Robert D. Hendrix
Petroleum Geologist

GEOLOGIST'S REPORT
DRILLING TIME AND SAMPLE LOG

COMPANY: Cobalt Energy.
LEASE: Befort Unit 'A' #1-23
FIELD:
LOCATION: 2530' fnl & 2150'fel
SEC: 23 TWSP: 13s RGE: 19w
COUNTY: Ellis STATE: Kansas
CONTRACTOR: Murfin Drilling Co. Inc. Rig 8
SPUD: 11/14/18 COMP: 11/24/2018
RTD: 3750 LTD: 3750
MUD UP: 2698 TYPE MUD: Chemical
SAMPLES SAVED FROM: 2900 TO: TD
DRILLING TIME KEPT FROM: 2900 TO: TD
SAMPLES EXAMINED FROM: 2900 TO: TD
GEOLOGICAL SUPERVISION FROM: 2825
GEOLOGIST ON WELL: Robert D. Hendrix

ELEVATIONS
KB: 2037
DF:
GL: 2032
Measurements Are All From: Kelly Bushing

CASING
CONDUCTOR:
SURFACE: 8-5/8" at 261'
PRODUCTION: 5 1/2"

ELECTRICAL SURVEYS
Dual Induction / Microlog
Compensated Porosity

FORMATION TOPS	ELECTRIC LOG	SAMPLE
Anhydrite	1322 (+715)	1328 (+709)
Topeka	3056 (-1016)	3052 (-1015)
Heebner Shale	3297 (-1260)	3297 (-1260)
Lansing	3345 (-1308)	3347 (-1310)
Stark Shale	3538 (-1501)	3541 (-1504)
BKC	3589 (-1552)	3589 (-1552)
Arbuckle	3678 (-1641)	3683 (-1646)

23

API# 15-051-26934

REMARKS:

LEGEND
Anhydrite | Sandstone | Limestone | Shale | Carb Sh | Cherty LS | Chert | Dolomite

DRILLING TIME IN MINUTES PER FOOT (Rate of Penetration Decreases)	DEPTH	LITHOLOGY	GAS UNIT	SAMPLE DESCRIPTION	REMARKS

Anhydrite 1328 (+709)

Base Anhydrite 1369 (+668)

Geologist on location 2825' at 2:14 am 11/17/2018
8:00 am 11/17/2018 at the bit trip done at 2857 to change from PDC to button bit.
Strap out of hole was 2.08' short to board.
wt 8.6, vis. 63, lcm 2#
Mud-Co, Gary Schmidtberger

Shale: gray, silty, blocky
Limestone: tan, f-mxln, chalky, fossiliferous, no vis por
Shale: dark to lt gray, blocky, hard
Limestone: tan to brown, f-mxln, fossiliferous, no vis por
Shale: dark to lt gray, blocky, hard
Limestone: tan to white, fxln, chalky, fossiliferous, glauconitic, no vis por
Limestone: tan to brown, fxln, sl oolitic, fossiliferous, dense, no vis por
Shale: dark to lt gray, blocky
Shale: gray, green, silty, pyritic
Limestone: tan to white, fxln, chalky, fossiliferous, no vis por
Shale: dk to lt gray, silty, blocky
Limestone: tan to white, fxln, chalky, fossiliferous, no vis por
Shale: gray, silty, blocky
Limestone: tan, fxln, sl chalky, fossiliferous, no vis por
Limestone: gray to brown, fxln, fossiliferous, no vis por
Shale: gray, brown, soft, silty
Shale: gray, brown, soft, silty
Limestone: tan to gray, f-mxln, chalky, granular, fossiliferous, pr pp por, ns
Shale: dark to lt gray, green, silty

Topeka 3052 (-1015)

Limestone: tan to white, f-mxln, chalky, granular, fossiliferous, sparry calcite, pr pp por
Limestone: tan, f-mxln, chalky, oolitic in part, fossiliferous, no vis por
Shale/siltstone: gray, sl red, blocky
Limestone: tan to white, fxln, sl chalky, oolitic, fossiliferous, granular, pr pp to vug por, 5 pieces spotty surface stain, nfo, no odor
Shale: gray, brown, silty
Limestone: tan, fxln, sl chalky, mostly dense, fossiliferous, no vis por
Shale: gray, brown, silty
Limestone: tan to white, fxln, chalky, fossiliferous, no vis por
Limestone: tan, fxln, mostly dense, sl fossiliferous, no vis por
Limestone: tan to white, f-mxln, sl chalky, v-fossiliferous, pr pp por, ns
Limestone: tan to white, f-mxln, sl chalky, sl cherty, v-fossiliferous, sl pp por, ns
Shale: gray, silty
Limestone: tan, fxln, sl chalky, sl cherty, granular, fossiliferous, no vis por, ns
Shale: dk to lt gray, red, green
Limestone: tan, fxln, sl chalky, cherty, fossiliferous, granular, no vis por
Shale: dark gray, black, silty
Limestone: tan, v-fxln, sl chalky, dense, sl fossiliferous, no vis por
Limestone: tan to white, f-mxln, chalky, dense sl fossiliferous, no vis por
Shale: dark gray, black, silty, pyrite
Limestone: tan to white, f-mxln, chalky, fossiliferous, pr interxln por, ns
Shale: gray, black

wt 9.0, vis. 54, lcm 2#
Mud-Co, Gary Schmidtberger

Limestone: tan to white, f-mxln, chalky, pyritic, fossiliferous, pr interxln por, ns
Limestone: tan, f-mxln, sl chalky, dense, fossiliferous, no vis por
Shale: dk to lt gray, green, red
Limestone: tan, f-mxln, sl chalky, dense, fossiliferous, no vis por

8:00am, 11/18/2018

Limestone: tan, f-mxln, chalky, dense, fossiliferous, secondary recrystalization, no vis por
Shale: dk to lt gray, green, red
Limestone: tan to white, fxln, sl chalky, oolitic, granular, sl fossiliferous, no vis por, ns
Shale: dk to lt gray, green, red
Limestone: tan, f-mxln, oolitic, sl chalky, fossiliferous, 5% sample fr oolicastic por, lt sat stain, slsfo on break only, good odor
Limestone: tan, f-mxln, chalky, granular, fossiliferous, no vis por
Limestone: tan to brown, fxln, mostly dense, fossiliferous, sl pyritic, no vis por
Limestone: tan to brown, fxln, mostly dense, sl cherty, fossiliferous, no vis por

DST #1
3242-3274
30-45-30-40
1st open: bob 12 min
1st shut in: intermittent surface
2nd open: bob 12min
2nd shut in: no blow
Rec:
560' mw 5/95
hydro: 1585-1548 psi
If: 28-192 psi
ff: 196-289 psi
sip: 1002-999 psi
bht: 109° F
chl: 133,000 ppm

Heebner 3297 (-1260)

Shale: black carbonaceous, dark gray, blocky
Limestone: brown, v-fxln, dense, pyritic, fossiliferous, no vis por
Shale: lt to dk gray, green, some red, silty

Toronto 3317 (-1280)

Limestone: tan to white, fxln, sl chalky, mostly dense, sl fossiliferous, sl interxln por, 2 pieces lt sat stain, slsfo on break only, no odor

wt 9.1, vis. 55, lcm 2#
Mud-Co, Gary Schmidtberger

Limestone: tan to white, fxln, mostly dense, sl fossiliferous, no vis por, ns
Shale: dark to lt gray, green, silty

8:00am, 11/19/2018

Limestone: tan to white, fxln, chalky, fossiliferous, no vis por
Shale: lt to dk gray, green, red, brown

Lansing 3347 (-1310)

Limestone: tan, fxln, oolitic, mostly dense, no vis por, 5 pieces lt spotty stain, slsfo on break only, no odor
Limestone: tan, v-fxln, dense, sl fossiliferous, optical calcite replacement, no vis por, ns
Limestone: tan, v-fxln, dense, sl fossiliferous, optical calcite replacement, no vis por, ns
Shale: dk to lt gray, green, red, silty, blocky
Limestone: tan to white, f-mxln, oolitic in part, fossiliferous, granular, 1% sample pr oolicastic to interxln por, Lt sat stain, slsfo more on break, no odor
Shale: gray, green, red, silty
Limestone: white, f-mxln, oolitic in part, fossiliferous, pyritic, 10% sample fr oolicastic to vug por, Lt sat stain, frsfo, good odor

DST #2
3360-3408
15-30-30-60
1st open: bob 20 sec
1st shut in: bob 6 min
2nd open: bob 3 min
2nd shut in: 12 min
Rec:
2056' cgo 30/70
gts during bleed off for final shut in
hydro: 1640-1609 psi
If: 134-309 psi
ff: 323-625 psi
sip: 981-946 psi
bht: 131° F
gravity: 38°

8:00am, 11/20/2018
wt 9.0, vis. 61, lcm 2#
Mud-Co, Gary Schmidtberger

Shale: gray, red, green
Limestone: tan, fxln, fossiliferous, 3% sample fr interxln por, lt to dark sat stain, frsfo (light), good odor
Shale: gray red, blocky
Limestone: tan to white, f-mxln, oolitic in part, fossiliferous, 5% sample fr oolicastic to pr interxln por, lt to dk sat stain, frsfo, good odor
Limestone: tan to white, f-mxln, oolitic in part, fossiliferous, 10% sample gd oolicastic por, lt sat stain, frsfo, good odor, some barren porosity noted
Limestone: white to tan, fxln, mostly dense, oolitic, no vis por, lt surface stain, nfo, fair odor
Limestone: white to tan, fxln, mostly dense, oolitic in part, 1% sample pr interxln por, lt surface stain, slsfo, fair odor
Shale: gray, black, green, red
Limestone: gray to brown, f-mxln, fossiliferous, no vis por
Shale: gray, brown, green, red, blocky

DST #3
3406-3433
30-45-60-90
1st open: blow built to 11"
1st shut in: blow built to 3"
2nd open: blow built to 10 1/2"
2nd shut in: very weak surface blow
Rec:
60' owcm 15/40/45
140' ocm 25/75
105' gip
hydro: 1677-1632 psi
If: 32-63 psi
ff: 79-110 psi
sip: 806-794 psi
bht: 106° F
chl: 77,500 ppm
gravity: 33°

8:00am, 11/21/2018
wt 9.0, vis. 52, lcm 2#
Mud-Co, Gary Schmidtberger

Limestone: white to tan, f-mxln, sl oolitic in part, sl fossiliferous, 3% sample pr pp to vug por lt spotty to sat stain, slsfo more on break, faint odor
Shale: gray, green, blocky, hard
Shale: dark gray, green, brown
Limestone: tan, fxln, granular, sl chalky, sl fossiliferous, no vis por
Shale: dark gray, green, brown
Limestone: tan, fxln, chalky, oolitic in part, fossiliferous, 1% sample pr oolicastic to interxln por, lt to dk sat stain, slsfo, faint odor
Limestone: tan to white, fxln, sl chalky, dense, sl fossiliferous, no vis por

DST #4
3434-3456
30-30-30-30
1st open: blow built to 1 3/4"
1st shut in: no blow
2nd open: blow built to 1 1/2"
2nd shut in: no blow
Rec:
60' osm
hydro: 1685-1638 psi
If: 31-46 psi
ff: 49-57 psi
sip: 890-872 psi
bht: 103° F

wt 9.1, vis. 48, lcm 2#
Mud-Co, Gary Schmidtberger
8:00am, 11/22/2018

Stark 3541 (-1504)

Shale: dark to ly gray, green, brown, red
Limestone: tan, v-fxln, dense, sl fossiliferous, secondary calcite fill, no vis por, ns
Limestone: tan to brown, v-fxln, dense, sl fossiliferous, secondary calcite fill, mottled brown non hydrocarbon stain, no vis por, ns
Shale: dark to lt gray, green, brown, red, silty
Limestone: tan to brown, fxln, dense, oolitic, fossiliferous, secondary calcite fill, no vis por, ns
Limestone: tan to white, fxln, sl chalky, dense, oolitic, fossiliferous, no vis por

DST #5
3468-3536
30-45-60-70
1st open: blow built to 4"
1st shut in: no blow
2nd open: bob 39 min
2nd shut in: no blow
Rec:
150' hocm
30' gip
hydro: 1712-1686 psi
If: 22-49 psi
ff: 49-78 psi
sip: 1007-1097 psi
bht: 104° F
gravity: 32°

BKC 3589 (-1552)

Shale: dark gray, brown, red, pyritic, silty
Limestone: white, v-fxln, dense, sl fossiliferous, no vis por
Shale: dark to lt gray, green, brown, red, silty
Limestone: tan to brown, fxln, dense, oolitic, fossiliferous, secondary calcite fill, no vis por, ns
Shale: dark gray, green, red, silty
Limestone: tan, v-fxln, dense, chalky, fossiliferous, with sparry calcite replacement, no vis por
Shale: gray, green/yellow, red, silty, fossiliferous
Shale: gray, green/yellow, red, mottled
Conglomerate:
Shale, mottled, green, gray, yellow, red, clay
Chert, fresh red, orange, gray, white, opaque mostly fresh
Sandy gray v-fn grained, well sorted, rnd, clumpy, soft,
Limestone: white to tan, fxln, v-cherty, sl chalky, oolitic, fossiliferous, no vis por, ns

DST #6
3642-3690
30-45-60-60
1st open: blow built to 4 1/2""
1st shut in: no blow
2nd open: blow built to 3/4"
2nd shut in: no blow
Rec:
65' osm
hydro: 1887-1828 psi
If: 22-38 psi
ff: 35-47 psi
sip: 1075-1022 psi
bht: 106° F

Arbuckle 3683 (-1646)

Dolomite: white to pink, mxln, cherty, granular, fossil remnants, pr interxln por, dark spotty to sat stain, slsfo (some bleeding), good odor
Dolomite: white to pink, mxln, granular, fr interxln por, dark spotty to sat stain, prsfo (some bleeding), good odor
Dolomite: white to pink, fxln, granular, more dense, sl cherty sl interxln por, dark spotty to sat stain, slsfo, fair odor

8:00am, 11/23/2018
wt 9.1, vis. 60+, lcm 3#
Mud-Co, Gary Schmidtberger

Dolomite: white to tan, f-mxln, granular, some dense, cherty sl interxln por, dark spotty stain, prsfo, fair odor
Dolomite: white to tan, vf-xln, sl granular, dense, cherty no vis por
Dolomite: white, gray, tan, f-mxln, granular, dense, cherty no vis por, dark spotty stain, nfo, faint odor

DST #7
3688-3700
30-45-30-60
1st open: bob 4 min
1st shut in: no blow
2nd open: bob 10 min
2nd shut in: no blow
Rec:
830' mw 30/70
hydro: 1902-1805 psi
If: 26-227 psi
ff: 232-381 psi
sip: 1215-1216 psi
bht: 117° F
chlorides: 40,000

RTD 3750 (-1713)

8:00am, 11/24/2018
Geologist off location at 6:00 am, 7/1/2012

Cobalt Energy
Befort Unit 'A' #1-23
2530'fnl & 2150'fel
23-13-19w, Ellis County, Kansas
KB=2037', GL=2032'
API: 15-051-26934