LeBlanc
Petroleum Geologist

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GEOLOGICAL REPORT

(35629)

COMPANY PETROLEUM DEVELOPMENT CO.

LEASE CROSS BELL FARMS 1-21

FIELD WTR

LOCATION 2186 FNL & 1220 FWL

SECTION 21 TOWNSHIP 22S RANGE 35W

COUNTY KEARNY STATE KANSAS

API: 15-093-21975

ELEVATIONS

KB 3084 FEET

DF 3082 FEET

GL 3073 FEET

MEASUREMENTS ARE ALL FROM: KB

CASING

9 5/8" AT 1665'

5½" NEAR 4700'

CONTRACTOR MURFIN DRLG RIG 21 (30606)

COMMENCED DRILLING WED. 7-17-19

COMPLETED DRILLING SAT. 7-27-19

RTD 4950 FEET LTD 4948 FEET

MUD UP AT 3425 FEET MUD TYPE CHEMICAL

ELOG SUITES

CNCD/PE
DUAL INDUCTION
MICROLOG
SONIC

SAMPLES SAVED FROM 3600 FEET TO 4950 FEET

DRILLING TIME KEPT FROM 3500 FEET TO 4950 FEET

SAMPLES EXAMINED FROM 3600 FEET TO 4950 FEET

GEOLOGICAL SUPERVISION FROM 3425 FEET TO 4950 FEET

NOTES: MUD SYSTEM-MUD-CO, INC., SURF CSG CMT-HURRICANE SVC., WATER-WELL, FUEL-BAINTER SVC, GAS DETECTOR MBC LOGGING AND LEASING, DSTS-TRILOBITE TSTG, LOGGING-ELI WL SVC., PROD CSG CMT-HURRICANE SVC.

CORES-NONE

Remarks: THE PET. DEV. CO. CROSS BELL FARMS 1-21 WAS DRILLED AS AN EXTENSION TO THE WTR POOL. SUBSURFACE GEOLOGY AS WELL AS 3D SEISMIC DEVELOPED THE CROSS BELL FARMS LOCATION. TWO (2) DSTS WERE TAKEN EVALUATING SHOWS IN THE MM A BENCH AND THE MM FT SCOTT. RTD OF 4950 FT PENETRATED ABOUT 100 FT OF MSS. STL. WITH NO SHOWS. A DECISION WAS MADE TO RUN 5½" PROD. CSG NEAR 4700 FT FOR FURTHER EVALUATION

Ken LeBlanc

Daily Penetration
7 Am

Date	Depth
7-16-19	BEGIN MIRT
7-17-19	MIRT, RIG UP
	SPUD 730 pm
7-18-19	DRLG 1095'
7-19-19	1665-WOC, SET
	9 5/8 AT 1665'
7-20-19	1909-LOST 600 BBLS
7-21-19	DRLG 3175'
7-22-19	DRLG 3675'
7-23-19	DRLG 4043'
7-24-19	4390-DST 1
7-25-19	4450-CFS, DST 2
7-26-19	DRLG 4577'
7-27-19	RTD 4950 AT 7AM
	CFS 60', SHORT
	TRIP 20 STDS,
	CTCH 90', DROP
	SURVEY, TOOH S/LOGS
	ELI WL SVC. LOGGING
	AT 2:15 pm, FINISHED
	AT 630 pm.
	DECISION MADE
	TO RUN 5½" PROD.
	CSG NEAR 4100'

Bit Record

Number	Size	Make	Type	Depth Out	Feet	Hours
1	12 1/4	HTC	Q60 SF	1665	1665	19 1/4
2	7 7/8	HTC	GX22	1909	244	5 3/4
3	7 7/8	HTC	DP506	3425	1516	25½
4	7 7/8	HTC	GX22	4950	1525	88
	TOTAL BIT HOURS →				4950	138½

AVG. PENETRATION RATE: O-RTD: 35.74 FPH

GENERAL INFORMATION

RAN 39 JTS, 8 5/8" SURF CSG, TALLY 1650.21', SET AT 1665', CMTD W/635 SXS CLASS A 3% + 2% GEL PD AT 2:30 AM 7-19-19, CMT DID CIRC. BY HURRICANE SVC.

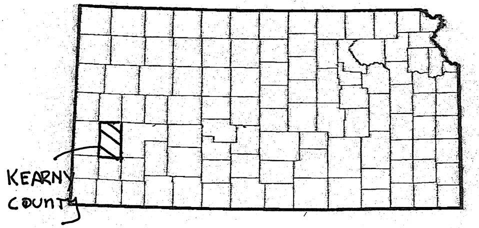
RIG MAKE: NATL 370, DBL, STEEL PITS
POWER: CAT C-16
PUMP: 1 EMSCO DB550, STROKE: 16", LINER: 6"
2 NATL K380, STROKE 14", LINER: 6"
POWER: CAT C-16
DP: 4½" XH, WT 16.6#/FT, OD: 6 1/4", ID: 2 1/4"
DC: 19-LENGTH 573.57', OD: 6 1/4", ID: 2 1/4"
RIG POWER: (2) DETROIT DIESELS SERIES 60

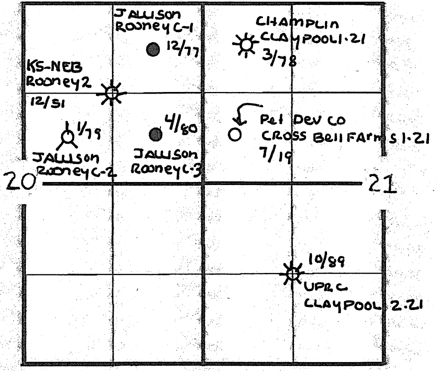
TOOL PUSHER: JUAN TINOCO

Formation Tops	Sample Tops	Corrected Sample Tops	Electric Log Tops	Subsea Datums
BASE SURFACE CASING	1665		1665	
B/HEEBNER SHALE	3813	3820	3813	-729
LANSING	3868		3862	-778
STARK SHALE	4196		4190	-1106
HUSH SHALE	4243		4248	-1164
BKC	4328		4323	-1239
MARMATON	4360	4355	4351	-1267
MM PAWNEELS	4437		4434	-1350
LABETTE SHALE	4464		4460	-1376
CHEROKEE SHALE	4486		4482	-1398
MORROW SHALE	4730		4725	-1641
MISS. ST. GEN	4820		4816	-1732
MISS. ST. LOUIS	4850		4850	-1766
RTD, LTD	4950		4948	-1864

Reference Well: UPRC CLAYPOOL 2-21 1250 FSL, 1250 FWL, 21-22S-35W

Kansas





Sec. 21 - T22S-R35W
Kearny County, Kansas

Legend

▨	Sandstone	▨	Limestone	▨	Chert	▨	Coal/ Carb. Shale
▨	Siltstone	▨	Dolomite	▨	Granite Wash	▨	Conglomerate
▨	Shale	▨	Anhydrite/ Gypsum	▨	Granite	▨	oolitic/ oomoldic

Drilling Rate Minutes/Foot 5 10	Depth	LITH-OLOGY	Sample Descriptions	SAMPLE %	Hot Wire Chromatograph 10u 25u 50u 75u 100u

① - CIRCULATE FOR SAMPLES
C - DRILL pipe connections

SHT AT 676' - 1/4°
1214' - 1/2°
1665' - 1/4°

MBC Logging; LEASING GAS DETECTOR OPERATIONAL AT 3425'

Geologist on location AT 3425'
DISPLACE MUD SYSTEM AT 3425'

1665 - WT 8.3, VIS NC
WL NC, CHL 100
LCM 0

1909 - WT 8.7, VIS 39
WL NC, CHL 22,000
LCM 30#

3290 - WT 9.7, VIS 36
WLNC, CHL 34,000
LCM 24#

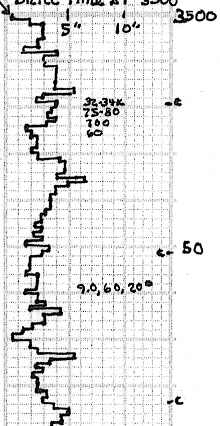
BEGIN one/1 FOOT DRILL TIME AT 3500'

DRLG W/BIT 4 HTC GX-22 in AT 3425', JETS 3-16's

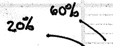
HW * LOST CIRCULATION AT 1665' - 200 BBLS HEALED W/14-16# MUD

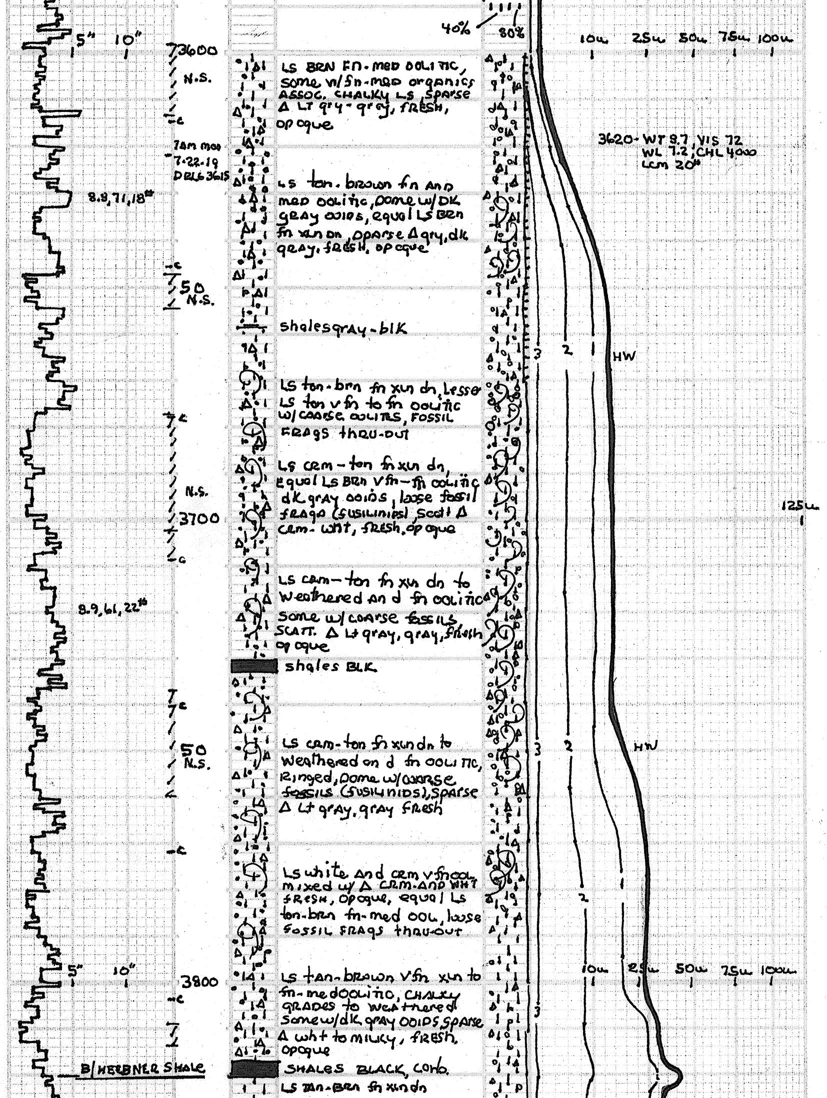
125u

* LOST CIRCULATION AT 1768' - 600 BBLS HEALED W/25-30# MUD



Sample %





LS BRN FN-MED OOLITIC, SOME W/FN-MED ORGANICS ASSOC. CHALKY LS SPARSE Δ LT GRY-GRAY, FRESH, OPAQUE

LS TAN-BROWN FN AND MED OOLITIC, SOME W/DK GRAY OOIDS, EQUAL LS BRN FN XLN DN, SPARSE Δ GRY, DK GRAY, FRESH, OPAQUE

shales gray-blk

LS tan-brn fn xln dn, lesser LS tan v fn to fn oolitic w/coarse oolites, fossil frags thru-out

LS crm-tan fn xln dn, equal LS BRN V FN-FN OOLITIC DK GRAY OOIDS, loose fossil frags (fusilinids), scatt Δ crm-wht, fresh, opaque

LS crm-tan fn xln dn to weathered and fn oolitic some w/coarse fossils scatt. Δ Lt gray, gray, fresh opaque

shales BLK

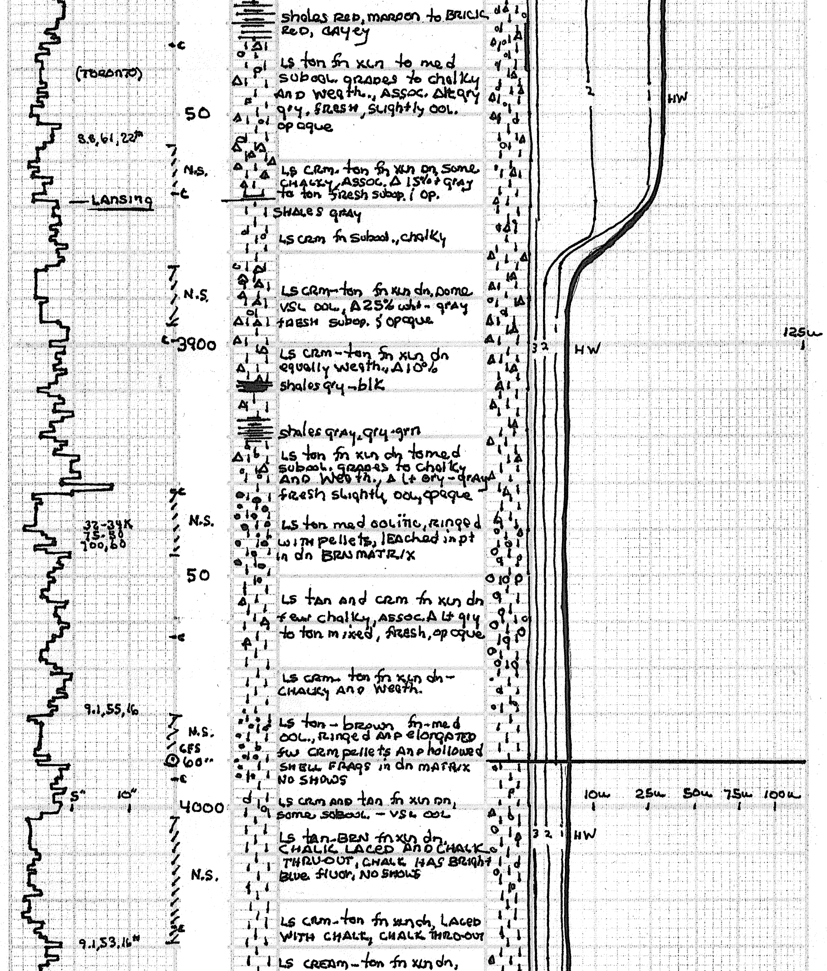
LS crm-tan fn xln dn to weathered and fn oolitic, ringed, some w/coarse fossils (fusilinids), sparse Δ Lt gray, gray fresh

LS white and crm v fn ool, mixed w/ Δ CRM AND WHT FRESH, OPAQUE, EQUAL LS tan-brn fn-med ool, loose fossil frags thru-out

LS tan-brown v fn xln to fn-med oolitic, chalky grades to weathered some w/dk gray ooids, sparse Δ wht to milky, fresh, opaque

SHALES BLACK, carb.

LS TAN-BRN fn xln dn



shales RED, maroon to BRICK RED, clayey

LS tan fn xln to med subool. grades to chalky AND weath., ASSOC. Δ lt gry gry, fresh, slightly ool. opaque

LS CRM. tan fn xln dn, some CHALKY, ASSOC. Δ 15%± gray to tan fresh subop. & op.

SHALES gray

LS crm fn subool., chalky

LS CRM-tan fn xln dn, some VSL OOL., Δ 25% wht - gray fresh subop. & opaque

LS CRM - tan fn xln dn equally weath., Δ 10%

shales gry - blk

shales gray, gry-grn

LS tan fn xln dn to med subool. grades to chalky AND weath., Δ lt gry - gray fresh slightly ool, opaque

LS tan med oolitic, ringed with pellets, leached in pt in dn BRN MATRIX

LS tan and crm fn xln dn few chalky, ASSOC. Δ lt gry to tan mixed, fresh, opaque

LS crm - tan fn xln dn - CHALKY AND weath.

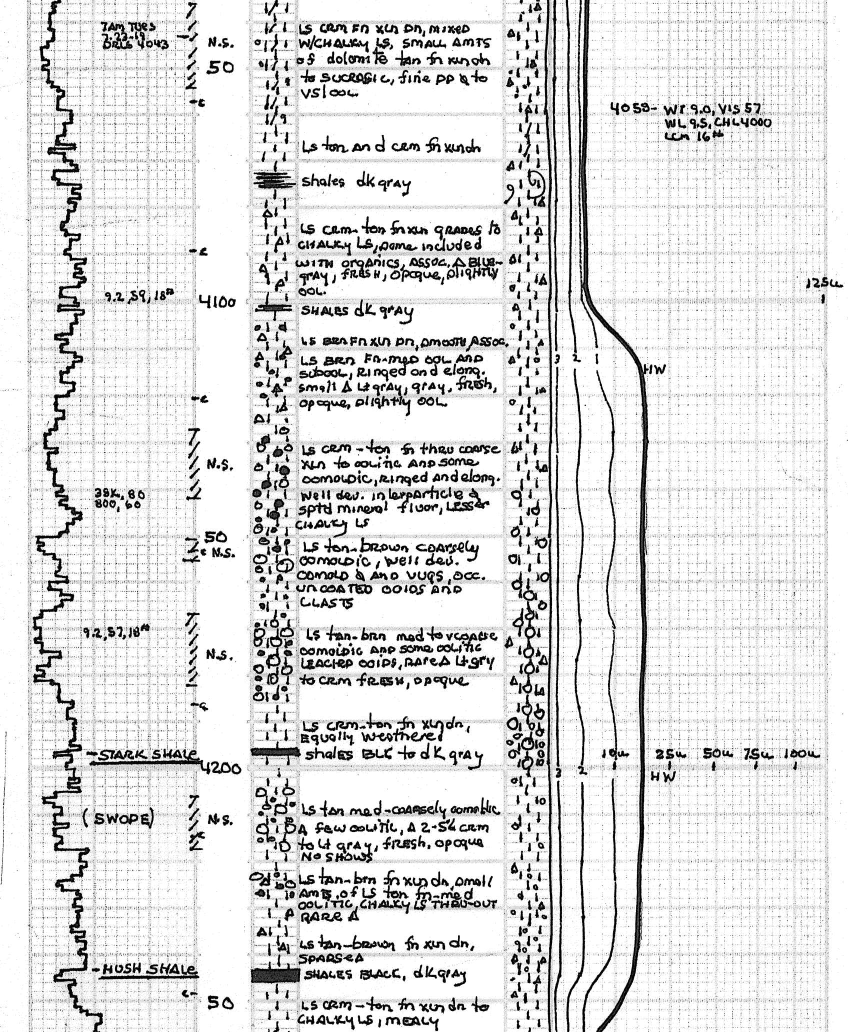
LS tan - brown fn-med OOL., ringed and elongated few CRM pellets and hollowed SHELL FRAGS in dn MATRIX NO SHOWS

LS crm and tan fn xln dn, some subool. - VSL OOL

LS tan-BRN fn xln dn, CHALK LACED AND CHALK THRU-OUT, CHALK HAS BRIGHT BLUE fluor, NO SHOWS

LS crm - tan fn xln dn, LACED WITH CHALK, CHALK THRO-OUT

LS CREAM - tan fn xln dn,



7AM TUES
7-23-19
DRLG 4043

50

LS CRM FN XLN DN, MIXED W/CHALKY LS, SMALL AMTS of dolomite tan fn xln dn to SUCROSIC, fine pp & to VSl OOL.

4059- WT 9.0, VIS 57
WL 9.5, CHL 4000
LCM 16#

LS tan and crm fn xln dn

shales dk gray

LS crm-tan fn xln grades to CHALKY LS, some included WITH organics, ASSOC. Δ BLUE-gray, FRESH, OPAQUE, SLIGHTLY OOL.

9.2, 59, 18#

4100

SHALES dK gray

LS BRN FN XLN DN, SMOOTH, ASSOC.

LS BRN FN-MED OOL AND SUBOOL, Ringed and elong. small Δ Lt gray, gray, fresh, opaque, slightly OOL.

LS crm - tan fn thru coarse xln to oolitic AND some oomoldic, Ringed and elong. Well dev. interparticle & sptd mineral fluor, LESSER CHALKY LS

38K, 80
800, 60

50

LS tan-brown coarsely oomoldic, well dev. oomold & AND VUGS, occ. UNCOATED OOIDS AND CLASTS

9.2, 57, 18#

LS tan-brn med to vcoarse oomoldic AND some oolitic LEACHED OOIDS, RARE Δ Lt gry to crm FRESH, opaque

LS crm-tan fn xln dn, Equally weathered

-STARK SHALE

shales BLK to dK gray

4200

(SWOPE)

LS tan med-coarsely oomoldic A few oolitic, Δ 2-5% crm to Lt gray, fresh, opaque NO SHOWS

LS tan-brn fn xln dn, small AMTS of LS tan fn-med OOLITIC, CHALKY LS THRU-OUT RARE Δ

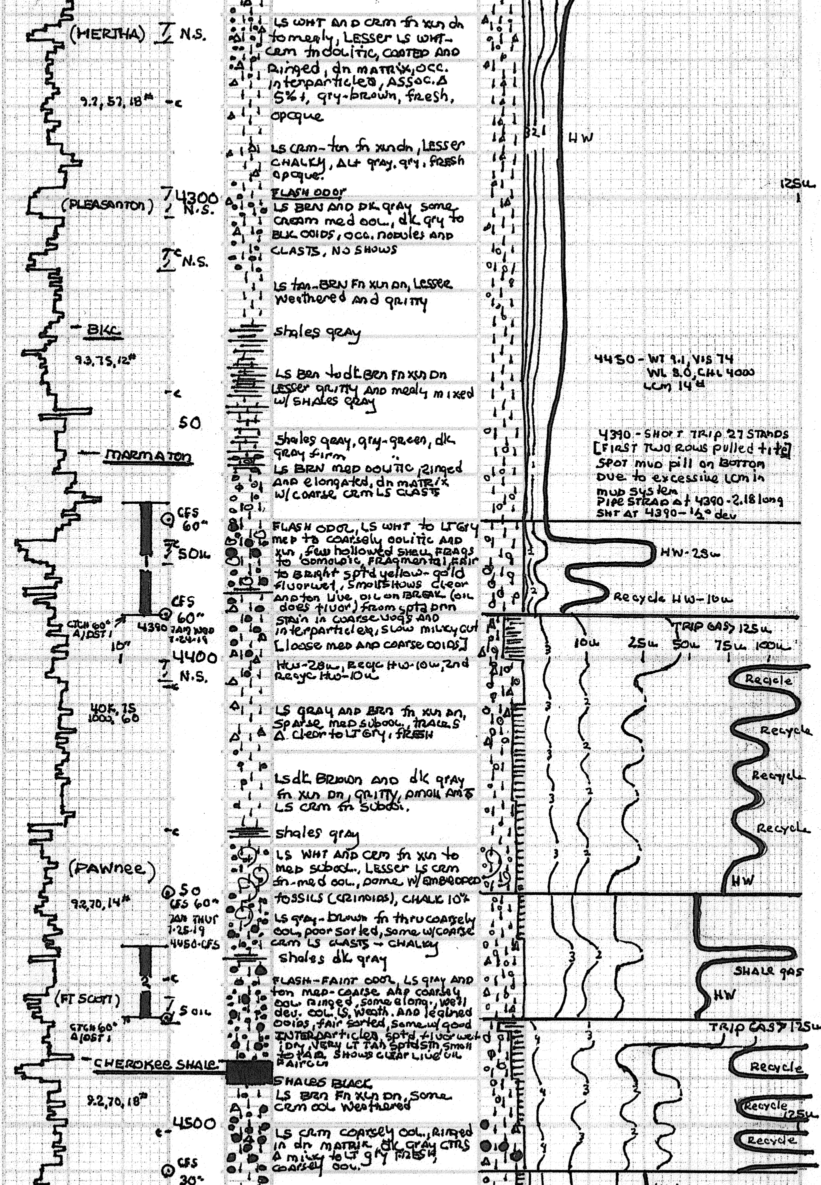
LS tan-brown fn xln dn, SPARSE Δ

-HUSH SHALE

SHALES BLACK, dK gray

50

LS crm-tan fn xln dn to CHALKY LS, MEALY



LS WHT AND CRM fn xln dn to mealy, LESSER LS WHT-CRM fn OOLITIC, COATED AND Ringed, dn MATRIX, OCC. interparticle Ø, ASSOC. Δ 5%±, gry-brown, fresh, opaque

LS CRM-tan fn xln dn, LESSER CHALKY, Δ Lt gray. gry. fresh opaque.

FLASH ODOR

LS BRN AND DK. gray some CREAM med OOL., dk gry to BLK OOIDS, OCC. NODULES AND CLASTS, NO SHOWS

LS tan-BRN Fn xln dn, Lesser weathered and gritty

shales gray

LS Brn to dk Brn fn xln dn Lesser gritty AND mealy mixed w/ SHALES gray

shales gray, gry-green, dk gray firm

LS BRN MED OOLITIC, Ringed AND elongated, dn MATRIX w/ COARSE CRM LS CLASTS

FLASH ODOR, LS WHT to LT GRY MED to COARSELY OOLITIC AND xln, few hollowed SHELL FRAGS to OOMOLDIC, FRAGMENTAL, FAIR to BRIGHT sptd yellow-gold fluor wet, small shows clear AND tan live OIL on BREAK (OIL does fluor) from sptd brn STAIN in COARSE vugs AND interparticle Ø, SLOW MILKY CUT [loose MED AND COARSE OOIDS]

HW-23u, Recyc HW-10u, 2nd Recyc HW-10u

LS GRAY AND BRN fn xln dn, Sparse MED SUBOOL., TRACES Δ clear to LT GRY, FRESH

LS dk BROWN AND dk gray fn xln dn, GRITTY, small AMTS LS CRM fn SUBOOL.

shales gray

LS WHT AND CRM fn xln to MED SUBOOL., LESSER LS CRM fn-med OOL., some w/ EMBEDDED fossils (CRINOIDS), CHALK 10%

LS gray-brown fn thru coarsely OOL., poor sorted, some w/ COARSE CRM LS CLASTS - CHALKY

shales dk gray

FLASH-FAINT ODOR, LS gray AND tan MED-COARSE AND COARSELY OOL. Ringed, some elong., well dev. OOL. LS, weath. AND leached OOIDS, fair sorted, some w/ good INTERPARTICLE Ø, sptd fluor wet, dry, VERY LT TAN sptd STN, small to FAIR SHOWS CLEAR LIVE OIL FAIR CUT

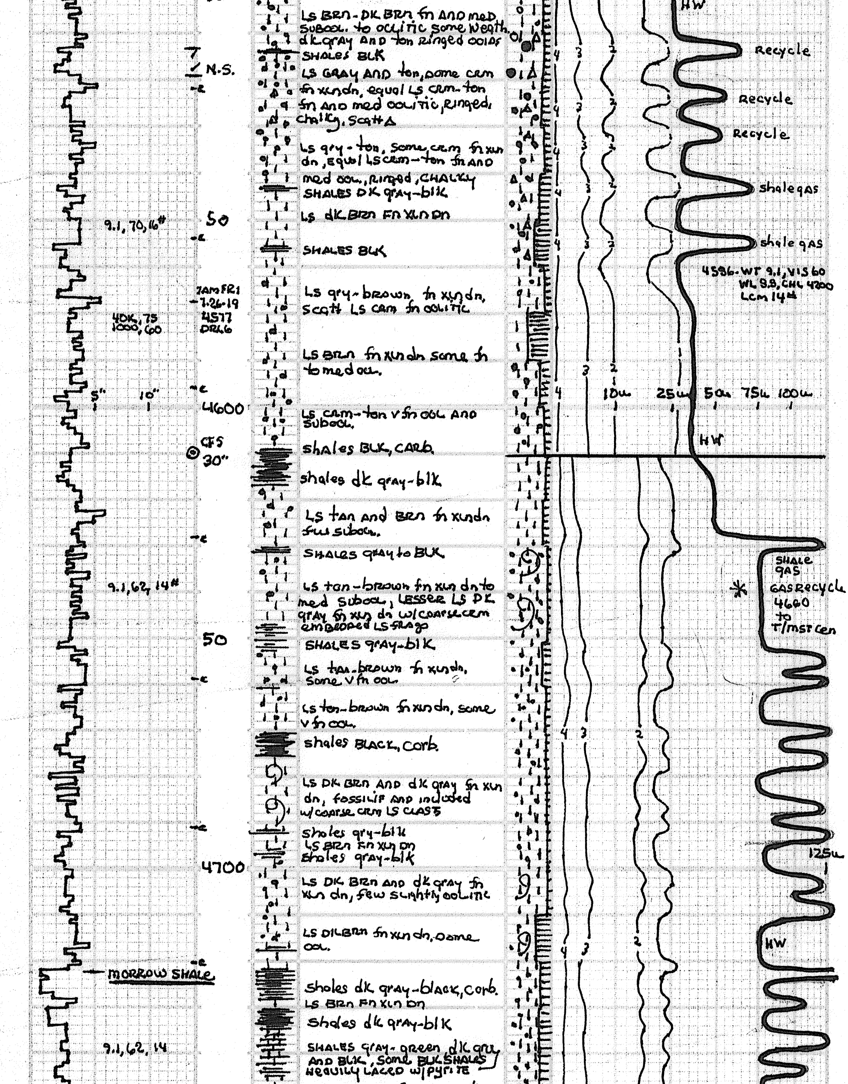
SHALES BLACK

LS Brn Fn xln dn, Some CRM OOL Weathered

LS CRM COARSELY OOL., Ringed in dn MATRIX, dk GRAY CTRS Δ milky to LT gry FRESH, coarsely OOL.

4450 - WT 9.1, VIS 74
WL 8.0, CHL 4000
LCM 14#

4390 - SHORT TRIP 27 STANDS
[FIRST TWO ROWS pulled tite]
SPOT MUD pill on BOTTOM
DUE to excessive LCM in
mud system
PIPE STRAP at 4390 - 2.18 long
SHT AT 4390 - ½° dev



LS BRN-DK BRN fn AND med SUBOOL. to OOLITIC some Weath. dk gray AND tan ringed ooids

SHALES BLK

LS GRAY AND tan, some crm fn xln dn, equal LS crm-tan fn AND med OOLITIC, RINGED, chalky, scatt Δ

LS gry-tan, some crm fn xln dn, equal LS crm-tan fn AND med ool., ringed, CHALKY

SHALES DK gray-blk

LS dK BRN FN XLN DN

SHALES BLK

4596-WT 9.1, VIS 60
WL 9.8, CHL 4200
LCM 14#

LS gry-brown fn xln dn, scatt LS crm fn oolitic

LS BRN fn xln dn some fn to med ool.

LS crm-tan v fn ool AND subool.

shales BLK, carb.

shales dk gray-blk

LS tan and Brn fn xln dn few subool.

SHALES gray to BLK.

LS tan-brown fn xln dn to med subool, LESSER LS DK gray fn xln dn w/coarse crm embedded LS frags

SHALES gray-blk

LS tan-brown fn xln dn, some v fn ool.

LS tan-brown fn xln dn, some v fn ool.

shales BLACK, carb.

LS DK BRN AND dk gray fn xln dn, fossilif AND included w/coarse crm LS CLASTS

shales gry-blk
LS BRN FN XLN DN
shales gray-blk

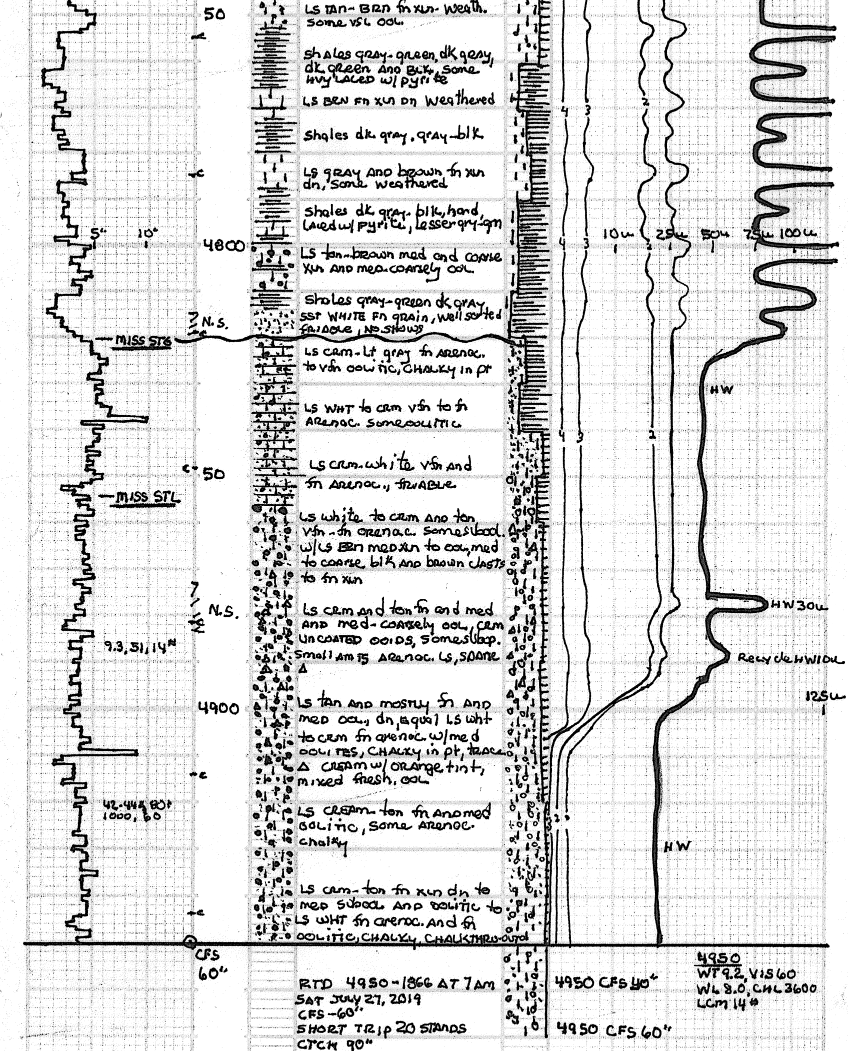
LS DK BRN AND dk gray fn xln dn, few slightly oolitic

LS DK BRN fn xln dn, some ool.

shales dk gray-black, carb.
LS BRN FN XLN DN

shales dk gray-blk

SHALES gray-green dk gry AND BLK, some BLK SHALES heavily laced w/pyrite



LS TAN- BRN fn xln- Weath. Some VSL OOL.

shales gray-green, dk grey, dk green and BLK, some hvy laced w/ pyrite

LS BRN fn xln dn Weathered

Shales dk. gray, gray-blk

LS gray and brown fn xln dn, some weathered

Shales dk gray-blk, hard, laced w/ pyrite, lesser gry-grn

LS tan-brown med and coarse xln and med-coarsely ool.

Shales gray-green dk gray

SST WHITE fn grain, well sorted friable, no shows

LS crm-lt gray fn arenac. to vfn oolitic, CHALKY in pt

LS WHT to crm vfn to fn arenac. some oolitic

LS crm-white vfn and fn arenac., friable

LS white to crm and tan vfn-fn arenac. some slool. w/ LS BRN med xln to ool, med to coarse blk and brown clasts to fn xln

LS crm and tan fn and med and med-coarsely ool, crm uncoated ooids, some slool. Small amts arenac. LS, sparse Δ

LS tan and mostly fn and med ool., dn, equal LS wht to crm fn arenac. w/ med oolites, CHALKY in pt, trace Δ cream w/ orange tint, mixed fresh, ool.

LS cream-tan fn and med oolitic, some arenoc. chalky

LS crm-tan fn xln dn to med slool. and oolitic to LS WHT fn arenoc. and fn oolitic, CHALKY, CHALK thru-out

RTD 4950-1866 AT 7AM
SAT JULY 27, 2019
CFS-60"
SHORT TRIP 20 STANDS
CTCH 90"

4950 CFS 40"

4950 CFS 60"

4950
WT 9.2, VIS 60
WL 8.0, CHL 3600
LCM 14#

DROP SURVEY
TOOH f/LOGS

ELI WL SVC. on location
AT 1:15 pm
Logging off BOTTOM
AT 2:15 pm
LTD 4948-1864
FINISHED Logging AT
630 pm 7-27-19
Decision made to Run
5½" PROD. Csg near
4700 FT

Drilling Rate Minutes/Foot 5 10	Depth	LITHOLOGY	Sample Descriptions	SAMPLE %	Hot Wire Chromatograph 10u 25u 50u 75u 100u

DST 1) 4366 - 4390

(Marmaton A Zone)

Times: 30-60-45-90

1st open: blow OBOB in 3 minutes - NO Gas to Surface
(blowback OBOB in 9 minutes, built to 42 inches)

2nd open: blow OBOB in 6 minutes - NO Gas to Surface
(blowback OBOB in 10 minutes, built to 36 inches)

Rec: 700' Gas in Pipe

280' Gassy Oil - GRAVITY 37 deg API
(40% gas, 60% oil)

150' Gassy Watery Mud Cut Oil
(30% gas, 30% oil, 20% water, 20% mud)

770' Slightly Mus Cut Water
(98% water, 2% mud - spots of oil)

1200' - Total Fluid - 275' in Drill Collars

Chlorides of mud system: 3,800 ppm
Chlorides of formation water: 80,000 ppm
Resistivity of formation water: 0.95 @ 72 deg F

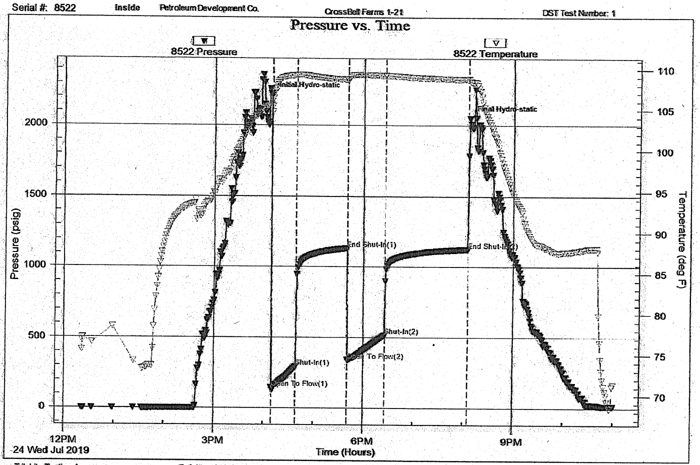
(Electronic Recorders)

IHYD: 2210 psig
IFP: 145-292 psig
IBHP: 1132 psig
FFP: 339-517 psig
FBHP: 1225 psig
FHYD: 2048 psig

TEMP: 109 degrees

Tester: Bradley Walter: Trilobite Testing, LLC, Scott City, KS District
NOTE: Conventional DST (dual packers, safety joint, electronic recorders, circulating sub, JARS)

NO bottom sampler



DST 1 - Chart

DST 2) 4462 - 4477

(Marmaton FT Scott)

Times: 30-60-60-90

1st open: blow built to 11.5 inches - NO Gas to Surface
(NO blowback)

2nd open: blow OBOB in 10 minutes NO Gas to Surface
(blowback to 3/4 inches)

Rec: 400' Gas in Pipe

80' Gassy Oil - GRAVITY 36 deg API
(40% gas, 60% oil)

150' Gassy Muddy Oil Cut Water
(20% gas, 20% oil, 50% water, 10% mud)

230' - Total Fluid - ALL in Drill Collars

Chlorides of mud system: 4,000 ppm
Chlorides of formation water: 16,000 ppm
Resistivity of formation water: 0.458 @ 76 deg F
Reserve Pit Chlorides: 25,000 ppm

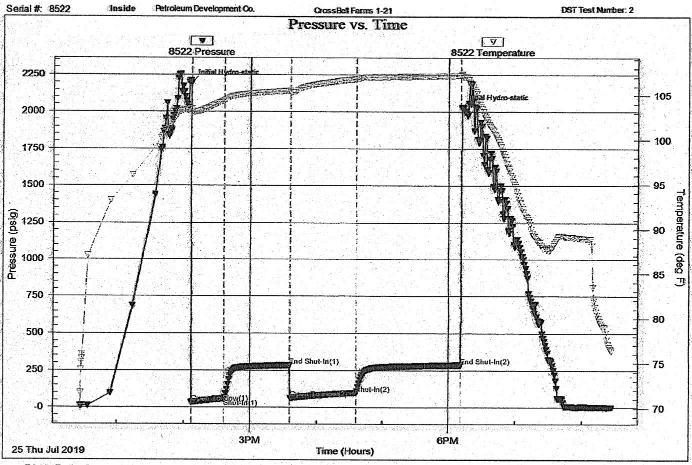
(Electronic Recorders)

IHYD: 2196 psig
IFP: 52-57 psig
IBHP: 283 psig
FFP: 62-97 psig
FBHP: 284 psig
FHYD: 2029 psig

TEMP: 107 degrees

Tester: Bradley Walter: Trilobite Testing, LLC, Scott City, KS District
NOTE: Conventional DST (dual packers, safety joint, electronic recorders, circulating sub, JARS)

NO bottom sampler



Trilobite Testing, Inc Ref. No: 64369

DST 2 - Chart

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