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KANSAS GEOLOGICAL SOCIETY

# BULLETIN

Volume 85 Number 3

May—June 2010

## IN THIS ISSUE

### *Memorials:*

*Craig Caulk  
Donald Melland  
Joseph Moreland*

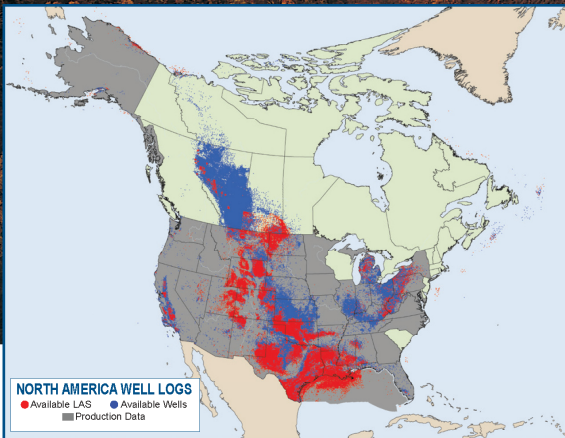
### **Osagean Petroleum Reservoirs in Kansas and Northern Oklahoma—for Which Osage are We Exploring?**

**S.J. Mazzullo & Brian W. Wilhite**

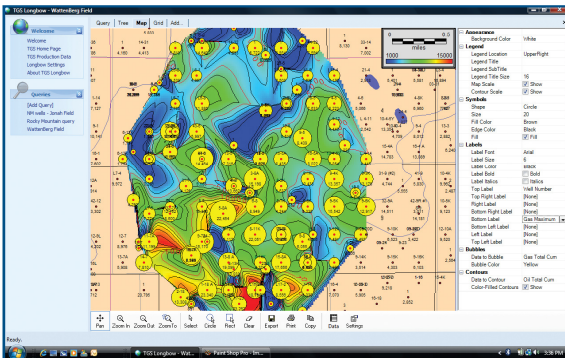
**Page 20**



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# Table of Contents

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## Features:

Memorials .....	14
Osagean Petroleum Reservoirs in Kansas & Northern Oklahoma— For Which Osage are we Exploring? S.J. Mazzullo & Brian W. Wilhite.....	20

## Departments & Columns:

KGS Tech Talks .....	4
President's Letter .....	7
Advertiser's Directory .....	8
From the Manager.....	9
KGS Board Minutes .....	17
Professional Directory .....	23& 24
Exploration Highlights .....	26
Kansas Geological Foundation .....	28
KGF Memorials.....	30

## ON THE COVER:

*A bryozoan-cored reef in lower Osagean limestones in the Pierson Formation, one of the many attributes of Mississippian stratigraphy that will be examined during the fall 2010 KGS field trip to SW Missouri, NW Arkansas, and NE Oklahoma*

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## 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 Technical Editor Dr. Sal Mazzullo at [salvatore.mazzullo@wichita.edu](mailto:salvatore.mazzullo@wichita.edu), whose mailing address is Department of Geology, Wichita State University, Wichita, Kansas 67260. 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>

# SOCIETY Technical Meetings

*Spring 2010*

*May 4—John Mitchell, - “Horizontal Drilling of Deep Granite Wash Reservoirs in the Anadarko Basin of Oklahoma and Texas” (Abstract page 10)*

*May 11—Shane Matson— “Exploitation of the Mississippi Chat Using Horizontal Well Bores in Osage County, OK”*

*May 18—Larry Richardson’s WSU Class*

*There are no technical meetings scheduled for the summer*

*We will resume meetings on September 7th*

## *Location for Technical Meetings*

*All KGS technical presentations are held at 12:30 p.m. at the **Wichita Bar Association**, located at **225 N. Market**, ground floor conference room, unless otherwise noted.*

*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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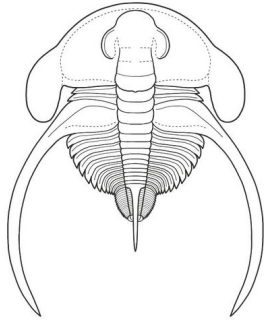
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So.....here we go again with a new one—good luck!

**Bulletin committee members and PhD's in  
Paleontology are prohibited from entering.**

## **JOIN US ON THE LINKS!**

### **KGS ANNUAL GOLF TOURNAMENT**

### **FRIDAY, JUNE 25TH**

**7:30 AM DONUTS & COFFEE**

**8:00 AM TEE OFF**

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**REGISTRATION FLYER IN THIS ISSUE  
(ON-LINE VIEWERS, SEE THE EVENTS TAB)**

# President's Letter

---



Dear Members,

Spring has finally arrived in Kansas, the flowers and trees are beautiful and Daylight savings time is giving us an extra hour of daylight to enjoy the outdoors after work. This is one of my favorite times of the year.

A couple of years ago, Bob Cowdery, our excellent Program Chairman, sent out an interesting study by the American Geological Institute (AGI). Included with this newsletter with the permission of AGI, two graphs indicate the distribution of age within the geoscience industry and the typical age distribution for an oil and gas company. The second graph clearly shows the bimodal age distribution within our industry, the aging of the majority of the geoscientists, and the significantly lower number of younger geoscientists. As I studied the graphs, several influential factors came to mind. The initial observation, I must admit, reinforced by preconceived ideas, is that the peak number of geoscientists is roughly tied to the oil price increase of the late 70's and early 80's, which led to higher salaries and an increase of the number of people entering the field. The peak in the number of hydrologists is the result of the downturn of the oil industry in the mid 80's, coupled with the increase in demand for environmental science services. The oil price doldrums of the 90's did not encourage students to enter exploration related fields. Other fields such as banking, finance and marketing may have looked more attractive to those deciding on a career path. The gradual but steady oil price increase in the early part of this decade, coupled with the attrition of the early baby boomers created a higher demand as indicated by the rapid increase in the "30 and under" category. I believe that we will continue to see an increase in the number of young people entering the geosciences field. I also believe that water resource and environmental fields will also experience a strong demand in the near future.

One of the effects of the bimodal age distribution of the exploration community is a discontinuity of the apprentice-mentor relationship that was common in many of the companies in our industry. Many of us worked for major companies or large independents where we developed a relationship with one or more mentors who would take us "under their wing" and show us the fundamentals of doing our jobs. These companies also had the resources to further our education by giving us industry specific training. I was very fortunate to work companies with some very good mentors and go to many career enhancement and continuing education courses, but how many of us have the opportunity to prepare for those to whom the torch will be passed? This mentor-apprentice relationship is probably a continuing process in some of the major companies, but as the graph indicates, there is a wider gap between those with experience and the younger generation entering the workforce. I also believe that the problem is exacerbated in our community. While we have some younger members entering into the exploration workforce here, will the need for experienced individuals be filled as it has in the past?

As I looked around to our aging KGS membership, and the number of us who are not likely to be in the business in the 5 to 10 year timeframe, I began to question the prudence of not planning for those changes in our membership. As my father so delicately stated, "Son, you are now in the 'check-out' generation". I wondered how many of us will be using the library, and how much business the library will have in 10 years. There are some individuals in their 30's and younger in our business, but are there enough younger members entering the field to offset the retirement and attrition rate? Tim Pierce and Paul Gunzelman kindly volunteered to help design a survey to distribute to all of our membership. They had been involved in an all-

Continued on page 10



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**ADVERTISER'S DIRECTORY**

	<i>page</i>
Allied Cementing Company, Inc	22
Duke Drilling	22
GeoCare Services AAPG	13
Kansas Geological Foundation	32
Kansas State University	21
Lockhart Geophysical	22
LogSleuth-MJ Systems	33
MBC Well logging	22
Murfin Drilling Company, Inc	22
Oneota Resources	11
PARAGON Geophysical Services, Inc	13
Professional Directory	23
Sunrise Oilfield Supply	22
TGS-NOPEC Geophysical Company	2
Tomcat Drilling	22
Trilobite Testing	6
Walters Digital Library	12
Weatherford	35
Well Enhancement Services, LLC	12

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## From The Manager

Dear Members,

What a nice spring we are having this year. The wind finally stopped blowing and the warm days finally arrived. Hope you are all enjoying it.

As I write this letter, some of our members are gearing up for the KGS Annual Bass Tournament this Friday and others are planning on attending the WSU Geo-Advisory Annual Baseball Bash—GO SHOCKERS! Both are good ways to celebrate spring in Kansas.

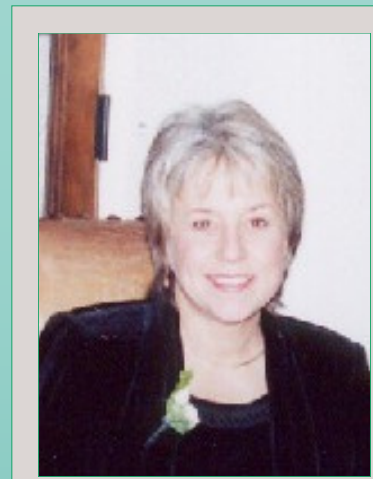
The next event coming up is the **Kansas Geological Foundation's Spring Mixer**. It will be on Wednesday, May 19th at the Petroleum Club. Please try to attend this very casual get-together. Free drinks and hors d'oeuvres will be served and it is a good time to get together and help support the Foundation. This year we will be doing things a little differently in that the Foundation is starting a fund raising effort to give new life to the Integration Project. We hope to hire some college student help this summer to get through some of the donated data that we have in the basement. This is a huge undertaking and we can use all the support we can get. We will have pledge sheets available at the Mixer so please consider helping with this noble cause. M.L. Korphage, Foundation President, will make a very brief presentation to help kick off this fund raiser.

Other upcoming events will be the KGS Golf Tournament which will be held on Friday, June 25th this year. The flyer is one of the inserts in this issue (on-line readers please go to EVENTS tab for the registration flyer). We also will be having the annual Picnic in August, a date has not been picked yet but we will post it on the web page as soon as we have it.

Enjoy the spring and I hope to see you at some of these upcoming events!

Respectfully submitted,

*Rebecca Radford*



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The Kansas Geological Society & Library

(President's letter continued)

member survey over 10 years ago, and were willing to help with the new survey. The product of the work is within this bulletin. PLEASE take the time to fill it out and return it to the library. It can be returned via mail, email, or FAX, anonymously or not. Please also fill out any feedback that you have regarding the library and how we can improve our services. Thank you for your commentary and please thank Paul and Tim for their effort. If you have any questions or comments please call or email me or Rebecca at the library.

Enjoy your spring and we'll see you at the Spring Mixer!

Respectfully submitted,  
Rick Saenger

American Geological Institute  
**GEOSCIENCE CURRENTS**  
No. 16  
09 October 2008

### Geoscience Workforce Age Distribution

The majority of geoscientists in the workforce are within 15 years of retirement age. Data from federal sources, professional societies, and industry indicate the imbalance of the age of geoscientists in the profession. The percentage of geoscientists between 31 and 35 years of age is less than half of geoscientists between 51-55 years old.

#### Age Distribution of Geoscientists in Industry


Age	Exploration Geophysicists (SEG)	Geoscientists (OPM)	Hydrologists (NGWA)	Geologists (USGS: GS-14)
30 and under	12%	10%	0%	0%
31-35	8%	7%	0%	0%
36-40	7%	8%	10%	0%
41-45	7%	10%	35%	0%
46-50	8%	12%	30%	0%
51-55	18%	18%	20%	28%
56-60	15%	17%	10%	25%
61-65	8%	10%	5%	15%
66-70	5%	5%	2%	8%
>70	8%	2%	0%	2%

Data Sources: Society of Exploration Geophysicists (SEG), US Office of Personnel Management (OPM), National Groundwater Association (NGWA), USGS Workforce Demographics and Trends, Peter T. Light 23rd IGC, Oslo, Norway, August 10, 2008 (USGS)

Even in oil & gas companies, which typically offer the highest salaries of all geoscience employing industries, the supply of new geoscientists is short of replacement needs. The number of younger geoscientists in their early 30's is approximately half the number of those nearing retirement age. This number is more than the data reported from federal agencies and professional societies.

#### Typical Age Distribution for an Oil & Gas Company

- Leila Gonzales

[www.agiweb.org/workforce/](http://www.agiweb.org/workforce/)  [workforce@agiweb.org](mailto:workforce@agiweb.org)

**Below is a screen shot of the KGS website where you now access the  
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The Kansas Geological Society is composed of geological professionals from across the country. The Society hosts many educational lectures and social functions and maintains a library of geological data.

The Kansas Geological Society and Library is located in the Landmark Square Building, just north of the corner of Market and First Street in Wichita.

[Bulletin: November - December 2009](#)

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The Kansas Geological Society Library has the most complete collection of oil and gas well data for the State of Kansas and surrounding areas. Donated by industry since 1923.

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**Walters Digital Library New Software Review**

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12:30 PM

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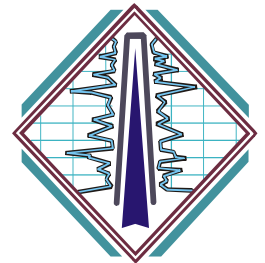
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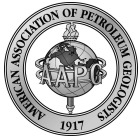
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## KANSAS GEOPHYSICS IN THE 21ST CENTURY

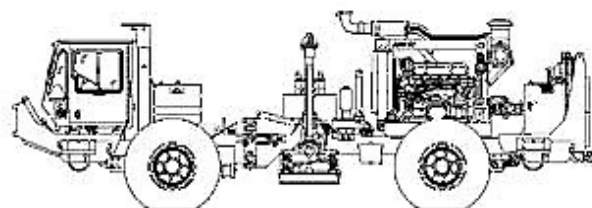
A symposium to be held in  
Wichita in the fall of 2010.

An update of the Kansas Geological  
Survey's Bulletin 137 (1959)  
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# Memorials

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## Memorial to Craig Caulk

( Much of this information was obtained from Craig's 1<sup>st</sup> cousin, Kim Shoemaker)

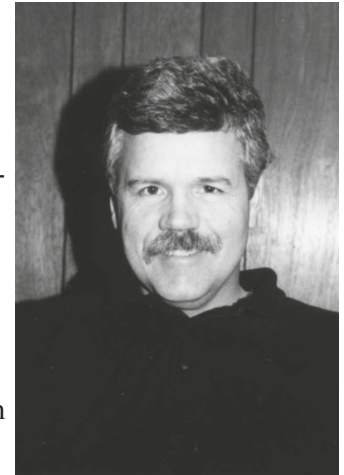
With the passing of Craig on March 3, 2010, the oil industry lost a great oil finder and the profession of geology, a real gentleman. Craig was born May 15, 1952 in Wichita. His father was employed by Boeing and his mother, a nurse who assisted in the care of the elderly. His grandfather was John Shoemaker, who as a driller had worked in such faraway places as Kuwait.

All of his education was acquired in Wichita, commencing with Levy for grade school, then Meade Jr. High followed by graduation from East High School in 1970. Craig graduated from Wichita State in 1974. During his attendance at these schools, Craig had been quite an outstanding athlete.

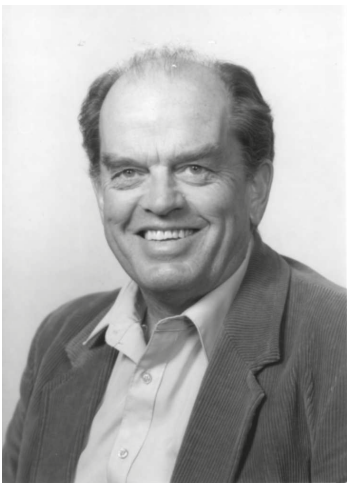
His professional career consisted of working for Rickelson Oil, Rains and Williamson, and work as an Independent. At the time of his death he was employed by Ritchie Oil.

Craig is survived by his wife, Rhonda and children: Nathaniel of the home, Jenny Caulk and Amy Caulk, both residing in Kansas City, Missouri and Melissa Petz of Wichita.

The family has designated the Central Christian Church and the Union Rescue Mission to be recipients of memorials. A memorial has also been established with the Kansas Geological Foundation.



## Memorial to Don Melland



Donald J. "Don" Melland, 85, died Sunday , March 14, 2010. Don was born in Casper, Wyoming on January 18, 1925 and graduated from St. Teresa High School in Hutchinson, Kansas. He served in the U.S. Army Air Corp as a Staff Sergeant in WWII. He received the European, African, Middle Eastern Campaign Medals, Good Conduct Medal, Air Medal with 5 Oak Leaf Clusters.

Don attended the University of Oklahoma, graduating with a degree in Geological Engineering in 1951. He worked as an independent consultant and also managed Melland Drilling Company from 1954 to 1978. Don was a 50 year member of the Kansas Geological Society and was also a member of the American Association of Petroleum Geologists.

Surviving family members include his children: Patricia Cleaves and her husband David of Hutchinson, Molly Kallenbach of Wichita, Thomas Melland and his wife Suzanne of LaVeta, Colorado, Fred Melland and his wife Debbie of Edmond, Oklahoma, Andrew Melland of Wichita, and James Melland of McPherson; his sister Mary Jane Dailey of Burlington, Iowa; his brother: John Melland of Hutchinson; 13 Grandchildren; three great-grandchildren; many nieces and nephews, other relatives and a host of friends. Family request donations to St. Joseph's Catholic Church or Hospice and Home Care Reno County.

## Memorial to Joseph Moreland

Joseph Moreland an outstanding petroleum geologist in Kansas died March 31, 2010 in El Dorado. Mr. Moreland began his oil career in 1948 when he graduated cum laude from Tulsa University with a double degree in Petroleum Engineering and Petroleum Geology. He received the Pat King award which was given to the top engineering student at T.U. He returned to Oil Hill, Kansas to work for Cities Service Oil. In 1955, he joined Petroleum, Inc. in Wichita and worked there nine years, eventually becoming Kansas District Geologist. From 1964 until 1981, he worked for Rex and Morris Drilling in El Dorado as the exploration manager. He joined Martin Oil and Exploration where he worked until his retirement in 2002. He was a member and past president of Kansas Oil and Gas Association, He was also a member of the American Association of Petroleum Geologists, President of the Kansas Geological Society, and other state and national geological associations. He was inducted into the Hall Of Fame at Butler County Oil Museum in 2004. The son of Joe and Monreen (Brown) Moreland, he was born, September 15, 1924 at Oil Hill. He graduated from the El Dorado High School in 1942 and enlisted in the US Army Air Corps in December of 1942. During WWII he served as a navigator on a B-17 with the 8th Air Force in England and flew 25 missions over Germany. Recalled to active duty during the Korean War, he was shot down over North Korea on July 3, 1952 and was a POW for 14 months. He and the crew that survived were released in 1953. He was a decorated war veteran receiving two Purple Hearts, Air Medal, Silver Star and the Distinguished Flying Cross. He retired as a Major from the Air Force Reserve in 1968. He married Virginia Ruth Coffman in August of 1943. She survives. He is also survived by two sons, Joseph Moreland III and wife Carol of Topeka and Jim Moreland of El Dorado; two daughters and their husbands, Annette and Alan Lindal of Wichita and Angie and Mark Schreiber of Emporia; 5 grandchildren; and 5 great-grandchildren. The memorial established by the family is with the Butler County Oil Museum. A memorial has also been established with the Kansas Geological Foundation.





## Warnings: The True Story of How Science Tamed the Weather

Author: Mike Smith

*Warnings* tells the compelling, previously untold story of how the science of weather forecasting has become the most effective science at saving lives; More than cardiology, cancer research, or traffic safety. Thousands of lives are saved every year—at a very low cost to society.



Like *The Right Stuff* and *Rocket Boys*, *Warnings* is a work of narrative non-fiction—a first-person backstory of those who have dedicated their lives to the science of storms and the creation life-saving storm warning technology. They have toiled largely in anonymity outside the scientific world, until now. This book tells their amazing, unexpected story.

Mike Smith has been a speaker for the KGS Technical Meetings and has written this new book which will be available in book stores May 1, 2010. Mike explained “this is not a science book but rather a story about how scientists created America’s warning system, something that many modern nations still do not have.” Mike will be having a book signing at Watermark Books on May 5th at 7:00 PM. He is also doing *Miracle in Greensburg* and signing books at Exploration Place on Saturday, May 22 at 1:00 PM and 3:00 PM.

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## Celebration for Delbert Costa

On April 25<sup>th</sup>, Phil Knighton and Bob Cowdery attended a reception at the United Methodist church in Council Grove, which honored Delbert Costa who celebrated his **100th birthday on the 23<sup>rd</sup> of April**.

Delbert is the oldest living member of the Kansas Geological Society. Delbert has served the KGS in many ways including: Field Trip Chairman, Secretary –Treasurer, Vice President and President in 1963. He received Honorary Membership in 1990.

The reception was attended by his many friends in Council Grove and elsewhere who greeted him and his wife, Lola. His son, Craig of Seattle, Washington and daughter Cheryl of Council Grove read just a few of the many congratulatory messages.



All of us at the Kansas Geological Society wish Delbert a very happy 100th birthday!



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# Kansas Geological Society Board Minutes

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*Note: Official minutes of KGS Board meetings are available at the KGS Library.*

**March 9, 2010** \*CORRECTED MINUTES\* Mr. Rick Saenger called the meeting to order at 11:41 A.M.

## FINANCIAL REPORT/MANAGERS REPORT

- A. **Treasurer's Report**- Mr. Clothier informed the board that expired CD (#5775) was moved to Kanza at 1.5% for 14 months. *Mr. Davis motioned to accept the Treasurer's report as presented. Mr. O'Dell seconded and the motion passed unanimously.*
- B. **Manager's Report**- Mrs. Radford presented the Manager's Report as of February 28, 2010. Monthly income was \$35,782.77 and expenses were \$41,077.85. When the library net income is combined with the WDL net income, the bottom line net income for the month came to -\$358.88. The Society has 632 members, the Library has 151 members and WDL has 173 members.

## OLD BUSINESS

- A. **Geo-Tech Membership Category**- Mr. O'Dell handed out the current Constitution and suggested that we do not put the Geo-Tech category under "Student" but place it as a sub-category under "Associate". Will be discussed further at future meetings.
- B. **Membership Survey**- Mr. Saenger handed out a sample questionnaire. The goal is to have the questionnaire ready for the next bulletin.
- C. **Employee Review Process**- Mr. Saenger is currently working on this.

## NEW BUSINESS

- A. **Email Update**- Currently the KGS cannot mass email. Only 500 emails are allowed in 1 hour and then system locks up. Currently looking at companies that will allow unlimited mass emailing for an acceptable price.
- B. **SEG/AAPG Distinguished Lecturer for December**- Have to look at the paperwork but would like to have a joint Geo-physical/KGS meeting
- C. **AAPG Delegates**- Mr. Morrison and Mr. Davis will represent the KGS at AAPG in New Orleans.
- E. **Geophysical Symposium**- To be held the last week of October at the Airport Hilton. Wednesday, October 27 is evening icebreaker, October 28 will have technical talks all day and Friday, October 29 (until 2 pm) will have geothermal papers presented. A request has been brought up for help and company sponsors.

**ADJOURNMENT**- *Mr. O'Dell motioned to adjourn the meeting at 1:15 p.m. and the motion passed unanimously.*

**April 5, 2010** Mr. Rick Saenger called the meeting to order at 11:40 A.M.

## FINANCIAL REPORT/MANAGERS REPORT

- A. **Treasurer's Report**- Mr. Clothier informed the Board that CD #5842 was renewed until 3/24/2011 at Andover State Bank with a rate of 1.15%. *After discussion, Mr. Davis motioned to accept the Treasurer's report. Mr. Watney seconded and the motion passed unanimously.*
- B. **Manager's Report**- Mrs. Radford presented the Manager's Report as of March 31, 2010. Monthly income was \$40,854.63 and expenses were \$40,048.84. When the library net income is combined with the WDL net income (\$12,352.50), the combined net income for the month came to \$13,158.29. The Society has 665 members, the Library has 170 members and WDL has 173 members. *Mr. Watney motioned to accept the Manager's report. Mr. Davis seconded and the motion passed unanimously.*

## OLD BUSINESS

- A. **Membership Survey**- Survey has been distributed and so far has seen a good response.
- B. **Employee Review Process**- Mr. Saenger will prepare and goal is for it to be ready by September or October.
- C. **Geo-Tech Membership Category**- Mr. O'Dell reviewed the Constitution to determine if the membership has to vote on membership category changes or if this is a board vote; Article IX states that changes must be voted on by the membership. This topic will be tabled until October will be included on the ballots for the next election.

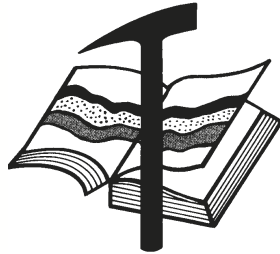
## NEW BUSINESS

- A. **Geophysical Symposium**- Joint venture with Geophysical Society heading up symposium (Oct. 27-29). Before contract is signed with the Hilton, putting about \$1400 at risk, does Rick have approval of the Board to have the Kansas Geological Society donate money and take 1/3 risk? *Mr. Clothier makes motion to support the conference for minimum \$500 with understanding that we may lose the money. Mr. Davis seconds the motion. motion passed with a 5-1 vote.*
- B. **Foundation Project for Integration**- Foundation Board has committed some money for starting integration project again under the supervision of Ted Jochems.
- C. **KGS Server**- The KGS server is now outdated (NT system) and Mrs. Radford would like approval from the Board to purchase a new server system. Mrs. Radford set aside money in the annual budget for computer hardware purchases and does not need approval of the Board unless the new system costs more than allowed in the budget. We should know more before next meeting.

**ADJOURNMENT**- *Mr. Davis motioned to adjourn the meeting at 1:11 p.m. and the motion passed unanimously.*

Respectfully submitted,  
Marjorie Noel, Secretary

It's Time For The  
KANSAS GEOLOGICAL FOUNDATION'S  
15th ANNUAL SPRING MIXER



On Wednesday, May 19, 2010  
Time 4:30 PM—8:00 PM

Where?

**The Petroleum Club**  
9th Floor of the Bank of America Building  
Broadway & Douglas

Casual Dress



Free Beer, Wine, Soda  
& Hors D'oeuvres



**Come Join In the Fun, Food & Libations!**

Everyone is welcome !!!!!  
You don't have to be a member of the Foundation  
or the Society or even a geologist to attend !  
Please join us on Wednesday, May 19th  
and bring your spouse, friends & colleagues.  
Encourage others to join!!!!!!

# **FIRST ANNOUNCEMENT**

## **FIELD TRIP & CORE WORKSHOP**

### **MISSISSIPPIAN OUTCROP LITHOSTRATIGRAPHY AND DEPOSITIONAL ARCHITECTURE AS MODELS FOR SUBSURFACE PETROLEUM EXPLORATION**

**Based on outcrops in SW Missouri, NW Arkansas,  
and NE Oklahoma**

Led by S.J. Mazzullo, Brian W. Wilhite, and Darwin R. Boardman  
Sponsored by the Kansas Geological Society

**WHEN: Friday, September 24th to Sunday, September 26th (Field Trip)**

**Friday, October 1st, 8:00 AM—Noon at WSU (Core Workshop)**

This 3 day trip (including travel) will examine world-class exposures of Mississippian (Kinderhookian to basal Meramecian) carbonate rocks in SW Missouri, NW Arkansas and NE Oklahoma. The trip will be followed a week later by a 1/2 day core workshop that features Mississippian cores from south-central Kansas to compare to what was seen in the field.

**The trip will be by bus (or vans) and will depart from Wichita, KS  
The trip will be limited to 40 people**

Cost of the trip, registration, and trip specifics will be announced in the next issue of the KGS Bulletin and will also be posted on the front desk at the KGS library and on-line at [www.kgslibrary.com](http://www.kgslibrary.com)

# OSAGEAN PETROLEUM RESERVOIRS IN KANSAS AND NORTHERN OKLAHOMA – FOR WHICH OSAGE ARE WE EXPLORING?

S. J. Mazzullo<sup>1</sup> and Brian W. Wilhite<sup>2</sup>

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<sup>2</sup>Woolsey Operating Co., LLC, 125 No. Market, Suite 1000, Wichita KS 67202

## INTRODUCTION

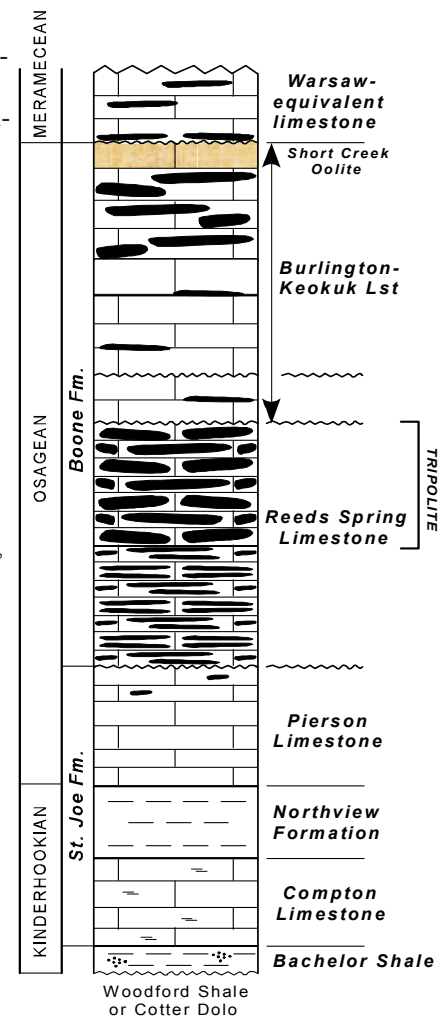
Mississippian rocks of Osagean age have been, and will continue to be, important petroleum reservoirs and reservoir exploration objectives in Kansas and northern Oklahoma. Fundamental lithologic and petrophysical attributes of Osagean reservoirs in these areas are described by a number of workers, including Difren (1966), Rogers et al. (1995), Colleary et al. (1997), Mullarkey et al. (1997), Montgomery et al. (1998), Rogers (2001), Watney et al. (2001), and Franseen (2006). Reservoirs in these rocks typically are chert or at least are very cherty (although dolomite locally comprises some Osagean reservoirs), and go by names such as “*Mississippian chert or chat*”, “*eroded or solid Miss*”, *tripolite*, and in the Cowley Formation, *spiculite* (Mazzullo et al., 2009). Important distinctions between chert, chat, tripolite, and spiculite were discussed recently by Mazzullo and Wilhite (2010a). Following those definitions, the present paper discusses only chert and tripolite.

The inadvertent product of years of exploration for “*the Osage*” is the notion that it comprises a single entity – namely, chert (under any terminological disguise). Inherent in this notion is that one never wants to drill too far into the Osagean section, if it is the deepest reservoir objective in a well, for fear of hitting the ocean. Is such a notion reality?

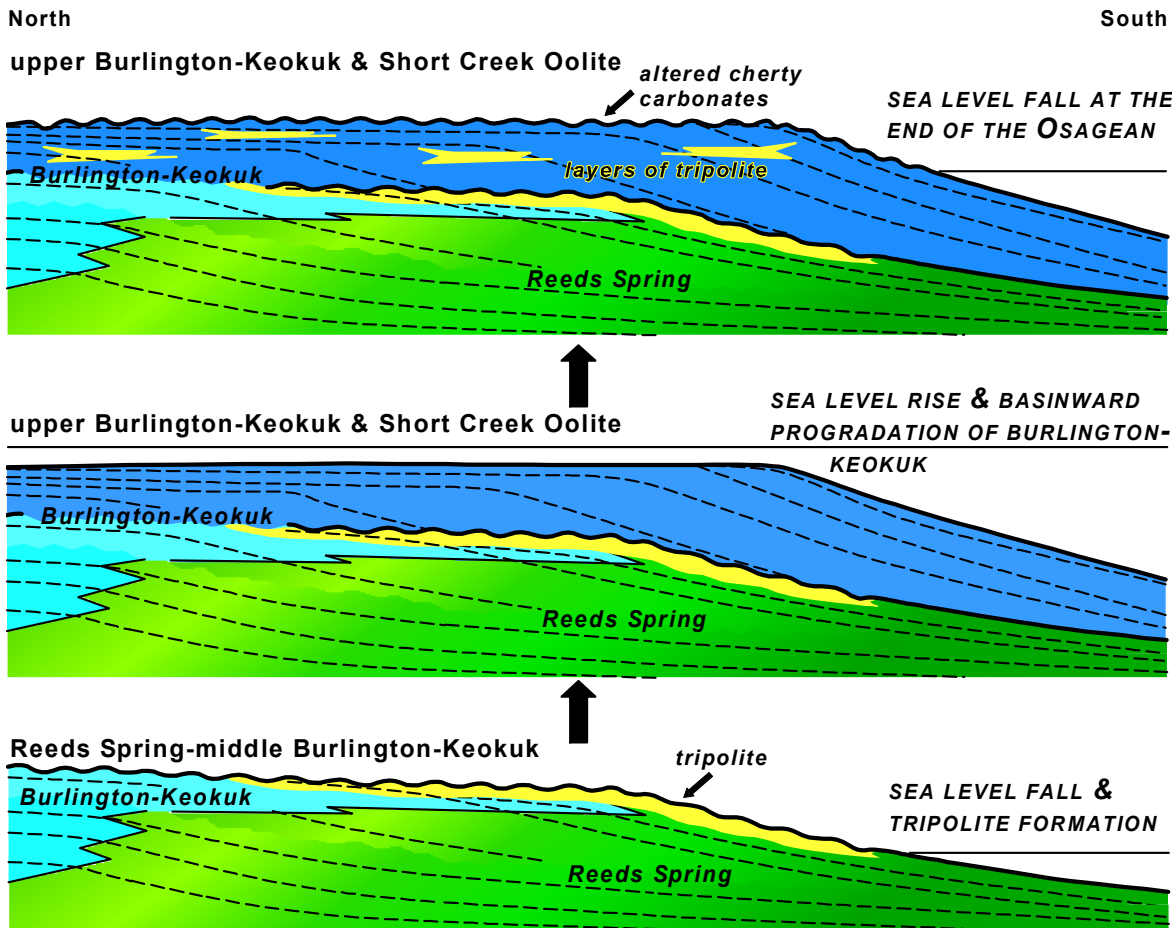
## WHICH OSAGE?

In exposures in SW Missouri, NW Arkansas and NE Oklahoma, the subsurface Osage actually comprises three formations rather than just one Osagean-age unit (Figure 1). The Pierson Limestone is the basal Osagean unit in outcrops, and it consists of limestones that only locally contain some nodular cherts. Generally non-cherty Pierson-equivalent rocks are present in the subsurface to the west of the outcrop belt, and except in rare instances, the formation is not a petroleum reservoir, at least not in Kansas. Where it does produce, for example in Pratt County, Kansas, the reservoir is in cherty residue beneath the top-of-Pierson unconformity, but cumulative production is only a few thousand BO per well – hardly a commercial reservoir objective.

Overlying middle Osagean rocks in outcrops are represented by the Reeds Spring Formation and the laterally-equivalent or overlying Burlington-Keokuk Formation (Figures 1, 2). The Reeds Spring Formation is a very cherty lime mudstone capped by a prominent subaerial unconformity. It was deposited in a relatively deep-water slope environment, and its up-dip lateral equivalent is shallow-water crinoidal limestones in about the middle of the Burlington-Keokuk Formation (Figure 2). The stratigraphic equivalents of the Reeds Spring are present in the subsurface only in southern Kansas and northern Oklahoma, where they include similarly cherty lime mudstones, and within the section is sandwiched the spiculitic Cowley Formation (Mazzullo et al., 2009). The upper part of the Reeds Spring Formation is a tripolite formed as a result of subaerial meteoric diagenetic alteration of the parent cherty limestones in the formation during a major sea-level fall (Mazzullo and Wilhite 2010b). This tripolite appears to be the reservoir in the very prolific Glick and Spivey-Grabs fields in south-central Kansas, and also in other fields in Kansas and northern Oklahoma. It is a major reservoir objective in these areas, and it may also be present locally as a reservoir in up-dip correlative basal Burlington-Keokuk Limestone beds (Figure 2). Inasmuch as it represents slope deposits, the Reeds Spring and its subsurface equivalent(s) are present in the subsurface only to the south of the latitude of a line approximately connecting northern Barber County to about northern Cherokee County in Kansas. North of that latitude, only time-equivalent (and younger) Burlington-Keokuk crinoidal limestones are present. So, one can not explore for this tripolite north of that latitude as it is not present.

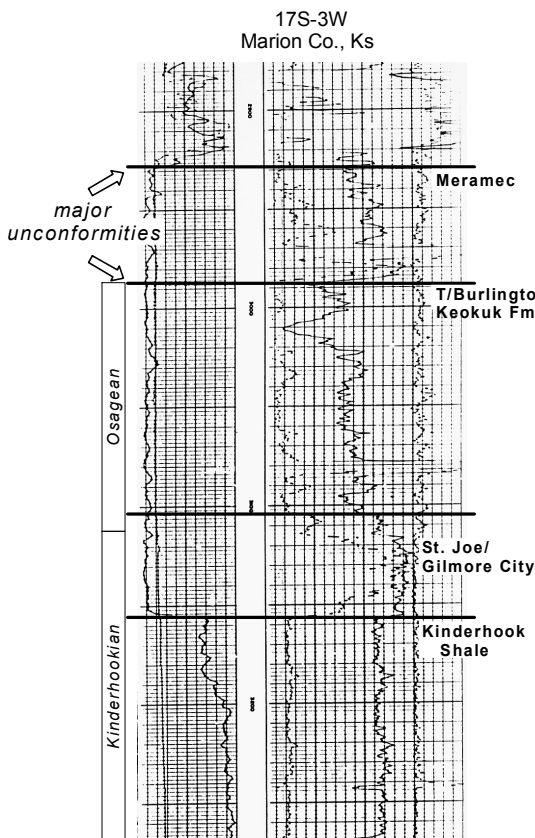


**Figure 1.** Lithostratigraphy of Kinderhookian to basal Meramecian rocks in SW Missouri and adjoining states (after Thompson, 1986). The Compton through Northview are known as the St. Joe Fm. in Oklahoma and Arkansas, and overlying strata are relegated to the Boone Fm. (which extends upward to include Warsaw-equivalent limestones in Arkansas). Modified from Mazzullo and Wilhite, 2010b).



**Figure 2.** Lithostratigraphy of middle and upper Osagean strata in the midcontinent. Bottom panel -- the Reeds Spring Fm comprises slope deposits that are time-equivalent facies of shallow-water crinoidal limestones of the ~middle part of the Burlington-Keokuk Fm. A major sea-level drop then exposed chert near the top of the section, which was altered to tripolite in the meteoric environment. Middle panel -- subsequent progradational deposition of the younger, shallow-water Burlington-Keokuk Fm ensued. Bottom panel -- sea-level fall at the end of Osage time exposed these rocks to meteoric diagenetic fluids

The youngest Osagean rocks in outcrop are represented by the middle to upper Burlington-Keokuk Formation, which is capped by the Short Creek Oolite Member (Figure 1). The lateral equivalent of these rocks are crinoidal limestones that are present throughout subsurface Kansas except where they have been eroded. These rocks are moderately cherty in surface exposures, and they become quite cherty in the subsurface to the west (Figure 3); in many areas the formation is composed largely of chert. In-situ weathered porous chert and associated porous limestones and dolomites, and locally, chert gravel, developed as meteoric alteration products along the major unconformity at the top of the Osagean section (Figure 2). These rocks are very productive throughout Kansas, and they are the main reservoir in very prolific oil fields such as, for example, Lost Springs Field in Marion County, Kansas. Reservoirs are present beneath the top-of-Osage unconformity throughout the stratigraphic extent of the Burlington-Keokuk Formation and regardless of how thick the preserved section is. Reservoirs locally are present beneath fairly thick sections of Meramecian strata (Figure 3), or they are present where Osagean strata are overlain by Chesterian or Pennsylvanian rocks.



**Figure 3.** Gamma ray-neutron/density log of a well in north-central Kansas where the middle to upper Osagean section -- the Burlington-Keokuk Limestone -- is very cherty. These rocks locally are petroleum reservoirs even where they are overlain by a fairly thick Meramecian section.

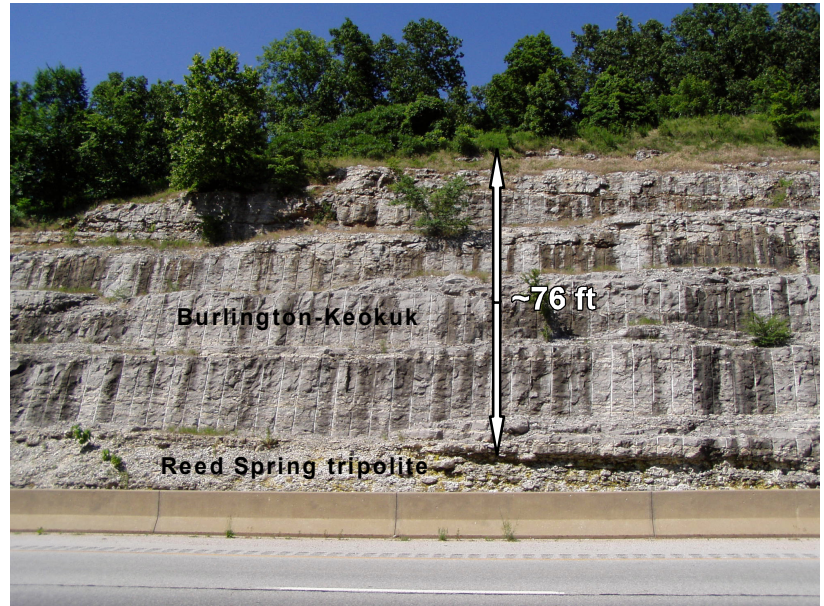
### CONCLUDING REMARKS

There are three Osagean units in subsurface Kansas and northern Oklahoma that are similar lithologically to equivalent sections in outcrops in SW Missouri, NW Arkansas, and NE Oklahoma. They are, in ascending stratigraphic order: (i) generally non-porous limestones correlative to the basal Osagean Pierson Formation in outcrops; (ii) porous tripolites at the top of the middle Osagean Reeds Spring Formation, and perhaps also in correlative up-dip beds of

the Burlington-Keokuk Formation, both only in southern Kansas and northern Oklahoma; and (iii) porous, altered cherts and carbonate rocks beneath the top-of-Osage unconformity in shallow-water deposits of the Burlington-Keokuk Formation throughout Kansas and northern Oklahoma. Commercial petroleum reservoirs are present within the subunconformity tripolites at the top of the Reeds Spring-correlative rocks, and in the overlying, subunconformity Burlington-Keokuk Formation. In southern Kansas and northern Oklahoma, subunconformity reservoirs may be present within the youngest Osagean Burlington-Keokuk Formation *and* in underlying erosional remnants of the tripolites in the Reeds Spring Formation (Wilhite et al., 2010).

In this regard it is apropos to ask: if we are drilling through a relatively thick section of non-porous Osage rocks (e.g., the youngest Burlington-Keokuk) should we drill any deeper if “the Osage” was our deepest reservoir objective? Figure 4 is a scenario where the answer to this question would be “yes”, and similar scenarios of potential reservoir occurrence are present throughout southern Kansas and northern Oklahoma.

**Figure 4.** Outcrop of ~ 76 ft of non-porous limestone and chert in the youngest Osagean Burlington-Keokuk Formation, overlying porous tripolite (45 ft thick in this immediate area) reservoir-type rock at the top of the middle Osagean Reeds Spring Formation along Highway 71 just south of Bentonville, Arkansas.



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Email: [johnroutree@bratco-operating.com](mailto:johnroutree@bratco-operating.com)



**KGS Golf Tournament**  
Friday—June 25th

**Help Wanted!**  
**Integration Project**

If you have any time you could give to the Library, we have projects that could move a little faster with some Expert Professional Geologists

Just a few hours a week would make such a difference.

To volunteer, please contact Ted Jochems  
or Rebecca at the Library  
265-8676

**Wednesday, May 19th**

**Please Join The Fun**  
**At the**

**Kansas Geological Foundation's**  
**Spring Mixer!**



**At the Petroleum Club in**  
**Wichita**

**4:30—8:00 PM**

**Free beer, wine &**  
**hors d'oeuvres**

**Help Support The KGF!**



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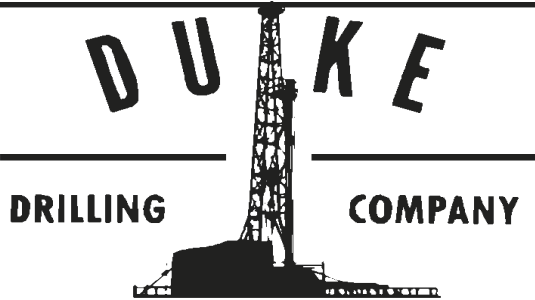
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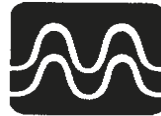
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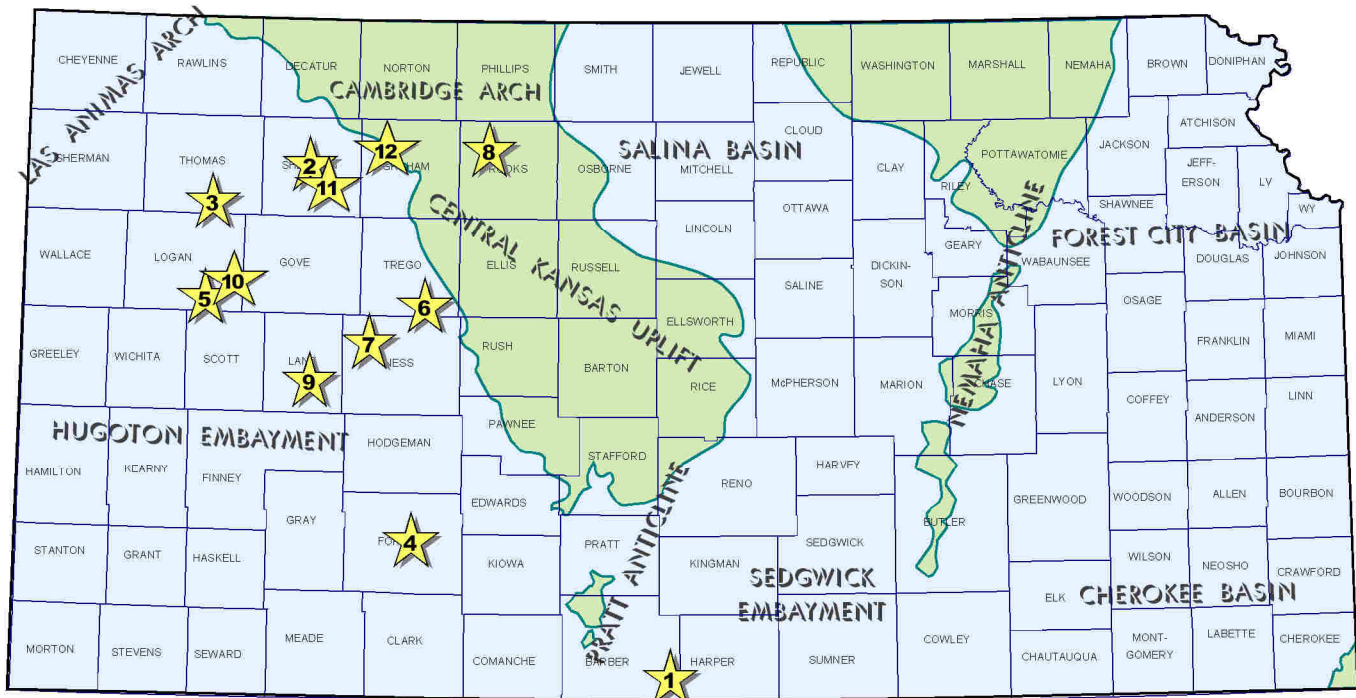
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(1) **Hart Energies, LLC** is flowing 9,460 Mcf natural gas daily on the Knorp Farms lease in the NW/4 of section 27- T34s- R10W, **Barber** County. The No. 1 well was placed on production on January 4th at site located one and one-half miles south of Hazelton, Kansas. Terra Drilling tools drilled the well to a rotary total depth of 5,198 ft. Operator perforated the Mississippian from 4705 to 4720 ft. The new Knorp field discovery is also making a trace of oil, but no water. Well site lies nearly one mile southeast of Mississippian oil production in the Hazelton Townsite South field, discovered by VAL Energy in 2008.

(2) **Castle Resources** has completed it's No. 1 Clark for 150 barrels of oil per day, no water. Located in the SW/4 of section 32 -T8s- R28W, **Sheridan** county, the well successfully revives production in the previously abandoned Hoxie East field, located about two and one-half miles southwest of the town of Hoxie, Kansas. The well found new pay source in Shawnee (Toronto limestone) from perforated depth of 3,826 to 3,829 ft.

(3) **O'Brien Resources, LLC** is pumping 80 barrels of oil and 39 barrels of water daily at it's No. 14-1 Krug, located in NE/4 of section 14- T10s- R33W, **Thomas** County. The Spica pool opener is producing oil from both the Lansing-Kansas City (4,308 to 4,322 ft.) and the Cherokee Johnson Zone (4,624 to 4,632 ft.). Sterling Drilling tools bottomed the well at a total depth of 4,760 ft. The discovery lies over three-quarters mile north of the Nollette Southeast oil field (LKC oil). The new field has not been named.

(4) **Vincent Oil Corp.** has discovered Mississippian oil and gas reserves in **Ford** County, about eight and one-half miles northwest of the city of Ford, Kansas. The Steele No. 1-31, drilled in the SE/4 of section 31- T27s- R23W, was completed in mid January for an undisclosed potential. Well is located over three-quarters mile northeast of abandoned 'show hole' in the Willroads Southeast field where the Morrow formation produced a little oil. Closest known Mississippian production lies over four miles away in the Steel field. VAL Energy tools drilled the well to a total depth of 5,330 ft. The new field is named Delphi.

(5) **Brito Oil Company** has established the Little Pyramids oil field in southeastern **Logan** county. The discovery well, No. 1-13 Fairleigh, NW/4 of section 13- T15s- R33W, was put on pump on February 9th at an undisclosed rate. Both the Altamont and Fort Scott limestones in the Marmaton were found to be productive. Murfin Drilling bottomed the hole at 4,500 ft. The new oil field lies over three miles from the Beaver Butte field, which produced oil from the Lansing-Kansas City and Marmaton for two years beginning in July, 1983.

(6) **Palomino Petroleum** has released additional information regarding it's No. 1 Pearson Trust, which recently established the new Chalk Cliffs field in **Trego** County. Located in the SE/4 of section 15- T15s- R22W, the pool opener was completed for 72 barrels of oil and 3

barrels of water per day. The well is producing crude oil from Cherokee Sand perforations from 4,194 to 4,200 ft. Total depth is 4,300 ft.

(7) Elsewhere, Palomino Petroleum has completed an isolated 'infield discovery' on the western side of the Aldrich field in **Ness** County. The No. 1 Ilene Norton, NE/4 of section 32- T17s- R25W, is on pump making 61 barrels of oil and 9 barrels of water per day from Mississippian perforations between 4,366 to 4,370 ft. The 4,500 ft. deep well is located about eight miles southwest of Arnold, Kansas.

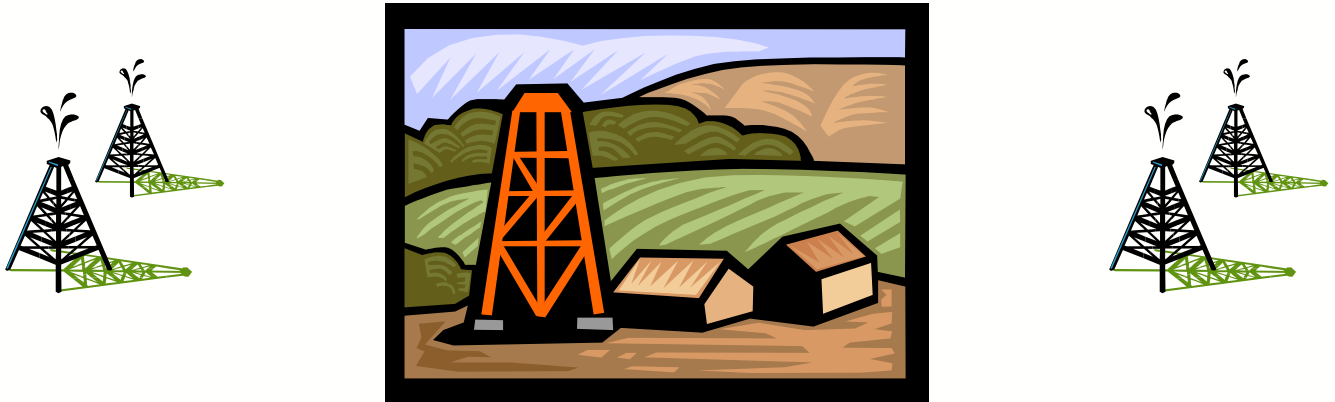
(8) **Brinker Enterprises, LLC** has discovered Arbuckle oil at a wildcat well in **Rooks** County. The No. 7-1 Gasperriffe, spotted in the SW/4 of section 7- T7s- R19W, is producing 50 barrels of oil per day, no water. The well topped the Arbuckle formation at 3,480 (-1445 kb) and is producing 30 degree gravity crude from perforations from 3,512 to 3,516 ft. Rotary total depth is 3,570 ft. The new Valley View North oil field is situated nearly three-quarters mile south of Arbuckle wells in the Slate South Field.

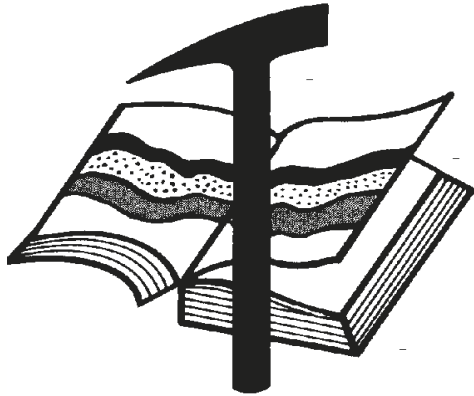
(9) **Mid-Continent Energy Operating Company** has opened the Creeks Edge oil field 2.5 miles south of Dighton, Kansas, in **Lane** county. The No. 1-6 Hineman Unit, NW/4 of section 6- T19s- R28W, is producing crude from undisclosed zone with rotary total depth reached at 4,675 ft. in Mississippian. Discovery site lies over 1.5 miles southeast of Lansing-Kansas City oil production in the Dighton field. Marmaton and Cherokee zones were also zones of interest in the area.

(10) **Landmark Resources, Inc.** is producing an undisclosed amount of oil from the Morrow formation at the No. 1-31 Ottley, SE/4 of section 31- T14s- R32W, **Logan** county. The wildcat pool opener found Morrow deposits nearly 4 miles southwest of other recognized Morrow production in the Chalk Buttes field. The new Burris Draw field is situated about 16 miles southeast of Russell Springs, Kansas. Total depth of the well reached 4,510 ft.

(11) **Dan Haffner** has reported an initial potential of 30 barrels of oil and 10 barrels of water per day at the Haffner No. 1, located in E/4 of section 18- T9s- R27W, in **Sheridan** county. The wildcat well started producing crude in January this year from Lansing-Kansas City formation. Southwind Drilling bottomed the well at a total depth is 4,190 ft. The new field is located 1.25 miles southeast of the Solomon Fork field (LKC oil) and is about 6 miles southeast of Hoxie, Kansas. The field is named Haffner.

(12) **H & M Petroleum Corp.** has established the Bessie May oil field in northwest **Graham** county with the completion of the No. 1 Bessie May. The well location was based on seismic interpretation and drilled to a total depth of 4,050 ft. in the NW/4 of section 16- T7s- R24W, about 7 miles northwest of Penokee, Kansas. Operator had targeted the Lansing-Kansas City and Cherokee Johnson Zone for exploration. No details have been released pertaining to production volume or pay source. The No. 2 confirmation well has also been drilled. Results are not available. Field area lies over 1.5 miles northeast of the Goddard pool (LKC oil).





# Kansas Geological Foundation

Web Site: [www.kgfoundation.org](http://www.kgfoundation.org)

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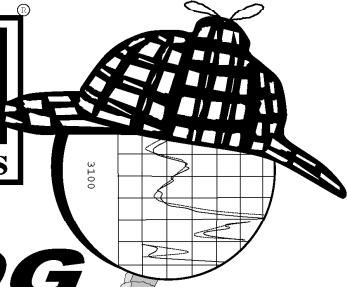
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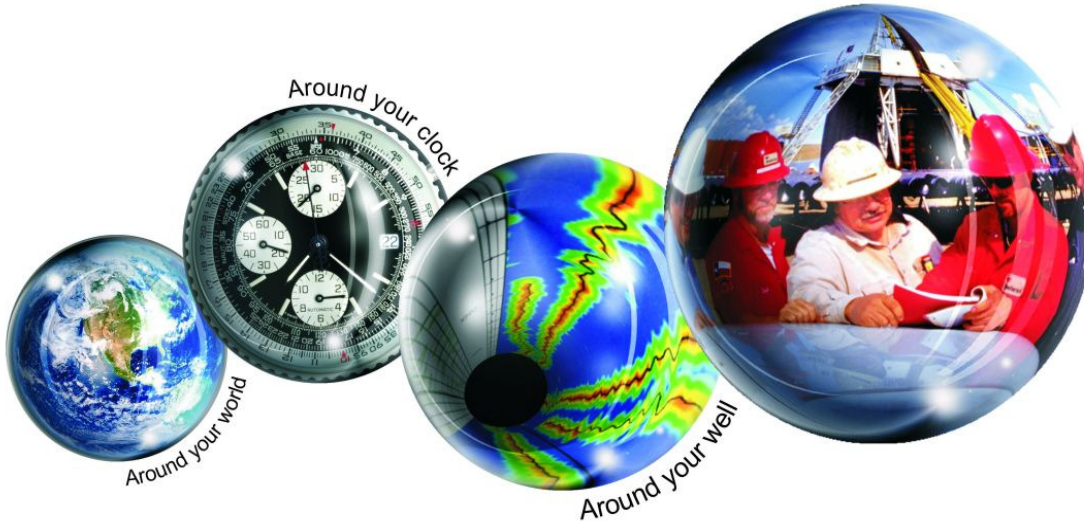
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KGS BULLETIN  
 May—June 2010

## May 2010

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1
2	3	4 <i>Tech Talk</i>	5	6	7	8
9	10	11 <i>Tech Talk</i>	12	13 <i>KGS Board Mtg.</i>	14	15
16	17	18 <i>Tech Talk</i>	19 <i>KGF Spring Mixer</i>	20	21	22
23	24	25	26	27	28	29
30	31 <i>Library Closed Memorial Day</i>					

## June 2010

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25 <i>KGS Golf Tournament</i> 	26
27	28	29	30			