



Empirica

Scale: 5" / 100'
Measured Depth Log

Well Name Waag 21

Location Sec. 19 T7N R65W

State CO

Country USA

API Number 05-123-40350

Region DJ Basin

Spud Date 9/27/2015

County Weld

Rig Number Savannah 802

Field Wattenberg

Drilling Completed 9/29/2015

Surface Coordinates Lat: 40°N 33' 15.732"

Lon: 104°W 42' 26.244"

Bottom Hole Coordinates Lat: 40°N 33' 21.554"

Lon: 104°W 43' 25.315"

Ground Elevation 4,868'

K.B. Elevation 4,883'

Logged Interval 5,000' **To** 11,876'

Total Depth 11,876'

Formation Niobrara

Type of Drilling Fluid Invert

Operator

Company Extraction Oil & Gas

Address 1888 Sherman St., Suite 200
Denver, CO 80203

Geologist

Name Jared Rouse

Company Extraction Oil & Gas

Address 1888 Sherman St., Suite 200
Denver, CO 80203



Other

Equipment ML-197

Comments Start: 9-27-15
TD: 9-29-15

Services Provided 2-man Logging

Logger Names Brian Ferwerda / Mark G

Address Empirica, LLC.
6360 W Sam Houston Pk
Suite 100
Houston, TX 77041

Zone Color Coding

Oil

Note

Error

Condensate

Core

Water

Gas

Pressure

Seal

Rock Types

UNKNOWN

ANHYDRITE

GYPSUM

SALT

CHALK

LIMESTONE

DOLOMITE

CHERT

COAL

MARLSTONE

CLAYSTONE

SHALE

SHALE GRAY

SHALE COLORED

SILTSTONE

SANDSTONE

CONGLOMERATE

BRECCIA

TILL

BENTONITE

TUFF

IGNEOUS

METAMORPHIC

CEMENT

Accessories

Fossils

F FOSSIL

GASTROPOD

ALGAE

AMPHIPORA

BELEMNITE

BIOCLASTIC

BRACHIOPOD

BRYOZOA

CEPHALOPOD

CORAL

CRINOID

ECHINOID

FISH

FORAMINIFERA

ARGILLACEOUS

ARGILLITE GRAIN

BENTONITE

BITUMENOUS SUBSTANCE

BRECCIA FRAGMENTS

CALCAREOUS

CARBONACEOUS FLAKES

CHTDK

CHTLT

COAL - THIN BEDS

DOLOMITIC

FELDSPAR

FERRUGINOUS PELLET

FERRUGINOUS

GLAUCONITE

GYPSIFEROUS

HEAVY MINERAL

KAOLIN

MARLSTONE

MINERAL CRYSTALS

NODULES

PHOSPHATE PELLET

PYRITE

SALT CAST

SANDY

SILICEOUS

SILTY

TUFFACEOUS

Stringer

ANHYDRITE STRINGER

BENTONITE STRINGER

COAL STRINGER

DOLOMITE STRINGER

GYPSUM STRINGER

LIMESTONE STRINGER

MARLSTONE (CALC) STRG

MARLSTONE (DOL) STRG

SANDSTONE STRINGER

SHALE STRINGER

SILTSTONE STRINGER

Other Syn

ORGANIC

PINPOINT

DEAD

EVEN

QUESTIONABLE

SPOTTED STAINING

FORM

GAS SHOW

VUGGY

NORMAL F

OIL SHOW

OVERTURN

Oil Show

Engineering

BIT

CASING

REVERSE

OVERTURE

SLIDE

SIDEWALL

Porosity

E EARTHY

FENESTRAL

F FRACTURE

INTERCRYSTALLINE

INTEROOLITIC

MOLDIC

CONNECTION (RIGHT)

CONNECTION GAS

CORE - LOST

CORE - RECOVERED

DST INTERVAL

FAULT

SURVEY

TRIP GAS

WIRELINE

WIRELINE

mbols

ATION TOP L LITHOGRAPHIC

Rounding

MX MICROXLN

A ANGULAR **MS** MUDSTONE

R ROUNDED **PS** PACKSTONE

S SUBANG **WS** WAKESTONE

F SUBRND

Sorting

Textures

M MODERATE

B BOUNDSTONE **P** POOR

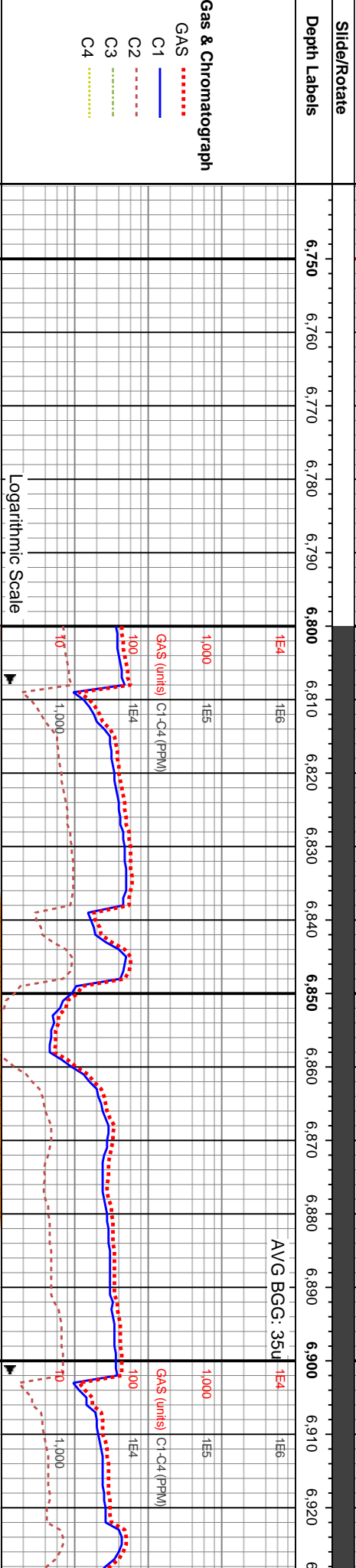
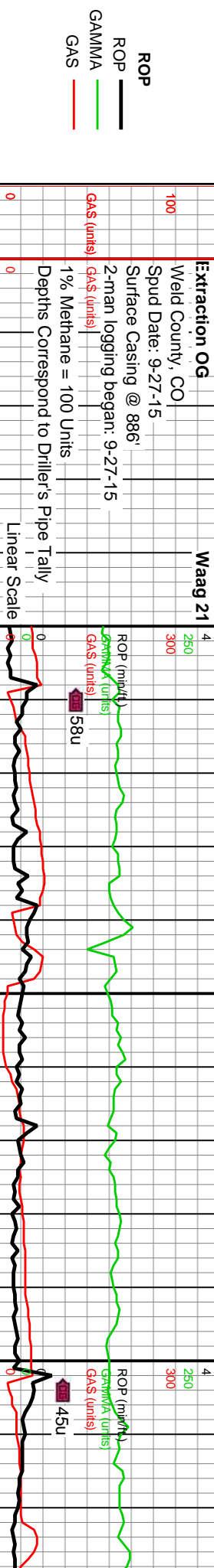
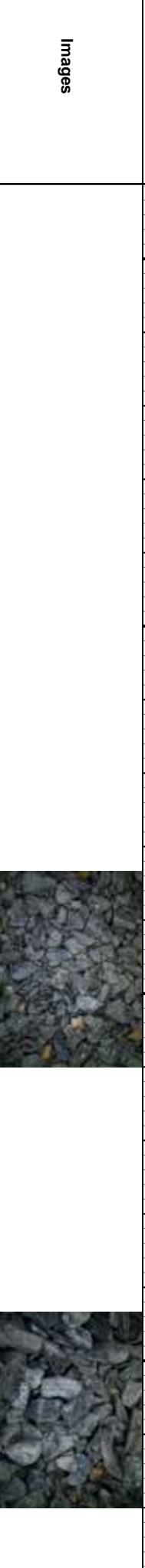
C CHALKY **W** WELL

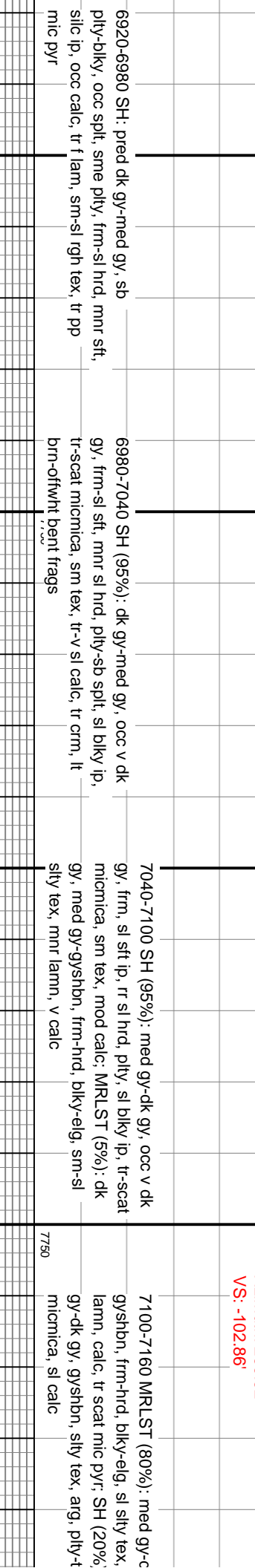
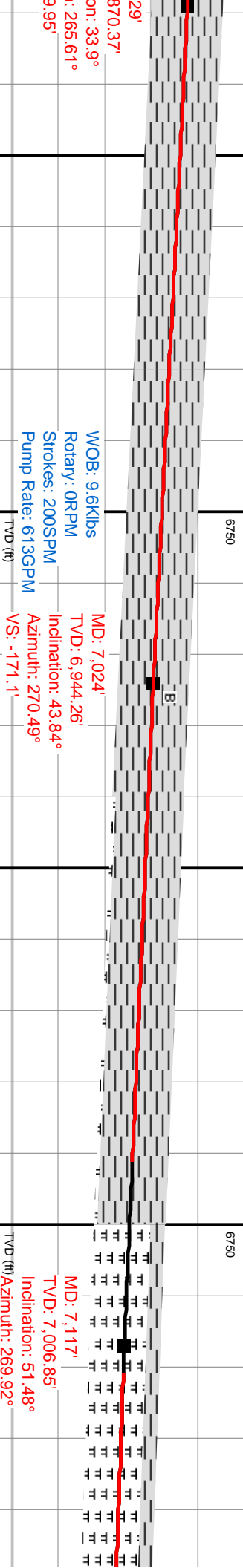
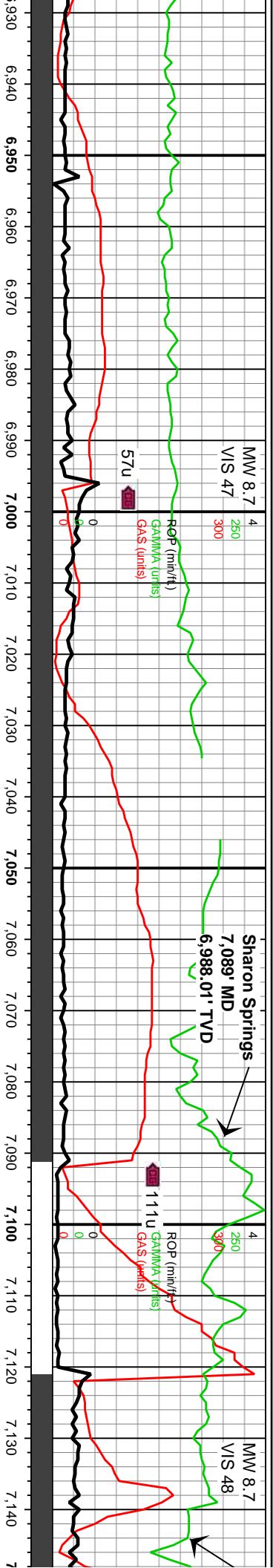
CX CRYPTOXLN

E EARTHY

FX FINELYXLN

GS GRAINSTONE

[illegible][illegible]



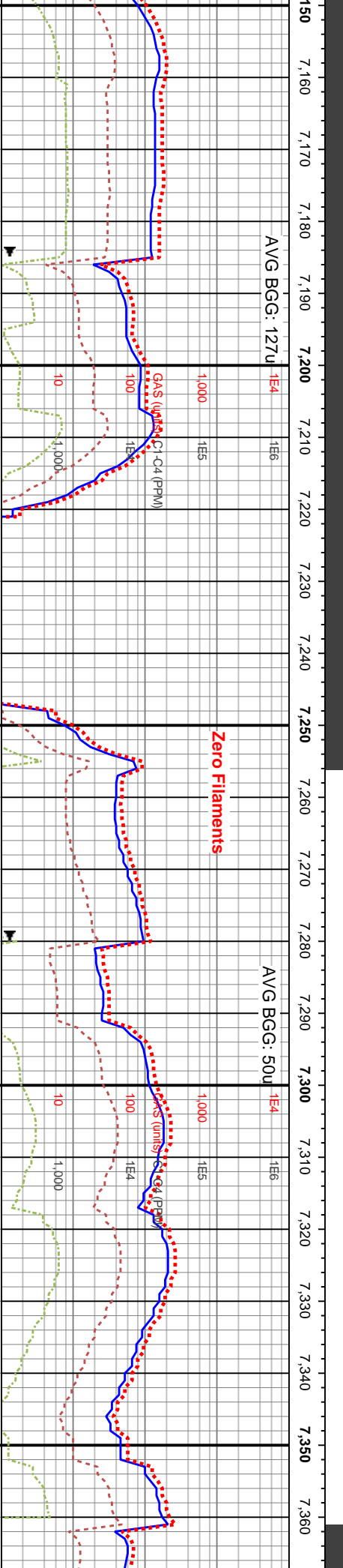
Niobrara A

7,144' MD

7,021.43' TVD

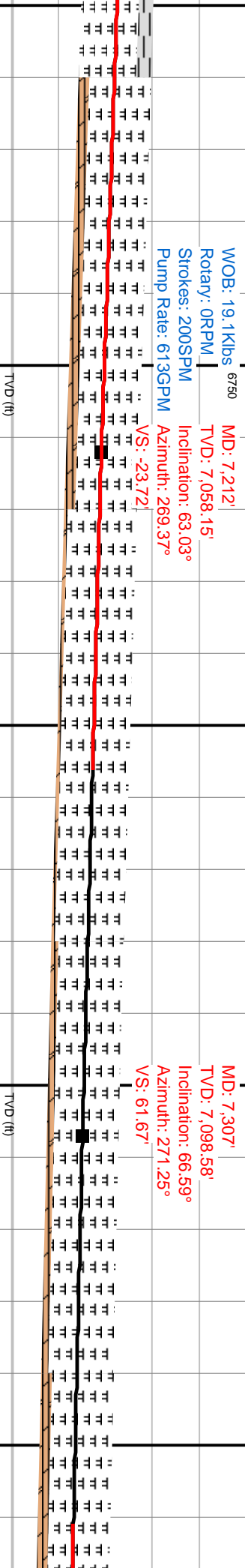
MW 8.0

M/S 50



WOB: 19.1Klbs 6750
Rotary: 0RPM
Strokes: 200SPM
Pump Rate: 613GPM

MD: 7,212'
TVD: 7,058.15'
Inclination: 63.03°
Azimuth: 269.37°
VS: -23.72'

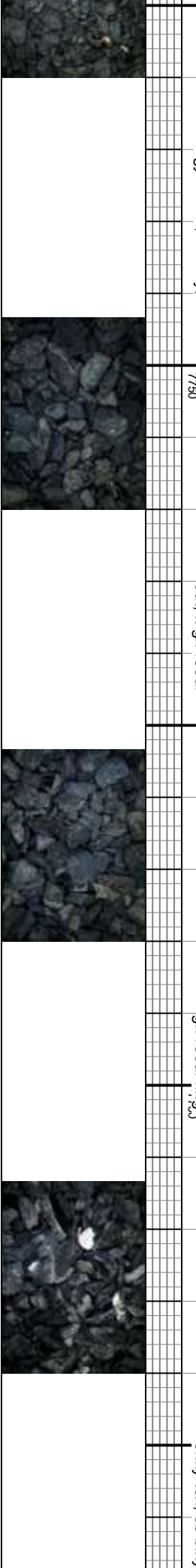


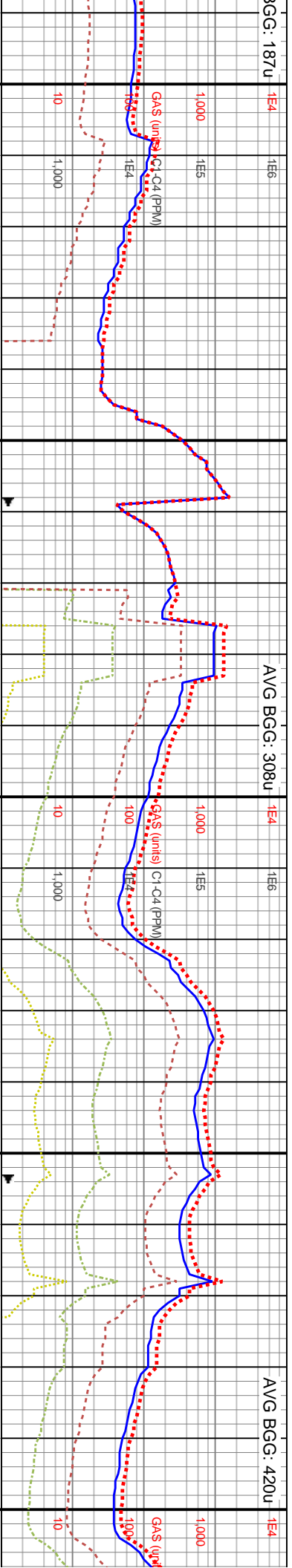
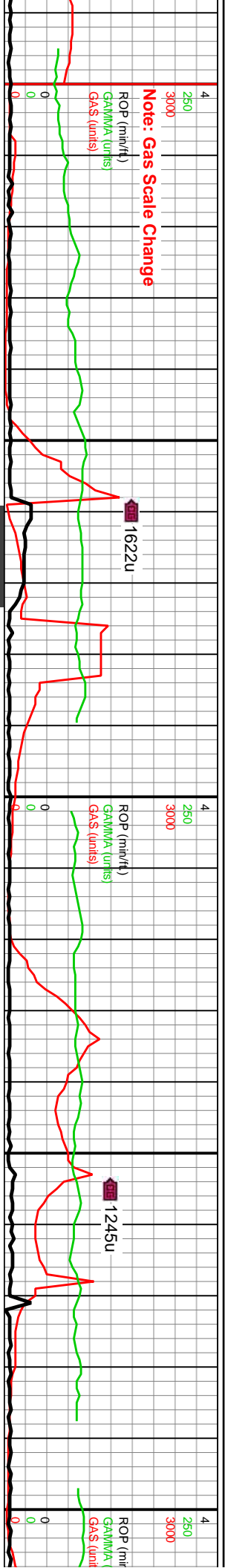
7160-7220 85% MRLST: v dk gy-gyshbn, pred frm-sl frm, mot, pred blkly, occ pily, v calc, scat imbd pyr, r r dui orng-yei flor, bri wht-bl mky cut, lt gn resdl; 15% CHK: gysbhn-gy, mot, occ lt gy-offwht, sb blkly, v sft

7220-7280 MRLST (95%): dk gy-v dk gy, frm-sl hrd, pily-tab, sl silty tex, tr chk lamm, v calc, tr pp mic pyr; CHK (5%): crn-lt gy, gysbhn, sft, vf lamm, intbdd wi mrst, calc, chky tex, r r dui orng-yei flor, bri bishwn stmng-rnky cut, lt gn resdl

7280-7340 MRLST (90%): dk gy-med gy, frm-sl hrd, tab-blky, sl silty tex, tr chk lamm, v calc, scat lse-frac fl cal; CHK (10%): crn-lt gy, gysbhn, sft, vf lamm, intbdd wi mrst, calc, chky tex, r r dui orng-yei flor, bishwn stmng-rnky cut, lt gn resdl

7340-7400 MRLS gysbhn, pily-sb sp pyr, dui orng flor, resdl ring; CHK (1 chky tex, sb blkly-





591'
156.12'
WOB: 43.3klbs
Rotary: 40RPM
Inclination: 91.51°
Strokes: 220SPM
Pump Rate: 67ZGPM
h: 270.76°
4.99'

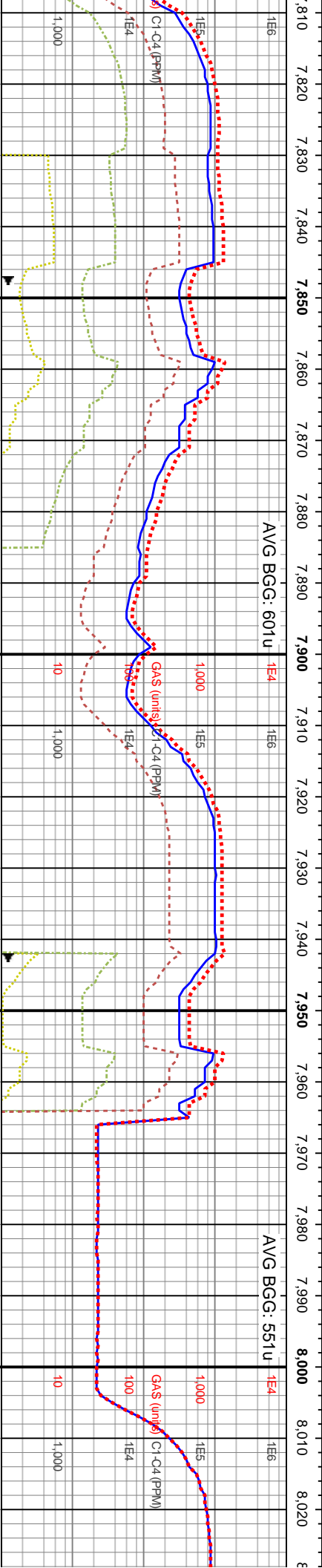
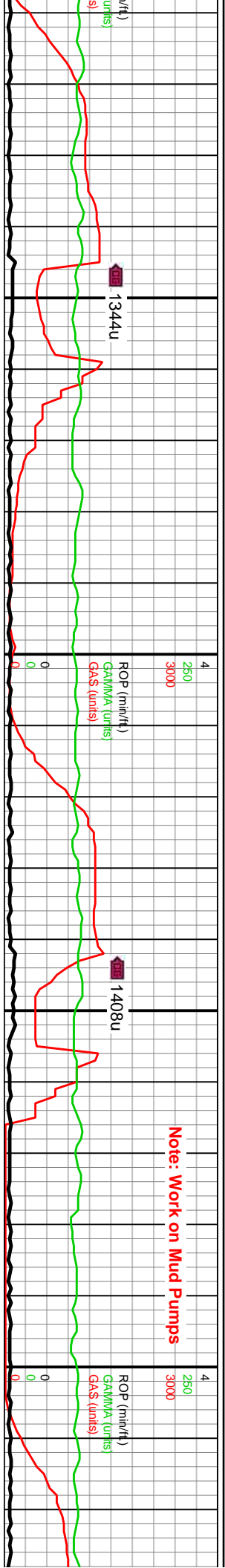
MD: 7,686'
TVD: 7,155.25'
Inclination: 89.54°
Azimuth: 270.73°
VS: 429.45'

6750

MD: 7,780'
TVD: 7,155.63'
WOB: 41.6klbs
Rotary: 70RPM
Inclination: 90°
Strokes: 220SPM
Pump Rate: 67ZGPM
Azimuth: 271.64°
VS: 522.99'

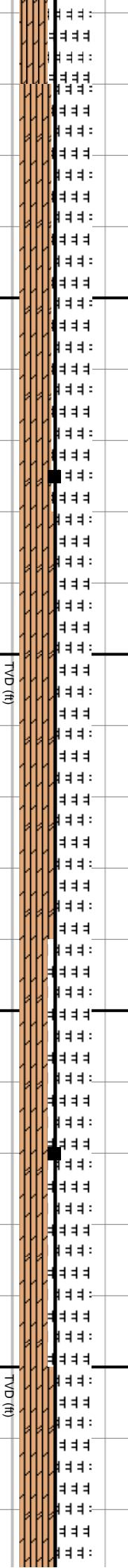
TVD (ft)	TVD (ft)	TVD (ft)	TVD (ft)
7580-7640 MRLST (60%): dk gy-med gy, mnr gysbhn, frm-sl hnd, ply-biky, v calc, mnr chk lam, scat pp pyr; CHK (40%): pred crm-it gysbhn, chky tex, calc, bishwh-du yelgn flr, mky cut, dul bishwh resd ring	7640-7700 MRLST (60%): mot med gy-dk gy, gysbhn, tab-sb spl, frm, v calc, scat mic pyr, fnt orng flr, bri wht-bish mky cut, bishwh resd ring; CHK (40%): mot crm-offwht, v sft, chky tex, sb ply-biky, bri bishwh flr, bish mky cut,	7700-7760 MRLST (65%): mot med gy-dk gy, gysbhn, biky-ply, frm, v calc, scat mic pyr, fnt dul orng flr, bish mky cut, no resd ring; CHK (35%): mot offwht-crm, v sft, chky tex, sb biky, bishwh flr, dul mky cut, bishwh resd ring	7760-7820 MRLST (60%): mot dk gy, gysbhn, frm-v frm, tab-spl, sl sfty tex, f chk lam, pp imbd pyr; CHK (40%): offwht-crm, chky tex, sft, sb biky, tr r yelgn flr, dul mky cut, bishwh resd ring





MD: 7,875'
TVD: 7,155.96'
Inclination: 89.6°
Azimuth: 271.3°
VS: 617.58'

WOB: 44.8kbs
Rotary: 71RPM
Strokes: 220SPM
Pump Rate: 673GPM



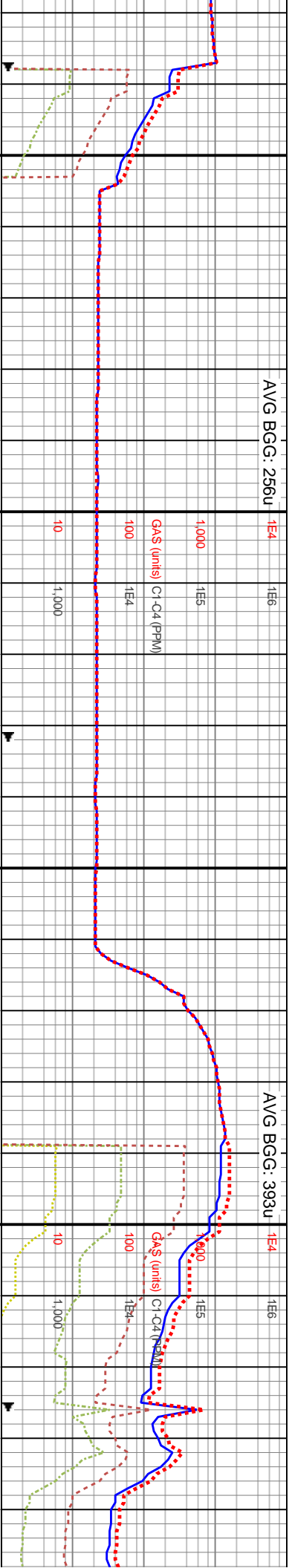
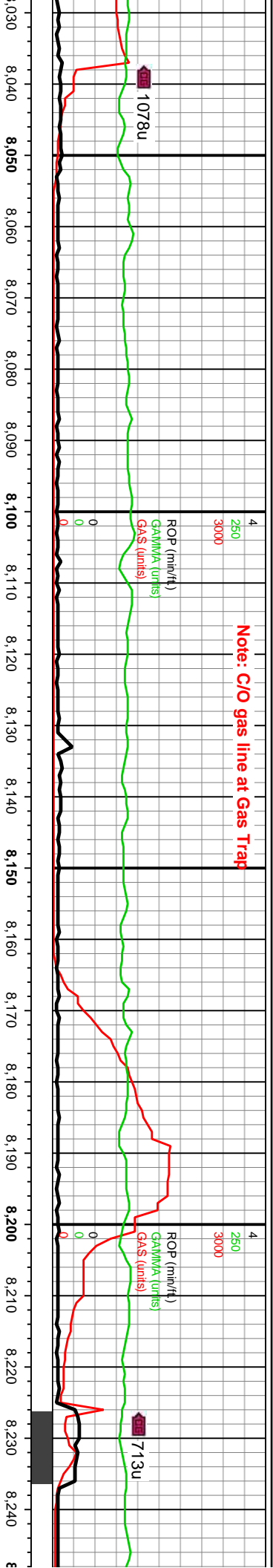
7820-7880 MRLST (55%): dk gy-med gy, sb
biky, frm, v calc, scat pp pyr, fnt orng flr, bri
wht-bl mky cut, no resd ring; CHK (45%): mot lt
gy-offwht, lt gysbhn, v sft, chky tex, sb biky, com
yelgn flr, mky cut, blshwh resd ring

7880-7940 MRLST (50%): dk gy-med gy,
frm-hrd, biky-tab, sl abrsv tex, v calc, intbd chk
lam, scat pp pyr; CHK (50%): lt gysbhn-crm,
chky tex, calc, sb ply, bri-dul yelgn flr, dul
mky cut, blshwh resd ring

7940-8000 MRLST (60%): dk gy-med gy,
gysbhn, frm-sl hrd, biky-sl elg, sl sily tex, intbd
chk lamm, v calc; CHK (40%): lt gysbhn-crm,
chky tex, calc, ply, dul yelgn flr, string-mky
cut, dul blshwh resd ring

8000-8060 MRLS
frm-hrd, biky-tab,
lam, scat pp pyr; (t
chky tex, calc, sb
dul mky cut, blshwh



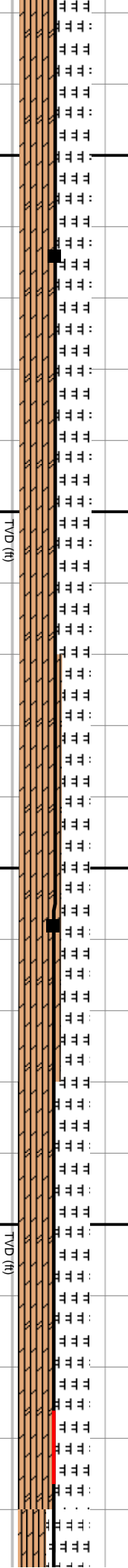


MD: 8,064'
TVD: 7,157.08'
Inclination: 89.78°
Azimuth: 274.79°
VS: 806.15'

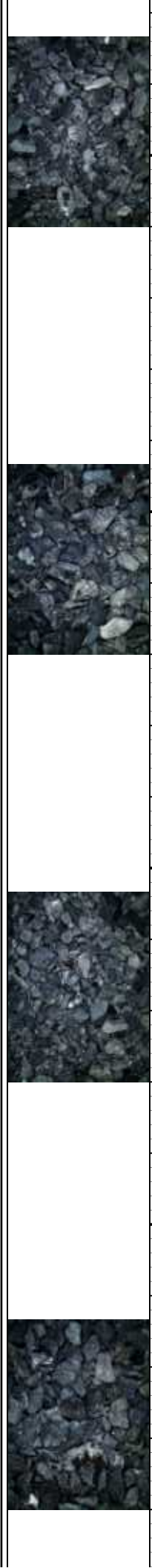
MD: 8,158'
TVD: 7,157.71'
Inclination: 89.45°
Azimuth: 273.74°
VS: 900.06'

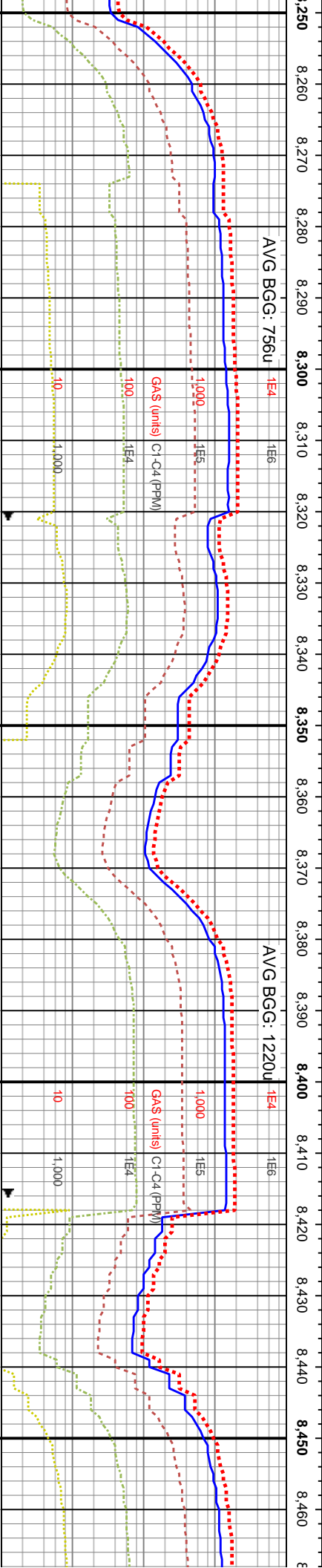
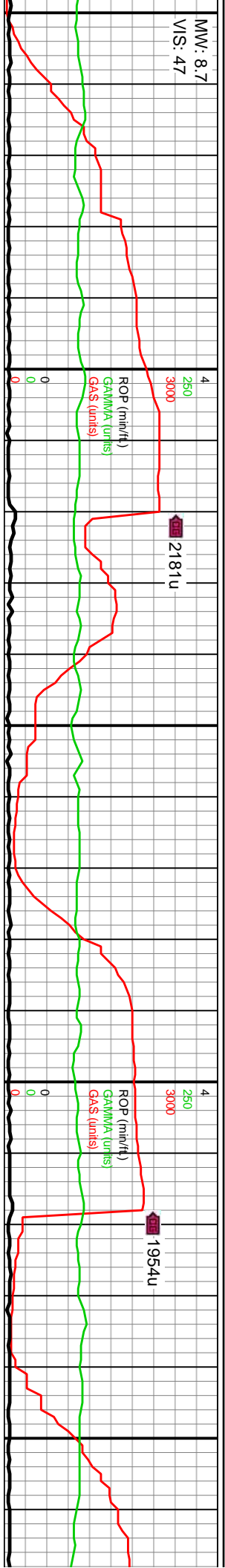
WOB: 39.3kbs
Rotary: 70RPM
Strokes: 220SPM
Pump Rate: 674GPM

MD:
TVD
Inclir
Azim
VS: :



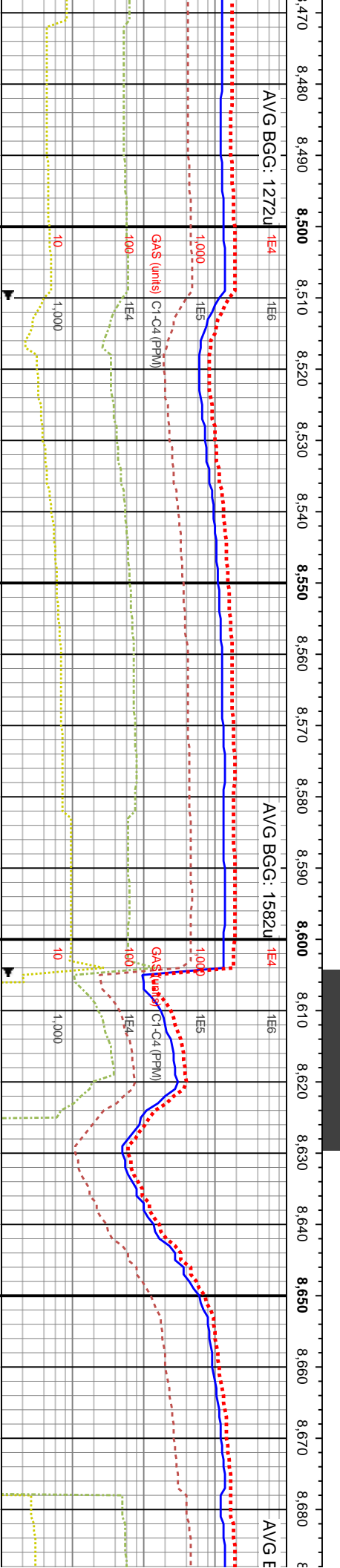
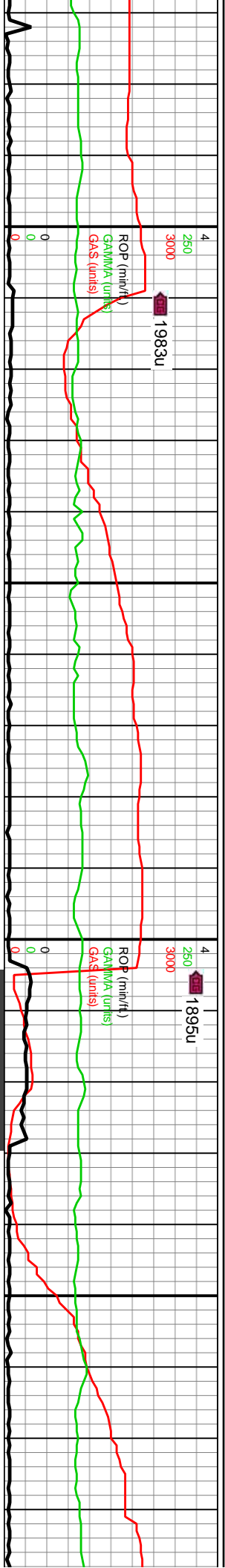
T (50%): dk gy-med gy, sl absrv tex, v calc, intbd chk	8060-8120 MRLST (50%): mot med gy-dk gy, gysbhn, ply-tab, frm, v calc, scat mic pyr; CHK (50%): mot lt gy-gysbhn, oftwht, v sft, chky tex, sb blk-y-pty, bri yeign flr, bri wht-bl mky cut, frnt lt gn resdl ring	8120-8180 CHK (60%): mot lt gy-offwht, lt gysbhn, v sft, chky tex, sb tab, mnr micfos, bri blshwh flr.; MRLST (40%): mot med gy-dk gy, gysbhn, ply-sb blk, frm, v calc, scat mic pyr, com yeign flr, bri wht-bl mky cut, blshwh resdl ring	8180-8240 MRLST (50%): med gy-dk gy, com mot gysbhn, pred blk, occ sb ply, frm-sl frm, v calc; CHK (50%): mot lt gy-offwht, v sft, chky tex, sb ply-sb blk, scat yeign flr, bri wht-bl mky cut, yeign resdl ring
h resdl ring	7750		





8240-8300 MRLST (60%): mot dk gy-med gy, frm-hrd, sb blkly, sl silty tex, v calc, tr chk lam, scat pp pyr; CHK (40%): gysbhn-crm, chky tex, calc, sft, scat brl-dul yeign flor, bri wht-bl mky cut, fnt lt gn resd ring	8300-8360 MRLST (65%): dk gy-med gy, gysbhn, frm-sl hrd, blkly-pily, sl silty tex, v calc, tr chk lamm, tr frac fl cal; CHK (35%): mot lt gysbhn-crm, chky tex, calc, sb blkly, bri yeign flor, bri wht-bl mky cut, fnt lt gn resd ring	8360-8420 MRLST (70%): mot med gy-dk gy, gysbhn, blkly-pily, frm, v calc, scat mic pyr; CHK (30%): mot gysbhn-lt gy, mnr ofwht, v sft, chky tex, sb blkly, fnt dul yeign flor, bri wht-bl mky cut, bishwh resd ring	8420-8480 MRLST (60%): mot med gysbhn, blkly-tab, frm, v calc, scat mic CHK (40%): mot gysbhn-lt gy, mnr o chky tex, sb tab, fnt-brl yeign flor, bri mky cut, bishwh-lt gn resd ring
7750	7750	7750	
TVD (ft)	TVD (ft)		

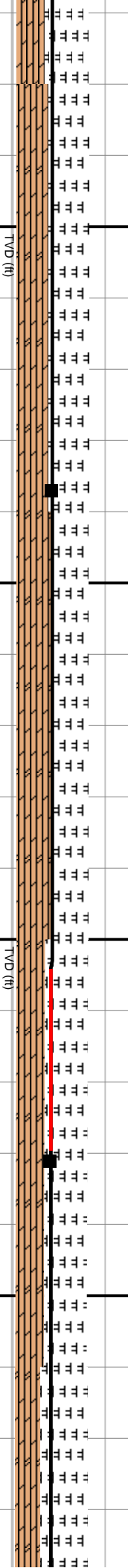




MD: 8,537'
TVD: 7,162.61'
Inclination: 89.11°
Azimuth: 273.79°
VS: 1,278.38'

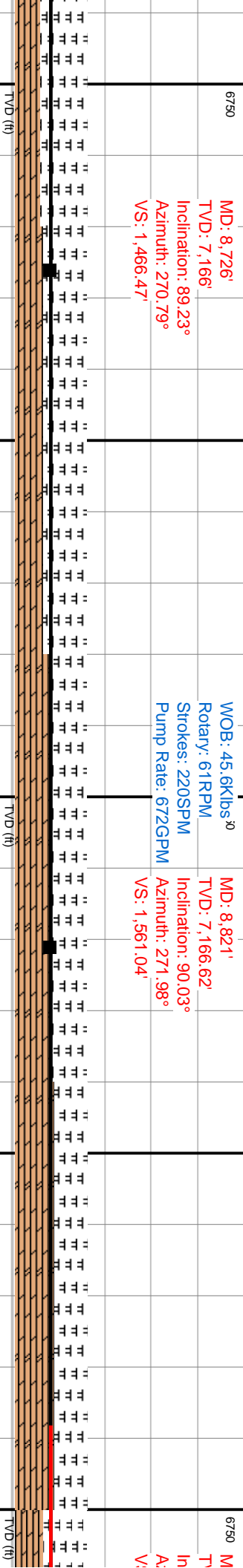
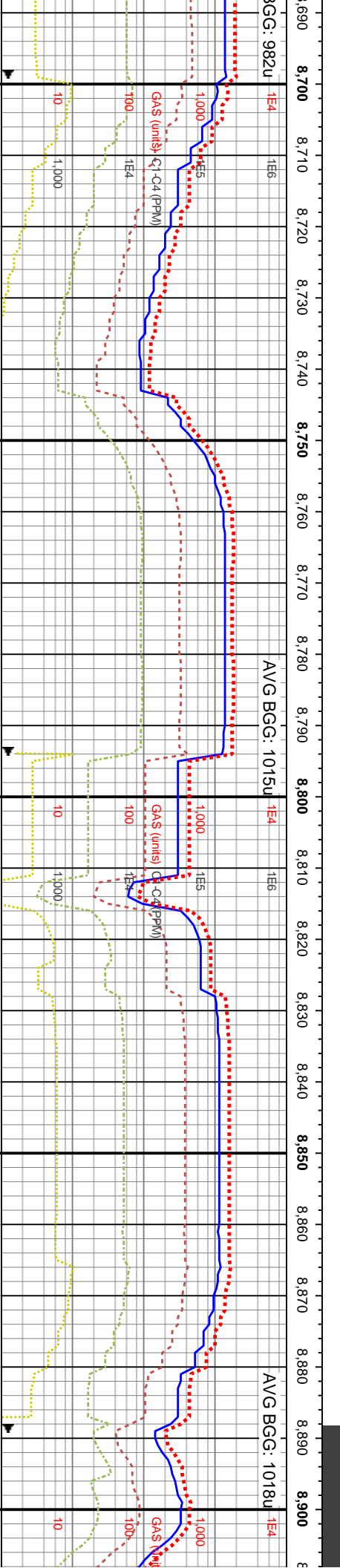
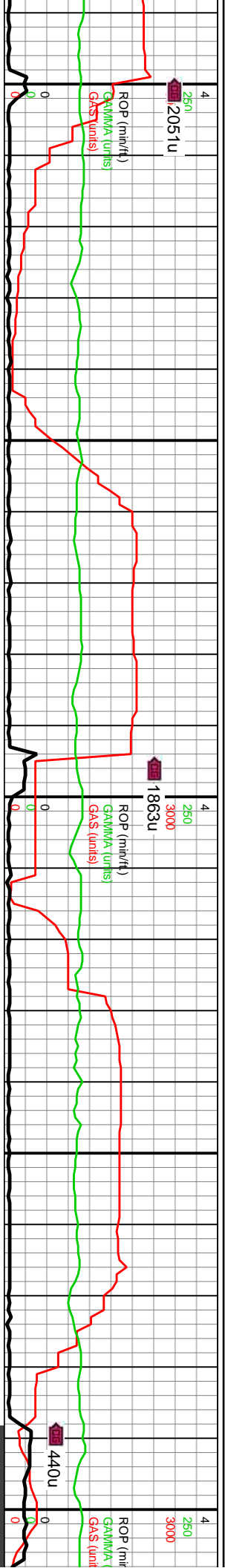
WOB: 41.6Klbs
Rotary: 70RPM
Strokes: 220SPM
Pump Rate: 673GPM

MD: 8,631'
TVD: 7,164.35'
Inclination: 88.77°
Azimuth: 270.46°
VS: 1,372.03'



gy-shbn, tab-sb splt, frm, v calc, scat mic pyr, fnt orng flr, br wht-bish mky cut, no resd ring, CHK (50%): mot crm-offwht, v sft, chky tex, sb ply-biky, dul-bri yelgn flr, bish stmng-mky cut, lt bishwh resd ring	8480-8540 MRLST (50%): mot med gy-dk gy, gyshbn, tab-sb splt, frm, v calc, scat mic pyr, fnt orng flr, br wht-bish mky cut, no resd ring, CHK (50%): mot crm-offwht, v sft, chky tex, sb ply-biky, dul-bri yelgn flr, bish stmng-mky cut, lt bishwh resd ring	8540-8600 MRLST (50%): mot dk gy-med gy, gyshbn, frm-v frm, tab-splt, sl sily tex, v calc, tr f chk lam, pp imbd pyr, CHK (50%): mot offwht-crm, chky tex, sft, sb biky, tr micfos, dul yelgn flr, dul mky cut, bishwh resd ring	9720-9780 MRLST (60%): mot med gy-dk gy, biky-tab, frm, v calc, scat mic pyr, CHK (40%): mot offwht-lt gyshbn, sft, chky tex, sb tab-biky, bishwh-dul yelgn flr, mky cut, bishwh resd ring	8660-8720 MRLS gyshbn, biky-ply, dul orng flr, bish (35%): mot offwht bishwh flr, dul m
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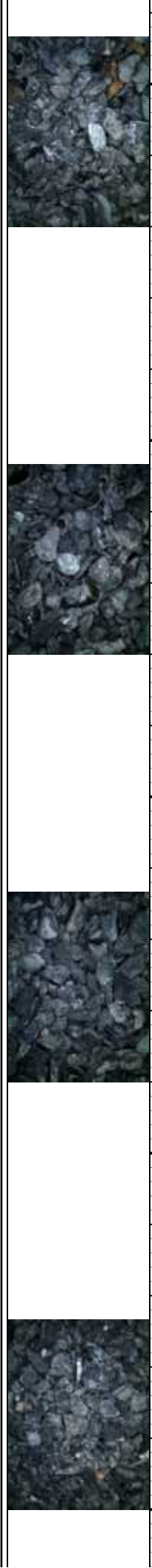


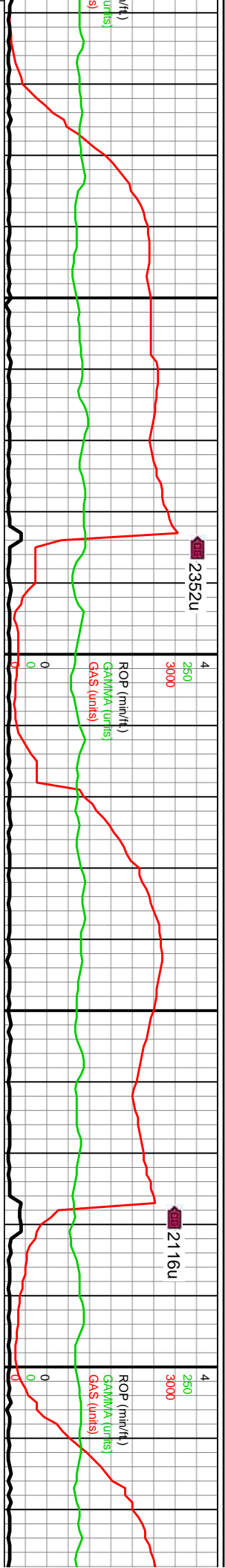
T (65%): mot med gy-dk gy, frm, v calc, scat mic pyr, fnt mky cut, no resdl ring; CHK -crm, v sft, chky tex, sb blk, kty cut, bishwh resdl ring		8720-8780 MRLST (60%): dk gy-med gy, gysbhn, frm-sl hrd, blk-sl elg, sl sily tex, intbd chk lamm, v calc; CHK (40%): lt gysbhn-crm, chky tex, calc, pily, bishwh-dul yelgn flor, mky cut, dul bishwh resdl ring		8780-8840 MRLST (50%): dk gy-med gy, frm-sl hrd, sb blk, sl sily tex, v calc, intbd chk lamm, scat pyrc nod; CHK (50%): lt gysbhn-crm, chky tex, calc, dul yelgn flor, dul mky cut, nod bishwh resdl ring		8840-8900 CHK (55%): mot lt gy-offwht, lt gysbhn, v sft, chky tex, sb tab, mmr micfos, bri bishwh flor,; MRLST (45%): mot med gy-dk gy, gysbhn, pily-sb blk, frm, v calc, scat mic pyr, fnt orng flor, bri wht-bl mky cut, no resdl ring	
TVD (ft)		TVD (ft)		TVD (ft)		TVD (ft)	

MD: 8,726'
TVD: 7,166'
Inclination: 89.23°
Azimuth: 270.79°
VS: 1,466.47'

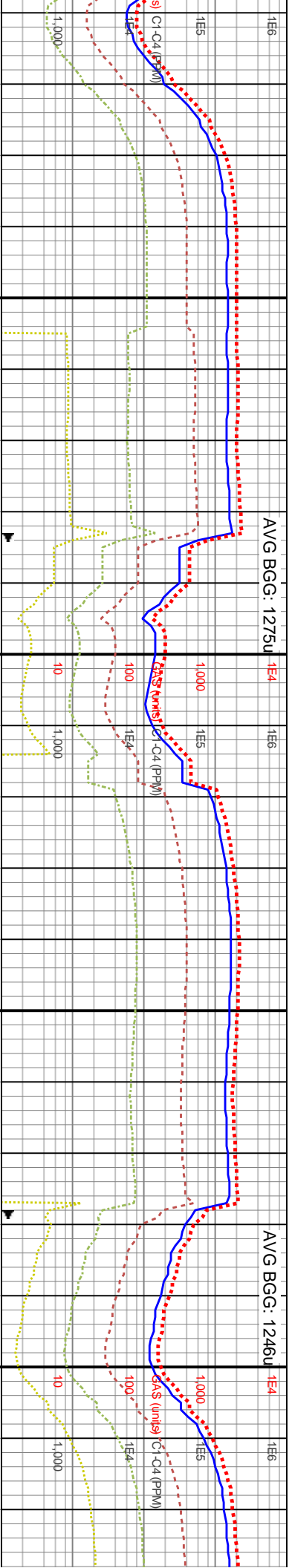
WOB: 45.6Klbs₃₀
Rotary: 61RPM
Strokes: 220SPM
Pump Rate: 672GPM

MD: 8,821'
TVD: 7,166.62'
Inclination: 90.03°
Azimuth: 271.98°
VS: 1,561.04'





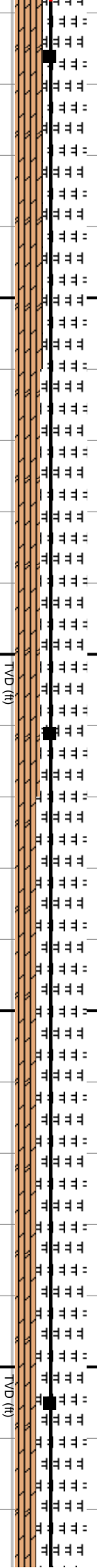
910 8,920 8,930 8,940 8,950 8,960 8,970 8,980 8,990 9,000 9,010 9,020 9,030 9,040 9,050 9,060 9,070 9,080 9,090 9,100 9,110 9,120



D: 8,916'
ID: 7,166.39'
Inclination: 90.25°
Azimuth: 269.28°
S: 1,655.47'

WOB: 40.5Klbs
Rotary: 71RPM
Strokes: 220SPM
Pump Rate: 673GPM

MD: 9,011'
TVD: 7,166.46'
Inclination: 89.66°
Azimuth: 267.64°
VS: 1,749.46'

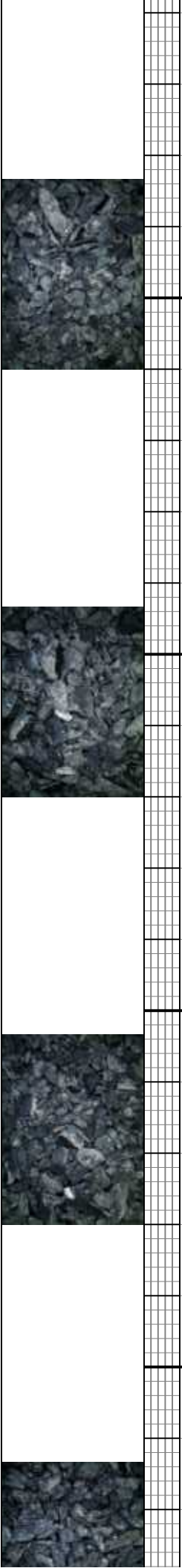


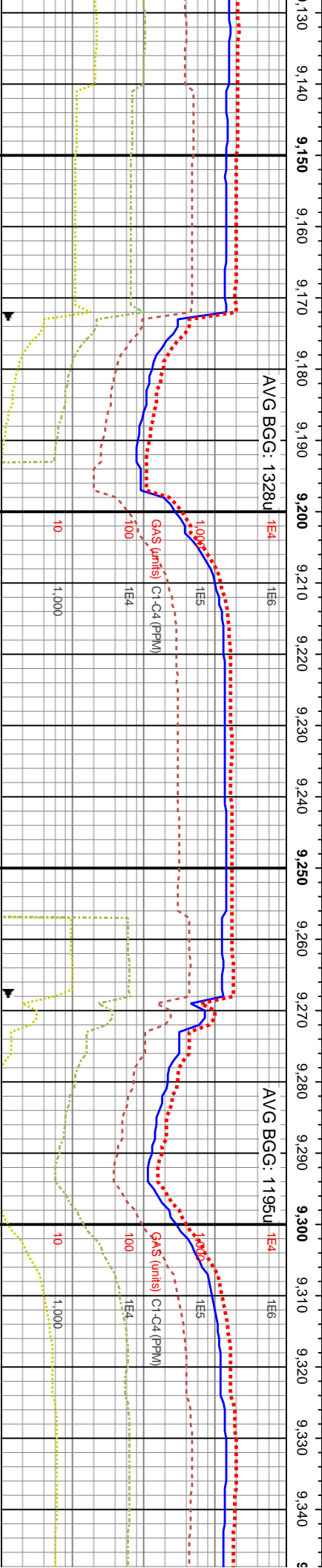
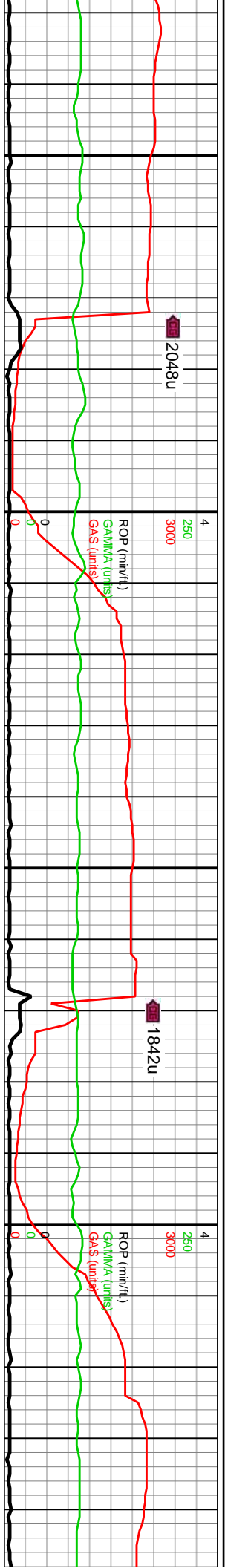
8900-8960 MRLST (60%): dk gy-gyshbn, med gy, frm-v frm, blk, sl absrv tex, v calc, scat imbd pyr; CHK (40%): gysbhn-crm, chky tex, calc, sb ply, dul yeign flr, dul mky cut, mod bishwh resd ring

8960-9020 MRLST (65%): dk gy-med gy, frm-sl hrd, ply-sl eig, sm-sl silty tex, v calc, tr chk lam, scat pyrc nod; CHK (35%): lt gysbhn-crm, chky tex, calc, blk, dul yeign flr, dul mky cut, mod bishwh resd ring

9020-9080 MRLST (70%): dk gy-med gy, frm-sl hrd, blk-ply, sl absrv tex, v calc, tr chk lam, pp mic pyr; CHK (30%): gysbhn-crm, chky tex, calc, ply, brt bishwh-dul yeign flr, dul mky cut, mod bishwh resd ring

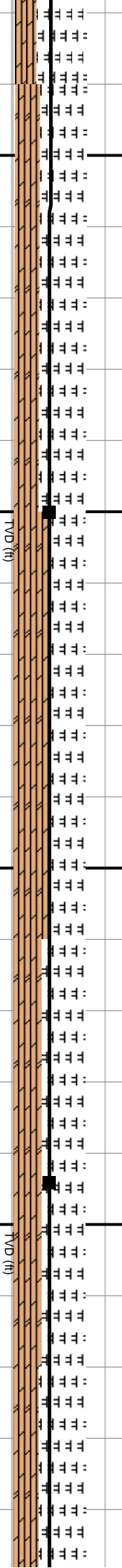
9080-9140 MRLST (70%): med gy-c-frm-sl hrd, blk-sil eig, sl silty tex, v calc, lam, scat pyrc nod; CHK (30%): lt gy chky tex, calc, blk, dul yeign flr, dul mod bishwh resd ring





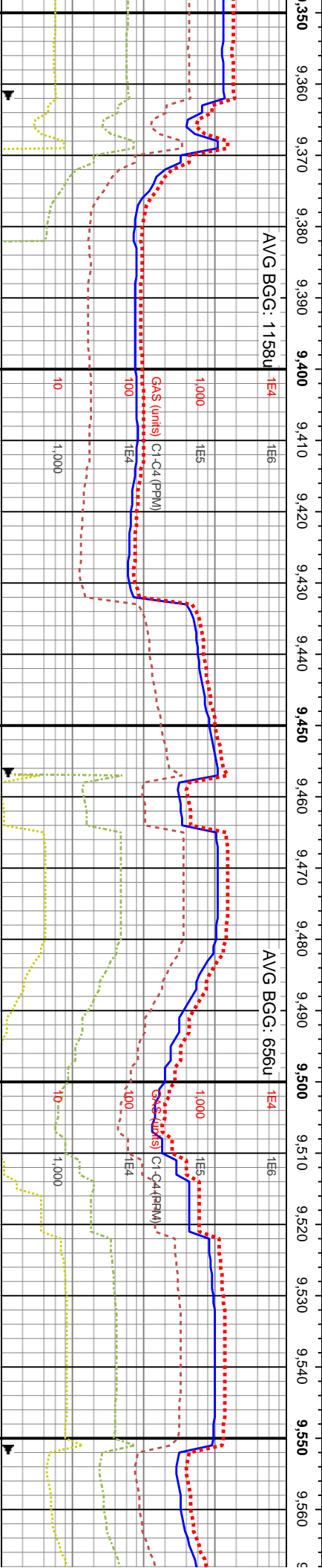
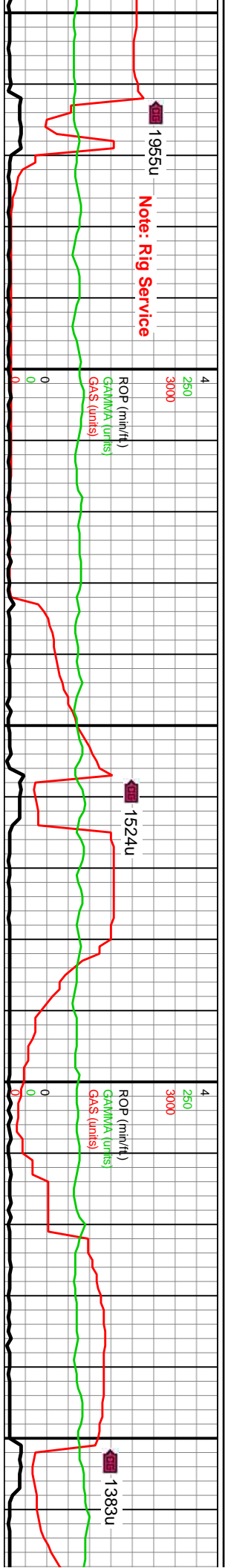
WOB: 44.8klbs
Rotary: 70RPM
Strokes: 220SPM
Pump Rate: 673GPM

MD: 9,200'750
TVD: 7,166.99'
Inclination: 89.94°
Azimuth: 269.17°
VS: 1.936.48'



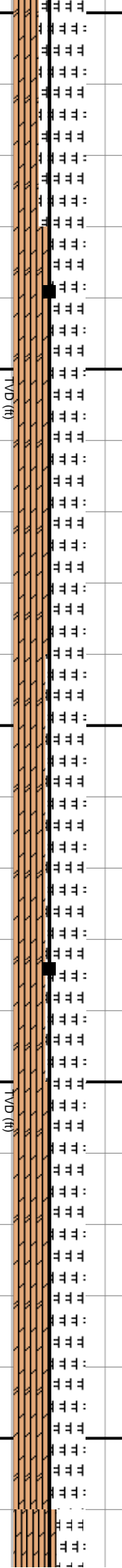
MD: 9,294'
TVD: 7,167.57'
Inclination: 89.35°
Azimuth: 267.52°
VS: 2.029.45'

9140-9200 MRLST (65%): mot dk gy-med gy, gysbhn, frm-v frm, tab-splt, sl silty tex, v calc, tr f chk lam, pp imbd pyr; CHK (35%): mot offwht-frm, chky tex, sft, sb blk, tr micfos, dul yeign flr, dul mky cut, bishwh resd ring	9200-9260 MRLST (50%): mot dk gy-med gy, gysbhn, frm-sl hrd, pty, sl silty tex, v calc, tr lam; CHK (50%): gysbhn-frm, chky tex, calc, tab, intbdd mlst, dul yeign flr, dul mky cut, mod bishwh resd ring	9260-9320 MRLST (60%): mot med gy-dk gy, gysbhn, blk-pty, frm, v calc, scat mic pyr, fnt dul ong flr, bish mky cut, no resd ring; CHK (40%): mot offwht-frm, v sft, chky tex, sb blk, bishwh flr, dul mky cut, bishwh resd ring	9320-9380 MRLST (25%): mot frm-hrd, blk, sl a CHK (25%): mot intbdd wi mlst, c mky cut, mod bis
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MD: 9,389'
TVD: 7,168.37'
Inclination: 89.69°
Azimuth: 267.93°
Pump Rate: 673GPM
VS: 2,123.26'

MD: 9,484'
TVD: 7,168.62'
Inclination: 90°
Azimuth: 268.17°
VS: 2,217.19'

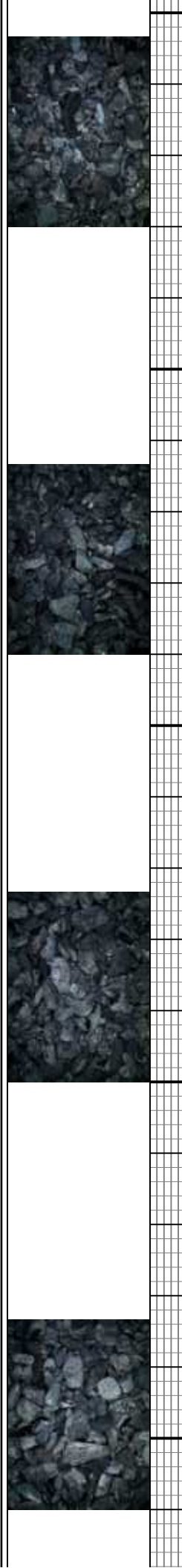


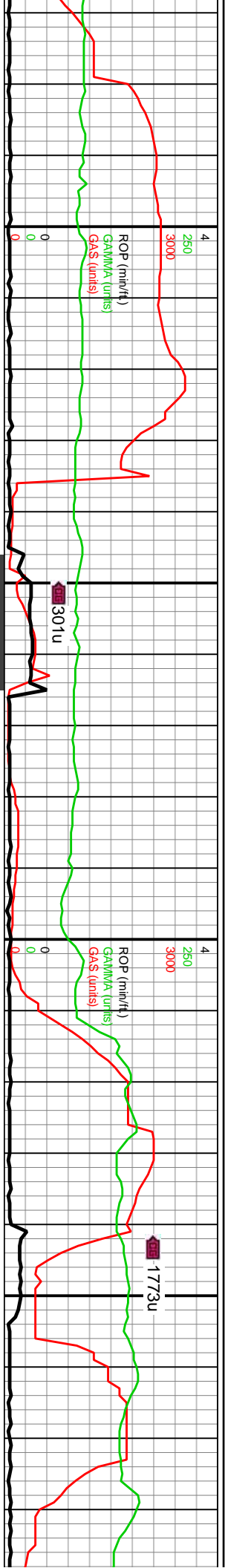
IT (65%): dk gy-med gy,
bsv tex, mnr micios, v calc;
cm-It gysbhn, calc, sb blkly,
chky tex, dul yeign flor, dul
mky cut, yeign resdl ring

9380-9440 MRLST (50%): med gy-dk gy, com
mot gysbhn, pred blkly, occ sb ply, frm-sl frm,
v calc; CHK (50%): mot It gy-offwnt, v sft, chky
tex, sb ply-sb blkly, scat yeign flor, bri wht-bl
mky cut, yeign resdl ring

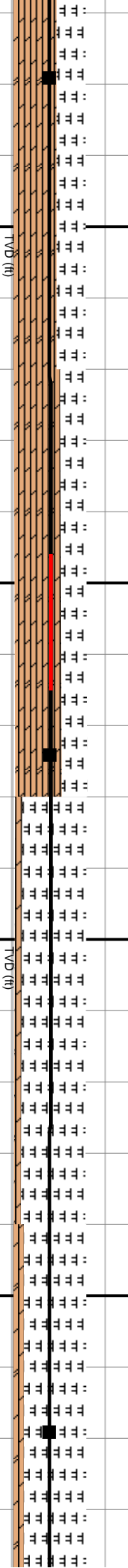
9440-9500 MRLST (55%): mot med gy-dk gy,
gysbhn, blkly-tab, frm, v calc, scat mic pyr;
CHK (45%): mot gysbhn-It gy, mnr ofwnt, v sft,
chky tex, sb tab, fnt-br yeign flor, bri wht-bl
mky cut, blshwh-It gn resdl ring

9500-9560 MRLST (50%): dk gy-med gy,
frm-sl hrd, sb blkly, sl sfly tex, v calc, inbnd chk
lamm, scat pyrc nod; CHK (50%): It
gysbhn-crm, chky tex, calc, dul yeign flor, dul
mky cut, mod blshwh resdl ring

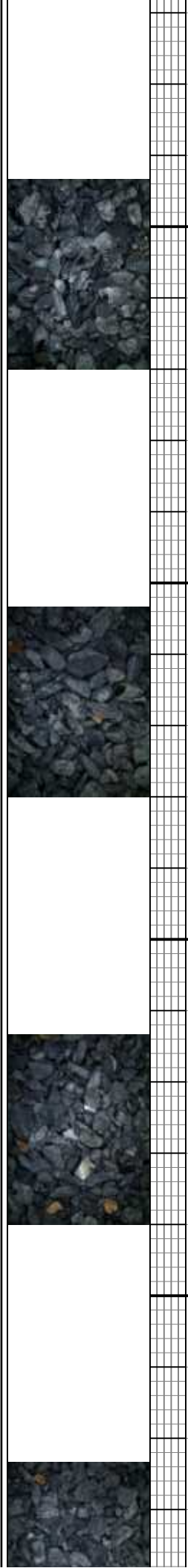


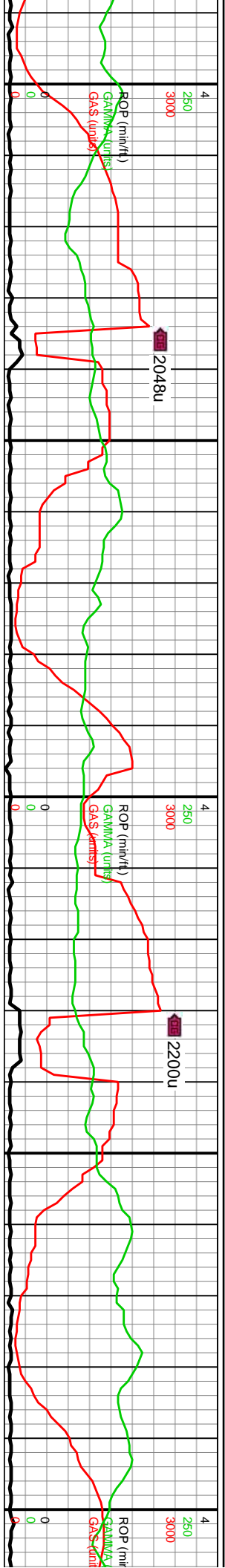


MD: 9,579' TVD: 7,167.35' Inclination: 91.54° Azimuth: 269.93° VS: 2,311.3'	WOB: 43.5Klbs Rotary: 71RPM Strokes: 220SPM Pump Rate: 673GPM
MD: 9,674' TVD: 7,166.4' Inclination: 89.6° Azimuth: 271.06° VS: 2,405.72'	
MD: 9,769' TVD: 7,167.35' Inclination: 89.26° Azimuth: 271.14° VS: 2,500.24'	

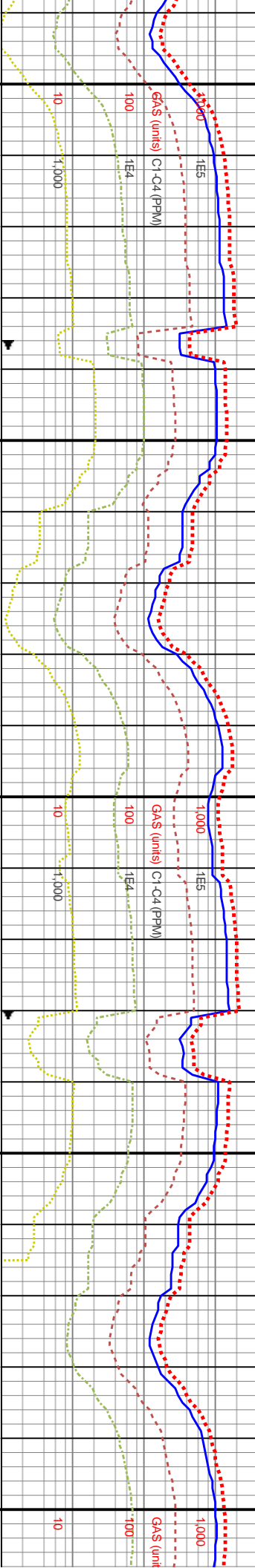


9560-9620 CHK (60%): lt gysbhn-crm, calc, sb blkly, intbdd wi mlst; MRLST (40%): mot dk gy-med gy, frm-sl hrd, blkly, sl silty tex, v calc, scat pp pyr, tr bri onrg flor, bri wht-bl string cut, bri bl resdl ring	9620-9680 CHK (65%): gysbhn-lt gy, mot, oftrwht, v sft, chky tex, sb blkly; MRLST (35%): med gy-dk gy-gysbhn, occ v dk gy, pried blkly, frm, v calc, tr imbd pyr; bri yeign flor, bri wh-bl mky cut, yeign resdl ring;	9680-9740 MRLST (90%): dk gy-med gy, frm-v frm, blkly, sl silty tex, v calc, intbdd wi chk, pp imbd pyr; CHK (10%): lt gysbhn, chky tex, sft, blkly, dul yeign flor, dul mky cut, mod blshwh resdl ring	9740-9800 MRLST (85%): dk gy-me
7750	7750	7750	





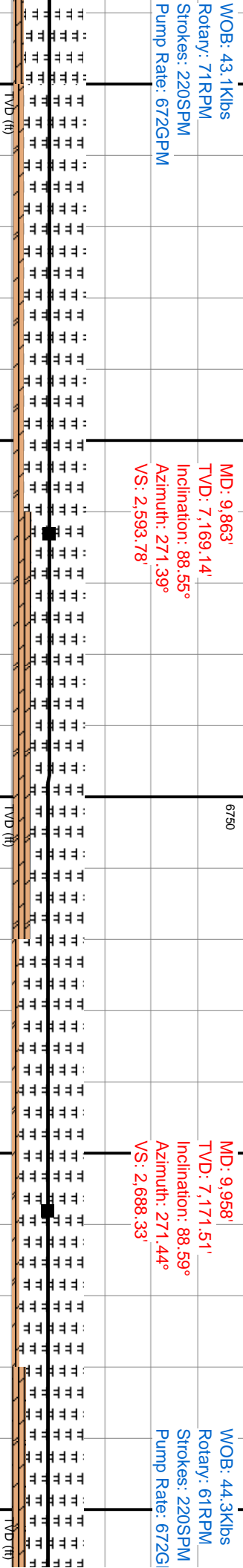
7,790 9,800 9,810 9,820 9,830 9,840 9,850 9,860 9,870 9,880 9,890 9,900 9,910 9,920 9,930 9,940 9,950 9,960 9,970 9,980 9,990 10,000 1



WOB: 43.1Klbs
Rotary: 71RPM
Strokes: 220SPM
Pump Rate: 672GPM

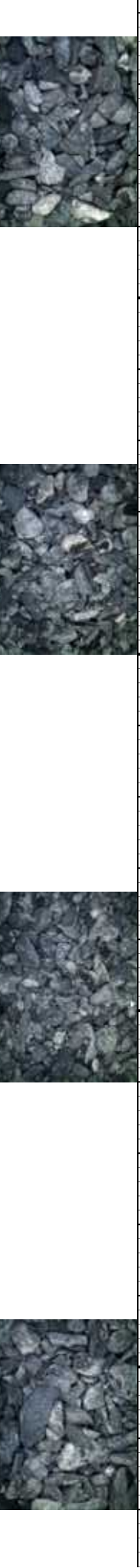
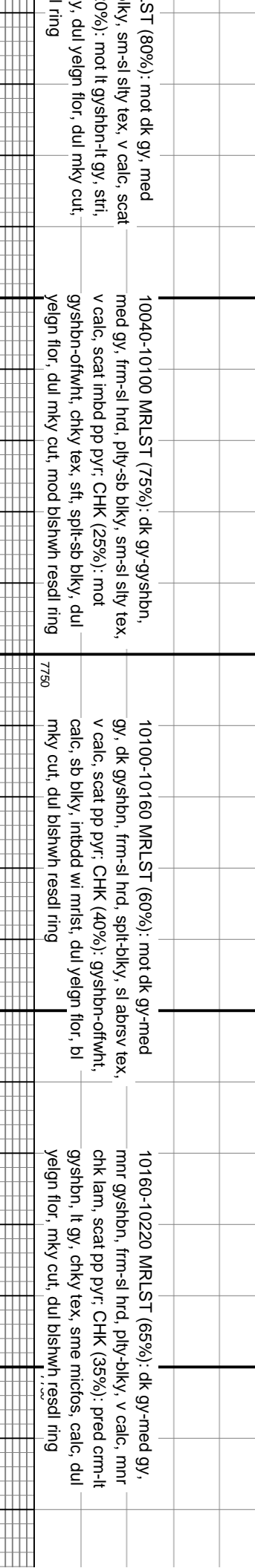
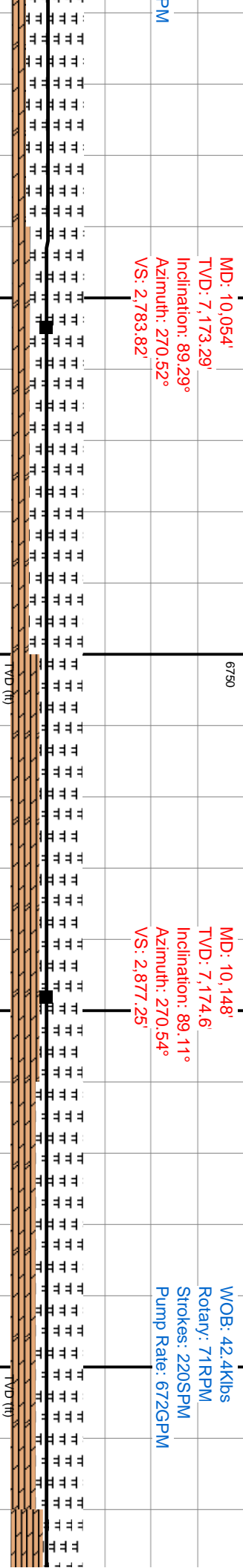
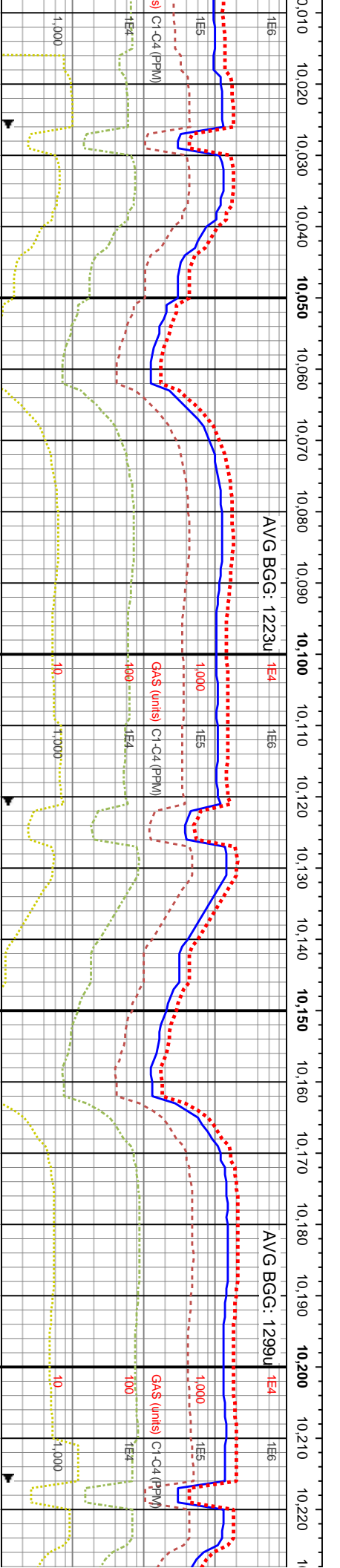
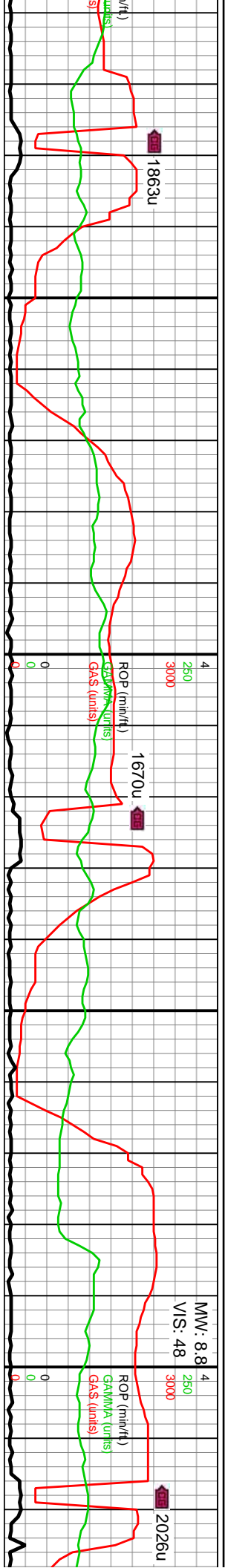
MD: 9,863'
TVD: 7,169.14'
Inclination: 88.55°
Azimuth: 271.39°
VS: 2,593.78'

WOB: 44.3Klbs
Rotary: 61RPM
Strokes: 220SPM
Pump Rate: 672GPM



9800-9860 MRLST (65%): dk gy-med gy, gysbhn, frm-hrd, blk, sl silty tex, v calc, tr chk lamn, scat imbd pyr; CHK (15%): lt gysbhn-crm, chky tex, calc, sft, dul yeign flor, dul mky cut, bishwh resd ring	9860-9920 MRLST (75%): med gy-dk gy, com mot gysbhn, pred blk, occ sb ply, frm-sl frm, v calc; CHK (25%): mot lt gy-offwht, v sft, chky tex, sb ply-sb blk, scat yeign flor, bri wht-bl mky cut, yeign resd ring	9920-9980 MRLST (90%): dk gy-med gy, mntr gysbhn, frm-sl hrd, ply-blky, v calc, mntr chk lam, scat pp pyr; CHK (10%): pred crm-lt gysbhn, chky tex, calc, bishwh-dul yeign flor, mky cut, dul bishwh resd ring	9980-10040 MRLST (95%): dk gy-med gy, mntr gysbhn, frm-sl hrd, ply-blky, v calc, mntr chk lam, scat pp pyr; CHK (5%): pred crm-lt gysbhn, chky tex, calc, bishwh-dul yeign flor, mky cut, dul bishwh resd ring
7750	7750	7750	7750





MW: 8.8
V/S: 48
3000

ROP (mnl/t)
GPM (units)
GMS (units)

2026u

AVG BGG: 1299u

ROP (mnl/t)
GPM (units)
GMS (units)

1570u

WOB: 42.4Klbs
Rotary: 71RPM
Strokes: 220SPM
Pump Rate: 672GPM

ROP (mnl/t)
GPM (units)
GMS (units)

1470u

MD: 10,148'
TVD: 7,174.6
Inclination: 89.11°
Azimuth: 270.54°
VS: 2,877.25'

ROP (mnl/t)
GPM (units)
GMS (units)

1670u

MD: 10,054'
TVD: 7,173.29
Inclination: 89.29°
Azimuth: 270.52°
VS: 2,783.82'

ROP (mnl/t)
GPM (units)
GMS (units)

1863u

10100-10160 MRLST (60%): mot dk gy-med
gy, dk gysbhn, frm-sl hrd, spl-bkly, sl absrv tex,
v calc, scat pp pyr: CHK (40%): gysbhn-ofwht,
calc, sb bkly, intbdd wi mrlst, dul yelgn flr, bl
mky cut, dul bishwh resd ring

ROP (mnl/t)
GPM (units)
GMS (units)

1670u

10040-10100 MRLST (75%): dk gy-gysbhn,
med gy, frm-sl hrd, ply-sb bkly, sm-sl sily tex,
v calc, scat imbd pp pyr: CHK (25%): mot
gysbhn-ofwht, chky tex, sft, spl-sb bkly, dul
yelgn flr, dul mky cut, mod bishwh resd ring

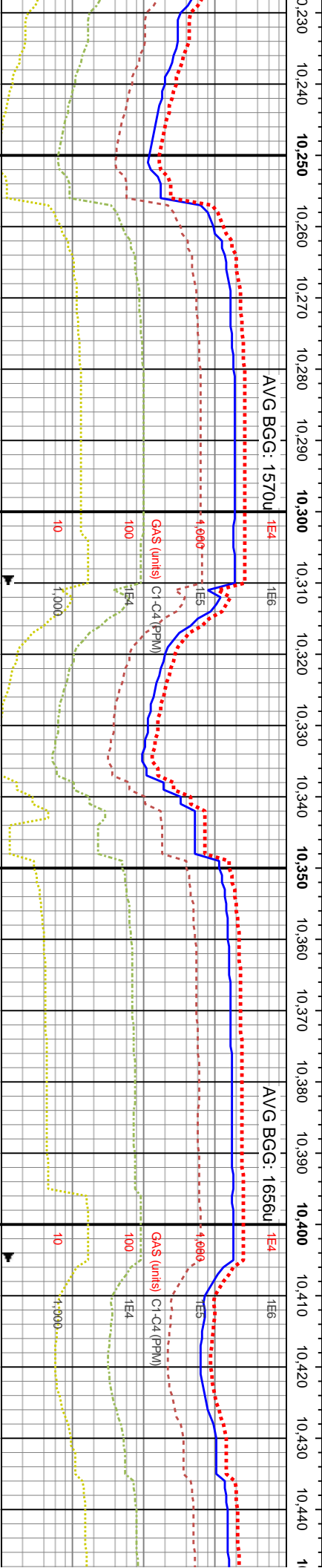
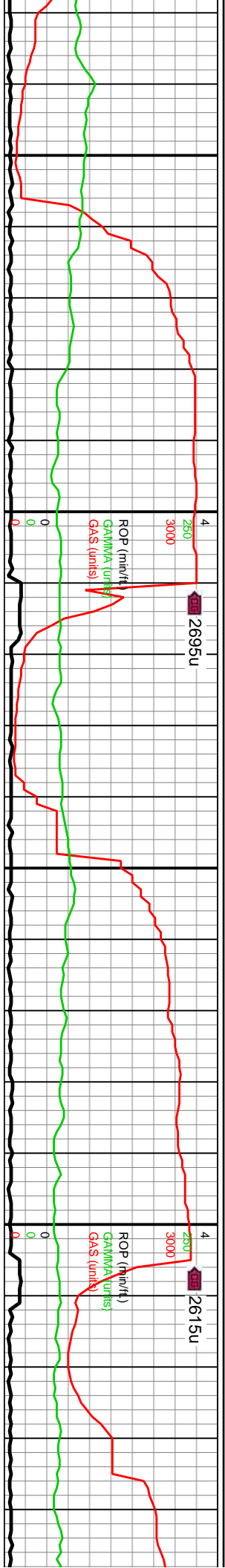
ROP (mnl/t)
GPM (units)
GMS (units)

1863u

ST (80%): mot dk gy, med
bkly, sm-sl sily tex, v calc, scat
0%): mot lt gysbhn-lt gy, stri,
y, dul yelgn flr, dul mky cut,
ring

ROP (mnl/t)
GPM (units)
GMS (units)

1863u



MD: 10,242'
TVD: 7,175.91'
Inclination: 89.29°
Azimuth: 270.47°
VS: 2,970.67'

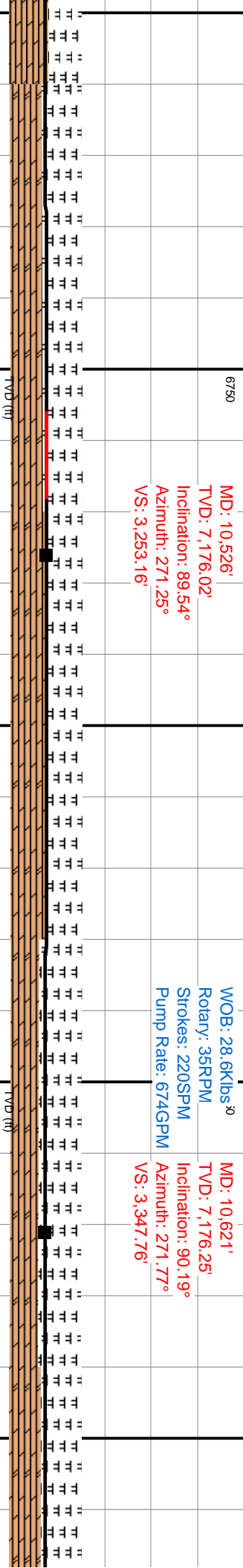
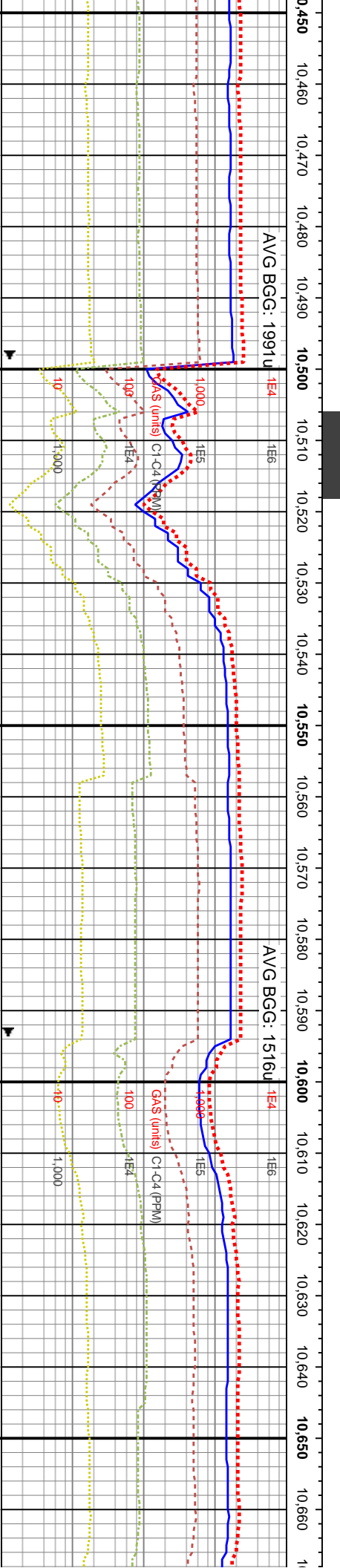
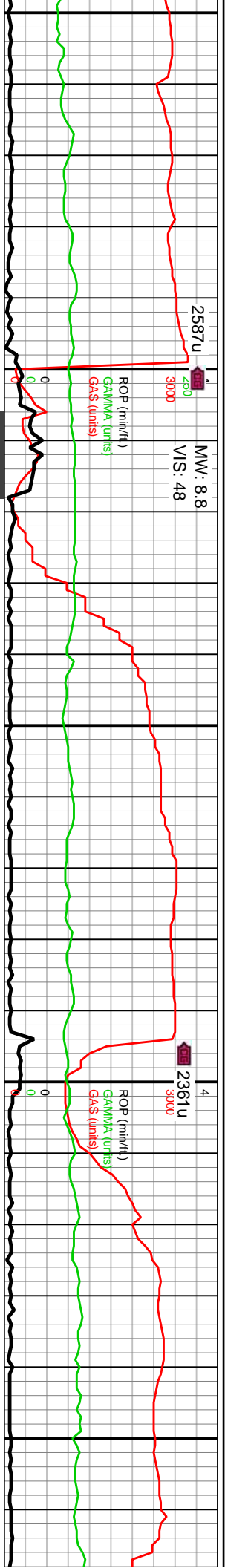
MD: 10,337'
TVD: 7,176.71'
Inclination: 89.75°
Azimuth: 270.93°
VS: 3,065.12'

WOB: 45.2Klbs
Rotary: 71RPM
Strokes: 220SPM
Pump Rate: 672GPM

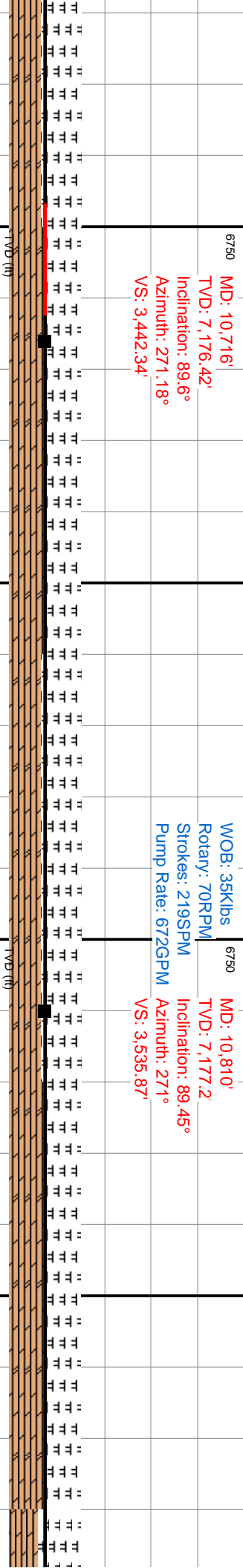
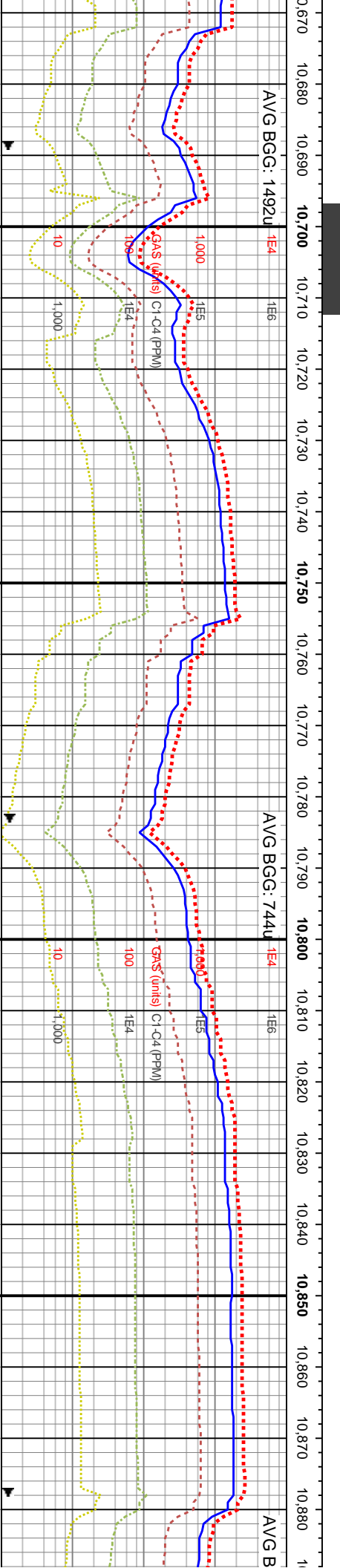
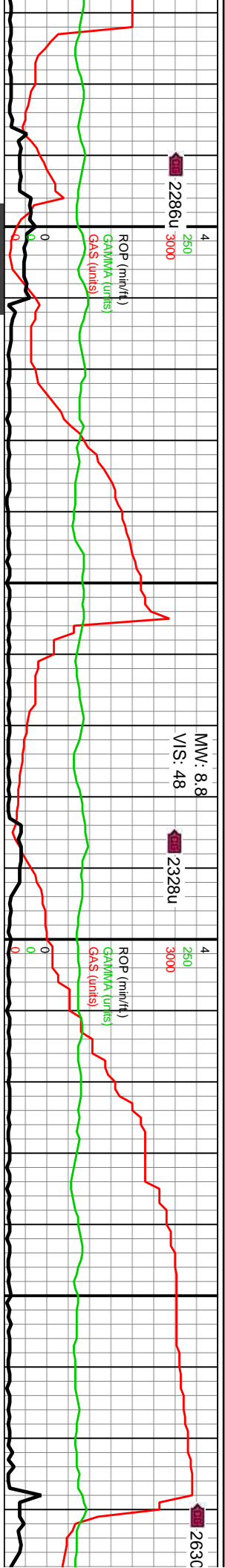
MD: 10,432'
TVD: 7,176.28'
Inclination: 90.77°
Azimuth: 271.23°
VS: 3,159.61'

10220-10280 MRLST (55%): med gy-dk gy, frm-sl hrd, blkyl-sl splt, sl absrv tex, v calc, mnr f chk lam, scat pyrc nod; CHK (45%): lt gysbhn-offwht-lt gy, chky tex, blkyl, calc, dul yeign flor, dul mky cut, mod blshwh resd ring	10280-10340 MRLST (55%): mot dk gy, med gy-gysbhn, frm-sl hrd, blkyl, sm-sl slty tex, v calc, scat imbd pyr; CHK (45%): gysbhn-crm, chky tex, mnr micos, calc, blkyl-pty, dul yeign flor, dul mky cut, mod blshwh resd ring	10340-10400 MRLST (50%): dk gy-med gy, frm-hrd, sb blkyl-splt, sl slty tex, v calc, mnr chk lam, scat pyrc nod; CHK (50%): offwht-crm, gysbhn, chky tex, calc, sft, sme micos, dul yeign flor, mod mky cut, dul blshwh resd ring	10400-10460 CHK (55%): mot lt gy-c-gysbhn, v sft, chky tex, sb tab, sme r yeign flor, mod mky cut, dul blshwh r MRLST (45%): mot dk gy-gysbhn, pl frm, v calc, scat mic pyr
TVD (ft)	TVD (ft)	TVD (ft)	TVD (ft)

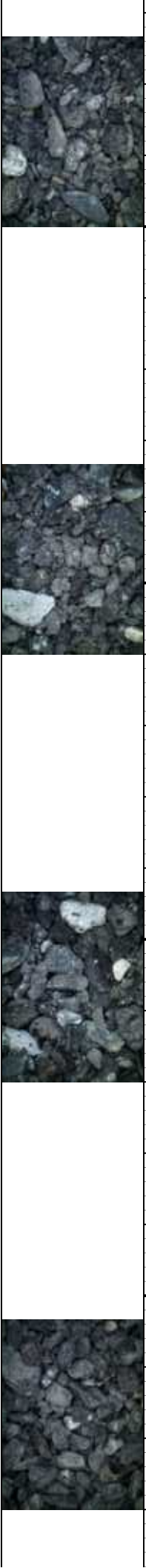


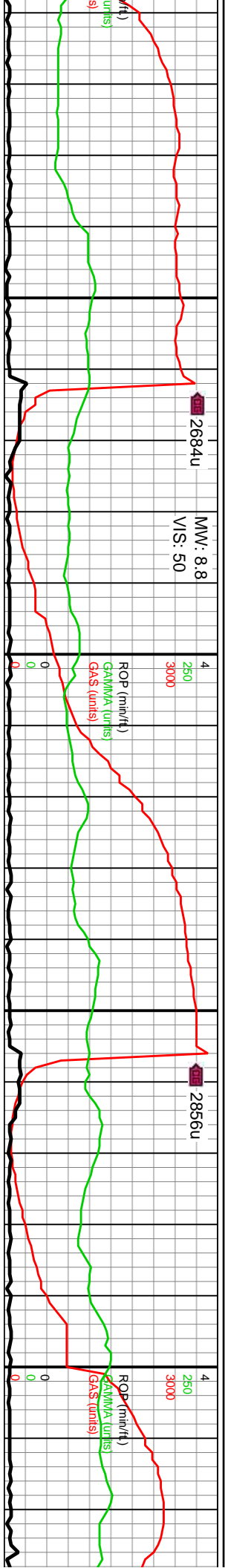


offwhnt, lt micos, dul resd ring; gy-sh blyk,	10460-10520 MRLST (55%): mot dk gy-med gy, gyshbn, frm-v frm, tab-splt, sl sily tex, v calc, tr chk lam, pp imbd pyr; CHK (45%): mot offwhnt-frm, chky tex, sft, sb blyk, tr micos, dul yelgn flor, dul mky cut, bishwh resd ring	10520-10580 CHK (50%): gyshbn-frm, sft, chky tex, blyk-sl pily, scat mic fos, v calc, dul yelgn flor, dul mky cut, bishwh resd ring; MRLST (50%): dk gy-gyshbn, pily-tab, frm-sl hrd, sl sily tex, v calc, sme imbd chk lamn	10580-10640 MRLST (60%): dk gy-med gy, frm-hrd, blyk-tab, sl absrv tex, v calc, intbd chk lam, scat pp pyr; CHK (40%): lt gyshbn-frm, chky tex, calc, sme micos, sb pily, dul yelgn flor, dul mky cut, bishwh resd ring	10640-10700 MR frm-hrd, blyk, sl al CHK (45%): mot chky tex, intbd w mky cut, mod bish
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10700-10760 CHK (50%): gysbhn-cm, sft-sl frm, chky tex, blkyl-sl pty, scat mic fos, v calc, dul yeign flr, dul mky cut, bishwn resd ring; MRLST (50%): mot dk gy-med gysbhn, sb blkyl, frm-sl hrd, tr micmica, sl stly tex, v calc	10760-10820 MRLST (55%): mot dk gy, med gy-gysbhn, frm-sl hrd, blkyl, sm-sl stly tex, v calc, scat imbd pyr; CHK (45%): mot lt gysbhn, sme micfos, chky tex, calc, spl, dul yeign flr, dul mky cut, mod bishwn resd ring	10820-10880 MRLST (50%): dk gy-med gy, frm-sl hrd, pty-blkyl, sm-sl stly tex, v calc, tr f lam, scat pp pyr; CHK (50%): gysbhn-cm, chky tex, calc, dul yeign flr, mod mky cut, dul bishwn resd ring
7750		





MW: 8.8
VIS: 50

2684u

2856u

ROP (m/h)

GAMMA (units)

GAS (units)

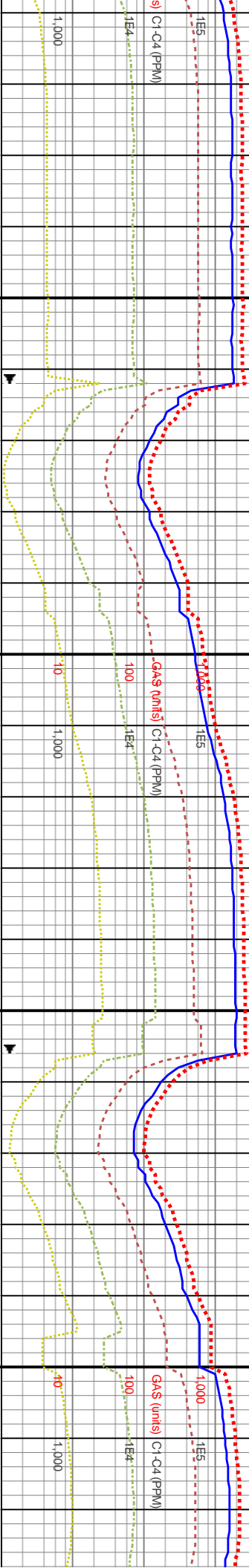
ROP (m/h)

GAMMA (units)

GAS (units)

AVG BGG: 1479u

AVG BGG: 1300u



MD: 11,189'

TVD: 7,185.89'

Inclination: 87.78°

Azimuth: 271.63°

VS: 3,913.16'

WOB: 45.6Klbs

Rotary: 60RPM

Strokes: 220SPM

Pump Rate: 672GPM

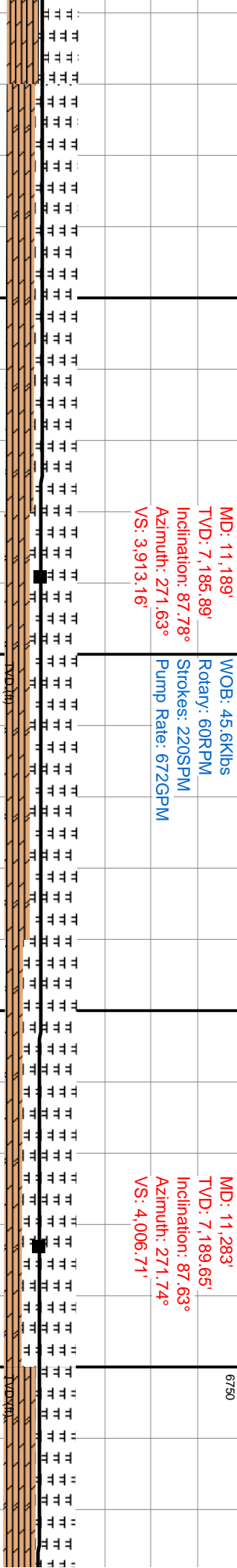
MD: 11,283'

TVD: 7,189.65'

Inclination: 87.63°

Azimuth: 271.74°

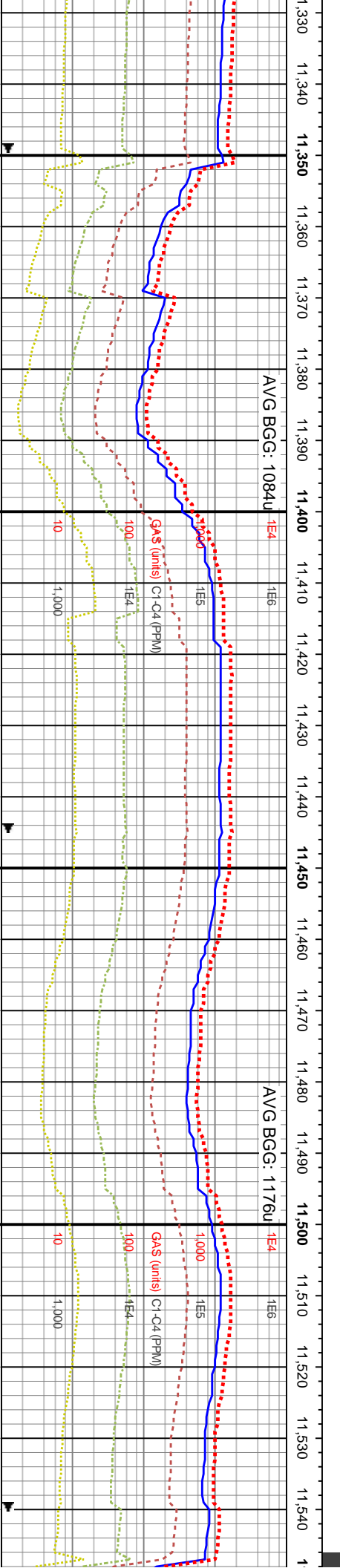
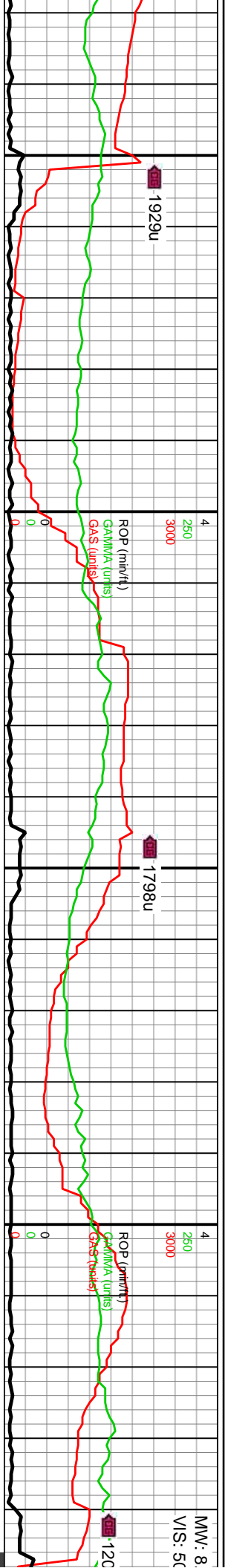
VS: 4,006.71'



gy-med ds, sl silty ht, sl frm, dul yeign	11120-11180 MRLST (60%): mot dk gy-med gysbhn, sb blkly-tab, frm-sl hrd, tr micnica, sl silty tex, v calc; CHK (40%): mot lt gysbhn, sl frm, blkly-sl eig, v calc, mnr micfos, dul yeign flor, dul mky cut, blshwh resd ring	11180-11240 MRLST (65%): pred dk gy-gysbhn, med gy, frm-sl hrd, pty-sb blkly, silty tex, v calc, scat pyrc nod; CHK (35%): mot gysbhn-ofwht, chky tex, sb blkly, dul yeign flor, dul mky cut, mod blshwh resd ring	11240-11300 MRLST (75%): dk gy-med gy, occ gysbhn, frm-sl hrd, pty-blky, v calc, tr chk lam, scat pp pyr; CHK (15%): lt gysbhn, str ip, chky tex, mnr mic fos, blshwh-dul yeign flor, mky cut, dul blshwh resd ring	11300-11360 MR pty-sb blkly, frm-h (45%): mot crm-g blkly-sl eig, scat r dul mky cut, blshwh
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7750





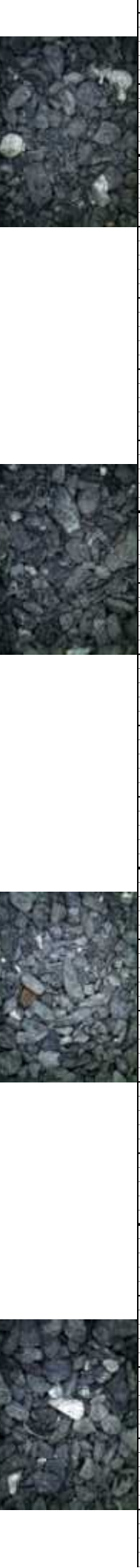
MD: 11,378'
TVD: 7,193.87'
Inclination: 87.28°
Azimuth: 271.47°
VS: 4,101.23'

WOB: 44.6Klbs
Rotary: 50RPM
Strokes: 220SPM
Pump Rate: 672GPM

MD: 11,472'
TVD: 7,198.73'
Inclination: 86.8°
Azimuth: 271.45°
VS: 4,194.69'

6750

11360-11420 MRLST (70%): dk gy-med gy, frm-sl hrd, blkly, sl silty tex, v calc, scat imbd pyr; CHK (30%): mot lt gysbhn, crm-oftwht, tr mictos, chky tex, calc, pily, dul yeign flor, dul mky cut, mod bishwh resd ring	11420-11480 MRLST (60%): dk gy-med gy, mot gysbhn, frm-sl hrd, sb split, sl silty tex, imbdd chk lam; CHK (40%): gysbhn-crm, lt gy, chky tex, mnr mictos, mlst imbds, calc, dul yeign flor, dul mky cut, bishwh resd ring	11480-11540 MRLST (65%): dk gy-med gy, gysbhn, frm-v frm, sb tab, sm-sl silty tex, tr chk lam, pp imbd pyr; CHK (35%): mot lt gysbhn, oftwht, chky tex, calc, sb elg, bri orgg-dul yeign flor, dul mky cut, mod bishwh resd ring
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9/29/15 MINDEPTH
BF @ 11,570'

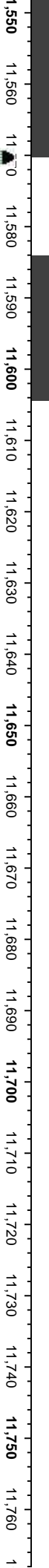
4612u

ROP (m/h-ft)
GAMMA (units)
GAS (units)

805u

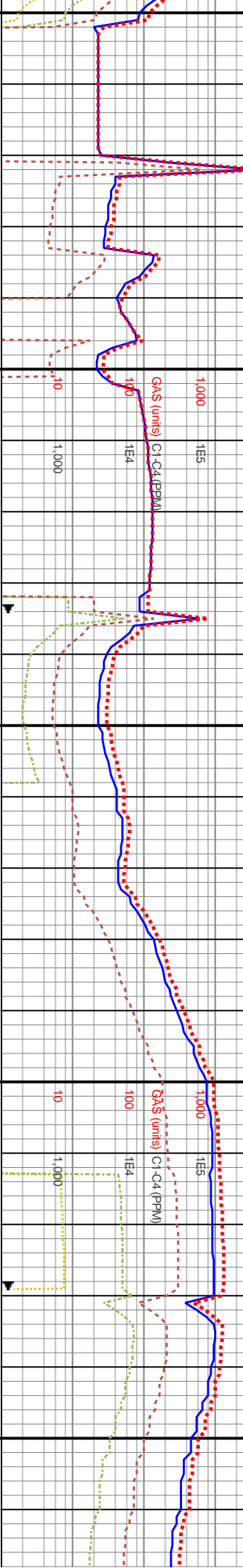
ROP (m/h-ft)
GAMMA (units)
GAS (units)

1323u



AVG BGC: 702u

AVG BGC: 154u



MD: 11,566'
TVD: 7,204.32'
Inclination: 86.37°
Azimuth: 270.89°
VS: 4,288.11'
WOB: 71.1kbs
Rotary: 0RPM
Strokes: 220SPM
Pump Rate: 672GPM
TOOH for New Motor

MD: 11,661'
TVD: 7,207.54'
Inclination: 89.75°
Azimuth: 269.73°
VS: 4,382.43'

MD: 11,755'
TVD: 7,207.42'
Inclination: 90.4°
Azimuth: 269.44°
VS: 4,475.68'

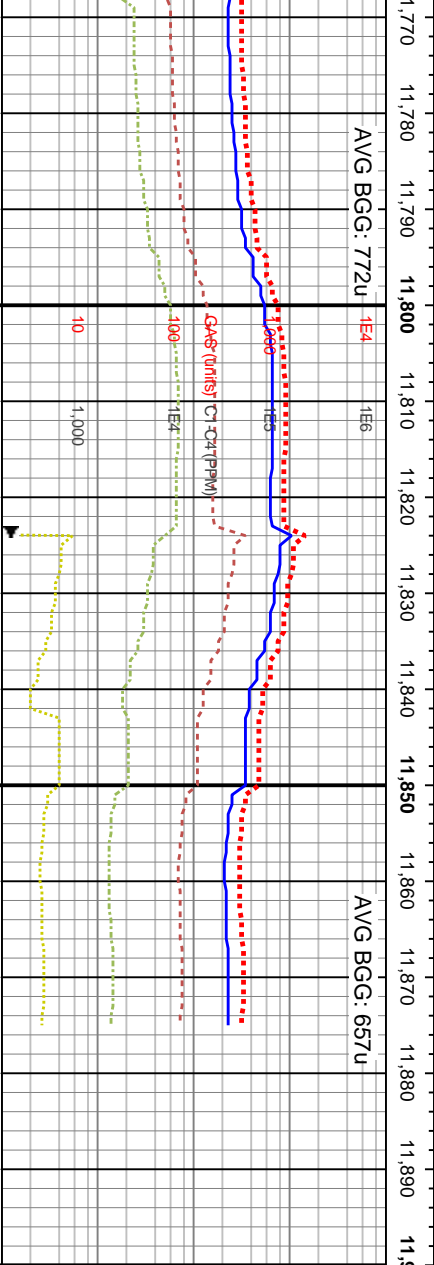
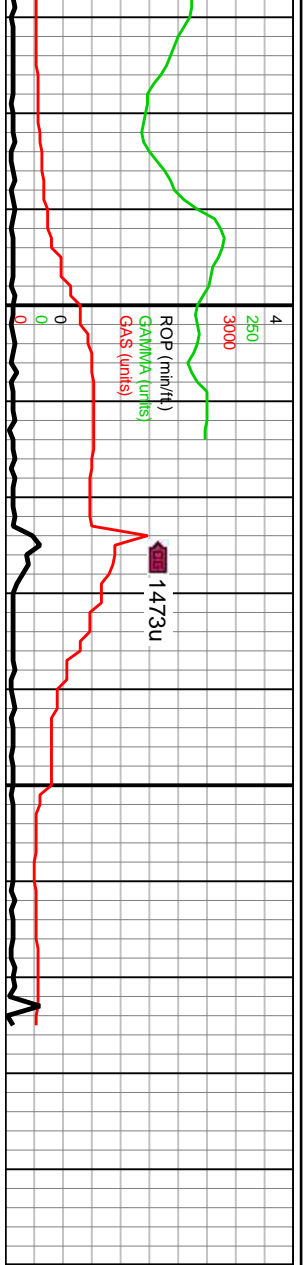
11540-11600 MRLST (60%): pred dk gy-gyshbn, med gy, frm-sl hrd, pty-sb blkly, silty tex, v calc, scat pyrc nod; CHK (40%): mot gysbn-offwht, chky tex, sb blkly, dul yeign flor, dul mky cut, mod bishwh resd ring

11600-11660 MRLST (50%): mot dk gy-med gy, frm-hrd, blkly, sl silty tex, v calc, tr imbd chk lam, scat imbd pyr; CHK (50%): gysbn-crm, chky tex, calc, sb tab, bishwh-dul yeign flor, dul mky cut, bishwh resd ring

11660-11720 MRLST (85%): pred med gy-dk gy, frm-hrd, sb spl-pty, sm-sl absv tex, v calc, tr lamm, scat pyrc nod; CHK (15%): mot gysbn-offwht, chky tex, calc, bishwh-yeign flor, dul mky cut, mod bishwh resd ring

11720-11780 MRLST (95%): med gy-pred blkly, frm-v frm, tr imbd pyr, fnt d flor, bish mky cut, no resd ring; CHK gysbn-crm, offwht, v sft, chky tex, sk bishwh flor, dul mky cut, bishwh resd

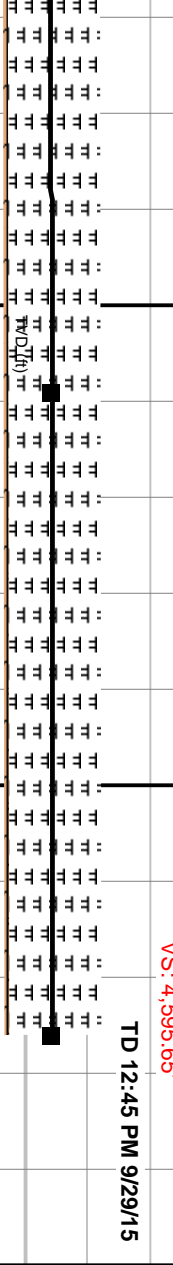




WOB: 45.2Klbs
Rotary: 60RPM
Strokes: 220SPM
Pump Rate: 672GPM

MD: 11,809'
TVD: 7,206.62'
Inclination: 91.29°
Azimuth: 269.4°
VS: 4,529.23'

Projection to Bit
MD: 11,876'
TVD: 7,205.11'
Inclination: 91.29°
Azimuth: 269.4°
VS: 4,595.65'



11780-11840 MRLST (95%): mot med gy-dk gy, gysbhn, blk-y-pty, frm, v calc, scat pyrc nod, fnt orng flr, bsh mky cut, no resd ring: CHK (5%): mot lt gy-offwht, lt bm, v sft, chky tex, sb blk-y, blshwh flr, dul mky cut, blshwh resd ring	7750
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