BULLETIN

Corpus Christi
Geological Society

and

Coastal Bend
Geophysical Society

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2016-2017

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Education	Dr. Robert Schneider		

Visit the geological web site at www.ccgeo.org

CCGS/CBGS JOINT MEETING SCHEDULE 2016-2017

September 2016

S	M	T	W	Th	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

GCAGS Convention
"Explore The Future"
September 18-20, 2016
Corpus Christi, TX.

October 2016

S	M	T	W	Th	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

GCAGS Post-Convention
Party & Society Kickoff
Bar-B-Q
Thursday, October 13
5:30 to 8:00 p.m.

November 2016

S	M	T	W	Th	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

11:30am-1:00pm.
Speaker: Bruce Moriarty, Principal Geophysical Advisor, Lumina Geophysical
"Simultaneous Inversion of Spectrally-Broadened 3D Seismic Data: Case Study for the Olmos Unconventional Play, South Texas"

December 2016

S	M	T	W	Th	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Combined November/December for the Holidays.

January 2017

S	M	T	W	Th	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

February 2017

S	M	T	W	Th	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28				

11:30am-1:00pm.
Speaker Howard Watt, Director of Sales and Marketing, North American Land Acq. for Geokinetics, Inc.
"Recent Advances in Onshore Seismic Data Acquisition Methods and What they can do for You"

CCGS/CBGS Joint Meeting Schedule 2016-2017

March 2017							April 2017							May 2017						
S	M	T	W	Th	F	S	S	M	T	W	Th	F	S	S	M	T	W	Th	F	S
			1	2	3	4							1		1	2	3	4	5	6
5	6	7	8	9	10	11	2	3	4	5	6	7	8	7	8	9	10	11	12	13
12	13	14	15	16	17	18	9	10	11	12	13	14	15	14	15	16	17	18	19	20
19	20	21	22	23	24	25	16	17	18	19	20	21	22	21	22	23	24	25	26	27
26	27	28	29	30	31		23	24	25	26	27	28	29	28	29	30	31			
							30													

Combined February/March for Spring Break

11:30a.m.-1:00p.m.
Speaker: Rocky Roden, Geophysical Insights "Interpreting Below Seismic Tuning Using Multi-Attribute Analysis"

11:30a.m.-1:00p.m.
Speaker: David L. Krams, P.F. Director of Engineering Services, Port of Corpus Christi Authority. "The Port of Corpus Christi – Past, Present and a Big Future"

Calendar of Meetings and Events

Calendar of Area Monthly Meetings

Corpus Christi Geological/Geophysical Society………… Third Wed.—11:30a.m.
SIPES Corpus Christi Luncheons………… Last Tues.—11:30a.m.
South Texas Geological Society Luncheons………… Second Wed—noon San Antonio
San Antonio Geophysical Society Meetings………… Fourth Tuesday
Austin Geological Society………… First Monday
Austin Chapter of SIPES………… First Thursday
Houston Geological Society Luncheons………… Last Wednesday
Central Texas Section of Society of Mining, Metalllurgy & Exp………… 2nd Tues every other month in San Antonio

PRESIDENT'S PAGE

It's May already, and I don't know where the year went. I had the good fortune of being able to travel this past year more than I ever have. It was great for me, but perhaps not so great for the Society because I was just plain ***busy***! Thanks to Marian who had to always remind me that my column was overdue…. and for her patience while I wrote.

Many of us are in incredibly busy. But with the passing of another year, members need to think about the future of the Society. Who wants to serve on the Executive Committee for next year? We completed the entire year with the President Elect position vacant.

We also need to examine what we want this Society to do, and members must step forward to do the work. Many of us have gray hair and won't be around in a few years…. retirement to the Hill Country seems to be a favorite theme for many of us. Who is going to continue with the work? If no one is able to do so, what will become of the Society and its assets?

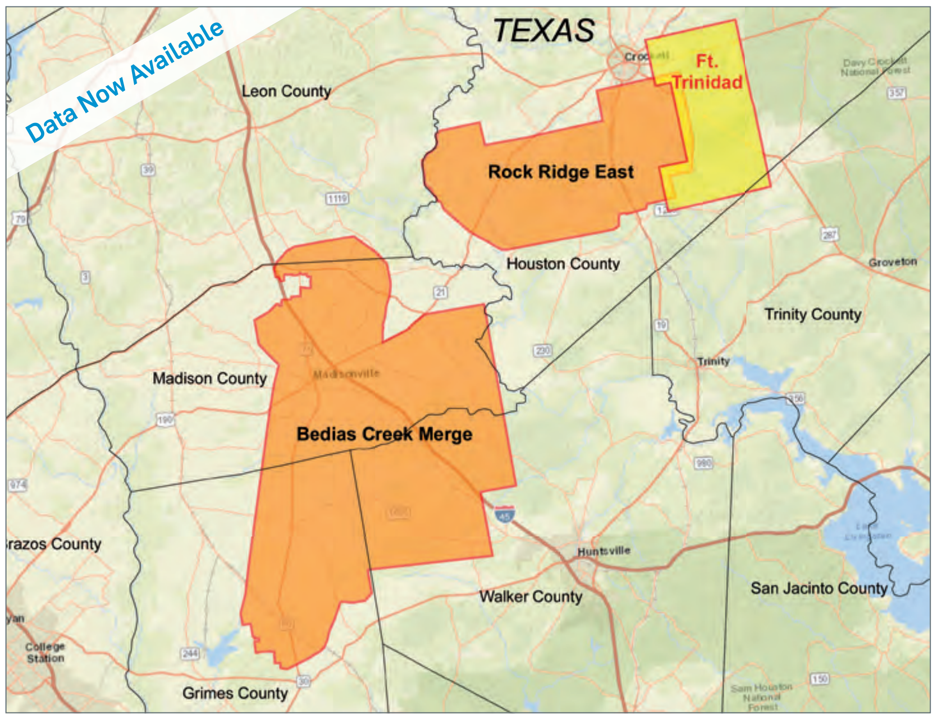
The good news is that the oilfield is starting to come back. I see activity in the Eagle Ford area along IH-37 on my travels. We have many young people in our local universities who will be filling the geological ranks in a few years. The Scholarship Committee awarded 14 scholarships to local students in April to help them with costs for field camp. Many of the applicants have already been accepted into graduate school, and many more are making plans to continue their post-baccalaureate education.

The future will be in great hands as we Baby-Boomers pass the baton to the younger generation. I am sure that they will do amazing things we can't even dream of!

Barbara Beynon
CCGS President

YOU'VE ARRIVED

New Ft. Trinidad 3D Survey
Houston and Trinity Counties, TX



CGG continues to expand its East Texas footprint with high-quality 3D projects while illuminating the stacked pay formations.

Data is already available from our Bedias Creek Merge and Rock Ridge East projects. Orthorhombic PSTM from our newest project Ft. Trinidad is also now available.

The right data, in the right place, at the right time

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Passion for Geoscience

CBGS President's Letter

News - **Rig counts are going up. Oil and gas prices are up again. When this was written oil was above $50 again, gas was above $3.00.** "Payrolls in the oil and gas sector in the United States rose for the month of November, recent U.S. government data shows, the first monthly gain in over two years" - Per Nick Cunningham at OilPrice.com. Oil and Gas Company bankruptcy rate is down and credit risk is down per CreditRiskMonitor. Texas oil production is up, drilling permits and completions are way up. What's next?

CBGS Business -

CBGS will be hosting a Basic Seismic Attributes Course, 9-4 Friday April 28th, EOG 3rd Floor Conference Center, Instructor is Dr. Robert Schneider

Students $10, CBGS Members $30, Non CBGS Members $50 (Includes $20 for CBGS membership)
CBGS would like to increase our membership to improve our ability to get SEG Distinguished Lecturers.
All proceeds go to the TAMUK Geophysics Program
Contact Robert.Schneider@tamuk.edu or Lonnie_Blake@eogresources.com

CBGS Officers for 2017-2018

- President- Dr. Subbaro Yelsetti
- Vice President- Lonnie Blake
- Sec/Treasurer- Matt Hammer
- Education Chairman- Dr. Robert Schneider
- Scholarship Chairman- Matt Egger
- Golf Chairman- Lonnie Blake

CBGS will hold its annual Golf Tournament to fund its scholarship program on October 6, 2017 at Northshore Country Club
To participate or sponsor, please contact Lonnie Blake, 361 887 2665, Lonnie_Blake@eogresources.com
Thanks to Fermin Munoz for his help in organizing this tournament the last few years. Anyone who wants to help, contact Lonnie Blake

Education/Events -

- GSH

GSH did their March Technical Luncheon online. CBGS is investigating a "simulcast" of the GSH technical program.
Carbonate Essentials: April 25-26, Webinar, Christopher Liner
Basic Signal Processing: May 23-26, Webinar, Enders Robinson and Sven Treitel
Introduction to Borehole Acoustics: July 25-28, Webinar, Mathew Blyth
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.
Mention CBGS if you register for GSH events.

-HGS

Unconventional Mechanics, Houston, Nov 8-9

- SEG

MicroSeismic and Hydraulic Fracture Mechanisms, Jun 19-21, Spring, Texas

SEG has 450+ eLearning courses online from $0.99 to $150.00(most expensive I saw) http: //www.seg.org/professional-development/seg-on-demand
Annual SEG Convention, Houston, Sept 24-27
-AAPG
URTEC, Austin, July 24-26
- Offshore Technology Conference, May 1-4, Houston

- NAPE, Aug 16-17, Houston

- SPE Convention, Oct 9-11, San Antonio, Texas

Monthly Saying

"The world as we have created it is a process of our thinking. It cannot be changed without changing our thinking." — Albert Einstein

Monthly Summary

Texas Oil and Gas Info	Current Month	Last Month	Difference	
Texas Production	MMBO/BCF	MMBO/BCF	MMBO/BCF	
Oil	89.9	89.1	0.8	Dec
Condensate	10.4	10.6	-0.2	Dec
Gas	629.5	633.7	-4.2	Dec
	Current Month	Yr to date - 2017	Yr to date - 2016	
Texas Drilling Permits	1,310	3,257	1,594	Feb
Oil wells	284	801	429	
Oil and Gas	893	2,140	946	
Gas wells	56	160	99	Mar
Other	0	0	0	?????
Total Completions	712	1,925	3,452	Mar
Oil Completions	586	1,537	2,720	
Gas Completions	77	256	577	
New Field Discoveries	2	8	4	
Other	0	3	13	?????

Lonnie Blake
President CBGS

CORPUS CHRISTI GEOLOGICAL SOCIETY
COASTAL BEND GEOPHYSICAL SOCIETY

LUNCHEON MEETING ANNOUNCEMENT

WEDNESDAY, MAY 17, 2017

Location: Congressman Solomon P. Ortiz International Center, 402 Harbor Drive, Corpus Christi, TX 78401 *ortizcenter.com*

Bar Sponsor: Gisler Brothers Logging

Student Sponsor: Core Laboratories and Geophysical Insights

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

Reservations: Please **RSVP** by 4PM on the FRIDAY before the meeting!
E-Mail: *arrangements@ccgeo.org*

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

www.corelab.com

www.geoinsights.com

www.gislerbrotherslogging.com

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IF YOU WOULD LIKE TO SPONSOR PINT NIGHT OR LUNCHEON BAR, PLEASE CONTACT US AT:

arrangements@ccgeo.org

The Port of Corpus Christi – Past, Present, and a Big Future

Presented by:

David L. Krams, P.E.

Director of Engineering Services, Port of Corpus Christi Authority

About our Presenter:

David Krams is a Registered Professional Engineer in the State of Texas with a Bachelor of Science degree in ocean engineering from Texas A&M – College Station. After working as a consulting engineer in the Corpus Christi area for ten years specializing in underwater engineering related to marine and waterfront facilities, Mr. Krams joined the staff of the Port of Corpus Christi Authority in 1994. After serving as Manager of Channel Development, he now serves as the Director of Engineering Services for the Port. He is responsible for the planning, design, and construction of all port facilities.

Mr. Krams, a resident of Corpus Christi since 1972, is active in the local community, serving on various local boards and committees. He has been married to his wife, Amy, for 30 years and has a daughter, Jamie, a Chemical Engineer from Texas A&M University that is currently employed with Monsanto in Luling, Louisiana.

PORT CORPUS CHRISTI®

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1st ANNOUNCEMENT

FIERY ICE 2017 - *Corpus Christi, Texas, USA, 6-8 December 2017*

TEXAS A&M UNIVERSITY CORPUS CHRISTI — HOKKAIDO UNIVERSITY — UNIVERSITETET I BERGEN — HNEI Hawai'i Natural Energy Institute, University of Hawai'i at Mānoa — AIST National Institute of Advanced Industrial Science and Technology (AIST)

11TH INTERNATIONAL WORKSHOP ON METHANE HYDRATE RESEARCH AND DEVELOPMENT

Progress and Future International Directions

OVERVIEW: The 1st International Workshop on Methane Hydrate R&D was held in March 2001 in Honolulu, Hawaii. The primary objective of that and subsequent workshops was to provide a forum where hydrate researchers and stakeholders could freely exchange information and identify research priorities in an effort to promote collaboration. Subsequent workshops have been held, on average, every 1.5 years in different countries including the U.S., Chile, Canada, the U.K., Norway, New Zealand, Japan, and India. This effort has resulted in a broad range of field and laboratory research pertaining to gas hydrate distributions, stability and formation, and contribution to climate change and coastal ocean carbon cycling. Based on previous workshop focuses and developments in this field over the last 16 years, the 11th workshop will focus on;

1) Gas Hydrate Energy: exploration, production, and economics;
2) Methane and Climate Change: Arctic, Antarctic and regions in between;
3) Natural and Anthropogenic Warming Contributions to Coastal and Industrial Platform Stability; and
4) Carbon dioxide injection for methane acquisition and sequestration.

We hope that previous participants in this workshop series, as well as other interested parties, will be able to join us in Corpus Christi this winter December 6th through 8th, 2017.

AGENDA: The 11th Workshop will follow the format that has successfully been employed in our previous meetings. The workshop will include plenary lectures, oral presentations and posters, and breakout sessions.

REGISTRATION AND ABSTRACTS: The Workshop website is under construction and is expected to be operational May 2017. The 2nd Announcement will be distributed electronically once the website is up, and will include information on registration, logistics, and a call for abstracts.

INTERNATIONAL STEERING COMMITTEE
Professor Richard Coffin, Texas A&M University – Corpus Christi, USA
Professor Bjorn Kvamme, University of Bergen, Norway
Professor Stephen Masutani, University of Hawaii, USA
Associate Professor Tsutomu Uchida, Hokkaido University, Japan
Dr. Norio Tenma, National Institute of Advanced Science and Technology, Japan

QUESTIONS?
Please email Workshop Liaison Mrs. Alessandra Garcia at agarcia@strategic-carbon.com

JOIN!

The Desk & Derrick Club of Corpus Christi is a dynamic organization that promotes the education of the petroleum, energy and allied industries and advances the professional

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- Attend regional and national meetings.
- Receive critical updates and information about the energy industry.
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For more information about the Desk & Derrick Club of Corpus Christi and to learn about member eligibility, go to www.addc.org or contact Jena Nelson at 361-844-6726 or email at jena@amshore.com

The Desk & Derrick Club of Corpus Christi is a proud affiliate of the Association of Desk And Derrick Clubs, www.addc.org

CORPUS CHRISTI BREWERY PUB CRAWL

In February the Scholarship committee hosted a Corpus Christi Brewery Pub Crawl. It was a fun event and with great beer and camaraderie. Many suggested that we do this again in the fall. Watch for details and join us then to benefit the scholarship fund.

SCHOLARSHIP NEWS

The Corpus Christi Geological Society awarded $7,000 in scholarships to 14 local students in April 2017 from TAMU-CC and TAMU-K.

TAMUCC STUDENTS:
Barbara Beynon, CCGS President; Jake Alexander Hailey Guillemette, Erin Matthys, Holly Thomas, Chad Sims (Not pictured), Dawn Bissell- CCGS Scholarship Committee

TAMUK STUDENTS:
Barbara Beynon, CCGS President; Tomisin Alagbe, Brian Wilkinson, Aaron Barron, Noelia Arredondo, Michael Garcia, Audrey Lucio, Sarah Dillion, Daniel Morales, Felipe Alarcon, Dawn Bissell- CCGS Scholarship Committee

These scholarships were provided to help with Field Camp expenses. These students are attending field camps sponsored by 8 different universities.

The CCGS Scholarship fund received donations from member contributions, the CCGS Fishing Tournament and the Corpus Christi Oilman's Tennis Tournament. A bonus from the GCAGS 2016 Convention was a $400 contribution to the scholarship fund from the Omni Hotel.

These donations are vital to allow the committee to fund the scholarships for our striving students. Every donation is very much appreciated.

The Scholarship Committee members are:

Brent Hopkins, Treasurer	Barbara Beynon, CCGS President
Bob Bell, Member	BJ Thompson, Member

Outgoing members are JR Jones and Beth Priday. Thank you both for your service and input to the scholarship committee.

Dawn S. Bissell
Scholarship Committee

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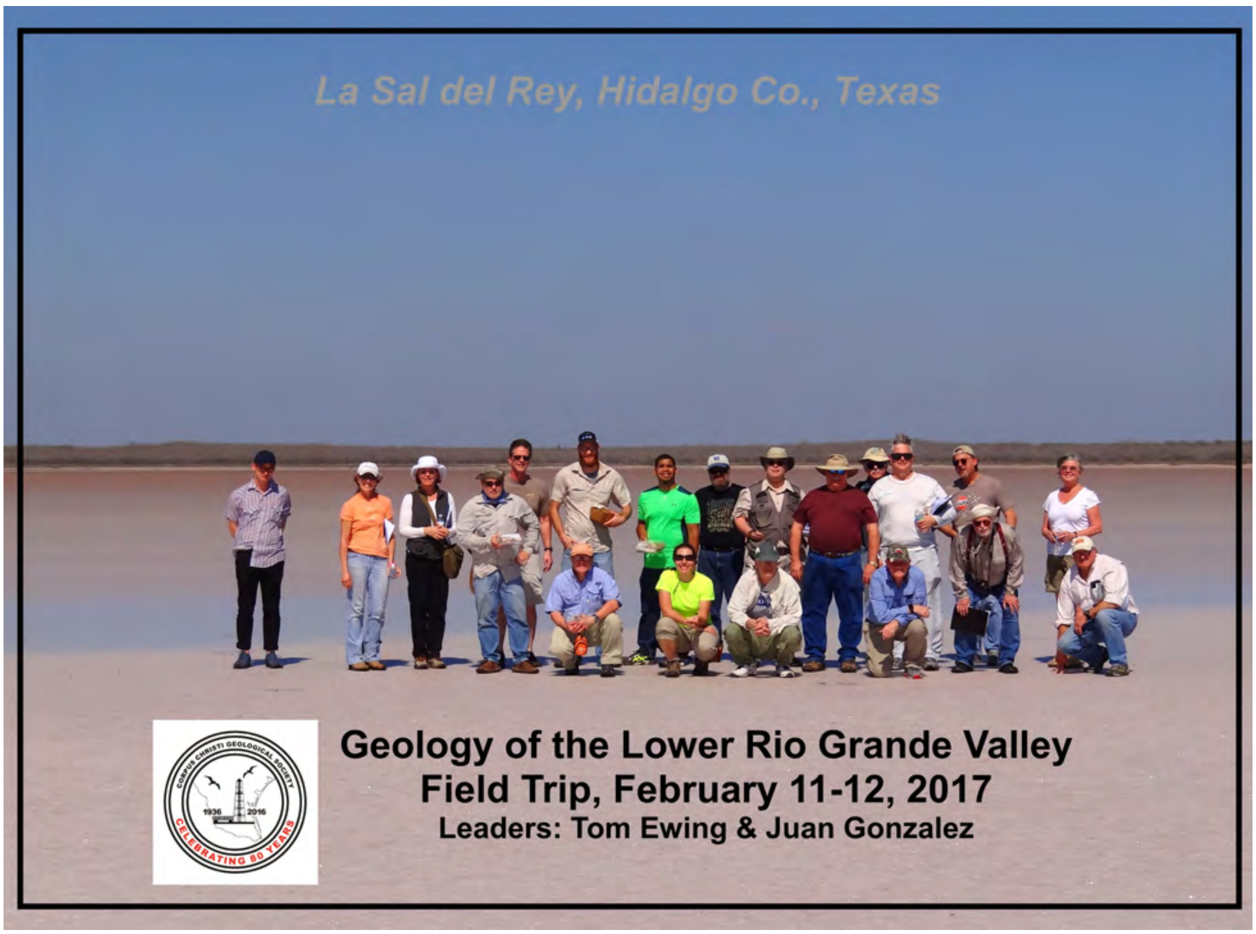
Rio Grande Valley Field Trip

In February, Tom Ewing of Frontera Exploration, and Juan Gonzalez of UT-Rio Grande Valley led 20 Geoscientists and one PhD candidate in Finance on a two day trip to study the Rio Grande Delta and Great Sand Sheet. We hailed from Austin, San Antonio, Houston, and Corpus Christi.

From the eolian sand sheet to an incredible salt lake; to lagunas, esteros, distributary channels, clay dunes, transgressive shorelines, and Oligocene ash bluffs; it was an informative trip and very insightful. We also visited irrigation and drainage features and preserved battlefields of the Rio Grande Valley.

For the next trip to the Valley, the field guide can be purchased. There are a limited number available locally or from the BEG bookstore. Cost $25.

Many thanks to Tom and Juan for an excellent trip.



Dawn Bissell

Field Trips

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Chile Vieja Field: 3D Seismic Data Adds over 70 BCF of Reserves by Revealing that a 'Bald' Structural High is Actually a Small, Shale-Filled Canyon

Richard E. Paige

Suemaur Exploration and Production, LLC, 539 N. Carancahua St., Ste. 1100, Corpus Christi, Texas 78401

ABSTRACT

Chile Vieja Field in Willacy County is a combination structural/stratigraphic trap that produces from upper-middle Frio age sands. The primary trapping element is a shale-filled erosional channel (the Raymondville Canyon) that cut and removed up to 400 ft of in situ marine deltaic sands. The canyon runs across the apex of a 4–way anticlinal structural high, which formed as a downthrown rollover to a regional growth fault. The field produces from 4 geopressured sandstone reservoirs truncated against the perimeter of the shale-filled canyon.

Detailed log and core characterization of the dominantly upward-coarsening, productive sands place the environment of deposition in a nearshore, lower to middle shoreface environment, which was deposited near wave base. The interpreted depositional environment is a prograding to aggrading shelf-margin deltaic complex, formed within a highstand prograding wedge, punctuated by short-lived transgressive episodes. The last transgressive event in the Chile Vieja parasequence set resulted in the formation of the Raymondville Canyon, interpreted to have developed due to mass wasting of a sediment-starved, unstable delta margin.

A detailed review of the discovery and development history of this field strongly suggests that early, pre–3D seismic interpretations mischaracterized the productive structure as a 'bald' structural high. Following the early drilling of numerous updip, shaled-out wells, this interpretation probably led to the conclusion that productive reservoir sands 'pinched-out' over a pre-existing bathymetric high. 21 yr after initial field development ceased, Suemaur E&P's acquisition of a large 3D seismic volume revealed the existence of the canyon. Recognition of the canyon's presence led to the realization of likely additional reserves downdip to the original discovery well.

Prior to Suemaur's involvement in the field, cumulative totals for this package of reservoirs was 27 billion cubic ft of gas (BCFG), and 1.02 million barrels of condensate (MMBC) from 4 wells spanning 41 yr. Since Suemaur's 'rediscovery' in 2006, 71 BCFG and 1.28 MMBC of additional reserves have been produced from 26 new well completions. This represents reserve increases of over 240% for gas and 100% for condensate.

OVERVIEW

Chile Vieja Field in Willacy County, South Texas, resides within one of a series of large, growth-faulted, syndepositional rollover structures, of late Middle to early Upper Frio age. A key element that forms the trap for Chile Vieja Field is an erosional shale-filled channel that truncates and seals 4 productive reservoirs. Maximum dimensions of the channel over the study area are 14,000 ft (4242 m) across, and 400 ft (121 m) deep at the thalweg (Fig. 1). Within the study area the channel runs 3.6 mi (5.8 km) in length, but is seismically visible for another 2.6 mi (4.2 km) basinward. Volume of excavated material in the immediate vicinity of the field (Fig. 1—

Paige, R. E., 2016, Chile Vieja Field: 3D seismic data adds over 70 BCF of reserves by revealing that a 'bald' structural high is actually a small, shale-filled canyon: Gulf Coast Association of Geological Societies Transactions, v. 66, p. 431–450.

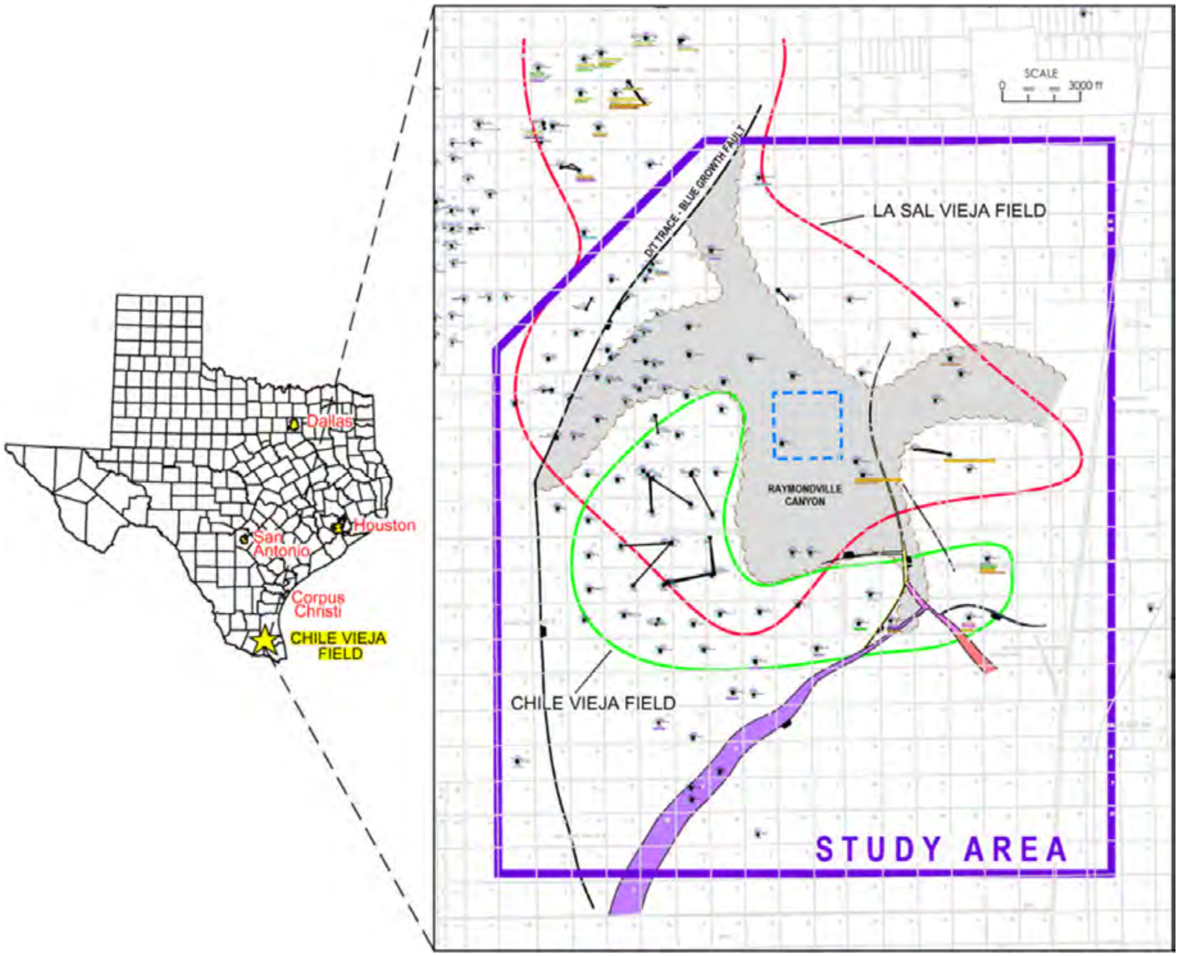

Figure 1. Chile Vieja Field study area. General position of shale-filled Raymondville Canyon shown in gray. Overlapping outline of Chile Vieja and La Sal Vieja fields is shown. See text for further description. Dashed blue box is a fixed surface reference area displayed on all maps.

the study area) is estimated at 0.3 mi^3 (1.6 km^3). Under the description provided by Coleman and Prior (1982), this would characterize it as a very large mud gully, or a small submarine canyon (Fig. 2A). A width-to-depth chart, compiled by M. Tomasso, incorporating a wide spectrum of submarine channels and canyons, classifies this feature as a small canyon (McDonnell et al., 2008; Fig. 2B). For reference in this paper the channel is named the Raymondville Canyon.

Structurally, Chile Vieja Field overlaps with the larger La Sal Vieja Field (Fig 1), which produces from upper Frio through expanded middle Frio reservoirs. For clarity in this study, Chile Vieja Field refers only to the 4 reservoirs trapped by truncation against the Raymondville Canyon. The field was established in 2006 with the drilling of the Suemaur Exploration and Production Ames #1 well, although in hindsight, the first well to complete within the Chile Vieja closure was drilled in 1965. This issue will be discussed in greater detail later in the paper. In point of fact, about one half the wells that make up Chile Vieja Field are officially filed as such with the Texas Railroad Commission (state oil and gas regulatory agency). The others are listed in La Sal Vieja (Dist. 4) Field.

Figure 3 is a representative composite type log that applies to both La Sal Vieja and Chile Vieja fields. Production in La Sal Vieja Field has been established over the entire displayed interval, including additional reservoirs above and below. The 4 reservoir sands that make up Chile Vieja Field are highlighted.

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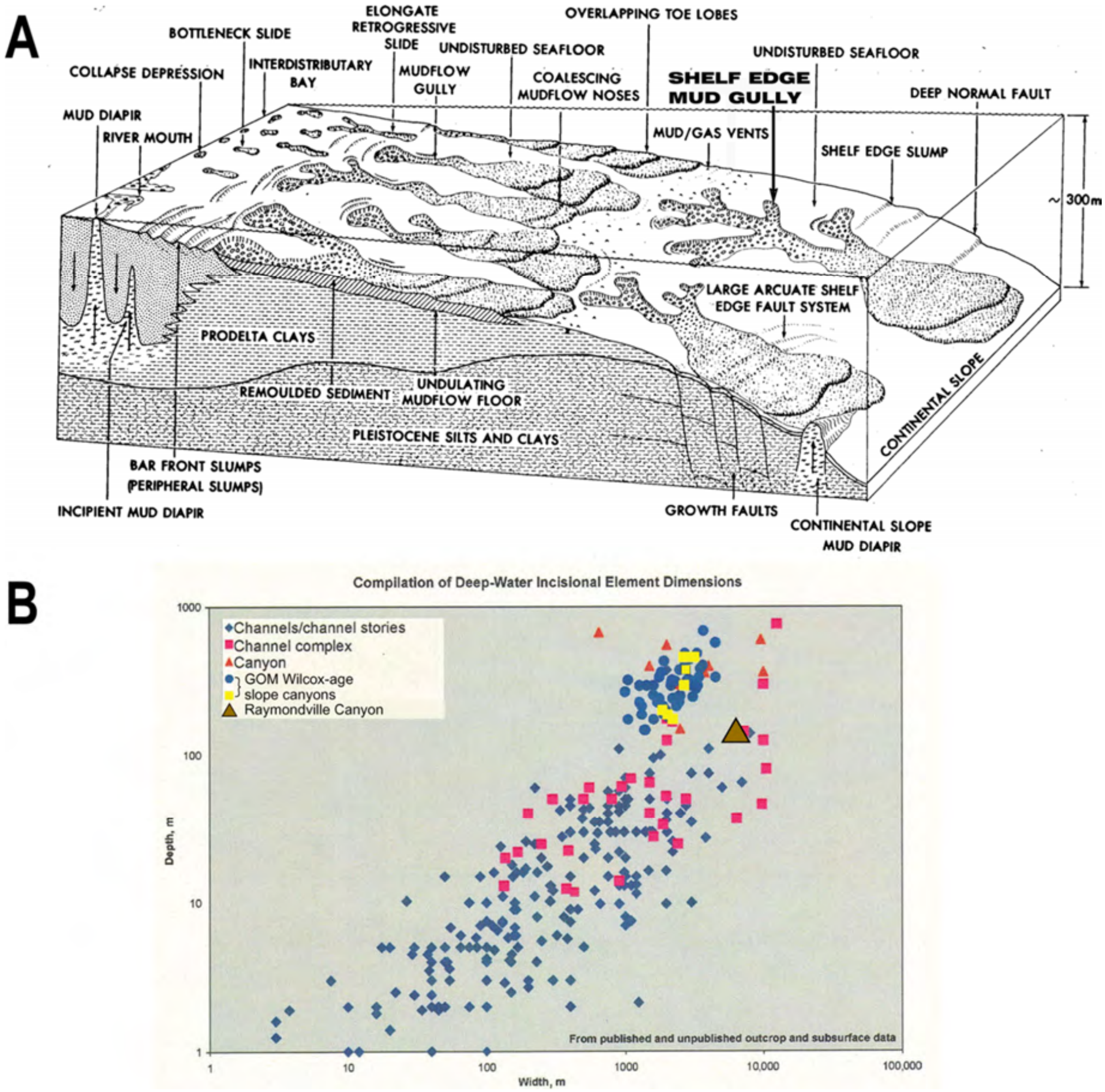

Figure 2. Shape and dimensions of the Chile Vieja erosional feature categorize it as either a large shelf edge mud gully or a submarine canyon. For this study the feature is defined as a submarine canyon. (A) Various shelf erosional features formed through mass-wasting processes (modified from Coleman and Prior, 1982). Note position and shape of the shelf-edge mud gully. (B) Plot of depth:width dimensions of a large variety of deepwater excavated elements. Plot includes both published and unpublished data (modified after McDonnell et al., 2008). Note plotted point of the Chili Vieja erosional feature (brown triangle) places it within canyon dimensions.

REGIONAL

Regionally Chile Vieja Field lies within a series of growth-fault controlled sedimentary packages that make up the larger La Sal Vieja Field. Figure 4 is a regional seismic dip line that crosses the combined fields. The general position of the two overlapping fields are shown (La Sal Vieja Field is projected, while the actual produc-

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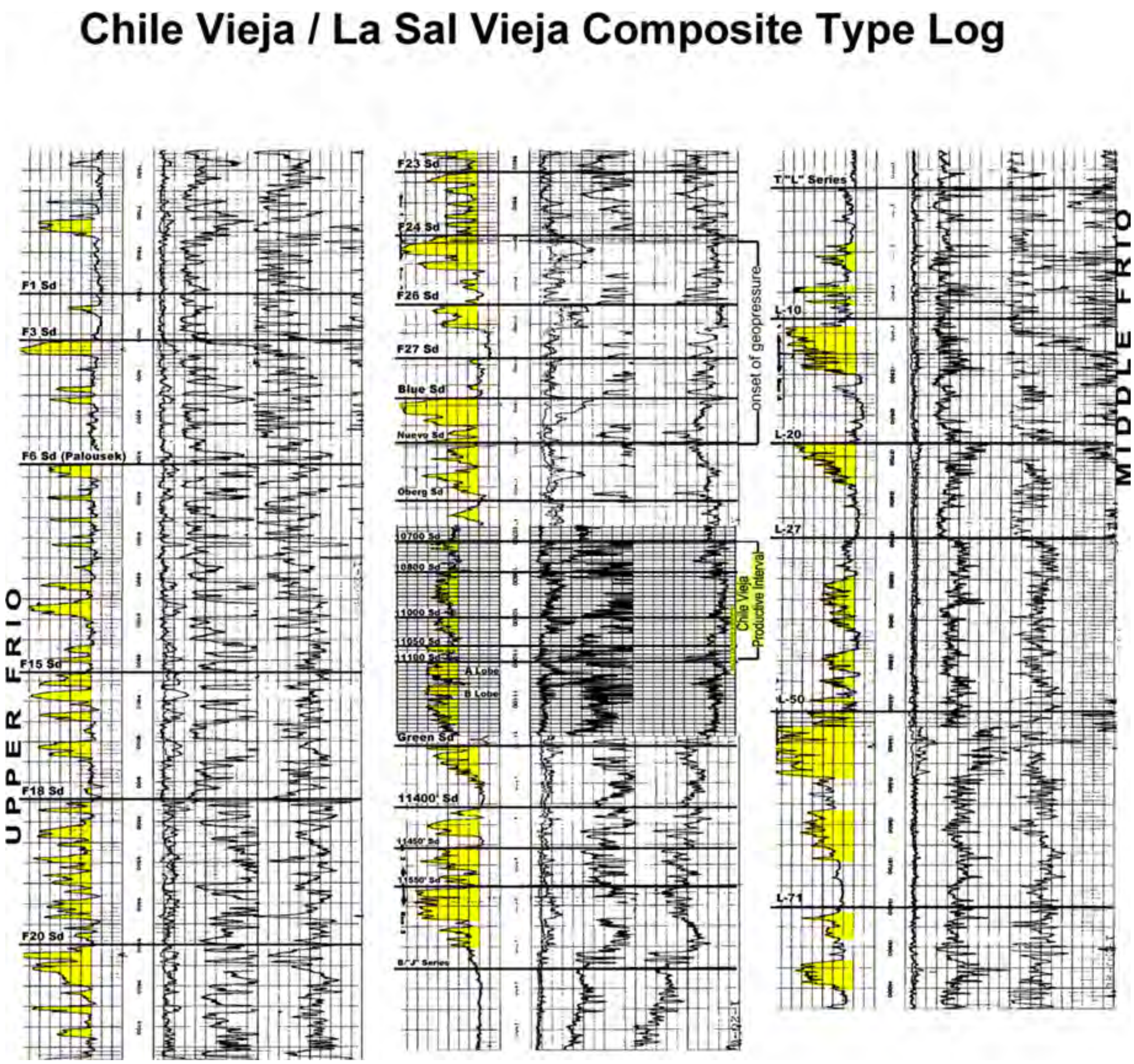

Figure 3. Composite type log for Chili Vieja and La Sal Vieja fields. Established production covers the entire display interval. Note the subset stratigraphic interval that makes up Chile Vieja Field, and its position just below the top of geopressure.

tive fault block for Chile Vieja Field is displayed). The multiple growth faults that make up La Sal Vieja Field display expansion throughout the entire Frio interval, exhibiting a classic detached growth fault assemblage trap style. Each major fault block displays productive rollover structures in the upper Frio stratigraphy (Figs. 5A and 5B). At progressively deeper map levels, the four-way rollover closures migrate basinward in sync with the lead fault. Much of La Sal Vieja's productive history (including Chile Vieja Field) has been the story of following these laterally migrating rollover anticlines.

By the expanded middle Frio, starting with the green sand and progressing into the L sand group and below, the section rotates into faulted 3–way high-side closures (Figs. 4 and 5C), some of which have also proven to be productive.

Chile Vieja Field is entirely confined within one fault block, trapped between the landward blue fault and the basinward combination purple/yellow fault (Figs. 4 and 5). The productive Chile Vieja reservoirs lie just above the green and 11,100 sands (Figs. 3 and 4). The Chile Vieja sands are the first (oldest) group to transition from

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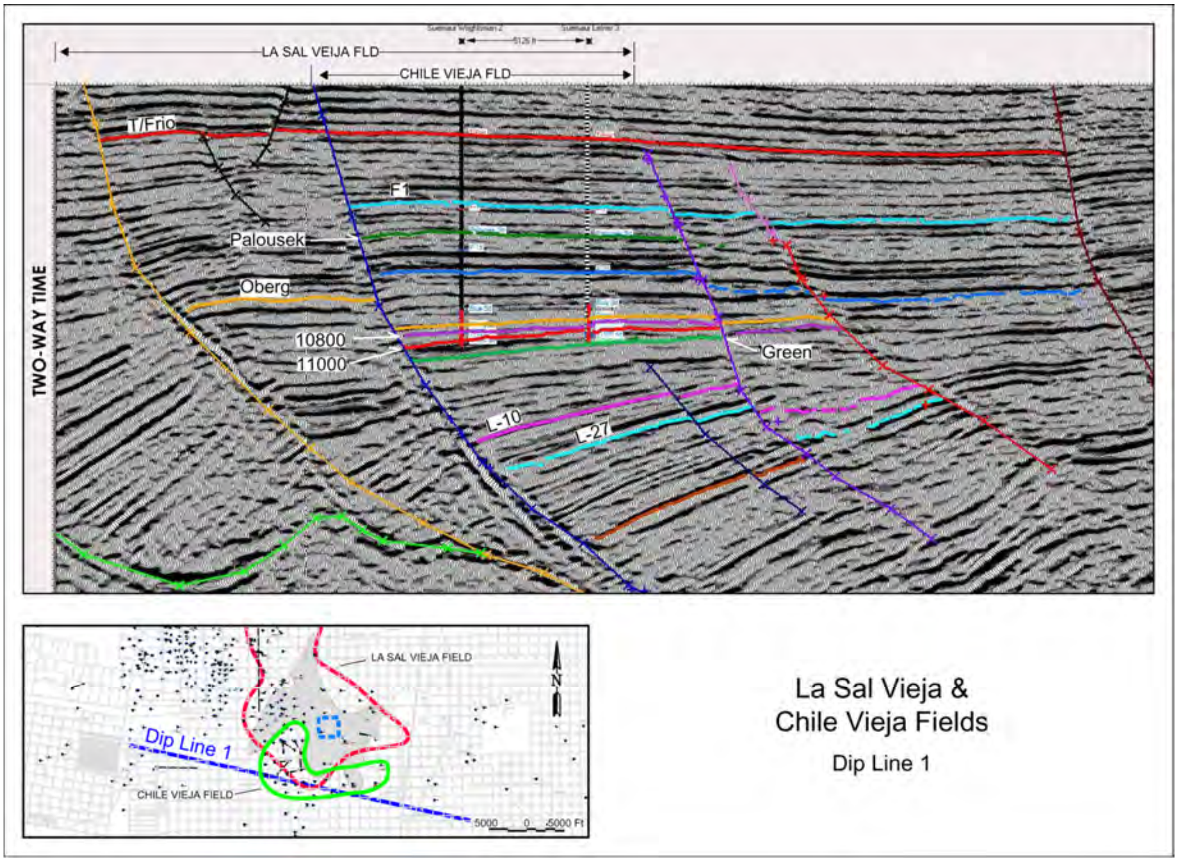

Figure 4. Regional seismic dip line, crosses Chile Vieja Field. Generalized position of La Sal Vieja Field (projected) and Chile Vieja Field (actual) are superimposed. Note that Chile Vieja Field is confined to one major fault block. Note progressively increasing throw across the growth faults, and, within the Chile Vieja fault block, the transition from rollover dip reversals (e.g., horizons F1 through 11000) to monoclinal dipping sedimentary wedges (L–10 and below). Seismic data owned or controlled by Seismic Exchange, Inc.; interpretation by author.

the wedge-shaped stratigraphic architecture of steeply dipping, 3–way, fault-bounded closures below, to 4–way anticlinal closures. It is within this time interval that the Raymondville Canyon downcut across anticlinal bathymetry, then later filled with fine-grained muddy sediments, establishing the key sealing element for the field.

CHILE VIEJA FIELD

The productive reservoirs that make up Chile Vieja Field are, in order from shallow to deep, the 10,700, 10,800, 11,000, and 11,050 sandstones (Fig. 6A). The dominant log shape displayed in the Chile Vieja sand group are laminated upward coarsening profiles. They are cyclic, stacking in a regular, repeating parasequence set, with good lateral continuity. A whole core taken in the 10,800 zone, displays horizontal to inclined bedsets, consisting of laminated, very fine sandstone, with abundant clay rip-up clasts. Microfossil and trace fossil analysis place the environment of deposition in a shallow, nearshore, lower to middle shoreface environment, deposited near wave base (Miller and Garrison, 2008). These data place the entire depositional episode in a prograding to aggrading, wave-dominated, shelf-margin deltaic complex. Seismic interpretation places the Chile Vieja depositional interval in a highstand prograding wedge, punctuated by short-lived transgressive episodes. It was during the transgression following deposition of the 10,700 delta that the Raymondville Canyon was cut and filled.

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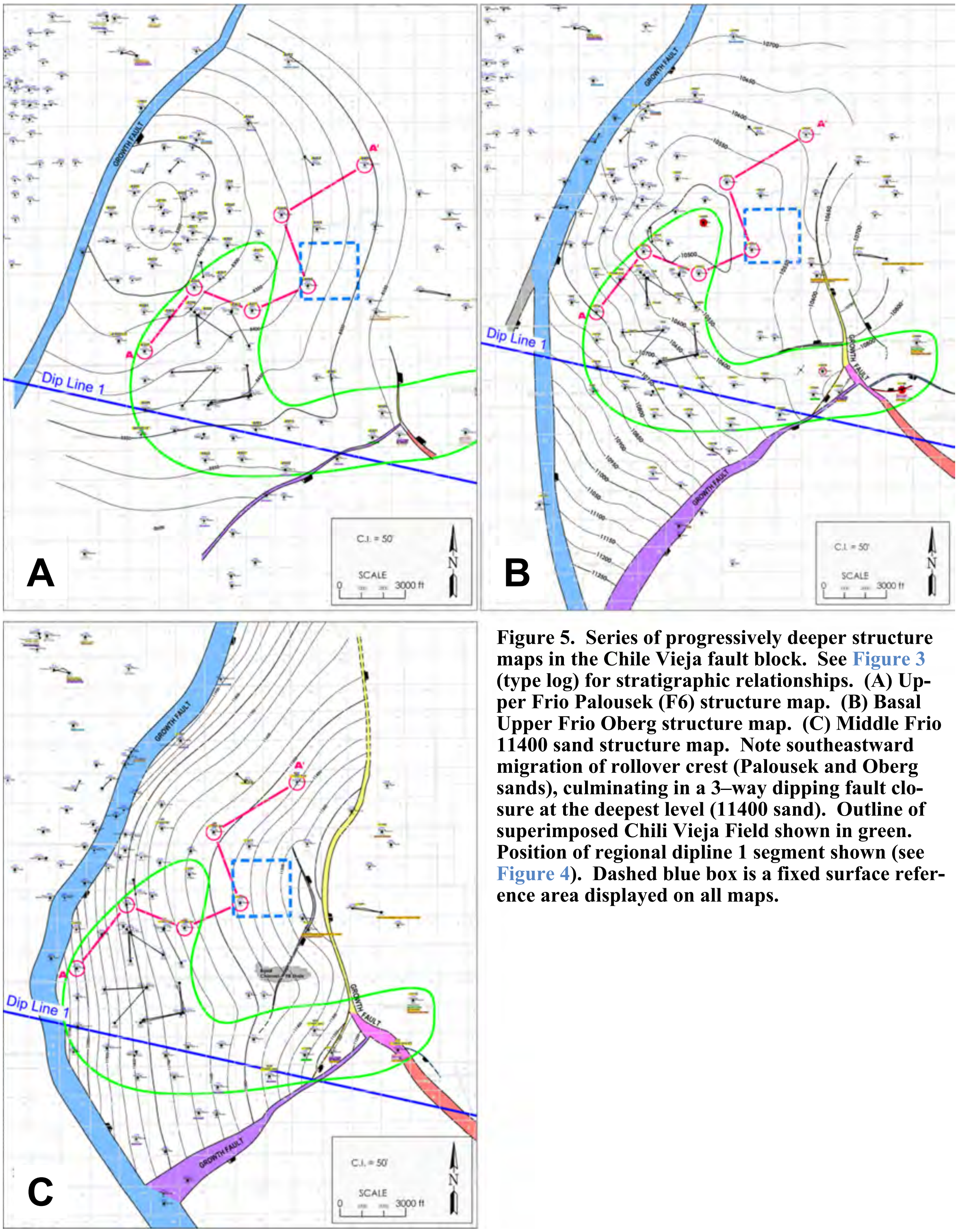

Figure 5. Series of progressively deeper structure maps in the Chile Vieja fault block. See Figure 3 (type log) for stratigraphic relationships. (A) Upper Frio Palousek (F6) structure map. (B) Basal Upper Frio Oberg structure map. (C) Middle Frio 11400 sand structure map. Note southeastward migration of rollover crest (Palousek and Oberg sands), culminating in a 3–way dipping fault closure at the deepest level (11400 sand). Outline of superimposed Chili Vieja Field shown in green. Position of regional dipline 1 segment shown (see Figure 4). Dashed blue box is a fixed surface reference area displayed on all maps.

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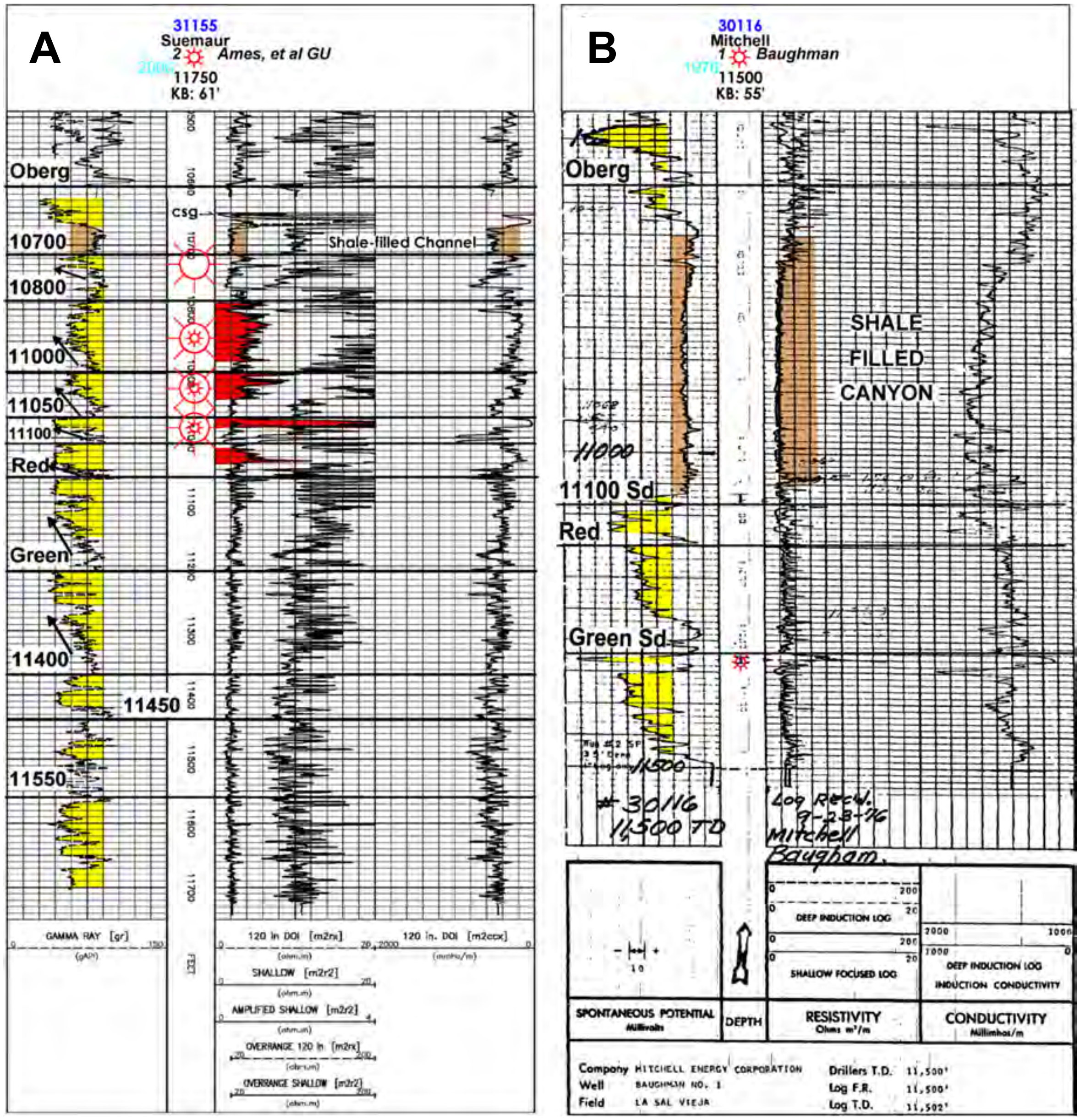

Figure 6. (A) Chile Vieja Field type log. The productive reservoirs trapped by the Raymondville Canyon are the 10,700, 10,800, 11,000, and 11,050 sands, and are identified with large gas symbols. Small gas symbols identify zones completed in this well. (B) Raymondville Canyon type log. Note "railroad track" log response in canyon-fill facies.

The overpressured Chile Vieja reservoir group lies near the top of geopressure (see Figure 3), with original formation pressures of 14.4 to 15.3 ppg equivalent mud weight. Typically a single string of intermediate protection casing is required in the vicinity of the Oberg sand. Commingled completions are common. The most typical completion involves 2 commingled zones, but 3 wells have commingled all 4 zones. Initial production rates vary, but typically are in the range of 3 million cubic ft of gas per day (MMCFG/D) and 120 barrels of condensate per day (BC/D). All modern completions hydraulically fracture stimulate the productive zones.

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Local structure over the productive interval is a simple 4–way rollover closure bisected by the Raymondville Canyon (Fig. 7). Curiously, the erosional canyon excavated a path over the crest of the structure. This will be discussed at length later in this paper.

A stratigraphic "jam" (i.e., no horizontal scale) cross-section (Fig. 8A) shows the relationship of the truncated reservoir sands to the shale-filled Raymondville Canyon. All 4 Chile Vieja Field reservoirs can be seen terminating against the canyon fill. Figure 8B is a seismic arbitrary line that parallels the well log cross-section. The steep walled, U-shaped canyon geometry is visible. South-southwestward dip extending away from the channel, coupled with the sealing capacity of the shale fill, are the primary elements forming the trap. The cut-and-fill phase of canyon formation ended with the deposition of the Oberg sand, the first prograding unit to cap the shale-filling phase of the canyon.

Oddly, despite a mirror structural closure, the opposing northeast flank beyond the canyon boundary does not produce from the same 4 Chile Vieja reservoirs (see right hand side of Figures 8Aa and 8B—Suemaur Prospect Co. #1). Based on limited well penetrations, the reservoirs on the northeast flank are thinner, and shalier, with generally noncommercial porosity and permeability. The 2 ft (0.6 m) of commercial porosity found in the 11,050 sand in the Suemaur Prospect Company #1 evaluates wet. The current best explanation for this is that hydrocarbon charge followed migration pathways along the fault system located to the southwest of the canyon, and was prevented from charging the opposite side by the impermeable canyon-fill itself.

The Raymondville Canyon is steep walled at its perimeter, with truncation angles ranging between 7 and 22 degrees (Fig. 9), while exhibiting a relatively flat bottom surface. It displays meander bends and channel branches within the study area. The shale fill is readily apparent on logs for its uniformity and lack of character. Gamma ray, spontaneous potential, and inductive resistivity logs are very consistent in their readings from top to bottom, portraying classic "railroad track" log displays (Fig. 6B). See also "shale-filled channel" wells (Fig. 8A). Sand fill within the canyon is extremely rare. Of the 17 wells that have intersected the canyon, only 2 have ever logged any sand within the fill section, and none has ever been found at the base of the canyon. Sand volume in the two wells represent 15% and 5%, respectively, of the total canyon-fill facies in each wellbore, and are interpreted as remnant sidewall slump bodies. Based on all the Raymondville Canyon penetrations, the percentage of shale making up the fill is estimated to be over 90%.

Seismic expression of the canyon is dominantly of a trough, onlap-fill style. Parallel to sub-parallel internal bedding is common, although reflectivity is typically subdued compared to the older, in-situ stratigraphy outside the canyon boundary (Fig. 8B). Reflection terminations are the clearest indication of the canyon boundary, although that characteristic image can be inconsistent, probably associated with the orientation of the acquisition grid relative to the orientation of the canyon edge.

TIMING OF RAYMONDVILLE CANYON CUT

The mechanisms responsible for cutting and filling submarine valleys in active depositional systems have a long history of debate (Posamentier, 1988; Farre et al., 1983; Galloway et al., 1991; Coleman et al., 1983; Pratson and Coakley, 1996). Over the decades wildly divergent hypotheses explaining the excavation and filling of submarine valleys have been advanced, including rip currents (Davis, 1934), artesian springs (Johnson, 1939), and turbidity currents (Daly, 1936). An interesting recent proposal was offered by Garrison et al. (2010), invoking catastrophic tsunami origins, an idea first suggested by Butcher (1940). As data quantity and quality has increased, several authors acknowledge that excavated and filled submarine incisions occur in a variety of sea level and tectonic settings, involving a variety of processes (Shepard, 1987; May et al., 1983; Morton, 1993; Ricketts et al., 1999, provides a good literature summary).

With specific regard to shale-filled submarine incisions on prograded passive continental margins, most modern endpoint views generally involve either (1) lowstand (or forced regression) downcutting of incised river valleys due to a drop in depositional base level, followed by transgessional filling (Posamentier, 1988, 1992; Zaitlin, 1994), or (2) transgressive or highstand mass wasting and gravity transport downslope of a drowned, over-steepened depocenter, followed subsequently by hemipelagic suspension-load and prograded, fine-grained, distal bed-load fill (Coleman et al., 1983; Berg, 1981; Galloway et al., 1991; Morton, 1993; Farre, 1983).

The hypothesis advanced here follows option 2, that is, the Raymondville submarine canyon was cut during a relative sea level rise, perhaps due to a major river avulsion landward of the deltaic depocenter. As a result, sediment starvation, subsidence, and differential compaction in the study area left oversteepened paralic sand bodies, made up of unconsolidated, undercompacted, rapidly deposited deltaic sediments, subject to slope instability (Bouma et al., 1991). This set the stage for slumping and gravity transport downslope. A likely vulnerable location for mass wasting would be the paleo-bathymetric high, because this would be the site of steepest clinoform dips and greatest delta margin slope instability (Coleman and Prior, 1983; Galloway and Hobday, 1983). This could start by a process of peripheral slumping (Coleman and Prior, 1983). Once a nick point forms from

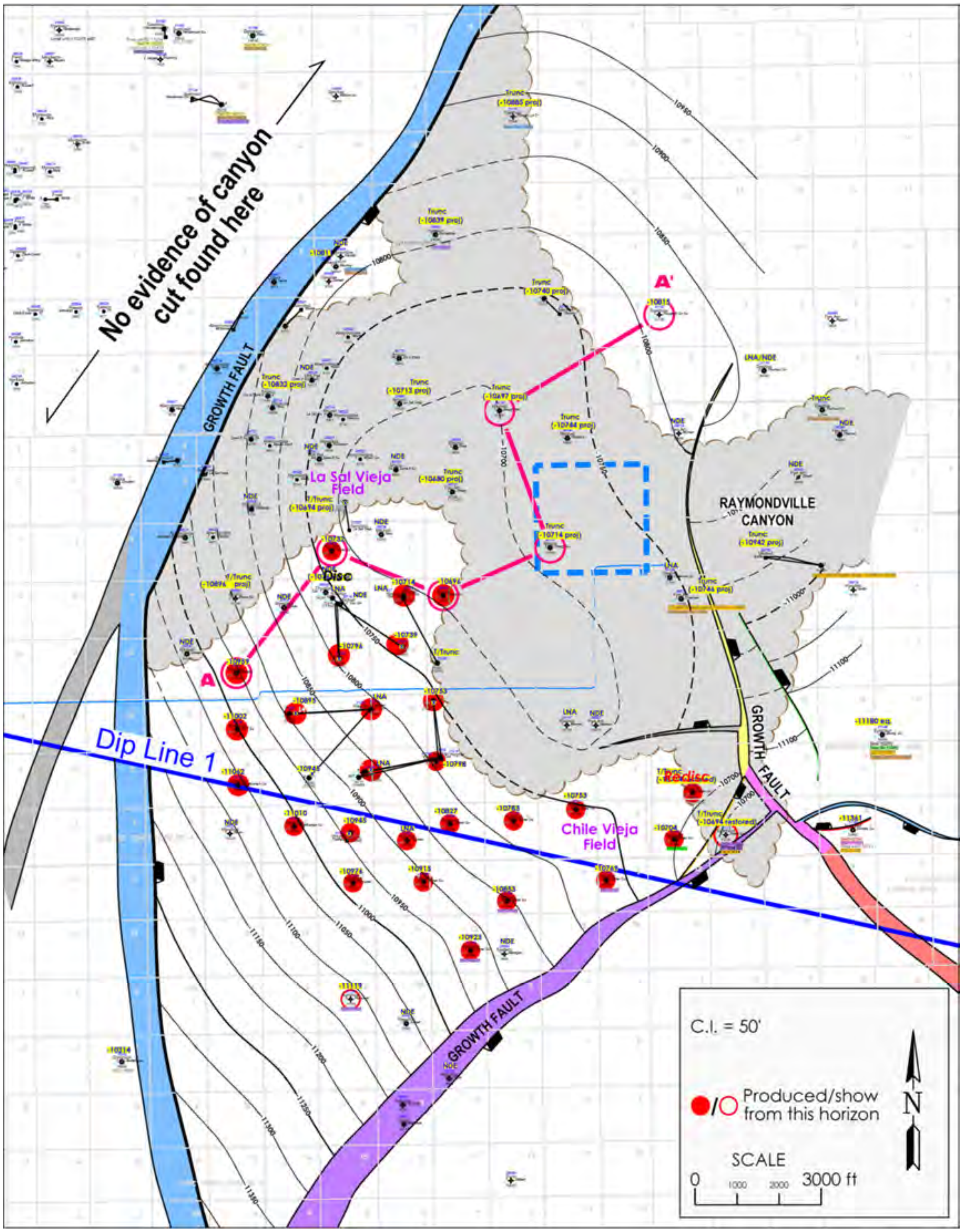

Figure 7. Structure map of the 10,800 sand. This productive member of Chili Vieja Field is trapped by a combination of the updip, shale-filled canyon (shown in gray), and the blue and purple growth faults. Note the axial position of the canyon crosses the structural high point. Tops posted within the canyon boundary are projected by log correlation. Solid red dots indicate wells productive from this zone. Open red circles indicate wells with shows in this zone. Position of regional dip line 1 segment shown (see Figure 4).


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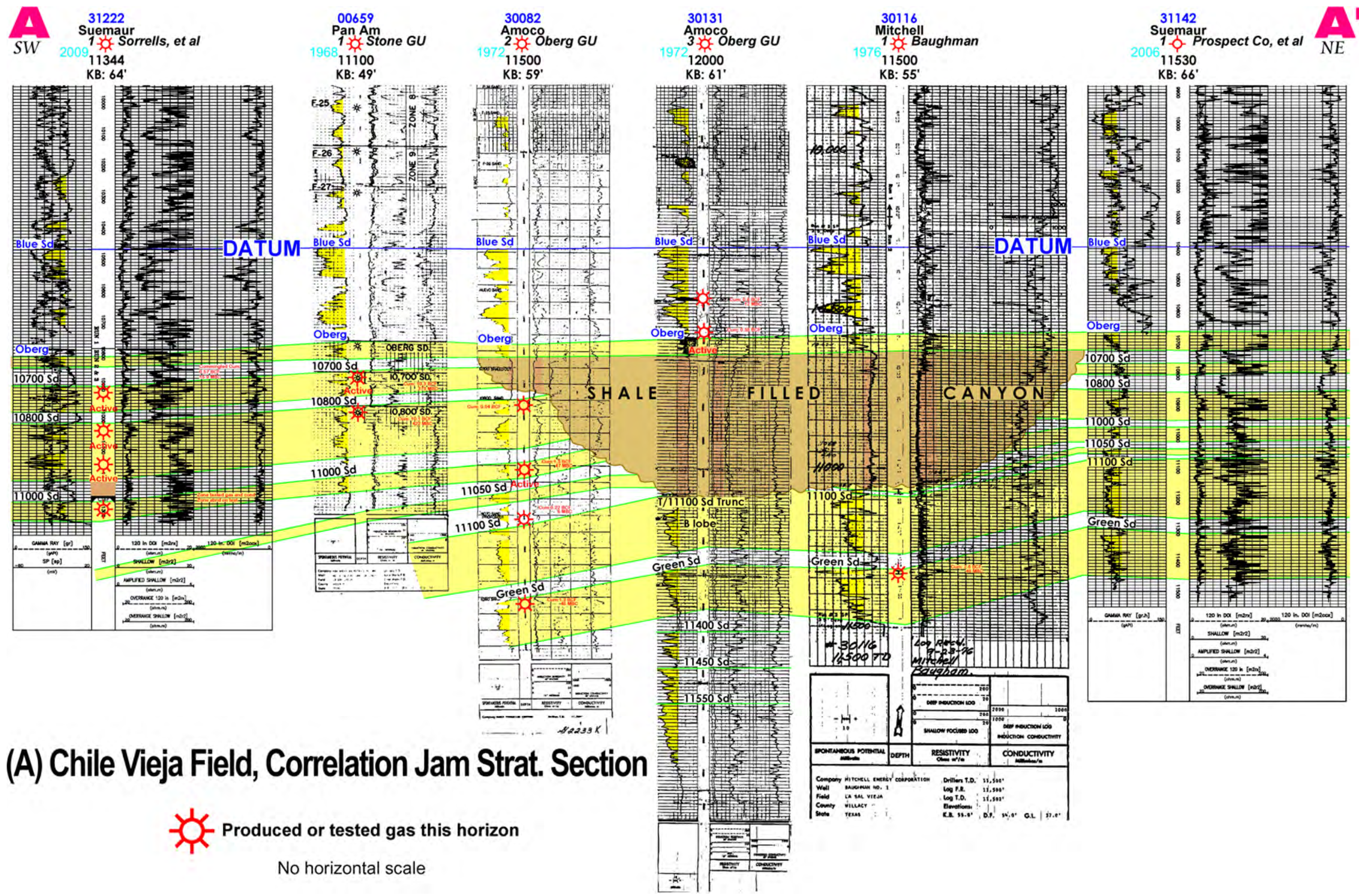
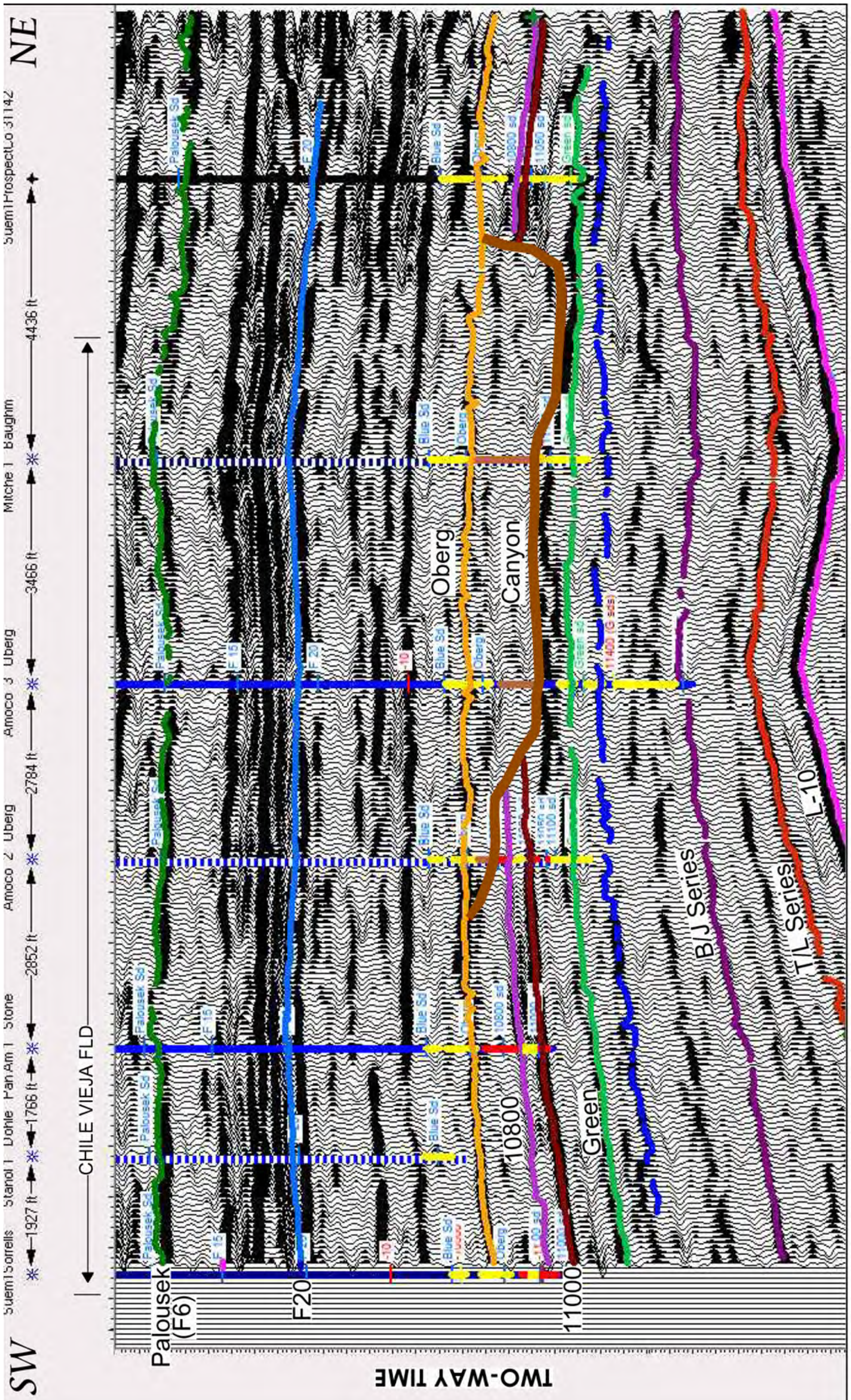


Figure 8. (A) Stratigraphic "jam" (no horizontal scale) cross-section A–A' across Chile Vieja Field. See Figure 7 for location. 3 of the 4 productive reservoirs in Chile Vieja Field show representative completions in this cross-section, trapped on the southwest (left) side of the Raymondville Canyon. Curiously, the northeast (right side of section) is unproductive from the same reservoir group, despite a mirror combination structural/stratigraphic closure. (B, FACING PAGE) Seismic arbitrary line that parallels the stratigraphic section (A–A'). Note "U" shape of Raymondville Canyon consisting of steep walls and relatively flat bottom. Yellow wellbore color represents sand, red represents gas productive sand, and brown represents shale. Seismic data owned or controlled by Seismic Exchange, Inc.; interpretation by author.



(B) La Sal Vieja & Chile Vieja Fields, Arbitrary Line A–A'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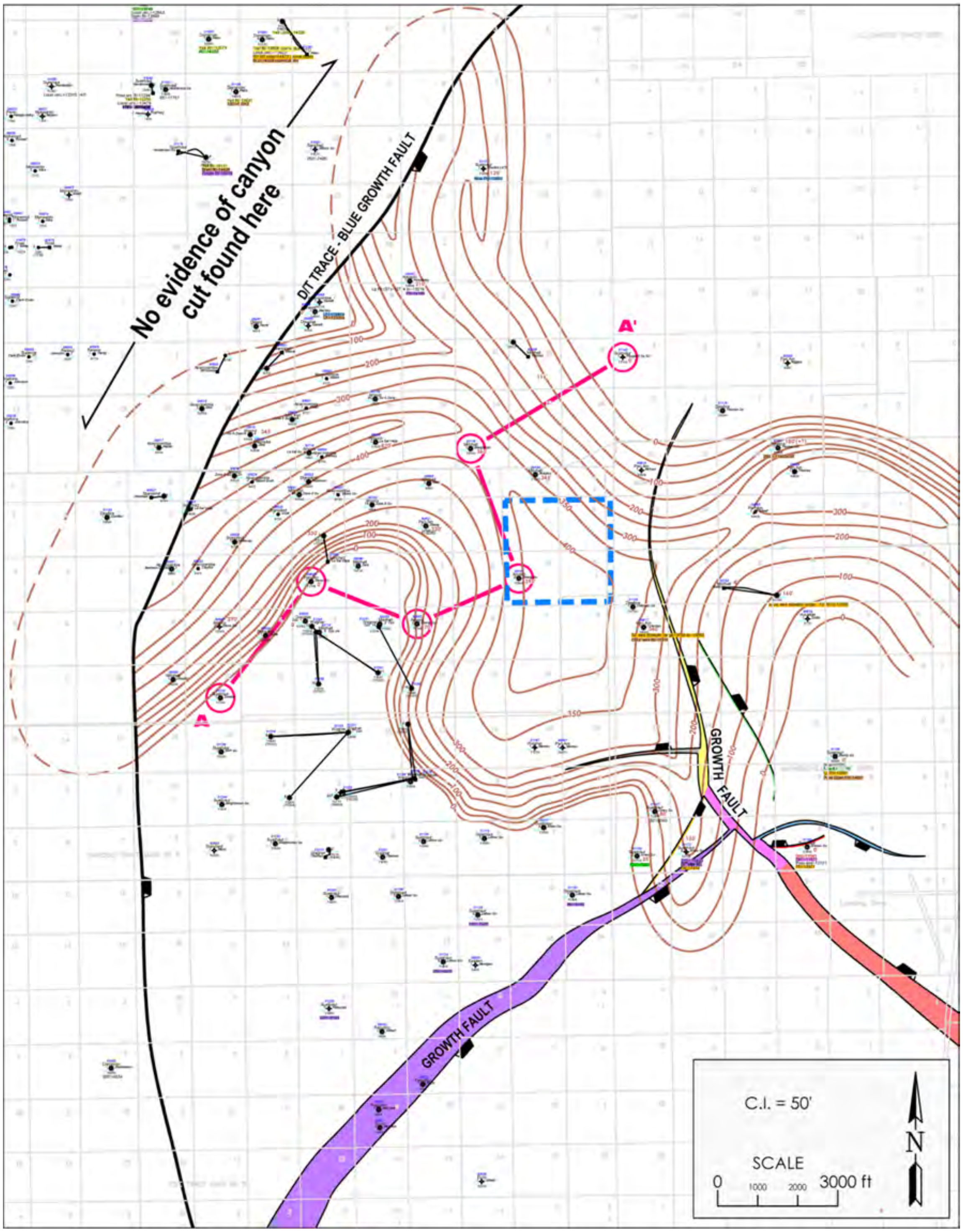

Figure 9. Raymondville Canyon isopach fill (statistically equivalent to isochore values due to low structural dip). Note steep sidewalls and relatively flat bottom. Also, note termination of the canyon landward of the blue growth fault. No evidence of landward extension of the canyon beyond the blue fault has been found. See text for discussion.

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slump activity along the delta margin, headward erosion involving retrogressive slides (Prior and Coleman, 1978; Bouma, 1991) along steep channel walls extend the erosional scarp into the main delta body. Hyperpyncnal bottom currents then become focused in the expanding erosional cuts, assisting in sweeping out slumped sediments (Shepard, 1979; Bouma, 1991). The excavated slump debris, initially mobilized by mass wasting processes into fluidized density flows, would eventually organize into turbidity currents, running out onto the continental slope to be deposited as submarine fans (Shepard, 1981; Berg, 1981).

Now the evidence to support this hypothesis: first, the nature of the canyon fill itself is consistent with such a transgressive event. As previously noted, the canyon is over 90% filled with homogenous shale, whose seismic expression is dominantly parallel to subparallel-bedded onlap fill. This fits a transgressive model for a shelf edge excavation, once stabilized and far removed from coarser continental sedimentation, to aggrade primarily with hemipelagic suspension load and distal pro-delta, fine-grained, prograded sediment (Jobe, 2011). Furthermore, neither sand deposits, nor any coarse lag material, have been found at the base of the canyon, either by well penetration, or by seismic facies analysis, which, by contrast, would be expected if originated as an entrenched river valley (Zaitlin, 1994; May et al., 1983; Davis, 1983; Dalrymple, 2006).

Analysis of the Raymondville canyon-fill material have been, to date, quite limited, because samples of the canyon-fill facies have been located from only one well. Preliminary elemental carbon/nitrogen ratio analysis suggests a continental source for the clay (Garrison et al., 2010). More work is needed, however, including micro fauna and flora analysis, and kerogen typing, to definitively determine the provenance of the canyon shale-fill facies.

Second, the Raymondville Canyon cuts across the top of the present-day structural high. Even more significantly, the location of the canyon happens to cut across the paleo-bathymetric high. Three gross interval isopach maps (Fig. 10), covering most of the Chile Vieja reservoir interval, reveal that the canyon crosses over the collective depositional thins, which, in gravity-transport systems, generally represent contemporaneous bathymetric highs (note: within the study area, isopach values are statistically equivalent to isochore values due to low structural dip). Admittedly, the presence of an active growth fault strongly influences depositional fill patterns, particularly in the region immediately downthrown to the lead fault. However, the shifting position and outline of the paleo-thin seen at each mapped isopachous interval (orange highlighted areas in Figure 10) suggests that there is an identifiable, shifting paleo-bathymetric high related to delta outbuilding. The outline of the Raymondville Canyon superimposed onto each isopach map demonstrates that the canyon cuts across a preexisting paleo high. An unconfined, gravity-driven drainage system on the shelf/slope margin, would be expected to flow around, and not across, paleo-bathymetric highs (Galloway and Hobday, 1983; Dalrymple, 2006).

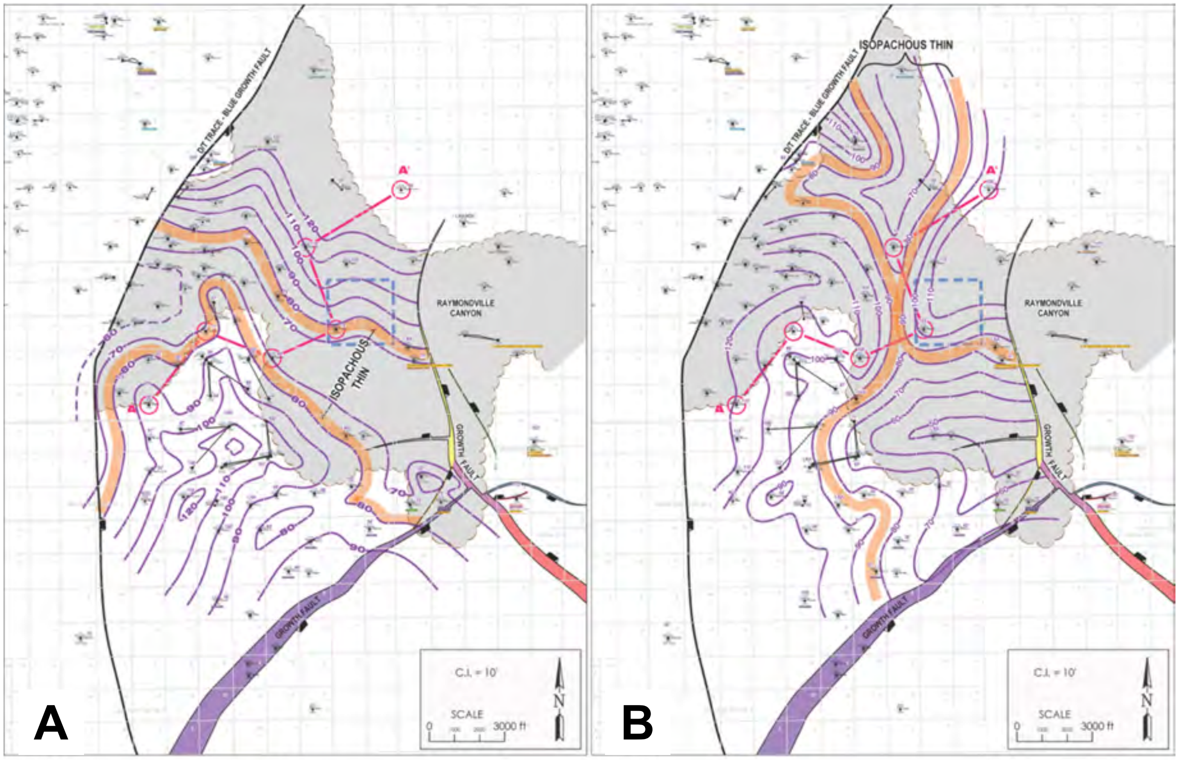
However, a counter to the above argument could involve a sudden base level drop (lowstand or forced regression) that happens to occur when a delta-front distributary channel is fortuitously positioned near its topographic high. A major distributary channel located on the topographic high of an advancing delta lobe is not as improbable as it might at first seem. Rapid delta lobe construction, and abandonment, coupled with swift subsidence, can lead to transient channel shifts over what eventually becomes the local topographic (or bathymetric) high (Galloway and Hobday, 1983). With a rapid and sustained fall in relative sea level, a distributary channel can become entrenched, ultimately transforming into an incised river valley.

To study this possibility, net sand isolith maps were generated of the last two prograding episodes prior to the excavation of the Raymondville Canyon (Fig. 11). The older 10,800 sand depositional event and the younger 10,700 event both reveal interdistributary delta lobe development, typical of a constructive delta phase in the submerged lower delta plain to upper delta front environment. Note the position of the distributary lobes well to the south of the Raymondville Canyon feature. If the Raymondville Canyon were to form by entrenchment of the preexisting delta channel, it should be located at the site of the last delta lobe position. This, however, is not the case. The canyon did not form at the site of either the last two distributary channel positions, and so the Raymondville Canyon did not likely form by entrenchment of an existing deltaic distributary channel.

Third, the U shaped profile of the canyon excavation is reminiscent of many modern day shelf edge mud gullies, and also the Mississippi Canyon, which formed by mass wasting processes and are found in a variety of perimeter delta positions (Coleman and Prior, 1983).

Finally, the landward extent of the Raymondville Canyon is limited to the study area fault block. Continuous areal 3D seismic coverage of the adjacent, upthrown (landward) fault block reveal no evidence of any continuation of the erosional channel cutting across the medial delta plain, as would be expected from an entrenched, incised river valley system (Posamentier, 2001). No well log evidence of a time-stratigraphic equivalent channel landward of the blue fault has been found either.

The conclusion drawn here is that a 400 ft (120 m) deep, 14,000 ft (4300 m) wide, U-shaped submarine canyon that is restricted to the submerged delta margin environments, which crosses a paleo-bathymetric high, is 90% filled with shale, and has no evidence of coarser sediment lag at its base, best fits a transgressive sequence model of origin.



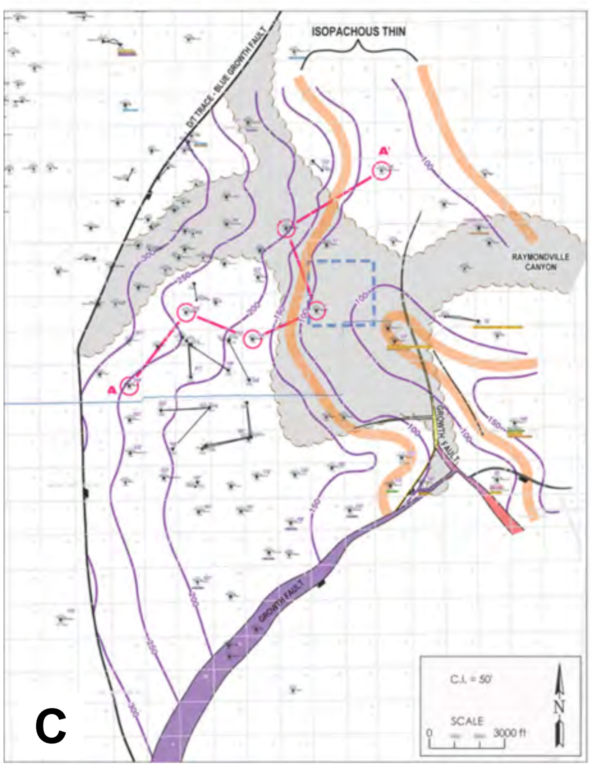


Figure 10. Series of Chile Vieja reservoir interval isopach maps (statistically equivalent to isochore values due to low structural dip). (A) Top Oberg to top 10700 sand, (B) top 10,700 to top 10,800 sand, and (C) top 10,800 to top 11,000 sand. Isopachous thin regions, reflecting paleo-bathymetric highs, are highlighted in orange. Note the superimposed canyon outline crosses the shifting paleo-bathymetric high areas. See text for discussion. Isopach values of truncated zones within the canyon boundary are determined from projected log tops.

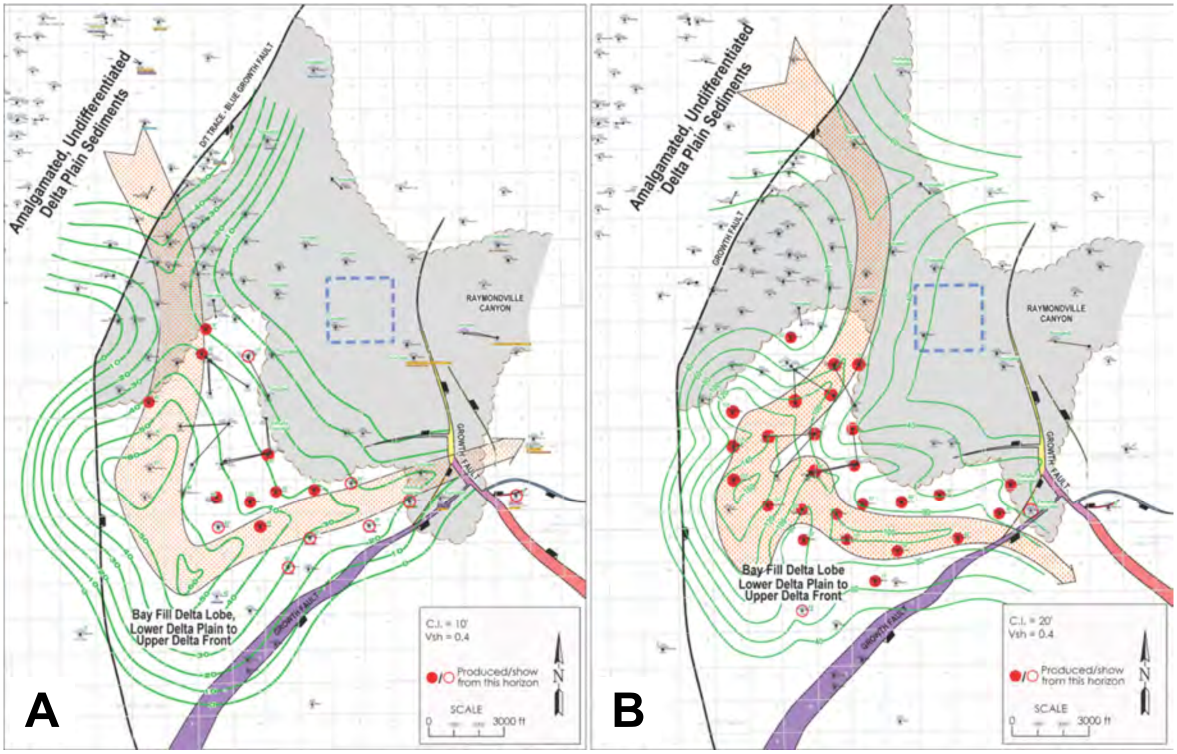


Figure 11. Series of net sand isolith maps. (A) 10,700 sand and (B) 10,800 sand. Vshale = 0.4. Note development of both distributary lobes south of the eventual canyon position. Arrows indicate axial position and flow direction of distributary channels. See text for discussion. Solid red dots indicate wells producing from this zone. Open red circles indicate wells with shows in this zone.

HISTORY OF FIELD DISCOVERY AND DEVELOPMENT, AND ITS RELATIONSHIP TO THE INTERPRETATION OF A "BALD" DEPOSITIONAL HIGH

One of the interesting aspects of studying and working this field has been to speculate on the early interpretations and how they influenced development, compared to recent activity following the acquisition of 3D seismic data. But first, a disclaimer: I have no knowledge of the early interpretations of what has now become Chile Vieja Field. The descriptions that follow regarding pre–3D seismic interpretations are purely my own deductions based on the known well information and public filings from that time.

Phase 1—Field Discovery and Early Development

La Sal Vieja Field, discovered in 1945, had been successfully producing upper Frio gas and condensate for 20 yr before discovery of geopressured middle Frio pay in 1965. From 1945 through 1965, 30 well completions produced a cumulative 60 billion cubic ft of gas (BCFG) and 2 million barrels of condensate (MMBC) from a multitude of normally pressured, proximal to medial delta plain sands (includes F1–F27 as seen in Figure 3).

In May 1965, George Mitchell & Assoc. reentered and deepened the Douglas Cox #1, originally spud in 1950, which had produced 2.8 BCFG from the F–3 sand in the normally pressured Frio. The reentry procedure deepened the well from 8770 ft (2700 m) (normally pressured) to 10750 ft (3300 m) (geopressured). It drilled to, and completed in, the 10700 sand, ultimately producing 4.4 BCFG and 124 thousand barrels of condensate (MBC). Initial gas rate was 3.6 MMCFG/D, with a surface shut-in-tubing-pressure (SITP) of 6375 psi. That well is now recognized as the discovery well for Chile Vieja Field, and it kicked off phase 1 of field development (officially all completions from phase 1 were filed in La Sal Vieja Field). Phase 1 wells are labeled chronologically in black text in Figure 12, starting with the Mitchell Cox discovery well at number 1.

The Cox well was drilled 3 yr later and was offset 1000 ft (300 m) to the north by the Pan Am Stone #1 well (Fig. 12, number 3), gaining 41 ft (12.5 m) of structure. The well drilled to 11,100 ft (3400 m) and made a dual completion in the 10700 and 10800 sands, without fracture stimulation. Initial production rate from the 10700 sand was 4.4 MMCFG/D and an estimated 286 BC/D, with an initial shut-in pressure of 6305 psi. The 10800 sand flowed at 2.3 MMCFG/D, and an estimated 101 BC/D, shutting in at 6957 psi. The well was long lived, with the 10800 producing a cumulative 10.1 BCFG and 422 MBC in 27 yr, while the 10700 remains active to this day, having produced a cumulative 10.8 BCFG and 382 MBC in 47 yr.

Following the major success of the Stone #1 in 1968, company geologists no doubt knew the predominant structure, established from decades of mapping shallower horizons, was a basinward-migrating, 4–way structural closure. Most probably subscribed to a nearshore marine, possibly deltaic, environment. There is no record of a dipmeter taken in any of the initial deep wells, but the gain in structure from the Cox to the Stone well, coupled with the mapped northerly position of the crestal apex at shallower map levels, would likely have indicated that structural gains could be had by drilling in a north to northeasterly quarter. For the next 15 yr, 10 wells were drilled attempting to offset the Stone, and it is obvious that most operators chose to drill positions in a northerly direction (updip) to the established Stone well (Fig. 12). This is textbook development strategy for laterally continuous reservoirs in hydrostatic regimes (England et al., 1991).

Most phase 1 wells encountered the Raymondville Canyon, finding all, or most, of the Chile Vieja sands shaled out. Some were able to find deeper pay than the Chile Vieja sands, below the effective trap base of the canyon-fill facies. Others were able to make completions in one of the normally pressured upper Frio sands. Several resulted in dry holes. Altogether, only 2 more wells, were able to find and complete in Chile Vieja Field reservoirs.

After the drilling of well #13 in 1983 (Fig. 12), new, deep, geopressured drilling in the field ended. Except for one deepened well reentry in 1995, phase 1e of field development was over 21 yr following well #13 (through 2006), all Chile Vieja production came from a total of 4 wells, producing an approximate cumulative of 27 BCFG and 1.02 MMBC, spanning 41 yr since discovery.

I believe the consensus conclusion drawn by phase 1 operators was of a "bald" high. That is, a paleobathymetric high that directed major depositional pathways around the flanks, resulting in sand pinch-outs over the crest. This, in my opinion, was a logical conclusion given the lack of seismic data available at that time.

Phase 2—3D Seismic Reveals a Different Picture

In 2006, Suemaur E&P, having licensed and interpreted a 3D seismic survey over the field, drilled the next well in what is now Chile Vieja Field, the Ames #1 (well #18, in red, Fig. 12). Recognizing the existence of the Raymondville Canyon and its role in the trap was the key element to realizing that there was strong potential for more reserves in place. The Ames #1 is a 2 stage fracture-stimulated, commingled completion in the 11050, 11000, and 10800 sands. It came on initially at 5.7MMCFG/D and 178 BC/D, with a virgin shut-in pressure of 7000 psi. Given its distance of 1.4 mi (2.25 km) to the nearest phase 1 completion, and finding virgin pressure, it was filed as the Chile Vieja new-field discovery. The well has cumulatively produced to date 5.7 BCFG and 100 MBC.

With this completion, Suemaur E&P kicked off phase 2 of the development at Chile Vieja Field. All phase-2 wells drilled in Chile Vieja Field are labeled sequentially in red in Figure 12. To date a total of 33 wells on the Chile Vieja structure have followed the Ames #1, 26 of them producing from the Chile Vieja stratigraphic group. It is noteworthy that most phase 2 development wells are positioned down structural dip from the original Cox #1 discovery well.

Current Chile Vieja Field phase 2 cumulative production is 71 BCFG and 1.28 MMBC, while phase 1 wells have cumulatively produced 29 BCFG and 1.07 MMBC to date. Phase 2 development has led to a 245% increase in field gas reserves, and 120% increase for condensate in the field. Altogether, from its 1965 discovery, the field has produced a total of 100 BCFG and 2.35 MMBC from 30 wells.

The stratigraphic canyon-fill element of the trap is key to explaining why so many additional reserves lay hidden in a producing field for so long. Rather than steadily updip-thinning reservoirs, which may, or may not, ultimately pinch-out over the structural crest in the "bald high" interpretation, the steep-walled, shale-filled canyon interpretation means significantly more net reservoir is preserved within the closure area. Thus, being able to accurately map the canyon boundary, and knowing that it extended beyond the structural crest, significantly enlarged the field, and subsequently added 78 BCFE (BCF energy equivalent) of reserves to date.

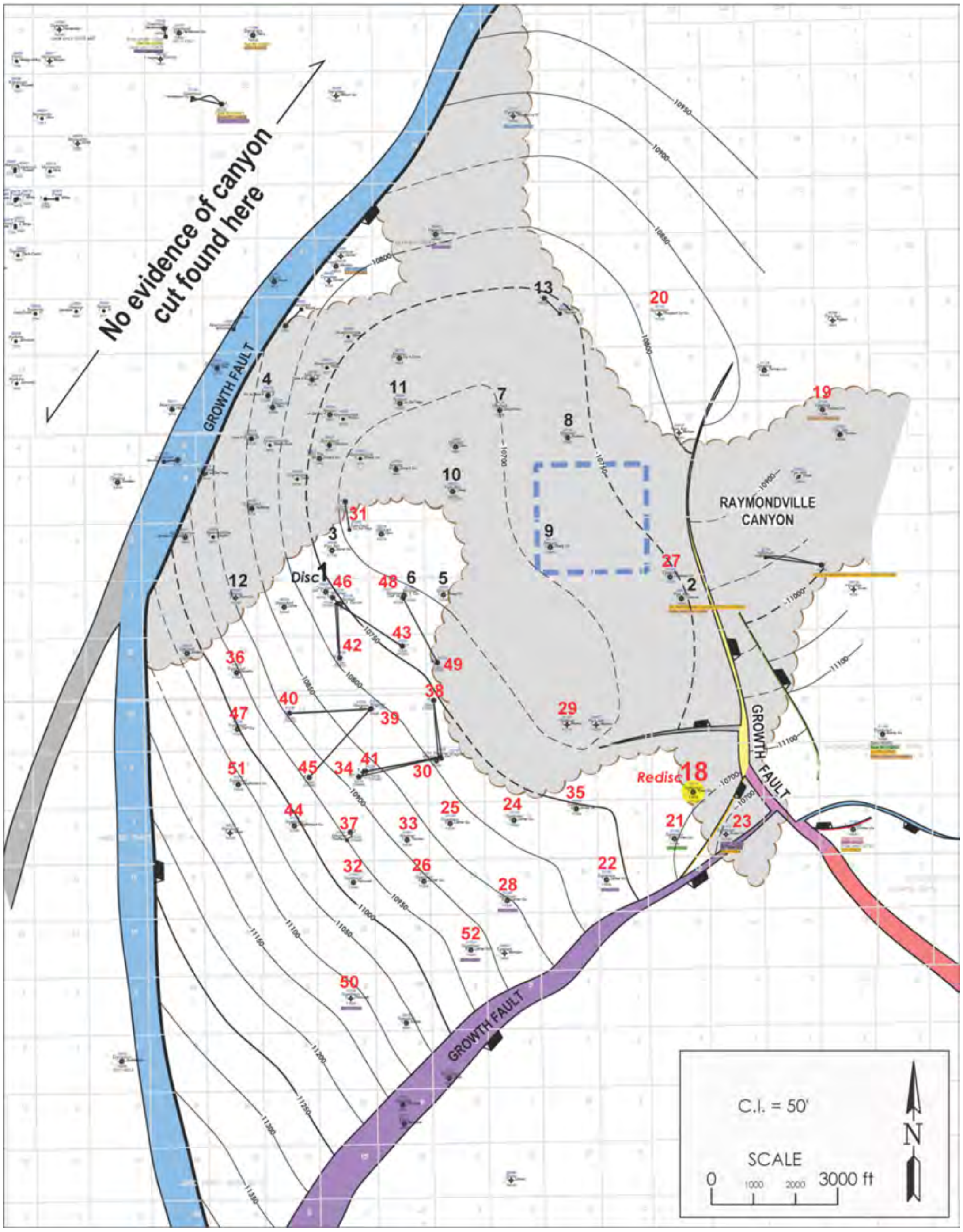


Figure 12. Drilling sequence of Chile Vieja Field posted on 10800 structure map. Phase 1 field discovery and development wells (1965–1984) shown in black. Phase 2 discovery and development wells (2005–2013) shown in red. Note preponderance of phase 1 wells to the northeasterly sector, up structural dip, of the discovery well, the Mitchell Cox #1 (labeled #1, "Disc" on map). Note the position of the phase 2 "rediscovery" well, the Suemaur Ames #1 (labeled #18, "redisc" on map), over 1.4 mi (2.25 km) from the nearest Chile Vieja phase 1 completion. Note also the majority of phase 2 development wells are structurally low to the original field discovery well. See text for discussion.

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CONCLUSION

Significant unique reserves were "rediscovered" at Chile Vieja due to a major interpretative change regarding one element of the trap—the realization of the canyon's presence. Realistically, this was only possible with the acquisition of a 3D seismic survey, or at the very least, a very dense network of 2D seismic data. It was highly unlikely, given the proximal to medial deltaic environments that characterized the first 20 yr of La Sal Vieja Field development, that the 10 Chile Vieja phase 1 wells located within the canyon-fill facies provided enough evidence to suspect the canyon's presence. A "bald" high was a reasonable interpretation. Even if someone from the phase 1 era had been inspired to consider a shale-filled submarine canyon interpretation, without the image density of seismic data, it would have been sheer guesswork to predict the canyon's boundaries. To prove the idea by drilling would truly have resembled the game of "Battleship."

Today, with the widespread commercial availability of 3D seismic in the major prograding system tracts of the Gulf Coast, other small to medium sized shale-filled troughs like the Raymondville Canyon are becoming exposed (Cornish, 2011; McDonnell et al., 2008). Some of those will no doubt have formed under the same transgressive, sediment-starved conditions as the Raymondville Canyon. Armed with a depositional model that predicts a high likelihood of hydrocarbon-sealing, hemipelagic-fill for those type canyons, opportunities involving other misinterpreted "bald" highs, or untested gully/canyon-related prospects will emerge. It behooves all Gulf Coast explorationists to look, and relook, at our datasets with an eye for shale-filled canyons.

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REFERENCES CITED

Armentrout, J. M, 1999, Sedimentary basin analysis, *in* E. A. Beaumont and N. H. Foster eds., Exploring for oil and gas traps: American Association of Petroleum Geologists Treatise of Petroleum Geology/Handbook of Petroleum Geology, Tulsa, Oklahoma, 123 p.

Berg, R. B., 1981, Deep-water reservoir sandstones of the Texas Gulf Coast: Gulf Coast Association of Geological Societies Transactions, v. 31, p. 31–39.

Bouma, A. H., H. H. Roberts, J. M. Coleman, and D. B. Prior, 1991, Delta-front gullies as part of mass-movement phenomena: Mississipi River delta front, *in* R. Osborne ed., From shoreline to abyss: Society of Economic Paleontologists and Mineralogists Special Publication 46, Tulsa, Oklahoma, p. 99–105.

Butcher, W. H., 1940, Submarine valleys and related geology problems of the North Atlantic: Geological Society of America Bulletin, v. 51, p. 480–512.

Coleman, J. M., D. B. Prior, and J. F. Lindsay, 1983, Deltaic influences on shelf edge instability processes, *in* D. J. Stanley and G. T. Moore, eds., The shelfbreak: Critical interface on continental margins: Society of Economic Paleontologists and Mineralogists Special Publication 33, Tulsa, Oklahoma, p. 121–137.

Coleman, J. M., and D. B. Prior, 1982, Deltaic environments of deposition, *in* P. A. Scholle and D. Spearing, eds., Sandstone depositional environments: American Association of Petroleum Geologists Memoir 31, Tulsa, Oklahoma, p. 139–178.

Cornish, F. G., 2011, Incised valleys of the upper Wilcox, middle Texas Gulf Coast: Additional pathways for Wilcox sand delivery to the deep Gulf of Mexico: Bulletin of the South Texas Geological Society, v. 51, p. 15–48.

Dalrymple, R. W., 2006, Incised valleys in time and space: an introduction to the volume and an examination of the controls on valley formation and filling, *in* R. W. Dalrymple, D. A. Leckie, and R. W. Tillman, eds., Incised valleys in space and time: Society of Economic Paleontologists and Mineralogists Special Publication 85, Tulsa, Oklahoma, p. 5–12.

Daly, R. A., 1936, Origin of submarine canyons: American Journal of Science, v. 31, p. 401–420.

Davis, R. A., Jr., 1983, Depositional systems: A genetic approach to sedimentary geology: Prentice-Hall, Inc., Upper Saddle River, New Jersey, 669 p.

Davis, W. M., 1934, Submarine rock valleys: Geologic Review, v. 24, p. 23–41.

England, W. A., A. L. Mann, and D. M. Mann, 1991, Migration from source to trap, *in* R. K. Merrill, ed., Source and migration processes and evaluation techniques: American Association of Petroleum Geologists Treatise of Petroleum Geology/Handbook of Petroleum Geology, Tulsa, Oklahoma, p. 23–54.

Farre, J. A., B. A. McGregor, W. B. F. Ryan, and J. M. Robb, 1983, Breaching the shelfbreak: Passage from youthful to mature phase in submarine canyon evolution, *in* D. J. Stanley and G. T. Moore, eds., The shelfbreak: Critical interface on continental margins: Society of Economic Paleontologists and Mineralogists Special Publication 33, Tulsa, Oklahoma, p. 25–39.

Galloway, W. E. and D. K. Hobday, 1983, Terrigenous clastic depositional systems: Springer Verlag, New York, New York, 423 p.

Galloway, W. E., 1985, Submarine canyon system in the Frio Formation of South Texas: Gulf Coast Association of Geological Societies Transactions, v. 35, p. 75–84.

Galloway, W. E., W. F. Dingus, and R.E. Paige, 1989, Seismic and depositional facies of Paleocene-Eocene Wilcox Group submarine canyon fills, N.W. Gulf Coast, USA: American Association of Petroleum Geologists Short Course No. 3, Tulsa, Oklahoma.

Galloway, W. E., and T. A. McGilvery, 1995, Facies of a submarine canyon fill reservoir complex, Lower Wilcox Group (Paleocene), Central Texas Coastal Plain, *in* R. D. Winn, Jr. and J. M. Armentrout, eds., Turbidites and associated deep-water facies: Society of Economic Paleontologists and Mineralogists Core Workshop 20, Tulsa, Oklahoma, p. 1–23.

Galloway, W. E., W. F. Dingus, and R. E. Paige, 1991, Seismic and depositional facies of Paleocene-Eocene Wilcox Group submarine canyon fills, northwest Gulf Coast, *in* P. Weimer and M. H. Link, eds., Seismic facies and sedimentary processes of submarine fans and turbidite systems: Springer Verlag, New York, New York, p. 247–271.

Garrison, J. R., Jr., J. Silliman, and J. Williams, 2010, Potential role of tsunamis in the formation and filling of the large subsurface Tertiary "shale-filled" valleys, Texas Gulf Coast): Texas A&M University–Corpus Christi, Geology Research Consortium, Division of Coastal Geology, unpublished study, .

Gluyas, J. G., A. G. Robinson, D. Emery, S. M. Grant, and N. H. Oxtoby, 1993, The link between petroleum emplacement and sandstone cementation, *in* J. R. Parker, ed., Petroleum geology of northwest Europe: Proceedings of the 4th Geological Society of London Conference, U.K., p. 1395–1402.

Jobe, Z. R., D. Lowe, and S. Uchytil, 2011, Two fundamentally different types of submarine canyons: Modern and ancient examples from the continental margin of equatorial Guinea, West Africa: American Association of Petroleum Geologists Search and Discovery Article 30179, Tulsa, Oklahoma, 14 p. <http://www.searchanddiscovery.com/pdfz/documents/2011/30179jobe/ndx_jobe.pdf.html> Last Accessed August 28, 2016.

Johnson, D. W., 1939, The origin of submarine canyons: Columbia University Press, New York, New York, 126 p.

McDonnell, A., R. G. Loucks, and W. E. Galloway, 2008, Paleocene to Eocene deep-water slope canyons, western Gulf of Mexico: Further insights for the provenance of deep-water offshore Wilcox Group plays: American Association of Petroleum Geologists Bulletin, v. 92, p. 1169–1189.

May, J. A., J. E. Warme, and R. A. Slater, 1983, Role of submarine canyons on shelfbreak erosion and sedimentation: modern and ancient examples, *in* D. J. Stanley and G. T. Moore, eds., The shelfbreak: Critical interface on continental margins: Society of Economic Paleontologists and Mineralogists Special Publication 33, Tulsa, Oklahoma, p. 315–332.

Miller, S. P., and J. R. Garrison, Jr., 2008, Unpublished core description, Suemaur Lefner et al. GU #5: Texas A&M University–Corpus Christi, Geology Research Consortium, Division of Coastal Geology, 14 p.

Morton, R. A., 1993, Attributes and origins of ancient submarine slides and filled embayments: Examples from the Gulf Coast Basin: American Association of Petroleum Geologists Bulletin, v. 77, p. 1064–1081.

Posamentier, H. W., M. T. Jervey, and P. R. Vail, 1988, Eustatic controls on clastic deposition II: Conceptual framework, *in* C. K. Wilgus, B. S. Hastings, C. G. St. C. Kendall, H. W. Posamentier, C. A. Ross, and J. C. Van Wagoner, eds., Sea-level changes: An integrated approach: Society of Economic Paleontologists and Mineralogists Special Publication 42, Tulsa, Oklahoma, p. 125–154.

Posamentier, H. W., G. P. Allen, D. P. James, and M. Tesson, 1992, Forced regressions in a sequence stratigraphic framework: Concepts, examples, and exploration significance: American Association of Petroleum Geologists Bulletin, v. 76, p. 1687–1709.

Posamentier, H. W., 2001, Lowstand alluvial bypass systems: Incised vs. unincised: American Association of Petroleum Geologists Bulletin, v. 85, p. 1771–1793.

Pratson, L. F., and B. J. Coakley, 1996, A model for the headward erosion of submarine canyons induced by downslope-eroding sediment flows: Geological Society of America Bulletin, v. 108, p. 225–234.

Ricketts, B. D., and C. A. Evenchick, 1999, Shelfbreak gullies; products of sea-level lowstand and sediment failure: examples from Bowser Basin, northern British Columbia: Journal of Sedimentary Research, v. 69, p. 1232–1240.

Shepard, F. P., 1981, Submarine canyons: Multiple causes and long-time persistence: American Association of Petroleum Geologists Bulletin, v. 65, p. 1062–1077.

Shepard, F. P., N. F. Marshall, P. A. McLoughlin, and G. G. Sullivan, 1979, Currents in submarine canyons and other seavalleys: American Association of Petroleum Geologists Studies in Geology 8, Tulsa, Oklahoma, 170 p.

Zaitlin, B. A., R. W. Dalrymple, and R. Boyd, 1994, The stratigraphic organization of incised-valley systems associated with relative sea-level change, *in* R. W. Dalrymple, R. Boyd, and B. A. Zaitlin eds., Incised valley systems: Society of Economic Paleontologists and Mineralogists Special Publication 51, Tulsa, Oklahoma, p. 45–60.

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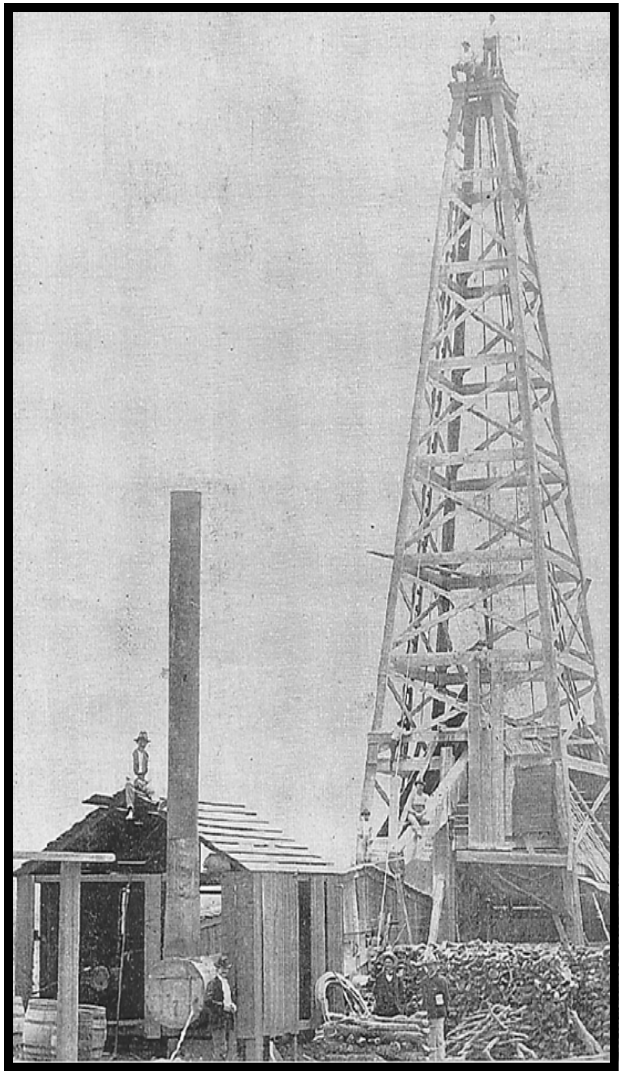

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