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KANSAS GEOLOGICAL SOCIETY

BULLETIN

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Orvie Howell

Tom Robinson

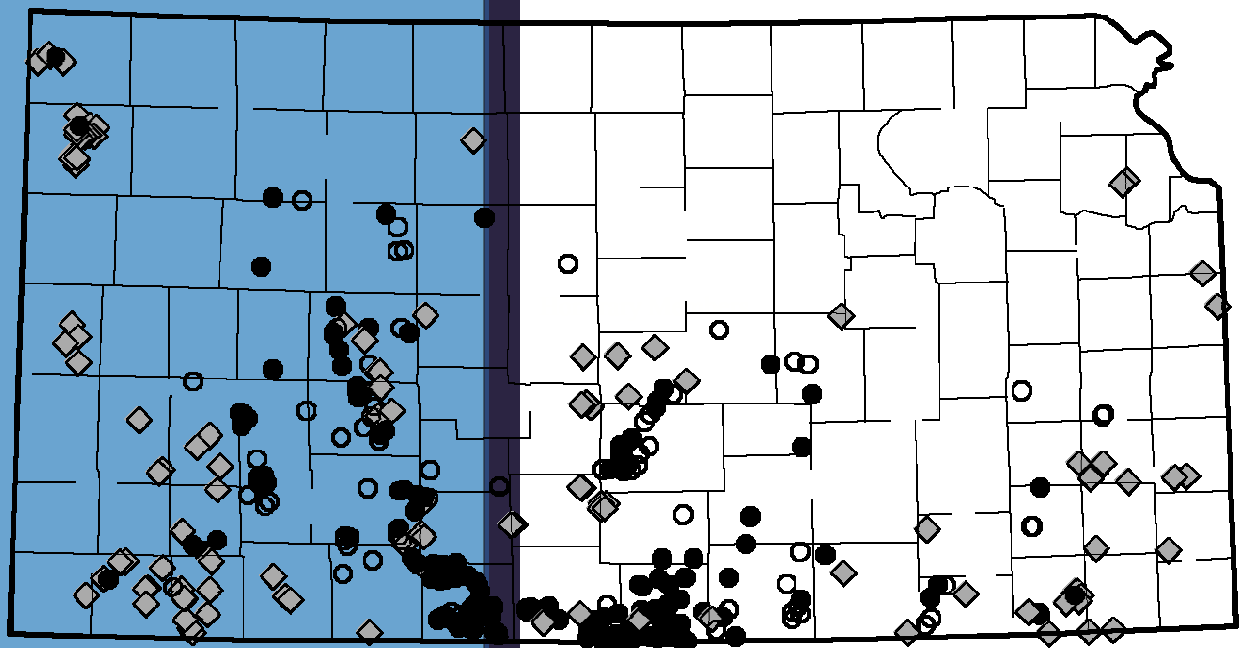
James Thompson

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**“An Overview and Preliminary
Economic Assessment of Horizontal
Wells Drilled in the Mississippian
Limestone Play in Kansas,
2010-2012”**

Newell, Watney, & Gerlach

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- ◆ Horizontal well drilled before Jan. 01, 2010

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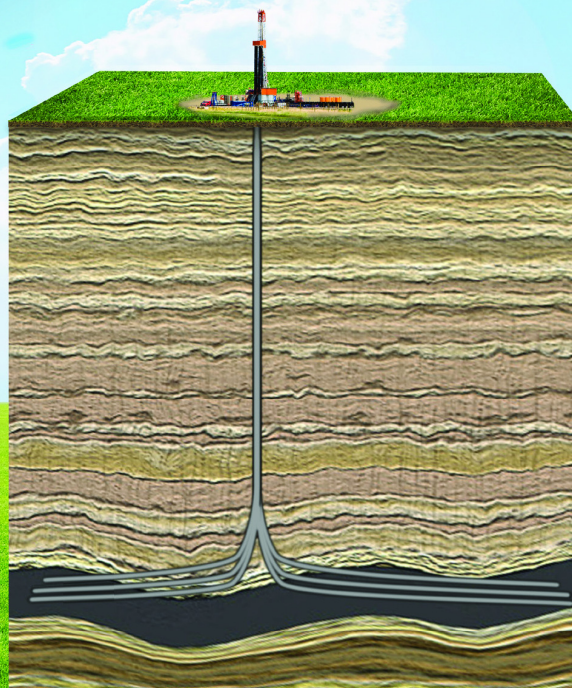
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A paper on horizontal drilling in Kansas:
"An Overview and Preliminary Economic Assessment of Horizontal Wells
Drilled in the Mississippian Limestone Play in Kansas, 2010-2012"

Newell, Watney, & Gerlach

CALL FOR PAPERS

The Kansas Geological Society Bulletin, which is published bimonthly both in hard-copy and electronic format, seeks short papers dealing with any aspect of Kansas geology, including petroleum geology, studies of producing oil or gas fields, and outcrop or conceptual studies. Maximum printed length of papers is 5 pages as they appear in the Bulletin, including text, references, figures and/or tables, and figure/table captions. Inquiries regarding manuscripts should be sent to Rebecca Radford, manager@kgslibrary.com or mailed to 212 N. Market, Ste. 100, Wichita, KS 67202. Specific guidelines for manuscript submission appear in each issue of the Bulletin, which can also be accessed on-line at the Kansas Geological Society web site at <http://www.kgslibrary.com>

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2014 Technical Talks - NEW LOCATION!!!

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Jan. 28— Dr. Anthony Walton Petroleum Class—Field Studies—Kansas University

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Mar.

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May 27—Larry Richardson's WSU Class presentations of field studies

**We will have more talks than you see posted here for our Spring 2014 sessions.
We now have a committee to locate speakers so if you have a speaker you would like to suggest,
Please contact Dave Clothier: dave@mccoypetroleum.com**

**We would like to again thank Bob Cowdery for all the years he found us outstanding speakers.
Bob will still serve as an advisor for the committee. Thank you Bob!**

NOTICE!!

NEW Location for Technical Meetings

All KGS technical presentations are held at 12:30 p.m. at the Landmark Square Building, located at 212 N. Market. We have a new meeting room on the 4th floor, up the stairs and at the end of the hallway in the Wisdom Center.

Note: For those geologists who need 30 points to renew their licenses, there will be a sign-in sheet at each presentation and also a certificate of attendance.

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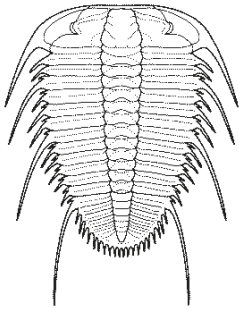
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President's Letter

Happy New Years to everyone!

The writing of this newsletter for the KGS Bulletin is the first official task now that I am the new president of the Kansas Geological Society. First I want to thank everyone for placing their trust in me and electing me to this office. I consider it to be both an honor and a privilege to be your new president.

For the past year I have served as the vice president under the very cable leadership of Dave Clothier. The society in 2013 had many important issues, some of these were: the uncertainty of the auction of the building, dealing with the new owner and the consideration of the board with the issues of whether to sign a new lease or move to another space in the downtown area, the continued success of the annual ongoing KGS events and the extra responsibility of the regional AAPG meeting.



The dedicated efforts of the society members, of the boards, and the leadership of the committees show that the KGS is blessed with many talented members who care for the future of our society and library. We had a great profitable year in 2013 with library sales that kept the library in the black again. We have monies put aside for a possible future building or land purchase and funds to draw upon should the library sales ever slow down again. (Yes we all remember those times and we all have our own stories to tell!) For 2014 we have a new 3 year lease signed, a new space for KGS talks, money in the bank and the library is expected to be profitable. The integration of existing and new data into the library data base continues and we also have a great library manager – what more could I ask as an incoming president?

I do have a wish list for 2014 – now that some of the unbridled excitement of the Mississippian Reservoir as a resource play in Kansas has died down - maybe we will all start to witness available and lower lease costs for Kansas exploration again. May we all live long enough! Well I suppose if the oil price stays up and there is peace and stability in the world markets that would be great also. How about the discovery of a new deeper oil play somewhere in Kansas – such that Kansas operators can first exploit. Higher natural gas prices that would help Kansas's exploration and development. How about sensible governmental regulations that address problems where real science shows negative impacts to human and the environment? How about giving good feedback and support of our State government and the Kansas Corporation Commission such that existing and new oil and gas regulations are sensible, fair, protective and prevent waste? How about more technological advancements for better seismic resolution of oil and gas filled reservoirs?

My current goals as the incoming president for 2014 – make sensible and varied investment strategies of the existing library monetary assets for higher yields, continue with the integration of geological data, possible consideration for the library to expand in other areas for sale of unique geological data and a business plan that provides continuity of the annual boards goals. As well as provide talks and services that reach over into other geological interests. As your new president I will also claim that I am sometimes not politically astute and may have shortcomings as a leader but I will strive to be the best president that I can be.

Thanks again for placing your trust in me,

Brian Fisher
KGS President 2014



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From The Manager

Dear Members,

Welcome 2014! We are starting the year off with lots of busy people in the industry. We love that.

We also, however, are starting our year off without some of our long time members. Orvie Howell being one, who always gave of himself, helped the Society, and was one of those people who I could turn to for advice and wisdom. Please see the memorials for Orvie, Jim Thompson, and one of our Colorado members, Tom Robinson, on pages 21 & 22. All will be missed.

The Society has signed a new 3 year lease with the owner of Landmark Square so we will remain here for at least another 3 years. Our new landlord has also given us a room on the 4th floor to hold our technical meetings. Our first Tech Talk in January (the 21st) will be at this new location. For those of you familiar with our building, it is Stan Wisdom's old office and we have named the room, Wisdom Center, which is in remembrance of Stan and also a play on words as you all gain such wisdom by attending these technical talks. I will have good signage so when you step off the elevator on the 4th floor, you will be directed to the room.

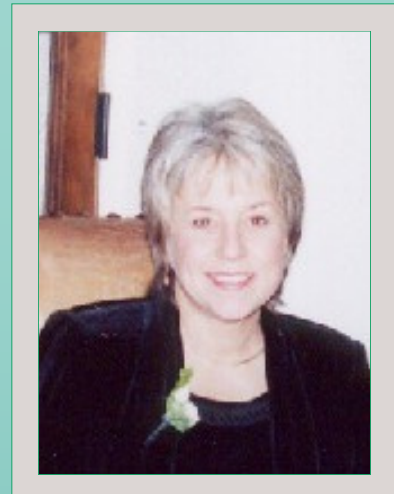
Meet your new Board of Directors on page 29. Looks like another good line up of people willing to serve the Society. Please note that we are adding a holiday closing for the library. President's Day, Monday, February 17 the library will be closed.

Here's hoping everyone has a prosperous and healthy year!

Respectfully submitted,

Rebecca Radford

Manager



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An Overview and Preliminary Economic Assessment of Horizontal Wells Drilled in the Mississippian Limestone Play in Kansas, 2010-2012

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Lawrence, Kansas

Paul Gerlach
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Miramar, Florida

Abstract

As of October 2012, 113 horizontal wells drilled in the Mississippian Limestone Play (MLP) have reported oil and gas production. This production accounts for 4.5% of Kansas oil and gas output, and MLP production is increasing with time. Some MLP wells have recorded production as great as 42,430 boe/month, but production declines for both oil and natural gas are high. These decline rates are similar to vertical wells in the region of the play, particularly where the reservoir has lower permeability. Average monthly production one year after the peak month will be on the order of 25% of the peak month. If MLP wells cost about \$3M to drill, only one-fourth of the wells already drilled are projected to recoup these costs in 2 years. The MLP is complex, but better technologies and geological assessments will likely improve this ratio. Production fairways and sweets spots will also be defined with additional drilling.

Introduction

Although horizontal drilling has been employed in a minor way for decades with varying success in Kansas, this study focuses on drilling activity and production characteristics of recent horizontal wells drilled for oil and gas in Mississippian strata in Kansas. Horizontal drilling in combination with staged hydrofracturing has revolutionized U.S. oil and gas production by opening up new production in low-permeability formations such as the Bakken Shale in North Dakota, Eagle Ford Shale in Texas, Niobrara Formation in Colorado, Woodford Shale in Oklahoma, and the Haynesville Shale in Louisiana. These techniques have also been applied to Mississippian limestones and cherts in north-central Oklahoma with some success. In 2010, this new play, also known as the Mississippian Limestone Play (MLP), extended northward into southern and western Kansas (Kansas Department of Commerce, 2013).

Overview of MLP Wells in Kansas

Nominally, the first modern producing Mississippian horizontal well is the Woolsey Summers 'A' #5H (SW SE SW NE sec. 20-34S-11W, Barber Co.), which first reported oil and natural gas production to the Kansas Corporation Commission (KCC) in September 2010. This well was quickly followed by the nearby SandRidge Shrock #1-1H (S2 S2 SW SW sec. 01-T35S-R11W, Barber Co.), which first reported natural gas production in January 2011, and oil production the following month. Sixteen Mississippian horizontal wells reported production during 2011. As of October 2012, oil or gas production has been established in 113 Mississippian horizontal wells in Kansas (Figure 1).

Horizontal Wells (by date)

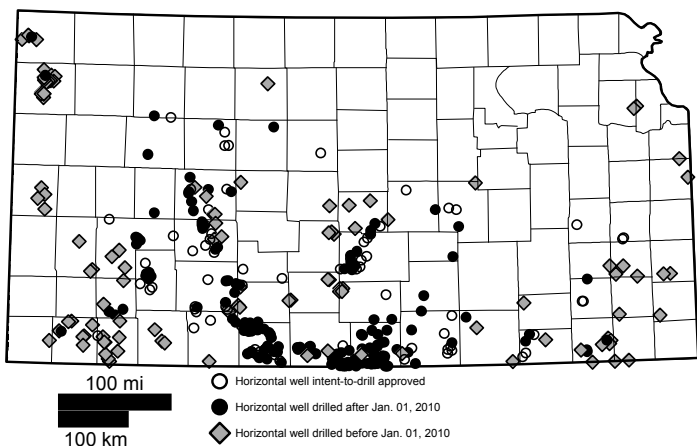


Figure 1. (A) Location of horizontal wells drilled and approved intents-to-drill in Kansas during 2010, 2011, and 2012. The majority of these wells are targeting Mississippian strata. (B) Wells and approved-intents to drill differentiated by operator. SandRidge Exploration and Production, LLC accounts for most of the intents-to-drill and wells drilled to date. Data from Kansas Geological Survey (2013).

Horizontal Wells (by operator)

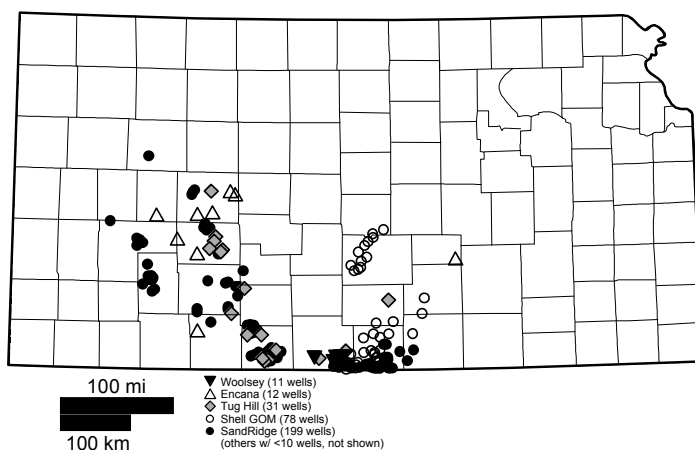


Figure 2. Intents-to-drill filed for horizontal wells in to regions in Kansas, starting in May 2010, and summed twice a month. Data from Kansas Corporation Commission (2013).

Intents -to-Drill and Wells Drilled

An intent-to-drill, which is filed with the KCC, is an official notice of where an operator intends to drill and how the well will be drilled. The KCC, in turn, registers the document and checks that the operator complies with applicable state laws and procedures before approval. Typically, about 90% of these intents eventually result in the actual drilling of a well, but occasionally the operator will decline to drill. In order to ascertain and anticipate the level of future activity in this new play, intents-to-drill for horizontal wells have been monitored. Prior to May 2012, intents-to-drill for horizontal wells were filed sporadically, but subsequently they steadily increased in numbers, particularly for the tier of counties just north of the Oklahoma state line (Figure 2). Filings for this region peaked in June 2012 and have since gradually dropped. Intents-to-drill for horizontal wells in western Kansas jumped abruptly in April 2012, and have remained steady ever since that date (Figure 2).

As of February 1, 2013, 378 intents-to-drill for MLP horizontal wells were approved by the KCC (Figure 3). The majority of approved intents-to-drill for the new horizontal wells have been filed by SandRidge Energy of Oklahoma City (175 intents, Figure 3). This activity extends this company's operations northward from Oklahoma. Other companies with significant exposure include Shell Gulf of Mexico (77 intents), Tug Hill (31), Encana (12), and Woolsey Petroleum (11). Twenty-one other companies account for a total of 72 other intents-to-drill that were approved.

Although 113 wells have reported production as of October 2012, several more wells have been reported as drilled, but their production has not yet been reported. Their status remains as "spudded", "producing", or "inactive" (Figure 3). Wells with this status may be temporarily shut-in and waiting on further testing or surface equipment, or disposal wells may have to be drilled nearby. They even may be waiting on the local electrical power to be upgraded so that their pumps can be operated. "Plugged and abandoned", of course, is a final benediction for some wells.

Production

As of October 2013, production from 113 MLP horizontal wells accounted for 4.5% of total Kansas oil and gas production (Figure 4). October 2012 production from the play recorded 144,471 bbls of oil and 1,288,912 mcf of natural gas. Combined, this is equivalent to 359,280 boe, (barrel of oil equivalent, with 1 boe = 6 mcf). The other 95.5% of production is due to 48,570 oil-producing wells and 24,522 gas-producing wells. The incremental production by the MLP horizontal wells is helping to stabilize (but possibly not yet reverse) the collective decline of all Kansas oil and gas wells (Figure 5).

To October 2012 (the latest date for which production is currently reported in Kansas, 1,194,729 bbls of oil, and 8,923,385 thousand cubic feet (mcf) of natural gas have been produced by wells in the MLP. Combined, this total is 2,681,960 boe, with the equivalent-energy conversion of 6000 cubic feet of natural gas approximately equals 1 barrel of oil. Cumulatively, 7469 cubic feet of natural gas has been produced for every barrel of oil in the play.

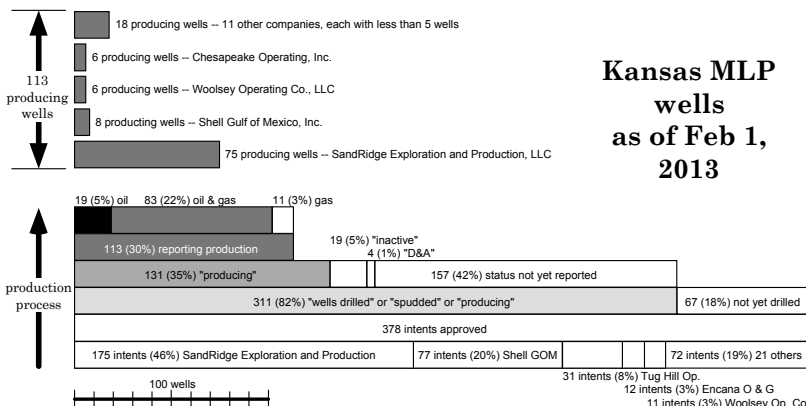


Figure 4. Oil and gas production reported for MLP wells in Kansas. Data from Kansas Geological Survey (2013).

INTENTS-TO-DRILL for HORIZONTAL WELLS in SOUTHERN and WESTERN KANSAS

(half-month time increments - May, 2011 through January, 2013)

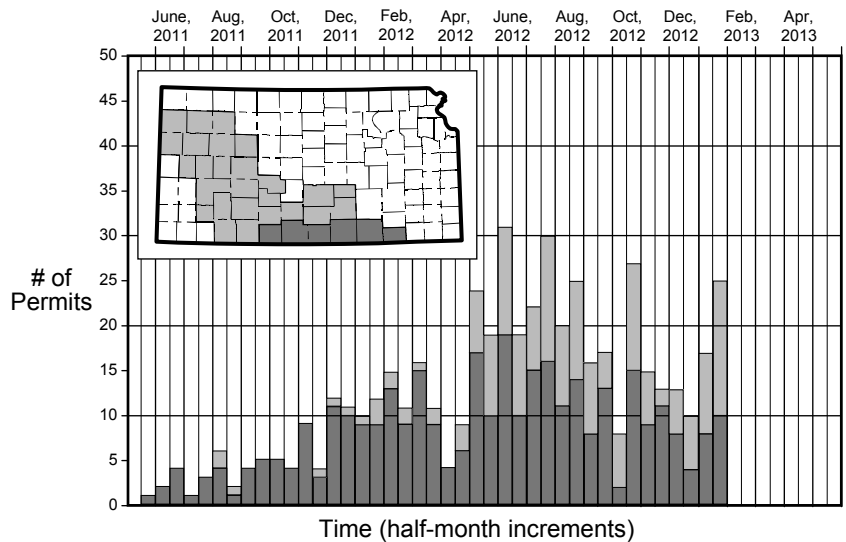


Figure 3. Current status of MLP wells in Kansas, as of February 1, 2013. Data from Kansas Geological Survey (2013).

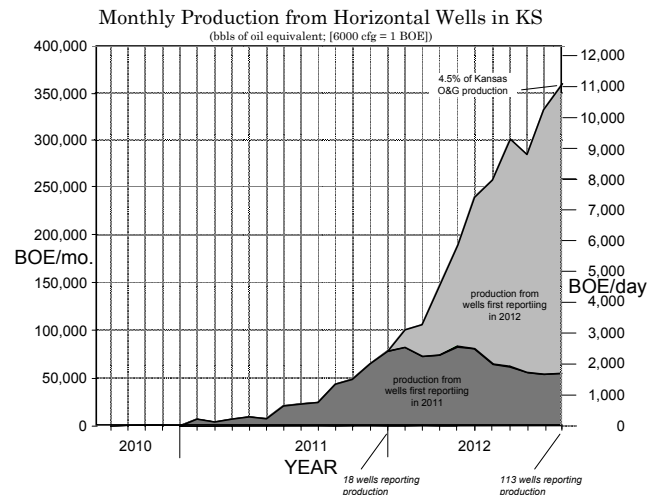


Figure 5. Oil and gas production in Kansas, with the proportion contributed by MLP production.

Rates of Production and Production Declines

As of September 2012, 101 modern horizontal wells recorded oil production, natural gas production, or both. As of October 2012, this total reached 113 wells recording oil production. This production is reported by the operator to the KCC and subsequently posted on the website of the Kansas Geological Survey (www.kgs.ku.edu). These data are made public on the Kansas Geological Survey website with a delay of about 4 months, due to proprietary and clerical delays and handling procedures. For example, production data for November 2012 will be reported around March 1, 2013.

A minimum of four months oil or gas production was deemed necessary for these wells to display a peak month of production. As of September 2012, 59 of the 103 wells reporting production met this criterion. Wells not meeting this criterion had reported to date either less than 4 months production, or their monthly production was still increasing even after 4 months of reported production. Several Shell Gulf of Mexico wells have yet to record their maximum monthly production. Shell GOM is evidently bringing on their production gradually in their new horizontal wells, for two of their wells are recording more production every month even after 5 months of production. Their well with the longest recorded production of 8 months, the Shell GOM Senff #3308 19-01H (sec. 19-33S-08W, Harper Co.), had its peak month oil and gas production 7 months after initial production was reported.

Ten wells of the 59 had their peak production in their first reported month, even though in that first month the well likely produced fewer days than a full month. Twenty-two of the 59 wells recorded peak oil and gas production in the second month of production, and 12 wells had their peak production in the third month. Three wells had peak production in their 4th reported month and the remaining 13 wells took longer than 5 months to record their peak production. In general, wells that took several months to achieve peak production were not prolific producers. One well took 14 months of production to record its peak monthly production, but on average, approximately 3 to 4 months of reported production is necessary to record peak production. The delay in reaching peak production is partially the result of removing hydrofracturing fluids during post hydrofracturing clean-up. Maximum fluid production may also be delayed as the rate of fluid extraction changes based on facilities available to dispose of the brine. The oil cut will increase or decrease through time as the large volumes of fluid are withdrawn and the production is stabilized.

In considering only oil production (and ignoring any gas production), 56 wells met the necessary criteria of 1) at least 4 months production, and 2) peak production followed by declining production. Peak oil production for these 56 wells was reported in approximately 3 months. In considering only natural gas production (and ignoring any oil production), 51 wells met the necessary criteria (Table 1).

Table 1. Peak Monthly Production for 59 wells with 4 months or more oil and natural gas production; 56 wells with 4 months or more of oil production; 51 wells with 4 or months natural gas production. Bbl = barrels; mcf = 1000 cubic ft; boe = barrels of oil equivalent, where 6000 cubic feet of gas = 1 bbl.

	OIL & GAS (boe) (59 wells)	OIL (bbls) (56 wells)	GAS (mcf, boe) (51 wells)
Maximum	42,430 boe/month (1414 boe/day)	25,963 bbls/month (865 bbls/day)	211,842 mcf/month (7061 mcf/day) (35,307 boe/month) (1177 boe/day)
Average	7119 boe/month (237 boe/day)	3494 bbls/month (116 bbls/day)	27,193 mcf/month (906 mcf/day) (4532 boe/month) (151 boe/day)
Median	3568 boe/month (119 boe/day)	1300 bbls/month (43 bbls/day)	8554 mcf/month (285 mcf/day) (1426 boe/month) (48 boe/day)
Minimum	435 boe/month (14 boe/day)	168 bbls/month (6 bbls/day)	52 mcf/month (1.7 mcf/day) (8.7 boe/month) (0.3 boe/day)

An average month-to-month decline rate can be determined by comparing the sum of the maximum monthly production with that of the following months. For combined oil and gas production, where gas is converted to barrels of oil equivalent (Table 1), the production decline for the first month after the peak month on a Kansas horizontal well is dramatic -- 24.14%. Months following have respectively record declines of 21.28%, 16.91%, 3.85%, 6.63%, 14.18%, 16.88%, 11.03%, 11.61%, and 12.71%. Declines after 10 months are erratic because too few wells have such long production histories to reasonably determine decline rates. If, however, a modest 7.5% decline is assumed for months 11 and 12, analysis of present production indicates that a horizontal well will be producing only 19% of its peak production the same month of its peak production just one year later (Figure 6). In other words, a well recording peak production of 1000 bbls in January 2011, would be expected to be producing only about 190 boe in January 2012.

An 81% decline in production in one year is a marked production decline. It probably attests to the tight reservoir that is being drained. A

MONTHLY OIL and GAS PRODUCTION in KANSAS

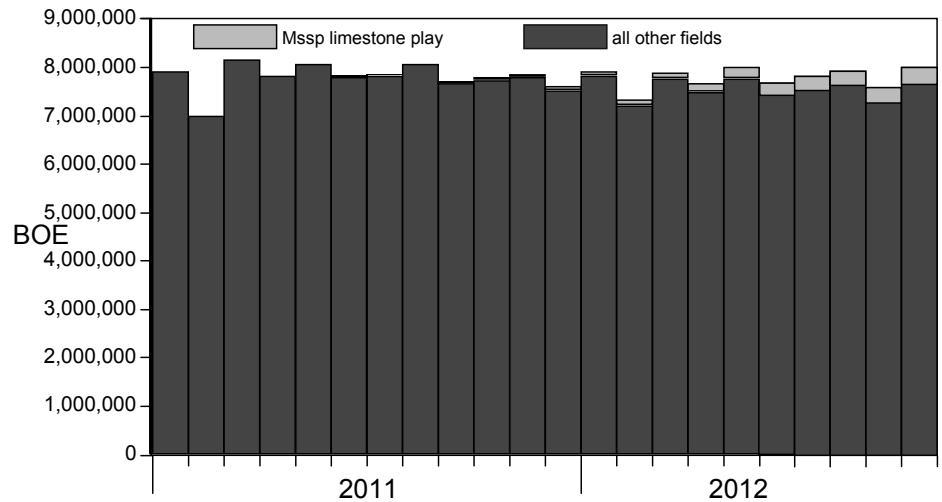


Figure 6. Production declines for MLP wells, combined using boe (bbls of oil equivalence) as a common measure, and differentiated according to oil and natural gas production, on a linear scale (A) and on an exponential scale (B). (C) MLP declines compared to Mississippian vertical wells in the Little Sandy Creek Field, Barber County, KS. Both rates of decline are very similar for the first year. Second year declines at Little Sandy Creek are used to predict 2nd-year declines for the MLP wells.

key will be when and how much the rate of decline decreases. Optimizing completion will be important to minimizing this decline. For comparison, CBM wells in southeastern Kansas take about one year to reach peak production, and then they decline, on average, 35% from that peak over the next year (Newell, 2010), with lesser decline percentages for following years. Natural gas production for the venerable Hugoton Field declined from 2010 to 2011 at a rate of only 6.3% per well for the entire year.

Since there is a substantial difference in the price of oil and gas (i.e., \$95/bbl for oil vs. \$21 for 6000 cubic ft of natural gas -- the approximate BTU equivalent of 1 bbl of oil), production for oil and gas were also considered separately (Table 1). Production declines for oil alone in new horizontal wells were slightly higher than for the combined production of oil and natural gas, with successive production declines of 21.97%, 28.64%, 13.98%, 14.33%, 11.94%, -1.13%, 15.60%, 24.02%, 3.10%, and 19.45%. If months 11 and 12 have only 2.5% decline rates, then monthly oil production from a horizontal well one year after its peak month can be expected to be about 18% of its peak month. This is not significantly different from the combined oil and gas production discussed above.

Natural gas, considered by itself, recorded successive production declines of 21.85%, 18.85%, 9.84%, 14.05%, 12.07%, 12.48%, 8.93%, 7.26%, 9.75%, 4.43%. Months 11 and 12 recorded slight rises in production (-2.17% and -0.41%) and this is due to the few wells (i.e., 3 wells) that have been producing this long. The effect of all these monthly production declines: one year after its peak natural gas production, a gas well can be estimated to produce 28% of that of its peak month. The drop in natural gas production is not as severe as that for oil. Besides the ability of natural gas to flow more readily than oil in a tight reservoir, the gas-oil-ratio in many wells increases with their production duration. Peak natural gas production also follows peak oil production by one or more months.

For preliminary comparison to vertical Mississippian wells, production declines were summarized for the Little Sandy Creek Field, a Mississippian oil and gas field in southern Kansas that straddles the Barber-Harper County line in T.32, 33S, and R.09, 10W. This field was discovered in 1973 and has produced 2,003,576 bbls of oil and 1,714,452 mcf of natural gas from 67 vertical producing wells. On average, oil and gas wells in this field declined 28.82% in the first month after peak production. Wells a year following their peak production produce only 21% of that peak. Production declines in the horizontal wells are thus not much different from their vertical counterpart (Figure 6). Production data from the Little Sandy Creek Field indicated that wells 2 years after their peak month will, on average, produce 72.5% of what they did one year previously. Production declines for MLP horizontal wells can be predicted if they decline in a manner similar to Mississippian vertical wells.

Economic Viability of MLP Horizontal Wells in Kansas

How many of the new horizontal wells have production that pleases the company that drilled them? This question likely has an answer that varies with every company, field, lease, and well. Obtaining an answer also requires setting standards that may resemble the proverbial Procrustean bed -- an arbitrary standard or rule to which exact conformity is forced. At this point in the exploration process, it may also be an unfair question, for sweet spots, optimal production techniques, and best economic solutions in drilling and well treatment are still being developed or have yet to be found. Every well is different in its geology, engineering, and attendant costs, and the economic viability of every energy company is different.

Nevertheless, in an attempt to approximate an answer for the question of how many wells are economically viable, several generalized rules are imposed. From our conversations with industry representatives, a horizontal well costs about \$3,000,000 to drill in the Mississippian Limestone Play. Next comes the Procrustean(?) Rule -- these costs should be recovered in two years by income from production. Operational costs (maintenance, royalties, electricity, disposal fees, fines, depreciation, taxes, salaries, etc.) are ignored in this exercise for purpose of simplification.

Operational costs may be substantial in horizontal MLP wells, for considerable amounts of fluid are produced and moved by these wells. For example, SandRidge, in addition to filing 175 intents-to-drill for MLP production wells, filed 37 intents-to-drill for salt-water disposal (SWD) wells. Most of these SWD wells are projected to the Arbuckle Group and are vertical wells, but 4 are intended to be horizontal. Also, in assembling the large acreage positions necessary for this unconventional resource play and to gain leverage for mineral

rights leased from landowners, some companies have offered larger royalties in excess of the historical standard of 1/8 royalty for the gross revenue of a well. This obviously reduces the net revenue to the company and requires more revenue than is obvious to offset drilling costs. These costs are unknown to us and vary with every lease owner and company.

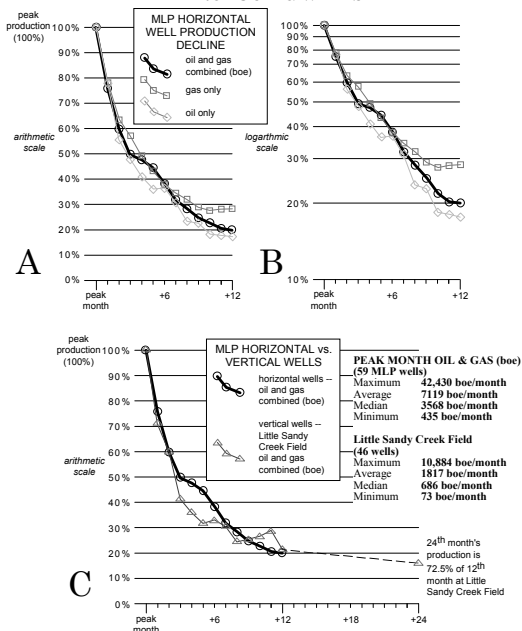
Simple division of \$3,000,000 by 24 months implies a constant monthly income of \$125,000, or \$4110 daily, is needed over a two-year period to pay back drilling and completion costs. Considering the drastic decline in production of these wells, the income necessary in the peak month will have to be approximately \$399,500, which averages \$13,325/day during the peak month. Considering the decline rates (Figure 6), a well producing \$399,500 in its peak month will only be producing \$63,475 (\$2120/day) worth of product in its 24th month of production, but its cumulative income over 24 months will be \$3,000,000.

Of the 113 horizontal wells in Kansas with recorded production, only one has had two years of reported production. However, by applying monthly Kansas oil and gas pricing data available from the Energy Information Agency (2013) and multiplying it by the monthly production volumes reported, some wells (8 so far) have likely paid for themselves well ahead of the requisite two-year pay-out period (see Table 2).

Table 2. Wells in the MLP that have likely grossed at least \$3,000,000. Data are from production volumes reported to KCC, multiplied against Kansas commodity prices for each month reported to the U.S. Energy Information Agency. Income calculated is thus only approximate. These wells are specifically identified in Figure 7.

Well	Approximate Cumulative Income	Months Producing
SandRidge Bernice #1-17H (sec 17-35S-07W, Harper Co.)	\$17,748,000	15
SandRidge Lake #1-21H (sec 21-34S-06W, Harper Co.)	\$10,339,000	11
SandRidge Lori #1-2H (sec 02-35S-10W, Barber Co.)	\$9,289,000	8
Woolsey Tucker #B-5H (sec 11-34S-11W, Barber Co.)	\$4,149,000	11
CMX Scrooge #1-7H (sec 07-35S-11W, Barber Co.)	\$4,011,000	15
SandRidge Lori #2-2H (sec 02-35S-10W, Barber Co.)	\$3,722,000	6
SandRidge Shrock #1-1H (sec 01-T35S-11W, Barber Co.)	\$3,489,000	22
SandRidge Sean #1-18H (sec 19-31S-19W, Comanche Co.)	\$3,403,000	10

MONTHLY PRODUCTION DECLINE FROM PEAK MONTH
MLP PRODUCING WELLS



Approximate Cumulative Income with Time
Modern Kansas Mississippian Horizontal Wells

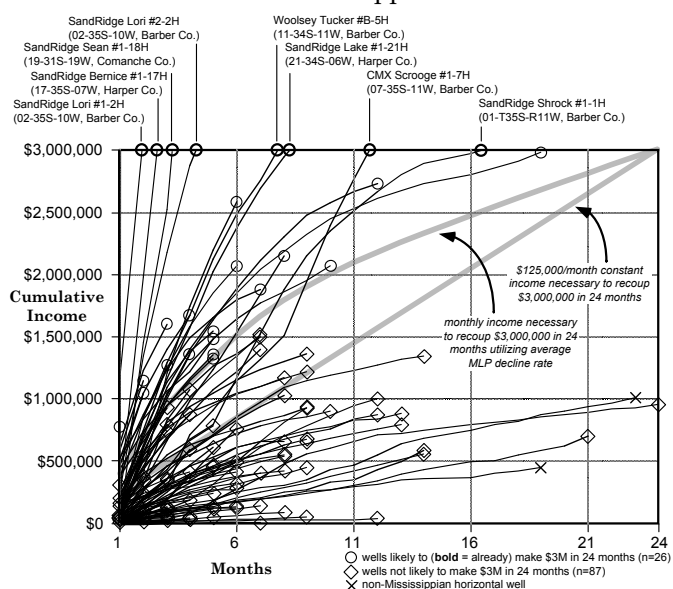


Figure 7. Approximate cumulative income for MLP wells with time. Twenty-six of the 113 MLP wells drilled to date are projected to recoup an estimated \$3,000,000 in drilling costs in less than 24 months. Eight wells so far exceeding \$3,000,000 are listed in Table 2.

Approximate cumulative income cross-plotted with months reported production indicate several more wells will likely pay for themselves, or more than pay for themselves within two years (Figure 7). By this analysis, 26 of the 113 modern Mississippian horizontal wells (i.e., 23%) will achieve \$3,000,000 gross income in 2 years. The remaining 77% will take longer than 2 years to do so, or perhaps they will never recover their drilling costs.

If approximately 3/4 of the wells that have been drilled so far in the play will not pay for their drilling costs in two years, does this justify further interest and activity in the play? Again, the answer depends on the company, the field, the lease, and even the individual well. The natural follow-on question could be: will the "winning" wells pay for the "losing" wells? It still may be too early to answer this question. Then again, maybe the generalized rules for financial viability we are applying are too conservative, too simple, and ultimately too "Procrustean" to take in to account what is in reality a multi-well drilling program with anticipated variations in successfully completing wells in a challenging play. Nevertheless, considering the limelight this new play is getting in Kansas with both the energy industry and public at large, this paper is an attempt to dispassionately assess its present importance and understand its future potential. Optimal technological and geological answers are also still being developed for the MLP, and better and more economic wells will no doubt be drilled in the future.

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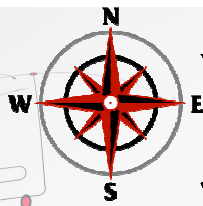
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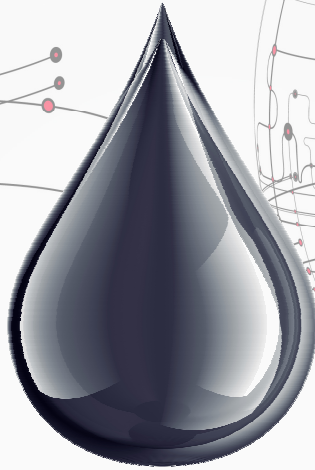




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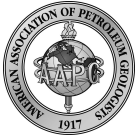
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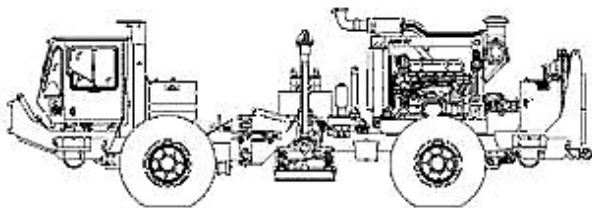
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Kansas Geological Society Board Minutes

The monthly meeting of the Board of Directors of the Kansas Geological Society was held on September 10, 2013, at the Wichita Petroleum Club. Mr. Clothier called the meeting to order at 11:35 a.m.

- A. **Treasurer's Report**- Mr. Bayer presented us with the Treasurer's report for August 2013. Mr. Bayer reported that the current CD's and Money Market Account earned \$464.06 interest. The next CD to mature will be June 5th, 2014 at Relianz Bank.
- B. **Manager's Report**- Mrs. Radford was absent and will present the Manager's Report for August 2013, via e-mail upon her return. After review and acceptance by the Board, the summary will be added as an addendum to these minutes.

OLD BUSINESS

- A. **KGS Nomination Committee** – Mr. Scribner reported that one half of the potential candidates have accepted their nomination and the remaining candidates will be contacted. The slate of candidates will be presented to the Board on October 1, 2013.

NEW BUSINESS

- A. **Future Capital Spending** – Board members were asked to consider potential items for improvement and enhancements for the Library. No specific items (e.g. furniture, equipment, computers, software, etc.) were identified for purchase, at present. **Mr. Clothier adjourned the meeting at approximately 12:50 p.m.**

The monthly meeting of the Board of Directors of the Kansas Geological Society was held on October 8th, 2013 at the Wichita Petroleum Club. Clothier called the meeting to order at 11:40 AM.

- A. **Treasurer's Report**- Mr. Bayer presented us with the Treasurer's report for September 2013 at 12:35 PM. Mr. Bayer reported that the current CD's earned an estimated \$464.06 interest. He said that some banks pay 1% interest on money market accounts. The Treasurer's report was approved at 12:40 PM after Mr. Clothier made the motion.
- B. **Manager's Report**- Mrs. Radford presented the Manager's Report for September 2013 at 12:40 PM. Monthly income was \$116,105.76 (which reflected a big increase in misc income). Expenses were \$85,757.92, making a net gain of \$30,347.84 for the month, and \$185,262.48 YTD. The report shows 252 Walters Digital Library members. The Digital Library lost \$3,709.76 in September after expenses. This report was approved at 12:47 PM.

OLD BUSINESS

- A. Joe Walsh (12:20 PM) discussed various tax issues with the members. He made the following points: advertising is fully tax deductible, contributions are not; buying a new building is not immediately deductible as it may have a slow depreciation schedule; we are a C-corp, and real estate should not go into a c-corp; developing software to consolidate paper and digital finances would be deductible. His 2012 report was very strong, we are in good financial shape.
- B. Dave Clothier suggested buying new equipment to upgrade the library. Walsh said do it to improve, but not for tax purposes.
- C. We will be taking on new space at the library (12:47 PM); we will take over the lawyer's front offices facing Market. We will also gain an additional office on the fourth floor that can be used for tech talks.
- D. The landlord has re-finished the front steps, polished the marble in the lobby.
- E. The trash bins should be picked up more often, as duplicate trash quickly fills them.

NEW BUSINESS

- A. Elections to be held soon, everyone accepted their nominations.
- B. Kent Crisler has been made an honorary member.

Mr. Clothier adjourned the meeting at 1:10 PM.

Respectfully submitted, Paul Ramondetta, Secretary

Note: November minutes on page 25



Memorials



Orvie Howell - With the passing of Orvie Howell on November 15, 2013, the society lost a long time and very dedicated member. Orvie was born in Wichita in 1931. Orvie spent his entire career in Wichita. He first attended Willard Grade School, then Roosevelt eventually graduating from Cathedral High School.

Following high school he attended Wichita University, graduating in 1954. At the University, he shared many classes with Ted Sandberg. Orvie held several positions with Lion Oil Company after graduation. He also worked for Lario Oil and Gas becoming District Geologist in 1960. He left Lion Oil in 1962 to work for Hinkle Oil Co.

Orvie was a member of many organizations to which he made contributions both monetary and time. Of particular note is the fact that he made the first contribution to start the Robert F. Walters Digital Library, a function of the Kansas Geological Society. Orvie had served as Secretary-Treasurer, Vice-President, and President of that organization. In 1991 He received the highest honor awarded by that organization, Honorary Member.

Other organizations that he belonged to and supported were: Wichita Petroleum Club, Crestview Country Club, Past President of the Wichita State University Geological Advisory Council, Rocky Mountain Association of Geologists, Alaskan Geological Association, Kansas Independent Oil and Gas Association, American Association of Petroleum Geologists and the Society of Independent Earth Scientists.

Besides having a passion for petroleum exploration, Orvie had a passion for two other activities: flying and music. He had been a pilot for over 30 years. He was an accomplished trumpet player from the 7th grade on and played in such prestigious organizations as the Wichita Symphony, Navy Concert Band and while in college served as music director for KMUW.

Orvie is survived by his wife, Marlene, children, daughters, Susan Eck, Sally Pounders, and son Richard Powell.

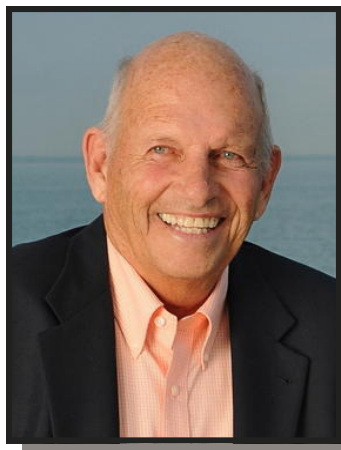


James Thompson - This is a memorial to Jim Thompson a dedicated geologist and long time member of the Kansas Geological Society. Jim was born in Augusta, Kansas in October of 1927 and passed away in November of 2013 after a long and productive career. His early schooling, grade school thru high school was all in Augusta where his dad owned a grocery store. In his youth he became interested in aviation and was one of the youngest employees of Beechcraft. He took the money from that employment to rent planes and soloed at the age of sixteen.

After graduating from Augusta High School in 1945, he enlisted in the U. S. Navy and with the war ending in 1945, he made the decision to enlist for an additional 4 years. His service included a period when he was assigned to a supply ship that provided supplies to the occupation forces in Europe. Jim was discharged from the Navy in 1949 and just prior to his discharge he was married to Barbara Sweeney. To this union three children were born: Mark, an environmental geologist with ISI environmental, Robert, retired from Union Pacific Railroad and Laura, involved in Interior Design with J. A. Marshall, Co.

After his discharge, Jim enrolled at Wichita University, where he graduated with a degree in Geology. One of the reasons he enrolled in Geology was a brother-in-law involved in the "oil business" told him that geologists made \$75 a day which at the time seemed very lucrative. With a recommendation from Dr. Ver Weibe, he was hired by Bob Watchous to work for Rocket Drilling. In 1956 Jim became an Independent Geologist and remained one the rest of his career. Jim had many friends among his contemporaries. Of course included in this group would be Bob Watchous but also; Walter Martz, Don Hellar, and Thornton Anderson. Jim was diagnosed with a debilitating disease in 2000, but continued to work at his profession until 2006. A memorial has been established with the Kansas Geological Foundation.

Memorials



Tom Garton Robinson was born February 23, 1937 in Carrizozo, New Mexico to Dr. and Mrs. Van C. Robinson. Raised in Des Moines, Iowa, he graduated from Roosevelt High School in 1955 and received a Bachelor of Science degree from Claremont Men's College in 1958. In 1961, Tom graduated with a geological engineering degree from Colorado School of Mines. From 1961 to 1964 he served as a 1st Lt. in the U.S. Army Engineers outside of Verdun, France. From 1964 to 1972, Tom was employed by Mobil Oil Corp. as a petroleum geologist in Oklahoma City. In 1972, Tom moved to Denver and worked for Vanderbilt Resources and later Consolidated Oil & Gas. In September 1982, Tom founded Dynoil Inc., an oil and gas exploration company with ventures in Kansas, Oklahoma, Colorado, Michigan and Australia.

Tom is survived by his wife of 22 years, Peggy, and his three children: Elizabeth Baker of Austin, Andrew Robinson of Denver and Chase Robinson of Denver. He is also survived by seven grandchildren: Hampton, Davis, Henry, Josephine, Annabelle, Lillian and Charlotte. His sister, Anne Bridges, resides in Des Moines. In addition to family and friends, Tom loved bird hunting, fishing, football, foreign travel and his family dogs: Kate, Scout and Lady. He was a tireless worker, true patriot, and a passionate Republican.

In Tom's memory, donations may be made to the Denver Dumb Friends League, 2080 South Quebec St., Denver 80231.

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Friday, Jan. 24th

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KANSAS GEOLOGICAL SOCIETY

The monthly meeting of the Board of Directors of the Kansas Geological Society was held on **November.12th, 2013** at the Wichita Petroleum Club.

Mr. Clothier called the meeting to order at 11:40 AM.

FINANCIAL REPORT/MANAGERS REPORT

A. Treasurer's Report- Mr. Bayer presented us with the Treasurer's report for October 2013. Mr. Bayer reported that the current CD's earned an estimated \$465.77 interest. He said that some banks pay 1% interest on money market accounts. The Treasurer's report was approved after Mr. Fisher made the motion.

B. Manager's Report- Mrs. Radford presented the Manager's Report for October 2013. Monthly income was \$118,632.84. Expenses were \$180,440.49 realizing a loss of \$61,807.65 for the month (increase expenses due to AAPG Mid Continent Meeting and income from the meeting not had not been received at time of November Board Meeting), and \$123,454.83 YTD. The report shows 256 Walters Digital Library members. The Digital Library made \$5,572.45 in October after expenses. This report was approved at 12:50 p.m..

OLD BUSINESS

- A. Review of New Lease for the Library.
- B. Discussed buying new equipment to upgrade the library and additional office on the fourth floor that will be used for tech talks.
- C. Summarized and discussed success of AAPG Mid Continent Meeting October 2013.

NEW BUSINESS

- A. 2014 Annual Budget – Previous yearly operating budgets were reviewed. The 2014 operations budget was approved, which included salary adjustments.
- B. Annual Banquet – the Annual Banquet will be Friday January 24, 2014 at the Petroleum Club, Wichita, Kansas.

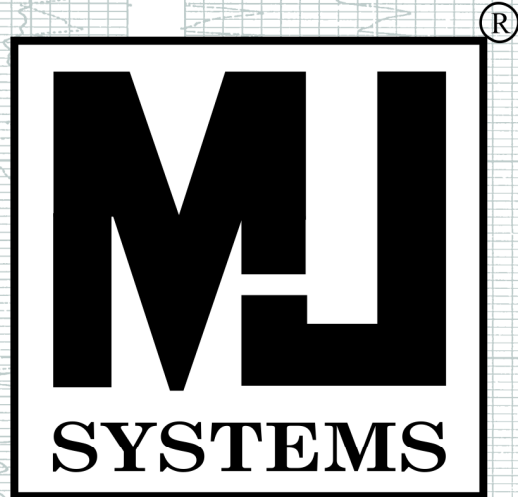
ADJOURNMENT- Motion made and passed. Mr. Clothier adjourned the meeting at 1:30 p.m.

Respectfully submitted,
Robert P. Bayer II, Treasurer
Acting Secretary

NOTICE!!!!



KGS Library will be closed
for President's Day
Monday, Feb. 17th



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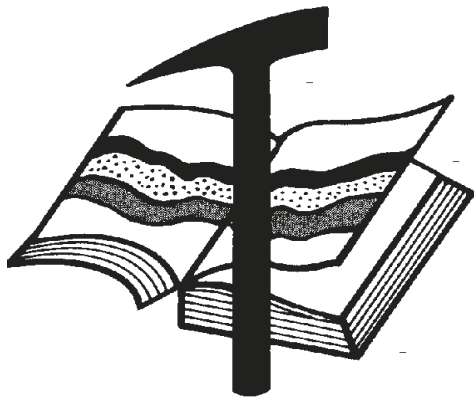
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Kansas Geological Foundation Services

The Kansas Geological Foundation provides the following services as a part of the organization's commitment to educate the public regarding earth science.

Speaker's Bureau

A list of speakers available to talk about various aspects of geology may be obtained by contacting Janice Bright at the KGS Library, 265-8676. This service is free to the public.

DVD/Videotape Library

The KGF maintains a DVD & videotape library focused primarily on the various fields of earth science. These tapes may be checked out without charge by the public. To obtain a list of tapes, please contact the KGS Library, 212 N. Market, Ste. 100, Wichita, KS 67202, or call Janice Bright at 265-8676.

The Kansas Geological Foundation was founded in March, 1989 as a not-for-profit corporation under the guidelines of section 501(c)(3) of the tax code to provide individuals and corporations the opportunity to further the science of geology. It is dedicated to providing charitable, scientific, literary and educational opportunities in the field of geology for the professional geologist as well as the general public.

KGF can receive in-kind donations through which the donor may receive a tax deduction. Of equal importance, the KGF provides the financial resources to sort, process and file this data at the KGS library. If you have a donation to make, please contact the KGF at 265-8676.

Your tax-deductible membership donation helps to defray the cost of processing donations and to support public education programs about the science of geology. Annual membership begins at \$50.00 per year. Donations of \$100.00 or more are encouraged through the following clubs:

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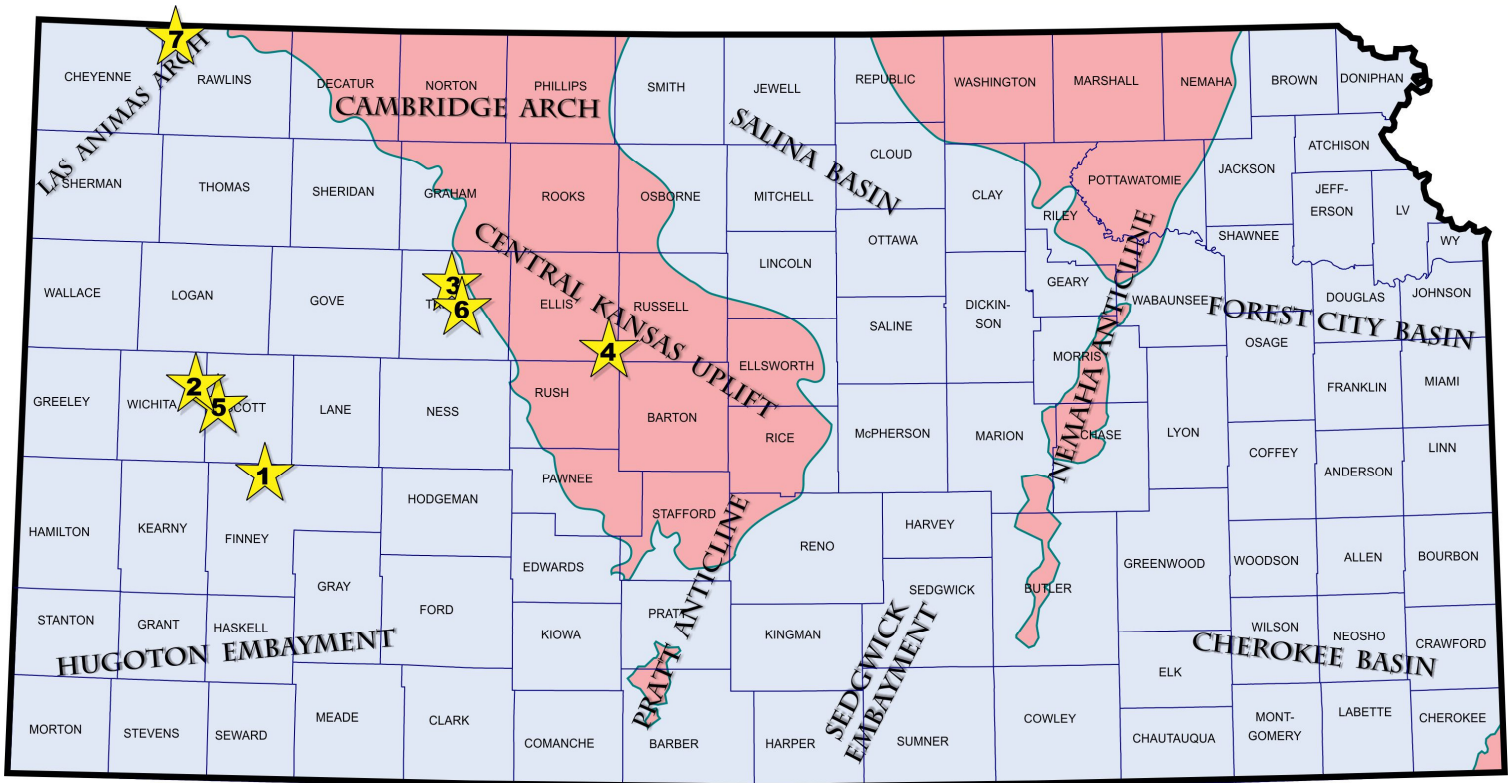
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Exploration Highlights

By John H. Morrison, III
Independent Oil & Gas



(1) SandRidge Exploration and Production LLC, Oklahoma City (OK), has discovered new Mississippian oil reserves in Finney County at the 1-11 Joyce Trust 2132 (API 15-055-22223), located in the NW NW SW of section 11- T21s- R32W, about one mile south and six miles east of Friend, Kansas. The vertical well was drilled to a rotary total depth of 5617 ft by Tomcat Drilling's Rig No. 3. Discovery site lies nearly eight and one-half miles northwest of the Sonderegger field, which has also produced oil from the Mississippian formation since 1952. Completion details remain confidential at this time. The name of the new oil field is Joyce.

(2) Lario Oil and Gas Company, Wichita (KS), has stepped-out nearly one mile northwest of their recently established Felt Northwest field (est. May 2013, Marmaton oil) in Wichita County, and has discovered oil deposits in the Lansing-Kansas City formation. New reserves were found at the 1-33 Zellner (API 15-203-20228), SW SE NE in section 33- T17s- R35W, located approximately three miles north and one and one-half miles east of the town of Marienthal, Kansas. The well was drilled to a rotary total depth of 5110 ft and went on production in early October. No details are available. The new field is named Zellner.

(3) Samuel Gary Jr and Associates, Inc., Denver (CO), has established new Lansing-Kansas City oil production in Trego County with the successful completion of the 1-35 Armbruster (API 15-195-22867), spotted in the NE NW SE of section 35- T12s- R23W. The wildcat well was drilled with Discovery Drilling Rig No. 4 to a depth of 4492 ft. Wellsite lies nearly two miles northwest of closest production in the Mary Lou field, which has produced oil from LKC and Marmaton formations since 2008. No completion information is available. The new Armbruster field lies three and one-half miles south and two miles east of Wakeeney, Kansas.

(4) American Land and Energy LLC, Castle Rock (CO), is producing an undisclosed amount of crude oil from the Lansing-Kansas City limestones at their 1 Brungardt (API 15-051-26588) in Ellis County. Operator bottomed the well at a total depth of 3600 ft with drilling rig provided by Royal Drilling. Well location is in the SW SE SE of section 7- T15s- R16W or about three miles north and one-and one quarter miles east of Pfeifer, Kansas. The new Big Valley Southwest oil field was discovered nearly two miles east of established production in the Phillip Ranch East field where the LKC zones are also productive.

(5) Lario Oil & Gas Company, Wichita (KS), has discovered Marmaton oil reserves at the 1-20 Gaschler - Krause Unit (API 15-171-20982) in western Scott County. Located in the SW NW NE in section 20- T18s- R34W, the new Lion Creek West pool discovery well was drilled to a total depth of 5000 ft about one-half mile south and three-quarters mile west of Modoc, Kansas. Well site lies over one mile west of Lario's recent Lion Creek discovery well, 1-21 Boulware in section 21, which was completed earlier this year with Marmaton and Cherokee (Johnson Zone) pays. No completion details have been released.

(6) Samuel Gary Jr & Associates, Inc., Denver (CO), is producing oil from the Lansing-Kansas City and Cherokee Sand formations at the 1-1 Max Etal (API 15-195-22875), spotted in the N/2 N/2 NE in section 1- T13s- R23W, in Trego County. The 4268 ft deep wildcat well lies nearly one mile west of Downing-Nelson Oil Company's 1-6 Mary Lou (API 15-195-22575) which was completed for 35 barrels of oil per day from Lansing-Kansas City perms from 3780 to 3784 ft and the lower Cherokee Sand from 4182 to 4185 ft in October, 2008. Gary's new Mary Lou West oil field is located about two miles south and four miles west of Ogallah, Kansas.

(7) **Murfin Drilling Company, Inc.**, Wichita (KS), has established Lansing-Kansas City oil production in northern Rawlins County, just south of the Nebraska border. Oil deposits were found at the 1-1 Mary Ann (API 15-153-20929), drilled in the NW NW NW of section 1- T1s- R36W, about fifteen miles north and three miles east of McDonald, Kansas. Operator drilled the well to a total depth of 4475 ft. Discovery was made over two miles northwest of the Driftwood field which Murfin opened in late 2007, also with LKC oil production. Since the Mary Ann discovery, Murfin has drilled nine development wells nearby and has staked locations at two other drill sites in the same section. The new oil field has been named Scoda.

MEET THE 2014 BOARD OF DIRECTORS



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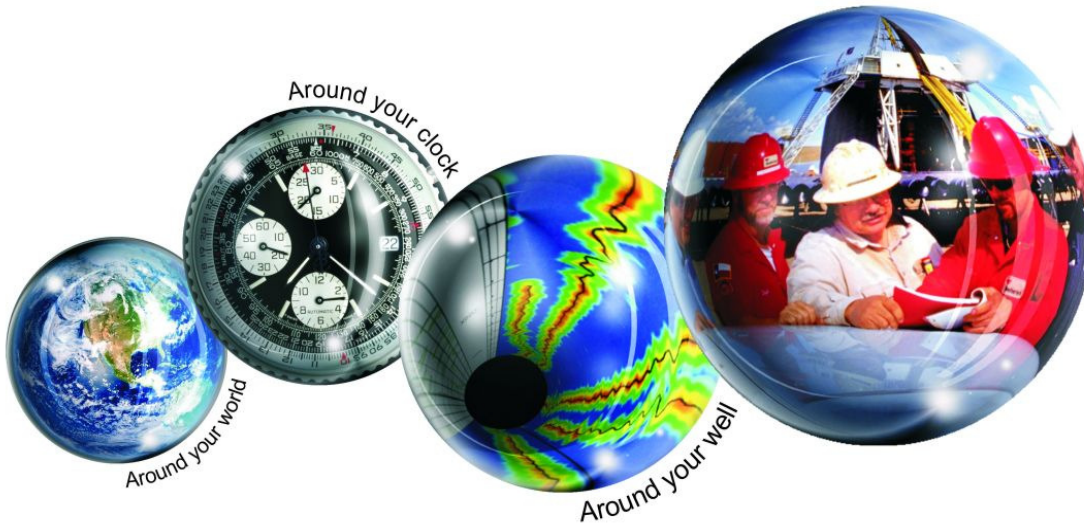
Photo by AJ



Ted McHenry

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George Bruce	08/89	1990	Robert W. Frensley	12/01	2002
Robert Gebhart	01/90	1990	Gerald W. Zorger	01/02	2002
Ray Anderson, Jr.	11/90	1990	Don L. Calvin	03/02	2002
Harold McNeil	03/91	1991	Claud Sheats	02/02	2002
Millard W. Smith	08/91	1991	Merle Britting	2002	2002
Clinton Engstrand	09/91	1991	Harold Trapp	11/02	2002
M.F. "Ted" Bear	10/91	1991	Donald M. Brown	11/02	2003
James & Kathryn Gould	11/91	1991	Elwyn Nagel	03/03	2003
E. Gail Carpenter	06/91	1993	Robert Noll	09/03	2003
Benton Brooks	09/92	1992	Benny Singleton	09/03	2003
Robert C. Armstrong	01/93	1993	Jay Dirks	2003	2003
Nancy Lorenz	02/93	1993	J. Mark Richardson	02/04	2004
Norman R. Stewart	07/93	1993	John "Jack" Barwick	02/01	2004
Robert W. Watchous	12/93	1993	Richard Roby	03/04	2004
J. George Klein	07/94	1994	Ruth Bell Steinberg	2004	2004
Harold C.J. Terhune	01/95	1995	Gordon Keen	03/04	2004
Carl Todd	01/95	1995	Lloyd Tarrant	05/04	2004
Don R. Pate	03/95	1995	Robert J. "Rob" Dietterich	08/96	2004
R. James Gear	05/95	1995	Mervyn Mace	12/04	2004
Vernon Hess	06/95	1995	Donald Hoy Smith	04/05	2005
E. K. Edmiston	06/95	1995	Richard M. Foley	06/05	2005
Jack Rine	07/95	1995	Wayne Brinegar	06/05	2005
Lee Cornell	08/95	1995	Charles B. Moore	09/96	2005
John Graves	10/95	1995	Jack Heathman	05/06	2006
Wilson Rains	10/95	1995	Charles Kaiser	09/06	2006
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Frank M. Brooks	03/98	1998	Theodore "Ted" Sandberg	07/08	2008
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Stephen Powell	04/98	1998	Earl Brandt	04/09	2009
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Donald L. Hellar	11/98	1998	Joseph E. Moreland, Jr.	03/10	2010
Joseph E. Rakaskas	01/99	1999	Gene Garmon	03/10	2010
Charles W. Steincamp	02/99	1999	James F. Dilts	05/10	2010
Robert and Betty Glover	10/96	1998	Jerry Pike	05/10	2010
Howard E. Schwerdtfeger	11/98	1999	Donald Hollar	06/10	2010
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V. Richard Hoover	01/00	2000	John Tanner	08/10	2010
Warren E. Tomlinson	01/00	2000	William (Bill) Owen	09/10	2010
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KGS BULLETIN
 January—February 2014

January 2014

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1 Library Closed	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21 Tech Talk	22	23	24	25
26	27	28 Tech Talk	29	30	31	

February 2014

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17 Library closed 	18	19	20	21	22
23	24	25	26	27	28	