TYLER H. SANDERS

GEOLOGIC REPORT

API: 15-135-25708-00-00

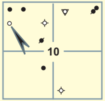
Operator: **Abercrombie Energy LLC**

Well Name: **Vogel 4-24**

Location: **1200'FNL; 330'FWL**

Section: **24** Township: **19S** Range: **26W**

County: **Ness** State: **Kansas**



○ LOCATION
☼ GAS WELL
✺ OIL/GAS WELL
● OIL WELL
⌀ ABANDONED OIL WELL
⌖ DRY HOLE
△ SALTWHATER DISPOSAL WELL

Drilling Co.: **Val Drilling** Rig no.: **2**
Mud Co.: **Mud-co** Type: **Chem.**
Displace depth: **3600** Gas Detector: **None**
Date Commenced: **12-10-13** Date at TD: **12-16-2013**
Samples saved: **3800** to **TD**
Drilltime saved: **3800** to **TD**
Logging Co.: **PIONEER** Surveys: **DIL/Den-Neut/ML/Sonic** Datum: **KB**
Casing Run: **5 ½ @ 4656' w/150sx**
TD Driller: **4660** TD Logger: **4665** Geologist: **Tyler H. Sanders**

ELEVATIONS

KB **2632**
DF
GL **2622**

SELECTED FORMATION TOPS:

	Sample	Elog
Formation Name	depth datum	depth datum
Anhydrite	*1886(+746)*	*1888 (+744)*
B/Anhydrite	*1926 (+706)*	*1927 (+707)*
Heebner	*3934 (-1301)*	*3938(-1306)*
Lansing	*3975 (-1343)*	*3978 (-1346)*
Stark	*4231 (-1599)*	*4234 (-1602)*
BKC	*4308 (-1676)*	*4312 (-1680)*
Marmaton	*4352 (-1720)*	*4354 (-1722)*
Pawnee	*4431 (-1799)*	*4435 (-1803)*
Fort Scott	*4485 (1853)*	*4490 (-1858)*
Cherokee	*4507 (-1875)*	*4512 (-1880)*
B/Cher Lm	*4558 (-1926)*	*4560 (-1928)*
Miss Lm	*4572 (-1940)*	*-*
Miss Dolomite	*4578 (-1946)*	*4582 (-1950)*
RTD 4660; LTD 4665		

	Sample	Elog
Formation Name	depth datum	depth datum

SUMMARY

In consideration of the sample shows and oil recoveries on Dsts no.s 1 & 2, the decision was made to run casing to further test te Mississippian dolomite.

The structural position of the Mississippian Dolomite was also positive and encouraging in relation to the offsetting well control. This was true even after a downhole correction of measurements after the open hole log was run. Originally, the log total depth indicated an 8 ft downhole correction. After reviewing all the information including drill time and fluid recoveries in relation to the established oil / water contact, it was decided that a more realistic total depth would be 4665.

Zones were very poorly represented in the samples down to the upper part of the Pawnee. A PDC bit was run to that point, which had such a high penetration rate, individual zones were very difficult to impossible to identify and evaluate in samples. Of the samples available above the Pawnee, no shows or significant porosity was seen. Once a conventional buttom bit was installed, samples below the Pawnee were generally good to very good.

__Bit Record:__

SIZE	MAKE/MODEL	DEPTH IIN/OUT
12 ¼	*JZ RT*	*0 - 268'*
7 7/8"	*Logic PDC*	*268-4447'*
7 7/8"	*JZ RR (button)*	*4447-RTD*

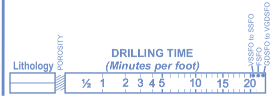
__Daily History / Penetration:__

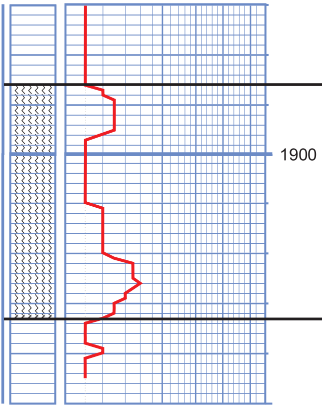
12/09/2013 :	*Move in*
12/10/2013:	*Spud 2:15PM*
12/11/2013 :	*WOC @ 268'*
12/12/2013:	*Drlg @ 2180'*
12/13/2013:	*Drlg @ 3704'*
12/14/2013:	*Drlg @ 4447'(bit trip)*
12/15/2013:	*Testing @ 4587'*
12/16/2013:	*Drlg rathole for log; RTD 4660 @ 2:00PM*

LEGEND

- ▨ SHALE
- ■ CARBONACEOUS SHALE
- ▨ SILTSTONE
- ▨ SANDSTONE
- ▨ LIMESTONE
- ▨ OOLITIC LIMESTONE
- ▨ DOLOMITE
- ▨ ANHYDRITE
- ▨ CHERT
- ▨ GRANITE

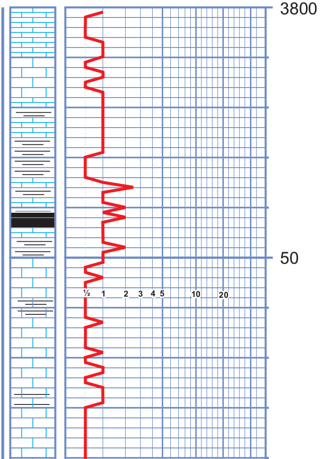
Lithology | POROSITY | DRILLING TIME (Minutes per foot) | SAMPLE DESCRIPTIONS | COMMENTS, DST'S, ETC.





Anhydrite 1886 (+746)
elog 1886 (+744)

Base/Anh 1926 (+706)
elog 1927 (+707)



Varied lms; brown and gray shaley; finely speckled to cream dense; some soft pure white chalk
no vis porosity; no shows

Poor representative samples (appears to be much carry-over) - PD C bit

Sample wash white; varied as above; some gray and green shale

Gray shale and dove gray dense shaley lms;

no visible porosity; no shows

few pieces black carbonaceous shale (80 spl)

very poor representative samples

Lm; possibly darker than above; tan to gray micro to cryptoxln lm; trace tan fresh fossiliferous chert

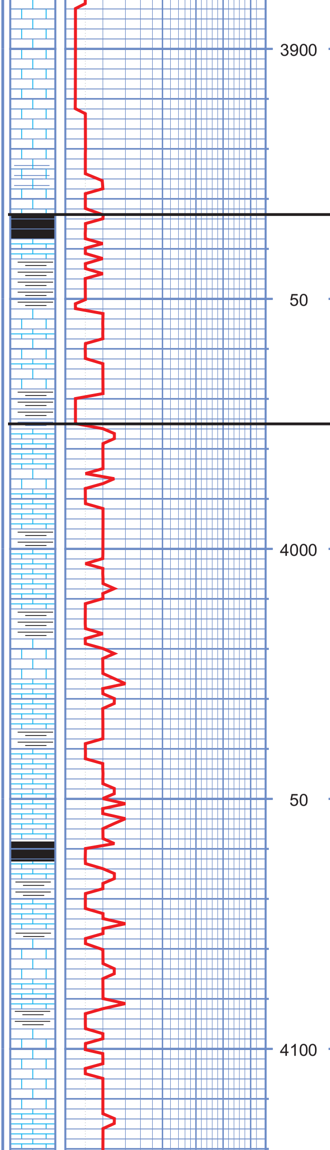
no visible porosity in lms as above; some cream fresh chert

Traces cream pelletal - micropelletal lm; (granular textured) with gd visible micxln to pinpoint porosity; gd amount pure white chalk pieces

good amount gry shale with vshly dns lm (cave)?

Poor to very poor representative samples; (much carryover even when sample box is cleaned thoroughly between samples; (PDC bit)

Changed to 20 ft. samples due to high penetration rate with PDC bit



samples wash white; - much pure white chalk pieces;

mixed with very chalky bright while lm; no vis poro; NS

Very chalky bright white lm as above;

trace pieces with isolated large vugular poro;

no shows

Becomes darkier in color (?); tan to gray dense; mottled and shaley in part

Heebner 3934 (-1301)
elog 3938 (-1306)

Soft black carbonaceous shale (some pieces in 80 spl)

cream to tan microxln to cryptoxln lm

much green and gray green fresh shale

mottled in part

Bright white eartho to very chlky lm

(spls wash white-milky) no visible porosity; no shows; non-fossilferous; non-oolitic

greenish gray in part; shaley; cryptoxln dns

green and gray-green shales

Lansing 3975 (-1343)
elog 3978 (-1346)

Med to dark gray dense lm and shaley lms;

very shaley in part; no shows; no porosity visible (still poor non-representative samples)

Poor to very poor representative samples; (PDC bit)

gray and dark gray very shaley dense lms and gray shale; some pyrite

Gray and green-gray shale and shaley lms as above

Change to cream to tan microxln to cryptoxln very dense lm mixed with some shaley gray and greenish gray lm

Lms and shales as above

Cream to tan vfxln and microxln lm ; some shaley pcs ; no visible poro or shows; poor samples

Few pcs black soft carbonaceous shale (4100 spl)

Tan microxln densl to cryptoxln dense lms

with gray and green-gray shales

Varied dense gray lm with lms as above;

becomes tan to brown; poor samples

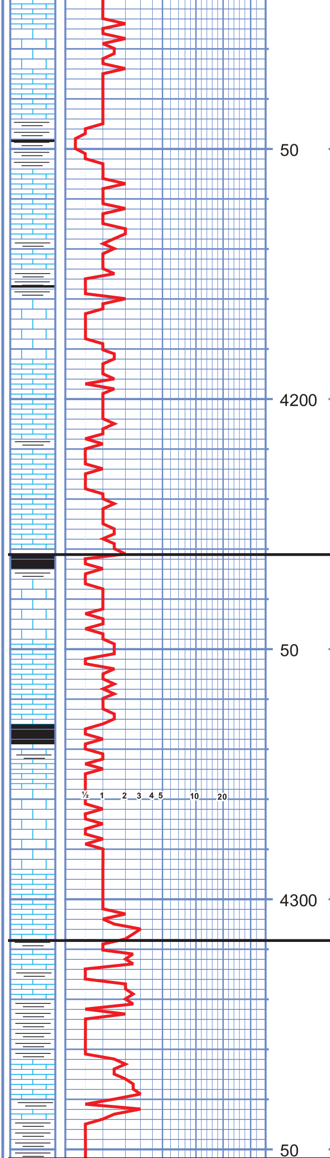
Mudco mud check 4091:
Vis: 44
Wt: 9.0
WL: 7.6
YP: 13
Cl: 8400 ppm
LCM: trace

gray shales mixed with varied gray and tan dense to shaley lms

Change to white earth to chalky lm; dense; some

tan foss chert pcs; no porosity visible; no shows

White and creamy gray dense to earthy lms



poor samples

few pcs oolitic cream fxln lm; no porosity; some
coxln calcite void fill; earthy in part;

gray to few pcs black carbonaceous shale

Dove gray microxln lm; no porosity visible;
non-fossiliferous; non-oolitic mudstone

becomes cream to tan and lt tan; speckled gray and white in part

Poor to very poor representative samples; (PDC bit)

trace black carbonaceous shale

Dense varied lms; cream to gray; cryptoxln very dense some darker gray

Dense microxln tan and gray to creamy
gray lm; no poro; non - fossiliferous; non-oolitic

Becomes dark brown and gray;
cryptoxln; dense

Stark 4231 (-1599)
elog 4234 (-1602)

Good amount black soft carbonaceous shale (4280 spl)

Cryptoxln dense dark lms; brown and gray;
minor cream to white earthy; no porosity; no shows

Dense lms as above; mottled in part

Few additional pcs black carbonaceous shale (4320 spl)

Varied types dark lms; dense; no porosity; some pcs finely fossiliferous; mottld;

some white earthy to chalky pcs and pure white soft chalk

Lms much as above ; dark colors; dense; no porosity; no shows

BKC 4308 (-1676)
elog 4312 (-1680)

Dense dark gray and brown lms; microxln; with some pcs fresh red-brown, gray, and green-gray shales and dns shaley lms (4360 spl)

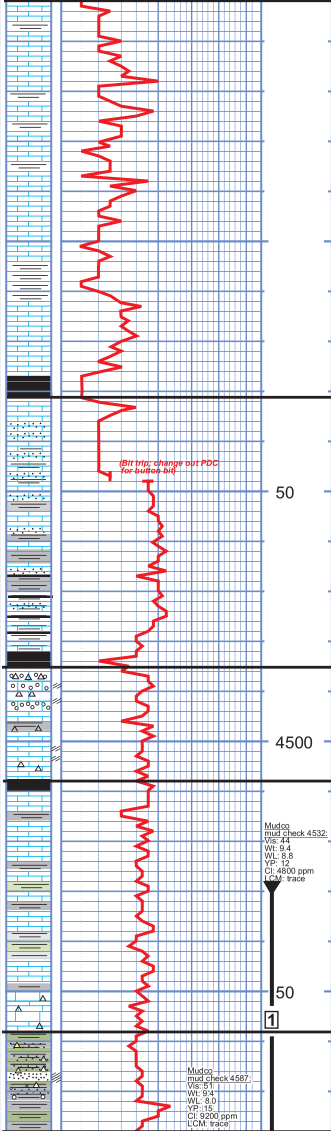
Some lms are pink and green shaley - var col; dense
Increase is shale fraction; red and green; some var col'

Poor to very poor representative samples; (PDC bit)

Lm; dense gray to var col; shaley; minor gray frsh chert

grn, gray and reddish shale

Mm 4352 (-1720)



Mudco
mud check 4532:
Vis: 44
Wt: 9.4
WL: 8.8
YP: 12
Cl: 4800 ppm
LCM: trace

Mudco
mud check 4587:
Vis: 51
Wt: 9.4
WL: 8.0
YP: 15
Cl: 9200 ppm
LCM: trace

elog 4354 (-1722)

Micro xln very dense lms and shaley

lms; no vis porosity; no shows; many pcs cream and white earthy

green and gray shales

Mottled tan to brown and gray lm; few pcs

fossiliferous; no visible poro; no shows

Dense micro xln lms and shaley lms as

above

Increase in shale green and green-gray

Dense brown, cream earthy and gry microxln

lms; very dense; non-fossiliferous; non-oolitic

Black soft carbonaceous shale

Pawnee 4431 (-1799)
elog 4435 (-1803)

Grayish-tan vfxln to microxln dense lm; granular appearence; some dark gray in color; no porosity; no shows

Lm as above; shaley in part w/gray shale partings

"micro-silty" - microgranular lm ; gray to tan-gray

shaliness increasing to silty lmy shale; some greenish

Becomes dark gray very shaley; sli silty and lmy to lmy silty shale

some dark gray to near black non-carb shale

Dark gray to near black shale as above; poss thin cryptoxln dns lms; no porosity; no shows

same as above

Soft black carbonaceous shale

Fort Scott 4485 (-1853)
elog 4490 (-1858)

Flood tan to grayish tan fresh cherty mixed with many pieces coarsely oolitic lm; dark gray and brown ools in cream fxln matrix; some chert pieces oolitic; trace very poor pinpoint to microxln porosity and spttd lt yellow brown stain; no saturation

4-5 pieces per tray VSSFO; sli odor; good fluor

becomes tan to brown microxln dense;

fossiliferous in part; trace pieces (2-3 per tray) w/rare foss moldic poro; sptd stain; some shaley

2-3 pieces per tray VSSFO; sli odor; good fluor

Cherokee 4507 (-1875)
elog 4512 (-1880)

Sli increase in soft black carbonaceous shale

Cream to gray fxln lm; fossiliferous in part; some tan to gray fossiliferous translucent chert

no visible porosity; no shows

Cream to tan and brown microxln dns lms; varied with some light gray dissolving clay shale and dark green-gray shale

Dense lm as above; increasing shale percent

Dark brown and gray-brown very dense lm with much very light gray dissolving clay mixed with fair amnt green silty shale and very shaley mottled lm

Increase in lm percent; white earthy to cream very dense to chalky; many green shale partings visible on lm pieces; no porosity; no shows; gray - brown opaque chert

DST no.1 (4528-4587) Miss Dol

1st op: blow off bottom 5 min.
2nd op: blow off bottom 8 min.

30-45-60-90

Rec: 201' GIP; 727 total fluid:

- 169' MCO (20%g;70%o;10%m)
- 248' MCGO (20%g;50%o;30%m)
- 248'GOCM (25%g; 5%o;70%m)
- 62' GOCM (45%g;5%o; 50%m)

no water; oil grav: 32 deg.

ISIP: 721 IFPs: 52/169
FSIP: 799 FFPs: 179/286
HPs: 2297/2328 BHT: 125 deg

B/Ck Lm 4558 (-1926)
elog 4560 (-1928)

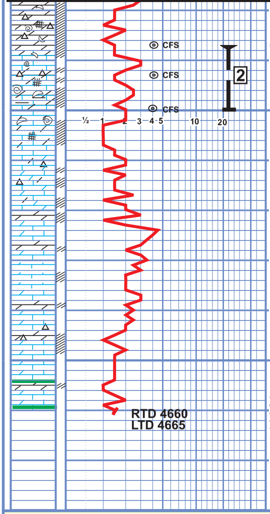
Sandy conglomerate interval; many pieces white earthy shale/marl studded with med grained sand grains with var col chert and floating sand grains; some sand grains very coarse; several pieces very fine grained tan fairly well cemented sandstn; Vsli show oil; some white sandy lm with dark heavy stain; Vsli show sluggish dark oil

Sli SFO; vdark brn; sluggish; sli odor

VSSFO; yell-brn; sli odor

Change to creamy white and light gray lm; micro foss; poss sli dolomitic with green shale partings; no shows; no poro

Miss Dolo 4578 (-1946)



4600

50

Mudco
mud check 4660:
Vis: 53
Wt: 9.5
WL: 8.4
YP: 15
Cl: 5200 ppm
LCM: trace

Flood tan fxln sucrosic dolomite with good and very good micro foss moldic and interxln porosity; mixed with some lt tan to while fresh opaque to translucent chert; good yell brown rich saturated stain; most pieces are porous; few pieces dns.

elog 4582 (-1950)

VGood rich odor; good fluor; good to very good show free oil; sli gassy; vlight yell-brn

Change to bright white chalky dolomitic fossiliferous lm; spls wash white with gd amnt pure soft chalk; lm with fair interxln poro with light yell brn stain

Fair odor; bright fluor; gd show yell-brn free oil in poro

Tan to gray fxln to some med xln dense foss & coarsely foss dolo lm; most pieces w/gd foss moldic -vug & intxln poro; some hard dns; many pieces w/light green cast; vdk brn to black stn-sat

Gd -strong sulphur odor; Gd show FO;less fluor; brn to dk brn oil;black heavy & sluggish in part

Cream to tan coarsely and very coarsely fossilferous dolomite to dolomitic lm; some with very good foss moldic poro (much bryozoan molds and other); most pieces with SFO with sat stn to few poro pieces with NSFO; no stn

Fair odor; gd show free oil; returns to yell brn gassy oil; bright fluor;

Spls wash milky white; good amnt white earthy to vchlky lm to pure white chalk mush; cream to tan and gray micro foss dolo lm; some white to off white vfxln dolo; scatt sml vug-moldic poro; no shows

Less odor; fair; shows decreasing

Cream to off white microxln lms mixed w/ brn hard dense dolomite to dolomitic fossiliferous lm; some fair moldic and intraclastic poro; minor vdk brn and dark gray highly mottld foss lm; dense

no odor
no shows;

DST no.2 *(4587-4600) Miss*

1st op: blow off bottom 15 min.
2nd op: blow off bottom 22 min.

30-45-60-90

Rec: 260' GIP; 400' total fluid:

-310' CGO (20%g;80%o;)
-60' MCGO (25%g;40%o;15%w;20%m)
-30' GMCW (5%g; trc%o;85%w;10%m)

Cl=32,500ppm; .349ohm@ 40 deg.
oil grav: 32 deg.; BHT: 126 deg,

ISIP: 1027 IFPs: 36/84
FSIP: 1017 FFPs: 98/166
HPs: 2330/2277

Flood bright white pure chalk clumps; spls wash very milky some cream to off white vfxln dense dolomitic lm; some pieces coxln; some milky white quartzose fresh chert

Much creamy gray to tan and brown hard dense dolomitic lm; to fossiliferous dolomite in part; some very large foss molds; no shows

Dolomitic lms as above; mostly tan with much bright white pure chalk clumps

Few pieces bright green shale and lmy shale (60" circ)

Operator: **Abercrombie Energy LLC** Section: **24** Township: **19S** Range **26W**

Well Name: **Vogel 4-24** County: **Ness** State: **Kansas**

Location: **1200'FNL; 330'FWL** Ref. Elevation: **2632 KB**