

NOGS LOG



August 2011

Volume 52, Number 2



August 1 - NOGS Luncheon

Presentation: Integrating Technologies to Unlock New Volumes in a Mature Deepwater Gulf of Mexico Field.
Guest speaker David Garner, Shell Exploration & Production Co. in New Orleans. See page 9 for more information.

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NOGS LOG

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ON THE COVER

Photo taken in 1954 by Past President Bill Hintze

The picture outcrop never has been publicized and probably will not be seen again for a long time. Taken in 1954 (a terrible drought year in Texas) and lying at the bottom of a significant river channel, this is the record of a cataclysm. The spongy gray-green material up to the top of the ledge is a tsunami deposit marking the passage of great waves, perhaps 100 meters or more in height at the locale created by the K/T boundary event Chicxulub (near and under Progresso, Yucatan, Mexico.) At the time I took the picture, iridium layers and extra-terrestrial missiles causing mass extinction weren't even gleams in the eyes of Drs. Alvarez (or mine either!).

Gray kernel fracturing shale in the foreground is Navarro while water in the Background covers lower Tertiary Midway splintery clay.

FROM THE EDITOR

Hello again fellow society members, this is another monthly column from your *NOGS LOG* editor. The August *NOGS LOG* has a few additions. The first is the selection of an AAPG abstract from last April's annual convention and exhibition. The abstracts that we'll running in the *NOGS LOG* will highlight oil and gas activities centered on the Gulf of Mexico sedimentary basin. Former NOGS president, Tom Klekamp has also provided an article on shale gas, which you will enjoy.

We have heard positive feedback on the overhaul of the cover, replacing the old format with a geological picture. So again, this is a formal invitation for members to send in their most unique geological photos!

PayPal has been very successful in providing convenience to members that would like to pay dues, luncheon costs or would just like to donate. This I hope will also attract future members. Just a reminder of our growth as a society since 1941; with an initial membership of only 55, our current membership total is 605.

In closing, I would like to quote the famous American poet Ralph Emerson. I find that this quote is a greater reminder of why we always will love to learn: "We learn geology the morning after the earthquake."

Thanks, David Tatum - *NOGS LOG* Editor



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Shell has worked in partnership with the NOGS for many years, and is proud to count the society among its closest business associates.

The New Orleans Geological Society was organized in 1941 to foster scientific research and advance the science of geology. Particular emphasis is laid on the exploration for and production of petroleum and natural gas. Related objectives include encouraging the adoption of improved methods of exploration, disseminating pertinent geological and technological data, and maintaining a high standard of professional conduct among its members.

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from the President

I want to discuss the purpose for our monthly luncheon meetings with you. As I see it, there are two primary reasons for NOGS to hold and for you to attend our Monday meetings. The first reason is the dissemination of Earth Science/Geology information that is current, relevant, useful or just plain interesting to its member scientists. The second reason is bringing together of its similarly-minded members to network, exchange ideas, suggestions, advice or just "BS" with each other. A lesser third reason is simply be a place to have lunch with co-workers and friends.

With these reasons in mind, the present NOGS board and past presidents encourage all members to attend as many luncheon meetings as possible, regardless of speaker and topic. It is always NOGS endeavor to bring interesting and entertaining speakers to our meetings. Because no one can always predict exactly what a speaker has to offer us, many times we are surprised how excellent a talk is considering the proposed topic subject. I realize some speakers may let us down but don't forget reason number two. You always have the opportunity to network and chat with your peer group.

The vice presidents are traditionally charged with lining up speakers for each meeting. It is a challenge to continuously come up with topics, speakers and mutually agreed upon dates for each meeting. Within the *NOGS LOG* are the phone numbers and e-mail address of the entire board. If you have a topic or speaker that would benefit our luncheon meeting, please contact one of us with your suggestion and advice. If you believe it would be interesting to you, it probably would be of interest to many of our members as well. Sometimes you hear an especially excellent talk at a convention. I encourage you to contact one of us, but especially Daisy Pate (dpate@gmail.com), and share your opinion about the speaker you heard at the convention and why the talk would be beneficial to NOGS.

I also want some discussion on our joint meetings with SGS . Because many of us have dual memberships, it seems natural to have more joint meetings to share speakers/topics with them. It saves attending two meetings downtown where some people are forced to choose to attend one or the other. Several of our joint meetings in the past year or two have had large and enthusiastic crowds. This is ideal for better networking opportunities as well. If you would take a few minutes and e-mail Annette (info@nogs.org) about our joint meetings, we could get a pulse from a larger audience than just our managing board.

One of the board's goals is to draw individuals into a more active role/voice for NOGS. Please send your suggestions to Annette.

Bob



2010-11 NOGS President Rick Kear and June luncheon guest speaker Kimberly Faulk

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Upcoming Events and Activities

August 1 - NOGS Luncheon

*** At the Holiday Inn Downtown Superdome ***
\$2.00 validated parking in hotel garage

Guest speaker David Garner, Shell Exploration & Production Co. in New Orleans,
will present:

“Integrating Technologies to Unlock New Volumes in a Mature Deepwater Gulf of Mexico Field.”

(See page 9 for Abstract and Biography)

HOLIDAY INN DOWNTOWN SUPERDOME

Check with concierge or
front desk for location
Lunch served at 11:30am

ADMISSION:

with reservation \$30.00
without reservation \$35.00
Student Member with reservation Free

August 9 - API Delta Chapter & SPE Delta Chapter Technical Luncheon

Holiday Inn Downtown Superdome. Guest speaker Roger Schuermann will present: “The Helix
Well Containment System.” See website www.api-delta.org.

August 11-12 - 15th Annual Deepwater Technical Symposium

Hilton Riverside Hotel. Sponsored by SPE-Delta - AADE - NOGS.
More information available on page 17

September 12 - NOGS Luncheon

Holiday Inn Downtown Superdome. Guest speaker and topic to be announced.

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--- continued from previous page ---

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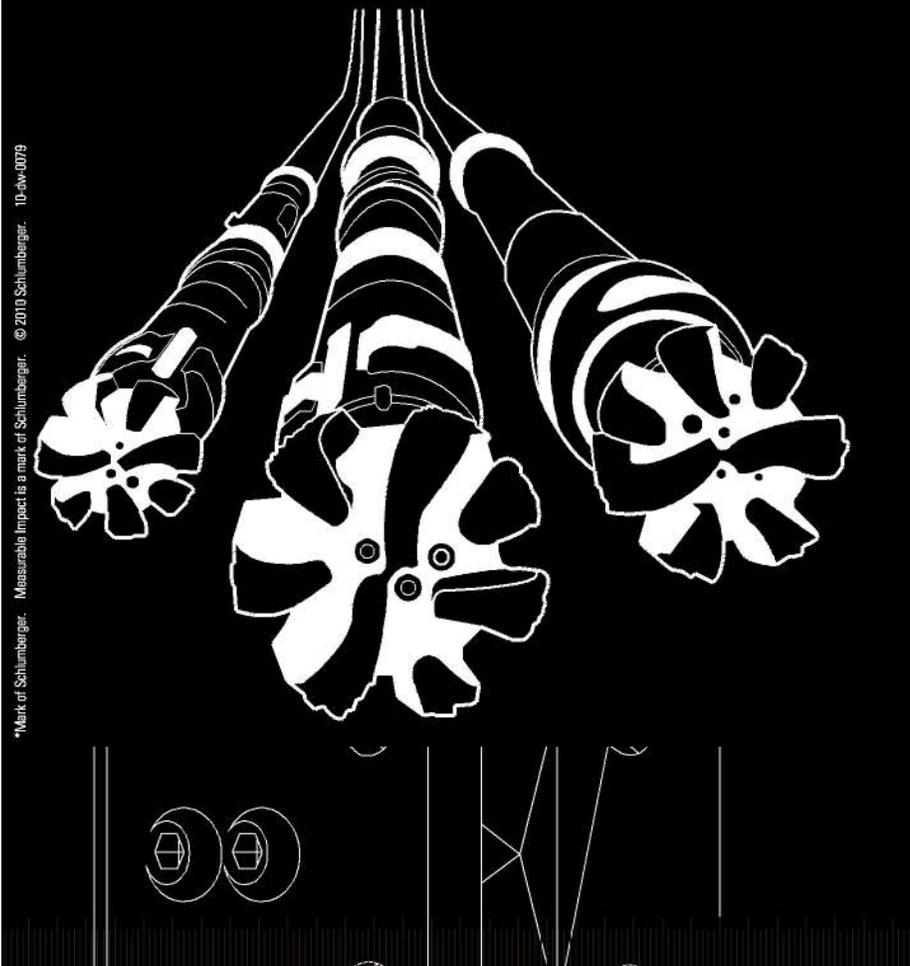
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August 1 NOGS Luncheon Presentation

At the Holiday Inn Downtown Superdome

Integrating Technologies to Unlock New Volumes in a Mature Deepwater Gulf of Mexico Field

presented by

David Garner

Shell Exploration & Production Co., New Orleans, LA

ABSTRACT

Shell Exploration and Production Co.'s recent Deep Cardamom discovery in Garden Banks Block 427 provides an example of successful near-field exploration through integrating new subsurface and operation technologies as well as a template for fast-tracking development and first production from discoveries adjacent to existing infrastructure.

Since initial development in 1994, Auger Field has produced >300 mln BOE, and the Auger TLP hosts six subsea field tie-ins. However, by early 2007, the field had become Shell's first unofficial "Super Mature" deepwater asset, thereby requiring a different approach to preserving the viability of the Hub while enabling access to deeper and higher risk, but also higher reward upside.

Reprocessed narrow azimuth (NAZ) 3D seismic and newly acquired wide azimuth (WAZ) 3D seismic provided the critical edge for better understanding Deep Cardamom's

key attributes and risks. Equally important to testing Deep Cardamom were new analyses and perceptions of the feasibility of drilling, evaluating and potentially completing a 30,000+ foot measured depth well from the Auger TLP. Learnings from previous TLP wells, combined with applications of new operational technology, made a well once deemed "undrillable" now possible.

The Deep Cardamom discovery well, drilled from Shell's Auger TLP in Garden Banks Block 426, reached total depth in April 2010 after encountering hydrocarbons of significant thickness in Lower Pliocene and Upper Miocene objectives. The well was completed in Q4 2010 and began producing in December 2010. The greater Deep Cardamom discovery will be fully developed through a combination of subsea wells and additional wells drilled from the Auger TLP. First production from the subsea system is expected in Q4 2013.

BIOGRAPHY

David Garner is a Staff Geologist with Shell Exploration & Production Co., the U.S.-based affiliate of Shell Upstream Americas, located in New Orleans, LA. He joined Shell in 1990 and worked for most of the next 10 years on primary development and redevelopment projects associated with Shell's offshore Gulf of Mexico Shelf assets.

In 2001, David joined the Mars Development Team as development geologist, supporting ongoing primary field development as well as quantification and justification of the Mars field water flood, which began operating in 2004.

In 2007, David moved to the Auger Development Team, where he has led an intensive effort to identify and test material opportunities on the deep, complex and under-exploited eastern side of the Auger salt diapir. Since that time, several wells drilled from the Auger TLP have found significant new volumes, including the recently announced Deep Cardamom discovery.

David received his B.S. in Geology from the University of Alabama in 1987 and his M.S. in Geology from Louisiana State University in 1990.

THE LUNCHEON RESERVATION DEADLINE IS JULY 27 - CONTACT THE NOGS OFFICE

“And Looking Ahead...”

The next luncheon will be held on September 12th. No speaker has been designated as of this publication's date. Contact the NOGS office at 561-8980 or use the PayPal link on the NOGS website (www.nogs.org) to make your reservation.

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OCTOBER 16-19, 2011 VERACRUZ, MÉXICO

This Convention will take place in an emblematic city of Mexico: the port of Veracruz, one of the most privileged places on the American Continent, where the universal interchange of goods and ideas led the way to the actual configuration of the modern world.

For two consecutive days, three oral technical sessions each morning and afternoon will be presented simultaneously with poster sessions all through the day. These twelve technical sessions will cover relevant topics about petroleum geology, seismic interpretation, climate change, sustainable development, geohydrology, and education, enhanced by three field trips, six short courses, a luncheon conference, and an industrial exhibition. On the third day, a Symposium on "Jurassic regional framework and reservoirs in the Gulf of Mexico" will be held. Student activities have been designed as an integral part of the Convention.



**12 Topics: 103 oral presentations 51 poster presentations
6 Short courses, 3 Field Trips, and 1 Symposium.**

	EDMUNDO CEPEDA DE LA GARZA ROOM	MANUEL ALVAREZ Jr ROOM	TEODORO DIAZ ROOM
Monday 8:25 – 11:30	Remaining potential in circum - Gulf of Mexico petroleum provinces	Stratigraphy framework of the Gulf of Mexico and adjacent areas	Climate change, geohydrology, geological risks, environmental challenges and sustainable development
Luncheon Conference			
Monday 11:30 - 13:25 PM	The Gulf of Mexico deepwater setting – geology and economics	Seismic imaging and interpretation of geological complex areas	Learning and teaching in the geosciences to meet new challenges.
Tuesday AM 8:25 – 11:30	New perspectives in fractured reservoirs.	New insights into the geodynamic evolution of the Gulf of Mexico	New concepts and methods in biostratigraphy
Walk & Talk Luncheon at the Exhibition			
Tuesday PM 11:30 - 13:25 PM	Petroleum systems and oil quality controls in the Gulf of Mexico	Interaction between salt tectonics and sedimentation.	New approaches in sandstone reservoirs characterization and diagenetic modeling.
GUILLERMO P. SALAS ROOM			
Wednesday AM 8:25 – 11:45	Ralph W. Imlay Symposium: "Jurassic tectonic framework and reservoirs in the Gulf of Mexico"		
Wednesday PM 13:30 – 15:30			

No.	COURSE NAME	INSTRUCTOR(S)	DAYS	FEE
1	Characterization of fractured reservoirs: examples from southeastern Mexico	Faustino Monroy, Miguel Hernández, Lilia Hernández, Norma Olaz and Clotilde Prieto <i>Pemex Exploración y Producción</i>	Saturday, October 15; and Sunday, October 16	\$215
2	Petroleum provinces of Mexico	Ernesto Miranda, Lourdes Clara, Mariano Téllez, Juan Rogelio Román, Victor Valdivieso, José Ruiz and Carlos Williams <i>Pemex Exploración y Producción</i>	Saturday, October 15; and Sunday, October 16	\$226
3	Regional trends in Upper Jurassic and Lower Cretaceous carbonate sequence stratigraphy and depositional systems and their application to carbonate reservoir case studies, onshore northern Gulf of Mexico	Ernest A. Mancini <i>Texas A&M University</i>	Sunday, October 16	\$150
4	Practical aspects of seismic depth imaging in complex geology areas	Rubén Darío Martínez <i>Petroleum Geo-Services</i>	Sunday, October 16	\$226
5	Fundamentals of siliciclastic sequence stratigraphy	John Holbrook <i>University of Texas at Arlington</i>	Sunday, October 16	\$250
6	Formation evaluation of thinly bedded reservoirs	Quinn R. Passey <i>Exxon-Mobil</i>	Sunday, October 16	\$185

Students activities

- Presentation and discussion on the latest version of the Geologic Map of Mexico by geologists of the Mexican Geological Service.
- Meet and Greet at the Exhibit Hall.
- Round Table after Learning and Teaching Session.



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Convention General Chairman
Javier Meneses - Rocha / jmenesesrocha@gmail.com
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Field Trip	Objetivo
Field Trip # 1 Thursday 13 to Sunday 16 October	Facies and development of turbiditic deposits from Chicotepec Formation, western margin of Chicotepec paleochannel, Mexico
Field Trip # 2 Saturday 15 to Sunday 16 October	Stratigraphic, sedimentological and structural elements of an exhumed Cretaceous reservoir at the frontal Sierra Madre thrust and fold-belt, Veracruz, Mexico
Field Trip # 3 Wednesday 12 to Sunday 15 October	Meaning of the stratigraphy and structure at Sierra de Chiapas in the Tectonic Evolution and Petroleum Systems of the southeastern Mexico



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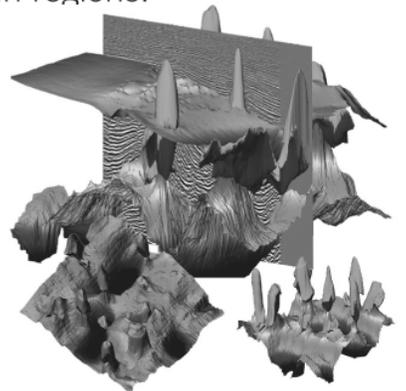


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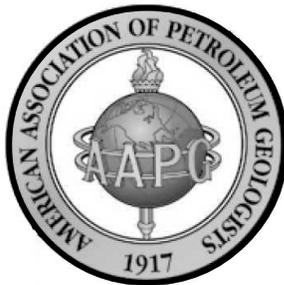
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Interpretation of the Basement Step – Some Observations and Implications in the Gulf of Mexico

Barker, Steven¹; Mukherjee, Souvik S.¹

⁽¹⁾Exploration, Shell Upstream Americas, Houston, TX

The architecture of basement plays a significant role in the structural evolution, depositional history, and salt migration in the Gulf of Mexico (GoM). That the boundary between continental and oceanic crust (COB) is demarcated by a “step up” in the basement outboard towards oceanic crust is a popular albeit controversial idea. Here, we examine the evidence in the seismic data for the presence and geographic distribution of the basement step, the related salt structures, and its relationship to a transition in crustal type.

The “acoustic basement” in the GoM refers to the base of the autochthonous Louann salt or its equivalent reflector in areas of little to no salt. The basement step is mapped as a discontinuity observed at the last outboard limit of autochthonous salt. The region outboard of the basement step can be defined into 3 geographic areas. 1) The Perdido foldbelt in the west, a large allochthonous salt feature that built out over basement during the Jurassic, lies down-dip to the step. 2) In the central GoM, the J-LK allochthon transgressed the basement step during the Jurassic to Lower Cretaceous, and is characterized by salt feeders and stocks much smaller in scale than those found up-dip of the basement step. A major transfer zone aligning with the Brazos lineament up-dip defines the western edge, while a smaller transfer zone aligning with the up-dip Hackberry lineament lies near the eastern boundary. 3) In the eastern GoM, the edge of autochthonous salt is coincident with the basement step and no significant allochthons are observed down-dip, suggesting the lack of a major up-dip depocenter.

Inboard of the step, a dominant NW-SE orientation in continental basement fabric tends to align with major salt feeders and published lineaments. In the eastern GoM abyssal plain, the dominant structural grain outboard of the step is oriented NE-SW. This difference in structural grain alignment is consistent with a two stage structural opening of the GoM - an NW-SE oriented rift stage followed by a counterclockwise rotation in the drift phase. The basement step does not unambiguously resolve the question of whether the outboard “acoustic basement” is true oceanic crust everywhere in the GoM; however, it places a limit on the possible inboard extent of oceanic crust.

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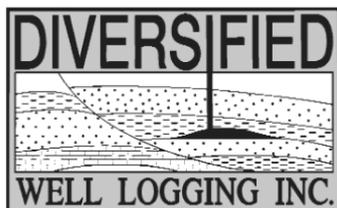
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Keynote Speakers

The Keynote speakers and panel discussion participants are also set. William Reilly, former head of the EPA and Chairman of the Presidential Oil Spill Commission will be the Keynote Speaker on Day 1. Mr. Reilly will recap the commission findings and has been asked to address the commission findings covering the systemic issues in our industry. On Day 2, Lars Herbst GOM Director of the BOEMRE will discuss BOEMRE challenges going forward as the agency splits into the BOEM (Bureau of Ocean Energy Management) and BSEE (Bureau of Safety and Environmental Enforcement).

Industry Leaders/Panel Discussion

The closing event for this year's symposium will be a panel discussion among industry leaders covering well activity and incident response in a post Macondo world. Initial presentations/discussion will cover well design and blow out response issues for deepwater subsea wells as well as deepwater platform wells. Tim Achee (Chevron) will cover well design & blowout response issues specific to Subsea BOP Stack wells while Joe Leimkuhler (Shell) will cover similar well design & response issues specific to Deepwater Floating platforms using surface BOP stacks. Charlie Miller - Chief Technology Officer for the MWCC will cover the issues related to Cap & Contain from the wellhead up. Tim Sargent - Noble Energy - has been asked to cover the subsurface Geological issues related to WCD (Worst Case Discharge rates) - and any Helix Consortium Group Issues. Our final panelist, Coast Guard Rear Admiral Nash, will cover the high level incident response learnings from a Macondo type incident from a unified command perspective. The goal of the panel is to provide a comprehensive overview from well design to cap and contain to spill response for Deepwater well operations in a post Macondo world and allow the Q&A session with the symposium attendees to fill in any gaps. Don't miss the final session. It promises to be one of the highlights of the symposium.

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SHALE GAS BLESSING OR CURSE?

Dick Selley has held a torch for UK shale gas exploration for over 30 years and was the first witness summoned to give evidence to the Parliamentary Energy & Climate Change Committee inquiry in February. Dick Selley is a Senior Research Fellow, Department of Earth Science & Engineering, Imperial College.

In the USA, the recent boom in shale-gas production has boosted US gas reserves to an all-time high and caused a drop in the gas price from a recent high of \$8 to the 1970's price of \$4. Shale gas exploration is booming, from Argentina to India, from Canada to South Africa. The 'land grab' for shale gas acreage in Europe is over, with shale gas wells being drilled in Sweden, Poland, and Lancashire. By providing secure domestic gas supplies, shale gas yields a high 'peace dividend'.

So, what's not to like? Well, plenty if you listen to outraged environmentalists. A boom in shale gas production will continue to release carbon dioxide and methane into the atmosphere and delay the dawn of a non-carbon economy. The artificial fracturing of shale gas reservoirs apparently triggers earthquakes, pollutes aquifers with carcinogens, ignites methane-laden water flowing from taps, causes the sky to rain flocks of dead birds - and probably fire and brimstone too in the Bible Belt.

A LITTLE HISTORY

In 1821 gas was produced from a natural seepage in fractured Devonian shales in the Appalachian Mountains at Fredonia, New York (**Figure 1**). An enterprising entrepreneur piped the gas through hollowed-out logs, later replaced by lead pipes, to illuminate a local bar. Thereafter shale gas production was carried on throughout the Appalachians as a 'cottage business' by small-time operators. Profit margins were too small to interest major companies. Exploration methods were basic. Seismic was out of the question as too expensive. Serendipity ruled. When one British potential investor questioned the geological rationale for picking a particular well location, the landowner replied '*Well ma pappy has been drillin' wells along that thar creek bottom for years, so I guess I'll jus' carry on*'.

Wells were air-drilled to save on drilling mud. Fracturing, artificially stimulating and compressing the gas were also deemed too expensive. Instead, one well would be allowed to flow naturally - which it would often do for many decades, supplying enough gas for an adjacent farm, school, hospital or shopping mall. There were no pipelines, no infrastructure. A shale-gas well was silent, steady, undemanding and generated minimal environmental trauma.

The UK's first well to encounter shale gas was drilled in 1875 by the Subwealden Exploration Company. This company was set up by a group of academics purely to investigate the depth to the Palaeozoic rocks beneath the Weald.



Figure 1: Monument to the first shale gas well drilled to light a bar in Fredonia, New York, in 1821. The plaque reads: 'The site of the first gas well in the United States. Lighted in honour of General Lafayette's visit, 4 June 1825. Placed by Benjamin Prescott Chapter of the Daughter's of the American Revolution. June 4. 1925.' Photo courtesy of A Giebel.

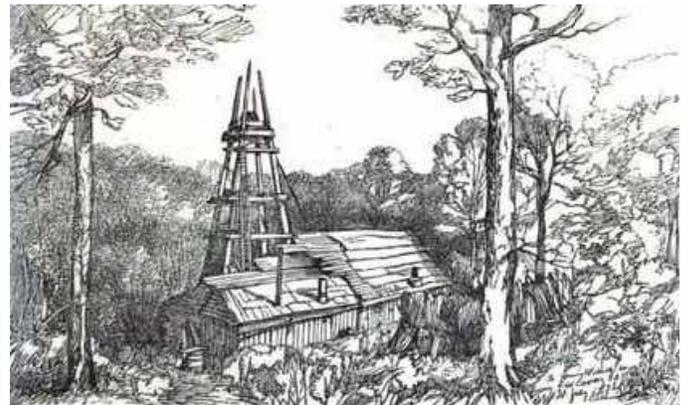


Figure 2: Not the house at Pooh Corner, but Netherfield No. 1 Well, Sussex drawn by E Cooke, Esq, RA. Drilled in 1987 purely for academic enlightenment this was the first UK well to discover shale gas. It, and the associated oil, was of no interest to the geologists.

According to Sir Andrew Ramsay, then Director of the Geological Survey, this was the last geological problem that remained to be solved in Great Britain. The borehole had no commercial objectives. The company was funded by private gentlemen (Including one C Darwin) with subventions from

the Royal Society, the Geological Society of London and the British Association for the Advancement of Science.

Two wells were drilled on the crest of the Battle anticline at Netherfield in West Sussex (**Figure 2**). Both were cored throughout by the Diamond Boring Company. The first well stopped drilling for mechanical reasons at 1018 feet TD. The Kimmeridge Clay had indications of petroleum throughout, smelt strongly of petroleum, was often brown in colour and burned with a brilliant flame. A second well drilled nearby reached 1905 feet, having drilled through the Kimmeridge Clay and penetrated the Coral Rag. Cores of the Kimmeridge Clay were extensively fractured. Some fractures were cemented with calcite; others were open and saturated with oil. Subsequently while measuring the bottom-hole temperature a naked light was injudiciously lowered down the hole. This resulted in an explosion of shale gas¹.

In 1976 the US Department of Energy initiated the Eastern Gas Shales Project at a cost of some \$70 million. This work evaluated geology, geochemistry, exploration and production. At that time the only shale gas production in the USA (indeed in the world) was from Devonian and Mississippian (Lower Carboniferous) shales in the Appalachian basin. The US Department of Energy reports² led to the establishment of the Gas Research Institute (Later Gas Technology Institute) and also stimulated research at Imperial College, London, into an evaluation of UK shale gas resources.

CLOSING THE GAP

Plate-tectonic reconstruction of the Atlantic Ocean implied that the Appalachian basin and fold belt extended across the United Kingdom and into mainland Europe (**Figure 3**). At this initial stage, Imperial College research concentrated on the US paradigm of 'cottage industry' operations run by small private operators. It applied the 'Goldilocks' model to the stratigraphic sequence. Old mudrocks, metamorphosed into slate, were too cooked and indurated to produce gas. At the other extreme, shallow un-compacted clays were both too immature to generate gas, and too under-compacted to fracture, naturally or artificially. In between these two extremes there is a 'Goldilocks' interval of shales that are both thermally mature and naturally fractured, (or sufficiently indurated to be artificially fractured).

Several potential shale gas sequences were identified within the British stratigraphic column. In the early 1980s it was generally believed that shale gas could only be generated by the thermal maturation of kerogen beyond the oil window. The study concluded that PreCambrian and Lower Palaeozoic shales were generally too metamorphosed to be potential reservoirs. Most Cretaceous and younger organic-rich mudrocks were deemed too un-compacted to fracture, and too immature to generate gas. Carboniferous shales in general, and Namurian shales in particular, were thought to be ideally

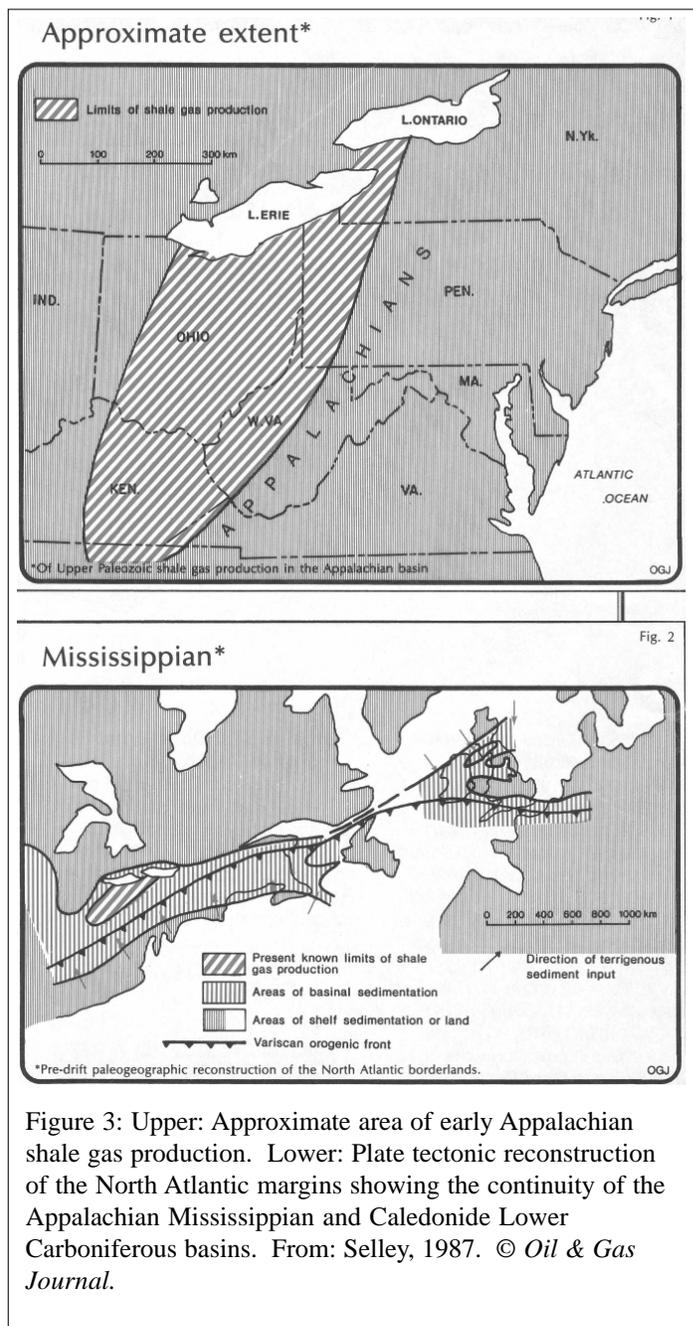
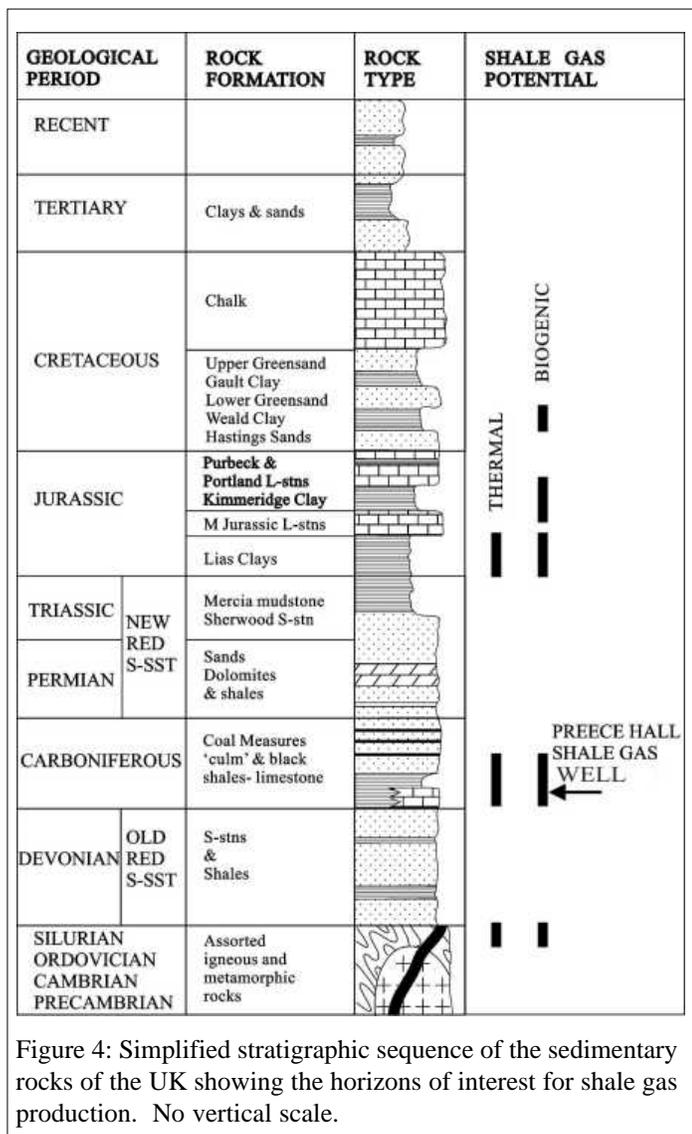


Figure 3: Upper: Approximate area of early Appalachian shale gas production. Lower: Plate tectonic reconstruction of the North Atlantic margins showing the continuity of the Appalachian Mississippian and Caledonide Lower Carboniferous basins. From: Selley, 1987. © Oil & Gas Journal.

suitable, both in terms of maturity and in the degree of natural fracturing (**Figure 4**). At that time, profit made by the extraction of petroleum was liable for both Corporation Tax and Petroleum Revenue Tax (introduced 1980). Shale gas production was not economic under this tax regime.

On 8 January 1985 the conclusions of the Imperial College study were presented to the UK Department of Energy. The Department expressed polite interest, but the exempting of shale gas from Petroleum Revenue Tax was a non-starter. Subsequent attempts to inform the wider world of the UK's potential shale gas resources failed miserably. Publication was rejected by several UK journals including *Nature* and a certain major geological society in London. (One editor

---continued on following page---



returned the manuscript opening Janus-like that the paper was too speculative and contained nothing new.) Finally however, the conclusions of the research were published in the USA³.

WAGONS ROLL

Meanwhile, back in the USA, the US Department of Energy research set the shale gas bandwagon rolling out from the Appalachians, geographically, stratigraphically and technologically. The Appalachian basin from New York State through Ohio to Kentucky and Illinois was the main historic area for shale gas production. But there was shale gas production in other basins.

In the Williston Basin, for example, the Bakken Shale had produced gas since 1953. Stimulated by the Department of Energy and the Gas Research Institute shale gas plays were found in the Cretaceous Lewis Shale of the San Juan Basin, the Mississippian (Lower Carboniferous) Barnett Shale of the Fort Worth Basin and the Devonian Antrim Shale of the

Michigan Basin. The latter play was of particular interest. Geochemical studies revealed that the gas was not thermogenic, but instead produced by bacterial methanogenesis. The bacteria had entered the fractured shale from groundwater, percolating from overlying glacial drift.

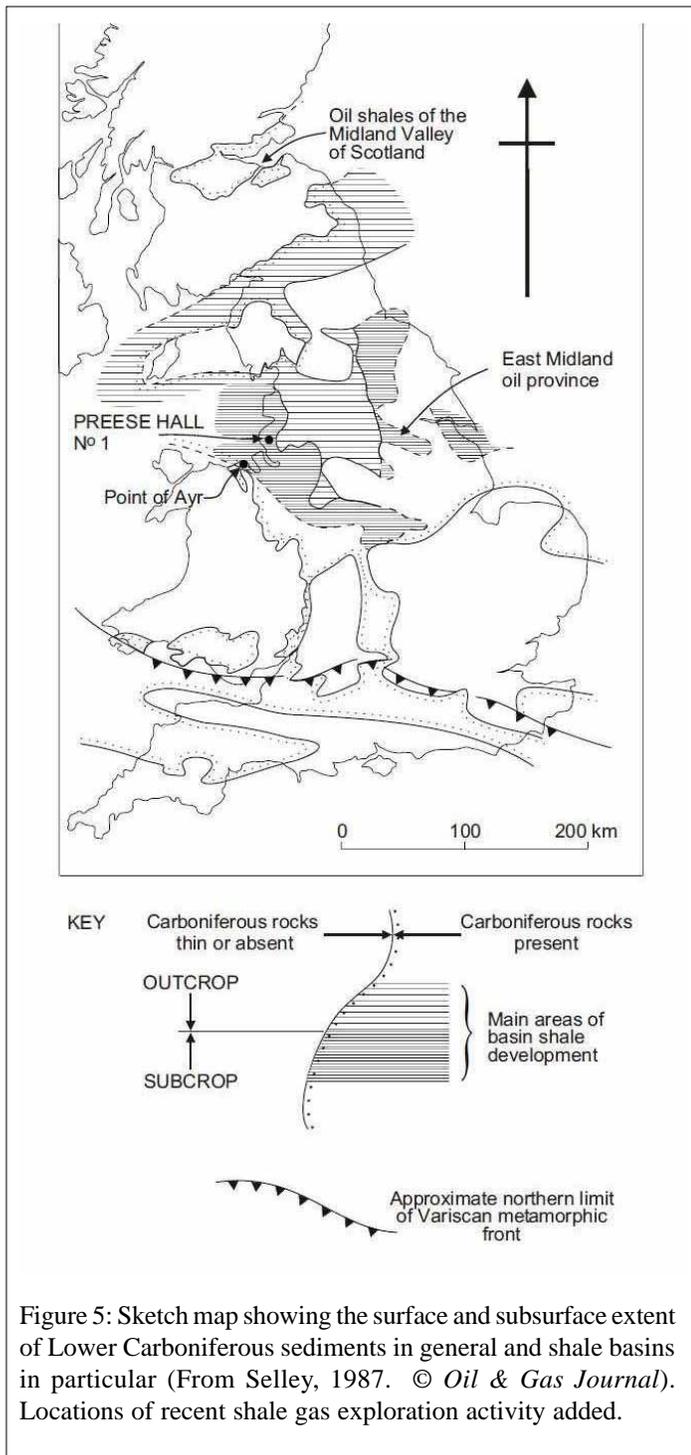
This second process for gas generation opened up new areas for exploration - areas where the source-rock was previously considered immature for thermogenic gas generation. The renaissance was enhanced by improved methods of drilling and completion. The ability to drill multiple wells from a single pad was financially and environmentally rewarding. While being able to drill not only vertically, but horizontally, and to steer the bit towards 'sweet spots', enabled permeable gas-charged zones to be tapped into.

Seismic techniques, which could use the fracturing process as an energy source, enabled gas charged 'sweet spots' to be imaged in 3D. More dramatic hydraulic and explosive fracturing techniques were developed. So there is nothing new in artificial fracturing - it has been used in the oil industry for some 60 years, and applied to hydrogeology since the days of Moses⁴ and Poseidon (according to the foundation myth of Athens).

NO CHANGE

Meanwhile back in the UK nothing had changed on the shale gas front. Published reviews of the future petroleum potential of the UK by staff of the Oil and Gas Directorate of the Department of Trade & Industry (successor to the Department of Energy) omitted any mention of shale gas resources. The only positive step was the repeal of the Petroleum Revenue Act (1 January 2003). The 6th Petroleum Geology Conference on the Global Perspectives of NW Europe took place at the Queen Elizabeth II Conference Centre, London, in the same year. The three-day programme concluded with a session on non-conventional petroleum. The last presentation was on the shale gas resources of the UK. There were four people in the vast auditorium: one delegate, the session chairman, the speaker and the projectionist. The presentation updated the conclusions of the earlier study of some 15 years before. It applied the advances in US shale gas exploration and production technology to the UK, in particular recognition that gas may have been generated, not only by the thermal maturation, but also by bacterial methanogenesis. New drilling and well completion techniques enabled higher initial flow rates. The presentation was published two years later⁵. More publications on the UK's shale gas potential have now followed^{6 & 7}.

Announcement of the UK's 13th round of onshore licensing in 2006 aroused the interest of several companies in applying for shale-gas acreage. In 2008, Wealden Petroleum Development Ltd., on behalf of Eurenergy Resources Inc., were successful in being awarded PEDL 247. This license covered large areas of the Weald, where the potential for shale gas had been recognised in Lower Jurassic (Lias) and Upper



Jurassic (Kimmeridge) shales. Island Oil & Gas (IGas), an established Coal-bed methane producer, holds acreage in several areas of the Midlands, notably Point of Ayr. Cuadrilla Resources Corporation holds acreage to test for shale gas in Lancashire (**Figure 5**) and has embarked on a three-well exploration programme. The first well (Preese Hall No 1) was completed in last December. At 0330 on 1 April there was an earthquake of magnitude 2.2 some three kilometres from the well site. Testing has since been halted. A second well is currently (March) being drilled at Singleton. Coastal Oil & Gas have announced plans to drill well to test for shale

gas at Llandow (Vale of Glamorgan). Interestingly, with the exception of Cuadrilla, all the other operators are exploring for shale gas in combination with conventional petroleum or CBL. Watch this space ⁸.

The USA shale-gas boom is now over - prices are now so low as to make further exploration uneconomic US gas reserves are now reportedly oil-equivalent to Saudi Arabian oil reserves. The number of rigs drilling for shale gas is in decline. The new boom is in now applying shale-gas fracking technology to oil production from the same shale formations, where they have yet to enter the gas generation zone, and are still in the oil window. The Eagleford, Niobrara and Bakken shales are the major targets. The 'land grab' for shale-gas acreage in Europe is also now over, with active exploration taking place in Sweden, Poland, Germany France and elsewhere.



Figure 6: Shale gas production plant in the Appalachians. Visually as intrusive as a piggery, and probably generating far less methane into the atmosphere. Photo © J.B. Earl & Statoil.



Figure 7: Single shale gas production well. Note warning flag for low flying birds and skipping hedgehogs. Courtesy, Cuadrilla Resources

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OPPOSITION

Shale-gas production is, however, being violently opposed by a range of individuals and organisations. The opposition is led in particular by Josh Fox's film '*Gasland*' which is marketed as a "documentary". This contains the astonishing film of ONE Mike Markham, of Weld County, Colorado, setting fire to water emerging from a his bathroom tap. This has nothing whatsoever to do with adjacent shale gas production. The phenomenon was investigated by the Colorado Oil & Gas Conservation Commission in 2008 who concluded that the gas was biogenic methane.

This conclusion was not as exciting as the film clip, and so has passed the media by. In Texas last year there were reports of groundwater contamination by shale gas. The Environmental Protection Agency slapped an emergency protection order on Range Resources production of gas from the Barnett Shale in Parker County. Subsequent investigation revealed, however, that the contamination predated the shale-gas fracking. The contaminating gas consists of a mix of methane and nitrogen, and nitrogen does not occur in the Barnett Shale gas. It is, however, characteristic of gas from the Paluxy Sands in the much shallower Strawn sequence. These were drilled several years ago and have been producing gas conventionally. A point-by-point rebuttal of these and other allegations made in the *Gasland* film has been made by the American Natural Gas Alliance⁹.

Earlier this year, the Parliamentary Energy & Climate Change Committee launched an inquiry into UK shale gas under the chairmanship of Tim Yeo. Written evidence was submitted by 22 individuals and organisations. These included BGS, The Old Rectory, IGas Energy, CPRE, the Tyndall Centre for Climate Change, Cuadrilla Resources Holdings Ltd., Ofgem, Shell, The Co-op, Friends of the Earth, the World Wildlife Fund, Imperial College - and the Geological Society, naturally. The first hearings were held on 9 February (Imperial College, BGS, the World Wildlife Fund and the Tyndall Centre) and are ongoing at the time of writing. The committee will submit a report of its findings and recommendations to Parliament.

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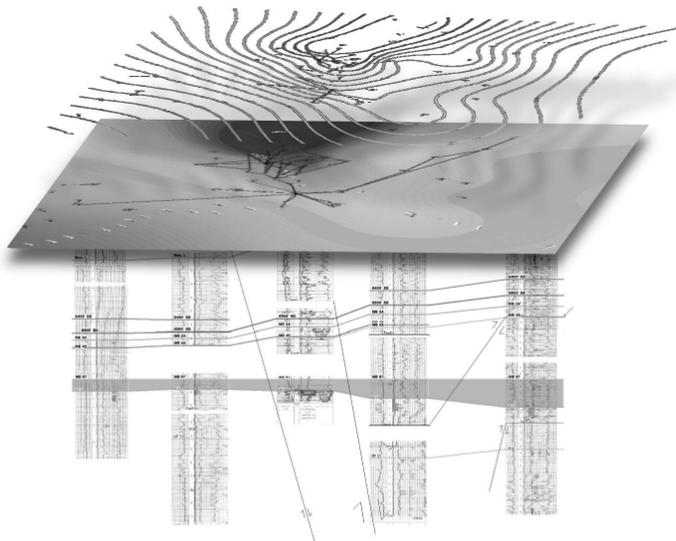
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South Louisiana and Offshore Gulf of Mexico Exploration and Production Activities

LAFAYETTE DISTRICT, ONSHORE AREA

By Carlo C. Christina

Since my last report, 47 new permits to drill in the Lafayette District, Onshore have been approved. Among these wells, the following list contains several significant locations: 2 Tuscaloosa Marine Shale horizontal wells, 2 wildcats, 2 deep tests in old fields, and 5 important field development wells.

In the July Drill Bits column, it was reported that several companies have accumulated large lease blocks of acreage in the Florida Parishes, in the Tuscaloosa Marine Shale play. It was also reported that 2 new players, Encana and Goodrich, were coming into the play. It has now been confirmed that Encana has staked a 19,400' horizontal well in North Chipola Field and Goodrich has purchased approximately 74,000 net acres in the trend, paying approximately \$13 million, or an average of \$175 per net acre.

Current drilling activity in the area lists 8 or more active wells permitted, drilling or testing. It should be noted here that 2 current NOGS members, Kirk Barrell and Clint Moore, are playing important roles in the play. Kirk is president of Amelia Resources, and Clint is the son of the late Alfred C. Moore, the pioneer of the Tuscaloosa Marine Shale potential. For a complete summary of the play, go to www.ameliareources.com.

NEW LOCATIONS

In Beauregard Parish, in **South Bear Head Creek Field**, (A), Midstates Petroleum is drilling the #9 Musser-Davis in Sec. 33, 6S-11W. The well was spudded on June 19 and is drilling below 7200 feet, toward the proposed total depth of 15,000 feet. (243320)

In **West Gordon Field**, Beauregard Parish, (B), Midstates Petroleum has permitted 2 new locations. The #4 Forestar Minerals, located in Sec. 7, 7S-9W has been drilled to a total depth of 14,128' after setting a 4 ½" liner to 14,092 feet and is waiting on a completion rig. (243342)

The Midstates #3 Forestar Minerals, (C), also located in Sec. 7, 7S-9W in **West Gordon Field**, is projected to a total depth of 14,000 feet. (243373)

Mayne & Mertz is drilling below 6000' on the #3 Martone, (D), in **South Manchester Field**, Calcasieu Parish, in Sec. 24, 10S-7W. The proposed total depth is 13,500 feet. (243371)

In **Cameron Meadows Field**, Cameron Parish, Apollo Energy continues its aggressive drilling program with the proposed #51 Dore, (E), a 10,000' test located in Sec. 28, 14S-13W, on the southwest flank of the field. (243345)

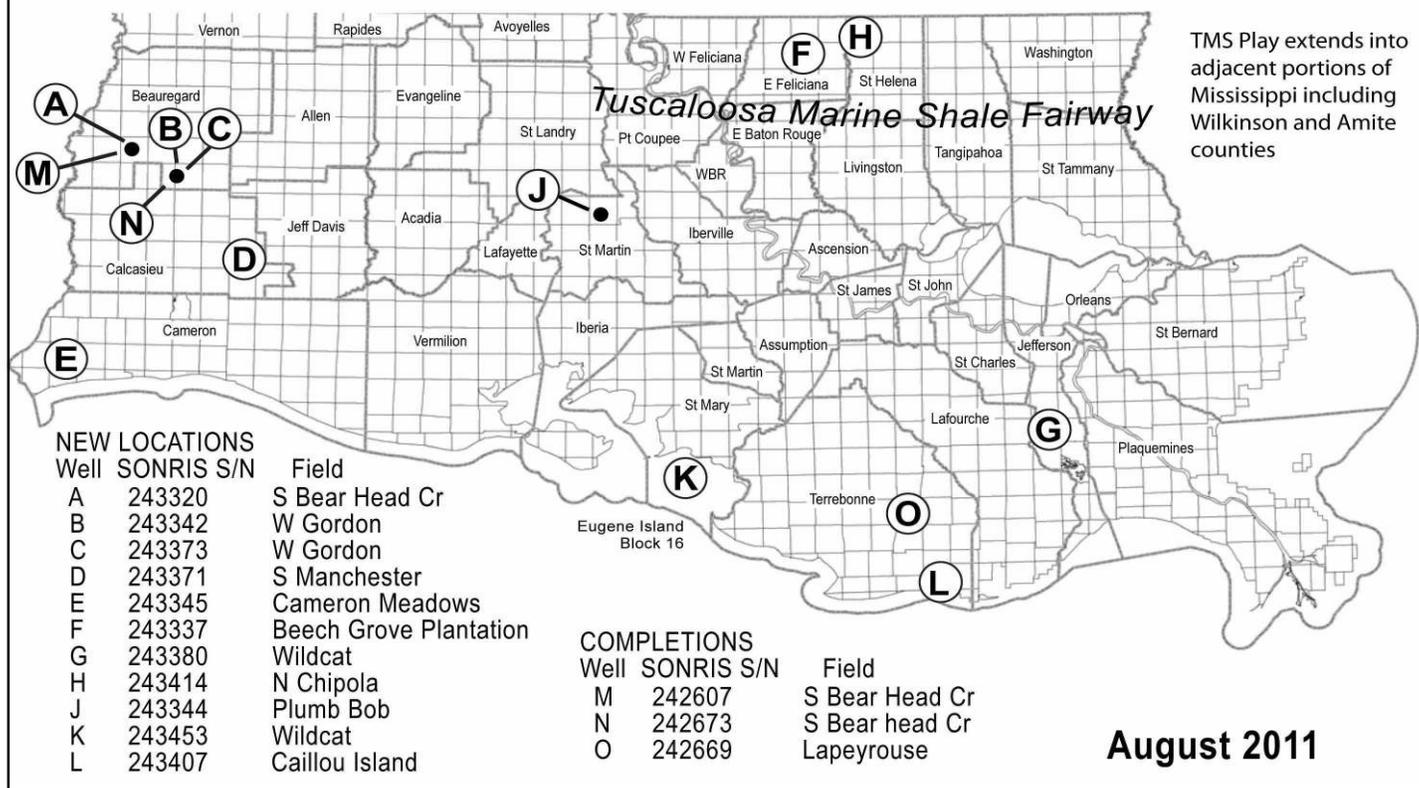
Devon Energy has permitted a Tuscaloosa Marine Shale, (TMS), a horizontal well in **Beech Grove Plantation Field**, (F), in East Feliciana Parish. Devon will drill the #1 Beech Grove Land Co. in Sec. 68, 2S-2E. The well will be drilled to a total depth of 18,590' in a horizontal leg of 5000 feet. This well is a critical test of the Tuscaloosa Marine Shale using the latest techniques of horizontal drilling and fracking. (243337) The future of horizontal drilling activity in the TMS trend will depend greatly on the results of this well and the Encana well, which will be drilled in North Chipola Field, as described in the St. Helena report below.

Beech Grove Plantation Field was discovered in 1995 with early completions in the Miocene and Frio zones between 3200 feet and 4700 feet. The field commenced production in 1996 but has been off production since 2002. Although 35 or more wells have drilled in the field, cumulative production has been only 2,822,502 MCF gas. The wells have been drilled in Townships 1 and 2 South and Ranges 1, 2, and 3 East although the State has classified all wells in the Beech Grove Field.

In Jefferson Parish, Manti Exploration will drill a **wildcat**, the #1 SL 20520, (G), in Sec. 10, 17S-23E, between Lafitte Field to the east and Little Temple Field to the west. The projected total depth is 12,500 feet. (243380)



NOGS LOG DRILL BITS — SOUTH LOUISIANA ACTIVITY MAP



In St. Helena Parish, Encana Oil & Gas will drill another Tuscaloosa Marine Shale horizontal well in **North Chipola Field** in Sec. 73, 1S-4E. The #1 Weyerhaeuser, (H), will be drilled to a PTD 19,400' in a 7000' lateral leg. (243414) (H)

North Chipola Field was discovered in 2008 by the Denbury #1 (originally operated by Encore) Weyerhaeuser and was completed in the Tuscaloosa Marine Shale flowing 323 BOPD through perforations 14,750 to 15,100 and 15,600 to 15,903 and 16,200 to 16,703 feet. The well has been on production 29 months has produced 28,643 barrels of 38 gravity oil.

A deep test has been permitted in **Plumb Bob Field** in St. Martin Parish. R&D Exploration will drill the #1 Kennison, (J), to a proposed total depth of 18,100' in Sec. 19, 8S-7E to test Wilcox sands. There has been no drilling in the field since 1990, and the deepest well previously drilled was to a depth of 13,274 feet in 1981. The proposed well is located on the extreme west flank of the field. This will be an interesting well to evaluate Wilcox sand in this area. (243344)

In St. Mary Parish, Phoenix Exploration will drill a **rank wildcat** in Atchafalaya Bay. The #1 SL 20523, (K), will be drilled to a proposed total depth of 19,800 feet. It is located between SW Belle Isle Field to the west and Little Bay Field to the east. (243453)

Hilcorp Energy Co. will drill a 20,500' test in **Caillou Island Field**, Terrebonne Parish. The #12 SL 2856, (L), will be drilled in Terrebonne Bay on the west flank of the field, in 23S-19E. (243407)

COMPLETIONS-

Midstates Petroleum has completed the #8 Musser Davis in **South Bear Head Creek Field**, in Beauregard Parish, located in Sec. 33, 6S-11W. (M). It was drilled to 14,250' and was completed on 5/2/2011, flowing 306 BOPD through perforations 13,774 to 13,840 feet. (242607)

Midstates Petroleum has also completed the #1 Dahlquists in **South Bear Head Creek Field**, located in Sec. 6, 7S-10W. (N). It was drilled to 15,500' and completed through perforations 13,151 to 13,252 feet, flowing 29 BOPD on 5/11/2011. (242673)

In **Lapeyrouse Field**, Terrebonne Parish, (O), Mannon L. Walters has completed the #1 Dupont, located in Sec. 64, 20S-18E. The well was drilled to 9895' and completed in the 5860' Stray Sand, flowing 157 BOPD through perforations 6513 to 6517 feet. (242669)

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OFFSHORE GULF OF MEXICO

By Al Baker

Between May 26th and June 23rd, the BOEMRE issued 59 drilling permits of which 37 were for Gulf of Mexico shelf wells. Five of the shelf permits are for new wells, of which 1 is exploratory and 4 are development. The exploratory well permit is for the West Delta Block 106 #A-7 well operated by Walter Oil & Gas. The development well permits were issued to Arena Offshore for the East Cameron Block 328 #C-6, #C-7 and #C-8 wells and to Conn Energy for the West Cameron Block 171 #10 well.

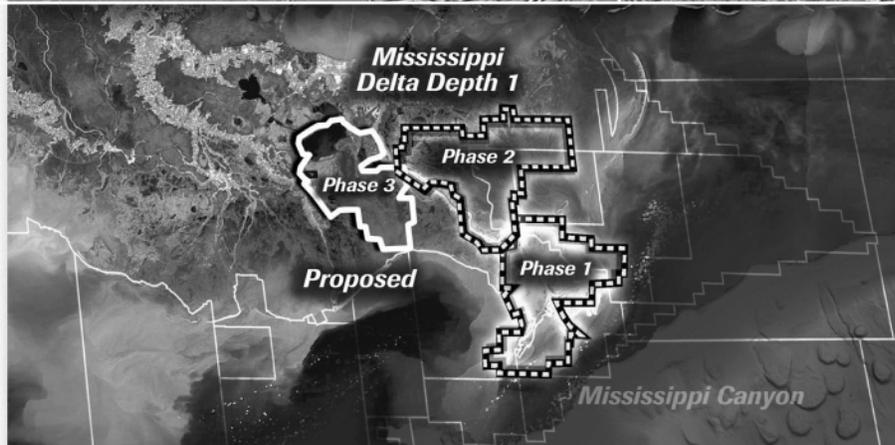
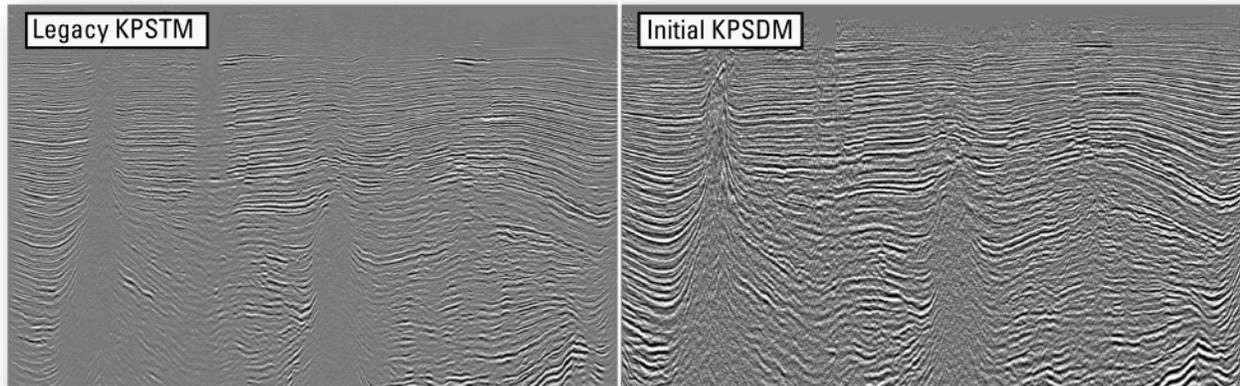
According to ODS-Petrodata, as of June 17th in the Gulf of Mexico, there were 67 rigs under contract out of the 122 rigs available, which represents a 54.9% utilization rate. However, the BakerHughes Rig Counts on June 17th indicated that there were 35 active rigs, which is only 52.2% of the total rigs under contract. The 35 active rigs compares to 17 active rigs during the same time last year. This indicates a 106% increase in the active rig fleet on a year-to-year basis. At the end of the 2011 first quarter, there were just 26 active rigs. The increases are encouraging news and suggest that the BOEMRE has increased its permitting activity. This is an obvious step in the right direction, but the offshore industry still has a long way to go to get back to pre-Macondo activity levels if it ever will.

The BOEMRE has not yet announced the date for the proposed oil and gas Lease Sale 218 in the Western Planning Area in the Gulf of Mexico, so the uncertainty still persists. According to the BOEMRE website, OCS Sale 218 is tentatively scheduled for late 2011 or early 2012. However, the Obama administration has indicated that one lease sale will be held in 2011 (presumably OC Sale 218), and two will be held during 2012. It is not known at this time whether the 2012 sales will include both the Central and Western Planning Areas.

On June 16th, Energy XXI provided an operational update of its GOM activities. Within the shallow water, ultra-deep shelf program, the McMoRan-operated partnership has current drilling activity that includes the Blackbeard East and the Lafitte exploratory wells and the offset appraisal well at Davy Jones. The Blackbeard East well, located on South Timbalier Block 144, has been drilled to 32,559 feet where McMoRan continues to make progress recovering drill pipe and stuck tools in the hole. McMoRan intends to deepen the well to 34,000 feet pending the resolution of the mechanical issues. On the Eugene Island Block 223 Lafitte well, a liner has been run below salt to 22,982 feet, and the well is currently drilling at 23,645 feet towards a proposed total depth of 29,950 feet. This well is targeting Middle and Lower Miocene objectives and possibly Oligocene (Frio) sands beneath the salt weld. The Davy Jones offset (#2) well, situated on South Marsh Island Block 234, has been drilled to 30,450 feet. Logging operations have been completed through the lower exploratory objectives in the Cretaceous section that is below the previously identified Wilcox pay sands. The logs are currently being evaluated while the well is being readied for production. The anticipated date of first production will occur during the second quarter of 2012.

Within their core producing properties portfolio, Energy XXI has had recent success at South Pass Block 89 Field, Grand Isle Block 16 Field and Main Pass Block 73 Field. In South Pass, the first of a six-well recompletion program has been successful. The #A-15 well is currently flowing 18 MMCFPD and 300 BCPD with 3000 psi FTP. At Grand Isle, the company perforated a prospective natural gas zone in the #J-21 well that instead flowed mostly oil at an approximate rate of 1200 BOPD. In Main Pass, the latest of two successful wells has been drilled. The Onyx well was drilled to 5,635 feet and encountered two pay zones that were previously modeled as salt. Previously, the Ashton well had found seven pay zones. The combined initial production from both wells is expected to be approximately 1,500 BOPD within the next 30 days.

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Info Tidbits –

“Central Louisiana area drawing interest for its oil and gas,” Richard Thompson, *The Times-Picayune*: This article was published in the *Times Picayune* on July 3rd 2011. An interesting read because of the regional impact it may have on the area and because of the legacy the Tuscaloosa brings:

Though the number of rigs exploring for natural gas in the U.S. has declined since the beginning of the year, interest in a 159,000-square-foot tract of land in central Louisiana has picked up recently, more than a decade after LSU researchers signaled that the geological formation could produce 7 billion barrels of previously out-of-reach oil.

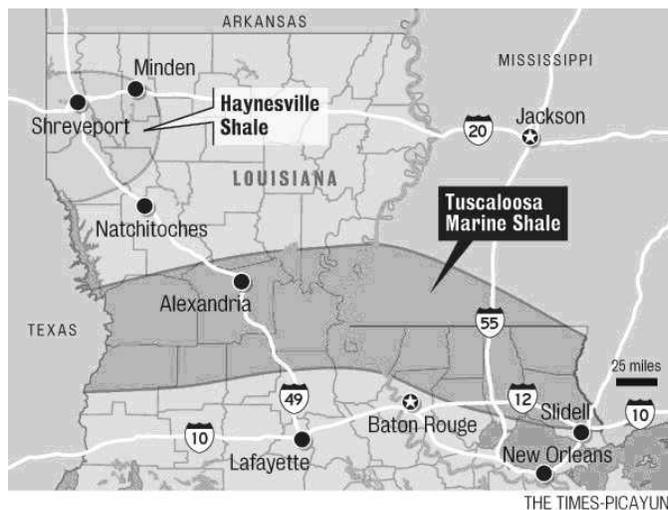
Several companies have announced acquisitions of oil and gas leaseholds in the Tuscaloosa Marine Shale area, which stretches from Texas through the center of Louisiana and into southwest Mississippi.

Goodrich Petroleum Corp., an independent energy producer, said last month that it had leased 74,000 acres in the Tuscaloosa Marine Shale for about \$13 million, or about \$175 per acre, with plans to begin development early next year. And in May, Devon Energy Corp. said that it will drill a pair of horizontal wells after accumulating 250,000 acres, at about \$180 apiece.

Other companies with interests in Tuscaloosa Marine Shale include Danbury Resources, having signed a joint venture with an unidentified party to develop 105,000 acres, and Indigo II Louisiana, which has accumulated 240,000 acres.

Analysts say the Tuscaloosa play is between 11,000 and 14,000 feet deep, compared to the 5,000- to 12,000-foot depths in the Eagle Ford area, an oil-and-gas producing region that has become more attractive to investors as the price of oil has skyrocketed. And some industry observers, such as David Dismukes, associate director of the Center for Energy Studies at LSU, say Tuscaloosa could be “the next big one” among shale plays.

Encore Acquisition Co., which acquired 208,000 acres of the Tuscaloosa Marine Shale in 2008, drilled three short horizontal wells, but mechanical issues, coupled with then-falling oil prices, hindered efforts for additional testing. J.P. Morgan said in a research report to investors in May. Encore was later acquired by Denbury Resources.



Rigzone - “Statoil Gets Go-Ahead to Drill Aldous Wells” http://www.rigzone.com/news/article.asp?a_id=108743: An interesting article around some of the ongoing exploration activity in the North Sea, Statoil is the major player for exploration activities in the Eastern North Sea. They also have several deepwater joint ventures in the Gulf of Mexico:

Statoil has as operator of production license 265, received the Petroleum Safety Authority Norway’s consent for drilling two exploration wells on the prospects Aldous Major and Aldous North. Det norske has a 20 percent share in the license.

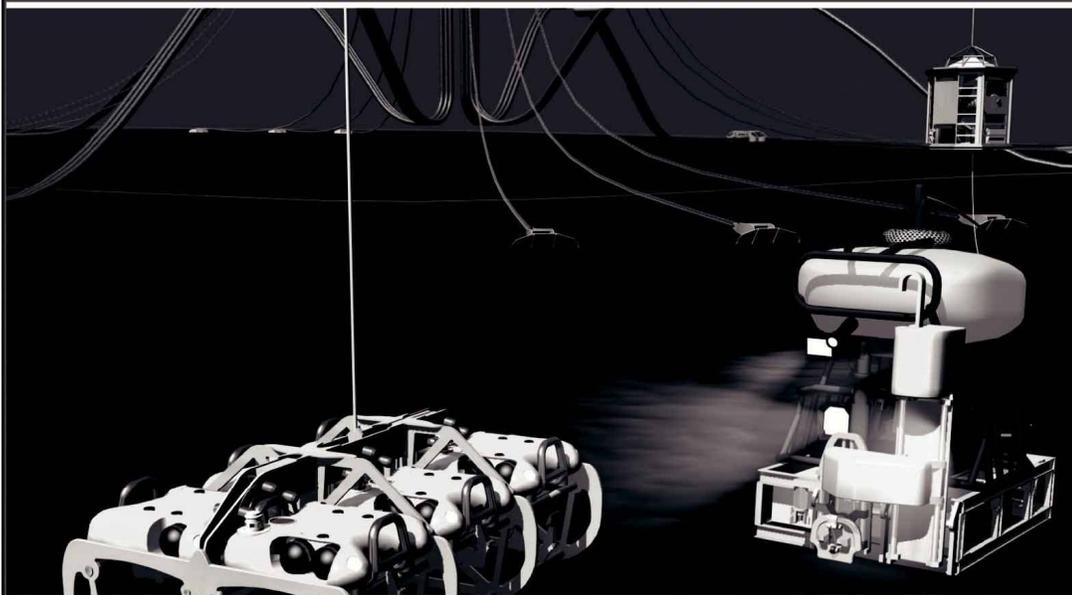
Det norske has expectations for the Aldous wells, as there is a chance that the prospects are an extension of Lundin’s major discovery on Avaldsnes in 2010.

There have been several encouraging discoveries in this area in the North Sea. In PL 265 a promising gas discovery at Ragnarrock was made 2009. In wellbore 16/2-4 Statoil discovered both oil and gas in the license, in 2007.

The wells 16/2-8 and 16/2-9S are two of four planned wells in the area in 2011, to define the discoveries in both PL 265 and Avaldsnes.

Expected start of the first well is in week 28. The second well will be drilled immediately after. The whole operation is expected to take around 75 days. The wells will be drilled by the semisubmersible drilling rig Transocean Leader.

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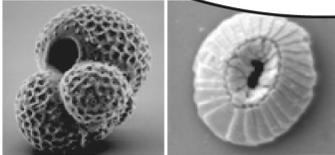
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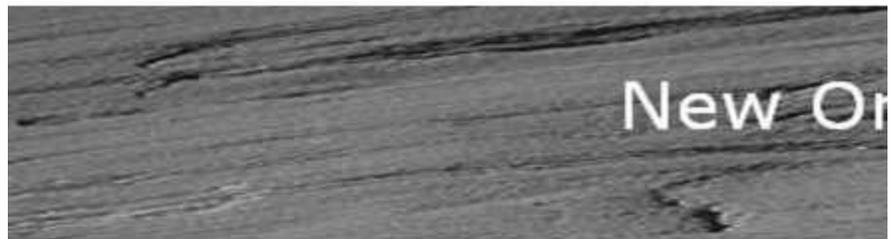
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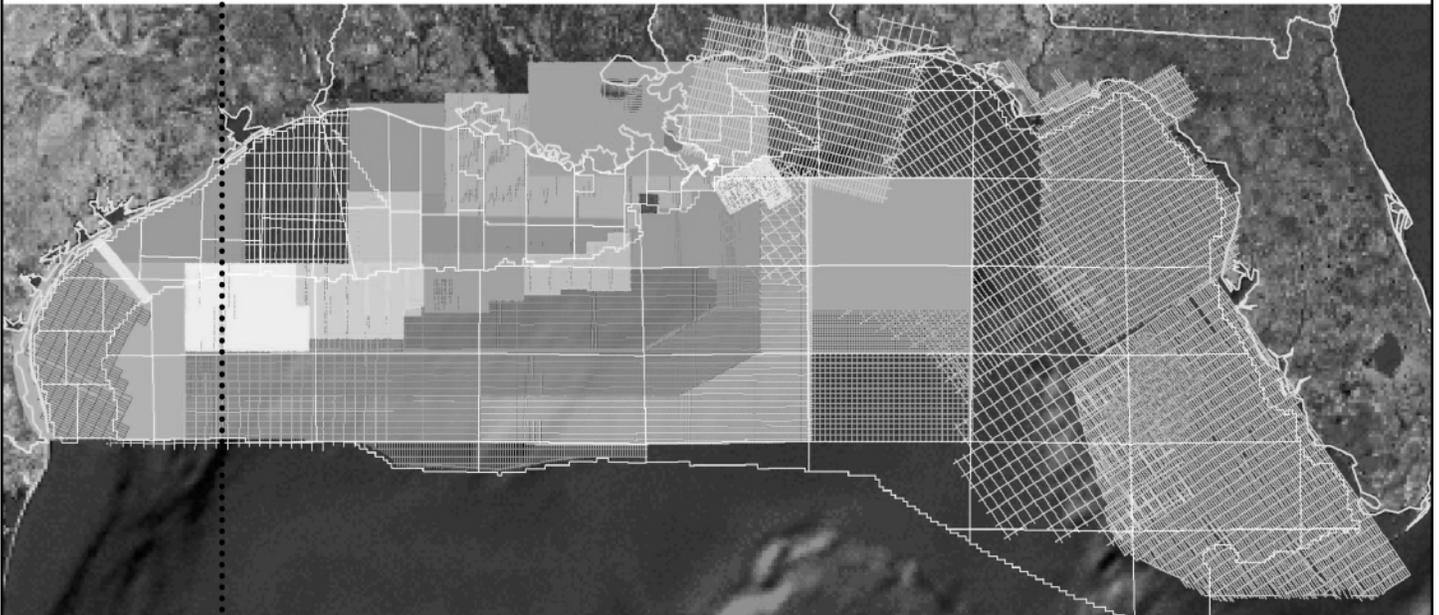
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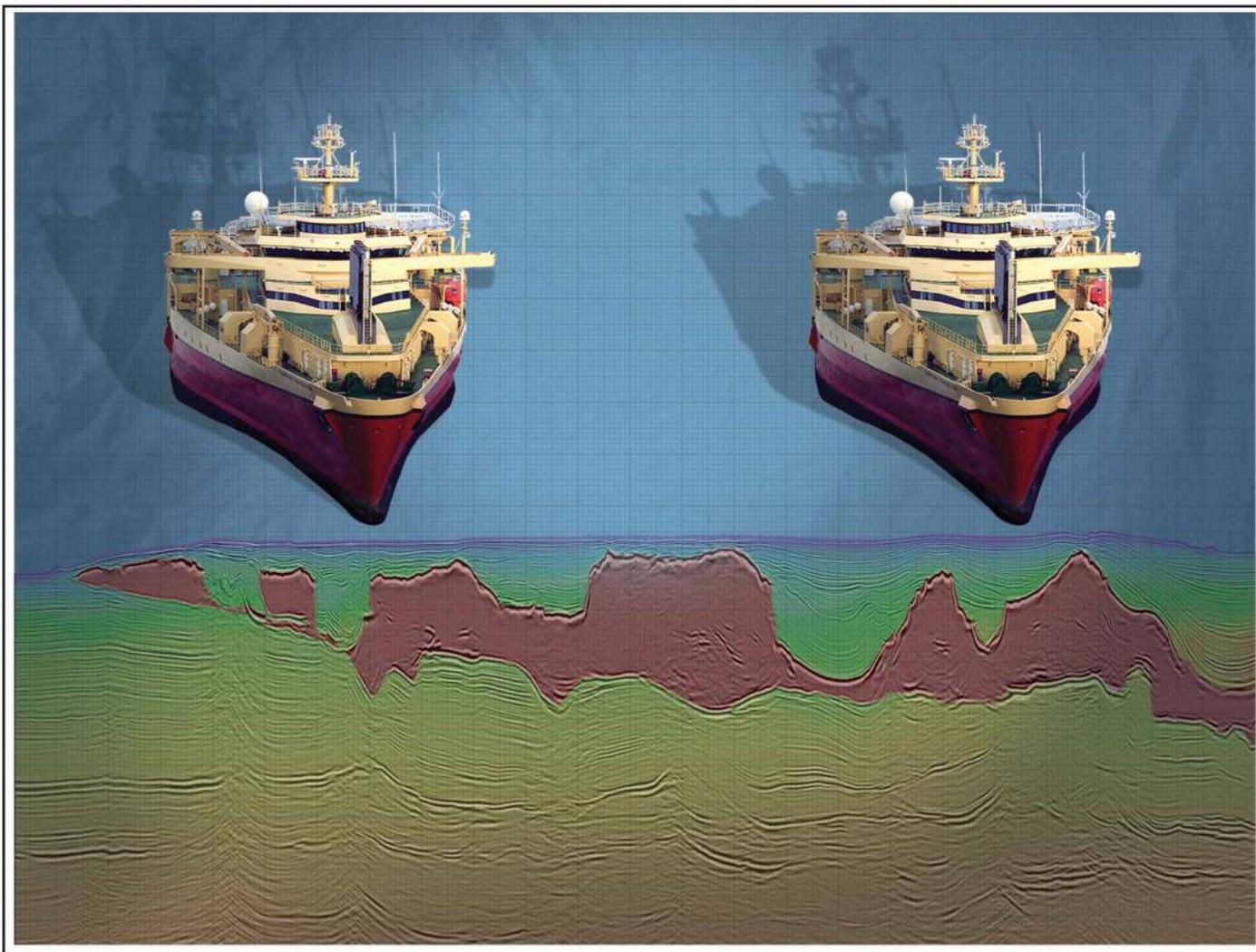
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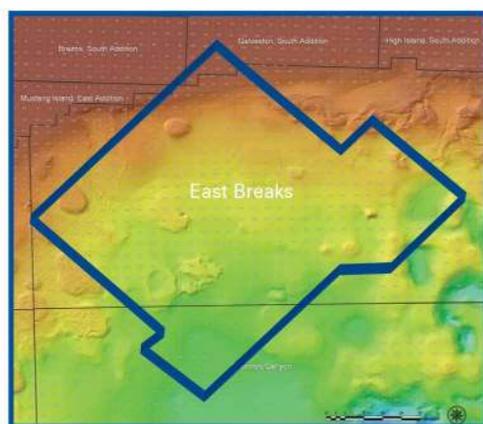
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