

**Ritchie Exploration, Inc.
Hell Creek 20D No.1
1785' FSL and 1775' FEL
135'N & 125'W of SE NW SE
Sec 20 T16S R31W
Scott County, Kansas**

Geological Report
by

Macklin M. Armstrong, P.G.
License Number 743

Scale 1:240 Imperial

Well Name:	Hell Creek 20D No. 1	
Surface Location:	Sec 20 T16S R31W	
Bottom Location:	1785' FSL and 1775' FEL	
API:	15-171-20987	
License Number:	4767	
Spud Date:	10/1/2013	Time: 1:45 PM
Region:	Scott County, Kansas	
Drilling Completed:	10/10/2013	Time: 6:12 AM
Surface Coordinates:		
Bottom Hole Coordinates:		
Ground Elevation:	2933.00ft	
K.B. Elevation:	2938.00ft	
Logged Interval:	3400.00ft	To: 4736.00ft
Total Depth:	4735.00ft	
Formation:	Mississippi	
Drilling Fluid Type:	Chemical/Fresh Water Gel	

OPERATOR

Company:	Ritchie Exploration, Inc.	
Address:	8100 East 22nd Street North, No. 700 Wichita, Kansas 67278	
Contact Geologist:	Pete Fiorini	
Contact Phone Nbr:	316-691-9500	
Well Name:	Hell Creek 20D No. 1	
Location:	Sec 20 T16S R31W	API: 15-171-20987
Pool:	Oil	Field: Wildcat
State:	Kansas	Country: USA

CONTRACTOR

Contractor: WW Drilling
 Rig #: 2
 Rig Type: mud rotary
 Spud Date: 10/1/2013
 TD Date: 10/10/2013
 Rig Release: 10/11/2013

Time: 1:45 PM
 Time: 6:12 AM
 Time: 4:15 AM

SURFACE CO-ORDINATES

Well Type: Vertical
 Longitude: 100° 46' 03.691" Latitude: 38° 38' 51.345"
 N/S Co-ord:
 E/W Co-ord:

ELEVATIONS

K.B. Elevation: 2938.00ft Ground Elevation: 2933.00ft
 K.B. to Ground: 5.00ft

NOTES

Date	Depth at 7 am	Activity
10-01-13	MIRU	Spud at 1:45 pm
10-02-13	835	Drilling
10-03-13	2645	Drilling
10-04-13	3340	Drilling
10-05-13	3930	Drilling
10-06-13	4045	Drilling
10-07-13	4245	Drilling
10-08-13	4470	OB with DST No. 3
10-09-13	4588	TOH for DST No. 4
10-10-13	4735	STCH for Log
10-11-13	4735	Set 4 1/2"

Surface Casing: 8 5/8" 23# at 211'
 Production Casing: 4 1/2" 10.5# at 477'

Deviation: 211' - 1 1/4°
 4006' - 1°
 4735' - 1°

Bit Record:	Make	Size	Type	Depth In	Depth Out	Hours
	SM	12 1/4"	RR	Surface	211	2
	SM	7 7/8"	F27	211	4735	124 1/2

Drill Stem Tests:

DST No. 1 3978 to 4006 Formation: Lansing C Zone
 30-45-45-60

Recovery: 144' GIP
 102' MCGO (10%G, 30%M, 60%O)
 124' MCGO (10%G, 40%M, 50%O)

IHP 1934 FHP 1898
 IFP 40-82 FFP 87-91
 ISIP 888 FSIP 853
 Temp 116°

DST No. 2 4034 to 4058 Formation: Lansing E Zone
 30-30-30-30

Recovery: 10' Mud
 IHP 2007 FHP 1952
 IFP 31-32 FFP 38-44
 ISIP 949 FSIP 940
 Temp 114°

DST No. 3 4434 to 4470 Formation: Pawnee
 30-30-30-30
 Recovery: 5' Mud
 IHP 2211 FHP 2164
 IFP 17-18 FFP 18-21
 ISIP 454 FSIP 464
 Temp 120°

DST No. 4 4532 to 4588 Formation: Johnson Zone
 30-45-45-60
 Recovery: 67' OCM (10%O, 90%M)
 IHP 2298 FHP 2240
 IFP 18-37 FFP 41-64
 ISIP 1158 FSIP 1155
 Temp 123°

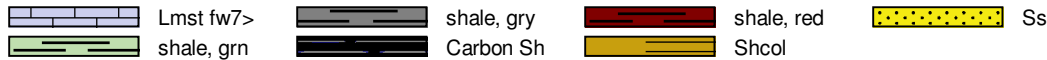
Formation	Sample	E-Log	Datum	Well 1	Well 2	Well 3
Anhydrite	2337	2337	+601	-3	+7	-11
B/Anhydrite	2359	2358	+580	-5	+7	-11
Stotler	3549	3548	-610	-6	+4	-12
Heebner	3934	3932	-994	-8	-1	-8
Toronto	3952	3950	-1012	-2	-2	-7
Lansing	3972	3970	-1032	-12	+1	-8
Muncie Creek	4140	4139	-1201	+1	+1	+1
Stark	4237	4237	-1299	+1	-3	-3
Hushpuckney	4276	4276	-1338	-3	-8	+1
B/Kansas City	4319	4319	-1381	0	-4	+3
Marmaton	4355	4354	-1416	-2	-8	+1
Altamont	4381	4380	-1442	-11	-15	-2
Pawnee	4454	4454	-1516	-4	-6	-1
Myrick Station	4485	4484	-1546	-8	-8	0
Fort Scott	4500	4500	-1562	-5	-5	+1
Cherokee Shale	4525	4524	-1586	-7	-7	-2
Johnson Zone	4563	4562	-1624	-2	-2	+5
Morrow	4587	4687	-1649	+8	+8	+11
Mississippi	4616	4616	-1678	-3	-3	+15
Total Depth	4735	4736	-1798			

Well 1: Ritchie Exploration, Inc. Huseman 20C No. 1 2275' FSL and 563' FWL Sec 20 T16S R31W
 Well 2: Ritchie Exploration, Inc. Huseman 20B No. 1 485' FNL and 1180' FWL Sec 20 T16S R31W
 Well 3: Chief Drilling Company Grothusen No. 1 NE NW NE Sec 30 T16S R31W

Pipe was set to further test the Lansing zone.

Respectfully submitted,
 Macklin M. Armstrong

ROCK TYPES

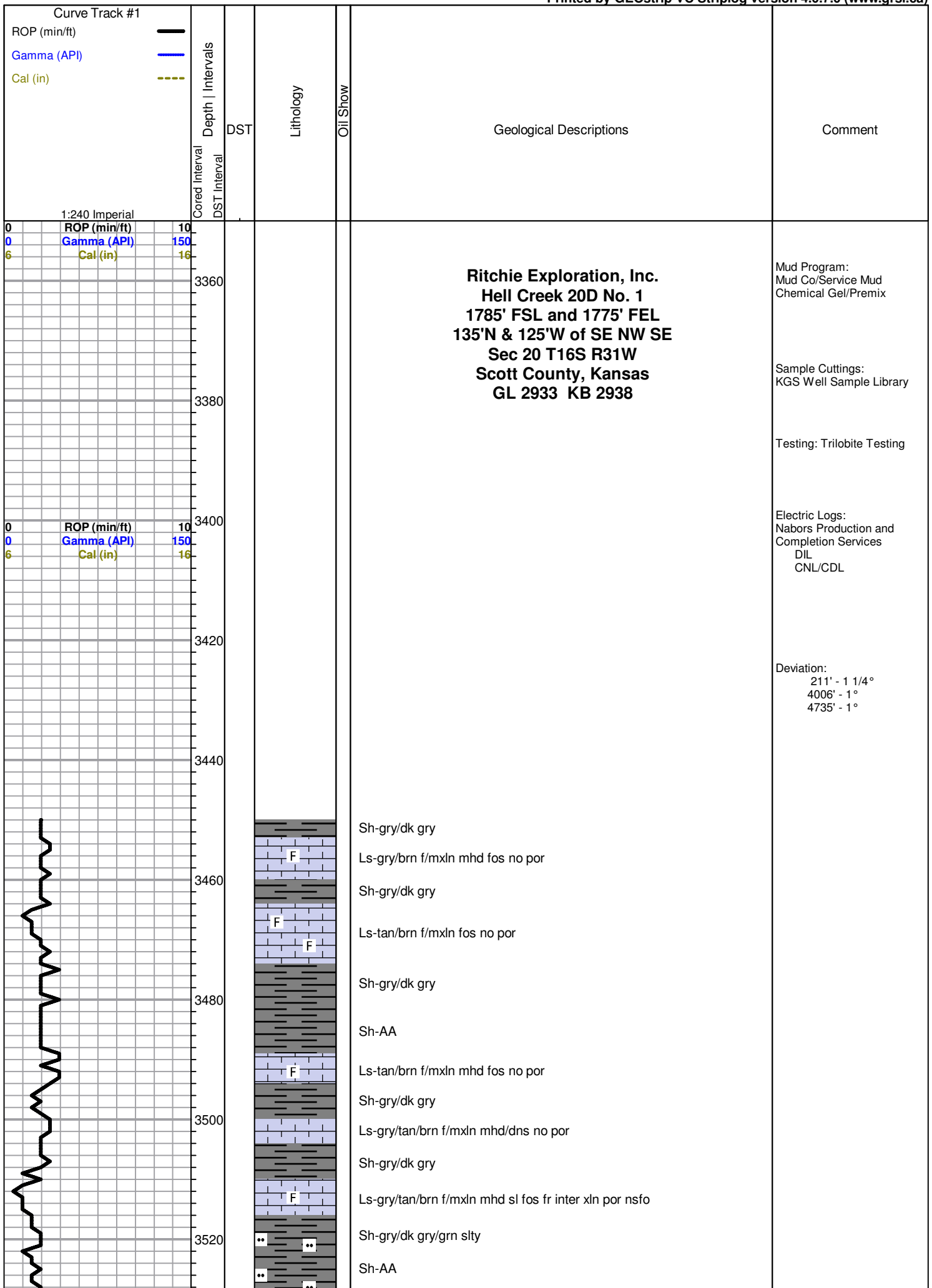


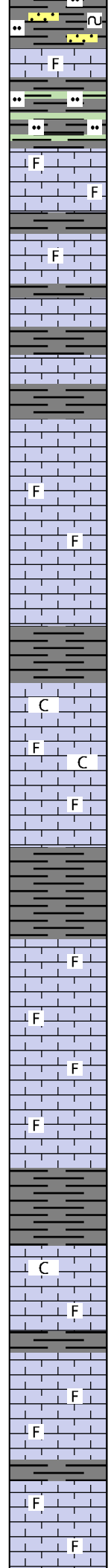
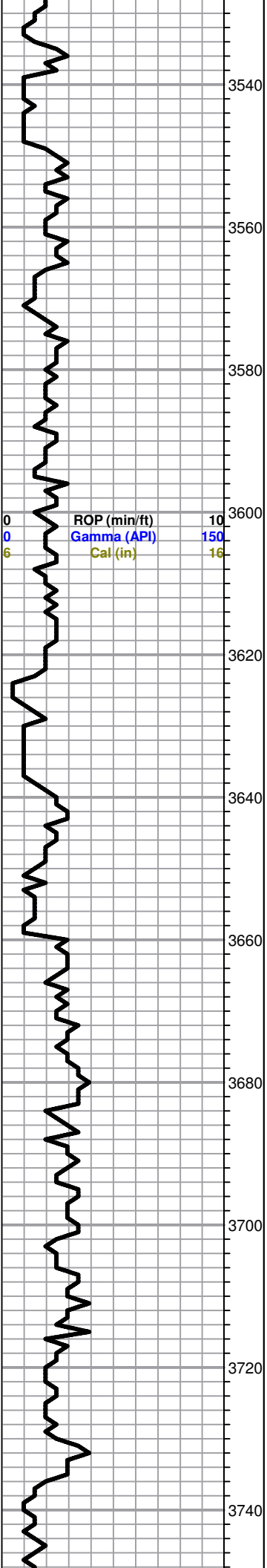
ACCESSORIES

MINERAL	FOSSIL	STRINGER	TEXTURE
▲ Chert, dark	∩ Bryozoa	••• Sandstone	C Chalky
∩ Glauconite	F Fossils < 20%		
•• Silty	⊕ Oolite		
△ Chert White	♂ Pellets		
	♁ Oomoldic		

OTHER SYMBOLS







Sh-AA with sm Ss-lt gry frgn sub ang to sub rnd sl fri sl glau

Ls-tan/brn f/mxln dns sl fos no por

Sh-gry/dk gry/gry grn slty

----- **Stotler 3549 -611** -----

Ls-tan/gry f/mxln mhd/dns sl fos no por

Sh-gry/dk gry

Ls-tan/gry f/mxln mhd/dns sl fos no por

Sh-gry/dk gry

Ls-tan/gry brn f/mxln pr inter xln por nsfo

Sh-gry/dk gry

Ls-gry/tan f/mxln mhd/dns no por

Sh-gry/dk gry

Ls-lt gry/tan fxln mhd/dns no por

Ls-AA sm Ls-brn f/mxln mhd fos no por

Ls-AA

Ls-tan/gry f/mxln dns no por

Sh-gry/dk gry

Ls-crm/lt tan fxln soft clky fr inter xln por nsfo

Ls-lt gry/tan f/mxln mhd no por

Ls-crm/lt tan f/mxln soft/mhd sl fos sl clky no por

Ls-tan/lt gry f/mxln dns sl fos no por

Sh-gry/dk gry

Ls-crm/tan f/mxln dns sl fos no por

Ls-lt gry/tan f/mxln mhd sl fos no por

Ls-lt gry/tan f/mxln dns fos no por

Ls-AA

Sh-gry/dk gry

Ls-crm/lt gry f/mxln mhd sl clky no por

Ls-lt gry f/mxln dns sl fos no por

Sh-gry/dk gry

Ls-lt gry/gry f/mxln mhd sl fos no por

Ls-AA

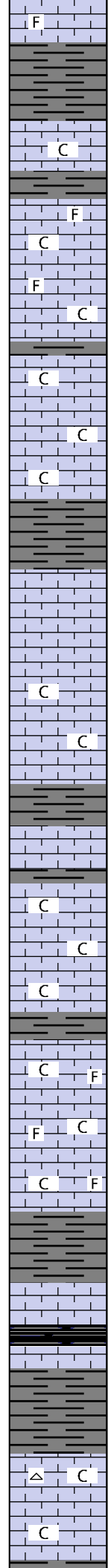
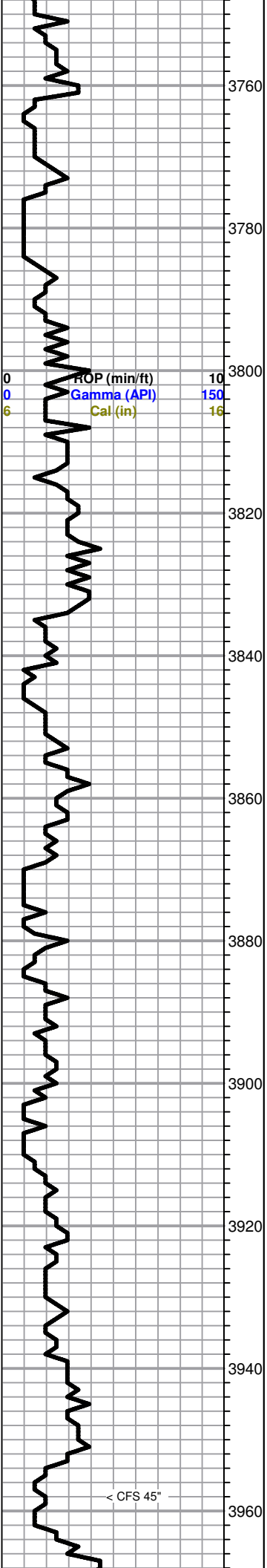
Ls-lt gry/gry f/mxln dns sl fos no por

Sh-gry/dk gry

Ls-crm/lt gry f/mxln mhd sl fos pr inter xln por nsfo

Ls-AA

All formation tops on this geological log have been correlated back to the electric log



Ls-gry/brn f/mxln dns sl fos no por

Sh-gry/dk gry

Ls-crm/tan f/mxln mhd sl clkly no por

Sh-gry/dk gry

Ls-crm/tan f/mxln clkly sl fos pr inter xln por nsfo

Ls-crm/tan f/mxln mhd sl clkly sl fos no por

Ls-AA

Sh-gry/dk gry

Ls-tan/lt gry fxln mhd clkly no por

Ls-tan/lt gry mhd/dns sl clkly no por

Ls-AA

Sh-gry/dk gry

Ls-tan fxln dns no por

Ls-crm/tan f/mxln mhd no por

Ls-tan fxln mhd sl clkly fr inter xln por nsfo

Ls-tan fxln mhd/dns sl clkly no por

Sh-gry/dk gry

Ls-tan fxln mhd/dns no por

Sh-gry/dk gry

Ls-crm/tan fxln soft clkly fr inter xln por nsfo

Ls-crm/tan fxln mhd sl clkly no por

Ls-crm/tan fxln soft sl clkly trc inter xln por nsfo

Ls-crm/tan fxln dns sl clkly no por

Sh-gry/dk gry

Ls-crm/tan f/mxln mhd sl clkly sl fos no por

Ls-AA

Ls-crm/tan f/mxln soft/mhd sl clkly fr inter xln por nsfo

Ls-tan/brn mott gry f/mxln mhd/dns sl clkly sl fos no por

Sh-gry/dk gry

Ls-tan/brn mott gry f/mxln dns no por

----- Heebner 3934 -996 -----

Sh-blk carb

Ls-tan/brn fxln dns no por

Sh-gry/dk gry

----- Toronto 3952 -1014 -----

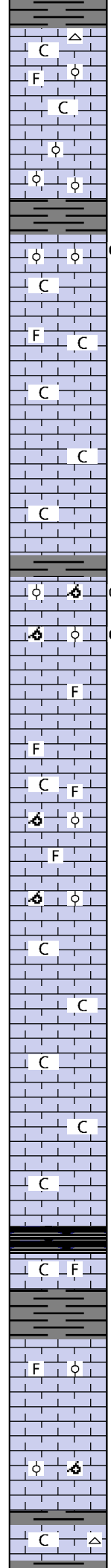
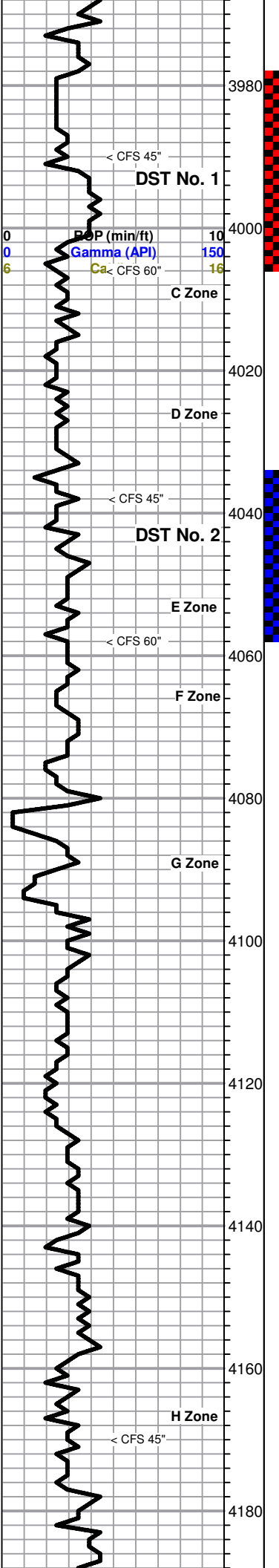
Ls-crm/lt tan fxln mhd sl clkly trc inter xln por nsfo sm Cht-crm/tan fsh opa and Ls-wt fxln soft clkly

Ls-crm/tan f/mxln mhd sl clkly no por

Sh-gry/dk gry

Mud Data at 3910'
 6:00 am 10-05-13
 Wt 9.2 Vis 52 WL 7.2
 pH 10 Chl 1500 Sol 5.8%
 YP 17 LCM 2#

DST No. 1
 3978 to 4006
 30-45-45-60
 1st CFS - ROP in 20"



----- **Lansing 3972 -1034** -----

Sh-gry/dk gry

Ls-crm/tan f/mxln mhd sl clky no por sm Ls-lt gry f/mxln mhd fos with blk ool no por

Ls-crm/lt tan fxln mhd clky no por

Ls-tan/brn fxln mhd/dns fos highly ool no por

Sh-gry/dk gry

Ls-tan fxln mhd fos ool gd inter ool por sct brn stn gd cut gsfo on brk fr odor

Ls-crm/lt tan fxln mhd/dns clky no por

Ls-crm/lt tan/lt gry fxln mhd/dns clky sl fos no por

Ls-crm/lt gry fxln mhd/dns clky no por sm Ls-wt fxln soft clky

Ls-AA

Ls-crm/lt tan/t gry fxln mhd/dns sl clky no por

Sh-gry/dk gry

Ls-crm/tan fxln pr inter xln por brn spt stn fsfo on brk sl odor

Ls-tan fxln mhd fos oom and ool gd inter fos por brn spt stn gsfo gd odor

Ls-crm/tan fxln mhd/dns fos no por

Ls-AA

Ls-crm/wt fxln mhd clky sl fos no por

Ls-tan/brn fxln mhd fos sl ool and oom gd ooc por nsfo

Ls-tan fxln dns fos no por

Ls-tan/brn fxln mhd fos sl ool and oom gd ooc por nsfo

Ls-crm/lt tan fxln dns sl clky no por

Ls-AA

Ls-crm/tan fxln dns sl clky no por

Ls-crm/tan/lt gry fxln dns sl clky no por

Ls-AA

----- **Muncie Creek 4140 -1202** -----

Sh-blk carb

Ls-tan/brn f/mxln sm blkly mhd sub clky sl fos no por

Sh-gry/dk gry

Ls-lt gry/tan fxln dns no por and Ls-tan/brn fxln dns fos sl ool no por

Ls-tan/brn fxln dns no por

Ls-crm/tan fxln mhd fos sl oom and ool fr inter ool/ooc por nsfo

Sh-gry/dk gry

Ls-crm/tan fxln dns sl clky no por sm Cht-wt/crm fsh opa

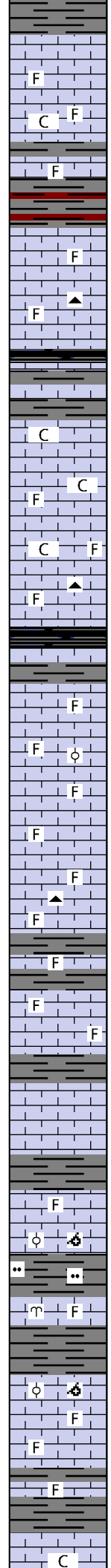
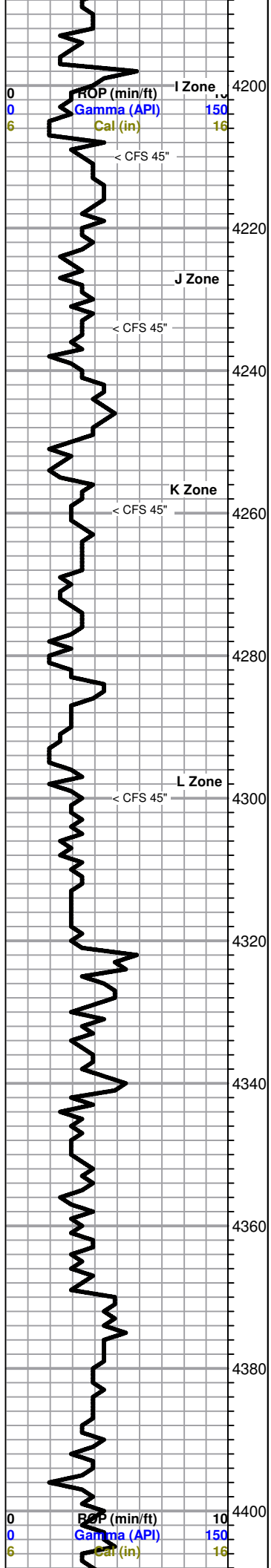
1st Open: BOB in 28"
 2nd Open: BOB in 30"
 Recovery:
 144' GIP
 102' MCGO (10%G, 30%M 60%O)
 124' MCGO (10%G, 40%M 50%O)
 IHP 1934 FHP 1898
 IFP 40-82 FFP 87-91
 ISIP 888 FSIP 853
 Temp 116°

Pulled 20 stand short trip at 4006', then cir for test - 60"

Mud Data at 4038'
 6:20 am 10-06-13
 Wt 9.2 Vis 53 WL 10.4
 pH 9 Chl 2800 Sol 5.9%
 YP 18 LCM 2#

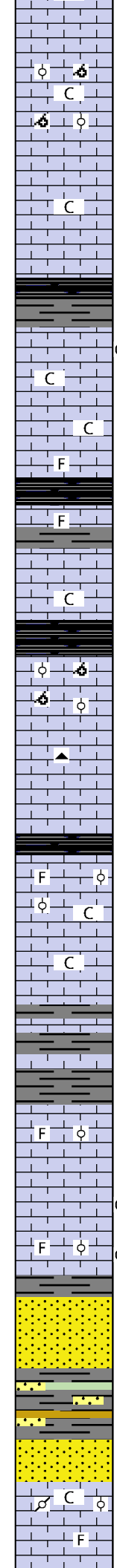
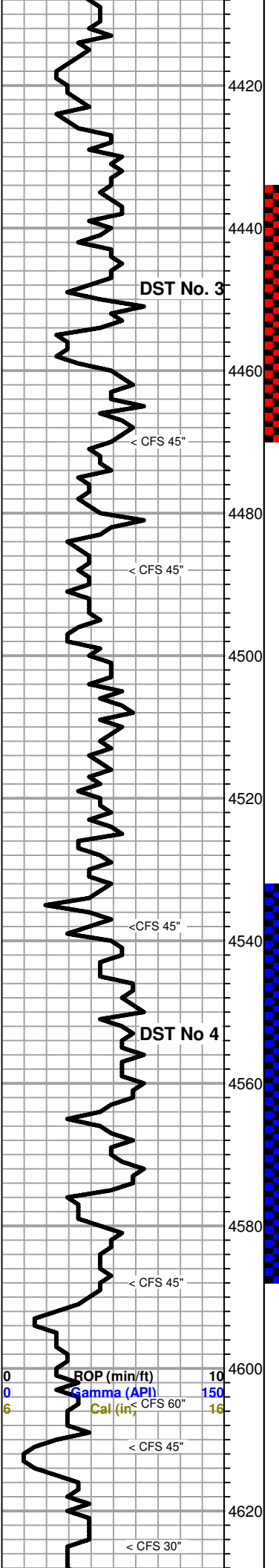
Pipe Strap at 4058'
 Short 0.75'

DST No. 2
 4034 to 4058
 30-30-30-30
 1st Open: Weak sur blow, died in 10"
 2nd Open: No blow, flushed tool, no help
 Recovery: 10' Mud
 IHP 2007 FHP 1952
 IFP 31-32 FFP 38-44
 ISIP 949 FSIP 940
 Temp 114°



Sh-gry/dk gry
 Ls-gry/brn fxln mhd no por
 Ls-tan/lt gry fxln dns sl fos no por
 Ls-crm/tan f/mxln mhd sl clky sl fos no por
 Sh-gry/dk gry
 Ls-tan/brn f/mxln dns sl fos no por
 Sh-gry/dk gry/mar
 Ls-tan/lt gry fxln mhd/dns no por
 Ls-tan/gry/brn f/mxln dns sl fos no por sm Cht-brn fsh opa
 ----- **Stark 4237 -1299** -----
 Sh-blk carb
 Sh-gry/dk gry
 Ls-tan/gry fxln dns no por
 Sh-gry/dk gry
 Ls-crm/tan fxln dns sl clky no por
 Ls-tan/lt gry/brn mxln mhd clky no por
 Ls-crm/lt gry/tan fxln dns sl clky sl fos no por
 Ls-crm/lt gry/tan fxln dns sl clky sl fos no por
 Ls-tan/gry/brn f/mxln sm blkly sl fos no por sm Cht-lt gry fsh opa
 ----- **Hushpuckney 4276 -1338** -----
 Sh-blk carb
 Sh-gry/dk gry
 Ls-lt gry/crm fxln dns sl fos no por
 Ls-tan/gry mott brnf/mxln sm blkly mhd fos with blk ool no por
 Ls-crm/tan f/mxln mhd/dns sl fos no por
 Ls-lt gry f/mxln mhd/dns sl fos no por
 Ls-tan/gry f/mxln dns sl fos no por sm Cht-gry fsh opa
 ----- **B/Kansas City 4319 -1381** -----
 Ls-tan/gry f/mxln dns sl fos no por
 Sh-gry/dk gry
 Ls-tan/gry/brn f/mxln dns sl fos no por
 Sh-gry/dk gry
 Ls-tan/brn/gry f/mxln dns no por
 Sh-gry/dk gry
 ----- **Marmaton 4355 -1417** -----
 Ls-tan/gry/brn f/mxln mhd/dns sl fos no por
 Ls-AA with sm Ls-brn cxln to frag mhd fos ool and oom no por
 Sh-gry/dk gry/grn slty
 Ls-tan/gry fxln dns sl fos no por with a few free byrozoa
 Sh-gry/dk gry
 ----- **Altamont 4381 -1443** -----
 Ls-tan/gry fxln dns sl fos no por with sm Ls-brn cxln mhd fos ool and oom no por
 Ls-tan/gry/brn f/mxln sm blkly dns sl fos no por
 Sh-gry/dk gry
 Ls-tan/gry fxln dns sl fos no por
 Sh-gry/dk gry
 Ls-crm/tan fxln dns sl clky no por

Mud Data at 4229'
 5:45 am 10-07-13
 Wt 9.3 Vis 54 WL 8.8
 pH 10 Chl 4000 Sol 6.6%
 YP 20 LCM 2#



Ls-tan/lt gry fxln dns no por

Ls-tan fxln mhd fos ool and oom no por

Ls-AA with sm Ls-wt fxln soft clk

Ls-tan/lt gry fxln dns no por

Ls-AA with sm Ls-wt fxln soft clk

Ls-tan/brn fxln mhd no por

Sh-blk carb
Sh-gry/dk gry

----- **Pawnee 4454 -1516** -----

Ls-crmtan f/mxln mhd fr inter xln por spt brn stn fgsfo on brk faint odor

Ls-tan/brn fxln dns no por sm Ls-crm fxln mhd clk no por

Ls-gry/brn fxln dns sl fos no por

Sh-blk carb

Ls-gry/brn fxln dns sl fos no por

----- **Myrick Station 4485 -1547** -----

Ls-lt gry/tan/gry fxln mhd/dns no por

Ls-crm/lt gry/tan fxln mhd/dns sl clk no por

Sh-blk carb

----- **Fort Scott 4500 -1562** -----

Ls-gry/brn f/mxln mhd fos ool and oom no por

Ls-gry/brn fxln dns no por sm Ls-brn f/mxln mhd fos ool and oom no por

Ls-tan/gry/brn fxln dns no por sm Cht-brn/gry fsh opa

Ls-gry/tan f/mxln dns no por

----- **Cherokee Shale 4525 -1587** -----

Sh-blk carb

Ls-tan/brn f/mxln dns fos with blk and dk brn ool no por sm Ls-lt gry f/mxln mhd sub clk fos with blk ool no por

Ls-lt gry f/mxln mhd sub clk dns fos with blk ool no por

Ls-gry/lt gry fxln dns no por

Ls-tan/brn fxln dns no por sm Ls-lt gry/tan fxln mhd/dns sub clk no por

Ls-gry/lt gry/brn fxln dns no por

Sh-gry/dk gry

Ls-gry/brn fxln dns no por

Sh-gry/dk gry

Ls-AA

Sh-gry/dk gry

----- **Johnson Zone 4563 -1625** -----

Ls-lt gry/gry f/mxln mhd sl fos sl ool no por

Ls-gry/lt gry/brn fxln dns no por

Ls-tan/brn fxln mhd fr vug por fr cut spt brn stn fsfo on brk faint odor

Ls-tan/brn fxln dns no por with sm Ls-tan f/mxln mhd fos sl ool fr vug por spt brn stn fsfo on brk faint odor

----- **Morrow 4587 -1649** -----

Sh-gry/dk gry

Ss-lt gry/lt grn fgrn ang to sub ang tite cement sm Ss-lt gry fgrn sub ang to sub rnd sl fri to sl cement nsfo

Sh-gry/dk gry/grn/sm yel

Sh-AA with sm Ss-lt gry fgrn sub ang to rnd sl fri

Ss-wt/lt gry fgrn sub ang to sub rnd fri nsfo

----- **Mississippi 4616 -1678** -----

Ls-crm/wt mxln to sl gran mhd fos sl ool or pell sl clk no por

Ls-tan/lt gry fxln mhd/dns sl fos no por

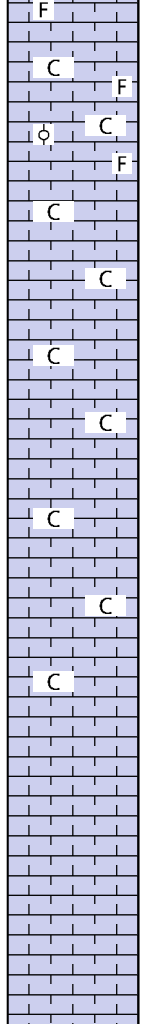
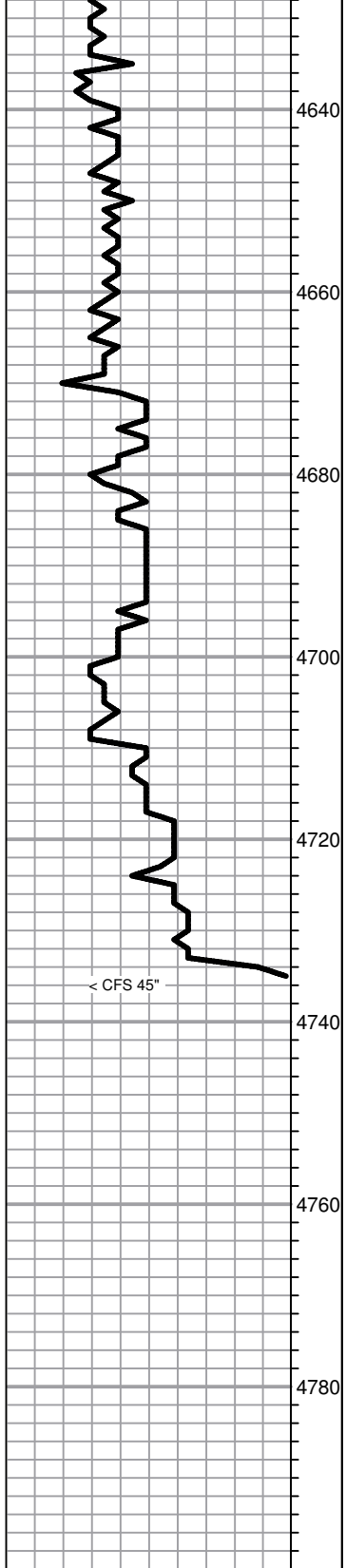
DST No. 3
4434 to 4470
30-30-30-30
1st Open: Weak sur blow, died in 6"
2nd Open: No blow, flushed tool, no help
Recovery: 5' Mud
IHP 2211 FHP 2164
IFP 17-18 FFP 18-21
ISIP 454 FSIP 464
Temp 120°

Pulled 15 stand short trip at 4470' then cir for test - 60"

Mud Data at 4470'
9:15 am 10-08-13
Wt 9.3 Vis 50 WL 6.8
pH 10 Chl 2000 Sol 7%
YP 18 LCM 2#

DST No. 4
4532 to 4588
30-45-45-60
1st Open: Weak blow, building to 1 3/4"
2nd Open: Weak blow, building to 1/2"
Recovery: 67' OCM (10%O, 90%M)
IHP 2298 FHP 2240
IFP 18-37 FFP 41-64
ISIP 1158 FSIP 1155
Temp 123°

Mud Data at 4588'
8:30 am 10-09-13
Wt 9.4 Vis 51 WL 7
pH 10 Chl 1800 Sol 7.7%
YP 18 LCM 2#



Ls-AA

Ls-crm/tan/lt gry f/mxln mhd/dns sl fos sl clkyl no por

Ls-crm/tan fxln to fgran dns sl clkyl no por

Ls-AA

Ls-tan/lt gry fxln to fgran dns sl clkyl no por

Ls-AA

Ls-tan/lt gry fxln to fgran dns no por

Ls-AA

Ls-tan/lt gry f/mxln dns no por

Ls-AA

Ls-AA

Ls-tan/lt gry f/mxln dns no por

Ls-AA

Ls-AA

----- **RTD 4735 -1797** -----

Finished Drilling at 6:12 am on 10-10-13. Pulled 10 stand short trip, then Cir for Log - 90"

Finished Logging at 1:35 pm on 10-10-13