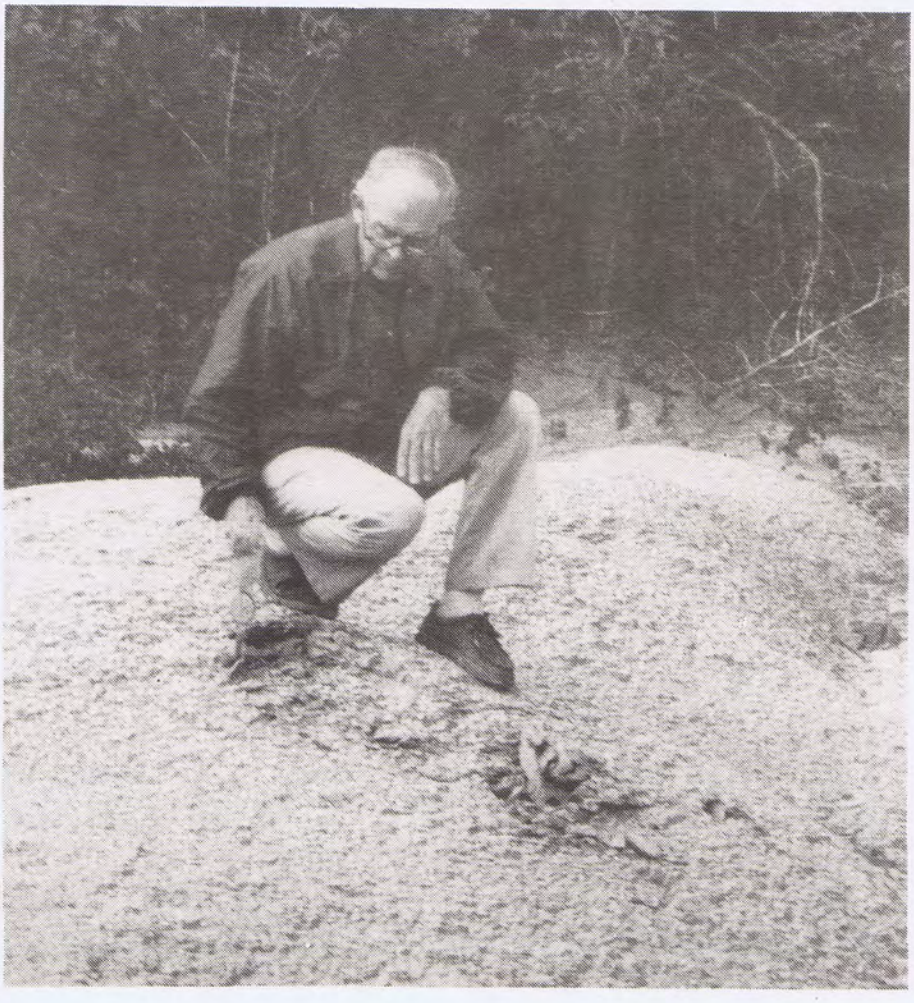
MISSISSIPPI GEOLOGICAL SOCIETY

Volume XXXIX No. 10 July, 1991



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1991-92

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PRESIDENT'S MESSAGE

I didn't know that a Spring Fling could be so enjoyable. Neither did I know that it could be so much work. Just as many of you confided, our hardy appreciation goes out to those who made this a delightful and happy occasion. An event that I'm sure we will recall until the next one. After several head counts we came up with about 98 in attendence at one time. Some 30 were the wives of members, the highest attendence by spouses in some years. The shrimp was great and the portions unbelievable. Thanks T.C., it was a splendid meal as usuall. Our thanks to Margret too. The gifts have alway been the high point for this social. Additionally, we want to congradulate Linda Bograd for playing the odds. She will be taking her husband on the grand prize trip to Las Vegas, or at least we hope so (Mike does too). More thanks go out to David Chastain for coming up with the game. It was wonderful; you should have seen yourselves. Finally, I'd like to express my sincere appreciation to out going President, Jim Files. Most of you knew Jim a lot better than I did prior to my activity on the MGS Board. He should be considered a distinguished leader, wise, and thoughful. I'm glad you'll be around to help with society matters now and in the years to come.

Well, we have just held our first MGS business meeting and we're **"fire up"**. The responsibility to take this body of members into the next decade has been assumed. Our model is the example set by our forerunners; hard work, devotion, and an unwillingness to fail. This will be our guide to future sucess. We know there's a hard road ahead that's full of uncertainty. Nevertheless, we are undaunted in our commitment to survive. Pulling together, closing the ranks will have to become our shield. We will be looking to you, our forerunners, to help forge that future. Without your counsel, without your undergirding support I'm not so certain how it all will end. Hopefully, over this next year, we can set up and staff a Special Committee with the sole charge of mapping that tomorrow. If called on, please consider the seriousness of this request. We've got to start somewhere and this is it.

In ending, let me thank you for allowing me to serve. I'm doing my best, but I'll need your best support to fully succeed.

Steve Ingram

ABOUT THE COVER: Dr. Ernest E. Russell, Field Trip Leader of the 18th MGS Field Trip held April 19th and 20th, test the brittleness of the chalks of the Demopolis Formation. This non-scheduled stop was an outcrop along Highway 45 south of Columbus, Mississipi. Photo by Scott Higgenbotham, OWLCO.

BUSINESS MEETING LUNCHEON SCHEDULE

1991	1992
September 10	January 14
October 8	February 11
November 12	March 10
December 10	April 14
	May 12

Other Society functions (tentative dates):

Fall BBQ, Thursday, September 26, 1991
Knox Seminar, November 25 & 26, 1991
Spring Fling, Friday, May 29, 1992

The Society thanks the following SPONSORS for their support of the 1991 SPRING FLING

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MISSISSIPPI GEOLOGICAL SOCIETY
TREASURER'S REPORT
OPERATING YEAR ENDING MAY 31, 1991

REVENUES

Membership dues	$ 6,090.00
Spring Fling contributions (1990)	170.00
Earth Enterprises (publication sales)	2,565.73
Luncheon receipts	3,690.00
Fall B.B.Q. sponsorship	1,000.00
Fall B.B.Q. receipts	490.99
Bulletin advertising	2,870.00
Christmas party revenue	461.00
Chalk Field Trip sponsorship	500.00
Chalk Field Trip receipts	760.00
Chalk Guide Book advertising	970.00
Salt Symposium registration	3,040.00
Spring Fling receipts	335.00
Spring Fling contributions (1991)	450.00
Interest on investment (Money Market)	1,256.18
Total Revenues	$ 24,648.90

GROSS OPERATING EXPENDITURES

Checking account fees	$ 74.26
Bulletin (printing, etc.)	3,678.23
Luncheons	4,951.81
Postage	816.99
Advertising G.C.A.G.S.	175.00
Fall Barbecue	859.62
Boland Scholarship	335.00
Luncheon speakers	293.11
Supplies	47.46
President representation to G.C.A.G.S.	695.17
Income tax preparation	200.00
Chalk Field Trip	3,096.83
Christmas party	833.27
Donations	50.00
Salt Symposium	1,876.34
A.A.P.G. delegates	1,000.00
Spring Fling	3,216.71
Advertising solicitation	31.62
Red Book	1,030.00
Total Expenditures	$ 23,261.42

OPERATING YEAR 1990-1991

Checking account balance 6/5/90	$ 894.26	
Money Market Account balance 6/5/90	18,951.03	
Cash balance 6/5/90		$ 19,845.29
Revenues 6/5/90-5/31/91	$ 24,648.90	
Expenditures 6/5/90-5/31/91	23,261.42	
Net income from operations	$ 1,387.48	
Checking account balance 5/31/91	$ 1,025.52	
Money Market Account balance 5/31/91	20,207.21	
Cash balance 5/31/91		$ 21,232.73

G. B. Truett
Treasurer

GEOCHEMISTRY - A GEOLOGIST'S POINT OF VIEW

by: A. H. Wadsworth, Jr.
President, APGE

The acceptance of the concept that buried hydrocarbons can be detected at the surface quickly runs afoul of a paradigm widely held by many petroleum geologists. They simply do not believe it works and keep asking for proof by example. In truth, many publications recite examples presented by informed scientists of case after case where such proof is evident. It is unfortunate for those who insist upon preserving that paradigm because geochemical knowledge is expanding and its application deserves more utilization by the geological community. New advances in instrumentation, particularly in miniaturization and digitization of equipment, are resulting in better data at lower cost. In turn, that has led to a clearer understanding of geochemical processes at the surface, as well as down hole. Many questions remain unanswered but through the dissemination of new knowledge many are being resolved.

Since its inception in 1984, the Denver based Association of Petroleum Geochemical Explorationists (APGE) has grown due to escalating world wide interest in geochemical exploration. Mineral explorationists adopted it long ago. With the scarcity of "conventional" petroleum prospects in mature basins, petroleum geologists are showing more interest. The APGE was formed to assist in the dissemination of geochemical knowledge to earth scientists. The purpose of this article is to point out the opportunities that are available to broaden one's knowledge ana to urge petroleum. geologists to utilize them.

Leaking hydrocarbons produce surface alteration that is manifest in chemical as well as physical changes. Numerous techniques and analytical methods may be employed to measure the surface effect of hydrocarbon microseepage in soils. Basically, these measurements are direct, i.e., the identification of soil gases that are not biogenetic; and indirect, i.e., radiometric, magnetic, satellite imagery, telluric, fluroscoptic, microbial, botanical and trace element analysis. All of these measurements may be related to hydrocarbon alteration. The geochemistry of all these processes is not yet fully understood.

Explorationists skeptical of the concept of near surface exploration for petroleum may be so for one or more reasons. First, unreasonable claims made by "black box" operators may have prejudiced their views.

Fortunately, these claims can be easily refuted with a little observation and common sense. Some practioners have veiled their work in secrecy as though they alone held the key to the ultimate oil finding tool. This has contributed to the "black box" image and has deferred acceptance of those methods that are based upon scientific reality. Secondly, geologists are taught or, at least, they are allowed to graduate believing that oil is trapped immobile beneath a leakproof seal. Third, only in rather recent years have petroleum geologists been offered courses in hydrology, so they have difficulty understanding earth fluid movement and vertical migration. Still another factor is the lack of uniform acceptance among geochemists of some of their tenets. Empirical observation is valuable but laboratory proof is better. No doubt satisfactory proof will be found, but at present, the science is too young to have discovered all the answers. Science is full of cases where observers have noted patterns that were statistically compelling, but were not fully understood until after implementation. Properly applied and carefully reviewed these methods have achieved dramatic results. The literature, particularly from the Soviet Union, abounds in such evidence. Fifth, the skeptic may have had a negative experience with a geochemical prospect. One has to wonder if that skeptic ever drilled a dry hole behind good solid subsurface or seismic work. Sixth, perhaps the most confusion comes from the fact that near surface exploration involves the interrelation of several scientific disciplines. Some of these, such as microbiology, geobotany and soil geology are not covered in the average bachelor of science degree. Nor is the geological or geophysical graduate offered such knowledge in job training. It may be that we are evolving a new branch of geoscience, one that evokes data from several fields of earth science.

Geochemical prospecting does not offer itself as a replacement to the conventional exploration methods. But it can and should be used as an adjunct to the other methods. If nothing else, its value as a negative indicator of hydrocarbons is well documented. Survey after survey indicates that these methods have identified non-productive areas prior to drilling with 90% accuracy. One hears comments from "lay" geologists that if geochemistry worked, someone would publish the results and the industry would jump on its bandwagon. Such articles have been published, but the skepticism is so widely held that they seem to be disbelieved. Geologic literature by numerous authors describes geochemical wildcat success ratios superior to any other exploration method. This is not to say that it works equally well in all locations. Earth conditions vary widely.

Surface exploration offers a means to greatly lower the cost of initial prospect generation. Much time (and money) can be saved by a quick geochemical check of a lead to determine its odds of being productive. Major oil companies with large international concessions would be wise to use surface geochemistry to guide their relinquishments. These methods can affect considerable savings by knowing where to concentrate one's exploration. As an independent, I have found that most useful.

APGE has active chapters in Denver, Dallas, Oklahoma City, and Houston which hold monthly technical meetings. It publishes a monthly Newsletter, a Directory, and has issued 5 bulletins on geochemical prospecting. A sixth is in preparation. Copies are available and applications for membership are invited.

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# # #

From earlier MGS Bulletins, for those of us who did not know many of our Honorary Members.

news of honorary members-

by Ed Minihan

Henry M. Toler was born at French Camp, Mississippi. He received his B. S. from L. S. U. and M. S. from the University of Illinois.

Henry met his wife, Ruth, at the University of Illinois. The Tolers have two daughters, Judy and Barbara. They also have three grandchildren. Jackson has been their home since 1931 .

In 1927 Henry went to work for Texas Petroleum Company in Columbia, South America. In 1929 he worked for Gulf Oil Corporation in West Texas and was transferred to Jackson to do surface work. In 1931-1932 he was a Consulting Geologist in Jackson. From 1932-1936 he was assistant and then the State Oil and Gas Supervisor. From 1938-1952 he was Chief Geologist with Southern Natural Gas Company, with Headquarters in Jackson.

HENRY TOLER

From 1952 Henry has been a Consulting Geologist with an office in Deposit Guaranty National Bank.

Henry was first President of the Mississippi Geological Society.

March, 1970

NEWS RELEASE

DEPARTMENT OF ENVIRONMENTAL QUALITY
GEOLOGY . LAND AND WATER . POLLUTION CONTROL
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For release May 21, 1991

The Map Sales section and the director for the Office of Geology, Department of Environmental Quality, have moved from the Office of Geology building on North West Street, Jackson, to Southport Center, 2380 Highway 80 West, near the corner of Highway 80 and Ellis Avenue, Jackson.

The Map Sales section includes bulletins, information series, cross sections, charts, and maps issued by the Office of Geology. The sales office also stocks all topographic maps available for the state of Mississippi. Map Sales hours are 8:00 a.m. to 4:30 p.m., Monday through Friday.

A list of publications is available at no charge from the Office of Geology, P.O. Box 20307, Jackson, Mississippi 39289-1307, or telephone 961-5523.

Forked Tongues speak against Arctic oil search

BY MICHEL T. HALBOUTY

Halbouty is chairman of the board and chief; executive officer of Michel T. Halbouty Energy Co. here. He has long experience in petroleum exploration and drilling in various areas of the Western Hemisphere.

WHEN analyzed rationally, it becomes clear that there can be no question that the development of Alaska's Arctic National Wildlife Refuge oil resources is essential to the security of the United States. This need is made all the more pressing when we consider the fact that oil imports are again rising, having topped 8.3 million barrels per day for the first week of May.

Despite this telling evidence, however, the environmental lobby remains intransigent. Part of the reason is that opposition to oil exploration on ANWR has grown to mythic proportions in the environmentalists' pantheon of issues, becoming in effect their Holy Grail. As with any group's quintessential issue, they have come to pursue opposition to drilling on ANWR with a virtually religious fervor.

For example, holding the line on ANWR became the environmental lobby's litmus test in last year's congressional election, with the group threatening active opposition to any candidate who dared refuse to pledge unqualified support for keeping oil explorationists out. But it was not always so. In fact, at one time, the very groups that are so adamant about ANWR's unique ecological value today were singing quite a different tune. It is interesting to read on and see just how they condoned and even suggested various heavy activities to be conducted in ANWR.

Between 1969 and 1973, the Department of the Interior held an exhaustive series of hearings examining the environmental consequences of building the Trans-Alaskan Oil Pipeline System. The record of these hearings comprises tens of thousands of pages, many of which are taken up by testimony from various members of the environmental lobby, which saw blocking the TAPS pipeline's construction as a way to block Alaskan oil development.

Although in most respects the arguments they put forward against the TAPS line are virtually identical to those offered in opposition to ANWR today, they differ in one important respect: their attitude toward ANWR

The testimony they presented in these hearings provided a valuable

insight for today's debate, because it shows how facile the environmental lobby is at tailoring its arguments to the cause of the moment. Indeed, the testimony clearly reveals the flimsy fabric of their current position, bringing to mind the old Indian expression of "speaking with forked tongues."

At the May 4,1972, TAPS hearing, Thomas J. Cade, testifying on behalf of the Wilderness Society, Friends of the Earth and Environmental Defense Fund, stated:

"The Arctic National Wildlife Range has practically no exceptional or unique natural values in its northern foothills and narrow coastal plain sections."

Sierra Club representative Lloyd Tupling stated at the same hearing:

"An all-land route through Canada, with a spur running to Prudhoe Bay south of the Arctic Wildlife Range (in which is now ANWR), would have several advantages over the North Slope-Valdez route."

Nor was this position new to the environmental lobby. A year earlier, at a hearing on May 16, 1971, Chris Hartwell another environmentalist, had stated:

"It is far better to run the pipeline through the wildlife range."

Richard Rice, a professor at Carnegie-Mellon University, even went so far as to suggest building a railroad across ANWR to ship Prudhoe Bay

And what about the most basic issue, the importance of Alaskan oil production?

At the Feb. 4,1971, bearing on TAPS held in Washington, D.C., David Wayburn, vice president of the Sierra Club, turned his crystal ball to the future, noting that development of Alaskan oil "suggests an increasing need for oil at a rate of 4 percent a year at the very time the internal combustion engine may be becoming obsolete."

Since Wayburn offered this opinion, the number of cars, trucks, buses and motorcycles on the road in the United States has risen by nearly 72 million from their 1971 level.

At the Feb. 17,1971, bearing, Berkeley Professor Richard B. Norgaard said: "The North Slope oil does not particularly add to our security."

As noted earlier, the North Slope contributes 20 percent of all the oil produced in the United States today.

Most revealing of all, however, in terms of the real goals of the environmental movement was a May 4,1972, New York Times article, later included in testimony by David Brower of Friends of the Earth. His summary of the environmentalist attitude presented one of the clearest revelations of its real objectives when he stated at one point:

"There is a hope our population will not increase over the next years Furthermore, new generations may find the quest for more material goodies a less satisfactory way to spend their lives than relating to more permanent systems of value."

And what might these "more permanent systems of value" be? Obviously, whatever Brower and his friends think they should be. What Brower's comment so clearly reveals is there is actually a hidden agenda behind the environmental lobby's opposition to virtually every effort to produce additional domestic energy, whether it is in ANWR or offshore, or anywhere else.

Their much vaunted concern over the environment, it seems, is merely a subterfuge to permit them to accomplish their genuine goal: the restructuring of society to conform with their own narrow concept of what it should be.

While they are certainly free to advocate whatever societal structure they want, their failure to be more forthright about their true aims Is simply disingenuous.

So, following their dream might permit an elitist few to live well, but would condemn the masses in most nations to the status of a permanent underclass. In short, theirs is an elitist vision that would benefit only a chosen few.

The above quotes of the environmentalists on their early attitude on ANWR clearly reveal that they will tailor their actions to whatever suits their fancy at the moment.

Passing up the opportunity ANWR presents a luxury the nation cannot afford. It is our last best chance to stem the rising tide of imports. Let the environmental lobby have its self-absorbed dreams of restructuring society, but let the explorationists have ANWR for the benefit of the nation. To do otherwise can only aggravate our import dependence without justification, and we have seen all too graphically over the last 10 months just how costly that dependence can be.

This editorial is reprinted with permission from the Houston Chronicle. Originally printed Thursday, May 23, 1991. Comments are invited.

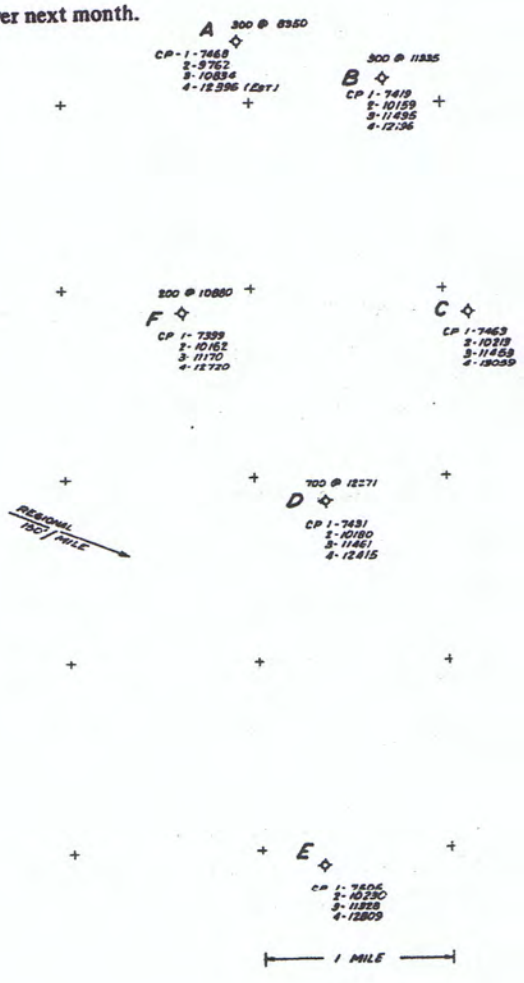
FIND THE OIL PATCH

Here is an opportunity for you to sharpen your oil finding skills and put them to good use in the '70's.

This map displays the critical subsurface control available to a Jackson independent geologist who succeeded in finding an important oil field with one additional well. Can you do it?

Additional pertinent data are: 1) Datum – Plane is conformable to but is not sea level. 2) Regional dip arrow shows amount and direction for region, not for that particular spot. 3) Map area is associated with a gravity minimum. 4) Objective interval is from CP3 down; rocks from CP2 to CP3 are predominately impervious. 5) Trap is structural, not stratigraphic.

Answer next month.



This puzzle was originally printed in the January 1970 Bulletin.

REMINDER OF LOCAL SOCIETY MEETINGS

SIPES
Regular Meeting 1st Thursday of Month, 11:30 a.m.
Petroleum Club

SPE
Petroleum Club Smackover Room, 11:30 a.m.
$10, reservations not required

MAPL
Usually 2nd Monday of Month,
except Summer months - 5:30 p.m. at Primos Northgate
For Reservations call 352-0662 or 352-7782

D & D
1st Wednesday of Month, except July - 12:00 noon at Petroleum Club
Rosemary Jenkins, 355-1578

MIPRO

GEOPHYSICAL SOCIETY
4th Wednesday of Month
11:30 a.m. at Petroleum Club. Reservations not required

GCAGS ADVERTISERS NEEDED NOW!

The Gulf Coast Association of Geological Societies will hold its 41st Annual Convention in Houston, Texas, October 16 - 18, 1991. We are currently seeking advertisers for the 1991 **Transactions** - the annual publication of the association which contains the technical papers presented at the convention. Preliminary indications suggest that over 3,000 people will register for the convention and each registrant will receive a copy of the 1991 **Transactions**. This technical publication is purchased by both industry and schools and is widely used as a reference.

Financing for the **Transactions** is accomplished to a great degree through funds collected from advertisers. The GCAGS needs your support for this very important publication. An advertisement placed in the **Transactions** will surely prove to be a worthwhile investment for the exposure alone. Prices for advertising space area as follows:

Size of Ad Space	Ad Width-Height	Cost
Full Page (8½ x 11)	7.5" x 10"	$325
1/2 Page	7.5" x 5"	$200
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1/8 Page (Business Card)	3.75" x 2.5"	$85

If you wish to place an advertisement in the 1991 **GCAGS Transactions**, please send you ad copy, payment, and any correspondence by **May 15, 1991** to:

Jerry A. Watson
Chairman, GCAGS Advertising Committee
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Camera-ready copy is required. Payment with your order will be greatly appreciated and will be promptly acknowledged. Please make checks payable to **GCAGS 1991 Convention**. Again, the deadline for getting your ad copy to the advertising committee is **May 15, 1991**. Thank you for supporting the **1991 Transactions** and the 41st Annual Convention of the GCAGS.

Call for Papers and Posters

The Gulf Coast Association of Geological Societies
and
The Gulf Coast Section of SEPM
42nd Annual Convention
Jackson, MS
October 21-24, 1992

Hosted by Mississippi Geological Society

Papers should be prepared in accordance with AAPG Guidelines, and should have application to Gulf Coast Geology. There will be three types of presentation:

- **Papers accepted to oral presentation**, which will be published in full in the Transactions.
- **Poster presentations**, which will be published as extended one-page abstracts with the option of half a page of illustrations.
- **Core presentations**, which will be published as extended two-page abstracts to include photographic illustrations.

We would like to encourage you to display conventional cores from hot plays or with features of sedimentological interest or other distinctive reservoir characteristics.

Abstracts should be submitted with answers to the following questions: (1) Has this material been published previously? (2) If so, where and when, and how does your submission differ from the original? (3) In your opinion, is your paper more applicable to GCAGS or to SEPM? (4) Is the paper submitted for oral, poster or core presentation, and would you consider a change of presentation type if necessary?

Submit all abstracts by January 4, 1992 for the 1992 GCAGS Convention to:

Steven S. Walkinshaw
Cougar Exploration
111 East Capitol Street, Suite 208
Jackson, MS 39201

Notification of acceptance will be by February 16 and completed papers will be due by April 4, 1992. Other than poster presentations, full manuscripts will be required for all papers.

John Marble, President
C. Kipp Ferns, Co-Chairman
S. Cragin Knox, Co-Chairman
Steven S. Walkinshaw, Program Chairman, GCAGS
David T. Dockery III, Program Chairman, GCS-SEPM

Mississippi Geological Society, Inc.

P.O. Box 422, Jackson, Mississippi 39205-0422

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1. Mississippi Geological Society Photo Directory, 1981 ..... $ 2.00
2. Wilcox Fields of Southwest Mississippi, Maps and production data on 171 fields, in ring binder, 350 pp., 1969 ..... 28.00
3. Mesozoic-Paleozoic Producing Areas of Mississippi and Alabama. Volume I. Maps and producing data on 57 fields, with 2 composite logs, clothbound, 139 pp., 1957 .....10.00
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11. Cenozoic of Horn Island and the Pascagoula Valley 10th Annual GCAGS Meeting, 24 pp., October, 1960 ..... 2.50
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13. Tertiary Type Localities of East-Central Mississippi, 25th GCAGS Meeting, 133 pp., Octoberr 1975..... 5.00
14. Mississippi Rocks of the Balck Warrior Basin, Seventeenth Field Trip, 79 pp., April, 1978 ..... 8.00
15. Tertiary and Upper Cretaceous Depositional Environments, Central Mississippi and West Central Alabama 33rd Annual GCAGS Meeting, 40 pp., October 1983 ..... 7.50

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Volume XXXX No. 1 September, 1991

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PRESIDENT'S MESSAGE

PRESIDENTS MESSAGE

Let me welcome you back to this new year of MGS Professional Lectures and luncheons. We have a well rounded menu to address the various needs within our geological community. This year we begin with a respected member, George Vockroth, covering one of the basic premise involved in petroleum exploration, that of fluid expulsion and migration in a compacting basin. I find this particular topic of import, in that one of our past monthly lectures involved another aspect of the regional hydrology and or plumbing (Leach, Base of Abnormal Pressure). We are all looking forward to George's insights into the subject, knowing that he has had years of experience with the majors, as well as his own personal knowledge of geo-hydrology and geochemical processes.

In other business matters, MGS and SIPES (Mississippi Chapter) are co-sponsoring a seminar, the **CAMBRO-ORDOVICIAN "KNOX" OF MISSISSIPPI AND ALABAMA**, to be held on November 25th and 26th, 1991, Downtown Holiday Inn, Jackson, Mississippi. Much work has gone into the planning of this seminar and we are expecting good things to come out of it. Topics include gravity, magnetics, stratigraphy, structure, trapping styles, remote sensing, thermal maturity, facies stratigraphy, and more. Speakers and exhibitors are being lined up now and are preparing to give you the most up to date information necessary to understand and make a successful Cambro-Ordovician play. The cost is nominal compared to other seminars or educational events, priced at only $95 for seminar registration. Your convenience has been a priority of our planning in that we have kept the seminar time frame to a 1 & 1/2 day meeting schedule to ensure that you will be home a few days before the Thanksgiving Holidays begin. We do hope that you will register early; we expect to fill our attendance maximum rather quickly. For more information regarding this event, please see the advertisement within.

Finally, our MGS Fall Social has been set for Thursday, September 26th. It will be held in the old Fowlers Lodge building, but in a new place. A map has been provided along with our formal announcement in the bulletin. Hope to see you all there !

Steve Ingram

BUSINESS MEETING LUNCHEON SCHEDULE

1991	1992
September 10	January 14
October 8	February 11
November 12	March 10
December 10	April 14
	May 12

Other Society functions (tentative dates):

Fall BBQ, Thursday, September 26, 1991
Knox Seminar, November 25 & 26, 1991
Spring Fling, Friday, May 29, 1992

BUSINESS MEETING LUNCHEON

September 10, 1991 • 11:30 a.m.
Capitol City Petroleum Club, Smackover Room

"Physical Constraints To A Compacting Basin"
by
GEORGE B. VOCKROTH

A better understanding of the physical processes that affect a compacting or developing sedimentary basin is necessary if we are to begin to develop realistic models for the generation, migration and accumulation of hydrocarbons.

This paper discusses some of the characteristic and known limits to the porosity profile, pressure profile and temperature profile in a compacting, sand-shale cenozoic basin. The causes of and variations in temperature gradients is discussed along with the implication for hydrocarbon maturation. Some of the causes of abnormal pressure are discussed and how abnormal pressure may or may not affect porosity based on the known generating mechanisms. The changes in porosity with depth in a basin is reviewed to give us a conceptual model of fluid movement during compaction.

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Exhibit Arrangements
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(ask for MGS Knox Seminar Group Rate)
Deadline: November 4 for group rate

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WINDS OF CHANGE

Theme for October 16-18, 1991 GCAGS Convention in Houston

Invitation and Comments from the General Co-Chairmen Daniel L. Smith and C. R. "Chuck" Noll

On behalf of the Houston Geological Society, we would like to invite you to join us October 16-18 for the Forty-First Annual Meeting of the Gulf Coast Association of Geological Societies. Most of you already have received a copy of the Announcement Brochure which was mailed to members of the various Gulf Coast Societies and to AAPG members in the region early in August. If you missed this brochure, please call our registration chairman, John Hefner (713) 468-9495.

In recent years Houston has benefited from an infusion of new independents and major companies to make us, more than ever before, the oil and gas center of the world. It is the increasing diversity of these companies, the concerns in matters of environmental impact on our industry and the centralization of activity with international emphasis that lend a new flavor of excitement to our city and our 1991 convention.

Nearly all activities will be conducted under one roof, the fabulous Adams Mark Hotel, located in the heart of the west side entertainment district. We have maintained a low registration fee of $60.00 and a student fee of $10.00. It is our intention to "break-even" on the convention and not make a profit. Our many generous corporate donors have made it possible to keep the GCAGS one of the best bargains available on the professional convention circuit.

We have planned a wide-ranging social and technical program with something for everyone, and we urge you to send in your pre-registration as soon as possible. One of the social highlights of this year's meeting will be a Thursday night roundup rodeo and barbecue, an outstanding opportunity to sample the best of Texas culture and cuisine. We are also proud to have P. W. J. "Jim" Wood and Thomas D. "Tom" Barber deliver our opening session addresses with specific emphasis on the future of petroleum geology.

A full schedule of activities is being offered including a program of very practical short courses, student events at special rates, a variety of field trips, expanded poster sessions, core presentations and the usual fine selection of oral papers. The ice-breaker party on Wednesday, the DPA luncheon with a timely discussion of the natural gas situation, several sporting events, employment assistance, alumni functions and exhibits will be additional important features.

The theme of the convention is "Winds of Change". The Petroleum Industry, and therefore most geologists, has experienced

some harrowing times in the past decade. For much of the 1980's those in the industry wished that they could meet the demands of the day believing, as did the young Hemingway, that "Life is a fine thing and worth the living." But much of the time, geologists have felt more like Karl Kraus in his cynical conviction that "Life is an effort that deserves a better cause." Yet most geologists have persevered in spite of the fact that many of the reasons for their problems were beyond their control.

Caught up in changing economic and political signals, the Petroleum Industry persists as one of the nation's largest industries. This, in itself, is a testimonial to the resiliency of our vibrant business. Change is, of course, inevitable. Both this Industry and the science of geology must evolve and adapt to the ever-changing world in which we live. Geology is responding to meet new demands, primarily through technological innovations. These, in turn, are leading to other changes in the profession, not just technical and economic, but cultural and social changes that will alter the face of the profession forever.

There are many challenges in store, and these will require specialized knowledge in areas that heretofore were viewed as ancillary to our trade. The day has long since passed when we could graduate with a degree and be fixed for a lifetime career. Continuing education, environmental awareness and training, financial expertise, psychology, and even political action will figure prominently in our future.

The public's perception of the Petroleum Industry is perhaps one of the greatest challenges facing geologists today, and each of us can play an active role in addressing this crisis. This has become a problem on a broad scale. The challenge is with the public, various special-interest groups, and the media. Scarcely a day goes by where the major news outlets of this country do not directly or indirectly pit the Petroleum Industry against the welfare of the general public.

We in geology need to constantly articulate our concern about issues that trouble society--those of the environment, endangered wildlife, clean air, water and safe food. We need to be seen as reasonable, compassionate, and confident that we manage our industry and natural resources wisely and for the benefit and betterment of society. We need to show the public that we provide vast amounts of energy that has formed the basis for the greatness which this country enjoys, and that we can do it at a competitive price and without degrading the environment. Further, that we can do it with the best interest of the consumer in mind.

The positive aspect of this focus of public attention on our industry is that it offers us untold opportunities to address these concerns. People in the Petroleum Industry, while sometimes feeling under siege from a radical minority, are part of mainstream society. We share the same views as the majority concerning responsible environmental stewardship, animal welfare, the economy,

consumer protection and our future as a civilization. There will be continuing enormous pressure from the radical few to impose their views on the larger part of society. Such imposed ethics, if successful, sometimes take the form of public policy and law. It is the melding of science, truth, and public policy that will create a balance acceptable to the majority.

The convention this year will focus on the future of our profession: the outlook for 1992 and beyond. Increasing demand for energy, combined with decreasing production and the age of most oil and gas fields, indicate that there's never been a better opportunity for the industry and geologists. These are exciting times. The winds of change are truly upon us. It will be the changes in our profession that will provide challenges and opportunities for each of us.

SEE YOU AT THE CONVENTION

MISSISSIPPI GEOLOGICAL SOCIETY

FALL BARBECUE

Thursday September 26
Reservoir Lodge
Festivities Start – 4:30 p.m.
Supper Served – 6:30 p.m.

$10.00 per person / $5.00 per student

The Greenhouse Blues: Ozone, Carbon Dioxide, and Other Myths

The Honorable Dixy Lee Ray
Former Governor, State of Washington;
Former Chairman, Atomic Energy Commission

Reprinted with permission from THE COMMONWEALTH Issue no. 21, May 27, 1991.
Based on a speech by Dixy Lee Ray before the Commonwealth Club of California on April 26, 1991.

ARE ENVIRONMENTAL ISSUES as serious and as frightening as the activists would like us to believe? I think not; but let me explain why.

For more than 20 years, the American public has been subjected to a barrage of criticism about the way we live, what we eat, how we manufacture, what kind of energy we use, and about how we handle the inevitable waste products of our activities.

We're told we're destroying the earth and destroying its capacity to support life. These scoldings have become a virtual litany of doom and disaster—a crusade to save the planet. The charges are very serious, but are they correct? What evidence is there to support them?

There appear to be five big, really scary issues: first, global warming said to be caused by an increase in the atmospheric concentration of carbon dioxide from the use of fossil fuels; second, depletion of the ozone—said to be caused by chlorofluorocarbons (CFCs), known as freons used in refrigeration, air conditioners, cleaning agents, and fire fighting; third, almost all chemicals—especially those claimed to be found as residues in our food, and such things as asbestos and dioxin; fourth, deforestation and loss of wetlands—what used to be called swamps, marshes, and bogs; and fifth, overpopulation of humans—said to cause depletion of natural resources and extinction of species. Each of these issues is important and complex.

Global Warming

Global warming is something everybody believes is happening because everybody says so. What is the real evidence? A belief that the earth is warming up rests first on the greenhouse theory, which holds that an increase in certain gases, of which carbon dioxide is one, will alter the atmosphere, trapping heat close to the surface.

However logical it is and however well the theory holds up under controlled conditions, the fact is it doesn't work in so simple and reasonable a manner. The so-called greenhouse gases—methane, hydrocarbons, water vapor—may act in contravening ways.

If the greenhouse effect were simple, straightforward, and evident, the earth would have warmed from two to four degrees in the past century—and it has not. Actual measurements, when corrected for the urban effect—the fact that it's warmer in cities than in surrounding areas—have shown no upward trend in temperatures.

There are warm years and cold years. Analysis of 137 years of ocean surface temperatures shows no warming trend. Measurements from satellites, including the Tyros 11 satellite, which circled the earth from 1978 to 1988, also show no upward trend. What has been shown is that temperatures in the arctic region of the Atlantic cooled five degrees between 1940 and 1987.

Moving South

Other temperature evidence comes from plant life. The citrus industry has had to shift its operations further and further south. It used to be possible to ripen oranges as far north as the Carolinas; now oranges can't be grown north of Orlando, Florida. Florida has had 24 episodes of severe, killing frosts in the last 30 years. In the previous 50 years there were only six such episodes.

The history of climate on earth is one of change. The earth is not stable, and the climate does not say the same for long, varying from ice ages—17 in the last 100 million years—to moderate and mild interglacials.

For the past 10,000 years we have been living in an interglacial period within which there have been both warm and cold times. The years 900 to 1100 A.D. were warm. The Vikings sailed across the iceberg-free North Atlantic to colonize Greenland and North America. And ancient wall paintings in caves in the Sahara Desert show elephants, giraffes, and crocodiles living in that area 7000 years ago.

Historical records also describe the "little ice age," lasting from 1450 to 1750 A.D. England at that time was so cold that the trees not only froze, but the build-up of ice within them was so intense that they burst with a loud explosive sound. The Thames River froze solid. Climate changes such as these cannot be ascribed to man's industrial activities.

What about the increase in carbon dioxide? True—industrial society puts about 7 billion tons of carbon dioxide into the atmosphere yearly. Nature adds another 200 billion tons. "Nature's enormously greater contribution comes from many different sources—not the least being volcanic eruptions.

Plants love carbon dioxide; they need it for photosynthesis. Photosynthetic activity is our main and possibly

our sole source of the oxygen on which we depend. With increased carbon dioxide, plants grow larger and stronger, use water more efficiently, and have greater resistance to drought.

At elevated carbon dioxide levels, crop yields increase by about 30 percent. Indeed, some botanists have concluded that the earth has been carbon dioxide starved for a long time. Levels of carbon dioxide were five to 10 times higher in the past than they are today.

Contradictory Computer Models

These data surely cast doubt on the claim that global warming is caused by man's industrial activities, but the computer models say otherwise. Which should we believe, nature or computers? When climate models are applied to the weather patterns of the past 140 years, the models don't fit the weather we actually had. Finally, if the very best weather forecasters can't forecast the end of the drought in California or give us an accurate and repeatable prediction of what the weather will be five days hence, why should we believe a computer forecast for 50 years into the future?

Computerized climate models are extremely expensive; their cost should be justified on scientific grounds—not on frightening a sympathetic public with forecasts of disaster.

Dr. Steven Schneider, one of the foremost advocates of the theory of global warming and an atmospheric scientist at the Center for Atmospheric Research in Boulder, Colorado, says the following about the necessity for government supported computerized climate modeling: "We need to get some broad-based support to capture the public's imagination which entails getting loads of media coverage, so we have to offer up scary scenarios, make simplified, dramatic statements, and make little mention of any doubts that we may have...." So much for the science underlying global warming.

The Fluctuating Ozone Layer

What about ozone depletion? Is the sky falling? Recently, William Reilly, administrator of the Environmental Protection Agency, said that the loss of ozone was greater than previously thought, and predicted another 15,000 cases of cancer of the skin. It's difficult to know where Mr. Reilly gets his data, so let's look at the facts.

Stratospheric Turbulence

The ozone layer of the stratosphere is in a constant state of turbulence. It fluctuates about 15 percent annually, according to latitude and season. The largest fluctuation and greatest thinning takes place at the poles, especially the Antarctic, where so-called depletion may be 50 percent. The thinning which occurs at the end of the Antarctic winter is reconstituted in a few weeks. There is not—and never has been—any overall loss of ozone. Ozone thinning is simply a temporary variation in thickness. The same ultraviolet light from the sun which breaks down ozone also interacts with oxygen to produce ozone.

The seasonal thinning of the ozone layer over the South Pole was described as long ago as 1958. The amount of thinning at that time—33 years before CFCs were in wide use—was 50 percent greater than at any time since.

The Antarctic ozone phenomenon is a natural response to extreme low temperatures and violent weather. The presence of ice crystals and chloride is also necessary. But charges that CFC is the source of the chloride responsible for the ozone thinning phenomenon does not stand up to scrutiny.

Anyone who has ever worked with freon knows that it doesn't evaporate—you can actually pour it. The molecules are so heavy that they sink. No one has ever proposed what transport mechanism could get those big, heavy molecules off the ground, up to the stratosphere, across the equatorial regions, and down to the South Pole where they could gobble up the ozone.

Where does the chloride come from? One possible place is Mount Erebus, a volcanic mountain 100 kilometers upwind of the McMurdo Sound station. Mount Erebus has been in a state of constant eruption for the last 100 years. It puts 1000 tons of chloride into the atmosphere daily.

If the ozone gets thinner, more ultraviolet light will strike the earth. Measuring stations set up in 1974 to measure the amount of ultraviolet light reaching the earth's surface actually show a slight reduction in the amount of ultraviolet light reaching the surface of the earth.

Skin Cancer

To frighten people about increased skin cancer due to ozone depletion is both false and misleading.

There are two kinds of skin cancer. The most common affects light-skinned people, and is caused by over exposure to ultraviolet light. This kind of skin cancer is unpleasant, unsightly, and irritating, but it is curable in 99 percent of the cases.

The other kind of skin cancer is malignant melanoma, which generally is fatal in a short time. It is not caused by exposure to ultraviolet light. No one knows what causes it, although there appears to be some genetic element involved, since it tends to run in families. There is no treatment and no cure for this type of melanoma.

Why the Fuss?

Some ultraviolet light is necessary to prevent rickets. With exposure to ultraviolet light, as with exposure to chemicals, very often a small amount is necessary or beneficial, a little more doesn't hurt, and too much is dangerous. So why, with no overall loss of ozone, is there so much fuss?

Dr. Richard Benedict, a scientist formerly with the Department of State, now with the Conservation

Foundation, has said, "By their actions, the signatories at the Montreal conference—that was the ozone depletion conference where 11 nations decided to ban all future use of CFCs—sounded the death knell for an important part of the international chemical industry...before there was measurable evidence either of ozone depletion or actual damage either from increased radiation or climate change."

We 're entitled to ask why a global climate treaty is necessary. According to estimates, such an agreement would cost the economy of the industrialized nations in excess of $1 trillion.

Acid Rain and Asbestos

On the subject of chemicals, let's start with acid rain. A 10-year congressionally mandated study conducted by hundreds of the most outstanding scientists in meteorology, atmospheric science, geology, biology, and chemistry concluded that the claims of environmental damage due to acid rain are vastly exaggerated. At worst, only a few lakes in New England are so damaged as to require treatment—treatment by the addition of lime, which can be accomplished for a few million dollars. Instead, Congress chose to ignore its own study and pass the Clean Air Act, which includes amendments requiring the expenditure of billions of dollars for what is—at worst—a $1 million problem.

As for asbestos, even the head of the EPA admits that the kind of asbestos used for insulation and sound-proofing "poses no risk of harm to the health of humans." Yet the EPA still requires its removal, at costs that last year exceeded $120 billion. This is both unnecessary and tragic; that money could otherwise be spent educating our young people.

Almost everybody now admits that dioxin is not the terrible toxin it has been made out to be. Excessive exposure to dioxin can cause a curable skin irritation; adverse effects of smaller amounts of dioxin can be found only in guinea pigs.

The amount of toxin that people of Times Beach, Missouri were exposed to has been found to be as harmful as one glass of beer. The EPA requirement that industrial emissions may contain no more than 0.13 parts per quadrillion of dioxin is nothing less than ludicrous and has put enormous costs on the pulp and paper industry.

Measurements of pesticide residues on food show that 61 percent of our food has no detectable pesticide residues what-so-ever; the remaining 39 percent do not exceed the government's very conservative standards that have been sent. Ninety-nine percent of the known carcinogens to which we are exposed come from nature.

Woodlands and Wetlands

Forests in North America are growing, not declining. More efficient agriculture has made it possible to grow more food on less land-450 million acres less. Today in the U S., annual wood growth is more than three times what it was in 1920 and is continuing to increase.

Appropriate use of preservatives allows more efficient use of wood. Lumber designed for use in outdoor fences, decks, and porches—if properly treated—lasts so much longer that in the last 20 years, we've saved a forest the size of New England.

What about wetlands, those swampy areas that everyone used to take such delight in draining? The Army Corps of Engineers now regulates as wetland the following areas abandoned or fallow farm fields or pastures; corn, wheat, and alfalfa fields in actual production; dry woods above the 100-year flood plain; weed-covered vacant lots; depressions in sanitary landfills; garbage dumps; dredged material; moist tundra; and even dry, desert swashes. More than 95 percent of Alaska and about 40 percent of California is wetland.

When we hear about how important it is to preserve wetlands, we seldom hear about one of the side effects, which is the encouragement of the growth of mosquitoes, a form of life that I, as a biologist, wouldn't mind seeing become extinct.

Mosquito-borne diseases are on the increase once again in this country. Both malaria and yellow fever are endemic in the Southeast and in California; before its conversion into agricultural land, the Central Valley was a malaria region.

Swamps encourage the spread of encephalitis—a disease which is difficult to diagnose, has no cure, and causes irreversible brain damage. It may well be that we'll have to choose between swamp draining and encephalitis. I'd like to propose that Congress, who has put us in this dilemma, start by returning to its original malarial swamp condition the area known as Washington, D.C

Population Bomb?

So many in the environmental movement are concerned about the numbers of people living in the world today. How many people should there be? Who's going to decide? Are we going to believe people like Kenneth Boulding—a follower of professor Paul Ehrlich, who developed the concept of spaceship earth, who said, "The right to have children should be a marketable commodity, bought and traded by individuals but absolutely limited by the state." Or should we believe David Brower, founder of Friends of the Earth, who says, "Childbearing should be a punishable crime against society unless the parents hold a government license?"

Or should we believe the spokesman for the Green Parties of Europe, who says, "We in the Green Movement aspire to a cultural model in which a killing of a forest will be considered more contemptible and more criminal than the sale of six-year-old children to Asian brothels."

John Muir, a respected leader of the environmental movement, in writing about alligators wrote: "May you enjoy your lilies and rushes and be blessed now and then with a mouthful of terror-stricken man by way of a

dainty." These and other leaders of the environmental movement feel very strongly about the size of the human population .

What can we do about all these things? A good dose of common sense and skepticism is in order. We have the ability to think rationally and should do so more often. We also have the gift to make conscious choices. We should choose to pursue knowledge and understanding that will better the lot of human beings and every other species on this planet.

Answers to Written Questions From the Floor:

Q. Do you use fertilizers and pesticides in your garden?

A. I do, specifically, horse manure and prepared fertilizers. I try to remember to read the labels and use these things in the proper and cautious way they were intended. If so used they cause no harm.

Q. Which of your achievements has given you the most satisfaction?

A. The Atomic Energy Commission.

Q. While governor of Washington, what was your program for the environment?

A. I entered of office with a state $500 million in debt. I discovered that the speaker of the house and the majority leader of the senate were engaged in a conspiracy to sell the state to criminal gambling activities for 18 percent of the profit. We've had prison riots. So I appointed a good man to be head of the Department of Ecology and paid attention to other problems.

Q. What can be done about the media hype on the issues you refer to?

A. The problem is a conflict between news worthiness and the presentation of information meant for the enlightenment of people. It's much more exciting to publish an accusation and to see what happens. It's hard to gather all the necessary data to refute it. And it's not very newsworthy to print that it's not as bad as people thought. Better communication is needed between the press and the scientific world. In some cases, the scientific world will have to do its own communicating.

Q. You don't completely agree with Rachel Carson; but what about DDT and Its impact on our bird population?

A. Much of Rachel Carson's book *Silent Spring* was emotional hysteria. DDT was banned in 1972 on the advice of the FDA because it was overused. We tend to do that as human beings; if something is good, then more is probably better. Instead of banning DDT, the FDA should have put it under better control. DDT's banning was decided on a political level, on the basis of public perceptions which had been raised by incorrect information instead of scientific data. DDT does not cause the thinning of egg shells for birds. There is good evidence that the thinning has many causes, such as poor nutrition and adverse weather during the breeding season.

Q. Is there a limit to the number of humans the earth can support?

A. Of course, but we don't know what that limit is. It is calculated, given the productivity of agriculture today and assuming that food can be transported to every person on earth, that the earth can carry about double the present population. If we just kept our heads screwed on straight, we'd realize that when economic conditions improve, population rates go down. When a country's economy becomes robust, fewer babies are born. That self-regulating mechanism is built into our psyche. We should be working to improve our own economy instead of shackling it to improve the economies of all the people on earth.

Q. What is the reason for the cooling trend on earth?

A. Nobody knows, just as nobody knows what caused ice ages of the past. The sun, which is the primary producer of our climate, is not stable. Sometimes the sun burns brighter; sometimes it burns less bright. We happen to be living in a time when the sun has a lot of sunspots. Sunspots throw out all kinds of radiation, much of it hitting the earth. So much hit the earth last year that it broke down all communications in the Northeast for a while. We are hit, on average, by 15,000 particles of radioactivity every second. Solar winds and changes in radiation coupled with the fact that the earth is tilted on an axis allows for the varying amount of heat, light, and radiation that hits us. It also causes differences in ocean temperatures. These colossal forces probably cause changes in climate.

Q. Isn't it wise to respond quickly to possible environmental threats rather than to wait decades to find solid scientific evidence in support; Isn't it better to be safe than sorry?

A. Is it wise to.carry an umbrella every day just in case it might rain? That's kind of stupid. It's easy to spend somebody else's money. That's why all these suggestions for all kinds of expensive cures for unknown and unlikely problems suggest spending public money—your money.

Q. Where is the harm in converting our energy sources away from fossil fuels? Aren't renewables the way to go?

A. Nuclear power is the better way to go. Nuclear energy uses a resource that isn't applicable for anything else. The record of nuclear power is both economical and environmentally safe. People won't believe that because they won't look at the acts. So-called renewables wind, solar, and hydroelectric power—all have a role to play. But to have a sufficient amount of electricity generated from wind power, you need an area with 50 mile-per-hour winds. That doesn't occur many places. Solar power can be used for heating water and even for producing electricity, but it's difficult and expensive. Solar cells are getting more efficient, but they take up an awful lot of land because you have to gather the solar power, collect it, and focus it before you can use it. Here's an analogy: If you want to pull a heavy load, would you rather put a harness on one elephant or on 1 million fleas—providing somebody builds flea harnesses at a price you can afford to buy, and you can make all those fleas hop at the same time, and in the same direction? With hydroelectric power, the problem is drought. We know a lot about this in the Pacific Northwest, since about 80 percent of our electricity comes from hydroelectric power, which is fine until there's a low water year. Nuclear power is the only way we know of at present to use a resource which is not useful for anything else to produce large amounts of electricity.

Q. What will be the long-term effects from Chernobyl?

A. There will be an effect from the Chernobyl accident in that area for quite a long time. It will not and should not affect the rest of the world. The accident at Chernobyl was not a nuclear explosion, but a steam or hydrogen explosion that burst the reactor apart and physically spread the radioactive fuel. We know quite a bit about the effects of radioactivity on human health from the 40-plus-year studies on the populations of Hiroshima and Nagasaki. That expertise is being drawn upon with regard to the unfortunate people in and around Chernobyl. Chernobyl had a kind of reactor that has never been built in the Western world—nor ever will be built. The kinds of reactors we use cannot undergo that kind of accident.

Q. Do we need stricter auto emission controls?

A. The automobile is only one use of petroleum—and not the most important, except for our own convenience. Perhaps the most important use of petroleum is in the petrochemical industry. Any clothing material that is not pure cotton, pure wool, pure silk, or pure linen has petroleum-based synthetic material in it. Many medicinals are petroleum-based. Some say it's wasteful simply to burn petroleum to get the thermal energy to run internal combustion engines. Perhaps one day we will have more efficient batteries, be able to run automobiles on electric current, and have lots of nuclear power plants, in remote locations, to supply the electricity to keep them going.

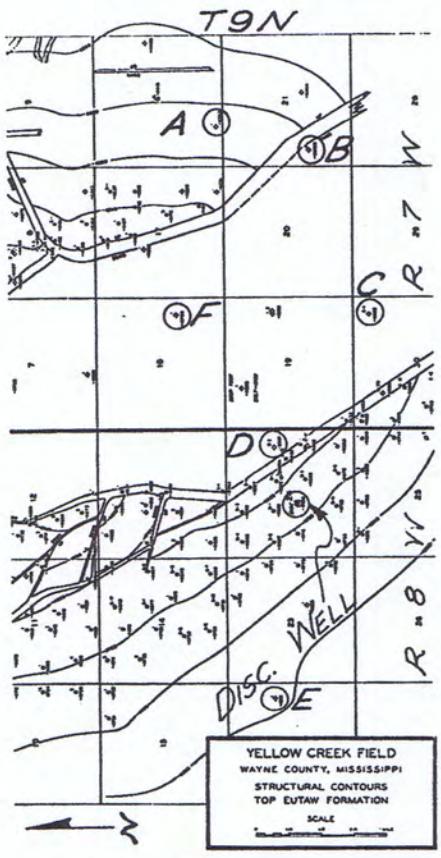
Q. Should we be concerned about the mass destruction of the rain forest in Brazil and Indonesia?

A. No one has appointed us the protectors of the world. We take on this mantle sometimes for reasons that I can't quite fathom. First and foremost is our responsibility to our own neighborhood, our own state, and our own country. I really don't know why there is such concern about what the Brazilians are doing to the Brazilian rain forest. Of course it is a unique place. But the trees are there because there is rain—not the other way around. There will continue to be rain in that area. It's true that removal of foliage causes a reaction in the soil; the soil's exposure to sunlight makes it bake hard like a brick. It's not a good idea to take the foliage away, because then nothing will grow in the soil. The Brazilian government is learning this. It's their forest, and they're doing a lot to bring the destruction under control. I don't think we should be the world's busybodies.

Your comments are invited.

Editor

ANSWER TO FIND THE OIL PATCH: YELLOW CREEK FIELD



This map of Yellow Creek Field shows the critical subsurface control available before its discovery in 1947. These wells are indicated by letters A through E, and were shown on the map which we printed in last month's Bulletin. The discovery well, and many of the producing wells as of 1957 are also shown here. The map is taken from the Mississippi Geological Society publication, Mesozic and Paleozic Producing Areas of Mississippi and Alabama, Vol. 1, 1957, page 137.

Discovery Well: J. W. Hughes and W. E. Sistrunk No. 1 G.M. & O. Land Co., Sec. 24, T9N, R8W, Wayne County, Miss. Initial production from Upper Cretaceous Eutaw formation pfs (4966-5151), pumped 183 Bbls 19.5° Grav. Oil per day.

Additional information: correlation points given in the problem were measured from a datum of + 6500 feet. CP-1 is Wilcox, CP-2 is Top Chalk, CP-3 is Base Chalk about 35 feet above Top Eutaw Sand, and CP-4 is Top Basal Tuscaloosa.

Did you rediscover Yellow Creek? We'd like to hear from you if you tried it.

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A Cross-Country 5K (3.1 miles) run and 5K walk will be held on Thursday, October 22, 1992, in conjunction with The Gulf Coast Association of Geological Societies' 42nd Annual Meeting hosted in Jackson by the Mississippi Geological Society.

Sponsors are being sought to provide logoed items, such as, visors, small towels (golf type), insulated cups, squeeze bottles, plastic bags, baseball caps, water coolers, etc. to be given to all race entrants or as randomly drawn door prizes. Financial assistance is also sought for providing awards, T-Shirts, fruit, beer, snacks and an electrolyte replacement drink. Contributing sponsors' logos will appear on the race registration form which will be mailed to all Gulf Coast Society members and on the commemorative race T-shirt.

Volunteers are needed to type name labels, put race packets together, hand out race packets, set up clock and finish line, work water stations, call split times, take up finish cards, tabulate the results, disassemble clock and finish line and clean up.

The race will be open to runners and walkers of all abilities for oil industry employees and their families to offer a healthy, fun activity during the annual meeting. Awards will be reserved for meeting registrants and their immediate family. However, the commemorative race T-shirts, race refreshments, and random door prizes will be for all race entrants and race volunteers.

To acknowledge your willingness to be a sponsor, a volunteer, or both, call Ross Barranco (601) 961-6304 or (601) 924-4006.

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REMINDER OF LOCAL SOCIETY MEETINGS

SIPES
Regular Meeting 1st Thursday of Month, 11:30 a.m.
Petroleum Club

SPE
Petroleum Club Smackover Room, 11:30 a.m.
$10, reservations not required
Tentative Fall Dates – Sept. 12, Oct. Golf Tournament, Nov. 14, Dec. 12

MAPL
2nd Monday of Month,
5:30 p.m. at Primos Northgate
For Reservations call 352-0662 or 352-7782

D & D
1st Wednesday of Month, except July - 12:00 noon at Petroleum Club
Rosemary Jenkins, 355-1578
September Meeting changed to 9/11/91

GEOPHYSICAL SOCIETY
4th Wednesday of Month
11:30 a.m. at Petroleum Club. Reservations not required
No September Meeting. Watch for date of Hog Roast to be announced.

PROPOSED RED BOOK ADDITION FOR 1990-91

Mesozoic Oil and Gas Fields

Alabama:	1. Foshee	Philip Reeves
	2. West Foshee	"
	3. Frisco City	Robert Schneeflock
	4. West Falco	"
	5. West Range	"
	6. Osaka	Les Aultman
Mississippi:	7. Flat Branch	Steve Ingram
	8. Trimble	Robert Schneeflock
	9. Poplarville	David Hancock
Florida:	10. Blackjack Creek	Les Aultman
	11. McDavid	Philip Reeves

Paleozoic Oil and Gas Fields

Mississippi:	12. Shannon	Ed Hollingsworth
	13. South Palmetto	"
	14. Maple Branch	Kevin Henderson

Updates

Mississippi:	15. Thompson's Creek	Steve Ingram
	16. South Thompson's Creek	"
	17. Wausau	"
	18. North Wausau	"

The Red Book Committee has begun the printing phase of this supplement which puts us at the end of this particular project. We express our gratitude to the persons listed above for contributing their time and effort in support of this final supplement to Volume III, **MESOZOIC - PALEOZOIC PRODUCING AREAS OF MISSISSIPPI AND ALABAMA**. We also wish to recruit new volunteers to help build the portfolio for our next publication, Volume IV. Please contact Brian Sims, Chairman of the Red Book Committee, as soon as possible.

Call for Papers and Posters

The Gulf Coast Association of Geological Societies
and
The Gulf Coast Section of SEPM
42nd Annual Convention
Jackson, MS
October 21-24, 1992

Hosted by Mississippi Geological Society

Papers should be prepared in accordance with AAPG Guidelines, and should have application to Gulf Coast Geology. There will be three types of presentation:

* Papers accepted to **oral presentation**, which will be published in full in the Transactions.
* **Poster presentations**, which will be published as extended one-page abstracts with the option of half a page of illustrations.
* **Core presentations**, which will be published as extended two-page abstracts to include photographic illustrations.

We would like to encourage you to display conventional cores from hot plays or with features of sedimentological interest or other distinctive reservoir characteristics.

Abstracts should be submitted with answers to the following questions: (1) Has this material been published previously? (2) If so, where and when, and how does your submission differ from the original? (3) In your opinion, is your paper more applicable to GCAGS or to SEPM? (4) Is the paper submitted for oral, poster or core presentation, and would you consider a change of presentation type if necessary?

Submit all abstracts by January 4, 1992 for the 1992 GCAGS Convention to:

Steven S. Walkinshaw
Cougar Exploration
111 East Capitol Street, Suite 208
Jackson, MS 39201

Notification of acceptance will be by February 16 and completed papers will be due by April 4, 1992. Other than poster presentations, full manuscripts will be required for all papers.

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1. Mississippi Geological Society Photo Directory, 1981 ..... $ 2.00
2. Wilcox Fields of Southwest Mississippi, Maps and production data on 171 fields, in ring binder, 350 pp., 1969 ..... 28.00
3. Mesozoic-Paleozoic Producing Areas of Mississippi and Alabama. Volume I. Maps and producing data on 57 fields, with 2 composite logs, clothbound, 139 pp., 1957 .....10.00
4. Volume II. Maps and producing data on 77 fields, includes Supplement 1, in ring binder, 143 pp., 1963 .....15.00
5. Supplements 2 through 7 for Volume II, Maps and producing data on 35 fields, 110 pp.....15.00
6. Supplement 8 for Volume 11, Maps and producing data on 34 fields, 108 pp., 1980 ..... 25.00
7. Volume II, complete with Supplements 2-8, 361 pp., 146 fields 50.00
8. Volume III, 85 pp., 46 fields, 1987 ..... 50.00

FIELD TRIP GUIDEBOOKS

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11. Cenozoic of Horn Island and the Pascagoula Valley 10th Annual GCAGS Meeting, 24 pp., October, 1960 ..... 2.50
12. The Paleozoics of Northwest Arkansas Sixteenth FGield Trip, 48 pp., May, 1962..... 5.00
13. Tertiary Type Localities of East-Central Mississippi, 25th GCAGS Meeting, 133 pp., Octoberr 1975..... 5.00
14. Mississippi Rocks of the Balck Warrior Basin, Seventeenth Field Trip, 79 pp., April, 1978 ..... 8.00
15. Tertiary and Upper Cretaceous Depositional Environments, Central Mississippi and West Central Alabama 33rd Annual GCAGS Meeting, 40 pp., October 1983 ..... 7.50

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MISSISSIPPI GEOLOGICAL SOCIETY

Volume XXXX No. 2 October, 1991

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PRESIDENT'S MESSAGE

I think I'm beginning to find out what all past MGS Presidents know. This "President stuff" keeps you busy ! I just handed in last months message and now the October message is due; and that's not all. I'm sure it gets worse because the members that have held offices in the past made sure that the bylaws restricted incumbents form having to hold an office more than once. Smart thinking. I will really appreciate that fact next year. So much for that; on to business.

Chris Bowen, Office of Pollution Control - Waste Minimization, will speak on some pertinent problems facing Mississippian's in the area of waste disposal. His topic is not restricted to environmental issues, but covers problems and solutions that will have to be addressed by all citizens in our state (including us). Here's a chance for our membership to get first hand information on "what's coming down" with regard to Federal and State waste disposal plans. We are already being affected by some aspects of waste disposal, but the future probably holds more than we know. We would be wise to find out.

Our Fall Barbecue was a great success. The membership thoroughly enjoyed the socializing and food (especially the ribs). We are pleased that the old Fowler's Lodge building (Reservoir Lodge) continues as a vestige and anchor for this annual event. Contributors for this social have been posted on the bulletin cover. Do take the time to thank each contributor for helping make this event a success.

Finally, I am going to continue to plug our upcoming KNOX SEMINAR. Registration has begun to come in 4 to 1 from out of state. Don't let yourself be caught unaware, expecting to make registration at the door. Also, there is a **hard deadline** for meals; therefore, you need to register early to ensure your meals are covered in your registration.

Steve Ingram

BUSINESS MEETING LUNCHEON SCHEDULE

1991	1992
October 8	January 14
November 12	February 11
December 10	March 10
	April 14
	May 12

Other Society functions (tentative dates):

Fall BBQ, Thursday, September 26, 1991
Knox Seminar, November 25 & 26, 1991
Spring Fling, Friday, May 29, 1992

BUSINESS MEETING LUNCHEON

October 8, 1991 • 11:30 a.m.
Capitol City Petroleum Club, Smackover Room

ABSTRACT

"Waste Minimization and the Petroleum Industry, Waste Minimization and You"

by Chris Bowen

Mississippi Department of Enviromental Quality
Office of Pollution Control
Waste Reduction/Waste Minimization Division

It's very easy to take our drinking water for granted, but close attention must be paid to the quality and quantity of the sources for this precious resource. More than five locations in the state have documented groundwater contamination from the production of brines associated with oil and gas production. Some service companies are utilizing innovative techniques to reuse oilfield and other wastes. Used oil may soon be regulated as a hazardous waste, and inevitably, this cost will be passed on to the consumer(these additional downstream costs could be a negative affect on upstream exploration). How do we live with ourselves in Mississippi and what can I do as an individual?

BIOGRAPHY

- Received B.S. in Geology from the University of Southern Mississippi in 1984. Attended geology field camp in the Jura Mountains of Switzerland. Held offices of treasurer and vice-president in the Southern Geological Society, Inc. Student member of AAPG and Mississippi Geological Society.

- December 1989 to present - hydrogeologist for the State Department of Environmental Quality, Office of Pollution Control.

- July 1986 to December 1989 - geologist for Crosby-Mississippi Resources, Ltd. Engaged in geological and engineering, exploration and development projects throughout South Mississippi.

- August 1984 to April 1986 - geologist for Hogan Exploration, Inc. Predominantly employed as a well-site geologist. Logged in excess of 150 wells.

- 1981 through 1983 - various assorted jobs including mudlogging for Data-Log and Welco, and doodle-bugger for Geophysical Field Surveys.

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ARTICLE REVIEW : **STEVE INGRAM**

Well, I hope you had a nice summer and are ready to get back to work. For most of us, that's a pretty lofty thought since the summer brings more activity and less rest than we'd like. Never-the-less, let's get back to reviewing the structural architecture of our state.

In our last review, I briefly touched on the depositional response of the Lower Wilcox to the basement structure in north and central Mississippi. I'd like to continue in this same vein by proposing a few more instances where structural architecture has influenced deposition in Mississippi. Let's look at the following three sedimentary units: Figure 2 - a longshore bar in the Coffee Sand, Figure 3 -the fluvial systems of the Lower Wilcox shown in the May review, and Figure 4 - a paleochannel in the Upper Tuscaloosa Formation. Figure 1 is a structural diagram of North Mississippi. It links the three depositional units to the basement structure of the Reelfoot Aulacogen (RA) and to transcurrent fault system of the Ouachita Deformed Belt.

Figure 1 - The RA is a northeast-trending Pre-Cambrian rift comprised of horsts, grabens, and transform faults. The horsts and grabens are the main structural elements controlling North Mississippi geology. This is evidenced by Ordovician through Pennsylvanian subcrops (Figure 1) and the three sedimentary units under discussion (Figure 2-4). Transform faults of the RA also influence the geology, but their control is less apparent. Figure 1 should be used as an overlay for figures 2-4. In doing so, note the structural continuity between Figure 1 and the sedimentary response in figures 2-4. Some interesting inter-relationships can be seen in this exercise which links basement architecture to depositional systems in the north.

Figure 2 - Coffee Sand longshore bars (Webb, 1984) were deposited on the crest of an upthrown normal fault (horst?) of the RA horst and graben assembly. It pinches out to the southwest in an area where Oxley et al. (1991) postulated the occurrence of a northwest-trending transcurrent fault. A tidal inlet is located about the middle of the bar and overlies another proposed transcurrent fault. The structural implications are clear. Deposition of this Coffee Sand longshore bar has been influenced and/or controlled by the underlying basement structure.

Webb, E. J., 1984, Sedimentology of the Upper Cretaceous Coffee Sand in North Central Mississippi, GCAGS Transactions, v. 34, p. 277.

REVIEW, CONTINUED :

Figure 3 - In the May 1991 article review, the Lower Wilcox fluvial systems (Cleeves, 1980) in North Mississippi were shown to be a network of paleotroughs. However, In this review we go a little further to say that the Wilcox paleotroughs in the north are structurally related to the RA's horst and graben assembly and to the transcurrent faults proposed by Oxley (1991) and Ingram (1991). By comparing Figure 3 to Figure 1, you notice immediately that the paleotroughs in the northwest corner of the state have evolved alongside the RA's horst and graben assembly there. When you add Figure 2 (illustrating the Coffee Sand) to your comparison of figures 1 and 3, you see that the Wilcox paleotroughs have developed on the downthrown side of the same fault that influenced distribution of the Coffee Sand. The implication is that the Wilcox fluvial components favored the downthrown side of the normal fault due to subsidence via fault movement in the RA's horst and graben assembly. This is not surprising since major tectonic events were occurring in the area at the time (Jackson Dome uplift and cook-off, reactivation of diapiric salt movement in the salt basin, strike-slip faulting along the Livingston Fault Zone, subduction of Cuba, and much more). Other less apparent structural continuities between the Wilcox and Coffee Sand units show that the Wilcox paleotroughs, and the Coffee Sand tidal inlet and southern pinchout coincides with the northwest trend of the transcurrent faults.

Cleaves, A. W., 1980, Depositional systems and lignite prospecting models: Wilcox Group and Meridian Sandstone of northern Mississippi, GCAGS Transactions, v. 30, p. 283.

Figure 4 - The Upper Tuscaloosa paleochannel in Figure 4 reflects the underlying structural architecture of northeastern Mississippi. In an overlay with Figure 1, it is seen that the Tishomingo and Lafayette ridges focused deposition of the Tuscaloosa channel through and between these structures. The RA's horsts, grabens, and transform faults obviously play a role in the channel's pathway when and where the northeast - trending normal faults and southeast-trending transforms intersect both the Paleozoic subcrops, the two ridges, and Tuscaloosa channel axis. One thing more may be implied here in regard to the Tishomingo and Lafayette ridges. There is a possibility that these features are flower structures and are more related to the Appalachian-Ouachita Juncture than to the RA alone. This may be a better answer to the Tuscaloosa's depositional response, rather than a total reliance on the RA's architecture as previously prescribed.

Jennings, S. P., 1991, personal communication.

Jennings, S. P., J. Hoffman, and P. Phillips, 1991, Effects of the Paleozoic-Cretaceous Unconformity on the Aquifers of northeast Mississippi, Proceedings : Mississippi Water Resources Conference 1991, p. 12.

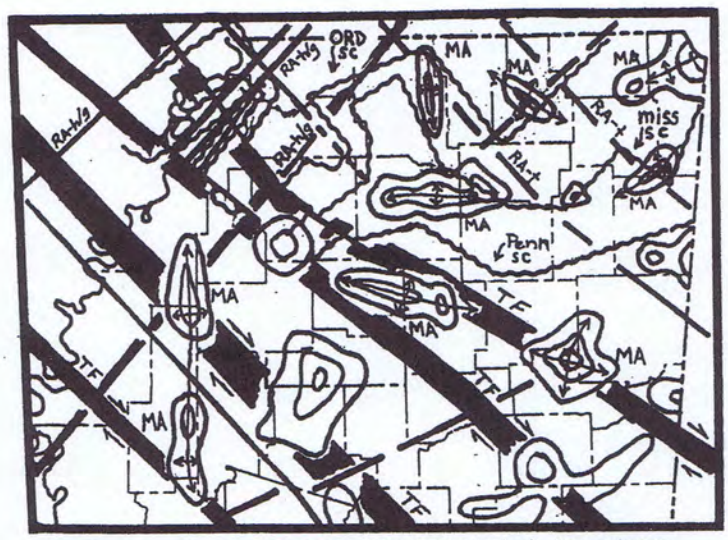

Figure 1 Structural diagram of North Mississippi: Sc = subcrop, MA = magnetic anomaly implying structure, TF = transcurrent fault, RA-h/g = RA horst and graben assembly, RA-t = RA transform fault.

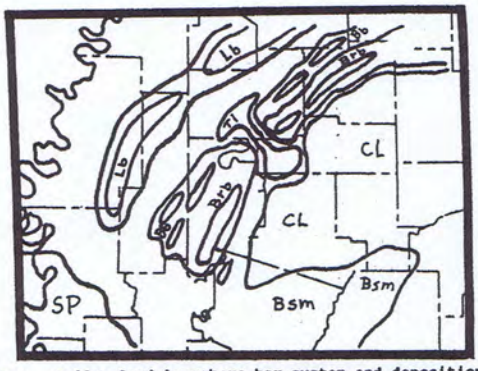

Figure 2 Coffee Sand longshore bar system and depositional environments (after Webb, 1984) : Lb = longshore bar, Bb = breaker bar, Brb = barrier bar, Ti = tidal inlet, CL = carbonate mud lagoon, Bsm = Bay siltstones and muds, SP = Sharkey Platform.

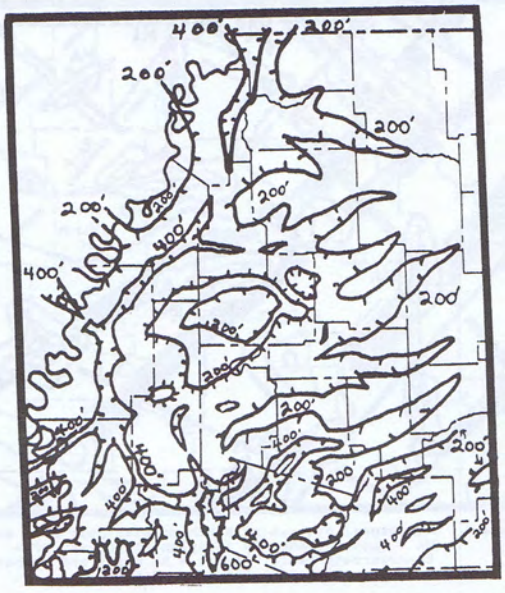

Figure 3 Lower Wilcox net-sandstone isolith map (after Cleaves, 1980).

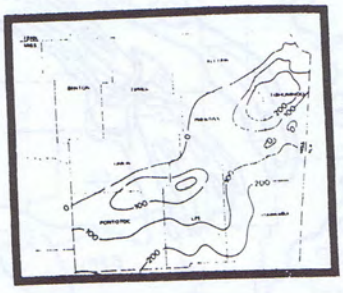

Figure 4 Thickness of Tuscaloosa Group (Jennings et al., 1991: personal communication).

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Productive Low Resistivity and Unconventional Petrophysical Well Logs of the Offshore Gulf of Mexico

Houston Geological Society / New Orleans Geological Society

September 4, 1991

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Stan Thieling
Editor
Mississippi Geological Society Bulletin
P. O. Box 422
Jackson, MS 39205-0422

Dear Mr. Thieling:

The Houston and New Orleans Geological Societies are calling for examples of productive low resistivity and unconventional log responses from the offshore Gulf of Mexico to be submitted for inclusion in a new guidebook to be entitled "Productive Low Resistivity and Unconventional Petrophysical Well Logs of the Offshore Gulf of Mexico."

We are writing you today about our project because we know that some of your members/readers have observed these phenomena when they worked the offshore Gulf of Mexico, and might want to contribute examples for inclusion. Obviously, we cannot afford to purchase advertising space for our "call" announcement but thought that you might want to let your members/readers know about the project by perhaps remarking about it in your editor's comments, news section, or some other place. We are including a copy of the announcement which contains all the information, as well as an example of a future page from the book.

Let us know if you would like more information, and thank you for your interest.

Dwight "Clint" Moore
Chairman & Chief Editor

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New Exploration Strategy: Dry Hole Drilling

By KERMIT SHIELDS

Theory

Obviously, there is a finite volume of hydrocarbons in the world. Applying basic set theory, we can locate these reserves either by drilling where the hydrocarbons *are* or where they *are not*. An extensive program of either option will accurately pinpoint the reserves. While independents appear to be pursuing the former option, the majors have obviously chosen the latter.

Advantages of dry hole drilling

Economic advantages include: 1) cheaper acreage on prospective dry hole locations; 2) tax write-offs provided by dry holes; 3) elimination of costly facilities such as pipelines, refineries, and tanks; and 4) elimination of nasty discoveries which will be eventually classified as "old oil" and will be underpriced.

Dry holes were very profitable in the past when drillers would sell more than 100% of the stock in a well. After it was declared a dry hole, the investors lost their money and the driller walked off with the excess capital. This method became risky when hydrocarbons were found by mistake and the drillers had to pay more than 100% of the profit.

Technical advantages

1) Smaller risks of blowouts, gas kicks, well fires, oil spills, etc.; 2) less need for expensive standby equipment on drilling rigs (blowout preventors, heavy mud, gas masks); 3) faster drilling times (dry holes can be drilled faster because they do not have to go as deep as many producers).

Current outlook for dry holes

Dry holes are becoming rarer as more areas of the globe have been explored. In 1917 the success rate for dry holes was 95% (Perrine, American Association of Petroleum Geologists, 1918) and now the success rate is down to 83% (*Oil & Gas Journal*, August 14, 1978). At this rate we will run out of dry holes in the year 2394. Recently, the US Geological Survey tried to drill a dry hole (Atlantic COST well, *OGJ*, January 22, 1979) and hit a nasty pocket of hydrocarbons. They did the same thing in the Cook Inlet (*OGJ*, February 13, 1978). Because of the increasing difficulty of drilling dry holes, modern exploration techniques will be required.

Exploration techniques for dry holes

Geophysicists must do extensive mapping to look for areas that have non-closure and areas with dull spots. Geochemists can be helpful by completing immaturation studies. Drilling of structure lows may be effective if proper caution is used to avoid stratigraphic traps. Some dry hole locations are obvious (i.e. Canadian Shield), but it takes real skill to drill dry holes in the center of producing areas. We must strive to be oil nonfinders.

Conclusion

Dry hole drilling is an increasingly popular approach to locating hydrocarbon reserves. The major oil companies are in the forefront of exploration and research, but the independents are not far behind. Perhaps we can best maintain our lead by financial motivation for the explorationists. They should be given a percentage of every tax write-off for a dry hole. LE

Kermit Shields is senior exploration geologist for Mobil in Denver. His spoof originally appeared in the Newsletter of the Dallas Geophysical and Geological Societies.

Public Education and the Well Site

By Susan M. Landon

(Perhaps if this approach were used more frequently in our industry, there would not be such a negative perception of the Petroleum Industry in the public's view. Ed)

In 1987 Amoco drilled the #1 Eischied well in Carroll County, Iowa, to evaluate the hydrocarbon potential of the Precambrian Midcontinent Rift System. The well was located far from the oil patch and the economic instability of agriculture made it the prime target of local and national news.

The status of this tight hole as the focus for public education started innocently. Because of the lack of familiarity of the state with exploration, several meetings were conducted early in the exploration program to facilitate leasing, seismic, acquisition and, ultimately, drilling.

Before spudding the well, Amoco and the lease owners hosted a barbecue for residents within a two mile radius of the well site. The correlation with the hydrogen sulfide contingency area was not coincidental, but tours of the rig and the presence of local and national media began a healthy process of understanding.

The company put a sign out at the country road which looked like an inverted United Way goal and each day the depth was updated so the local residents could keep track of activity. The well was a tight hole and specific information was not released.

At one point one of my friends in Denver called the local hardware store for an update. When Betty, the store clerk, found out the caller was in Denver she suggested he call me. He said I would not tell him the current depth, so Betty said she wouldn't tell either! We certainly had developed a strong sense of being part of the team for those individuals who lived near the rig.

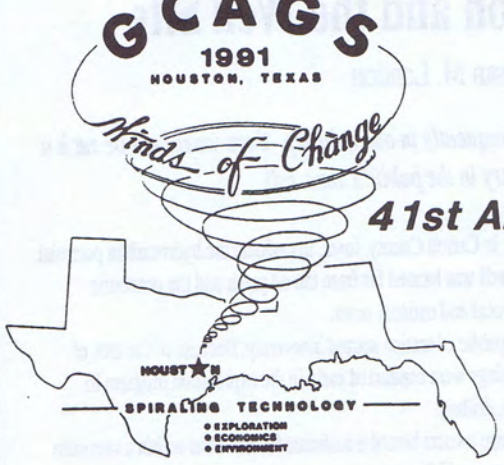
Each of the well-site geologists and engineers volunteered to spend some time lecturing to classes in the local schools and to local service organizations. Classroom visits included the first grade and up.

On Memorial Day, the nearest community; Halbur, hosted a social evening with a presentation on the oil industry by one of the well-site staff. The local radio station took part in the education process. The Farm Director became the Oil and Farm Director and each Friday at noon, he interviewed a member of the crew at the rig. The interview included the current depth. No other information regarding the drilling was included and the interview focused on the job of the particular individual being interviewed.

By the time the well reached TD at 17, 851 feet, almost everyone was included: toolpusher, mud engineer, mudlogger, and others. The interview with the mudlogger concentrated on the garden he was growing on the stockpiled topsoil (of specific interest in a community which depends on agriculture).

With very little resource investment and a lot of enjoyment on the part of Amoco and Grace well-site personnel, a tremendous amount of information was disseminated to many people. A sense of goodwill for our industry was developed and, when the well was plugged, there was a minimum amount of disappointment, because the local population understood the concept of exploration risk.

(This article originally appeared in the AAPG Youth Activities & Public Information NEWSLETTER Number 1, April, 1991)



GCAGS
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41st ANNUAL CONVENTION

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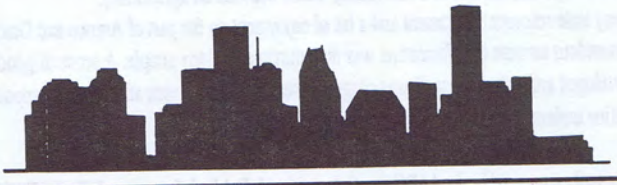

TWENTY-TWO DIFFERENCES BETWEEN SKILLED AND UNSKILLED SCIENCE THINKERS

Skilled Thinkers	Unskilled Thinkers
1. are curious about the natural world and see it as a set of cause-and-effect relationships	1. show little curiosity about the natural world and see it as chaotic
2. assume that the rules of nature are discoverable by normal scientific means and have a basis in the predictability of interaction between matter and energy.	2. assume that the rules of nature are beyond the capabilities of normal science and involve processes or forces outside the realm of predictability of interaction between matter and energy
3. don't give up too quickly; persevere even when the answer to a problem does not come easily; persist in carrying out a thinking task	3. give up quickly, if unsuccessful in solving a problem on first or second try
4. don't impulsively jump to conclusions; suspend judgment	4. are impulsive and often jump to conclusions
5. exhibit flexibility in thinking; are open-minded	5. are inflexible in approaching thinking tasks exhibit a closed mind
6. search for connections between ideas and concepts	6. fail to see connections between ideas and concepts
7. use creativity to generate possibilities, connections, and possible solutions	7. fail to use creativity to its fullest extent
8. are objective; judge in terms of situations, issues, purposes, and consequences rather than in terms of fixed, dogmatic precepts or emotional, wishful thinking	8. are subjective; use emotion and dogma in making choices
9. seek to be well informed; secure as much information as possible before making a judgment	9. are reluctant to seek information or evidence; get by on as little information as possible
10. can articulate how they go about executing a thinking task; have a plan to go by	10. plunge into a thinking task without planning or considering what to do; skip steps in executing a thinking task
11. use and check the credibility of sources and consider authority or opinion to be insufficient	11. fail to consider the accuracy and credibility of sources of information; take everything on face value or put too much faith in authority or the opinions of others
12. seek a clear statement of a problem, thesis, or question; initiate questions and pose problems	12. start to solve the problem before they really understand what the problem is
13. check for accuracy before submitting the results of their thinking	13. fail to check for accuracy in their work
14. use precise terms to describe how and what they are thinking	14. use imprecise or vague language to describe what they are thinking
15. demonstrate confidence in their abilities to execute a thinking task	15. are unable to launch a thinking task
16. use thinking skills and strategies in a variety of contexts	16. use thinking skills and strategies only when forced to in the classroom situation
17. use previous knowledge and past experience	17. fail to apply previous knowledge and past experience to new thinking situations
18. question the assumptions including theories on which problems or thesis are based	18. accept all assumptions unquestioningly
19. seek and give reasons and evidence in support of a claim	19. present unsupported claims or statements
20. successfully engage in a line of reasoning	20. fail to use a line of reasoning
21. recognize that the rules of nature are probabilistic	21. fail to see the probabilistic nature of science
22. understand and use the interdependence of hypothesis generation, observation, experimentation and theorization	22 fail to see and use the interdependence of hypothesis generation, observation, experimentation, and theorization

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REMINDER OF LOCAL SOCIETY MEETINGS

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Petroleum Club
No October Meeting

SPE
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D & D
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Rosemary Jenkins, 355-1578
September Meeting changed to 9/11/91

MIPRO

GEOPHYSICAL SOCIETY
4th Wednesday of Month
11:30 a.m. at Petroleum Club. Reservations not required
No September Meeting. Watch for date of Hog Roast to be announced.

PROPOSED RED BOOK ADDITION FOR 1990-91

Mesozoic Oil and Gas Fields

Alabama:	1. Foshee	Philip Reeves
	2. West Foshee	"
	3. Frisco City	Robert Schneeflock
	4. West Falco	"
	5. West Range	"
	6. Osaka	Les Aultman
Mississippi:	7. Flat Branch	Steve Ingram
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	9. Poplarville	David Hancock
Florida:	10. Blackjack Creek	Les Aultman
	11. McDavid	Philip Reeves

Paleozoic Oil and Gas Fields

Mississippi:	12. Shannon	Ed Hollingsworth
	13. South Palmetto	"
	14. Maple Branch	Kevin Henderson

Updates

Mississippi:	15. Thompson's Creek	Steve Ingram
	16. South Thompson's Creek -	"
	17. Wausau	"
	18. North Wausau	"

The Red Book Committee has begun the printing phase of this supplement which puts us at the end of this particular project. We express our gratitude to the persons listed above for contributing their time and effort in support of this final supplement to Volume III, **MESOZOIC - PALEOZOIC PRODUCING AREAS OF MISSISSIPPI AND ALABAMA**. We also wish to recruit new volunteers to help build the portfolio for our next publication, Volume IV. Please contact Brian Sims, Chairman of the Red Book Committee, as soon as possible.

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Submit all abstracts by January 4, 1992 for the 1992 GCAGS Convention to:

Steven S. Walkinshaw
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Notification of acceptance will be by February 16 and completed papers will be due by April 4, 1992. Other than poster presentations, full manuscripts will be required for all papers.

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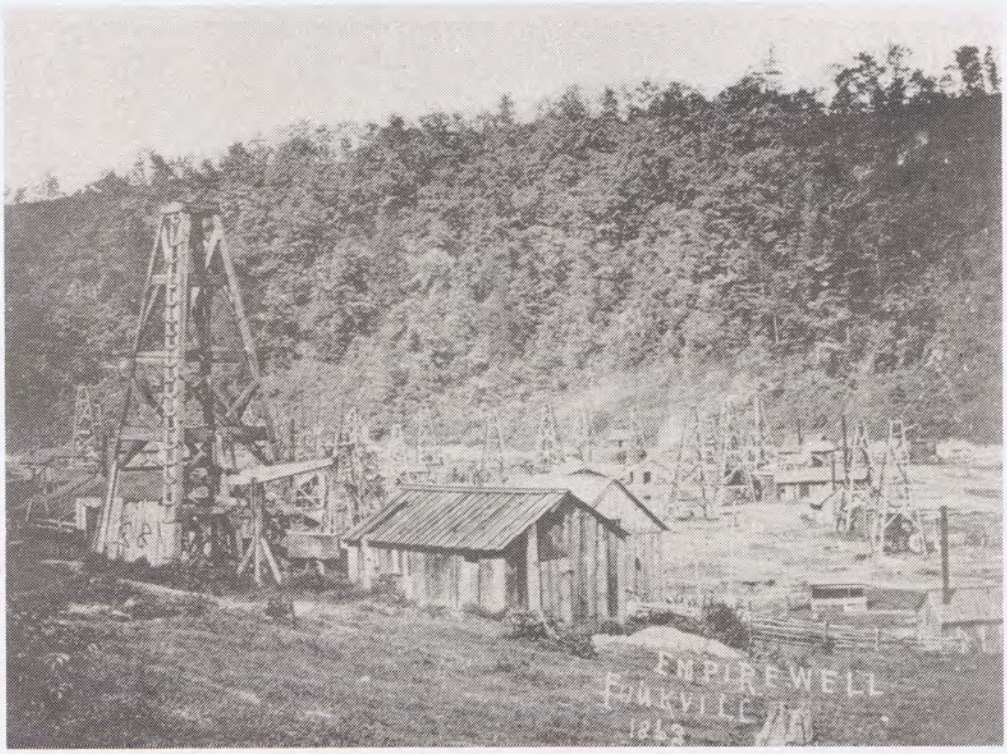
MISSISSIPPI GEOLOGICAL SOCIETY

Volume XXXX No. 3 November, 1991



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1991-92

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PRESIDENT'S MESSAGE

Well, you've caught me in a slump ! After attending the GCAGS meeting in Houston and a four day field trip (IGCP Project 308) looking at Paleogene sequence boundaries in Mississippi and Alabama, I'm pooped out. Much energy went into planning these events and even more will be generated from them as we assimilate the newest technical advances and most current geological concepts that are evolving today.

Our guest speaker this month is Dot McElroy, a well known, experienced, and highly respected technical professional in the petroleum industry. Dot will introduce some very timely concepts and guidelines to be used in making a successful exposition, whether for oral presentations or for marketing your prospects. A similar technical session held at the Houston GCAGS meeting a few weeks ago was well attended, indicating the importance that is now being placed on getting your idea across to management and/or investors. We all could use some pointers. Hope to see you there.

The MGS-SIPES "Knox" Seminar will be held on November 25th & 26th at the Downtown Holiday Inn in Jackson. Our schedule includes topics on geophysics, structure, stratigraphy, and more. Several deadlines are near that you should be aware of: 1) November 4th is the deadline for the seminar group rate at the Downtown Holiday Inn; 2) exhibitors should have their requests in now; if not get them in as soon as possible (next few days); 3) and attendees should make sure that their payment is in **no later than** the November 21st seminar deadline. **Any** registration beyond that date **can not** be ensured meals or a syllabus, and there will be no pro-rating of registration fees. If you have any questions, call Stan Thieling or myself, Steve Ingram, at the telephone numbers given in our announcement, this bulletin.

Finally, I have the distinct privilege of announcing the induction of two society members into "Honorary Standing" in the Mississippi Geological Society. Mr. Dudley J. Hughes and Mr. William H. Moore have been given Honorary Membership into our society for distinguished service to our society over the past many years. Dudley and Bill are esteemed for different reasons, each having given or having benefitted the society in an exceptional way. "Dudley and Bill, we thank you for your devotion and service to our community and membership; and we thank you for holding the standard of excellence that the rest of us must follow."

Sincerely,

Steve Ingram

BUSINESS MEETING LUNCHEON SCHEDULE

1991	1992	
November 12	January 14	February 11
December 10	March 10	April 14
		May 12

Other Society functions

Knox Seminar, November 25 & 26, 1991 Spring Fling, Thursday, May 14, 1992

ABOUT THE COVER: Dr. Ernest E. Russell, Field Trip Leader of the 18th MGS Field Trip held April 19th and 20th, test the brittleness of the chalks of the Demopolis Formation. This non-scheduled stop was an outcrop along Highway 45 south of Columbus, Mississipi. Photo by Scott Higgenbotham, OWLCO.

BUSINESS MEETING LUNCHEON

November 12, 1991 • 11:30 a.m.
Capitol City Petroleum Club, Smackover Room

"KEYS TO SUCCESSFUL PRESENTATIONS"
BY
DOT McELROY

Three keys to a successful presentation are planning, communication and preparation. No matter what the objective, remember you are selling yourself as well as your idea. Certain rules apply to any presentation and some are unique to geological situations.

The single most important aspect of making a good presentation is PLANNING. Even the best plan might fail if not executed properly, but the project is SURE to fail without one. The answer to five questions determine the basis for a comprehensive plan: who? what? where? when? and how?

When you know who the audience will be, you know the quality expected. Company brass expect top quality; peers do not. Tailor the material to fit the audience. What is appropriate for technical personnel may be incomprehensible to students or clients.

If the ultimate objective is to sell an expensive deal, the requirements are naturally much different than they would be to gain approval for further study or to train new employees.

The time factor may limit the number and quality of exhibits. A reasonable amount of time certainly allows more options. Rush jobs are self-defeating, sacrifice quality and usually cost more than necessary.

Because transporting or shipping exhibits can prove cumbersome and costly, making a presentation in the home office has many advantages including fewer limitations and fewer unknowns, in addition to the home court advantage.

How the material is presented is determined by the previous factors. It is difficult to design exhibits equally suitable for wall displays, brochures, 35mm slides and overhead transparencies. Each form has a different set of parameters and should be planned accordingly.

Only after the overall plan has been decided should the preparation of exhibits begin. At this point the key is COMMUNICATION: from the boss who orders it, to the people who prepare it, to the ones who present it and in the end, to those who must be persuaded by it.

Every exhibit should begin with a professional quality reproducible original. The quality of the original determines the quality of the exhibit. Certain properties of the original may limit the reprographic processes which can be used. The ultimate use, quality, longevity and cost requirements add further limits. Know the limits beforehand.

Wall displays are probably the easiest kind to prepare, and size is a big factor, especially if the exhibits must be transported to different locations. Tapes and applique films are okay for mounted maps, but will wrinkle when rolled. It is unrealistic to assume that wall displays can automatically be reduced to go into the brochure. A map to be reduced must be drawn with reduction in mind. Allowance must also be made for binding.

For 35mm slides and overhead transparencies, the main rule is keep it simple, with one idea to a slide and lettering bold and simple. In the case of photographs, showing an object, person, or ruler helps to indicate the scale. Quality is preferred over quantity. Two excellent publications are recommended for slide presentations: one from AAPG, 35mm Slides, A Manual for Technical Presentations, and the other from Eastman Kodak, Publication S-30.

When all is ready and the time comes to make the presentation, be prepared! Punch and clip loose notecards in order; lock the carousel, locate electrical outlets and spare bulbs and remember push pins don't work well in metal walls!

In summary, PLAN, COMMUNICATE and PREPARE.

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Knox Seminar
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Jackson, Mississippi 39215-1457
Deadline: November 21

HOTEL REGISTRATION
Holiday Inn Downtown
200 E. Amite Street
Jackson, Mississippi 39201
(601) 969-5100
(ask for MGS Knox Seminar Group Rate)
Deadline: November 4 for group rate

CONTACTS

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STAN THIELING (601) 353-5850
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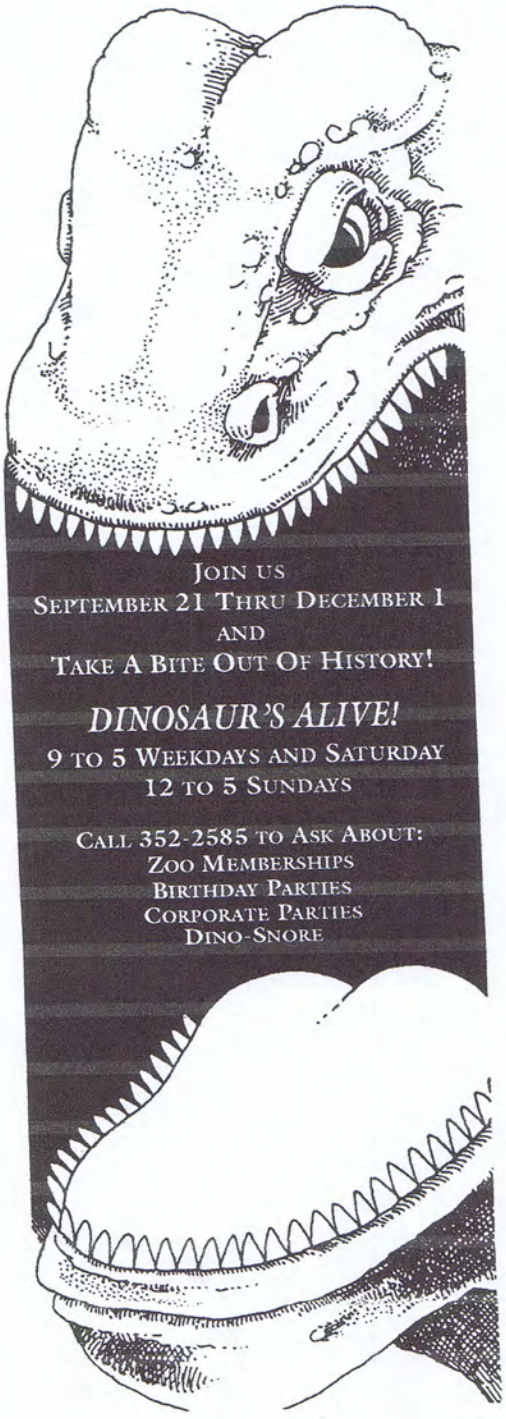
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THE SHREVEPORT GEOLOGICAL SOCIETY

November dinner meeting will feature guest speaker Bill Demis of Marathon Oil Company, Houston, on "North Shongaloo-Red Rock Field — A recent major Smackover Discover in the Very Mature Stateline Trend." The meeting is scheduled for November 19th at 5:30 p.m. at the Shreveport Petroleum Club, 416 Travis Street, Shreveport. Cost is $12.50.

For reservations call Chris Johnson or Lynda Allen at Cobra Oil & Gas, (318) 222-6652; FAX (318) 222-6673.

MISSISSIPPI GEOLOGICAL SOCIETY MEMBERSHIP RENEWALS

The deadline for all membership renewals is quickly approaching. The membership renewal cards were sent out approximately three (3) months ago and there are several members who still have not renewed their membership. The dues for the 91-92 year are $20.00 for members and $5.00 for students. Please use the membership information form located at the end of this bulletin to remit your dues if you have not yet done so. If you know of a member who has not been receiving their bulletin or your address is listed incorrectly, please contact me, Rick Ericksen, at 948-5279 so that I may update the address information and get the bulletins and/or any other Society information to you without any undue delays.

- THANKS FOR ALL YOUR COOPERATION -

Productive Low Resistivity and Unconventional Petrophysical Well Logs of the Offshore Gulf of Mexico

Houston Geological Society / New Orleans Geological Society

September 4, 1991

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Stan Thieling
Editor
Mississippi Geological Society Bulletin
P. O. Box 422
Jackson, MS 39205-0422

Dear Mr. Thieling:

The Houston and New Orleans Geological Societies are calling for examples of productive low resistivity and unconventional log responses from the offshore Gulf of Mexico to be submitted for inclusion in a new guidebook to be entitled "Productive Low Resistivity and Unconventional Petrophysical Well Logs of the Offshore Gulf of Mexico."

We are writing you today about our project because we know that some of your members/readers have observed these phenomena when they worked the offshore Gulf of Mexico, and might want to contribute examples for inclusion. Obviously, we cannot afford to purchase advertising space for our "call" announcement but thought that you might want to let your members/readers know about the project by perhaps remarking about it in your editor's comments, news section, or some other place. We are including a copy of the announcement which contains all the information, as well as an example of a future page from the book.

Let us know if you would like more information, and thank you for your interest.

Dwight "Clint" Moore
Chairman & Chief Editor

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CALL FOR GEOLOGIC PAPERS
FOR 1992 GSA SECTION AND ANNUAL MEETINGS

SOUTH-CENTRAL SECTION, February 24–25
Rice University
Houston, Texas

Abstract Deadline: November 6, 1991

Submit completed abstracts to
James E. Wright
Department of Geology & Geophysics
P.O. Box 1892
Rice University
Houston, TX 77251
(713) 527-4880

NORTHEASTERN SECTION, March 26–28
Harrisburg Hilton & Towers Hotel
Harrisburg, Pennsylvania

Abstract Deadline: December 5, 1991

Submit completed abstracts to
Jeffrey W. Niemitz
Department of Geology
Dickinson College
Carlisle, PA 17013
(717) 245-1355

CORDILLERAN SECTION, May 11–13
Eugene Hilton Conference Center
Eugene, Oregon

Abstract Deadline: January 21, 1992

Submit completed abstracts to
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Department of Geological Sciences
University of Oregon
Eugene, OR 97403-1272
(503) 346-4573

SOUTHEASTERN SECTION, March 18–20
Stouffer-Winston Plaza
Winston-Salem, North Carolina

Abstract Deadline: November 26, 1991

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Department of Geology, C.B. 3315
Mitchell Hall
University of North Carolina
Chapel Hill, NC 27599-3315
(919) 966-4516

NORTH-CENTRAL SECTION, April 30–May 1
University of Iowa
Iowa City, Iowa

Abstract Deadline: December 30, 1991

Submit completed abstracts to
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Iowa DNR, Geological Survey Bureau
University of Iowa
123 North Capital
Iowa City, IA 52242
(319) 335-1575

ROCKY MOUNTAIN SECTION, May 14–16
Ogden Park Hotel
Ogden, Utah

Abstract Deadline: January 29, 1992

Submit completed abstracts to
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Department of Geology
Weber State University
Ogden, UT 84408-2507
(801) 626-6908

GSA Annual Meeting
Cincinnati, Ohio, October 26–29, 1992
Abstract Deadline: July 8, 1992

Submit completed abstracts to
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3300 Penrose Place, P.O. Box 9140, Boulder, CO 80301
(303) 447-8850

1992 ABSTRACT FORM REQUEST

To: GSA Abstracts Coordinator, P.O. Box 9140, Boulder, CO 80301

Please send ____ copies of the 1992 GSA abstract form. I understand that the same form may be used for all 1992 GSA meetings—(the six Section Meetings and the Annual Meeting).

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GEOLOGICAL HAZARDS

Three Short Stories

By P. J. Shannon, Consultant

When you are doing field geology, hazards come in many unexpected forms, as the following true tales make clear.

THE DAY OF THE AXES

In the field season of 1955, the Esso Rover Boy's field party was traversing the creeks in the southern part of the Thrace Basin of Turkey, doing more detailed reconnaissance-type work than usual. As you will recall, Thrace is the European part of Turkey, north of the Dardanelles-Sea of Marmara Bosphorus. To the north lies Bulgaria, which at that time was a bulwark of communism, and to the west is Greece, which has always been at odds with the Turks. As a result of persistent government propaganda about the dangers of communists and other spies, the local people were quite suspicious of foreigners.

So one fine summer day I was down in a creek cut, measuring the dip with my Brunton compass, chipping off rock samples, making notes in my field book, and minding my own business, when I became aware that I had been quietly surrounded by a band of about 40 villagers, all wielding axes. Some were concealed behind bushes and trees and rocks, and others were in the open. I was surely trapped. They had decided that this obvious foreigner was probably a spy, and it was their patriotic duty to capture him and haul him in to the local police authorities.

No amount of explanation that I was on official business exploring for oil, and how beneficial it was to their country that we find oil, would allay their suspicions. Nor would my official documents replete with seals, stamps and signatures convince them of my innocence, (they probably could not read very well, either, since they kept turning the documents around). So we set off walking toward the nearest village, which was about 5 km away—me, surrounded by the band of ax-wielding farmers. It was only then that I became aware that I, at six feet, was much taller than the villagers, and that they, though armed, were somewhat afraid of me, because of my size as well as my obvious spy potential.

About halfway to the village we came across a villager coming out to meet us. He was obviously known to my captors as someone of authority in the village. But what seemed to me of greater import: he was as tall as 1, and consequently was not awed by my stature, even though he had no ax.

After a bit of discussion amongst themselves, the band of ax-wielders turned me over to the big man, who assured them that he would take care of the stranger—somewhat to their relief, I thought. Then the two of us set off walking toward another village.

We walked and conversed for a while; he told me that he had been an Olympic wrestler (the Turks' national sport) as a youth, and had then traveled a bit. He was now mayor of the village.

After we were well out of sight of the other villagers, he apologized for their frightened actions and explained that he understood our petroleum exploration work and bade me go safely with Allah back to our field camp. The moral that I took from this adventure was that big men who are not afraid of you are a lot less dangerous than little men who are!

A RURAL FEAST

Jaime Gallo, a Colombian geologist, and for many years field party chief working for Intercol, recounted this true happening that took place in the Eastern Cordillera of the Andes in Colombia, in about 1970. Jaime tells of the night that he and his party got too far away from their base camp and had to appeal to the hospitality of the local farmers for a place to spend the night. Now this is not your run-of-the mill story of the traveling geologist and the farmer's daughter; but rather, it is the tale of the supper that the lady of the house prepared for them. The principal dish was chicken, which they ate with gusto by candlelight. It was only the next morning, after paying for their board and lodging and thanking the lady for her hospitality, that they came across a pile of bones and feathers out behind the house. These showed conclusively that the chicken they had so enjoyed, and whose bones they had so hungrily gnawed the night before, was actually a vulture.

THE NIGHT OF THE CAMELS

It had been a long, hot, dusty field season in the desert of southeastern Turkey that summer of 1954, and the Esso Rover Boys—hardened field geologists, young bachelors all—felt that they deserved some rest and relaxation. We therefore decided to sample the tourist attractions of the town of Gaziantep, which had been described to us in glowing terms by one of the local villagers as "Paradise." We weren't sure if he was thinking of the Koranic version of Paradise, or perhaps (as we suspected) something a little less spectacular; but we decided to have a shot at it anyway.

That summer evening we accordingly pulled up in front of what one might call

the local emporium of pleasure. This was a place across the street from the Gul Palace Oteli (Rose Palace Hotel) that must certainly have been called a night club—or the Turkish version of something French such as "Moulin Rouge" or "Folies Bergere."

Anyway, it turned out to be a large open-air courtyard surrounded by a wall eight feet high. Once inside, we sat around one of the many tables and ordered something to drink. Buzbag red wine, Kavaklidere white wine, and Portakal Suyn Ve Vodka (a Screwdriver made with canned orange juice) were the staples. All the other customers, like us, seemed to be men. The center of attention was a lighted stage up at one end of this courtyard; seated across this stage were about a dozen attractive ladies who, we assumed would be in charge of whatever entertainment might be forthcoming. We quickly discovered, however, that the sole pleasure dispensed by these charmers consisted of smiles, beamed in the general direction of whichever patrons deigned to treat them to a bottle of champagne.

So, getting into the spirit of the occasion, we bought a bottle of champagne for the ladies. We could see that the waiter surreptitiously shook the bottle a bit backstage before bringing it out—to make sure that the cork would provide a properly impressive pop. Then, after the ladies had their glasses filled, the music began, to which they clapped in time and sang in unison, toasting the audience with the champagne, and favoring us with their smiles. And so the evening passed.

Of course, being young and optimistic, we kept at this for a considerable time, hoping that something more than a smile would materialize. But after eating, and downing numerous rounds of drinks, we were finally forced to conclude that nothing else would be forthcoming. So, having had more rounds than we probably should have, we decided to abandon the pleasure palace and Gaziantep itself, and follow our usual custom of retiring to the open country outside of town, to set up our nightly field camp. We piled out of the local night club and into our jeep station wagons, which we had left parked at the curb right in front of the cabaret.

Unbeknown to us, local pranksters had hooked the front winch cable of the second jeep to the back bumper of the first. As Dave Kingston and Abdullah Gurun took off in the first jeep they were closely followed by the second, with the driver honking his horn and yelling to get them to stop. They misunderstood, thinking him under the influence, and roared on through the darkened town, around the street corners with jeep number two careening madly behind.

A policeman passing by finally stopped the parade and we found out about disturbing the peace, lax police patrols, hooliganism, and other subjects. Eventually we were told to leave town, which is what we had been trying to do all along. We

drove north out of town about 15 km on one of the main dirt roads, and then turned off across the desert. The area was full of big basalt boulders; we wended our way through this maze.

It was, of course, rather late at night by this time, and our selection of a campsite alongside the road was not as good as it might have been had we done this by daylight. Nevertheless we managed to travel a few kilometers from the road and came across an area with a beautiful wide open space, which was ideal for the purpose. We set up our folding cots with sleeping bags under the stars, as we usually did, and very quickly were in bed and peacefully asleep... dreaming, naturally, of the adventures that might have ensued, had the evening developed as hoped.

For my part, I was dreaming that one of those delightful ladies had come to me. The dream progressed to the point that the lady was actually kissing me. Then it came to me, even in my dream, that the situation was somehow more realistic than any dream should be. At that point I woke abruptly and realized that I was not being kissed by one of the lovely Gaziantep girls, but rather, by a camel standing alongside my campcot. This, however, was only part of a scenario developing through our entire campsite. Numerous camels milled around our strewn-out cots; excited camel drivers were running about waving their sticks and shouting things. All of this, of course, resulted in everybody in our group, with heavy heads and broken dreams, struggling out of bed to slip into boots or whatever we could get on in a hurry, and try to sort out what was happening.

It was only then that we discovered, through the help of our able interpreters and field assistants (and our own limited knowledge of Turkish), that this beautiful, wide, cleared-out camping area that we had selected was actually part of the main camel-caravan trail into Gaziantep. The camels and their drivers who had blundered into our campsite were carrying wares for the weekly open-air bazaar that was scheduled to begin the next day in town.

If one now wishes to put a moral to this narrative, we might conclude by observing that in this life and this world, neither cabarets nor campsites are necessarily what they appear to be.

About the author: Pat Shannon got his B.A. in Geology from TCU and his M.S. from the University of Oklahoma. In 1954 he joined Exxon as a Rover Boy. He spent 25 years overseas with different Exxon affiliates. Since 1986 he has been a consultant in Houston, specializing in remote sensing and photogeology.

Reprinted from the Houston Geological Society Bulletin, June 1991.

CALL FOR PAPERS AND POSTERS

THE GULF COAST ASSOCIATION OF GEOLOGICAL SOCIETIES
AND
THE GULF COAST SECTION OF SEPM
42nd ANNUAL CONVENTION
JACKSON, MISSISSIPPI
OCTOBER 21-24, 1992

HOSTED BY THE MISSISSIPPI GEOLOGICAL SOCIETY

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- **Poster presentations**, which will be published as extended one-page abstracts with the option of half a page of illustrations.
- **Core presentations**, which will be published as extended two-page abstracts to include photographic illustrations. We would like to encourage you to display conventional cores from hot plays or with features of sedimentological interest or other distinctive reservoir characteristics.

Abstracts should be submitted with answers to the following questions: (1) Has this material been published previously? (2) If so, where and when, and how does your submission differ from the original? (3) In your opinion, is your paper more applicable to GCAGS or to SEPM? (4) Is the paper submitted for oral, poster or core presentation, and would you consider a change of presentation type if necessary?

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Petroleum Club

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Petroleum Club Smackover Room, 11:30 a.m.
$10, reservations not required
Tentative Fall Dates – Nov. 14, Dec. 12

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For Reservations call 352-0662 or 352-7782

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Rosemary Jenkins, 355-1578

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GEOPHYSICAL SOCIETY
4th Wednesday of Month
11:30 a.m. at Petroleum Club. Reservations not required

PROPOSED RED BOOK ADDITION FOR 1990-91

Mesozoic Oil and Gas Fields

Alabama:	1. Foshee	Philip Reeves
	2. West Foshee	"
	3. Frisco City	Robert Schneeflock
	4. West Falco	"
	5. West Range	"
	6. Osaka	Les Aultman
Mississippi:	7. Flat Branch	Steve Ingram
	8. Trimble	Robert Schneeflock
	9. Poplarville	David Hancock
Florida:	10. Blackjack Creek	Les Aultman
	11. McDavid	Philip Reeves

Paleozoic Oil and Gas Fields

Mississippi:	12. Shannon	Ed Hollingsworth
	13. South Palmetto	"
	14. Maple Branch	Kevin Henderson

Updates

Mississippi:	15. Thompson's Creek	Steve Ingram
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	18. North Wausau	"

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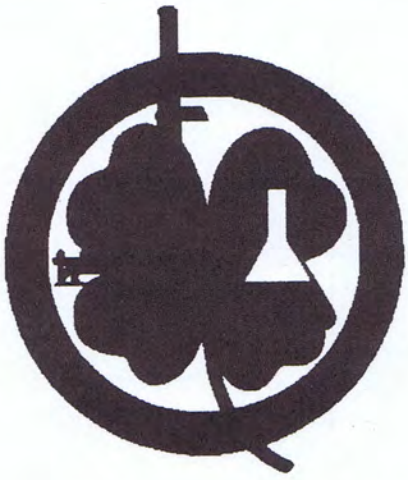

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PUBLICATION LIST

1. Mississippi Geological Society Photo Directory, 1981 ..... $ 2.00
2. Wilcox Fields of Southwest Mississippi, Maps and production data on 171 fields, in ring binder, 350 pp., 1969 ..... 28.00
3. Mesozoic-Paleozoic Producing Areas of Mississippi and Alabama. Volume I. Maps and producing data on 57 fields, with 2 composite logs, clothbound, 139 pp., 1957 .....10.00
4. Volume II. Maps and producing data on 77 fields, includes Supplement 1, in ring binder, 143 pp., 1963 .....15.00
5. Supplements 2 through 7 for Volume II, Maps and producing data on 35 fields, 110 pp.....15.00
6. Supplement 8 for Volume 11, Maps and producing data on 34 fields, 108 pp., 1980 ..... 25.00
7. Volume II, complete with Supplements 2-8, 361 pp., 146 fields 50.00
8. Volume III, 85 pp., 46 fields, 1987 ..... 50.00

FIELD TRIP GUIDEBOOKS

9. Upper Cretaceous Outcrops, Northeast Mississippi and West Central Alabama, Fourteenth Field Trip, 29 pp., May 1959..... 4.00
10. Cenozoic of Southeast Mississippi and Southwest Alabama, Fifteenth Field Trip, 52 pp., May 1960 ..... 6.00
11. Cenozoic of Horn Island and the Pascagoula Valley 10th Annual GCAGS Meeting, 24 pp., October, 1960 ..... 2.50
12. The Paleozoics of Northwest Arkansas Sixteenth FGield Trip, 48 pp., May, 1962..... 5.00
13. Tertiary Type Localities of East-Central Mississippi, 25th GCAGS Meeting, 133 pp., Octoberr 1975..... 5.00
14. Mississippi Rocks of the Balck Warrior Basin, Seventeenth Field Trip, 79 pp., April, 1978 ..... 8.00
15. Tertiary and Upper Cretaceous Depositional Environments, Central Mississippi and West Central Alabama 33rd Annual GCAGS Meeting, 40 pp., October 1983 ..... 7.50

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Volume XXXX No. 4 December, 1991

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December 10, 1991
4:00 - 6:00 p.m.

Capital City Petroleum Club
20th Floor

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1991-92

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PRESIDENT'S MESSAGE

PRESIDENTS MESSAGE

Well, holidays are upon us and the year is at end. Mike Noone, 1st VP - MGS, has a reminder for us all - "Remember those in need during this holiday season." That is well spoken and worthy of repeating. Yes, we (the petroleum industry) have been hit pretty hard over the last several years, yet we have plenty to be thankful for in our families, our health, and I'm sure there are many other areas worthy of thanksgiving and reflection. On behalf of the MGS Board of Directors, I wish you a happy holiday season and the kind promise of happiness and success for the year(s) to come. May we prosper.

Along this same vein, the MGS Christmas Social will be held on the second Tuesday of December (10th) from 4-6 pm. in the Penthouse, 20th Floor, Capital City Petroluem Club. Come join us; hope to see you there.

Finally, if you find yourself surprised by the small size of this months bulletin, account it to our efforts toward our KNOX Seminar in November.

Happy Holidays

Steve Ingram

BUSINESS MEETING LUNCHEON SCHEDULE

1991	1992	
December 10	January 14	February 11
	March 10	April 14
		May 12

Other Society functions

Spring Fling, Thursday, May 14, 1992

ABOUT THE COVER: For those of you unable to find Dr. Russell on last month's cover, he is behind the ladder near the top of the derrick (He was a young boy in this photo). With apologies to Dr. Russell.

MGS
Christmas Party

December 10, 1991
4:00 - 6:00 p.m.

Capital City
Petroleum Club
20th Floor

Hors D'oeuvres

$5.00
Special Christmas Price

DESK AND DERRICK CLUB OF JACKSON

Industry Appreciation Night

December 11, 1991

Petroleum Club Main Dining Room

7:00 Cash Bar

7:30 Dinner

8:00 Speaker —
Joe Sims Mid-Continent
Oil & Gas Association

$20.00

RSVP Mary Jenkins 355-1578
by December 6

Everyone Invited

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FOR 1992 GSA SECTION AND ANNUAL MEETINGS

SOUTH-CENTRAL SECTION, February 24–25
Rice University
Houston, Texas

Abstract Deadline: November 6, 1991

Submit completed abstracts to
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Department of Geology & Geophysics
P.O. Box 1892
Rice University
Houston, TX 77251
(713) 527-4880

NORTHEASTERN SECTION, March 26–28
Harrisburg Hilton & Towers Hotel
Harrisburg, Pennsylvania

Abstract Deadline: December 5, 1991

Submit completed abstracts to
Jeffrey W. Niemitz
Department of Geology
Dickinson College
Carlisle, PA 17013
(717) 245-1355

CORDILLERAN SECTION, May 11–13
Eugene Hilton Conference Center
Eugene, Oregon

Abstract Deadline: January 21, 1992

Submit completed abstracts to
Jack M. Rice
Department of Geological Sciences
University of Oregon
Eugene, OR 97403-1272
(503) 346-4573

SOUTHEASTERN SECTION, March 18–20
Stouffer-Winston Plaza
Winston-Salem, North Carolina

Abstract Deadline: November 26, 1991

Submit completed abstracts to
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Department of Geology, C.B. 3315
Mitchell Hall
University of North Carolina
Chapel Hill, NC 27599-3315
(919) 966-4516

NORTH-CENTRAL SECTION, April 30–May 1
University of Iowa
Iowa City, Iowa

Abstract Deadline: December 30, 1991

Submit completed abstracts to
Greg Ludvigson
Iowa DNR, Geological Survey Bureau
University of Iowa
123 North Capital
Iowa City, IA 52242
(319) 335-1575

ROCKY MOUNTAIN SECTION, May 14–16
Ogden Park Hotel
Ogden, Utah

Abstract Deadline: January 29, 1992

Submit completed abstracts to
Sidney Ash
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Weber State University
Ogden, UT 84408-2507
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Cincinnati, Ohio, October 26–29, 1992
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Submit completed abstracts to
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(303) 447-8850

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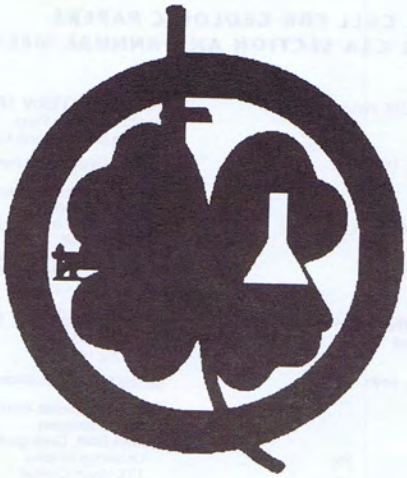

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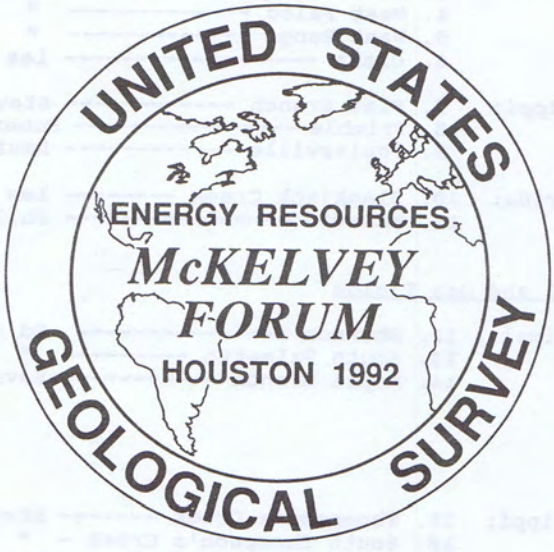

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$10, reservations not required
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D & D
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4th Wednesday of Month
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2. Wilcox Fields of Southwest Mississippi, Maps and production data on 171 fields, in ring binder, 350 pp., 1969 ..... 28.00
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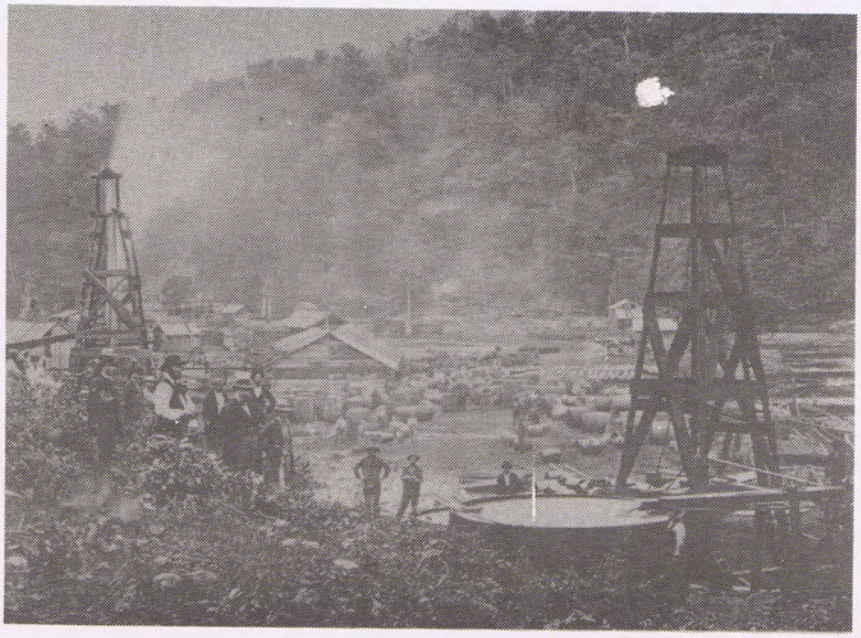
MISSISSIPPI GEOLOGICAL SOCIETY

Volume XXXX No. 5 January, 1992



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PRESIDENT'S MESSAGE

By the time you get this bulletin we will have begun a new year. The horizons for this new year appear fuzzy, and events of the past year have left us nervous and uncertain as to the future of exploration here in the continental U. S. Some of our comrades have begun to give up, but that attitude wont aid us in defining our future now. We can not forget that fortitude (that gut defiance, unwillingness, and resolve to accept what the present circumstances have allotted us) is what forged this country and our own profession in past times of equal severity. We are going to have to make a way for ourselves in this present climate. For some of us that may mean following environmental applications, some of which pay exceptionally well after a few years of experience ($45,000 and $90,000 in two cases that I have heard about). Others may have to pull together to form consulting groups, as suggested by Fred Dix, Administrative Director of AAPG Headquarters. And we hope that some will be able to diversify their consulting by incorporating environmental geology with their current petroleum activities. How ever it turns out, we must remain true to our calling which characterizes us as bold, progressive thinkers, opportunistic, and even defiant with regards to the present un-nerving circumstances. This present darkness must also provide us new avenues to apply our skills. The dawning of this new year must be seen as opportunity rather than an end. I know that this type of message can sound like highminded rhetoric or even something that an unsophisticated, uncaring boob would write; never-the-less, I believe that this is the time to make these comments and to assure you that your Board of Directors are looking into these issues and trying to make clear paths to follow. You should see something in the next few months which reflect some of our planning in this regard.

In closing, Stan Thieling has asked me to advise the membership that there are only a few books leftover from the KNOX SEMINAR. If you wish to purchase one of these books, contact Stan at his work number, 353-5850.

Steve Ingram

BUSINESS MEETING LUNCHEON SCHEDULE

1992

January 14
February 11
March 10
April 14
May 12

Other Society functions

Spring Fling, Thursday, May 14, 1992

ABOUT THE COVER: Phillips and Woodford Wells. Shortly after the Empire well came in, the Phillips well flowed at 4,000 barrels a day. About 60 feet away, the Woodford well flowed 1500 barrels. Harsh lessons about reservoir geology and engineering were soon learned as more wells were drilled on such close spacing.

BUSINESS MEETING LUNCHEON

January 14, 1992 • 11:30 a.m.
Capitol City Petroleum Club, Smackover Room

THE FLANK SHALLOW PIERCEMENT PLAYS OF MISSISSIPPI

John Warner and Jack Moody
Mississippi Office of Geology

There is an active play on the flanks of piercement salt domes in the upper Gulf Coast region from East Texas through the Mississippi Interior Salt Basin. The combination of fundamental subsurface geology, modern seismic and deeper drilling has resulted in several field discoveries in Mississippi. Reviewing the seismic, subsurface, and production information reveals the flanks of the domes are structurally and stratigraphically complicated, but commercial quantities of hydrocarbons are present. A brief review of the existing flank productive fields illustrates both the complexities and similarities of the flank dome-related fields.

The first such field in Mississippi was Shell's Camp Shelby Field on the flank of the Cypress Creek Salt Dome in Perry County, discovered in 1972 Shell drilled through a 2775 foot salt overhang and established production in the Tertiary Clayton and the Lower Cretaceous Paluxy formations. The Cypress Creek dome salt stock extends into the Miocene Section. The resulting structural uplift of the surrounding beds extends out as far as 2000 feet and has created 200 to 500 feet of structural rise. The oil and gas accumulations are due to structural uplift of porous strata and their termination against the salt, and to reservoir sands which "roll" over the flanks of the domes. At Camp Shelby Field five wells were drilled; three produced and one of the dry holes was used as a salt water disposal well. The wells were drilled to an average depth of 15,400 feet. In addition to the productive zones, the Hosston Formation tested 169 BOPD but was deemed noncommercial. As of January 1991, the Camp Shelby Field has produced 588,412 BO and 305,082 MCFG.

The next flank dome field was discovered in 1985 by Enserch. The discovery, West Raymond Field, was on the southwestern flank of the Oakley Salt Dome in Hinds County, Mississippi. The discovery well was a Cotton Valley test which was plugged back and completed in the Lower Cretaceous Rodessa. Further development of the field has resulted in 13 producing wells and three dry holes. Production has been established in the Lower Cretaceous Mooringsport, Pine Island, and Rodessa formations. Oakley Dome Field was established in a southeastern fault block of the same salt piercement. Two wells have been drilled in this field, with production from the Rodessa and Paluxy formations. North Oakley Dome Field is located on the northern flank of the dome in a horst fault block. The two wells in this field produce from the Rodessa and Pine Island formations. As of January 1991, the three fields at Oakley Salt Dome have produced 1,689,633 BO and 1,054,193 MCFG. Oakley has a complex system of radial faults created by the salt piercing

through the stratigraphic section, as is typical of many shallow piercement domes. There are nine known fault blocks at Oakley Dome. Production has been found in three of the four fault blocks which have been tested. The radial faulting can provide the mechanism for the development of traps on the flanks of the piercement domes. Fault displacement can place impermeable beds opposite potential reservoirs, thus creating lateral seals. For example, in West Raymond Field the displacement along fault planes has placed the Ferry Lake Anhydrite and Mooringsport shale against the Rodessa sands. The faulting may provide a conduit for migration of hydrocarbons from deeper seated source rocks. The vertical migration of hydrocarbons can result in multiple reservoirs being charged in the process. Conversely, the complex faulting can make development much more difficult. Too many faults may result in small reservoirs, which can impact the economics. Also, the faulting may juxtapose porous rocks against porous rocks, thus eliminating the necessary lateral seals. Because of the nature of the radial faults, every resulting fault block is an individual entity which must be evaluated separately. Oakley Dome provides a good illustration of variation among fault blocks around the same dome. The western block has yielded commercial production, other blocks have had minor production, and another has been nonproductive. Thus, the flank of a dome must not be condemned because one fault block fails to be productive. A dome cannot be evaluated by one or two wells.

In 1985, Sun Oil drilled the discovery well for the Leaf River Field on the southern flank of Dont Dome in Covington County, Mississippi. The well was a dual completion from the Lower Cretaceous Rodessa and Sligo formations and tested 468 BOPD and 3710 MCFGPD. Based on what was observed at the Oakley Dome, Dont Dome should have similar characteristics. There should be radial faulting present with resulting separate fault blocks, uplifted beds which contain reservoirs draping the structure or terminating against the salt, and lateral seals which result from fortuitous fault displacements. Sun has since drilled two more producing wells in the Leaf River Field. As of January 1991, the field has produced 295,748 BO and 4,314,901 MCFG. Oryx (formerly Sun) then moved over to the Centerville Salt Dome in Jones County, Mississippi, and drilled a discovery well in 1989. The No. 1 Frankie Smith flowed 1231 BOPD and 4425 MCFGPD. Production is from a series of sands in the Lower Cretaceous Hosston Formation on the flank of the dome. The Free State Field is in the southern fault block of a typically radial fault system. As of January 1991, the No. 1 Frankie Smith has produced 221,267 BO and 962,298 MCFG.

The above described fields provide examples of flank dome production. They show that all the necessary elements for potential hydrocarbon discoveries are present on the flanks of Mississippi's piercement domes. In areas of good rock quality, the steeply dipping beds, thick potential reservoirs, and multiple pays can offer large per well reserve potential under relatively small

acreage. With the utilization of subsurface well information and today's modern seismic, the complex structure and stratigraphy associated with the shallow piercement salt domes can be interpreted. What can be learned from the fields already discovered will surely aid in future efforts to explore and develop other dome-related fields.

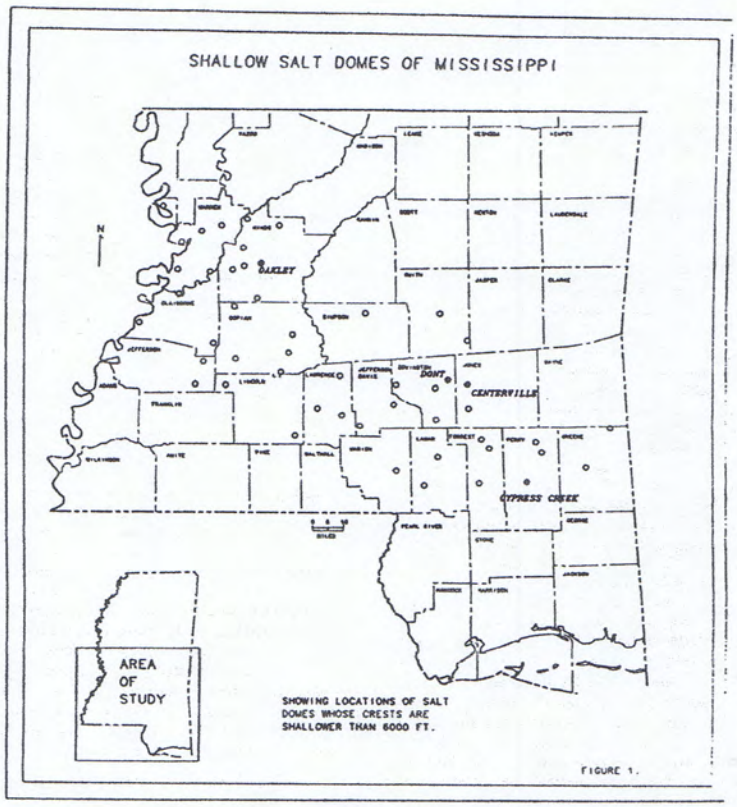


FIGURE 1.

The Following 5 pages are excerpted from the November, 1991 SIPES Newsletter

DPA/SIPES Model Form Confidentiality Agreement

Report of the DPA/SIPES Model Form Committee

by Robert W. Sabate', Chairman

ABSTRACT

DPA and SIPES [1] jointly commissioned a Model Form Committee to draft, among other instruments, a Model Form Confidentiality Agreement, acceptance of which by the industry will protect the intellectual property of independent deal generators and promoters.

BACKGROUND

The oil and gas industry boom of the late 1970's and early 1980's generated a large number of charlatans; frustration and desperation during the subsequent crash tested the business ethics even of some theretofore highly respected oil men. These factors eroded the reliability of an oral agreement sealed with the traditional handshake. This has been particularly disappointing and financially damaging to independent prospect generators and promoters.

The Chairman's involvement began while serving on the Board of the SIPES New Orleans Chapter. A.T. Green, Jr., #689, had contributed a great deal of his time (and legal expense) to create and promote a form of confidentiality agreement.[7] Subsequently, at the 1990 SIPES Annual Meeting in Houston, Gene B. Wiggins, Jr. presiding, the Chairman was approached by Patrick J.F. Gratton, then DPA President, to help inaugurate a joint DPA/SIPES committee to work first on a model confidentiality agreement, and then a model consulting agreement. Thereafter, incoming SIPES President Fred M. Thompson, Jr. and incoming DPA President James P. Rogers caused this plan to be ratified. Each appointed two additional committee members so that the Committee was composed as follows: Robert W. Sabate', Chairman;* [2] DPA: Robert T. Sellars, Jr.[3] and Victor H. Abadie, II;* [4] SIPES: Joseph G. Samuels[5] and John C. Roberts.* [6] (*Members of both DPA and SIPES).

The Committee prepared a preliminary draft Confidentiality Agreement that was presented at the 1991 national meetings of SIPES in Lafayette, Louisiana and DPA Advisory Board in Dallas. The purpose of this report is to offer and explain the final draft, and to recommend its adoption.

LEGAL CONCEPTS

The purpose of the confidentiality agreement is not to create a contractual relationship between Offeror and Receiver, but to define it in written terms. Only some kinds of contracts require a written instrument under the Statute of Frauds, or equivalent state code, such as those involving real property, large sums of money, and personal employment agreements exceeding one year (which might have some bearing on the Committee's next project). Not only may an enforceable contract be unwritten, it may be unexpressed orally. The essentials of a contract may be implied silently by circumstances. A person stepping aboard a bus creates such a situation. The yawning door of the halted bus is an offer of transportation, and entry is acceptance. Consideration on the passenger's side is the fare (perfected by dropping coins in a box); on the bus's side it's a ride to the passenger's destination on the line. Neither driver nor passenger need utter a word. Our industrial analogy is an Offeror showing data to a Receiver without prior exaction of promises. Industry practice requires the Receiver to pay a reasonable price to the Offeror, if the Receiver acts upon the information (and the Offeror to relinquish his intellectual property) or, if the Receiver rejects the idea, to maintain confidentiality for a time reasonably necessary to preserve the Offeror's ability to sell his deal, and not to act upon the information without paying. The elements are clear: revelation, action with payment, inaction with confidentiality. What remain unclear are the limits on these elements. The relationship has created a contract that theoretically is enforceable, but offers little by way of evidence and measure of damages.

A written agreement will cure parts of the problem, but might present some of its own. Written contracts have certain characteristics that affected the Committee's thinking. The basic contractual elements — offer, acceptance, and consideration — must be identifiable to insure enforcement. Order of control is (1) handwritten additions or changes, (2) typed-in material, and (3) printed matter; this guided our construction of choices and blanks. Finally, an instrument is construed against its draftsman, under the assumption it says what he wanted to say and contains all the terms he wanted. It is presumed to be complete, and generally its material content cannot be modified by parol evidence. Therefore, it must be constructed to contain all relevant provisions, though it can adopt other materials (such as a sales brochure) by reference.

So, while a "silent" Offeror's contractual rights might be vague, they are unlimited, whereas an Offeror with a written agreement is bound by its terms. The Chairman is aware of a pending case in which a "silent" Offeror is suing a company (that allegedly stole his idea) under the Uniform Trade Secrets Act (UTSA), [8] which might entitle him not only to the cash and override he originally had in mind, but also to all the profits (!) generated by unauthorized use of his intellectual property. Application of UTSA is illustrated in the case of *William D. Hurst* v. *Hughes Tool Company.*[9]

(Continued)

Further treatment may be reviewed in Cockrell, *Trade Secrets in the Oil Patch* [10] and Galloway, *Seismic Property Rights.*[11] UTSA[8] reflects adoption by most of the oil producing states with the notable exception of Texas (we believe Texas by now has adopted UTSA). UTSA affords damages and equitable remedies to an Offeror who has communicated a trade secret and the Receiver's unauthorized use of it damages the Offeror.

Some contributors have proposed an agreement not to compete. Such a provision might be *contra bonos mores* (in restraint of trade) and therefore could attract the attention of the anti-trust division of the Justice Department. The Receiver must be allowed to do whatever he wants with an idea — but if he uses it, he must pay the Offeror. Another concept is Area of Mutual Interest (AMI), which, if it is of no interest to the Receiver, more appropriately might be called an Excluded Area, or, as we have called it, the Prospect (from which the Receiver is excluded from operating for some period of time).

The Committee's task was formidable. The agreement had to be complete, but limited to a page or two. It must address all of the Offeror's potential problems (at least all of the common ones) in a short document. Its language must be binding legally, but clear enough for a layman to understand and accept without referring it to his legal department. It must protect the Offeror's rights without being too onerous for the Receiver to accept.

METHOD

The Committee set out to collect as many forms of confidentiality agreement as possible; identify their important provisions; ponder these and other essential provisions; draft a form incorporating all provisions thought to be essential; seek further legal review; measure major company Receiver reflexes and submit a final draft to DPA and SIPES Boards.

Committee members and others submitted twenty confidentiality agreement forms, four of them favoring major companies. From these, the Chairman identified some 21 common provisions. These are as follows:

1) No conflict exists
2) Offeror's desire to interest Receiver in prospect.
3) Confidentiality to be maintained
4) Desire to enter written agreement (as to terms)
5) Compensation – mutually acceptable (never expressed)
6) Term – one to five years
7) Release of Receiver after term
8) Receiver not to buy leases or exert other advantage
9) Subject to prior sale
10) Evaluate data but don't copy
11) Return data if not interested
12) AMI or Prospect description
13) Binding on employees, agents, etc.
14) Indemnification for above
15) Noncircumvention
16) Relationships (denial of partnership, etc.)
17) Operative Law (State, etc.)
18) Sole agreement
19) Amendments in writing
20) Counterparts
21) Penalties:
    - payment of fees, overrides
    - actual damages
    - costs (attorney's fees, court costs, interest)
    - injunctive relief
    - deed acquired interest
    - lost profits

For public policy reasons expressed above and for additional reasons expressed below, and further to induce ready acceptance of a form, some of the above terms (keyed to their number above) were analyzed as follows:

1) Conflict: Let the Receiver bring this up.
6) Term: Should be appropriate to allow Offeror time to sell deal and most Receivers won't accept more than two years; provide blank?
8) Non-competition: Let them do it, but only if they pay for it.
12) AMI? Excluded Area? Unnamed? Prospect?
15) Noncircumvention? Covered by unauthorized use of data.
18) Sole agreement? Actually, a separate agreement nailing down terms is contemplated.
19) Written amendments: see 18.
20) Counterparts? Usually only one Receiver.
21) Penalties: Deed acquired interest and lost profits probably not acceptable; best left unexpressed.

Most of these concepts are expressed or implied in the Model Form. Legal review was accomplished in two stages. First, the Chairman accumulated – from the Committee and elsewhere – and analyzed several references cited below. Particularly helpful was a discussion and form proposed by Hendrix, *Confidentiality Agreements.*[12] Second, the Chairman is deeply indebted to Bernard A. Guerrini, Esq., of the Dallas law firm Strasburger and Price, for his learned counsel and aid in the final draft.

THE FORM

A critic should be aware of what the form is not intended to contain. The form does not recite the terms of the deal because it will be presented to the Receiver before any serious trade negotiations have begun; therefore, a separate trade document is contemplated. If desired, Exhibit "A" could embody terms, as well as location. The form also does not specify remedies or damages because they are unique to each deal; any recitation would have the effect of limiting the Offeror's remedies, which have been left wide open. The only specific remedy is 3(c), which lets the Receiver do what

(Continued)

he wants with the Prospect so long as he pays for it. Considerable effort was addressed to simplifying the legal language, but much of it must survive to be effective. Still, it should be intelligible to a layman as sophisticated as its intended target. Addenda lines have been provided for modifications. Only the offeree (Receiver) need execute the document.

ACKNOWLEDGMENTS

The Chairman gratefully acknowledges the hard work and wise suggestions of his Committee members, the support and encouragement of past and present DPA and SIPES officers and of their directors, especially James P. Rogers, and in particular the valuable counsel of Messrs. Green and Guerrini.

RECOMMENDATION

The Committee recommends that DPA and SIPES jointly print and promulgate the submitted Model Form Confidentiality Agreement. Its use should be encouraged by all deal presenters, not just DPA and SIPES members, so as to promote industry acceptance. Printed copies of the form are available free of charge from the SIPES office in Dallas.

FOOTNOTES

1) Division of Professional Affairs, American Association of Petroleum Geologists and Society of Independent Professional Earth Scientists.

2) San'Doil Exploration Co., New Orleans, Louisiana

3) Petroleum Geologist, Denver, Colorado

4) Consulting Geologist, Montara, California

5) Consulting Geologist, Houston, Texas

6) Petroleum Geologist, Oklahoma City, Oklahoma

7) Confidentiality Agreement, A.T. Green, Jr. in "How to Survive in the Oil and Gas Business Today," *SIPES Newsletter*, August, 1989.

8) Uniform Trade Secrets Act, La. Rev. Stat. 51:1431 et seq.

9) William D. Hurst v. Hughes Tool Company, 634 F.2d 895, USCA 5th Circ. 1981.

10) "Trade Secrets in the Oil Patch: Geological and Geophysical Data - A Legal Analysis," M.W. Cockrell, Jr., *State Bar of Texas Advanced Oil, Gas and Mineral Law Course*, September 1989.

11) "Seismic Property Rights, a Real Can of Worms," R. Mark Galloway, *The Landman*, January/February 1991.

12) "Confidentiality Agreements and Covenants Not To Compete in the Oil Industry," Lynn P. Hendrix, *Denver Association of Petroleum Landmen Spring Seminar*, February 1991.

DPA / SIPES

CONFIDENTIALITY AGREEMENT

6

This Agreement is between _____ ("Offeror") and _____ ("Receiver") and sets forth the terms for the presentation to Receiver of an oil and gas exploration prospect (the "Prospect") which will provide Receiver with the opportunity to evaluate the Prospect and to acquire an oil and gas interest (including - but not limited to - drilling or leasing, royalty, and purchase of producing properties) in the Prospect lands on the basis of mutually acceptable compensation to the Offeror. The Prospect is located in the geographical area set forth below and in Exhibit "A", if attached hereto. Since the Prospect, the Prospect information and the geographical area related to the Prospect is secret, proprietary and confidential information developed by Offeror over time and at great expense, Receiver, as consideration for the opportunity to evaluate the Prospect, agrees to the following:

1. **The Geographical Area.** As used in this Agreement, the geographical area on which the Prospect is located ("Geographical Area") is agreed to mean the following:

EXHIBIT "A" IS/IS NOT ATTACHED HERETO.

2. **Propriety and Confidential Information.** The term "Propriety and Confidential Information" ("PCI") as used in this Agreement is agreed to mean all oral disclosures and information, data and knowledge contained in the documents (whether geological, geophysical, economic, financial or management and whether in the form of maps, charts, logs, seismographs, interpretations, calculations, summaries, opinions or other written or charted means) which are related, directly or indirectly, to the Prospect or to the exploration potential of the Geographical Area, and which are now or hereafter delivered or disclosed by or on behalf of the Offeror to the Receiver.However, the PCI shall not include information to the extent it (a) is now or subsequently becomes part of the public domain through no acts or omissions attributable to Receiver or (b) as shown by Receiver's written records, was rightfully in Receiver's possession prior to disclosure by the Offeror.The Receiver acknowledges that Offeror intends to maintain the confidential, proprietary and secret nature of the PCI.

3. **Restrictions on Receiver's Future Activities.** For the period of _____ (____) year(s) after the date on which Receiver has signed this Agreement, Receiver agrees:

(a) To keep the PCI secret and not to disclose the PCI to any entity or person except to Receiver's employees or consultants necessary to evaluate the Prospect, unless specific written authorization is received from the Offeror;

(b) To use the PCI solely for the purpose of evaluating the Prospect and not to use the PCI for Receiver's financial advantage without compensation to the Offeror;

(c) Not to purchase or acquire in any manner, directly or indirectly, any oil or gas ownership, leasehold, royalty or other interest within the Geographical Area unless it shall be deemed by such action or otherwise that Receiver has accepted the terms of the Offeror in conjunction with the presentation of the Prospect;

(d) Not to reproduce or make any copies of any of the PCI unless specific written authorization is received from the Offeror except copies used in conjunction with the evaluation of the PCI; and

(e) Immediately at the request of the Offeror or within fifteen (15) days of Receiver's rejection of the Prospect, to return to the Offeror all PCI which has been delivered or disclosed to Receiver and to destroy all other related documents (except a copy of this Agreement) including, without limitation, all documents, memoranda, notes, interpretations, data, copies and other written material prepared by Receiver or others utilizing any PCI or in evaluating the Prospect, certifying to the Offeror in writing that Receiver has destroyed all such documents.

4. **Remedies for Breach of this Agreement by Receiver.** Receiver agrees that if this Agreement is breached by Receiver the remedy

at law may be inadequate and therefore an injunction, specific performance or other forms of equitable relief or money damages or any combination thereof shall be available. All rights, powers and remedies provided for herein are cumulative, and not exclusive, of any and all rights, powers and remedies at law or in equity as may now or hereafter exist. However, and not withstanding the foregoing, Offeror and Receiver agree that if Receiver shall breach paragraph 3(c) of this Agreement, the remedy shall be only as stated therein, namely, acceptance of terms. The Offeror shall be entitled to recover the cost and expenses incurred in enforcing this Agreement including any attorney's fees.

5. **Binding Effect on Receiver and Others.** This Agreement entered into by Receiver shall be binding on Receiver and Receiver's officers, directors, employees, agents, attorneys, accountants and representatives. Receiver agrees to inform all such persons and entities of this Agreement and to be liable to the Offeror for the acts of such persons and entities if this Agreement is breached by any one of them.If any part of this Agreement is declared void or unenforceable, the Receiver agrees to be bound by the remaining part of this Agreement.

6. **Miscellaneous.** The following are also agreed to by Offeror and Receiver:

(a) THIS AGREEMENT AND THE RELATIONSHIP THEREUNDER SHALL BE GOVERNED BY AND CONSTRUED IN ACCORDANCE WITH THE LAW OF THE STATE OF _____ WITHOUT GIVING EFFECT TO THE CONFLICT OF LAWS PROVISION;

(b) The Prospect is offered subject to prior sale; and

(c) This Agreement is not intended to and does not create a partnership, joint venture or any other business combination between Receiver and Offeror.

Addenda:_____

_____

_____

AGREED TO AND ACCEPTED:

_____ Title:_____

By:_____ Date:_____

SIPES MEMBERS TO VISIT EASTERN EUROPE

A delegation of the Society of Independent Professional Earth Scientists has been invited to visit Poland, Hungary, Germany and Czechoslovakia in September of 1992 under the auspices of People to People International. Fred M. Thompson, Jr, a Director for SIPES will serve as delegation leader.

The delegation will represent the various aspects of earth science and technology in technical and professional exchanges with their Eastern European counterparts. Visits will be arranged with leaders in the field with on site visitations of their facilities in Prague, Warsaw, Budapest and Berlin. The delegation will also visit many of the major historical and cultural attractions in these cities, as well as learning about the new societies emerging in the former East Bloc countries.

Since People to People is a voluntary citizen effort, participants are responsible for their own expenses. The administering agency, American People Ambassador Program, working under the auspices of People to People International (founded in 1956 by President Dwight D. Eisenhower), will coordinate all professional meetings and arrangements.

Professionals who are interested in participating in the delegation should contact Mr. Thompson in order to receive further information. Please contact: Fred M. Thompson, Jr., Box 12, Corpus Christi, Texas 78473; telephone: (512) 888-5854; Fax: (512) 882-9071.

REMINDER OF LOCAL SOCIETY MEETINGS

SIPES
Regular Meeting 1st Thursday of Month, 11:30 a.m.
Petroleum Club
January 9, 1991

SPE
Petroleum Club Smackover Room, 11:30 a.m.
$10, reservations not required

MAPL
2nd Monday of Month,
5:30 p.m. at Primos Northgate
For Reservations call 352-0662 or 352-7782

D & D
1st Wednesday of Month, except July - 12:00 noon at Petroleum Club
Rosemary Jenkins, 355-1578

MIPRO

GEOPHYSICAL SOCIETY
4th Wednesday of Month
11:30 a.m. at Petroleum Club. Reservations not required

CALL FOR PAPERS AND POSTERS

THE GULF COAST ASSOCIATION OF GEOLOGICAL SOCIETIES
AND
THE GULF COAST SECTION OF SEPM
42nd ANNUAL CONVENTION
JACKSON, MISSISSIPPI
OCTOBER 21-24, 1992

HOSTED BY THE MISSISSIPPI GEOLOGICAL SOCIETY

Papers should be prepared in accordance with AAPG Guidelines, and should have application to Gulf Coast Geology. There will be three types of presentation:

* Papers accepted for **oral presentation**, which will be published in full in the Transactions.
* **Poster presentations**, which will be published as extended one-page abstracts with the option of half a page of illustrations.
* **Core presentations**, which will be published as extended two-page abstracts to include photographic illustrations. We would like to encourage you to display conventional cores from hot plays or with features of sedimentological interest or other distinctive reservoir characteristics.

Abstracts should be submitted with answers to the following questions: (1) Has this material been published previously? (2) If so, where and when, and how does your submission differ from the original? (3) In your opinion, is your paper more applicable to GCAGS or to SEPM? (4) Is the paper submitted for oral, poster or core presentation, and would you consider a change of presentation type if necessary?

SUBMIT ALL ABSTRACTS BY JANUARY 4, 1992 for the 1992 GCAGS Convention to:

Steven S. Walkinshaw
Cougar Exploration
111 East Capitol St., Ste. 208
Jackson, MS 39201

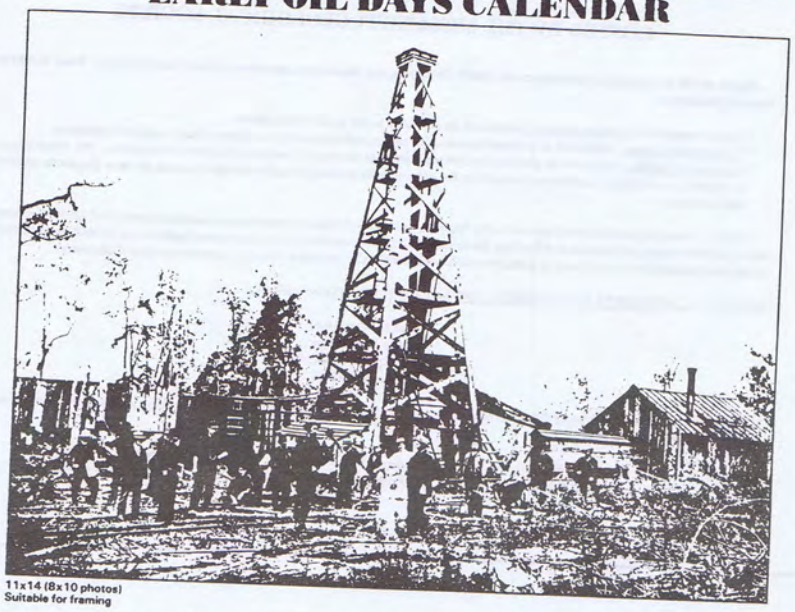
Notification of acceptance will be by February 16 and completed papers will be due by April 4, 1992. Other than poster presentations, full manuscripts will be required for all papers.

John Marble	**C. Kipp Ferns**	**David T. Dockery, III**	**Steven S. Walkinshaw**
President	**S. Cragin Knox**	*Program Chairman, GCS-SEPM*	*Program Chairman, GCAGS*
	Co-Chairmen		

MISSISSIPPI GEOLOGICAL SOCIETY
BUSINESS LUNCHEON SPEAKERS
SPRING 1992

JANUARY 14	MR. JOHN WARNER (MISSISSIPPI OFFICE OF GEOLOGY)	"THE FLANK SHALLOW PIERCEMENT PLAYS OF MISSISSIPPI."
FEBRUARY 11	DR. ERNEST A. MANCINI (STATE OIL & GAS BOARD OF ALABAMA)	"VARIABILITY IN CARBONATE RESERVOIR HETEROGENIETY IN SMACKOVER FORMATION OF SOUTH-WEST ALABAMA."
MARCH 10	DR. ARTHUR W. CLEAVES (OKLAHOMA STATE UNIVERSITY)	"DEPOSITIONAL SYSTEMS AND SEQUENCE STRATIGRAPHY OF THE MISSISSIPPIAN CARTER SANDSTONE."
APRIL 14	DR. DARREL W. SCHMITZ (MISSISSIPPI STATE UNIVERSITY)	"PREDICTING DATA POINT LOCATIONS NEEDED TO CHARACTERIZE FLUVIAL SAND BODIES."
MAY 12	OPEN - TO BE SCHEDULED	

EARLY OIL DAYS CALENDAR



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The Pittsburgh Geological Society and Eastern Section AAPG is offering an intriguingly detailed "limited edition" 1992 wall calendar featuring twelve Mather early oil days photographs. John A. Mather (1827-1915) preserved for history one of the finest and most extensive pictorial records of the beginnings of the petroleum industry. About 3,000 of the original 16,000+ wet-plate glass negatives represent the collection today found at the Drake Well Museum in Titusville, Pennsylvania. These unique scenes, depicting events of the 1860's, will enhance any home or office or provide a gift someone will truly remember.

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PUBLICATION LIST

1. Mississippi Geological Society Photo Directory, 1981 ..... $ 2.00
2. Wilcox Fields of Southwest Mississippi, Maps and production data on 171 fields, in ring binder, 350 pp., 1969 ..... 28.00
3. Mesozoic-Paleozoic Producing Areas of Mississippi and Alabama. Volume I. Maps and producing data on 57 fields, with 2 composite logs, clothbound, 139 pp., 1957 .....10.00
4. Volume II. Maps and producing data on 77 fields, includes Supplement 1, in ring binder, 143 pp., 1963 .....15.00
5. Supplements 2 through 7 for Volume II, Maps and producing data on 35 fields, 110 pp.....15.00
6. Supplement 8 for Volume 11, Maps and producing data on 34 fields, 108 pp., 1980 ..... 25.00
7. Volume II, complete with Supplements 2-8, 361 pp., 146 fields 50.00
8. Volume III, 85 pp., 46 fields, 1987 ..... 50.00

FIELD TRIP GUIDEBOOKS

9. Upper Cretaceous Outcrops, Northeast Mississippi and West Central Alabama, Fourteenth Field Trip, 29 pp., May 1959..... 4.00
10. Cenozoic of Southeast Mississippi and Southwest Alabama, Fifteenth Field Trip, 52 pp., May 1960 ..... 6.00
11. Cenozoic of Horn Island and the Pascagoula Valley 10th Annual GCAGS Meeting, 24 pp., October, 1960 ..... 2.50
12. The Paleozoics of Northwest Arkansas Sixteenth FGield Trip, 48 pp., May, 1962..... 5.00
13. Tertiary Type Localities of East-Central Mississippi, 25th GCAGS Meeting, 133 pp., Octoberr 1975..... 5.00
14. Mississippi Rocks of the Balck Warrior Basin, Seventeenth Field Trip, 79 pp., April, 1978 ..... 8.00
15. Tertiary and Upper Cretaceous Depositional Environments, Central Mississippi and West Central Alabama 33rd Annual GCAGS Meeting, 40 pp., October 1983 ..... 7.50

COMPOSITE LOGS AND CROSS-SECTIONS

16. Composite Mesozoic Log of South Mississippi and South Alabama 2.00
17. Composite Paleozoic Log of Black Warrior Basin, Mississippi and Alabama..... 2.00
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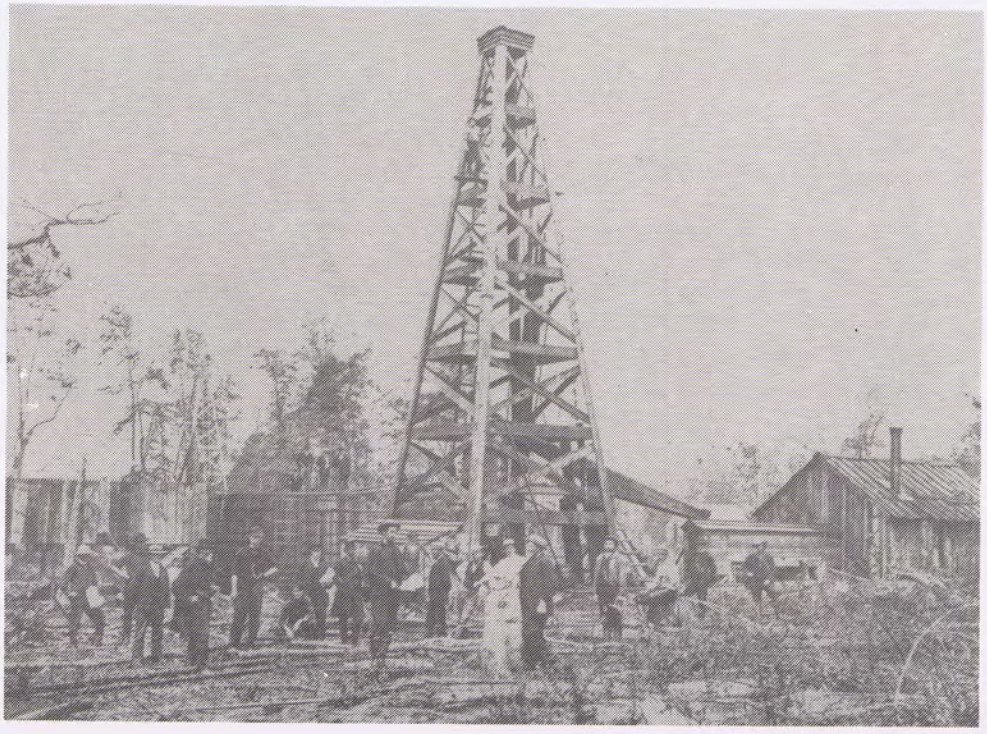
MISSISSIPPI GEOLOGICAL SOCIETY

Volume XXXX No. 6 February, 1992



MISSISSIPPI GEOLOGICAL SOCIETY
1991-92

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PRESIDENT'S MESSAGE

We have now begun to approach the end of the 1991-92 term for our current MGS Officers and Board of Directors. Only four months remain until elections for the 1992-93 term; yet a considerable amount of work looms with regard to normal society business, not to forget preparations for the October 1992 GCAGS Convention to be held here in Jackson this summer. To say the least, our work is definitely cut out for us, but we have prepared ourselves well for this period and are still a little ahead of schedule in several areas. I would like to notify those that read this bulletin that the deadline for receipt of abstracts for this convention has been extended to February 10th in response to a number of requests from persons wishing to submit papers. So, let me encourage any of you that have a desire to submit a paper or abstract to contact the appropriate representatives listed in the "Call For Papers".

Another item of import for those of you who explore in Alabama. AIPG is sponsoring a registration bill for geologists that was to have gone to the Alabama Legislature this January 1992. Although our society has not recently taken a public position on registration of environmental geologists, it would behove you to look into this particular bill. There appear to be some very evident concerns that petroleum geologists might have with this particular (5th or 6th) draft. The AAPG-SIPES-AEG CoPGO model registration bill would probably better serve the needs of the public and industry should registration be deemed necessary. If any of you Alabamians need a contact with regard to the CoPGO bill, please call Dan Titerle / AAPG-DPA (512-246-3307), Chris Mathewson / AEG (409-845-2488), or Ken Seewald / SIPES (512-822-0649). They have spent considerable personal time and money in helping draft the CoPGO bill and are willing to advise and support in what way they can.

Many of you know of Dr. Ernest Mancini's passion for the Smackover. Dr. Mancini will present the "Variability In Carbonate Reservoir Heterogeneity In Smackover Formation Of Southwest Alabama" at our February Professional Luncheon. This report is bound to be interesting and provocative so I hope to see you there.

One last mention for the KNOX SEMINAR book. Stan Thieling has three left at $15 each plus $2.50 for postage. And a last mention for bulletin advertisers. Anyone wishing to advertise in this new year, January through December 1992, should contact Brian Sims at (601) 853-1445.

Finally, please take time to complete and return the questionnaire printed in this months bulletin. Some of the information is needed prior to publishing our annual directory, while many of the questions will serve to help future MGS leadership address the coming changes in society and community affairs.

Steve Ingram

BUSINESS MEETING LUNCHEON SCHEDULE

March 10:	Dr. Arthur W. Cleaves Oklahoma State University	"Depositional Systems and Sequence Stratigraphy of the Mississippian Carter Sandstone.
April 14	Dr. Darrel W. Schmitz Mississippi State University	"Predicting Data Point Locations Needed to Characterize Fluvial Sand Bodies"
May 12	John B. Echols Director Basin Research Institute, LSU	"Deltaic Processes"

ABOUT THE COVER: THE STANDARD RIG. Introduced about 1865, the standard rig brought uniformity of rig dimensions to the oil region. Prior to this, every rig was unique being built of whatever materials were available.

BUSINESS MEETING LUNCHEON

February 11, 1992 • 11:30 a.m.
Capitol City Petroleum Club, Smackover Room

VARIABILITY IN CARBONATE RESERVOIR HETEROGENEITY IN SMACKOVER FORMATION OF SOUTHWEST ALABAMA

by

Ernest A. Mancini, Robert M. Mink, Berry H. Tew,
David C. Kopaska-Merkel, and Steven D. Mann

Upper Jurassic Smackover Formation oil fields in southwest Alabama are grouped into five oil plays and six subplays. These plays differ in carbonate reservoir characteristics and in the nature of heterogeneity as a result of depositional, diagenetic, and halokinetic processes. The plays and subplays can be classified into three groups (low, moderate, and high) that differ in the scale, type, or range of reservoir heterogeneity.

Low heterogeneity values typify reservoirs in the Choctaw ridge complex subplay of the basement ridge play, the Pickens, Gilbertown, and West Bend fault systems subplay of the regional peripheral fault trend play, the northern graben subplay of the Mobile graben fault system play, and the Mississippi interior salt basin play. Low heterogeneity results from the restriction of reservoirs to thin, relatively homogeneous intervals and the presence of areally extensive porous grainstones with associated relatively homogeneous moldic and partial moldic pore systems. Reservoirs in the Conecuh and Pensacola-Decatur ridge complexes subplay of the basement ridge play and Pollard and Foshee fault systems subplay of the regional peripheral fault trend play exhibit moderate to high heterogeneity values which can be attributed to the diversity of reservoir rock types and characteristics of the intercrystalline pore systems. High reservoir heterogeneity values in the southern graben subplay of the Mobile graben fault system play and in the Wiggins arch complex play result from the diversity of reservoir strata present and the highly variable nature of the intercrystalline pore systems.

Delineation of the variability and distribution of heterogeneity in Smackover reservoirs will assist in the exploration for hydrocarbons in these carbonate strata. In addition, the recovery of oil from these reservoirs can be improved by understanding the relationship of Smackover reservoir heterogeneity to rock types, diagenesis, and pore system characteristics.

This research was partially funded by the United States Department of Energy under Contract No. DE-FG22-89BC14425.

MISSISSIPPI GEOLOGICAL SOCIETY
QUESTIONNAIRE

The following questionnaire is being provided so that MGS may be able to access information concerning the makeup and professional views of its membership for demographic purposes.

It is anticipated that the results of this questionnaire will be published in some form in a forthcoming issue of the Bulletin.

Please provide the following information. Pertinent data will be added to and/or verified with the existing information you have previously supplied when applying for membership or renewal with the MGS.

1) Name - _____
Last First Middle Initial

2) Home address - _____

_____
City State Zip

3) Home Telephone No. - _____

4) Company/Employer Name - _____

5) Business Address - _____

_____
City State Zip

6) Business Telephone No. - _____

7) Preferred mailing address (circle question no. 2 or no. 4)

8) College/Univ. Attended - _____

Major/Minor/Degree/Year Obtained - _____

_____

College/Univ. Attended - _____

Major/Minor/Degree/Year Obtained - _____

_____

9) Honors, Deans List etc - _____

_____

10) Date of Birth - _____
month/day/year

11) Are you willing to be a blood donor? Yes_____; No_____

If yes, what is your blood type (if known)? _____
Blood type

12) Have you served as an officer or on a committee for MGS? Yes_____; No_____

If an ex-officer, year and position _____

13) Would you be willing to serve as an officer or chair a committee for the Society? Yes_____; No_____

14) Other professional affiliations - Please check all those applicable

a) AAPG_____
b) SIPES_____
c) JGS_____
d) SEG_____
e) Other professional/civic organizations

_____

_____

_____

15) If consulting and/or employed, do you plan on retiring in the next 1 2 3 4 5 6 years (circle one if applicable)?

16) Circle and/or check the following which are applicable to you -

a) Employed by an oil & gas exploration/development firm? Yes_____; No_____

b) Employed by a government agency specifically involved with the oil & gas industry? Yes_____; No_____

c) Employed by (circle one) government or private industry involved with hydrogeology? Yes_____; No_____

d) Employed by (circle one) government or private industry involved with hazardous waste disposal, site assessment and/or remediation? Yes_____; No_____

e) Employed by (circle one) government or private industry involved with any other geological discipline - If other geological discipline, please describe area and job duties - Yes_____; No_____

_____

_____

work restricted to oil & gas? If no, please briefly describe the nature of your consulting areas below -

_____

_____

_____

_____

g) Would you be interested in having speakers discuss hydrogeology, environmental geology, hazardous materials management, geological site assessment etc.?

Yes_____; No_____

17) Do you anticipate changing careers from oil & gas exploration/development to an environmental geology or related career? Yes_____; No_____

18) Do you foresee leaving your career in oil & gas (geology-geophysics) to pursue an unrelated career?
Yes_____; No_____

19) Are you (circle those which apply) -

Self-employed?; Company employed?; Government employed; Under-employed?; Un-employed?; Semi-retired? Retired?

Provide an explanation, if necessary_____

_____

20) Optional - what is your current estimated annual salary?

$_____

21) Do you favor the registration of geologists by the State of Mississippi?
Yes_____; No_____

If no, please provide on an additional sheet stating the reasons why you feel registration is unnecessary, and what you would be willing to do if it registration for geologists is proposed/adopted by the state's legislature. Please be concise and as realistic as possible

PLEASE RETURN THIS FORM BY MAIL TO MGS, P.O. BOX 422, JACKSON, MS 39205, OR RETURN AT THE NEXT MGS MEETING THAT YOU ATTEND. THANKS FOR YOUR COOPERATION!

NEW FIELD & SIGNIFICANT NEW RESERVOIR DISCOVERIES FOR 1991
MISSISSIPPI, ALABAMA, FLORIDA

BLACK WARRIOR BASIN - MISSISSIPPI & ALABAMA

Nason Production Co., No. 1 Smith, sec. 11-T15S-R5E, Clay Co., Miss. Abernethy sand perforations 4698-4712', 50 BO, 16/64" ch.,30# FTP, 200# CP, 36 Gty, DISCOVERY BOOGIE BOTTOM FIELD

Sanford Resources Corp., No. 1 Peeks 7-5, sec. 7-T15S-R14W, Lamar Co., Ala. Carter sand perforations 2740-67' (OA), 22 BO, 410 MCFG, 10% BS&W, 16/64" ch., 285# FTP, 19,000:1 GOR. DISCOVERY SOUTHEAST WATSON CREEK FIELD

Moon-Hines-Tigrett Operating Co., No. 1 Rainer 25-12, sec. 25-T17S-R14W, Lamar Co., Ala. Lewis sand perforations 4476-92', 1694 MCFG, 18,64" ch., 910# FTP, DISCOVERY LITTLE COAL FIRE CREEK FIELD

Munoco No. 1 Renley Boyett 13-13, sec. 13-T14S-R18W, Monroe Co., Miss. Millerella perforations 3102.5-110, 300 MCFG, 14/64" ch., 260# FTP. DISCOVERY WILSON CREEK FIELD

Gibraltar Energy Co., No. 1 Lancaster 32-7, sec. 32-T12S-R4E, Chickasaw Co., Miss. Carter sand perforations 1858-865', 90 MCFG, 0 wtr, 14/64" ch., 70# FTP. Lewis sand perforations 2672-700', 280 MCFG, 16/64" ch., 190# FTP. DISCOVERY VAN VLEET FIELD

Norcen Explorer, Inc. (Sierra Prod. Co.) No. 1 Cockerham Unit 32-2 (workover) sec. 32-T14S-R17W, Monroe Co., Miss. Pennsylvanian Bull sand perforations 2618-32', 170 MCFG, 0 wtr, 20/64" ch., 70# FTP. DISCOVERY PENNSYLVANIAN BULL SAND RESERVOIR WISE GAP FIELD

Victory Resources, Inc. No. 1 Chandler 34-7, sec. 34-T23N-R4E, Hale Co., Ala., Knox perforations 3220-4162'(OA), 22 BO, 2 MCFG, 43 BW, 118:1 GOR, 36 Gty. DISCOVERY UNNAMED

WILCOX - FRIO SOUTHWEST MISSISSIPPI

El Toro Oil Co. #1 Livingston, sec. 16-T5N-R3W, Adams Co., Miss. Campbell sand perforations 6346-49.5', 51 BO, 10/64" ch., 60# FTP, 41.2 Gty., 0 wtr. DISCOVERY WEST ELLIS CLIFFS FIELD

ARKLA No, 1-25 ARK-Lyons et al, sec. 25-T2N-R2e, Amite Co., Miss. Frio perforations 3868-74', 330 MCFG, 10/64" ch., 1430# FTP. EXTENSION INDEPENDENCE FIELD

ARKLA No. 2-25 ARK-Lyons et al, sec. 25-T2N-R2E, Amite Co., Miss. Frio "C" sand perforations 3426-42. 280 MCFG, 7/64" ch., 1185# FTP. EXTENSION INDEPENDENCE FIELD

ARKLA No. 1-25 R. A. White Est., sec. 25-T1N-R3E, Amite Co., Miss., Frio sand perforations 3721-28', 361 MCFG, 0 wtr., 9/64" ch., 1355# FTP. EXTENSION OLIO FIELD

Easom & Middleton No. 1 Brumfield, sec. 6-T4N-R1E, Franklin Co., Miss. Freewoods sand perforations 6175-79', 72 BO, 7/64" ch., 170# FTP. FREEWOODS SAND RESERVOIR DISCOVERY GARDEN CITY FIELD

ARKLA No. 1-4 Gallent, sec. 4-T1N-R2E, Amite Co., Miss. Frio perforations 4161-71', 699 MCFG, 11/64" ch., 1335# FTP. EXTENSION HOLLY GROVE FIELD

Easom & Middleton (KFG Petroleum) No. 2 Pritchartt (re-entry), Accretions-T2N-R5W, Wilkinson Co., Miss. Sparta sand perforations 5626-27', 82 BO, 0 wtr., 7/64" ch., 420# FTP, 35 Gty. SPARTA RESERVOIR DISCOVERY PALMETTO POINT FIELD

A. J. Ferguson No. 2 Ogden, sec. 35-T6N-R2W, Adams Co., Miss. Third Wilcox sand perforations 4285-90.5, 75 BO, 9/64" ch., 200# FTP. DISCOVERY GREENFIELD

Exchange Oil & Gas Co., No. 1 Aline N. Stephenson, sec. 21-T3N-R2E, Amite Co., Miss. Frio sand perforations 3187-90', 264 MCFG, 6/64" ch., 1170# FTP. FRIO RESERVOIR DISCOVERY CHRISTMAS FIELD

Easom & Middleton No. 1 Ormond Plantation, sec. 15-T5N-R3W, Adams Co., Miss. 4600' sand perforations 4909-11', 50 BO, 13 MCFG, 0 wtr., 8/64" ch., 160# FTP, 40 Gty., 250:` GOR. DISCOVERY ORMOND

Exchange Oil & Gas Co., No.1 Netterville Heirs, sec. 35-T3N-R2E Amite Co., Miss. Frio sand perforations 3164-67', 235 MCFG, 10/64" ch., 1005# FTP, 0 wtr., FRIO RESERVOIR DISCOVERY CHRISTMAS FIELD

JURASSIC - CRETACEOUS, SOUTH MISSISSIPPI

Pacific Enterprises Oil Co. (USA) No.1 PEOC-Paramount-G. W. Walker et al 6-7, sec. 6-T7N-R10W, Jones Co., Miss. Hosston Perforations 16,069-16,173, 468 BO, 549 MCFG, 16/64" ch., 1062 # FTP, 1173:1 GOR, 44 Gty. DISCOVERY CAMP CREEK FIELD

Davis Petroleum Corp. No.1 B.O.E. (workover), sec. 16-T2N-R12E, Jasper Co., Miss. Haynesville perforations 14,252-288'(OA), 260 BO, 723 MCFG, 18/64" ch., 259# FTP, 43 Gty., 2780:1 GOR. HAYNESVILLE RESERVOIR DISCOVERY WEST PAULDING FIELD

Norcen Explorer No.1 Adrine Moffett et al, sec. 22-T8N-R12W, Jones Co., Miss. Cotton Valley 16,200' sand Perforations 16,199-212', 968 BO, 700 MCFG, adj. ch., 634# FTP, 780:1 GOR, 43.4 Gty., 5% CO2, Cotton Valley perforations 16,567-634', 150 BO, 33.2 Gty.DISCOVERY TALLAHOMA CREEK FIELD

Plains Resources, Inc. No.1 V.F. Foster, sec. 36-T3N-R2E, Amite Co., Miss. Lower Tuscaloosa "A" sand perforations 11,917-928', 324 BO, 600 MCFG, 10/64" ch., 2,192# FTP, 34.6 Gty, Lower Tuscaloosa Foster sand perforations 11,939-949', 68 BO, 767 MCFG, 12/64" ch., 2,713# FTP, 50.3 Gty. DISCOVERY CHRISTMAS FIELD

Perkins, Inc. No.2 Compton-Howard 22-1, sec. 22-T9N-R1W, Madison Co., Miss. Rodessa sand perforations 9572-80', 138 BO, 1/4" ch., 115# FTP, 40 Gty. RE-DISCOVERY KEARNEY FIELD

Cobra Oil & Gas Corp., No.1 Williams 7-9, sec. 7-T1N-R14E, Clarke Co., Miss. Smackover perforations 14,084-090', 174 BO, 154 MCFG, 3 BW, 1/4" ch., 230# FTP, 44 Gty., 4.3% CO2 & H2S, EXTENSION WEST NANCY FIELD

Norcen Explorer No.1 J.C. Henderson et al, sec.1-T3N-R7E, Smith Co., Miss. Sligo perforations 10,638-644', 224 BO, 104 MCFG, 0 wtr., 14/64" ch., 430# FTP, 39.1 Gty., 464:1 GOR, 1.8% CO2. SLIGO RESERVOIR DISCOVERY BURNS FIELD

Oryx Energy Co. No.1 S.R. Speed "A", sec. 8-T8N-T14W, Covington Co., Miss. Washita-Fredericksburg perforations 9891-10,261(OA), 151 BO, 353 MCFG, 10 BW, 14/64" ch., 655# FTP, 35# CP, 38.8 Gty., 2338:1 GOR, WASH-FRED RESERVOIR DISCOVERY LEAF RIVER FIELD

Inexco Oil Co., No.2 Masonite-FLB 15-15 (workover), sec. 15-T1N-R15E, Clarke Co., Miss. Haynesville perforations 13,406-411', 145 BO, 80 MCFG, 40 BW, pumping, 550:1 GOR, HAYNESVILLE RESERVOIR DISCOVERY PRAIRIE BRANCH FIELD

Oryx Energy Co., No.1 Charles Grayson, sec. 13-T8N-R14W, Jones Co., Miss. Hosston perforations 15,707-798'(OA), 83 BO, 75 MCFG, 7 BW, 48/64" ch., 30# FTP, 1590# CP, 42 Gty., 904:1 GOR. EXTENSION FREE STATE FIELD

Midroc Operating Co., No.1 Yelverton (workover) sec. 5-T10N-R16W, Smith Co., Miss. Sligo perforations 13,345-350', 120 BO, 60 MCFG, 13 BW, 12/64" ch., 380# FTP, 125# CP, 42.6 Gty. SLIGO RESERVOIR DISCOVERY EAST MAGEE FIELD

Oxy USA, Inc. No.1 CMR "A", sec. 5-T3N-R1E, Wilkinson Co., Miss. Lower Tuscaloosa "A" sand perforations 11,551-564', 2,674 MCFG, 143 BC, 1.1 BW, 12/64" ch., 3010# FTP, 54.9 Gty, DISCOVERY FREEDOM FIELD

Hardy Oil & Gas USA, Inc., No.1 Caldwell 14-6, sec. 14-T3N-R4W, Hinds Co., Miss. Hosston perforations 17,284-336'(OA), 3,100 MCFG, 22 BW, 10/64" ch., 5200# FTP, 8.8% CO2. HOSSTON RESERVOIR DISCOVERY UTICA FIELD

Norcen Explorer, Inc. No.1 Allen P. Kearney, sec. 35-T4N-R7E, Smith Co.. Miss. Rodessa perforations 10,190-250'(OA), 357 BO, 185 MCFG, 0 wtr., 22/64" ch., 230# FTP, 518:1 GOR, 44.5 Gty. RODESSA RESERVOIR DISCOVERY BURNS FIELD
Oryx Energy Co. No.1 Charles Grayson (workover) sec. 13-T8N-R14W, Jones Co., Miss. Rodessa perforations 13,470-604'(OA), 63 BO, 1 BW, 15 MCFG, pumping, RODESSA

RESERVOIR DISCOVERY FREE STATE FIELD

R.W. Tyson Producing Co., Inc. (Norcen Explorer, Inc. & R.W. Tyson Prod. Co., Inc.) No.1 G.L. Reasor, sec. 29-T6N-R11W, Jones Co., Miss. Mooringsport perforations 11,854-866', 69 BO, 36 MCFG, 10/64" ch., 190# TP, 35 Gty, 522:1 GOR. MOORINGSPORT RESERVOIR DISCOVERY OVETT FIELD

SOUTH ALABAMA

FINA Oil & Chemical Co., No.1 A.T.I.C. 2-11, sec. 2-T4N-R7E, Conecuh Co., Ala. Smackover perforations 13,222-244'(OA), 403 BO, 404 MCFG, 8/64" ch., 1900# FTP, 1002:1 GOR, DISCOVERY EAST CORLEY CREEK FIELD

FINA Oil & Chemical Co., No.1 Blacksher Trust 20-2, sec. 20-T4N-R6E, Monroe Co., Ala. Smackover perforations 14,040-045', 436 BO, 260 MCFG, 15/64" ch., 950# FTP, 596:1 GOR, 43.3 Gty. DISCOVERY SOUTH URIAH FIELD

Pacific Enterprises Oil Co. (FINA Oil & Chemical Co.), No.1 Jones Trust 21-7, sec. 21-T1N-R9E, Escambia Co., Ala. Norphlet perforations 14,943-950', 226 BC, 1400 MCFG, 204 BW, 12/64" ch., 3200# FTP, 6204:1 GOR, DISCOVERY JERNIGAN MILL CREEK FIELD

Torch Operating Co. No.1 Paramount-Sigler 25-6, sec. 25-T6N-R6E, Monroe Co., Ala. Haynesville Frisco City sand perforations 12,069-119'(OA), 540 BO, 716 MCFG, 12/64" ch., 2395# FTP, 0.2% BS&W, DISCOVERY NORTH FRISCO CITY FIELD

Phillips Petroleum Co., No.1 A.T.I.C. 12-14, sec. 12-T3N-R5E, Escambia Co., Ala. Smackover perforations 14,710-750', 98 BO, 108 MCFG, 12/64" ch., 765# FTP, 55.3 Gty, 1104:1 GOR, DISCOVERY UNNAMED

Spooner Petroleum Co. No.1 Edwards 35-16, sec. 35-T2N-R13E, Escambia Co., Ala. Haynesville Frisco City sand perforations 12,834-846', 117 BO, 0 wtr., 12/64" ch., 140# TP, 41.3 Gty. DISCOVERY HICKORY BRANCH FIELD

FINA Oil & Chemical Co. No. 1 A.T.I.C. 15-1, sec. 15-T3N-R8E, Escambia Co., Ala. Smackover perforations 13,400-446', 144 BO, 24 MCFG, 6/64" ch., 2780# FTP, 43.9 Gty., 166:1 GOR, DISCOVERY UNNAMED

Duer Wagner & Co., No. 1 Burnett 37, sec. 37-T8S-R4E, Baldwin Co., Ala. Miocene Amos sand perforations 1747-55', 490 MCFG, 12/64" ch., 592# FTP, DISCOVERY OAK FIELD

Coastal Oil & Gas Corp., No. 1 Escambia River 26-7, sec. 26-T4N-R7E, Conecuh Co., Ala. Smackover perforations 13,420-456'(OA), 663 BO, 1750 MCFG, 3BW, 12/64" ch., 50.7 Gty., 2640:1 GOR, DISCOVERY NORTH BARNETT FIELD

STATE OF MISSISSIPPI

DEPARTMENT OF ENVIRONMENTAL QUALITY

RAY MABUS
GOVERNOR

November 25, 1991

CAMBRO-ORDOVICIAN SUBSURFACE STRATIGRAPHY
OF THE BLACK WARRIOR BASIN IN MISSISSIPPI

The Office of Geology announces the publication of Report of Investigations 2, "Cambro-Ordovician Subsurface Stratigraphy of the Black Warrior Basin in Mississippi," by Kevin S. Henderson.

This report describes the Cambrian and Ordovician of the Black Warrior Basin in northern Mississippi, a sequence of rocks up to 8000 feet in thickness. Henderson's study compiles information on nine Cambro-Ordovician formations from available geophysical logs, cores, and samples. The Cambrian stratigraphic units discussed are the Weisner Quartzite, Shady Dolostone, Rome Formation, Conasauga Limestone, and Copper Ridge Dolostone. The Ordovician units are the Knox Dolostone, Knox Limestone, Stones River Dolostone, and Stones River Limestone. Lithologies and stratigraphy are discussed in the text and illustrated in isopach maps and five cross sections. The report concludes that this section in Mississippi offers exciting possibilities due to numerous hydrocarbon shows, excellent reservoir rocks, and large undrilled structures.

Report of Investigations 2 may be purchased from the Office of Geology at Southport Center, 2380 Highway 80 West, Jackson, for $8.00 per copy. Mail orders will be accepted when accompanied by payment ($8.00, plus $1.50 postage and handling). Send mail orders (with check or money order) to:

Office of Geology
P. O. Box 20307
Jackson, MS 39289-1307

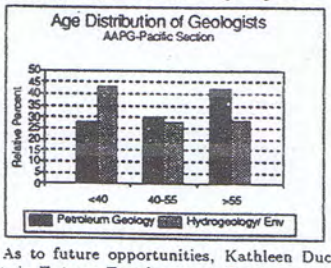
OFFICE OF GEOLOGY, P. O. BOX 20307, JACKSON, MS 39289-1307, (601) 961-5500, FAX (601) 961-5521

Environmental News

by Dale H. Easley

Dept. of Geology and Geophysics
University of New Orleans

What is the future of employment for geologists? The present trend is toward increased employment in geohydrology and environmental geology. A survey of AAPG-Pacific Section members showed a considerable difference in age distribution between petroleum geologists and geohydrologists/environmental geologists:



As to future opportunities, Kathleen Duckett, in **Future Employment Opportunities in the Geological Sciences**, a GSA publication, says

The environmental industry is truly dynamic and is probably one of the fastest growing industries in the world today. ... Current estimates suggest that the environmental consulting industry will grow at a rate of 20% over the next five years. The greatest demand exists for persons with degrees in the fields of hydrogeology, environmental, civil and geological engineering, geochemistry and geology. Persons with master's degrees are preferred over persons with bachelor's degrees. Regardless of the types of degree, however, the most important skills for a consultant to have are effective verbal and written communication skills.

Professional Geological organizations need to confront the changes in employment patterns in order to serve more fully their members. In an editorial aimed at university geology departments that appeared in Geology (May, 1991, p.419), J.A. Cherry and R.N. Farvolden say,

There will continue to be an abundance of opportunities in the geosciences that deal with the human occupation of Earth, including hydrogeology and environmental geochemistry. Unless we prepare young professionals to do this work, and do it well, our place wil! be filled by others who are more qualified. Unless we fully embrace this opportunity, our hallways will continue to be deserted by coming generations.

Organizations like AAPG are currently evaluating the role environmental geoscientists will play in their future. Should organizations remain tightly focused on a particular area of geology or should they expand into growth areas? Both possiblities raise legitimate concerns—about being trendy and unfocused and about missing opportunities of which someone else will surely take advantage.

My personal concern is for geologists missing opportunities. Environmental work is going to continue. If we don't encourage and train skilled geologists, the work will be done by others, and probably not as well. Environmental consultants need a good understanding of the physical system, not a cookbook of methods to use at any cleanup site. Organizations like AAPG and NOGS can encourage good work by geologists or they can leave the arena to others and complain about the results.

Reprinted from New Orleans Geological Society NOGS LOG Vol. 32, No. 2, Dec. 1991

AAPG ANNUAL CONVENTION

Calgary, Alberta, Canada

June 21 - 24, 1992

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Mississippi Gem & Mineral Society

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1992 Gem & Rock Show

A & I Buildings — State Fairgrounds
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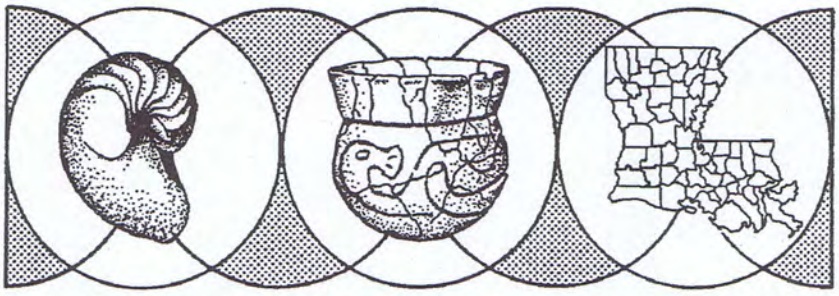
LSU MUSEUM OF GEOSCIENCE



ADMISSION: Adults $3.50, Senior Citizens $2.50, Children $1.50
TICKETS MAY BE PURCHASED AT THE INFORMATION DESK IN THE UNION

WHAT IS THE MUSEUM OF GEOSCIENCE?

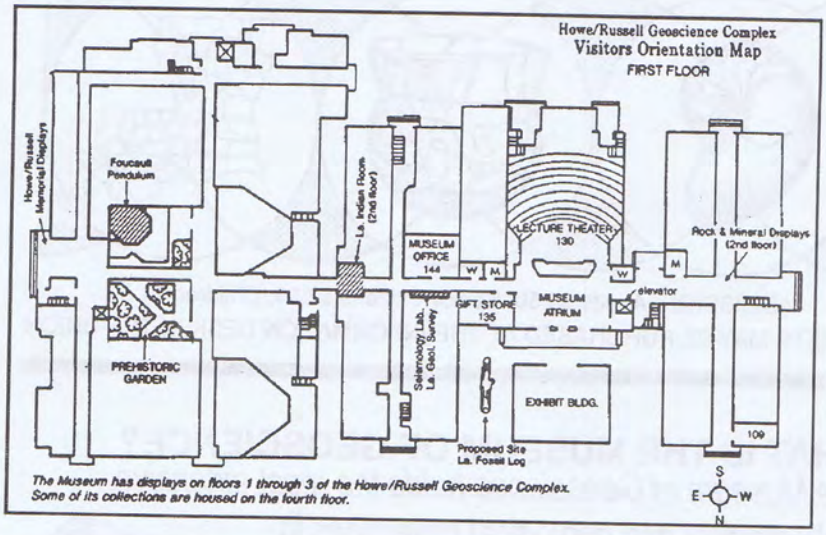
The Museum of Geoscience holds the most extensive archeological and geological collections in Louisiana. Research, teaching, and display collections number over 1 1/4 million items.

Geological collections include: microfossils, invertebrate fossils, and rock and mineral samples from the Gulf Coast Region, Mexico, Central and South America, the Caribbean Islands, and Europe.

The **Ethnological inventory** includes material from North and South America, Africa, Australia, Oceania, Asia, and the Artic. The Louisiana Chitimacha Indian basketry collection is one of the finest and best documented in the world.

Archeological collections include over one million items from 1800 sites in the Gulf Coast and Caribbean Regions.

The **Southeast Regional Archaeologist** is a member of the Museum's staff. If you have information concerning archeological sites or collections please contact the Regional Archaeology Program at (504) 388-6739.

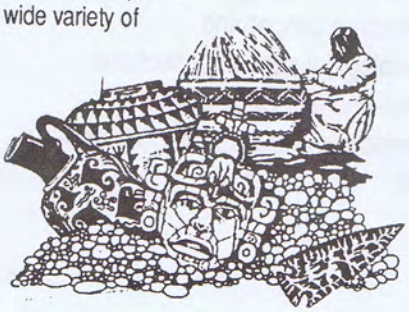


DISPLAY HIGHLIGHTS

Prehistoric Garden:
featuring plant types common in the Paleozoic and Mesozoic.

Louisiana Native Americans:
The only complete display in the state on the sequence of Louisiana's prehistory.

Geologic Giants: Dinosaurs, Louisiana fossil whale, and mastadones.
Rocks and Minerals: Data on formation and identification plus a wide variety of specimens from around the world.
Foucault Pedulum: 40 ft. high pendulum graphically proves earth's rotation. *Display in preparation.*



Allosaurus Skeleton:
ongoing construction of 35 ft. skeleton in the Exhibit Building.

THE MUSEUM ASSOCIATES

Friends of the Museum sponsor lectures and field trips, provide volunteer services as research aids, display developers, and docents for tours.

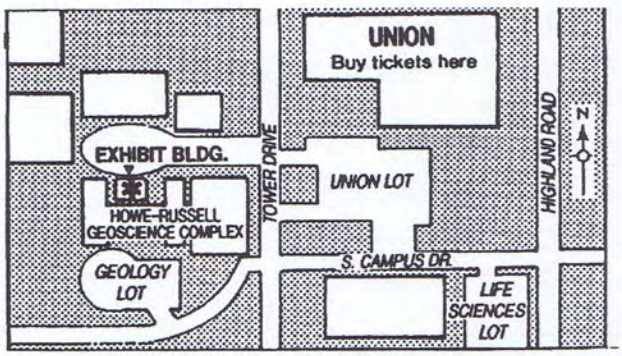
WHY SHOULD YOU BECOME A MEMBER OF THE MUSEUM?

HERE ARE FIVE GOOD REASONS!

1. FREE admission to all exhibitions.
2. Quarterly NEWSLETTER with details on lectures, trips, and worships in which members can participate.
3. FREE admission to 117 science and technology centers throughout the world.
4. 20% DISCOUNT on items sold at the Museum Gift Store, such as books, geologic maps, T-shirts, gems, minerals, and jewelry.
5. The OPPORTUNITY to be a volunteer, lead tours, prepare displays, and aid in archeological and geological research.

MEMBERSHIP DUES

Students: $6.00 Individuals: $10.00
Families: $15.00 Sustaining: $25.00



WHERE IS THE MUSEUM OF GEOSCIENCE?

The Museum is located on the corner of Tower Drive and South Campus Drive. Use the Tower Drive entrance to the visitors parking lot at LSU union.

WHEN IS THE MUSEUM OPEN?

The Museum is open to the public Saturdays, 10:00-5:00 and Sundays, 2:00-5:00.

Scheduled torus are conducted Monday-Friday.

Schedule may change during the summer and on holidays.

Call 388-2934 for details on tours and Adventure Weekends.

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REMINDER OF LOCAL SOCIETY MEETINGS

SIPES
Regular Meeting 1st Thursday of Month, 11:30 a.m.
Petroleum Club

SPE
Petroleum Club Smackover Room, 11:30 a.m.
$10, reservations not required

MAPL
2nd Monday of Month,
5:30 p.m. at Primos Northgate
For Reservations call 352-0662 or 352-7782

D & D
1st Wednesday of Month, except July - 12:00 noon at Petroleum Club
Rosemary Jenkins, 355-1578

MIPRO

GEOPHYSICAL SOCIETY
4th Wednesday of Month
11:30 a.m. at Petroleum Club. Reservations not required
Watch for date of Hog Roast to be announced.

PERSONAL LIABILITY, PROFESSIONALISM, AND ETHICS IN GEOLOGICAL PRACTICE

by David M. Abbott, Jr. [1,2]

INTRODUCTION

In this paper I address the liabilities you face as individual geologists practicing your profession. I also suggest how a variety of professional practices coupled with constant consideration of ethical issues can help you avoid or minimize the liabilities you face. While my experience in this field relates to the considerable liabilities for geologists under the securities laws, I will address a broader range of areas. I will begin by focusing on the liabilities — the personal and professional risks—each of you assumes by practicing geology. I do this to get your attention and to demonstrate why practicing your profession in a careful, consistent, professional, and ethical manner is worth the time and effort.

GENERAL CHARACTER OF THE LIABILITIES

The liabilities faced by the practicing geologist are stipulated by a variety of laws. I won't attempt to make a list of all the laws; I will simply state that if a project you have worked on doesn't go as expected, you may be faced with the possibility that some upset party will be looking to sue— an increasingly common event in these days of dramatically increased litigation. The possible liabilities stemming from geologic practice run a gamut from:

- simply losing out on a promotion or repeat or referral business;
- Losing your professional stature;
- being fired from your job or by your clients;
- being enjoined and/or fined in a civil lawsuit; to
- being jailed for a criminal violation for participation in fraud.

Any of these liabilities adversely impacts your bank account. Some do so severely and dramatically and some so subtly that you may not be aware of them immediately.

Regardless of their severity, these liabilities stem from actual or perceived unprofessional or unethical practice. By "perceived," I am including those instances where you did not, in fact, practice unprofessionally or unethically but were perceived to have done so by the party making the allegation. We must remember here that PERCEPTION IS REALITY regardless of the truth of the matter. Unless you become aware of the perception and you may not—and you change it, the negative consequences will follow. These consequences may not include the actual imposition of one of the legal penalties listed above. They can, however, easily include time and money lost in defending yourself against a charge that is made.

SOURCES OF LIABILITY

What sorts of events trigger consideration of a lawsuit by an aggrieved party? Simply, something didn't turn out as planned. Money was lost because of such things as:

- the well was dry or watered out after 6 months;
- the gold grade turned out lower than expected or the wrong bulk density was used;
- the dam whose foundation you engineered broke;
- a drinking water supply was contaminated;
- a house slid down the hill or into a sink hole, or was hit by a falling rock or flood or mudslide; or
- some insider trading occurred.

All of us can easily conceive of all sorts of things which could and sometimes do go wrong. As a final example, consider the U.S. Park Service's and U.S. Forest Service's decision to let naturally caused forest fires burn and the results of that policy in Yellowstone National Park during the summer of 1988. The political heat and even scientific debate over an environmental science-based decision has been intense for the responsible

personnel in these agencies, including the scientists who recommended the policy. The point of this gloomy — even frightening — beginning is simply to recognize that we live in an increasingly litigious society. Malpractice suits and damage suits against all types of professionals are proliferating. Malpractice insurance coverage is increasingly difficult and expensive to obtain. And if you don't have insurance, your house, your bank account, and all your other assets may be on the line.

AVOIDING OR REDUCING YOUR LIABILITY

Now let me turn to some things you can do and can avoid doing in order not to experience personally, or at least to minimize, the impact of the foregoing events. I will do this using the AIPG's Code of Ethics.[3] Rather than going through the whole Code, I am going to use various parts to illustrate specific examples of appropriate and inappropriate professional and ethical practice. However, if you haven't read the Code of Ethics recently, I suggest that you do so. And while reading the Code, think about how the principles in it apply to your particular practice.

The results of our professional practice are almost always put into reports of some sort. In this paper I am going to call the geologist's work product a "report" regardless of form. By "report" I mean any form of written work product, maps, cross sections, photographs, drawings, results of computer programs utilizing data you analyzed, etc. on which you have recorded your observations and interpretations, and any oral reports of your observations and interpretations, again regardless of type.

Section 1 of the Code of Ethics, General Principles, addresses the need to exercise the highest standards of professional responsibility, scientific knowledge, and personal honor. Honesty, integrity, loyalty, fairness, impartiality, candor, fidelity to trust, inviolability of confidence, and honorable conduct are identified as dynamic living principles for guiding professional practice and life in general. These principles seem simple. But careful, honest reflection suggests that they are goals to strive for, goals which are never perfectly attained. The rest of the Code of Ethics addresses specific issues related to these principles. Fundamentally these General Principles are tied not only to the particular actions discussed in the rest of the Code but also to one's feelings about those actions. Reflect on a particular proposed action, recommendation, whatever. Do you honestly feel comfortable about it? If you do, fine. If not, then your gut is telling you that something must be changed. I know this sounds very unscientific. But I am learning how important it is to stop and reflect on what's happening and how I'm feeling about it in all aspects of my life, personal and professional. I'm much more comfortable with myself and what I'm doing when I take this time for reflection. And commonly enough, I've heard other geologists who are involved with some sort of troubled project mention that something didn't feel right about the project, the recommendations, the way work was actually done, or the people involved. Pay attention to these feelings.

Sections 2 and 3 of the Code of Ethics address relations of members to the public and to the employer or client. These sections contain more concrete suggestions than those in the General Principles of Section 1.

Subsection 4 of Section 2 provides fundamental guidance for practice. It states:

A member should not give a professional opinion or submit a report without being as thoroughly informed as might be reasonably expected, considering the purpose for which the opinion or report is requested.

Subsections 8 and 10 of Section 3 also contain fundamental admonitions:

8. A member shall engage, or advise an employer or client to engage, and cooperate with, other experts and specialists whenever the employer's or client's best interests would be best served by such service.

10. A member shall make an effort to issue professional advice primarily within the member's expertise. An employer or client shall be notified if any professional advice outside of the member's expertise is issued.

To me these provisions of the Code of Ethics require the professional and ethical geologist to ascertain not only what he is being asked to do, but also to ascertain the purpose for which the information is being obtained: how the report or opinion will be used. The answers to these questions will suggest the degree of detail required, the amount of money available to do the work, whether the requested work will answer the ultimate questions for which the work is being done, and whether the geologist is competent to perform the work or whether others are actually better qualified for the job or should be employed as part of a team.

TWO EXAMPLES—DETERMINING THE NATURE OF THE JOB

Let me give you a personal example. Carleen Achuff, the other Commission geologist, and I are essentially in-house consultants. Our "clients" are the lawyers in the various Commission offices. One recent case involved the question of whether or not a particular property contained gold reserves as claimed by the property's promoter. The lawyers, who were not familiar with mining geology, asked if we could prove that there was no gold on this property. We explained that to literally do what was asked would require many months and hundreds of thousands of dollars in drilling. Nor was it necessary to do this drilling in order to establish that the promoter was making misrepresentations. The real question was whether the Commission could show that the promoter had no basis for representing that gold existed in the claimed quantities. This was a much easier and cheaper question to answer. We could take a few samples in the areas the promoter identified as high-grade and, if the assays failed to support the claimed amounts of gold, we would have a basis for proving that the promoter was making fraudulent claims.

Another example illustrates how a professional's work failed the client through failure to fully ascertain what the requested work was to be used for. A geologist was hired by a state securities agency to go out and sample a property. All he was told was where the property was located. The geologist took a few scattered samples as instructed. But the money and time spent was wasted. All the promoter had to do was claim that the samples had been taken in the wrong place. This is an example of the client not understanding how the job should be done and the geologist failing to ask about the purpose for which his examination was sought.

These two examples illustrate the importance of determining what you are being employed to do and the use to be made of your work. Only if you understand what is really wanted can you determine whether the appropriate type and degree of work is being requested by the client and whether you are capable of doing the work.

THE USE AND MISUSE OF GEOLOGIC REPORTS IN FRAUDS

The first two subsections of Section 2 of the Code of Ethics enjoin the professional geologist from making unwarranted, exaggerated, or unsupported statements that might induce participation in an unsound enterprise and from knowingly permitting the use of his or her reports, maps, etc. for any unsound or illegitimate undertaking. I have a lot of experience with these types of enterprises in my work with the Commission's Enforcement Division. In most cases I am familiar with, the geologic information contained in the fraudulent offerings or statements about a company were not prepared by geologists who are members of technical societies, particularly the peer-review societies such as AIPG, AAPG, SIPES, and SEcG.

The most common types of problems with reports prepared by reasonably competent geologists in connection with the fraud cases I see involve one or more of the following factors:

- The report is incomplete or has been high-graded. Only selected parts are included in a summary. Important caveats are left out.
- The report has been changed. Numbers have been altered, pages are substituted. Lots of things can be done with photocopiers; we do them ourselves for legitimate reasons. In one case, assays showing fractions of an ounce per ton had digits added to the left of the decimal point. In another, the type font on one page was distinctly different from the other pages suggesting additions, deletions, or significant changes to the text.
- Additional sections are added to the report. One petroleum geologist got repeat business from an oil and gas promoter. In his first job for this client, the geologist's report had been accurately reproduced in the offering material. However, in the second job, a reserve estimate had been added.
- In the most blatant case I've heard of, a consultant's stationary had been stolen and a report written on it.

In cases like these, absolving the geologist of liability was relatively easy. Indeed in such instances, the geologist whose work has been misused becomes a witness for the prosecution.

But there are more subtle problems. For example, consider the short (page or two) oil prospect write-up intended for other geologists familiar with the area of the play. This type of letter report contains all the reasons why the well should be drilled and none of the negative aspects of the area. The person for whom it was written already knows them. There are two problems with this type of report. First, it assumes knowledge of the negative factors on the part of the intended recipient, which may not be a warranted assumption. Second — and more common — is the situation where this report gets into the hands of unintended recipients. Say the proposed well is not drilled by the company to whom the prospect was proposed. Instead, the prospect gets farmed out and along with the farm-out goes the report which comes into the hands of a promoter who has found the report of his dreams. He doesn't have to alter it at all before showing it to the mullets.[4]

Another type of all too common and problematic type of report involves careless use of terminology. Reserves is a term with a definite, economic meaning. When you state that reserves exist, you are talking about a mineral commodity you know can be extracted at a profit, and you have the detailed data to support your belief. Be very careful with reserves or any other terms or language implying economic viability.

Discussions of safety factors in an engineering project carry the same sort of potential legal consequences. Again be very careful of terminology.

A different group of problems results from the report which covers only a part of the whole project. For example, you do a report on the reservoir or fluid movement properties of a particular sandstone for an enhanced recovery project or for a pollution control program. Your report is not intended to consider the economic or political aspects of the project. The NIMBYs (the"Not In My Back Yard" folks) will be out in force if the project is proposed, but that isn't your concern and you say nothing about these non-geologic aspects in your report. Again we have a situation which could be exploited by the unscrupulous. The foregoing examples barely scratch the surface of potential types of liabilities that lurk within a geologist's report. However, they are sufficient to suggest the following considerations for professional report writing:[5]

1. All your reports should state:
   • for whom they were prepared • the questions you were asked to answer; and
   • the questions you were—and were not—able to answer .
2. State what you did and how you did it.
   - If you used someone else's work, state that is what you did. For example, state that you used client supplied data or that you obtained some data from another consultant's report. Use of someone else's data is common enough, but state its source. In addition, examine the data and if you notice that the data seem inconsistent with what you know, check it out. The "ostrich" defense may be a very limited one.
   - If the report's distribution should be limited to particular readers, say so. For example, if it is not intended for non-industry readers, say so.
3. Write clearly and simply. Erudition is pompous, particularly if not warranted—you are not writing a doctoral dissertation. Clearly distinguish between facts, interpretations, and opinions.
4. Include the negative information along with the positive information. Don't assume that the reader knows it. That is, include an assessment of the risks along with the potential for success.
5. Be very careful with loaded terms: those having economic, degree of assurance, safety limit, or similar implications. Define the terms you've used, and use orthodox, generally accepted definitions. Can you support your statements? Would you care to defend the report in court? Remember that you might have to.
6. If the report covers only part of the topic, note that additional information is required to complete the picture. For example. "This report covers only the geologic aspects of the proposed project. It does not consider the engineering and economic factors required for determination that reserves exist."
7. If you become aware of a factor outside your area of study which would affect the project, note it and suggest appropriate work. In one of my earlier examples, I mentioned the NIMBYs. If in the course of your work you become aware of such a problem or even potential problem, it is worth mentioning that the issue should be addressed. Perhaps the client hasn't recognized the problem or the degree of its importance.

8. Date and sign the reports. It may be important to know who knew what and when.
9. Try to put all your opinions in writing. At least keep good notes of your meetings and discussions with clients. Make memoranda of phone conversations.
10. Keep copies of your reports. If a question is ever asked about what you did, you will have a copy. This is your best insurance against those who are creative with copy machines.
11. If someone is going to use your report to raise money, obtain copies of the offering documents and review them before consenting to the use of your name, opinions, or report in the offering. Review the offering documents, looking not only for correct summarization of your work but also for factors which might invalidate your conclusions. For example, the prospect might be good if costs are strictly controlled, but you notice a heavy promote, extra overrides, etc. Require changes or other necessary disclosures — or change your conclusions if necessary prior to consenting to the use of your work.

Before leaving the subject of reports, I want to briefly address what you can do if your reports are misused. The first issue is knowing that your report is being used. You know, or should know, what use will be made of the report by the person for whom it was written. But, as I have suggested, reports go in files and get resurrected along with previously deceased projects. If your report is being widely used, particularly to raise money for a prospect from a lot of people, some offeree is likely to call you asking if you wrote the report. If the dam you did foundation work on two years ago fails 5 years from now, the post mortem investigation will dust off the old files. This is a situation where having kept good notes and memoranda will be very useful to you.

When you learn of a problem, question the persons misusing your information. Write them a letter asking for prompt clarification If there is a problem, scream—loudly and often. Write letters requesting specific action, and send copies to the SEC or other appropriate agencies noting at the bottom c,f the letter that a copy is being sent to these agencies. Clearly set out how your work is being misused. Withdraw your consent in writing, if you gave one, for the report's use. Notify whomever you feel needs to know about the problem by phone **and in writing.** In writing complaint letters, clearly set out the facts. Let the appropriate investigators determine which laws, if any, are being broken —you don't want to open yourself up to a libel suit.

By distancing yourself from and alerting others to the potential problem, you are removing yourself from liability for fraud committed without your knowledge or consent. If you don't act, your inaction places you at risk of aiding and abetting the fraud, of being a knowing participant, and of being a potential defendant.

CONFLICTS OF INTEREST

Let me turn now to another aspect of Section 3 of the Code of Ethics, addressed in several subsections the issues of conflicts of interest and confidentiality. These two issues are closely related. In the course of your professional practice, you will learn a wide variety of types of confidential information which are not to be used or disclosed without the consent of the party from which you obtained it. (There is an exception to this general rule which involves your duty to disclose illegal activities or public safety issues, but I won't go into this issue.) Confidential information includes specific geologic data, proprietary geologic methodology and concepts, business data, business plans and strategies, areas of interest, information about various actual and proposed deals, etc. Not only do you have the obligation not to disclose confidential information, you also have the obligation to disclose to your employer or client the existence of any conflicts of interest you may have. This includes such things as interests in adjoining leases, knowledge of information from a former employer or client which you are not free to use, etc. Many larger companies have non-compete clauses in employment contracts or as other conditions of employment. Be sensitive to the possibilities. If you have the slightest doubt about an issue, discuss it with the parties involved.

For example, suppose you worked in an area for one employer or client. Some time later another client or employer, or you as an individual, want to work in the same area. Even if you don't have the data you worked on originally, you will remember certain critical pieces of information. Your memory cannot be erased like a computer disk. Ask the previous employer if there is a problem. One common solution in the oil.industry is for

former employees who are interested in a particular area to obtain a farm-out on the area from their former employer.

A particular form of the misuse of confidential information for personal gain has been a hot topic in the financial news, and even in the movies, during the past couple of years. This is insider trading. I would like to remind you that the classic case that set the foundation for the current crop of insider trading cases was *SEC v. Texas Gulf Sulfur (SEC u. TGS)* (258 F. Supp. 262 (1966) and 401 F2d 833 (1968)) which revolved around the discovery of the Kidd Creek massive sulfide deposit near Timmons, Ontario.

In *SEC v. TGS*, four earth scientists—two geologists, a mining engineer, and a geophysicist—who lead Texas Gulf's massive sulfide exploration program were among the very limited number of people who knew, that after several years of looking at hundreds of prospects and drilling barren to marginal holes on 65 prospects, the initial 655-foot drill hole on the 66th prospect went through glacial overburden and into 599 feet of solid massive sulfides with average visually estimated grades of 1.15% copper and 8.65%(, zinc. Subsequent assays revealed average contents of 1.18%, copper, 8.26% zinc, and 3.94 troy ounces per ton silver over 602 feet of core *(SEG u. TGS*, 410 F2d 833 (1968), p.843). After learning of the results of this hole and later, similarly encouraging information and prior to the public announcement of the discovery, these four defendants either personally or through agents purchased TGS stock or calls thereon. In addition, one of the four tipped others about the discovery and the tippees purchased TGS securities as well *(SEG u. TGS*, 410 F2d 833 (1968), p. 842-843). The four earth scientist defendants' violations of the securities laws stemmed not from the fact of their knowledge of the drilling results, but from the fact that they turned this confidential, non-public information to personal gain by purchasing Texas Gulf stock or calls or by tipping friends to buy. These activities led to findings that illegal insider trading had occurred.[6]

Another case of insider trading involved the geologists and petroleum engineers who were the officers of a new, public oil and gas company. They were on the rig floor when the logs were run on a well in which their company had a 25%, working interest. The logs indicated that this was the potential company-maker well. They called their broker before they called their public relations firm. In their defense, they argued that well logs measure electrical and radiation properties of rocks, not the amount of oil which can be produced. The Commission's staff agreed with the defense's characterization of geophysical measurements but pointed out that well logs are routinely used to determine whether holes should be completed and to make initial reserve estimates. And the defendants considered these scientifically derived squiggly lines to be sufficiently important enough to make the decisions to buy the company's stock. Based on their actions, the geophysical results were material information. That is, information which alone or in important part triggers an investment decision. Use of inside — that is, undisclosed material information—is illegal.

For those of you in the environmental business, consider what you have when your monitoring well suddenly shows contaminants leading out of your client's site. If you own some of your client's stock and sell it (or sell it short) before that information is released, you can be fined for up to three times the losses you avoided by selling early. You might even, like Ivan Boesky or David Winans, go to jail.

CONCLUSION

I've touched on a number of issues, but there are many more that haven't been mentioned. I hope I have impressed upon you the fact that unprofessional and unethical practice results in negative economic consequences, ranging from lost income to time in jail. I urge you to regularly read the Code of Ethics and to carefully consider how each of its provisions bears on the work you are doing. I will even recommend that you write up summaries of your musings on particular issues and send them to the TPG Editor. I can think of no better way for the AIPG to demonstrate its commitment to educate its members and foster ethical and professional practice.

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[1] Regional Geologist, U.S. Securities & Exchange Commission, Denver Regional Office, 410 17th St., Suite 700, Denver, CO 80202. The Securities & Exchange Commission, as a matter of policy, disclaims responsibility for any private publication or statement by any of its employees. The views expressed herein are Mr. Abbott's and do not necessarily reflect the views of the Commission or of Mr. Abbott's colleagues on the Commission's staff.

[2] An earlier version of this paper was presented at the AIPG's Annual Meeting in Tulsa, Oklahoma on September 29, 1988. A samizdat edition of this paper has been in circulation for about 2 years now. This edition differs from the earlier edition only in bringing this footnote and footnote 3 up to date and in the correction of some grammatical and typing errors.

[3] In writing this paper (June, 1989) I used the Code of Ethics existing in 1988 and published in the 1989 Membership Directory. The Code of Ethics was revised on December 11, 1989. However, I believe that the general ethical concepts addressed in this paper are still valid even if the organization and wording of the Code of Ethics have changed.

[4] For those unfamiliar with oil-patch jargon, mullet is a "[h]umorous and patronizing reference to an investor with money to put into the drilling of an oil well with the expectation of getting rich; a sucker: a person who knows nothing about the oil business or the operator with whom he proposes to deal" (R.D. Langenkamp, 1977, *Handbook of Oil Industry Terms and Phrases*, 2nd ed.: Petroleum Publishing Co., Tulsa, OK).

[5] The AIPG's 1986 pamphlet, Organization *and* Content of *a Typical* Geologic Report, contains many excellent suggestions and recommendations. There is, however, not a great deal of overlap between the pamphlet's suggestions and mine. This lack of overlap results from the different approaches to report writing taken by the pamphlet's authors and myself. Use the pamphlet and this paper together when writing your reports.

[6] The legal opinions in *SEC v. TGS* address a number of aspects of the defendant's activities which are not addressed in this paper. Some of these activities resulted in findings that insider trading occurred, others did not. I suggest that, if you are interested, that you read the opinions. My point in this article is to raise the issue of insider trading; it is not to exhaustively discuss the subject.

DAVID M. ABBOTT, JR.—Biographical Sketch

Mr. Abbott received an AB degree in earth sciences from Dartmouth College in 1971 and an MS degree in geology from the Colorado School of Mines in 1975. He joined the Commission's staff at the Denver Regional Office in February 1975 as a geologist and March 1981 was promoted to Regional Geologist. He is responsible for reviewing the natural resource aspects of filings made in the Denver and Los Angeles Regional Offices and works on the natural resource aspects of enforcement matters for all of the Commission's offices. He is a Certified Professional Geologist and is a member of the American Institute of Professional Geologists; a Certified Petroleum Geologist and a member of the American Association of Petroleum Geologists; a fellow of the Society of Economic Geologists; and a member of the Geological Society of America; the Society for Mining, Metallurgy, and Exploration (SME); the Society of Petroleum Engineers; and the Rocky Mountain Association of Geologists. He has authored a number of papers and given numerous speeches on the interplay between geology and securities law and other aspects of professional geologic practice.

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STATE SURVEYS IN TROUBLE

With state budgets throughout the country under recession-induced stress, especially in the northeast, state geologic surveys and environmental agencies are having a hard time. The Connecticut DEP has had to suspend publication of its popular **Connecticut Environment** after 18 years of publication. The Pennsylvania Topographic and Geologic Survey has become a bureau of the Office of Parks and Forestry, and the future of its popular **Pennsylvania Geology**, published for 22 years, is in doubt The planned February, April and June editions were combined into a Spring issue, and future budget decisions await. A paid subscription may secure its continuation.

The New Jersey Department of Environmental Protection has begun restructuring and may abolish the New Jersey Geological Survey with functions distributed to, as yet, unnamed organizations. The N.J. Survey has taken on many new functions since 1988, which logically could be placed in other agencies (eg. shellfish-growing water classification). However, a proposal to split the ground-water resources and mapping programs into different agencies would be a serious setback in achieving their goal to evaluate the State's ground-water resources utilizing the latest mapping techniques. The N.J. DEP will be merged with the Department of Energy in August. The Division of Water Resources was abolished on July 15. Further restructuring which will affect NJGS is expected in early fall. Any letters of support to retain the NJGS as a functioning agency should be directed to Commissioner Scott Weiner, NJDEP, CN402, Trenton, NJ 08625.

National AIPG has an Ad Hoc Committee on Assistance to State Geological Surveys that is "on the case". They have provided each Section with the following document (printed in its entirety) which merits your thought and action

Suggested Means of Assisting State Geological Surveys By Members and State Sections of AIPG.

"It has been said that State Geological Surveys lack a constituency because they differ from other agencies, such as those dealing with soils or environment, that have support from groups with a cohesiveness of purpose. Surveys provide information to individuals with a broad spectrum of interests, many of whom do not reside in the state from which they request the information. *Members of AIPG Sections may form the core of a constituency that can speak out to legislators and government officials about the importance of a state source of public geologic information."*

1. Invite the State Geologist to conduct a discussion session with your state section or executive committee on plans and activities of the State Geological Survey, with emphasis on ways in which individual AIPG members and Sections can help. This can be done on a regular basis, perhaps yearly. In addition, extend an open invitation to the State Geologist to attend meetings and to otherwise communicate with the AIPG section whenever assistance might be helpful.

2. On controversial, fiscal or political issues that may occur, AIPG members may be in a position

to offer supplementary, documented support for state surveys. This type of action should be carefully coordinated with the Director of the Survey in advance.

3. Designate one person in the Section to be a press writer for any activities in the state where the State Survey is involved. Be certain to get one or two key points across in each article emphasizing its importance to the state. The Survey will probably be doing the same thing, but there is a lot they cannot say.

4. Whenever practical invite the press and/or media people to your meetings when you have prominent speakers. Have a written statement prepared. Spend some time with them. Help them understand how the speaker's comments relate to conditions or problems in the state. For additional information on a given subject, refer them to the State Survey for confirmation.

5. All members of AIPG should have available names, mailing addresses and phone numbers of their representatives in the State Legislature and U.S. Congress. If practical, get to know them personally . Put in a good word for the State Survey whenever opportunity permits. Keep them advised on all important aspects of geological work underway in their district.

6. It never hurts to keep the Governor's office apprised of important geological activities in your state. Don't be afraid to set the record straight if there are obvious mistakes or misrepresentation in the newsprint. Gubmatorial staffs form strong and sometimes far reaching opinions based on what they clip from newspapers. Whenever necessary, have them verify your comments with the Geological Survey.

7. Make recommendations to appropriate state officials in support of candidates for positions on the Geological Survey Advisory Board but coordinate this with the State Geologist.

8. Advise the Geological Survey if you hear of property, furnishings, equipment, and instruments that are to be surpluses by companies, corporations, or governments agencies.

9. As a politically active organization, AIPG can coordinate and work with all other geological, geophysical engineering or other professional organizations to help gain support for the work of the Geological Survey in your state.

AIPG Ad Hoc Committee on Assistance to State Geological Surveys
AIPG Northeast Section Newsletter, Indian Summer 1991 issue.

Final Announcement

SOUTH-CENTRAL SECTION, GSA 26TH ANNUAL MEETING
Houston, Texas, February 23-25, 1992

The South-Central Sections of the Geological Society of America and the Paleontological Society of America, and the Midcontinent Section of the National Association of Geology Teachers will meet in Houston, Texas, February 23-25, 1992. The meeting is sponsored by Rice University, the University of Houston, and the Houston Geological Society, and will take place on the campus of Rice University.

TECHNICAL PROGRAM

Scheduled symposia and their conveners are:

1. **Tectonics and evolution of the Gulf of Mexico Basin.** Chairs: D. S. Sawyer (Rice University) and R. T. Buffler (University of Texas, Austin).
2. **Late Pleistocene-Holocene climatic record of the Gulf Coast.** Chairs: J. B. Anderson (Rice University and M. B. Lagoe (University of Texas, Austin).
3. **Comparison of North American and Eastern European folded belts.** Sponsored by GSA International Division. Chairs: A. W. Bally (Rice University) and M. A. Schuepbach (Maxus Energy Co., Dallas).
4. **Response of carbonate platform to sea-level fluctuations: Cases in the Caribbean and the Gulf of Mexico.** Chairs: A. W. Droxler (Rice University) and R. N. Ginsburg (University of Miami).
5. **Sequence stratigraphy of the Gulf Coast Paleogene: A global comparison.** Chairs: P. R. Vail (Rice University), W. W. Wornardt (Micro-Strat, Houston), and R. M. Mitchum (Geological Consultant, Houston).
6. **Evolution of Grenville basement.** Chairs: V. B. Sisson (Rice University), S. Mosher (University of Texas, Austin), and W. M. Lamb (Texas A&M University).
7. **Hydrogeologic controls on contaminant transport.** Sponsored by GSA Hydrogeology Division. Chairs: R. M. Capuano (University of Houston) and C. W. Kreitler (University of Texas, Austin).
8. **Mesozoic/Cenozoic Micropaleontology.** Sponsored by the Paleontological Society. Chairs: R. N. Rosen (Arco Oil and Gas Co., Houston) and R. W. Scott (Amoco Production Co., Tulsa).
9. **The role of planetary geology in the undergraduate geology curriculum.** Sponsored by the National Association of Geology Teachers. Chair: D. H. Locke (Richland College).
10. **Magellan to Venus.** Chairs: V. L. Sharpton (Lunar Planetary Institute, Houston) and E. R. Stofan (Jet Propulsion Laboratory, Pasadena, California).

FIELD TRIPS

Pre-meeting

1. **Mid-Cretaceous Carbonates in Central Texas and Sea-level Variations. (February 22-23)**
   LEADERS: A. W. Droxler and J. L. Wilson (Rice University), and R. W. Scott (Amoco Production Co., Tulsa)
2. **NASA Johnson Space Center. (February 22)**
   LEADERS: J. W. Dietrich and D. L. Amsbury (Solar System Exploration Division, NASA Johnson Space Center, Houston)
3. **United Salt Corporation Hockley Mine, Hockley, Texas. (February 22)**
   LEADERS: D. Wilson (United Salt Corporation) and J. McCartney (Texas Brine Corporation)
4. **Recent Sediments of Southeast Texas. (February 22)**
   LEADER: R. J. LeBlanc, Sr. (Rufus LeBlanc School of Clastic Sediments, Houston)
5. **Holocene Sea-Level Rise and Its Impact on Evolution of East Texas Coastal Environments. (February 23)**
   LEADERS: J. B. Anderson and F. Siringan (Rice University)
6. **Environmental/Engineering Geology in the Houston Metropolitan Area. (February 23)**
   LEADERS: C. E. Norman (University of Houston) and S. Aronow (Lamar University, Beaumont)

Post-meeting

7. **Paleogene Sequence Stratigraphy of the Brazos River Valley, Texas. (February 26)**
   LEADERS: T. E. Yancey (Texas A&M University), P. R. Vail (Rice University), and A. Davidoff (Texas A&M University)
8. **Modern Mixed Carbonate/Siliciclastic Systems, Belize. (February 26-March 2)**
   LEADER: A. W. Droxler (Rice Univeristy)

SHORT COURSES

1. **Geologic interpretation of Seismic profiles. (February 22-23)**
   LECTURERS: A. W. Bally (Rice University), M. O. Withjack (Mobil Research and Development, Dallas), and K. E. Meisling and D. A. Fisher (ARCO Oil and Gas Co., Dallas)
2. **Geochronology and Thermochronology. (February 23)**
   LECTURERS: J. E. Wright (Rice University), P. Copeland (University of Houston), and K. A. Hagerty (Geotrack International, Houston)

ADDITIONAL INFORMATION

For additional information concerning the program, please contact Hans G. Ave' Lallemant (General Chairman) or James E. Wright (Program Chairman) at Rice University, Department of Geology and Geophysics, P.O. Box 1892, Houston, Texas 77251-1892 (713) 527-4880. Questions concerning entertainment, spouse activities, and other local arrangements may be addressed to Martha Lou Broussard at the same address and number.

PREREGISTRATION FORM

SOUTH-CENTRAL SECTION, GSA
FEBRUARY 23-25, 1992

Please print or type • Copy for your records • Shaded areas are for your badge.

IMPORTANT

1. Full payment must accompany registration. Unpaid purchase orders not accepted as valid registration.
2. Use separate form for each registrant, professional or student.
3. PREREGISTRATION MUST BE POSTMARKED NO LATER THAN MONDAY, JANUARY 20, 1992. Cancellation deadline for full refund is January 27, 1992.
4. For registration information, please call the GSA registration coordinator at (303) 447-2020.

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(Registration required for participation in all exhibits and technical sessions) (PLEASE CHECK ONE):	Full Meeting		or	1 Day		Qty	Col. A Amount
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For field trips and short courses only —Nonregistrant fee (98)	$10	☐		N/A	☐	1	$
						Total Column A	$

SYMPOSIA

To help us with scheduling of symposia, circle which symposia (up to four) you would like to attend:

1. Tectonics and Evolution of the Gulf of Mexico
2. Late Pleistocene–Holocene Climate Record of the Gulf Coast
3. Comparison of North America and Eastern European Folded Belts
4. Response of Carbonate Platform to Sea-level Fluctuation: Cases in the Caribbean and the Gulf of Mexico
5. Sequence Stratigraphy of the Gulf Coast Paleogene: A Global Comparison
6. Evolution of Grenville Basement
7. Hydrogeologic Controls on Contaminant Transport
8. Mesozoic/Cenozoic Micropaleontology
9. The Role of Planetary Geology in the Undergraduate Geology Curriculum
10. Magellan to Venus

PREREGISTRATION IS REQUIRED FOR ALL EVENTS BELOW.

			Qty	Col. B Amount
FILED TRIPS				
1. Mid-Cretaceous Carbonates in Central Texas, Feb. 21-23	(100)	$ 110.00	1	$
2. NASA Johnson Space Center, Feb. 22	(101)	$ 18.00	1	$
3.a. United Salt Corporation Hockley Mine, Feb. 22, 5:30 a.m.	(102)	$ 50.00	1	$
b. United Salt Corporation Hockley Mine, Feb. 22, 8:15 a.m.	(103)	$ 50.00	1	$
4. Recent Sediments of Southeast Texas, Feb. 22	(104)	$ 40.00	1	$
5. Holocene Sea-Level Rise & Its Impact on Evolution of East Texas Coastal Environments, Feb. 23	(105)	$ 40.00	1	$
6. Environmental/Engineering Geology in the Houston Metropolitan Area, Feb 23	(106)	$ 40.00	1	$
7. Paleogene Sequence Stratigraphy of the Brazos River Valley, Texas, Feb. 26	(107)	$ 50.00	1	$
8. Modern Mixed Carbonate-Siliciclastic Systems, Belize, Feb. 26-Mar. 2	(108)	$850.00	1	$
SHORT COURSES				
1. Geologic Interpretation of Seismic Reflection Profiles, Feb. 22-23				
Professionals	(150)	$120.00	1	$
Students	(151)	$ 60.00	1	$
2. Geochronology and Thermochronology, Feb. 23				
Professionals	(152)	$ 60.00	1	$
Students	(153)	$ 30.00	1	$
SPECIAL EVENTS				
1. Houston Livestock Show and Rodeo, Feb. 23	(40)	$ 12.00	___	$
2. Paleontological Society Luncheon, Feb. 24	(60)	$ 11.00	___	$
3. Banquet, Feb. 24	(61)	$ 22.50	___	$
4. NAGT Luncheon, Feb. 25	(62)	$ 11.00	___	$
5. GSA and HGS International Dinner, Feb. 25	(63)	$ 21.00	___	$
LUNCH				
1. Feb. 24, Mexican food	lunch (64)	$ 7.00	___	$
2. Feb. 25, Barbecue	lunch (65)	$ 7.00	___	$
GUEST EVENTS				
1. Heritage Society Tour and Lunch, Feb. 24	(20)	$ 15.00	___	$
2. Tour of Rice University, Feb. 25	(21)	$ 2.00	___	$
3. Manor House Lunch and SHopping, Feb. 25	(22)	$ 23.00	___	$
4. Galleria Shopping on your own, Feb. 24	(23)	$ 4.00	___	$
5. Galleria Shopping on your own, Feb. 25	(25)	$ 4.00	___	$
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			Total Column A	$

Columns A + B = Total Remittance (full payment must be enclosed) $ _____

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MISSISSIPPI GEOLOGICAL SOCIETY

Volume XXXX No. 7 March, 1992

MISSISSIPPI GEOLOGICAL SOCIETY
1991-92

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, Continuing Education
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BUSINESS MEETING LUNCHEON

March 10, 1992 • 11:30 a.m.
Capitol City Petroleum Club, Smackover Room

Facies distribution, Sequence Stratigraphy, and Petroleum Geology of the Carter-Millerella Sandstone Interval (Middle Chesterian) of the Black Warrior Basin in Mississippi

Arthur W. Cleaves*

The interval between the base of the Millerella Limestone and the top of the Sanders Sandstone incorporates the most prolific hydrocarbon zones in the Black Warrior Basin. Three distinct terrigenous clastic units, the "Millerella" Sandstone, Carter 'A' Sandstone, and Carter 'B' Sandstone of the Middle Chesterian Parkwood Formation have together yielded roughly 47% of the gas and 20% of the crude oil from the Mississippi part of the basin. The "Millerella" Sandstone produces from isolated, marine-reworked sand bodies associated with a eustatic rise in sea level (transgressive systems tract). Higher, carbonate units of the 'Millerella' Limestone Interval represent the culminating, marine shelf highstand facies for the Carter depositional cycle.

Lower in the section, the Carter 'A' and Carter 'B' sandstone intervals produce from delta-front sheet sand facies, distributary channel fill, and bar-fingers of river-dominated delta systems. Net sandstone isolith maps of both Carter members indicate the presence of 5 discrete deltaic depocenters; these were also operative with Rea, Abernathy, and Sanders deposition. In the Bean's Ferry Field the Carter sandstones are represented by an incised valley-fill unit that cuts out more than 250 feet of the lower Bangor Limestone. Similar types of disconformable terrigenous clastic units in the Morrowan of Colorado and the Virgillian of North-Central Texas have been accurately interpreted as an up-dip component of eustatically induced lowstand systems tracts.

Based on petrographic evidence and inferred sequence stratigraphic relationships, one can reconstruct the most probable source area and sediment dispersal system for the Millerella-Carter sandstones. The high percentage of monocrystalline quartz and the almost complete absence of metamorphic rock fragments, polycrystalline quartz, and feldspar demonstrate that these quartz-arenite units have a cratonic and not orogenic source area. Five distinct hypotheses for explaining the sandstone composition will be considered. Most likely, the mixed sedimentary-igneous terranes beyond the northern rim of the Illinois Basin served as the ultimate sediment source for the sandstone units. Major episodes of sea level lowstand brought this mineralogically mature sediment across the Illinois Basin, through incised valleys, to the northeastern margin of the Arkoma Basin (Batesville Delta) and the Northern Shelf of the Black Warrior Basin. The Ouachita Mountains of Central Mississippi contributed no sediment to the productive sandstone bodies of the Carter lowstand delta complex or the overlying transgressive systems tract.

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* School of Geology, 105 Noble Research Center, Oklahoma State University, Stillwater, Oklahoma 740748-0451.

SPECIAL NOTICE TO THE OIL AND GAS COMMUNITY

Mississippi Oil & Gas Lawyers Association and Mississippi Association of Petroleum Landmen

present

MISSISSIPPI OIL & GAS INSTITUTE

Thursday and Friday, April 23 and 24, 1992 Coliseum Ramada Inn, Jackson, Mississippi

This is the Eighth Tri-Annual Seminar. Wide spread efforts are underway to bring in participants from across the country. Your support is critical to the success of this event.

On Thursday, April 23, from 2:00 to 5:30 p.m., there will be a free **computer workshop** emphasizing "hands-on" demonstrations of the latest in hardware and software designed for use in the oil and gas industry. Displays will remain through Friday.

On Thursday from 5:30 to 7:30 p.m., there will be a **reception** for seminar participants. Members of the oil and gas community who cannot attend the Friday seminar may attend this reception for $15.00. There will be an open bar, hors d'oeuvres and entertainment.

On Friday, the **Seminar Program** will consist of eight industry related topics and a special luncheon address by Honorable Joseph S. Zuccaro. Also, an invitation to speak has been extended to W. Henson Moore, former Deputy Secretary of Energy and the current Deputy Chief of Staff at the White House.

All events are being held at the Coliseum Ramada Inn.

Call (601) 948-3800 for more information or contact: Michael C. Corso, P. O. Box 23040, Jackson, MS 39225

NAME: _____

FIRM: _____

ADDRESS: _____

_____

TELEPHONE: _____

$75.00 Advance Registration (includes reception Thursday and lunch on Friday); $85.00 at the door on Friday. Non-registrants may attend the reception for $15.00. The computer workshop is open free of charge.

MAKE CHECK PAYABLE TO MISSISSIPPI OIL & GAS INSTITUTE AND MAIL TO:
MICHAEL C. CORSO, P. O. BOX 23040, JACKSON, MS 39225

MISSISSIPPI OIL & GAS INSTITUTE 8:30 - 5:00 APRIL 24, 1992

DO YOU PLAN TO ATTEND THURSDAY RECEPTION Yes__ No __

Certification vs. Registration

Comment

If the practice of a profession vitally impacts the public health, safety, and welfare, the public has an interest in such practice and has the right to regulate the profession so that the public's interest is served. Geology is such a profession, and engineering geology is the specialty that affects the public health, safety, and welfare more consistently and more often than any other.

In effect, we have available only two ways to regulate the profession of geology: by state registration laws, or by professional association certification. Which better serves the public? If engineering geology furnishes the most justification for regulation of the profession, should engineering geologists be the only ones subject to registration? What about groundwater geologists and environmental geologists? They affect the public health, safety, and welfare, too.

The Association of Engineering Geologists supports professional registration through state laws, with specialty recognition for engineering geologists. The American Institute of Professional Geologists has always preferred professional association certification as the regulatory mechanism for the profession, and has always opposed recognition of specialties in registration laws, as far as I know.

AEG policy on registration for engineering geologists speaks of the need for specialty recognition of engineering geologists under state registration laws. Fundamental to this policy is the nature of engineering-geology practice: More than any other geologic specialist, the engineering geologist has, on a daily basis, an impact on the health, safety, welfare, and property of the public in a wide variety of ways.

A careful reading of the AEG policy statement reveals that it calls first for the registration of engineering geologists, not all geologists. However, when this is proposed, geologists in other specialties generally seem to eventually decide that they want to be registered too, once they agree that registration is appropriate for engineering geologists.

Although I have no problem with professional-association certification coexisting with registration, I think the two are very different creatures. Professional-association certification is private accreditation. Professional registration by state law is public regulation. The first duty of a professional association is to serve its members and the profession. The first duty of a state board of registration is to protect the public. A professional association that tries to protect and serve the public through a certification program is really trying to serve two masters, its members and the public, who must at times have conflicting interests.

A state board of registration operates from law, giving it authority to enforce its standards by applying any of a significant range of penalties. The disciplinary options of a professional association amount to little more than denying membership.

Because membership is voluntary, professional associations seldom reach even half their membership potential, and therefore cannot impose their standards on a significant number of practitioners. AIPG, for example, has a total membership of about 4,500 certified professional geologists (W.V. Knight, personal communication, March 2, 1991). From a 1988 publication of the American Geological Institute, "North American Survey of Geoscientists," we can glean that the total number of geologists in the United States is about 51,000. AIPG's certified professional geologists (CPGs) therefore represent about nine percent of all U.S. geologists. How can AIPG regulate and discipline those who are not and never will become members or CPGs?

Professional-association certification, more than registration, is open to cynical charges of having the motive of limiting entry into the profession, being a vehicle for artificially raising costs to the consumer, and being uninterested in consumer complaints because it is operated by a closed group not ultimately answerable to the public through the political processes of democratic government.

A state board of registration is a public body, a unit of government, and its operations and books are open to public scrutiny. Few, if any, professional societies seem to be willing to undertake this level of commitment to the consumer of professional services and to the public.

Registration by state law has many important advantages over professional-society certification as the means of regulating professionals who wish to practice before the public. I readily grant the most laudable of motives and the most honorable of intentions to professional associations that certify their members. Their certification programs are worthwhile, meaningful, and have a positive effect on us all, certified or not. But professional-association certification cannot be designed to protect the public as effectively and comprehensively as registration under a state law.

Robert E. Tepel
767 Lemonwood Court, San Jose, Calif. 95120.
Reprinted with permission from AEG News, v. 34, n. 2, April 1991. Tepel is secretary of the Association of Engineering Geologists.

Drawbacks to certification

- Professional associations exist to serve members and the profession, not the public.
- Certification has no legal standing.
- Certification is internal to the association and is therefore open to charges of being a closed shop or "good ol' boys" club.
- Certification can be lost by non-renewal of membership or disciplinary action, but professional practice could continue without state regulation.
- Standards can only be imposed on members.
- Associations must stand ready to defend themselves against claims and lawsuits.
- Associations can discipline individual members but not business firms.

Advantages of registration

- State boards of registration exist to protect the public.
- Registration gives acceptance of one's qualifications as an expert witness in courts of law, provides legal standing, puts affirmative legal responsibility on practitioners, and gives specific legal bases for redress.
- Public involvement by way of the vote, state-board membership, and scrutiny of state board of registration activity, helps to provide a broader set of checks and balances than certification.
- A practitioner who loses registration status cannot continue to sign reports as the responsible geologist.
- Far more practitioners are subject to jurisdiction of a state board of registration than are subject to a professional society's standards — including firms as well as individuals.

GeoTech '92

Geocomputing Conference
Aug. 29 - Sept. 1, 1992
Denver, Colorado

Call For Papers

The emphasis this year will be placed on state-of-the-art and anticipated future trends in computer-oriented geoscience. Abstracts are requested for oral and poster presentation suitable for the broad range of technical fields (minerals, petroleum, environment, engineering, etc.) which will be represented among anticipated participants.

Topical areas included in this computer-oriented meeting will be:

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- Ground Water
- Graphics
- Geographic Information System Applications
- Workstation Applications
- Data Capture and Handling
- Well Log Data Analysis
- Mining and Mineral Exploration
- Reservoir/Deposit Modeling
- Environmental Site Characterization and Remediation

Abstracts must include a paper title and the name(s), address(es), affiliation(s) and telephone/fax numbers of the author(s). Send your typed, double-spaced abstract of no more than 250 words for consideration to:

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SUBMITTAL DEADLINE for abstracts is April 1, 1992. Please specify whether you want your abstract considered for only oral, only poster or either oral or poster presentation. Authors will be notified of acceptance/rejection by May 10, 1992. Camera-ready extended abstracts and short papers (no longer than 9 pages, including figures) for the Proceedings volume will be required for accepted abstracts by July 1, 1992.

Oral presentations will be 25 minutes long, followed by 5-minute-long question-and-answer period. Poster presentations will be one-half day in length, although the authors will be required to attend their poster for only a portion of that time.

Increasing RCRA costs in bills before Congress threaten a majority of nation's oil and gas wells

by Don Lyle

Picture a national disaster that can wipe out 80% of the nation's oil and gas wells. It's name is RCRA, and it stands now before Congress for a hearing.

In this territory, the oilpatch along the Gulf Coast stands to lose more than a half-million oil wells and 199,000 gas wells. Reserves from those wells are calculated at nearly 611 MMboe.

And RCRA, the Resource Conservation and Recovery Act, is just one potential threat to the industry from environmental issues. Others include wetlands, implementation of the Clean Air Act of 1990 and Clean Water Act reauthorization.

Most operations take the position, "I've heard all this before. Environmental legislative proposals come and go. That's not hurt us as much as the price of oil and gas," says Barbara E. Steakley, Washington representative for government relations for Pennzoil Co. of Houston.

"Well, that may have been," she adds. "But, let me tell you. They're coming to get us this time."

But, let's concentrate on RCRA. At this point, produced water, drilling muds and other wastes from exploration and production operations are exempt from RCRA's Subtitle C hazardous waste requirements.

The Environmental Protection Agency (EPA), after a study, said those wastes don't pose a significant threat to health and the environment when they're properly managed, and the states are managing them properly.

The EPA also put up the money for the Interstate Oil & Gas Compact Commission to develop guidelines for state regulation of those wastes. They've already started auditing states, beginning with Wyoming.

"Great," you say. Sounds like things are going well, and sufficient improvements will be made to satisfy those who believe the wastes are routinely and systematically managed properly," Steakley says. "Wrong," she adds. "There are still some in Congress—for whatever reason, be they substantive or political—who presently are pushing, and may continue to push, for further regulation under RCRA of E&P wastes."

The American Petroleum Institute wondered what would happen if the most threatening legislation passes in the Resource Conservation and Recovery Act Amendments of 1991 (Senate Bill 976). A study by Gruy Engineering Corp. reported:

- Production from 710,668 oil and gas wells (83%) producing on Jan. 1, 1990, would cease.
- Fourteen states will lose more than 97% of their oil wells, and 10 states will lose 95% of their gas wells.
- All of the oil wells will close down in seven states, and all the gas wells will close in three states.
- The U.S. will lose, permanently, 2.5 Bbo and 10.2 Tcfg in recoverable reserves.
- Domestic production will drop by 1.2 MMbo/d and 5.5 Bcfgd in the first year.
- Revenues to royalty owners will fall 17%.
- Oil and gas revenues to states and local jurisdictions will dip 13%.
- The exploration and production industry will lose 40,177 (out of 404,000) jobs. And, the U.S. economy will lose 148,655 jobs.

Massive additions to costs of operations will cause the shut-downs, the API says. Those costs would go to individual permitting of non-hazardous solid waste treatment, storage and disposal facilities. Those permits would require design specifications, groundwater monitoring, financial assurance for environmental safety and assurance of corrective measures.

Permit fees would depend on the volume of wastes managed, the API says, but figure, roughly, 40¢/bbl, and that doesn't include the costs of building ($1 million) and operating the facility ($9,728 a month).

All unlined surface impoundments would be closed, including workover pits and emergency pits, at a cost of about $25,000 each. Groundspreading, burial or landspreading of wastes would be prohibited.

Workover waste disposal would cost $65/bbl.

A closed mud system on each well drilled would add $1600 a day to well costs, or about $3.61 a foot. Add to that another $3.11 a foot for disposal of the wastes.

That's a brief summary of the kinds of costs that will close down operating wells, cost oilfield jobs and prevent operators from drilling new wells, if just the proposed RCRA legislation passes. Those provisions are not law, yet.

Even with the industry's questionable standing before Congress, legisla-

Gulf Coast RCRA costs

	Wells closed				
	Oil		Gas		Reserves lost
State	Number	%	Number	%	Mboe
Alabama	196	21	867	57	8,112.5
Florida	16	13	0	0	140.7
No. Louisiana	15,712	97	10,139	87	90,185.0
So. Louisiana	4,014	64	988	35	78,738.2
Mississippi	2,480	69	312	42	58,332.4
Texas Gulf	45,790	79	9,222	42	375,370.0
Gulf Coast	**68,208**		**21,528**		**610,878.8**
Total U.S.	511,568		199,000		4,187,472.1

Source: American Petroleum Institute

tion that punitive won't go through as it stands.

But, "The fact is, that if Congress imposes more regulation on E&P wastes, somebody is going to shut in wells. Another fact is that Congress will impose some additional regulation on E&P wastes," says Steakley.

Honest feelings

Most members of Congress know about energy security and energy independence and the dangers of more imported oil. Some don't believe the warnings. Others believe conservation will solve the problems. Some want revenge for real or imagined past political sins, or disputes over Canadian gas, or an honest feeling that the wastes are hazardous, she adds.

"So, what do we do? We can't do much about past political sins. I believe efforts are being made to resolve the current policy disputes involving Canadian gas, but if the situation is not resolved, then your peril potential increases," she says.

The best answer for every individual that depends on the petroleum industry for a living is to convince members of Congress that regulation of wastes by states is effective and that states and the industry are taking steps to improve that regulation even more.

Responsible operators support rational and necessary change in environmental regulation, and that's good. But the tendency now leans toward overkill.

"I have this feeling about environmental issues—that they are not going to simply go away, and we're not always going to win them—a feeling much like I had about 10 years ago when I was working in the health care industry.

More regulation

"Change was a-coming and coming fast. More regulation and less payment for services. I remember telling people then, that, if they were going to survive the transition, they had better become proactive, and not just sit back and let it happen to them.

"And, I would tell you the same thing. You are survivors, and you will have to continue to play that role. Just don't become lulled into complacency, because some changes for your operations are coming down the pike. If you become interested and proactive, you can help formulate the solution and, therefore, minimize the impact," Steakley says. □

Reprinted from Gulf Coast Oil World January, 1992

Continued from page 3

MONEY JOBS RANKING CHART

Rank	Occupation	Annual earnings	Security	Prestige	Satisfaction	1992 Outlook	14-year growth
1	**Biologist**	$64,531	Good	Excellent	Excellent	Good	34%
2	**Geologist**	70,560	Average	Good	Excellent	Excellent	22
3	**Physician**	315,000	Good	Excellent	Average	Good	34
4	**College Math Prof.**	67,936	Average	Excellent	Good	Fair	19
5	**High School Principal**	67,071	Average	Good	Good	Fair	24
6	**Sociologist**	67,936	Average	Good	Excellent	Fair	11
7	**Pharmacist**	53,968	Average	Good	Good	Excellent	21
8	**Urban planner**	66,600	Average	Average	Excellent	Poor	19
9	**Civil engineer**	62,280	Good	Good	Excellent	Poor	30
10	**Veterinarian**	107,670	Average	Good	Good	Fair	31

Reprint from Oil & Gas Journal, September 9, 1991

COMMENT

Is natural gas too inconvenient to be the U.S. fuel of the future?

Vinod K. Dar
Managing Director
Dar & Co.
Washington

They say the future belongs to those who make it convenient and pleasant to do business while creating value for customers.

They also assert the essence of marketing is to offer goods and services that solve the business and personal problems of companies, institutions, groups, and individuals.

In our society the standard for excellence—a steadily rising one, at that—in these areas is set by the telecommunications, broadcasting, entertainment, processed and fast food, mutual fund, and computer software industries.

Convenience, whether through customized products and services, ease of completing a transaction, or access to a wealth of choices, commands a growing premium in a society that considers it a right to be instantly gratified by flicking a switch, pushing a button or touching a pressure pad.

Each year we become more of a cerebral economy. Value added shifts decisively to above the neck work and businesses.

By these standards the U.S. energy industry as a whole is not in the lead pack coming around the bend. One of its representatives, electricity—a more convenient way, really, to use coal, combustible industrial and municipal waste, hydropower, uranium, wood, and the like—is making an honorable showing somewhere in the middle. Another, gasoline, is only a few runners behind.

But one wonders: Is natural gas even in the race? Did it forget the date, sprain its ankle, oversleep, or just decide to take the day off, settle down on its rocker and watch the runners go by?

Natural gas seems to be in danger of becoming the Walter Mitty of fuels—glorious, invincible, adored only in the imagination of the industry.

Consider this:

Strategy and scarcity

The marketing strategies of producers have ranged from "Freeze a Yankee in the dark," and "If you don't have an oil well, get one" a decade ago to "Wait till the market turns, I'll get you" in more recent times.

Such bumper sticker attitudes display thinly disguised contempt for the consumer, not a realization that only the consumer pays the bills for the industry, and only consumption imparts worth to natural gas.

Some influential executives and Wall Street analysts have argued for several years that a looming natural gas scarcity and attendant curtailments and price spikes are just ahead because the current level of drilling and spending is too low.

Is it any surprise that consumers read and believe this line, perhaps more than most people in the gas industry, and are scared off from making a long term commitment to natural gas?

Distant supply sources

Large users are often sold natural gas hundreds of miles from their facility by producers or other merchants. They are then told to fend for themselves in moving gas on one or more transmission systems and the local distribution company from the field where the gas was purchased to their facilities in Detroit, Boston, Seattle, or Los Angeles.

How many issues would a newspaper or magazine sell if people had to get their copy at the printing plant instead of having it delivered to their home or office or the ubiquitous vending machine?

Many gas transmission companies and local gas utilities certainly do not make it easy, pleasant or convenient to ship gas on their system. That forces shippers to deal with a bewildering maze of rates, regulations, and penalties—but no incentives for being frequent shippers—that frustrates existing users and discourages potential users from pursuing the gas option.

The transporting entities seem more concerned with creating transportation rules of the game that make it convenient for themselves, not the user or merchant.

Cogenerators and independent power producers, potentially the best new customers for the gas industry, find that assembling a financeable portfolio of long term—say 10-20 year—gas supply and reliable transportation for a planned new power plant is an excruciating, expensive exercise.

Many gas producers are so reluctant to sign long term contracts that it is the independent power generator who must cajole and wheedle to prove his suitability as a customer to the U.S. seller or turn increasingly to more amenable Canadian producers.

In no other industry does a customer have to work so hard for the privilege of writing checks to a supplier!

Mystical experience

Invoicing, reconciliation of volumes of gas billed with volumes sold and transported (often through a daisy chain of purveyors), and even finding out from sellers and transporters, within any reasonable time with any reasonable accuracy, what happened to gas contracted for

Dar

continues to be a baffling, even mystical experience for industrial, commercial, and institutional gas buyers coast to coast.

There have been many dreary instances of consumers trying to reconcile their natural gas bills with sellers and tranporters 12-15 months after the transaction was completed.

Service after sales remains a remote, vaguely distasteful concept for large numbers of gas sellers and transporters.

This makes it unfairly difficult for the few who do believe in customer service to transcend the generally unflattering image of the producing, selling, and transporting industry in the minds of many industrial, commercial, institutional, and power generation consumers of gas.

A surprising number of managers at regulated gas companies regard gas consumers, particularly small business, institutional, and residential users, as little more than commercial vassals who exist for the purpose of being included in the rate base on which regulators grant the regulated entity a return.

"Don't steal my customers" is the warning these managers growl at potential competitors. They have yet to learn, much less acknowledge, that in a free society customers are a privilege to be earned by performance, not a right to be guarded by threats. In the

Continued on next page

Continued from page 9

long run, there are no captive customers.

Federal and state rules governing gas transportation and storage in interstate and local markets are complex, myriad, changing, inconsistent, and occasionally capricious. That brings joy to lawyers but gloom to gas users and shippers.

Yet it is a rare gas seller who takes the time and trouble to explain the shifting sands of regulation to his current or prospective customers, leaving nervous users to flounder and guess, their confidence in seller and transporter shaken and their commitment to gas further eroded.

Whatever else the gas regulatory system is and no matter how exalted the motives of regulators, there is nothing user friendly about the way the gas consumer is treated by rule makers and enforcers.

It's not too late

Gas has everything going for it to sweep the energy field: abundant, inexpensive, clean, and all-American. Yet it stumbles year after sorry year.

If it is not the fault of the consumer—it almost never is—and decreasingly the fault of the government, it's either the fault of little green men from Mars or the industry itself.

There is nothing wrong with natural gas that a passion for marketing and care for the customer cannot fix.

There is time yet to enter the convenience race and surge ahead before clean coal combustion becomes a reality, before more competent nuclear power becomes a renewed competitive force, before advanced solar conversion devices and genetically engineered biofuels and biochemicals establish a supply beachhead, and before highly efficient energy consuming, molecular engineering and waste reduction technologies begin to flatten or even shrink U.S. energy use even with brisk economic growth.

Perhaps a decade remains for gas to become the fuel of the future—but not a generation. Otherwise, it may well become the forlorn fuel of the past.

The 1990s should be the Golden Age for gas in the U.S.

The way things are going they may turn out to be the Stone Age. •

GEOTOONS

From Shreveport Geological Society Bulletin, January, 1992

AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS ANNUAL CONVENTION

HOST SOCIETY: CANADIAN SOCIETY OF PETROLEUM GEOLOGISTS
WITH: SEPM (SOCIETY FOR SEDIMENTARY GEOLOGY)

January 30, 1992

MEMORANDUM

TO: Society Newsletter Editors

FROM: Randa L. Reeder, Convention Department

RE: 1992 AAPG Annual Convention

Please include the following information in your Calendar of Events:

The 1992 Annual Convention of the American Association of Petroleum Geologists will be held June 21-24, in Calgary, Alberta. The theme of this year's meeting is "Environments of Exploration."

More than 300 oral presentations will be offered in six concurrent sessions and 50 poster presentations per half day.

For a copy of the convention announcement, please contact AAPG Convention Department, P.O. Box 979, Tulsa, OK 74101, (918) 584-2555.

AAPG ANNUAL CONVENTION

Calgary, Alberta, Canada

June 21 - 24, 1992

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SUPERSAVER FARES also available

based on availability with certain restrictions applying

SO CALL EARLY!

Also, if you have ever considered a vacation in the beautiful Canadian Rockies or Alaska (that's right Alaska) this may be your opportunity! Before or after Convention tour packages are available which include the Convention airfare. For more information and details call:

GIESBERG'S TRAVEL CONNECTION - tel.: 1 (713) 530-7291, FAX: 1 (713) 530-1923.

Arranged by HGS Transportation Committee (in conjunction with Giesberg's Travel Connection) Gaylon Freeman - Chairman.

Natural Gas in Texas: Recent Trends and Outlook

William L. Fisher
Leonidas T. Barrow Chair in Mineral Resources
The University of Texas at Austin

A decade-and-a-half ago, natural gas production in the United States had already peaked and had been in decline for five years. These events were supposedly validating the then common perception that domestic natural gas was a largely depleted resource to be available in the future only in limited and declining volumes and at substantially higher prices. According to this then-prevailing model of resource depletion, the ability to add producible reserves of gas through drilling was to decline, even exponentially, with further drilling effort.

The Changed Perception

Today, we sit with the almost universal perception that the U.S. gas resource base is ample for the long term; we have witnessed supply in excess of demand for several years, and in recent years, at real prices as low as those of a decade-and-a-half ago. During the past three years, even with low prices and depressed drilling, reserve additions have exceeded production in the United States and have been nearly equal to production in onland Texas (Figure 1). Since those times in the middle and late 1970's when supplies were short and natural gas policy was being debated, we have drilled and completed 210,000 gas wells, half the historical total. The record of that drilling lays out the basis for the dramatic shift in the way natural gas availability is now judged, in Texas and in the Nation.

From the late 1970's through the middle 1980's, gas reserves in the U.S. lower 48 states were added directly proportionally to drilling in significant contrast to the presumed notion of exponential decline (Figure 2). From 1977 through 1979, 42,000 wells added 43 Tcf of reserves; from 1980 through 1982, 56,000 wells yielded 58 Tcf of reserves; and again, from 1983 through 1985, 41 Tcf of reserves were booked by 44,000 wells. With this evidence of essentially direct proportionality–142 Tcf from 141,000 wells—the thesis of exponential decline and the consequent mentality of resource scarcity were buried, or at least they should have been. But, the last half of the 1980's was to bring the real surprise. The 43,000 gas wells completed (from 1985 through 1990) should have yielded about 43 Tcf if direct proportionality had prevailed; the actual yield has been 83 Tcf, nearly twice the volume expected. In onland Texas with gas provinces presumably among the most mature in the Nation, a similar pattern occurred; actual additions since 1985 have been 60 percent greater than expected (Figure 3).

Continued on page 15

Presented to the second annual Conference on Moving Gas on Texas Intrastates,
September 17, 1991, Houston, Texas. Reprinted with permission

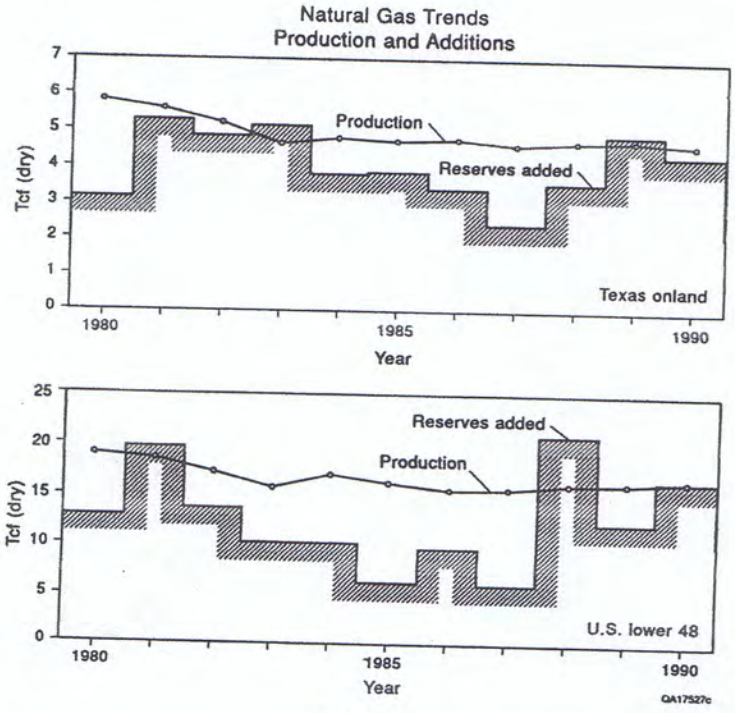


Figure 1.

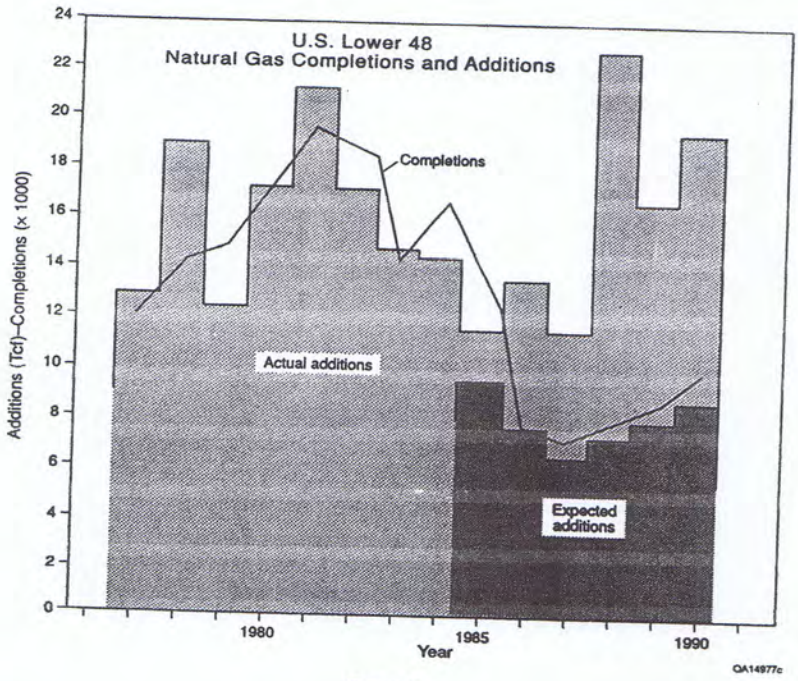


Figure 2.

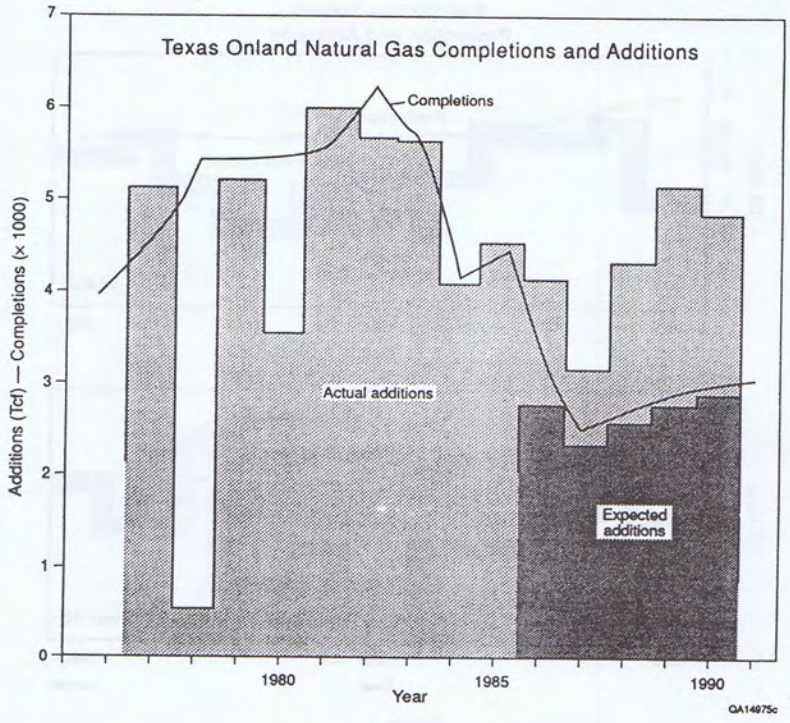


Figure 3.

Table 1

Remaining Texas Gas Fields

	Number	Average size (Bcf)	Resource volume (Tcf)
Major fields (>60 Bcf)	400	65	26
Significant fields (6–60 Bcf)	2,300	10	23
Minor fields (0.9–6 Bcf)	17,000	1	17
Total	19,700		66

This article will be continued in the next bulletin.

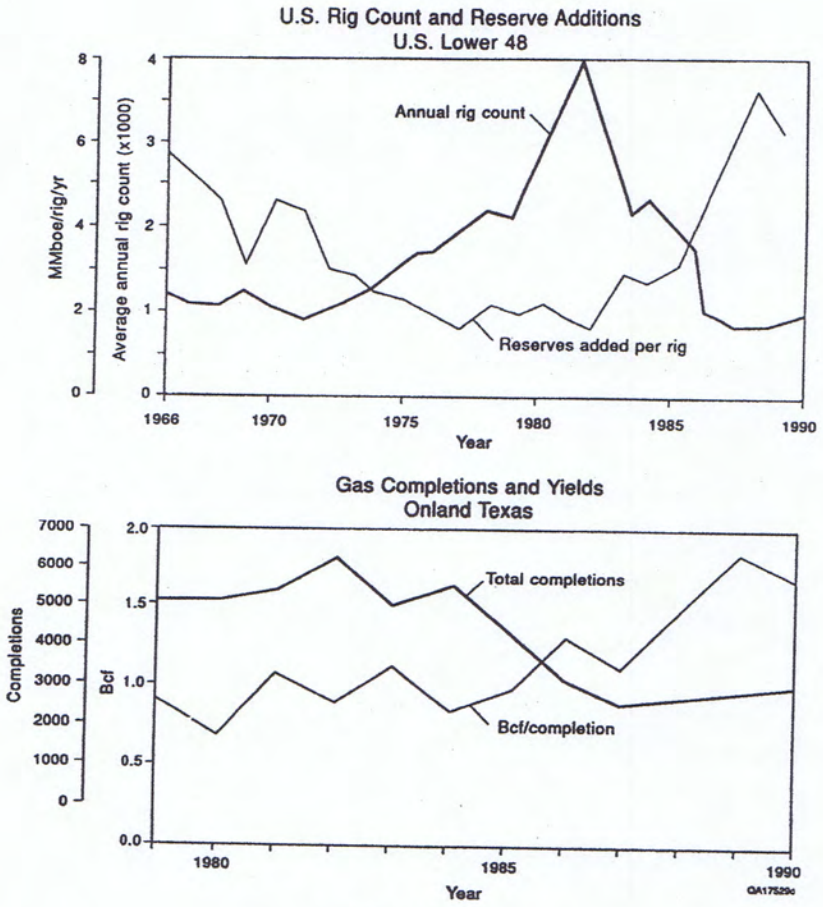
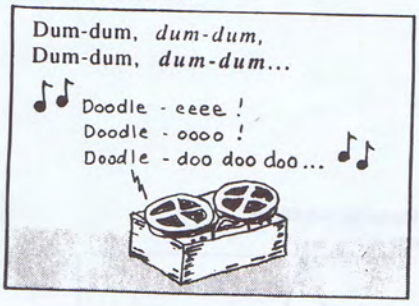
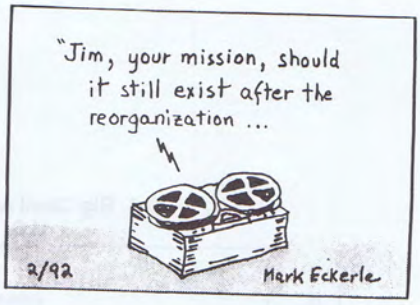

U.S. Rig Count and Reserve Additions
U.S. Lower 48
MMboe/rig/yr
Average annual rig count (x1000)
Annual rig count
Reserves added per rig
Year
1966
1970
1975
1980
1985
1990
Gas Completions and Yields
Onland Texas
Completions
Bcf
Total completions
Bcf/completion
Year
1980
1985
1990
QA17529c

Figure 4.

EARL FINDER





From the New Orleans Geological Society Nogs Log, February 1992

REMINDER OF LOCAL SOCIETY MEETINGS

SIPES
Regular Meeting 1st Thursday of Month, 11:30 a.m.
Petroleum Club

SPE
Petroleum Club Smackover Room, 11:30 a.m.
$10, reservations not required

MAPL
2nd Monday of Month,
5:30 p.m. at Primos Northgate
For Reservations call 352-0662 or 352-7782

D & D
1st Wednesday of Month, except July - 12:00 noon at Petroleum Club
Rosemary Jenkins, 355-1578

MIPRO

GEOPHYSICAL SOCIETY
4th Wednesday of Month
11:30 a.m. at Petroleum Club. Reservations not required

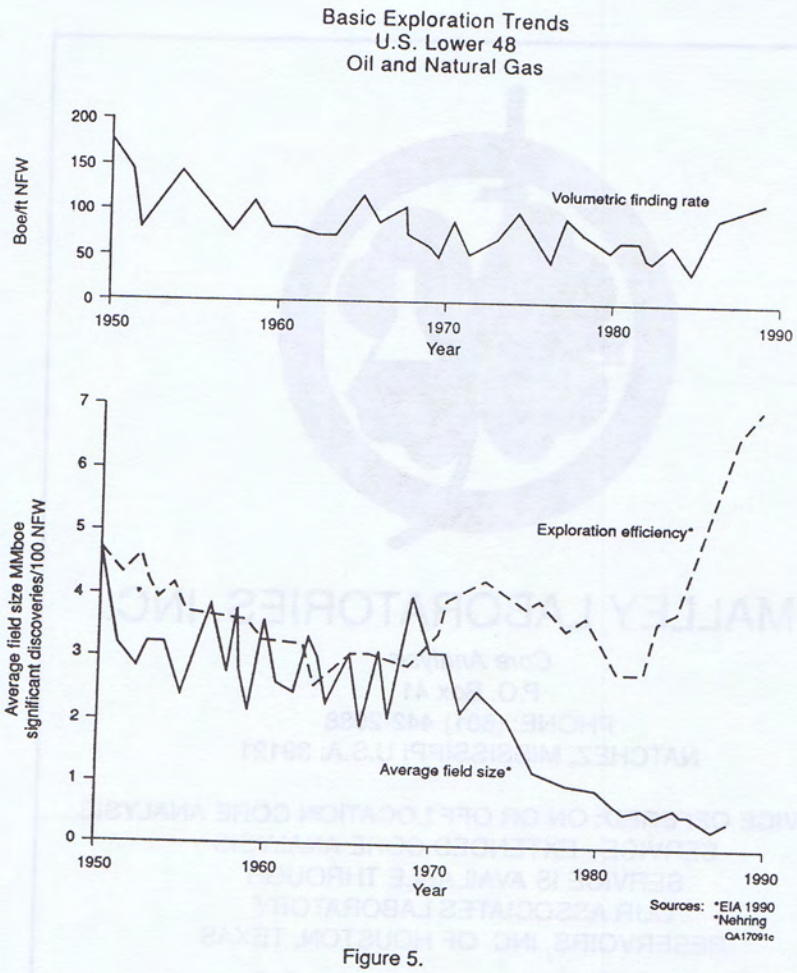

Basic Exploration Trends
U.S. Lower 48
Oil and Natural Gas
Boe/ft NFW
200
150
100
50
0
Volumetric finding rate
1950
1960
1970
1980
1990
Year
Average field size MMboe
significant discoveries/100 NFW
7
6
5
4
3
2
1
0
Exploration efficiency*
Average field size*
1950
1960
1970
1980
1990
Year
Sources: *EIA 1990
*Nehring
OA17091c

Figure 5.

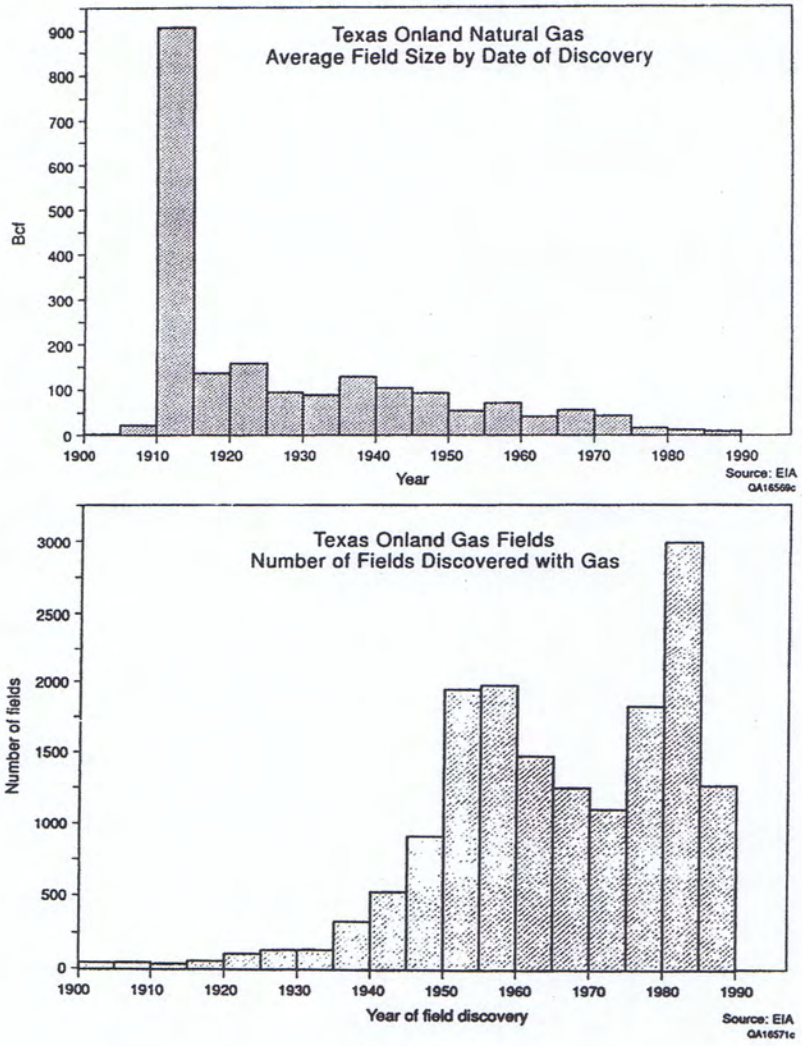

Texas Onland Natural Gas
Average Field Size by Date of Discovery
Bcf
900
800
700
600
500
400
300
200
100
0
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
Year
Source: EIA
QA16569c
Texas Onland Gas Fields
Number of Fields Discovered with Gas
Number of fields
3000
2500
2000
1500
1000
500
0
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
Year of field discovery
Source: EIA
QA16571c

Figure 6.

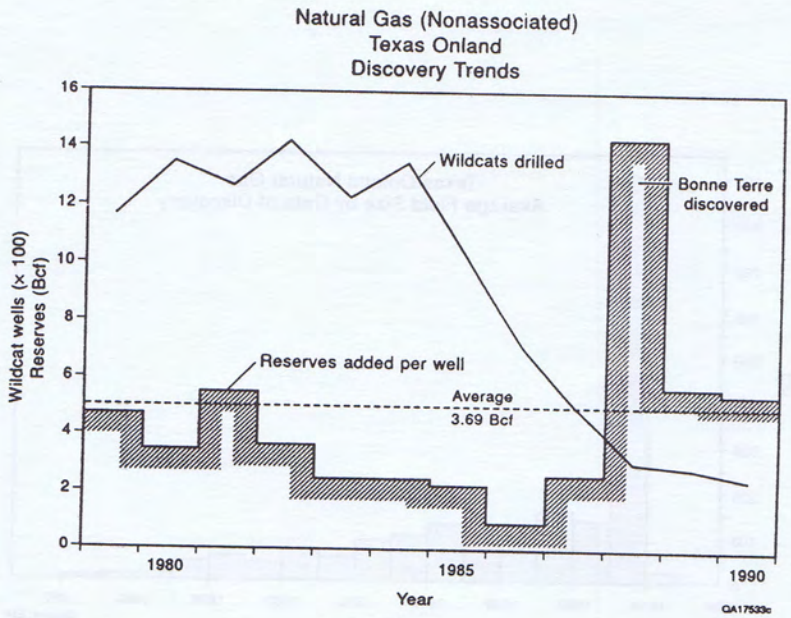


Figure 7.

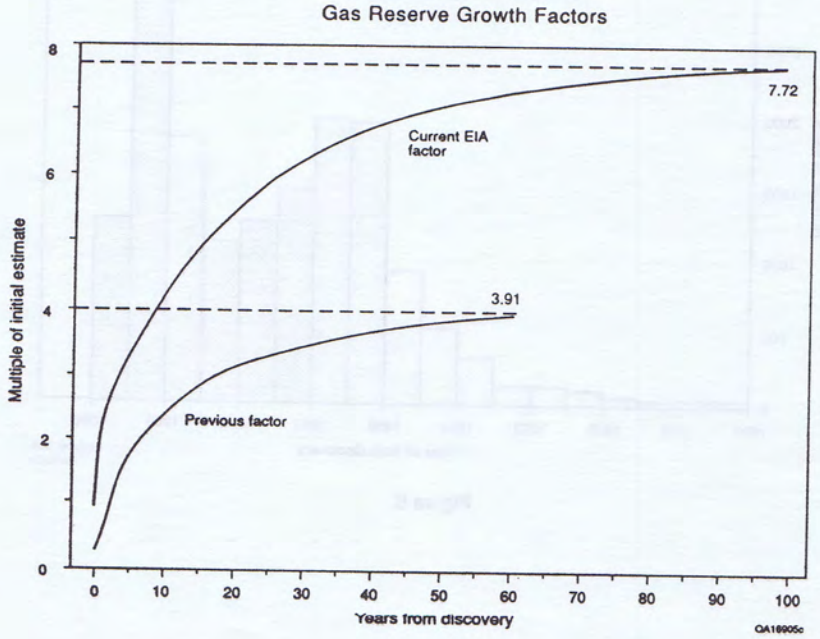


Figure 8.

Greater Efficiencies

In recent years, oil and gas reserve additions per operating rig have been running better than 5 MMboe, 2.5 times the level achieved in the late 1970's and early 1980's, and a sure sign of renewed efficiency after the period of boom drilling (Figure 4). In fact, if this level of efficiency were to be maintained while the annual rig count were increased to 1,500, reserve additions would amount to 7.5 Bboe of oil, gas, and liquids, sufficient to support a U.S. production level of oil at 8.2 MMbbl per day and natural gas at 22 Tcf per year. The same kind of efficiency is shown in Texas gas additions where volumes added per completion for the last five years have been running 75 percent higher than during the first half of the 1980 decade (Figure 4). While the trend has moved upward almost exponentially in recent years when the effects of better drilling prospects have played with reduced drilling, the basic upward trend through the decade is clear and reflects the application of progressively better technology and know-how.

The basis of these unexpected shifts during the 1980's and especially during the last half of the decade is threefold:

- There has been a reemergence of efficiencies both in exploration and development as the dampening effect of the boom drilling in the early 1980's has slipped away.
- There is a rapidly widening recognition of the substantial reserve growth potential from existing, commonly old, conventional gas fields.
- There has been a dramatic response of the so-called unconventional gas resource tight sands and coalbed gas—to combined tax credit incentives and advanced technology.

Exploration

Some rather remarkable trends in discovery efficiency are shown in the United States over the past 30 years and are reflected in Texas exploration as well. Average field size discovered in the United States has declined from almost 3 MMboe in the 1950's and 1960's to about 500,000 Boe in the 1980's. The absolute level will increase, and more so from recent fields, as reserve growth continues, but the trend to smaller average field size is real. However, efficiency in exploration, shown in the number of significant oil and gas fields discovered per 100 new-field wildcats drilled, has trended steadily up since about 1960, because of quantum jumps in acquisition, processing, and interpretation of reflection seismic data, coupled with major advances in genetic basin analysis. This increase in efficiencies essentially offsets the decreasing field size so that a long-term, stable volumetric finding rate has been achieved. As exploratory efficiency continues and as an expected, relatively stable field size population is approached, volumetric finding rates, especially for gas, should be stable and could actually increase at least slightly (Figure 5).

Through most of the history of gas exploration in Texas, average field size discovered has been in the 50- to lOO-Bcf range (Figure 6). A great exception was in the early teens when few gas fields were discovered but one was the whopping Panhandle field. Over the past 15 years the average field discovered contained about 8 Bcf, assuming an ultimate growth factor of 7.72 as calculated by the Energy Information Administration (EIA).

About 16,000 fields with gas have been discovered in onland Texas; almost one-quarter of the total has been discovered during the past decade, containing slightly more than 10 percent of the total volume discovered (Figure 6). Although gas fields discovered in Texas during the last decade as well as those remaining to be discovered have been and will be relatively small, the universe of remaining fields is large. Some 20,000 fields, containing an estimated 65 Tcf, remain for discovery in onland Texas (Table 1). Average field size of those remaining to be discovered, assuming field size of 0.9 Bcf or greater, will be about 3.4 Bcf. Continued efficiencies in smaller field exploration are expected and will to a large measure offset the economic impact of smaller field size.

The rate of finding of nonassociated gas, expressed in volume discovered per new-field wildcat well drilled and completed, was relatively stable during the decade of the 1980's at about 3.7 Bcf per well (Figure 7). Over the past three years, lower prices have meant that only the best prospects get drilled; accordingly, the rate of finding has been up by 70 percent, excluding Bonne Terre, over the rate during the period of increased drilling from 1980 to 1984. Efficiency has been and most likely will be sufficient to keep volumetric gas finding rates in Texas stable for the long term. And while the vast part of fields yet to be discovered will be small, a few giant fields, like Bonne Terre—a South Texas discovery in 1988—as well as 400 or so major fields, are yet in the offing.

To date, onland Texas has contributed one-third of the natural gas discovered in the lower 48. Over the past decade, the contribution was about 25 percent of the total, and over the long term, Texas is estimated to hold one-fifth the remaining discovery potential in the United States. The major part of that potential is expected to be in the onland Gulf Coast, much at depths below 15,000 ft.

The Role of Conventional Reserve Growth

Estimates of the ultimate production from oil and gas fields subsequent to discovery generally increase over time. This increase, called reserve growth or in some terminologies inferred reserves, comes from extensive and intensive drilling in existing fields, improved recovery of original in-place hydrocarbons, and new pools above, below, or within existing production zones. The average of several recently published estimates of remaining gas resources in the U.S. lower 48 states shows that nearly 40 percent lies in potential reserve growth. In Texas, 55 percent of the remaining resource potential for gas is from reserve growth.

The rise of reserve growth as a major factor in recent and future reserve additions basically came with the judgment that reservoirs were more complex geologically than generally assumed, and thus hold substantial quantities of oil and gas in conventionally movable state that are not recovered by typical well spacing practice. The U.S. Department of Energy (DOE) estimates existing, geologically complex oil reservoirs hold about 100 Bbbl of movable oil beyond current proved reserves, a volume nearly five times what the U.S. Department of the Interior (DOI) estimates as inferred reserves. Recent experiences with oil recovery and reserve growth were applied to natural gas resources in a 1988 DOE study of U.S. natural gas resources. Fully realizing that gas is more mobile than oil, the committee preparing the report calculated degree of reservoir complexity and estimated conventional gas reserve growth potential from existing gas fields to be 227 Tcf, plus 61 Tcf of associated gas from oil reserve growth. These estimates were about twice those then calculated by DOI, based on reserve growth data through 1979. The new calculation of reserve growth potential, along with the explicit consideration of the unconventional gas base, was the main

Table 2
Sources of Onland Texas Reserve Additions of Nonassociated Gas (1985 – 1988) (Tcf)

	New [1] Fields	New Pools	Intra-pools	Extension	Infill	Total
Gulf Coast Onland	2.62	1.67	1.28	2.38	0.47	8.42
East Texas	0.05	0.09	0.08	0.82	1.09	2.13
North Texas	—	0.04	0.04	0.36	0.22	0.66
Permian Basin	0.05	0.06	0.05	0.25	1.19	1.60
Panhandle	0.10	0.04	0.06	0.52	0.74	1.46
Total	2.82	1.90	1.51	4.33	3.71	14.27
Percent	(20)	(13)	(11)	(30)	(26)	

[1] One-third appreciated, assuming growth factor of 7.72

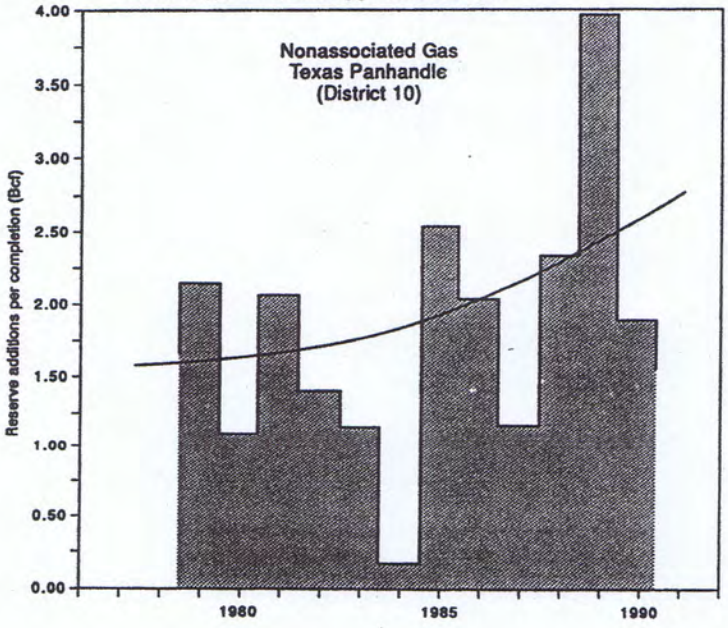


Figure 9.

Lafayette Geological Society

reason for the generally more optimistic outlook in the DOE 1988 report. Recently, the EIA (1990) did a comprehensive analysis of gas reserve growth based on data through 1988, capturing the results of gas drilling 45 percent greater than the DOI series Where DOI had earlier calculated a growth factor of 3.91, EIA calculated a factor of 7.72, nearly double, and pegged conventional gas reserve growth potential at 265 Tcf, comparable to the estimates of the 1988 DOE study (Figure 8). Almost 150 Tcf of this potential is estimated to be in existing Texas gas reservoirs, chiefly in bypassed pools of the complexly stacked fields of the Gulf Coast and from infill drilling in other provinces of the State.

In recent years in onland Texas about 80 percent of nonassociated gas reserve additions have come from reserve growth in existing reservoirs; half of this amount is from reservoirs discovered before 1960, and one-fifth is from gas reservoirs 60 years or older. An even greater percentage of associated gas additions come from reserve growth.

Of the 80 percent of reserve additions coming from reserve growth, extension drilling of existing fields accounts for 37 percent, more than half of which is from the development of Gulf Coast field and pool discoveries of the 1970's and 1980's (Table 2). Infill drilling in existing fields adds about one-third the reserve growth. More than half of all reserve additions in the Permian Basin, the Panhandle, and East Texas comes from infill drilling. The increasing shift to infill drilling in gas provinces like the Texas Panhandle has shown significant improvement in rate of additions per completion (Figure 9). New pools either above or more commonly below producing zones in fields contribute 16 percent of the reserve growth. Nearly 90 percent of all new pool additions come from the onland Gulf Coast Basin, especially deep South Texas. Intrapool completions, commonly recompletions of bypassed pools within existing production intervals, make up 16 percent of reserve growth. This is a significantly increasing strategy used chiefly in the Gulf Coast where recompletions constitute half the total completion activity. The strategy of recompletion from bypassed gas pools in the geologically complex stacked reserves of the Gulf Coast has led to substantial improvement in the rate of reserve additions per completion (Figure 10). Reserves added from intrapool completions are generally reported as positive revisions to reserves and reflect dramatically in the shift in the Gulf Coast from severe net negative revisions to slightly positive net revisions in most of the 1980's (Figure 11). As a result, Gulf Coast production and reserves, especially in the Upper Gulf Coast (RRC 3) have stabilized after a reserve decline of 80 percent and production decline of 50 percent from levels in the 1970's.

The emergence of significantly enlarged conventional reserve growth potential is a critical factor in low-cost gas availability and the maintenance of long-term production capacity in the more mature provinces of the Nation and Texas. About 150 Tcf of reserve growth potential is estimated from onland Texas, equivalent to 30 years of production at 5 Tcf annually. Conventional reserve growth recovery is particularly amenable to advanced technology, especially advanced geophysical detection techniques that allow detailed geological modeling of complex reservoirs and thus strategic, relatively low cost recovery of bypassed gas.

Continued on page 29

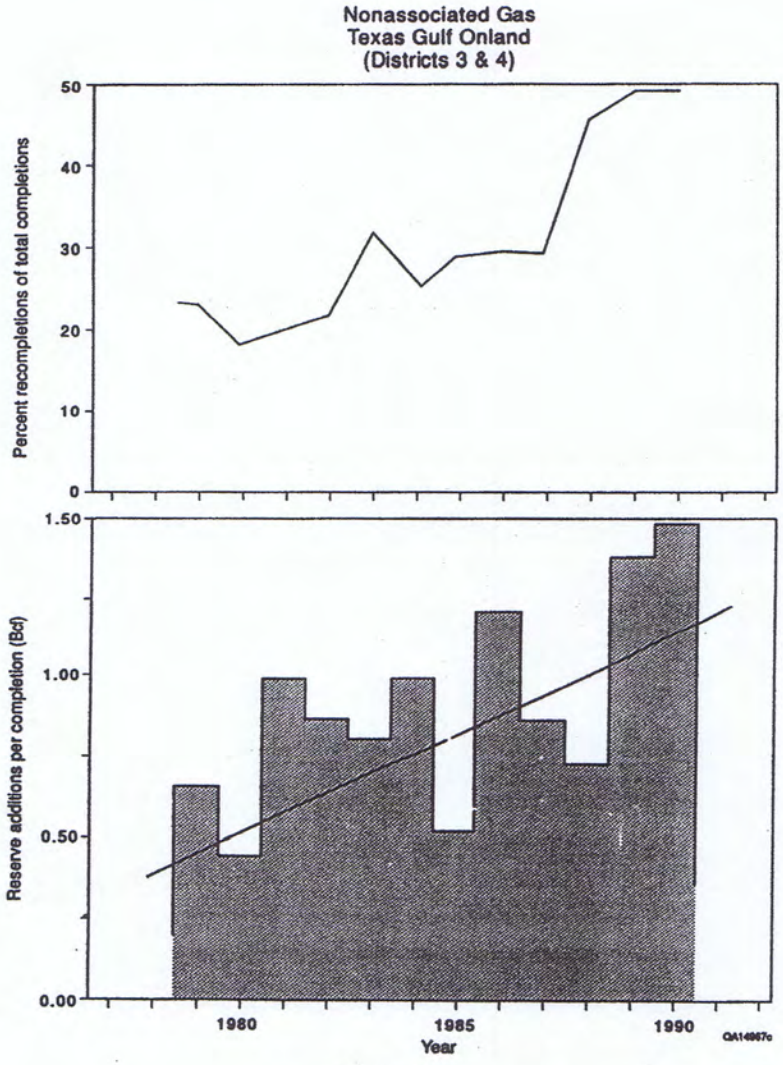

Nonassociated Gas
Texas Gulf Onland
(Districts 3 & 4)
Percent recompletions of total completions
50
40
30
20
10
0
Reserve additions per completion (Bcf)
1.50
1.00
0.50
0.00
1980
1985
1990
Year
GA14967c

Figure 10.

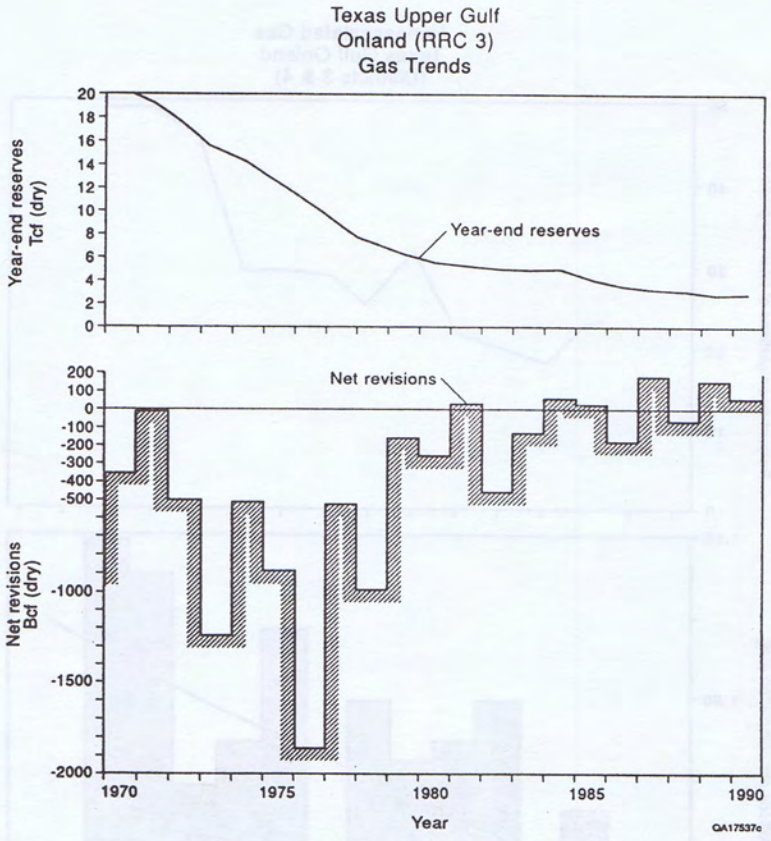

Texas Upper Gulf
Onland (RRC 3)
Gas Trends
Year-end reserves
Tcf (dry)
20
18
16
14
12
10
8
6
4
2
0
Year-end reserves
Net revisions
200
100
0
-100
-200
-300
-400
-500
-1000
-1500
-2000
Net revisions
Bcf (dry)
1970
1975
1980
1985
1990
Year
GA17537c

Figure 11.

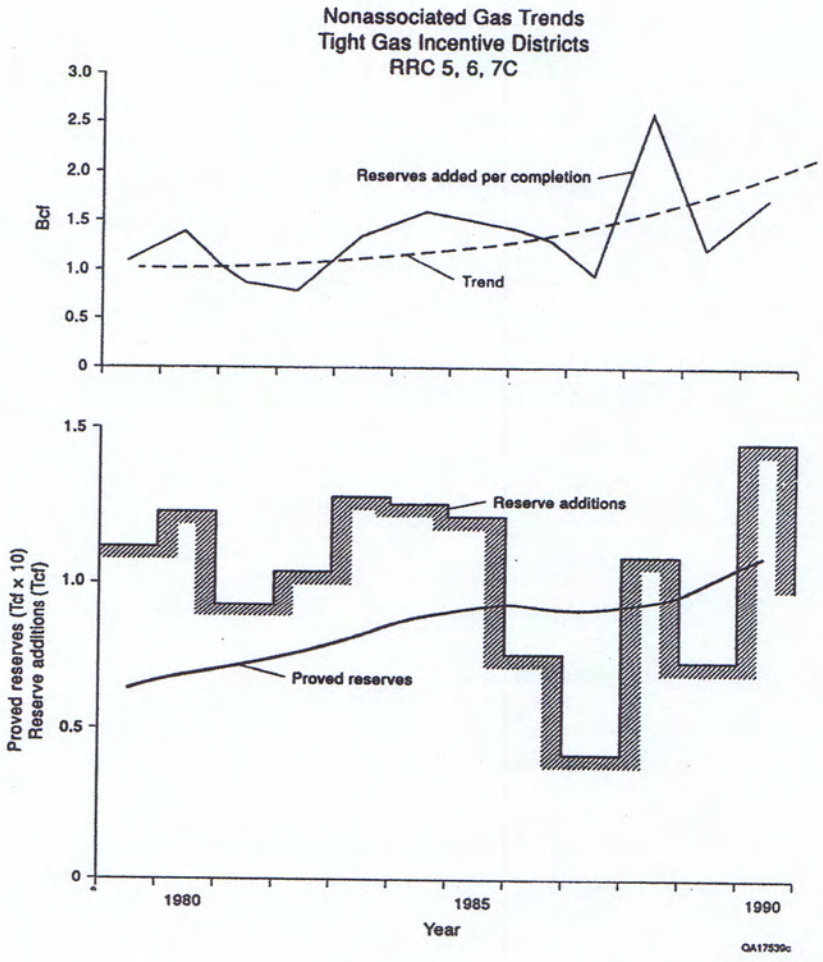

Nonassociated Gas Trends
Tight Gas Incentive Districts
RRC 5, 6, 7C
Bcf
3.0
2.5
2.0
1.5
1.0
0.5
0
Reserves added per completion
Trend
Proved reserves (Tcf) x 10)
Reserve additions (Tcf)
1.5
1.0
0.5
0
Reserve additions
Proved reserves
1980
1985
1990
Year
GA17539c

Figure 12.

Unconventional Gas: Response to Incentives and Technology

Unconventional gas recovery, especially from so-called tight, or low-permeability, reservoirs, sparked by intensive field research by the Gas Research Institute (GRI) along with price and tax incentives has moved spectacularly over the past decade. The gas provinces in Texas and the Nation having substantial resources in low-permeability formations have also been the gas provinces posting some of the largest gains in reserve additions and production. Response in the incentive districts of Texas, that is, those provinces with significant tight formation gas including East Texas and the Sonora-Ozona Trend of West Texas, are illustrative. Nonassociated gas in these districts increased by 75 percent over the past decade (Figure 12). Production increased by 30 percent and would have increased more had demand been available.

Reserve additions have exceeded production by 30 percent over the past decade. Further illustration of activity in the tight gas incentive districts is shown by production increase in major fields (Table 3). While incentives in the form of price and tax credits, and forgiveness of Texas severance tax have played a major role in drilling and reserve addition activity, there has also been a strong increase in reserves added per completion, now nearly twice the rate at the beginning of the decade. This trend is almost entirely due to advances in hydraulic fracturing technology and improved geologic understanding of fractured reservoirs for optimal deployment of advanced fracture technology in extension and infill strategies.

Although Texas holds nearly half of the Nation's conventional gas reserve growth potential, it holds only about 20 percent of the total unconventional gas potential. The western United States with major resources of both coalbed methane and low-permeability formation gas hold the lion's share. Still the onland Texas provinces have a low-permeability resource base of up to 75 Tcf, sufficient to support current rates of tight gas reserve additions for 75 years.

Table 3

Field	Production (Bcf) 1985	1989	% Change
Carthage Cotton Valley	82	96	+17
Oak Hill Cotton Valley	17	39	+129
Ozona Canyon	23	31	+35
Gladewater Haynesville	15	24	+60

This article will be continued in the next bulletin.

PUBLICATION LIST

1. Mississippi Geological Society Photo Directory, 1981 ..... $ 2.00
2. Wilcox Fields of Southwest Mississippi, Maps and production data on 171 fields, in ring binder, 350 pp., 1969 ..... 28.00
3. Mesozoic-Paleozoic Producing Areas of Mississippi and Alabama. Volume I. Maps and producing data on 57 fields, with 2 composite logs, clothbound, 139 pp., 1957 .....10.00
4. Volume II. Maps and producing data on 77 fields, includes Supplement 1, in ring binder, 143 pp., 1963 .....15.00
5. Supplements 2 through 7 for Volume II, Maps and producing data on 35 fields, 110 pp.....15.00
6. Supplement 8 for Volume 11, Maps and producing data on 34 fields, 108 pp., 1980 ..... 25.00
7. Volume II, complete with Supplements 2-8, 361 pp., 146 fields 50.00
8. Volume III, 85 pp., 46 fields, 1987 ..... 50.00

FIELD TRIP GUIDEBOOKS

9. Upper Cretaceous Outcrops, Northeast Mississippi and West Central Alabama, Fourteenth Field Trip, 29 pp., May 1959..... 4.00
10. Cenozoic of Southeast Mississippi and Southwest Alabama, Fifteenth Field Trip, 52 pp., May 1960 ..... 6.00
11. Cenozoic of Horn Island and the Pascagoula Valley 10th Annual GCAGS Meeting, 24 pp., October, 1960 ..... 2.50
12. The Paleozoics of Northwest Arkansas Sixteenth FGield Trip, 48 pp., May, 1962..... 5.00
13. Tertiary Type Localities of East-Central Mississippi, 25th GCAGS Meeting, 133 pp., Octoberr 1975..... 5.00
14. Mississippi Rocks of the Balck Warrior Basin, Seventeenth Field Trip, 79 pp., April, 1978 ..... 8.00
15. Tertiary and Upper Cretaceous Depositional Environments, Central Mississippi and West Central Alabama 33rd Annual GCAGS Meeting, 40 pp., October 1983 ..... 7.50

COMPOSITE LOGS AND CROSS-SECTIONS

16. Composite Mesozoic Log of South Mississippi and South Alabama 2.00
17. Composite Paleozoic Log of Black Warrior Basin, Mississippi and Alabama..... 2.00
18. Well Log Correlation Sections, Paleozoic of the Black Warrior Basin, Set of 5 Sections.....10.00
19. Statigraphic Cross-Sections, Jurassicc of Mississippi, Alabama and Northwest Florida, Set of 9 Sections 50.00

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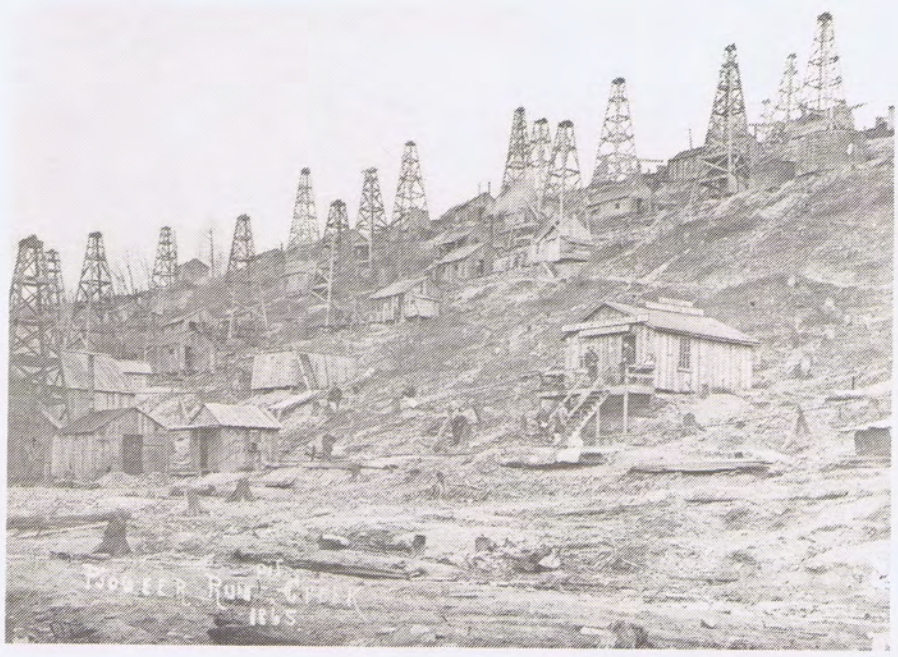
MISSISSIPPI GEOLOGICAL SOCIETY

Volume XXXX No. 8 April, 1992



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1991-92

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PRESIDENT'S MESSAGE

It's that time of year again! Our annual MGS elections are here, the Spring Fling is just around the corner, and another year of MGS activities is coming to an end. The MGS Election Committee has completed it's selection of nominees for the 1992-93 term. Anyone wishing to add a nomination to this list (published herein) should contact Chairman, Jim Files as soon as possible. In addition, anyone needing an absentee ballot can contact Secretary, Rick Ericksen. The election will be held by paper ballot during our May 12th Professional Luncheon.

Speaking of the luncheon, our speaker this month is Dr. Darrel Schmitz, Mississippi State University. His presentation, "Predicting data point locations needed to characterize fluvial sand bodies", will cover a technical method devised for computer use. This method is applicable to both petroleum exploration and environmental waste site evaluations.

In other news, George Vockroth has accepted the Chairmanship of the MGS Continuing Education Committee. He has already begun preparation for a future seminar on sequence stratigraphy. If you have any requests or would like to offer your views, please contact George; I'm sure he would appreciate the input.

Most of you have already received your annual MGS Directory(s). By now, you probably have two. If you are wondering why, the first printing was flawed and the second is the corrected copy.

To date, we have received about 20% of the MGS Questionnaires that were included in the February bulletin. I think you will find the collected information quite interesting when it is published in the bulletin later this year. Those of you that haven't "put in your 2 cents worth" should answer the questionnaire and mail it in as soon as possible. We are just as interested in our out-of-state subscribers as our local members since we are all looking at the same transition/evolution taking place in our profession today. Again, the survey is intended to facilitate planning for future society activities, and to ensure that our society is well informed on current changes and views in our geological community.

Finally, someone has suggested that a group of MGS members attend one of the public meeting to be held in Alabama on the proposed registration of geologists there. Those dates should be known by the time you get this bulletin. Should you want to attend, please contact me, Steve Ingram, or Jim Files as soon as possible.

Steve Ingram

BUSINESS MEETING LUNCHEON SCHEDULE

April 14	Dr. Darrel W. Schmitz Mississippi State University	"Predicting Data Point Locations Needed to Characterize Fluvial Sand Bodies"
May 12	John B. Echols Director Basin Research Institute, LSU	"Deltaic Processes"
May 14	Thursday, Spring Fling at Reservoir Lodge (Old Fowlers' Lodge)	

ABOUT THE COVER: PIONEER RUN AREA As the Banks of Oil Creek were drilled up, the hillsides adjacent to the creek soon spouted rigs. Sixteen rigs, some so close they overlap, can be found on this hillside.

BUSINESS MEETING LUNCHEON

April 14, 1992 • 11:30 a.m.
Capitol City Petroleum Club, Smackover Room

PREDICTING DATA POINT LOCATIONS NEEDED TO CHARACTERIZE FLUVIAL SAND BODIES

Darrel W. Schmitz
Assistant Professor
Department of Geology and Geography
Mississippi State University

A model was developed which used geologically based calculations to follow a discontinuous fluvial sand body into and through a site. This is accomplished by establishing the environment of deposition from stratigraphic information and by assuming the sand body width is the same as the meander belt width. The meander belt width is calculated from sand thickness, once the sand body has been encountered by a well. Spacing for additional well locations away from the one intercepting the sand is determined from the sand body width and the probability of a second location intersecting the sand body.

Once a sufficient number of locations are available, the sand thickness is estimated from the site by a geostatistical technique called kriging. Kriging gives the errors for those estimates. These errors are used, in combination with the spacing determined from the probability of another boring intersecting the sand body, to select a new well location. The additional locations(s) are selected in areas with the most error at the determined spacing.

By following the model's procedures, sand bodies were followed through sites in hypothetical explorations. The sand bodies in these sites were defined reliably with fewer locations than required by the typical grid pattern of drilling commonly conducted in site investigations. A grid pattern does not take into account the effects of geology within the site, particularly discontinuous sand bodies. The size and geometry of such deposits are controlled by the environment in which they were deposited. By bringing the geology of a site into the investigation to guide the investigation, the number of exploration holes needed to define such a discontinuous deposit can be reduced, subsequently reducing the associated costs and hazards of site investigations.

SPECIAL NOTICE TO THE OIL AND GAS COMMUNITY

Mississippi Oil & Gas Lawyers Association and Mississippi Association of Petroleum Landmen

present

MISSISSIPPI OIL & GAS INSTITUTE

Thursday and Friday, April 23 and 24, 1992 Coliseum Ramada Inn, Jackson, Mississippi

This is the Eighth Tri-Annual Seminar. Wide spread efforts are underway to bring in participants from across the country. Your support is critical to the success of this event.

On Thursday, April 23, from 2:00 to 5:30 p.m., there will be a free **computer workshop** emphasizing "hands-on" demonstrations of the latest in hardware and software designed for use in the oil and gas industry. Displays will remain through Friday.

On Thursday from 5:30 to 7:30 p.m., there will be a **reception** for seminar participants. Members of the oil and gas community who cannot attend the Friday seminar may attend this reception for $15.00. There will be an open bar, hors d'oeuvres and entertainment.

On Friday, the **Seminar Program** will consist of eight industry related topics and a special luncheon address by Honorable Joseph S. Zuccaro. Also, an invitation to speak has been extended to W. Henson Moore, former Deputy Secretary of Energy and the current Deputy Chief of Staff at the White House.

All events are being held at the Coliseum Ramada Inn.

Call (601) 948-3800 for more information or contact: Michael C. Corso, P. O. Box 23040, Jackson, MS 39225

NAME: _____

FIRM: _____

ADDRESS: _____

TELEPHONE: _____

$75.00 Advance Registration (includes reception Thursday and lunch on Friday); $85.00 at the door on Friday. Non-registrants may attend the reception for $15.00. The computer workshop is open free of charge.

MAKE CHECK PAYABLE TO MISSISSIPPI OIL & GAS INSTITUTE AND MAIL TO:
MICHAEL C. CORSO, P. O. BOX 23040, JACKSON, MS 39225

MISSISSIPPI OIL & GAS INSTITUTE 8:30 - 5:00 APRIL 24, 1992

DO YOU PLAN TO ATTEND THURSDAY RECEPTION Yes__ No __

THE DEQ LIBRARY

IN GENERAL

You may already know that the DEQ Library is the result of moving the Geology library into new and more spacious quarters at Southport Center and merging it with the various smaller libraries from Poll-tion Control and Land and Water. (There is still considerable merging ahead though much has been accomplished.) So to begin with if you are a geologist it is more likely, at the present time anyway, that you will find the information you are looking for than if you are employed in some other capacity. However, with books and reports being added from the other divisions, the library is continually growing in the areas of environmental law and regulation, (CFR's), hazardous waste, underground storage tank, ground water, surface water, and air pollution information. The librarian will be ready to help you find the information you need. Also, keep in mind that you can assist the librarian in identifying new publica-tions which the library needs to offer. Additionally there are those general interest materials which many staff members will occasionally find useful: Mississippi telephone directories, various specialized telephone directories (EPA, USGS, National Directory of State Agencies, etc.), U.S. and Mississippi statistical guides, the Mississippi Code, assorted dictionaries, encyclopedias, atlases, road maps, and general interest science, engineering, and computer journals.

LOAN POLICIES/STAFF

Books, Government Reports - 2 week loan with renewals.

Journals - 1 day loan for most current issue. 3 day loan for back issues.

Reference Materials - Short term loan, as much as 3 days on selected materials, These are high use items such as telephone directories, indexes, encyclopedias, Mississippi Code, which staff is encouraged to use within the library, making photocopies as needed.

LOAN POLICIES/PUBLIC

Books, Government Reports - 2 week loan with 1 renewal.

Journals - no loans on most current issue or bound volumes. Articles may be photocopied.

Reference Materials - The public must use these materials within the Library.

(Selected materials because of frequent use, replacement cost, age or rarity, or condition may be restricted to library use at the discretion of the librarian.)

Shreveport Geological Society

P.O. BOX 750
SHREVEPORT,
LOUISIANA 71162

February 7, 1992

Memo: Preliminary Announcement
To: Ark-La-Tx and surrounding Geological Societies
From: Percy Wheeler, Field Trip Chairman, 313 797-8905

SHREVEPORT GEOLOGICAL SOCIETY FIELD TRIP

North/South Regional Tectonic Stratigraphic Trend Section of the Ozark Platform and Ouachita Facies.

Date: March 27, 28, 29, 1992.

Where: Okla/Ark line from Tulsa to Broken Bow, Okla.

Motels: Friday night, March 27, Tulsa.
Saturday night, March 28, Ft. Smith.

Traverse: Saturday, March 28: Tulsa to Ft. Smith. Begin on the Ozark Platform with Pre-Cambrian granite and Cambrian Arbuckle outcrops and climb, stratigraphically, through outcrops of Pre-Ouachita beds southward to Ft. Smith.

Sunday, March 29: Ft. Smith to Broken Bow. Continue southward on the Oklahoma side climbing, stratigraphically, through the Ouachita facies outcrops to the Broken Bow Uplift.

Data: Regional north/south Cross-Section.
Regional north/south Seismic Section.

Please announce at your next meetings and in your newsletters!

Additional details will be forthcoming.

The New Orleans Chapter of SPWLA is sponsoring a seminar on the evaluation of Low Contrast Hydrocarbon bearing reservoirs. Details are as follows:

LOW CONTRAST PAY SEMINAR
Sponsored by:
the New Orleans Chapter
of
The Society of Professional Well Log Analysts

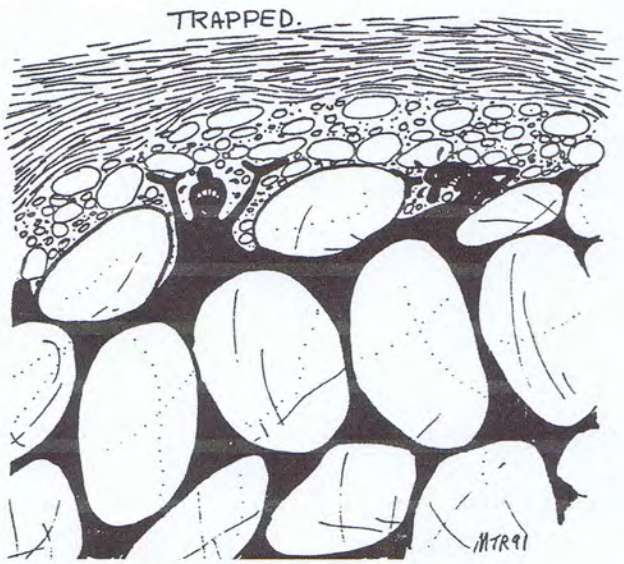
THURSDAY, MAY 21, 19992
8:00 AM -4:00 PM
at the Petroleum Club of New Orleans

$30.00 per person for full day, includes lunch
$16.00 per person for lunch speaker only

contact Linda Hart at (504) 569-3552 for reservations

The seminar will consist of talks and technical presentations given by Log Analysts with Gulf of Mexico and International experience. There will be a wide variety of topics ranging from modeling of Low Contrast pay responses to practical application and examples of evaluation data. Audience participation will be welcomed and encouraged as floor discussion will be the heart of this seminar.

GEOTOONS



FARMED OUT FROM SGS

Endangering the endangered could result in stiff penalties

By Joe McDonald
Mississippi Forestry Commission

Warning: Don't mess with endangered species. It could be costly.

Three foresters employed by the U.S. Army at Fort Benning face jail sentences and heavy fines if convicted of charges they allowed timber harvesting on the Army base to destroy Red Cockaded Woodpecker habitat.

According to the Southern Forest Products Association, the foresters were officially charged with conspiracy to violate the Endangered Species Act by concealing the presence of Red Cockaded woodpeckers on the military post's timberland.

A federal grand jury in Macon, Georgia, handed down a 17 page indictment against the foresters who were arraigned January 31st in Columbus.

If convicted, one forester could receive a maximum sentence of 31 years imprisonment and a $640,000 fine. another, the post forester, could receive 36 years and a $650,000 fine. The third man, who is chief of the post's environmental division, could get six years and be fined $110,000.

These could be the most severe penalties ever imposed on individuals for violating the Endangered Species Act, according to the SFPA.

The men are charged with additional counts of making false statements by failing to reveal with colored pins on a map the presence of known woodpecker colonies.

All three have pleaded innocent to the charges.

The Red Cockaded Woodpecker is a small bird that must live in old-growth pine forests to survive, according to biologists with the U.S. Fish and Wildlife Service. The bird is listed as an endangered species due to decreasing habitat.

The bird is found throughout the southeastern United States, primarily on publicly owned forest lands where old growth pines are still found.

The woodpecker's presence is well known in the Homochitto National Forest, where extensive efforts are underway to create habitat for expanding the bird's population.

Continued from previous Bulletin
Presented to the second annual Conference on Moving Gas on Texas Intrastates, September 17, 1991, Houston, Texas. Reprinted with permission

Natural Gas in Texas: Recent Trends and Outlook

William L. Fisher
Leonidas T. Barrow Chair in Mineral Resources
The University of Texas at Austin

Texas Trends and Outlook

Gross production of natural gas in Texas peaked at about 9.6 Tcf in 1972. It fell proportionately through 1978 to 7.1 Tcf. Production was relatively stable through 1980 but through 1983 fell to 5.6 Tcf. Since 1983 Texas production of natural gas has stayed steady, averaging 5.7 Tcf (Figure 13). Proved reserves peaked at 120 Tcf in the middle 1960's, steadily declining down to the early 1980's. During the first half of the 1980's reserves held steady at near 45 Tcf. In the middle 1980's, total proved reserves declined to about 38 Tcf (dry basis), where they have remained for the past four years. Reserve additions of nonassociated gas in onland Texas over the past decade have amounted to about 42 Tcf (dry basis). Additions have amounted to seven-eights of dry basis production reported by EIA and about three-quarters of the gross production reported by the Railroad Commission of Texas (RRC) (Figure 13).

Nonassociated, or gas-well, gas production peaked in the early 1970's as average well production reached 325 MMcf per year. Production fell steadily through the early 1980's, as average well production fell. Stabilization of average gas-well production in 1982 at just below 100 MMcf per year led to stabilization of total gas-well production at an annual rate of 4.3 Tcf (RRC gross production), where it has held since 1983. Proved reserves were maintained at about 35 Tcf during the first half of the 1980's. With the substantial falloff in drilling gas wells, nonassociated gas reserves slipped to a little above 32 Tcf in the last half of the decade; however, the decline in reserves of only 10 percent contrasts with the 50-percent drop in drilling (Figure 14).

The main nonassociated gas provinces of South Texas and the tight gas incentive districts (56 percent of total production) have either maintained production levels (South Texas) or substantially increased (East Texas and Sonora-Ozona) (Figure 15). The once-major districts of the State-Panhandle, Upper Gulf, and Permian Basin—contributed nearly two-thirds of the State's nonassociated gas production in the late 1970's. By the middle 1980's production from these districts had dropped by half and constituted only 45 percent of State production. Critically, not only for these districts but for overall Texas, production has essentially stabilized (Figure 16). Conventional reserve growth will be a major factor in maintaining relatively stable production in these districts.

Year-end reserve trends of the several nonassociated gas provinces of the State have generally reflected production patterns (Figure 17). The Panhandle, Permian Basin, and Upper Gulf show continued decline though at a much reduced rate in the late 1980's as compared with the decline of the late 1970's and early 1980's. Other major districts South Texas, East Texas, and Sonora-Ozona—have increased or at least have held steady. These trends will most likely be maintained.

Table 4 summarizes the salient trends in onland Texas nonassociated gas, comparing the first half of the last decade to the last half. Average wellhead price is down, as is annual gas drilling and discovery gas drilling. Reserve additions are also down but significantly less so than drilling.

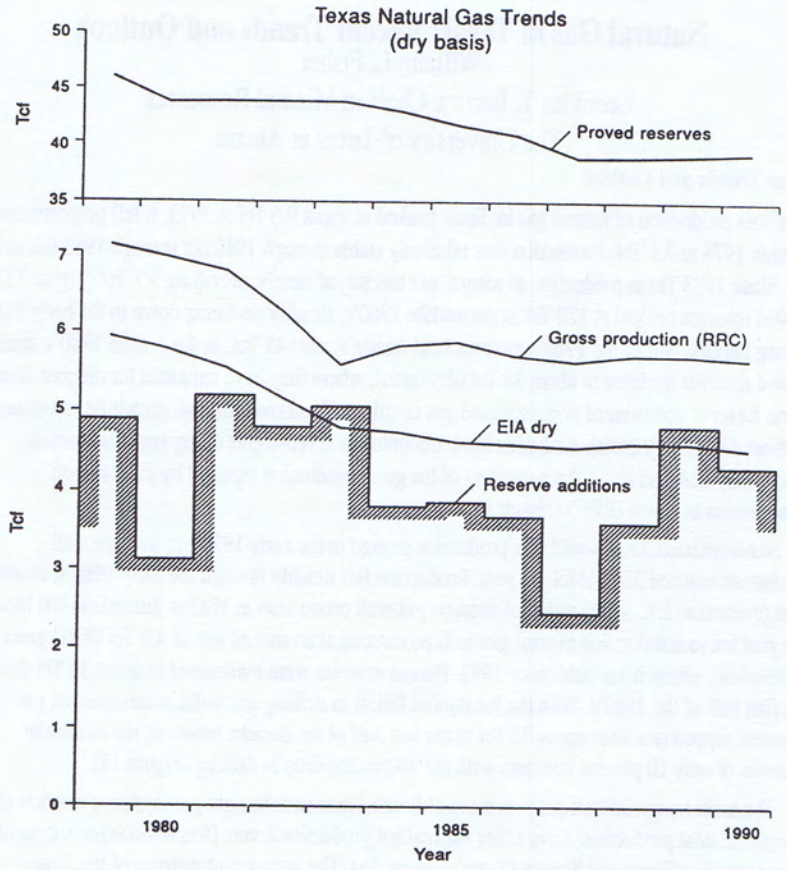


Figure 13.

Continued on page 13

The Gulf Coast Association of Geological Societies

GCAGS Convention 1992
P. O. Box 2474
Jackson, MS 39225-2474

42nd Annual Convention
October 21-23, 1992
Sponsored by Mississippi
Geological Society

GCAGS ADVERTISERS NEEDED NOW !!!

The Gulf Coast Association of Geological Societies will hold its 42nd Annual Convention in Jackson, Mississippi, October 21-23, 1992. We are currently seeking advertisers for the 1992 TRANSACTIONS - the annual publication of the association which contains the technical papers that are presented at the convention. Preliminary indications suggest that over 2,000 people will register for the convention and each registrant will receive a copy of the 1992 TRANSACTIONS. This technical publication is purchased by both industry and schools and is widely used as a reference.

Financing for the TRANSACTIONS is accomplished to a great degree through funds collected from advertisers. The GCAGS needs your support for this very important publication. An advertisement placed in the TRANSACTIONS will surely prove to be a worthwhile investment for the exposure alone. Prices for advertising space are as follows:

Size of Ad Space	Ad Width-Height	Cost
Full Page (8 1/2 x 11)	7.5" x 10"	$325
1/2 Page	7.5" x 5"	$200
1/4 Page	3.75" x 5"	$125
1/8 Page (Business Card)	3.75" x 2.5"	$ 85

If you wish to place an advertisement in the 1992 GCAGS TRANSACTIONS, please send your ad copy, payment, and any correspondence by May 20, 1992 to:

Brad Truett
Chairman, GCAGS Advertising Committee
Post Office Box 13403
Jackson, MS 39236-3403
(601) 957-2691

We can provide limited assistance with drafting of advertisements and we will also provide proofs for your inspection. Payment with your order will be greatly appreciated and will be promptly acknowledged. Please make checks payable to GCAGS 1992 Convention. Again, the deadline for getting your ad copy to the advertising committee is May 20, 1992. Thank you for supporting the 1992 TRANSACTIONS and the 42nd Annual Convention of the GCAGS.

AAPG ANNUAL CONVENTION

Calgary, Alberta, Canada

June 21 - 24, 1992

COACH FARES DISCOUNTED 35%

Call AMERICAN AIRLINES - 1 800 433-1790 (Meeting Services Desk)

reference STAR FILE # S 026277

SUPERSAVER FARES also available

based on availability with certain restrictions applying

SO CALL EARLY!

Also, if you have ever considered a vacation in the beautiful Canadian Rockies or Alaska (that's right Alaska) this may be your opportunity! Before or after Convention tour packages are available which include the Convention airfare. For more information and details call:

GIESBERG'S TRAVEL CONNECTION - tel.: 1 (713) 530-7291,
FAX: 1 (713) 530-1923.

Arranged by HGS Transportation Committee (in conjunction with Giesberg's Travel Connection) Gaylon Freeman - Chairman.

SPOONER ENERGY, INC.

OIL & GAS EXPLORATION

Deposit Guaranty Plaza
Suite 954
Jackson, MS 39201
(601) 969-1831
Fax (601) 353-4117

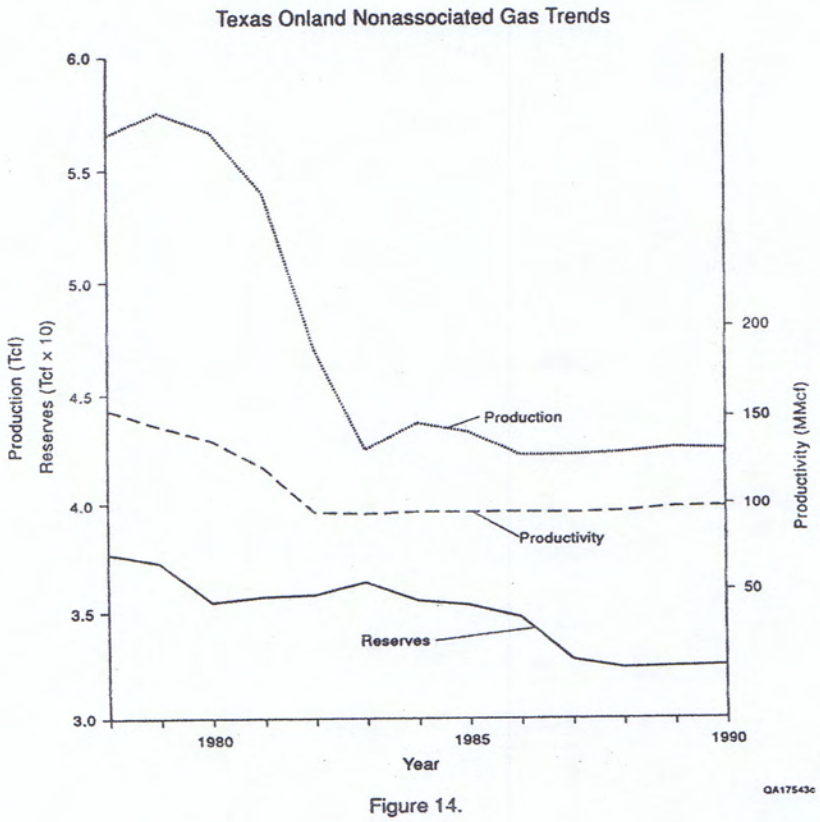


Figure 14.

Continued on page 15

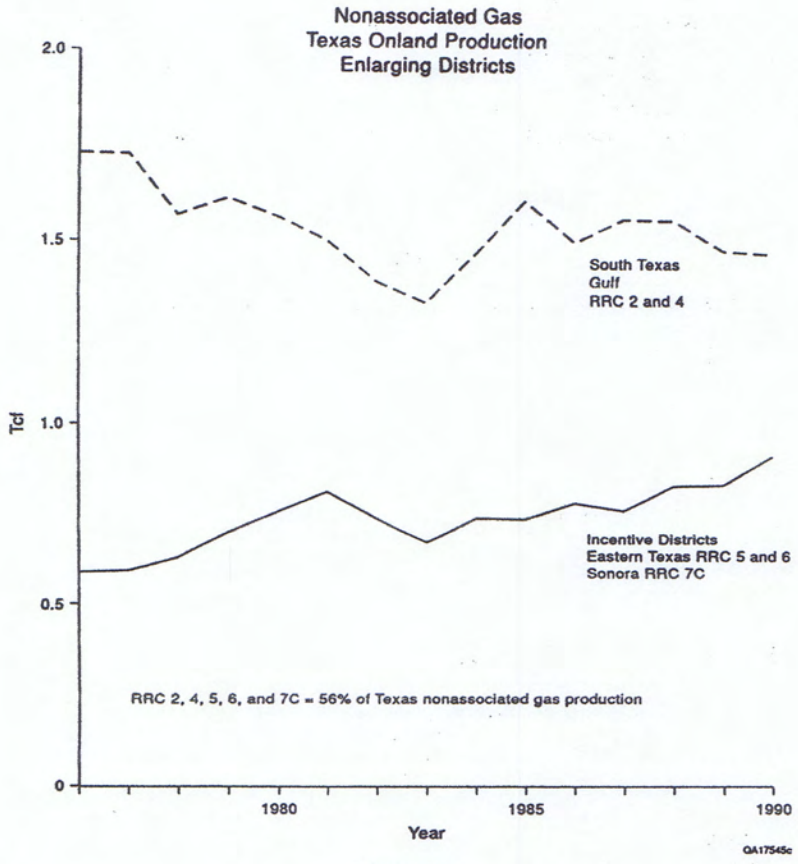

Nonassociated Gas
Texas Onland Production
Enlarging Districts
2.0
1.5
1.0
0.5
0
Tcf
South Texas
Gulf
RRC 2 and 4
Incentive Districts
Eastern Texas RRC 5 and 6
Sonora RRC 7C
RRC 2, 4, 5, 6, and 7C = 56% of Texas nonassociated gas production
1980
1985
1990
Year
QA17545c

Figure 15.

Table 4

Salient Trends in Texas Onland Nonassociated Gas

	Average 1981–85	1986–90	% Change
Wellhead price (1990$)	2.98	1.82	–40
Finding costs (1990$)	0.758	0.314	–60
Gas-well drilling	5,370	2,780	–48
Discovery wells drilled	1,003	363	–67
Recompletions	800	1,100	+38
Reserves added per completion (Bcf)	0.76	1.21	+59
Annual reserve additions (Tcf)	4.06	3.36	–17
Annual production (Tcf)	4.60	4.24	– 8

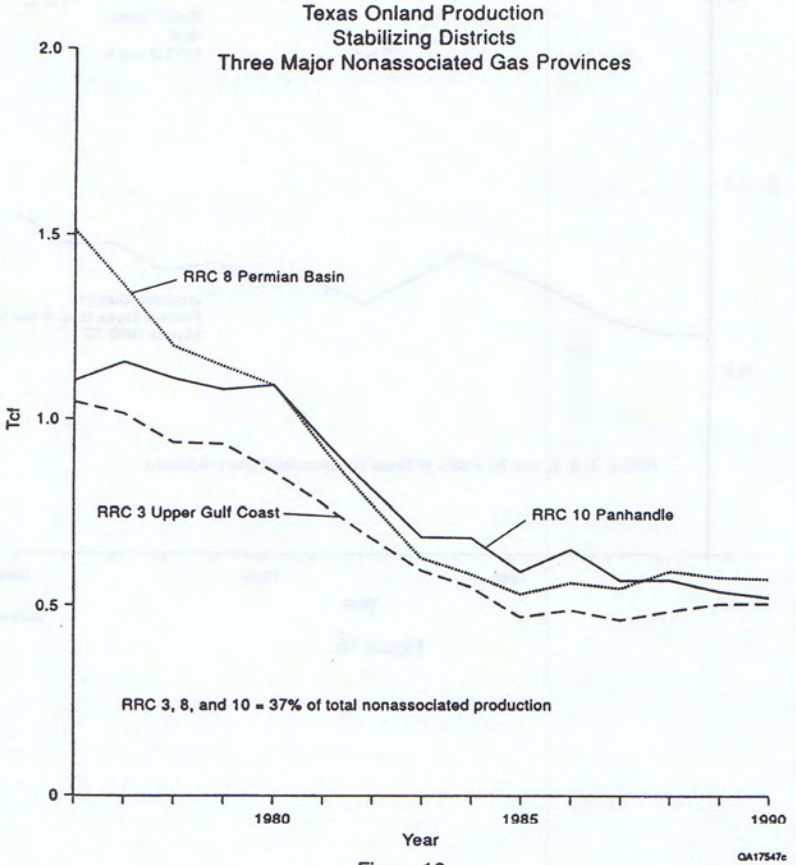


Figure 16.

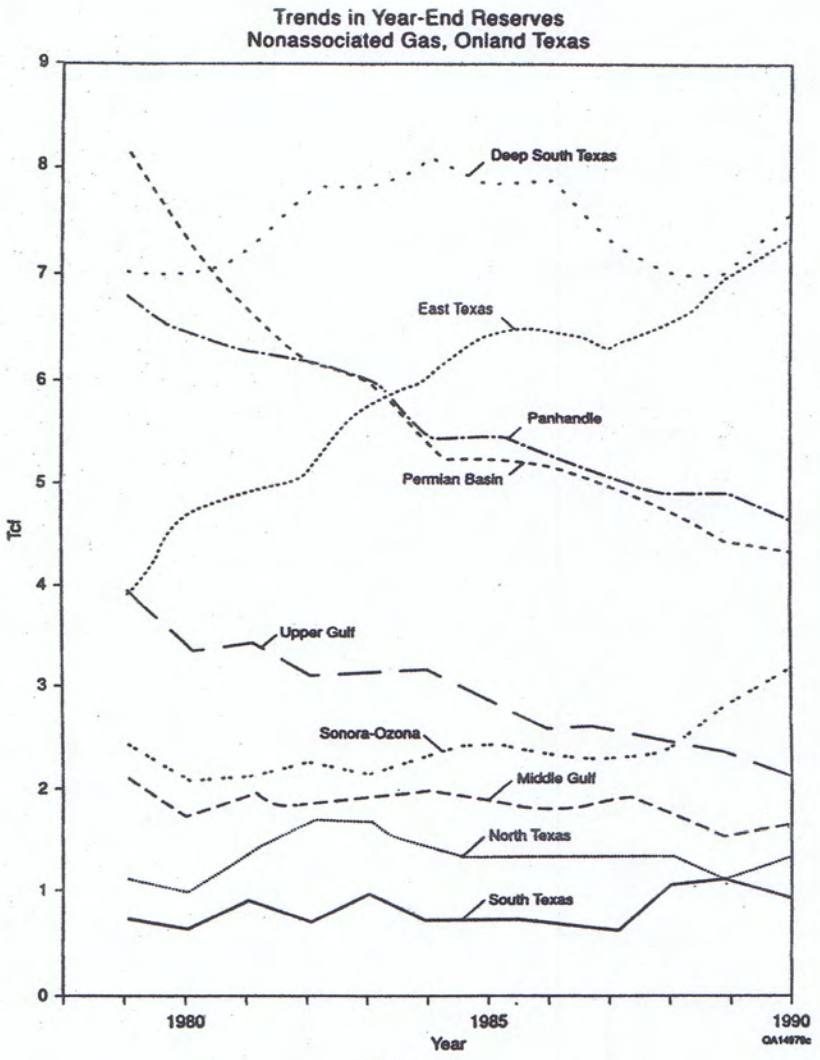


Figure 17.

Continued on page 20

PRELIMINARY ANNOUNCEMENT AND

CALL FOR PAPERS

4TH MULTIDISCIPLINARY CONFERENCE ON SINKHOLES AND THE

ENGINEERING AND ENVIRONMENTAL IMPACTS OF KARST

JANUARY 25-27, 1993

PANAMA CITY, FLORIDA

ABSTRACT DEADLINE: JUNE 15, 1992

MANUSCRIPT DEADLINE: SEPTEMBER 15, 1992 -- The Proceedings will be pre-printed as in previous conferences.

This conference brings together engineers, geologists, geographers, hydrologists, planners, and other environmental specialists, who are interested in the practical aspects of the unique hydrogeology of karst terranes.

For further information, contact: Dr. Barry F. Beck, Florida Sinkhole Research Institute, Research Bldg. Alpha, Univ. of Central Florida, Orlando, FL 32816 (tel: 407 823-5645).

REMINDER OF LOCAL SOCIETY MEETINGS

SIPES
Regular Meeting 1st Thursday of Month, 11:30 a.m.
Petroleum Club

SPE
Petroleum Club Smackover Room, 11:30 a.m.
$10, reservations not required
Spring Golf Tournament May 7 at Shady Oaks, Everyone Invited

MAPL
2nd Monday of Month,
5:30 p.m. at Primos Northgate
For Reservations call 352-0662 or 352-7782

D & D
1st Wednesday of Month, except July - 12:00 noon at Petroleum Club
Rosemary Jenkins, 355-1578

MIPRO

GEOPHYSICAL SOCIETY
4th Wednesday of Month
11:30 a.m. at Petroleum Club. Reservations not required

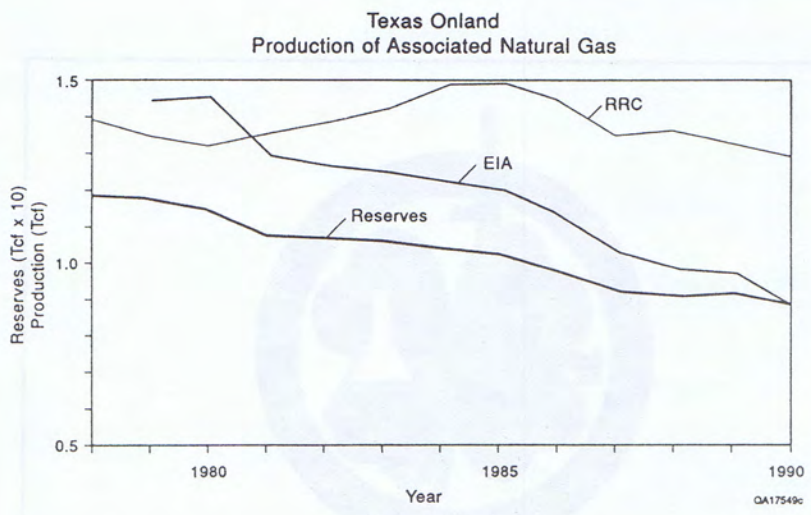


Figure 18.

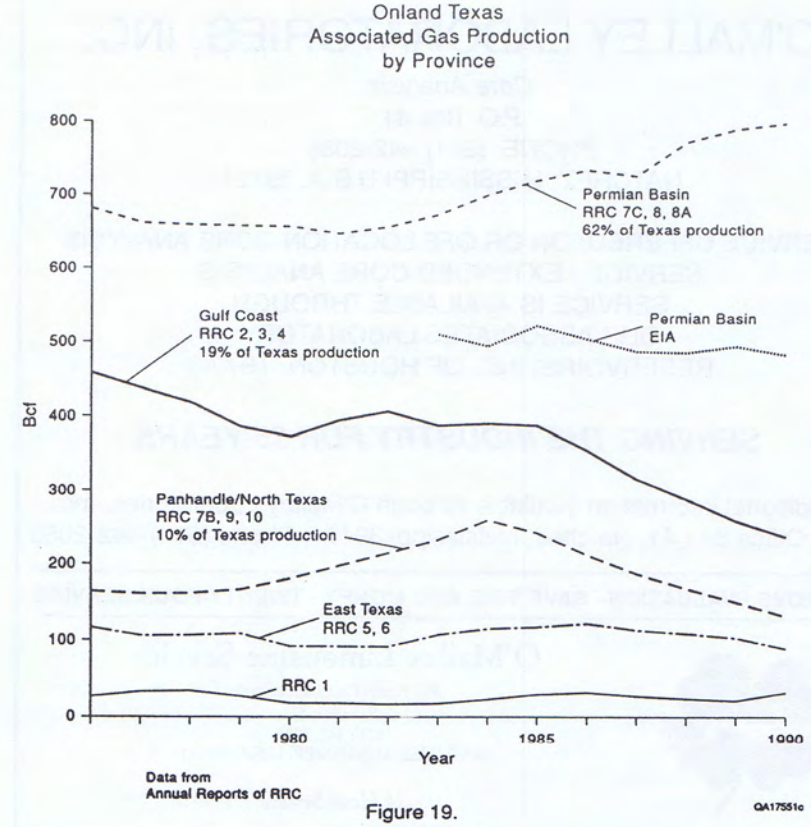


Figure 19.

Annual production is also down, but by a margin less than decline in reserve additions and much less than drilling activity. Recompletions are up. Most significantly, reserve additions per completion are up about 60 percent, and finding costs have been reduced by a like percentage.

Associated Gas

Year-end reserves of associated gas have declined slightly over the past decade from about 11 to 9 Tcf. Production of associated gas (as reported by EIA) has generally followed trends in year-end reserves. Production reported by the TRC is gross production including reinjected associated gas production and enhanced oil recovery injection of carbon dioxide and flue gas, all recirculated (Figure 18). The major associated-gas-producing region of the State is the Permian Basin, where gross production represents 62 percent of the gross production of the State. Gross production in the Basin has increased significantly since the early 1980's, reflecting the strong reserve growth activity in oil production. Almost 300 Bcf of gross production reported by the RRC is reinjected gas or flue gas and carbon dioxide associated with improved oil recovery (Figure 19). Actual marketed production is about 500 Bcf, or half the State total production. Permian Basin marketed production, almost all from oil reserve growth, has held steady over most of the past decade and is expected to remain so as long as the significant oil reserve growth potential of the Basin is pursued.

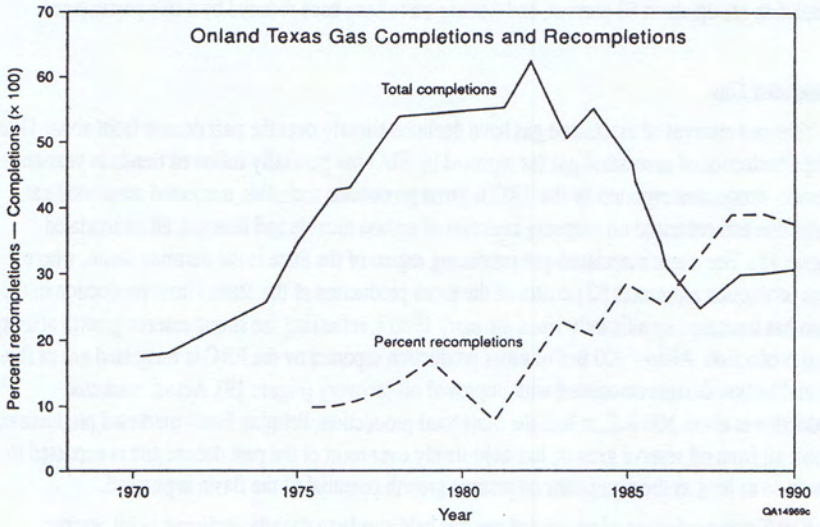
East Texas production of associated gas has held steady to slightly declining as oil reserve growth in the district nearly offsets the decline in associated gas production from the giant East Texas oil field (Figure 19). Associated gas production in the Gulf Coast as well as North Texas and the Panhandle has been declining since the middle 1980's. With high-efficiency oil reservoirs of the Gulf Coast limiting oil reserve growth potential, associated gas production from the Gulf Coast will most likely continue to decline. North Texas and the Panhandle have the potential to stabilize and possibly increase slightly, but not at the rate of the early 1980's (Figure 19).

Total Reserve Pattern

Overall reserves now compared with the late 1970's are up substantially in the tight gas incentive districts (Figure 20). In the Upper Texas Gulf Coast Basin year-end reserves are down substantially; decline will continue but at a much reduced rate. Year-end reserves are up slightly in RRC Districts 1, 4, 8A, and 9 and are down slightly in Districts 7B, 8, and 10 (Figure 20).

Gas Drilling Mix in Texas

The trends in numbers of annual gas-well completions in Texas over the past decade expectedly have closely reflected trends in average prices (Figure 21). As a percentage of the total mix, extension and infill drilling have held relatively steady or slightly declined, new-field wildcats have fallen, and recompletions have increased substantially (Figure 21). An unfortunate casualty of the gas price collapse of the late 1980 s has been the critically important wildcat drilling (Figure 22). With wellhead prices at the $2.50 to $3.00 (1990$) range in the first half of the 1980's, successful wildcat completions were consistently near 25 percent of the total new-well completions made. With the decline in prices, both average and spot, wildcat completions fell and are now only one-fourth the early level and, as a percentage of total new-well completions, have fallen to about 12 percent (Figure 22).


Onland Texas Gas Completions and Recompletions
Total completions
Percent recompletions
Percent recompletions — Completions (× 100)
0
10
20
30
40
50
60
70
1970
1975
1980
1985
1990
Year
QA14969c

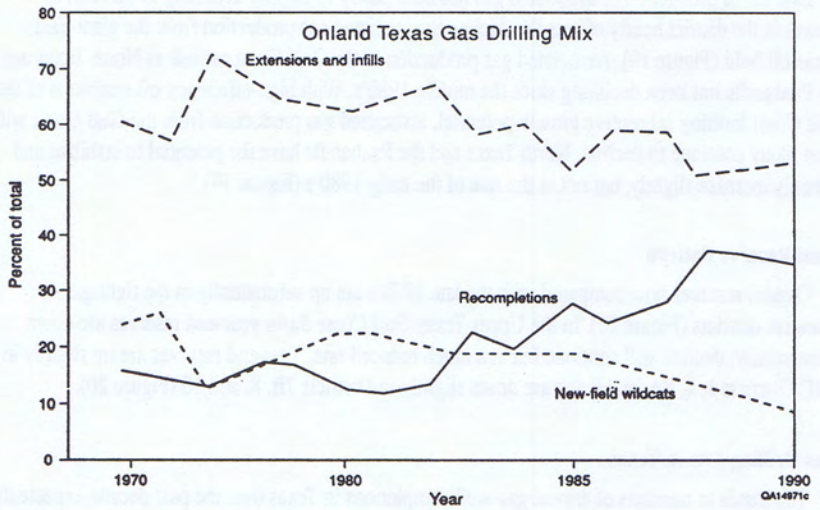

Onland Texas Gas Drilling Mix
Extensions and infills
Recompletions
New-field wildcats
Percent of total
0
10
20
30
40
50
60
70
80
1970
1980
1985
1990
Year
QA14971c

Figure 21.

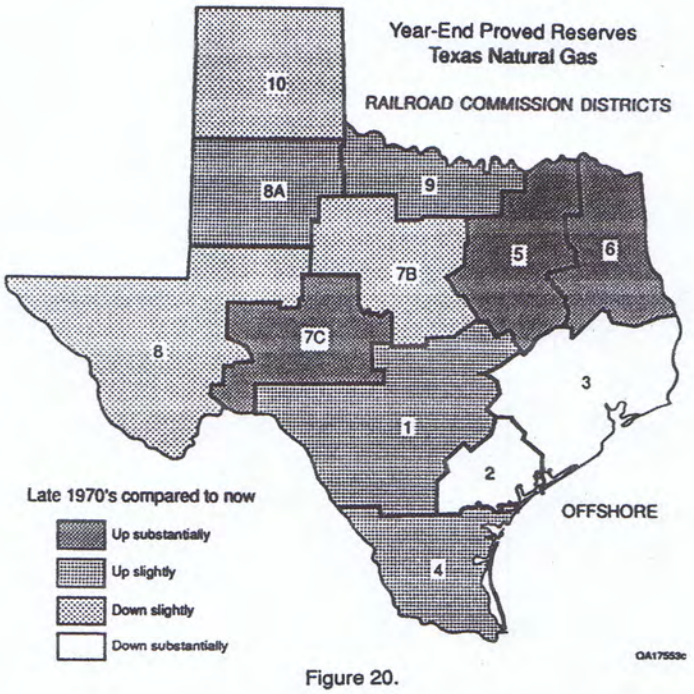


Figure 20.

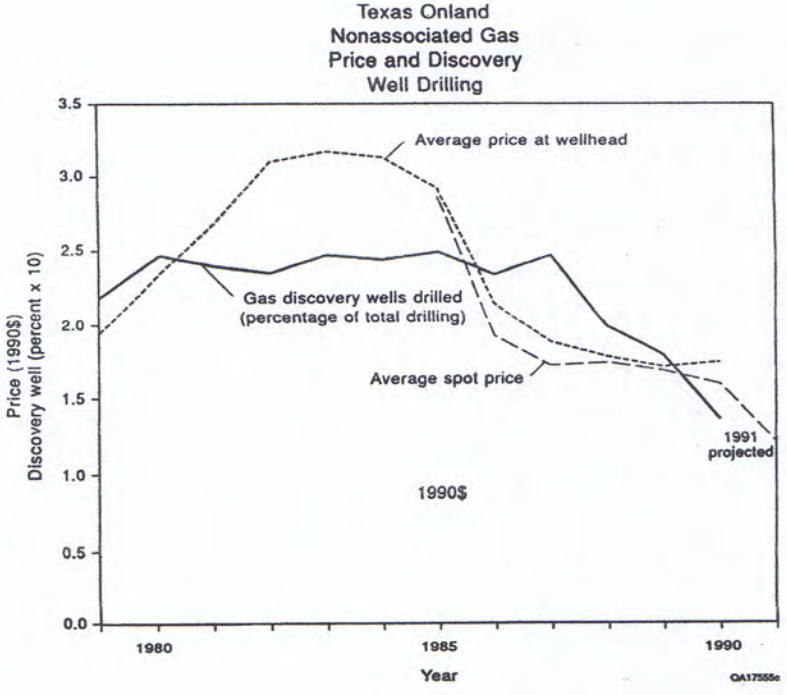


Figure 22.

Finding Rates and Finding Costs

A remarkable part of the story of Texas natural gas over the past five years and indeed over the past decade is trends in finding rates and costs. In the last half of the 1980's average gas prices fell by half, reducing overall gas well drilling by a like amount. Expectedly annual reserve additions fell but only by 17 percent, whereas they should have fallen by one-half. The basis for this apparent disparity is the significant increase in the volume of gas added per completion. In the early 1980's the average rate was about 0.8 Bcf per completion; the trend line now stands at about 1.7 Bcf, or double (Figure 23). Average well productivity, in sharp decline during the 1970's and early 1980's, stabilized and is now increasing. Part of the increase and particularly the almost exponential increase in finding rate of the past five years has come from more selective drilling with fewer wells. But the trend was well under way in the early 1980's (Figure 23) and to a great extent reflects improved technology and improved geologic understanding in deploying the technology.

The improved finding rate along with reduced drilling costs and the significant increase in relatively low cost recompletion strategies has had a major impact on finding cost. These costs now stand at 25 percent of those of 1979, calculated in real terms. Again, this decline has been stronger in the last half of the 1980's, reflecting improved finding rates, but it is a trend all across the decade (Figure 24).

Average wellhead prices as well as spot prices have fallen, but until the past couple of years, not as far as finding costs—one of the reasons drilling, reserve additions, and supplies have maintained. Two points are relevant: First, the significant price deterioration in 1991, if not reversed, will continue to have significant impact on the margins. Second, while the spread between costs and wellhead value has maintained during most of the last half of the 1980's, the average price now is less than the price needed for a reasonable return, for average finding costs of gas developed prior to 1987.

Texas Supply Outlook

Anticipated natural gas production in Texas in year 2000 will most likely be only marginally different from the average production of the past years. If current trends persist, that is, if some means of tax credit incentives remain and real prices (1990$) fall in the $1.50 to $1.75 range, Texas gas production will have declined 7 percent by 1995 and 13 percent by year 2000 (Table 5). However, assuming real gas prices of $2.00 or more and oil prices of $25.00 (1990$), 1995 production will be up 8 percent and by year 2000 should be up 3 percent. Under either of the price assumptions, nonassociated gas will fare substantially better than associated gas production.

By district, production from the tight gas districts (RRC 5, 6, and 7C) is expected to be up 20 percent or more (Figure 25). Districts 1, 2, and 10 are projected to be down by 10 to 20 percent. All other districts of the State will see production at year 2000 equal to or slightly less than the average of the past five years.

The Natural Gas Resource Base

With the dramatic shifts in natural gas trends over the past decade, a number of estimates of the resource base have been made beyond those historically made by the U.S. Department of the Interior and the Potential Gas Committee, an industry-based estimating group. The DOE published estimates

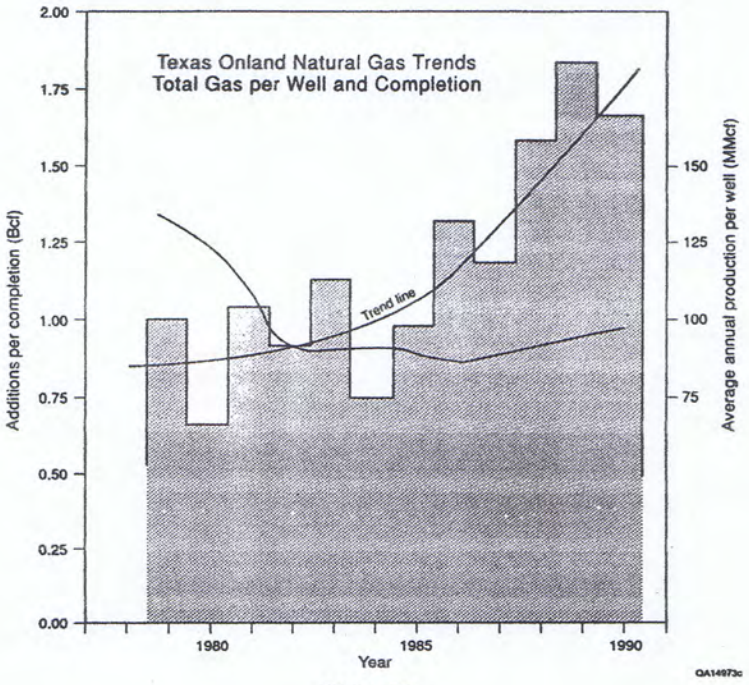


Figure 23.

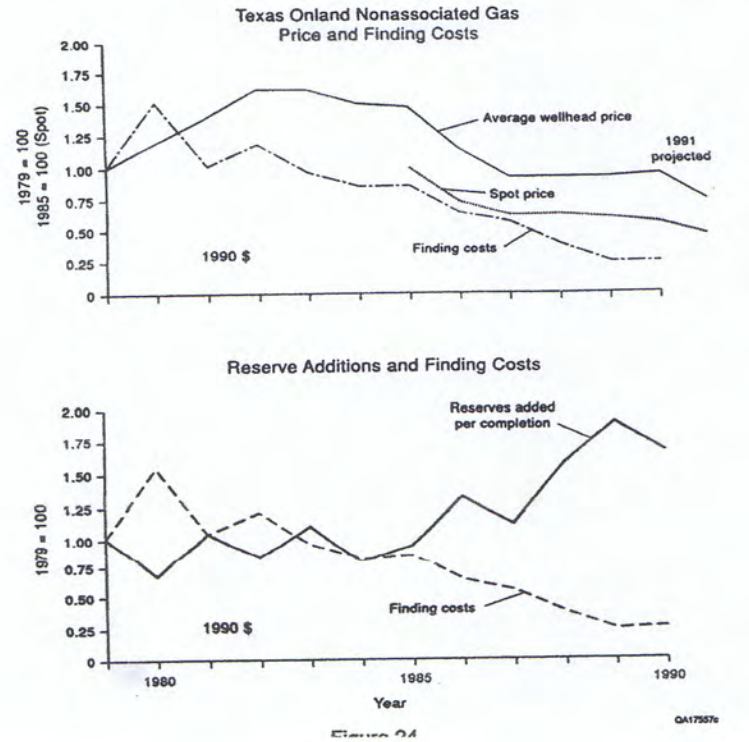


Figure 24.

in their watershed report of 1988 and again in 1991. Enron Corporation published estimates in 1989 and 1991. Recent estimates also have been made by the American Association of Petroleum Geologists, the Texas Govenor's Energy Council, the Gas Research Institute, the National Research Council, and the Energy Information Administration. The average of the recent estimates, under applicable assumptions, is shown in Table 6; most estimates assumed prices in 1988 or 1989 dollars. With existing technology and $3 prices the consensus of the remaining resource volume is about 570 Tcf, equivalent to more than 30 years' supply at current levels. The onland Texas portion is here projected to be 152 Tcf, or about one-quarter of the total. At $3 prices but with assumptions of advanced technology, the consensus estimate exceeds 900 Tcf, 60 percent more than at the same price with existing technology; such reflects the consensus of strong sensitivity to technology. The Texas portion is judged to be about 236 Tcf, or one-quarter of the total. Finally, the EIA calculates an economically recoverable resource base, assuming advanced technology and exploration and development access, of 1,263 Tcf. This estimate does not include exotics like geopressured-geothermal methane and hydrates. The Texas portion is pegged at 333 Tcf, an amount exceeding the historical cumulative production of the State.

Texas Compared with the Nation

Historically, onland Texas has constituted one-third of the natural gas activity of the lower 48 states. At present, the State provides 27 percent of U.S. lower 48 production and holds 25 percent of the proved reserves. Annual reserve additions for Texas make up about 25 percent of lower 48 additions. Over the long term Texas should continue to make up about one-quarter the lower 48 action and will contribute about 30 percent of ultimate production.

Based on reserve growth rates and volume and ratio of production to reserve addition, the main natural gas provinces of the Nation can be ranked relatively (Figure 26). The highest ranked provinces are the offshore Gulf of Mexico, East Texas, Oklahoma, and certain of the Rocky Mountain basins of Wyoming and New Mexico. The Michigan and Williston Basins as well as the onland California Basins are ranked low chiefly because of relatively low volumes. Louisiana, especially South Louisiana, has historically been a major gas province. But in the last decade-and-a-half, average annual reserve growth in South Louisiana has been a mere 0.6 percent, and reserves added have equaled only 50 percent of production. The rest of the gas provinces have maintained average relative rank, including the large Gulf Coast and Permian Basins (Figure 26).

In comparing rank of Texas gas provinces with relative position nationally in 1979 and 1990, Texas offshore, East Texas, North Texas, and Sonora-Ozona have gained substantially (Figure 27). Southwest and deep South Texas have held or even gained slightly. The Panhandle, Permian Basin, and the middle Gulf Coast have seen slight losses, and the Upper Gulf has seen a moderate loss of relative status.

Conclusions

The long-term resource and supply outlook for natural gas in Texas as in most of the rest of the Nation is good and vastly improved from the outlook of the middle and late 1970's. Chief among the positive points are the near universal judgment of an ample resource base and the technological amenability of the resource base to provide relatively low cost gas. The potential of conventional reserve growth is positive particularly in maintaining certain of the more mature gas provinces.

Continued on page 29

Table 6

Texas Onland Natural Gas Resources (Tcf) Compared with Average of Recent U.S. Lower 48 Estimates*

	Existing Technology $3/Mcf		Advanced Technology $3/Mcf	
	U.S. 48	Texas	U.S. 48	Texas
To-be-discovered	165	33	195	39
Reserve growth	152	61	264	106
Unconventional	85	17	280	50
Proved reserves	169	41	169	41
Totals	571	152[1]	908	236[2]

Texas Economically Recoverable Natural Gas Resource Base Compared with EIA Estimate of Lower 48 Economically Recoverable Base

	U.S. 48	Texas
To-be-discovered	326	65
Reserve growth	265	152
Unconventionals	503	75
Proved reserves	169	41
	1,263	333[3]

*Recent national estimates

AAPG 1989
EIA 1990
GRI 1989
PGC 1989, 1991
DOE 1988, 1991
DOI 1989
Enron 1989, 1991
NRC 1990
Texas Governor's Energy Council 1990

[1]56 percent of cumulative production
[2]86 percent of cumulative production
[3]122 percent of cumulative production

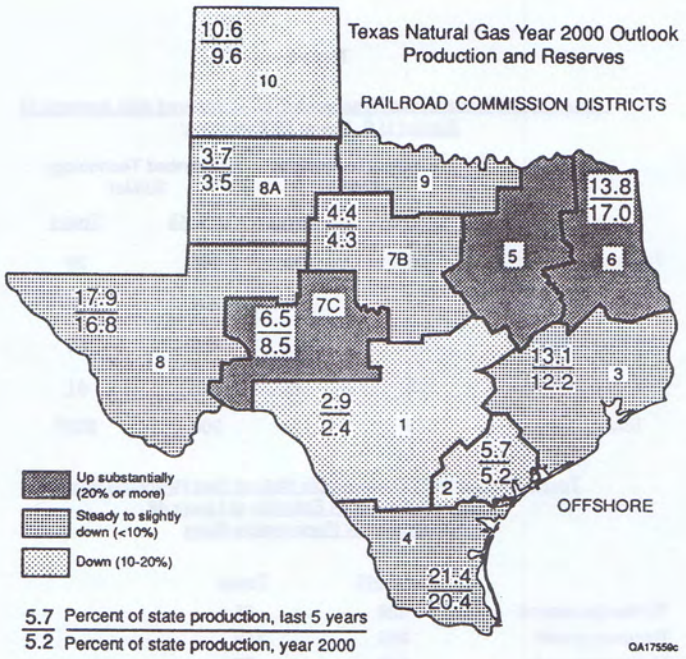

Texas Natural Gas Year 2000 Outlook
Production and Reserves
RAILROAD COMMISSION DISTRICTS
10.6
9.6
10
3.7
3.5
8A
9
4.4
4.3
7B
13.8
17.0
5
6
17.9
16.8
8
6.5
8.5
7C
13.1
12.2
3
2.9
2.4
1
5.7
5.2
2
OFFSHORE
4
21.4
20.4
Up substantially (20% or more)
Steady to slightly down (<10%)
Down (10-20%)
5.7 Percent of state production, last 5 years
5.2 Percent of state production, year 2000
QA17559c

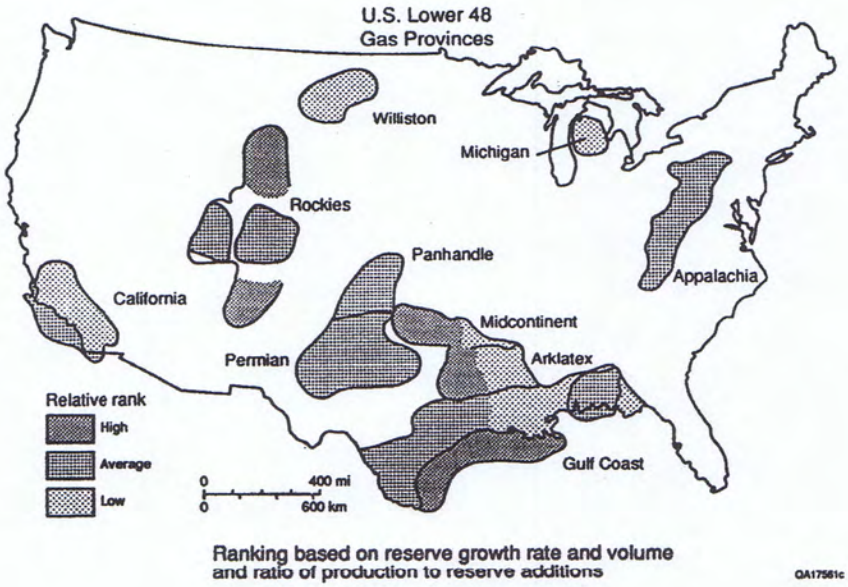
Figure 25.

Table 5

Projections of Natural Gas Production Onland Texas

	Projected change (%)			
	Current trends		Improved prices[1]	
Average production (last 5 years)	1995	2000	1995	2000
Associated gas (1,295 Bcf)	–23	–31	–2	–10
Nonassociated gas 4,220 Bcf	–2	–8	+11	+7
Total gas 5,515 Bcf	–7	–13	+8	+3

[1]Assumes gas price of $2.50 and oil price of $25.00 (1990$)



Ranking based on reserve growth rate and volume and ratio of production to reserve additions

QA17561c

Figure 26.

Critically, reserve additions per completions, expected in the 1970's to decline exponentially, are actually increasing and in recent years increasing at a near exponential rate. Coupled with other factors, increased finding has significantly reduced finding costs. The existence of a major collective research by the GRI is a substantial asset. All these basic and fundamental trends and factors speak to the long-term health of the U.S. and Texas gas industry.

But there are some dark clouds now and in the near term. Demand is soft and likely to remain so in the near term. Whereas decline in finding costs has largely offset decline in price, the recent price drop is squeezing margins tightly even for gas recently found. For much of the gas developed into producible reserves in the late 1970's through the middle 1980's, the needed minimum price to produce is higher than current average and spot prices. While reserves added have generally equaled production, in some districts additions are lagging production significantly, a sign of inevitable decline. Too few wells are being drilled especially in the category of new-field wildcats. Incentives to maintain exploration at some reasonable rate would help assure that future natural gas production would meet increased demand.

In sum, the mid-term and long-term futures are bright if increased demand materializes. Some bright spots exist for the short term, but in many cases the short-term situation for many producers is one only to be survived.

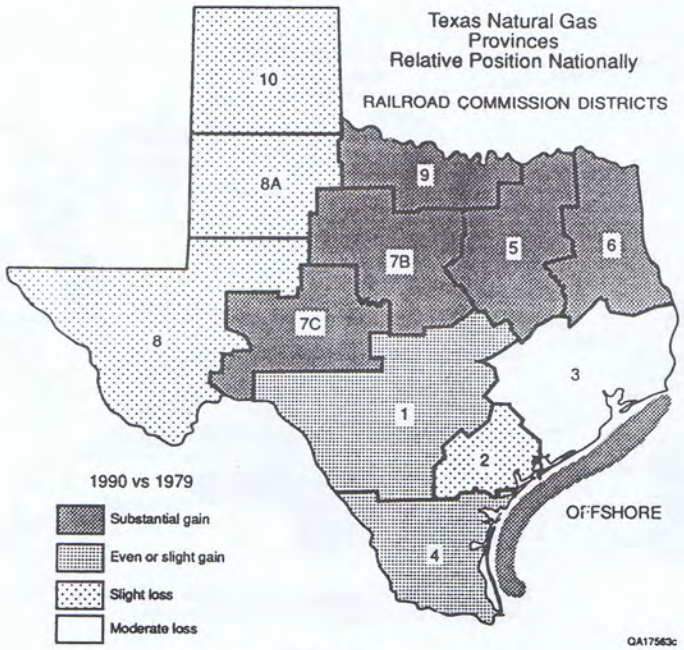


Figure 27.

AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS ANNUAL CONVENTION

HOST SOCIETY: CANADIAN SOCIETY OF PETROLEUM GEOLOGISTS
WITH: SEPM (SOCIETY FOR SEDIMENTARY GEOLOGY)

January 30, 1992

MEMORANDUM

TO: Society Newsletter Editors

FROM: Randa L. Reeder, Convention Department

RE: 1992 AAPG Annual Convention

Please include the following information in your Calendar of Events:

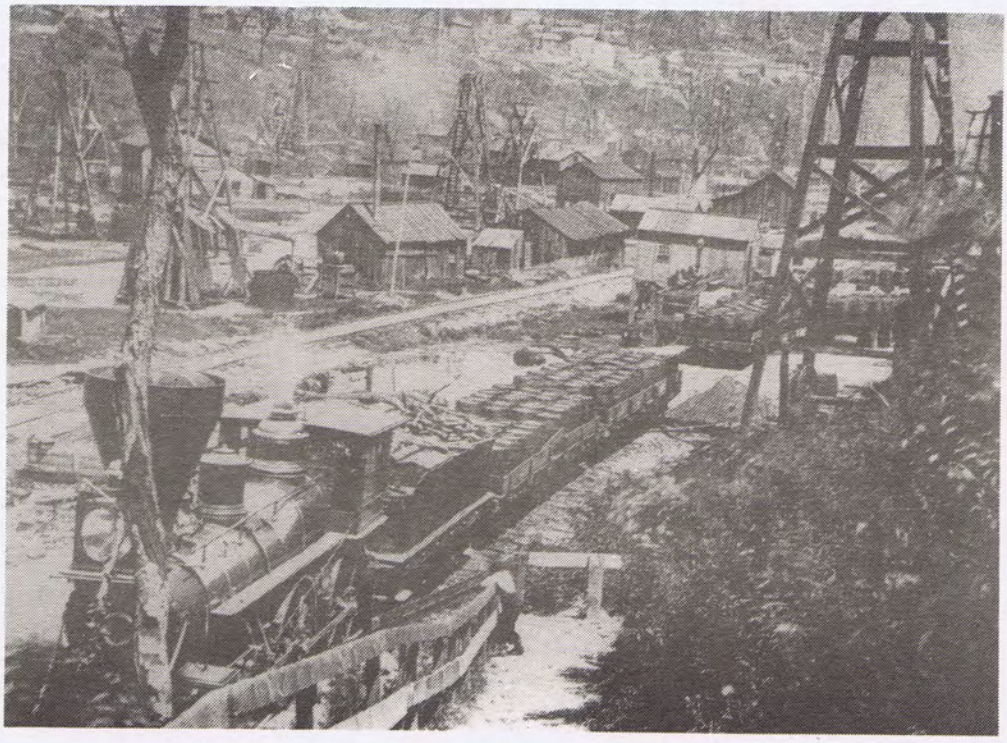
The 1992 Annual Convention of the American Association of Petroleum Geologists will be held June 21-24, in Calgary, Alberta. The theme of this year's meeting is "Environments of Exploration."

More than 300 oral presentations will be offered in six concurrent sessions and 50 poster presentations per half day.

For a copy of the convention announcement, please contact AAPG Convention Department, P.O. Box 979, Tulsa, OK 74101, (918) 584-2555.

MISSISSIPPI GEOLOGICAL SOCIETY

Volume XXXX No. 9 May, 1992



MISSISSIPPI GEOLOGICAL SOCIETY
1991-92

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Michael A. Noone, 1st Vice President (856-7641).....Independent
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Brad Truett, Program (957-2691).....Independent
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AAPG.....Steve Walkinshaw (93), Paramount
AAPG.....Gerald Kinsley (94), Independent
AAPG.....Dave Cate (94), Pruet Oil Col.

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Emil Monsour
William H. Moore
Marvin E. Norman
Richard R. Priddy*
Thurston Connell Rader
Baxter Smith*
Henry Toler*

* Deceased

BUSINESS MEETING LUNCHEON

May 12, 1992 • 11:30 a.m.

Capitol City Petroleum Club, Smackover Room

Deltaic Processes

By John B. Echols

Basin Research Institute, LSU

Deltas are usuallly classified as either: 1) constructive, or, 2) destructive. In a constructive delta, fluvial processes dominate, and in the destructive delta the destructional processes of sediment reworking and redistribution by wave and tidal action dominate. Three processes control delta geometry and sand/shale facies framework: 1) sediment input, 2) available wave energy, and 3) available tidal energy. All three are strongly influenced by the relative rise and fall of sea-level.

Dominate fluvial processes are usually recognized as 1) narrow, straight, distributary channels with accompanying overbank bayfill facies, and 2) distributary mouth bars. Overbank bayfill sediment fills large interdistributary bay areas between or flanking distributary channel systems and include areally smaller crevasse splay deposits. Both are commonly associatedwith capping lignites (coals), or organic rich shales, or their subaqueous facies equivalent, burrowed, sideridic sandstone. The distributary channel and mouth bar framework of a forming delta is welded together by the interfingering, overlapping, and vertical stacking of interdistributary bayfill facies.

A fundamental distinction exists between distributary channels and distributary mouth bars. The narrow distributary channel of the constructive delta scours into older pre-existing delta lobe(s) deposits of the delta plain, and is flanked by the overbank bayfill facies. The wider distributary mouth bar progrades into the waters of the receiving basin over prodelta muds and may bring with it an oil rich subaqueous levee facies.

Dominate wave and tidal processes of the destructive delta system produce strike oriented sand facies deposited as transgressive barrier bars or coastal barriers. Commonly associated facies are lagoonal shales. Dip oriented facies are meandering delta plain distributary channels and tidal channels associated with estuarine or drowned river mouth environments.

VITA

John B. Echols was born in New Albany, Union Co., Mississippi, February 23, 1937. Echols attended through Central High School in Jackson, Mississippi, graduating in 1955. He attended Mississippi State University 1955-57, transferring to Millsaps College, Jackson, Mississippi, where he graduated in geology with a B.A. in 1959. After Millsaps, he attended the University of Missouri from 1959-1961, receiving the Masters Degree in Geology. From 1961-66 he attended Louisiana State University working toward to Ph.D. In 1966, Echols went to work for the Humble Oil and Refining Company as an Exploration and Production Geologists until 1970, when he became an independent geologist working the Wilcox trend of Louisiana and southwest Mississippi. Echols continued as an independent until mid 1990 when he became the Director of the Basin Research Institute, Louisiana State University, Baton Rouge, Louisiana, where he is currently employed.

Candidates for Mississippi Geological Society Officers 1992-1993

FIRST VICE PRESIDENT

Brian Sims

Education: Millsaps B.S. Geology 1982
Experience Clayton Williams, Jr., Inc. 1981 - 1990
Consulting Geologist 1991-present
AAPG, MGS, HGS,-Advertising Comm. Chair 1991-92

Stanley King

Education: Millsaps BA 1974
Mississippi State Univ. BS Geology 1979
Experience Mississippi Oil & Gas Board 1979-80
TXO Prod. Corp 1980-83
Independent 1983-Present
AAPG, MGS, HGS, MGS-Treasurer 1985-86,
Secretary 1986-87, 1st V.P 1987-88,
President 1988-89, ECAGS Treasurer 1992

SECOND VICE PRESIDENT

Jack Moody

Education: East Carolina U. BS Geology 1970
LSU, Graduate Work Geology 1970-72
Experience: High School Teacher 1972-73
Shenandoah Oil Corp. 1973-79
Western Reserves Oil Co. 1979-86
M & P Exploration 1986-89
Mississippi Office of Geology 1989-Present
AAPG, MGS

TREASURER

John Warner

Education: USM BS Geology 1982
Experience: Downhole Data, Inc. 1983-86
the Mudlogging Company, Inc. 1986-90
Mississippi Office of Geology 1990-Present
MGS

Ed Hollingsworth

Education: Univ. of Alabama BS Geology 1977
Experience: Dresser Atlas 1977-79
Pruet Oil co. 1981-83
Moon & Hines 1983-Present
AAPG, MGS, MGS-Secretary 1988-89,
Committee Chairman 1986-88

SECRETARY

Andy Sylte

Education: Florida State University BS Geology 1982
Experience: Hughes & Hughes 1982-89
Prairie Producing co. 1989-90
Independent Geologist 1990-Present
AAPG, MGS, FLIPPA, IPAA
MGS Projection Comm, Committee Chair
1992-GCAGS Conv.

Larry Baria

Education: NE Louisiana State/BS Geology 1967
NE Louisiana State MS Geology 1969
LSU Ph.D. Studies Geology 1973
Experience: Ark. Geol. Comm. U.S. Forest Service,
Clay Durham and Assoc. 1971-74
Getty Oil co. 1974-76
Enserch Exploration 1976-79
Consulting Geologist 1979-Present
AAPG, MGS, SIPES, SEPM, IAS, JGS
Committee Chair 1992 GCAGS Conv.

The Election will be held at the May business luncheon.
Winners will be announced at the Spring Fling.
Contact Rick Ericksen if you need an absentee ballot.

MGS QUESTIONNAIRE RESPONSE

Per the recent survey conducted by the Mississippi Geological Society, the following is a synopsis of the more salient questions which were included in that survey.

Thirty six (36) MGS members responded to the survey, and all of the following percentages etc. are based on that group of respondents. When questions were not answered with the requested yes or no answer, the response was not tabulated. Otherwise, all responses were included in the following report.

Of the thirty six (36) respondents, 29 members live in the state of Mississippi, and seven (7) are located outside the state. The youngest MGS member responding to the survey is 29 years old and the oldest is 76. The average age of the "typical" MGS member is 48.5 years old. Twenty (20) percent of the members intend to retire within the next five (5) years, with the average retirement age calculated to be exactly 65 years of age. Additionally, one (1) member is currently semi-retired, and one (1) member now is fully retired.

As for those who reported annual compensation, the lowest income was $3,000/year and the highest was $150,000/year. The average income, calculated by removing the lowest and highest reported yearly compensation, is $31,150/year.

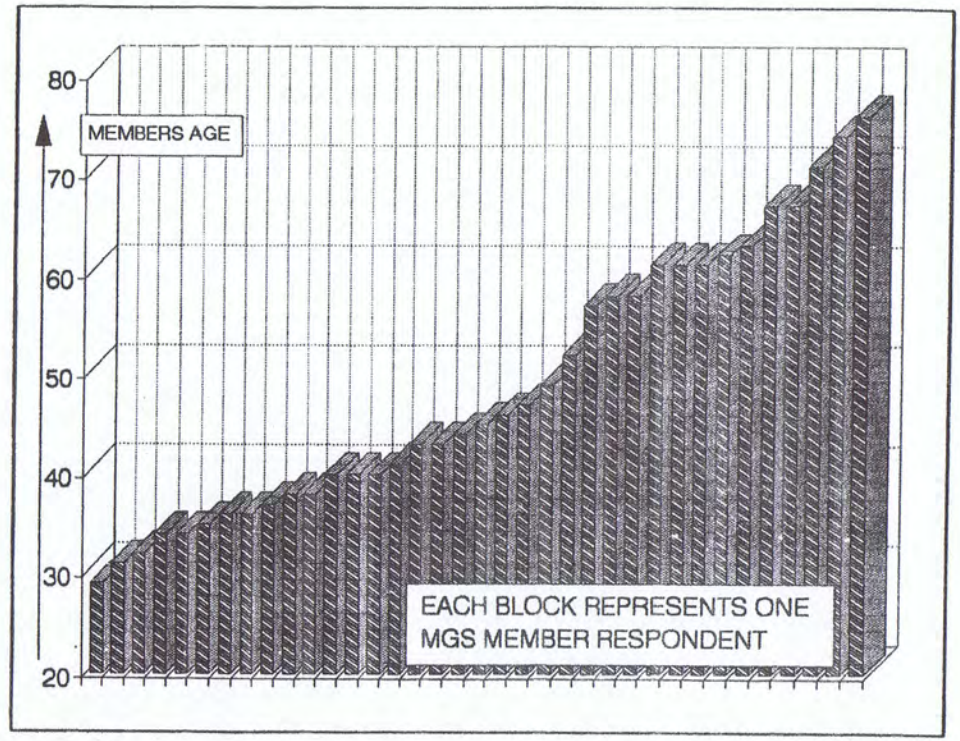
Two other key questions which should be of interest to the membership were those concerning (1) changing jobs within the profession, e.g. petroleum geologist to environmental geologist; and (2) changing careers and leaving the geological profession. Per the survey, nineteen (19) percent anticipate changing jobs and remain in the geologic profession. Interestingly enough, no one, zero (0) percent anticipated leaving the geological profession.

In response to MGS Noon Meetings, sixty six (66) percent wanted to hear talks concerning concerning hydrogeology, environmental issues, geologic site assessment etc. Further, fifty six (56) percent are currently self-employed, fifty (50) percent are employed by the government/industry, and fourteen (14) percent are both self-employed and are also employed by government/industry.

Probably the most debated question contained in the survey was that concerning state registration of geologists. The results are as follows, out of those responding sixty four (64) percent are in favor of some form of registration, and the remaining thirty six (36) percent are against registration.

The following graph is a visual breakdown of the age of the respondents to this survey. I would like to take this opportunity to thank those who took the time to fill out the questionnaires. The information obtained will hopefully help guide the MGS.

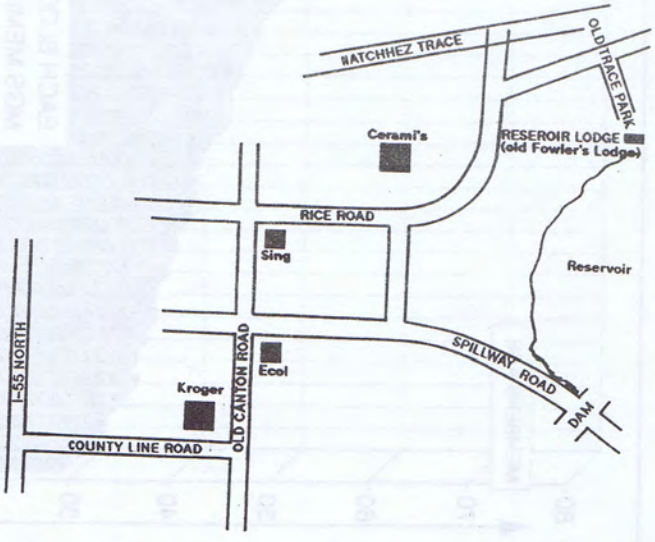
Rick L. Ericksen, Secretary


80
MEMBERS AGE
70
60
50
40
30
20
EACH BLOCK REPRESENTS ONE
MGS MEMBER RESPONDENT

SPRING FLING

Thursday May 14
Reservoir Lodge

Festivities 4:30 p.m.
Dinner 6:00 p.m.



$7.00 per person
$5.00 student

The New Orleans Chapter of SPWLA is sponsoring a seminar on the evaluation of Low Contrast Hydrocarbon bearing reservoirs. Details are as follows:

LOW CONTRAST PAY SEMINAR
Sponsored by:
The New Orleans Chapter
of
The Society of Professional Well Log Analysts

THURSDAY, AMY 21, 1992
8:00 AM - 4:00 PM
AT THE PETROLEUM CLUB OF NEW ORLEANS

$30.00 PER PERSON FOR FULL DAY, INCLUDES LUNCH
$16.00 PER PERSON FOR LUNCH SPEAKER ONLY

for reservations or further information
Contact Linda Hart at (504) 569-3552
Jim Oberkircher at (504) 525-7737 or Fred Palumbo at (504) 522-2020

The seminar will consist of talks and technical presentations given by Log Analysts with Gulf of Mexico and International experience. there will be a wide variety of topics ranging from modeling of Low Contrast pay responses to practical application and examples of evaluation data. Audience participation will be welcomed and encouraged as floor discussion will be the heart of this seminar.

GEOLOGICAL SOCIETIES

DALLAS GEOLOGICAL SOCIETY
Dean Thomas - Employee Committee Chairman (214-715-8716)
Send Resume To: Dallas Geological Society
4925 Greenville Avenue
Suite 170
Dallas, Texas 75206
Attn: Dean Thomas

EAST TEXAS GEOLOGICAL SOCIETY
Charles Doubek - President (903-593-5221)
Send Resume To: Darrow-Shaver Resources
P.O. Box 216
Tyler, Texas75710
Attn: Charles Doubek

HOUSTON GEOLOGICAL SOCIETY
Joe Cubanks- Personnel Placement Chairman (713-367-8679)
Send Resume To: Houston Geological Society
71 71 Harwin
Suite 3 14
Houston, Texas 77036
Attn: Personnel Placement Committee
"Must be a member of the Houston Geological Society."

EMPLOYMENT PERSONNEL

LAFAYETTE GEOLOGICAL SOCIETY
Joe Phillips - Employment Assistance (318-232-6841)
Send Resume To: Lafayette Geological Society
P.O. Box 51896
Lafayette, Louisiana 70505
Attn: Joe Phillips

MISSISSIPPI GEOLOGICAL SOCIETY
Rick Ericksen- Secretary(601-961-5507)
Send Resume To: Mississippi Geological Society
P.O. Box 422
Jackson, Mississippi 39205-0422
Attn: Rick Ericksen

NEW ORLEANS GEOLOGICAL SOCIETY
Robert Murphy- Employee Chairman (504-568-0111)
Send Resume To: New Orleans Geological Society
P.O. Box52172
New Orleans, Louisiana 70152-9989
Attn: Robert Murphy

SHREVEPORT GEOLOGICAL SOCIETY
Glen Kelly- EmployeeChairman (318-222-0649)
Send Resume To: Hurley Petroleum
619 Market Street
400 Petroleum Building
Shreveport, Louisiana71101
Attn: Glen Kelly

DEQ Library Newsletter

Number 1, March 1992

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY / GEOLOGY - LAND AND WATER - POLLUTION CONTROL

LIBRARIAN'S MESSAGE

A library newsletter is one available means of communicating with the DEQ staff and others about the many resources available in the library. The main focus of this first issue is a JOURNALS LIST of the major journals the library has to offer in the fields of environment, pollution control, geology, and hydrology. A primary library goal is to be able to meet the broad range of departmental information needs. The more I learn about the numerous federal and state programs administered by the Department the better I am able to respond to your inquiries and develop the resources necessary to serve information needs. That is why communication is important! The new resources highlighted in the newsletter are a direct response to your information requests. Please let me hear from you so that we can move toward a first rate departmental library. - Carolyn Woodley

NEWSBRIEFS

FEDERAL REGISTER

A library subscription to the FEDERAL REGISTER will begin in March. The new subscription is in response to the frequent requests from OPC staff. For those needing to identify and review back issues on specific topics the library has annual issues of the Federal Register Index, 1977-1988, and has been able to borrow back issues of the Register from the State Law Library.

CODE OF FEDERAL REGULATIONS

The 1991 CODE OF FEDERAL REGULATIONS, Title 29 (parts 1910-end) and Title 40 (all parts) are on order. The 1990 editions of the above CFR titles and parts are available on the library reference shelves.

MISSISSIPPI CODE

The library set of the MISSISSIPPI CODE OF 1972, revised volumes and supplements, is now up-to-date. A list of the code volumes, revisions and supplements needed for a current set is available from the librarian.

DIRECTORIES

An assortment of organizational telephone and address DIRECTORIES is available in the library. A new directory which should not be overlooked is the 1991-1992 STATE EXECUTIVE DIRECTORY ANNUAL, which has state government organizational listings for all fifty states. Telephone numbers and primary officers are listed for each state department, division, commission, or other primary unit of state government. The directory is an excellent tool for locating administrative counterparts and units in other states. Also don't miss the new ACCESS EPA directory, even though some telephone numbers are already disconnected or out-of-date.

EPA ONLINE LIBRARY SYSTEM

The library now has DIAL-IN-ACCESS to the EPA ONLINE LIBRARY SYSTEM, an EPA service offered for the first time in January, 1992. The Online Library System (OLS) is a computerized list of bibliographic citations compiled by the EPA library network. EPA provides this menu-driven, user friendly system at no cost to support public access to environmental information. The only charges for use of the system are telecommunication charges. The OLS will help the library identify EPA reports on specific environmental topics and should be the best existing index to the massive volume of environmental report literature.

BOOK DONATION

Kevin Cahill, administrator of the Mining and Reclamation Section, Office of Geology, recently made a donation of 98 books to the library from his personal collection. All are major titles from the petroleum geology literature of the past fifteen years, many from the American Association of Petroleum Geologists and the Society of Economic Paleontologists and Mineralogists. It is the most outstanding book donation the library has had in the past ten years from a personal donor. Thanks to Kevin!

LIBRARY CONFERENCE ROOM

The library conference room is available for staff members needing a place for small group meetings or a quiet area for work on projects or review of documents by the public. See the librarian to reserve or confirm the availability of the room. Plans for the future are to expand the use of the room to that of a small audio-visual facility equipped with a VCR, monitor, and other projection equipment.

LIBRARY STATISTICS
MONTH OF JANUARY, 1992

239 persons used the library, based on daily counts.
310 journals, reports, books were loaned (does not include publications used in the library).
320 new publications were received; journals, books, maps, government reports.

JOURNALS LIST/DEQ LIBRARY

This is a list of primary journals offered in the library. Title, frequency of publication, and beginning volume and year of holdings are given for each entry.

JOURNALS: ENVIRONMENT/POLLUTION CONTROL

Chemical & Engineering News. Weekly, v.68- 1990-
Climatological Data: Mississippi. Monthly, v.54- 1949-
EPA Journal. Bimonthly, v.6- 1980-
Environmental Claims Journal. Quarterly, v.1- 1989-
Environmental Management Review. Quarterly, no.11- 1989-
Environmental Science & Technology. Monthly, v.24- 1990-
Forum for Applied Research & Public Policy. Quarterly, v.3- 1988-
Hazardous Materials Control. Quarterly, v.1- 1991-
Hazardous Waste Consultant. Bimonthly, v.4- 1986-
Hazardous Waste Report. Biweekly, v.2- 1981-
Journal of the Air and Waste Management Association. Monthly, v.1- 1951-
Journal of the Water Pollution Control Federation. 7 issues yearly, v. 32 - 1960-
Management of World Wastes. Monthly, v.32- 1989-
NTIS Alert: Environmental Pollution & Control. Biweekly, v.90- 1990-
National Environmental Enforcement Journal. Monthly, v.11- 1989-
Pollution Engineering. Monthly, v. 19 - 1987-
Resources: The Magazine of Environmental Management. Monthly, v.11- 1989-
Remediation. Quarterly, v.1- 1991-
Risk Analysis. Quarterly, v.10- 1990-
Soils: Analysis, Monitoring, Remediation. 9 issues yearly, 1991-
Waste Age. Monthly, v.17- 1986-
Water Environment & Technology. Monthly, v.1- 1989-

JOURNALS: GEOLOGY/HYDROLOGY

American Association of Petroleum Geologists. Bulletin. Monthly, v.1- 1917-
American Water Resources Association. Water Resources Bulletin. Bimonthly, v.24- 1988-
Bulletin of the Association of Engineering Geologists. Quarterly, v.26- 1990-
Bulletin of the Seismological Society of America. Bimonthly, v.81- 1990-
Bulletins of American Paleontology. Irregular, v.1- 1895-
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DEQ Library Newsletter: Number 1
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RECENT ADDITIONS TO THE LIBRARY

The reports selected for this list are chosen from the many publications received by the library for their potential interest to the staff in the various divisions of the Department, and their relevance to current environmental, geological, and hydrological topics.

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The Gulf Coast Association of Geological Societies

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*** CALL FOR PAPERS ***

1992 FALL SYMPOSIUM

PERMIAN BASIN EXPLORATION AND PRODUCTION STRATEGIES - APPLICATIONS OF SEQUENCE STRATIGRAPHIC & RESERVOIR CHARACTERIZATION CONCEPTS
NOVEMBER 5 - 6, 1992

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- **Prospect Generation from Sequence Stratigraphy**
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C A L L F O R P A P E R S

F A L L F I E L D S E M I N A R

SEQUENCE STRATIGRAPHY APPLIED TO PERMIAN BASIN RESERVOIRS
Outcrop Analogs in the Mud Springs, Caballo, and
Sacramento Mountains of New Mexico
November 6-8, 1992
Sponsored By
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Field Seminar Leaders:

Lynn Soreghan - University of Arizona
Pennsylvanian Sequence Stratigraphy of the Mud Springs Mountains

Greg Mack - New Mexico State University
Depositional Environments of the Pennsylvanian in Derry Hills, Caballo Mountains

Thomas Algeo - University of Cincinnati
Tectonic Influence on the Sequence Stratigraphy of the Pennsylvanian in the Sacramento Mountains

The Field Seminar will be run in conjunction with the Annual Fall Symposium. Emphasis of this trip will be on the application of sequence stratigraphy to reservoir characterization. We will primarily be viewing Pennsylvanian-age equivalents to Permian Basin reservoirs.

Suggested topics for papers included:

* **THE APPLICATION OF OUTCROP SEQUENCE STRATIGRAPHY TO SUBSURFACE RESERVOIR CHARACTERIZATION - EMPHASIS PERMIAN BASIN**
* **THE INFLUENCE OF REGIONAL TECTONIC ACTIVITY ON DEPOSITIONAL ENVIRONMENTS DURING THE LATE PALEOZOIC IN THE PERMIAN BASIN**
* **SEQUENCE STRATIGRAPHY APPLIED TO DETAILED RESERVOIR STUDIES**
* **ELECTRIC LOG INTERPRETATIONS USING SEQUENCE STRATIGRAPHIC PRINCIPLES AND TECHNIQUES**

DEADLINES: ABSTRACTS — JUNE 1, 1992
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1991 ARKANSAS OIL AND GAS COMMISSION EXHIBITS

A complete set of exhibits prepared for Arkansas Oil and Gas Commission hearings held in 1991 is now available through the Department of Geology, University of Arkansas. These exhibits are complete and include both the north (Arkoma Basin and shallow gas province) and south (coastal plain) Arkansas petroleum provinces. The exhibits are reproduced at handy 8 1/2" X 11" size, but all are fully readable. They are numbered by docket, indexed by township and range, and spiral bound.

The 1991 Arkansas Oil and Gas Commission exhibits are available at a cost of $50.00. Proceeds will benefit the department's Summer Field Camp in Dillon, Montana. Help yourself and help the department's field camp by purchasing a copy of the exhibits. Please return this flyer to:

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Fayetteville, Arkansas
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International Brief

Argentina: South American Hotspot

By John J. Bruns

Similar to other South American nations, Argentina has embarked on an ambitious program to turn a heretofore strongly centralized Federal system, with its inherent problems, into a vibrant market controlled economy. The current President, Mr. Carlos Menem, assumed control of Argentina five months prior to his official inauguration amid hyper-inflation and general fiscal chaos in 1989. President Menem has done a remarkable task of decentralizing, demonopolizing and deregulating the Argentine economy. YPF, the former government oil monopoly, has been downsized and privatized and will shortly emerge on the Argentine and global oil scene as a strongly competitive entity. YPF will go from nearly 50,000 employees to 12,000 by late 1992-1993. The Argentine oil industry has been opened to local and international companies in both upstream and downstream activities and ownership from exploration concessions to the gas distribution network (formerly Gas del Estado). At this time, more than thirty companies are exploring or developing on Association Areas or Houston Plan Risk Contract Areas in the five producing basins and many of the 14 or 15 non-producing basins both onshore and offshore. During 1992 more than 145 exploration concession blocks will be open for competitive bidding between March 31, and October 31, 1992. The bidding will take place in three rounds beginning with onshore southern Argentina which opens March 31 and runs for 3 months. Northern Argentina bidding will commence on May 4, 1992 and run for 4 months. Finally, offshore bidding will start June 1, 1992 and run for 5 months. The terms and conditions of the concessions are governed by the Petroleum Law of 1967.

Past Exploration and the Sedimentary Basins

Argentina covers almost 1,000,000 square miles onshore of which nearly 50% is composed of sedimentary basins. If the offshore basins are included total sedimentary area is about 700,000-800,000 square miles. The latter figure includes the vast slope-rise prism. There are 19 or 20 discrete basins in Argentina both on and offshore. Five of the basins have been proven productive (Austral, Cuyo, Neuquen, Northwest and San Jorge) and are exclusively onshore except for a narrow offshore producing trend in the Austral Basin. The five basins have produced 5.3 billion barrels of oil, 96% of which is from Mesozoic reservoirs. The San Jorge and Neuquen have produced 75% of the cumulative total. Except for the bioclastic lime production in the Neuquen Basin, Argentine production is almost entirely from clastic reservoirs and from depths generally less than 10,000 feet. About 28,500 total wells have been drilled in Argentina since the discovery of commercial petroleum in the San Jorge Basin in 1907. It is estimated that there have been roughly

Continued on page 20

6200 wildcats drilled and incredibly 98.2% of these wells have been drilled in the five known producing basins. In other words 1.8% of all wildcats drilled were drilled in the 15 non-producing basins which cover 575,000 square miles or 1 well per 4752 square miles including both on and offshore. Onshore non-producing basins cover about 200,000 square miles and have seen 88 wells drilled. An area the size of Colorado and Wyoming with only 88 wells suggests an enormous, future, discovery potential. The offshore area is essentially untouched. There have been 33 significant wildcats drilled offshore to test a total sedimentary basin area of 365,000 square miles including the slope-rise prism. This is a sedimentary area larger than Texas-Louisiana combined with 33 nearshore wildcats. Much of this area is in very deep water yet the potential is staggering.

Several of the onshore, non-productive basins have had well shows and contain oil and gas seeps. Previous drilling indicates sufficient depths and favorable source-reservoir lithology. There is little doubt that some of these basins will be proven productive in the future. The five producing basins display excellent potential for extension and deeper drilling along the known producing trends as well as deeper, rank wildcat drilling in the slope-basinal zones and in the complex fold-thrust belts found in the western sectors of the basins. Except for localized areas of deep drilling, the producing basins are practically virgin below 13,000 feet.

Participation in Argentina

Companies considering oil and gas opportunities in Argentina have various options which are dictated by type of venture they wish to enter, the area they want to exploit and the resources they intend to commit. The options are discussed below.

Association Contracts - these are joint ventures with YPF (50-50) and involve purchase of interest in established producing fields. The one-time purchase fee is based on the remaining reserve and additional exploratory potential of the area. These are high cost ventures generally in excess of 100 million (U.S.) The term of the contracts is 25 years.

Marginal Area Exploitation Concession

These are former low-productivity or inactive YPF areas which were placed under jurisdiction of the Undersecretariat of Fuels. Participation involves a one-time exploitation fee based on the areas assessed, future potential. The contract is for 25 years with a 10 year extension and is subject to 12% royalty which may be reduced up to 5% depending on well capacity and location.

Exploration Concession

This class of permit covers all basinal areas not held by YPF or YPF contractors and involves the 145 blocks up for bid during 1992.

The size of the permits are 10,000 square km onshore and 15,000 square km offshore. The permits involve 3 terms totaling 9 and 12 years for onshore and offshore, respectively with a potential 5 year extension. The permits are competitively bid and various obligations and relinquishments must be met at the end of each term. Upon a discovery, the field area may be converted to an Exploitation Concession. The concession holds a 25 year term with a possible 10 year extension. The concession is liable for all in force taxes and a 12% royalty which may be reduced up to 5% depending on well capacity and location.

Farm-in Contracts

Companies may participate in Argentina by farm-in through companies already holding properties in any of the categories cited above. Farm-in agreements must be approved by the government.

For further information contact: John J. Bruns or Carl Dillistone, GCS Houston, Texas (713) 785-7900.

THE BASIN RESEARCH INSTITUTE: ITS PAST, PRESENT, AND FUTURE ROLE IN LOUISIANA GEOLOGY AND ENERGY RESOURCES

John B. Echols, Director

INTRODUCTION

The Basin Research Institute (BRI) was established in 1984 by the Louisiana Board of Regents and funded by the Louisiana Legislature to conduct applied and basic research in the oil- and gas-producing basins of Louisiana and transfers the research results to the oil and gas community, primarily the smaller independents without research capabilities.

The BRI staff is composed of 6 technical employees and 3 administrative personnel, all full time, and 5 part-time researchers and lab technicians. However, current staff does not yet meet the recommendations of the original proposal, which allowed for 25 staff members.

The BRI offices, labs, and separate core storage with core work lab are located on the Louisiana State University (LSU) campus at Baton Rouge.

BASIN RESEARCH PROJECTS

Past

Initial research efforts, under the direction of Dr. Clyde Moore, emphasized the carbonates and stratigraphy of the Jurassic Smackover of north Louisiana, south Arkansas, and east Texas. Dr. Clyde Moore currently serves as a visiting lecturer for BRI. The next director, Dr. Roger Sassen, pursued the applications of geochemistry to oil and gas exploration. Subsequently, Dr. Arnold H. Bouma, current director of the LSU School of Geoscience, began the task of moving BRI in the direction originally proposed.

In an attempt to transfer geological information useful in the exploration and production phases of petroleum geology, Dr. Bouma, a leading world authority on turbidites and submarine fans, lectures to state geological societies and other professional groups. Dr. Bouma has contributed a report to this issue of the BRI Bulletin about the characteristics of submarine fan channels. Turbidites and submarine fans, as reservoirs, contain the second largest volume of oil reserves in the nation.

Additional research efforts in diagenesis have led to the possible use of ammonia (NH_4) as an indicator of oil and gas migration through reservoir rocks. This research has evolved into concepts affecting current theories of oil and gas source rock maturity.

Stratigraphic studies continue to be a large part of BRI research activities. The ultimate aim of these studies is to provide an organized foundation of correlated strata throughout the basin being investigated to form a data base from which better ideas for exploration and production can progress.

Present

Currently, the Wilcox project is underway to investigate sediments of the Paleocene-Eocene Wilcox Group in east central Louisiana. This group along with the equivalent sediments of Mississippi has produced almost 1 billion barrels of oil since its initial development in the early 1940s at Lake St. John field, Concordia Parish, Louisiana, and Cranfield field, Adams County, Mississippi. The principals of deltaic sedimentation brought out in this project can be applied to any comparable deltaic sequence, regardless of age or location.

An accessible data base of E-log data will be developed as part of this study. For a membership fee, this information will be available to operators who have the computer equipment needed to print, store, and use the data to make maps, etc. Other operators who do not have this equipment will need to come to the workshops planned for later this year to see the demonstration of the data base and computer program. This data base will be extended beyond the initial Wilcox Group into adjoining parishes to cover as much of the state as possible.

A conventional core project will begin in fiscal year 1991-92 to conventionally core the entire Wilcox section for cooperative study with the faculty and graduate students of Geology and Geophysics, and Petroleum Engineering at Louisiana State University and other interested, qualifying state educational institutions. John Echols, BRI Director, and Donald Goddard, BRI Assistant Director, will collaborate on the conventional core and the Wilcox projects.

Long-term studies on diagenesis have been initiated for BRI by Dr. R. E. Ferrell, LSU Department of Geology and Geophysics. These studies are an attempt to discover if systematic variations in sand and shale mineralogy can be mapped in reservoir and potential source beds. The ultimate aims of this study are to improve drilling and completion procedures, and enhanced reservoir recovery techniques, and to establish better estimates of reservoir recovery factors.

BRI is part of a consortium of 23 organizations, representing 18 states through the Geoscience Institute of Oil and Gas Recovery Research established by the University of Texas at Austin. BRI is under contract to deliver datato the Department of Energy (DOE) for over 1,500 reservoirs in Louisiana, Arkansas, Mississippi, Alabama, and Florida. The data output provides information on the depositional environment, structural configuration and diagenetic overprint for each reservoir. The final objective of the DOE is the development of a joint, national industry and university interdisciplinary recovery research program to develop more cost-effective, advanced recovery technologies. This is part of the DOE Tertiary Oil Recovery Information System (TORIS) database study.

BRI is also part of a bypassed oil study program with the LSU Department of Petroleum Engineering. Dr. Adam T. "Ted" Bourgoyne is the principal investigator for this project. This study is a multi-million dollar project under contract to DOE to provide models for recovering oil bypassed during standard primary recovery operations.

BRI has committed funds to the LSU Coastal Studies Institute for the completion of a study of the modern LaFourche delta. The objectives are to determine the processes and rock types within this delta, thereby developing a sediment distribution model for the identification of similar deltas in both modern and subsurface settings.

Future

The future goal of BRI is to serve Louisiana through service to the oil and gas industry, the primary source of state revenue. Future research goals in applied and fundamental basin research coincide with national goals for developing a joint, national industry and university interdisciplinary recovery research program and incorporating the exploration objectives of new discoveries of oil and gas reserves.

The following is an outline of the plan for BRI research directions.

I Applied Research Programs
- Reservoir Heterogeneity
- Stratigraphy
- Basin Formation and Evolution
- Exploration Techniques
- Reservoir Management
- Reservoir Rock Porosity and Permeability
- Carbonates

II Fundamental Research Programs
- Paleontology
- Sedimentology
- Geochemistry
- Diagenesis

In an attempt to map and report on all of Louisiana's oil and gas fields, BRI plans to produce with the local Louisiana geological societies oil and gas field reports. The project will continue as long as practical, and when most of the fields are mapped and reported, an annual update from each society region will keep the project current.

Finally, it is planned to publish the BRI Bulletin biannually, which features articles from BRI personnel, faculty and graduates students, and any Louisiana operators who wish to share a report, paper, or other information. The BRI staff and editorial contacts will assist in formatting their article for those who wish to publish in the bulletin.

BRI CONTACT LIST
(504) 388-8328

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Bertie Gilmore, Coordinator
Faye Couvillion, Administrative Specialist
Cherri Webre, Secretary

FLUORESCENT MICROSCOPY OF PARTICULATE ORGANICMATTER: SPARTA FORMATION AND WILCOX GROUP, SOUTH CENTRAL LOUISIANA

William A. Gregory[1], Elizabeth W. Chinn[1], Roger Sassen[2], George F. Hart[1], 1991, Flourescent microscopy of particulate organic matter: Sparta Formation and Wilcox Group, south central Louisiana: Organic Geochemistry, v. 17, n. 1, p. 1-9.

ABSTRACT

Particulate organic matter (POM) from mudstone core samples in the Sparta Formation and Wilcox Group in Louisiana was characterized using transmitted and fluorescent light microscopy and Rock-Eval pyrolysis. Observations of maceral fluorescence and programmed pyrolysis results define source potential better than visual examination using light or microscopy Rock-Eval pyrolysis alone.

Microscopic characterization of POM indicates that amorphous macerals ofterrestrial and marine origin dominate samples from the lagoonal and shelf depositional environments. Microscopic examination indicates that some of the amorphous matter, including terrestrially material, fluoresces to some degree. Hydrogen index values show a positive correlation between the total number offluorescing particles and relative fluorescence levels.

A comparison of Sparta and Wilcox samples indicates that changes occur at levels of thermal maturation where petroleum generation begins. Thermally mature samples contain a higher percentage of moderate fluorescent particles and lower percentages of strong and weak fluorescent particles. This phenomenon is apparent in particle types, such as amorphous nonstructured protistoclasts, miospores, and dinoflagellate cysts. The results indicate that a re-evaluation of geochemical-based assessments of Wilcox Group rocks could be made using organic petrology and geochemistry. In addition, the integration of sequence stratigraphic interpretations could better predict petroleum source potentials.

[1]Basin Research Institute, School of Geoscience, Louisiana State University, Baton Rouge, LA 70803
[2]British Petroleum Exploration, Inc., 9401 Southwest Freeway, Suite 1200, Houston, TX 77074

SUBMARINE FAN CHANNEL CHARACTERISTICS

Arnold H. Bouma
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Baton Rouge, LA 70803

ABSTRACT

Deep-water sands normally are part of submarine fans that become known as potentially large hydrocarbon reservoirs. The majority of these fans can be defined as channel-levee-overbank-distal sheet deposits in which the sands occur primarily in the channel and levee areas or in the channel and distal sheet deposits. Sand occurrence depends strongly on the factors responsible for the formation of the fan, such as those grouped under tectonics, sediment, and sea level fluctuations.

Published models often highlight channels, but no model has been published to emphasize exploration targets. Channel fills can vary widely from sand rich to shale rich and from massive fill to thinning-upward fill to oblique fill. These types of fill normally are undetectable on seismic data and cannot be deducted from standard well logs. Therefore, it is advisable to be more familiar with some potential geological characteristics when having to work with indirect observations.

INTRODUCTION

Submarine fans are sediments that contain deep-water sands and turbidites. Recently, these units have received a lot of attention because of their importance as very large hydrocarbon reservoirs (Weimer and Link 1991). Studies on submarine fans are relatively new when compared to other reservoir groups. The many dry holes clearly illustrate our degree of knowledge of these primarily stratigraphic plays. Final answers are wanted before the questions have been defined. This type of reservoir is normally formed in the deep marine basin, which makes it difficult to analyze its characteristics. Either expensive equipment and ships must be utilized to study the modern examples, or the information obtained must come from subsurface bodies and outcrop. Each type of location has its degree of completion, techniques for study, and inherent problems of correlation. Often, these are parameters conveniently forgotten. However, the picture is not as bleak as may be perceived. Several examples have been studied in different modes, and only partial models are available. A tendency exists to jump onto a potential target within the confines of the lease area, leaving updip and downdip areas unstudied. However, the sediments comprising the fan come from shallow marine areas, and a lack of knowledge of the total setting can easily result in misinterpreting the overall pattern and the position of the potential sandy reservoirs. To date, researchers are aware of certain general principles but ignoring those leads back towildcatting.Well-log interpretations and correlations can form a fantastic framework comparable to that obtained by sequence stratigraphy. However, success emerges when geological concepts are combined with petrophysical and geophysical results because the well logs cannot give a continuous correlation, and the geophysics lacks the resolution.

INTERNAL FRAMEWORK CHARACTERISTICS OF SUBMARINE FANS

The Mississippi fan is the only submarine fan that has been drilled systematically, and the results are in the public domain (Bouma et al. 1985, 1986). It contains enormous Pliocene and Pleistone sediment, measures about 290,000^2 and displaces at least 300,000 k^3 (figure 1). Several continuous reflections along the fan can be divided into intervals, each the result of a major fluctuation in sea level (figures 2, 3). Although not proven, it seems that most of the ancient submarine fans can be divided into intervals to ease the total approach and understanding of each.

Except for debris aprons restricted to the steep sides of half grabens (e.g. Brae field in the North Sea) and other steep-sloping, tectonically controlled areas, all intervals can be defined as channel-overbank-sheet deposits (figure 1). The intervals are not stacked vertically but typically onlap because each interval has a flat lenticular cross section that forms an elevation on the sea floor. Also, the intervals contain all the lithologies characteristic of a given submarine fan. When considering submarine fans that basically contain sandstone and shale (although carbonates or evaporites can also form the bulk of the constituents), it is important to analyze the locations of the sands and the fluid communication possibilities between and within the sand bodies.

FACTORS THAT INFLUENCE SUBMARINE FAN CONSTRUCTION

Stow et al. (1985) summarized the factors that play a role in the formation of submarine fans (figure 4). The block diagram shows that the mountains are the main

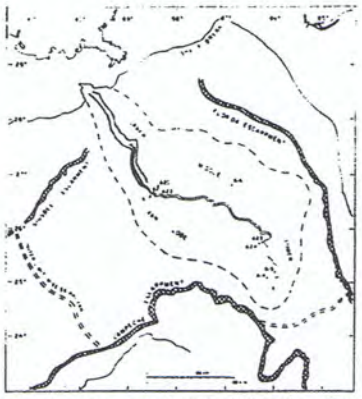

Figure 1. Eastern part of the Gulf of Mexico. Three escarpments form the major boundaries of the Mississippi fan. This fan consists at least of 17 intervals (fan lobes) that do not stack on top of each other but onlap onto underlaying ones. The youngest one is outlined by the dash-dot line. It consists of a channel-overbank complex. The boundary between the upper and middle fan is about the base of the slope (just undip from sites 617,621, 620). The middle fan changes into the lower fan just undip from sites 623, 624. The lower fan has several ephemeral channels (not shown) that bifurcate at about site 615 and disappear, changing into sheet deposits. Drill site numbers represent the Deep Sea Drilling Project.

generator of the sedimentary particles. Climate and rock types in that area are the main parameters that determine what kinds of grain will be placed into the transport-deposition cycle and what the sediment volumes may be. Several small, steep rivers bring the sediment down to the flatter foothills and lowlands. The smaller rivers merge into larger ones, depending on gradient, discharge, and distance of travel. Boulders and gravels initially may be transported into the mountainous terrain. Gradually, the coarser material is left behind, and the sand-to-shale ratio of the overall sediment decreases with an increase of the transport distance.

Tectonically active coastal areas, or active margins, may have the mountains close to the coastline. Many small rivers enter the sea to transport a small-to-modest amount of sediment with a high sand-to-shale ratio. The finer grain sizes are kept in suspension and float into the sea. The sand-sized material normally moves from a very small delta into the longshore drift and then may be partially caught by submarine canyons that have cut into the narrow shelves. Very sand-rich material then creeps or slides down the canyon to the deep marine offshore basins.

Passive margins follow a different scenario. Very few rivers enter the coastal area, and the transported material may have an enormous volume with a low sand-to-shale ratio. Large delta complexes can be constructed, depending on the force of currents, waves, and tides. To have the fluvial and delta material move to the deeper marine basin, it is required that relative sea level be lowered because shelves may be wide. Either an ice age or sudden outbuilding of a

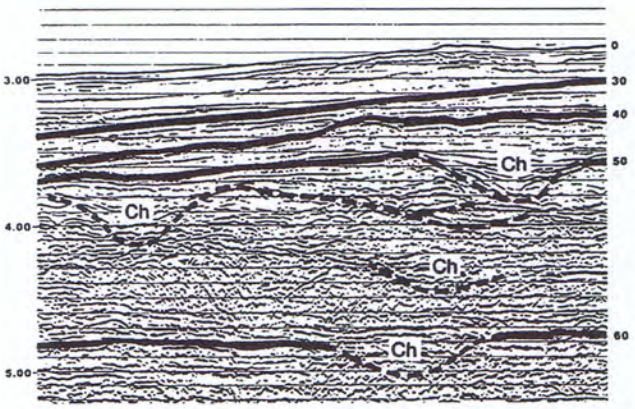

Figure 2. Strike line of multifold seismic data across the middlefan of the Mississippi fan. The upper figure shows slightly processed data; the lower one is annotated. A number of acoustical doublets or strong single reflections can be followed fan wide (numbered on right-hand side), dividing the submarine fan into fan lobes or intervals Breaks in those reflections often reveal the presence of channels (Ch). On the left, the depth in seconds is in two-way time.

delta complex can bring the sediment near the shelf break. Extreme rapid deposition of clay-rich sediment results in abnormally high pore pressures because the escape of water cannot keep up with the accumulation. Instability will result, and a mass of sediment will slide down. The removal of material will result in the formation of a canyon that will continue to grow updip by retrogressive slumping, gradually collecting more shallow marine sediment which will periodically move down via slumping and turbidity currents to the basinal floor. The large volume, low sand-to-shale ratio sediment can carry the sand over long distances.

Once a massive slump becomes a debris flow and/or a turbidity current, a channel-levee-overbank system is constructed by the transport process. Sediment transport will be directed by the channel leaving part of the material behind, while some overflows to build the levees and adjacent overbank areas. Sufficient information does not yet exist to indicate why certain submarine fans (or any of their

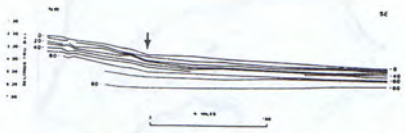

Figure 3. Dip line with the projection of all continuous reflections numbered in figure 2 onto one vertical plane. Arrow indicates base of the slope. Updip are the canyon and upper fan; both are erosional in nature and filled last with sediment. The gradient may be as much as 1.5. Downdip from the base of the slope are the middle and lower fans, both depositional in character with gradients from about 0.5 to 0.2 on the distal part of the lower fan.

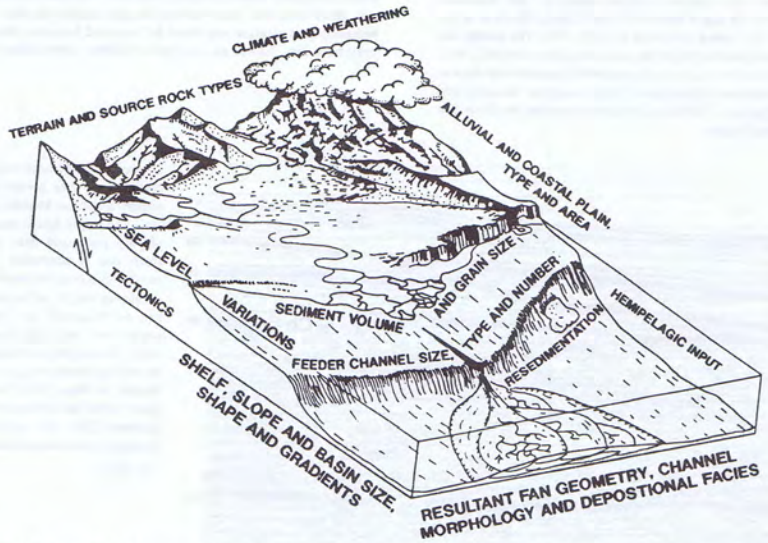

Figure 4. Schematic block diagram illustrating the geological factors that influence the development of a submarine fan interval. Climate, weathering, rock type, and terrain determine the petrological composition, sand-to-shale ratio, and amount of available sediment. Tectonics dictate a wide or narrow alluvial and coastal plain, width of the shelf and slope, size of the receiving basin, and gradients of the sea floor. Sea level variations have a very strong effect on passive margins which have wide alluvial and coastal plains, a wide shelf, and large receiving basin. (Redrawn from Stow et al. 1985).

Continued on page 29

intervals) have distinct levees and others not, or at least no levees that are discernable morphologically or seismically.

Generally, active margins are characterized by small-to-medium submarine fans, often deposited in oblong basins or trenches parallel to the coastline. The deposits have a high sand-to-shale ratio, and the sand is concentrated in the channels, levees, and nearby overbank areas. Once the channels have bifurcated several times, they become so small they disappear. The constrained currents change into unconstrained transport units, and the remaining sand falls out rapidly. The canyon and the upper fan, which occupy the continental slope, receive the last material available. Possibly half of all active margin canyons and upper fan channels become shale filled with little or no sand.

Passive margins, however, contain medium-to-large submarine fans normally deposited in more open basins to allow the fans to grow away from the shelf. The high mud content mixes with the water, and the slurry can transport the sand over large distances. Less sand-sized material seems to flow over the levees and is stacked on broad, flat levees. A significant portion of the sand is transported past the ends of the channels to result in major sand-rich sheet deposits.

The channels can be straight-to-highly sinuous, but insufficient data are available to analyze the reason for the differences. Possibly, transport gradually ceases at the end of the interval, and the reduction of transport volumes moving through a large channel complex results in a meandering activity.

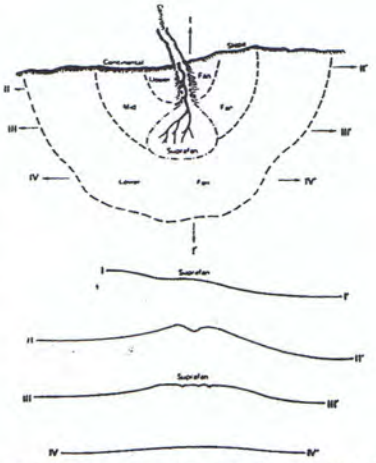

Figure 5. Schematic presentation of the Normark model of a submarine fan, which emphasizes the distributary channel pattern on the middle fan (suprafan) where the bulk of the sand is deposited. The cross sections that the channels occupy the highest parts of the fan. (After Normark 1970).

THE DANGER OF MODELS

With the distinction of active and passive margins, sand-rich and sand-poor submarine fans, the influence of fluctuations of relative sea level and other criteria mentioned earlier, it becomes obvious that one model cannot encompass all the variations that can occur. To date, a limited number of models based on different criteria exists, making it impossible to weigh each against the other.

Normark (1970) studied several small modern fans off southern California and Baja, California, emphasizing morphology and surficial sediments (figure 5). Mutti and Ricci Lucchi (1972) established sedimentary facies characteristics and related those to depositional areas on a fan (figure 6). Their studies came from outcrops and lacked a tight stratigraphic control. Their model is also for tectonically active margins and presents many good aspects to consider when dealing with submarine fans. Walker (1978) added conglomerate-rich sediments to the Mutti-Ricci Lucchi model and discussed how the locations of successive suprafans of depositional units or intervals vary (figure 7). Kumar and Slatt (1984) developed a specific model for the deep Anadarko basin (figure 8). The Tonkawa sandstone is deposited in a deep interior basin that was partially surrounded by reefs. Their example may well be applicable to the Permian Delaware basin in west Texas and New Mexico. Eustatic sea level fluctuations are considered the driving force. Additional models will not be discussed here.

No passive margin submarine fan models have been published that are directly applicable to exploration or production (figure 9). Models should be considered as ideal examples, and therefore familiarity with models and published aspects is recommended. However, once the applicable aspects have been selected, a model should be developed that is tuned to the area of activity and the specific needs.

EXAMPLES OF CHANNEL FILLS

Many characteristics have been found that seem to make submarine fan channels comparable to fluvial and delta channels. Insufficient examples have been studied to design proper guidelines, and therefore researchers have to restrict themselves to a few cases.

Mutti and Ricci Lucchi (1972) indicated that vertical successions of layers, becoming thinner and finer grained (thinning- and/or fining-upward sequences) indicate that the deposits represent channel fills (figure 6). In contrast, the thickening- and/or coarsening-upward sequences represent the non-channelized sheet deposits or depositional lobes downdip from the channel fills. The characteristics of the channel fills, as mentioned above, seem to be common for channels but that is not the only type of fill. It is also very

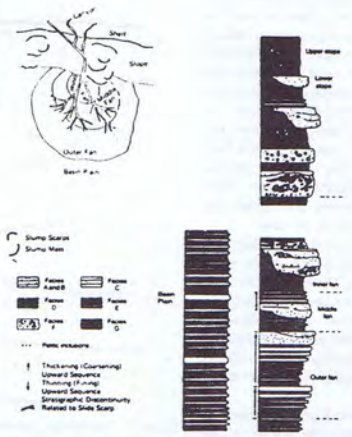

Figure 6. Schematic presentation of the Mutti and Ricci Lucchi model, showing six lithological facies patterns and where they fit in a lithological and morphological profile. The map projection of the submarine fan indicates facies locations. Note the arrows indicating different sequences. (Modified from Mutti and Ricci Lucchi 1972).

important to realize that establishing the criteria of fining and thinning, and coarsening and thickening upward are often not that distinct, and defining the type of vertical sequence often is a matter of interpretation. Several persons can look at a vertical sequence and determine different cycles, often depending on where one starts and where one locks his or her eyes onto assumed major boundaries. The illustration in figure 10 clearly demonstrates the dangers involved. The size of the outcrop, primarily the exposure in stratigraphic direction or the length of the core, has much to do with the interpretation. Examples are known that show small, fining-and thinning-upward sequences comprising larger, fining- and thinning-upward sequences, as well as small coarsening and thickening sequences in larger coarsening and thickening sequences. However, examples are now becoming known of small, thickening- and coarsening-upward sequences that fit into a larger, thinning- and fining-upward sequence and vice versa. Small outcrops or short cores may only reveal the small sequences. Such sequences may be defining the depositional setting; although, it is possible that additional stratigraphic coverage would change the interpretation. Using only the principle of sequences, however, can be very dangerous.

Many channel fills consist of uniform, unstructured sediment. Occasionally a few amalgamated contacts may be detected by a sudden difference in grain size with the coarsest size above the contact, or by a scattering of shale pebbles along the nearly invisible contact plane. This means the filling of such a channel is not the result of a fast or slow mode of deposition, but that the filling went in pulses. Such contacts can have a very thin shale lining, and they may have more cementation along the contact area than normal for the sediment above and below it. Such denser contacts have an adverse effect on vertical permeability.

More examples of the lateral filling of channels are being discovered, together with lateral migration of the channel. Such can only be detected in major outcropping areas, such as in the Upper Eocene of the Maritime Alps in southeastern France and in road outcrops in the Delaware basin (figures 11, 12, respectively). Figure 11 shows that if two wells were drilled near the east and west sides, they may encounter the same number of sandstones. Not knowing the internal organization of the channel fill, the explorers could present a near-horizontal correlation. However, drilling a third hole later between the first two would not only kill the initial correlation but would result in much confusion and possible insertion of one or more faults. Only after the geologist has seen inclined lateral fill examples can other scenarios be considered.

In the Delaware basin along a half-mile outcrop, an example can be studied of lateral fill and migration (figure 12). This figure shows that the channel fill contains three major erosional contacts that divide the fill into four parts. Field observations suggest that the fill was nearly horizontal for a major time, after which a sudden major erosion took place. The erosional activity may be the result of a major transport phase, such as a sudden large slump, debris flow, or turbidity current that removed part of the fill. The reasons for a migration to the east are not understood. The erosional phase was followed by a gradual filling until the next major

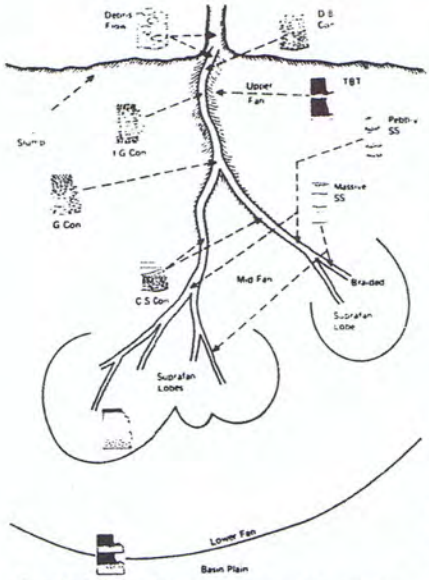

Figure 7. Submarine fan model by Walker. Generally, the model merges with the Mutti and Rici Lucchi, and Normark models to emphasize conglomerates. The suprafans do not stack vertically. (After Walker 1978).

erosional event took place. Sometimes the erosional contact is between two sandstone units; other times it is lined with shale. The latter suggests that the erosional event did not leave any eroded material behind, but the event was followed by a quiet period without sand transport to allow deposition of shale.

Good examples of lateral fill can be observed in the Jackfork Formation in the Big Rock Quarry on the east side of Little Rock, Arkansas. This abandoned quarry shows different styles ofchannel fill.

A long, abandoned quarry in the Jackfork Formation near Haig, east of Little Rock, shows good examples of different channel fills. An undulating, low-relief, erosional sandstone surface is overlaid by shales. One example shows that one of those depressions contains a thin channel fill overlaying the shale (figure 13). The channel fill seems to be horizontal and reveals a thinning-upward sequence.

Several examples have been found that suggest many of the homogeneously filled sandstone channel fills also present repeated erosion-filling activities rather than one fill. Amalgamated contacts may not always be observable. The result is a nested channel fill with lateral migration and an irregular channel side. These examples also show that the levees are formed, while the channel is used for transport, leaving some sediment behind in the channel. In a few cases, part of the channel fill can be correlated to levee deposits, but in most instances a clear, erosional, shale-lined contact exists between channel fill and levee deposits. An example of this can be found along the road from El Paso, Texas, to Carlsbad, New Mexico, just south of El Capitan where a massive channel sand partially overlies and cuts into bedded levee deposits.

Similar examples can be observed in the Lower Permian Ecca Group of the Karoo in southwestern South Africa. Five sand-rich submarine fans, separated by thick shale units, comprise the fan complex. The individual fans range from 24 to 60 m thick (70-160 ft). Figure 14 shows the formation of a channel, followed by a gradual filling and the emplacement of the levee deposits. A major transport pulse may be the cause of the erosionof part of the channel fill and its adjacent levee sediments. The channel cutting moved westward compared to the last channel fill. Where the erosion cut part of the existing channel fill and its adjacent levee deposits, either an erosional contact between sandstone and sandstone or a shale lining can be observed. If this cycle of erosion filling continues for a while, a complex major channel fill will result that may only be detectable or observable seismically as one channel fill. Well logs, including FMS, through such a sandstone pile will show a blocky, uniform sandstone.

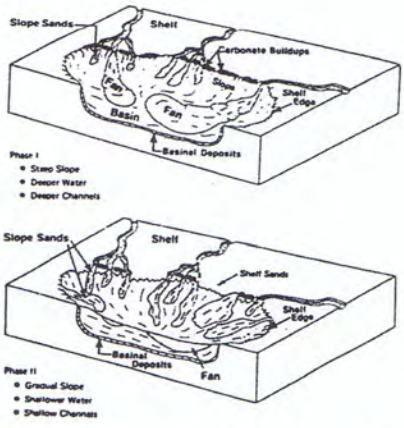

Figure 8. Two-phase submarine fan model by Kumar and Slatt. Phase I presents and early stage with well defined submarine fans fed from distinct point sources. Phase II is presented during a sea level rise. (After Kumar and Slatt 1984).

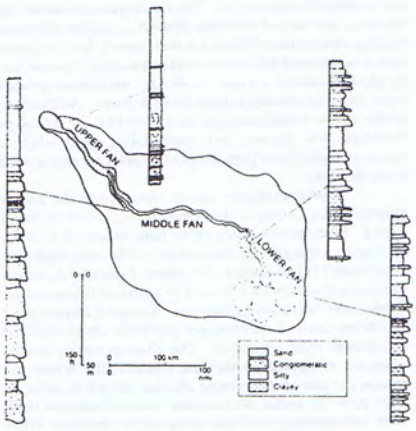

Figure 9. Schematic model of the youngest (Upper Pleistocene) interval of the Mississippi fan showing 1) clayey muds with some thin silts in the canyon fill; 2) a fining-upward sequence in the channel fill, beginning with gravels, pebbly mudstones, and sands, and ending with thin-bedded clayey turbidites; 3) a succession of small channel fills in the lower fan with ephemeral channels; and 4) sheet sands in the lower fan sheet deposits.

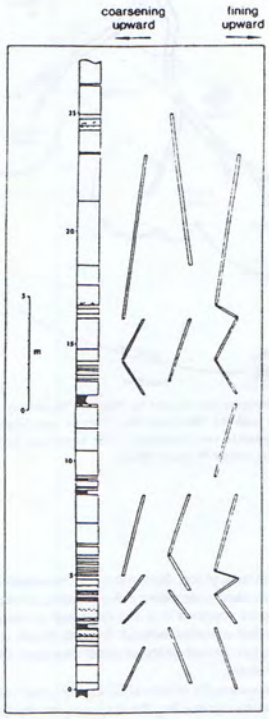

Figure 10. Portion of the Jeppe section in Namibia showing three possible interpretations of vertical sequences, depending on where the observer established boundaries in the section. Once a person has decided how to divide a section or core into small, logical packages, it can be determined for each package if it fines or coarsens upward. Because the initial breakdown into packages is often personal rather than geological, the decision of fining or coarsening upward can strongly vary between observers as this example by Swart (1990) demonstrates. Therefore, a strong dependence on coarsening- and fining-upward sequences is discouraged.

CONCLUSIONS

It is premature to indicate that the channels from submarine fans are completely comparable to fluvial channels. At this time, there are several similarities in a general sense that do not necessarily indicate that the processes of transport and deposition are the same. At best, numerous observations have been made, and now questions can be formulated. Some may consider that question to be of scientific interest only. However, an understanding about the processes will help to discover more about the channel formation and its different types of fill. When do we end up with a massive fill, a deposition that shows an upward fining and thinning sequence, or a lateral migratory fill inside a major valley? Do those different fills belong to different parts of a submarine fan? Do they have different internal permeability characteristics and trends in different directions? And, are the present exploration and production approaches capable of differentiating them? One type may

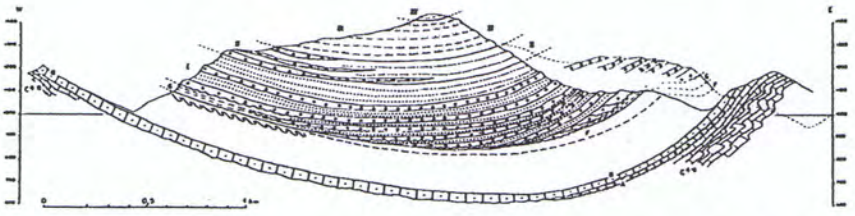

Figure 11. An east-west cross section through the southern Peira-Cava synclinorium, showing that the small basin filled obliquely. Maritime Alps, north of Nice, France. (After Ravenne et al. 1987 in Bouma 1990).

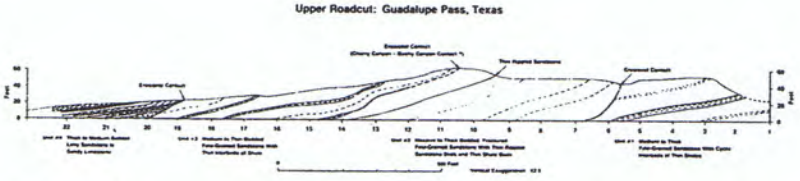

Figure 12. Simplified drawing, with a 2.5-times vertical exaggeration, of a east-west road cut near Guadalupe Pass, Delaware basin, Texas, showing channel fill. Three major erosional contacts, caused by lateral move of the channel during periods of major erosion, were followed by lower activity of transport and deposition. The east is to the left.

be a better target than another one. More and more it becomes apparent that larger channels change into smaller ones that may occupy a major alluvial valley or a certain zone. Sometimes the channels cut into each other; sometimes a long period of shale deposition was available to the area of observation; and successive channels are totally, or partially, separated by shale units. Observed features may be interpreted as the equivalents of pointbars, as described from the Peira-Cava area in southeastern France (Bouma and Coleman 1985).

As stated in the introduction, few examples of submarine fans have been described using comparable study approaches and accentuating certain aspects, such as channels. Good descriptions from different types of field observations (e.g., seismic data, well log, outcrop) will result in a rich data base. Simultaneous studies may emphasize processes, and finally, a picture may show, with some confidence, the internal characteristics and various channel fill locations. Weimer (1989) demonstrated that an excellent grid of good seismic data of part of the Mississippi fan south of the Sigsbee escarpment can divide the fan in 17 intervals. Making use of different seismic facies Weimer distinguished channels from levee-overbank complexes from slump masses and was able to map the channel(s) from each interval (figure 15). The result was very confusing, revealing that some intervals have a very simple channel system, while others are very complicated in shape, displaying a distributary system (e.g., channel sequence data #10). The seismic data reveal that probably one channel was operational at a given time, and thus that the complex consists of a small or large number of ephemeral channels. It is unknown if the complicated types are more distal than the simple ones. Also, bottom gradients, amount of sediment available for transport, sand-to-shale ratio of the sediment in transport, and type and size of the transport mechanism are the important criteria that cause different channel results. At this time it is sufficient to note that in a stratigraphic package different types can be found successively.

Figure 13. Drawing from a photograph showing an undulating erosional sandstone surface, capped by shale, and followed by a channel fill restricted to one of the depressions. The channel fill shows a thinning-upward sequence. Abandoned quarry near Haig, Arkansas, Jackfork Formation.

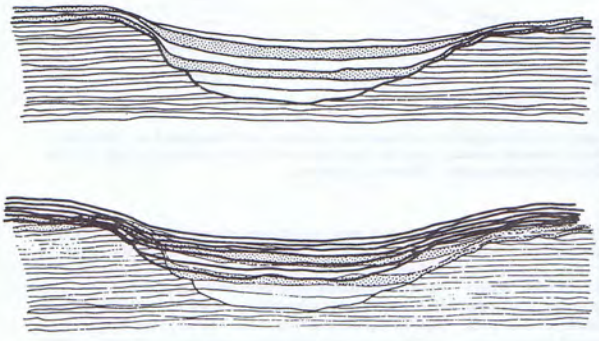

Figure 14. Schematic presentation of the formation of an erosional channel followed by a gradual filling and simultaneous construction of the levee deposits. The lower drawing suggests, in bold lines, a new erosional event removing part of the channel fill, followed by channel filling and levee construction. The real example is very sandy; the dotted pattern only emphasizes some time-equivalent deposition in the channel and on the levee. Blaukop, Skoorsteenberg Formation, Ecca Group, Tanqua Karoo, north of Ceres, South Africa.

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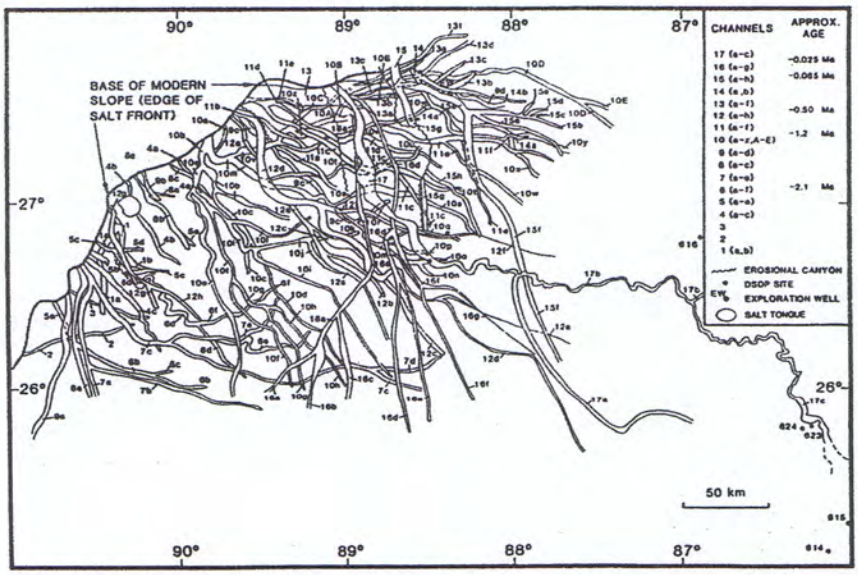

Figure 15. Composite map of the 17 channel-levee systems (intervals or fan lobes) identified in part of the Mississippi fan south of the Sigsbee escarpment. Some of the channels are single and simple, while others are complicated with distributary patterns. See figure 1 for location. (From Weimer 1989)

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Yazoo Clay Study Under Way

The Office of Geology has completed the longest continuous core of the Yazoo clay to date. The total depth of the core is 530 feet, with the Yazoo clay totaling 462 feet in thickness.

The Office of Geology's drilling rig has drilled to greater depths, but what makes this drilling so different is the continuous core. Most often, geologists drill a site to examine only a particular section. They drill until they reach the desired depth, and begin the coring at this point. This process costs much less money, time, and manpower than the continuous core method.

The clay was extracted as a continuous core for numerous purposes. Geologists wanted to study the clay's mineralogy, age, and economic value. They were also interested in studying the geologic history of a complete section of the Yazoo clay in central Mississippi, where the clay has a thickness greater than 400 feet. Studies of the core are under way at the geology departments at the University of Southern Mississippi and East Carolina University.

The coring was done in northwestern Hinds County by a seven-man crew consisting of geologists David T. Dockery, Curtis W. Stover, Phillip Weathersby, C. Wayne Stover Jr., and Stephen L. Ingram, and drillers Scott Mixon and Archie McKenzie, the youngest driller in the state. The coring time averaged around five minutes per ten-foot core, but, with the time required to circulate and retrieve each core, the job required twelve working days to complete.

The core hole was a cooperative effort of the Mississippi Office of Geology and the Geology Department of the University of Southern Mississippi and was funded in part by a grant from the Mississippi Mineral Resources Institute.

For more details, telephone (601) 961-5510 or write to the Office of Geology at P.O. Box 20307, Jackson, MS 39289-1307.

From left, Scott Mixon and Stephen Ingram clean drill cuttings from the mud pit.

McKenzie Youngest Well Driller in State

Archie McKenzie, at the age of 21, is the youngest well driller in the state of Mississippi. Employed at the Mississippi Office of Geology since May of 1990, McKenzie received his drilling license in June of 1991.

Following his 1988 graduation from Salem High School in Tylertown, Mississippi, McKenzie enrolled in a two-year drilling program at Southwest Community College (SWCC) in Summit, Mississippi, the only school in the country that offers such a program.

McKenzie said he had always been interested in drilling. What attracted him to the work was job stability, job possibilities, and good pay. Lucky for him, he was located near a facility that offered just what he wanted.

To become a licensed driller you must be 21 years of age, have a minimum of three years experience, and must pass two out of three tests given by the National Drillers Association. In place of two years experience, McKenzie was able to substitute his schooling at SWCC.

Age apparently makes no difference in McKenzie's job performance. "He takes a great deal of pride and interest in his work, reading and studying materials on his own time," said Curtis W. Stover, Chief, Environmental Geology Section at DEQ.

In addition to being the youngest driller in the State, McKenzie also had the privilege of being a driller of the longest continuous core of the Yazoo clay, to date. (See article above.)

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Cuts to Geologic Survey to hurt Louisiana, expert says

Reprinted from THE MORNING ADVOCATE, Baton Rouge, LA
week of April 1, 1992

Geologists and support personnel with the Louisiana Geologic Survey, which plays a major role in environmental and coastal protection, will be laid off May 1 because the new administration has not included them in the budget for the upcoming year, state officials confirmed Friday.

In the past, the survey program has been touted as a major reason canal dredging in coastal wetlands has been drastically reduced, because its geologists are able to review permit applications and determine when oil companies can use directional drilling rather than dredging a canal to the point above which they want to drill. Canal dredging is easier, but more destructive, according to coastal experts.

In past years, the survey also has played a major role in planning coastal protection projects, which rely heavily on geologic information.

The survey also has assisted state agencies in reviewing applications for hazardous waste landfills and injection wells and has provided expertise in environmental enforcement matters.

Last year, one geologist for the survey raised serious safety concerns about some of Louisiana's hazardous waste injection wells.

All of that support would be lost, as things now stand, and all that would be left of the survey is a research portion that comes under LSU, Groat said. Eight geologists and their support personnel would be laid off.

Groat said not only is the survey important to state government, but it also is important to both existing industry and to companies that are considering moving to Louisiana.

"One of the first things that an industry that is considering moving to Louisiana does is go to the survey for maps" and various hydrological and geological information, Groat said.

He said the only realistic way he can see the survey saved before the layoff date is for the governor's office to put it back into the budget.

"Every state has a geologic survey, and Louisiana's is considered one of the best in the nation," Groat said.

"If the survey is killed, it says the state doesn't hold its natural resources or its environment in very high esteem," he said.

Gov. Edwin Edwards could not be reached for comment late Friday.

REVIEW SERIES : Stephen L. Ingram

Well, it's been some time (last October) since the last article regarding the structural architecture of Mississippi. Since then MGS and SIPES co-sponsored a very successful KNOX Seminar here in Jackson (November 1991). I make mention of this so as to convey an excuse for such a long delay between articles (as though I need one; I've been very busy).

This month we will focus on a specific area of interest in the Black Warrior. ARCO has permitted a 20,000' test in section 9 - 22N - 10E Calhoun County, Mississippi. This test is probably drilling and/or is near or has reached total depth. In retrospect to past MGS bulletin reviews and the KNOX presentations given in the November seminar, this area (see figure) is the point of convergence between two very large magnetic anomalies and their (apparent) associated fault systems in the western portion of the Black Warrior Fault System / Complex (BWFS).

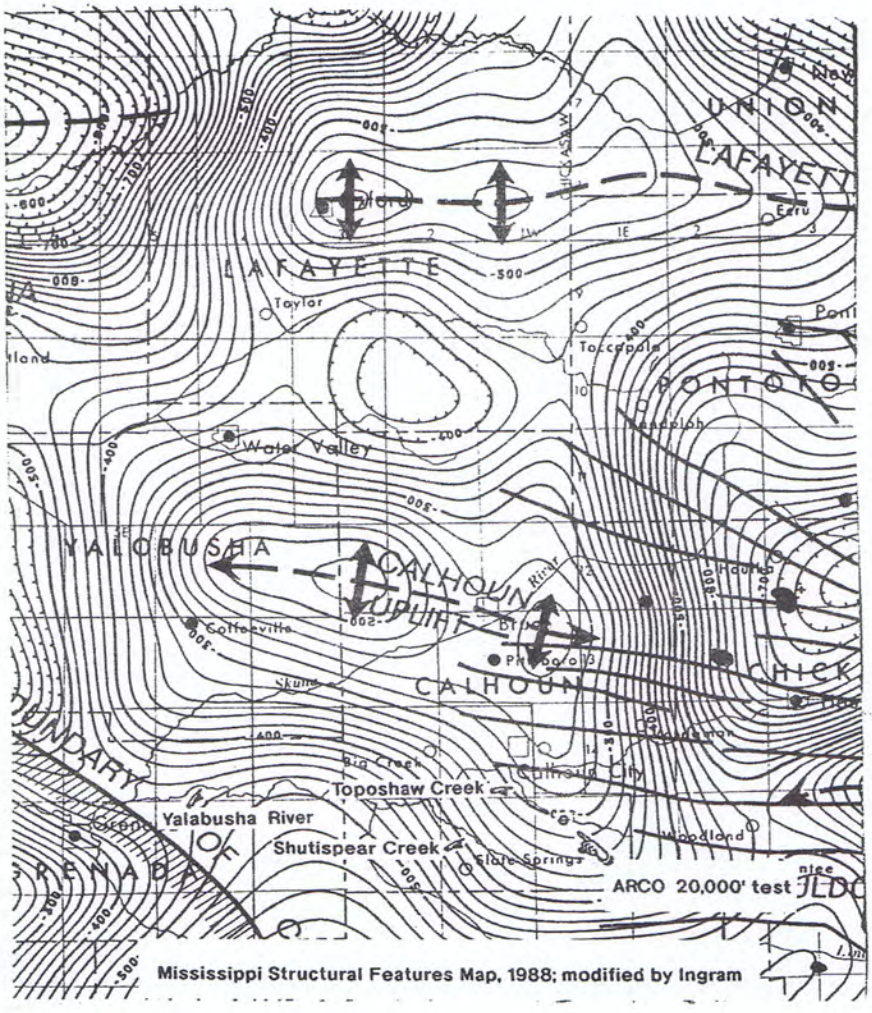
The magnetic anomalies in figure 1 are the Lafayette Ridge (LR) and the Calhoun Uplift (CU). The LR anomaly rests along the western edge of the northern fault unit of the BWFS. Similarly, the CU lies at the western edge of the southern BWFS fault unit. The LR was briefly mentioned in the October '91 bulletin review as possibly depicting a flower structure; although, an anticlinal interpretation may be correct. Likewise, the CU may well be interpreted in the same light. Take special note of the fact that magnetic anomalies in this area appear to be shifted to the north-northwest of the basement magnetic source. That means that any possible structure, anticlinal or the like, would actually be located south (perhaps 3 miles or so) of the recorded magnetic signal. In this case (after shifting the anomaly south), the two associated fault systems are in better alignment with the proposed structural anomalies. In part, this geologic alignment better relates the evolution of the anomalies to these portions of the BWFS.

Other items of interest are :

1. Boland et al (Figure 2; 1971) indicate that the BWFS faulting extends much further to the west-northwest.

2. Net sand isoliths of the Carter delta and it's subcrop may be closely associated with certain aspects of the LR and possibly to the CU (Witt, Masters Thesis; 1991).

3. Surface outcrops of the lower Wilcox Group show steeply dipping strata and a surface fault in Calhoun County (MGS Bulletin 92).


LAFAYETTE
YALOBUSHA
CALHOUN
PONTOTOC
UNION
Water Valley
Taylor
Toccopola
Calhoun City
Pittsboro
Coffeeville
Skuna
Big Creek
Toposhaw Creek
Yalabusha River
Shutispear Creek
State Springs
Woodland
ARCO 20,000' test
Mississippi Structural Features Map, 1988; modified by Ingram

4. A Triassic-Jurassic tholeiitic basalt-diabase sill was encountered in 3 wells east-northeast of Calhoun City in the Vardaman area indicating the involvement of basement lineaments in the BWFS (Mellen, 1978).

5. The general northwest-southeast orientation of the Topisaw and Shutispear creeks off the Yalobusha River just south of Calhoun City are aligned with known faults (a common occurrence with the BWFS).

The ARCO well appears to be well situated between the forementioned stream and river systems and the nearby faults. This relation could suggest fault convergence. As an observation, there are several fields in the Black Warrior that occur at the intersection of main and secondary splay faults. Add to this the possibility that the north trending eastern edge of the Calhoun magnetic anomaly could represent a very strong structural nose trending south toward the test location. Should either or both possibilities occur, a discovery could well be on the way. That is not to say that I am foretelling a discovery or the type of prospect that ARCO is drilling, but this is an attempt to put together what other information is available in the area, aside from the seismic (which I have not seen - hint, hint).

Which ever way the test goes, we will certainly gain a better knowledge and understanding of the structural and depositional architecture for the state which could and should lead to sucessful exploration in the future.

References Cited :

Boland, L. F., and E. D. Minihan, 1971, Petroleum potential of the Black Warrior Basin, in GCAGS Transactions: v 21, p 139.

Calhoun County Geology and Ground-water Resources, 1961, Bulletin 92, Mississippi Geological Survey.

Mellen, F. F., 1978, Vardaman Triassic-Jurassic sill, Calhoun County, Mississippi, AAPG v 63, p 2101.

Witt, Stephen W., 1991, Masters Thesis - Comparative petrology of the Chesterian Batesville Delta and equivalent subsurface depositional systems on the northern shelf of the Black Warrior Basin, Oklahoma State University.

REMINDER OF LOCAL SOCIETY MEETINGS

SIPES
Regular Meeting 1st Thursday of Month, 11:30 a.m.
Petroleum Club

SPE
Petroleum Club Smackover Room, 11:30 a.m.
$10, reservations not required
Spring Golf Tournament May 7 at Shady Oaks, Everyone Invited

MAPL
2nd Monday of Month,
5:30 p.m. at Primos Northgate
For Reservations call 352-0662 or 352-7782

D & D
1st Wednesday of Month, except July - 12:00 noon at Petroleum Club
Rosemary Jenkins, 355-1578

MIPRO

GEOPHYSICAL SOCIETY
4th Wednesday of Month
11:30 a.m. at Petroleum Club. Reservations not required