

**Professional Energy Services**

9402 Kessler Lane  
 Shawnee Mission, KS 66212  
 Ph.913.341.7434

**GEOLOGICAL REPORT**

Operator: **EVERGREEN OPERATING CORPORATION**

Project: Hamlin Well Name: Reschke 34-34

Location: 92' W of SW SE - 660' FSL & 2072' FEL

Sec. 34-1S-16E County: Brown State: Kansas

All measurements GL: 983' API: 15-013-20032-00-00

Company: Sr. Operations Engineer: Mr. Tom Erwin

Company: Geologist: Mr. Paul Clarke

Professional Energy Services: Geologist: Rich Robba

Crown: Drilling Superintendent: Fred O'Doan

Patterson Logging: Engineer: Roger Taylor

Drilling Contractor: Layne Christensen Company

CBM Solutions: Desorption: Dean/Ken Glover/Dion

Geosearch Logging: Mudloggers: Bill/Nathan Barnes

Commenced: 03/05/04 Completed: 03/17/04

**CONFIDENTIAL**

This geological report is prepared for **EVERGREEN OPERATING CORPORATION**. Wellsite geological supervision was conducted from surface to Total Depth. The Reschke 34-34 was water drilled to the core point, continuous cored from above the Summitt Shale to the Mississippi and then deepened by rotary to TD. ROP, gas curves and sample descriptions from water rotary chips are recorded on the mud log and geophysical survey formation tops, visual core recovery descriptions and desorption canisters are listed below.

**Reschke 34-34**

This well's coring data recorded significant coal development for the northern pilot program. Ash and shale content decreased, resulting in lower density coals. Coal group intersections were better developed with good gas shows and fair to good cleating pattern.

**Formation E-Log Tops**

Heebner Shale:	703'	Excello:	1440'
Lansing:	906'	VShale:	1541'
Stark Shale:	1180'	Tebo Shale:	1632'
B/Kansas City:	1242'	Mississippi:	2264'
Altamount:	1322'	RTD:	2320'
Summit:	1420'	LTD: (5' fill)	2315'

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Geophysical Density Survey Coal and Coal Shale Intersections

Net Coals(ft) < 1.75 g.cc		Net Coals(ft) >1.75g.cc< 2.00 g.cc		Net Carbonaceous Shale (ft)	
Name/Canister	Depth	Name/Canister	Depth	Name/Canister	Depth
Mulberry	1335-1336.6	Weir B/X11	1695.6-1696.4	Stark Shale	1180-1184
Bevier/X9	1516.1-1517.3	Rowe A/T336	1934-1936	Hushpuckney	1214-1215.6
Verdigras/19	1541.9-1543			Oswego	1389.8-1391
Mineral/X10	1588.4-1589.8			Summitt/T38,T59	1420-1422
Tebo/T380	1633.8-1634.9			Excello/T60,T62	1440-1443.9
Weir A	1675.4-1676			Fleming/T64	1583-1585
Bluejacket B/ii	1823-1824.6			Tebo/T103	1632-1633.8
Drywood/T301,X14	1928.7-1930.4			Bluejacket A	1788-1788.8
Rowe B/T612	1944.4-1947			Bluejacket C/T125	1841-1842
Rowe E	1999-1999.8			Bluejacket D/T300	1845.6-1847
Neutral A/390	2016-2018			Bluejacket F/X13	1921-1921.9
Neutral C/X16	2040-2041.6			Neutral B	2028.8-2030
Neutral D/X16	2045-2046.3			Werner C	2085-2086
Werner A/396	2062-2064			Riverton A/T630	2185-2186.4

Cumulative Net Thickness Geophysical Density Survey

Net Coals (ft) < 1.75 g.cc	Net Coals (ft)>1.75g.cc < 2.00 g.cc	Net Carbonaceous Shale (ft)
18.8'	2.8'	20.2'

Visual Core Sample Descriptions

- 1400-1408 SHALE: gr, soft at top, bec/ fissile w/ v low carb bands at base.
- 1408-1410 LIMESTONE: vfnxn, wh-gy, v sli chky and foss, p interxln and pin point por.
- 1410-1415 SHALE: dk gy-gr, v low carb, sli soft.
- 1415-1418 LIMESTONE: dk gy, v shly, vfnxn.
- 1418-1422 SHALE: v dk gy, fissile, p frac.
- 1422-1428 LIMESTONE: fnxn, lt gy, nvp, sli shly on top.
- 1428-1431 SHALE: lt gy-gr, hard.
- 1431-1438 LIMESTONE: gy, shly, fnxn, v foss at top dec towards base.
- 1438-1442 SHALE: blk, hard, fissile, bec/ brn at base, 1 frac.
- 1442-1444 UNDERCLAY: gy, soft, med tx.
- 1444-1450 SILTSTONE: burrows, gritty, v shly in part, frac w/ blk fill.
- 1450-1458 SHALE: gr, soft in part w/ tan sh bands and burrow infill.
- 1458-1513 SHALE: sli sdy in part w/ thin to 1" dk gy/lt gy sh varving.
- 1513.6-1514 COAL SHALE: dull, sh partings, well cleated.

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### Visual Core Sample Descriptions

1514-1518 UNDERCLAY: dk gy, cs tx, soft, washout.  
1518-1539 SHALE: dk gy w/ gr area's, hard, fissile, low carb w/ 6" med carb, soft bands.  
1539-1540 COAL: blk, mod ash, br, banded, calc.  
1540-1546 UNDERCLAY: gy, lt gy, med tx, hard.  
1546-1567 SILTSTONE: lt gy-gr w/ occ lt gy sh thin beds, v gritty, v fn gn ss.  
1567-1578 SHALE: dk gy w/ siltstone varving bec/ dk gy sh w/ 1-2" med carb layers.  
1578-1580 SHALE: blk, massive, med carb.  
1580-1584 UNDERCLAY: wh-gy w/ v thin dk gy sh w/ 1-2" med carb layers.  
1584.9-1585.7 COAL: blk, mostly rubble, wh mineralization, vpshogas.  
1586-1590 UNDERCLAY: gy-gr, soft in part, fn-med tx.  
1590-1627 SHALE: gy to blk seasonal varving, soft in part, fissile, layers v silty, few clam beds.  
1627.3-1629.3 SHALE: blk, massive, mod carb.  
1630.1-1630.9 COAL: shly, low ash, med density, p-f cleating, trc gas.  
1631-1634 UNDERCLAY: dk gy, hard.  
1634-1638 SHALE: gy-gr, soft, cs tx.  
1638-1644 SILTSTONE: gy, v sdy, vfngn, well rnd.  
1644-1644.2 COAL SHALE: blk, hard.  
1645-1649 UNDERCLAY: dk gr, med-cs tx.  
1649-1660 SHALE: med to dk gy, generally fissile, blk locally w/ rubble zones, waxy tx w/ organic base.  
1660-1663 SILTSTONE: wh/crm, v well cement, occ pink nodules bec/ sli calc and thin gy/gr laminations, pedogenic structure.  
1663-1669 MUDSTONE: gy/grn/bl mottled, non-calc, nodular with local sh breaks.  
1669-1671: SHALE: brn to dk gy, soft and fissile, grades into dark organic rich base.  
1671-1671.4: CARB SHALE: dk gy sh w/ organic rich laminations  
1671.4-1674: SILTY SHALE: gy to crm, blk w/ waxy tx, irregular concoidal frac, slickenslides.  
1674-1687: SHALE: med gy, grading to very dark gy sh at base, fissile throughout w/ localized nodular beds and calcite filled fractures.  
1687-1692: SHALE: blk to v dk gy, laminated w/ thin shell beds.  
1692-1692.4: CARB SHALE:  
1692.4-1693: COAL: Patchy matte, locally vitreous luster, generally dull gy occ br, blk, irregular, banded distribution of vitrain (<40%) and clarain/durain (>60%), relatively soft, platy w/ plant impressions vis along partings, pyr, patches of hard br vitrain cut irregular calcite filled frac, no vis gas.  
1693-1694: SILTSTONE: off wh to crm, well-cemented, organic rich smears show root traces, waxy to base w/ slickenslides.  
1695-1711.2: SHALE: medium gy, locally blk to base, platy and fissile, occ paper sh tx, dull metallic luster w/ pyr horizons.  
1711.2-1712: SHALE: blk, firm generally massive w/ hackly frac.  
1712-1715: SHALE: medium gy, w/ paler siltstone lamination, bioturbated horizons and shell beds present.  
1715-1727.5: SANDSTONE: white, off white fn-gn to med/fn-gn, mod sorting w/ thin sh partings. Organic fragments, ripple-forms show mud drapes, loc bioturbation.  
1727-1735.3: HETERLITHICS: thinly bedded fn-gn ss and laminated sh, plant fragments concentrated along laminae.  
1735.3-1745.7: SHALE: med to dk gy, fissile w/ well-cement nodular bands (slightly calc) of siderite. Thin beds show burrow mottling and traces of carb shale.  
1745.7-1757.6: MUDSTONE: pale gy silt mudstone, massive and blk, local irregular frac show waxy texture and slickenslides, calcite filled veins @ 1755.

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Visual Core Sample Descriptions

1757.6-1781.1: HETEROLITHICS: interbedded med gy, well-indurated mudstone, fissile waxy sh and fn/medgrn, ripple-laminated ss, plant fragments common throughout, occur on forests and show flow alignment, high-angle fractures occur in mudstone facies w/ calcite filled slickensides showing dip-slip motion, ss lenses show bioturbation locally.

1781.1-1786.4: SHALE: pale gy and blk, to dk gy fissile, compressed plant fragments coalified, show good cleats w/ calcite fill.

1786.4-1790: SANDSTONE: wh, med-gn, mod sorting, lithic frag's and feldspar abundant, cross-bedded w/ organics along foresets, blk and mod well demented, p vis por.

1790-1792: SHALE: v dk gy to blk, organic rich w/ concentration of plant fragments

1792-1796.8: SANDSTONE: med gy silty ss, fn-gn, micaceous w/ rootlets and plant fragments.

1789-1790 SANDSTONE: med gn, p sorted, sub ang, friable, brn mineral thin beds.

1790-1792 SHALE: blk, fissile, low carb, soft at base.

1792-1820 SHALE: gy w/ thin bed varving w/ shly ss bec/ mostly carb sh at base.

1820-1827 SHALE: lt gy, hard, carb mat w/ ss thin beds towards base.

1827-1832 SANDSTONE: fn-med gn, f sorted, sub rnd, friable, gd por.

1832-1838 SHALE: blk, hard, fissile, low carb.

1838-1840 SHALE: blk, high ash content, sooty app.

1840-1843 SHALE: blk w/ lt gy sh bands, fissile, hard.

1843-1845 SHALE, blk, med carb, fissile, no vis cleats.

1845-1863 SANDSTONE: fn-med gn, sub rnd, part to v friable w/ shly bands.

1863-1875 SHALE: lt gy, hard w/ thin dk gy sh bands bec/ blk sh, soft in part, low to med carb.

1875-1877 SHALE: dk gy, cs tx.

1877-1887 SANDSTONE: v thin beds w/ dk gy sh to v low carb seasonal varving.

1887-1916 SHALE: blk, hard fissile, low-med carb.

1916.9-1917.4 COAL: blk, br, f cleats, calc, med density.

1918-1920 UNDERCLAY: wh-gy, fn tx, hard.

1920-1925 SHALE: v dk gy, fissile, carb inc towards base.

1925-1927.3 COAL: br, low density top, gd cleating middle, rubble at base, fshogas.

1928-1930 SHALE: blk, hard, bands w/ dense clam beds.

1930.5-1932.7 COAL: mod ash, rubble, p cleated, br, f degassing.

1933-1940 UNDERCLAY: cs tx w/ abund carb mat at base.

1940-1942 COAL: mod ash, p cleated, calc.

1942-1946 UNDERCLAY: cs tx, well devel, carb mat in part.

1946-1981 SHALE: blk, hard, fissile w/ occ shells and one bed, gy sh bands and pebbles w/ calc nodules.

1981-1983 UNDERCLAY: gy, soft, washout.

1983-2011 SHALE; dk gy w/ low-med carb bands, lmy @ 1999.

2011.9-2012.8 COAL: blk, low ash, p-f cleats, low density.

2013-2017 UNDERCLAY: army gy, v soft, washouts.

2017-2023 SHALE: blk, hard to soft in part w/ washouts.

2023-2026 UNDERCLAY: wh-gy, fn tx, hard.

20126-2047 SHALE: blk, hard, fissile.

2047-2047.8 COAL: mod ash, pyr, calc, low density, lost 3.2' core recovery betw/ 2040-2050.

2048-2050 UNDERCLAY: wh-gy, med tx.

2050-2057 SHALE: blk, low-med carb, fissile w/ lt gy bands and slickensides.

2057.1-2058.6 COAL: shly top to low density at base, gd sho gas.

2059-2061 UNDERCLAY, wh-gy, med tx.

2061-2077 SHALE: blk, hard, fissile w/ v low to occ low carb inc towards base w/ thin wh clay thin beds.

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### Visual Core Sample Descriptions

2077-2084 UNDERCLAY: wh-gy, fn-med tx, hard.  
2084-2094 SHALE: gy, soft in part w/ low carb sh bands at top and med carb bands at base.  
2094.4-2096.4 SHALE: blk, fissile, med carb.  
2097-2100 UNDERCLAY: blk w/ many lt gy sh pebbles and sdy bands.  
2100-2109 SHALE: dk gy, hard, v low carb.  
2109-2115 SHALE: wh-gy w/ wh layers, slumping, hard.  
2115-2117 SHALE: blk, hard, fissile.  
2117-2139 SHALE: wh-gy, cross bedding,, wh mineral layers w/ p por, carb inc towards base bec/ gy to dk gy, soft in part, washouts.  
2139-2186 SHALE: blk, v low to occ low carb, brittle, carb inc at base.  
2186.5-2188.5 SHALE: blk, fissile, med carb.  
2189-2193 UNDERCLAY: wh-gy w/ wh mineralization, lt gy sh pebbles.  
2193-2213 SHALE: blk, hard, fissile w/ wh and brn layers, lt gy and brn nodules, slickensides.  
2213-2216 UNDERCLAY: v hard, v foss, sdy.  
2216-2218 SANDSTONE: v fn gn, well sorted, compacted, layer w/ blk sh cross bedding.  
2218-2230 SHALE: blk, hard, fissile, lt gy when dry w/ lt gy sh thin beds.  
2230-2238 SHALE: dk gy w/ thin to 3" ss bands.  
2238-2260 SANDSTONE: v fn gn well sorted, rnd, wh, w/ shly layers.  
2260-2268 SHALE: v dolomitic, gy, hard.  
2268-2268.2 SHALE: blk, dolo, rubble.  
2268.2-2270 LIMESTONE: fn-medxln, sli ool and sdy, few foss.

### Conventional Oil and Gas Shows

No shows recorded.

Respectfully submitted,

Richard A. Robba, PG  
Director of Operations  
Professional Energy Services

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