FORM OGC-3

MISSOURI DEPARTMENT OF NATURAL RESOURCES
MISSOURI OIL AND GAS COUNCIL

APPLICATION FOR PERMIT TO DRILL, DEEPEN, OR PLUG BACK

☒ APPLICATION TO DRILL ☐ DEEPEN ☐ PLUG BACK ☐ FOR AN OIL WELL ☒ OR GAS WELL

NAME OF COMPANY OR OPERATOR			DATE
Osborn Energy, L.L.C.			MAY 7, 2002
ADDRESS	CITY	STATE	ZIP CODE
24850 Farley	Bucyrus	Kansas	66013

DESCRIPTION OF WELL AND LEASE

NAME OF LEASE	WELL NUMBER	ELEVATION (GROUND)
Smith	1-22	981'

WELL LOCATION (GIVE FOOTAGE FROM SECTION LINE)
1071 FT. FROM (N)(S) SECTION LINE 273 FEET FROM (E)(W) SECTION LINE

WELL LOCATION SECTION	TOWNSHIP	RANGE	COUNTY
22	T44N	R33W	Cass

NEAREST DISTANCE FROM PROPOSED LOCATION TO PROPERTY OR LEASE LINE 273 FEET
DISTANCE FROM PROPOSED LOCATION TO NEAREST DRILLING, COMPLETED OR APPLIED — FOR WELL ON THE SAME LEASE 773 FEET

PROPOSED DEPTH	DRILLING CONTRACTOR, NAME AND ADDRESS	ROTARY OR CABLE TOOLS	APPROX. DATE WORK WILL START
900'	Layne Christensen Compant; 1345 Highfield Crescent South East Calgary, Alberta, T2G 5N2	Rotary	MAY 13, 2002

NUMBER OF ACRES IN LEASE: 80
NUMBER OF WELLS ON LEASE, INCLUDING THIS WELL, COMPLETED IN OR DRILLING TO THIS RESERVOIR: 4
NUMBER OF ABANDONED WELLS ON LEASE: None

IF LEASE PURCHASED WITH ONE OR MORE WELLS DRILLED, FROM WHOM PURCHASED?
NAME: New lease from land owner
ADDRESS:

NO. OF WELLS: PRODUCING ____ INJECTION ____ INACTIVE 3 ABANDONED ____

STATUS OF BOND	☐ SINGLE WELL AMOUNT $	☒ BLANKET BOND AMOUNT $ 30,000	☒ ON FILE ☐ ATTACHED

REMARKS: (IF THIS IS AN APPLICATION TO DEEPEN OR PLUG BACK, BRIEFLY DESCRIBE WORK TO BE DONE, GIVING PRESENT PRODUCING ZONE AND EXPECTED NEW PRODUCING ZONE; USE BACK OF FORM IF NEEDED.)

PROPOSED CASING PROGRAM				APPROVED CASING — TO BE FILLED IN BY STATE GEOLOGIST			
AMOUNT	SIZE	WT/FT	CEM.	AMOUNT	SIZE	WT/FT	CEM.
20'	10 3/4"	32 lbs.	20' - Surface	20'	10 3/4"	32 lbs	20' → Surf
800'	7"	20 lbs.	800' - Surface	800'	7"	20 lbs	Surf → TD
				To within 10' of bottom. Amt depends on depth to Mississippian.			

I, the undersigned, state that I am the Director of Operations of the Osborn Energy, L.L.C. (company), and that I am authorized by said company to make this report, and that this report was prepared under my supervision and direction and that the facts stated therein are true, correct, and complete to the best of my knowledge.

SIGNATURE [signature] DATE 5-6-02

PERMIT NUMBER 20921
APPROVAL DATE 5-9-02
APPROVED BY [signature]

☑ DRILLER'S LOG REQUIRED ☑ E-LOGS REQUIRED IF RUN
☑ CORE ANALYSIS REQUIRED IF RUN ☑ DRILL STEM TEST INFO. REQUIRED IF RUN
☐ SAMPLES REQUIRED
☑ SAMPLES NOT REQUIRED
☐ WATER SAMPLES REQUIRED AT

NOTE ▶ THIS PERMIT NOT TRANSFERABLE TO ANY OTHER PERSON OR TO ANY OTHER LOCATION

APPROVAL OF THIS PERMIT BY THE OIL AND GAS COUNCIL DOES NOT CONSTITUTE ENDORSEMENT OF THE GEOLOGIC MERITS OF THE PROPOSED WELL NOR ENDORSEMENT OF THE QUALIFICATIONS OF THE PERMITTEE.

I _____ of the _____ Company confirm that an approved drilling permit has been obtained by the owner of this well. Council approval of this permit will be shown on this form by presence of a permit number and signature of authorized council representative.

DRILLER'S SIGNATURE _____ DATE _____

MO 780-0211 (2-88)

REMIT TWO COPIES TO: MISSOURI OIL AND GAS COUNCIL, P.O. BOX 250, ROLLA, MO 65401

MISSOURI DEPARTMENT OF NATURAL RESOURCES
MISSOURI OIL AND GAS COUNCIL
WELL COMPLETION OR RECOMPLETION REPORT AND WELL LOG

Form OGC-5

☒ NEW WELL ☐ WORKOVER ☐ DEEPEN ☐ PLUG BACK ☐ INJECTION ☐ SAME RESERVOIR ☐ DIFFERENT RESERVOIR ☐ OIL ☒ GAS ☐ DRY

OWNER: Osborn Energy, L.L.C.	ADDRESS: 24850 Farley, Bucyrus, Kansas 66013
LEASE NAME: Smith	WELL NUMBER: 1-22
LOCATION: 1021 FSL & 2913 FEL	SEC. TWP. AND RANGE OR BLOCK AND SURVEY: 22 -T44N-R33W
COUNTY: Cass	PERMIT NUMBER (OGC-3 OR OGC-31): 20721
DATE SPUDDED: 6/08/2002	DATE TOTAL DEPTH REACHED: 6/11/2002
DATE COMPLETED READY TO PRODUCE OR INJECT: waiting on completion	ELEVATION (DF, RKR, RT, OR Gr) FEET: 981'
ELEVATION OF CASING HD. FLANGE: N/A FEET	
TOTAL DEPTH: 764'	PLUG BACK TOTAL DEPTH: N/A
PRODUCING OR INJECTION INTERVAL(S) FOR THIS COMPLETION: Undetermined	ROTARY TOOLS USED (INTERVAL): 0' TO 764'
DRILLING FLUID USED: air & water	CABLE TOOLS USED (INTERVAL): N/A
WAS THIS WELL DIRECTIONALLY DRILLED? NO	WAS DIRECTIONAL SURVEY MADE? NO
WAS COPY OF DIRECTIONAL SURVEY FILED? N/A	DATE FILED: N/A
TYPE OF ELECTRICAL OR OTHER LOGS RUN (LIST LOGS FILED WITH THE STATE GEOLOGIST): Dual Induction Log	DATE FILED: 6/10/2002

CASING RECORD

CASING (REPORT ALL STRINGS SET IN WELL - CONDUCTOR, SURFACE, INTERMEDIATE, PRODUCING, ETC.)

PURPOSE	SIZE HOLE DRILLED	SIZE CASING SET	WEIGHT (LB. FT)	DEPTH SET	SACKS CEMENT	AMOUNT PULLED
Surface	13 3/4"	10 3/4"	32	21'	14	0
Production	7 7/8"	5 1/2"	15 1/2	765'	110	0

TUBING RECORD

SIZE IN.	DEPTH SET FEET	PACKER SET AT FEET	SIZE INCH

LINER RECORD

TOP FEET	BOTTOM FEET	SACKS CEMENT	SCREEN FEET

PERFORATION RECORD

NUMBER PER FEET	SIZE AND TYPE	DEPTH INTERVAL

ACID, SHOT, FRACTURE, CEMENT SQUEEZE RECORD

AMOUNT AND KIND OF MATERIAL USED	DEPTH INTERVAL

INITIAL PRODUCTION

DATE OF FIRST PRODUCTION OR INJECTION	PRODUCING METHOD (INDICATE IF FLOWING, GAS LIFT, OR PUMPING — IF PUMPING, SHOW SIZE AND TYPE OF PUMP.
Waiting on completion	Shut-in Gas Well

DATE OF TEST	HOURS TESTED	CHOKE SIZE	OIL PRODUCED DURING TEST bbls.	GAS PRODUCED DURING TEST MCF	WATER PRODUCED DURING TEST bbls.	OIL GRAVITY API (CORR.)
N/A	N/A	N/A	N/A	N/A	N/A	N/A

TUBING PRESSURE	CASING PRESSURE	CAL'TED RATE OF PRODUCTION PER 24 HOURS	OIL bbls.	GAS MCF	WATER bbls.	GAS OIL RATIO
N/A	N/A	N/A	N/A	N/A	N/A	N/A

DISPOSITION OF GAS (STATE WHETHER VENTED, USED FOR FUEL OR SOLD): Shut-in Gas Well

METHOD OF DISPOSAL OF MUD PIT CONTENTS: Let water evaporate then use bulldozer to backfill pit

CERTIFICATE: I, THE UNDERSIGNED, STATE THAT I AM THE Geologist OF THE Osborn Energy, L.L.C. COMPANY, AND THAT I AM AUTHORIZED BY SAID COMPANY TO MAKE THIS REPORT, AND THAT THIS REPORT WAS PREPARED UNDER MY SUPERVISION AND DIRECTION AND THAT THE FACTS STATED THEREIN ARE TRUE, CORRECT AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DATE: 9-25-02 SIGNATURE:

MO 780-0215 (1-86) (Rev. 1-86)

DRILLER LOG

Smith #1-22
1021 FEL, 2913 FEL
Section 22-T44N-R33W
Cass, Co. Missouri
OGC #20721
Elevation: 981 GL, 984 KB (Surveyed)
Drilling Contractor: (Lic. 32999#)
Spud: 6/08/2002
Surface: 13 3/4" bore hole, set 21' of 10.75" csg., cmt'd with 14 sx
Production bore hole: 7 7/8"
Core Hole Total Depth: 751'(750.6) on 6/10/2002
Rotary Total Depth: 764' on 6/11/02
Drilling fluid: water w/ polymer added
E-Log Total Depth: 751'
Production Csg.: 5 ½" 15.50#/ft., set at 765 feet, cmt'd with 110 sx.

Formation	E-Log Top	Datum
Stark Shale	23	961
Bethany Falls Limestone	30	954
Hushpuckney Shale	50	934
Base Kansas City	67	917
Mound City Shale Zone	67	917
"Upper" Knobtown Sand	71	913
"Middle" Knobtown Sand Zone	96	888
"Lower" Knobtown Sand Zone	160	824
Carbonaceous Zone in Tacket	178	806
"Big Lake" Sand	183	801
South Mound Zone	233	751
Hepler (Wayside) Sand	----	----
Carbonaceous Zone in Holdenville	247	737
"Upper" Mulberry Zone	266	718
Mulberry Zone	274	710
Laberdie Limestone	280	704
Weiser Sand	292	692
Anna Shale (Lexington Coal Zone)	319	665
Peru Sand	345	637
Summit Shale Zone	----	----
Mulky Coal/Shale Zone	396	615
"Upper" Squirrel Sand Zone	376	608
"Middle Squirrel Sand Zone	397	587
"Lower" Squirrel Sand	431	553

Bevier Coal Zone	----	----
Croweburg Zone(s)	481	503
Fleming Coal Zone	----	----
Mineral Coal Zone	511	473
Scammon Coal Zone	518	466
Tebo Coal Zone	548	436
Bartlesville "A" Sand Zone	561	423
The "Un-named" Zone	592	392
Bartlesville "B" Sand Zone	608	376
Dry Wood Coal Zone	631	353
Bartlesville "C" Sand	645	339
Rowe Coal Zone	----	----
"Upper" Neutral Coal Zone	686	298
"Lower" Neutral Coal Zone	----	----
"Neutral" (Mystery) Shale Zone	----	----
"E" Sand	----	----
"F" Sand	----	----
"G" Sand	----	----
Riverton Coal Zone	709	275
Mississippian (Core depth, not log'd)	740	244
Core Hole Total Depth	751	233
E-Log Total Depth	751	233
Rotary Total Depth	764	

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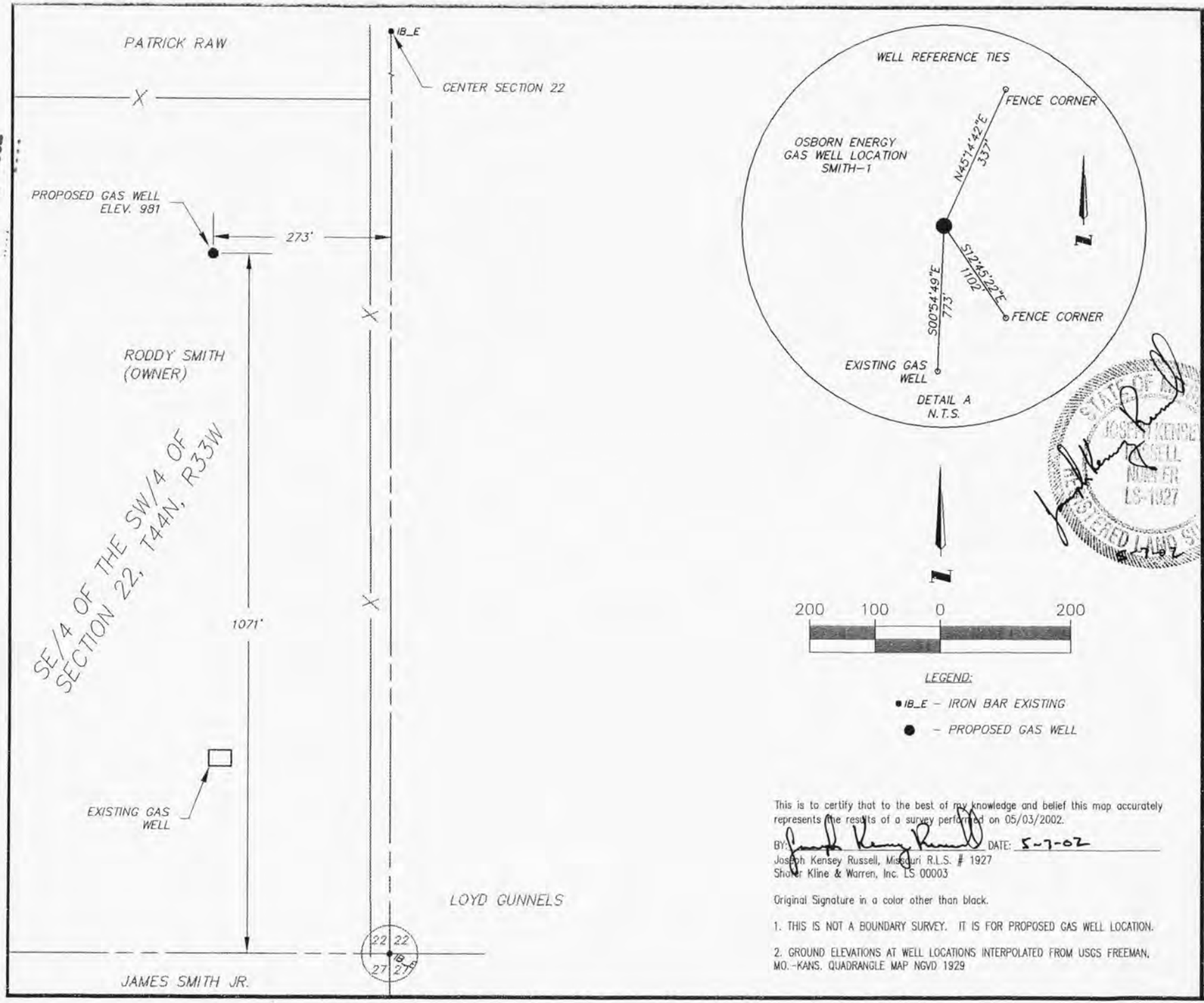

This is to certify that to the best of my knowledge and belief this map accurately represents the results of a survey performed on 05/03/2002.

BY: Joseph Kensey Russell DATE: 5-7-02

Joseph Kensey Russell, Missouri R.L.S. # 1927
Shafer Kline & Warren, Inc. LS 00003

Original Signature in a color other than black.

1. THIS IS NOT A BOUNDARY SURVEY. IT IS FOR PROPOSED GAS WELL LOCATION.

2. GROUND ELEVATIONS AT WELL LOCATIONS INTERPOLATED FROM USGS FREEMAN, MO.-KANS. QUADRANGLE MAP NGVD 1929

STATE OF MISSOURI
JOSEPH KENSEY RUSSELL
NUMBER
LS-1927
REGISTERED LAND SURVEYOR

AUTOCAD VER.12 INFORMATION BLOCK:
DRAWING: BY: DATE: 05/2002
XREF DWG1: XREF DWG2:
XREF DWG3: XREF DWG4:

NO.	DATE	REVISIONS	BY	APP'D
1				
2				
3				
4				
5				

Designed By: ____
Drawn By: TBH
Checked By: KRS
Issue Date: 05/2002
Job No.: 302801

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SHAFER, KLINE & WARREN, INC.
921 Jackson Street, Chillicothe, MO 64601
660/646-9788 Fax: 660/646-9791
OTHER OFFICE LOCATIONS:
Ida, KS
Overland Park, KS
Moore, MO
Kansas City, MO
CIVIL ENGINEERS • ELEVATION ENGINEERS • MECHANICAL ENGINEERS • LANDSCAPE ARCHITECTS • LAND SURVEYORS • LAND PLANNERS

OSBORN ENERGY
GAS WELL LOCATION
SMITH-1 SITE
CASS COUNTY, MISSOURI

SHEET NO.
1
302801

Osborn Energy, L.L.C.

24850 Farley
Bucyrus, KS 66013
Ph: 913-533-9900
Fax: 913-533-9955

September 25, 2002

Missouri Department of Natural Resources
Division of Geology and Land Survey
P.O. Box 250
Rolla, MO 65402

57-20721

Attention: Sherri Stoner

Dear Oil and Gas Council:

Osborn Energy, L.L.C., a Kansas corporation having its principal place of business at:

24850 Farley
Bucyrus, KS 66013

is requesting that the Oil and Gas Council keep the information on the Well Completion or Recompletion Report (OGC-5) of Smith 1-22, 1021 FSL and 2913 FEL in sec. 22, T44N, R33W with permit number 20721, confidential for the maximum amount of time allowed which Osborn Energy deems confidential and proprietary information. Osborn Energy understands the Oil and Gas Council desires to obtain the confidential and proprietary information for the sole purpose of regulating the gas and oil industry.

Sincerely,

Steve Allee.
Osborn Energy, L.L.C.

Draft 037-20721

GEOLOGICAL REPORT

Updated: 2 December 2002

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Smith #1-22
273 FEL, 1071 FSL, SW/4
Section 22-T44N-R33W
Cass, Co. Missouri
OGC #20721
Elevation: 981 GL, 984 KB (Surveyed)
Drilling Contractor: Layne (Lic. #32999)
Spud: 6/08/2002
Surface: 13 3/4" bore hole, set 21' of 10.75" csg., cmt'd with 14 sx
Production bore hole: 7 7/8"
Core Hole Total Depth: 751'(750.6) on 6/10/2002
Rotary Total Depth: 764' on 6/11/02
Drilling fluid: water w/ polymer added
E-Log Total Depth: 751'
Production Csg.: 5 ½" 15.50#/ft., set at 765 feet, cmt'd with 110 sx.

Formation	E-Log Top	Datum	"Net" Pay
Stark Shale	23	961	See report
Bethany Falls Limestone	30	954	See report
Hushpuckney Shale	50	934	3.40
Base Kansas City	67	917	----
Mound City Shale Zone	67	917	3.00
"Upper" Knobtown Sand	71	913	0
"Middle" Knobtown Sand Zone	96	888	0
"Lower" Knobtown Sand Zone	160	824	0
Carbonaceous Zone in Tacket	178	806	1.10
"Big Lake" Sand	183	801	0
South Mound Zone	233	751	2.10
Hepler (Wayside) Sand	----	----	0
Carbonaceous Zone in Holdenville	247	737	1.30
"Upper" Mulberry Zone	266	718	0
Mulberry Zone	274	710	1.30
Laberdie Limestone	280	704	0
Weiser Sand	292	692	5.00
Anna Shale (Lexington Coal Zone)	319	665	3.85
Peru Sand	345	637	4.00
Summit Shale Zone	----	----	0
Mulky Coal/Shale Zone	396	615	4.60
"Upper" Squirrel Sand Zone	376	608	0
"Middle Squirrel Sand Zone	397	587	0
"Lower" Squirrel Sand	431	553	0

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Bevier Coal Zone	----	----	0
Croweburg Zone(s)	481	503	.90
Fleming Coal Zone	----	----	0
Mineral Coal Zone	511	473	1.50
Scammon Coal Zone	518	466	1.90
Tebo Coal Zone	548	436	2.70
Bartlesville "A" Sand Zone	561	423	0
The "Un-named" Zone	592	392	1.25
Bartlesville "B" Sand Zone	608	376	0
Dry Wood Coal Zone	631	353	1.00
Bartlesville "C" Sand	645	339	0
Rowe Coal Zone	----	----	0
"Upper" Neutral Coal Zone	686	298	3.55
"Lower" Neutral Coal Zone	----	----	0
"Neutral" (Mystery) Shale Zone	----	----	0
"E" Sand	----	----	0
"F" Sand	----	----	0
"G" Sand	----	----	0
Riverton Coal Zone	709	275	1.40
Mississippian (Core depth, not log'd)	740	244	0
Core Hole Total Depth	751	233	----
E-Log Total Depth	751	233	----
Rotary Total Depth	764		----

Major Zones of Interest (Depths correct to the Open Hole E-Log measurements)

Note: The following bulk densities (as per Mohajir Engineering Group, Inc.) were used to calculate "net" pay for carbonaceous zones.

2.00 to 2.40 g/cc for shale
1.75 to 2.00 g/cc for "coaly shale"
1.75 g/cc or less for coal

** Lithology based on core report.

** Depths rounded off to the nearest foot.

Stark Shale. 23-26. The Stark lies close to the surface, so subsequently was drilled through for the purpose of setting surface casing. No drill cuttings were collected for examination, but believed to be to shallow for commercial gas production.

Bethany Falls Limestone. 30-33. Limestone, light gray, trace gray chert, vertical fractured, scattered pinpoint vugs to marble size holes, faint to weak odor, no fluorescence, abundant hydrocarbon residue in cavities and along fracture planes.

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Bethany Falls Limestone continued.

33-37. Limestone appeared off white to very light gray with abundant dark gray spots on core face. When sample examined with microscope, was brown, very dolomitic and primarily consisted of oolitic and biomoldic casts in a microcrystalline calcareous matrix. Has excellent intercrystalline, oolicastic and biomoldic porosity, showed excellent hydrocarbon staining, and contained very good to excellent shows of hydrocarbon residue (tarry in part), no shows of "live" oil.

The average water saturation is 37%. Although the water saturation is relative low, because of the depth and lack of free "live" oil, it is not recommended that this zone be further tested. When drilling further in to the Forrest City Basin, where the Bethany Falls is deeper, drill cuttings should be collected for microscopic examination.

Hushpuckney Shale. 50-52. Shale, mottled dark grays.

52-54. Shale, very dark gray and black, no shows.

54-56. Shale, black to very dark black (if there is such a color), carbonaceous, pyritic, and no apparent shows of free gas. Log shows 3.40 feet of net shale and the core contained 3.8 feet of this black shale. Maybe to shallow of depth for commercial production, so should be questionable for further testing.

Mound City Shale. 67-71. Shale, medium gray, calcareous, fossiliferous, trace black pyritic shale, trace gray, soft, gummy shale, trace coal (.30 feet core), micro to macro fractured with secondary crystalline growth of light pink colored gypsum, no shows of free gas were observed, and trace olive-gray-brown gummy shale with scattered carbonaceous fragments. Log indicates 3.0 feet of net shale, but due to the depth again, is questionable for further testing for gas.

"Upper" Knobtown Sand Zone. 71-75. Conglomerate, consisting of pale green shale, reworked limestone and macro-size fossil fragments.

75-79. Shale, pale green, with intermittent, silty and sandy lamina. No gross or net sand and no shows were found.

"Middle" Knobtown Sand Zone. 96-102. Poorly developed, consisted of intermittent shale, silty shale, and sandy shale lamina.

"Lower" Knobtown Sand Zone. 160-177. Poorly developed, consisted of intermittent gray shale, silty and sandy gray shale, scattered silty to sandy lamina, and contained no gross or net sand.

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Carbonaceous Zone in the Tacket Formation. 178-180. Shale, very dark gray to black with no shows, "coaly shale", fractured in part, trace pyrite, no visible shows of free gas, trace gray gummy to clayish shale with scattered carbonaceous fragments. Core contained .20 feet of the black shale and .20 feet of the "coaly shale". Log indicates 1.10 feet of total net shale.

"Big Lake" Sandstone. 183-200. Shale, pale green, abundant pale green to light tan siltstone lamina and thin sandstone lens. Light tan sandstone lens had weak to fair odor, showed very dull fluorescence, contained poor to fair hydrocarbon staining, a "sheen" show of free oil, and a few scattered gas bubbles were noted.

The core contained 14.5 feet of the laminated material above. Because this section is so laminated or "broken", it is difficult to determine total gross sand thickness, but is estimated to be 5.10 feet. The average water saturation is 51%. Does not merit further testing at this time.

South Mound Shale. 233-236. Shale, black, carbonaceous, no show, "coaly shale", fractured, trace conchoidal fracturing on some surfaces, trace pyrite, and exhibited fair show of free gas. Core contained 1.60 feet of the black shale and 1.40 feet of the "coaly shale". Log indicates 2.10 feet of net shale. Did not recognize or detect the presence of the "coaly shale" which occurs most of the time when using conventional style open hole logging equipment. The tools have a difficult time recording accurate bulk densities of slender carbonaceous zones.

Carbonaceous Zone in the Hepler Sand Zone, part of the Holdenville Shale Fm. 247-248. Coal and "coaly shale", highly fractured and very crumbly (may be due in part to the hydraulics of coring), no shows of free gas reported. Core contained .30 feet of this coal. The log indicates 1.30 feet of net pay, .90 feet of shale and .70 feet of "coaly shale".

"Upper" Mulberry Zone. 266-268. No carbonaceous material, no shows, and no net pay.

Mulberry Coal Zone. 274-280. Shale, medium gray, trace "coaly shale" (.60 feet core), with fair show of free gas, abundant gray-green, green-gray shale, calcareous in part. Log shows a small wash out. Washouts affect the bulk density readings by fabricating a false and or thicker carbonaceous zone. Omitting the washout, the log indicates 1.30 feet of total net shale.

Weiser Sand. 292-298. Sandstone, light tan, fine grain, sub-angular to angular, poorly sorted, well consolidated, semi-firm, fair with trace fair intergranular porosity, trace shaly, micaceous, scattered very thin silty and shaly lamina, very-very dull fluorescence, good to strong odor, fair to good shows of dark brown free oil. Core contained 6.7 feet of this sand. Log shows between 5 and 6 feet of gross, 5 feet net, and the average water saturation is 34%.

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Anna Shale (Lexington Coal Zone). 319-322. Shale, black, carbonaceous, no show, coal and "coaly shale", fractured, secondary crystal growth, fair to good show of free gas. Core contained 2.60 feet of the black shale and 2.50 feet of coal and "coaly shale". Log indicates 3.85 feet of net pay, composed of 2.15 feet of shale, 1.25 feet on "coaly shale", and .45 feet of coal.

Peru Sand. 347-362. Sandstone, gray, tan, fine grain, angular, poorly sorted, trace moderately sorted, firm to very dense, mostly poor to very poor porosity, trace fair intergranular porosity, calcareous, no visible show of hydrocarbons.

Core contained 12.8 feet of the sand. Log shows between 11 and 12 feet of gross sand, 3 to 4 feet of possible net sand (sand that contained water saturations below 36%), and the average water saturation is 45%. One might consider calling this the "Lower" Peru Sand because, normally, the Peru is found at the base of the Anna Shale (Lexington Coal Zone) or within 5 +/- feet. In this case, the sand has developed 25 feet below. Will need to do additional geological work to confirm if it is a separate sand.

Summit Shale Zone. Eroded away or never developed.

Mulky Coal/Shale Zone. 369-374. Coal, fractured in part, trace pyritic, good to very good shows of free gas, shale, black, carbonaceous, no shows of free gas reported. Core contained 4 feet of coal and .6 feet of the black shale. Log indicates 4.60 feet of net pay, consisting of 1.80 feet of shale, .70 feet of "coaly shale", and 2.10 feet of coal.

"Upper" Squirrel Sand Zone. 376-397. Log shows a poorly developed zone consisting of intermittent shale, silty shale, sandy shale, silty to sandy lamina, and no gross or net sand. The core contained gray shale with 9 feet of gray, fine grain, argillaceous, cross-bedded, sandstone, and contained no shows.

"Middle" Squirrel Sand Zone. 397-431. Log indicates a zone as above. The core contained same type of shale along with silty shale, and 6 feet of very shaly sand. No shows were reported.

"Lower" Squirrel Sand. 431-435. Sandstone, tan, very calcareous, very poor intergranular porosity, no shows.

435-442. Sandstone, grayish-tan, fine grain, poor trace fair porosity, and exhibited scattered shows of free gas. Footage contains 11 feet of gross sand, no net, and the average water saturation is 58%.

444-454. Sandstone, tan, fine grain, alternating thin lamina and lens of the sandstone and gray shale, and no shows reported. Footage contains 8 feet of gross, laminated sand, no net, and the average water saturation is 57%.

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"Lower" Squirrel Sand continued.

457-462. Sandstone, tan, fine grain, poor to fair intergranular porosity, scattered gray shale lamina, and contains no shows. Footage contained 5 feet of gross sand; no net, and the average water saturation is 52%.

469-480. Sandstone, tan, fine grain, micaceous, poor-to-fair intergranular porosity, fair to good odor, and had a "sheen" show of oil to spotty bleeding of free oil on core face. Footage contains 10 feet of gross sand, no net, and the average water saturation is 54%.

Note: Based on shale breaks, the "Lower" Squirrel is divided into 4 separate sand sections with a combined total of 34 feet of gross sand and an overall average water saturation of 56%. Cannot recommend further testing at this time.

Bevier Coal Zone & Verdigris (Ardmore) Limestone. Not present, possible incised by the "Lower" Squirrel or never developed.

Croweburg Zone(s):

Shale Zone. 481-490. The Croweburg Shale, which is typically black and carbonaceous, is absent in the subject well. The gray-green and green-gray shale, that separates the shale and the coal from this black shale, is present.

Coal Zone. 490-493. Coal, fractured in part, trace pyritic, and displayed good to very good shows of free gas, shale, light gray, clayish, and gummy (under clay). Core contained .60 feet of coal. The log shows a large wash out again affecting the bulk density. Omitting this, there is .90 feet of net pay, .50 feet of shale and .40 feet of "coaly shale".

Mineral Coal Zone. 511-512+. Coal, and "coaly shale" with good shows of free gas. Core contained 1.50 feet of this carbonaceous material. Log indicates 1.50 feet of net pay, 1.00 feet of shale and .50 feet of "coaly shale".

Scammon Coal Zone. 518-520. Coal, fractured with secondary crystalline growth of gypsum, trace pyritic, fair shows of free gas, trace black carbonaceous shale with fair show of free gas. Core contained 1.50 feet of coal and .60 feet of the black shale. The log indicates 1.90 feet of net pay, composing of .60 feet of shale, .40 feet of "coaly shale", and .90 feet of coal.

Tebo Coal Zone. 548-550. Shale, dark gray grading to black with depth, dense, carbonaceous in part, and no shows reported.

550-553. Coal, good to excellent shows of free gas.

553-557. Shale dark gray and contained no show.

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Tebo Zone continued.

Core contained 4.70 feet of the first shale with no shows and 2.30 feet of the coal and "coaly shale". Log indicates 2.70 feet of net pay, consisting of .60 feet of shale, .45 feet of "coaly shale", and 1.65 feet of coal.

Note: There is a large wash out from 557-559 which the log signifies as being a net carbonaceous layer, but this footage consists of light greenish-gray crumbly shale and is subject or prone to washing out. This can be seen on numerous open hole well logs in the surrounding area and should not be mistaken for a carbonaceous zone when mapping or calculating reserves.

Bartlesville "A" Sand Zone. 561-592. Poorly developed, no gross sand (1 to 3 feet at most), no net, and no shows were recorded.

The "Un-named" Zone. 592-594. "Coaly shale", vertical fractured, weak shows of free gas reported on core face, and trace gray carbonaceous shale with no show. Core contained .50 feet of the "coaly shale" and 1.50 feet of the gray carbonaceous shale. Log shows 1.25 feet of net shale.

Bartlesville "B" Sand Zone. 608-631. Poorly developed, 3 to 4 feet of gross sand, no net, and no shows recorded.

Dry Wood Coal Zone. 631-633. "Coaly shale" with no apparent shows of free gas reported. Abundant light grayish tan sandstone also with no shows. Core contained .10 feet of "coaly shale", then 2 feet of the sand, followed by .20 feet of coaly shale" or a total of .30 feet of "coaly shale". The log shows 1-foot of net shale. Zone should be questionable for further testing at this time.

Bartlesville "C" Sand. 645-651. Sandstone, light gray, fine to coarse grain with depth, poor to fair intergranular porosity, intermittent silty-shaly lamina, trace very thin carbonaceous lamina with good shows of free gas along bedding planes, but no show found in sand.

654-658. Sandstone, light gray, fine grain, abundant thin lamina, micaceous, trace carbonaceous, and no shows reported.

"C" Sand contains 9 feet of gross sand, no net, and the average water saturation is 52%.

"Upper" Neutral Coal Zone. 686-690. ("Rowe" in some reports) Coal and "coaly shale", fractured, secondary crystalline growth of gypsum and or calcite in most fractures, pyritic, trace with silty or gritty texture, scattered parallel veined carbonaceous plant material, all exhibited very good to excellent shows of free gas, and trace very-very dark gray to black, pyritic shale containing no shows. Core contained 2.40 feet of this carbonaceous material. Log indicates 3.55 feet of net pay, consisting of .80 feet of shale, .40 feet of "coaly shale", and 2.35 feet of coal.

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Riverton Coal Zone. 709-710. Shale, black, very carbonaceous, trace fractured pyritic "coaly shale", and all contained good to very good shows of free gas.

715-716. "Coaly shale" and black very carbonaceous black shale with weak shows of free gas.

Core, of this Riverton Zone, contained two carbonaceous lens separated by a five foot shale. The upper layer contained .20 feet of the carbonaceous black shale and .10 feet of the "coaly" material. The bottom bed had .20 feet of the "coaly shale". The log indicates .80 feet in the top and .60 feet in the bottom, all net shale. Due to their thickness and distance between the two, it is questionable they should be further tested for commercial gas production.

Mississippian. 740-751 (Core TD). Conglomerate composed of varied shades of off white and gray chert in a pale green clay and or gray-green, light gray shale matrix, sandstone, brown, coarse grain, dense, vertical fractured, trace mudstone and or claystone, trace tripolitic chert.

751-764 (RTD). Core hole drilled deeper after reaming. No drill cuttings collected for examination.

** See Core Report for further details.

End Report.

_____

Rex R. Ashlock
Staff Geologist
Osborn Energy, L.L.C.

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Printed 8/15/02

CORE REPORT

Updated: 15 August 2002

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Smith # 1-22
1071 FSL, 273 FEL (SW/4)
Section 22-T44N-R33W
Cass Co., Missouri
OGC # 20721
Elevation: 981 GL, Surveyed
984 KB, measured 3' (3.3') above ground level

T. Stark SH @ 23'; LM

Basic lithology of the continuous core from the subject well. Coring began at 9:35 A.M., 6/09/02 at a depth of 27 feet and ended at a cored total depth of 751 feet, 4:40 P.M., 6/10/02. Footage based on Driller's Depths, which were taken from KB measurement.

27-29.3. Cement

29.3-32. Limestone, light gray, trace gray chert, vertical fractured in part, scattered pin-point to marble size vugs, abundant hydrocarbon residue in vugs and along fracture planes, very-very weak odor, no show of free oil. (Bethany Falls Limestone)

32-37. Limestone, core face appeared off white to very light gray with abundant dark gray spots. When examined with microscope, was brown, very dolomitic and primarily consisted of oolitic casts. Contained excellent oolicastic and inter-crystalline porosity had excellent stain, and a very good show of hydrocarbon residue (tarry in part). (Bethany Falls)

37-37.4. Limestone, light gray, dense, vertical fractured with ½-inch porosity zones paralleling the fractures and contained hydrocarbon residue. (Bethany Falls)

37.4-40.1. Limestone, mottled grays and tans, abundant gray chert nodules, scattered stylolites.

40.0-44.4. Limestone, light grays, dense, trace chert nodules, scattered algal and stylolite partings.

44.4-47. Limestone, light gray with hairline fractures about every .5 feet. Paralleling the fractures is ½ to ¾ inch porosity zones containing hydrocarbon residue.

47-50.6. Limestone, light grays, few scattered algal partings.

50.6-50.9. Shale very-very dark gray-black, no shows. (Hushpuckney Zone)

50.9-51.3 Shale, "mottled" dark grays. (Hushpuckney)

51.3-51.5. Shale, black, no shows. (Hushpuckney)

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51.5-53. Shale dark grays grading to black, no shows. (Hushpuckney)

53-54.9. Shale, black, trace pyritic, no shows of free gas. (Hushpuckney)

54.9-56.8. Shale, black to very "dark" black, carbonaceous, trace pyrite, no apparent shows on core face or visible shows when viewed with microscope. (Hushpuckney)

**Canned 55.2-56.2 (Hushpuckney)

56.8-57.2. Shale, dark gray, calcareous "limy", trace fossiliferous.

57.2-58.6. Limestone, grays, dense, with a couple of .2 feet shale parting at 57.8.

58.6-59.2. Shale very-very dark gray to black, fossiliferous -- crinoid and brachiopod fragments.

59.2-60.3. Shale, gray-green, green-gray.

60.3-61.3. Conglomerate: consisted of limestone and chert fragments with shale partings in part.

61.3-63.6. Limestone, grays, lithoclastic.

63.6-65. Limestone, gray, dense, very uniform microcrystalline.

65-66. Limestone with thinly bedded pale green shale partings.

66-67. Limestone, dense, but very-very shaly, abundant fossils.

67-67.2. Shale, dull green, very calcareous, very fossiliferous.

67.2-67.8. Limestone, grays, dense, hairline fractured, shaly in part.

67.8-68. Shale, medium gray, calcareous, fossiliferous.

68-68.6. Shale, black, pyritic, no show.

68.6-68.9. Shale, gray-green, grays "limy".

68.9-69.3. Shale, gray, gummy to clayish textured.

69.3-69.6. Coal, micro to macro fractured, fractures filled with light pinkish colored gypsum, no show of free gas. (Mound City)

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69.6-71.4. Shale, olive-gray-brown, gummy in part, scattered carbonaceous fragments, "under-clay".

71.4-72. Shale, gray.

72-75. Conglomerate: consisting of pale green shale, limestone and large fossil fragments.

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75-76. Shale, pale green silty.

76-77. Shale, pale green silty to sandy, scattered calcareous material.

77-81.7. Shale, pale green, silty, scattered limestone streaks

81.7-87. Shale, medium, scattered "worm" burrows with pyrite.

87-90. Shale, medium gray with scattered large Calamites and Cordites fragments.

90-91. Shale, gray.

91-97. Shale, gray, silty.

97-100.3. Sandstone, very light gray, with abundant featheredge, dark gray, silty shaly lamina. Two ¾ inch burrows were found extending the full length of this footage. ("Middle" Knobtown Sand Zone)

100.3-100.9. Sandstone light gray, no show. ("Mid." Knobtown)

100.9-104.6. Siltstone, medium gray, scattered sandy to shaly lamina and lenses. A .9 feet dense, limestone bed was found at 102.

104.6-107. Shale, very silty to sandy.

107-117. Shale, gray, silty to very silty, few scattered sandy lamina, micaceous along bedding planes. Silt decreases with depth.

117-127. Shale, gray, silty.

127-137. Shale gray, trace silty, trace fossil fragments.

137-159.3. Shale, gray, trace silty.

159.3-161.7. Shale, gray, "banded"

161.7-167. Shale, medium gray, scattered siltstone and sandy lamina and lens. ("Lower" Knobtown Zone)

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167-175.3. Shale, gray, calcareous and fossiliferous in part.

175.3-175.8. Shale, very dark gray to black, very calcareous, fossiliferous, trace carbonaceous, no shows.

175.8-177. Shale, gray, scattered carbonaceous fragments.

177-178.8. Shale, gray, "gummy".

178.8-179. Shale, very dark gray to black, no show.

179-179.2. "Coaly shale" fractured in part, trace pyrite, no visible shows of free gas on core face. (Carbonaceous zone located above the "Big Lake" Sand Zone, part of the Tacket Formation)

179.2-181. Shale, gray, gummy to clayish textured, trace carbonaceous fragments. (Zone as above)

181-183.4. Shale, light to dull gray-green, green-gray.

183.4-187. Shale, pale green, silty to sandy with intermittent light tan, silty to sandy lamina containing poor to fair hydrocarbon staining, fair odor, no show of free oil or bleeding on core face. ("Big Lake" Sand Zone)

187-197.9. Siltstone, pale green with scattered 3-inch, very light tan, shaly sand lens. These "wispy" looking lenses had weak to fair odor, fair stain, dull fluorescence, "sheen" of free oil, and scattered gas bubbles. ("Big Lake")

197.9-201. Siltstone as above, but lens grade to lamina thickness.

201-202.7. Shale, pale green.

202.7-207.6. Shale, gray, trace slightly silty.

207.6-215.9. Shale, gray with featheredge silty lamina.

215.9-233. Shale, gray.

233-234.6. Shale, black, carbonaceous, no visible show of free gas on core face. (South Mound Zone)

234.6-236. "Coaly shale", fractured, trace conchoidal fracturing, trace pyrite, fair show of free gas. (South Mound)

**Canned 235-236.

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236-245. Shale, gray, few scattered sandy-silty lamina.

245-247. Shale dark gray.

247-248. Shale, gray.

248-248.3. "Coaly shale" and coal, very crumbly and broken, no show of free gas reported, not canned, but placed in zip-lock bag. (A non-contiguous carbonaceous zone, which, when present, occurs in the Hepler {Wayside} Sand Zone, maybe part of the Holdenville Shale or Seminole Formation, no name assigned.)

248.3-255. Shale, gray-green, sandy.

255-261.2. Shale, gray-green.

261.2-266.6. Limestone, gray-tan, fine crystalline, scattered shale partings. Shale has a waxy texture.

266.6-267.5. Shale, pale gray-green.

267.5-269.7. Shale, dark gray with sandstone lens, no shows.

269.7-270.5. Limestone, gray-tan, fine crystalline, argillaceous.

270.5-274.6. Shale, gray-green, fossiliferous.

274.6-275.4. Limestone, dark gray-tan, trace carbonaceous, slight hydrocarbon odor, no show of free gas, oil, or stain.

275.4-275.6. Shale, medium gray. (Mulberry Zone)

275.6-276. "Coaly shale", fair show of free gas, not canned, placed in zip lock bag. (Mulberry Coal)

276-280. Shale, gray-green, green-gray, scattered indurated calcareous material.

280-281. Limestone, very shaly.

281-291. Limestone, gray-tan, dense.

291-292.3. Shale, grays, sandy.

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292.3-295. Sandstone, light tan, fine grain, sub-angular to angular, poorly sorted, well consolidated, semi-firm, fair trace good intergranular porosity, trace shaly, micaceous, good odor, very-very dull fluorescence, fair to good show of dark brown oil, with good uniform stain and slight bleed on core face. (Weiser Sand Zone)

295-299. Sandstone as above, stronger odor and increase stain. (Weiser Ss)

299-305. Shale, gray, silty, scattered dark gray shale lamina.

305-313.5. Shale, gray, fissile, intermittent very fine grain sandstone lamina.

313.5-315. Lost

315-318.4. Limestone, mottled browns, fine crystalline, dense, slightly dolomitic, fossiliferous. (Myrick Station)

318.4-320.5. Shale, black, carbonaceous, no show of free gas reported on core face. (Anna Shale, Lexington Coal Zone)

320.5-321.5. Coal and "coaly shale", fractured, secondary crystal growth, fair to good show of free gas on core face. (Lexington)

321.5-322. Shale, black, carbonaceous, no show of free gas noted in field notes. (Lexington)

322-323.5. Coal and "coaly shale", good show of free gas. (Lexington)

**Canned 322.5-323.5, 321.5-322.5, and 320.5-321.5

323.5-325. Lost

325-330. Shale, gray-green with carbonaceous shale lamina.

330-331.5. Shale, gray, sandy.

331.5-335. Shale, gray with thin sandstone lamina.

335-337. Shale, gray-green.

337-347. "Banded" shale, intermittent tan, calcareous, dense sandstone, and medium gray shale. ("Banded" shale is a general term used to describe a shale that consists of lens that are evenly spaced, fairly uniform in thickness, alternate in color and or texture, and are thicker than lamina.)

347-349. Sandstone, gray, calcareous, tight, no shows. (Peru Sand Zone)

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349-351.5. Sandstone, tan, fine grain, fair porosity, no shows. (Peru)

351.5-352.7. Sandstone, gray, very calcareous, no shows. (Peru)

352.7-353.4. Sandstone, tan, fine grain, fair porosity, no shows. (Peru)

353.4-355. Sandstone, gray, calcareous, tight, no shows. (Peru)

355-357. Sandstone, tan, poor porosity, tight, no shows. (Peru)

357-359.8. Sandstone, tan, fine grain, calcareous, fair porosity, and no shows. (Peru)

** Summit Zone. Not developed or has been eroded away.

359.8-370. Limestone, gray-black, very fossiliferous, "salt & pepper" appearance. Described as a fossil "hash" in shale matrix. Looked like a coquinoid limestone, but shaly.

370-373.4. Coal, fractured in part, good to very good show of free gas. (Mulky Zone) } Poss. Summit & Not Mulky

373.4-374. Shale, black, carbonaceous, no show of free gas reported. (Mulky)

374-374.6. Coal, fractured in part, trace pyritic, good to very good show of free gas. (Mulky)

**Canned 370-371, 371-372, and 372-373.

374.6-375.5. Shale, dark grays, no shows reported.

375.5-377. Shale grays.

377-386. Sandstone, gray, fine grain, argillaceous, cross-bedded in part, no visible porosity, and no shows. ("Upper" Squirrel Sand Zone)

386-396. Shale, light gray, slightly silty to sandy.

396-402. Sandstone, gray, fine grain, very shaly, tight, and no shows. ("Middle" Squirrel Sand.)

402-406. Shale, gray.

406-415. Shale, gray with thin sandstone lamina.

415-425. Shale, gray, slightly silty.

425-431.5. Shale, gray.

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Gas Count

431.5-435. Sandstone, tan, very calcareous, tight, no shows. ("Lower" Squirrel Sand)

435-442. Sandstone, grayish-tan, fine grain, mostly poor porosity-tight, trace scattered shows of "popping" free gas. ("Low." Sq.)

442-447. Sandstone, tan, fine grain, few small gas bubbles, scattered thin black shale partings. ("Low." Sq.)

447-455. Sandstone, tan, fine grain, tight, no visible shows of free gas on core face. ("Low." Sq.)

455-457. Alternating thin beds or lens of tan sandstone and medium gray shale, no shows in sandstone. ("Low". Sq.)

457-462. Sandstone, tan, fine grain, firm, poor to very poor porosity, no shows. ("Low." Sq.)

462-465. Shale with scattered sandstone lamina and thin lenses, no shows. ("Low." Sq.)

465-467. Shale, gray.

467-469. Alternating thin beds of sandstone and shale, no shows in sand.

469-473. Sandstone, tan, fine grain, micaceous, and rainbow show of oil on core face. ("Low." Sq.)

473-477. Sandstone, tan, fine grain, spotty bleed of oil on core face. ("Low." Sq.)

477-481. Sandstone, tan, fine grain, bleeding and had shows of "popping" gas. ("Low." Sq.)

** No apparent Bevier Coal Zone or Verdigris Limestone.

481-481.5. Shale, gray-green with indurated calcareous material.

481.5-487. Shale, gray-green, green-gray.

487-490. Shale, gray, soft, clayish.

490-490.6. Coal, fractured in part, trace pyritic, with good to very good show of free gas on core face. (Croweburg Zone)

** Canned 490-490.6

490.6-502. Shale, light gray, soft, clayish.

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502-502.3. Shale, dark gray to black.

502.3-503.9. Shale, gray, soft.

503.9-506. Not recorded, lost?

506-510. Shale, gray.

510-511.5. Coal, "coaly shale", good show of free gas on core face, "popping". (Mineral Zone)

** Canned 510-511

511.5-517. Shale, medium gray, soft, clayish.

517-519.5. Shale gray with black carbonaceous shale streaks, no shows reported.

519.5-521. Coal, fractured, secondary crystal growth, trace pyritic, "popping" gas. (Scammon Zone)

521-521.6 Shale, black, carbonaceous, "popping" gas. (Scammon)

** Canned 519.7-520.7

521.6-527. Shale, gray, and silty.

527-532. Shale, light gray with limestone inclusions.

532-534. Shale, medium gray.

534-536. Lost.

536-543. Shale, dark gray to black, no shows.

543-546. Lost.

546-550.7. Shale, dark gray to black, dense, conchoidal fracture, no show of free gas. (Tebo Zone)

550.7-553. Coal, good to excellent show of free gas, "bubbling". (Tebo)

** Canned 551-552 and 552-553

553-557. Shale, dark gray. (Tebo)

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557-559.7. Shale, light grayish green, crumbly and broken up.

559.7-561.4. Shale, very dark gray to black, carbonaceous in part, no show of free gas.

561.4-561.6. Sandstone, brown, calcareous, no show. (Bartlesville "A" Sand Zone)

561.6-561.9. Shale, black with dull green shale lamina.

561.9-562.2. Alternating lamina of shale and sandstone as above.

562.2-567. Shale, very-very dark grays, trace black, carbonaceous in part, no shows.

567-567.4. Shale, black, no shows.

567.4-568.4. Shale, gray, very silty to sandy.

568.4-570. Shale, very-very dark gray, trace large carbonaceous plant fragments that have pyrite filled veins in part.

570-570.4. Shale, very dark gray with mudstone lamina and mudstone nodules.

570.4-572.7. Shale, "banded" very-very dark grays and tan.

572.7-575.1. Shale, very-very dark gray, trace carbonaceous, no show.

575.1-577. Shale, very-very dark gray with tan mudstone lamina, mudstone nodules, and a couple of very calcareous, 2-inch lens containing abundant fossil fragments.

577-578.2. Shale, very-very dark gray, trace silty lamina, trace mudstone nodules.

578.2-578.9. Shale as above with abundant featheredge silty lamina.

578.9-580. Shale very dark gray, pyritic and carbonaceous, no shows.

580-580.4. Shale, light gray with dark gray shale lamina.

580.4-581.1. Shale, very dark gray with mudstone lens.

581.1-581.2. Shale, very thinly laminated.

581.2-581.5. Shale, very dark gray.

581.5-582.4. Siltstone, very pale greenish-gray.

582.4-584.4. Shale, olive green with "stringy" calcareous material.

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584.4-584.6. Shale, gray, very dense.

584.6-586.2. Sandstone, tan, dense, vertical fractured with chalcedony in fractures, calcareous in part, no shows.

586.2-587. Shale, gray.

587-589.4. Shale, gray, trace slickenside.

589.4-589.5. Shale, black, carbonaceous, no show.

589.5-591. Shale, gray, slickenside.

591-592.2. Shale, gray, intermittent featheredge lamina.

592.2-592.7. "Coaly shale", vertical fractured, weak show of free gas on core face. To thin to can, placed in zip lock bag. (The "Un-named" Zone)

592.7-594.2. Shale, gray, carbonaceous in part.

594.2-595. Shale, gray, silty to sandy.

595-597. Shale, gray.

597-607. Shale, very-very dark gray, pyritic and carbonaceous in part.

607-607.2. Shale, black, carbonaceous, no shows.

607.2-612.3. Shale, light gray with scattered "wispy" stringers of fine to coarse grain size siderite nodules and sandstone. (Bartlesville "B" Sand Zone)

612.3-617. Shale, thinly laminated shades of grays and dull gray-greens. Shale becomes silty with depth.

617- 617.7. Shale, pale to dull greens, silty, laminated.

617.7-618.6. Shale, gray-green.

618.6-619.6. Shale, gray, gray-green, trace lamina.

619.6-619.7. Sandstone, brown, dense, no shows.

619.7-620.5. Shale, very sandy, laminated in part.

620.5-621.8. Shale, grays, silty, and laminated.

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621.8-622. Sandstone, rust-red-brown, medium grain, tight, no shows.

622-623. Shale, gray-green, carbonaceous in part, laminated.

623-623.3. Sandstone, rust-brown, medium grain, tight, no shows.

623.3-623.9. Shale, gray-green laminated.

623.9-624. Sandstone, rust-brown, no show. The rust-brown color due to abundant medium grain size siderite nodules.

624-625.6. Sandstone, gray, carbonaceous and laminated.

625.6-626. Shale, very-very sandy, carbonaceous, no show.

626-626.3. Shale, brown.

626.3-627. Shale, light gray-green, trace slickenside.

627-627.7. Shale, gray.

627.7-628.2. Sandstone, rust-brown, abundant medium grain size siderite nodules.

628.2-628.7. Shale, very sandy.

628.7-629.2. Consolidated siderite nodules, fine grain size, looks like sandstone lamina.

629.2-629.5. Shale, gray-green, silty to sandy.

629.5-630.1. Shale, olive green.

630.1-630.2. "Coaly shale", no show, to small to can. Placed in zip lock bag. (Dry Wood Zone)

630.2-632.5. Sandstone, light grayish tan, no show.

632.5-632.7. "Coaly shale" with no shows of free gas. (Dry Wood)

632.7-634.2. Shale, beige-green, crumbly.

634.2-634.9. Shale, gray-green, crumbly.

634.9-635.9. Shale, olive green, very sandy, trace carbonaceous, no shows.

635.9-637. Shale, gray-green, green-gray, silty to sandy.

637-639.8. Sandstone with intermittent dark gray shaly lamina. (Bartlesville "C" Sand Zone)

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639.8-641.3. Shale, dark gray, very sandy, laminated in part. Some lamina had a "swirled" appearance due to differential compaction.

641.3-641.5. Sandstone, light gray, no show.

641.5-642.1. Thinly laminated light gray sandstone and dark gray shale, cross-bedded at a 30-degree angle.

642.1-642.7. Shale, dark gray with sandy lamina.

642.7-643. Sandstone, laminated and cross-bedded.

643-643.4. Shale, dark gray, silty.

643.4-644. Sandstone, light gray, few black shale streaks.

644-644.3. Shale, very dark gray.

644.3-644.5. Sandstone, very finely laminated.

644.5-644.55. Coal, about a ½ inch, trace show of free gas. Not canned, to thin. (Very local thin coal seam)

644.55-647. Sandstone, intermittent hairline to featheredge lamina, with a dark gray to black shale lens at 646.4, no shows. (Bartlesville "C" Sand)

647-647.6. Sandstone, light gray, no show. ("C" Ss)

647.6-647.8. Shale, dark gray.

647.8-649.2. Sandstone light gray, coarse grain, scattered chunks of carbonaceous material, occasional gas bubbles. ("C" Ss)

649.2-649.7. Sandstone as above with abundant, very thin, "coaly shale" and coal lamina having good shows of free gas, micaceous along bedding planes. ("C" Ss)

649.7-654.7. Alternating sandstone, siltstone, silty shale, and shale lamina, "tidalites", no shows. ("C" Ss)

654.7-657. Sandstone, light gray with scattered "wispy" silty-shaly lamina, no shows. ("C' Ss)

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657-658.2. Sandstone, light gray, intermittent hairline to featheredge lamina, carbonaceous and micaceous, trace mudstone, no shows. ("C" Ss)

658.2-659. Sandstone as above with an increase in laminations, no shows. ("C" Ss)

659-667. Sandstone, light gray, "tiger stripe" laminated. ("Tiger striped" is a general term applied to thinly bedded, interlocking and or overlapping wedge-shaped lamina that has the appearance of tiger stripes. Similar to "flaser" structures.) ("C" Ss)

667-668.7. Shale, very dark gray, laminated in part, trace tiger stripe lamina.

668.7-668.9. Sandstone, gray, and brown.

668.9-677. Tiger striped lamina. Sandstone lamina becomes thinner and the shale lamina becomes thicker with depth, micaceous and carbonaceous along bedding planes.

677-679.1. Shale, very-very dark gray, pyritic, scattered .125 to .75 inch silty lens.

679.1-679.3. Conglomerate, consisting of limestone rubble, varied colored shale and silty shale.

679.3-680.6. Shale, black (darker than the usual black shale), scattered very thin lamina, no show.

680.6-681.1. Shale, very dark gray, laminated in part.

681.1-681.2. Sandstone, tans, very shaly, no show.

681.2-681.7. Shale, very dark gray to black, no shows.

681.7-683.4. Shale, very thinly laminated dark and medium grays.

683.4-685.3. Shale, very-very dark gray with intermittent featheredge lamina.

685.3-687. Shale, very-very dark gray grading to black, pyritic, no show of free gas.

** Canned 686.3-687.1. No gas had desorbed after 3+ hours, so removed and placed in core box.

687-688.8. Coal, fractured, secondary crystal growth of calcite/gypsum, pyritic in part, very good to excellent show of free gas on core face. ("Upper" Neutral Coal Zone)

688.8-689.4. Coal and "coaly shale", fractured, pyritic, trace silty textured, scattered parallel veined plant material, very good to excellent show of free gas on core face, "sizzling" when view with microscope. ("Up." Neutral)

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** Canned 687-687.9 and 687.9-688.9.

689.4-693.5. Shale, gray, very "crumbly" top 1.5 feet.

693.5-696.9. Shale, gray, very sandy.

696.9-697. Shale, gray.

697-697.9. Shale, gray, and very sandy.

697.9-701. Sandstone, gray, very silty, with 2, 1 ½" tan, sandstone lens with abundant, medium grain size siderite nodules.

701-702.5. Sandstone, light gray, gray, with thin silty, shaly, scattered lamina, no show.

702.5-705.6. Shale, gray, very sandy.

705.6-706.5. Conglomerate containing large carbonaceous plant fragments. Scattered shows of free gas where carbonaceous.

706.5-708.7. Shale, very dark gray, carbonaceous, no show of free gas, trace mudstone.

708.7-708.9. Shale, black, very carbonaceous, trace show of free gas. (Riverton Coal Zone)

708.9-709. Coal and "coaly shale", fractured, trace pyritic, good to very good shows of free gas. (Riverton)

** 708.7-709 was too thin to can.

709-711.1. Shale, dull olive green, waxy textured and clayish in part, grading to very dark gray.

711.1-715.2. Shale, very dark gray to black with featheredge lamina, no shows.

715.2-715.4. "Coaly shale" and very carbonaceous black shale, weak shows of free gas, to thin to can. (Riverton)

715.4-716. Shale, dark gray.

716-717. Shale, gray with abundant algal material and trace chalcedony.

717-721.1. Siltstone, pale green, scattered shaly lamina, few fractures with slickenside.

721.1-721.5. Shale, dull green-grays, waxy textured.

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721.5-722.9. Shale, drab olive green with a few carbonaceous streaks.

722.9-723.4. Shale as above with a slight increase in carbonaceous material.

723.4-727. Shale, very dark gray, fractured in part, slickenside along fracture planes.

727-730.5. Shale, very dark gray to black, no shows.

730.5-730.7. Shale, somewhat of flat-dull dark gray.

730.7-730.9. Shale, very dark gray to black, trace tan mudstone and claystone.

730.9-733.3. Shale, very dark gray to black, trace pyrite nodules, no shows.

733.3-733.4. Shale, as above with tan claystone.

733.4-737. Shale, olive-gray brown with scattered .4 to .6 silty-sandy lenses, fractured in part and slickenside along fracture planes.

737-737.9. Sandstone, medium brown, medium grain, dense, no shows.

737.9-738.6. Shale, light gray, very crumbly.

738.6-740.2. Shale, very dark gray.

740.2-740.6. Conglomerate, consisted of weathered chert in clay matrix, poorly consolidated, crumbly. (Mississippian)

740.6-742. Conglomerate, consisted of: sandy shale, chert fragments, shale, clay, with pale green silty streaks throughout, very well consolidated, dense. (Miss.)

742-742.4. Chert, light to medium gray (large nodule). (Miss.)

742.4-743.4. Chert, browns, tripolitic, trace shaly, silty, and sandy. (Miss.)

743.4-747. Conglomeratic pale green clayish shale and sandstones, dense. (Miss.)

747-749.5. Conglomeratic brown tripolitic chert and brown sandstone, vertical fractured, dense. (Miss.)

749.5-749.6. Conglomerate as above with abundant silty-shaly fine lamina. (Miss.)

749.6-750. Conglomeratic brown sandstone and tripolitic chert. (Miss.)

750-750.6. Shale, very pale green, clayish. (Miss.)

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750.6-751, (core total depth). Chert, brown, tripolitic. (Miss.)

** The weathered material, from 740.2 to 751, is thought to be "fill" within a solution cavity along a joint.

End of Core

** Patrick E. G. Morgan, Rolland Yoakum, Dean E. Seeber and Rex R. Ashlock examined and described the core from the subject well.

** After coring, the subject well was reamed with a 7 7/8" bit to the original cored total depth of 751 feet. An additional 13 feet of new hole was drilled, making a rotary total depth of 764 feet. No drill cuttings were examined from this 13-foot interval.

End Report.

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Rex R. Ashlock
Staff Geologist
Osborn Energy, L.L.C.

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Smith #1-22

** The Kansas Geological Survey, collected coal and black shale samples from the subject well and placed same in canisters for the purpose of gas desorbtion. The following is a preliminary report as of June 14, 2002.

Formation	Footage Canned	Results
Stark Shale	-----	-----
Hushpuckney Shale	-----	-----
South Mound Shale Zone	235-236	
"Upper" Mulberry	-----	-----
Mulberry Coal Zone	-----	-----
Anna Shale (Lexington Coal Zone)	320.5-321.5	
Anna Shale (Lexington Coal Zone)	321.5-322.5	
Summit Shale Zone	-----	-----
Mulky Coal/Shale Zone	370-371	
Mulky Coal/Shale Zone	371-372	
Croweburg Shale Zone	-----	-----
Croweburg Coal Zone	490-490.6	
Mineral Coal Zone	510-511	
Scammon Coal Zone	519.7-520.7	
Tebo Coal Zone	551-552	
Tebo Coal Zone	552-553	
"Un-named" Zone	-----	-----
Dry Wood Coal Zone	-----	-----
Rowe Zone	-----	-----
"Upper" Neutral Coal Zone	687-687.9	
"Upper" Neutral Coal Zone	687.9-688.9	
"Lower" Neutral Coal Zone	-----	-----
Riverton Coal Zone	-----	-----