CATE LOGGING

P.O. Box 2041
Park City, Utah 84060

Operator APACHE CORPORATION **Area** LAKE VALLEY **Well No.** FED. 22-13
Apache-Frontier Expl.
Logged By Richard Maly & Clair Adams
County Lincoln **State** Nevada
Location Spot 2200' FNL 2100' FWL **Sec** 13 **Twp** 6N **Rge** 66E
Depth Logged 856' -- 6050' **Date Logged** 7-14-93 8-12-93
Spud Date JULY 11, 1993 **Elevations** GL 6033 KB 6046 **Total Depth** DRILLER 6050' SLM 6115' LOG 6116'

Abbreviations:

NB	New Bit
RR	Rerun
WOB	Weight On Bit
RPM	Rotary Rev/Min
PP	Pump Pressure
SPM	Pump Strokes/Min
NR	No Returns
BPS	Bypass Shaker
LC	Lost Circulation
LAT]	Logged After Trip
CO	Circulate Spls Out
CG	Connection Gas
TG	Trip Gas
DTG	Down Time Gas

Rock Types:

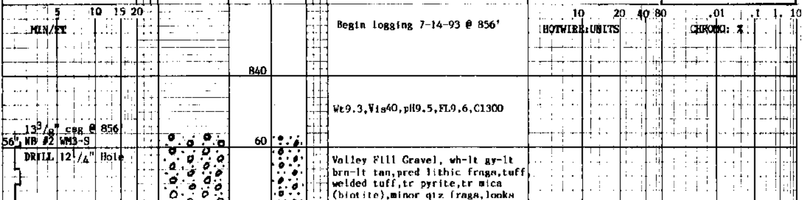
▦	Limestone
▨	Dolomite
▨	Anhydrite
▧	Gypsum
▦	Salt
⁘	Conglomerate
░	Sandstone
▤	Siltstone
▭	Shale
■	Coal
△	Chert
×	Igneous
∨	Volcanics
☐	

Accessories & Symbols:

B	Bentonitic
G	Glaucotitic
P	Pyritic
⊥	Calcareous
∠	Dolomitic
▬	Carbonaceous
∧	Siliceous
F	Fossiliferous
○	Oolitic
?	Very Poor Samples
☒	No Samples
┬	Drill Stem Test Interval
▯	Cored Interval
☐	

CAD Service April 19, 1993

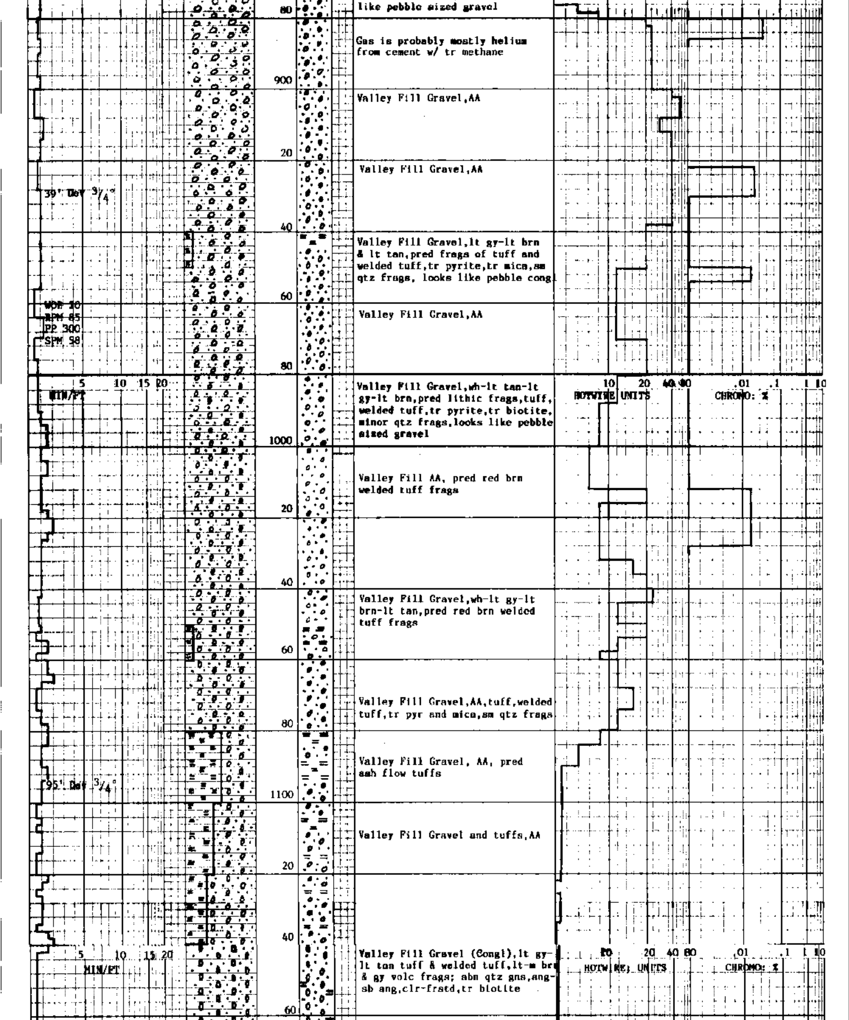
PENETRATION MINUTES/FOOT	CUT	LITHOLOGY PERCENTAGE	DEPTH	LITHOLOGY INTERPRETIVE	POROSITY	LITHOLOGIC DESCRIPTION	GAS LOG: HOT WIRE Total Gas —— Cuttings Gas - - - - Reported In Units	GAS LOG: CHROMATOGRAPH Methane —— Ethane - - Propane —·—·— ISO+Normal Butane —··— Reported In Percent



Begin logging 7-14-93 @ 856'

Wt9.3,Vis40,pH9.5,FL9,6,C1300

Valley Fill Gravel, wh-lt gy-lt brn-lt tan,pred lithic frags,tuff welded tuff,tr pyrite,tr mica (biotite),minor qtz frags,looks



like pebble sized gravel

Gas is probably mostly helium from cement w/ tr methane

Valley Fill Gravel,AA

Valley Fill Gravel,AA

Valley Fill Gravel,lt gy-lt brn & lt tan,pred frags of tuff and welded tuff,tr pyrite,tr mica,sm qtz frags, looks like pebble congl

Valley Fill Gravel,AA

Valley Fill Gravel,wh-lt tan-lt gy-lt brn,pred lithic frags,tuff, welded tuff,tr pyrite,tr biotite, minor qtz frags,looks like pebble sized gravel

Valley Fill AA, pred red brn welded tuff frags

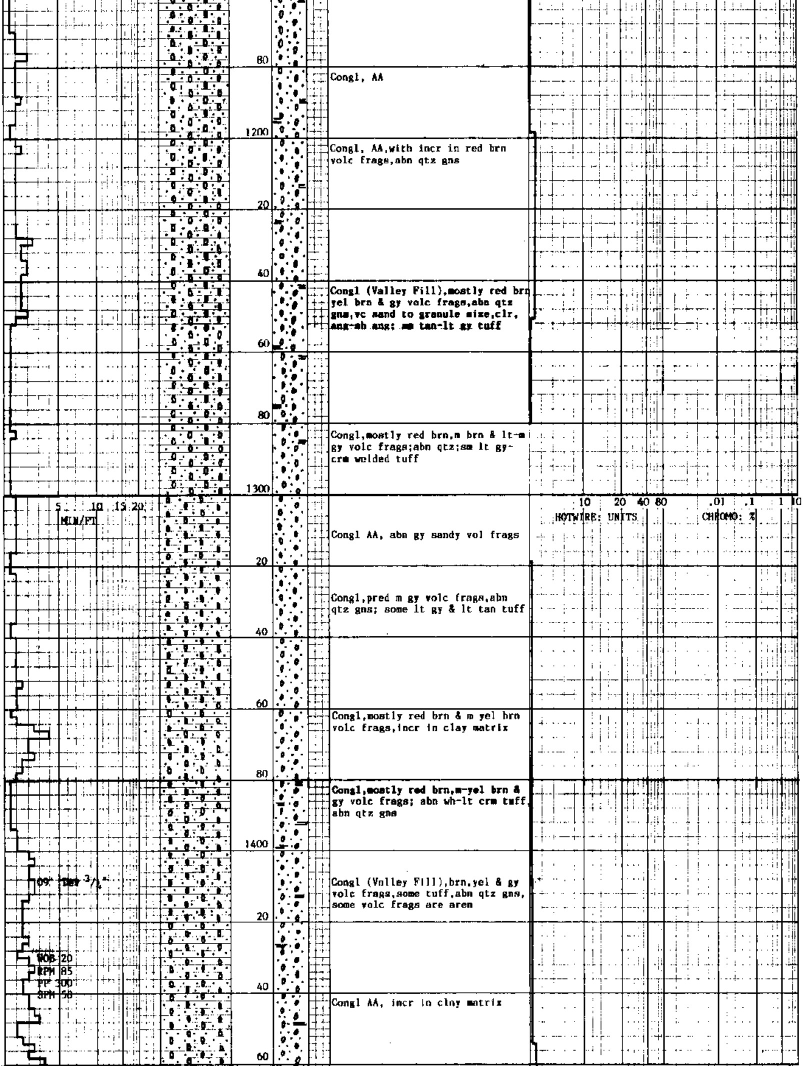
Valley Fill Gravel,wh-lt gy-lt brn-lt tan,pred red brn welded tuff frags

Valley Fill Gravel,AA,tuff,welded tuff,tr pyr and mica,sm qtz frags

Valley Fill Gravel, AA, pred ash flow tuffs

Valley Fill Gravel and tuffs,AA

Valley Fill Gravel (Congl),lt gy-lt tan tuff & welded tuff,lt-m brn & gy volc frags; abn qtz gns,ang-sb ang,clr-frstd,tr biotite



Congl, AA

Congl, AA,with incr in red brn volc frags,abn qtz gns

Congl (Valley Fill),mostly red brn yel brn & gy volc frags,abn qtz gns,vc sand to granule size,clr, ang-sb ang; sm tan-lt gy tuff

Congl,mostly red brn,m brn & lt-m gy volc frags;abn qtz;sm lt gy-crm welded tuff

Congl AA, abn gy sandy vol frags

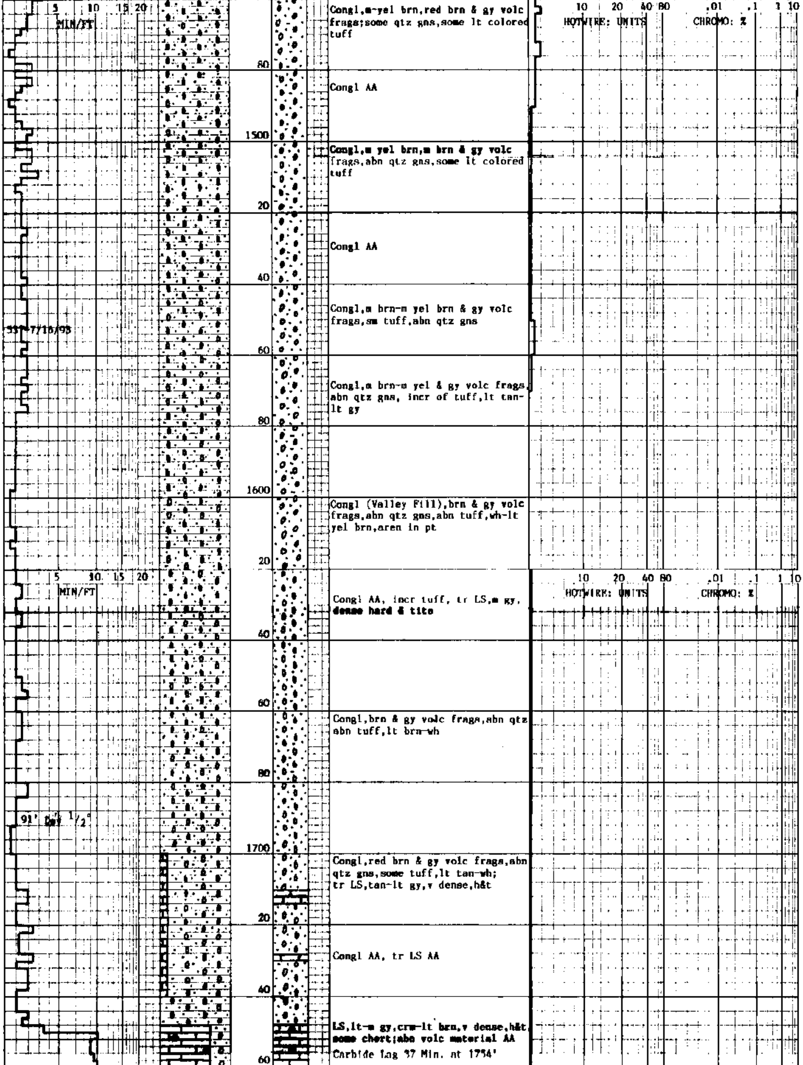
Congl,pred m gy volc frags,abn qtz gns; some lt gy & lt tan tuff

Congl,mostly red brn & m yel brn volc frags,incr in clay matrix

Congl,mostly red brn,m-yel brn & gy volc frags; abn wh-lt crm tuff, abn qtz gns

Congl (Valley Fill),brn,yel & gy volc frags,some tuff,abn qtz gns, some volc frags are aren

Congl AA, incr in clay matrix



Congl,m-yel brn,red brn & gy volc frags;some qtz gns,some lt colored tuff

Congl AA

Congl,m yel brn,m brn & gy volc frags,abn qtz gns,some lt colored tuff

Congl AA

Congl,m brn-m yel brn & gy volc frags,sm tuff,abn qtz gns

Congl,m brn-m yel & gy volc frags, abn qtz gns, incr of tuff,lt tan-lt gy

Congl (Valley Fill),brn & gy volc frags,abn qtz gns,abn tuff,wh-lt yel brn,aren in pt

Congl AA, incr tuff, tr LS,m gy, **dense hard & tite**

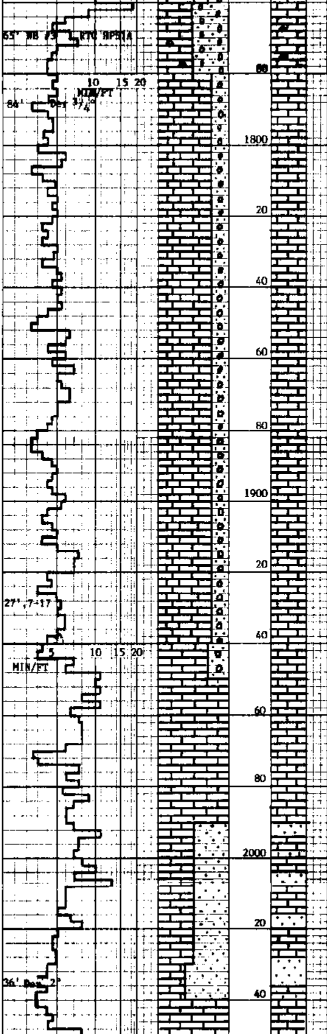
Congl,brn & gy volc frags,abn qtz abn tuff,lt brn-wh

Congl,red brn & gy volc frags,abn qtz gns,some tuff,lt tan-wh; tr LS,tan-lt gy,v dense,h&t

Congl AA, tr LS AA

LS,lt-m gy,crm-lt brn,v dense,h&t, some chert;abn volc material AA

Carbide lag 37 Min. at 1734'



LS,lt-m gy,micro xln to slty in p
v hdt; abn chert,lt-m gy brn;abn
volc frags AA

LS,lt-m gy,lt pnk-rd,crypt-micxln
pel i.p., tr grnstone tex,frm-hd,
sme cht, tr fe stn along frac,
poor por, NSFOC
Carbide Lag 38 Min. at 1785'

LS, lt - m gy, sme lt pnk-rdbrn,
crypt-micxln,tr mottled,tr s&p tex
sme cht,sli dol i.p.,tr pel i.p.,
frm-hd,dense, tr limonite frac
fill,tr grnstone i.p.

LS, A/A incr gray color

LS, wh, lt-m gy, sme lt pnk-rdbrn,
crypt-micxln, hd,dnse,tr mottled,
tr pel i.p., tr fe stn, NSFOC

WOB 20/25, RPM 80,PP500,SPM 80

Wt 9.0 Vis 34, Fl 8.4, pH 9.5

LS, lt-m gy, sme lt pnk, crypt-
micxln, tr fxln, tr mottled, sli
dol i.p.,sme cht,tr pel i.p.,
hd-dns, tr fe frac fill, NSFOC

LS, A/A NSFOC; sm Congl cavings

LS,lt-mbrn,lt-m gy,sm rd brn,mottled,hd-dns,incr calc frac fill
tr mnrl fluo
LS,m brn,sm lt brn,lt-m gy & pk
brn,micro xln;abn calc w/ mnrl
fluo

LS A/A incr lt brn & lt gy

LS A/A

WOB 20, RPM 80, PP 525, SPM 60

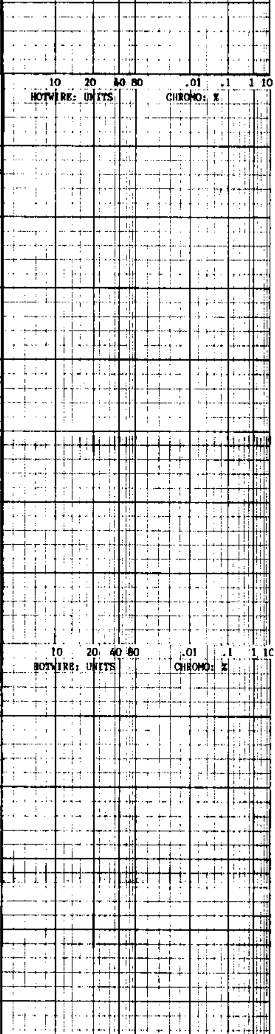
LS,m gy-gy brn,micro xln,decr lt-
m brn LS A/A,sm calc

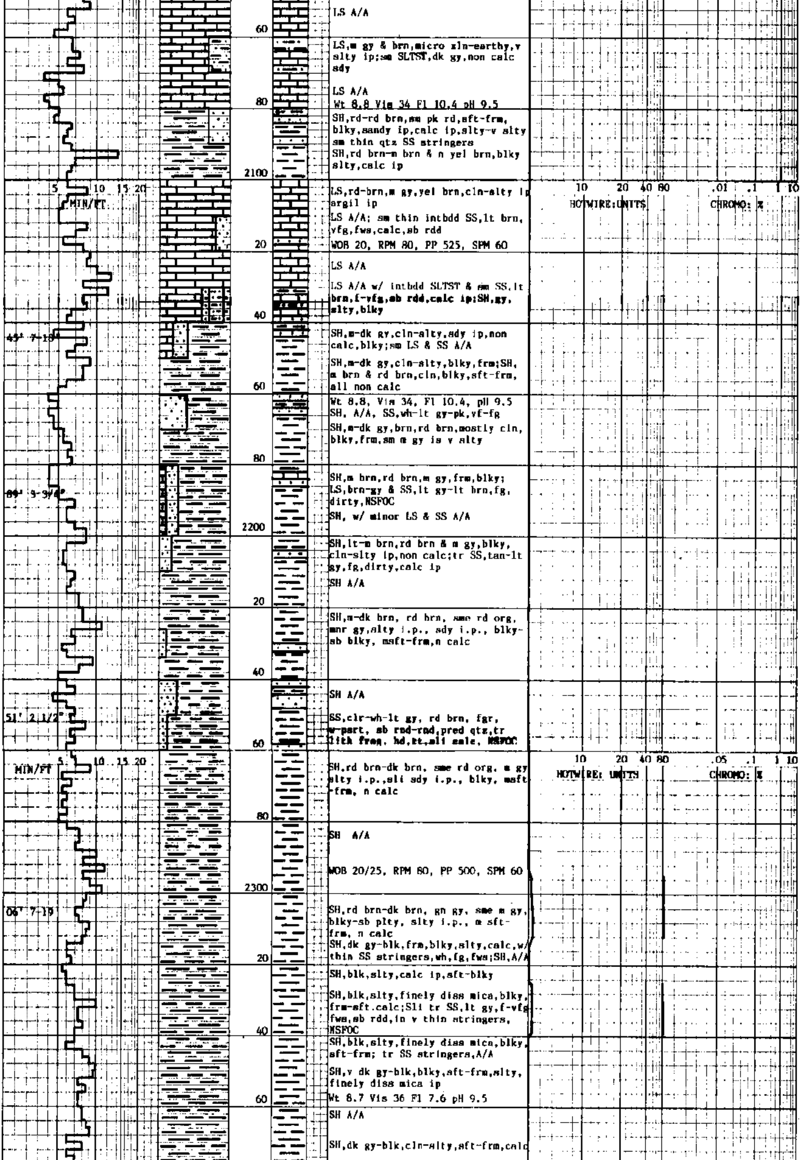
LS,m gy brn,m gy & lt pk brn,slty
to sdy,micro xln ip,tr calc;Abn
SS,lt brn,fg-vfg,fwn,arg ip NSFOC
Carbide Lag 41 Min. at 2004'
LS,lt-m gy,m gy-brn & lt brn,v
sdy ip;Abn SS,wh-lt & m brn,fg,
fwn,sb rdd,calc NSFOC
LS & SS A/A,spl cont abn clay,lt
pk tan,v sft

LS & intbdd SS A/A NSFOC

SS,lt-m brn,vf-fg,sb rdd,fwn,calc
LS,lt-m gy brn & brn,calcite

LS,m gy brn,pk brn,yel brn,arg &
slty ip





LS A/A

LS,m gy & brn,micro xln-earthy,v
slty ip;sm SLTST,dk gy,non calc
sdy

LS A/A
Wt 8.8 Vis 34 Fl 10.4 pH 9.5

SH,rd-rd brn,sm pk rd,sft-frm,
blky,sandy ip,calc ip,slty-v slty
sm thin qtz SS stringers
SH,rd brn-m brn & n yel brn,blky
slty,calc ip

LS,rd-brn,m gy,yel brn,cln-slty ip
argil ip
LS A/A; sm thin intbdd SS,lt brn,
vfg,fws,calc,sb rdd
WOB 20, RPM 80, PP 525, SPM 60

LS A/A

LS A/A w/ intbdd SLTST & sm SS,lt
brn,f-vfg,sb rdd,calc ip;SH,gy,
slty,blky

SH,m-dk gy,cln-slty,sdy ip,non
calc,blky;sm LS & SS A/A

SH,m-dk gy,cln-slty,blky,frm;SH,
m brn & rd brn,cln,blky,sft-frm,
all non calc

Wt 8.8, Vis 34, Fl 10.4, pH 9.5
SH, A/A, SS,wh-lt gy-pk,vf-fg
SH,m-dk gy,brn,rd brn,mostly cln,
blky,frm,sm m gy is v slty

SH,m brn,rd brn,m gy,frm,blky;
LS,brn-gy & SS,lt gy-lt brn,fg,
dirty,NSFOC
SH, w/ minor LS & SS A/A

SH,lt-m brn,rd brn & m gy,blky,
cln-slty ip,non calc;tr SS,tan-lt
gy,fg,dirty,calc ip
SH A/A

SH,m-dk brn, rd brn, sme rd org,
mnr gy,slty i.p., sdy i.p., blky-
sb blky, msft-frm,n calc

SH A/A

SS,clr-wh-lt gy, rd brn, fgr,
w-psrt, sb rnd-rnd,pred qtz,tr
lith frag, hd,tt,sli calc, NSFOC

SH,rd brn-dk brn, sme rd org, m gy
slty i.p.,sli sdy i.p., blky, msft
-frm, n calc

SH A/A

WOB 20/25, RPM 80, PP 500, SPM 60

SH,rd brn-dk brn, gn gy, sme m gy,
blky-sb plty, slty i.p., m sft-
frm, n calc
SH,dk gy-blk,frm,blky,slty,calc,w/
thin SS stringers,wh,fg,fws;SH,A/A

SH,blk,slty,calc ip,sft-blky

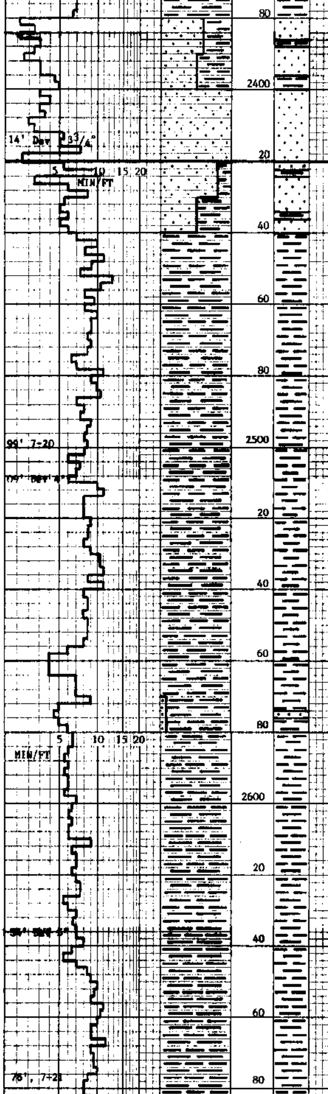
SH,blk,slty,finely diss mica,blky,
frm-sft.calc;Sli tr SS,lt gy,f-vfg
fws,sb rdd,in v thin stringers,
NSFOC

SH,blk,slty,finely diss mica,blky,
sft-frm; tr SS stringers,A/A

SH,v dk gy-blk,blky,sft-frm,slty,
finely diss mica ip
Wt 8.7 Vis 36 Fl 7.6 pH 9.5

SH A/A

SH,dk gy-blk,cln-slty,sft-frm,calc



SH,dk gy-blk,A/A;SS,lt gy-lt brn, **vfg-slty-dirty,h&t,sb rdd,NFSOC**

SS & SH A/A

SS,m gy,fg,fws,sb ang,v h&t,non calc,siliceous,sm dk gns,few brn gns,NSFOC

SS,lt gy,fg,fws,sb rdd-sb ang, silic,h&t,few dk gns;
SH,dk gy,slty,sft-frm,NSFOC

SS,lt-m gy, fgr, m-w srt, sb ang-sb rnd, sil cmt, sme qtz ovrgth, sme frost gr, v hd, tt, p por, NSFOC

SH.rd brn-m gy, blky,slty i.p., m sft-frm, non calc

Carbide Lag 48 Min. at 2446'

SH,dk gy-blk, blky-sb fiss,v slty, sli sdy ip., sli calc i.p., trpyr

SH, A/A

WOB 20/25, RPM 85, PP 500, SPM 60

SH, blk, blky-sb plty, vslty, sli sdy i.p., sli calc i.p.

SH,dk gy-blk,frm,blky,cln-slty ip, non calc

SH A/A w/ tr pyrite & bcm more slty w/ fine diss mica

SH A/A

Sh,dk gy-blk,cln,frm,blky,tr pyr

Wt 8.8 Vis 37 Fl 5.8 pH 9.5

SH A/A

SH,dk gy-blk,frm,blky,cln-slty ip, tr pyrite

SH A/A

SH A/A; tr SS,lt tan-lt gy,vf-fg, sb rdd-sb ang,sme blk & lt brn gns calc,NSFOC

SH, blk, blky-sb plty, sft-frm, v slty, tr sli sdy i.p., tr fn dessim mica, tr pyr, n-sli calc

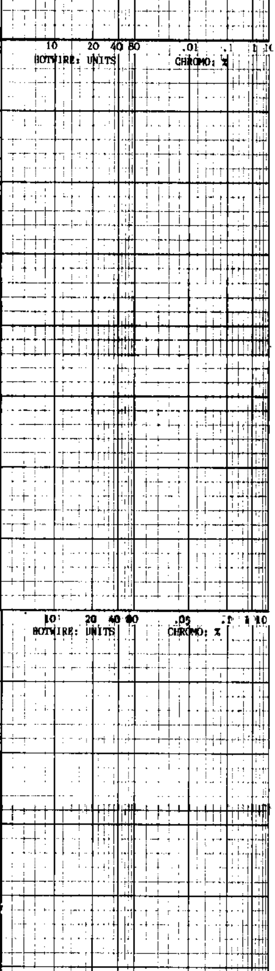
SH A/A decr sdy

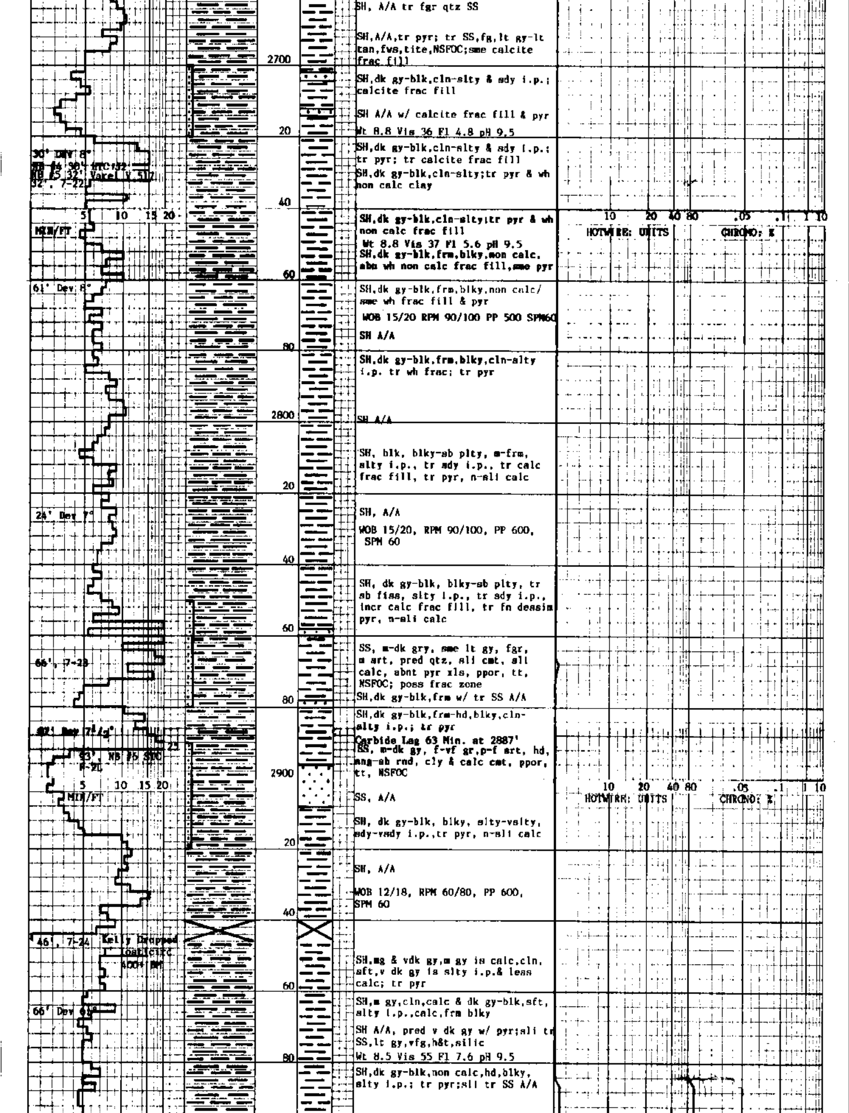
WOB 20, RPM 85, PP 550, SPM 60

SH, blk, sb blky-sb plty, v slty, tr sli sdy i.p., tr pyr, n-sli calc

SH, A/A tr fn dessim pyr

SH, dk gy-blk, blky-sb plty, v slty sft-m frm, tr fn dessim pyr, tr bent, n-sli calc





SH, A/A tr fgr qtz SS

SH,A/A,tr pyr; tr SS,fg,lt gy-lt tan,fws,tite,NSFOC;sme calcite frac fill

SH,dk gy-blk,cln-slty & sdy i.p.; calcite frac fill

SH A/A w/ calcite frac fill & pyr

Wt 8.8 Vis 36 Fl 4.8 pH 9.5

SH,dk gy-blk,cln-slty & sdy i.p.; tr pyr; tr calcite frac fill

SH,dk gy-blk,cln-slty;tr pyr & wh non calc clay

SH,dk gy-blk,cln-slty;tr pyr & wh non calc frac fill

Wt 8.8 Vis 37 Fl 5.6 pH 9.5

SH,dk gy-blk,frm,blky,non calc, abn wh non calc frac fill,sme pyr

SH,dk gy-blk,frm,blky,non calc/ sme wh frac fill & pyr

WOB 15/20 RPM 90/100 PP 500 SPM60

SH A/A

SH,dk gy-blk,frm,blky,cln-slty i.p. tr wh frac; tr pyr

SH A/A

SH, blk, blky-sb plty, m-frm, slty i.p., tr sdy i.p., tr calc frac fill, tr pyr, n-sli calc

SH, A/A

WOB 15/20, RPM 90/100, PP 600, SPM 60

SH, dk gy-blk, blky-sb plty, tr sb fiss, slty i.p., tr sdy i.p., incr calc frac fill, tr fn dessim pyr, n-sli calc

SS, m-dk gry, sme lt gy, fgr, m srt, pred qtz, sli cmt, sli calc, abnt pyr xls, ppor, tt, NSFOC; poss frac zone

SH,dk gy-blk,frm w/ tr SS A/A

SH,dk gy-blk,frm-hd,blky,cln-slty i.p.; tr pyr

Carbide Lag 63 Min. at 2887'

SS, m-dk gy, f-vf gr,p-f srt, hd, ang-sb rnd, cly & calc cmt, ppor, tt, NSFOC

SS, A/A

SH, dk gy-blk, blky, slty-vslty, sdy-vsdy i.p.,tr pyr, n-sli calc

SH, A/A

WOB 12/18, RPM 60/80, PP 600, SPM 60

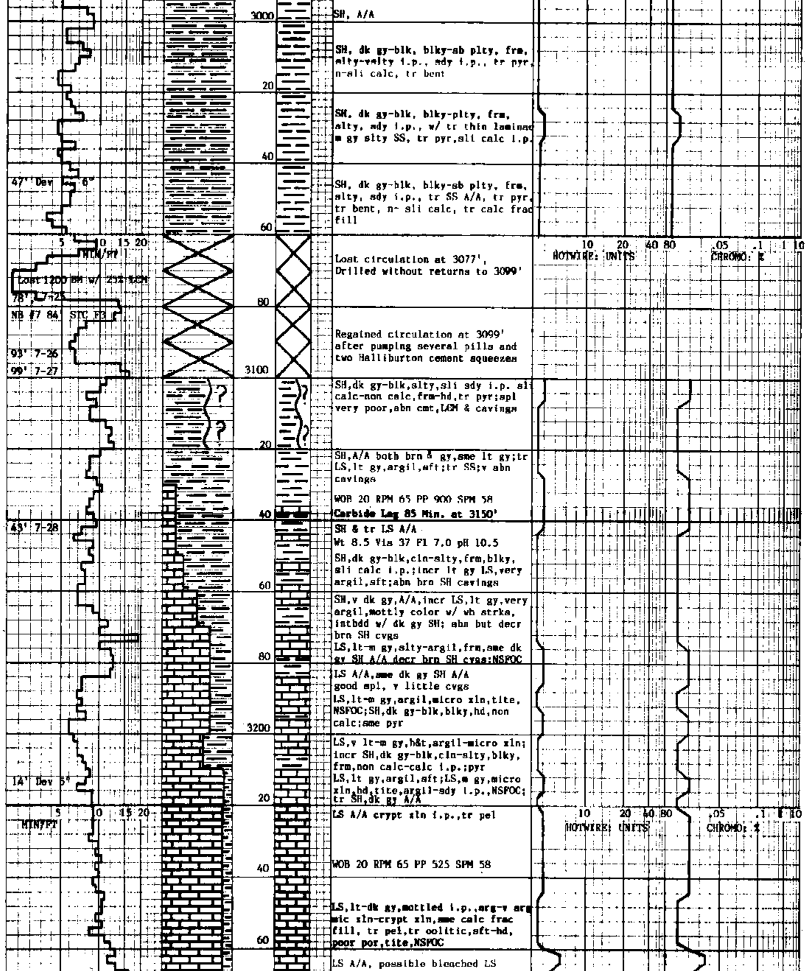
SH,mg & vdk gy,m gy is calc,cln, sft,v dk gy is slty i.p.& less calc; tr pyr

SH,m gy,cln,calc & dk gy-blk,sft, slty i.p.,calc,frm blky

SH A/A, pred v dk gy w/ pyr;sli tr SS,lt gy,vfg,h&t,silic

Wt 8.5 Vis 55 Fl 7.6 pH 9.5

SH,dk gy-blk,non calc,hd,blky, slty i.p.; tr pyr;sli tr SS A/A



SH, A/A

SH, dk gy-blk, blky-sb plty, frm, slty-vslty i.p., sdy i.p., tr pyr, n-sli calc, tr bent

SH, dk gy-blk, blky-plty, frm, slty, sdy i.p., w/ tr thin laminae m gy slty SS, tr pyr, sli calc i.p.

SH, dk gy-blk, blky-sb plty, frm, slty, sdy i.p., tr SS A/A, tr pyr, tr bent, n- sli calc, tr calc frac fill

Lost circulation at 3077', Drilled without returns to 3099'

Regained circulation at 3099' after pumping several pills and two Halliburton cement squeezes

SH, dk gy-blk, slty, sli sdy i.p. sli calc-non calc, frm-hd, tr pyr; spl very poor, abn cmt, LCM & cavings

SH, A/A both brn & gy, sme lt gy; tr LS, lt gy, argil, sft; tr SS; v abn cavings

WOB 20 RPM 65 PP 900 SPM 58

Carbide Lag 85 Min. at 3150'

SH & tr LS A/A

Wt 8.5 Vis 37 Fl 7.0 pH 10.5

SH, dk gy-blk, cln-slty, frm, blky, sli calc i.p.; incr lt gy LS, very argil, sft; abn brn SH cavings

SH, v dk gy, A/A, incr LS, lt gy, very argil, mottly color w/ wh strks, intbdd w/ dk gy SH; abn but decr brn SH cvgs

LS, lt-m gy, slty-argil, frm, sme dk gy SH A/A decr brn SH cvgs; NSFOC

LS A/A, sme dk gy SH A/A
good spl, v little cvgs

LS, lt-m gy, argil, micro xln, tite, NSFOC; SH, dk gy-blk, blky, hd, non calc; sme pyr

LS, v lt-m gy, h&t, argil-micro xln; incr SH, dk gy-blk, cln-slty, blky, frm, non calc-calc i.p.; pyr

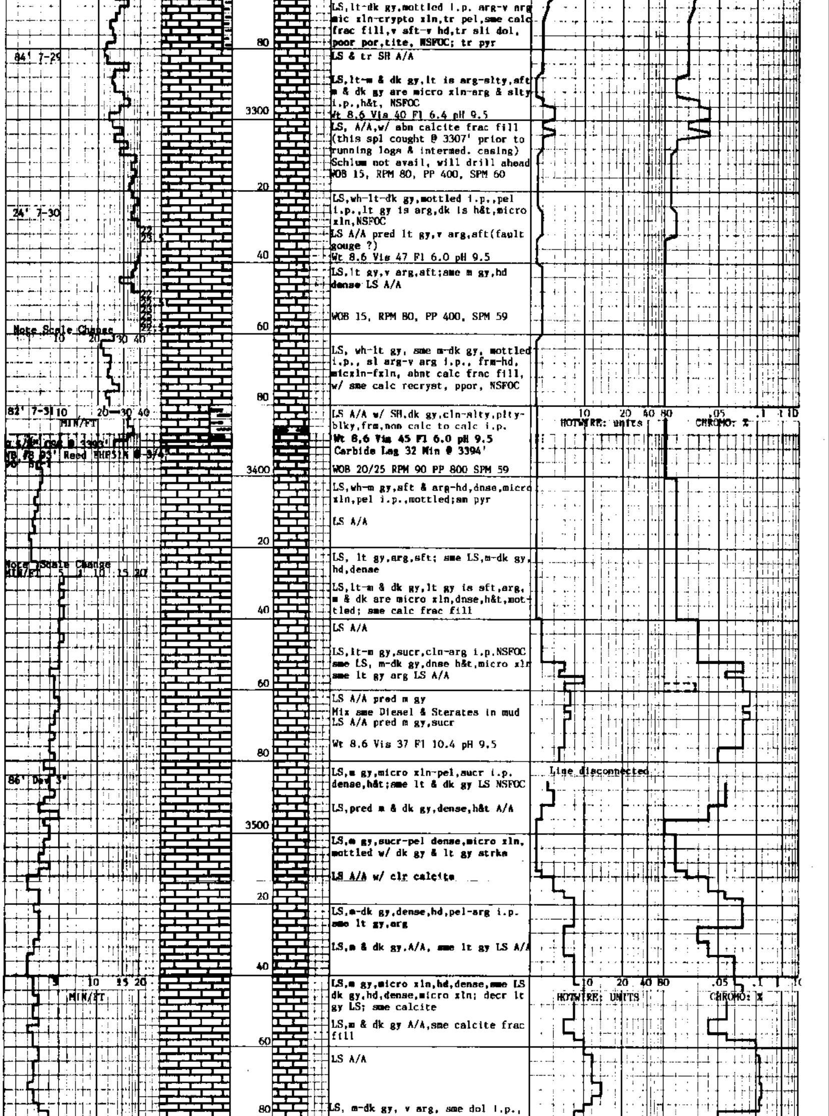
LS, lt gy, argil, sft; LS, m gy, micro xln, hd, tite, argil-sdy i.p., NSFOC; tr SH, dk gy A/A

LS A/A crypt xln i.p., tr pel

WOB 20 RPM 65 PP 525 SPM 58

LS, lt-dk gy, mottled i.p., arg-v arg mic xln-crypt xln, sme calc frac fill, tr pel, tr oolitic, sft-hd, poor por, tite, NSFOC

LS A/A, possible bleached LS



LS,lt-dk gy,mottled i.p. arg-v arg mic xln-crypto xln,tr pel,sme calc frac fill,v sft-v hd,tr sli dol, poor por,tite, NSFOC; tr pyr

LS & tr SH A/A

LS,lt-m & dk gy,lt is arg-slty,sft m & dk gy are micro xln-arg & slty i.p.,h&t, NSFOC

Wt 8.6 Vis 40 Fl 6.4 pH 9.5

LS, A/A,w/ abn calcite frac fill (this spl cought @ 3307' prior to running logs & intermed. casing)

Schlum not avail, will drill ahead

WOB 15, RPM 80, PP 400, SPM 60

LS,wh-lt-dk gy,mottled i.p.,pel i.p.,lt gy is arg,dk is h&t,micro xln,NSFOC

LS A/A pred lt gy,v arg,sft(fault gouge ?)

Wt 8.6 Vis 47 Fl 6.0 pH 9.5

LS,lt gy,v arg,sft;sme m gy,hd dense LS A/A

WOB 15, RPM 80, PP 400, SPM 59

LS, wh-lt gy, sme m-dk gy, mottled i.p., sl arg-v arg i.p., frm-hd, micxln-fxln, abnt calc frac fill, w/ sme calc recryst, ppor, NSFOC

LS A/A w/ SH,dk gy,cln-slty,plty-blky,frm,non calc to calc i.p.

Wt 8.6 Vis 45 Fl 6.0 pH 9.5
Carbide Lag 32 Min @ 3394'

WOB 20/25 RPM 90 PP 800 SPM 59

LS,wh-m gy,sft & arg-hd,dnse,micro xln,pel i.p.,mottled;sm pyr

LS A/A

LS, lt gy,arg,sft; sme LS,m-dk gy, hd,dense

LS,lt-m & dk gy,lt gy is sft,arg, m & dk are micro xln,dnse,h&t,mottled; sme calc frac fill

LS A/A

LS,lt-m gy,sucr,cln-arg i.p.NSFOC sme LS, m-dk gy,dnse h&t,micro xln sme lt gy arg LS A/A

LS A/A pred m gy

Mix sme Diesel & Sterates in mud

LS A/A pred m gy,sucr

Wt 8.6 Vis 37 Fl 10.4 pH 9.5

LS,m gy,micro xln-pel,sucr i.p. dense,h&t;sme lt & dk gy LS NSFOC

LS,pred m & dk gy,dense,h&t A/A

LS,m gy,sucr-pel dense,micro xln, mottled w/ dk gy & lt gy strks

LS A/A w/ clr calcite

LS,m-dk gy,dense,hd,pel-arg i.p. sme lt gy,arg

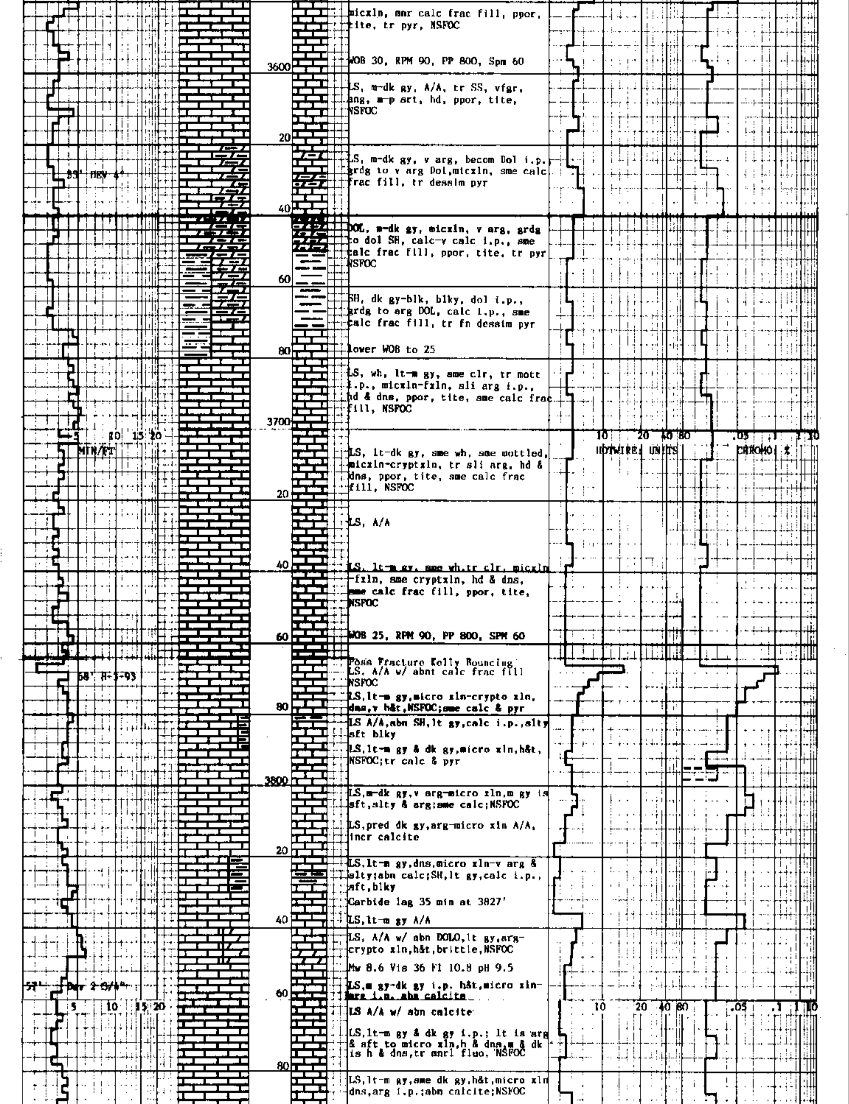
LS,m & dk gy,A/A, sme lt gy LS A/A

LS,m gy,micro xln,hd,dense,sme LS dk gy,hd,dense,micro xln; decr lt gy LS; sme calcite

LS,m & dk gy A/A,sme calcite frac fill

LS A/A

LS, m-dk gy, v arg, sme dol i.p.,



micxln, mnr calc frac fill, ppor, tite, tr pyr, NSFOC

WOB 30, RPM 90, PP 800, Spm 60

LS, m-dk gy, A/A, tr SS, vfgr, ang, m-p srt, hd, ppor, tite, NSFOC

LS, m-dk gy, v arg, becom Dol i.p., grdg to v arg Dol,micxln, sme calc frac fill, tr dessim pyr

DOL, m-dk gy, micxln, v arg, grdg to dol SH, calc-v calc i.p., sme calc frac fill, ppor, tite, tr pyr NSFOC

SH, dk gy-blk, blky, dol i.p., grdg to arg DOL, calc i.p., sme calc frac fill, tr fn dessim pyr

lower WOB to 25

LS, wh, lt-m gy, sme clr, tr mott i.p., micxln-fxln, sli arg i.p., hd & dns, ppor, tite, sme calc frac fill, NSFOC

LS, lt-dk gy, sme wh, sme mottled, micxln-cryptxln, tr sli arg, hd & dns, ppor, tite, sme calc frac fill, NSFOC

LS, A/A

LS, lt-m gy, sme wh,tr clr, micxln-fxln, sme cryptxln, hd & dns, sme calc frac fill, ppor, tite, NSFOC

WOB 25, RPM 90, PP 800, SPM 60

Poss Fracture Kelly Bouncing
LS, A/A w/ abnt calc frac fill NSFOC

LS,lt-m gy,micro xln-crypto xln, dns,v h&t,NSFOC;sme calc & pyr

LS A/A,abn SH,lt gy,calc i.p.,slty sft blky

LS,lt-m gy & dk gy,micro xln,h&t, NSFOC;tr calc & pyr

LS,m-dk gy,v arg-micro xln,m gy is sft,slty & arg;sme calc;NSFOC

LS,pred dk gy,arg-micro xln A/A, incr calcite

LS,lt-m gy,dns,micro xln-v arg & slty;abn calc;SH,lt gy,calc i.p., sft,blky

Carbide lag 35 min at 3827'

LS,lt-m gy A/A

LS, A/A w/ abn DOLO,lt gy,arg-crypto xln,h&t,brittle,NSFOC

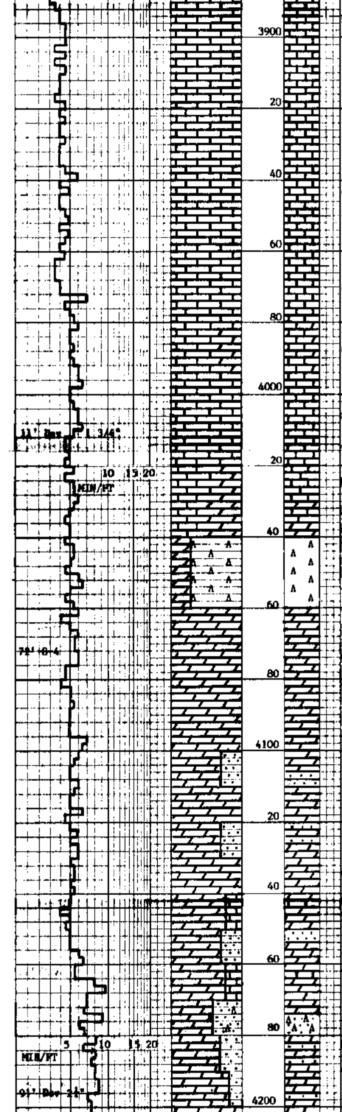
Mw 8.6 Vis 36 Fl 10.8 pH 9.5

LS,m gy-dk gy i.p. h&t,micro xln-[illegible] i.p. abn calcite

LS A/A w/ abn calcite

LS,lt-m gy & dk gy i.p.; lt is arg & sft to micro xln,h & dns,m & dk is h & dns,tr mnrl fluo, NSFOC

LS,lt-m gy,sme dk gy,h&t,micro xln dns,arg i.p.;abn calcite;NSFOC



LS A/A, abn calcite

LS,lt gy,sft,blky;LS,m gy,h&t,
crypto xln,cln; sme dk gy; LS,
micro xln,arg,h&t,NSFOC;sme calc

LS A/A w/ calcite

LS A/A; abn calcite; pred m-dk gy
h&t LS

LS,m-dk gy, A/A, NSFOC

WOB 25, RPM 90, PP 800, SPM 60

LS, lt-m gy, micxln-cryptxln,
tr chalky, sli arg i.p., tr calc
frac fill,tr fine dessim pyr,

ppor, tite, NSFOC

LS, A/A, w/ tr epidote, poss
thermal alteration zone

LS, wh-lt gy-m gy, sme dk gy,
micxln-fxln, becom DOL i.p.,
tr sli sucrosic,tr pyr, ppor, tite

LS, wh-lt gy-m gy, A/A, poss
thermal alteration zone, poss
porcellanite(?)

LS, A/A becoming more dolomitic

DOL-LS, lt-dk gy, micxln-fxln,
sucrosic i.p., sli arg i.p., ppor,

tr fine dessim pyr, NSFOC

White,hard,brittle,clean,non calc
altered clay(?) possible porcellinite

DOL, m-dk gy, fxln-sub sucrosic i.p., arg i.p., calc frac fill, ppor,
tite, NSFOC
WOB 25/30 RPM 90 PP 850 SPM 60

DOL A/A

DOL,m-dk gy,arg,slty i.p. calcite
frac fill;sme wh v sdy DOL,calc in
pt;sme wh clay,hard
DOL A/A,incr hard,wh(altered?)
clay

DOL,m gy,arg-v sdy,sme micro xln,
frm-hd & tite,calc strks;calc frac
fill;sme wh dolo slty vfg SS,calc
fws
DOL A/A & DOL, dk gy,arg,h&t,slty
i.p.;sucr DOL is calc; NSFOC

DOL,m-dk gy A/A, v arg & sdy;sme
lt gy-wh dolo SS A/A

DOL A/A sme calcite frac fill

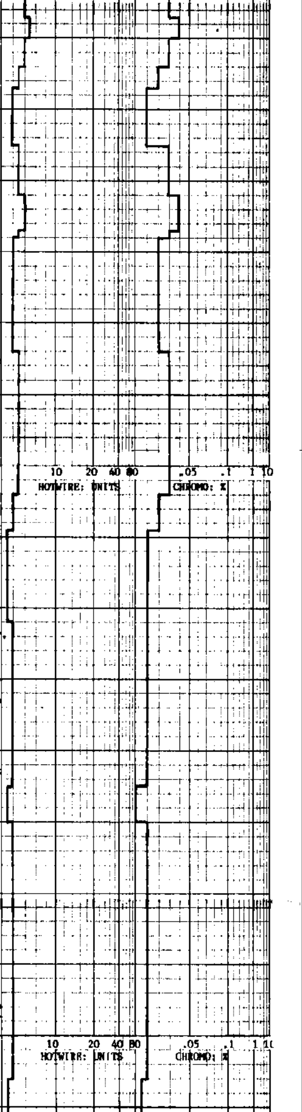
Wt 8.8 Vis 36 Fl 10.0 pH 9.5

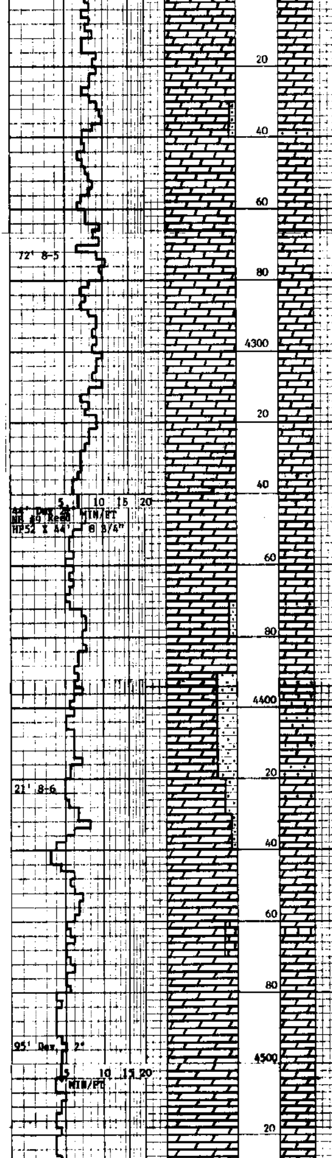
DOL,m-dk gy,arg-micro xln,slty &
sdy i.p.;sme LS,tan,micro xln,dns,
h&t; NSFOC;abn calcite

DOL,w/ sme calcite A/A, sme v sdy
DOL or cln dolomitic SS

Carbide Lag 37 min at 4161'
WOB 20/22 RPM 90 PP 850 SPM 60
DOL,m-dk gy,xln-arg,pel,h&t,calc
i.p;Qtz,clr-milky i.p,particles in
spl are granule size,ang,solid clr
to milky,sme clusters of med gns

DOL,m-dk gy,arg,aren i.p. h&t,calc
i.p.;sme lt gy dolo SS,vfg-slty,
calc i.p.





DOL, m-dk gy, micxln-fxln, sli sucrosic i.p., sli arg i.p., sdy i.p., sme calc frac fill, hd, tite ppor, NSFOC

DOL, m-dk gy, fxln-sb sucrosic, calc i.p., sli arg i.p., sdy i.p., calc frac fill w/ mnr pyr xln, hd, ppor, tite, NSFOC

DOL, m-dk gy, sme lt gy, fxln-micxln, tr sucrosic, sdy i.p., sli arg i.p., hd, incr calc frac fill mnr pyr, ppor, tite, NSFOC

DOL, A/A becom more calc

SOL,m-dk gy,micro sln-arg & sdy in pt;sme DOL,lt-m gy,sucr,non calc

DOL A/A, v sdy

DOL,m-dk gy,sln-arg,h&t,sme lt-m gy DOL,slty-sucr,NSFOC

Wt 8.7 Vis 35 Fl 9.6 pH 9.5

DOL,lt,m & dk gy,lt is slty-sucr,m & dk are micro xln-slty;abn calcite

DOL A/A; Incr calcite,sme DOL sucr vfg,sb rdd,fws calc,fri,calc filled;NSFOC (tr mnrl fluo)

WOB 20/25 RPM 90 PP 875 SPN 60

DOL, m-dk gy, sme lt gy, micxln-fxln, sli arg i.p., sme calc frac fill, hd, ppor, tite, NSFOC

WOB 20/25 RPM 80, PP 900, SPM 60

DOL, A/A, SS, wh-clr, vfgr, sbang-sb rnd, wsrt, calc cmt, ppor, tite NSFOC

DOL, m-dk gy, micxln-fxln, sli arg sdy i.p., sme calc frac fill, sme clay fault gouge, ppor, tite, NSFOC

SS, wh-clr, vfgr, m-wsrt, calc cmt, tr sil cmt, sb ang-sb rnd, ppor, tite, NSFOC

DOL, A/A

DOL, A/A w/ decr SS, A/A

DOL,m-dk gy,micro xln-arg i.p. tr SS A/A; abn calcite & milky Qtz, ang,granular size,clr i.p.;sme wh clay; NSFOC

DOL,m-dk gy,micro xln,arg-sdy i.p. abn wh clay & calcite frac fill

DOL,m gy,micro xln-arg,frm;DOL dk gy,h&t,arg & sdy i.p.;abn wh clay & sme milky qtz

DOL A/A sme LS,m gy,micro xln,h&t, dense;abn wh clay & calcite

DOL,m gy,arg-micro xln,h&t,sucr ip sme gy DOL A/A, sme calcite

Wt 8.7 Vis 35 Fl 9.2 pH 9.5

DOL w/ sme calcite A/A

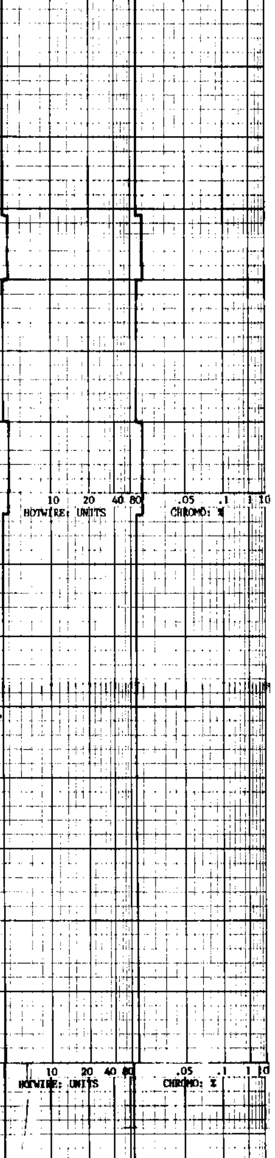
DOL A/A; sme lt gy, v sucr,decr calcite

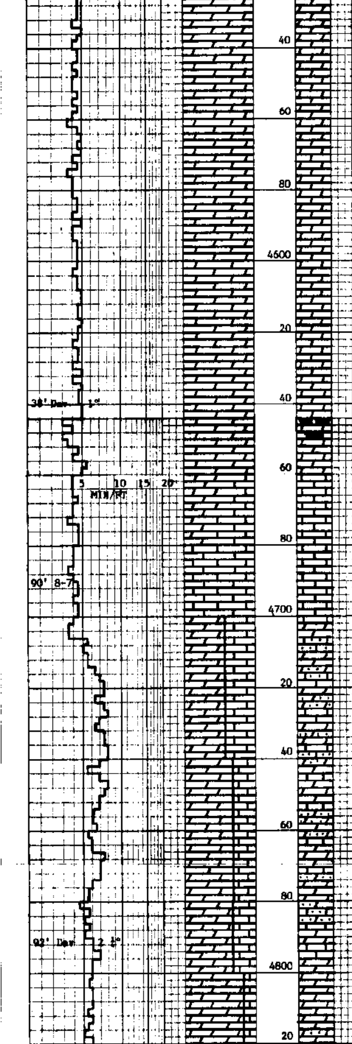
Carbide Lag 40 min at 4495'

DOL,m gy,arg-sucr,h&t,sme DOL,dk gy,micro xln-arg,h&t;sme calcite & wh clay w/ mnrl fluo, NSFOC

DOL,m-dk gy & sme lt gy,v sucr i.p. sme calcite frac fill

DOL A/A sme wh cht,wh clay & calc





WOB 30, RPM 80, PP 900, SPM 60

DOL, m-dk gy, arg i.p., micxln-fxln, tr sucrosic, hd, sme calc frac fill, tr fine dessim pyr, NSFOC

DOL, m-dk gy, sme lt gy, fxln-sb sucrosic i.p., hd, sli calc i.p tr clay fault gouge, sme calc frac fill, NSFOC

DOL, m-dk gy, arg i.p., micxln-fxln, tr sb sucrosic, hd, sme clay fault gouge, smr calc frac fill, tr dessim pyr, NSFOC

DOL, A/A incr clay gouge

Wt 8.7 Vis 35 Fl 9.2 pH 9.5

DOL, m-dk gy, tr lt gy, micxln-fxln, tr sucrosic, hd, arg i.p., sme calc frac fill, tr pyr, NSFOC

WOB 35, RPM 80, PP 900, SPM 60

DOL, m-dk gy, micxln-fxln, hd, sme calc frac fill, incr clay fault gouge, tr pyr, NSFOC

LS, lt-m gy, sme wh, cryptxln-micxln, tr fxln, vfrm-hd, mottled i.p., sli arg i.p., ppor, tite, NSFOC

LS, A/A

WOB 35 RPM 80 PP 900 SPM 60

LS, A/A w/ DOL,m-dk gy,h&t,arg: sme wh clay & calcite;tr wh chert

DOL,m-dk gy,f xln-arg,h&t,sucr ip. LS,lt-m gy,micro xln-arg,NSFOC; wh clay & calcite

DOL & LS A/A,decr clay, cht & calcite

DOL, A/A, LS, lt-m gy,v sdy-arg, frm,tite,NSFOC;sme calcite

DOL & LS A/A, abn calcite

Wt 8.8 Vis 41 Fl 9.2 pH 9.5

Calcite; w/ LS,m gy,xln-sdy,h&t; DOL,m-dk gy,micro xln-sdy & arg i.p. NSFOC

DOL,m-dk gy,v arg,xln-v arg & sdy, v sucr i.p.,sme LS,lt gy,micro xln to sdy,h&t; NSFOC; abn calcite

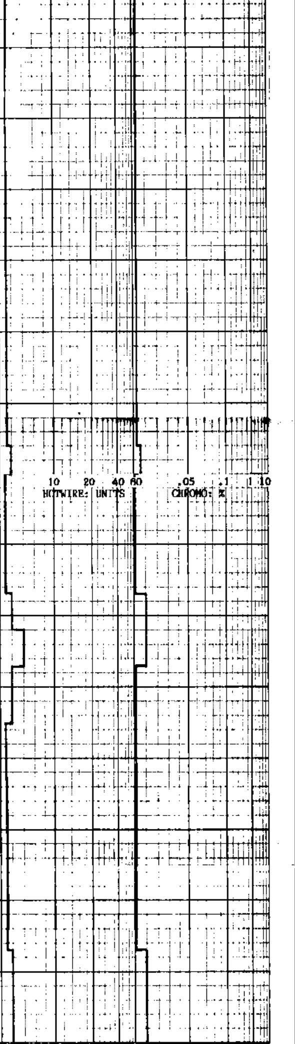
DOL,m-dk gy A/A w/ zones of lt-m gy,v sucr DOL;sme LS A/A;decr calcite

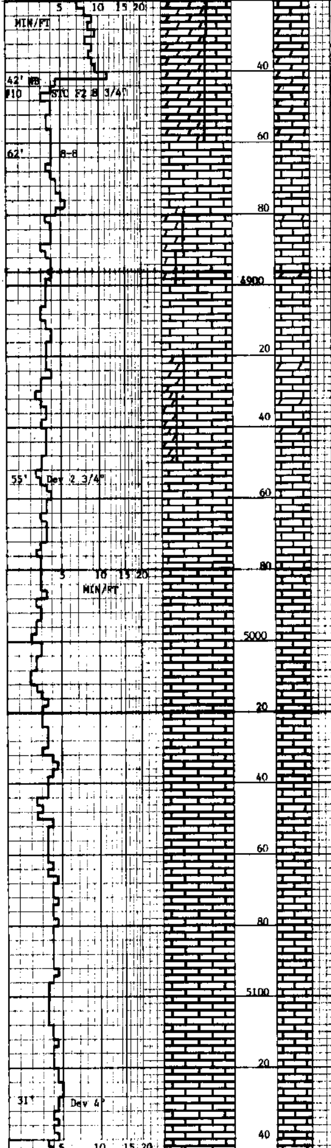
DOL,m-dk gy,arg-sdy,lam w/ limy DOL & sdy LS

DOL & LS A/A w/ calcite

Carbide Lag 43 Min. at 4802'

DOL, m-dk gy, tr lt gy, arg i.p., sdy i.p., micxln-fxln, sme calc frac fill, tr pyr, NSFOC





DOL, pred dk gy, sme m gy, arg-v arg i.p., fxln-sbsucrosic, hd, dns, sdy i.p., tr calc fracfill, tr pyr, NSFOC

LS, wh-lt gy, micxln-cryptxln, hd, sli chalky i.p., sli arg i.p., sdy i.p., ppor, tite, NSFOC

LS, wh-lt gy,micxln-cryptxln,hd, sli chalky i.p., sli arg i.p.,sdy i.p., ppor, tite, NSFOC

Wt 8.7 Vis 35 Fl 8.8 pH 9.5

Trip for hole in pipe at 4882

LS,lt-m gy, micro xln,h&t to frm & arg (tite),sme DOL,dk gy,arg i.p. NSFOC; Poor sample, abn LCM & pipe dope

LS,lt-m gy,frm,micro xln,dolomitic i.p., tite, tr calcite

LS A/A

WOB 30/35 RPM 80/90 PP 900 SPM 60

LS,lt-m gy,micro xln, tite,frm, dolomitic i.p.sdy i.p.;sme DOL, m-dk gy,arg i.p.,h&t;NSFOC

LS & DOL A/A

LS & DOL A/A,,Very poor sample. Jetted pits,may not be representative sample

LS,wh-lt gy,v sdy i.p. to crypto xln,tite; v abn calcite

LS A/A, mostly lt gy,sli silic i.p.

LS,lt-m gy,crypto xln-micro xln, arg & sdy i.p.,h&t,NSFOC sme calc

LS A/A, incr calcite

LS A/A becoming more sandy

LS, wh-lt gy, sme m gy, cryptxln-micxln, tr fxln, arg i.p., sdy-v sdy i.p., ppor, tite, NSFOC

LS, wh-lt gy, sme m gy, pred micxln, sme fxln, sdy i.p., arg-v arg i.p., tr calc frac fill, ppor, tite, tr pyr, NSFOC

LS, wh-lt gy, cryptxln-micxln, tr fxln, arg i.p., sdy i.p.,frm-hd, sli chalky i.p., sli DOL i.p., ppor, tite, NSFOC

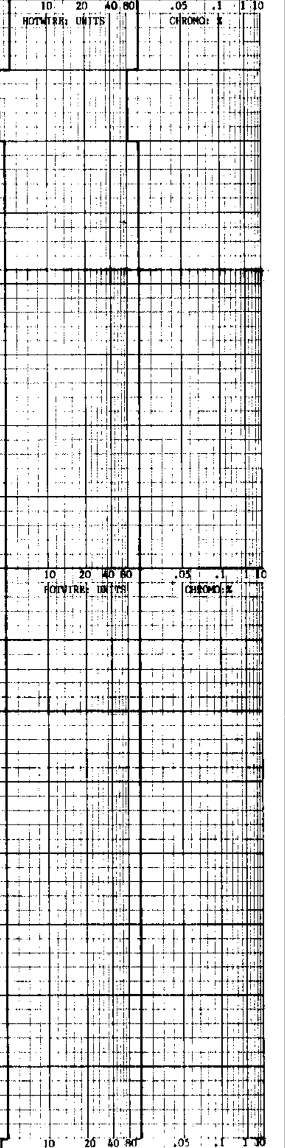
LS, wh-lt gy, tr m gy, cryptxln-micxln, tr fxln, sli mottled i.p., tr chalky, arg-v arg i.p., sdy i.p., ppor, tite, NSFOC

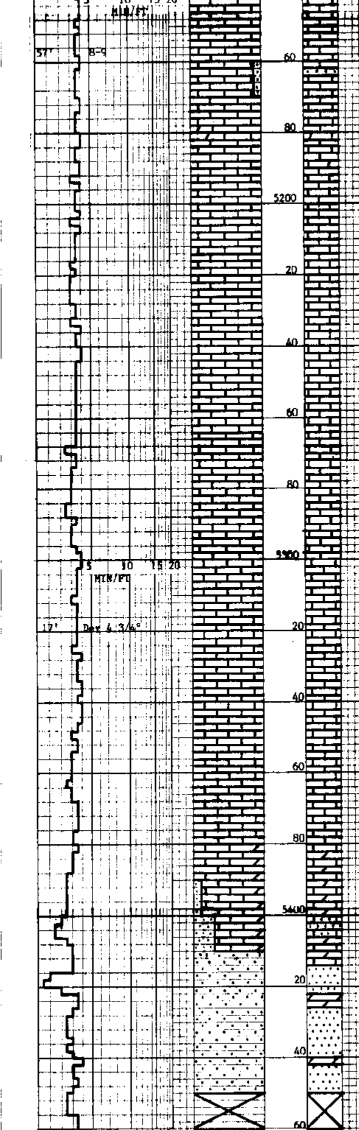
LS, pred wh, sme lt-m gy, cryptxln-micxln, sli mottled i.p., tr chalky, sli arg i.p., sdy i.p., ppor, tite, NSFOC

LS, wh-lt gy, sme m gy, cryptxln-micxln, sme fxln, arg i.p., sdy i.p., tr chalky, tr calc frac fill, ppor, tite, NSFOC

WOB 30/35, RPM 60, PP 900, SPM 60

LS, wh-lt gy, sme m gy, cryptxln-micxln, arg i.p., sdy i.p., tr calc frac fill, ppor, tite NSFOC





LS, wh-lt gy, sme m gy, cryptxln-micxln, sme fxln, sli arg- arg i.p., sdy i.p., tr chalky, sli dol i.p., tr calc frac fill, ppor, tite, NSFOC

LS, A/A incr sdy LS; sme SS vf-fg slty,pred DOL gns; sme blk arg mnrl & pyr; abn calcite
LS,lt-m gy,micro xln-frm-hd,tite, sm calcite; NSFOC,sme blk mat intr lam w/ lt gy LS & calcite

LS A/A,m gy is dolomitic;sme calc

LS,wh-m gy A/A; sme calcite

WOB 25/35 RPM 65 PP 950 SPM 60

LS,lt-dk gy,crypto xln-micro xln, arg i.p. dete,sucr,i.p.;calcite

LS A/A incr dk gy, dolo i.p. decr calcite

LS, lt-m & dk gy,micro xln,frm-hd arg-sdy i.p. looks tite;sme calcite; NSFOC
LS A/A sme v sucr

Wt 8.8 Vis 36 Fl 9.6 pH 9.5

LS A/A incr m-dk gy,h&t dolomitic in pt
LS,wh-lt gy,micro xln,frm-hd,arg in pt,tite,sucr i.p.abn calcite; sme LS,m-dk gy,micro xln,h&t NSFOC, sme mnrl fluo

LS A/A

LS A/A w/ incr lt gy-wh LS and calcite

LS,lt-m gy,micro xln,h&t,mottled color,arg-sdy i.p. sme calcite, sme w/ blk arg partings

LS,lt-m gy,micro xln-arg i.p. sme m-xln,h&t,mottled color,NSFOC; some calcite
LS A/A, sme v lt gy, v sucr; abn calcite

LS A/A decr calcite
Carbide Lag 48 Min. at 5327'
LS,wh-lt-m gy,lt is sucr-arg i.p. wh is arg,sft,m gy is m xln,h&t; sme calcite; NSFOC

LS A/A

WOB 30/35 RPM 65 PP 950 SPM 60
LS,wh-m gy,f-m gy,f-m xln,h&t, sucr i.p. sm wh arg LS & calcite

LS,wh-lt-m gy,micro-fine xln,sft-frm,sli arg,dolomitic

LS A/A

LS A/A becm incr wh-lt gy & more dolomitic

LS,wh-translu,micro-crs xln,dns, brit-chalky,cln-sli speckled w/ blk arg mat,dolomitic,grdg to limy DOL, NSFOC

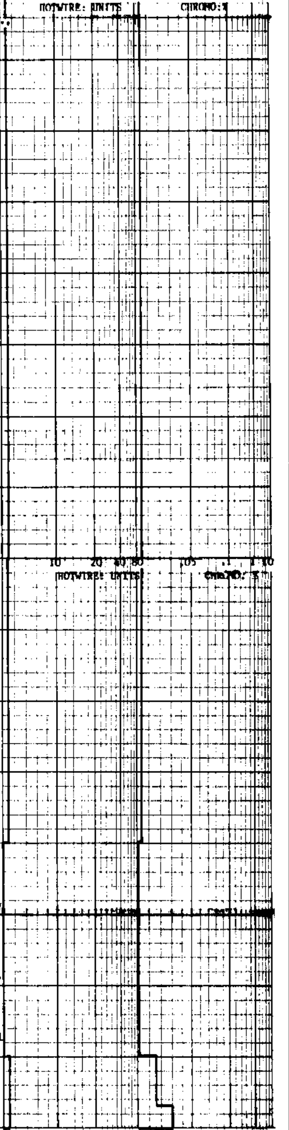
LS, A/A bcm incr aren, grdg to dolomitic SS (30%)
Dolo SS,wh-clr,f-crs,fri-frm,sb ang xln,tite,no vis poro,dolo cmt, mnr qtz grs,abnt sec xlization

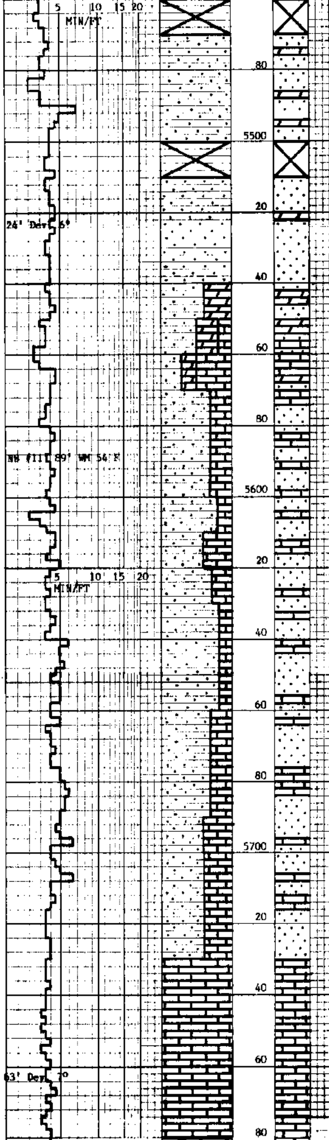
Slowly loosing fluid, LCM Sweep
Dolo SS A/A

Fair amt of xln dolomite frac fill

Dolo SS A/A

50-60 spl all LCM





60-70 spl all LCM

Dol SS, wh-clr,fri-frm,f-m gr,f-gd srtg,sb rdd-xln,tite,f amt sec xlization,dol grs,mnr qtz,dol cmt tr blk arg mat

Dol SS A/A

Dol SS,wh-clr,fri-hd,pred dol grs sm qtz,f-mg & m xln,ws,sme sec xlization,abn calcite

WOB 30/35 RPM 65 PP 900 SPM 60

10-20 spl all LCM

Dol SS A/A, abn LCM

Wt 8.7 Vis 36 Fl 10.4 pH 9.5

Dol SS,wh-clr,fri-hd,f-mg,fws,xln sb ang,tite,sme sec xlization,pred Dol grs sme qtz,tr blk arg mat; sme calcite

Dol SS A/A, sme blk diss arg mat

Dol SS A/A, looks v h&t,glassy ip sme DOL,wh-translucint,micro xln, h&t,dns

Dol SS & DOL A/A; sme LS,m-dk gy, v h&t,dns

LS,m-dk gy,mottled,lt gy i.p. crypto xln,h&t; abn calcite,sme Dol SS A/A

Dol SS, wh-clr,mg,fws,ang-xln; sme LS,A/A; abn calcite

Dol SS, LS & calcite A/A

Dol SS, LS & calcite A/A

Wt 8.7 Vis 36 Fl 10.4 pH 9.5

WOB 30/35 RPM 65 PP 900 SPM 60

Dol SS, wh-clr,h&t,sb ang-xln,fws sme sec xlization; LS,wh-lt & m gy micro xln,h&t,NSFOC

Dol SS,wh-clr-lt gy,fg,frm v calc, w/ sme wh LS & calcite

Dol SS, A/A; decr LS A/A;abn calcite

SS,fg-slty,v arg i.p. m gy-wh,v dol,incr qtz gns,fws,sb ang,fri ip m gy has lg amt blk diss arg mat; some LS A/A, NSFOC,abn calcite

SS A/A w/ incr arg mat & calcite; LS,wh-m gy,micro xln,h&t,NSFOC

SS,LS & calcite A/A

SS, LS & abn chalky calcite w/ v abn blk arg mat in SS & calcite

Wt8.8,V35,Fl10.4,Ph9.5.

SS, LS & calcite A/A

SS A/A, incr LS,wh-m gy,micro-crypto xln,h&t,NSFOC; abn calcite

LS,wh-lt gy,chalky,sft-hd,sdy, some dolo SS A/A w/ v abn blk arg mat; abn calcite

WOB 30/35, RPM 65, PP900, SPM 60

LS,SS & calcite A/A

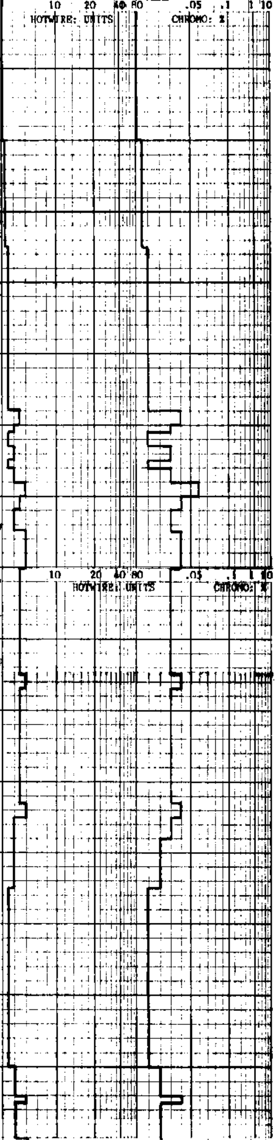
LS,SS & calcite A/A w/ lg incr of blk arg mat,some red-brn arg mat w/ "baked" look

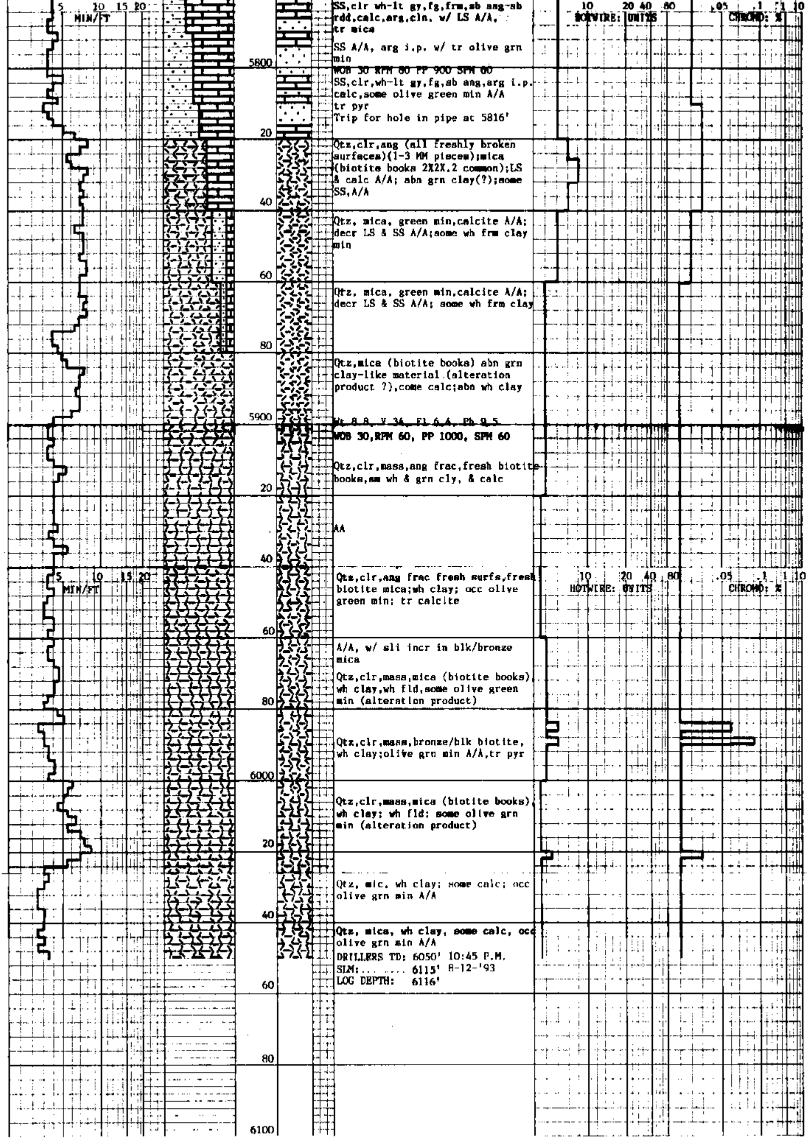
LS,wh-v lt crm,frm-hd crypto xln, tite,cln-sdy i.p. earthy & softer i.p.; some calcite

LS A/A

Wh-lt crm LS A/A, some calcite

LS,wh-lt crm A/A,incr calcite; some blk arg mat and sandy LS





SS,clr wh-lt gy,fg,frm,sb ang-sb rdd,calc,arg,cln. w/ LS A/A, tr mica

SS A/A, arg i.p. w/ tr olive grn min

WOB 30 RPM 60 PP 900 SPM 60

SS,clr,wh-lt gy,fg,sb ang,arg i.p. calc,some olive green min A/A tr pyr

Trip for hole in pipe at 5816'

Qtz,clr,ang (all freshly broken surfaces)(1-3 MM pieces);mica (biotite books 2X2X.2 common);LS & calc A/A; abn grn clay(?);some SS,A/A

Qtz, mica, green min,calcite A/A; decr LS & SS A/A;some wh frm clay min

Qtz, mica, green min,calcite A/A; decr LS & SS A/A; some wh frm clay

Qtz,mica (biotite books) abn grn clay-like material (alteration product ?),come calc;abn wh clay

Wt 8.8, V 34, Fl 6.4, Ph 9.5

WOB 30,RPM 60, PP 1000, SPM 60

Qtz,clr,mass,ang frac,fresh biotite books,sm wh & grn cly, & calc

AA

Qtz,clr,ang frac fresh surfs,fresh biotite mica;wh clay; occ olive green min; tr calcite

A/A, w/ sli incr in blk/bronze mica

Qtz,clr,mass,mica (biotite books) wh clay,wh fld,some olive green min (alteration product)

Qtz,clr,mass,bronze/blk biotite, wh clay;olive grn min A/A,tr pyr

Qtz,clr,mass,mica (biotite books) wh clay; wh fld; some olive grn min (alteration product)

Qtz, mic, wh clay; some calc; occ olive grn min A/A

Qtz, mica, wh clay, some calc, occ olive grn min A/A

DRILLERS TD: 6050' 10:45 P.M.
SLM:... .... 6115' 8-12-'93
LOG DEPTH: 6116'