
 Bottom Hole Coordinates:
 Ground Elevation: 1893.00ft
 K.B. Elevation: 1903.00ft
 Logged Interval: 2800.00ft To: 3575.00ft
 Total Depth: 3575.00ft
 Formation: ARBUCKLE
 Drilling Fluid Type: CHEMICAL/FRESH WATER GEL

SURFACE CO-ORDINATES

Well Type: Vertical
 Longitude: -99.0836441
 Latitude: 38.7801796
 N/S Co-ord: 1360' FNL
 E/W Co-ord: 1720' 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: 11/22/2016 Time: 7:00 PM
 TD Date: 11/29/2016 Time: 3:05 PM

ELEVATIONS

K.B. Elevation: 1903.00ft Ground Elevation: 1893.00ft
 K.B. to Ground: 10.00ft

NOTES


RECOMMENDATION TO RUN PRODUCTION CASING BASED ON RESULTS OF DST # 2 AND LOG ANALYSIS
 OPEN HOLE LOGGING BY PIONEER ENERGY SERVICES: DUAL INDUCTION LOG, DUAL COMPENSATED POROSITY LOG, AND MICRORESISTIVITY LOG
 DRILL STEM TESTING BY TRILOBITE TESTING INC: TWO (2) CONVENTIONAL TESTS RAN

ROBBEN FAMILY # 1	DORTLAND B-5	HUSER B-1
NW NE SW NE	NW NE SE	NW NW SW
SEC.3-15S-16W	SEC.34-14-16W	SEC.3-15-16W
1903'KB	KB 1839'	KB 1908'

<u>FORMATION</u>	<u>LOG TOPS</u>	<u>LOG TOPS</u>	<u>SPL TOPS</u>
Anhydrite	1011 +892	+ 891	+ 872
B-Anhydrite	1048 +855	+ 854	+ 842
Topeka	2889 - 986	- 987	- 998
Heebner Sh.	3110-1207	-1207	-1220
Toronto	3129-1226	-1225	
LKC	3161-1258	-1254	-1268
BKC	3384-1481	-1485	-1494
Arbuckle	3426-1523	-1531	-1590
RTD	3575-1672	-1544	-1642

SUMMARY OF DAILY ACTIVITY

- 11-22-16 Spud 7:00 PM, drill to 217', CCH, slope 1/4 degree, run 8 5/8" surface casing**
- 11-23-16 217', cement with 150 sxs common 2%gel 3%CC, plug down 1:30AM**
- 11-24-16 217', shut down for Thanksgiving Day**
- 11-25-16 217', TIWB, drill plug**
- 11-26-16 1862', drilling, displace 2500'-2522'**
- 11-27-16 2885', CFS 3200', short trip 26 stands, CCH, TOWB, DST # 1 3146'-3200' "A" to "C" LKC**
- 11-28-16 3200', TIWB, drilling, CFS 3452', CCH, TOWB, slope survey @3200' ¾ degree**
- 11-29-16 3452', DST # 2 3390' to 3452' Arbuckle, TIWB, RTD 3575' @3:05PM, CCH, TOWB, logs, TIWB, CCH, slope survey @ 3575' 1 degree**

	DRILL STEM TEST REPORT	
	TDI Inc 1310 Bison Rd Hays Ks 67601 ATTN: Tom Denning, Herb Di	3-15s-16w Ellis Robben Family #1 Job Ticket: 63548 DST#: 1 Test Start: 2016.11.28 @ 00:15:42

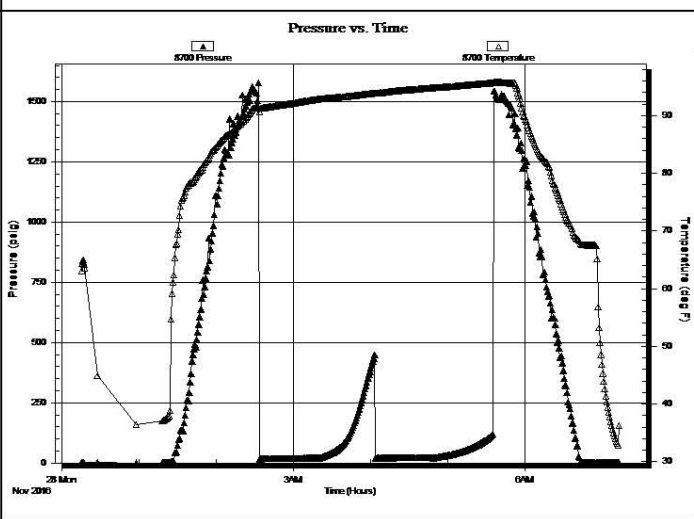
GENERAL INFORMATION:

Formation: LKC A-C	Test Type: Conventional Bottom Hole (Initial)
Deviated: No Whipstock: ft (KB)	Tester: Ray Schwager
Time Tool Opened: 02:33:37	Unit No: 77
Time Test Ended: 07:13:21	
Interval: 3146.00 ft (KB) To 3200.00 ft (KB) (TVD)	Reference Elevations: ft (KB)
Total Depth: 3200.00 ft (KB) (TVD)	1893.00 ft (CF)
Hole Diameter: 7.85 inches Hole Condition: Fair	KB to GR/CF: ft

Serial #: 8700 Outside

Press@RunDepth: psig @ 3150.00 ft (KB)	Capacity: 8000.00 psig
Start Date: 2016.11.28 End Date: 2016.11.28	Last Calib.: 2016.11.28
Start Time: 00:15:59 End Time: 07:13:23	Time On Btm:
	Time Off Btm:

TEST COMMENT: 45-IFP-w k bl thru-out 1/4"to 1/2"bl
 45-ISIP-no bl
 45-FFP-surface bl thru-out
 45-FSIP-no bl



PRESSURE SUMMARY			
Time (Min.)	Pressure (psig)	Temp (deg F)	Annotation


Recovery		
Length (ft)	Description	Volume (bbl)
15.00	Mud	0.21

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

Trilobite Testing, Inc

Ref. No: 63548

Printed: 2016.11.28 @ 07:33:14

	DRILL STEM TEST REPORT	
	TDI Inc 1310 Bison Rd Hays Ks 67601 ATTN: Tom Denning, Herb Di	3-15s-16w Ellis Robben Family #1 Job Ticket: 63549 DST#: 2 Test Start: 2016.11.29 @ 01:30:44

GENERAL INFORMATION:

Formation: **Arbuckle**
 Deviated: No Whipstock: ft (KB)
 Time Tool Opened: 03:38:24
 Time Test Ended: 08:44:38

Interval: **3390.00 ft (KB) To 3452.00 ft (KB) (TVD)**
 Total Depth: 3452.00 ft (KB) (TVD)
 Hole Diameter: 7.85 inches Hole Condition: Fair

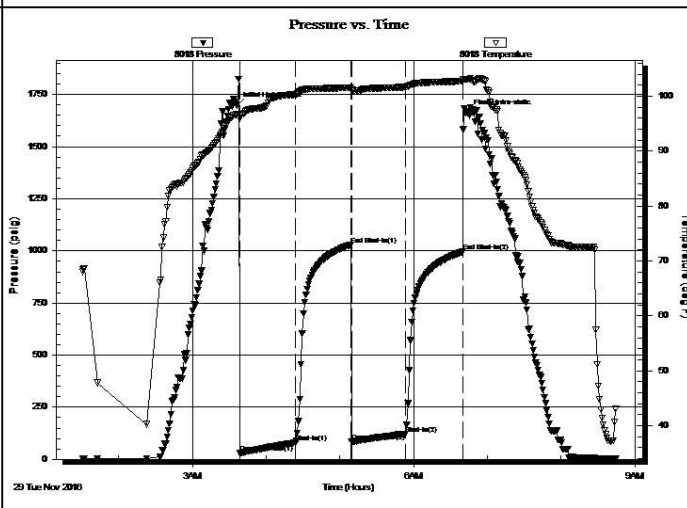
Test Type: Conventional Bottom Hole (Reset)
 Tester: Ray Schwager
 Unit No: 77

Reference Elevations: 1902.00 ft (KB)
 1893.00 ft (CF)
 KB to GR/CF: 9.00 ft

Serial #: 8018 **Inside**

Press@RunDepth: 122.19 psig @ 3395.00 ft (KB) Capacity: 8000.00 psig
 Start Date: 2016.11.29 End Date: 2016.11.29 Last Calib.: 2016.11.29
 Start Time: 01:30:44 End Time: 08:44:38 Time On Btm: 2016.11.29 @ 03:36:24
 Time Off Btm: 2016.11.29 @ 06:44:08

TEST COMMENT: 45-IFP-w k to strg in 19min
 45-FSIP-no bl
 45-FFP-w k to strg in 35min
 45-FSIP-w k bl bk,



PRESSURE SUMMARY			
Time (Min.)	Pressure (psig)	Temp (deg F)	Annotation
0	1697.85	96.68	Initial Hydro-static
2	31.34	95.83	Open To Flow (1)
48	81.88	100.26	Shut-In(1)
93	1030.09	101.53	End Shut-In(1)
93	84.71	101.20	Open To Flow (2)
138	122.19	101.67	Shut-In(2)
184	995.80	102.72	End Shut-In(2)
188	1660.62	103.11	Final Hydro-static

Recovery		
Length (ft)	Description	Volume (bbl)
124.00	MGO 20%G35%M45%O	1.74
102.00	MGO 10%G20%M70%O	1.43
75.00	CO	1.05
0.00	330'GIP	0.00

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

ROCK TYPES

 Chtcongl	 Lmst fw<7	 Lscongl	 shale, gry	 shale, red
 Dolprim	 Lmst fw>7	 shale, grn	 Carbon Sh	

ACCESSORIES

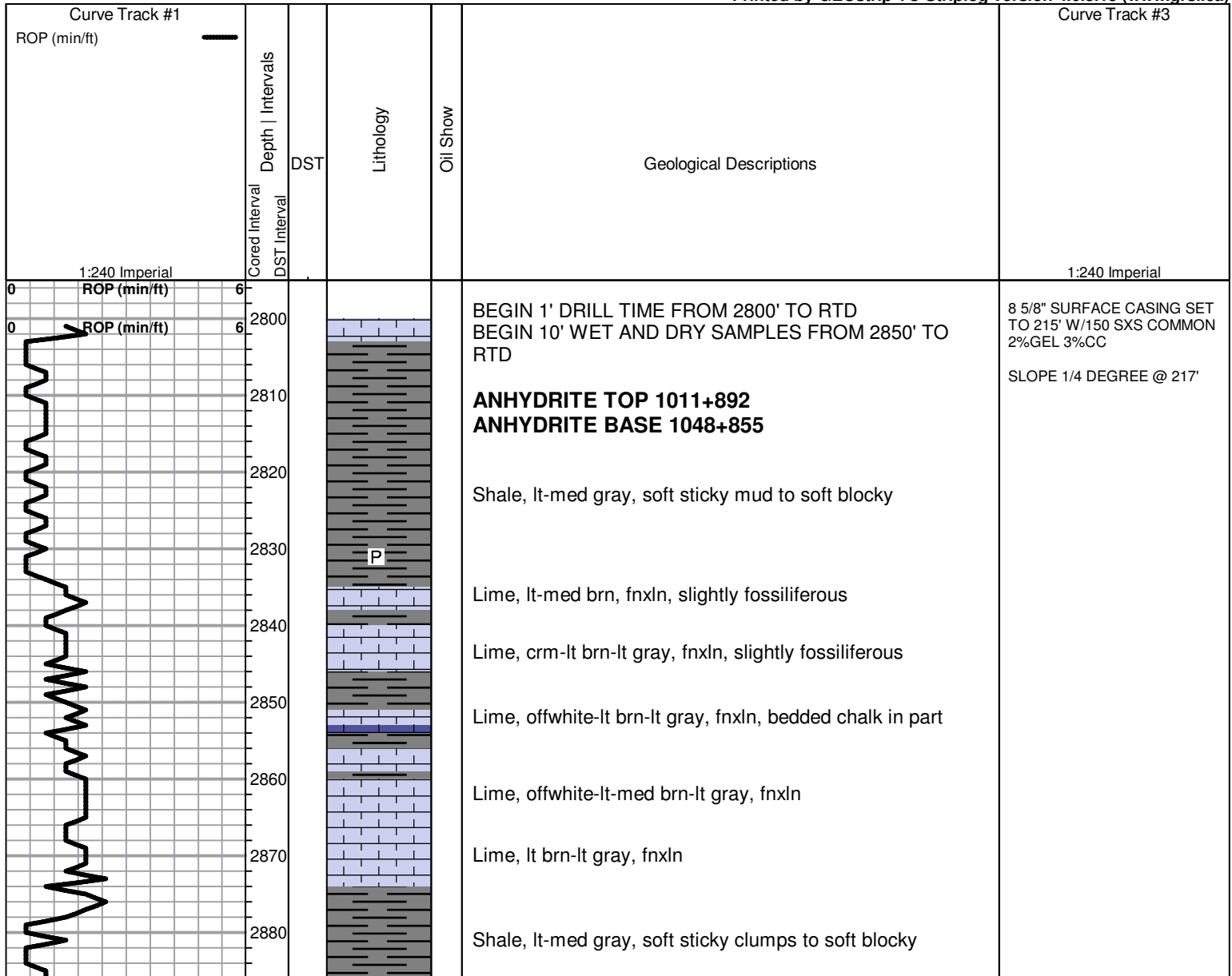
MINERAL

- ▲ Chert, dark
- ∩ Glauconite
- P Pyrite
- △ Chert White

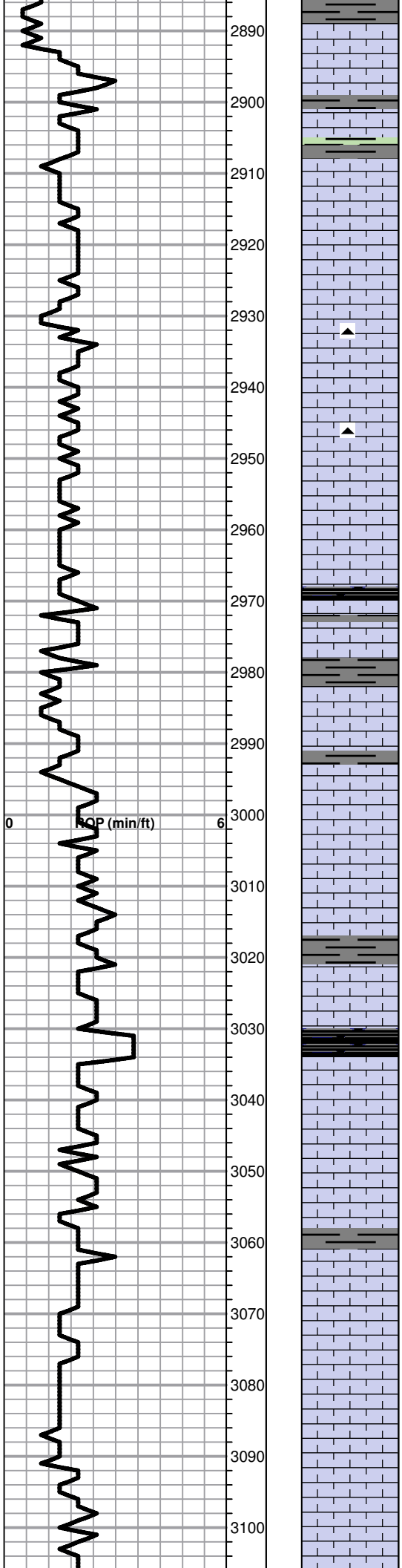
FOSSIL

- ⊙ Oolite
- ⊕ Oomoldic

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TOPEKA 2889-986



Lime, lt brn, fnxln with some micro xln

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

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

Lime, lt-med brn-med grayish brn, fn-vfxln with thin cemented fusulinid beds

Lime, lt brn-lt grayish brn, fn-vfxln with some granular chalky matrix , NS

Lime, lt brn-lt-med gray, fnxln with slight granular in part
Chert, tan, fresh, sharp

Lime, lt-med grayish brn, fnxln with beds of chalky matrix with bedded chalk in part

Lime, lt brn, fnxln-granular with increasing chalk content with lt white chalk wash

Lime, lt brn, fnxln-granular with chalk
Shale, black carbonaceous, blocky

Lime, lt brn, fn-vfxln

Lime, white-crm, fn-vfxln, sublithographic

Lime, crm, fn-vfxln

Lime, lt brn-lt gray, fnxln with scattered, thin, well cemented fossil beds

Lime, tan-lt gray, fnxln with gray fossil casts

Shale, dove gray, soft mud

Lime, crm-lt brn-lt gray, fn-vxln, slightly fossiliferous

Shale, black carbonaceous, fissile, blocky

Lime, lt brn, fnxln

Lime, lt brn-lt-med gray, fnxln

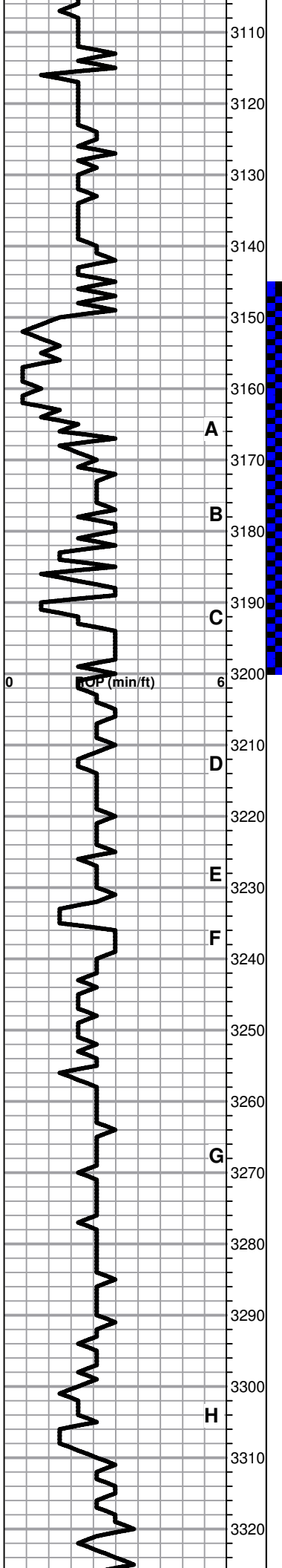
Lime, lt brn-lt grayish brn, fn-vfxln

Lime, crm-lt brn, fnxln with lt white chalk wash

Lime, lt brn, fnxln with bedded chalk

Lime, crm-tan, fnxln with soft crush, bedded chalk and chalky matrix

Lime, tan-lt brn, fnxln



HEEBNER SHALE 3110-1207

Shale, black carbonaceous, fissile, blocky
Lime, lt brn, fn-vfxln

Shale, lime green, soft sticky to soft blocky

TORONTO 3129-1226

Lime, crm, fnxln-granular in part, 2 chips with spotty dark stain in fine pinpoint porosity, NFO, No Odor

Lime, crm-lt brn, fn-micro xln

Shale, red-lt gray, soft sticky to soft blocky

LKC 3161-1258

* Lime, crm-lt brn, fn-micro xln, NFO or stain but lt gassy odor

Lime, crm-lt brn, fn-micro xln

Shale, lime green to lt gray, soft sticky to soft blocky

Lime, lt brn, fnxln with thin oomoldic zone with spotty staining with very lt odor, NFO

Lime, lt brn, fn-micro xln

Lime, white-crm, fnxln, lt bedded chalk in part, NS

Lime, crm, fnxln, bed chalk with lt white wash

Lime, crm-lt brn, fn-vfxln

Shale, black carbonaceous, blocky
Lime, lt gray, fn-vfxln

Lime, white-crm, fnxln, bed chalk with sticky clumping, NS

Lime, crm-lt brn, fn-vfxln, bedded chalk, NS

Lime, crm-lt brn, fn-micro xln, 1 chip of oolitic lime with lt spotty staining, NFO, no odor

Lime, crm-lt brn, fn-micro xln

Lime, crm-lt brn, fn-micro xln

Lime, crm-lt brn-lt gray tinting in part, fn-micro xln

Lime, crm-lt brn with scattered dark brn lime chips, fn-micro xln ,
Shale, gray-black carbonaceous, blocky

Lime, crm, fn-vfxln with scattered sticky clumps of lt gray shale

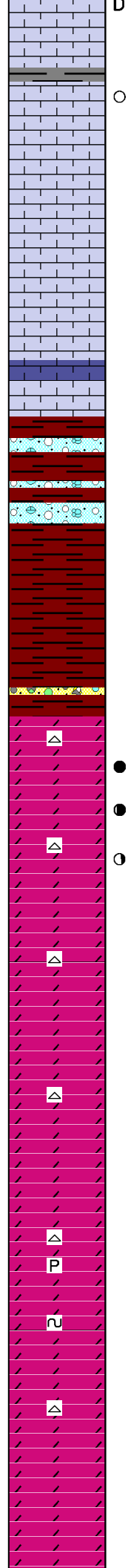
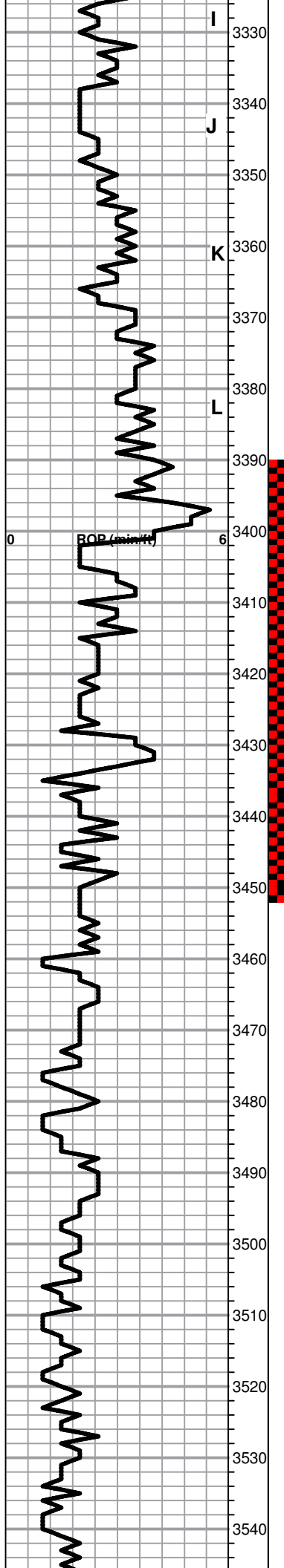
Lime, crm, fnxln with lt white chalk wash, NS

Lime, crm-lt brn-lt gray, fn-micro xln, NS

Lime, crm-lt brn, fn-micro xln, fine specks of dead oil

DST # 1 3146' TO 3200' SEE
HEADER FOR TEST
SUMMARY

SLOPE 3/4 DEGREE @3200'



Lime, crm-lt brn, fn-micro xln, fine spots of dead oil staining in very fine inter xln porosity, NFO, no odor

○ Lime, crm-lt brn, fn-vfxln, with few ool moldic chips with spotty lt staining, NFO, very lt odor, white chalk wash

Lime, crm-lt brn, fn-micro xln, white chalk wash

Lime, crm-lt brn, fn-micro xln, lt chalk wash

Lime, crm-lt brn, fn-micro xln

Lime, lt-med brn, fn-micro xln

BKC 3384-1481

Shale, lt red wash, soft

Lime, crm-med grayish brn, fn-micro xln, NS

Lime, crm-lt brn, micro xln

Shale, red wash, soft mud

Shale, red wash, soft mud

ARBUCKLE 3426-1523

● Dolomite, lt brn, fnxln grading into granular fine grained dolomite, lt odor and spotty staining

● Dolomite, tan-lt brn, fnxln-granular, lt-fair odor, lt saturated staining and free floating specks of lt gassy oil

○ Dolomite, white-lt brn, fnxln-granular, med to cxln, sucrosic, fair odor with floating droplets of lt gassy oil

Dolomite, crm-tan, fnxln-granular, lt odor with spotty staining

Dolomite, crm, fnxln-granular, chalky in part

Dolomite, crm-lt brn, fnxln-granular

Dolomite, crm-lt brn, fn-micro xln, granular in part

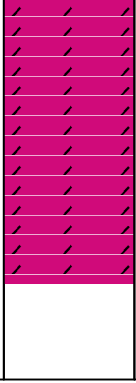
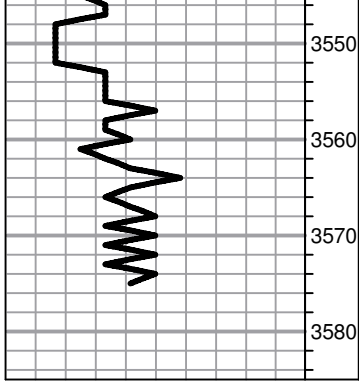
Dolomite, ivory-crm, fnxln-granular with increasing interxln porosity with less sucrosic material, scattered pyrite clusters

Dolomite, crm-ivory, granular-fnxln, scattered glauconite staining in part

Dolomite, crm-ivory, fnxln-granular

Dolomite, ivory, cxln granular

DST # 2 3390' TO 3452' SEE
HEADER FOR TEST
SUMMARY



Dolomite, ivory-crm, granular

Dolomite, crm, fnxln-granular with clear quartz inclusions in part

Dolomite, crm-ivory, fnxln with quartz inclusions in part

RTD 3575-1672 LTD 3574-1671

5 1/2" 14# PRODUCTION CASING RAN WITH DV TOOL SET IN ANHYDRITE AND CEMENTED TO SURFACE

SLOPE @ 3575' 1 DEGREE