## BULLETIN

## Corpus Christi Geological Society



and

## Coastal Bend Geophysical Society



January 2016 ISSN 0739 5620

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Compliments of

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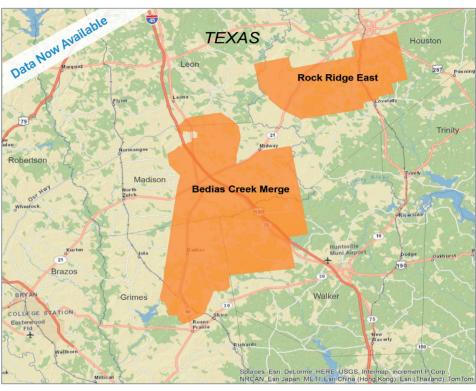
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www.ccgeo.org

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Tournament

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Education

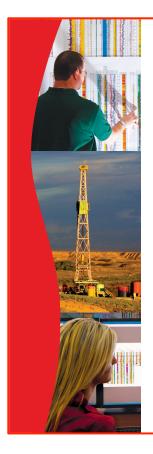
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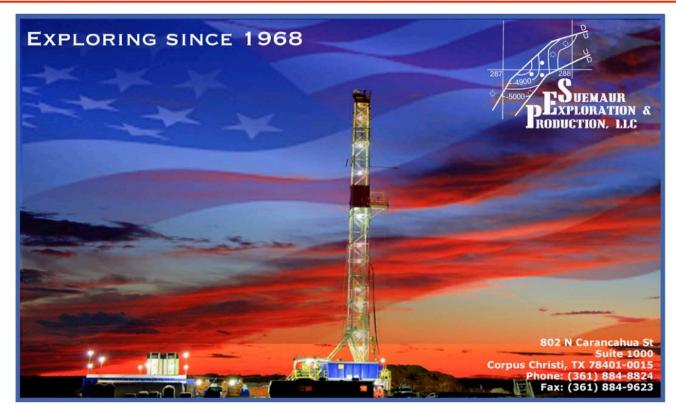
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#### CCGS/CBGS JOINT MEETING SCHEDULE 2015-2016

		Sej	otem	ber				October								N	ovem	ber		
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27	28	29	30				25	26	27	<u>28</u>	29	30	31	29	30					

Sept. 10, 2015 5:30p.m.—8:30p.m. Kickoff BBQ Hoegemeyer's Barbeque Barn Oct. 28—11:30a.m.—1:00p.m. Speaker: Neil Peake, CCG Geo Consulting Seismic Reservoir Characterization. "Unconventional Reservoirs: An Integated Workflow Incorporating Surface Seismic, Mineralogy, & rock Properties in the Haynesville Shale."

Nov. 18—11:30a.m.—1:00p.m. Speaker: Lorenzo Garza & Joe Stasulli, Railroad Commission of Texas. "Horizontal Drilling in Texas: A Tale That Begins in the Austin Chalk, but Whose Ending Has Yet To be Written."

		De	ecem	ber			January									F	ebru	ary		
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Dec. 9—11:30a.m.--1:00p.m. Speaker: Dmitri Bevc,Ph.D., Chevron, SEG Distinguished Lecturer "Full Wave-Form Inversion: Challenges, Opportunities and impact"

Jan. 20--11:30a.m.—1:00p.m. Speaker: Charles Sicking, VP of R&D/Chief Geophysicist, Global Geophysical Services, Inc. "Predicting Frac Performance and Active Producing Volumes Using Microseismic Data" Feb. 17—11:30a.m.—1:00p.m. Speaker: Collegiate Month.

#### **CCGS/CBGS JOINT MEETING SCHEDULE 2015-2016**

			Marc	h						Apri	l			May						
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27	28	29	30	31			24	25	26	27	28	29	30	29	30	31				

March 16—11:30a.m.—1:00p.m. April 20—11:30a.m.—1:00p.m. May 18—11:30.m.—1:00p.m. Speaker: Distinguished Speaker:

## **Calendar of Meetings and Events Calendar of Area Monthly Meetings**

Corpus Christi Geological/Geophysical SocietySIPES Corpus Christi Luncheons	
South Texas Geological Society Luncheons	•
San Antonio Geophysical Society Meetings	
Austin Geological Society	
Austin Chapter of SIPES	First Thursday
Houston Geological Society Luncheons	Last Wednesday
Central Texas Section of Society of Mining, Metallurgy & Exp	2 <sup>nd</sup> Tues every other month
	In San Antonio



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#### Contacts:

Mike Layman (Geophysicist) 361-844-6922 Tom Winn (Geologist) 361-844-6992 Southern Winn (Geologist) 361-844-6998

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#### **MERRY CHRISTMAS, HAPPY HANUKKAH**

#### AND

#### **HAPPY NEW YEAR!!**

I want to wish any and all members a very blessed holiday season. We all need to think of all the good things in life and love our family members. Let's try to not dwell on the cloudy future.

We all need to try to get ahead of the curve in-so-far as anticipating what type of prospects the market may bare now, and in a higher oil or natural gas environment in the future. This is not easy, but is necessary. Make yourself as relevant as possible to your employers and go above and beyond in all your efforts. The cream does rise to the top.

To the groups that were flying very high during the intense drilling in the "shale plays", the same advice holds. The past plays on the original Austin Chalk were exposed to the same oil price swings. There were "sweet spots" that were drilled as commercial and profitable to those who studied the trend very hard and worked the stratigraphy and better understood the fracture geometry. Deals can be made now! Leases may be expiring and the \$5,000.00 per acre lease bonuses may become a bonus free term assignment to a new investor.

New seismic acquisitions and innovative processing could unlock many a complex geological environment or may shed light on subtle but important "amplitude work" on layer cake plays that may give up key information not obvious on conventional approaches.

Good	luck	to	you	all!

Sincerely,

Mike Lucente

#### \*\*\*BLOOD DRIVE\*\*\*

## THE BLOODMOBILE – IN **JANUARY, 2016**WILL BE AT SOME CONVENIENT LOCATIONS PLEASE CALL 855-4943 for those locations or see below



## PLEASE MAKE **ONE** NEW YEAR'S RESOLUTION & GO DONATE BLOOD!!!



#### **ATTENTION!!!**

When you give blood: They have us listed as <u>C.C. Geological</u> <u>Society</u>. Our number with them is <u>4254</u> & it would be helpful if you can give them that number also.

## FOR CURRENT SCHEDULES & LOCATIONS OF THE BLOODMOBILES YOU CAN LOG ON TO:

www.coastalbendbloodcenter.com

This message approved by Mike Lucente....

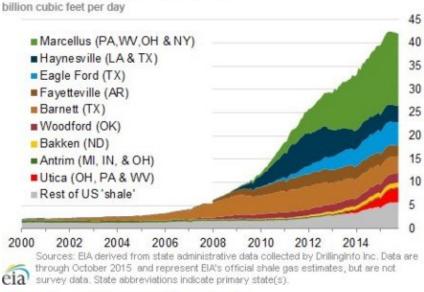


#### **CBS** President's Letter

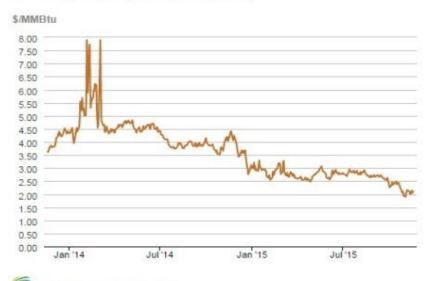
<u>News - Still haven't found any data on seismic crew counts.</u> Following is the best source of seismic news I've found, but no crew

count. <a href="http://www.rigzone.com/news/oil\_gas/t/9/Seismic">http://www.rigzone.com/news/oil\_gas/t/9/Seismic</a> Oil has been below \$40/bbl for 2 straight days. Natural gas is struggling to stay above \$2/Mcf. What is the bottom?





#### Natural gas spot prices (Henry Hub)



#### **Business - CBGS** had a meeting to discuss golf

tournament, scholarships and other education support. We will award 2 scholarships for the 2016/17 academic year even if it requires using some of the current funds on hand. Discussion occurred around supporting the TAMU-K Geophysics/Petrophysics program. Options are being explored. CBGS is going to investigate opportunities for a 1 day geophysical forum.

#### **Education - - GSH**

No education events on the calendar. Numerous technical luncheons if you happen to be in Houston. Check following link.

**Geophysical Society of Houston Calendar** 

CBGS has a revenue sharing agreement with GSH, so please mention CBGS if you register for any GSH events.

#### - SEG

NEW - 2015 SEG Convention Technical Program Recording: Available at the following link -xxxxx

Gravity and Magnetics for Explorationists, 25-26 January, Houston, Michal Ruder

<u>Microseismic Monitoring in Oil or Gas Reservoir - , Houston, Leo Eisner, 25-26</u>
January 2016

A Practical Understanding of Inversion for Exploration Geophysics - , , Houston, John Bancroft, 27-28 January 2016

Understanding and Adapting Rockphysics Principles for Mudrock (Shale) Reservoirs, OK City, Manika Prasad, 29Feb/1Mar

SEG has 450+ eLearning courses online from \$0.99 to \$150.00(most expensive I saw)

Error! Hyperlink reference not valid.

#### - AAPG

Fundamentals of Reservoir Characterization and Modeling, 11 January/Abilene, 12 January Ft Worth

Deepwater Reservoirs, 10 February, Houston

#### Thought for the month

I was seldom able to see an opportunity until it had ceased to be one. ~Mark Twain

#### Monthly O&G Statistics

Texas Oil and Gas Info	Current Month	Last Month	Difference	
Texas Production	MMBO/BCF	MMBO/BCF	MMBO/BCF	
Oil	73	79	-6	Sept
Condensate	10	11	-1	
Gas	619	680	-61	Sept
	Current Month	Yr to date - 2015	Yr to date - 2014	
Texas Drilling Permits	687	9,822	24,286	Nov
Oil wells	173	2,401	7,085	
Oil and Gas	441	6,145	14,826	
Gas wells	47	724	1,342	
Other	11	137	184	
Total Completions	965	18,510	27,595	Nov
Oil Completions	776	14,790	23,440	
Gas Completions	150	2,636	3,232	
New Field Discoveries	3	59	42	
Other	39	1,084	923	

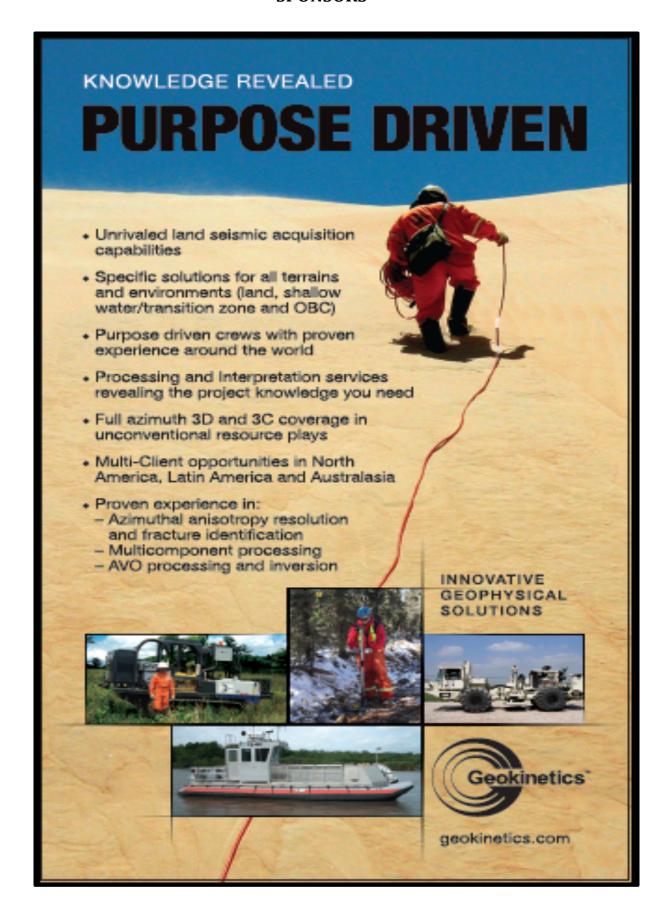
#### Thought for the month:

A vision without a task is but a dream, a task without a vision is drudgery, a vision with a task is the hope of the world

- Inscription on a wall in Sussex England, circa 1730

Lonnie Blake—CBGS President

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## CORPUS CHRISTI GEOLOGICAL SOCIETY & COASTAL BEND GEOPHYSICAL SOCIETY



#### **LUNCHEON MEETING ANNOUNCEMENT**

#### WEDNESDAY, JANUARY 20th, 2016

**Location:** Congressman Solomon P. Ortiz International Center, 402 Harbor

Drive, Corpus Christi, TX 78401 <a href="http://ortizcenter.com">http://ortizcenter.com</a>

**Bar Sponsor:** To be announced (sponsors needed!)

Student Sponsor: Core Laboratories and Global Geophysical Services

**Time:** 11:30 am Bar, Lunch follows at 11:45 am, Speaker at 12:00 pm

**Cost:** \$25.00 (additional \$10.00 surcharge without reservation; No-shows

<u>may be billed</u> and non-RSVP attendees cannot be guaranteed a lunch); *FREE* for students (discounted by our generous sponsors)!

**Reservations:** Please RSVP by 4PM on the FRIDAY before the meeting!

E-Mail: <u>wes@gislerbrotherslogging.com</u>

Please note that luncheon RSVPs are a commitment to the Ortiz Center and must be paid even if you can't attend the luncheon.





http://www.corelab.com

http://www.globalgeophysical.com

Please thank our generous sponsors!!

## Predicting Frac Performance and Active Producing Volumes Using Microseismic Data

Presented by: Charles Sicking, Ph.D., Vice President of Research and Development, Global Geophysical Services

#### Summary

The use of the depth imaging fracture extraction method provides predictive value for reservoir development and management. Passive recordings are used to: 1) map the natural fractures in the reservoir; 2) map the fractures opened during the stage by stage treatment of a well; and, 3) compute the rock volume activated during production of the

reservoir fluids. The Fracture Imaging method uses streaming depth imaging to focus the energy emitted by the fractures in the rocks for computing the seismic emission volumes. Many seismic emission volumes are computed for a specified time interval. These volumes are integrated to compute a final seismic emission volume from which the detailed fracture volume is extracted. The method generates a map of fractures across an entire area of interest which can then facilitate the prediction of frac treatment performance before a well is drilled or completed. The method is also used for monitoring the fractures opened during the frac treatment. The stimulated rock volume (SRV) is computed from the seismic emission volumes that are computed during the frac. Passive recordings during well production are used to compute the detailed volume of rock that is activated by the flow of the fluids from the reservoir. The rock volume that is active during production is more representative of the volume that contains the proppant. However, this active producing volume (APV) changes over time. Computing the APV periodically over the years of production can be used to map the reservoir depletion over time, plan refracs, and determine future drilling and completion strategies.

#### Method

The fracture imaging method uses pre-stack depth migration to image passive recordings for each of many time windows. The depth volumes that are computed for each of the time windows are examined for noise contamination and then integrated to produce a single depth volume that is used for computing the fracture volumes. Fracture imaging is different from detecting and locating hypocenters or microearthquakes (MEQ). The hypocenter and MEQ methods detect short duration signals generated when the rocks slip over a short time interval. Seismic Emission Tomography (SET) method is used to focus the MEQ detections to find the locations. The fracture imaging method does not use detections or the SET method. The passive imaging method, instead, uses streaming depth imaging to compute the maximum focusing for every voxel in the depth volume for a selected time window. This is prestack depth imaging but the travel times are one-way instead of two-way. The seismic emission volume integrated for the entire clock time is used to extract the fracture systems used for mapping and producing volume computations. The focus of this talk is on examples of the seismic emission volumes and the associated fracture systems. The fracture imaging method is reviewed in order to lay the foundation.

#### Results

Examples from different basins show consistent correlation between the fractures mapped before drilling to the performance of the frac treatment. The fractures extracted during the well treatment for each stage are displayed in two ways. The accumulated intensity of the activity along the fracture zones during the pump time is used to show the most active fracture zones. The first time of opening for each fracture segment is tracked during the computations and this information allows for detailed investigations for the frac. Movies of the fracture opening times illustrates the episodic nature of the fracture activity and are useful for determining the optimum length of pumping time and

pressures. The fracture volumes computed during the frac treatment show the stimulated rock volume (SRV) that is activated by the treatment. The seismic emission volumes are extracted during well production over the years after the well is put on line. The activate fractures are extracted from these emission volumes and are used to show the Actively Producing Volume (APV) of rocks. The APVs are used to determine which parts of the well are producing and shows the fracture systems that are most productive. This provides data for planning future wells that will exploit the highest value areas of the reservoir. Using passive recordings collected periodically over months or years allows for tracking the changes of the rock volume that is producing.

#### **About our Presenter:**



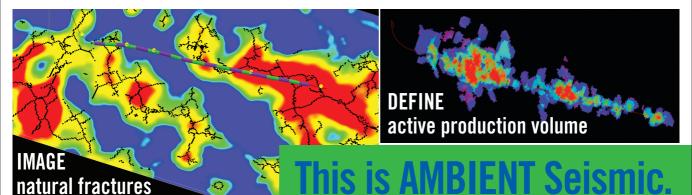
**Dr. Charles** Sicking is currently the Vice President for R&D and Chief Geophysicist for Global Geophysical Services. During his tenure at Global Geophysical Services, Dr. Sicking has developed seismic processing algorithms including, azimuthal migration, HFVS separation, Harmonic Noise Filtering, and 3D SRME. Recently, Dr. Sicking led the seismic processing development of Global's fracture mapping microseismic processing system.

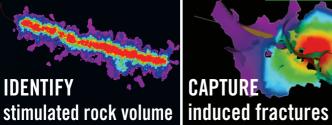
During his career in Geophysics, Dr. Sicking developed seismic processing algorithms in the areas of imaging, deconvolution, wavelet estimation, velocity analysis, filtering, interpolation, attenuation and AVO. Dr. Sicking led the development of the seismic wavelet processing flow and methodology for Arco's seismic processing system. He also developed technology for velocity model building for 2D and 3D models for use in Time-to-Depth and Depth imaging applications and was a key contributor to 3D prestack depth migration imaging teams. While in graduate school Dr. Sicking invented a new method for interpolation and extrapolation of digital signals. In other industries, Dr. Sicking was a key contributor and led the development of simulators for ground mapping synthetic aperture radars and for laser imaging systems.

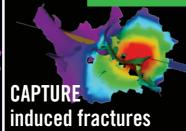
Dr. Sicking received his B.A. in physics from the in 1969, and his Ph.D. in geophysics in 1980, both from the University of Texas at Austin.



http://www.globalgeophysical.com







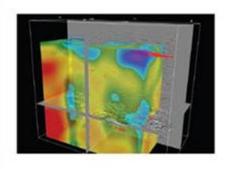
Global Geophysical's innovative approach to ambient seismic provides direct imaging of acoustic activity in the subsurface. This allows us to identify areas or zones that are acoustically active due to natural fractures, hydraulic stimulation or production-related activities. Our ambient seismic results can be presented as 3D attributes, as discrete volumes of acoustic activity or as Tomographic Fracture Images<sup>sm</sup>.

For more information: www.globalgeophysical.com/AMBIENT or Contact us at AMBIENT@globalgeophysical.com

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Plans for the GCAGS are moving along nicely.

Abstracts for presentations are coming in. The deadline is January 15<sup>th</sup>, so get your submission in soon. Eleven sessions are in the making as this is published. More may come to fruition.

Three exciting field trips are in the works and three more are being planned. There are field trips planned to the Rio Grande Delta and a Nueces River to GOM Geomorphology study. A Port of Corpus Christi/Refinery tour and the Ice Age Fossil Hunt are also being prepared. A field trip for K-12 science teacher is also in the works.

Several short courses are shaping up – from ancient clastics log analysis; biostratigraphy and basin analysis; to using geopressure in risk assessments. Two K-12 science teacher workshops are being formulated. More are being considered.

Of course we are soliciting sponsorships. If you are interested in being a sponsor (please say yes), and make your commitment by March 1<sup>st</sup> your ad/logo will be included in the Convention Announcement brochure that will be mailed to over 9000 members in May. This recognition is in addition to the immediate acknowledgement on the website, in the convention program guide, and in *The Transactions*. The sponsorship form can be found in this issue. Contact Lonnie Blake (361-876-6614) or me for more information.

Looking Back Thinking Forward . . .

Dawn Bissell General Chairman 361-960-2151 The Corpus Christi Geological Society awarded \$8,000 in scholarships to 15 local students in November 2015.

TAMU-CC, TAMU-K, and Del Mar were all represented with scholarship recipients.

Texas A&M Corpus Christi Students were:

Sajjad Abdullajintakan, Audrey Douglas, Wendy Schwertner, Nicholas Spalt, and Brittney Tamborello.

Students from Texas A&M Kingsville were:

Tomisin Alagbe, Noelia Arredondo, Payton Campbell, Sara Dillon, Monica Estrada, Emily Hager-Hahn, and James Quisenberry.

Del Mar students were:

Byron Gorham, Kasondra Maleski, and Lenora Perkins.

The CCGS Scholarship fund received donations from member contributions, the CCGS Fishing Tournament and the Corpus Christi Oilman's Tennis Tournament proceeds. These donations are vital to allow the committee to fund the scholarships for our deserving students. Every donation is very much appreciated.

The next awards will be given in 2016.

The Scholarship Committee members are:

JR Jones, Vice-Chairman Beth Priday, Secretary

Brent Hopkins, Treasurer Mike Lucente, CCGS President

Bob Critchlow, Member BJ Thompson, Member

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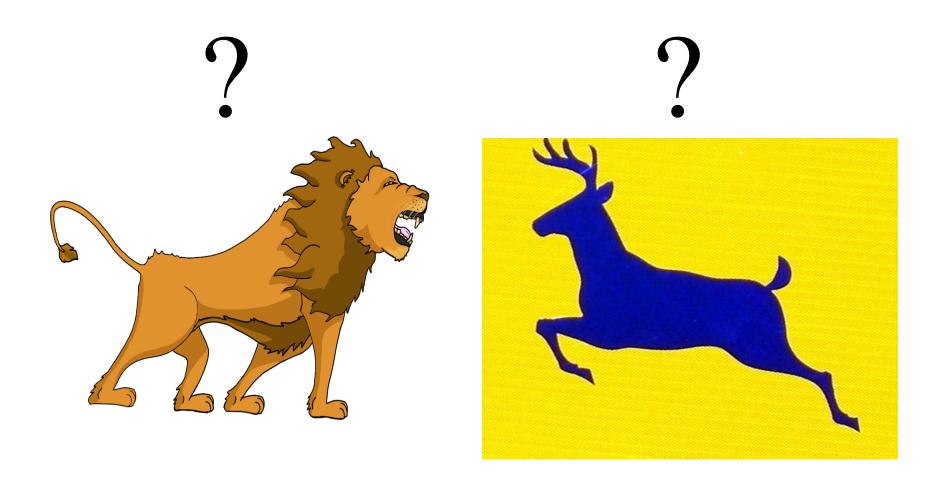
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## The Shale Revolution The Impact on North American Hydrocarbon Prices

GCGS Corpus Christi May 20, 2015

## 2015 E&P Employee



### **Outline**



## Market Outlook

- Natural Gas
- NGL's
- Oil
- Impact on US Economy
- Conclusions

#### **North American Gas**



- Island commodity
- Not a pretty picture for producers
- Amount of shale gas is enormous relative to demand
- Marcellus and Utica will be the low cost basins
- Marcellus current production 13 BCFD (20% of US total)
  - By 2018 Marcellus/Utica production likely 23 BCFD (33% of US total)
  - This will reduce 2018 wellhead netbacks for Rockies/ Canada gas

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#### **North American Gas**



- Sufficient shale supply for  $\pm$  50 years
- 2015-2020 LNG exports (~ 5 BCFD of 77 BCFD total market) will not fix oversupply situation
- \$2.75 \$3.75 HH likely long term price

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### **North American NGL's**



- Similar situation to gas
- Likely long term oversupply
- Expect prices to (roughly) track gas



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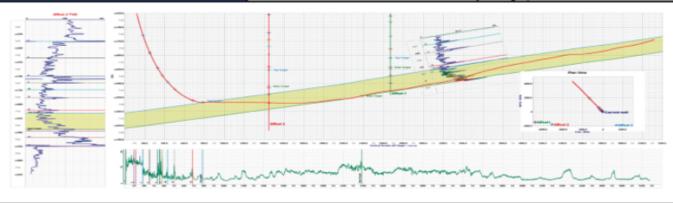
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#### **Crude Oil**



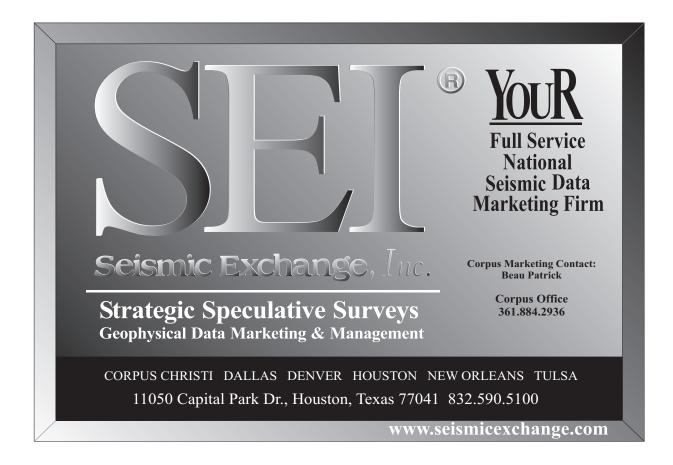
- Totally different macro picture not an island commodity
- Current global demand 93 million BPD; growing 1 million BPD/year
- At \$60 WTI, it's uneconomic to develop new oil almost anywhere in the world except in the Middle East
- US is the only significant place where global supply is growing

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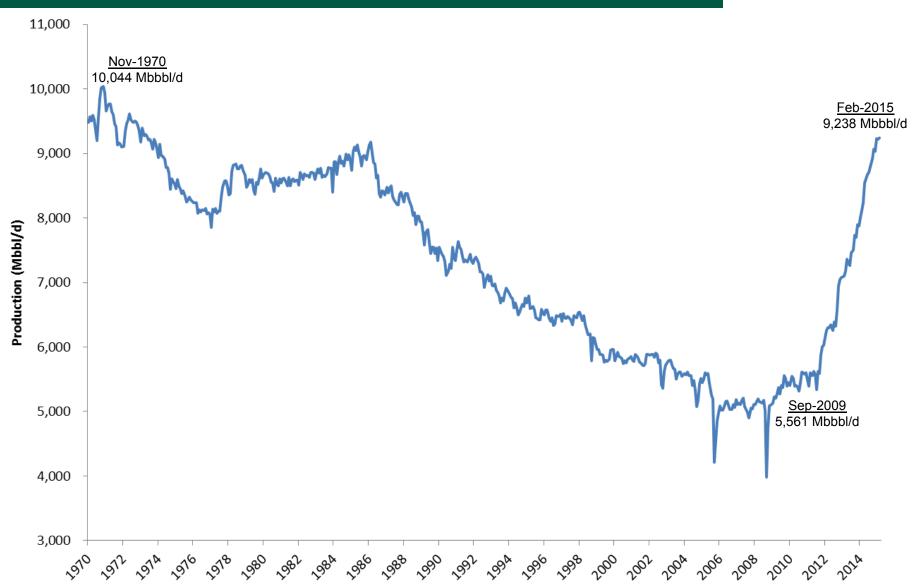
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## U.S. Crude Production by Month (Mbbl/d)





Source: U.S. Energy Information Agency

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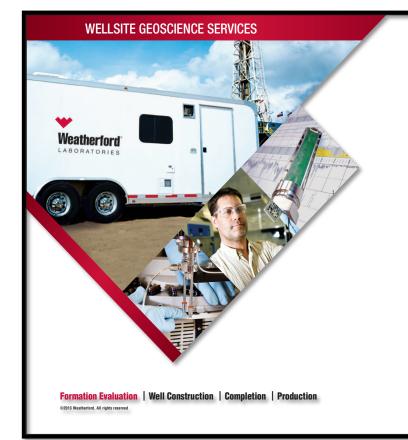
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## What will Happen to US Production Growth?



- At \$60 WTI, the only significant domestic oil plays that are economic on a full cycle basis are parts of the Eagle Ford and Delaware Basin
- Domestic production has been growing at a 1.2 million BPD YOY rate for the past year. Within 4 months, this should drop to 0.6 million BPD.
- By YE15 domestic YOY growth will be zero

# **By YE15**



- Global demand growing at 1+ million BPD
- US oil growth  $\sim 0$
- Rest of world oil growth  $\sim 0$
- Likely upward oil price pressure

## **Other Global Factors**



- Saudi Arabia could increase production by 0.5 million BPD to further punish US shale industry
- Iran If nuclear agreement reached production could increase by 0.7 million BPD after 1 year
- US Production will grow again if prices >\$80
- Any of these would tend to lower prices
- Likely no shale oil outside North America for 5 10 years

## **Price Prediction**



- Prices will likely rise in 2H15
- Stable price is likely \$75-\$80
- Long Term \$90-\$100 prices unlikely
- Long Term \$50 price unlikely





- Biggest boost to overall economy in  $\pm$  40 years
  - Reindustrialization of parts of US
- Long term domestic natural gas prices will be  $\sim 1/3$  of similar prices in Europe or Asia
  - Major uplift for chemicals industry and others
- US will be a long term major oil producer
  - Foreign policy impact
  - Major trade deficit benefits

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Note: Publication codes are hyperlinked to their online listing in <a href="https://example.com/The Bureau Store">The Bureau Store</a> (http://begstore.beg.utexas.edu/store/).

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ARANSAS COUNTY	Vista Del Mar	Maurbro	MCMULLEN COUNTY	— Plymouth
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Fulton Beach	Cook	Thompsonville, N.E.	Agua Dulce (3)	Garcia
Goose Island	*****Nordheim	JIM WELLS COUNTY	Arnold-David	Hinde
Half Moon Reef	Smith Creek	Freebom	Arnold-David, North	La Reforma, S.W.
Nine Mile Point	Warmsley	Hoelsher	Baldwin Deep	Lyda
Rockport, West	Yorktown, South	Palito Blanco	Calallen	Ricaby
St. Charles	DUVAL COUNTY	Wade City	Chapman Ranch	Rincon
Tally Island	DCR-49	KARNES COUNTY	Corpus Christi, N.W.	Rincon, North
Tract 831-G.O.M. (offshore)	Four Seasons	Burnell	Corpus Christi West C.C.	Ross
Virginia	Good Friday	Coy City	Encinal Channel	San Roman
BEE COUNTY	Hagist Ranch	Person	Flour Bluff/Flour Bluff. East	Sun
Caesar	Herbst	Runge	GOM St 9045(offshore)	Yturria
Mosca	Loma Novia	KENEDY COUNTY	Indian Point	VICTORIA COUNTY
Nomanna	Petrox	Candelaria	Mustang Island	Helen Gohike, S.W.
Orangedale(2)	Seven Sisters	Julian	Mustang Island, West	Keeran, North
Ray-Wilcox	Seventy Six, South	Julian, North	Mustang Island St.	Marcado Creek
San Domingo	Starr Bright, West	Laguna Madre	889S(offshore)	McFaddin
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Strauch Wilcox	Berclair	Stillman	West	Placedo
BROOKS COUNTY	North Blanconia	KLEBERG COUNTY	Perro Rojo	WEBB COUNTY
Ann Mag	Bombs	Alazan	Pita Island	Aquilares/Glen Martin
Boedecker	Boyce	Alazan, North	Ramada	Big Cowboy
Cage Ranch	Cabeza Creek, South	Big Caesar	Redfish Bay	Bruni, S.E.
Encintas	Goliad, West	Borregos	Riverside	Cabezon
ERF	St Armo	Chevron (offshore)	Riverside, South	Carr Lobo
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Gyp Hill West	HIDALGO COUNTY	Seeligson	Shield	Hirsch
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S.E. Zoller

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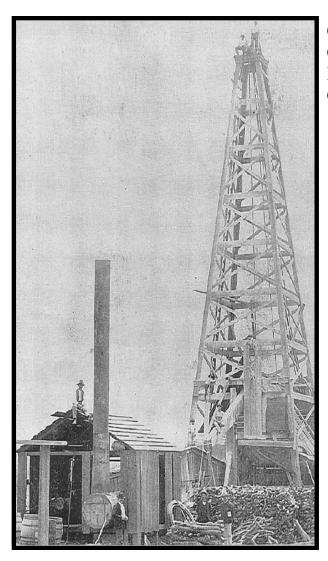
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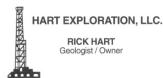


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