

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 NORTH # 3
 Location: SW NE NW NE SEC.21-T15S-R18W
 API: 15-051-26,880-00-00
 Pool: IN FIELD
 State: KANSAS

Field: SCHOENCHEN
 Country: USA



Scale 1:240 Imperial

Well Name: ENGEL NORTH # 3
 Surface Location: SW NE NW NE SEC.21-T15S-R18W
 Bottom Location:
 API: 15-051-26,880-00-00
 License Number: 4787
 Spud Date: 7/18/2017 Time: 2:00 PM
 Region: ELLIS COUNTY
 Drilling Completed: 7/23/2017 Time: 4:40 PM
 Surface Coordinates: 530' FNL & 1970' FEL
 Bottom Hole Coordinates:
 Ground Elevation: 2027.00ft
 K.B. Elevation: 2037.00ft
 Logged Interval: 2800.00ft To: 3640.00ft
 Total Depth: 3640.00ft
 Formation: ARBUCKLE
 Drilling Fluid Type: CHEMICAL/FRESH WATER GEL

SURFACE CO-ORDINATES

Well Type: Vertical
 Longitude: -99.3262318
 Latitude: 38.7389806
 N/S Co-ord: 530' FNL
 E/W Co-ord: 1970' 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: 7/18/2017 Time: 2:00 PM
 TD Date: 7/23/2017 Time: 4:40 PM



**TRILOBITE
TESTING, INC.**

DRILL STEM TEST REPORT

TDI, Inc
1310 Bison Rd
Hays Ks 67601-9696
ATTN: Tom Denning, Herb D

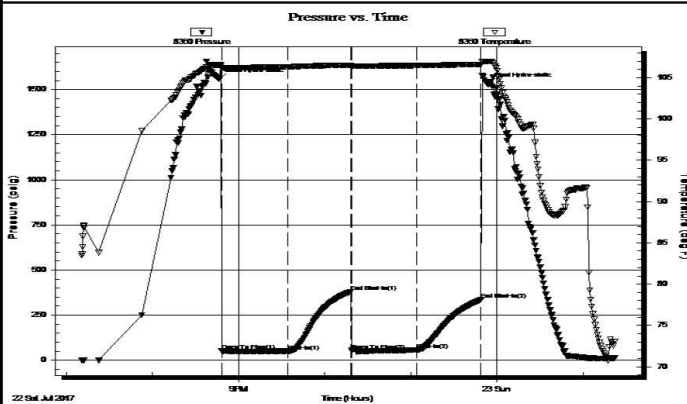
21-15s-18w Ellis
Engel North #3
Job Ticket: 63003 **DST#: 1**
Test Start: 2017.07.22 @ 19:10:45

GENERAL INFORMATION:

Formation: **LKC A-D**
Deviated: No Whipstock: ft (KB)
Time Tool Opened: 20:48:10
Time Test Ended: 01:21:54
Test Type: Conventional Bottom Hole (Initial)
Tester: Ray Schwager
Unit No: 77
Interval: **3321.00 ft (KB) To 3370.00 ft (KB) (TVD)**
Reference Elevations: 2037.00 ft (KB)
Total Depth: 3370.00 ft (KB) (TVD) 2027.00 ft (CF)
Hole Diameter: 7.85 inches Hole Condition: Fair KB to GR/CF: 10.00 ft

Serial #: 8360 Inside
Press@RunDepth: 57.41 psig @ 3334.00 ft (KB) Capacity: 8000.00 psig
Start Date: 2017.07.22 End Date: 2017.07.23 Last Calib.: 2017.07.23
Start Time: 19:10:45 End Time: 01:21:54 Time On Btm: 2017.07.22 @ 20:46:25
Time Off Btm: 2017.07.22 @ 23:53:39

TEST COMMENT: 45-IFP-w k to a gd bl 1/2"to 9"bl
45-ISIP-no bl bk
45-FFP-w k to a fr bl surface to 5"bl
45-FSIP-no bl bk



PRESSURE SUMMARY

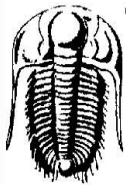
Time (Min.)	Pressure (psig)	Temp (deg F)	Annotation
0	1558.79	106.55	Initial Hydro-static
2	52.29	106.10	Open To Flow (1)
48	50.85	106.32	Shut-In(1)
92	380.72	106.51	End Shut-In(1)
93	54.42	106.42	Open To Flow (2)
138	57.41	106.47	Shut-In(2)
183	335.51	106.60	End Shut-In(2)
188	1530.98	106.98	Final Hydro-static

Recovery

Length (ft)	Description	Volume (bbl)
0.00	260' GIP	0.00
30.00	O&GCM 20%G20%O60%M	0.42
20.00	O&GCM 10%G30%O60%M	0.28

Gas Rates

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



TRILOBITE TESTING, INC.

DRILL STEM TEST REPORT

TDI, Inc
 1310 Bison Rd
 Hays Ks 67601-9696
 ATTN: Tom Denning, Herb D

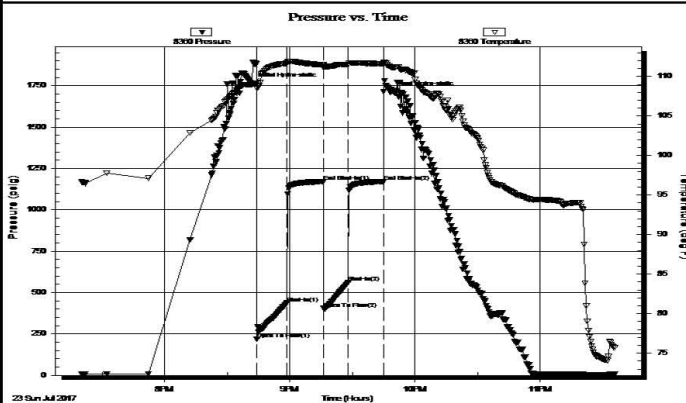
21-15s-18w Ellis
Engel North #3
 Job Ticket: 63004 **DST#: 2**
 Test Start: 2017.07.23 @ 19:20:21

GENERAL INFORMATION:

Formation: **Arbuckle**
 Deviated: No Whipstock: ft (KB)
 Time Tool Opened: 20:44:16
 Time Test Ended: 23:35:46
 Test Type: Conventional Bottom Hole (Reset)
 Tester: Ray Schwager
 Unit No: 77
 Interval: **3590.00 ft (KB) To 3640.00 ft (KB) (TVD)**
 Total Depth: 3640.00 ft (KB) (TVD)
 Hole Diameter: 7.85 inches Hole Condition: Fair
 Reference Elevations: 2037.00 ft (KB)
 2027.00 ft (CF)
 KB to GR/CF: 10.00 ft

Serial #: 8360 Inside
 Press@RunDepth: 560.39 psig @ 3604.00 ft (KB) Capacity: 8000.00 psig
 Start Date: 2017.07.23 End Date: 2017.07.23 Last Calib.: 2017.07.23
 Start Time: 19:20:21 End Time: 23:35:46 Time On Btm: 2017.07.23 @ 20:41:46
 Time Off Btm: 2017.07.23 @ 21:48:16

TEST COMMENT: 15-IFP-BOB in 2min
 15-ISIP-no bl bk
 15-FFP-BOB in 2 min
 15-FSP-no bl bk



PRESSURE SUMMARY

Time (Min.)	Pressure (psig)	Temp (deg F)	Annotation
0	1763.48	109.00	Initial Hydro-static
3	218.33	108.51	Open To Flow (1)
17	436.86	111.65	Shut-In(1)
35	1171.55	111.46	End Shut-In(1)
35	403.76	111.12	Open To Flow (2)
47	560.39	111.54	Shut-In(2)
63	1171.30	111.57	End Shut-In(2)
67	1710.46	111.19	Final Hydro-static

Recovery

Length (ft)	Description	Volume (bbl)
30.00	Mud	0.42
1054.00	Water	14.78

* Recovery from multiple tests

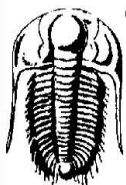
Gas Rates

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

Trilobite Testing, Inc

Ref. No: 63004

Printed: 2017.07.23 @ 23:56:12



TRILOBITE TESTING, INC.

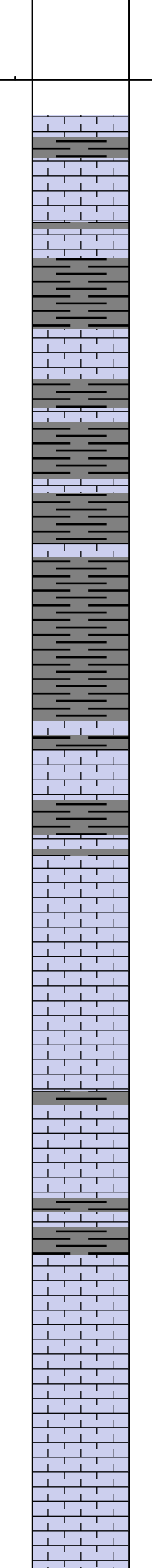
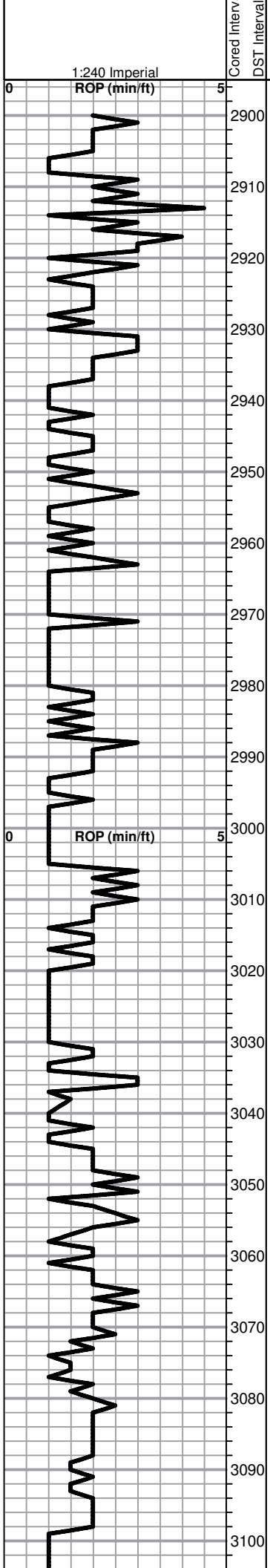
DRILL STEM TEST REPORT

TDI, Inc
 1310 Bison Rd
 Hays Ks 67601-9696
 ATTN: Tom Denning, Herb D

21-15s-18w Ellis
Engel North #3
 Job Ticket: 63005 **DST#: 3**
 Test Start: 2017.07.24 @ 03:41:03

GENERAL INFORMATION:

Formation: **LKC H-J**
 Deviated: No Whipstock: ft (KB)
 Test Type: Conventional Straddle (Reset)



BEGIN 1' DRILL TIME FROM 2900' TO RTD
 BEGIN 10' WET AND DRY SAMPLES FROM 3000' TO RTD

ANHYDRITE TOP 1186+851
ANHYDRITE BASE 1224+813

Shale, lt-med gray, soft mud-soft blocky

Shale, lt gray, soft sticky

Lime, lt-med brn, fnxln

TOPEKA 3004-967
 Lime, crm-lt brn, fnxln, crinoid segments

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

Lime, lt-med brn, fnxln, bedded chalk with gray shaley lime in part

Lime, lt-med brn-med gray, fn-micro xln

Lime, lt-med brn, fnxln-granular in part, NS

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

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

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

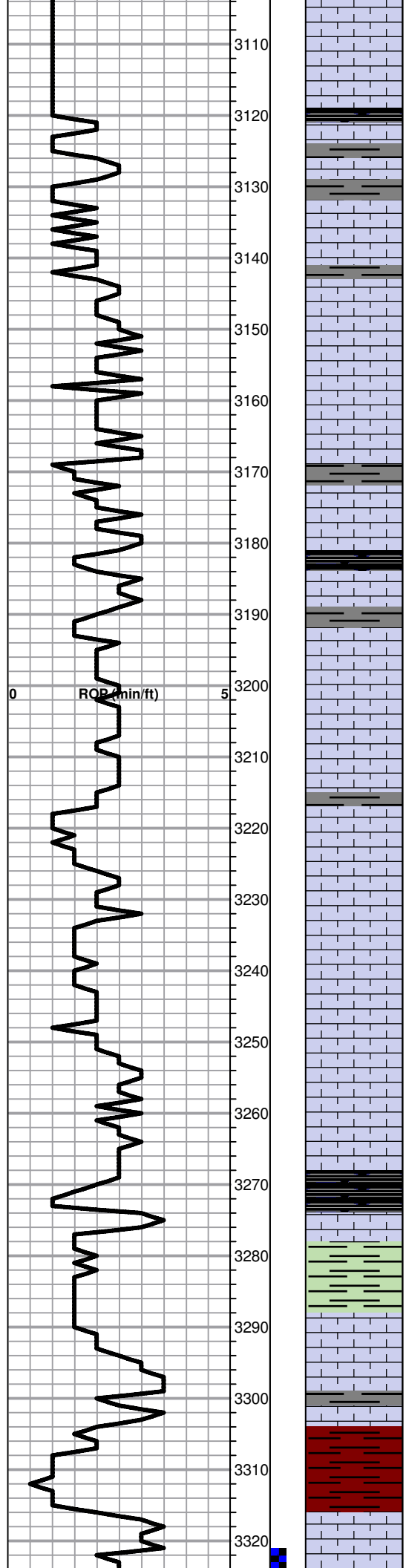
Lime, lt-med brn, fn-vfxln, slightly fossiliferous

Lime, lt brn-light grayish brn, fnxln with increasing bedded chalk and granular chips

1:240 Imperial

8 5/8" SURFACE CASING SET TO 1189' W/ 375 SXS SMD

SLOPE 1 DEGREE @1190'



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

Lime, lt brn, fnxln-granular

Shale, black carbonaceous, blocky

Lime, crm-lt brn, fn-vfxln slightly fossiliferous in part

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

Lime, crm-lt brn, fnxln, bedded chalk with scattered dark mottling in part

Shale, med gray, firm blocky, calcareous and fossiliferous

Lime, lt grayish brn, fn-vfxln

Shale, black carbonaceous, fissile, blocky

Lime, lt grayish brn, vfxln

* Lime, lt brn, fnxln-granular, lt odor, NFO or staining. light wet cut

Lime, crm-lt brn, fnxln with increased chalk content

Lime, lt-med brn, fnxln

○ Lime, lt brn, fine oomoldic/fossil fragment with scattered vugs, lt odor, scattered to saturated staining, NFO

Lime, crm-lt brn, fnxln with bedded chalk

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

Lime, lt-med brn, fnxln, slight bedded chalk

HEEBNER SHALE 3268-1231

Shale, black carbonaceous, fissile, blocky

Lime, med brn, fn-micro xln

Shale, dove gray-lime green, soft mud, sticky

TORONTO 3288-1251

Lime, white-crm, fnxln with firm bedded chalk, NS, white chalk wash

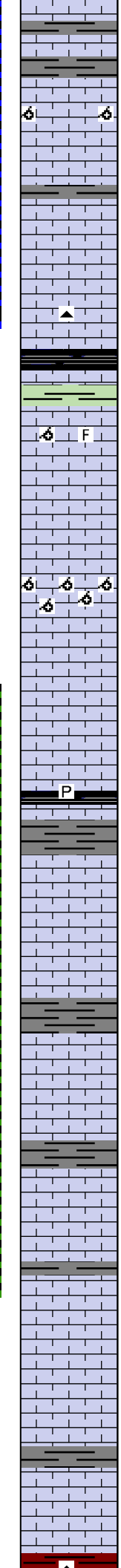
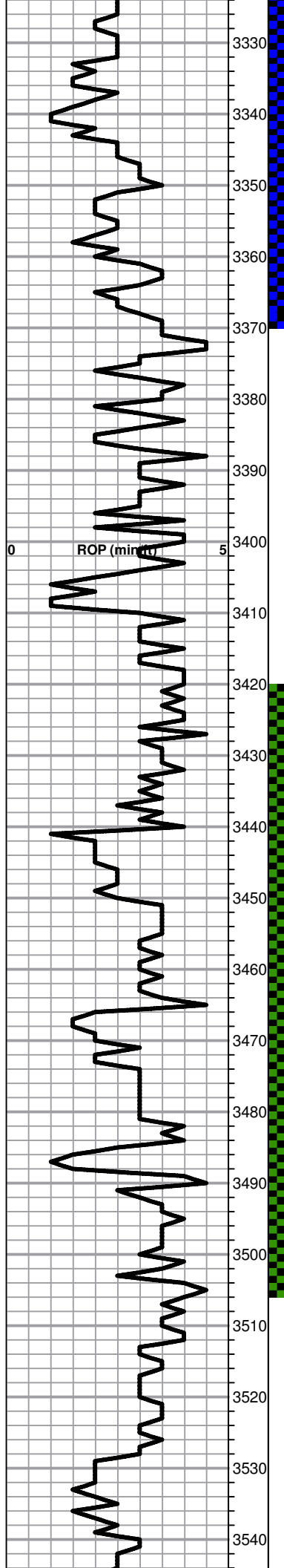
Lime, crm-lt brn, fn-vfxln

Shale, red-reddish brn, soft mud-soft blocky

LKC 3316-1279

○ Lime, lt-med brn, fn-micro xln, 3 chips with trace of staining, NFO, no odor. Does not appear well developed

CFS 3300'
SHORT TRIP 23 STANDS



Shale, red-reddish brn-gray, soft blocky
Lime, med brn, fn-micro xln

○ Lime, crm, fnxln, few oomoldic chips with spotty stain, NFO, very lt odor

Lime, crm-lt brn, fn-micro xln

○ Lime, crm-lt brn, fnxln, bed of mixed fossil fragments and oolites with scattered vugs, fair odor and scattered staining in mold casts and vugs

Lime, crm-lt brn, fn-micro xln

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

○ Lime, crm-tan, fnxln with bed of fossil fragments and oolites, scattered light stain, NFO

Lime, white-crm, fnxln

○ Lime, crm-lt brn, fnxln-granular, slightly oomoldic with trace of lt spotty staining in molds, NFO, no odor

Lime, white-crm, fn-vfxln, slightly fossiliferous

Lime, crm-med-dark brn, fn-vfxln

Shale, gray-black carbonaceous, blocky, pyrite clusters

○ Lime, crm, mostly fn-vfxln, thin zone with oolites and fossil fragments, spotty staining in voids and casts with few saturated stain chips, NFO, very lite odor

○ Lime, white-crm,fnxln, fossil fragments with spotty to saturated staining in voids and casts, NFO, very lt odor

Lime, crm, fn-micro xln

○ Lime, white-crm, fnxln, thin bed of fossil fragments and oolites with scattered vugs, spotty stain in vugs and cast, NFO with very lt detectable odor

Lime, white-crm, fnxln with lt chalk wash

Lime, white, fnxln-granular, NS, no odor, no wet cut

Lime, white-crm, fn-micro xln, slight bed chalk

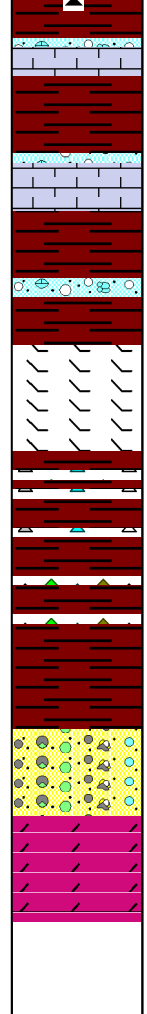
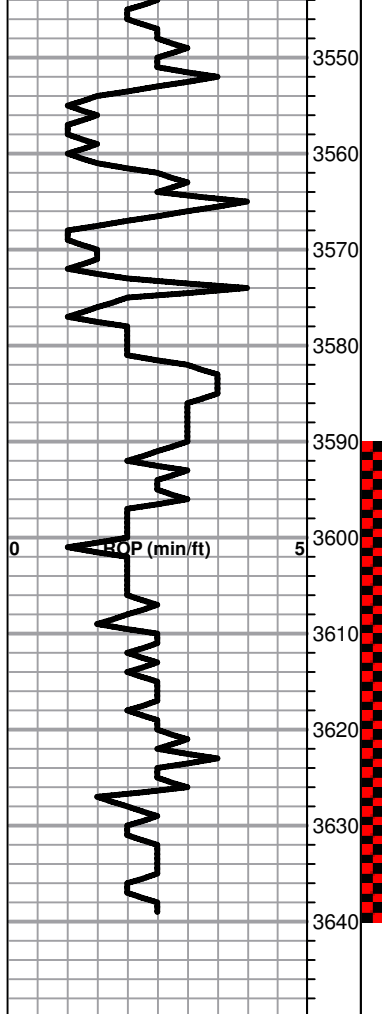
○ Lime white-crm, fn-vfxln, chips chips with scattered vugs with light spotty staining, NFO, no odor

BKC 3542-1505

Chalk, red-reddish brn, soft blocky with short fragments, lt

DST # 1 3321' TO 3370' SEE
HEADER FOR TEST
SUMMARY

STRADDLE TEST 3420' TO
3506' SEE HEADER FOR
TEST SUMMARY



Shale, re-reddish brn, soft blocky with chert fragments, lt red wash

Lime, crm, fnxln

Shale, red-reddish brn, soft with red wash

Lime, crm-lt brn, fn-vflxn, some clastic with red shale staining

Shale, red-reddish brn, soft blocky with red wash

Lime, white-crm, fn-micro xln, slightly dolomitic, orange chert fragments

Chert, vari colored with dry flaky gilsonite in part

Shale, red with red wash with vari colored chert fragments

Shale, red-reddish brn, soft blocky with light red wash

Chert, vari colored, oolitic chert in part with mix of dolomite

ARBUCKLE 3629-1592

Dolomite, white-ivory-lt brn, fnxln-granular with interxln porosity. It scattered to saturated staining, good odor and VMSFO on crush

RTD 3640-1687 LTD 3639-1686

DST # 2 3590' TO 3640' SEE
 HEADER FOR TEST
 SUMMARY