

**GRAND
MESA**

OPERATING COMPANY

(316) 265-3000
FAX: (316) 265-3455

1700 N. WATERFRONT PARKWAY
BLDG. 600
WICHITA, KANSAS 67206-5514

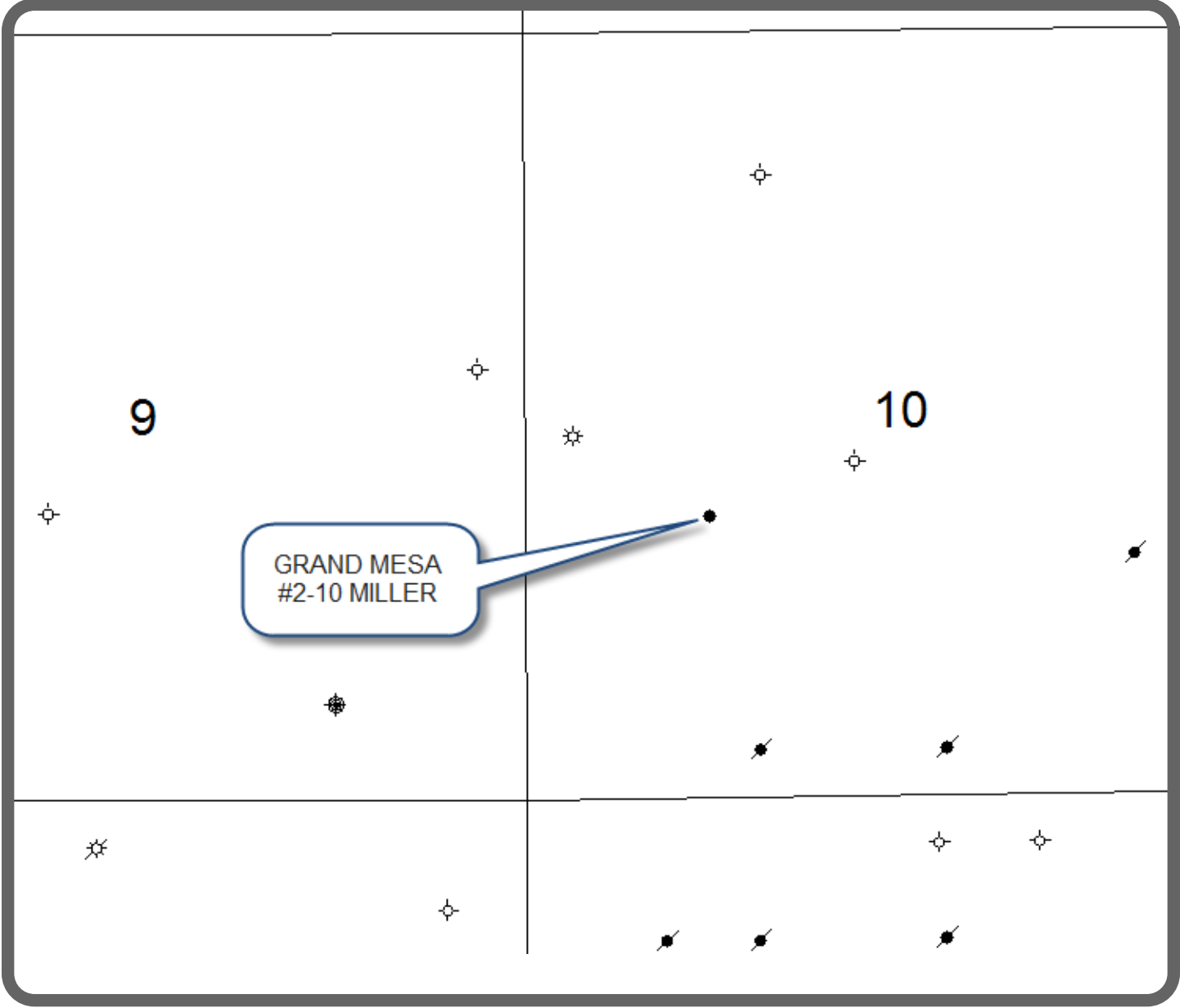
Scale 1:240 (5"=100') Imperial
Measured Depth Log

Well Name: #2-10 MILLER
API: 15-155-21759
Location: 1950 FSL, 1273FWL SEC 10-23S-10W RENO COUNTY KANSAS
License Number: Region:
Spud Date: 09/14/2018 Drilling Completed: 09/21/2018
Surface Coordinates: Lat: 38.0618
Long: -98.4128
Bottom Hole Vertical hole
Coordinates:
Ground Elevation (ft): 1765 K.B. Elevation (ft): 1770
Logged Interval (ft): SURF To: RTD Total Depth (ft): 3860
Formation: Simpson
Type of Drilling Fluid: Chemical

Printed by MudLog from WellSight Systems 1-800-447-1534 www.WellSight.com

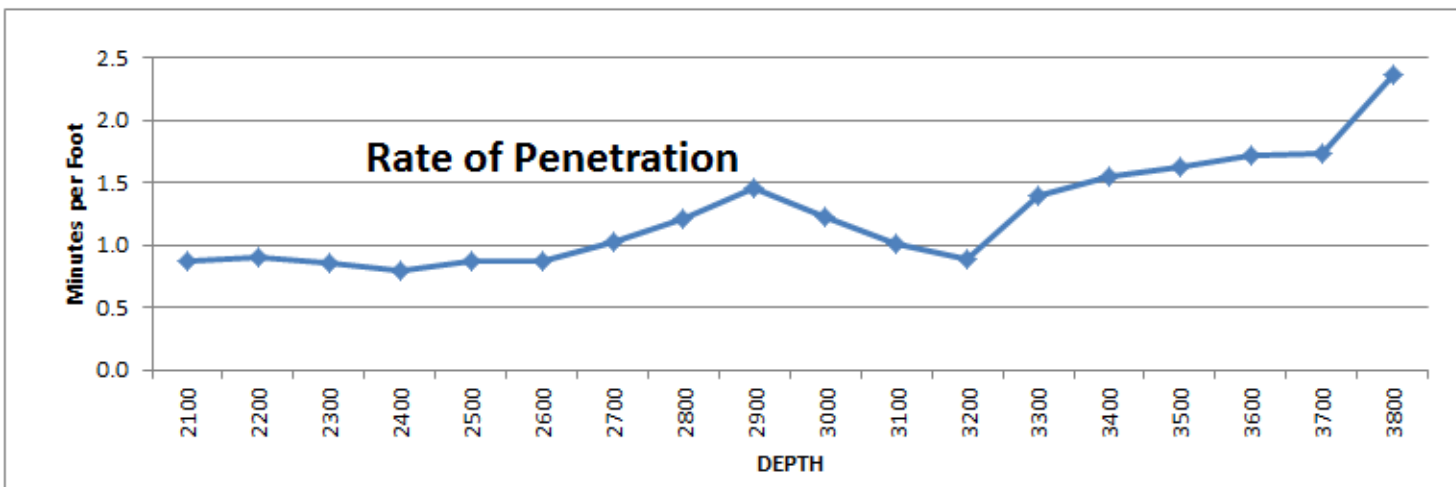
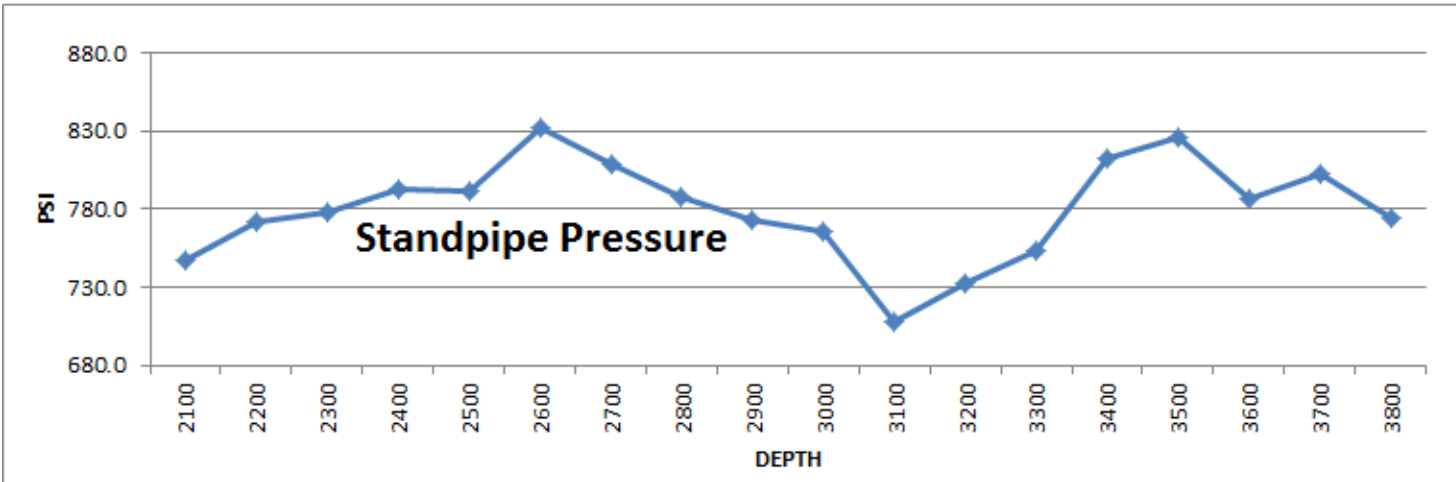
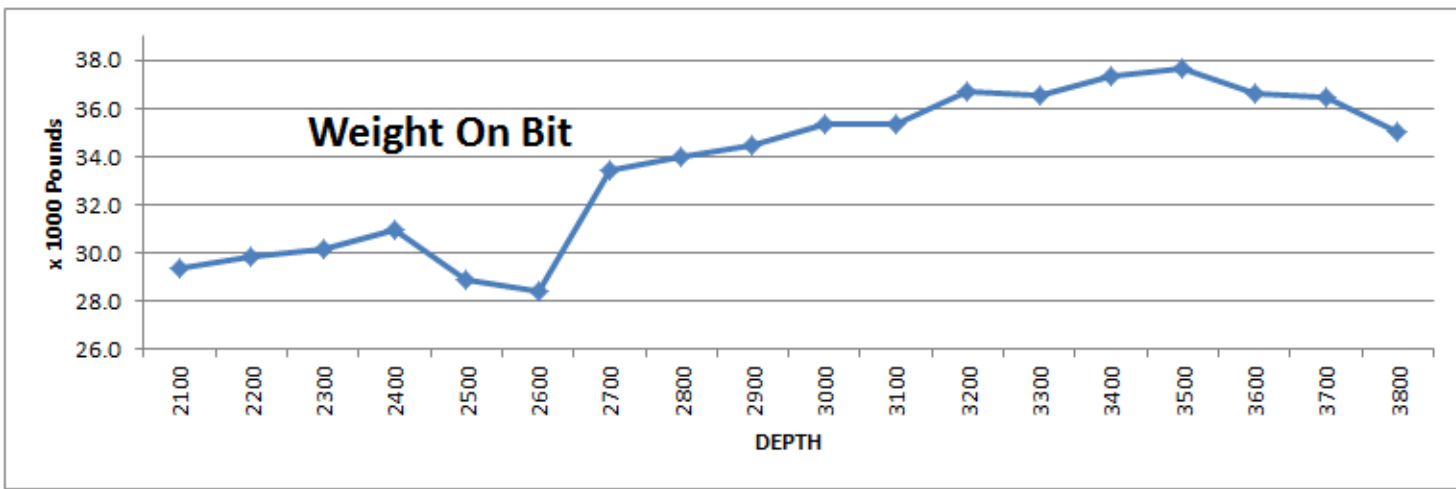
GEOLOGIST

Name: Steven P. Carl
Company: Grand Mesa Operating Company
Address: 1700 N. Waterfront Parkway, Bldg 600
Wichita, Kansas 67206
316-256-3000



FORMATION TOPS

FORMATION	LOG TOPS	
	Depth	Datum
B/Stone Corral	443'	+1327
Tarkio	2445'	-675
Howard	2670'	-900
Topeka	2774'	-1004
Heebner Shale	3068'	-1298
Lansing	3254'	-1484
Stark Shale	3476'	-1706
Hushpuckney Shale	3506'	-1736
BKC	3534'	-1764
Kinderhook SH	3626'	-1856
Viola	3700'	-1930
Simpson	3820'	-2050
RTD	3860'	-2090
LTD	3856'	-2086



COMMENTS

Contractor: WW RIG #4
Tool Pusher: DUSTIN DAY
Surface Casing: 8 5/8" SET AT 168', Cement by Basic.
Production Casing: 5 1/2" set at 3820', Cemented by QES Services
Mud by: MudCo
DST's by: DIAMOND TESTING
Logs by: Weatherford (DIL, CN-CD, ML, SON)
ROP and GAS by PASON
RTD=3860'
LTD=3856'

Curve Track 1

ROP (min/ft)

GAS



MD

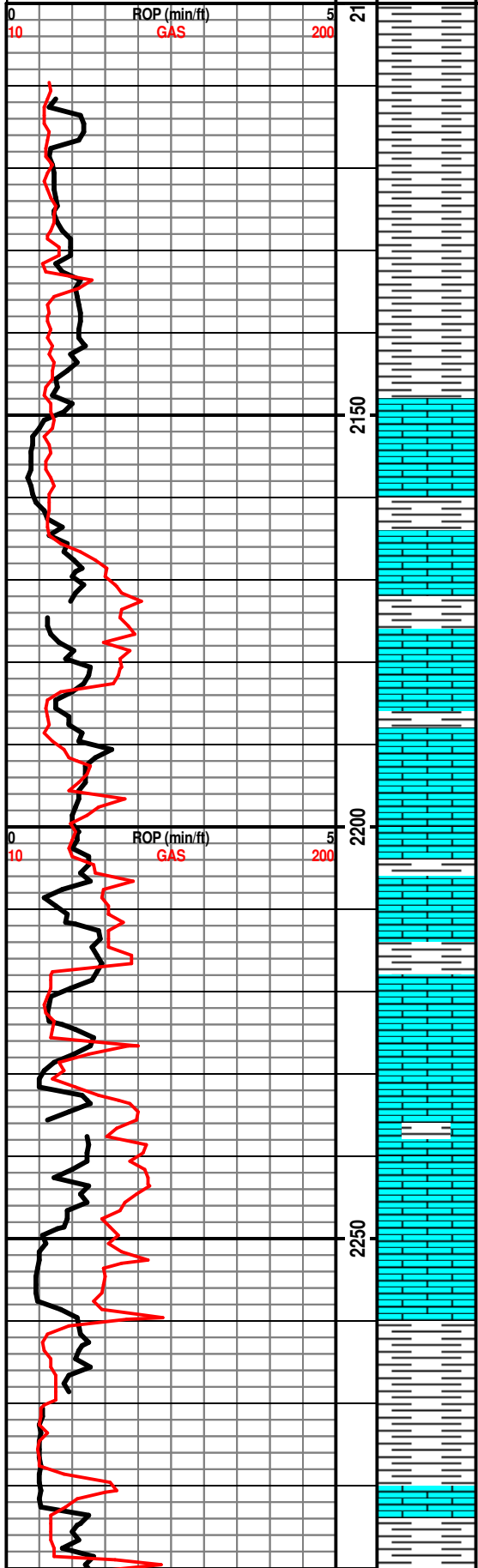
Lithology

CFS Point

Oil Shows

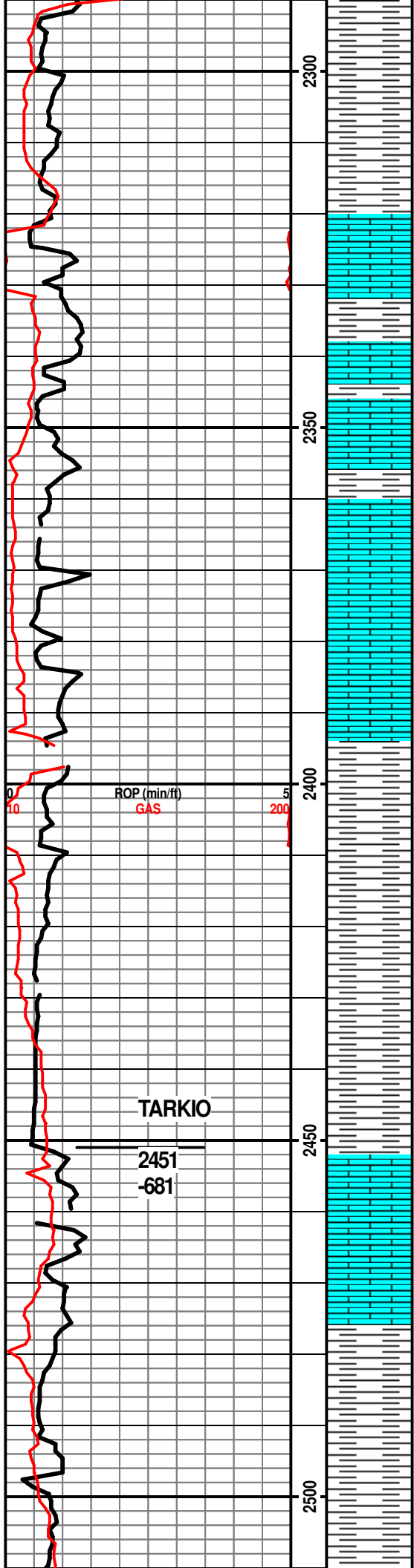
Geological Descriptions

Remarks



Base Stone Corral = 442, datum 1327
 Chase Group = 1501, datum 269

 9/15/2018, MIRT
 9/16/2018, Drilled out, at 11am, 168'
 9/17/2018, Drilling at 1598'
 9/18/2018, Drilling at 2715'
 9/19/2018, Drilling at 3485'
 9/20/2018, DST #1 at 3780'
 9/21/2018, Logging at 3860'
 9/22/2018, Running 5 1/2" casing



2400 sample: Mostly silty gray shales, med to dark gry, a few ss clusters, fn gm, friable.

Mostly the same, influx of red shales, some anhydrite, few gyp xtls.

SH-med to drk gry, blocky, waxy, some silty, some SH-red, muddy, some LS-lt gry, med xln, mottled, soft, few anhy and gyp xtls.

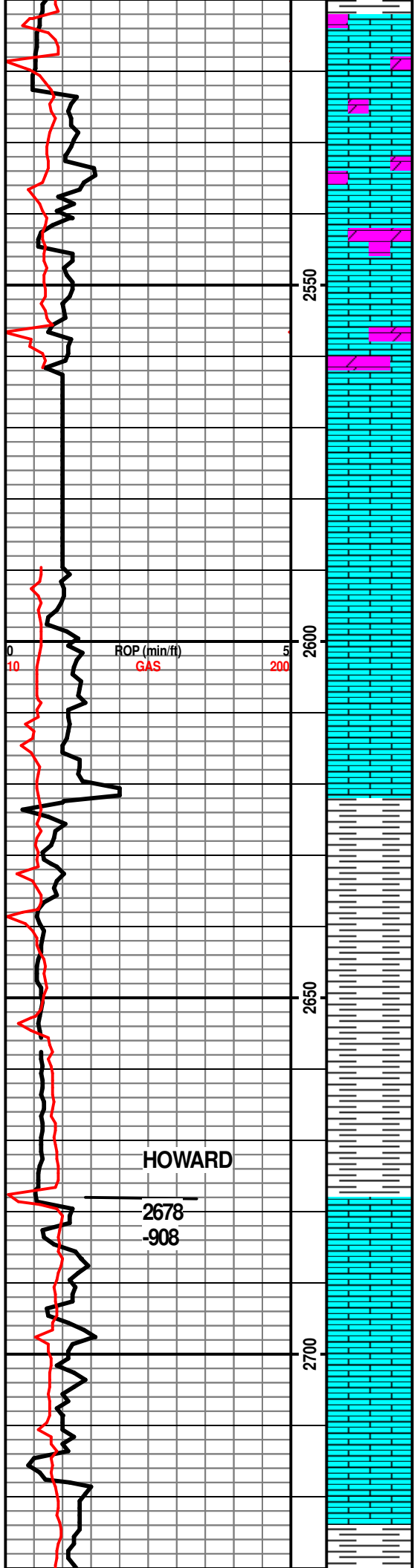
same

SH's mostly as above, some rounded, soft, sticky.

2500 sample: LS-lt gry/tan, fn-med xln, some grainy/gritty, abun foss-crin, few chalky, soft matrix, easy crush, rare fr vug por, no cup odr, no show.

same LS's, lt gry/tan, soft, brittle, SH's as above, mostly drk gry, some silty.

predom same as above, few chips of DOLO-lt tan, dense, med hard, no por, still coming some anhy and gyp xtls



Still carrying some anhydrite and gypsum crystals.

LS-crm, fn xln to sparry, abun foss-large fusulinids, few chalky, scat int xln (chalky) porosity, few chips of DOLO as above, lots of drk shales, no cup odor.

LS's and DOLO's as above.

2600 sample: sharp decr in LS, mostly dark shales, some LS-drk brown, foss, dense, med crush, no vis por, no cup odor, no show.

same

LS's, some drk brown, crs xln, foss, mottled, dense, med crush, some LS-lt gry/tan, fn xln, chalky, easy crush, abund drk gry shales, few chips anhy/gyp, no cup odr, no show.

influx lt gry mudstone, very soft, sticky, incr evap minerals, some LS, mostly as above, well preserved fusulinid fossils, no por, no cup odor, no show.

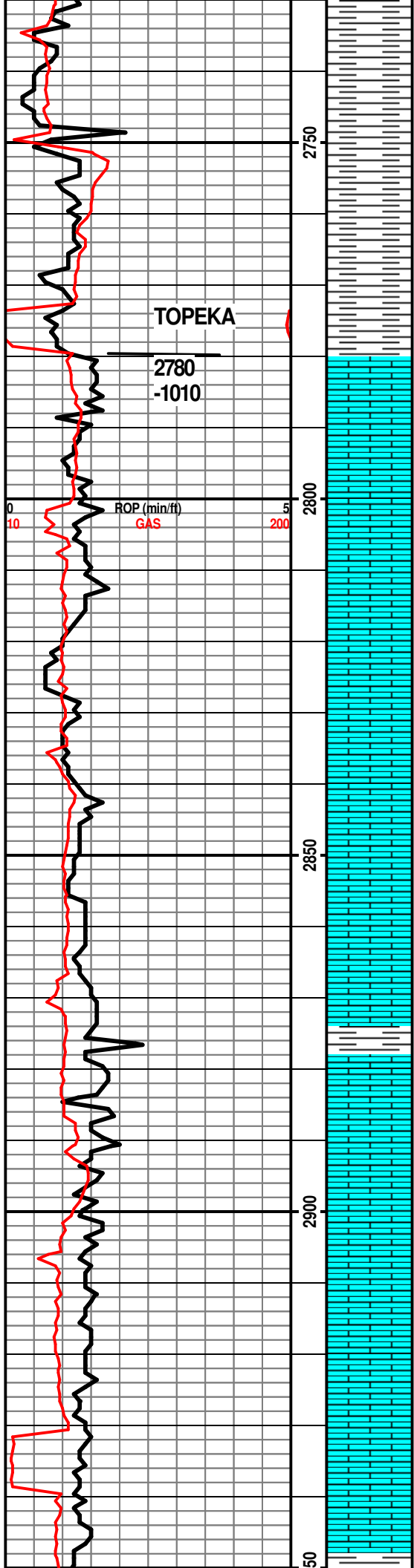
sharp incr red SH's, abund evap minerals.

2700 sample: as above, decr in red SH's.

LS-crm, lt tan, fn xln, chalky, mostly uniform matrix and texture, some mottled, lot of SH's as above, decr in evap mins, no cup odor.

LS-lt tan, few dark tan, fn xln, mostly uniform as above, some mottled/foss, few chips of CHERT, no cup odor, no vis por, no show.

LS-lt tan, few dark tan, fn xln, mostly uniform as above, no cup odor, no vis



por, no show

LS- as above, Foss-coral/fusulinids

2800 sample: LS-lt tan, fn xln, foss, brittle, easy crush, no cup odr, ns.

TOPEKA

2780
-1010

LS-lt tan, fn xln, chalky in part, med crush, no vis por, no cup odr, ns.

LS- mostly as above, influx LS-drk brown, mottled, foss-crin/fus, no cup odr, no por, ns.

same LS's foss, chalky.

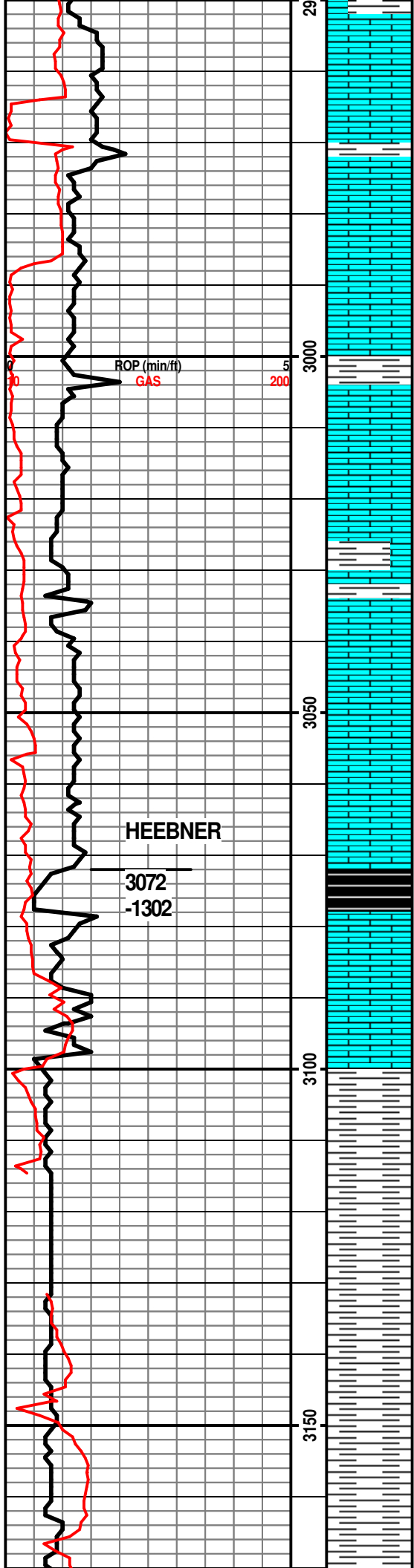
same LS's, influx SH-drk gry to black, brittle, fissile, few frags of evap minerals as above, no cup odr, no por, ns.

LS's, mostly lt tan/crm, fn xln, some chalky, some brittle, few chips of fresh CHERT, abund foss-brach/coral/fus/crin, no cup odr, no por, ns.

LS-as above, darker tan, abund foss, scat int foss por, some chalky int xln por, no cup odr, no show.

LS-lt gry/crm, fn xln, chalky, foss, soft, brittle, easy crush, scat in xln por, no cup odr, ns.

same: slt incr sharp CHERT, no cup odr, no por, ns.



3000 sample: sharp increase in fissile dark gry to black SH, no cup odr.

SH- as above, lighter gry, influx of some blocky red SH, no cup odr, ns.

LS-lt tan/crm, chalky in part, foss, rare pr int xln (chalky) por, soft, easy crush, no cup odr, no show

LS-crm, mottled in part, uniform in part, some foss, influx of abund anhy and gyp minerals, no cup odr, no show

LS-med tan, fn xln sparry, mottled, abund foss, some chalky, some hard and brittle, some spotty mineral staining in pr int xln por, does not fluor, no cup odr, no show

3050 sample: LS-mottled tn, chalky matrix, abund drk brn gilsonite staining, does not fluor, cuts in acetone bright blue, no cup odr, no show of free oil.

LS-as above, decr staining, abund foss, no cup odor, no show free oil.

LS-as above, continues with gilsonite staining in por int xln, chalky porosity, no cup odor, no show free oil.

same, decr staining, no cup odr, no fluor, no show free oil.

Same: no HEEB in 3090 sample, no cup odor, abund gilsonite, no show free oil.

LS-predom med tan, hard, dense, mostly uniform, few foss, some LS-crm/lt tan, chalky, foss, still carrying a small amount of gilsonite, abund gry shale, no HEEB in 3100 sample.

LS's same as above, few chips of HEEB in 3110 sample.

HEEB abund in 3120 sample, blk, carb, fissile, brittle bleeding gas bubbles, no cup odor, no show free oil.

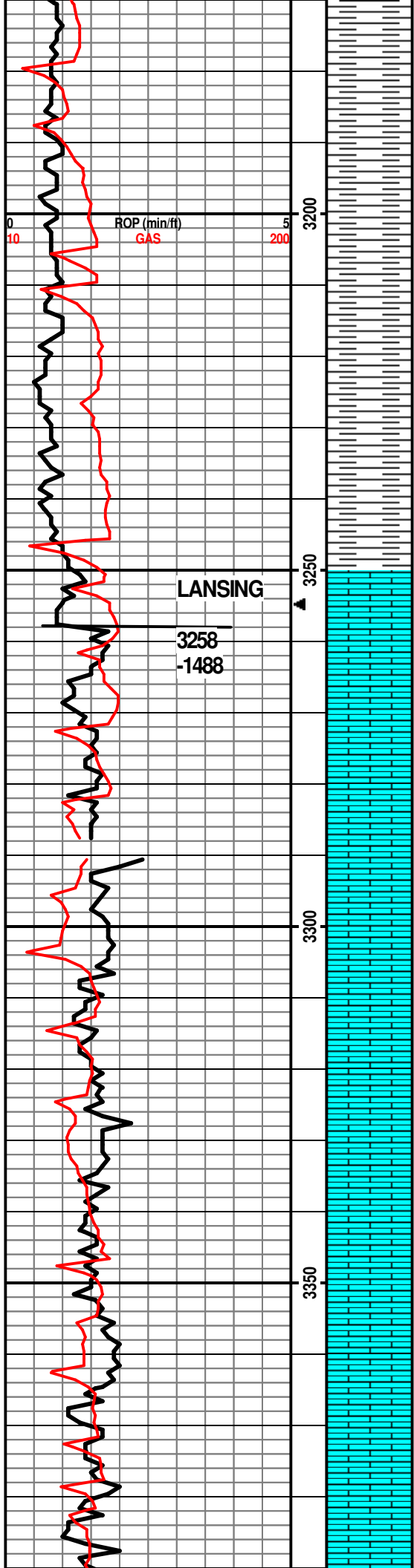
Several LS's- some med to lt tan to crm, some lt tan/crm, hard, brittle, uniform, some chalky, mottled, foss, lots of HEEB shale in 3140 sample, influx of brn/red waxy SH, no cup odor, no show

LS's as above, still carrying abund HEEB shale.

LS-med tan, fn xln, dense, hard, abund foss- brach/spic/ crin, some chalky, mealy, mottled, pr int xln por in a few pcs, few pcs LS-drk tan, mottled, foss, brittle, hard, no cup odor, no fluor, no show.

3200 sample: LS's as above, SH's, lt-dry gry, varicolored, red/brown, few gm, no cup odor, ns.

LS-predom mottled tan, foss, flakey in part, chalky in part, SH's as above, no cup odor, no show



No change, predom SH's as above

No change

LS-med tan, fn xln, mottled, foss, brittle, no vis por, no cup odr, no show, SH's as above.

SH-drk gry to black, not carb, less red/brown, no cup odor, no show.

SH- as above, increase proportion of red/bm, lighter gray, less black.

LANSING

3258
-1488

LS-lt tan/crm, fn-med xln, sparry, brittle, foss, no por, influx of small amount of CHERT-gry, opaque. SH's as above, no cup odor, no show.

LS-crm, lt gry, fn xln, some uniform, chalky, some mottled, foss, sparry, no cup odor, no por, no fluor, no show.

LS-med tan, fn xln, dense, brittle, hard, mostly uniform, some foss, no cup odor, no por, no show.

SS-lt blu/gray, silty, muddy, very fine grained, well sorted, mica, no cup odor.

LS-mostly lt tan/crm, some med tan, fn xln, all mottled, foss, chalky to dense/brittle, no por, no cup odor, no show.

LS-lt tan, fn xln, some chalky, some dense/brittle, more uniform than above, decr foss, no por, no cup odor, no show.

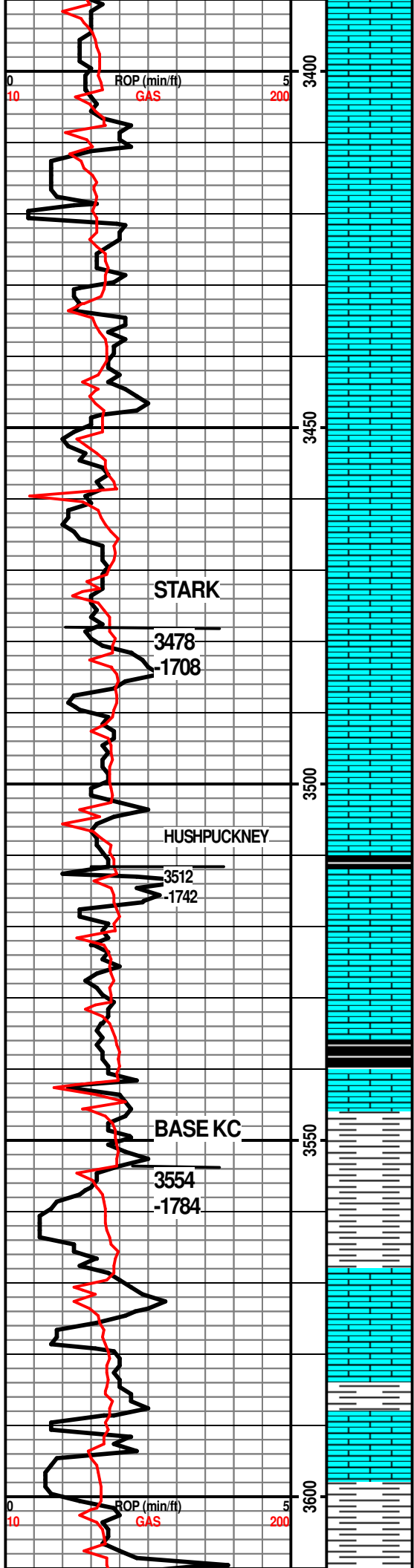
LS's as above, no change, no cup odor, no vis por, no show.

LS-lt gry, lt tan, fn xln, dense, hard, difficult crush, few chips oolitic, int ool por is filled with calcite, no cup odr, no fluor, no vis por, no show.

LS's as above, rare drk mineral stain in por int xln (chalky) por, no cup odr, no fluor, no vis por, no show.

LS-med tan, fn xln, dense, hard, no cup odr, no fluor, no vis por, no show.

Several LS's-LS-lt-med tan, dense, hard uniform, LS-med tan, v foss-bryz/crin/brach, LS-lt gry, mealy, chalky, foss, no cup odr, no fluor, no vis por, no show.



LS's as above, inf, influx CHERT -gry opaque to milky, transl, all sharp/fresh, no cup odr, no fluor, no vis por, no show

LS-predom lt tan/gry, fn xln, uniform, hard, brittle, incr CHERT as above, no cup odr, no fluor, no vis por, no show

LS-med tan/gry, fn xln, uniform, mostly hard, dense, brittle, some chalky, decr CHERT as above, no cup odr, no fluor, no vis por, no show

LS- as above, no cup odr, no fluor, no vis por, no show

LS-lt gry/tan, fn xln, dense, hard, tough, difficult crush, mostly uniform, some foss, rare ool, sparry, rare ooc, sparry, rare good ooc por, no cup odor, no fluor, no show.

LS-as above, few chips with black mineral staining along frac faces and stylolites, weak blu fluor on cut with acetone, no cup odor, no show free oil

LS-med tan, fn xln, mostly dense/hard, some uniform, some v foss, rare CHERT, no cup odr, no fluor, no vis por, no show.

LS's as above, incr chalk, no cup odr, no fluor, scat int xln (chalky) por, no show.

Several LS's, fn xln, uniform, some foss, some chalky, incr milky CHERT, some SH-gry, no carb SH, no cup odr, no fluor, no vis por, no show.

no change, no carb blk shale in 3510 sample

LS-lt tan, fn xln, mostly uniform, few foss, rare CHERT, rare chalky, no carb shale in 3520 sample, no cup odr, no fluor, no vis por, no show

Few chips black carb shale in 3530 sample, no cup odr, no fluor, no vis por, no show.

LS's same as above, light colored, dense, hard, brittle, mostly uniform, rare foss, rare CHERT, no cup odr, no fluor, no vis por, no show.

LS-med tan, vfn xln, dense, brittle, hard, foss-bryz/crin no cup odr, no fluor, no vis por, no show

LS's as above, no cup odr, no fluor, no vis por, no show

LS-predom lt tan, fn xln, mostly uniform, some v foss, few chalky, SH's lt to drk gry, gm, no cup odr, no fluor, no vis por, no show.

LS's as above, dense, hard, incr SH's, gry/gm, no cup odr, no fluor, no vis por, no show

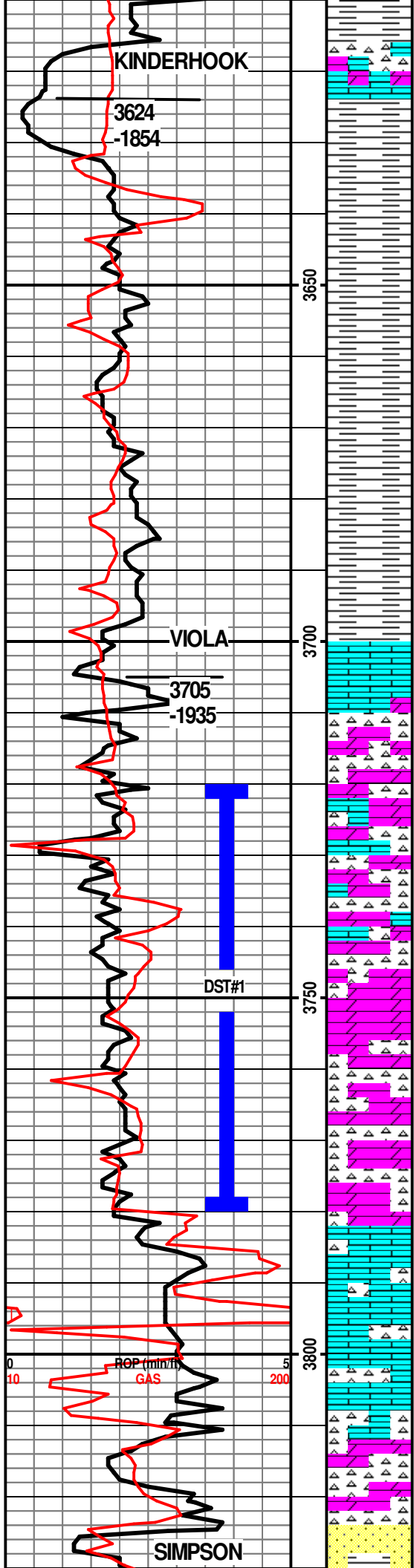
LS-crm tan, fn xln, dense, hard, some ool/foss, some uniform, no cup odr, no fluor, no vis por, no show.

LS-lt tan, fn xln, dense, hard, brittle, mostly uniform, some v foss, few chips CHERT, few chips of carb blk SH, no cup odr, no fluor, no vis por, no show.

LS's as above, incr in various SH's, drk gry, blk, lt gry, some green, some red/brown, waxy, no cup odr, no fluor, no vis por, no show.

no change, no odor.

no change, no odor.



LS-predom lt gry/tan, fn xln, dense, med hard, some uniform, some foss/ool-fus, some chalky, sample is about 50% SH, and of the SH's about 50% drk lt gry, 50% red/brown, rare (1-2 chips per tray) DOLO-lt tan, fn xln, foss, dense, no por, rare CHERT-milky, fresh, 1-2 chips per tray in the 60min sample with poor porosity and vssfo, no cup odr.

30min- as above, influx abun CHERT- orange, milky, sharp, fresh, one chip of milky CHERT had one tiny bright blue spot of fluor, otherwise no cup odr, no fluor, no vis por, no show free oil.

3680sample had several (3-4) pcs per tray of CHERT as above with a sso, Predom LS- lt tan/cm, crs xln in part, foss in part, no cup odr, no fluor.

3690sample: Predom SH-gry/gm, about 30% red/brown, most waxy, blocky, no blk carb, no cup odr, no fluor, no vis por, no show.

3700sample predom SH's as above, still carrying an occasional chip of CHERT with vssfo, no cup odr, no fluor.

SH-predom drk gry, some red/brown, vari col, no cup odr, no fluor, no vis por, no show

SH-as above, no cup odr.

SH-as above

LS-lt tan/cm, fn xln, med hard, mostly uniform, no por, no cup odr, no show.

3750 sample, influx CHERT, mostly fresh, sharp, still carrying lot of SH as above, some LS as above, cup has faint petr odor, rare CHERT with poor porosity with vssfo.

3760sample flood of CHERT, mostly fresh, sharp, several pcs/tray with fair vuggy por filled with xln DOLO with sso to fsfo, good staining in all vugs in the dry samples, obvious petr odor to sample cup.

CHERT- milky, sharp, fresh, as above, decr in show.

30min, CHERT as above, increase in cup odor, several pcs of weathered milky chert with slight show dark free oil.

60min, CHERT as above, decr in cup odor, influx of LS-lt cm, fn xln, soft/chalky, some hard/dense, no por, very faint cup odor, vssfo in rare pcs of CHERT.

3790 and 3800 Sample mostly SH's, lt to drk gry, some red/bm, CHERT mostly white/milky as above, some orange, none with por or show, no cup odr, no fluor, no vis por, no show.

SH's as above, drk gry, varicolored, influx of LS-wht, fn to med xln, uniform, med hard, rare int xln por, few chips milky CHERT, no cup odr, no fluor, no vis por, no show.

SH-drk gry/gm, waxy, some fissile, LS-as above, incr CHERT, milky, sharp, few clusters of SS, gray, dirty, fn grained, well sorted, rounded, rare glauconite, some have tiny flecks of dark brown mineral-gilsonite? Does NOT cut in acetone, abund pyrite, no cup odr, no fluor, no vis por, no show.

SS-dirty gry, fn grained, well sorted, rounded, flecks of dark mineral, biotite? will NOT cut in acetone, same LS's and SH's as above, no cup odr, no fluor, no vis por, no show.

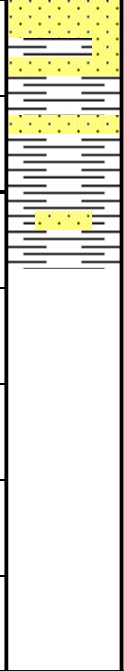
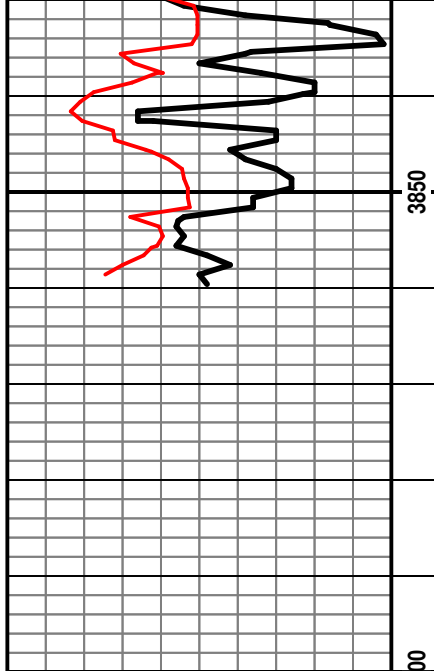
**CFS 3650
60mins**

**DST #1
VIOLA
3720'-3780'
30-60-60-90
REC:
1777' GIP
50' SOCM
SIP:
517-479#
FP:
20-38, 22-32**

**CFS 3780
60mins**

Circ after DST#1 for 30min, went back to drilling, cleaned out sample box 15 mins after started drilling.

Survey at 3780 was 2.5 deg off. Took 10klbs off of bit when back to drilling after test. WOB = 30klbs



no vis por, no show.

3850 sample: 90% drk SH's, decr SS clusters, decrease LS's, no cup odr, no fluor, no vis por, no show.

Stop Sample 3860 same, decr in SS.

30 min: same

60min: same, incr in SS-dirty gry as above.

Added 5klbs to bit at 3835
WOB 35klbs

**TOTAL DEPTH
3860 FT**