

Geological Report

Cooper Hiat #19-2
970' FNL; 10,078' FEL
Cowley County, KS

Operator: B-C Steel, LLC., C/O Bert Carlson, 209 North Fry, Yates Center, KS, 66783.

Drilling Contractor: Hat Drilling. Midway Mud Rotary Rig #2.

Wellsite Geologist: Mark Brecheisen.

Dates Drilled: April 4th, 2011 to April 7th, 2011.

Size Hole: 8 1/4"

Total Depth: 2834'

Elevation: 1428'

Drilling Fluid: Freshwater bentonite and additives.

Surface Casing: 450' of 8-5/8" casing cemented with 135 sx of cement to surface.

Formation Tops: Formation tops were picked from the electric logs.

Field Name: Radcliff, Northeast.

Status: Oil/Gas Well.

Oil Shows: Layton Sandstone @2020'-2030' & 2040'-2050'.
Kansas City Limestone @2072'-2076'.
Hertha Limestone @2237'-2240'.

Gas Shows: Layton Sandstone @2022'-2024', 47 unit gas kick on hot wire.
Layton Sandstone @2026'-2036', 60 unit gas kick on hot wire.
Kansas City Limestone @2072'-2075', 76 unit gas kick on hot wire.
Hertha Limestone @2223'-2225' & 2237'-2240', 38 and 15 unit gas kick on hot wire respectively.
Cleveland Sandstone @2314'-2354', 380 unit gas kick on hot wire.

Water Encountered: No appreciable water encountered upon drilling.

On Location: April 4th, 2011, 3:40 pm. Left location @ TD, Well Depth of 2834' @ 10:28 am, April 7th, 2011.

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0'-1500': Samples not examined.

1500'-1537': Shale, medium to medium dark gray, silty to sandy in part with visible sand laminations scattered throughout. Traces of red shale present. No fluorescence no petroliferous odor/show.

1537'-1569': Shale, medium to dark gray, soft, greasy silty to sandy in part.

Top of Iatan Limestone @1569'(-141'), top of the Pedee Group

1569'-1573': Limestone, pale yellowish brown, fine crystalline, fairly friable, some traces of inter-crystalline porosity present. No visible oil stain. No fluorescence, no petroliferous odor/show.

1573'-1593': Shale, medium to dark gray, silty to sandy in part, slightly micaceous.

1593'-1602': Stalnaker Sandstone, very light gray to medium gray, very fine grained, well sorted with sub-angular to well-rounded grains. Fair to excellent friability. Micaceous, and pyritic in part. No visible oil stain present. No fluorescence. No petroliferous odor/show.

1602'-1609': Shale, medium gray, silty to sandy.

1609'-1610': Coal, thinly banded with alternating vitreous and dull bands. Conchoidal fracturing present. Less than 10% flat cleat faces.

1610'-1626': Shale, medium to medium dark gray, silty with some visible sandstone laminae. No fluorescence. No petroliferous odor/show.

1626'-1637': Stalnaker Sandstone, very light to light gray, very fine grained, well-sorted with sub angular to well-rounded grains. Very friable, very clean. No visible oil stain present. Very homogenous sandstone. Trace of mottled, dull, yellow mineral fluorescence. No petroliferous odor/show.

1637'-1717': Shale, medium to medium dark gray, soft and greasy to silty and sandy. Few sandstone partings present. Traces of pale green and red shale present. Overall, no fluorescence, no petroliferous odor/show.

Top of Lansing Group @1717'(-289')

1717'-1740': Limestone, pale yellowish brown to olive gray, fine to medium crystalline, mottled in part, fossiliferous. From 1730'-1736' some visible porosity present from Oolitic Limestone. This section exhibited good friability, however there was no oil present. Overall, 50% even, dull yellow mineral fluorescence. No petroliferous odor/show.

1740'-1784': Shale, medium-dark to dark gray, calcareous in part. Few scattered limestone partings present. 5-10% mottled to even, variegated yellow mineral fluorescence. No petroliferous odor/show.

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- 1784'-1790': Limestone, olive gray, fine to medium crystalline, mottled, hard. No visible porosity. 20% mottled to even, variegated yellow mineral fluorescence. No petroliferous odor/show.
- 1790'-1809': Shale, medium-dark gray, with few limestone partings.
- 1809'-1818': Limestone, olive gray, fine to medium crystalline, hard dense. No fluorescence. No petroliferous odor/show.
- 1818'-1868': Shale, medium dark gray. Traces of pyrite present. Scattered limestone partings throughout.
- 1868'-1882': Limestone, dark yellowish brown to olive gray, fine to medium crystalline, hard, dense, sucrosic, fossiliferous. Traces of pyrite present. Traces of dark gray shale present. 5% mottled to even, bright yellow mineral fluorescence. No petroliferous odor/show.

Base of the Lansing Group @1882' (-452)

- 1882'-1956': Shale, medium to medium dark gray, soft, slightly silty, with traces of red shale present. Few scattered limestone partings present. Sample overall exhibited no fluorescence. No petroliferous odor/show.
- 1956'-1959': Limestone, olive gray, fine to medium crystalline, mottled, hard, fossiliferous. No fluorescence. No petroliferous odor/show.
- 1959'-1980': Shale, medium to medium dark gray, silty to sandy, micaceous. Trace sandstone, medium gray, very fine grained, well sorted with sub-angular to sub-rounded grains, micritic. No visible oil stain present.

Top of Iola Limestone @1980' (-552')

- 1980'-1982': Limestone, pale yellowish-brown to olive gray, fine to coarse crystalline, mottled, hard. Trace pyrite. No fluorescence. No petroliferous odor/show.
- 1982'-1992': Shale, medium-dark gray. Limestone parting from 1990'-1991'. No fluorescence. No petroliferous odor/show.
- 1992'-2017': Layton (A) Sandstone, light to medium gray, very fine grained, well-sorted with sub-angular to well-rounded grains, fairly friable, micaceous in part, argillaceous in part. Traces of black bitumen on few sample surfaces-no cut observed. Shale partings present. No fluorescence. No petroliferous odor/show. This sandstone is very shaley and is of no commercial value.
- 2017'-2054': Layton (B) Sandstone, light gray to light brown, very fine grained, well-sorted with sub-angular to well-rounded grains. Fair to good friability. Oil shows are as follows:
- 2020'-2030': Nice visible oil stain on many samples. Wet acetone cut left visible oil floating in dimple tray from several samples. Overall, samples exhibited a slow, even, fair, milky-blue cut. Fair oil saturation in rock samples. 20% even, bright yellow hydrocarbon

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fluorescence. Good petroliferous odor, fair to good show. A 47 unit gas kick was observed when this interval was drilled.

- 2030'-2040': Trace of visible light brown oil stain on few samples. Trace, even, bright yellow hydrocarbon fluorescence. No petroliferous odor/show. A 60 unit gas kick was observed that spanned this and part of previous interval.
- 2040'-2050': Sandstone samples exhibited a 10% even, bright yellow hydrocarbon fluorescence. Slow, even, fair, milky-blue cut. No residual show to tray after cut. Strong petroliferous odor, fair show.

This entire section has good permeability, as well as strong gas and oil indications. It should definitely be considered for commercial oil and gas production.

Top of Kansas City Limestone @2054'(-626')

2054'-2076': Limestone, pale yellowish brown, fine crystalline, mottled, no visible inter-crystalline porosity. Few visible shale partings present. Overall, 60% pinpoint to mottled, variegated mineral fluorescence. No petroliferous odor/show. A drilling break was encountered from 2072'-2075'. A description of that interval is as follows:

- 2072'-2076': Limestone, pale yellowish brown, fine to coarse crystalline, fair to excellent friability. Good vugular and oolitic porosity present in some samples. Visible light brown oil stain on oolitic limestone samples. Some gas bubbles observed in voids between oolites. Oil saturation fair to good in oolitic samples. 40% mottled to even variegated hydrocarbon and mineral fluorescence present. Wet acid cut revealed fair to good residual oil show to tray, after sample was dissolved. Approximately 20% of sample has vugular and oolitic porosity—these samples have the oil saturation. Strong petroliferous odor, fair show. It should be noted that oil was visible on the mud pits after cutting this zone, as well as a strong petroliferous odor observed from the drilling platform. A 76 unit gas kick was observed when drilling this interval.

2076'-2127': Shale, medium-dark gray, silty, calcareous in part. Inter-bedded limestone throughout section—olive gray, fine crystalline, hard, gritty texture. No visible porosity. Overall, 10% even, dull, bluish yellow mineral fluorescence. No petroliferous odor/show.

2127'-2164': Limestone, dark yellowish brown to olive gray, fine crystalline, mottled, hard, sucrosic. No visible inter-crystalline porosity. Some inter-bedded shale present. 40% mottled, dull, bluish yellow mineral fluorescence. No petroliferous odor/show.

2164'-2167': Stark shale, black, gritty texture, fissile, carbonaceous.

2167'-2185': Limestone, dark yellowish brown to olive gray, fine crystalline, hard. Traces of inter-bedded shale present. 25% mottled to even, very dull to bright, yellow mineral fluorescence. No petroliferous odor/show.

2185'-2190': Sandstone, light to medium gray, very fine grained, well-sorted with sub-angular to sub-rounded grains, very friable, micaceous. Traces of black bitumen on few samples. No fluorescence. No petroliferous odor/show.

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2190'-2216': Limestone, pale yellowish brown to olive black, fine to medium crystalline, fairly friable. Some pinpoint porosity is visible on few rock samples. No oil stain present. Trace mottled, very dull, bluish yellow mineral fluorescence. No petroliferous odor/show.

2216'-2220': Shale, dark gray.

2220'-2222': Hushpuckney Shale, black, slightly gritty, carbonaceous, trace of vitrain coal present.

Top of the Hertha Limestone@2222'(-794')

2222'-2291': Limestone, pale yellowish brown to olive gray, fine crystalline, fairly friable, mottled, slightly sucrosic. A drilling break was observed from 2233'-2235'. Samples contained no oil, but a 38 unit gas kick was observed on the hotwire. From 2237'-2240' a second drilling break was observed. A few samples from this interval had light brown oil stain covering their surface. Poor to fair oil saturation within samples. Vugular porosity in samples with oil stain. Slow, uneven, fair milky blue cut. No residual oil to tray after cut. Less than 10% mottled to even, bright yellow hydrocarbon fluorescence. Fair petroliferous odor, poor show. A 15 unit gas kick was observed after drilling this interval.

2291'-2302': Shale, dark gray to black, carbonaceous. Trace vitrain coal present. No fluorescence. No petroliferous odor/show.

Top of Lenepah Limestone @2302'(-874')

2302'-2306': Limestone, pale yellowish brown to olive gray, fine crystalline, hard, dense, sucrosic, glauconitic. No visible porosity. 30% mottled to even, variegated mineral fluorescence. No petroliferous odor/show.

2306'-2314': Shale, light to medium gray, silty to sandy.

2314'-2359': Cleveland Sandstone, very light gray to light gray, fine grained, well-sorted with sub-angular to well-rounded grains, excellent friability, very glauconitic. 2340'-2350' interval was only sample interval with a show of oil, but only one rock sample was found that had oil stain. It had a fast, even, fair milky blue cut, but no real saturation within that sample. At 2337' the hotwire alarm went off—a 380 unit gas kick was observed for a few minutes before dropping back to 100 units. The hotwire stayed at 100 units throughout the drilling of the rest of the Cleveland section and below the Altamont Limestone until approximately 2400'. Overall, sandstone exhibited good to strong petroliferous odor, with no oil show. Because of hotwire and electric log indicators, I would complete this zone for commercial gas production.

2359'-2373': Shale, medium to medium dark gray, silty in part.

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Top of Altamont Limestone @2373'(-945')

2373'-2390': Limestone, pale yellowish-brown to olive gray, fine crystalline, fairly friable with traces of pinpoint porosity present. 25% pinpoint to mottled, variegated yellow mineral fluorescence. No petroliferous odor/show.

2390'-2406': Shale, medium to medium dark gray, silty to sandy, pyritic in part, inter-bedded limestone present.

2406'-2442': Peru Sandstone, light to medium gray, very fine grained, well-sorted with sub-angular to sub-rounded grains, very friable, argillaceous, micaceous in part. Shale laminae present. No visible oil stain present. Traces of black bitumen on few samples. Overall, trace of mottled, very dull, yellow mineral fluorescence. No petroliferous odor/show.

Swivel Failure @ 4:30 am on April 5th, 2011. Shut down to repair. Resume drilling at 5:45 am Wednesday April 6th, 2011.

Hotwire stopped working at 2432'—down until TD'd.

2442'-2452': Shale, medium gray to red, soft, greasy, fissile in part, pale yellowish brown limestone present. Overall, less than 3% mottled to even, bright yellow mineral fluorescence. No petroliferous odor/show.

Top of the Pawnee Limestone @ 2452' (-1026')

2452'-2484': Limestone, grayish red to dark yellowish brown, fine crystalline, hard dense, sucrosic, no visible porosity present. Black shale break from 2474'-2476'.

2484'-2488': Lexington Shale and Coal, black, carbonaceous. Coal, very pyritic, thinly banded.

2488'-2496': Shale, dark gray, fairly hard.

Top of the Fort Scott Limestone @ 2496' (-1068')

2496'-2516': Limestone, graying red to pale yellowish brown, fine crystalline, hard, dense, sucrosic. No visible porosity on any sample surfaces. Few scattered shale laminae present. 20% even, variegated, yellow mineral fluorescence. No petroliferous odor/show.

2516'-2522': Summit Shale, dark gray to black, slightly carbonaceous, fissile in part.

2522'-2529': Limestone, pale red to pale yellowish brown, fine to medium crystalline, hard, sucrosic, fossiliferous. No visible oil stain on rock samples. 15% even, medium bright yellow mineral fluorescence. No petroliferous odor/show.

2529'-2534': Mulky Shale and Coal, shale black, carbonaceous, traces of vitrain coal in sample.

2534'-2541': Calcareous Shale, pale yellowish brown, fine crystalline, hard. Trace dark brown oil on one sample surface. No saturation within rock itself. Appears to have a contact surface with oil-bearing formation, possibly the mulky coal. Fast, uneven, fair

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milky blue cut. No residual oil show to tray after cut. Very poor saturation. Trace of mottled, very dull yellow mineral fluorescence. No petroliferous odor, very slight show.

Top of the Cherokee Group @ 2541' (-1113)

2541'-2602': Shale, medium dark gray and red, soft, greasy. Calcareous shale present—dark yellowish brown, very hard, many flat surfaces exhibited on rock samples. No porosity, extremely tight. Minute pinpoint traces of oil liberated from these rock samples with hydrochloric acid cut. Oil is totally immobile, as there is no porosity in these samples. No fluorescence. No petroliferous odor/show.

Top of the Ardmore (Verdigris) Limestone @ 2602' (-1174')

2602'-2604': Limestone, olive gray, fine to medium crystalline, mottled, very hard, very dense, very fossiliferous. No visible porosity. 35% even, variegated, yellow mineral fluorescence. No petroliferous odor/show.

2604'-2608': Croweburg Shale and Coal, Shale—black, carbonaceous. Coal—durain to fusain, very dull with no vitrinite present. No fluorescence. No petroliferous odor/show.

2608'-2640': Shale, medium to medium dark gray with red shale present. Traces of limestone, sandstone, and pyrite present. Overall, less than 2% mottled to even, variegated, yellow mineral fluorescence. No petroliferous odor/show.

2640'-2641': Scammon Coal, finely banded vitrain coal, with many conchoidal fractures.

2641'-2658': Shale, light to dark gray with red and pale green shale present, soft, greasy, silty/sandy. Sandstone present in small quantities, light gray, very fine grained, well-sorted, with sub-angular to well-rounded grains. Very friable, very clean. Trace pyrite in limestone present. Overall, trace even, bright yellow mineral fluorescence. No petroliferous odor/show.

2658'-2662': Tebo Shale, dark gray, fairly soft, fissile in part, trace coal.

2662'-2687': Shale, medium gray to red, soft and greasy to silty/sandy. Sandstone laminae present, light to medium gray, very fine grained, well-sorted, with sub-angular to sub-rounded grains, very friable, no oil staining present. Trace pinpoint to mottled, variegated, yellow mineral fluorescence. No petroliferous odor/show.

2687'-2690': Weir Shale and Coal, shale—black, carbonaceous, traces of thinly banded vitrain coal present.

2690'-2720': Shale, medium to dark gray with red and pale green shale present. Scattered sandstone and limestone laminae present. Trace mottled to even, variegated, yellow mineral fluorescence. No petroliferous odor/show.

2720'-2742': Shale, medium dark gray with red shale present. Trace limestone—pale yellowish brown, fine crystalline, fairly hard. Trace sandstone. No fluorescence. No petroliferous odor/show.

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2742'-2774': Shale, medium dark to dark gray with red shale. Scattered traces of sandstone, black shale, and pyrite present.

Jet Pits @ 2770' 1:30 am April 7th, 2011. Resumed drilling @ 6:35 am.

2774'-2798': Shale, medium to medium dark gray with red shale present. Traces of sandstone and limestone present. Trace even, medium, bright yellow mineral fluorescence. No petroliferous odor/show.

2798'-2800': Riverton Coal, thinly banded vitraine coal, many conchoidal fractures, less than 10% flat cleat faces.

2800'-2803': Shale, dark gray, soft, greasy.

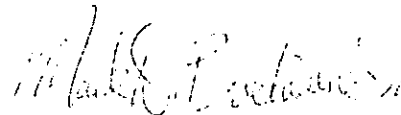
Top of the Mississippian @ 2803' (-1375')

2803'-2820': Shale, (60%) medium dark gray to dark gray, soft, greasy. Chert (30%) off-white to moderate yellow, hard, massive, amorphous, no porosity, no surface staining. Tripolitic Chert (10%) off-white to pale yellow, hard, vugular porosity present. No visible oil stain present. Sandstone (tr) light gray, fine grained. No oil staining present. No fluorescence. No petroliferous odor/show.

2820'-2834': Shale, (60%) medium dark gray. Limestone (35%) pale yellowish brown, fine to coarse crystalline, fairly hard, glauconitic in part, pinpoint and vugular porosity in few samples. No oil stain present. Pyritic in part. Chert (5%). 10% pinpoint to even, very dull, bluish yellow mineral fluorescence. No petroliferous odor/show.

TD 2834' @ 10:28 am, Thursday, April 7th, 2011.

Note: Oil was circulated out of annulus when cementing 4 1/2" casing—Brent Whiteman observing.



(Mark D. Brecheisen)

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