

**Professional Energy Services**

9402 Kessler Lane  
Shawnee Mission, KS 66212  
Ph.913.341.7434

**GEOLOGICAL REPORT**

Operator: **EVERGREEN OPERATING CORPORATION**

Project: Centerville Well Name: Souders 42-13

Location: NW SE NE - 1735' FNL & 950' FEL

Sec. 13-21S-21E County: Linn State: Kansas

All measurements GL: 915' API: 15-107-23788-00-00

Professional Energy Services: Geologist: Rich Robba

Drilling Superintendent: Fred O'Doan

Patterson Logging: Engineer: Roger Taylor

Ensign Drilling Company: Drilling Contractor

CBM Solutions: Desorption: Dean/Ken Glover/Kelly

Geosearch Logging: Mudloggers: Kevin Clark/Nathan Barnes

Commenced: 03/31/04 Completed: 04/03/04

**KCC**

**JUL 22 2004**

**CONFIDENTIAL**

This geological report is prepared for **EVERGREEN OPERATING CORPORATION**. Wellsite geological supervision was conducted from surface to Total Depth. The Souders 42-13 was water drilled to the core point, continuous cored from above the Mulberry Coal to the Mississippian unconformity and then deepened by rotary to TD. ROP, gas curves and sample descriptions from water rotary chips are recorded on the mud log and conventional hydrocarbon shows, geophysical survey formation tops, visual core recovery descriptions and desorption canisters are described and listed below, respectively.

Souders 42-13

This well's organic intersections were of lower density and ash with visual outgassing from some layers.

Formation E-Log Tops

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KANSAS CORPORATION COMMISSION

**JUL 23 2004**

CONSERVATION DIVISION  
WICHITA, KS

Stark Shale: 59'  
B/Kansas City: 97'  
Altamount: 291'  
Summit: 442'  
Excello: 455'

V Shale: 550'  
Tebo Shale: 621'  
Mississippi: 819'  
RTD: 922'  
LTD: 922'

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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/T23	343.9-345.7	Bevier/T951	535-536.4	Stark Shale	59.9-61.6
Mineral/T958	594-595.7	V Coal/X27	552-552.8	Hushpuckney	84.5-86
Riverton/93	798-799.6	Fleming/T953	579.8-581	Dawson	265.8-266.8
		Tebo/21	621.7-623	Mulberry A	299.9-300.3
		Drywood	740.8-742.1	Mulberry B/X23	325-326.4
		Rowe/X29	764.1-764.9	Lexington/T134	371-371.9
				Oswego/T679	433.1-435.1
				Summit/T949	442.4-443.6
				Bluejacket A/T959	659.7-661.5
				Bluejacket B/84	681-682
				Bluejacket F/X28	718-719.4
				Neutral/85	771.8-772.5

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)
5.1'	6.6'	13.0'

Visual Core Sample Descriptions

- 317-329 SHALE: lt gy, fissile, carb content inc towards base.
- 329.4-330 COAL: shly, med density, p-f cleats, master cleat w/ wh mineral, pyr layers, pred dull, some br.
- 330-344 SHALE: lt gy w/ plant carb mat.
- 344.7-346.1 COAL: blk, br, shly at top, low density at base, gd sho gas, pyr lenses, p-f cleats.
- 347-348 UNDERCLAY: dk gy, med tx, washes out.
- 348-351 SHALE: gy, hard, splintery.
- 351-362 LIMESTONE: v fnxln, v foss, sli shly at top, shly base, argil, lt gy.
- 362-368 SHALE: gy, v hard, v calc.
- 368-371 LIMESTONE: micro-v fnxln, shly.
- 371-374 SHALE: v dk gy, med carb, frac w/ wh mineral.
- 374.8-376.9 COAL SHALE: blk, massive, slickenside, sli pyr.
- 377-381 SHALE: v dk gy, massive, sli to v foss.
- 381-381.5 COAL SHALE: blk, med carb w/ clam bed.
- 382-411 SHALE: lt gy w/ calc varving bec/ blk low carb, fissile.
- 411-418 LIMESTONE: medxln, foss, gr-gy, f interxln por, shly inter-bedding, argil in part.
- 418-432 SHALE: blk w/ lt gy bands, calc, hard.
- 432-434 SHALE: med carb, dk gy, blkgy.

### Visual Core Sample Descriptions

434-435 SHALE: blk, fissile w/ clam bed at base.  
435-439 LIMESTONE: v fnxln, gy, scat shells w/ blk carb sh bands, low to med carb.  
439-440 SHALE, v dk gy, massive, plant mat.  
440.8-442.6 SHALE: blk, carb.  
443-445 SHALE: blk w/ shells, low carb, fissile.  
445-450 MUDSTONE: med tx, hard, bkn pcs.  
450-453 LIMESTONE: fnxln, foss, shells, no vis por.  
453-461 SHALE: v dk gy, blk, med tx.  
461-484 SHALE: gy to blu-gy top cs tx, calc, to sh v fn tx, gr-blu non calc.  
484-534 SHALE: gy to blk, v low to low carb sections, lmy layers at top, occ clam beds.  
534-535.7 COAL: mod ash, shly parting, p cleats, wh mineral infill.  
536-542 UNDERCLAY: carb mat, cs tx, partially soft.  
542-547 SHALE: dk gy, fissile, v sli calc, hard.  
547-549 LIMESTONE: medxln w/ carb mat-bands, numerous foss, shells.  
549-551 SHALE: blk, brn nodules, med carb w/ br carb pcs.  
551.6-552 COAL: mod ash, p cleats, non-calcite wh mineral in cleats.  
552-553 UNDERCLAY: gy w/ coaly roots, fn-med tx.  
553-571 SHALE: lt gy, fn tx w/ occ v low carb, dk gy sh bands.  
571-571.4 SHALE: blk, carb, blk, hard.  
572-576 MUDSTONE: med tx top, fn tx base w/ organic mat, mica.  
576-578 SHALE: blk, blk, carb content inc towards base.  
578.1-579.5 COAL: low ash, pyr, gd cleats, wh mineral infill, no effervescence.  
580-588 UNDERCLAY: med tx w/ bkn pcs coal, plant mat, soft in part.  
588-590 SHALE: blk w/ lmy lt gy sh bands, v shelly.  
590-592 LIMESTONE: fnxln, gy, foss, massive in part.  
592.11-594.4 COAL: low ash, br bands, soft in part, wh mineral in cleats.  
595-607 UNDERCLAY: cs tx, dk gy, carb mat throughout, soft, sli washout.  
607-621 SHALE: dk gy w/ brn sh and lt gy sh bands, blk, bec/ inc organics near base.  
621.4-622.6 COAL: rubble at top, low density, pyr bands, br bands, f sho gas, gd cleats w/ calcite fill.  
623-627 UNDERCLAY: gy w/ plant mat, v soft, washes out.  
627-635 SILTSTONE: lt gy-gr, sli gritty, v shly in part w/ cs gn ss bands.  
635-645 MUDSTONE: gr-gy w/ carb mat and bands.  
645-660 SHALE: v dk gy, v low w/occ low carb mat, v lt gy shale thin beds, lost 2' core betw/ 650-660.  
660.4-662.2 COAL SHALE, blk, v blk, massive w/ pyr, med carb.  
663-665 UNDERCLAY: brn-gy w/ much carb mat, v silty.  
665-665.2 COAL SHALE: brn-blk, high carb content.  
666-667 UNDERCLAY: gy, fn tx w/ carb mat.  
667-669 LIMESTONE: fnxln, gy, no vis por, shly.  
669-671 MUDSTONE: gr w/ brn nodules, v soft washouts.  
671-672 SHALE: blk, splintery w/ brn nodules.  
672-673 LIMESTONE: medxln, brn, shly in part.  
673-675 MUDSTONE: gy-gr w/ gy sh bedding planes semi hard.  
675-678 SHALE: blk, dk gy top w/ inc carb at base, inc pyr clusters dipping.  
678-679 COAL SHALE: organic rich, pyr.  
679-690 UNDERCLAY: gy, fn tx, gritty, w/ brn sdy bands, v hard.  
690-696 SILTSTONE: gritty, gy shly in part.  
696-700 SHALE: lt gy w/ dk gy sh thin beds.  
700-701 SHALE: blk w/ gy sh bands and pyr clusters, v low carb.

### Visual Core Sample Descriptions

701-717 MUDSTONE: cs tx top and fn tx towards base, carb mat, bands, siderite bands, inc organic towards base w/ slickensides.  
717-717.6 COAL: low density, pyr lenses and large clusters, low ash, f sho gas, f cleating, br bands, brn coal, partial rubble.  
718-722 UNDERCLAY: tan-gy w/ carb mat, soft in part, washes out.  
722-736 SANDSTONE: fn gn, sub rnd, f-well sorted, abund carb thin beds lower, f friable, no show.  
736-740 SHALE: dk gy w/ lt gy sh and v sdy lt gy sh layers.  
740-740.2 COAL: lost 1' recovery, blk w/ wh mineral in horizontal cleats.  
741-745 UNDERCLAY: gr-gy w/ slumping carb mat.  
745-748 SHALE: lt gy, low carb, many disks, soft, washes out.  
748-750 MUDSTONE: gy, silty, soft, washes out.  
750-762 SHALE: gy w/ v dk gy bands, v low carb.  
762.8-763.3 COAL: rubble, blk, cleating planes, no sho gas, sli pyr.  
764-769 UNDERCLAY: fn-med tx, carb mat, hard.  
769-770 SHALE: v dk gy, blk.  
770.1-771.3 COAL: low density, med ash, p cleats, no sho gas, br bands, pyr lenses.  
772-776 UNDERCLAY: fn tx, lt gy w/ carb mat.  
776-796 SHALE: dk gy, lt gy, laminated, sdy in part, brn sdy sh bands, low carb.  
796.7-797.7 COAL: rubble, lg pcs pyr lenses, p sho gas, calcite in planes, br.  
798-801 SHALE: dk gy w/ low carb sh bands, hard, fissile.  
801-809 SHALE: gy, reworked bec/ gr sh w/ lg ang bkn pcs ls, sh towards base.  
809-810 LIMESTONE: tan, v fnxln to massive.

### Conventional Oil and Gas Shows

801-805 Conglomerate: top black shale, soft texture, w/ organic rich sandy gy sh, up to 110u gas kick.

Respectfully submitted,

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