KANSAS GEOLOGICAL SOCIETY

BULLETIN

Volume 79 Number 1 January—February 2004

IN THIS ISSUE...

THIS MONTH AT THE KGS

Jan. 15—Allied Geophysical Lab, U. of Houston

Jan. 22—Dr. Victor Jones, ETI, Houston

Jan. 23—KGS Annual Banquet

Jan. 29—John Coates, Patrick Energy, Tulsa

NEXT MONTH AT THE KGS

Feb. 5—Pat Gratton, President-Elect AAPG

Feb. 12—Dr. William Parcell, WSU

Feb. 26—Dr. Jim Puckette, OSU

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CONTENTS

ON THE COVER

Read Honorary Member Larry Skelton's profile on pg. 12 and the profile on Don Strong, pg. 14

Get an insight to evolution of porosity in carbonates in Part I of Dr. Sal Mazzullo's scientific paper on pg. 22.

We hope to see a good turnout for the Annual Banquet in January, info on page 17.

KANSAS GEOLOGICAL SOCIETY

Established 1925

KANSAS GEOLOGICAL SOCIETY TECHNICAL PROGRAMS

Schedule of Programs for Spring 2004

Jan. 15	Allied Geophysical lab, University of Houston, *"Seismic Attributes"*
Jan. 22	Dr. Victor Jones, ETI, Houston, concerning geochemistry—Abstract pg. 15
Jan. 29	John Coates, Patrick Energy, Tulsa— *"A Review of Coalbed Methane Operational Issues in the Cherokee Basin, Kansas and Oklahoma"*
Feb. 5	Pat Gratton, President-Elect AAPG, *"Looking Back and Praying Forward"*
Feb. 12	Dr. William Parcell, Wichita State University, *"Jurassic Microbial Reefs: Subsurface Reservoirs and Outcrop Analogs"*
Feb. 26	Dr. Jim Puckette, OSU— "*Lower Skinner Valley Fill Sandstones: Attractive Exploration Targets on the NE Oklahoma Platform" - Abstract pg. 29*
Mar. 4	William McBee, *"The Nemaha Fault Zone: Strike Slip Faulting in the Mid-Continent, U.S.A."*
March 11	Dr. J. Edward Blott, Littleton, CO— *"3-D, 3-C Reservoir Characterization of a Morrow Valley-Fill Sandstone, Reservoir at Sorrento Field, Colorado"*

More To Follow

All technical meetings are held at 12:30 p.m. in the Bank of America Auditorium 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.

KGS Library HOLIDAY HOURS

Closed Jan. 1 for New Year's

EDITOR'S PAGE

Dear KGS members and friends,

Another year has drawn to a close. As I write this letter, a cold wind is howling outside my window. Of course cold and snow are a normal part of December weather. I am due to head out west for a well as I write this evening. I am afraid all the work putting out this January/ February issue of the Bulletin will fall on Rebecca and Kimberly's shoulders. I know Rebecca hopes to have this issue over to the printer around the 15th of December.

I want to extend my deepest gratitude to Rebecca Radford for handling so much of the Bulletin this past year. My field work load has been quite steady this past year. I want to also thank Kimberly Dimmick-Wells of Woolsey Petroleum. She has been giving time, especially on Thursday evenings, to help Rebecca. She has been learning the publishing software. Last but not least, I want to give my heartfelt thanks to Kent Scribner for handling the advertising chores.

I also want to thank those who contribute to the Bulletin with articles and information. Bob Cowdery works constantly to keep us all updated on upcoming technical talks, writes the "profiles" and provides memorials at times when we lose a member. Bob Stozle started writing book reviews on books about the oil business or geology in history. I have always found them to be concise and interesting. Please take the time to appreciate the endeavors of your fellow members. Sal Mazzullo recently pulled me aside to say he was going to have some geologic papers ready for publication in the Bulletin. Bravo to him and Chellie for the efforts in this.

A big thanks to Sal and Chellie Mazzullo for leading the Thursday Night volunteers for integration of materials into the library. Ted Jochems also works constantly for the betterment of the society and library. I cannot forget to thank Tyler Sanders for all his work in getting the scanning project of the library's data up and running. In addition to all the time that project has taken out of his life, he still takes care of preparing the online version of the Bulletin. Dave Barker has been doing much for the society with the scanning project along with Tyler.

The election of new officers for the KGS Board was completed with the counting of ballots in early December. Newly elected to the Board were: Fred James, President-Elect; Bryce Bidleman, Secretary 2004/Treasurer 2005; and Phil Knighton, Director. Congratulations to these gentlemen on their selection and a great thanks for agreeing to serve. Thanks should also be extended by each of us to those men who ran against these newly elected Board members. They also agreed to serve the Society with their time and expertise.

Are you tired of all of these "attaboys" I have been giving? Well, they have to be given. Unfortunately, most of the time that is all any volunteer receives. These men and women don't go to all the efforts that they do for any financial reward or for a nice plaque. They do so for the satisfaction they feel for getting a job done that needed to be done. The least the rest of us can do is to verbally thank them face to face. I am sure that I have slighted someone by not mentioning them by name or project. I apologize for that. If someone will chastise me for my oversight I will atone for it in the next issue.

The driller still has not called. Probably forgot. Drillers sometimes do forget to call. I'll check with the crew shortly, but won't head their way until morning.

I hope all of you have a safe and joyous holiday season. Good luck in the New Year. Aloha from Betty and I.

Bye for now,

Wes

PRESIDENT'S LETTER

Hope everyone had a Merry Christmas and Happy New Year. It is hard to believe a year has rolled around since I was voted President of the Kansas Geological Society. I am honored to be your president and promise to do my best to represent all the members of the Kansas Geological Society. If you would like to volunteer for a committee please let me or a board member know. Volunteers are what make the Kansas Geological Society such a great organization.

What can the Kansas Geological Society do to better serve its membership? Do we need to publish more oil and gas field studies, maps, cross sections? Any reasonable idea will be considered.

As all of us age towards retirement, what is going to happen to the geological profession in Kansas? It is important for us to encourage young people to become geologists and pass our knowledge on to the next generation of geologists. Our profession is important for the oil and gas industry, environmental industry, government, teaching, etc. Many of our members donate much of their time to mentoring others, teaching, and passing their knowledge on to the next generation. Mentoring is very important to the survival of our profession. Thank you all for your time and effort in this endeavor.

In April of 1998 when Dr. Bob Walters died, the following on mentoring flowed from my mind to a piece of paper.

TO A MENTOR FALLEN
(In Memory of Dr. Robert F. Walters)
by Tom Hansen

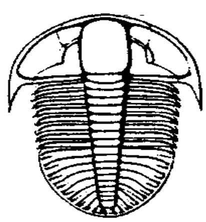
A mentor has fallen.
A mentor has fallen.
A mentor to us all.
Eager to see us learn.
Always present to cheer us on.
One who encouraged.
One who taught us to discover the secrets of the earth and life.
One who taught right from wrong.

Remember the mentor.
Remember the mentor.
Showing us that saying it is so, does not make it so.
Proving it so, does make it so.

Time to carry forward the message of the mentor fallen.
Teach young and old the secrets of the earth.
Bestow them the technology to solve the earth's secrets.
Teach them the secrets of life.
Time to carry the message of the mentor fallen to one and all.

Live, love, and learn in memory of the mentor fallen.
Time to be a mentor of present and future generations.
Time to carry on the work of the mentor fallen.

Respectfully,
Thomas J. Hansen



CAN YOU NAME THE CRITTER?

Sponsored by Trilobite Testing, Inc.

Is your paleo up to date?

If you know the name of the trilobite, submit your guess to Wes Hansen at 316-263-7313 or via e-mail at bulletin@kgslibrary.com

Remember that Trilobite Testing is sponsoring your efforts, so be sure to thank Paul Simpson the next time that you see him.

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

COMMITTEE CHAIRMEN

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	Chuck Brewer
Annual Banquet	Marjorie Crane
Bulletin	Wes Hansen
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Continuing Education	Robert Cowdery
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Environmental	Steve Murphy
Field Trip	Larry Skelton
Fishing Tournament	Tim Pierce
Future Plans	
Golf	Jon T. Williams
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Investment	Ernie Morrison
Legislative	Richard Moberly
Library	
Membership	Larry Friend
Nomenclature	John H. Morrison, III
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Technical Program	Robert Cowdery
Ticket Sales	Bill Shepherd

The Bulletin is now On-Line!

Check out the complete KGS Bulletin on our web site
www.kgslibrary.com

A simple way to help your Society save money would be to let us know if you like viewing the Bulletin on line. This would allow us to reduce our mailing & printing costs of sending the Bulletin to every member.
We are glad to keep mailing it to you but if you are satisfied with reading on-line, please just let us know.
316-265-8676

GEOLOGIST'S WIVES

OFFICERS

President—Kate Donnelly
Vice-president—Peg Walters
Secretary—Sue Cowdery
Treasurer—Barbara Thompson
Historian—Dianne DeGood

February Meeting

February 6
Georgetown Village

Lunch at 11:30 AM

Program: Style Show
By Ann's Fashions

Chairperson: Karon Mitchell

Guests Welcome

MEMBERSHIP REQUIREMENTS

Husband must belong to the Kansas Geological Society or be an acting geologist. Wives of deceased members are eligible to retain their membership. Officers and voting privileges shall be restricted to widows and wives of active Kansas Geological Society members.

Think About It

"AS I AGE, I OFTEN THINK THERE ARE TOO MANY JOHNS IN THE WORLD AND NOT ENOUGH BATH-ROOMS."

—— Roger Martin

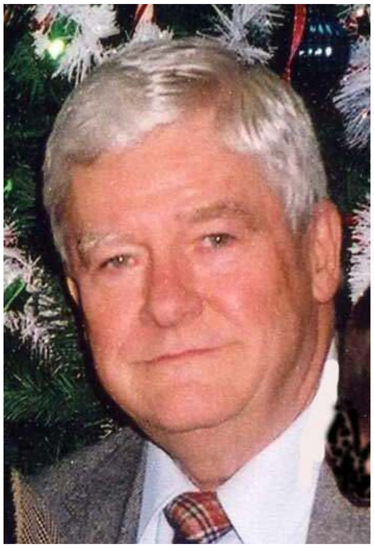
Help Wanted!
<u>Integration Project</u>

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

Just a few hours a week would make such a difference in helping to integrate the small scale files into the regular file cabinets.

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

HONORARY MEMBER PROFILE: Lawrence Skelton



This year's honoree Lawrence "Larry" Skelton has consistently served the geological profession and the Kansas Geological Society in a wide variety of ways to the benefit of both.

His story commences in Evansville, Indiana in 1937, where his father was engaged in several occupations eventually owning an electro-plating company. Larry's mother was a fulltime wife and mother and was able to devote herself to raising Larry as he did not have any siblings.

His entire primary and secondary schooling was in Evansville culminating in his graduation from Central High School, which Larry states "allegedly the oldest public high school west of the Allegheny Mountains"

At the age of ten, a lapidary friend of his Dad's presented him with a medicine box filled with scraps of different colored stones and fragments of minerals. Larry says "I'd never seen so many pretty colorful stones and I was hooked from then on". Prior to this occurrence, Larry had been interested in bugs and considered becoming an Entomologist.

Larry graduated with a degree in geology from Indiana University in geology. One of the professors at Indiana that Larry believes influenced him was Dr. Charles Vitelano, in part because he was friendly and treated him like a person not just a non-descript student, and at the same time prodded him to work harder. He then joined the United States Air Force where he served for 21 years, retiring in 1981 with the rank of Lt. Colonel. Most of his service time was spent as a petroleum logistics officer.

During this time, Larry attended a number of universities, including Trinity where he earned an MBA – Management and Finance in 1977. He also attended Air Force Institute of Technology at the University of Dayton – Advanced Logistics Management Certification and Industrial College of the Armed Forces – Economics and National Defense.

The most amusing event of Larry's career occurred while he was in the Air Force stationed at Perrin AFB, Texas. He and his airmen were remodeling the men's latrine at the Fuels Management Administration building. They had installed a new urinal, but had not plumbed it. At this time the base was visited by the Commanding General of the 14th Air Force, Brigadier General Tom Beeson who was brought to their building, which they had already repainted and completed additional work, as an example of the base's "self help initiatives". General Beeson headed straight for the latrine and used the urinal. The flushed water came right out the bottom and onto his shoes and cuffs (no sign had been put up, since the building occupants all knew it was out-of-order and to use the stool). General Beeson came out and said "you guys ought to put a sign up – did you know your urinal was broke?' Larry says that he was embarrassed beyond words and the wing C.O. was furious. The General laughed it off and soothed the wing C.O. The based engineers arrived within 10 minutes after the visiting party left., stormed in frowning and plumbed the urinal. Larry heard no more about it.

While in the service, Larry married Mary Pearl Fuller of Fruita, Colorado in February of 1965 at Edwards AFB, California. Mary and Larry have two sons: Harold, a speech pathologist with USD 259 and John, who is self-employed. They have 3 grandchildren.

Prior to joining the Air Force, Larry had worked for six months at Surdex, a photogametry mapping company in St. Louis. After his discharge he joined the Kansas Geological Survey in 1981. After being employed by the survey for several years, Larry enrolled at Wichita State University and obtained his MS in 1991. At WSU, Larry was influenced by Dr. Dan Merriam, finding in Dr. Merriam some of the same qualities that he had discovered in his professor at Indiana University. Larry has combined his 22 years employment at the survey with some academic endeavors. He has taught geology and geography courses at Cowley County Community College. He taught Historical Geological at WSU for a semester. KGS member Kitt Noah was one of his students. For six weeks he filled in as an instructor of Physical Geology for Dr. Colette Burke. During his Survey career he would single two individuals, Dr. Robert Walters and Dr. Lynn Watney as influencing his career, but qualifies this by saying there were many others. Many Kansas Geological Society members had an influence on his career. Larry would award the honor of being the biggest character he has encountered in his career to Lee Cornell.

As previously indicated, Larry has contributed much to the Kansas Geological Society, serving on the Board of Directors as a member, President – Elect, President and also as an advisor to the President He has served the KGS exceedingly well as either the Chairman or member of numerous committees i.e., Field Trip, Nomenclature, History, Future Plans, Bulletin Editor, Nominating, Awards. He has also served on the Committee for the Mid-Continent Section Meeting of the AAPG.

In addition to the KGS, Larry holds memberships in the Kansas Geological Foundation, AAPG, Division of Environmental Geoscience (AAPG), Sigma Xi, SGE, Kansas Academy of Science. He has served the profession by participating in Earth Day for several years with Tom Hansen and Chuck Brewer, he also has engaged in a number of activities with the Wichita Gem Society. He presents talks on geology and other topics to students and civic organizations. He has conducted many "Downtown Geologic Walking Tours" for tourist groups, conventions and school classes. Larry has been very active in the Regional and State Science Olympiad having judged their topographic map contest at least a dozen times. He has been active in judging 4-H geology exhibits at Sedgwick, Shawnee and Cowley County Fairs, as well as 16 of the last 21 years at the Kansas State Fair. In addition to his involvement in the geologically oriented activities of the community, Larry has also been President of the Washington Chapter of the Sons of the American Revolution and has served on the Board of Directors of the East Wichita Shepherd's Center.

Even with Larry's professional and community involvement, he still finds time to pursue numerous recreational interests and avocational activities that include: traveling, collecting minerals, fossils, postcards, antiques and, as he says, "too many other things." He likes reading, especially history and earth science and has additional interest in geological research, lapidary and writing.

Larry says that he would like to be a little more involved in petroleum geology, but as you read through this brief profile you realize that he has been deeply involved in the field, if not directly in exploration. His advice to the young geologist entering the field is "study hard and make good grades. C's won't hack the program any longer. Try to develop your imagination. I believe many wells are found by not being stuck in a mental rut. Also take some business and economics courses when you can."

He still has several goals in mind including finishing the quality control check of the well sample database and make some plans for reconstruction/ enlargement of the sample library to better serve the Kansas geological community.

Larry is certainly not ready to retire, but when he does, travel, doing some genealogy, collecting minerals and fossils, as well as possibly working up some oil and gas prospects that he has been thinking about for a number of years.

This has been a short story of man who has provided a great deal to the geological community both in his professional capacity and in numerous volunteer activities. He is very deserving of this Honorary membership

PROFILE: Don Strong

Although in recent times, Don has only been in Wichita for an occasional visit, many current members of the KGS remember Don from the days when he was an active and respected Kansas explorationist.

Don's story commences in Morland, Kansas on April 27, 1927. Don attended both grade school and high school in Hill City. In 1943 Don played on the only undefeated football team in Hill City's High School's history. A fellow team member was Roger Welty, geologist and KGS member. Don says that he, Roger and all the surviving members still like to brag a little about their accomplishments.

After graduation from Hill City High School, Don enrolled at Kansas State as a Physical Science/ Geology major. He had taken a course in Physical Science and decided at that time that he wanted to be a geologist. Also residing in Hill City at that time was a consulting geologist, Irv Hardman. Don says he "looked up" to Irv who was a successful geologist and that this probably also influenced his decision to become a geologist. Among his classmates are a number of geologists whose names are very familiar to KGS members: Dick Roby, Lee Poulsen, Bernie Lounsbury, Charlie Steincamp and Page Twiss. Don graduated from K-State in January 1950. Don's favorite professor at K-State was Dr. Frank Byrne.

In 1950, he commenced his professional employment with Skelly Oil Company. Don worked for Skelly until 1955, which included two years of service with the Army during the Korean War. Fellow employees at Skelly were Harold Smedley, District Geologist, Kenny Smith and Don Bieber. As a beginning geologist at Skelly, Don found that Kenny Smith was an excellent mentor. Later he received from Gene Taylor, some very good well sitting advice. Don recalls one of his first solo well sitting jobs was a test in the Hugoton gas field. It was a development well completely surrounded by producing gas wells As Don says "it was the type of job you sent the dummy newcomer out on." The test fell-off structurally about 150 feet from all of the surrounding producers. and it was a completely unexpected structural anomaly. Don convinced the production people to drill deeper and surprisingly the test was completed as a good gas well and this was something from which later he derived a great deal of satisfaction.

Don terminated his employment with Skelly and joined Imperial Oil of Kansas. Other employees of Imperial during the period were: Gordon Keen, Chuck Moore, Burt Schmidt, Orlin Phelps, Ray Dombaugh, Bill Sladek, and Bob Williams Jr. Don resigned from Imperial to establish his own office as a consulting geologist in 1961.

In October 1962, Don married Lou Ella Siemsen-Zajic and they have three children. Layton Strong and his wife Shelley live in Pleasant Valley, Missouri, Richard Zajic and wife Sharyl live in Broken Arrow, Oklahoma, and daughter Vickie and her husband Cliff Wideman reside in Wentzville, Missouri.

In his consulting practice, Don believes the biggest "character" he encountered was Dick Hoover. Don has several good things to say about Dick namely that "Dick was a pleasure to work for and he could delegate authority, make good decisions and stick with them" Don has never regretted being a geologist and says he would do it all over again. Perhaps, his own words describe best why he feels this way, "I had a few discoveries and a lot of dry holes and it wasn't always easy. However, the process of creating and selling a prospect and seeing it being drilled always gave me a thrill." "I also got a great deal of pleasure in running a drill stem test and recovering oil." Although he would still choose to be a geologist, his advice to young geologists entering the field is "be sure you want to be a geologist." Looking back on his own career, Don has the following thoughts: "If I had any special talent, I think it was well sample examination and I tried to pass on

Continued on page 15

Continued from pg. 14, Don Strong

this experience to all the beginners, I dealt with. I take a lot of satisfaction in the fact I had some part in helping a number of trainees."

During his career in Wichita, Don served the KGS as Library Chairman in the first two years of the library's existence. In 1995 Don and Lou moved to Arkansas where he has continued all of the recreational interests he enjoyed while in Wichita plus he has added additional interests. He does say that his current health has slowed him down some. He does fly fish when he can and enjoys fly tying, bird watching and reading. When he was in Wichita, his fishing "cronies" were Ch uck Ewing, a landman, and Jay McNeil.

Don and Lou also enjoy going to the bowl games in which K-State participates, where often, they are joined by Carolyn and Dick Roby. In the past few years Don has developed a new interest, flint knapping which he states he has taken to "in a big way" He and Lou attend about 8 to 10 "Knap Ins" and artifact shows each year.

Although Don says he has left geology "almost completely", he, like an "old fire horse" has illusions of one more run and in his case one more discovery.

Moore-Johnson (Morrow) Field, Greeley County Kansas: A Successful Integration of Surface Soil Gas Geochemistry With Subsurface Geology and Geophysics.

Victor T. Jones III and Rufus J. LeBlanc, Jr.

ABSTRACT

Moore-Johnson Field in Greeley County, Kansas produces oil from a stratigraphic/structural trap involving sandstones of the Morrow V7 incised valley-fill system. This field is one of a complex of Morrow oil fields known as the Stateline Trend. These fields in the incised valley trends of southeast Colorado and southwest Kansas will have ultimate recoverable reserves of about 110 MMBO.

The Moore-Johnson field was initially discovered by a major oil company applying conventional geology/geophysics. However, development efforts ceased in 1990 after drilling seven dry holes with only three producers. A second attempt to extend the field was conducted by six other companies, starting in 1992. One of these companies used an integrated approach of combining subsurface geology and seismic with a high-density geochemical soil gas survey. The remainder of the companies used industry-standard Morrow exploration techniques.

The first soil gas survey was conducted on a uniform sample grid of 40-acre spacing over the area of the three producing wells and the dry holes. Analyses of the soil gas samples indicated areas of anomalous and background microseeps that confirmed the three producing oil wells and indicated that the dry holes had been drilled in background areas. Following this calibration survey, a much higher density soil gas survey, consisting of 106 sites, was conducted over a four square mile area of interest suggested by this initial soil gas data. Integration of geochemistry, geology, and geophysics allowed a compatible, unified interpretation to be developed.

The company utilizing the soil gas survey completed the first well to extend the field with a 4700-foot stepout. This company completed eight consecutive successful Morrow wells in the field before drilling a dry hole. After drilling 10 wells, the company had a 90% success rate.

A total of 34 wells were drilled by all operators, to both define the limits of the field, and to develop the Morrow reserves. Of the total 34 wells drilled, 19 wells were completed in the Morrow as oil completions. By only drilling 29% of the total wells, the company utilizing soil gas geochemistry acquired 47% of the reserves produced to date. Success rates for the remainder of the other field operators were 0%, 30%, 50% and 67%. The latter two rates are within the range of industry success rates for development of Morrow fields, but were aided by the successful wells drilled by the company that applied the geochemical methodology.

This documentation of a successful application of a detailed soil gas survey demonstrates how the application of geochemistry with geology/geophysics could be used to delineate other areas of Morrow incised valley-fill systems in areas of untested potential. Additionally, the method would also be applicable in incised valley-fill systems of other geologic ages in Mid-Continent and Rocky Mountain basins.

Note: Victor Jones will be our speaker on January 22.

Myths and Facts About The Oil Industry

by Wayne E. Swearingen

1. ***Myth—Oil companies gouge the public.***

Fact: comparative pricing of a gallon: Gasoline is $1.50 (includes 41 cents excise taxes) while soft drinks are about $2.00; bottled water is about $2.30 and milk is about $2.90. The latter three do not include taxes. Since 1977, the gasoline pump price is up 38 percent, while the Consumer Price Index is up 300 percent, according to the Oil and Gas Journal—2002 Almanac.

2. ***Myth—Oil companies do not pay a fair share of taxes.***

Fact: The national average gasoline pump price includes 41 cents per gallon in just excise taxes, which the average citizen is totally unaware of. Tax amounts to $84.6 billion per year, or two and one half time the combined profitability of the 200 largest U.S. oil and gas companies.

3. ***Myth—Oil companies make obscene profits.***

Fact: The industry is struggling through a 20 year depression. Profit margins are below the average of other industries and well-known companies have disappeared due to financial failures or mergers. Employee have been hard hit, as more than 350,000 men and women (52 percent of the industry work force) have had to seek career employment elsewhere.

4. ***Myth—Oil is a "Giant" owned by "Them."***

Fact: The major oil companies are publicly held, not privately owned by a few of "Them." Millions of Americans have secure investments in the oil industry to fund countless trusts, savings and retirement accounts, pension funds and life insurance policies for retirees, teachers, government workers, widows and others.

5. ***Myth—Oil companies destroy the environment.***

Fact: Oil companies spend 8 billion dollars annually in environmental research, prevention and related areas, which exceeds the annual budget to the EPA. Oil companies co-exist with the environment under "fishbowl" scrutiny. Petroleum operators were environmentalists before that term was "cool."

6. ***Myth — Foreign oil is cheap.***

Fact: America's dependency on foreign oil has doubled since 1984 and is now 60 percent of our needs and increasing. We are vulnerable and controlled by foreign oil pricing. Almost two of every three gallons of gasoline are imported, with much of it coming from countries that hate America. Some us e the money to fund terrorists. Also, it cost the U.S. military $33 billion a year to protect oil exported from the Middle East during peace time. Your friends and your elected representatives need to be reminded that adequate energy at affordable prices is essential to a free and prosperous America.

*Source: **Investment Perspectives**, The Trust Company of Oklahoma, October, 2003, p.3. Wayne Swearingen has been active in educating the public about energy and was one of the founders of the Energy Advocates*

Plan To Attend

2004

Kansas Geological Society

Annual Banquet

Friday — January 23rd

Wichita Petroleum Club

Social Hour: 5:30 Dinner: 7:00 pm

- Installation of New Officers & Awards Ceremony
- Honorary Member Lawrence Skelton
- Recognition of 50 Year Members

Followed by More Social Hour

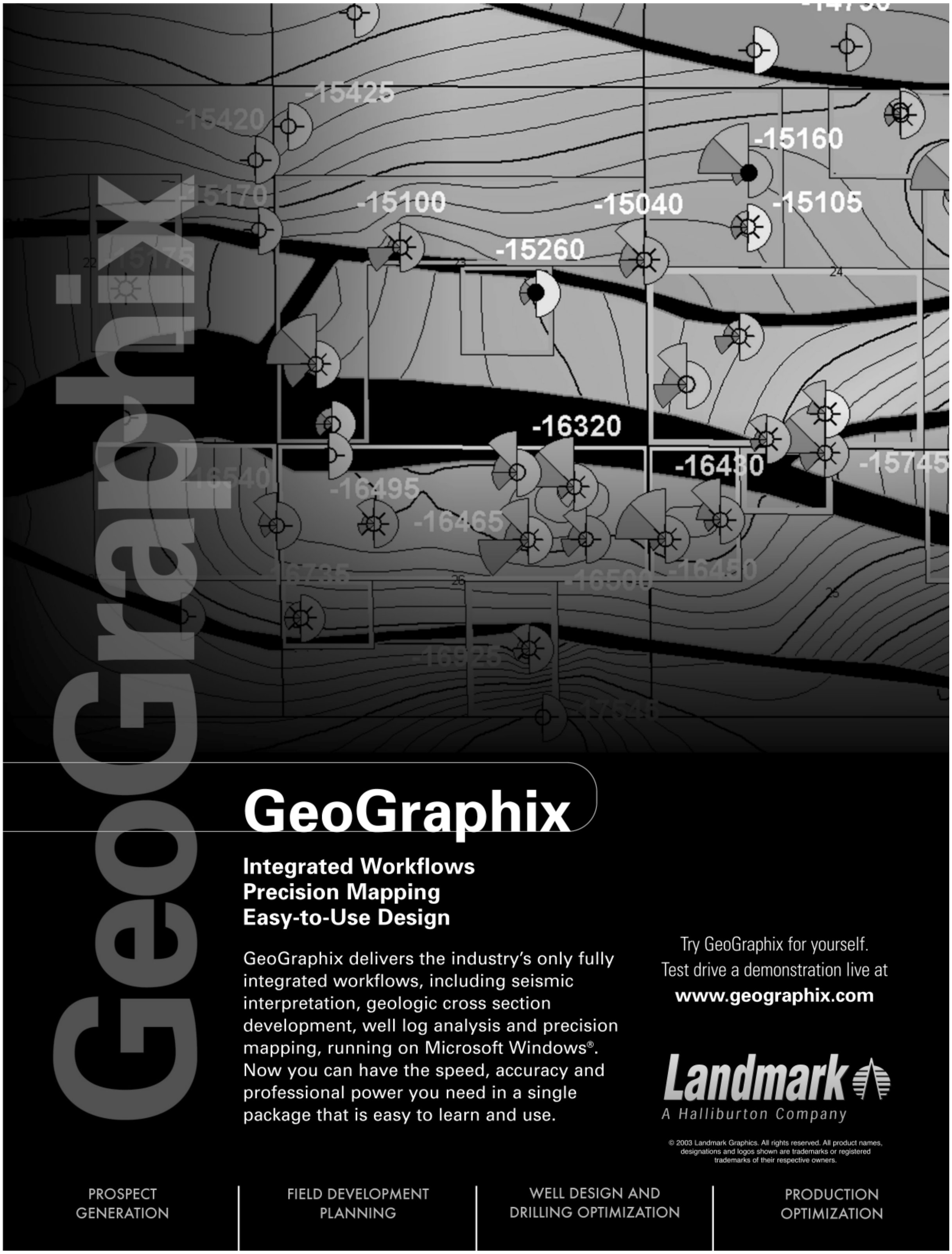
Tickets: $25.00 per person

Tickets may be purchased from
Bill Shepherd 263-5495
Or
At the Library 265-8676

When purchasing your tickets, please consider a contribution to help underwrite the Banquet. Donations may also be forwarded to Rebecca Radford, KGS Business Manager, Bill Shepherd or Marjorie Crane, Banquet Chairperson

All Members, Spouses & Guests are Welcome

Special Treat This Year… … ..The Chocolate Fountain!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PROSPECT GENERATION
FIELD DEVELOPMENT PLANNING
WELL DESIGN AND DRILLING OPTIMIZATION
PRODUCTION OPTIMIZATION

FROM THE MANAGER'S DESK

Dear Members,

Another year is upon us. We must be having some fun because time sure does fly!

I would like to take this opportunity to congratulate our newly elected board members: Fred James, Bryce Bidleman & Phil Knighton. Welcome aboard fellows, I am looking forward to working with all of you.

We had a very productive 2003. We completed a file stretch in the library, making room for the integration of the small scale logs into the files as well as the new material coming in. I would again like to thank Sal & Chellie Mazzullo for all of the time they have volunteered to this project and for enlisting the help of several WSU students. All of their hard work is truly appreciated, please let them know when you see them.

One of the most exciting things to happen in 2003 was the opening of the Walters Digital Library. We officially opened for business the 1st of November and have had a very positive response. If you have not tried the "free demo" yet, give it a try. You can get all the instructions from logging on to the Foundation's web page: ***www.kgfoundation.org***. I think you will find that it is very easy to use and offers access to our data 24 hours a day, 7 days a week.

The plans for 2004 are to continue the scanning (archiving) of the data. This is so important to all of us. If you are in a position to donate any funds to this project, it will be greatly appreciated.

Wishing you the best for a wonderful and productive year!

Rebecca Radford

Pictured from left: Tim Pierce, Mary Jean Berg, Dr. Steve Sonnenberg, Dr. Dan Merriam and Robert Cowdery

Dr. Sonnenberg was the guest speaker at the 17th Annual Dr. J.R. Berg Distinguished Lecture

Kansas Geological Foundation
<u>Items for Sale</u>

Several sets of geological data and publications
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OVERVIEW OF POROSITY EVOLUTION IN CARBONATE RESERVOIRS

S. J. Mazzullo
Department of Geology
Wichita State University

INTRODUCTION

Carbonate rocks (limestone and dolomite) account for approximately 50% of oil and gas production around the world. Of the carbonates, a slightly greater percentage of world hydrocarbon reserves has been produced from dolomites because such rocks commonly, but not always, have more porosity and permeability than limestones (Halley and Schmoker, 1983). Unlike most sandstone reservoirs, which typically are single-porosity systems (i.e., interparticle pores) of relative uniform (homogeneous) nature, reservoirs in carbonate rocks commonly are multiple-porosity systems that characteristically impart petrophysical heterogeneity to the reservoirs (Mazzullo and Chilingarian, 1992). Hence, the specific types and relative percentages of pores present, and their distribution within the rocks, exert strong control on the production and stimulation characteristics of carbonate reservoirs (e.g., Jodry, 1992; Chilingarian et al., 1992; Honarpour et al., 1992; Hendrickson et al., 1992; Wardlaw, 1996). Pore types in carbonate rocks can generally be classified on the basis of the *timing* of porosity evolution (Choquette and Pray, 1970) into: (1) primary pores (or depositional porosity), which are pores inherent in newly-deposited sediments *and* the particles that comprise them. Such pore types include *interparticle pores* in, for example, carbonate sands (but also in muddy carbonates), *intraparticle pores* (within particles such as foraminifera or gastropod shells), *fenestral pores* (formed by gas bubbles and sediment shrinkage in tidal-flat carbonates), and *shelter* and *growth-framework pores* (common in reef buildups); and (2) secondary pores, which are those that form as a result of later, generally post-depositional dissolution. Such pore types include all of those mentioned above, but only when it can be demonstrated that primary pores which subsequently were occluded by cement later had all or some of that cement dissolved (resulting in the generation of exhumed pores Figure 2), as well as *vugs* (large pores that transect rock fabric, that is, dissolution was not fabric-selective) and *dissolution-enlarged fractures*. Most of these primary and secondary pore types can readily be identified in cores, and with the possible exception of shelter and growth-framework pores, also in well cuttings samples.

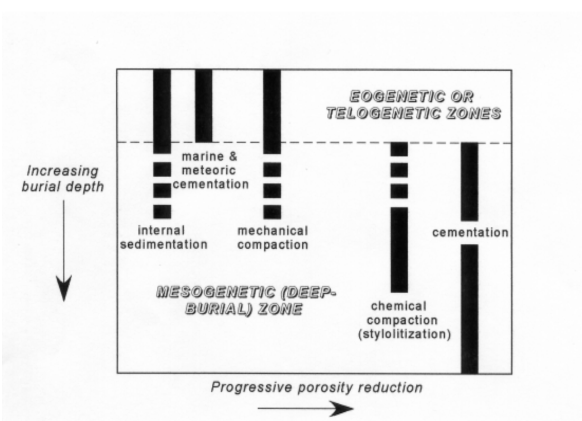

Figure 1. Processes by which porosity is reduced in carbonate rocks. Syndepositional marine cementation occurs only in the eogenetic zone, and mechanical compaction is unlikely to affect telogenetically-exposed older carbonate rocks.

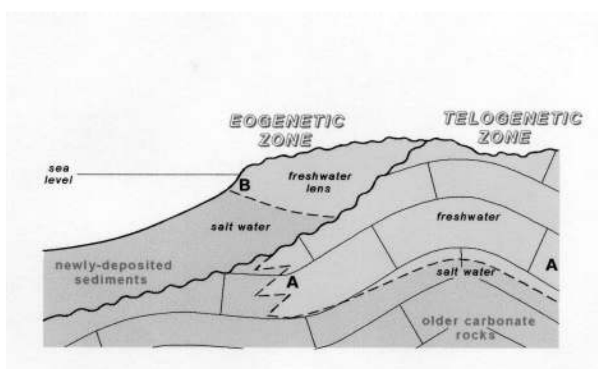

Figure 2. Meteoric subaerial exposure of newly-deposited sediments in the eogenetic zone, and of older carbonate rocks in the telogenetic zone. Note that the freshwater lens in the eogenetic zone can extend some distance below sea level ('B'), and that freshwater may extend down -dip for a considerable distance in the telogenetic zone ("A").

Because the natural tendency in most carbonate sediments is that primary porosity is substantially reduced by cementation and compaction during post-depositional burial (Figure 1; Halley and Schmoker, 1983), many workers would argue that most porosity in limestone and dolomite reservoirs is of secondary origin (e.g., Mazzullo and Chilingarian, 1992). Exceptions to this statement are cases where primary porosity is preserved because of the early influx of hydrocarbons into pores (e.g., Feazel and Schatzinger, 1985). Early on in the study of carbonate sediments and their diagenesis, the *subaerial meteoric diagenetic (freshwater) model* was promoted as a means of explaining porosity evolution in carbonates, specifically in shallow-water carbonates that lie beneath unconformities in paleo-vadose and paleo-phreatic freshwater zones (e.g., Friedman, 1964; Land, 1967). This model still is heavily applied today, especially in sequence stratigraphic-related diagenetic studies of reservoirs. This model presupposes that if porous carbonate rocks are present beneath unconformities, then that porosity must have been created by freshwater dissolution during subaerial exposure. Of course, as explorationists we all can probably list a large number of wells that were drilled into non-porous carbonate rocks beneath unconformities. Hence, the corollary pertaining to subaerial exposure is not true meteoric exposure does not always create porosity, and even if it did, that porosity may be occluded during later burial (Figure 1). A most critical constraint on evaluating, or more importantly, on predicting porosity in carbonate rocks utilizing only the subaerial meteoric diagenetic model is that one must call upon fluids capable of dissolving carbonate to come from *above*, that is, from rain water percolating down into sediments or rocks beneath unconformity surfaces. Ostensibly, then, many might consider that if there is not an unconformity in the section, then the carbonates will not be porous. Again, as explorationists we can all probably compile a list of wells in which porous carbonates that were not associated with unconformities were encountered in the subsurface.

The foregoing analysis therefore begs the following questions: (1) can secondary porosity in carbonate rocks be generated by processes *other than* subaerial meteoric exposure, and if so, what are those processes?; (2) how might reservoir porosity formed by such alternative processes differ from reservoirs created by meteoric dissolution along unconformities?; (3) how can we recognize and determine the origin of reservoir porosity?; and (4) can the subsurface occurrence of porosity formed by any such alternative models of reservoir origin be predicted? The purpose of this contribution is to address these questions by demonstrating the multi-faceted evolution of secondary porosity in carbonate hydrocarbon reservoirs. In the following discussions attention will be focused on the recognition and origin of pore types in shallow-water limestones and dolomites as observed mainly in cores and well cuttings samples.

SECONDARY POROSITY BENEATH UNCONFORMITIES: THE SUBAERIAL METEORIC MODEL

The generation of secondary porosity in carbonate sediments or rocks in this model is a direct consequence of dissolution by freshwater (ultimately rain-derived), which dissolves carbonates because the water is undersaturated with respect to calcium carbonate. The extent of dissolution and secondary porosity formation are controlled by factors such as the acidity of freshwater (e.g., rain water percolating down through a soil zone will be more acidic than in areas where soils are not present), the amount of porosity or fractures within the affected carbonates, the residence time of the freshwater in the diagenetic system, the mineralogy of the sediments or rocks, and so forth (Longman, 1980; Moore, 1989). Secondary porosity generation via dissolution can occur relatively soon after deposition, in unconsolidated sediments, in what Choquette and Pray (1970) refer to as the *eogenetic zone*; or it can occur much later, in rocks, in the *telogenetic zone* as a consequence of uplift of older, formerly buried carbonates (Figure 2). In newly-deposited carbonate sediments that subsequently are subaerially exposed, it is the difference in original mineralogies of particles in the sediments that drives the relatively rapid, selective dissolution of particles. Fragments of corals, pelecypods and gastropods, and oolites,

Continued on page 24

Continued from pg. 23

for example, are originally composed mostly of the mineral *aragonite* ($CaCO_3$, orthorhombic), which is very soluble. It is for this reason that formerly aragonitic particles in limestones usually are represented by pores (in this case, fabric-selective pores) or cement-filled pores. In contrast, particles such as forams, crinoid fragments, and bryozoans are originally composed of the mineral high-magnesium calcite ($CaCO_3$, hexagonal-rhombohedral), which is calcite with up to 23 mole% $MgCO_3$ in the crystal lattice. With exposure to freshwater such particles tend merely to lose $MgCO_3$ and not to dissolve like aragonitic particles. Other particles, such as brachiopod shells and some pelecypods, build their skeletons out of low-Mg calcite (also $CaCO_3$, hexagonal-rhombohedral), which is calcite with less than 4 mole% $MgCO_3$. Particles of original high-magnesium calcite and low-magnesium calcite mineralogy tend not to dissolve unless the freshwater is quite undersaturated with respect to calcium carbonate, and it is for this reason that some particles (crinoids, bryozoans, brachiopods) often are well-preserved in ancient rocks. The eogenetic exposure to freshwater of newly-deposited carbonate sediments, which are generally highly porous and *polymineralic* (i.e., as discussed above, composed of mixtures of aragonite, high-magnesium and low-magnesium calcite), results in the formation of cemented limestones, of varying porosity, of stable low-magnesium calcite composition (notwithstanding dolomitization). In contrast, late eogenetic or telogenetic freshwater exposure of older limestones that have already been mineralogically stabilized and cemented is not driven by such differences in the relative solubility of aragonite, high-magnesium and low-magnesium calcite because the rocks already are mineralogically stabilized to low-magnesium calcite, and further dissolution can occur only if the fluids are quite undersaturated with respect to calcite (the least soluble of the aforementioned carbonate minerals). Typically, such dissolution forms vugs and caverns, which can also form in polymineralic carbonate sediments. Dissolution of already stabilized limestones can also result in the formation of particle-selective pores when certain particles in the rocks are slightly more soluble than other particles because of differences in particle size or their micro-architectural arrangement of component calcite crystals. For example, crinoid fragments in older rocks are composed of single, relatively large crystals of low-magnesium calcite, which have relatively low solubility. It is for this reason that crinoid-rich Mississippian limestones, for example, typically have low porosities. In contrast, foram shells are composed of myriads of small calcite crystals, which have relatively higher solubility, and they usually are more readily dissolved than crinoid fragments.

In either case, it is important to note that carbonates can be affected by meteoric dissolution not only directly beneath unconformities on land, but also for some distance down-dip into the subsurface ("A" in Figure 2) and some distance in a seawa rd direction below sea level, depending on the extent of freshwater lenses ("B" in Figure 2). Porosity generation by dissolution eventually ceases, generally in a down-dip direction within phreatic zones when that water becomes saturated with respect to dissolved calcium carbonate. At that point, porosity can be maintained, or if the water becomes even more saturated with respect to dissolved calcium carbonate, it can begin to be occluded by carbonate cement (and other cements as well, such as gypsum/anhydrite or silica).

Meteoric Porosity in Limestones

In limestones, common secondary pore types formed as a result of post-depositional dissolution variously include exhumed interparticle, intraparticle, fenestral, shelter, and growth-framework pores, all of which are considered to be fabric-selective pores; and also not fabric-selective vugs (Figure 3E) and dissolution-enlarged fractures. The size of vugs (Figure 4) varies from small (but larger than component particles in the rocks) to caverns or cavernous porosity. Vugs may originate either by wholescale dissolution of parts of the rock or by dissolutional enlargement of fabric-selective pores (Figure 3E).

In many cases there is coincidence between the types of fabric-selective pores present in the rocks and the depositional environment of the rocks, which serves as an important guide in evaluating permeability and potential recoverable reserves from the reservoir, and in deciding on what stimulation

Continued on page 25

Continued from pg. 24

procedures to use but only if one knows the depositional environment of the rocks from study of subsurface samples. For example, carbonate sands (lime grainstones), deposited in high-energy environments such as oolite shoals or skeletal sand shoals, commonly have high interparticle porosity (Figure 3A) and attending relatively high permeabilities. On the other hand, however, high porosity but low permeability may characterize a carbonate sand (limestone) reservoir wherein only the particles have been dissolved (for example, in cases where the reservoir contains only molds of oolites referred to as oomoldic porosity or by the older term oocastic porosity: Figure 3D). In such cases there may be ample hydrocarbon storage volume in the pores in the rocks, but in the absence of fractures, there is little interconnected porosity. Notwithstanding porosity associated with dolomitization (discussed later), limestones deposited in tidal-flat environments commonly contain a specific type of vuggy porosity referred to as fenestral pores (for example, birdseye pores, which is one type of pinpoint porosity: Figure 3C), and unless fractured, such rocks may have decent porosity but limited permeability. Skeletal sands shoals wherein the particles mainly are foraminifera, which are common in midcontinent Pennsylvanian limestone reservoirs (Wilhite and Mazzullo, 2000), may be highly porous and permeable because of the presence of interparticle pores, and within the forams, of intraparticle pores as well (Figure 3B). On the other hand, if intraparticle pores are the only pore types present, then porosity (and hydrocarbon storage volume) might be high but permeability would be low (notwithstanding fracturing). As a corollary, variations in porosity and permeability from well-to-well within a given zone may be a consequence of different depositional environments in that zone and/or from differing extents of porosity generation versus occlusion between wells. Only study of cores/cuttings and thin sections can resolve the possible reasons for such variations between wells.

Over-riding such generalizations about the relationships among pore types, permeability, and depositional environments of the limestones is the importance of pore throats in the rocks (Wardlaw, 1976). In limestones, particularly in grainstones, for example, the nature of pore throats and their effect on permeability is controlled by the size of the particles in the rocks, and more importantly, by the distribution of any remaining earlier-precipitated cement in the pores that wasn't dissolved (Figure 3F). Calcite cement overgrowths on crinoid fragments can significantly restrict pore throats as well (Figure 5), which is why many crinoid-rich Mississippian limestones are of low-permeability nature. The best way to determine the extent of pore-throat restriction in the rocks under consideration is by examining the rocks petrographically in thin section. Clay-mineral cements are extremely rare in carbonate reservoir rocks, and therefore, need not be considered here.

Meteoric Porosity in Dolomites

In contrast to earlier postulates on the subject (e.g., Murray, 1960; Weyl, 1960), the process of dolomitization of a pre-existing limestone does *not* automatically create secondary porosity. Whereas it is true that porosity tends to increase as amount of dolomite increases (Figure 6), it generally does so for the following reasons. In partly dolomitized limestones exposed to telogenetic meteoric fluids, for example, any remaining calcite (which may represent particles and/or carbonate mud matrix) inherently is more susceptible to dissolution by freshwater because it is more soluble than dolomite. Hence, subaerial exposure of a partly dolomitized limestone can result in the generation of the same types of pores as described above by dissolution of remaining calcite, depending on the original texture of the rock (mudstone, wackestone, packstone, or grainstone), its depositional environment, and degree of replacement by dolomite (Figure 7). Likewise, remaining evaporites in the rocks can also be dissolved. In more pervasively dolomitized rock exposed to telogenetic meteoric fluids, remaining calcite (or evaporite minerals) between dolomite crystals can be dissolved during subaerial exposure to produce intercrystalline pores between dolomite crystals. In completely dolomitized rocks, vugs (and sometimes dissolution-enlarged fractures) are common pore types present if the meteoric fluids were highly acidic or acted on the rocks over long periods of time. Selective dissolution of small dolomite crystals (because solubility

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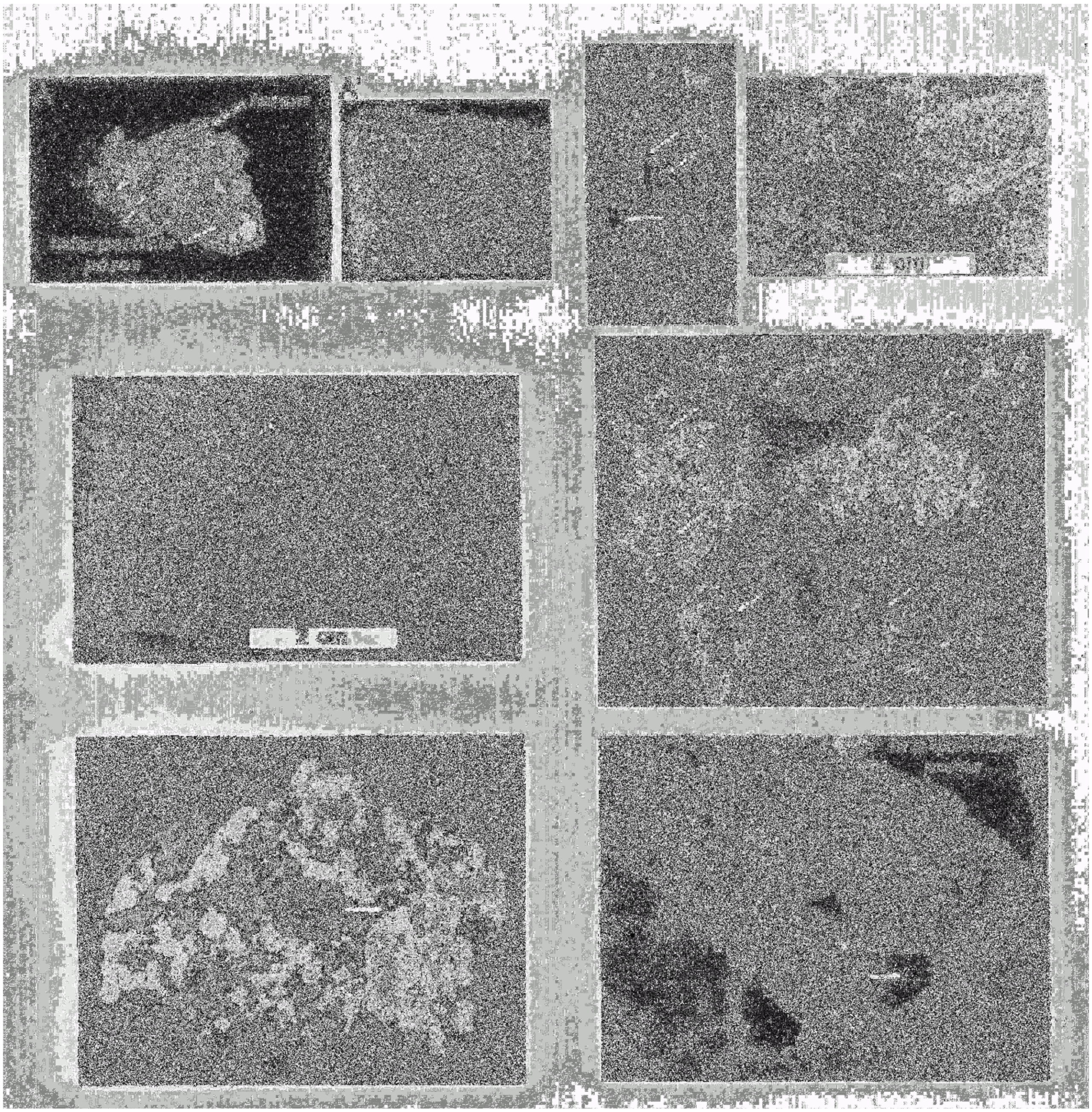

Figure 3. Typical secondary dissolution pore types in carbonate rocks that are readily identifiable in cuttings and core samples. A – interparticle pores in a grainstone (cuttings sample) and A' – core showing interparticle porosity in a carbonate grainstone. B – thin-section photomicrograph of intraparticle porosity (arrows) within a fusulinid and B' – core showing intraparticle porosity within a coral. C – Fenestral porosity in a tidal-flat dolomite. Tilted arrows point to planar (laminar) fenestral pores, and horizontal arrows point to smaller 'birdseye" pores. D – Cuttings samples with oomoldic pores (arrows) in an oolite grainstone. E – Carbonate grainstone with identifiable skeletal particles (circled) and larger vug (arrow) that formed from the initial dissolution of a particle and then further dissolution of the matrix around it (cuttings sample). F – Thin-section photomicrograph of interparticle porosity in a carbonate sand wherein remnant cement (arrow) restricts pore throats and reduces permeability.

increases as crystal size decreases), or of more soluble dolomite phases in the rocks, can result in the development of vugs and intercrystalline pores. All such processes and resulting pore types can be repre-

Continued on page 27

Continued from pg. 26

sented in a given reservoir. As in limestones, the nature of pore throats in dolomites affects permeability, and as a general rule, intercrystalline pore throat sizes decrease with decreasing crystal size and extent of dolomitization (Figure 8).

Cavernous Porosity in Carbonate Rocks

Cavernous and associated vuggy porosity are major attributes of hydrocarbon production from reservoirs such as the Arbuckle Group in Kansas (Walters, 1946; Newell et al., 1987) and Oklahoma (Gatewood, 1970), and from its stratigraphic correlative, the Ellenburger Group, in west Texas and New Mexico (Holtz and Kerans, 1992). Additional examples of hydrocarbon reservoirs in paleo-caverns are given in Mazzullo and Chilingarian (1996). Only rarely are completely fluid-filled caverns encountered in the subsurface. Rather, paleo-caverns usually are filled by porous (or, unfortunately, sometimes tight) cave-roof collapse breccia and associated sediments and/or by overlying, younger rocks (Figure 9). Rather than being single zones, paleo-caverns typically are labyrinthine systems characterized by extreme lateral and vertical reservoir compartmentalization (Figure 9). Cavernous porosity undoubtedly also locally contributes to hydrocarbon production from some Mississippian reservoirs in Kansas. I have encountered a number of instances in Kansas, for example, where wellsite geologists= reports picked the top of the Mississippian at a certain depth, and then the limestone or dolomite directly below seemingly was underlain by a section of sand (which I presume to be Pennsylvanian-age siliciclastic sand) that is, in turn, underlain by more carbonate rock. Such occurrences may indicate that the wells penetrated sand-filled paleo-caverns (Figure 10).

This article will be continued in the March—April Bulletin
Selected References will be published with the conclusion of this article.

Figure 4. Core slab with secondary vugs (arrows) resulting from the partial dissolution of earlier dolomite cement (white).

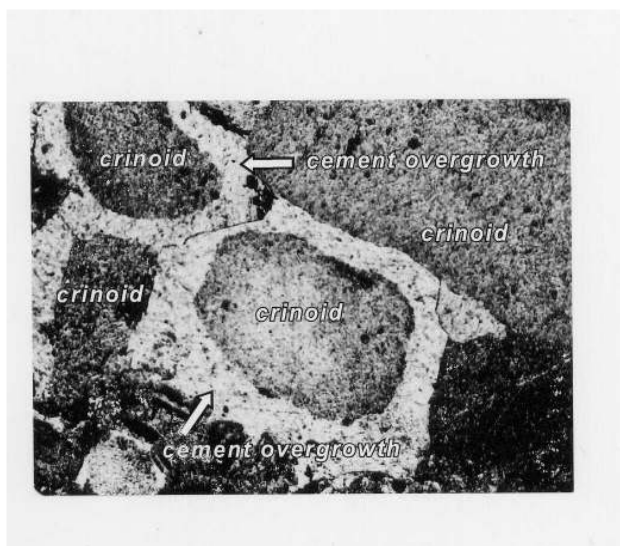

Figure 5. Thin-section photomicrograph of calcite cement overgrowths on crinoid fragments that occlude interparticle porosity.

More figures on page 28

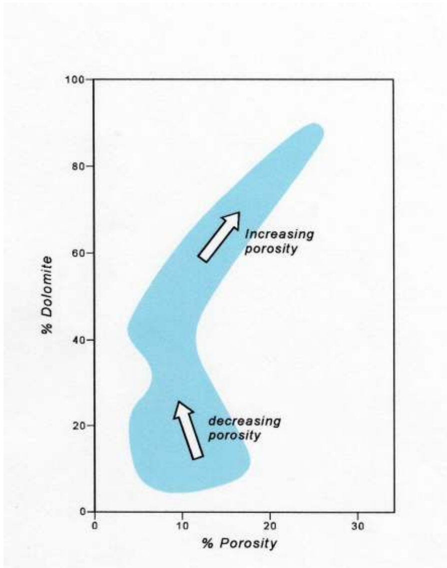

Figure 6. Relationship of porosity to percent dolomite in carbonate rocks (after Murray, 1960).

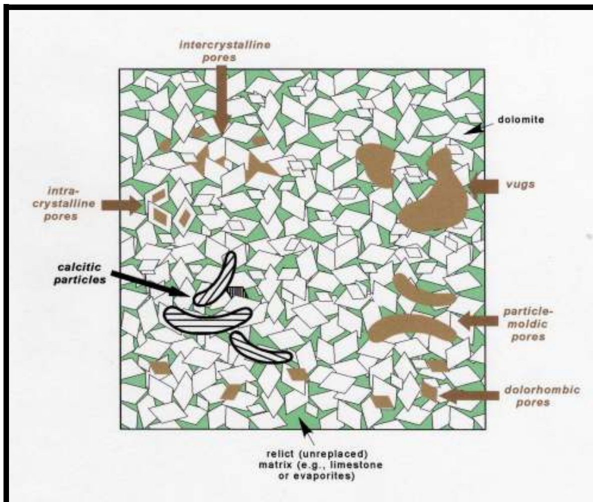

Figure 7. Origin of secondary dissolution porosity in dolomites.

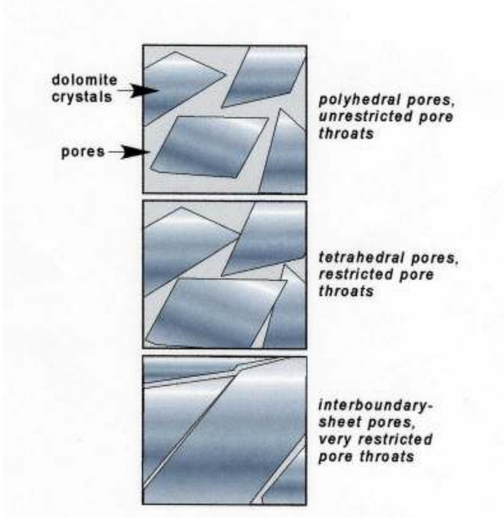

Figure 8. Intercrystalline pores and pore throats in dolomites. Relative size of pores and pore throats is not necessarily correlative to dolomite crystal size because porosity is a percentage of total rock volume. Pore throat characteristics, however, do reflect the degree (extent) of dolomitization in rocks. Dolomites with polyhedral pores generally are referred to as "sucrosic".

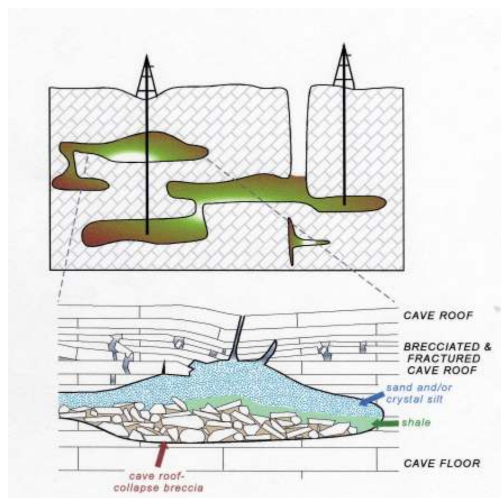

Figure 9. Top – Typical lateral and vertical compartmentalization of reservoir zones in cavernous (karsted) carbonate rocks. Bottom – Typical porosity types and fills of cavernous reservoirs. Cave roof rocks become progressively more brecciated downward, with attending fracture, dissolution-enlarged fracture, and commonly, vuggy porosity. Cave-fill deposits variously can be: (1) cave roof-collapse breccia, which can have inter-clast porosity as well as intra-clast vuggy and fracture porosity. Conversely, original inter-clast porosity can be filled with cements and/or shale, or can be filled with porous sand; (2) impermeable shale infiltered into the cavern from above; or (3) porous or tight sand infiltered into the cavern from above. Cave roof collapse and infiltering of sand and/or shale can occur soon after karstification or later.

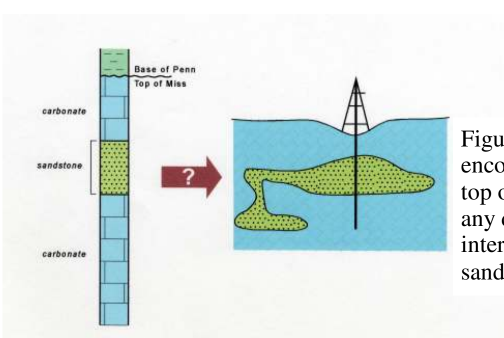

Figure 10. On the left is a partial stratigraphic column of what I've sometimes encountered in the Mississippian in Kansas – a few feet of carbonate below the top of the Miss, underlain by sandstones (which are not laterally correlative for any distance), in turn underlain by more carbonate. On the right is a possible interpretation of such a stratigraphy – that the wells in question encountered sand-filled caverns below the top of the Miss.

ABSTRACT

Lower Skinner Valley Fill Sandstones: Attractive Exploration Targets on the NE Oklahoma Platform

Puckette, Jim, Oklahoma State University

High-volume oil and gas accumulations occur in Desmoinesian Lower Skinner valley fills located on the NE Oklahoma Platform. Sandstones within these paleovalleys produce oil and gas from traps that combine two key components: porous reservoir and anticlinal folding. Skinner valleys formed in response to a drop in sea level. Lowstand stream erosion formed the resultant valleys, which form narrow, linear trends. Lower Skinner valleys that eroded through underlying "Skinner" highstand deltaic and marginal marine strata resulted in the juxtaposition of fluvial Lower Skinner sandstone on the partially eroded Pink Limestone marker. In some cases, incision removed the Pink Limestone, and Skinner valley fill sediments were deposited directly on Red Fork strata.

The heterogeneous nature of valley fills complicates oil and gas recovery. High-resolution stratigraphic correlation using wireline logs is useful in identifying potential isolated compartments. In the NW Sooner Valley Field in central Payne County, compartmentalization is confirmed by fluid and pressure data.

Porosity in valley fill sandstones is mostly secondary and resulted from the dissolution of feldspar and metamorphic rock fragments. The combination of thicker sandstone, high porosity (16 to 20%) and permeability (>200 md), and favorable trapping conditions, results in oil recoveries that often exceed 200 MBO per well. The shallow drilling depths on the NE Oklahoma Platform make these sandstones attractive exploration targets.

Note: Jim Puckette will be our speaker on February 26.

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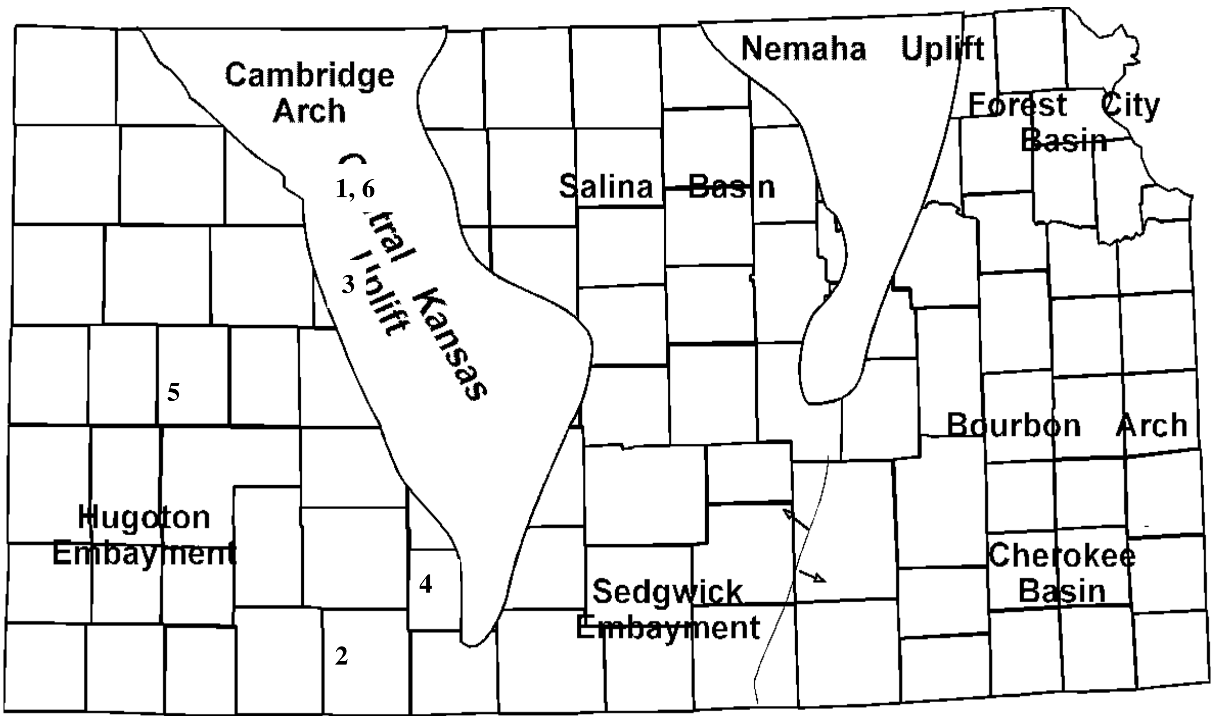
William A. Sladek	06/01	2001
Harlan B. Dixon	06/01	2001
Edward B. Donnelly	08/01	2001
Richard P. Nixon	02/02	2002
Robert W. Frensley	12/01	2002
Gerald W. Zorger	01/02	2002
Don L. Calvin	03/02	2002
Harold Trapp	12/02	2002
Claud Sheats	02/02	2002
Merle Britting		2002
Donald M. Brown	11/02	2003
Elwyn Nagel	4/03	2003
Robert Noll	9/19	2003

HOLIDAY HOURS FOR KGS LIBRARY

Closed New Year's Day

EXPLORATION HIGHLIGHTS

By John H. Morrison, III
Independent Oil and Gas Service



(1) Northern Lights Oil Completes Graham Wildcat (OIGsi Weekly News 10/3/03) - Northern Lights Oil Company, LLC, Andover (KS), has established a new oil field in Graham County, north central Kansas, about six miles south of the city of Densmore. The Marie #1, located 1520 ft. from north line and 380 ft. from west line (approximate W/2 W/2 NW) in section 12-T6s-R2W, is producing a commercial amount of crude from undisclosed perforations in the Lansing-Kansas City limestones. The wildcat well was drilled in early October by Mallard JV rotary tools to a total depth of 3718 ft. by loggers measurement. The new unnamed pool discovery lies about 3/4-mile west of known oil production within the Boys West field where pay comes from the Shawnee and Lansing-Kansas City zones. The field was discovered by A. Scott Ritchie in 1984 and has produced nearly 800,000 barrels of oil from 15 wells in the field. Producing horizons are found between 3380 to 3600 ft. in depth. Northern Lights has not released any completion details on their new discovery. John W. Sutherland, Jr. is managing partner of the firm. Kurt L. Smith served as wellsite geologist.

(2) Vess Oil Corporation Has Arbuckle Discovery in Clark County (OIGsi Weekly News 10/3/03) - New Arbuckle oil reserves have been discovered in western Clark County by Wichita-based Vess Oil Corporation. Utilizing 3-D seismic data interpretation, the Denton 'A' #1 was drilled in July at location 1415 ft. from south line and 1415 ft. from west line approximate Cen SW/4) in section 1-T32s-R24W. It is producing an unspecified amount of crude at site located about 6 miles north and 5-3/4 miles west of Ashland, Kansas. Val Energy's Rig #2 was contracted to drill the well to a total depth of 6686 ft. Completion details will be released soon by operator. The Denton 'A' lease is situated almost 1-1/2 miles northwest of the one-well Yesta field in section 11. Enron Oil & Gas Company reported the discovery of Viola oil at their #11-1 Berryman Tract OWWO to open the field in early 1999. However, the 6910 ft. deep well never produced according to production records. Slightly over 1-1/2 miles to the north, J. M. Huber's #36-1 Alley in section 36-T31s-R24W was completed in 1986 for around 3 million cubic feet of gas per day from Mississippian perforations at 5684 to 5700 ft. Well never produced due to lack of facilities. Vess Oil has since drilled a second well to the west of the new find. The Denton 'B' #1, approximately C N/2 NE SE SE in section 3-T32s-R24W, proved to be dry and was plugged and abandoned last month. Proposed total depth was 6850 ft. in Arbuckle. Their new Arbuckle oil field, the first in Clark County, has not been named.

(3) Downing-Nelson Has Two New Discoveries (OIGsi Weekly News 11/10/03) - Independent oil producer Downing-Nelson Oil Company, of Hays (KS), has completed two new wildcat wells in Trego County to establish new unnamed oil fields southwest of Ellis, Kansas. The Honas #1-29, located in approximately NW NE NW of section 29-T13s-R21W, is on pump making 70 barrels of oil per day from the Lansing-Kansas City zones. No completion details have been released to date. The estimated 4100 ft. deep well found isolated feature about 5/8-mile west of Locker #1-D well in section 29, completed by Pickrell Drilling Company in 1974 to open the Riga South pool. The well was completed for 95 barrels of oil daily from LKC perforations at a depth between 3722 to 3763 ft. Top of the Lansing was reported at 3688 (-1347 KB). Downing-Nelson's second oil strike is in section 28-T13s-R21W. The Sherfick #1-28, spotted 1230 ft. from south line and 820 ft. from east line (E/2 SE), is pumping 123 barrels of oil per day from the Cherokee Sand formation. The well is giving up crude naturally without acid stimulation. No details are available. The estimated 3950 ft. deep well is situated about 5/8-mile southeast of producing wells in the east side of the Riga South pool in the north half of section 28. Downing-Nelson has staked another location to the east in approximately NE SE SW of section 27. The Bertha Riedel #1-27 is a proposed 4200 ft. LKC and Arbuckle test that is scheduled to begin drilling operations in December this year. Discovery Drilling tools will be used.

(4) Roberts Resources Flows Oil at New Discovery (OIGsi Weekly News 11/24/03) - Kent Roberts, dba/ Roberts Resources, Inc. of Wichita (KS), has completed the Schmidt #1 well in Kiowa County as flowing 30 barrels of oil and 233 Mcf gas per day, no water. Well is located 500 ft. from the north line and 420 ft. from the east line (E/2 NE NE) in section 8-T29s-R18W. Operator found the Altamont limestone member of the Marmaton formation to be productive from 4818 to 4822 ft. Well kicked off flowing after pay zone was treated with 2500 gallons of 28 percent gelled acid. Electric log top of the Altamont was called at 4818 (-2526 KB). Logged total depth is 5427 ft. in the Arbuckle. Commercial production started on September 15, 2003. The Schmidt wildcat well opens a new unnamed field 3-1/2 miles south of Greensburg town site. Well site is located about 3/4 mile west of Ursula Field discovery well, Graves #1, NE SW NE in section 9, which was completed for 3,000 Mcf gas daily from the Mississippian in 1961. Robert's Schmidt well also tested good shows of gas in the Mississippian and was perforated from 4955 to 4958 ft. However, no completion details have been reported and the zone was squeezed-off to complete the Altamont pay source. Roberts is currently drilling their first offset, Schmidt #2, at location only 45 ft. to the north of the #1 well. Duke Drilling's Rig #1 spudded the hole on October 27th and is presently drilling ahead toward a proposed total depth of 4960 ft. Closest Marmaton production in the vicinity of the new Schmidt discovery lies nearly one mile to the east in the Ursula Field. In 2001, Robert Resources' McKinley #1, spotted in C N/2 SE NE in section 9, was new Marmaton oil discovery in the field. The well was completed for 50 barrels of oil and 300 Mcf gas daily, no water, from Altamont perforations at 4807 to 4812 ft., as well as the Pawnee limestone from 4852 to 4858 ft. The Schmidt well ran about six feet lower structurally on the Altamont compared to the McKinley well.

(**5) Slawson Exploration Opens New Oil Field (OIGsi Weekly News 12/08/03)** - Slightly over one mile northeast of known Lansing-Kansas City, Pleasanton and Marmaton oil production in the Beckley East Field in eastern Scott County, Wichita-based Slawson Exploration Company, Inc. has discovered new oil deposits in the Mississippian formation at the Weisenberger 'K' #1 well. Located in approximately NW SW SE in section 10-T18s-R31W, the new pool opener began producing oil commercially on November 12, 2003. The wildcat well was drilled to a total depth of 4601 ft. by Murfin Drilling tools. Production volume and depth is not available. The new unnamed oil field lies nearly four miles southeast of other known Mississippian production found in the Beckley North Field in section 6. Slawson's new find is located 1-1/4 miles north and 9 miles east of Scott City, Kansas.

(**6) Great Eastern Energy & Development Corp. Has Discovery (OIGsi Weekly News 12/08/03)** - Great Eastern Energy & Development Corp., of Midland (TX), has completed a northwestern Kansas wildcat well 7-1/2 miles north of the city of Nicodemus, in Graham County, and has discovered new

Continued on pg. 34

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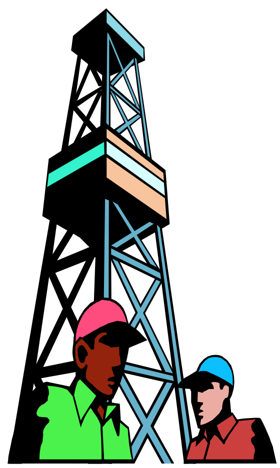

Continued from pg. 33

Lansing-Kansas City oil reserves. Discovery was made at the Mid-American #1 well, located 2020 ft. from the north line and 730 ft. from the west line (appx SW NW) in section 25-T6s-R21W. The wildcat well is currently on pump at an undisclosed rate. Completion details are not available. Proposed total depth of the well was 3800 ft. The new unnamed oil field is situated nearly 3/4-mile southwest of Great Eastern's States / Vehige #1 well in the southeast-quarter of section 24. The well was completed for 50 barrels of oil per day and opened the Pioneer Southeast Field earlier this year. Pay was also from undisclosed depth in the Lansing-Kansas City zone. The well has produced over 4700 barrels of oil during the first three months on production.

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