



Established 1925

KANSAS GEOLOGICAL SOCIETY

# BULLETIN

Volume 85 Number 1

January—February 2010

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Paul Gunzelman*

*Profile:  
Jay Swanson*

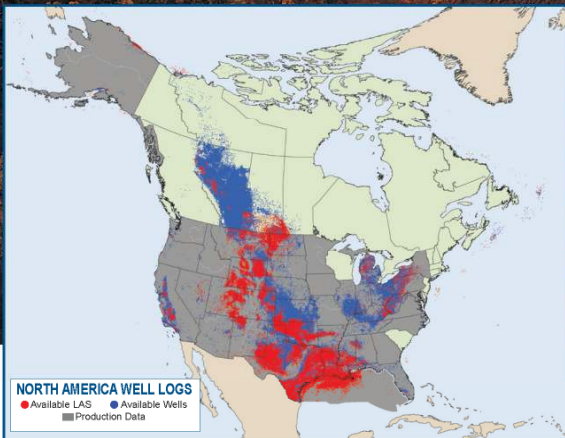
*KGS 2010 Board of Directors*

*“Chert, Tripolite, Spiculite, Chat  
What’s in a Name?”*

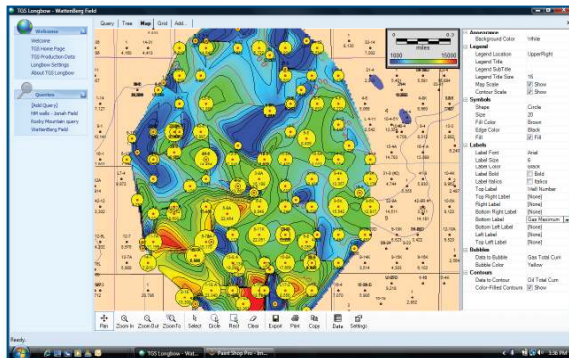
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## ON THE COVER:

*I believe this photo is from Tim Pierce’s vacation to Alaska a few years ago. You can almost hear the ice hitting the water.*

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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*

*Jan. 5—Demonstration of new Walters Digital Library Software*

*Jan. 19—Rick Andrews— “Production Decline Curves & Payout Thresholds of Horizontal Woodford Wells in the Arkoma Basin, Oklahoma”*

*Jan. 26—Robert Henthorne—KDOT—“Subsidence and its Impact on Infrastructure”*

*Feb. 2—Dr. Tony Walton’s KU Petroleum Class*

*Feb. 16—Rick Fritz—AAPG— “Great American Carbonate Bank”*

*Feb. 23—Dr. Gene Rankey—“Morphodynamics and Depositional Heterogeneity of Bahamian Holocene Ooid Shoals”*

*Mar. 16—David Rensink—President-Elect AAPG*

*Mar. 23—Will Gilliland— “Development of Kansas, the Land and the State”*

*Mar. 30—Drs. Susan W. and James Aber— “Legacy of Mining: Aerial Photography in Southeastern Kansas and Northeastern Oklahoma”*

*Apr. 6—TBA*

*Apr. 20 - Jean Lemmon, Tulsa— “TBA”*

*May 4—TBA*

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

*May 18—Larry Richardson’s WSU Class*

## *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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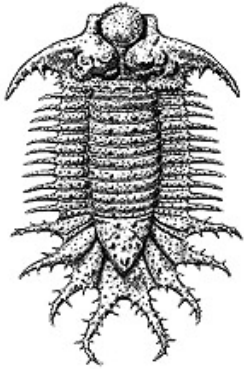
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**Okay—Randy guessed 2 in a row.**  
**Now someone else has to guess this one!**

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

*Please Plan To Attend The Kansas Geological Society's*

*Annual Banquet*

*Friday, January 22, 2010*

*Social Hour 5:30 P M*

*Dinner 7:00 P M*

*Program & Awards 8:00 P M*

*This Year We Will Be Honoring*

*Paul Gunzelman*

*Please Call 316-265-8676 to make your reservations!*

## KGS President's Letter – January 2010

Happy New Year to you all!

This is my first occasion to write the year 2010 on a document and it does not seem real that we are already a decade into the century. In my mind, Y2K was only a couple of years ago!

I would like to thank Lynn Watney for his outstanding leadership over the past year. He has handled some difficult issues with grace and skill that I can only hope to emulate. Fortunately, I can rely on a very fine Board that includes Dr. Watney, other past presidents, and Rebecca and the library staff to keep me out of serious trouble. I also want to thank Ernie Morrison and Jon Callen for their willingness to continue to serve our society as advisors.



We are taking steps to address budgetary concerns, including an increase in library membership dues beginning this year. It has been 10 years since we have had a dues increase. The leadership in past years understood the wisdom of “saving for a rainy day”, and that prudent philosophy is now being realized.

Kurt Look and Eileen Jones have made excellent progress on the WDL programming in a relatively short amount of time. On December 15<sup>th</sup> members of the board and the Walters Digital Library Committee were given a software update and demonstration. They presented a proposed Statement of Work for 2010 that prioritizes tasks to improve the utility of the digital database and fielded questions. Beta testing on the new software has started and Kurt and Eileen are addressing some of the issues presented to them. One of the concerns is the backlog of information that needs to be scanned. Rebecca moved all of the digital members to the new software over the week of Dec. 21 and we have been receiving good feedback. Data will begin flowing from the Kansas Geological Survey into our database to expedite our scanning effort. The Board understands that we are in the data business, and it is crucial to meet the needs of our membership by providing timely access to the most complete and accurate data available.

Finally I would like to thank our membership for placing their trust in me to serve in this position. While I am not politically astute and have many shortcomings, I will work hard to serve to the best of my abilities.

Respectfully submitted,  
***Rick Saenger***

Below is a screen shot of the KGS website where you will now access the Walters Digital Library [www.kgslibrary.com](http://www.kgslibrary.com)

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**Society**

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](#)

**Library**

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.

Robert F. Walters Digital Geological Library has 1,018,425 digital documents and logs available. [See](#) the count by county.

**Walters Digital Library New Software Review**

Tuesday, January 5, 2010

We will conduct a class on the new software for the Walters Digital Library

Please plan to attend and bring your questions and suggestions

12:30 PM

Wichita Bar Association

225 N. Market

**The KGS Library**

Done

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## From The Manager

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Dear Members,

Join me in welcoming 2010.....a new decade!

We are very excited to start the year with our new software for the Walters Digital Library up and running. We will be making changes and improvements to the software as the year progresses. In the first quarter, we will be concentrating on adding in all of the new data from 2005 to date. The old software did not work properly and we had not been able to add new data or make corrections. But this year, you will see a marked improvement in what we can offer you "on-line". If you do not belong to the digital library give me a call and I can set you up on a demo account so you can try it out.

On the preceding page, you will see a screen shot of what the web page looks like and where you sign in for the digital library.



We are concentrating on making room for more paper logs in our files. KGS staff will be busy stretching the files in the file cabinets to make room for all we have scanned and need to print out. If you are in the library looking for information and can't find it, please ask staff for assistance as we most likely have the information but we may not have it in the file cabinets yet.

Please mark your calendars for the first event of the year, the KGS Annual Banquet. It will be held on Friday, January 22nd and we will be honoring Paul Gunzelman this year. Let's hope for a nice evening weather wise and a good turnout for the Banquet.

I want to extend a warm welcome to our new president, Rick Saenger. I know Rick will continue the fine work of those who have come before him, in guiding the Society.

I wish you all a wonderful, productive year!

Respectfully submitted,

*Rebecca Radford*

Manager

# Honorary Profile— *Paul Gunzelman*

---

This year the Society is honoring a member who over the years has been very active in the Society and the field of geology and is very worthy of this honor bestowed upon him.

Paul was born in Guymon, Oklahoma the second of six children. He was reared on a farm near Stratford, Texas and attended school in Stratford. Paul's other siblings are: Steve a geologist in Amarillo; Jeff of Canberra, Australia; Carol, a college administrator in Chicago; David, a food service coordinator in San Francisco; and Brian, an environmental engineer in Ft. Worth.

During the summer before his senior year, the family moved to Amarillo and Paul graduated from Amarillo High School. Paul always wanted to work outside and couldn't envision having a career behind a desk so he considered employment as a park ranger. After a short stint in junior college, Paul moved to Colorado and established in-state residency to attend Colorado State University. But after discussing his career choice with his landlord, a park ranger at Rocky Mountain National Park, Paul realized this was not a job for him. So he moved back to Texas and took a job with Teledyne Exploration as a surveyor. Teledyne was one of the largest geophysical companies in the world at that time and his unit was under contract to Amoco. While working for them Paul met an Amoco geologist and liked the work he was doing. Paul's dad encouraged him to talk to Bob Dougherty who was the Head of the Geology Department at West Texas State in Canyon, Texas. Bob told Paul to take some introductory geology courses and see how he liked it.



Paul went his first year of geology at West Texas State then attended Texas Tech in Lubbock the next year. He returned to West Texas State at the end of his senior year and graduated from that institution in 1978. While at West Texas, one of his classmates was another prominent KGS geologist, Ernie Morrison. One of Paul's most influential instructors at West Texas State was Dr. James Underwood, later to be Head of the Department of Geology at Kansas State.

After graduation, Paul went to work for Pendleton Land and Exploration, a Denver based company. From 1980 until 1982, he worked Brandt Oil Company and went independent until 1984. In 1984 he accepted employment with Mull Drilling Company and worked for that company for ten years. Also employed at Mull during this period were current KGS members: Mike Kidwell and Dallas Donner. In 1994 he went to work for Canyon Energy and worked there until 1997. KGS members Joel Alberts and Rob Patton were with Canyon at that time. Since 1998 Paul has been an Independent Geologist.

In 1985, Paul married Shauna Abbott and they have three children: Carmen, who lives in Wichita and works for Hispanic Media; Spencer, a senior finance major at Kansas University; and Hannah, who is majoring in elementary education at Kansas University.

Paul has been very active in the KGS. He has served on the Library Committee, the Future Plans Committee, the Technical Programs Committee, the Honors and Awards Committee, and sold advertising for the KGS Bulletin. He has received a Presidential Citation and two Distinguished Service Awards. He has served as Secretary/Treasurer of the KGS and was President in 1994. He has twice been an Advisor to the Board. Paul has been on the Board of the Kansas Geological Foundation two times and was President of the Foundation in 2001. He is a current member of AAPG and has been on the Mid-Continent Section Council, an elected delegate from Kansas, and an advisor to the Division of Professional Affairs. He has also been on the Board of Directors of the Kansas Oil & Gas Association.

In line with his desire to be out of doors, Paul has been the wellsite geologist on a number of tests. When questioned about his most embarrassing experience, Paul recalls that he missed the Heebner Shale pick on one of the first wells he was on in Lane County. When he returned to Wichita, several individuals said “I understand you missed the Heebner pick”. One of his most challenging wells was with Brandt Oil in SE Nebraska. The well was 8 miles from the nearest dry hole. The objective was to encounter the Viola on the upside of the Humbolt Fault, expecting to encounter the granite at about 1700 feet. The well crossed the fault in the Hunton and encountered the Granite at about 2800 feet.

In his career Paul met many of the “Legends of the Kansas Oil Patch”. Some that he named were: Judd Hipps, J. Mull, and Scott Ritchie.

Paul has not confined his activities to those related to geology and oil. He has served his community by volunteering for the United Way, Episcopal Social Services, and was on the Board of Directors for the Wichita Art Museum Foundation. He has served on the Vestry of St. James Episcopal Church and taken an active part in their annual Oyster Dinner fund raiser.

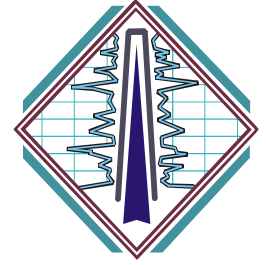
Paul enjoys hiking, fishing, and football games. He and Shauna enjoy traveling and the grandchildren.

Looking back on a very successful career, Paul hasn't any regrets of being a petroleum geologist and he plans to continue to be active in his chosen field of endeavor.



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<p><b>KANSAS GEOPHYSICS IN THE 21ST CENTURY</b></p> <p>A symposium to be held in Wichita in the fall of 2010. An update of the Kansas Geological Survey's Bulletin 137 (1959) Symposium on Geophysics in Kansas</p> <p>Sponsored by: Kansas Geophysical Society Kansas Geological Society Kansas Geological Survey</p> <p>Watch for time &amp; venue</p>
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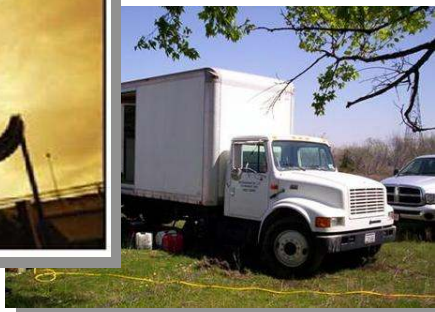
If you are a member in good standing of the Kansas Geological Society Library, you can purchase a yearly membership to the WDL for an additional \$600.00/yr.

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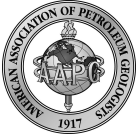
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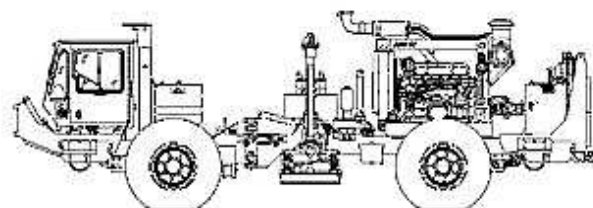
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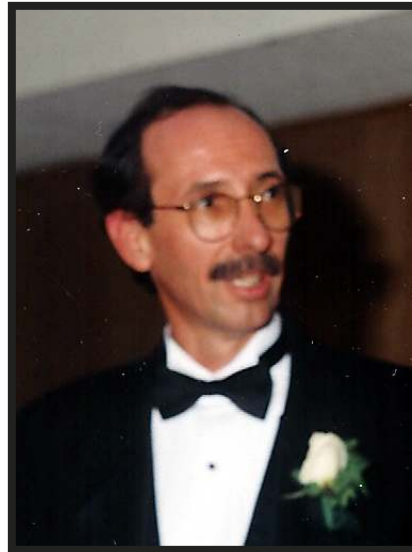
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# MEET THE 2010 KGS Board of Directors



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## Directors



**Lynn Watney**



**Robert O'Dell**



**Ken Dean**

# Profile *Jay Swanson*

---

JAY D. SWANSON, who topped off his 1956 degree in Geology with an additional semester of graduate studies, all at the University of Oklahoma, presents a tough act to follow for any writer who tries to organize all the pieces of Jay's life into a neat and orderly sequence. But here goes...

Jay was born on March 13, 1933, in Wichita. His family lived in a pleasant east side neighborhood not far from the old Wichita Country Club. His father—who had been involved in marketing for the Wilcox Oil Company before his tragic death in an automobile accident—left behind his wife, a daughter Beverly, a son Roy and his youngest child, Jay D.

During these early years Jay D. attended Alcott Elementary School, Robinson Intermediate and Wichita High School East from which he was graduated in 1951. It was during those years that Jay D. began to feel and think like a true entrepreneur.

He turned his entrepreneurial leanings into ways to make money, a commodity then in short supply in the Swanson's fatherless household. The urge to earn took him to the caddy shack at the Wichita Country Club where he began carrying golf bags and measuring the wealth and success of those he carried them for by the way they dressed, the quality of their golf clubs and equipment, and mainly, the size of their tips. Providentially, some of those he judged to be the most successful were geologists, which whetted his interest in geology as a potential career.

After graduating from East High, Jay D. set his cap to attend either Oklahoma University or Wichita University to study geology. A friend talked him into going to O.U. And suddenly, there he was enrolled in Geology and newly pledged to Beta Theta Pi where he worked off his fraternity fees and charges as head waiter and breakfast cook.

During his years at O.U. Jay D. studied hard and gratefully remembers the lessons learned, particularly from two excellent professors, Dr. V. E. Monnett and Dr. Carl Moore. Upon graduation in 1956, Jay found employment in the Geophysical Department of Phillips Petroleum in Bartlesville where he worked for six months before he was called into service by the U.S. Air Force. Then he and his bride, Susan Ann Adamson who he had married in 1955, were off to Selfridge USAF base in Michigan where he was to fly fighter jets as a member of the 71st Fighter Squadron.

After his discharge from active Air Force duty, Jay D. returned to his Phillips Petroleum job in Bartlesville. But only briefly. When his position was terminated, he returned to Wichita to look for a new job in the oil industry. Finding none available, he took a job selling luxury cars for Dick Price Motors.

He later landed employment with Jayhawk Mud Company of El Dorado, a pivotal step that turned into a giant leap back to the oil industry, which led Jay to a long and productive career with Davis Mud and Chemical Company. He joined Bob Davis in 1961, an association lasting 30 years. And during these three decades Jay was instrumental in building company sales to the 50 million dollar mark, and maintaining offices in Denver, Houston, Oklahoma City, Tulsa, Casper and the Williston Basin. They had their own mining operation for barite and bentonite. It is Jay's belief that Bob Davis exerted the biggest influence on him and his career.

In the 60's they were actively involved with an Algerian company, Al-Fuild in North Africa. They also owned Pawnee Salt Company, which was active in Brazil. During this period Jay was active in oil deals, manufacturing (in particular, Vim Trailer and WW Grinder) and mining and an involvement with commercial warehousing in Oklahoma City. In the early '80s he restored Kress dime store at the corner of Broadway and Douglas, which is now the Kress Energy Center.

In the late '70's and early '80s, Jay spearheaded a "plaque program" for the Petroleum Club that raised \$200,000!



Continued on page 16

After the liquidation of the Davis Mud and Chemical Company, Jay was a consultant for Aladdin Middle East for five years and then began a second career as a seasoned and successful sales, marketing and management professional. This ongoing second career has thus far yielded Jay ownership and top management posts in many companies, including Summit Industries, Core-Lite, Inc.; Vim Trailer Mfg, Inc.; WW Grinder, Gazelle Oil Properties, Christopher Steel, Commercial Concepts, Inc; Reid Supply Company; Linwood LLC (an oil company) PrimePal (a plastic pallet company), and still counting! (Jay's newest involvement is with NRP (products for waste water plants).

And while all this was going on in his entrepreneurial adventures, Jay seems to always make room for a robust public service and social life. For instance, he has served as Mayor of Eastborough; as a member of the Wichita Chamber of Commerce Board and as a member of its executive committee; as treasurer of the Kansas Republican Party; as a delegate to the 1972 Republican National Convention; as a fundraiser and campaign chairman for the American Cancer Society; as membership chairman and fundraiser for the Wichita YMCA; member of both the Young Presidents and Chief executive's organizations.

This year, Jay will receive recognition for his 50 years of membership in the Kansas Geological Society. He is a former member of both AAPG and KIOGA. He has also served on the advisory board of the Wichita Mid-Continent Airport Authority.

Even though Jay's geological career has deviated from the more typical ones, he remains in touch with all the major geological events and with many of the geologists involved with them. His membership in petroleum organizations includes IPAA, AAPG, KGS, IOABC, OIPA, and KIOGA. He twice chaired the KIOGA convention, which included the 50th anniversary of KIOGA. Although not a practicing geologist, Jay served on the Oklahoma University School of Geology advisory board. In spite of the head-spinning variety of his work activities over a career that is still on going, he continues to think like a 100% geologist.

Although he has shut down his annual home-based chili feed, he suggests that it's quite likely only a temporary time-out. A couple of injuries ended his tennis playing, but he continues to be first, last and always an outdoorsman. His flowers and shrubs and lawn are uniformly gorgeous and the pride of Eastborough. Jay loves to cook (and to eat), to travel and to party on, just like he always has.

And to end this story, Jay's wife Susan is his best friend, partner and boss of the family, the true-north focus of his life. He enjoys every minute of the company he keeps with Susan and their son and daughter and four grandchildren. And as we say, there goes Jay, the "Energizer Bunny," who just keeps hoppin' along!

—submitted by Patric Rowley







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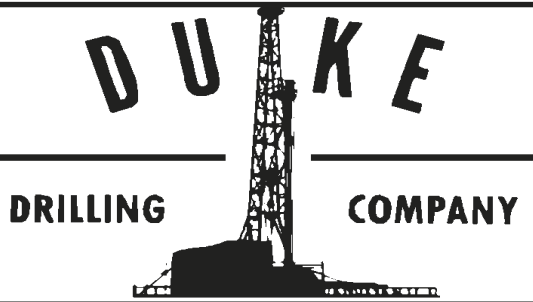
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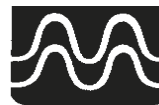
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# CHERT, TRIPOLITE, SPICULITE, CHAT – WHAT’S IN A NAME?

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## INTRODUCTION

Geologists, like all other scientists, are a very particular lot especially when it comes to the spoken or written word. Over the last 200 years we have developed a finely-tuned scientific vocabulary that not only allows us to communicate ideas and concepts among ourselves without ambiguity (in the very least we strive for that), but which also serves to bewilder and sometimes impress the non-geologists with whom we associate. If, for example, we say to the counter-top salesman at the local hardware store – “That’s not granite...it’s gneiss.” or “That’s not marble...it’s coarse-grained crinoidal lime grainstone.” – we’re not being demeaning, but rather, we’re being precise. We know what we mean by such wording; and besides, we’re probably a bit averse to paying high-quality Italian marble-top prices for ordinary crinoidal grainstone.

Sometimes, however, certain words or phrases get into the scientific vocabulary and end up losing all meaning. Consider, for example, the term “graywacke”, whose definition and history of usage fills nearly an entire page in the American Geological Institute’s (1974) glossary of geology. Following Naumann (1858), the name was generally applied to “...a dark (usually gray or greenish gray, sometimes black) and very hard, tough, and firmly indurated, coarse-grained sandstone that has a subconchoidal fracture and consists of poorly sorted and extremely angular to subangular grains of quartz and feldspar with an abundant variety of small, dark rock and mineral fragments embedded in a preponderant and compact, partly metamorphosed clayey matrix having the general composition of slate and containing an abundance of very fine-grained micaceous (illite and sericite) and chloritic minerals.” Thereafter, the rock “graywacke” (or “grauwacke”) was assigned genetic significance as it variously was associated with rapid source-area erosion (little chemical weathering) and rapid sediment deposition, or syndepositional tectonism in geologically mobile belts (e.g., geosynclines), or submarine lava flows, or deep-sea turbidity currents (but excluding post-orogenic turbidites, hence, excluding molasse but naturally more akin to flysch); and on and on. To make matters even worse, the large number of other definitions that subsequently were applied to the term “graywacke” (AGI, 1974) rendered its meaning so obscure, so ambiguous and vague, as to make it totally useless in scientific terminology by the early 1800s (Mawe, 1818). In fact, Murchison (1839) referred to the term as being “worthless”. That great stalwart of 20<sup>th</sup> century siliciclastic (and carbonate) sedimentology, Robert L. Folk (1968), likewise chose not to use the term in his compositional classification of sandstones. The term graywacke has thus gone the way of the dodo, and its etymological DNA will forever remain extinct.

Which brings us to the subject of this paper – the meaning of the terms chert, tripolite, spiculite and chat. If we are to communicate ideas precisely, and meaningfully, then we need to use terms that have precise definitions and/or genetic connotations. Such terminological clarifications also serve to specify petroleum reservoir objectives in the subsurface, and in large part, to direct exploration for particular siliceous reservoirs in Kansas and adjoining states.

## CHERT

Let us first consider the term “chert”. The AGI glossary (1974) defines chert as “...a hard, extremely dense or compact, dull to semi-vitreous, cryptocrystalline sedimentary rock”; varied color, splintery to conchoidal fracture.”. The classic textbooks of Blatt et al. (1980) and Friedman and Sanders (1978) define it as “...a rock composed largely or entirely of microcrystalline or cryptocrystalline quartz; nearly pure SiO<sub>2</sub>.” and “...a tough, brittle rock consisting of nearly pure silica, exhibiting a splintery to conchoidal fracture and a vitreous luster.”, respectively. Simply put, chert is a variety of quartz. Likewise, the great sedimentologist Francis Pettijohn (1975), following Tarr (1926, 1938), defined chert as “...a dense rock composed of one or several forms of silica – opal, chalcedony (microcrystalline fibrous quartz), or microcrystalline quartz. It has a tough, splintery to conchoidal fracture.”. Folk and Weaver (1952) showed us that chert variously comprises microcrystalline quartz, fibrous quartz (a.k.a. chalcedony), and commonly translucent megaquartz (“drusy”) crystals (Figure 1).

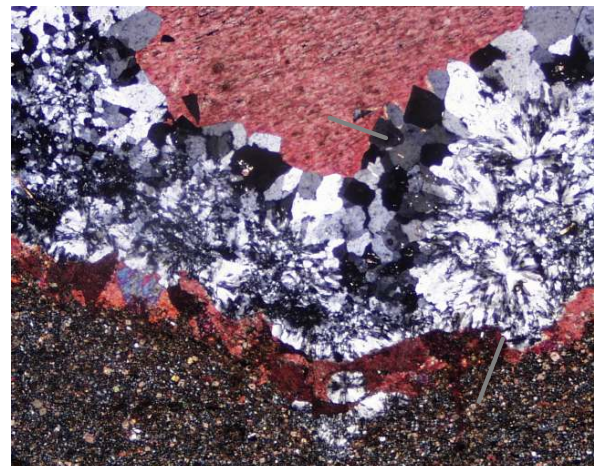


Figure 1. Thin-section micrograph of typical microfabrics in replacement chert, including fibrous chalcedony, megaquartz, and microquartz. Coarse crystalline calcite filled the remainder of a pore after megaquartz precipitation. Mississippian, Woolsey “A” #5 Oakes, 4911’, Barber Co., KS. Cross polars, 20x magnification; sample stained with Alizarin red-S.

Continued on page 22

All geologists know what chert is, and to the amazement of some laypersons, we can spot it from great distances and often from within a vehicle traveling at 65 mph or faster. For all we know, our seemingly innate recognition of chert may possibly be encoded in our genes. Black chert is otherwise known as “flint”, red chert as “jasper”, and gray or yellow or orange chert is simply known as “chert”. Banded or laminated, varie-colored chert is known as “agate”. Petrified wood is mostly replaced by chert. Chert occurs as nodules and/or beds, or it comprises concretions. Most chert replaces pre-existing rocks such as limestone or dolomite, and some deep-sea cherts are diagenetically-altered (recrystallized and silicified) accumulations of initially siliceous diatoms or radiolarians. The presence of chert does not automatically indicate or suggest the presence of siliceous spicules in rocks. The Osagean Reeds Spring Formation exposed in southwestern Missouri and adjoining states, and its correlatives in subsurface Kansas, for example, are very cherty limestones in which spicules have yet to be found. The source of silica in such deposits alternatively may be from silica-rich marine waters or meteoric waters that drained upland sources with abundant chert or siltstone (Mazzullo et al., 2009). On the other hand, some cherts and associated rocks do in fact contain spicules, and the silica for chertification in such rocks may have come largely from the dissolution of spicules. Nonetheless, regardless of the variety or origin, all chert is the same – SiO<sub>2</sub>. Chert is tough to drill through because SiO<sub>2</sub> has a hardness of 7 on the Moh’s hardness scale, and it is readily identifiable in well cuttings.

### TRIPOLITE

The AGI (1974) glossary defines “tripolite” as “...a term that is poorly applied as a synonym of diatomaceous earth, in reference to the material from the north African location of Tripoli. It has also been used, less correctly, as a synonym of “tripoli” (a residual product consisting of nondiatomaceous silica).”. Pettijohn (1975) referred to “...tripoli...as a very porous, light-weight, siliceous rock (mainly chalcedony).”. He further stated “It has a harsh, rough feel.”. Pettijohn’s definition was in accord with that of Tarr (1938), who had considered tripolite to be a product of weathering (leaching and hydration) of chert and siliceous limestone from which carbonate has been leached. We similarly use the term “tripolite” in reference to chert of any age that has been highly weathered by meteoric fluids (along and for some distance beneath unconformities), and which is light-weight because of high micro-porosity that formed during subaerial exposure (Figure 2). Some tripolites are calcitic because of the presence of unsilicified carbonate particles or secondary calcite. In other words tripolite, which is readily identifiable in well cuttings, is a diagenetic alteration product of chert, and that precursor chert may have been spicule-rich or spicule-poor (Figure 2B, C). Various spiculitic tripolite of Osagean age has been described in subsurface Kansas, for example, in Glick Field in Kiowa and Comanche Counties (Rogers et al., 1995; Montgomery et al., 1998; Watney et al., 2001), and soft, weathered chert is described in subsurface north-central Oklahoma (Rogers, 1996, 2001). Non-spiculitic tripolite is common at the top of the Osagean Reeds Spring Limestone in outcrops in southwestern Missouri and northwestern Arkansas.

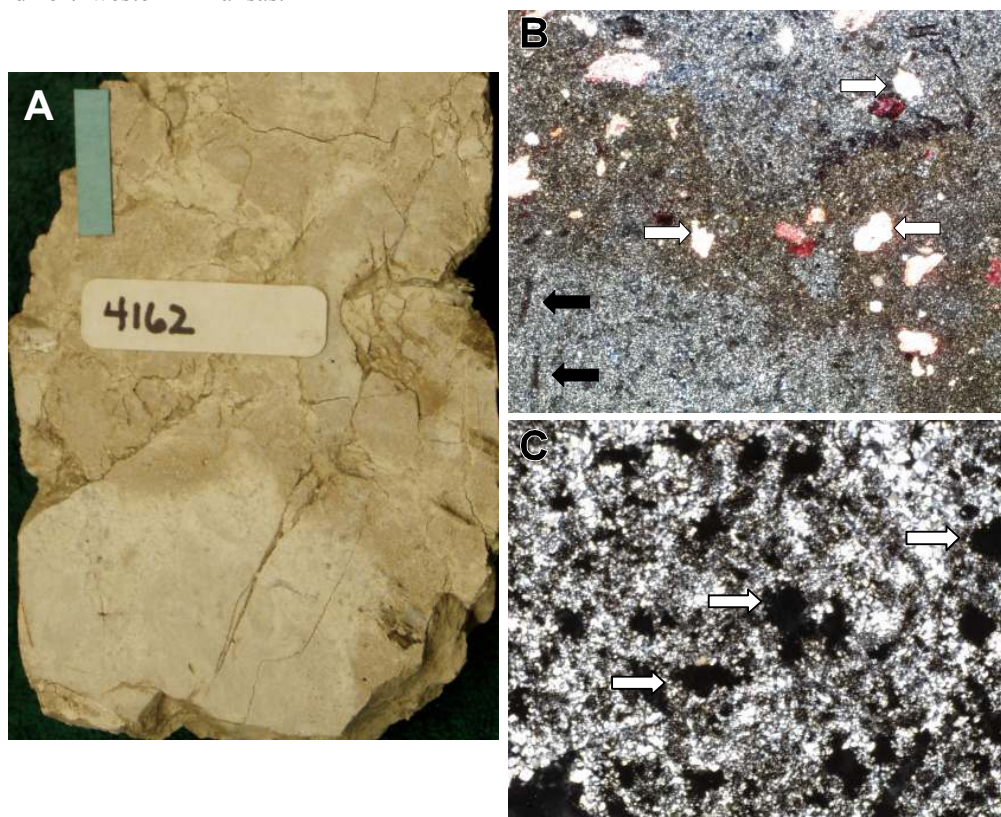


Figure 2. (A) Core slab of brecciated tripolite, Glick Field. General Atlantic #1-“A” Tjaden, 4162’, Kiowa Co., KS. (B) Thin-section micrograph of brecciated tripolite with rare spicules (black arrows); white arrows point to remnant calcitic clasts. General Atlantic #1-“A” Tjaden, 4342’. Cross polars, 40x magnification. (C) Thin-section micrograph of tripolite with abundant small vugs (arrows) that are micro-pores, and without spicules. Graves #12 Forsyth, 4448’, Barber Co., KS. Cross polars, 40x magnification. All images are of Mississippian (Osagean) rocks.

## SPICULITE

The American Geological Institute glossary (1974) defines the term “spiculite” as “...a sediment or rock composed principally of the siliceous spicules of invertebrates.”, which would include sponge spicules. Following Tarr (1938), Pettijohn (1975) defined the term as an accumulation of sponge spicules. We similarly define the term “spiculite” as “...a fine-grained rock composed of spicule fragments (silt to sand), with few to no other allochems...” (Mazzullo et al., 2009, p. 1655). True Mississippian spiculites as so defined are present in subsurface Kansas only in the Cowley Formation, although variously spiculitic carbonates or cherts have been noted elsewhere in the Osagean and Meramecian section (e.g., Rogers et al., 1995; Ebanks et al., 1977; Franseen, 2006). Spiculites are readily identifiable in well cuttings with a high-magnification binocular microscope and good light source. They often have been described erroneously, however, as silty dolomites and other “dirty” lithologies because of their fine grain size. They are best identified in cores (Figure 3) or thin sections of either cores or well cuttings (Figure 4).

Figure 3. Core slab of Cowley spiculite (light brown) that has been partly replaced by non-tripolitic chert immediately beneath the top-of-Miss unconformity. Dark brown-stained area is oil. Woolsey “B” #1 Wiley, 4600', Barber Co., KS.

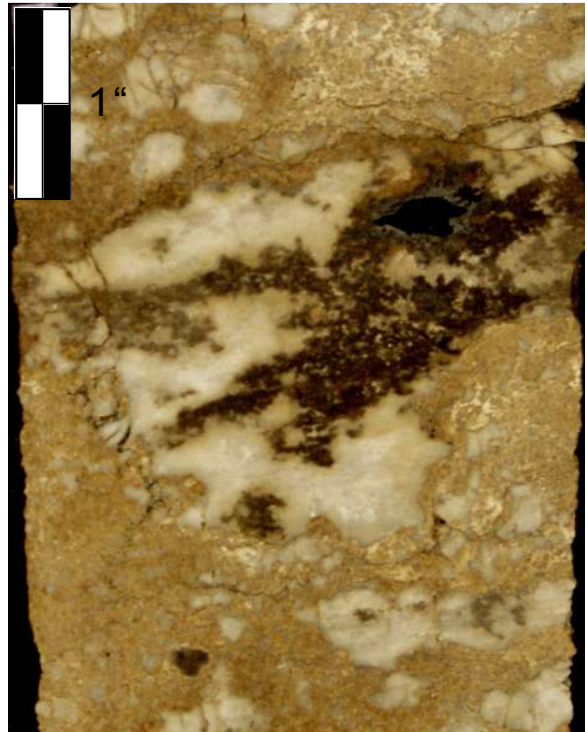


Figure 4. Thin-section micrograph of bedded Cowley spiculite. Woolsey “A” #5 Oakes, 4936', Barber Co., KS. Plane light, 40x magnification.

## CHAT

The AGI glossary (1974) and the classic textbooks of Pettijohn (1975), Friedman and Sanders (1978), Blatt et al. (1980), and Friedman et al. (1992) do not define the term “chat”. The likely reason for this omission is because the term is used only locally rather than regionally, and hence, it is not widely recognized as a formal geological term. Other than its use as a verb (i.e., to chat), various non-scientific dictionaries define “chat” as a yellow-breasted songbird or any of several songbirds; or it can refer to lice. The etymology of the term suggests its derivation from the 15<sup>th</sup> century British English terms “chatten” or “chatteren” in reference to informal or familiar discussions, or to talk lightly, glibly, or flirtatiously; others suggest it derived from the Scottish term “chad”. In non-geological technical jargon, the term “chat” may refer to chert gravel or any crushed stone, including road metal and mine tailings, or to river gravels. In geological jargon the term may be a vernacular corruption of the word “chert” as midcontinent drillers noted that their rigs bounced while drilling through chert. In their study of Mississippian chert reservoirs in Kansas, Watney et al. (2001) defined the term as follows: “Chat is an informal name for high porosity, low resistivity producing chert reservoirs in the mid-continent.”. This definition was also followed by Rogers (2001). Actually, any rock composed dominantly of SiO<sub>2</sub>, such as heavily silicified limestone or dolomite, can inherently be of low resistivity, and in some cases, they can be porous; low resistivity may reflect the presence of large amounts of bound formation water in micro-pores within the rocks (Colleary et al., 1997; Mullarkey et al., 1997). Accordingly, the Watney et al. (2001) definition of “chat” is not specific enough to be meaningful in that it doesn’t differentiate between, and actually encompasses, several forms of siliceous sediments – chert, tripolite, or spiculite.

On the other hand, Dufren (1966) considered “chat” to be an oil-field term for the tripolitic chert reservoir in Glick Field that has high micro-porosity (26-52%). Montgomery et al. (1998), Watney et al. (2001), and the Kansas Geological Survey (2002) simi-

Continued on page 24

larly characterize the very productive “chat” reservoirs at Glick, Aetna, Hardtner, and Bates fields in south-central Kansas as “...a tripolitic chert exhibiting variable degrees of sponge spicule mold content, chert microporosity, dissolution vuggy porosity, autoclastic brecciation, and clay infills of fractures.” (although Mazzullo et al., 2009 showed that the reservoirs in Aetna and Hardtner fields are spiculite rather than tripolite). All of these aforementioned workers agreed that such “chat” (that is, tripolite) represents highly diagenetically altered (in the meteoric environment), siliceous rocks. The “chat” in Glick Field, however, actually is a soft, weathered chert (tripolite) that replaced rocks with lesser amounts of spicules (Figure 2A, B) than in spiculites (Figure 4). Montgomery et al. (1998) recognized that at least three different rocks have been referred to as “chat”: (1) in-situ (primary depositional) chert composing the top of the Osagean and the base of the Meramecian in Kansas. What the authors meant by “primary depositional” is not clear; (2) in-situ, brecciated and often weathered chert below the top-of-Miss unconformity within Osagean strata where Meramecian strata were eroded (e.g., Rogers, 2001); and (3) chert-clast conglomerate immediately above the Osagean that commonly is confused for basal Pennsylvanian (reworked) chert-clast conglomerate. That is to say, some conglomerates also are referred to as “chat”.

In fact, just about any type of chert can and has been called “chat” over the years. So, exactly what is “chat”? It seemingly represents everything, yet nothing in particular. Sounds a lot like the term “graywacke”, and therefore we suggest it be similarly regarded as an obsolete geological term that is relegated to dodo land.

### CONCLUSIONS

Chert is siliceous and composed of SiO<sub>2</sub>, and so are tripolite, spiculite and “chat”. Tripolite is weathered chert, and in order to form, it must have had a chert precursor that subsequently was diagenetically altered in the meteoric environment; and that precursor chert may be spiculitic or non-spiculitic. A number of workers have described the soft, tripolitic Osagean chert that comprises the gas reservoir in Glick Field, and have referred to it as being “spiculitic” (e.g., Dufren, 1966; Rogers et al., 1995; Montgomery et al., 1998; Watney et al., 2001). We have also examined these tripolites petrographically, and found that, with some compositional variation, they contain far fewer spicules relative to the spiculites in the Cowley Formation (Mazzullo et al., 2009). Hence, we believe that the chert precursor of the tripolite reservoir in Glick Field replaced carbonate rocks with varying amounts of spicules rather than having replaced spiculite *sensu stricto*. In contrast, the Osagean spiculite in the Cowley Formation in subsurface Kansas comprises nearly 100% spicules, and despite examination of many cores, we have not ever identified any spiculite that was weathered along subaerial unconformities to form tripolite despite the presence of unconformities within and at the top of this section (Mazzullo et al., 2009). Some spiculites in the upper part of the Cowley Formation beneath the top-of-Cowley or top-of-Mississippian unconformity, however, are partly replaced by chert, hence, forming very spiculitic chert. These cherts subsequently were subaerially exposed for several million years along the pre-Pennsylvanian unconformity, but they were not converted to tripolite. Rather, the most common diagenetic effect of subaerial weathering of spiculite is the formation of micro-porosity and vugs (Mazzullo et al., 2009). Why some cherts were weathered into tripolite (e.g., Glick Field) whereas spiculites in the Cowley Formation do not appear to have been so altered remains equivocal. Finally, as the term “chat” does not denote a specific lithology, we recommend it be abandoned.

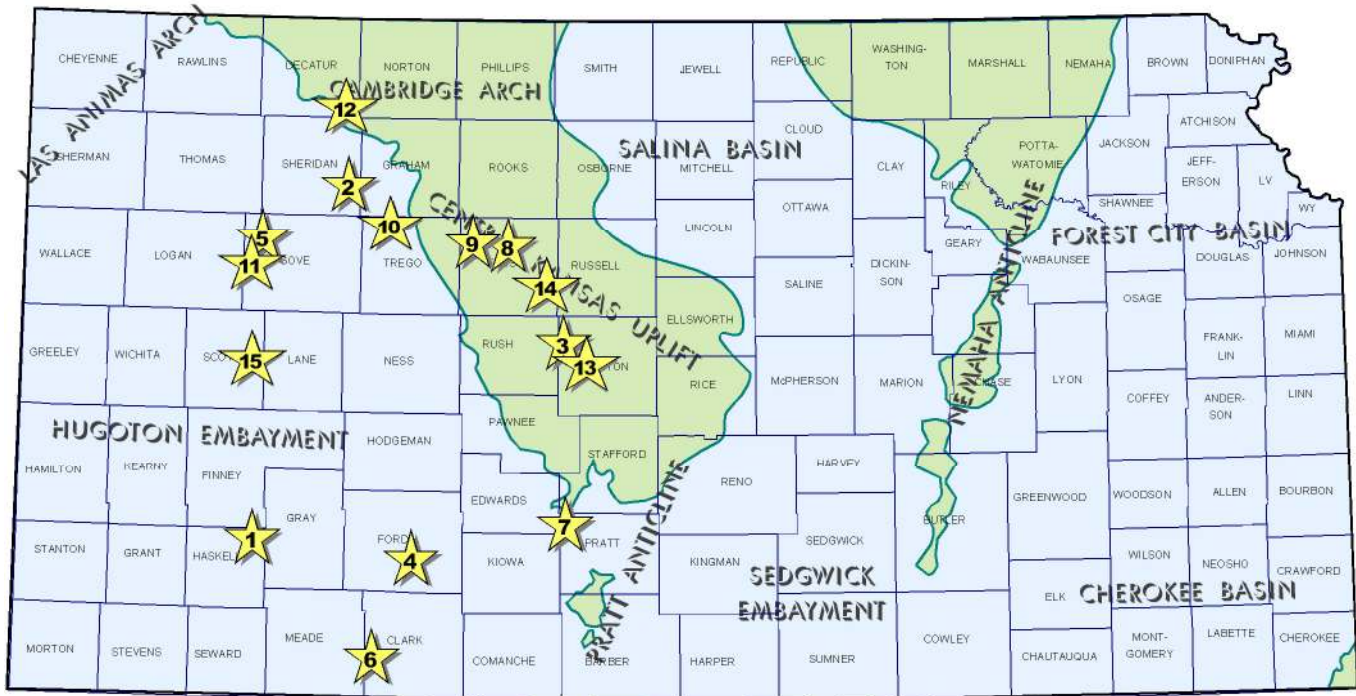
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(1) **Bengalia Land and Cattle Company** reports the discovery of new Mississippian Saint Louis gas reserves at their Leonard No. 1-13, drilled in the NE/4 of section 13- T27s- R31W, Haskell County, near the Gray County line. The wildcat well has tested an undisclosed amount of natural gas at site located nearly three miles southeast of the Bedell (Morrow oil / gas) field. Total depth is 5370 ft. Operator presently has the well shut in pending pipeline construction and hookup. The new unnamed gas field is located thirteen and one-half miles northwest of Montezuma, Kansas.

(2) **Rains & Williamson Oil Company** has completed their No. 2-36 Fore in Sheridan County for 150 barrels of oil per day, no water. Located in the C N/2 NE NW of section 36- T9s- R26W, the Gra-Sher Northwest Field development well is producing crude from the Lansing-Kansas City H, J and K zones from 4000 to 4070 ft. overall. Rotary total depth is 4150 ft. Well site lies about eight and one-quarter miles south of Studley, Kansas.

(3) **Mai Oil Operations** has successfully extended oil production over one-quarter mile to the west of established production in the Mater South field in Barton County, as well as, discovered Shawnee (Toronto) as a new pay source for the field. The stepout well, No. 1 Helfrich, NE/4 of section 15- T17s- R15W, is completed for 100 barrels of oil per day, no water. Pay comes from five separate zones in the LKC from perforated depths between 3257 to 3419 ft. overall. New pay in the Toronto was found at a depth of 3194 to 3198 ft. The well was put on pump on August 18, 2009 at location about three and one half miles northwest of Olmitz, Kansas.

(4) **Vincent Oil Corp.** has discovered Marmaton (Pawnee) and Lower Morrow oil deposits three-quarters mile west

of established Conglomerate and Mississippian gas production in the Great Mogul Canyon field in Ford County. The Droste No. 1-21, spotted in the NE/4 of section 21- T28s- R23W, is situated over one and one-quarter miles from any other deep oil production in the area. The well potential is unknown. Total depth was reached at 5480 ft. Field area lies five miles southwest of Ford, Kansas.

(5) **H & M Petroleum Corp.** has discovered two new pay sources within the Leona field in Gove County. The Leona field has produced over 65,000 barrels of crude from the Lansing-Kansas City since being established in 1973 by D. C. Slawson. H & M Petroleum picked location using 3-D seismic to drill their No. 4 Bonita Springs in the NW/4 of section 13- T12s- R31W. The well is completed for 120 barrels of oil and 5 barrels of water per day from perforations in the Marmaton (Myrick Station) 4412 to 4416 ft. and the Mississippian 4548 to 4552 ft. Crude gravity is 36.3 degrees. First production was established on December 12, 2008. Field lies eight and one-half miles southwest of Grinnell, Kansas.

(6) **Midco Exploration** has discovered Viola gas reserves about one-quarter mile west of its No. 2-19 Theis, which opened the McKinney North field in the NE/4 of section 19- T33s- R25W, Clark County. The pool discovery well was completed for 200 Mcf gas daily from the Mississippian in 2001. New Viola pay has been discovered with the completion of the No. 3-19 Theis, in the NW/4 of section 19, in August this year. The well was drilled to a total depth of 7709 ft. and has been plugged-back to a depth of 6914 ft. No production volume has been disclosed. The top of the Viola formation runs around 6863 ft. in the area. Field area is located approximately seventeen and one-half miles northwest of Englewood, Kansas.

(7) **L. D. Drilling** has discovered Viola oil deposits over three-quarters mile northeast of the Grizzell field (Mississippian oil) in Pratt County. The Giles No. 1, spotted in the NE/4 of section 3- T26s- R15W, was recently placed on pump at an undisclosed rate. The well was drilled to a total depth of 4500 ft. The new Grizzell Northeast pool opener lies two miles north and four miles west of Byers, Kansas.

(8) **McCoy Petroleum Corp.** has established the Ridge Point Northeast oil field northeast of their recently discovered Ridge Point field in Ellis County. The No. 1-9 Seib 'A', located in the SE/4 of section 9- T12s- R18W, was placed on pump at an undisclosed rate on September 24, 2009. The new pool opener is producing crude from multiple Lansing-Kansas city zones. Sterling Drilling tools bottomed the well at a total depth of 3820 ft. McCoy's Ridge Point field produces oil from the Arbuckle formation. Field activity is centered about three and one-half miles northeast of Hyacinth, Kansas.

(9) **Raymond Oil Company** has opened the new Rose Garden Lansing-Kansas City oil field less than one-half mile west of the city of Hyacinth, Kansas in Ellis County. The Pfeifer No. 1, located in the SW/4 of section 14- T12s- R19W, is presently awaiting installation of surface equipment for production. The 3940 ft. deep well found deposits over one and one-half miles east of existing production in the Glathart field (LKC oil). The new field has not been named.

(10) **Coral Production Corp.** has expanded Lansing-Kansas City oil production one-quarter mile to the east of established production in the Hober field in Trego County. The firms No. 16-1 Hober, spotted in the NW/4 of section 16- T11s- R24W, was completed for 25 barrels of oil and 10 barrels of water per day on October 5, 2009. The stepout well is producing 30 degree gravity crude from perforations shot at two holes per foot between 3806 to 3808 ft. and 3182 to 3818 ft. Total depth is 4220 ft. The field lies seven miles northwest of WaKeeney, Kansas.

(11) **Ritchie Exploration** has a new multiple zone oil discovery at their No. 1 Hess 29-CD Unit, located in the SE/4 of section 29 - T13s- R31W, about eighteen miles southwest of Gove, Kansas. The well is a stepout of the Antelope Ridge field which Ritchie established in September last year. The well is producing an undisclosed amount of crude from the Cherokee (Johnson Zone), Conglomerate Sand and Morrow Sand formations. These are all new pay sources in the field where previous production was limited from the Lansing-Kansas City limestones. Total depth is 4595 ft.

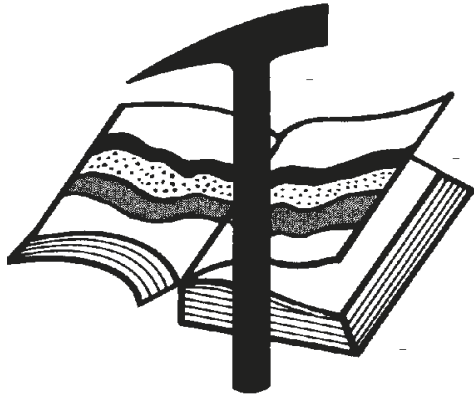
(12) **Mica Energy Corp.** has successfully extended Lansing-Kansas City oil production in the Allison field one-quarter mile to the south with the completion of their No. 3-21 Randolph for 134 barrels of oil per day, no water. The development well, located in the NW/4 of section 21- T5s- R26W, found production horizon in the 'K' zone from perforations spaced at eight holes per foot from 3848 to 3857 ft. Total depth is 3930 ft. Crude oil is rated at 35 degrees API. Field area lies nine miles southeast of Dresden, Kansas.

(13) **Shelby Resources, LLC** is producing an undisclosed amount of crude oil from the Shawnee (Plattsmouth) formation at the No. 1-13 Mauler in Barton county. The new unnamed pool opener is located in the SW/4 of section 13- T18s- R14W, about two and one half miles southwest of Hoisington, Kansas. Well site lies over one mile southwest of closest established wells in the multipay Boyd field.

(14) **DaMar Resources, Inc.** has completed its No. 1 Pfeifer A Trust in Ellis county for an undisclosed potential. The wildcat well is producing oil from unknown zone at site located in the SE/4 of section 3- T14s- R16W, three and one-quarter miles east of Victoria, Kansas. Lansing-Kansas City and Arbuckle zones were explored. Deposits were found nearly one and one-quarter miles southeast of the Air Base field where the Shawnee, Lans-KC and Basal Pennsylvanian formations have given up reserves. Total depth is 3540 feet. The new field has not been named.

(15) **FIML Natural Resources, LLC** has discovered new oil reserves in Scott county with the completion of the No. 11-A Long. Located in the SW/4 of section 28- T18s- R31W, the wildcat well opens a new oil field three-quarters mile south of the recently established Eva field discovered by BEREXCO, Inc. in September this year. Production zone and volume is unknown. Total depth was reached at 5039 feet.





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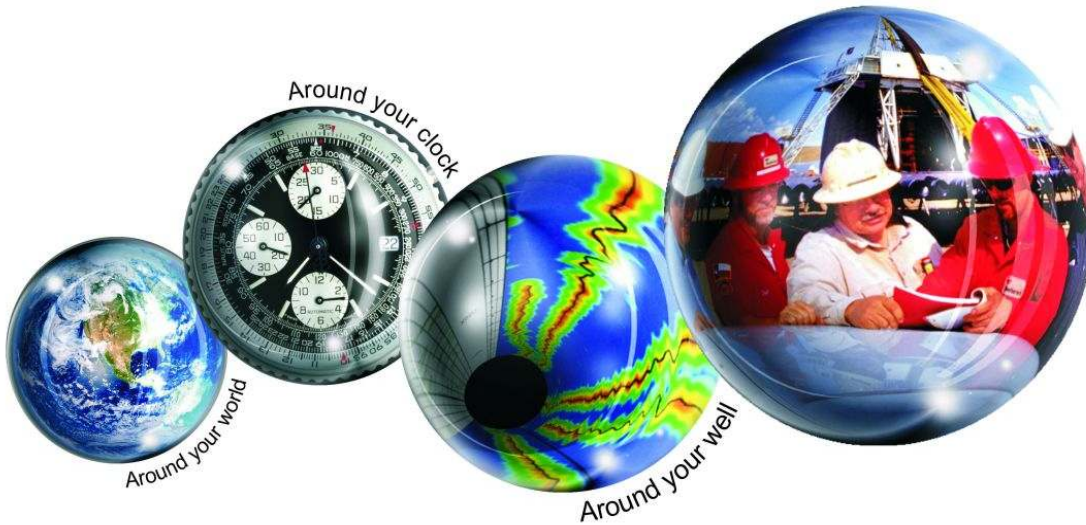
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