The Bulletin
Houston Geological Society

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about the cover: Research at the Bureau of Economic Geology's Applied Geodynamics Laboratory. Analysis of seismic data combined with physical, mathematical, and kinematic modeling help develop new concepts for the origin, evolution, and mechanics of salt structures and their adjacent sediments. *Graphics created by AGL researchers and designed by Scott Rodgers.*

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President's Letter

by Craig M. Dingler

Diversity Among Geologists

The joint dinner meeting in November with the HGS International Explorationists and the University of Houston (UH) Geoscience Alumni Association, otherwise known as the 5th Annual Robert E. Sheriff Lecture, was hampered by a flooding rainstorm that kept almost half of those who had made reservations from attending—including the featured speaker and many students.

Serendipity and luck were smiling on us. Eric A. Williams, a UH graduate and former student of Dr. Sheriff's, was in town on business and was attending the dinner. Eric just happens to be the Minister of Energy and Energy Industries for the Republic of Trinidad and Tobago. He was more than happy to pop a CD into a laptop computer and give a 20-minute presentation about Trinidad-Tobago's oil and gas development efforts and how the government is funneling money raised from petroleum back into development of the country. Trinidad-Tobago is setting itself up to be a fully industrialized nation within a few years and to become a model for many other emerging nations and third-world governments. It was all very impressive.

Many things struck me about Eric Williams. First, his public speaking skills are very impressive. Second, his obvious admiration for Dr. Sheriff—his mentor and friend. Eric is also a politician with a background and training in the geosciences. He was surprised when I told him he wasn't the only politician with a start in geology – Colin Powell earned a bachelor's degree in geology from the City College of New York. We both agreed he should be so successful! Their similarities did not end there—Colin Powell also has Caribbean roots. His parents emigrated from Jamaica.

This brings me around to the point of this month's letter. The diversity of our ranks in the field of geology is about to go through a monumental change. One look at the names of the students presenting posters at the Sheriff Lecture (see the November 2003 *Bulletin*, page 25) and you notice the numerous surnames with Arabic, Spanish, Asian, and Eastern European roots. The AAPG/SEG Student Expo held last fall here in Houston was also a multi-cultural mingling of students. It is intuitively obvious to the casual observer that the days of a white males-only profession are numbered or, as I believe, gone already.

Many of the ways to foster diversity begin in colleges and universities, by making sure they teach earth sciences to a broad spectrum of the student body.

The September 2003 issue of *Geotimes* dedicated its theme to diversity and public outreach, and I highly recommend reading all of the articles (most are available online at http://www.geotimes.org/sept03/). Probably the most relevant article was *A Unified Approach to Diversifying the Earth Sciences*, written by Jill Karsten, manager of education and career services at the American Geophysical Union (AGU). She describes the efforts of the Joint Society Conference on Increasing Diversity in the Earth and Space Sciences (IDEaSS Conference; http://www.agu.org/sci_soc/education/jsc/) in trying to define diversity, broaden participation in the Earth sciences formulate solutions to declining student enrollment, loss of geoscience departments (Lamar alumni take note), upcoming "Baby Boomer" retirements and turbulent employment conditions. Numerous geological organizations participated in the Joint Society Conference, including AAPG, GSA, AGU, SEPM, and the U.S.G.S.

A formal statement from the IDEaSS Conference urges collaborative efforts on diversity. The HGS Executive Board was made aware of this resolution by director Marsha Bourque, who asked for and received HGS board endorsement. Supporting it was like supporting Mom, apple pie, and the American way; that is, what the statement outlines is fairly straightforward and inoffensive. The statement is printed on page 7 of this month's *Bulletin*. Many of the ways to foster diversity begin in colleges and universities, by making sure they teach earth sciences to a broad spectrum of the student body. In life outside educational institutions, I believe geologists offer supportive, mentoring environments to young colleagues, no matter what,

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and will continue to do so. It is our nature. My feeling is that the biggest obstacle to achieving diversity among geologists lies with the profession's overwhelming problem of scant employment opportunities.

Our professional ranks will evolve through change and adaptation. The challenge, as always, will come with the details. ■

For your perusal, the resolution is reprinted below.

Statement on Increasing Diversity in the Earth, Ocean, Atmospheric, Space, and Physical Sciences

The HGS Executive Board endorses this resolution drafted by participants attending the Joint Society Conference on Increasing Diversity in the Earth and Space Sciences, held 10-12 June 2003 at the American Center for Physics in College Park, Maryland [Final draft issued 6 October 2003].

Increased participation and retention of women, minorities and persons with disabilities is an essential component of maintaining a robust and productive scientific workforce in the Earth, ocean, atmospheric, space and related physical sciences. The future health of these disciplines in the U.S. is threatened by declining undergraduate and graduate enrollments, loss of degree-granting geosciences programs and ageing of the current scientific work force. Globalization of the geosciences enterprise has partially compensated for these losses and fostered a rich, multi-cultural scientific community. Yet, reliance on international talent is increasingly uncertain, as the number and quality of opportunities available to scientists in their native countries increase and security restrictions are enhanced. By increasing the diversity of the talent pool, the community can ensure that the workforce is not only sufficient to meet future demand in these fields, but also enriched with the variety of perspectives that are essential for effective operation in our global society.

Failure to attract and retain women and minorities in the geosciences is not well understood. Although rapid growth has occurred in the proportion of women entering these scientific fields during the past decade, it has been highly discipline-specific. Importantly, this proportional growth is largely due to loss of males, as the number of females entering these fields has remained relatively constant. Many women doctoral recipients do not pursue careers in academe.

In the U.S., ethnic and cultural minorities are a largely untapped resource for the geosciences, which has the poorest diversity record of all science and engineering disciplines. In the year 2000, only 1.3% of geosciences bachelor's degrees awarded went to African Americans and 3.1% went to Hispanic Americans. As the largest growing population sector in the U.S., minorities are projected to comprise nearly half of the college-age population within the next decade. Collectively, these groups offer a significant resource for the geosciences community, but only if more productive methods of attracting and retaining them can be established.

The scientific societies and organizations listed below [omitted here] commit to take an active leadership role in efforts to increase participation of women, minorities and persons with disabilities in the Earth, ocean, atmospheric, space, and physical sciences workforce. Specifically, these groups agree to:

• Make diversity a priority in the use of their organizational resources, educate their members about the need to become more involved in promoting diversity and provide access to resources that will enable their members to work productively on this issue.

• Endorse and help to implement key recommendations outlined in the Task Force on National Workforce Policies for Science and Engineering report [National Science Board, 2003]. This report advocates for: improving undergraduate success in science and engineering for all demographic groups; developing better options for addressing the economic needs of students pursuing graduate education and research in science and engineering disciplines; and, attracting and retaining an adequate cadre of well-qualified pre-college teachers of mathematics, science and technology. Advancing the state of knowledge on international science and education workforce dynamics and considering policy implications for the international mobility and vitality of the science and engineering workforce are also recommended in this report.

• Coordinate efforts to foster diversity in the Earth, ocean, atmospheric, space and physical sciences and work in partnership on: increasing the visibility of education, research, and career opportunities in these **Statement on Increaseng Diversity** continued on page 35

Editor's Letter

EDITOR'S NOTE: Art Berman, Editor-Elect, came across this letter in the *AAPG Bulletin* Vol. 87, No. 4 (April 2003), p529-533, from the AAPG's Editor. Although we don't receive many technical papers for publication in the HGS *Bulletin* we thought it would be a nice segment to publish for members who may be contemplating submitting a technical article or for members who may simply find it helpful in their technical writing endeavors. Art Berman received permission for publication from the *AAPG Bulletin*.

— Diane Yeager, editor@hgs.org

Writing for the *AAPG Bulletin*: We're Not Literary Giants, But We Can Try To Be

by John Lorenz, 2003-2004 AAPG Editor

Introduction

Many of the manuscripts received for consideration by the *AAPG Bulletin* contain good science but are less than spectacular pieces of writing. Before authors send a manuscript to Tulsa, they need to know that the *Bulletin* is expecting a certain level of quality in a manuscript, and that if two manuscripts describe exactly the same science, the polished manuscript has a much better chance of being accepted than the poorly written one. The following is an attempt to illustrate some of the more common problems and to educate authors, hopefully couched in a form that is palatable, understandable, and maybe just interesting enough that it will actually be read.

Our training is as scientists: Those of us with an English major, or who have even just taken a course in technical writing, are the lucky exceptions. Most of us can apply the Scientific Method, but few of us are intimately familiar with the mechanics of successfully communicating the results of that method. One result of this dichotomy is that a disheveled editor constantly sees the same mistakes in manuscripts submitted for publication.

If an author wants to communicate science and persuade readers that the science is both valid and worth knowing, that author must make the reader's job as easy as possible by writing in an easy-to-follow manner. This is not the same as making the science simplistic. If a reader can't get past the English, the science, simple or complex, will never become an issue.

In fact, most authors are too close to their manuscripts to see the awkward phrases and obscure passages, although they would be quick enough to pick the same mistakes out of a colleague's manuscript. We all think we're good writers, yet some errors must be programmed into the human makeup at birth because they are almost common enough to be predictable. Good writing is apparently not instinctive.

Editing is the alternative to instinct. A good piece of writing, technical or otherwise, even one by a practiced author, is typically an achievement attained only after continuous editing and many revisions. The first draft of a manuscript rarely bears more than a passing resemblance to the finished product. Even respected authors with much experience can write something, come back to it later to read it cold, and get caught short thinking "I didn't mean to say that!" Much is going on in the brain during the writing process and it doesn't all get transferred through the keyboard and onto the hard drive. What does get transferred doesn't always turn out the way we intended, even though we were convinced that it was absolutely gem quality when we wrote it.

Many publications provide advice on how to write, including the classic *Elements of Style* (Strunk and White, 1979) and the U.S. Geological Survey's *Suggestions to Authors* (Hansen, 1991). Reading these texts is relatively easy and it all makes sense when absorbing it, but putting it into practice involves a higher level of effort. Instead of duplicating such sage advice, allow me to offer observations on some of the more common flaws and awkward turns found in the manuscripts submitted to the *AAPG Bulletin* during the first half of my term as editor.

Much of the following sounds silly and self-evident out of context, but each observation below is based on numerous suggestions for revision sent to various authors. With some chagrin, I must admit that many of these errors are also recognizable in my own efforts.

Dubious Text-Figure Integration

Figures add immeasurably to an article, not the least of which is in breaking up solid blocks of text and generally lightening a manuscript. Don't forget the introductory figures such as location maps and stratigraphic columns, as they give the reader the context for the discussion. The location map must cover an area large enough that people from other

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countries can recognize it, and should include latitude and longitude tick marks.

Once introductory figures are out of the way, the remaining figures should precisely illustrate or specifically support concepts that are being explained in the text at the point where the figures are cited. If the text is describing dolomitization, it is less effective to show a generalized photomicrograph of a dolomite than to present a photomicrograph that highlights, with arrows, diagenetic evidence for the discussed dolomitization.This photomicrograph should be from a sample used during the study.

Conversely, some figures present valuable data that have the potential to strengthen a paper by illustrating important concepts, but that merely represent opportunities lost because the figures are never fully discussed. The strongest manuscripts are those that fully integrate the figures into the text, i.e., where the figures offer additional support for, or an illustration of, the argument being developed.

Unhelpful Figure Captions

Figure captions should further improve the manuscript and the text-figure integration by specifying the importance of that figure to the text. Captions should not, however, reiterate at length the concepts and descriptions that are already found in the text. Readers must be told specifically what that connection of the figure to the text is because few readers care to play games at reading the author's mind. A caption such as "Figure 1. Graph of height vs. length" doesn't have nearly the impact of the more explicit caption "Figure 1. Graph showing that height varies inversely with length, suggesting a genetic relationship." Amplification of that relationship should be found in the text.

Extraneous Figures and Data

Some figures seem to be included more because the author had them handy from a related part of the study than because they support the text. Delete these. In a similar vein, many authors include tables of vaguely related data, sometimes, it seems, merely to impress the reader with how much work was done. This is akin to the proverbial advice given to a speaker: "Your argument is weak here, you had better shout." Rather, let your work speak for itself in this regard. Authors with a mathematical or engineering bent often include numerous figures that present similar patterns, commonly from sequential computer runs with only minor tweaking. If the minor variations in the patterns have no significance and are not discussed, elimination of such repetition does not weaken a paper. Print space is too valuable for extraneous figures or data.

Figures Swiped from Presentations

More and more manuscripts are being submitted that include figures from oral presentations, figures that have been electronically pasted into the text without modification. This is easy to do in the electronic age, but color figures where the colors have been converted to indistinguishable gray scales instead of to different black and white patterns give readers heartburn.

Many such figures also include meaningless file numbers in the corners, or titles at the top that needlessly duplicate the figure captions. Moreover, many contain labels or features that were obviously important to a related application but that have no meaning for the present manuscript. The author has not bothered to remove them, and they are left to clutter up the figure and distract the reader.

All of the symbols on a graph, and all the geographic labels on an index map (except for things like major towns that help orient the reader), should be those that are important enough to be explained in a legend or caption. Moreover, if they are prominent on a figure, they should have a purpose within the text. Likewise, all geographic features important enough to be referenced or discussed in the text should appear on an index map. Well logs, maps, and cross sections need scales and indications of orientation. These are silly, nitpicking things, but neglecting them reflects poorly on the author.

We are also beginning to see papers where the figures consist of composite, multi-image, full-color montages, complete with circles and arrows on the back. These are suitable for, and have commonly been derived from, poster presentations, but they are too complicated for a text. Although summary block diagrams are useful in many cases, don't try to tell the entire story with figures.

Whiplash

It is disconcertingly common for an author to discuss something important in the text that is never mentioned in the abstract or in the conclusions. More unsettling yet to the reader is the paper that includes a topic in the conclusions, or sometimes in the abstract, that is never discussed in the main body of the text. An interesting but less common variation on this theme is a title that doesn't reflect the content of the paper. Conclusions must be derived from something more substantial than thin air. Some authors avoid this particular problem by omitting a conclusions section, but most reviewers note and object to that.

Abstract Vs. Introduction

There is a difference between writing an abstract that is a summary of an attached paper and writing an abstract for a presentation. The first type, under discussion here, should present the conclusions of the paper and a few pieces of important supporting data. An abstract should **Editor's Letter** continued on page 13

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hook the reader into delving into the rest of the paper for most of the details. Statements such as "52 coal samples were taken by the Gropengrab method and were measured for 162 elements in the laboratory under simulated rainforest conditions" don't belong in an abstract because most readers don't care about such details at this point. Rather, the stronger abstract indicates what was inferred from those samples and measurements; i.e., "Elemental data from 52 samples suggest that these coals were deposited in deep-marine environments." Now you have the attention of the readers, and they'll dig into the manuscript to find out just what tests you did and how you did them in order to reach that particular conclusion.

The flip side of the coin, of course, is the abstract that doesn't give enough background for the reader to understand it. For example, some abstracts present the reader with undefined terms or acronyms that might as well be in pig Latin for all they add to a reader's comprehension.

Abstracts that do present the conclusions of the paper commonly do so only in generalities when being more specific can immeasurably strengthen the piece. Consider the difference in the level of information conveyed by the two statements, "Deposition of deep-marine coals is related to sea level fluctuations," and "Deep-marine coals were deposited during sea level lowstands." The latter statement encompasses the full concept of the former, yet it also specifies what the relationship is and even lets the reader anticipate the potential implications.

Disorganization

High school English taught us to make an outline so we could see the overall flow of a text before we wrote it rather than become lost in the forest because trees blocked the view. Few bother with outlines anymore it seems; therefore, an editor commonly sees disorganized papers, papers that contain redundant statements and sections, or papers that mix data with interpretations in the same sections. When this happens, it isn't always clear that the distinction between data and interpretations is clear to the author, let alone to the reader.

When sections are redundant, the authors either didn't realize they were being repeated and didn't edit the manuscript to check, or felt that the redundancies were necessary. They aren't. The most effective papers still follow some variation of the standard format: Introduction, Data/Descriptions, Interpretations, Discussion, Conclusions—and an outline is still a valuable tool.

Unsupported Plausible Theories and Bald Statements

Authors who grew up under authoritarian systems tend to expect a reader to accept and believe bald statements ("these are fluvial deposits") just because the author believes it and is telling the reader it is so. The data necessary to support such interpretive assertions, such as sedimentary structures, fossils, or paleogeography, are omitted.

On the other hand, authors with a penchant for anarchy commonly offer a broader scale of unsupported material, presenting plausible, often good ideas, but without supplying the discussions that dissect and analyze the ideas. The data offered in support of these ideas tend to be broad in scale, not specific to the problem, and commonly do not exclude other theories. Without specific supporting data such ideas are so much speculation and are not suitable for publication.

The Joy of Theses

Several authors commonly get together to pool their related theses, and this technique can make an excellent paper. Often as not, however, the result is an unevenly written and poorly integrated product, each section reflecting the different authors' styles and objectives. It usually takes one of the authors with a unifying concept of the problem, and the willingness to make changes in a co-author's wording, to take charge of such an effort and to successfully amalgamate everything into a paper with a smooth flow and common purpose.

If a paper has been derived from a single author's thesis, however, it often contains too much detail that, although appropriate for a thesis, results in a paper that is much too long for publication in the *Bulletin*. This author must pare down and focus on the best supported or most appropriate aspect of the thesis, to confine the paper to one strong theme instead of a weaker discourse on all of the various aspects and ramifications of the thesis topic. It is difficult for an author to let go of the related subtopics of a thesis, but if the subtopics can be eliminated without detracting from the main argument, they don't belong and the paper is cleaner and stronger without them.

Speaking of length, under the current space constraints in the *Bulletin*, ideally the main body of a text should run less than about 8000 words and there should be 10–15 figures to accompany it. After the laughter dies down, we start negotiating; however, the *Bulletin* is not accepting long manuscripts at present.

Disguishing a Model From Its Application

Some manuscripts consist almost entirely of the description and details of the construction of a model. Although models are increasingly important to our science, they are primarily tools, means to an end rather than an end product. The importance of a model lies in its application rather than its construction. A model's value is in its ability to tell us something about the real world. For the *AAPG Bulletin*, most **Editor's Letter** continued on page 15

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readers want to see one or two examples of how such models have been applied to the exploration and development of hydrocarbon reservoirs, and are less interested in the construction details.

Nuts and Bolts

An editor receives numerous manuscripts from authors who have not proofread or even run a basic spell-check program on their manuscripts before mailing them. Words are misspelled, sentences may be incomplete, figures are cited out of sequence, and figures and/or figure captions are omitted. A common problem is references cited in the text that don't appear in the reference list and vice versa. Authors of these papers seem to figure that it is someone else's job to do the nuts and bolts work for them. Although most reviewers and editors don't have time to put up with this, some reviewers in fact use the degree of reference-citation correlation as a preliminary quality check on the manuscript. Either way, be forewarned. Numerous errors and omissions in these seemingly minor details generally guarantee a negative review regardless of the quality of the science.

Another irritant is the manuscript that doesn't conform to the Instructions to Authors provided by the journal. And, finally, spell out all but the most common acronyms and abbreviations, and avoid acronyms that are unique to your study. Acronyms may make writing easier (a nonissue really in this age of word processing), but they make reading harder.

Non-English Speaking Authors

The effort of writing something in a language other than the one you grew up with is truly daunting. My hat is off to our authors who do not speak English as a native tongue. Nevertheless, these authors must find a native English speaker to smooth the flow of the grammar, straighten out the syntax, and clarify the vocabulary of the manuscript before submission. If reviewers cannot follow the English, they cannot begin to assess the science. If the main author is a non-English speaker and has co-authored the paper with an English-speaking colleague, the English-speaking co-author has an obligation to thoroughly edit the manuscript just for English prior to submission.

Relevance to Hydrocarbon Geology

Manuscripts for the *AAPG Bulletin* can pertain to any part of geology that has implications for the exploration and development of hydrocarbons. Reviewers typically suggest that papers that do not have such connections, potential or direct, would be more appropriate for another journal. Authors are strongly encouraged to suggest how their studies might be or actually have been applied to, for example, the improvement of recovery efficiency from a related reservoir. The *Bulletin* is not the place to submit papers on the isotopic composition of feldspars on Mars.

Summary

Writing and editing are two separate and very different processes, even though they're perceived as overlapping. Nevertheless, authors should be the first editors of their own masterpieces. After the first flush of successfully completing that long-in-the-process draft of a manuscript, let it cool for a few days or even weeks, then return to it and edit it objectively. And then do it again. And again. And again, until it says at least something close to what was intended. Edit at all levels: words, phrases, sentences, paragraphs, and sections. Make sure the title still reflects the content, as the focus of many papers shifts during writing. Double-check the nuts and bolts; make yourself let go of marginally related passages and figures; remove redundancies.

Occasionally the trick is in knowing when to stop, but there isn't a paper in existence, draft or final form, that can't be improved. The key to semi-objective editing is to put the paper aside for a while so that the synapses don't hold quite so much memory of what the manuscript should say vs. what it actually says. Often a different perspective on the paper can be gained by reading it to yourself out loud. For real objectivity, hand the manuscript to a friend who is not afraid to speak out about perceived problems. At any and every point in the paper where that person has questions, chances are not that the friend is particularly dull, but rather that the writing needs clarification. ■

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Biographical Sketch

John Lorenz Sandia National Laboratories, Mail Stop 0750, Albuquerque, New Mexico, 87185; jcloren@sandia.gov

John C. Lorenz is a Distinguished Member of Technical Staff at Sandia National Laboratories, where he has worked on sedimentary and natural-fracture reservoir characterization issues. His work has focused on the Rocky Mountain region but has extended to reservoirs in other parts of the world. Lorenz earned a PhD from Princeton University and joined Sandia in 1981. Previously he was with the Peace Corps, Morocco, and worked for the U.S. Geological Survey. He is the current AAPG editor, and his responsibilities include the *Bulletin*, books, and other AAPG special publications.

Monday, February 9, 2004

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HGS General Dinner Meeting

*by **G. Haddad,** ConocoPhillips / Upstream Technology,*
***S.Young,** ConocoPhillips / Magnolia Development Team,*
***C.J.Liu,** ConocoPhillips / Magnolia Development Team*
***J. Hufnagel,** ConocoPhillips / Magnolia Development Team*
***M. Petersen,** ENI Houston, **R. Waszczak,**ConocoPhillips / Upstream Technology, **D. McGee,** ConocoPhillips / Upstream Technology, **R. Fitzsimmons,** ConocoPhillips / Norway,*
***P. Travis,** ConocoPhillips / Magnolia Development Team*

Stratigraphic Evolution of the Magnolia Field and Surrounding Area, Garden Banks Blocks 783 and 784, Deepwater Gulf of Mexico

The Magnolia Field is located along the southern edge of the Titan mini-basin where multiple deep water reservoir sands are positioned across a series of down-to-the-basin and antithetic faults adjacent to salt bodies. Reservoirs are of Miocene, Pliocene and Pleistocene age. Sand body geometry is related to the interplay between structural movement and sediment input both in time and space.

Sand bodies are defined within a sequence stratigraphic framework. Sequence boundaries are identified at the base of sand-prone intervals observed in well logs and 3D seismic data. Nannofossil and foraminiferal abundance and diversity data suggest that true maximum flooding surfaces are rarely preserved. Flooding surfaces are probably truncated or removed by erosional surfaces associated with sea-level low-stands and zones of re-sedimented microfossils.

Similar to other central Gulf of Mexico intra-slope basins, Magnolia can be subdivided into ponded, transitional and bypassed depositional phases. A ponded phase extends from the Miocene to the Plio-Pleistocene boundary and consists primarily of sheet sands that thin or onlap salt bodies. The latest Pliocene depositional axis is oriented from west to east. Stratigraphic architecture changes dramatically across a sequence boundary separating ponded Pliocene fill from lower Pleistocene transitional fill. This marks a period when an exit point formed to the south and the depositional axis assumed a north–south orientation. A typical lower Pleistocene sequence consists of basal sheet sands overlain initially by erosional, amalgamated channel and later by constructional channel sandstone and mudstone corresponding to the abandonment phase of deposition. ■

Biographical Sketch

Geoffrey Haddad joined ConocoPhillips Upstream Technology in 2001 as a member of the Integrated Geological Analysis Group in Houston. Before joining ConocoPhillips he worked at the Technology Center for TotalFinaElf (TFE) in Pau, France, at Exxon Exploration in Houston and at the Superior Oil Company in Houston. Geoffrey has also worked as a scientist at the Houston Advanced Research Center in the Woodlands and at a CNRS Paleoclimate Laboratory in Gif-sur-Yvette, France. Geoffrey earned a PhD in Geology at Rice University in 1994, an M.S. degree in Geology at Duke University in 1986 and a B.S. degree in Geology at Rice University in 1982.

Geoffrey has extensive experience working on the prediction and characterization of deepwater turbidite reservoirs. He was responsible for mapping deepwater reservoirs for TFE's New Ventures group in offshore Brunei, Barbados, Nigeria and Equatorial Guinea. He also identified and mapped deepwater prospects and provided reservoir modeling input for deepwater Congo and Gulf of Mexico.

Geoffrey is currently working in the Stratigraphic Prediction and Analysis team at ConocoPhillips where his responsibilities include integrated seismic and well log stratigraphic analysis to predict deepwater reservoir occurrence. While at ConocoPhillips Geoffrey has worked on exploration and development projects in the western Mediterranean Sea, the North Sea, offshore Brazil, and the Gulf of Mexico.

Tuesday, February 10, 2004

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Engineering and Environmental Dinner Meeting

by ***Michael D. Campbell***
M. D. Campbell and Associates

Environmental Geoscience and Litigation: Dos and Don'ts, Now or Later

The geoscience profession practiced within either a public or private company can be rewarding and intellectually stimulating, or it can also be frustrating and costly. Flaws in the practice of geoscience can and often do lead to litigation. Certain professional responsibilities go along with practicing within the profession that involve protecting human health and the environment. Beyond that, the methods employed are of paramount importance in avoiding litigation. The methods necessary depend on the level and type of education and training. As a Licensed Geoscientist in the State of Texas, the individual has met certain requirements in formal education and experience but these do not protect the individual or associated company from litigation. First, the individual must have passed through the normal progression of working in the field and gaining increasing experience by first working under the supervision of experienced senior professionals. Having appropriate support personnel available, such as chemists, microbiologists, engineers, and others is mandatory in order to function appropriately in the multidisciplinary environmental field of today. Access and use of relevant technical literature augments professional training and experience. Project scoping, combined with appropriate execution, reporting and documentation are integral features of project management. Minimizing any one function opens the individual or company to errors and omissions. Assessing all relevant data without preference allows for the appropriate evaluation of surface and subsurface conditions. For example, knowledge of the difference between the water table and first water encountered, the nature of how certain industries typically contribute to local contamination of soil and ground water, and the differences involved in whether the individual consultant or company performs as a geoscience consultant or contractor all need to be well considered and understood in practicing geoscience today or there may be litigation in the future. ■

Biographical Sketch

Michael D. Campbell, P.G., P.H. is a graduate of The Ohio State University (geology and hydrogeology) in 1966 and of Rice University (geology) in 1976. He has served Law Engineering, Inc. and ENSR Engineering and Consulting, Inc. as Corporate Consultant and Chief Hydrogeologist in the 1980s. In the early 1990s, he served DuPont Environmental as Regional Technical Manager and Chief Hydrogeologist where he was responsible for five sections: geology, environmental specialties, design engineering, construction engineering, and deep well services. Since the mid-1990s, he has been in private practice as Principal with M. D. Campbell and Associates (http://www.mdcampbell.com), where he has provided senior management and consultation in a range of hydrogeological and associated environmental and mining projects. He also has served as an expert witness on numerous cases in Texas and around the United States In adjunct functions, he has served as Principal Instructor for the Institute of Environmental Technology, and as Principal Hydrogeologist for Environmental Litigation Associates, Houston, Texas (http://www.ela-iet.com).

Monday, February 16, 2004

Westchase Hilton • 9999 Westheimer
Social 5:30 p.m., Dinner 6:30 p.m.

Cost: $25 Preregistered members; $30 Nonmembers & Walk-ups

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International Explorationists Dinner Meeting

*By **James D. Robertson***
Rannoch Petroleum
Fort Worth, Texas

Tangguh—The First Major Pre-Tertiary Discovery in Indonesia

Indonesia is a prolific oil and gas province in which more than 23 BBO and 150 TCFG of reserves have been discovered. Most of the hydrocarbons originate from and have been trapped in Tertiary rocks in western Indonesian basins on and offshore of Java, Sumatra and Kalimantan (Figure 1). Throughout the 20th century, explorers searched less successfully for major accumulations in eastern Indonesia. This eastern search was finally rewarded in 1994 when Atlantic Richfield Company (known as ARCO) discovered a super-giant natural gas accumulation in pre-Tertiary rocks in the Bintuni Basin of Papua, which was called Irian Jaya at that time.

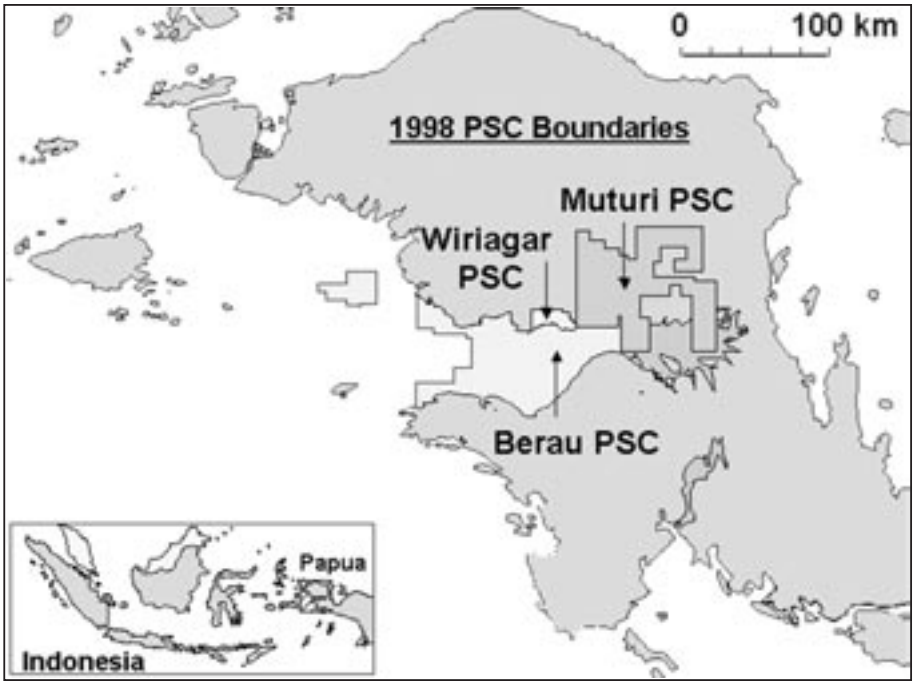

Figure 1. Location Map of Tangguh in Papua New Guinea

The ARCO discovery spanned Paleocene through Jurassic formations below a producing Miocene oil field called Wiriagar. The exploratory drilling of the pre-Miocene stratigraphy was justified largely by geochemistry, which showed that the oil in the field was Jurassic despite flowing from a Miocene limestone reservoir. Analysis of pressures in the discovery well indicated that the height of the gas column exceeded 2000 feet, making the gas accumulation potentially large enough to justify construction of a liquefied natural gas (LNG) plant. From 1994 to 1998, ARCO farmed into adjacent acreage containing the majority of the discovery's hydrocarbons, improved commercial terms through negotiations with the Indonesian government, appraised the initial well, identified and discovered two nearby gas fields, shot an extensive 3D onshore and offshore seismic program, and worked with an engineering firm to certify 24 trillion cubic feet of natural gas as reserves (14.4 certified as proved; the remainder as probable and possible). These reserves are the basis for what the Indonesian government designated in 1997 as the Tangguh LNG Project. Tangguh was the third largest discovery in the history of ARCO, exceeded only by the Prudhoe Bay and Kuparuk River Fields found in the 1960s on the North Slope of Alaska. Tangguh is also the first major pre-Tertiary hydrocarbon discovery in the history of oil and gas exploration in Indonesia.

Tangguh was the third largest discovery in the history of ARCO, exceeded only by the Prudhoe Bay and Kuparuk River Fields.

The discovery and appraisal of Tangguh involved technical and commercial analyses, insights, and decisions whose interplay is a fascinating case study in how a modern, multidisciplinary,

International Explorationists *continued on page 23*

International Explorationists continued from page 21

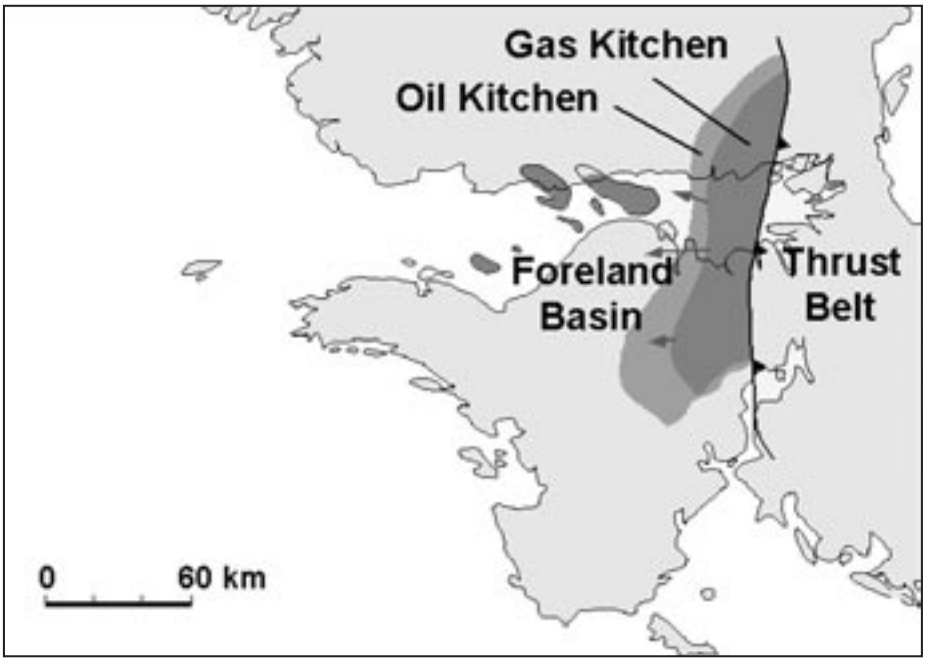

Figure 2. Petroleum system of Tangguh field area.

globally dispersed exploration team operates (Figure 2). Numerous individual initiatives including petroleum geochemistry, drilling cost reduction, government relations, reservoir pressure analysis, negotiating strategy, porosity prediction and the like turned out in hindsight to be crucial in their accuracy and timing to keeping the project technically viable and commercially attractive. Since Tangguh is so recent, the thoughts and actions of the involved individuals and the linkage and details of successive events can be and have been precisely recorded. This talk will tell the story of the exploration team that discovered Tangguh. ■

Biographical Sketch

James D. Robertson received a BSE in civil and geological engineering from Princeton University in 1970, and a PhD in geophysics from the University of Wisconsin in 1975. While at Wisconsin, he worked on geophysical and glaciological studies of Antarctica, and spent three field seasons in Marie Byrd Land and on the Ross Ice Shelf as part of the U.S. Antarctic Research Program. Robertson joined Atlantic Richfield Company (known as ARCO) in 1975, and over a 25-year period held various technical and management positions including director of geophysical research, geophysical manager of the offshore Gulf of Mexico exploration group, geoscience operations vice president of ARCO's Lower 48 division, chief geophysicist of ARCO's international division, and exploration vice president of ARCO's international division. After retiring from ARCO in 2000 following ARCO's merger into BP, he founded Rannoch Petroleum LLC, an independent petroleum consulting company based in Fort Worth, Texas.

Robertson has been active in various geological and geophysical societies and was the 1994–95 President of the Society of Exploration Geophysicists. He has been an SEG Distinguished Lecturer, Technical Program Chairman of the SEG Annual Meeting, and an instructor in 3D seismic interpretation in the SEG Continuing Education Program. He received SEG's Best Paper award in the magazine *Geophysics* in 1985 and SEG's Best Paper at the SEG Annual Meeting award in 1979 and again in 1983. He served on the Board of Directors of the Offshore Technology Conference from 1998 to 2002. He is a past president and honorary member of the Dallas Geophysical Society, and was a founding member of the Fort Worth chapter of SIPES (Society of Independent Professional Earth Scientists) in 2001. He currently serves on the advisory boards of the geology and geophysics departments of Princeton University and the University of Wisconsin, and previously has been on the geophysics advisory board of the Colorado School of Mines.

His can be contacted via e-mail at jdrrannoch@sbcglobal.net; telephone at 817-370-1634; or via mail at 7045 Shadow Creek Court Fort Worth, Texas, 76132.

Tuesday, February 17, 2003

The Woodlands Conference Center • 2301 N. Millbend Drive • The Woodlands
Social 5:30 p.m., Dinner 6:30 p.m.

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HGS NorthSiders Dinner Meeting

*by **Charles Kerans***
Bureau of Economic Geology
Jackson School of Geosciences
University of Texas at Austin

Prediction of Reservoir Architecture in Carbonate Systems

Carbonate reservoirs hold more than half of the world's remaining hydrocarbon resource base. Much of this resource is well delineated in terms of in-place volumetrics, but major hurdles still exist in terms of maximizing the recovery efficiency of this resource. With more than 70 years of carbonate reservoir development in basins like the Permian basin of West Texas, both major and independent oil producers have arrived at an important conclusion—carbonate reservoirs are complex! Recovery efficiencies rarely exceed 30 percent through secondary recovery. Tertiary recovery can be effective in many fields, but an equal number are probably unsuited. The additive effect of depositional, diagenetic and structural heterogeneities contribute to the mystique that is carbonate reservoir development and the through-going message is that these systems must be unraveled one reservoir at a time. Notwithstanding this complexity, observations from a wide range of reservoirs have led to important generalizations regarding our ability to predict reservoir style and substantially improve static reservoir model construction.

Reservoir architectures can be predicted, analyzed and converted into 3D models

Prediction of stratigraphic architecture and heterogeneity style in carbonate reservoirs has advanced greatly over the past decade. Integration of core, log and seismic data, aided by outcrop analogs, has proved to be the most successful approach to unraveling the stratigraphic or "matrix" plumbing systems of carbonate fields. Sequence concepts such as accommodation history and Milankovitch setting are important, but geologically oriented petrophysical analysis and seismic processing are both critical for proper delineation of the 3D reservoir model. Examples of heterogeneity styles and reservoir architectures found in greenhouse, transitional and icehouse settings, with examples from the Middle East, U.S., and other areas will provide examples of how reservoir architectures can be predicted, analyzed and converted into 3D models. ■

Biographical Sketch

Charlie Kerans is a senior research scientist at the Bureau of Economic Geology, the University of Texas at Austin, where he has worked since 1985. His areas of focus are in carbonate sequence stratigraphy and reservoir characterization, with an emphasis on integrating outcrop analog information for improved understanding of the subsurface.

Kerans received his PhD from Carleton University in Ottawa, Canada, in 1982 where he studied basin analysis and origin of Precambrian carbonates. While completing his PhD he held a lectureship at the University of Kansas geology department. From Kansas, Kerans moved to a two-year post-doc posting, studying Devonian reef complexes of the Canning Basin working with Dr. P.E. Playford of the Western Australian Geological Survey. In 1985 Kerans took a position at the Bureau of Economic Geology where he has worked on Paleozoic carbonate reservoirs of the Permian basin. In 1988 Kerans initiated the Carbonate Reservoir Characterization Research Laboratory (RCRL) at the Bureau and has co-directed this research effort with Jerry Lucia of the Bureau up to the present. Work with the RCRL has involved linked outcrop and subsurface studies of the Ordovician, Pennsylvanian and Permian of the Permian basin and Cretaceous reservoirs of the Middle East.

Kerans has been both a domestic and international AAPG distinguished lecturer. He also won the Pratt award from AAPG for best paper in the *AAPG Bulletin* for 1994 and has received best paper or poster for 8 other regional meetings for work on aspects of carbonate sequence stratigraphy and reservoir studies. He has authored or coauthored 60 papers, 6 field trip guides, 46 abstracts, and 1 regional geologic map.

Monday, February 23, 2004

Westchase Hilton • 9999 Westheimer
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North American
Dinner Meeting

by ***Steven J. Maione***
Core Lab, Reservoir Technologies Division
Houston, Texas

Helium Exploration – A 21st Century Challenge

As we enter the first decade of the 21st Century worldwide helium demand is rising as many high tech industries are developing new commercial applications that are dependent on the unique physical properties of helium. The need for continued adequate supplies of helium in the 21st Century will be critical. To fulfill the anticipated future demand for helium, a new approach to helium supply is likely needed soon – the deliberate search for helium-rich gas reservoirs.

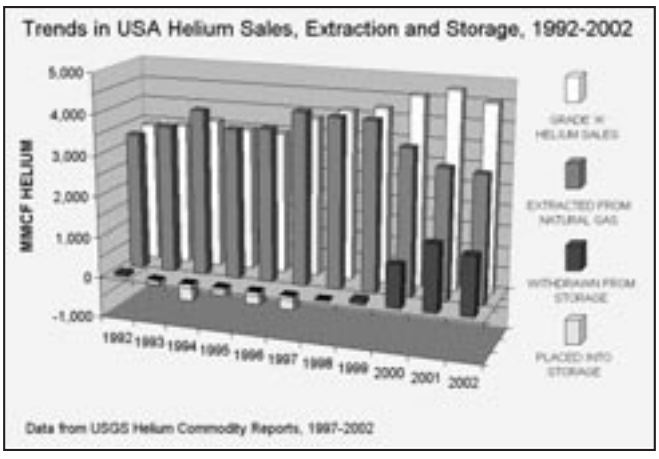
Up until 1905 helium was a laboratory curiosity, having only been discovered on Earth in 1895.

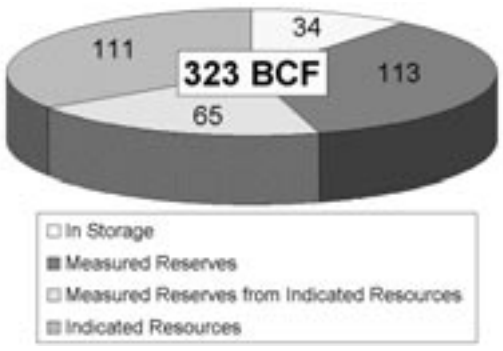
In December 2005 the 100th anniversary of the discovery of helium in natural gas will be celebrated in Dexter, Kansas. Up until 1905 helium was a laboratory curiosity, having only been discovered on Earth in 1895. The detection of helium in natural gas at Dexter was followed in the next three decades by many discoveries of small to giant gas fields in Kansas and the Panhandle regions of Oklahoma and Texas that held helium concentrations between 0.5% and 2%. Some contained upwards of 7% helium. In later decades helium-rich oil and gas fields were discovered in Colorado, New Mexico, Arizona and Wyoming, with some holding as much as 10% helium. Helium has been produced in commercial quantities at few other sites around the world. Although Canada, Russia, Poland and Algeria have produced helium in commercial quantities, none have discovered reserves or helium concentrations comparable to those found in the United States. As a consequence, the United States has been the world's principal source of helium for over 80 years, and both the U.S. petroleum industry and the U.S. government have played key roles in establishing ample supplies of helium throughout the 20th Century.

Nearly all helium gas reserves have been discovered serendipitously during the normal course of oil and gas exploration and development. As a result, there has been little need to develop any special geological expertise to target helium-rich gases in order to provide an adequate supply of helium. Scientific and industrial applications that were developed during the 20th Century that required helium were sustained by the abundant and reliable supply of helium associated with high BTU gas production.

Review of the geologic framework of helium accumulations, and recent findings from ancillary fields of study that include isotope and noble gas geochemistry, geohydrology, seismology, volcanology, mineral exploration and geothermal exploration provide grounds for formulating strategies for the exploration of helium-rich natural gas. The principal source of helium is from the steady rate of

North American Explorationists *continued on page 28*



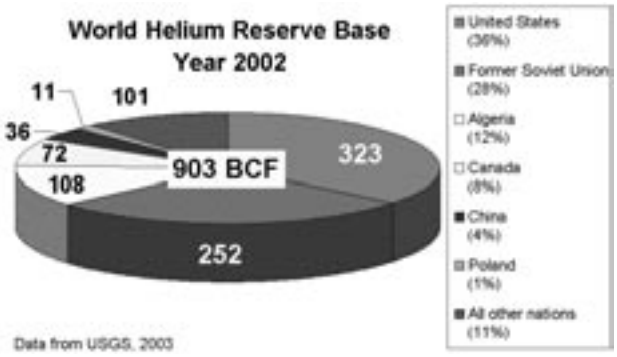


U.S. Measures Helium Reserves and indicated Helium Resources (2001) from USGS Minerals Yearbook, 2002

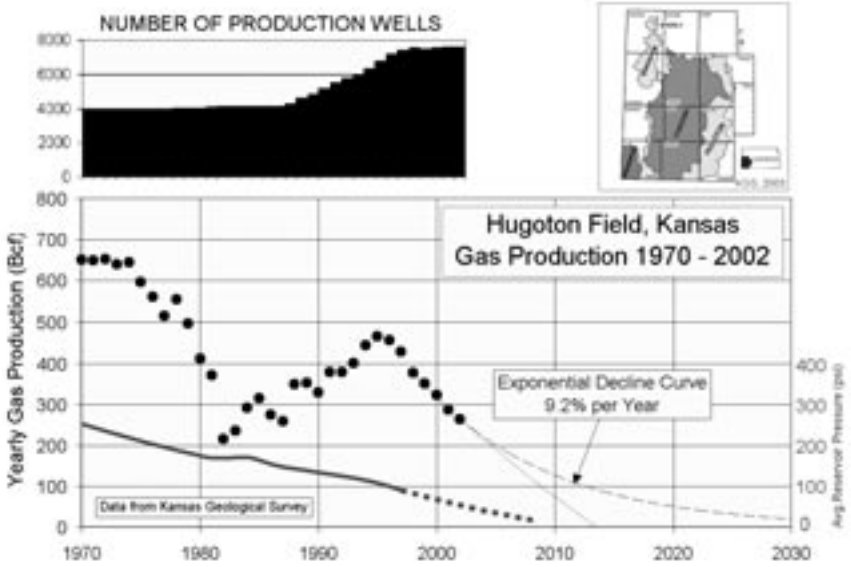
North American Explorationists

continued from page 27

radioactive decay of uranium (average: 2.8 ppm) and thorium (average: 10.7 ppm) found throughout the crust. Over geologic time substantial radiogenic and some nucleogenic helium, will accumulate within the mineral crystal lattices and microfractures in crustal rocks. Degassing of this helium from the crust has been the subject of many studies, including deep crust research drilling. Concentration profiles of helium in ultradeep wells and that found in confined groundwater systems that hold helium concentrations orders of magnitude higher than can be accounted for by steady-state helium diffusion, have demonstrated the necessity for periodic tectonism to increase fracture permeability of the crust and allow advective transport of helium. Helium soil gas and helium groundwater surveys adapted for uranium and hydrocarbon exploration have long revealed the association of high helium flux with faults, lineaments and natural springs.



World Helium Reserve Base Year 2002



Gas production and production well count history of the Kansas portion of the Hugoton Gas Field 1970-2002. Exponential decline curve based on 1998-2002 period. Historically the Hugoton-Panhandle Gas Field (KS, OK, TX) has been the principal source of helium in the United States since the 1950's. The current production decline rate and declining average reservoir pressure indicate that in less than 10 years the production of natural gas (and helium) in the Kansas portion of the Hugoton field will be at or near abandonment conditions.

Recent recordings of short-term, voluminous discharges of helium following strong earthquakes have aptly demonstrated the role of seismicity in periodic releases of helium from the crust.

While ^{4}He flux is largely accounted for by degassing of radiogenic helium from the crust, the rare ^{3}He isotope originates from the mantle, where the isotopic composition of helium is ~1000 times greater than that found in the Earth's crust (mantle ^{3}He/^{4}He ratio = ~10^{-5}, Crust ^{3}He/^{4}He ratio = ~ 10-8). The discovery in 1969 of ^{3}He flux from mid-ocean ridges and subsequently in volcanoes, intra-plate hot spots, and high-temperature geothermal systems has provided earth science with a highly sensitive tracer of mantle-derived gases. He-rich gas fields have variable but mostly distinctively elevated ^{3}He/^{4}He ratios, providing evidence that degassing and release of mantle volatiles accompanied significant releases of helium from the crust. Commencement of magmatic activity within a volume of long-stable, aseismic crust would mobilize long-held helium as levels of seismicity, crustal heat flow and rock temperatures increased.

Formation of economic helium-rich gas deposits can develop when periodic episodes of high helium flux are swept up by an overlying regional aquifer, effectively transported and concentrated in a reservoir trap. Because helium has very high diffusion rates in sedimentary rock, high-density rock seals are needed to effectively slow the relentless flux of helium through the sedimentary column and into the atmosphere where it would eventually be lost into space. Rock types such as anhydrite, salt, or dense (Paleozoic) shale provide the most effective top (or lateral) seals. The first sandstone or carbonate reservoir (commonly Paleozoic or Mesozoic in age) above the crystalline basement is favorably situated to capture, transport and "temporarily" hold helium-rich gases. Effective helium transport in an aquifer and retention of helium in a trap are further augmented if the reservoir is underpressured. A negative pressure gradient across the cap rock of an underpressured reservoir would be effective in retaining a higher concentration of helium for a longer period of geologic time. Field studies indicate an underpressured reservoir with a cap rock of anhydrite or salt provides the ideal geologic framework for the accumulation of helium gas.

Incorporating recent isotopic studies of noble gases by Ballentine and Lollar (2002), a geologic model is presented to explain the collection, movement and accumulation of over 600 BCF of helium in the Hugoton-

North American Explorationists continued on page 30

North American Explorationists continued from page 29

Panhandle gas field and adjacent areas. The model recognizes the key sequential geologic events that occurred to form the world's largest helium-rich gas district. These geologic events included 1) uplift of the Rocky Mountains, 2) development of an east-dipping, underpressured hydrogeologic system of basal Paleozoic clastics and carbonates, 3) deposition of Permian shale, anhydrite, and salt, and 4) Late Oligocene–Early Miocene volcanism of the Spanish Peak region of southeast Colorado.

Not since the helium gas boom years in the Four Corners area of the Southwest in the 1960s has the American petroleum industry given much thought to targeting helium-rich gas fields. As the 21st century begins the need for the exploration for additional helium reserves is beginning to be apparent as the Mid-Continent gas fields, long the principal world source of helium, are nearing depletion. A goal for the American oil and gas industry should be to accept this challenge, and with improved geologic models and exploration strategies, to locate and develop new helium deposits. ■

Biographical Sketch

Steven J. Maione, senior staff geologist for the Reservoir Technologies Division of Core Laboratories, received degrees in geological engineering and a Masters in geology from the Colorado School of Mines. In 1971 he joined Union Oil Company of California (now Unocal Corp.) as an exploration petroleum geologist in Casper, Wyoming.

In 1974 he joined Unocal's Geothermal Division and participated in geothermal exploration projects in North America, Philippines, Indonesia and Japan. In 1992 he transferred to Sugar Land, Texas, and rejoined the Unocal oil and gas exploration division and participated in teams evaluating new venture opportunities, including China.

In 1997, Steve became an Associate of Valenti Engineering Services of Kingwood, Texas, where he carried out 3-D seismic interpretations. He joined Coherence Technology Company (CTC) in Houston in 1998, specializing in integrating Coherence Cube seismic volumes in 3-D seismic interpretations. Following acquisition of CTC by Core Laboratories, his seismic interpretation activities for the Advanced Reservoir Geophysics Group now include integration of rock properties derived from seismic (LambdaMuRho, or LMRTM analysis) in pursuit of the wily hydrocarbon.

Steve is a registered professional geoscientist with the State of Texas, a member of the Houston Geological and Geophysical Societies, the Society of Exploration Geophysicists, Sigma Xi, Rocky Mountain Association of Geologists, and a 32-year member of the American Association of Petroleum Geologists. His interest in the science and geology of helium followed his work as an exploration manager of a geothermal joint venture in Japan in the early 1980s. There he adapted the newly emerging isotopic science of $^{3}He/^{4}He$ ratio measurements of gas and water samples in pursuit of the wily geotherm.

Wednesday, February 25, 2004

Petroleum Club • 800 Bell (downtown)
Social 11:15 a.m., Lunch 11:45 a.m.

Cost: $25 Preregistered members; $30 Nonmembers & Walk-ups

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HGS General Luncheon Meeting

by ***Richard L. Tannehill***
POGO Producing Co.
Houston, Texas

Main Pass 61/62 Field – A Recent 50 MMBOE Discovery Among the Old Giants of Main Pass

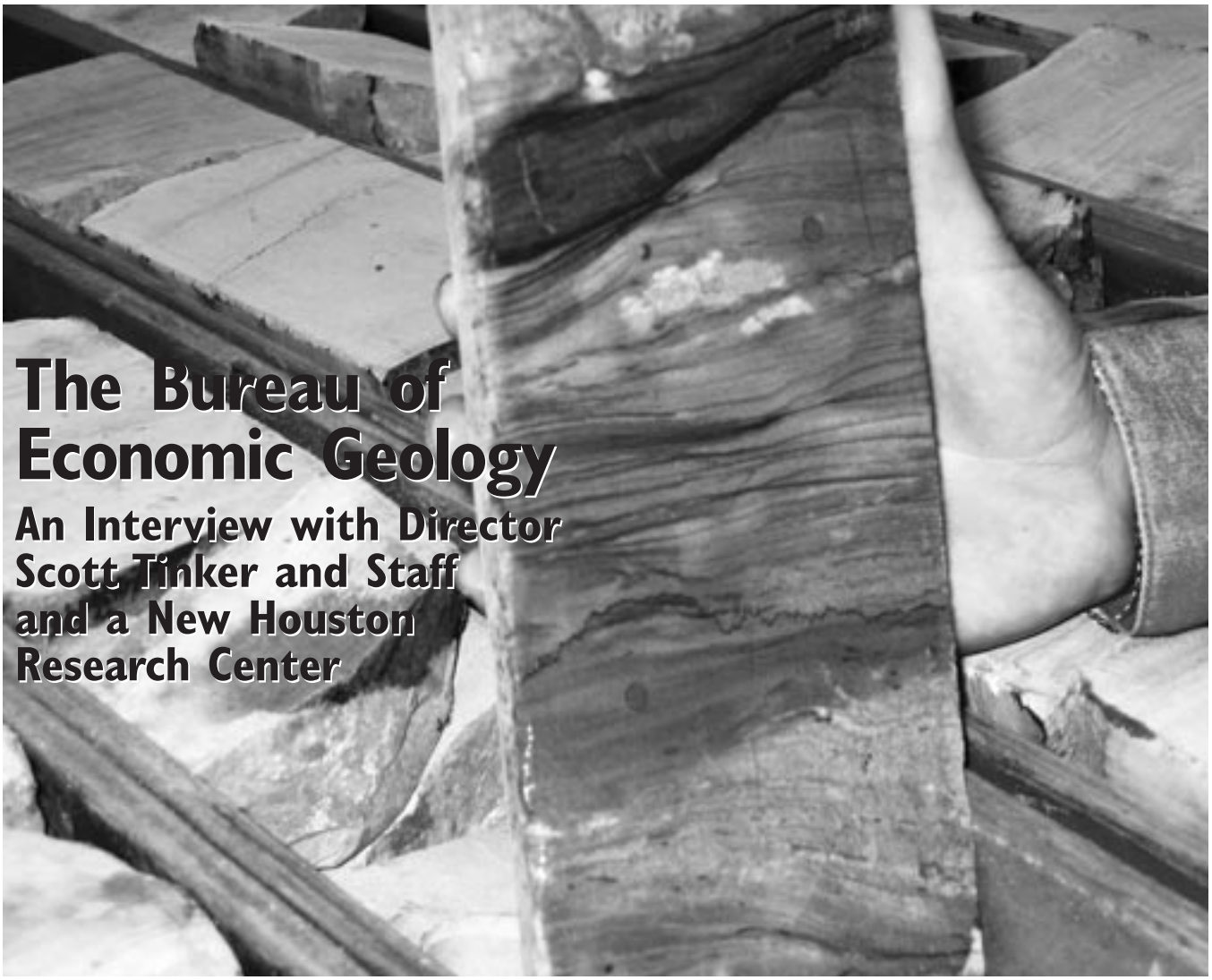
As geoscientists working the Offshore Gulf of Mexico we are often asked, "why can't you find normally pressured, shallow water prospects near shore?" Main Pass 61/62 Field (MP 61/62) is one of those management dreams come true. This field is located in 90 feet of water, 9 miles off the Mississippi river delta and situated among three fields that have produced 1/3 of the Federal Main Pass OCS portraction area oil and gas. MP 61/62 is a normally pressured, stratagraphic trap located at a depth of 7,200 feet sub-sea true vertical depth (SSTVD). Working off nearby company properties, and utilizing traditional subsurface and 3D seismic control, discovery and development of 50 million barrels of oil equivalent took 30 months. The field's production of 20–30,000 barrels of oil equivalent per day was accomplished by the installation of two manned platforms and two caissons. A third water injection platform was installed to maintain a formation pressure in the primary reservoir. ■

Biographical Sketch

RICHARD L. TANNEHILL is Division Geophysicist with POGO Producing Co. in Houston, where he has worked both on- and offshore Gulf Coast as well as Gulf of Thailand since 1989. He graduated in 1974 with a BS in oceanographic technology with emphasis in geology from Lamar University and began his career with Texaco in New Orleans. He has also worked for Aminoil U.S.A., Hamilton Brothers Oil Co. and Burlington Resources Inc. primarily as explorationist/prospect generator before joining POGO.

Increasing Diversity *continued from page 7*

fields within underrepresented communities; promoting greater and more effective teaching of these fields, especially in settings that serve minority students; and, advocating for supportive, mentoring environments and more inclusive attitudes within academic institutions, government laboratories, and corporations. Initial efforts of this partnership will focus on two specific activities: (1) developing and promoting a centralized web-based portal with comprehensive, culturally tailored information and profiles about careers in these disciplines, and (2) developing a central web-based repository that provides detailed demographic and statistical information to substantiate the importance of the diversity issue and examples of effective diversity programs. ■



The Bureau of Economic Geology

An Interview with Director Scott Tinker and Staff and a New Houston Research Center

Article and Photos by Arthur E. Berman

"We're having a 95th birthday this year. 1909 is when the Bureau came together from three other units. We're the oldest research unit in the University of Texas. We're the first one. Our whole reporting line is up through the University of Texas," said Bureau of Economic Geology Director Scott Tinker as I sat in his office in Austin a few weeks ago.

"The Bureau people stay pretty hungry—and we stay pretty relevant that way. That's the model we've been working with and it's been a good one but it's not without its challenges."

—Scott Tinker

I have known about and worked with the Bureau of Economic Geology for all of my professional life as a geologist. I thought I had a good idea of what the Bureau did and why it was important. The experience of researching this article for the HGS *Bulletin*, however, made me realize that there are many aspects of the Bureau and its funding that I was unaware of.

There is a dynamic aspect of the Bureau I did not previously appreciate as the Bureau responds to a shifting industry and funding environment. More than anything I am impressed by the tremendous effort involved with piecing together the predominantly non-state funding that provides the oil and gas and environmental industry with the great services that the Bureau of Economic Geology offers.

The Bureau of Economic Geology —or just "the Bureau"—is a world-class research organization, an academic arm of the University of Texas, the Texas State Geological Survey and a major partner to industry involved in petroleum and environmental work. The Bureau does all this along with maintaining book and

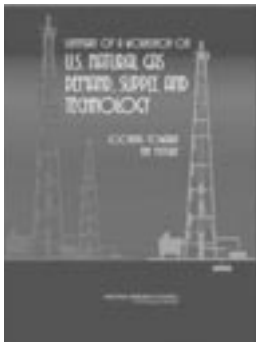
The Bureau of Economic Geology *continued on page 38*

The Bureau of Economic Geology continued from page 37

The Bureau Is In The News

- Scientist Susan Hovorka was featured in the December 9, 2003 *USA Today* for her work and opinions on CO_2 disposal in the subsurface as part of the environmental solution to combustion in Texas.

- Director Scott Tinker just returned from Washington where he met with White House staff on strategic aspects of natural gas resources and supplies.

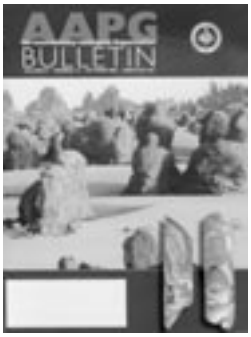


- Scientist Jim Gibeaut's work was on the cover of *GeoTimes* magazine in November for his work using laser light mapping techniques to better understand issues of coastal erosion in the Matagorda Bay area of Texas.

- The September and October *AAPG Bulletin* featured articles by Bureau scientists on emerging gas basins of Mexico.

Geologic framework of upper Miocene and Pliocene gas plays of the Macuspana Basin, southeastern Mexico

W. A. Ambrose, T. F. Wawrzyniec, K.Fouad, S. C. Talukdar, R. H. Jones, D. C. Jennette, M. H. Holtz, S. Sakurai, S. P. Dutton, D. B. Dunlap, E. H. Guevara, J. Meneses-R., J. Lugo, L. Aquilera, J. Berlanga, L. Miranda, J. Ruiz M., R. Rojas and H. Solís



Traps and turbidite reservoir characteristics from a complex and evolving tectonic setting, Veracruz Basin, southeastern Mexico

D. C. Jennette, T. F. Wawrzyniec, K.Fouad, D. B. Dunlap, J. Meneses-R., F. Grimaldo, R. Muñoz, D. Barrera, C. T. Williams-Rojas and A. Escamilla-Herrera

journal libraries, log libraries, a publication center and core facilities with about 80 scientists and 45 support staff.

What's New? Houston Research Center

The Bureau is constantly providing new resources and services like the new Houston Research Center. Located in west Houston (six miles north of I-10 and two miles south of U.S. Highway 290) this state-of-the-art facility is equipped to permanently store and curate geological core and cuttings.

The Center has a full-time staff of two part-time geologist-curators—Beverly DeJarnet and Laura Zahm—and Storage Supervisor Randy McDonald and his three assistants. The 12-acre property includes 3 large buildings with warehouse space of 64,000 square feet that will be increased to 96,000 in the near-future with construction of an additional warehouse.

Houston Research Center Location Map

The HRC houses 557,000 boxes of cores and cuttings that, along with other core repositories in Austin and Midland, bring total Bureau holdings to 1.7 million boxes of core. In addition to the climate-controlled core and cuttings warehouse, the HRC complex has offices, laboratories and a well-lit core layout room available for visiting scientists. There are also two conference rooms with modern projection systems to accommodate guests attending short courses and seminars or just renting meeting space from the Bureau.

HRC Geologist Laura Zahm

HRC Storage Supervisor Randy McDonald

I toured the HRC with geologist and curator Laura Zahm. I was impressed by the ample and well-lit space for core examination, microscope study and discussion. When I was at the HRC, in spite of being in the midst of the winter holiday season, there were several core boxes laid out and a geologist studying some of the boxes of core. Maps and montages covered many of the walls. A recent exhibit from Earth Science Week was still on display in one of the meeting rooms showing core and cuttings samples as well as coring and drilling bits and other equipment.

I asked Storage Supervisor Randy McDonald what was involved with arranging to examine a core.

The Bureau of Economic Geology *continued on page 40*

Houston Research Center

HRC Core Storage area

The Bureau of Economic Geology

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"That depends on whether you want to view it here or somewhere else," he answered. "If you want to see it at the HRC ideally we would like about two weeks notice."

Laura quickly added, "But sometimes we can get the core out a lot faster depending on our schedule and how much core you want to look at."

HRC Core Layout area

There are over half-a-million boxes of cores and cuttings in beautifully organized, modern facilities with high-load shelving on a three-tiered layout with wide aisles for storage and easy forklift access to core boxes. The HRC can quickly arrange to have cores displayed at the HRC or shipped to your location.

The HRC strives to be the world-class public-sector curator of industry and academic geoscience material—core, cuttings, and other collections—in the United States. The HRC plant was donated to the Bureau of Economic Geology by BP in 2002. The facility was originally developed by Amoco in 1982 and was acquired by BP in 1999 when it bought that company. Amoco built and designed the site expressly for storing and studying core and other geological material.

HRC Meeting Rooms

The Houston Research Center is relatively new to the Houston area earth science community. HGS members should visit and use the Center as well as encourage the companies they work for and with to keep it in mind for courses and meetings. Space can be arranged for meetings by the public or industry and, in fact, at least one Houston Geological Society-sponsored group is currently using the HRC for its regular meetings.

HRC Exhibit from Earth Science Week

A Meeting with Bureau Director Scott Tinker: What the Bureau Does

After leaving the HRC I drove on to Austin where I met with Director Scott Tinker and many of the Bureau's geoscience staff at the Pickle Research Campus of the University of Texas at Austin.

"The Bureau does research. We proudly do research," said Director Tinker. "The second hat we wear is the State Geological Survey. We function closely with the academic world and UT broadly and we function with the state geological surveys of the country and there are fifty.

"A lot of people in Texas don't know how the Bureau is funded—I didn't and I had been a user for a long time. It turns out that of our budget—which is about $15 million this year—just under 10% comes from the State of Texas. We use that to run the public kind of things the Bureau does: log libraries, book and journal

Bureau Director Scott Tinker

libraries, publications and publication sales and the support staff that run the business of the Bureau. It actually doesn't fully cover that."

Scott Tinker: How Is the Bureau Funded?

"How about the scientists? All of their support comes from grants and contracts that we raise every year."

The Bureau gets roughly one-third of its funds from contracts and grants with federal government agencies like the Department of Energy, US Geological Survey, Minerals Management Survey, Environmental Protection Agency and NASA. This is not money simply given to the Bureau of Economic Geology but is competitively won and contracted for specific research and deliverable products.

Another third of the Bureau's support comes from the private sector. About half of that is from the consortia or Industrial Associates programs. Another half comes from sponsored research where the Bureau contracts with individual companies to do large, integrated studies in places like West Texas and Mexico.

The final third comes from state grants and contracts that are competitively bid and that the Bureau has to win and then deliver required products and services.

"The Bureau people stay pretty hungry—and we stay pretty relevant that way. It's challenging. I'm not going to paint a picture that's different. The growth that occurs is growth you have to maintain the following year. It's not like something comes in and you've got it forever. That's the model we've been working with and it's been a good one but it's not without its challenges.

"In terms of the energy side, about 60% of our business is with oil and gas research. That's a very good staff. You know most of their names. Salt research, carbonate reservoir characterization, clastic research, fractures and geophysics—those are the main consortia. Lesli Wood has started one (a consortium) in Trinidad this year which is taking off. That's the basic research side of things."

The Applied Geodynamics Laboratory

I met with structural geologist Martin Jackson who, along with Mike Hudec, head the Applied Geodynamics Laboratory (AGL).

"Sixteen years ago when I started the AGL projects I decided that focusing on salt tectonics might fill an important need. Looking back now that looks like a very fortunate choice," observed Jackson.

Martin Jackson

The AGL has been among the most successful of the Bureau's Industrial Associates programs over the years as understanding salt tectonics in the Gulf of Mexico and the South Atlantic have become increasingly important in oil and gas exploration and production.

Says Jackson, "That brings us to the seismic-based basin studies focusing on salt tectonics. We did about four years of research in West Africa: in the Kwanza Basin and the Lower Congo basin, first on a 2D set of data and onshore on the Kwanza Basin and then two years on the Lower Congo basin using a 3D volume donated by Total. Along with seismic studies we have a long history of tectonic modeling. The focus has been on how deep water depositional systems have been affected by salt tectonics and passive-margin tectonics."

The AGL carries out geologic studies, physical modeling, mathematical modeling, and computer visualization to test concepts and generate new hypotheses in salt tectonics. AGL research focuses on a complete range of salt-tectonic styles including extensional, compressional and strike-slip systems in both thin-skinned and thick-skinned tectonic settings. The AGL was established in 1988 and is funded by a consortium of oil companies and supported by numerous software and seismic vendors. The AGL is widely considered the world's premier institute for research on salt tectonics.

The Exploration Geophysics Laboratory (EGL)

"The EGL is an industry-sponsored consortium but to survive we have to get a lot of federal money. We in EGL focus on one topic: that's development of multi-component seismic technology,"

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explains Bob Hardage. EGL was established in 1997 and develops seismic vector-wavefield technology for improved reservoir characterization and prospect evaluation. The EGL develops technologies, such as seismic field-recording techniques and data-processing and data-interpretation procedures, to image reservoirs using all components of the seismic wavefield.

Bob Hardage

Scientist Bob Hardage explained how the petroleum industry has until recently worked almost exclusively in the compressional or "P" wave realm.

"Each elastic mode has a different reflectivity and has the potential of seeing different stratal surfaces. "P" wave data are typically the only data used for sequence stratigraphic interpretation but those data alone do not resolve the entire geology," says Hardage.

"At EGL we do full-elastic wavefield stratigraphy which requires both P-wave and S-wave seismic data. The additional sequences we see make a huge difference."

State of Texas Advanced Resource Recovery (STARR)/ University Lands Advanced Recovery Initiative (ULARI)

Scott Tinker: "The sponsored work we do: the State of Texas Advanced Resource Recovery Program is an important one for your [HGS] members to know about and the University Lands Program is also important to your members.

"The University Lands Program takes University money to do studies on and work with operators on lands that are owned by the University. They are royalty lands. The goal was to help operators understand their fields better through (reservoir) characterization projects so they could improve the way they managed them. If they did a better job of management and produced more oil and gas, the University would see that reflected in royalty returns.

"We try to get the operators to invest in a cost-sharing kind of a program. They're getting a nice team of researchers in exchange for their investment. Steve Ruppel has been the team PI on that and we've had a good team under him."

Steve Ruppel explained how his team is working with over 1200 wells in the Fullerton field of the West Texas Permian basin:

"Part of the funding is from the University system and we're looking at reservoirs on the University's leases. One of the best examples of what we are doing is ExxonMobil's Fullerton Clear Fork field—it's the largest Clear Fork reservoir in the Permian Basin. We're underpinning all of this with outcrop models and that's a key to the interpretation. What we're trying to do is to learn where the oil is, where the remaining resource is, to help the companies understand the reservoir and come up with drilling programs. We're really interested along with RCRL (Reservoir Characterizaton Research Laboratory) in applying 3D seismic imaging, attribute extraction and inversion models for characterization of inter-well reservoir attributes."

Steve Ruppel

Director Tinker: "An exact parallel program [to the Unversity Lands Program] is funded by the State of Texas and it's called STARR—State of Texas Advanced Resource Recovery. Bob Loucks is the PI of that program and, again, he has a good team that he works with. The State of Texas puts in money every year for us to work on state-owned lands. These have been largely in West Texas and in the shallow marine bays, estuaries and coastal regions where the state owns anywhere from 3 to 10 miles of 100% royalty [interest] in the offshore leases.

"We have been working with small and mid-size independents, though we will work with any sized company, to bring a funded team to help to understand their fields. It's a resource that's available to anyone who has interest in those State- or

Ramón Treviño and Ursula Hammes

University-owned lands. We try to get some sort of matching investment, but it's not required, to leverage against the State investment.

Scientists Ramón Treviño and Ursula Hammes showed me graphic examples of new sequence stratigraphic interpretations they had done in the STARR program for the gas-prone offshore areas of South Texas near Corpus Christi.

"The only thing that is required by the State is that we demonstrate that the increases we have caused to production have a royalty value at least equal to what the State has spent and it's never been a problem. This year's work has resulted in royalty revenue that is ten times the cost of the program," says Treviño.

"The only thing we require from the operators is their data: logs, seismic and production data," adds Hammes.

"Most of the time we work with really small operators, one- or maybe two-man companies," says Treviño. "Frank Brown and Bob Loucks, both well-known sequence stratigraphers, have been instrumental in helping us with the interpretation. The main point is that sequence stratigraphy is the key to correlating within fault-bounded sub-basins. Individual sands don't correlate very far, certainly not acorss the growth faults. That's the punch-line to the project."

"These two programs—University Lands and Advanced Resource Recovery—are resources that are available that many people don't necessarily know about," emphasized Director Tinker.

"They don't know that there is actually State and University support for the Bureau to do that. For the STARR program the state comptroller has to show that those programs are at least revenue-neutral every year so that the money put into the program is paid back out of royalties. So far the multiplier has been five to ten times the money that the state or university has invested.

"So for the HGS people who are working those areas, it's important to hear from you. It's critical to us that when we do things with people we get letters or documentation that say 'The Bureau mattered. We may have done this anyway or maybe not but we certainly did it better through our partnership with the Bureau.' The firmer the numbers, the better!"

Scott Tinker: Logs and Other Data

"One of our greatest challenges is for outreach and for making data available: Websites and digital data. I have a million paper logs in our log library. We're required by the Railroad Commission to house a paper copy of every well log in the state. People come in all the time to copy them and there are companies that also do that. I'm really trying to find a way to scan or rasterize all those logs so we could put them on a Website and people can access them. The Illinois survey has done this, it's GIS-searchable, and I want to do that for Texas.

"After years of struggling with how to do this, we just bought a scanner and we will have students and graduate students working on it. We may ramp it up and I think this would be a tremendous service to Texas and to the members of your society [the HGS]. There are companies that do this and sell this data and sell software. We're never going to try to do that. I would love to partner with someone so that the Bureau's data would suddenly become available. I'd be willing to look at a membership fee that would go to the company—I don't want the money. I just want to provide the service."

Doug Ratcliff

Jay Kipper

Log Library

The Bureau log library or Geophysical Log Facility (GLF) is a repository for all the oil and gas well logs in the State of Texas including wire line electric logs, well records and scout tickets from hundreds of thousands of wells located in Texas. Approximately 25% of the GLF's indexed logs have been entered into the on-line Integrated Core and Log Database (IGOR)—available on-line at http://begdb1.beg.utexas.edu/Igor/—and efforts are under way to enter the remaining 600,000 logs.

Associate Directors Doug Ratcliff and Jay Kipper gave me a tour of the Log Facility. Explained Ratcliff, "We have over 900,000 logs from the Railroad Commission, donations from retiring geologists and other sources. Over 250,000 of those now have digitally catalogued **The Bureau of Economic Geology** *continued on page 44*

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header data. Daniel Ortuño can find and scan logs for users right now. The long-term goal is of getting all these well logs scanned and getting them into a data base on-line. We are totally and completely aware of your needs. It's a very expensive and time-intensive operation. We also have enormous amounts of other ancillary data like scout tickets and driller's logs which are totally not in the data base but they're in pretty good order."

In addition to the log facility the Data Center has a reading room and maintains a collection of geological reference materials, including periodicals, maps, well logs, publications and reports from various governmental and non-governmental earth science entities.

Scott Tinker: Why the Bureau Is Involved with International Projects

"People always question: Why is the Bureau working internationally? Why aren't they only working in Texas?

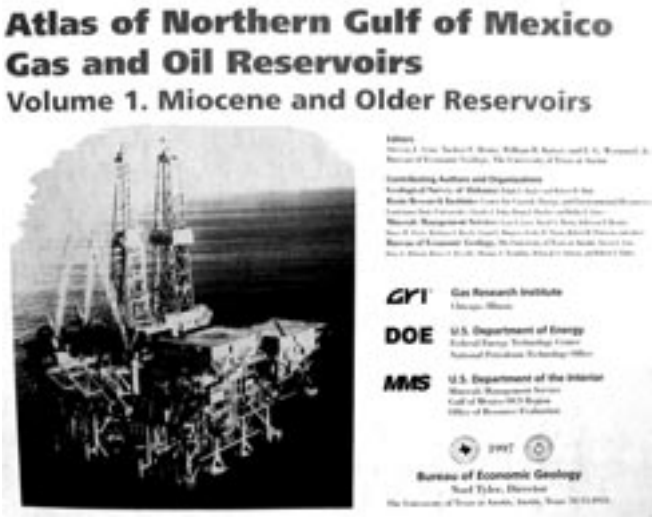
"Once you understand the budgetary structure it's very clear. We do as much in Texas as we can possibly find money to do. We try to target things in Texas all the time and to use Texas as the prototype to apply to the world.

"We've got to go out to the world because we're a research unit of UT. Geological research is global and a lot of our private funding comes from international sources and federal sources. So the Bureau is an international research organization with a strong reputation globally. I think that makes us better in Texas. I really, truly believe that.

"If we had 100% of a hard-line funding from the State of Texas we would be a very different organization. I wouldn't want that. I like it the way it is because there are challenges. You're always out there looking for ways to make things happen and that makes it really fun. But it is international and that may not be something your members [the HGS] understand. So Mexico is in the September issue of the *AAPG Bulletin*—a paper on the Macuspana basin. In the October issue of the *AAPG Bulletin*—a paper on the Veracruz basin. We're making the information, at least the results, public.

"In fact the things we do with support don't even fully cover all the research. We ran the numbers last year. Over 99% of the research salaries were raised from grants and contracts.

"I'm very conscious of that. All the thinking is really to try not to compete with the industry that is here in Texas. We try to complement it."



Bureau Atlas

The Atlases

"The atlases are consistently popular. We would like to go to the next level of atlas and make them digital and GIS. It requires hundreds of thousands of dollars to put the atlases together. One of the proposals we have out now is called TEACZ—Texas Environmental Atlas of Coastal Zones. We're trying to make a digital and GIS atlas of the coastlines—wetlands and bays and estuaries—that operators can use when they are going for environmental permitting—to reduce the time and cost it takes to get a permit to do drilling on the Texas coast. That's the thought behind it. We're going after the private sector to try to get a consortium of companies to fund this."

Shirley Dutton

Geologist Shirley Dutton is working in the Permian basin on a joint project between the Bureau of Economic Geology and New Mexico Geological Survey.

"We have a goal of updating and clarifying the oil plays by using one million barrel fields as the threshold—the earlier atlas projects only looked at fields with ten million barrels or greater," says Dutton.

"Like the old atlases this will provide a quick introduction to the geology of all the producing intervals, either a particular play or the entire basin. The earlier oil atlas has lots of valuable petrophysical data. With the new, digital GIS mapping we will complement that work. The project is very much aimed at people producing Permian basin reservoirs."

Says Scott Tinker,"We've got some money now from DOE and are looking at the oil plays in the Permian basin. We're putting in a big proposal to study the whole Permian basin [from the point-of-view of] play analysis which we can publish—a modern play analysis. We're going to need some private matching funds as well. It will be a great contribution to both exploration and field development in West Texas.

"I want everybody to hear: we are trying to modernize and update the atlases."

"I want everybody to hear: we are trying to modernize and update the atlases."

The Bureau of Economic Geology is a dynamic and compact group of earth scientists and support staff. It covers an astonishing range of focused and applied research and services to mainly the oil and gas and environmental industries and the State of Texas. The Bureau's funding is mostly "soft money" in that it has to be raised annually, often by creative means and links to private, state, federal and international funding sources. The Bureau uses Texas as the basis and model for all the work it does and actively partners with companies doing business in Texas. As a globally recognized research leader and responding to the needs of its private sector sponsors the Bureau is also very much involved with international work.

In addition to being a research unit of the University of Texas, the Bureau is the Texas State Geological Survey and, as such, is a rich source of vital information in the form of well logs, cores, publications and atlases. It is part of the University of Texas and, therefore, works on the academic side of both research and teaching. Like all state and federal agencies the Bureau must dynamically respond to shifts in funding to stay vital—this is recognized and accepted by all at the Bureau as the way things are and will always be.

Bureau scientists enthusiastically discussed their work and research with me. I heard a consistent theme of value-added and operator-sponsor focus in all my discussions: these scientists are excited about their work and contribution. Continued industry support for programs and consortia indicates a bright and challenging future for earth science research and services at the Bureau of Economic Geology. ■

Who Speaks For The Beach? William Dupré, PhD

This is a story about loving what you do, doing what you love, and giving to the community.

by Diane Yeager

I first met Dr. William Dupré when I attended a field trip with my daughter this past November. Friends of Geographers (FOG) sponsored a field trip for local geography teachers to obtain continuing education credits. A limited number of seats were open to students and parents from Clear Brook and Bellaire High Schools. My daughter told me that the lecturer was a professor from the University of Houston (UH) and he was going to lead the group through Galveston and Galveston Island and speak about the city's history, how it has been shaped by the 1900 hurricane, and the geologic processes that are forming Galveston Island. Fascinated by the subject matter, FOG's educators Ann Linsley-Kennedy, Judy Lucas and Dr. Jeff Lash from University of Houston at Clear Lake, welcomed me aboard the bus.

Loving What You Do

William Dupré grew up in Houston, where he became interested in "rocks and fossils" while at Pershing Junior High School. It was the fortuitous establishment of a "Science" Explorer Post sponsored by Exxon Production Research (EPR), however, that led him to see geology as a possible career. For several years he was one of several fortunate students who met weekly with two Exxon paleontologists, went with them on field trips, and "learned" science by "doing" science. And it was because of them that he became a geology merit badge counselor at the Boy Scout camp (El Rancho Cima) in the Texas Hill Country, where he learned you never really know a topic until you are forced to teach it!

"Though I have long since forgotten their names, I have never forgotten the debt I owe those two HGS members who volunteered their time to help educate high school students about science and the wonders of the earth," says Dupré.

Unfortunately, Bill's high school counselor told him that he was "not college material" and that perhaps he should consider joining the Army. Undeterred by this less than stellar recommendation, Bill enrolled in the University of Houston to study geology. Fortunately, once in college you have a clean academic slate, and a fresh start. After completing his first two years at the University of Houston, Bill transferred to the University of Texas (UT) in Austin, Texas, where he graduated cum laude with a Bachelor of Science degree in 1968—a sweet victory for someone who had been dissuaded from higher education.

Elaine and Bill Dupré

He stayed on at UT to obtain his Master's Degree in geology in 1970. As part of his research, Dr. Dupré spent a year doing regional mapping in Honduras. Only then did he finally figure out why he was required to take foreign language as an undergraduate! His mapping in Honduras was the first in a long line of mapping projects in the Dominican Republic, Alaska, California, and the Texas coastal zone. Thus it is no surprise he has taught hundreds of students at the last 17 field camps at UH, the last 10 as its director.

"I love geologic mapping—it has always been like a giant outside jigsaw puzzle. Where else can you get paid for doing what others consider a vacation!"

It was in this Hill country populated by Longhorn fans that Bill met the love of his life—his wife Elaine. Elaine was a Plan II (honors) major at UT when her roommate (also a geology student) introduced her to Bill on a blind date. Bill didn't make the best impression on that first date, **People Profile** *continued on page 48*

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but there must have been a spark, as four years later they were married. They recently celebrated their 31st wedding anniversary and look forward to many more!

Bill left UT to pursue his Doctoral Degree in geology at Stanford University in California, where he planned to study remote sensing.

"Unfortunately, the professor I was working with [doing remote sensing] was interested in ore deposits and I wasn't. Through a series of mishaps, I ended up without a job and sleeping in my office at the beginning of my first summer—I went through an identity crisis of sorts. Fortunately, the United State Geological Survey (USGS) had recently a created an Environmental Geology Branch next-door to Stanford. Working with the USGS for the rest of that summer I realized there was a lot of exciting geologic work being done to help address environmental issues. I rediscovered my roots, and that was when I decided to switch my research emphasis from remote sensing to environmental geology."

Braided stream at the Great Sand Dunes (UH Field Camp, 1986)

Dr. Dupré began his research on the evolution of the landscape and origin of terraces fringing Monterey Bay.

"I was interested in the Quaternary evolution of the coastal region around Monterey Bay. Up until that point, everyone had viewed these landscapes as erosional. Fortunately, I had taken courses on depositional systems at UT, thus I tended to think of landforms as part of a genetically related suite of depositional environments. I realized that much of the confusion in interpreting that region was that people had ignored the role of depositional processes in shaping the landscape."

It was while studying the landscapes around Monterey Bay that he began to recognize and document the effects of tectonic setting and sea-level changes on coastal depositional systems, including the ability to reconstruct past sea-level curves from coastal stratigraphy. Interestingly, he submitted a paper on that topic to the AAPG in the late 1970s, only to have it rejected on the basis that those topics were of little or no interest to AAPG's readers!

Mapping Quaternary sediments further allowed him to recognize and delineate potentially active faults, as well as to define the relative susceptibility of those deposits to liquefaction. Thus his

California coastline

geologic maps were transformed into derivative maps, most of which are still being used by city and county planners throughout the area. This project marked the beginning of his continued interest in geology and land use planning.

"The processes and products by which the land has formed and our use of that land are inextricably linked. One of the goals of our science should be to better understand those links, and educate the public about how the land affects us and how we affect the land."

His work with the USGS also provided him an opportunity to work with hydrologists and, in doing so, to better appreciate the interdisciplinary nature of environmental problems and their solutions. This led him to get an interdisciplinary Master of Science degree in hydrology while at Stanford.

Dr. Dupré completed his doctoral degree and he and his wife were ready to move on. His expertise in depositional systems led to several offers from oil companies, however, he thought he would first give academia a try. He accepted an Assistant Professor position at Wesleyan University in Connecticut in 1974. Two years later, the cold of New England and the lure of family and friends led Bill and Elaine back to the University of Houston where it all began. Twenty-seven years later he remains on the faculty of the Geosciences Department. During that time he has helped supervise over 60 Master's and Doctoral students in the geosciences, many of whom remain members of HGS. He has also taught a wide variety of courses at both the graduate and undergraduate level.

"Much, perhaps most of my time teaching in recent years has been devoted to teaching the nonscience major, both in my Introductory Physical Geology course as well as in my National Parks and Geologic Hazards courses. For most of these students, mine is the last science course they will ever take, so I feel it imperative they leave with an appreciation of how geology affects their lives, from the earth resources which provides our standard of living to the way in which we affect our environment and our environment affects us. This is probably the hardest educational task I have ever undertaken, yet in some ways it may end up being one of my most important educational accomplishments."

For most of these students, mine is the last science course they will ever take, so I feel it imperative they leave with an appreciation of how geology affects their lives.

Bill feels he has been fortunate in being able to merge his academic career with opportunities outside the university. He did geologic mapping in the Dominican Republic for King Resources and worked with Shell Oil Company's Alaska Division on marine sedimentation and geomorphology of the southern Bering Sea. He spent four summers mapping the Yukon-Kuskokwim Delta region for the Bureau of Land Management (BLM) to better understand possible impacts of proposed offshore drilling in Norton Sound. He worked intermittently for 18 years delineating seismic hazards in the Monterey Bay region for both the USGS and local county governments. He worked with the U.S. Corps of Engineers to describe the impacts of Hurricane Alicia, and with the U.S. Department of Justice to better understand the pipeline rupture and massive oil spill on the San Jacinto River during the flood of 1994. He continues to work on local problems related to subsidence, erosion and flooding.

Beach erosion along Highway 1 in California

Doing What You Love

Amongst his many teaching and research commitments, Bill finds time to devote to

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Dr Dupré helping children learn earth science

photography. His interest in photography began in high school, driven by a love of the outdoors and the growing environmental movement of the early 1960s. It was those same interests that helped guide him toward a career in geology.

Hanging on his walls are photographs that express both geology and art. I told Bill that a friend of mine, Ms. Susan Rogers, P.G., both an artist and geologist, told me that art and geology are one in the same. Bill concurred with my friend's philosophy and went on to say that it was the art of the landscapes that propelled him to both study and photograph them.

"As geologists," Bill said, "we are trained to 'read' the landscape and in doing so, we gain insights that are often seen in our photography."

His photograph of a braided stream at the Great Sand Dunes (UH Field Camp, 1986) is testimony to his statement. Many of his photographs are displayed throughout the pages of this article. The black and white print of this *Bulletin* does not do these pictures justice. The myriad of color and imposing contrast has depth and texture, which unfortunately are lost in this printing. One of his photographs will however be presented in a later issue as the *Bulletin* cover.

"I view geology as a study in landscape appreciation. Much as a course in art history allows us to view great art with greater clarity and insights, and one in music appreciation allows to better hear and enjoy great music, geology allows us to better view and appreciate great landscapes, large and small."

Geologists often think in terms of millions or even billions of years—of "deep time." We can visualize plates moving, mountains growing, and oceans filling at rates as small as a centimeter per year to millimeters per 1000 years. Unfortunately, most of the public can't relate to such scales of time and space. They can, however, relate to rivers flooding and beaches eroding. Rivers and beaches change at rates we can see on television. In addition, most of the world's population live in a coastal zone or along a river floodplain. It may not be as stirring as a volcanic eruption or a major earthquake; however, understanding the processes by which rivers and coastlines form should be an integral part of anyone's education.

Giving to the Community

When Dr. Dupré's sons were in the Houston Independent School District (HISD) school system he realized they were not getting adequate science instruction. He further realized that if he wanted to have an affect on the "system", he needed to do more that occasionally visit the classroom. It seemed clear that the way to reach large numbers of students was through their teachers! With that goal in mind, Dr. Dupré established the Houston Area Earth Science Summer Institute in 1992 with competitive funding from the Eisenhower Program for Higher Education in Science and Math. For four summers he taught a graduate course titled Energy and Energy Resources. His basic objective in this program was to help elementary and secondary school teachers in the Houston area achieve the following goals: (1) increase their understanding of basic scientific concepts; (2) improve their teaching of these concepts; and (3) recognize the interrelationship of science, technology, and their impact on modern-day society, to better motivate students.

We taught 108 teachers from 20 different school districts. These teachers, in turn, have taught over 80,000 students since taking our courses.

Dr Dupré has this to say about his Earth Science Institute: "I believe our major accomplishment has been the increased knowledge and understanding of science and the enthusiasm of the teachers in taking their newly acquired knowledge back to the classroom. Teachers have given workshops for other teachers in their district, and several have given or plan to give workshops at various local and regional meetings. Perhaps the most important accomplishment of our program is the numbers of teachers who were in some way influenced over the four summers. We taught 108 **People Profile** continued on page 53

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teachers from 20 different school districts. These teachers, in turn, have taught over 80,000 students since taking our courses."

He has continued to take his teaching outside the university. He has taught numerous short courses and workshops and lead field trips for a variety of professional organizations (e.g. the HGS), industry, and teacher groups. He was the chairman of the HGS Academic Liaison Committee for many years, and continues to visit classrooms every year. He also speaks to local groups to help increase the general level of awareness of how geologic processes affect our daily life. He is especially proud of his "Distinguished Service Award" presented by the Texas Earth Science Teachers Association in 1997, and his "Distinguished Educator Award" presented by Gulf Coast Association of Geological Societies in 2001.

Dr. Dupré eloquently asked, "Who speaks for the beach?"

Back to the Beach

I met Dr. Dupré on a field trip where once again he was devoting his time and talent to helping geography teachers understand the beach processes. I too learned much about the beach and the political structure that surrounds the fight for protecting the public beach. It was at this moment that I understood that the general public is often told the fight is about "saving the beach" when it is in fact about "saving the beach front view lots." We often don't realize that installing "GeoTubes" to save a homeowner's small lot next to the beach may save the house, but at the cost of losing the beach.

Dr. Dupré eloquently asked, "Who speaks for the beach?", an analogy to Dr. Spock's pithy phrase "Who speaks for the trees" that was coined from William O. Douglas' dissents on the environmental movement.

This time spent with Dr. Dupré not only educated my daughter and me on the beach and the effects we have on the beach, he taught us that some things in our environment are overlooked because no one speaks for them. I learned that the best way to speak for these things is to educate others on what we do and what the consequence of our actions is. I also learned that by doing what you love resonates to the entire community. Thank you Dr. Dupré—for both this interview and the education. ■

A special "thanks" to Judy Lucas and Ann Lindsey-Kennedy, both high school geography teachers in the Houston area, for making the field trip to the beach possible. Both have received several awards recognizing their exemplary contributions to education.

Eyes on Planet Earth: Monitoring Our Changing World

Earth Science Week 2003
Showcasing HGS and BEG Contributions

*Photography by **Inda and Neal Immega***

Janet Combes and Inda Immega set up the registration table at BEG's Houston Research Center, site of the Sunday indoor field trip for Houston's ESW 2003.

BEG geologist Beverly DeJarnet explains how cores are used to determine depositional environments.

CVG (Certified Volunteer Geologist) Annette Colgan (in overalls) with visitors in the core storage area of the BEG's Houston Research Center

BEG geologist Laura Zahm takes visitors on a "Virtual Vacation" in the geologic past with the help of cores and well samples.

February Anniversary of Cerro Azul #4 Blowout, Veracruz, Mexico

Article by Arthur E. Berman

February 9 is the anniversary of the discovery well at Cerro Azul, the most famous oil well ever drilled in Mexico. In the U.S. petroleum community we appropriately remember and celebrate the first oil well at Titusville in August 1859 and the discovery of the Spindletop field in January 1901. Cerro Azul #4, however, had the highest daily oil production of any well drilled before or since.

Cerro Azul is located in the state of Veracruz, Mexico and lies approximately 50 miles north of Poza Rica and 75 miles south of Tampico. Cerro Azul is a municipality of just over 20,000 people and lies in a chiefly agricultural region on the Pan American highway, Mexico Route 180.

Cerro Azul #4 Blowout February 9–19, 1916

The well blew out on the morning of February 9, 1916, at a drilled depth of 1752 feet with a flow that rose 600 feet in the air and spewed out nearly a million barrels before it was capped on February 18. The well was completed flowing 260,858 barrels of oil per day. The cumulative production from this well alone exceeded 87 million barrels of oil. Cerro Azul, along with the La Pez well, near Ebano west of Tampico, marked the opening of the Golden Lane and Poza Rica production from Cretaceous El Abra and Tamabra carbonate reservoirs. Poza Rica became the principal operating center for Golden Lane production and developed from a rural, agricultural area into a boom town in a matter of years.

The following is an account taken from a 1921 document published by the Pan American Petroleum and Transport Company:

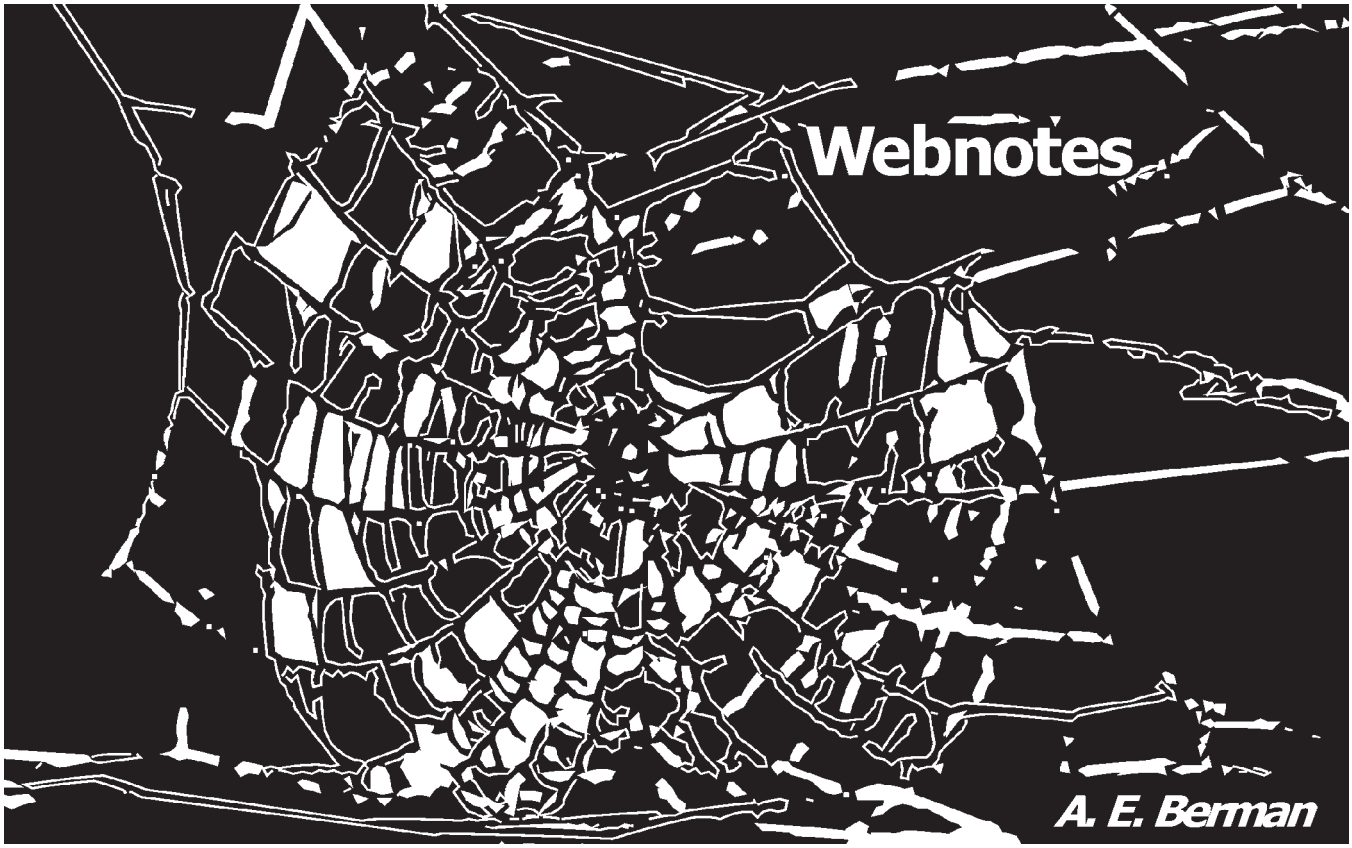
"A ominous rumbling was heard at great depth below the surface that quickly increased in intensity. The drillers abandoned the rig. Suddenly there was a terrible explosion as if a giant, sleeping volcano had exploded in some diabolical form. Before the drillers had moved more than 50 feet away from the well the enormous drilling tools shot into the air as if from a stockade cannon. The drilling tower was smashed into tinder and the crown blocks were sent flying over nearby trees landing 120 feet away and making a hole in the ground sixteen feet deep. The drill bit, collars, jars and attached apparatus, which weighed over two tons, landed twenty feet from the drilling location. As the cable was expelled from the hole it completely wrapped around and destroyed the pulling equipment. The travelling block attached to the end of the cable was shot 600 feet away."**

These remnants of the blow-out in February 1916 can still be seen today near the town of Cerro Azul, Veracruz. ■

***Liberally translated and interpreted from the Spanish regarding cable-tool drilling terminology by A. E. Berman.*

February Anniversary of Cerro Azul #4 Blowout *continued on page 59*

The men who capped the Cerro Azul #4 Blowout

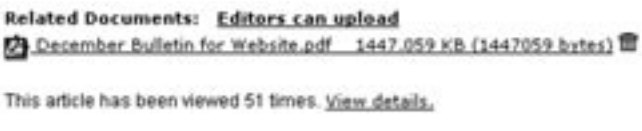


What's new on the HGS Website this month?

1. October, November and December issues of the HGS Bulletin are now available on-line on the HGS Website. Simply log on to the Website and go to the Navigation Area on the left side of the home page and select "Publications." This will take you to a list of all current event descriptions and posted publications. Scroll down until you see:

"December 2003 *HGS Bulletin* in PDF Format"

There's a brief description of the contents. Click below on "For More Information…." Scroll down to the Adobe Acrobat icon:



By clicking on the underlined area the PDF document will launch Adobe Acrobat Reader (or Adobe Acrobat if you have it) on your computer. You can then look through the December *Bulletin*, in this case, print it, or save it to your hard drive.

While you're at it you will also notice that as the Chairman of the HGS Academic Liaison Committee I uploaded several PowerPoint presentations on earth science and earth science careers onto the HGS Website. The procedure for downloading and launching these presentations is identical to that described for downloading the recent HGS Bulletin issue PDF documents.

Look for more detail on Academic Liaison Committee and the resources now available on the HGS Website in the March Bulletin, both in Webnotes and in a separate Bulletin article.

2. The Geophysical Society of Houston (GSH) has converted its Website to the same interactive Schipul Technologies software that the HGS adopted in September 2003 and that the SPE-GCS has been using for several years. While the HGS and GSH Websites are completely separate they now have similar features. Members of both societies will find it easy to navigate and use both sites.

Present and former GSH and HGS members are preregistered on both sites, but they have separate registrations and separate logons for each respective site. GSH members can log into the GSH Website and make reservations for GSH events. In the case of joint HGS/GSH events, members of both societies can make reservations on either Website—only sign up once, of course. If you are a member of only one society, be sure to sign up on your respective Website in order to get member pricing.

Please send any and all questions about the HGS Website by e-mail to me at aberman@houston.rr.com, along with your comments, suggestions or complaints about Webnotes.

All the best until next month!

February Anniversary of Cerro Azul #4

continued from page 57

Poza Rica Field c. 1933

May Day celebration, Poza Rica, Veracruz, 1936

Cerro Azul ("Blue Hill") today

HGA *and* GeoWives **News**

HGA

*By **Betty Alfred**, President*

As we go to press, I find it is hard for me to believe our year is almost over. I am looking forward to spring and the beauty of that season here in Houston.

I am so encouraged by the warmth and cooperation of everyone in the HGA. It is such a pleasure to serve with so many talented members, who give so generously of their time and efforts. By the way, I want to extend a big Thank You to Winona La Brant Smith for her efforts in providing us with an excellent seating plan for the December luncheon. Good job!

I look forward to seeing you at our next social. I encourage one and all to join us for our programs that are planned. For our group to be strong, to be able to have variety and to meet at the facilities that meet our expectations—we need the support of all our members and a good attendance.

With all the unrest in our world—I am conscious every day of being so blessed to live in this great country—to be able to worship as I wish and to be able to socialize with friends at any time and place. How very lucky we are! Quite often I find myself humming a lovely tune—"Let There Be Peace On Earth and Let It Begin With Me!"

See you on February 16 at Game Day!—*Betty*

GeoWives

February 11 we are looking forward to visiting the Museum of Fine Arts to enjoy the work of Matthew Richie and Anne Wilson. This will be followed by lunch at the Café Express. For details of time and meeting place, call Debra Munsell at 832-249-9442.

The GeoWives Spring Trip will be on Thursday, March 11. The group will be going to Brenham and Independence this year, continuing the study of Sam Houston and his wife Margaret. Margaret moved to Independence to live with her mother after Sam died in 1863. The two women are buried side by side in the cemetery there. The church where Sam was baptized is also in Independence.

There will be a good lunch and we all know that Brenham is the home of our favorite cow, Belle! There is also a winery, Pleasant Hill, and places to shop along the way.

Please see our membership application on page 53.