BULLETIN Corpus Christi Geological Society



and

Coastal Bend Geophysical Society



April 2020 ISSN 0739 5620

Compliments of

American Shoreline, Inc.



Specializing in Oil & Gas Exploration & Wind Energy

802 N. Carancahua Frost Bank Plaza, Suite 1250 Corpus Christi, Texas 78401 (361) 888-4496

www.amshore.com

Table of Contents

Officers, Committees and Chairpersons for CCGS/CBGS	2&3
CCGS/CBGS Joint Calendar of Meetings & Events	4- 5
CCGS President's Letter	6
Meeting Updates due to Coronavirus	7
CBGS President's Letter	9-11
Field Party of 1864	14
Paper: Mountaineering in the Sierra Nevada by Clarence King V11 Around Yosemite Walls 1864	15
CCGS Papers available for purchase at the Bureau of Economic Geology	31
Geo Link Post	32
Type Logs of South Texas Fields	33
Order Oil Men DVD	34
Wooden Rigs Iron Men	35
Professional Directory	36



CORPUS CHRISTI GEOLOGICAL SOCIETY P.O. BOX 1068* C.C.TX. 78403 2019-2020

www.ccgeo.org

OFFICERS			
President	Austin Nye	361-452-1435	austin@nyexp.us
President Elect			
Vice President	Randy Bissell	361-885-0110	randyb@headingtonenergy.com
Secretary	Emily Olson	361-542-7434	emily@olsongeo.com
Treasurer	Sebastian Wiedmann	361-946-4430	swiedmann.geo@gmail.com
Past President	Frank Cornish	361-563-9184	frank.cornish@gmail.com
Councilor I	Rick Paige	361-884-8824	rpaigesio2@gmail.com
Councilor II	BJ Thompson	361-816-2326	william.thompson426@gmail.com

AAPG DELEGATE

EDITORS

Bulletin Editor	Marian Wiedmann	361-855-2542	wiedgulf@gmail.com
Bulletin Tech. Editor	Jeanie Timmermann	361-883-1492	jeanie@industrialcorrosion.net
Web Master	Josh Pollard	361-654-3100	support@interconnect.net

GEOLOGICAL SOCIETY COMMITTEES & CHAIRPERSONS

MEMBERS PLEASE NOTE COMMITTEES CONTINUE TO FUNCTION WITHOUT A NAMED CHAIR, ALL ARE WELCOME TO ANY COMMITTEE THAT SUITES YOUR INTERST

Advertising/Bus. Cards Arrangements	Robby Sterett Wes Gisler & Will Graham	361-739-5618 830-239-4651 361-885-0110	<u>robert.sterett@gmail.com</u> <u>arrangements@ccgeo.org</u> willg@headingtonenery.com
Continuing Education			
Education	Dawn Bissell	361-960-2151	<u>bissells@swbell.net</u>
Scholarship Program	Dawn Bissell	361-960-2151	<u>bissells@swbell.net</u>
Fishing Tournament	Leighton Devine	361-882-8400	ldevine@suemaur.com
History	OPEN (Ray Govett)	361-855-0134	ray30@hotmail.com
Membership	Dorothy Jordan	361-885-0110	<pre>dorothyj@headingtonenergy.com</pre>
	Randy Bissell	361-885-0113	<pre>randyb@headingtonenergy.com</pre>

Type Logs



COASTAL BEND GEOPHYSICAL SOCIETY P.O. BOX 2741*C.C. TX. 78403 2017-2018

OFFICERS			
President	Dr. Subbarao Yelisetti	361-593-4894	subbarao.yelisetti@tamuk.edu
Vice President	Samara Omar	361-902-2826-office	Samara_Omar@eogresources.com
		361-446-7334-mobile	
Secretary/Treasurer	Erik Scott	361-902-2880-office	Erik Scott@eogresources.com
		361-800-3364-mobile	
Golf Chairman	Mark Wiley	361-902-2844-office	Mark_Wiley@eogresources.com
		361-445-6712-mobile	
Scholarship Chairman	Matt Hammer	361-888-4792	mhammer@royalcctx.com
		361-563-6137	

Visit the geological web site at www.ccgeo.org

CCGS/CBGS JOINT MEETING SCHEDULE 2019-2020

September							October							November						
S	Μ	T 2	W 2019	Th	F	S	S	Μ	T 2	W 019	Th	F	S	S	Μ	T 2	W 019	Th	F	S
1	2	3	4	5	6	7			1	2	3	4	5						1	2
8	9	10	11	12	13	14	6	7	8	9	10	11	12	3	4	5	6	7	8	9
15	16	17	18	19	20	21	13	14	15	16	17	18	19	10	11	12	13	14	15	16
22	23	24	25	<mark>26</mark>	27	28	20	21	22	23	24	25	26	17	18	19	<mark>20</mark>	21	22	23
29	30						27	28	29	30	31			24	25	26	27	28	29	30
Th	ursda	y, Sep	ot. 26 th	¹ at 5::	30-		12	2-1:0	0pm					1	1.20	1.00				
Thursday, Sept. 26th at 5:30- 8:00p.m. Kickoff at Hoegemeyer's Barbeque Barn.							Ge W Ec do	12-1:00pm Speakers: Richard Parker Geophysicist w/Schlumberger Edgar Velez geomechanics domain champion for the western hemisphere					11:30-l:00 pm Speaker: Dr. Neil Bockoven "Early Human Interactions & Migrations—Three Mysteries"					s &		

	December							January						February						
S	Μ	Т	W	Th	F	S	S	Μ	Т	W	Th	F	S	S	Μ	Τ	W	Th	F	S
	2019						2020					2020								
1	2	3	4	5	6	7				1	2	3	4							1
8	9	10	11	12	13	14	5	6	7	8	9	10	11	2	3	4	5	6	7	8
15	16	17	<mark>18</mark>	19	20	21	12	13	14	<mark>15</mark>	16	17	18	9	10	<mark>11</mark>	12	13	14	15
22	23	24	25	26	27	28	19	20	21	22	23	24	25	16	17	18	19	20	21	22
29	30	31					26	27	28	29	30	31	-	23	24	25	26	27	28	29

12-1:00pm Speaker: Peter M. Duncan President & CEO of Micro-Seismic, Inc. "Frac-Driven Interactions & Well Spacing: A Microseismic Perspective

11:30am-1:00pm Speaker: SEG Distinguished Lecturer, Sergey Fomel— University Texas, Austin. "Automating Seismic data analysis and interpretation.

		N	larch							April				May						
S	Μ		W 2020	Th	F	S	S	Μ	Т	-	Th	F	S	S	Μ	Т	Ŵ 2020		F	S
			2020							2020	J						2020	J		
1	2	3	<mark>4</mark>	5	6	7				1	2	3	4						1	2
8	9	10	11	12	13	14	5	6	7	8	9	10	11	3	4	5	6	7	8	9
15	16	17	18	19	20	21	12	13	14	<mark>15</mark>	16	17	18	10	11	12	13	14	15	16
22	23	24	25	<mark>26</mark>	27	28	19	20	21	22	23	24	25	17	18	19	<mark>20</mark>	21	22	23
29	30	31					26	27	28	29	30			24	25	26	27	28	29	30
														31						

CCGS/CBGS Joint Meeting Schedule 2019-2020

Dr. Charles Puryear-Senior Research Geophysicist at Multi-Physics Technologies. "Spectral Extrapolation & Acoustic Inversion for the Characterization of an Ultrathin Reservoir." MARCH 26: MEMBERS MEETING NUECES BREWING 6:30PM

CANCELED DUE TO CORONAVIRUS 11:30-1pm, Speaker: Dr. Osareni C. Ogiesoba, Research Scientist, Bureau of Economic Geology. The Univ. of TX at Austin. "Comparison of Structural Styles Observed in Upper Eocene (Jackson Group) & Oligocene (Vicksburg Group) Strata within the Rio Grande & Houston Embayments"

Calendar of Meetings and Events

Calendar of Area Monthly Meetings

Corpus Christi Geological/Geophysical Society	
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
Houston Geological Society Luncheons	Last Wednesday
Central Texas Section of Society of Mining, Metalllurgy & Exp	2 nd Tues every other month in
	San Antonio



CCGS PRESIDENT'S LETTER—CORONAVIRUS EDITION

What to think...as a geologist, I am an optimist. I try to see opportunity during downturn, costs can come down to drill, lessors can be more reasonable, hard work and small gambles can pay off in the long term during these times. With oil again in the \$20s, and a Saudi tolerance of \$15 or so per barrel and rumors of increased record daily output through April, it seems like the quarantine due to COVID 19 is not awful timing. A forced staycation isn't the worst prescription. Other small silver linings include, but are not limited to: catching up on server and file/map room organization, dusting off old prospects with a fresh perspective, organizing fishing/hunting equipment, taxes on time, creativity with parenting. With a four-year-old and an almost two -year-old in the house for the indefinite future, life is charming if you choose to see it that way; the fussing, the fighting, the laughing, the dancing, it's all good. Just like \$60 oil and \$20 oil, it's all good. When we get below \$18.32/bbl I might start to lose some optimism... But for now, it seems like a good time to roll up my sleeves, put my nose to the grindstone with a kid around my leg, and try to come up with something that we can poke a hole at in this market.

All April events are canceled due to the COVID 19 recommendations. Pub Crawl, Golf Tournament, Shrimp Boil, April Luncheon. The May Luncheon is on hold and we will wait and see what shakes out next month with the pandemic. We will update next month regarding any postponements into June.

I hope everyone stays well, listens to reason and does what is best for them and their loved ones.

Austin Nye CCGS President



CCGS Members and Friends,

I suppose the first thing you will notice is that we have changed our email system provider to Constant Contact. That will require some adjustments to your responses. Please note that replies directly to me or Dorothy at the Headington Energy email may not be delivered.

COVID19 UPDATE

- Our member Beer Summit is <u>canceled</u> for March 27.
- Our April Events are <u>canceled</u>, notably the Luncheon/Collegiate Day, the Pub Crawl, and the Golf Tourney.
- Our May meeting will remain on the calendar for now, but recognizing that it is tentative and may possible be canceled.

For 2020-21 Season. We are optimistic that normalcy will resume by October with some calendar resembling the following.

- October 2020, kickoff Bar-B-Que
- late-October 2020, Science On Tap with the CC Museum of Natural History
- November 2020 Luncheon Meeting
- December 2020 Christmas Break
- January 2021 Luncheon Meeting
- February 2021 Science On Tap with the CC Museum of Natural History
- March 2021 Spring Break
- April 2021 Luncheon Meeting/Collegiate Month Scholarship
- May 2021 Special Speaker Luncheon or other format.

We're asking the CCGS Board and Chairs to remain in their positions/roles for the foreseeable future to ensure continuity and function of the Society. Also, if you want to help, let us know. Contact Randy Bissell at <u>bissellr@swbell.net</u> if you'd like to help in any position.

Thank you for your understanding and patience through this time of rapid change and uncertainty.

Best regards,

Randy Bissell CCGS Board & Membership Chair

SPONSORS

Nueces Energy, Inc. P.O. Box 252 Corpus Christi, Texas 78403 Office: (361) 884-0435 Fax: (361)-654-1436	THUNDER EXPLORATION, INC. Celebrating 30+ years of prospect generation and exploration in the following South Texas plays and trends.
Nueces Energy, Inc. is a complete land services company in the business of providing professional landmen and project management to various energy	FrioSan MiguelEdwardsJacksonAustin ChalkPearsallYeguaEagle FordSligoWilcoxBudaCotton ValleyOlmosGeorgetownSmackover
related jobs primarily in the oil and gas industry. With over 30 years of industry experience, we specialize in determining surface and subsurface ownership and negotiating and acquiring contracts, rights of way agreements, and easements to provide our clients with the legal right to explore and develop oil and gas resources. We provide a full service land company capable of managing any project no matter how large or small.	Thunder is currently seeking non-operated working interest participation in projects and prospects. Contact Walter S. Light Jr. President/Geologist 713.823.8288 EMAIL: wthunderx@aol.com





CBGS President's Letter

CBGS Board 2019-2020

Dr. Subbarao Yelisetti- President Samara Omar- Vice President Erik Scott- Secretary/ Treasurer Matt Hammer - Scholarship Chair Mark Wiley - Golf Chair Education – Robert Schneider Monica Estrada – TAMUK student representative Ryan Turner-TAMUCC student representative

CBGS Scholarships

The Coastal Bend Geophysical Society (CBGS) has donated \$10,000 to the Department of Physics and Geosciences, Texas A&M University-Kingsville in support of the multidisciplinary Petrophysics Graduate Program that has been requested. These funds will be used as scholarships in attracting quality graduate students.

The board awarded three scholarships of \$2,000 each to undergraduate geophysics majors from Texas A&M University-College Station, University of Houston and Texas A&M University-Kingsville. We will be awarding the scholarships again this year.

Scholarship Requirements

Criteria for awarding the Scholarship from Coastal Bend Geophysical Society of Corpus Christi, Texas:

- 1. Scholarships are open to undergraduate or graduate students.
- 2. Must have declared major in Geophysics, or Geology with a concentration in Geophysics or Petrophysics.
- 3. Preference is given to students attending Coastal Bend schools (TAMU-K, TAMU-CC and Del Mar College), then to Coastal Bend natives attending other universities.
- 4. Must have a GPA of at least 3.0 and be in good standing with the school.
- 5. Must make effort to attend a Coastal Bend Geophysical Society Meeting in Corpus Christi Texas after being awarded a scholarship to be recognized by the society.

News

- Coronavirus outbreak slowed global economy and reduced energy demand. As a result oil prices dropped over 8% on March 8th.
- At the time of writing this report, Brent futures dropped to \$45.28 a barrel, its lowest since June 2017, and West Texas Intermediate crude fell to \$41.77, its weakest since August 2016.

CBGS Business

CBGS currently has 43 active members, 4 honorary members, and 40 student members. Raised \$1,200 towards student scholarships through membership revenue.

CBGS workshops/talks

CBGS organized **2020 SEG Distinguished Lecture** entitled "*Automating seismic data analysis and interpretation*" by Sergey Fomel on February, 11th, 2020, from 11:30 am -12:30 pm. Sergey's biography and abstract can be found at https://seg.org/Education/Lectures/Distinguished-Lectures/2020-DL-Fomel

CBGS has also hosted another lecture entitled "Spectral Extrapolation and Acoustic Inversion for the Characterization of An Ultra-thin Reservoir" by Charles Puryear on March 4th, 12-1 pm.

CBGS is looking forward to offer workshops/talks in the future. Topic/speaker suggestions are welcome. Email your suggestions to <u>Samara_Omar@eogresources.com</u> or <u>Subbarao.Yelisetti@tamuk.edu</u>

Golf Tournament

CBGS organized its annual **Golf Tournament** to fund its scholarship program in the first week of October, 2019 at Northshore Country Club. Raised ~\$1,600 for the scholarship fund. If you are interested in our next Golf Tournament, please contact Mark Wiley at Mark_Wiley@eogresources.com

New Degree Tracks at TAMUK

- Texas A&M University-Kingsville (TAMUK) started its first cohort of MS Petrophysics program in Fall 2018. If you are interested in joining this program in Fall 2020, please contact the graduate coordinator for MS in Petrophysics, Dr. Subbarao Yelisetti at Subbarao.Yelisetti@tamuk.edu.
- **BS degree in Geophysics, Minor in Geophysics and Certification in Geophysics** offered at Texas A&M University-Kingsville since Fall 2017. Interested students can contact Dr. Subbarao Yelisetti (<u>Subbarao.Yelisetti@tamuk.edu</u>) for additional information.

Education/Events

-<u>SEG</u>

SEG 2020 annual meeting will be held in Houston, TX from Oct 11-16th. See <u>https://seg.org/AM/2020/</u> for additional details.

See <u>https://seg.org/Education/Lectures/Distinguished-Lectures</u> for information about upcoming SEG distinguished lecture in Houston and other locations.

See <u>https://seg.org/Education/Lectures/Honorary-Lectures</u> for SEG honorary lecture locations in Texas.

-AGU

2020 Fall AGU annual meeting will be held in San Francisco, CA from December 7-11th, 2020. https://fallmeeting.agu.org/2018/future-meetings/

Monthly Saying

"Conservative estimates project a price of \$80 a barrel, even if peace is restored to the Persian Gulf....." Quote from National Geographic 1981 on the projected oil price for 1985.

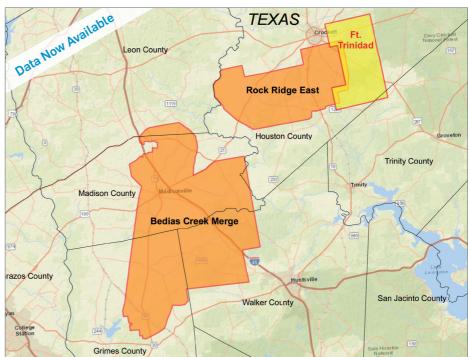
Monthly Summary

Texas Oil and Gas Info	Current Month	Last Month	Difference	
Texas Production	MMBO/BCF	MMBO/BCF	MMBO/BCF	
Oil	129.0	139.7	-10.7	November
Condensate	16.9	18.8	-1.9	November
Gas	765.9	829.8	-63.9	November
	Current Month	Yr to date - 2020	Yr to date - 2019	
Texas Drilling Permits	874	2030	2202	February
Oil wells	204	514	605	February
Gas wells	50	111	145	February
Oil and Gas wells	576	1327	1281	February
Other	6	7	21	February
Total Completions	1395	3230	3475	February
Oil Completions	1120	2579	2653	February
Gas Completions	275	651	822	February
New Field Discoveries	0	1	9	February
Other	420	1002	1225	February

Subbarao Yelisetti President, CBGS

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

Scott Tinley +1 832 351 8544 scott.tinley@cgg.com

Cheryl Oxsheer +1 832 351 8463

cheryl.oxsheer@cgg.com





SPONSORS

CHARGER EXPLORATION

Michael L. Jones President/Geologist

Onshore Gulf Coast Prospect Generation and Consulting

1001 McKinney Street, Suite 801 Houston, TX 77002 Ofc: 713.654.0080 Cell: 713.398.3091 Email: mjones@chargerexploration.com www.chargerexploration.com

That old gas kick could be your next discovery!

Characterization of Unconventional Reservoirs

Traditional methods of core analysis cannot yield acceptable results when applied to unconventional reservoirs such as gas shales, tight gas sands, coals and thin bed formations.

Production controls on these reservoirs are not limited to hydrocarbons in place, permeability and porosity. Pay Identification requires an understanding of complex lithologies and exotic mineralogies.

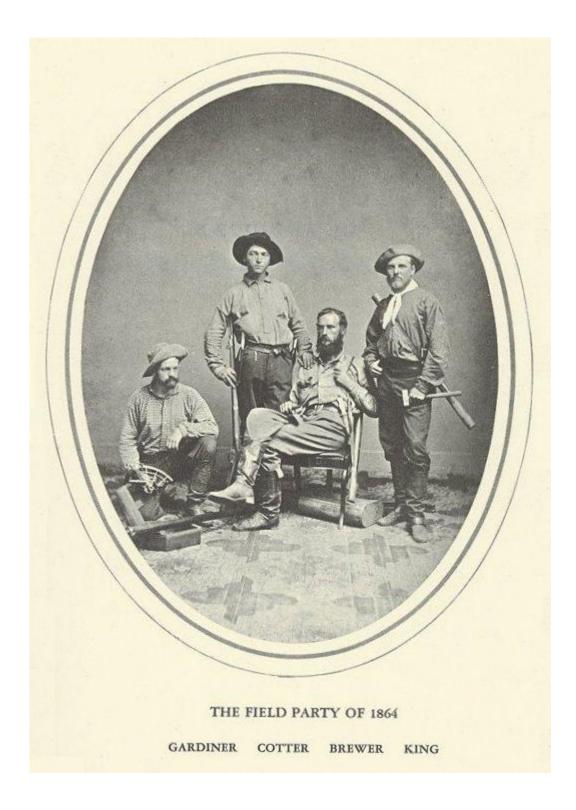
Only Core Lab offers the comprehensive range of unique technologies required to optimize your unconventional reservoirs.

Geological Petrophysical Geomechanical Geochemical



To learn more about our unique unconventional reservoir evaluation services contact Core Lab. (713) 328-2121 or (361) 289-5457 psinfo@corelab.com

© 2005 Core Laboratories. All rights reserved



Home A - Z FAQ Online Library Discussion Forum Muir Weather Maps About Search Tweet

Online Library: <u>Title Author California Geology History Indians Muir Mountaineering Nature Management</u>

<u>Yosemite</u> > <u>Library</u> > <u>Mountaineering</u> > Yosemite Walls >

Chapter VI • Index • Chapter VIII

Mountaineering in the Sierra Nevada by Clarence King VII AROUND YOSEMITE WALLS 1864

LATE in the afternoon of October 5, 1864, a party of us reached the edge of Yosemite, and, looking down into the valley, saw that the summer haze had been banished from the region by autumnal frosts and wind. We looked in the gulf through air as clear as a vacuum, discerning small objects upon valley-floor and cliff-front. That splendid afternoon shadow which divides the face of El Capitan was projected far up and across the valley, cutting it in halves,—one a mosaic of russets and yellows with dark pine and glimpse of white river; the other a cobalt-blue zone, in which the familiar groves and meadows were suffused with shadow-tones.

It is hard to conceive a more pointed contrast than this same view in October and June. Then, through a slumberous yet transparent atmosphere, you look down upon emerald freshness of green, upon arrowy rush of swollen river, and here and there, along pearly cliffs, as from the clouds, tumbles white, silver dust of cataracts. The voice of full, soft winds swells up over rustling leaves, and, pulsating, throbs like the beating of far-off surf. All stern sublimity, all geological terribleness, are veiled away behind magic curtains of cloud-shadow and broken light. Misty brightness, glow of cliff and sparkle of foam, wealth of beautiful details, the charm of pearl and emerald, cool gulfs of violet shade stretching back in deep recesses of the walls,—these are the features which lie under the June sky.

Now all that has gone. The shattered fronts of walls stand out sharp and terrible, sweeping down in broken crag and cliff to a valley whereon the shadow of autumnal death has left its solemnity. There is no longer an air of beauty. In this cold, naked strength, one has crowded on him the geological record of mountain work, of granite plateau suddenly rent asunder, of the slow, imperfect manner in which Nature has vainly striven to smooth her rough work and bury the ruins with thousands of years' accumulation of soil and *débris*.

Already late, we hurried to descend the trail, and were still following it when darkness overtook us; but ourselves and the animals were so well acquainted with every turn that we found no difficulty in continuing our way to Longhurst's house, and here we camped for the night.



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

Member Benefits:

- Learn from energy industry experts.
- Network with energy industry leaders and colleagues.
- Attend regional and national meetings.
- Receive critical updates and information about the energy industry.
- Enhance communication and leadership skills.
- Make friends for life!

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 By an act of Congress the Yosemite Valley had been segregated from the public domain, and given —"donated," as they call it—to the State of California, to be held inalienable for all time as a public pleasure-ground. The Commission into whose hands this trust devolved had sent Mr. Gardiner and myself to make a survey defining the boundaries of the new grant. It was necessary to execute this work before the Legislature should meet in December, and we undertook it, knowing very well that we must use the utmost haste in order to escape a three months' imprisonment,—for in early winter the immense Sierra snow-falls would close the doors of mountain trails, and we should be unable to reach the lowlands until the following spring.

The party consisted of my companion, Mr. Gardiner; Mr. Frederick A. Clark, who had been detailed from the service of the Mariposa Company to assist us; Longhurst, an *habitué* of the valley,—a weather-beaten round-the-worlder, whose function in the party was to tell yarns, sing songs, and feed the inner man; Cotter and Wilmer, chainmen; and two mules,—one which was blind, and the other which, I aver, would have discharged his duty very much better without eyes.

We had chosen as the head-quarters of the survey two little cabins under the pine-trees near Black's Hotel. They were central; they offered a shelter; and from their doors, which opened almost upon the Merced itself, we obtained a most delightful sunrise view of the Yosemite.

Next morning, in spite of early outcries from Longhurst, and a warning solo of his performed with spoon and fry-pan, we lay in our comfortable blankets pretending to enjoy the effect of sunrise light upon the Yosemite cliff and fall, all of us unwilling to own that we were tired out and needed rest. Breakfast had waited an hour or more when we got a little weary of beds and yielded to the temptation of appetite.

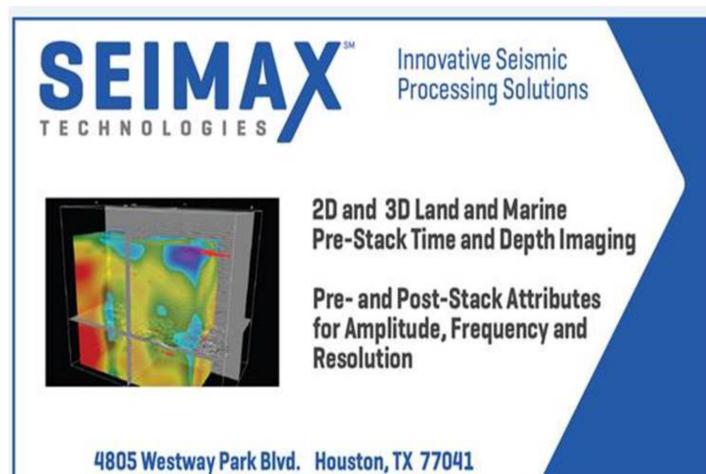
A family of Indians, consisting of two huge girls and their parents, sat silently waiting for us to commence, and, after we had begun, watched every mouthful from the moment we got it successfully impaled upon the camp forks, a cloud darkening their faces as it disappeared forever down our throats.

But we quite lost our spectators when Longhurst came upon the boards as a flapjack-frier,—a *rôle* to which he bent his whole intelligence, and with entire success. Scorning such vulgar accomplishment as turning the cake over in mid-air, he slung it boldly up, turning it three times,—ostentatiously greasing the pan with a fine, centrifugal movement, and catching the flapjack as it fluttered down,— and spanked it upon the hot coals with a touch at once graceful and masterly.

I failed to enjoy these products, feeling as if I were breakfasting in sacrilege upon works of art. Not so our Indian friends, who wrestled affectionately for frequent unfortunate cakes which would dodge Longhurst and fall into the ashes.

By night we had climbed to the top of the northern wall, camping at the head-waters of a small brook, named by emotional Mr. Hutchings, I believe, the Virgin's Tears, because from time to time from under the brow of a cliff just south of El Capitan there may be seen a feeble water-fall. I suspect this sentimental pleasantry is intended to bear some relation to the Bridal Veil Fall opposite. If it has any such force at all, it is a melancholy one, given by unusual gauntness and an aged aspect, and by the few evanescent tears which this old virgin sheds.

A charming camp-ground was formed by bands of russet meadow wandering in vistas through a stately forest of dark green fir-trees unusually feathered to the base. Little, mahogany-colored pools surrounded with sphagnum lay in the meadows, offering pleasant contrast of color. Our camp-ground



p: 832.554.4301 www.seimaxtech.com



was among clumps of thick firs, which completely walled in the fire, and made close, overhanging shelters for table and beds.

Gardiner, Cotter, and I felt thankful to our thermometer for owning up frankly the chill of the next morning, as we left a generous camp-fire and marched off through fir forest and among brown meadows and bare ridges of rock toward El Capitan. This grandest of granite precipices is capped by a sort of forehead of stone sweeping down to level, severe brows, which jut out a few feet over the edge. A few weather-beaten, battle-twisted, and black pines cling in clefts, contrasting in force with the solid white stone.

We hung our barometer upon a stunted tree quite near the brink, and, climbing cautiously down, stretched ourselves out upon an overhanging block of granite, and looked over into the Yosemite Valley.

The rock fell under us in one sheer sweep of thirty-two hundred feet; upon its face we could trace the lines of fracture and all prominent lithological changes. Directly beneath, outspread like a delicately tinted chart, lay the lovely park of Yosemite, winding in and out about the solid white feet of precipices which sank into it on either side; its sunlit surface invaded by the shadow of the south wall; its spires of pine, open expanses of buff and drab meadow, and families of umber oaks rising as background for the vivid green river-margin and flaming orange masses of frosted cottonwood foliage.

Deep in front the Bridal Veil brook made its way through the bottom of an open gorge, and plunged off the edge of a thousand-foot cliff, falling in white water-dust and drifting in pale, translucent clouds out over the tree-tops of the valley.

Directly opposite us, and forming the other gatepost of the valley's entrance, rose the great mass of Cathedral Rocks,—a group quite suggestive of the Florence Duomo.

But our grandest view was eastward, above the deep, sheltered valley and over the tops of those terrible granite walls, out upon rolling ridges of stone and wonderful granite domes. Nothing in the whole list of irruptive products, except volcanoes themselves, is so wonderful as these domed mountains. They are of every variety of conoidal form, having horizontal sections accurately elliptical, ovoid, or circular, and profiles varying from such semi-circles as the cap behind the Sentinel to the graceful, infinite curves of the North Dome. Above and beyond these stretch back long, bare ridges connecting with sunny summit peaks. The whole region is one solid granite mass, with here and there shallow soil layers, and a thin, variable forest which grows in picturesque mode, defining the leading lines of erosion as an artist deepens here and there a line to hint at some structural peculiarity.

A complete physical exposure of the range, from summit to base, lay before us. At one extreme stand sharpened peaks, white in fretwork of glistening ice-bank, or black where tower straight bolts of snowless rock; at the other stretch away plains smiling with a broad, honest brown under autumn sunlight. They are not quite lovable, even in distant tranquillity of hue, and just escape being interesting, in spite of their familiar rivers and associated belts of oaks. Nothing can ever render them quite charming, for in the startling splendor of flower-clad April you are surfeited with an embarrassment of beauty; at all other times stunned by their poverty. Not so the summits; forever new, full of individuality, rich in detail, and coloring themselves anew under every cloud change or hue of heaven, they lay you under their spell.





Austin Office:

1717 W. 6th Street, Ste 230 Austin, Texas 78703 512.457.8711 Contact: Bill Walker, Jr. bwalker@stalkerenergy.com

Houston Office:

2001 Kirby Drive, Suite 950 Houston, Texas 77019 713.522.2733 Contact: Todd Sinex tsinex@stalkerenergy.com

www.stalkerenergy.com

From them the eye comes back over granite waves and domes to the sharp precipice-edges overhanging Yosemite. We look down those vast, hard, granite fronts, cracked and splintered, scarred and stained, down over gorges crammed with *débris*, or dark with files of climbing pines. Lower the precipice-feet are wrapped in meadow and grove, and beyond, level and sunlit, lies the floor,—that smooth, river-cut park, with exquisite perfection of finish.

The dome-like cap of Capitan is formed of concentric layers like the peels of an onion, each one about two or three feet thick. Upon the precipice itself, either from our station on an overhanging crevice, or from any point of opposite cliff or valley bottom, this structure is seen to be superficial, never descending more than a hundred feet.

In returning to camp we followed a main ridge, smooth and white under foot, but shaded by groves of alpine firs. Trees which here reach mature stature, and in apparent health, stand rooted in white gravel, resulting from surface decomposition. I am sure their foliage is darker than can be accounted for by effect of white contrasting earth. Wherever, in deep depressions, enough wash soil and vegetable mould have accumulated, there the trees gather in thicker groups, lift themselves higher, spread out more and finer-feathered branches; sometimes, however, richness of soil and perfection of condition prove fatal through overcrowding. They are wonderfully like human communities. One may trace in an hour's walk nearly all the laws which govern the physical life of men.

Upon reaching camp we found Longhurst in a deep, religious calm, happy in his mind, happy, too, in the posture of his body, which was reclining at ease upon a comfortable blanket-pile before the fire; a verse of the hymn "Coronation" escaped murmurously from his lips, rising at times in shaky crescendos, accompanied by a waving and desultory movement of the forefinger. He had found among our medicines a black bottle of brandy, contrived to induce a mule to break it, and, just to save as much as possible while it was leaking, drank with freedom. Anticipating any possible displeasure of ours, Longhurst had collected his wits and arrived at a most excellent dinner, crowning the repast with a duff, accurately globular, neatly brecciated with abundant raisins, and drowned with a foaming sauce, to which the last of the brandy imparted an almost pathetic flavor.

The evening closed with moral remark and spiritual song from Longhurst, and the morning introduced us to our prosaic labor of running the boundary line,—a task which consumed several weeks, and occupied nearly all of our days. I once or twice found time to go down to the cliff-edges again for the purpose of making my geological studies.

An excursion which Cotter and I made to the top of the Three Brothers proved of interest. A halfhour's walk from camp, over rolling granite country, brought us to a ridge which jutted boldly out from the plateau to the edge of the Yosemite wall. Upon the southern side of this eminence heads a broad, *débris*-filled ravine, which descends to the valley bottom; upon the other side the ridge sends down its waters along a steep declivity into a lovely mountain basin, where, surrounded by forest, spreads out a level expanse of emerald meadow, with a bit of blue lakelet in the midst. The outlet of this little valley is through a narrow rift in the rocks leading down into the Yosemite fall.

Along the crest of our jutting ridge we found smooth pathway, and soon reached the summit. Here again we were upon the verge of a precipice, this time four thousand two hundred feet high. Beneath us the whole upper half of the valley was as clearly seen as the southern half had been from Capitan. The sinuosities of the Merced, those narrow, silvery gleams which indicated the channel of the Yosemite creek, the broad expanse of meadow, and *débris* trains which had bounded down the Sentinel slope, were all laid out under us, though diminished by immense depth.

SPONSORS



VirTex Operating Company, Inc.

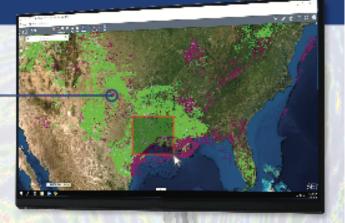
615 North Upper Broadway, Suite 525, Corpus Christi, Texas 78477 (361) 882-3046

The Upstream Oil And Gas Industry's Premiere Resource For Onshore And Offshore Seismic Data.

Explore our expansive North American 2D and 3D seismic library using an interactive GIS interface

WWW.SEISMICEXCHANGE.COM

Corporate Marketing Contact: Max Cunningham mcunningham@seismicexchange.com



SEI SEISMIC 4805 Westway Park Blvd., Houston, TX 77041 · 832-590-5100 New Orleans | Houston | Dallas | Denver | Tulsa | Canada The loftiest and most magnificent parts of the walls crowded in a semi-circle in front of us; above them the domes, lifted even higher than ourselves, swept down to the precipice-edges. Directly to our left we overlooked the goblet-like recess into which the Yosemite tumbles, and could see the white torrent leap through its granite lip, disappearing a thousand feet below, hidden from our view by projecting crags; its roar floating up to us, now resounding loudly, and again dying off in faint reverberations like the sounding of the sea.

Looking up upon the falls from the valley below, one utterly fails to realize the great depth of the semicircular alcove into which they descend.

Looking back at El Capitan, its sharp, vertical front was projected against far blue foot-hills, the creamy whiteness of sunlit granite cut upon aërial distance, clouds and cold blue sky shutting down over white crest and jetty pine-plumes, which gather helmet-like upon its upper dome. Perspective effects are marvellously brought out by the stern, powerful reality of such rock bodies as Capitan. Across their terrible, blade-like precipice-edges you look on and down over vistas of cañon and green hillswells, the dark color of pine and fir broken by bare spots of harmonious red or brown, and changing with distance into purple, then blue, which reaches on farther into the brown monotonous plains. Beyond, where the earth's curve defines its horizon, dim serrations of Coast Range loom indistinctly on the hazy air. From here those remarkable fracture results, the Royal Arches, a series of recesses carved into the granite front, beneath the North Dome, are seen in their true proportions.

The concentric structure, which covers the dome with a series of plates, penetrates to a greater depth than usual. The Arches themselves are only fractured edges of these plates, resulting from the intersection of a cliff-plane with the conoidal shells.

We had seen the Merced group of snow-peaks heretofore from the west, but now gained a more oblique view, which began to bring out the thin obelisk-form of Mount Clark, a shape of great interest from its marvellous thinness. Mount Starr King, too, swelled up to its commanding height, the most elevated of the domes.

Looking in the direction of the Half-Dome, I was constantly impressed with the inclination of the walls, with the fact that they are never vertical for any great depth. This is observed, too, remarkably in the case of El Capitan, whose apparently vertical profile is very slant, the actual base standing twelve hundred feet in advance of the brow.

For a week the boundary survey was continued northeast and parallel to the cliff-wall, about a mile back from its brink, following through forests and crossing granite spurs until we reached the summit of that high, bare chain which divides the Virgin's Tears from Yosemite Creek, and which, projecting southward, ends in the Three Brothers. East of this the declivity falls so rapidly to the valley of the upper Yosemite Creek that chaining was impossible, and we were obliged to throw our line across the cañon, a little over a mile, by triangulation. This completed, we resumed it on the North Dome spur, transferring our camp to a bit of alpine meadow south of the Mono trail, and but a short distance from the North Dome itself.

After the line was finished here, and a system of triangles determined by which we connected our northern points with those across the chasm of the Yosemite, we made several geological excursions along the cliffs, studying the granite structure, working out its lithological changes, and devoting ourselves especially to the system of moraines and glacier marks which indicate direction and volume of the old ice-flow.



SABALO ENERGY | P.O. BOX 2907 | CORPUS CHRISTI, TX 78403 | 361.888.7708 | SABALOENERGY.COM

An excursion to the summit of the North Dome was exceedingly interesting. From the rear of our camp we entered immediately a dense forest of conifers, which stretched southward along the summit of the ridge until solid granite, arresting erosion, afforded but little foothold. As usual, among the cracks, and clinging around the bases of bowlders, a few hardy pines manage to live, almost to thrive; but as we walked groups became scarcer, trees less healthy, all at last giving way to bare, solid stone. The North Dome itself, which is easily reached, affords an impressive view up the Illilluette and across upon the fissured front of the Half-Dome. It is also one of the most interesting specimens of conoidal structure, since not only is its mass divided by large, spherical shells, but each of these is subdivided by a number of lesser, divisional planes. No lithological change is, however, noticeable between the different shells. The granite is composed chiefly of orthoclase, transparent vitreous quartz, and about an equal proportion of black mica and hornblende. Here and there adularia occurs, and, very sparingly, albite.

With no difficulty, but some actual danger, I climbed down a smooth granite roof-slope to where the precipice of Royal Arches makes off, and where, lying upon a sharp, neatly fractured edge, I was able to look down and study those purple markings which are vertically striped upon so many of these granite cliffs. I found them to be bands of lichen growth which follow the curves of occasional water-flow. During any great rain-storm, and when snow upon the uplands is suddenly melted, innumerable streams, many of them of considerable volume, find their way to the precipice-edge, and pour down its front. Wherever this is the case, a deep purple lichen spreads itself upon the granite, and forms those dark cloudings which add so greatly to the variety and interest of the cliffs.

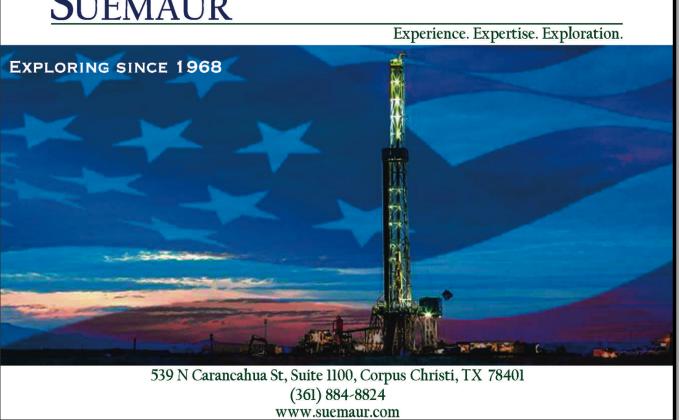
I found it extremest pleasure to lie there alone on the dizzy brink, studying the fine sculpture of cliff and crag, overlooking the arrangement of *débris* piles, and watching that slow, grand growth of afternoon shadows. Sunset found me there, still disinclined to stir, and repaid my laziness by a glorious spectacle of color. At this hour there is no more splendid contrast of light and shade than one sees upon the western gateway itself,—dark-shadowed Capitan upon one side profiled against the sunset sky, and the yellow mass of Cathedral Rocks rising opposite in full light, while the valley is divided equally between sunshine and shade. Pine groves and oaks, almost black in the shadow, are brightened up to clear red-browns where they pass out upon the lighted plain. The Merced, upon its mirror-like expanses, here reflects deep blue from Capitan, and there the warm Cathedral gold. The last sunlight reflected from some curious, smooth surfaces upon rocks east of the Sentinel, and about a thousand feet above the valley. I at once suspected them to be glacier marks, and booked them for further observation.

My next excursion was up to Mount Hoffmann, among a group of snow-fields, whose drainage gathers at last through lakes and brooklets to a single brook (the Yosemite), and flows twelve miles in a broad arc to its plunge over into the valley. From the summit, which is of a remarkably bedded, conoidal mass of granite, sharply cut down in precipices fronting the north, is obtained a broad, commanding view of the Sierras from afar, by the heads of several San Joaquin branches, up to the ragged volcanic piles about Silver Mountain.

From the top I climbed along slopes, and down by a wide *détour* among frozen snow-banks and many little basins of transparent blue water, amid black shapes of stunted fir, and over the confused wreck of rock and tree-trunk thrown rudely in piles by avalanches whose tracks were fresh enough to be of interest."

Upon reaching the bottom of a broad, open glacier-valley, through whose middle flows the Yosemite Creek and its branches, I was surprised to find the streams nearly all dry; that the snow itself, under influence of cold, was a solid ice mass, and the Yosemite Creek, even after I had followed it down for





miles, had entirely ceased to flow. At intervals the course of the stream was carried over slopes of glacier-worn granite, ending almost uniformly in shallow rock basins, where were considerable ponds of water, in one or two instances expanding to the dignity of lakelets.

The valley describes an arc whose convexity is in the main turned to the west, the stream running nearly due west for about four miles, turning gradually to the southward, and, having crossed the Mono trail, bending again to the southeast, after which it discharges over the verge of the cliff. An average breadth of this valley is about half a mile; its form a shallow, elliptical trough, rendered unusually smooth by the erosive action of old glaciers. Roches moutonnées break its surface here and there, but in general the granite has been planed down into remarkable smoothness. All along its course a varying rubbish of angular bowlders has been left by the retiring ice, whose material, like that of the whole country, is of granite; but I recognized prominently black sienitic granite from the summit of Mount Hoffmann, which, from superior hardness, has withstood disintegration, and is perhaps the most frequent material of glacier-blocks. The surface modelling is often of the most finished type; especially is this the case wherever the granite is highly silicious, its polish becoming then as brilliant as a marble mantel. In very feldspathic portions, and particularly where orthoclase predominates, the polished surface becomes a crust, usually about three-quarters of an inch thick, in which the ordinary appearance of the minerals has been somewhat changed, the rock-surface, by long pressure, rendered extremely dense, and in a measure separated from the underlying material. This smooth crust is constantly breaking off in broad flakes. The polishing extended up the valley sides to a height of about seven hundred feet.

The average section of the old glacier was perhaps six hundred feet thick by half a mile in width. I followed its course from Mount Hoffmann down as far as I could ride, and then, tying my horse only a little way from the brink of the cliff, I continued downward on foot, walking upon the dry streambed. I found here and there a deep pit-hole, sometimes twenty feet deep, carved in mid-channel, and often full of water. Just before reaching the cliff verge the stream enters a narrow, sharp cut about one hundred and twenty feet in depth, and probably not over thirty feet wide. The bottom and sides of this granite lip, here and there, are evidently glacier-polished, but the greater part of the scorings have been worn away by the attrition of sands. A peculiar, brilliant polish, which may be seen there to-day, is wholly the result of recent sand friction.

It was noon when I reached the actual lip, and crept with extreme caution down over smooth, rounded granite, between towering walls, to where the Yosemite Fall makes its wonderful leap. Polished rock curved over too dangerously for me to lean out and look down over the cliff-front itself. A stone gate dazzlingly gilded with sunlight formed the frame through which I looked down upon that lovely valley.

Contrast with the strength of yellow rock and severe adamantine sculpture threw over the landscape beyond a strange unreality, a soft, aërial depth of purple tone quite as new to me as it was beautiful beyond description. There, twenty-six hundred feet below, lay meadow and river, oak and pine, and a broad shadow-zone cast by the opposite wall. Over it all, even through the dark sky overhead, there seemed to be poured some absolute color, some purple air, hiding details, and veiling with its soft, amethystine obscurity all that hard, broken roughness of the Sentinel cliffs. In this strange, vacant, stone corridor, this pathway for the great Yosemite torrent, this sounding-gallery of thunderous tumult, it was a strange sensation to stand, looking in vain for a drop of water, listening vainly, too, for the faintest whisper of sound, and I found myself constantly expecting some sign of the returning flood.

From the lip I climbed a high point just to the east, getting a grand view down the cliff, where a broad, purple band defined the Yosemite spray line. There, too, I found unmistakable ice-striæ, showing that

the glacier of Mount Hoffmann had actually poured over the brink. At the moments of such discovery, one cannot help restoring in imagination pictures of the past. When we stand by river-bank or meadow of that fair valley, looking up at the torrent falling bright under fulness of light, and lovely in its graceful, wind-swayed airiness, we are apt to feel its enchantment; but how immeasurably grander must it have been when the great, living, moving glacier, with slow, invisible motion, crowded its huge body over the brink, and launched blue ice-blocks down through the foam of the cataract into that gulf of wild rocks and eddying mist!

The one-eyed mule, Bonaparte, I found tied where I had left him; and, as usual, I approached him upon his blind side, able thus to get successfully into my saddle, without danger to life or limb. I could never become attached to the creature, although he carried me faithfully many difficult and some dangerous miles, and for the reason that he made a pretext of his half-blindness to commit excesses, such as crowding me against trees and refusing to follow trails. Realizing how terrible under reinforcement of hereditary transmission the peculiarly mulish traits would have become, one is more than thankful to Nature for depriving this singular hybrid of the capacity of handing them down.

Rather tired, and not a little bruised by untimely collision with trees, I succeeded at last in navigating Bonaparte safely to camp, and turning him over to his fellow, Pumpkinseed.

The nights were already very cold, our beds on frozen ground none of the most comfortable; in fact, enthusiasm had quite as much to do with our content as the blankets or Longhurst's culinary art, which, enclosed now by the narrow limit of bacon, bread, and beans, failed to produce such dainties as thrice-turned slapjacks or plum-duffs of solemnizing memory.

One more geological trip finished my examination of this side of the great valley. It was a two days' ramble all over the granite ridges, from the North Dome up to Lake Tenaya, during which I gathered ample evidence that a broad sheet of glacier, partly derived from Mount Hoffmann, and in part from the Mount Watkins Ridge and Cathedral Peak, but mainly from the great Tuolumne glacier, gathered and flowed down into the Yosemite Valley. Where it moved over the cliffs there are well-preserved scarrings. The facts which attest this are open to observation, and seem to me important in making up a statement of past conditions.

We were glad to get back at last to our two little cabins in the valley, although our serio-comic hangers-on, the Diggers, were gone, and the great fall was dry.

A rest of one day proved refreshing enough for us to leave camp and ascend by the Mariposa trail to Meadow Brook, where we made a bivouac, from which Gardiner began his southern boundary line, and I renewed my geological studies east of Inspiration Point.

I always go swiftly by this famous point of view now, feeling somehow that I don't belong to that army of literary travellers who have here planted themselves and burst into rhetoric. Here all who make California books, down to the last and most sentimental specimen who so much as meditates a letter to his or her local paper, dismount and inflate. If those firs could recite half the droll *mots* they have listened to, or if I dared tell half the delicious points I treasure, it would sound altogether too amusing among these dry-enough chapters.

I had always felt a desire to examine Bridal Veil cañon and the southwest Cathedral slope. Accordingly, one fine morning I set out alone, and descended through chaparral and over rough *débris* slopes to the stream, which at this time, unlike the other upland brooks, flowed freely, though with far less volume than in summer. At this altitude only such streams as derive their volume wholly from melting snow dry up in the cold autumnal and winter months; spring-fed brooks hold their own, and rather increase as cold weather advances.

It was a wild gorge down which I tramped, following the stream-bed, often jumping from block to block, or letting myself down by the chaparral boughs that overhung my way. Splendid walls on either side rose steep and high, for the most part bare, but here and there on shelf or crevice bearing clusters of fine conifers, their lower slopes one vast wreck of bowlders and thicket of chaparral plants.

Not without some difficulty I at length got to the brink, and sat down to rest, looking over at the valley, whose meadows were only a thousand feet below; a cool, stirring breeze blew up the Merced Cañon, swinging the lace-like scarf of foam which fell from my feet, and, floating now against the purple cliff, again blew out gracefully to the right or left. While I looked, a gust came roaming round the Cathedral Rocks, impinging against our cliff near the fall, and apparently got in between it and the cliff, carrying the whole column of falling water straight out in a streamer through the air.

I went back to camp by way of the Cathedral Rocks, finding much of interest in the conoidal structure, which is yet perfectly apparent, and unobscured by erosion or the terrible splitting asunder they have suffered. Upon a ridge connecting these rocks with the plateaus just south there were many instructive and delightful points of view, especially the crag just above the Cathedral Spires, from which I overlooked a large part of valley and cliff, with the two sharp, slender minarets of granite close beneath me. That great block forming the plateau between the Yosemite and Illilluette cañons afforded a fine field for studying granite, pine, and many remarkably characteristic views of the gorge below and peaks beyond. From our camp I explored every ravine and climbed each eminence, reaching at last, one fine afternoon, the top of that singular, hemispherical mass, the Sentinel Dome. From this point one sweeps the horizon in all directions. You stand upon the crest of half a globe, whose smooth, white sides, bearing here and there stunted pines, slope away regularly in all directions from your feet. Below, granite masses, blackened here and there with densely clustered forest, stretch through varied undulations toward you. At a little distance from the foot of the Half-Dome, trees hold upon sharp brinks, and precipices plunge off into Yosemite upon one side, and the dark, rocky cañon of Illilluette upon the other. Eastward, soaring into clouds, stands the thin, vertical mass of the Half-Dome.

From this view the snowy peak of the Obelisk, flattened into broad, dome-like outline, rises, shutting out the more distant Sierra summits. This peak, from its peculiar position and thin, tower-like form, offers one of the most tempting summits of the region. From that slender top one might look into the Yosemite, and into that basin of ice and granite between the Merced and Mount Lyell groups. I had longed for it through the last month's campaign, and now made up my mind, with this inspiring view, to attempt it at all hazards.

A little way to the east, and about a thousand feet below the brink of the Glacier Point, the crags appeared to me particularly tempting; so in the late afternoon I descended, walking over a rough, gritty surface of granite, which gave me secure foothold. Upon the very edge the immense, splintered rocks lay piled one upon another; here a mass jutting out and overhanging upon the edge, and here a huge slab pointed out like a barbette gun. I crawled out upon one of these projecting blocks and rested myself, while studying the view.

From here the one very remarkable object is the Half-Dome. You see it now edgewise and in sharp profile, the upper half of the conoid fronting the north with a sharp, sheer, fracture-face of about two thousand feet vertical. From the top of this a most graceful helmet curve sweeps over to the south, and descends almost perpendicularly into the valley of the Little Yosemite; and here from the foot springs

up the block of Mount Broderick,—a single, rough-hewn pyramid, three thousand feet from summit to base, trimmed upon its crest with a few pines, and spreading out its southern base into a precipice, over which plunges the white Nevada torrent. Observation had taught me that a glacier flowed over the Yosemite brink. As I looked over now I could see its shallow valley and the ever-rounded rocks over which it crowded itself and tumbled into the icy valley below. Up the Yosemite gorge, which opened straight before me, I knew that another great glacier had flowed; and also that the valley of the Illilluette and the Little Yosemite had been the bed of rivers of ice; a study, too, of the markings upon the glacier cliff above Hutchings's house had convinced me that a glacier no less than a thousand feet deep had flowed through the valley, occupying its entire bottom.

It was impossible for me, as I sat perched upon this jutting rock mass, in full view of all the cañons which had led into this wonderful converging system of ice-rivers, not to imagine a picture of the glacier period. Bare or snow-laden cliffs overhung the gulf; streams of ice, here smooth and compacted into a white plain, there riven into innumerable crevasses, or tossed into forms like the waves of a tempest-lashed sea, crawled through all the gorges. Torrents of water and avalanches of rock and snow spouted at intervals all along the cliff walls. Not a tree nor a vestige of life was in sight, except far away upon ridges below, or out upon the dimly expanding plain. Granite and ice and snow, silence broken only by the howling tempest and the crash of falling ice or splintered rock, and a sky deep freighted with cloud and storm,-these were the elements of a period which lasted immeasurably long, and only in comparatively the most recent geological times have given way to the present marvellously changed condition. Nature in her present aspects, as well as in the records of her past, here constantly offers the most vivid and terrible contrasts. Can anything be more wonderfully opposite than that period of leaden sky, gray granite, and desolate stretches of white, and the present, when of the old order we have only left the solid framework of granite, and the indelible inscriptions of glacier work? To-day their burnished pathways are legibly traced with the history of the past. Every ice-stream is represented by a feeble river, every great glacier cascade by a torrent of white foam dashing itself down rugged walls, or spouting from the brinks of upright cliffs. The very avalanche tracks are darkened by clustered woods, and over the level pathway of the great Yosemite glacier itself is spread a park of green, a mosaic of forest, a thread of river.

<u>Chapter VI</u> • <u>Index</u> • <u>Chapter VIII</u>

Home A - Z FAQ Online Library Discussion Forum Muir Weather Maps About Search TweetOnline
Library:Title Author California Geology History Indians Muir Mountaineering Nature Management

http://www.yosemite.ca.us/library/mountaineering_in_the_sierra_nevada/07.html

Corpus Christi Geological Society Papers available for purchase at the Texas Bureau of Economic Geology

Note: Publication codes are hyperlinked to their online listing in The Bureau Store (http://begstore.beg.utexas.edu/store/).

Cretaceous-Wilcox-Frio Symposia, D. B. Clutterbuck, Editor, 41 p., 1962. CCGS 002S \$15.00

Type Logs of South Texas Fields, Vol. I, Frio Trend. Compiled by Don Kling. Includes 134 fields. 158 p., 1972. Ring binder. CCGS 015TL \$25.00

Type Logs of South Texas Fields, Vol. II, Wilcox (Eocene) Trend. Compiled by M. A. Wolbrink. 98 p., 1979. Ring binder. CCGS 016TL \$25.00

Field Trip Guidebooks

South Texas Uranium. J. L. Cowdrey, Editor. 62 p., 1968. \$12.00 CCGS 102G

Hidalgo Canyon and La Popa Valley, Nuevo Leon, Mexico. CCGS 1970 Spring Field Conference. 78 p., 1970. CCGS 103G \$8.00

Padre Island National Seashore Field Guide. R. N. Tench and W. D. Hodgson, Editors. 61 p., 1972. CCGS 104G \$5.00

Triple Energy Field Trip, Uranium, Coal, Gas-Duval, Webb & Zapata Counties, Texas. George Faga, Editor. 24 p., 1975. CCGS 105G \$10.00

Minas de Golondrinas and Minas Rancherias, Mexico. Robert Manson and Barbara Beynon, Editors. 48 p. plus illus., 1978. CCGS 106G \$15.00

Portrero Garcia and Huasteca Canyon, Northeastern Mexico. Barbara Beynon and J. L. Russell, Editors. 46 p., 1979. CCGS 107G \$15.00

Modern Depositional Environments of Sands in South Texas. C. E. Stelting and J. L. Russell, Editors. 64 p., 1981. CCGS 108G \$15.00

Geology of Peregrina & Novillo Canyons, Ciudad Victoria, Mexico, J. L. Russell, Ed., 23 p. plus geologic map and cross section, 1981. CCGS 109G \$10.00

Geology of the Llano Uplift, Central Texas, and Geological Features in the Uvalde Area. Corpus Christi Geological Society Annual Spring Field Conference, May 7-9, 1982. Variously paginated. 115 p., 53 p.

CCGS 110G \$15.00

Structure and Mesozoic Stratigraphy of Northeast Mexico, prepared by numerous authors, variously paginated. 76 p., 38 p., 1984. CCGS 111G \$15.00

Geology of the Big Bend National Park. Texas, by C. A. Berkebile. 26 p., 1984. CCGS 112G \$12.00

GEO LINK POST

<u>http://www.lib.utexas.edu/books/landsapes/index.php</u> Free service. Rare, fragile, hardto-find, public domain documents covering various topics about the landscape of Texas. Includes the Texas Geological Survey from 1887 until 1894.

USGS TAPESTRY OF TIME AND TERRAIN <u>http://tapestry.usgs.gov</u> The CCGS is donating to all of the 5th and 6th grade schools in the Coastal Bend. Check it out--it is a spectacular map. You might want to frame one for your own office. The one in my office has glass and a metal frame, and It cost \$400 and it does not look as good as the ones we are giving to the schools.

FREE TEXAS TOPOS'S <u>http://www.tnris.state.tx.us/digital.htm</u> these are TIFF files from your state government that can be downloaded and printed. You can ad them to SMT by converting them first in Globalmapper. Other digital data as well.

FREE NATIONAL TOPO'S <u>http://store.usgs.gov/b2c_usgs/b2c/start/</u> (xcm=r3standardpitrex_prd)/.do go to this webpage and look on the extreme right side to the box titled TOPO MAPS <u>DOWNLOAD</u> TOPO MAPS FREE.

<u>http://www.geographynetwork.com</u>/ Go here and try their top 5 map services. My favorite is 'USGS Elevation Date.' Zoom in on your favorite places and see great shaded relief images. One of my favorites is the Great Sand Dunes National Park in south central Colorado. Nice Dunes.

http://antwrp.gsfc.nasa.gov/apod/asropix.html Astronomy picture of the day--awesome. I click this page everyday.

http://www.spacimaging.com/gallery/ioweek/iow.htm Amazing satellite images. Check out the gallery.

http://www.ngdc.noaa.gov/seg/topo/globegal.shtml More great maps to share with kids and students.

www.ccgeo.org Don't forget we have our own we page.

http://terra.nasa.gov/gallery/ Great satellite images of Earth.

<u>www.ermaper.com</u> They have a great free downloadable viewer for TIFF and other graphic files called ER Viewer.

<u>http://terrasrver.com</u> Go here to download free aerial photo images that can be plotted under your digital land and well data. Images down to 1 meter resolution, searchable by Lat Long coordinate. Useful for resolving well location questions.

TYPE LOGS OF SOUTH TEXAS FIELDS by Corpus Christi Geological Society

NEW (2019)TYPE LOGS IN RED

ARANSAS COUNTY Aransas Pass/McCampbell Deep Bartell Pass Blackjack Burgentine Lake Copano Bay, South Estes Cove Fulton Beach Goose Island Half Moon Reef Nine Mile Point Rockport, West St. Charles Tally Island Tract 831-G.O.M. (offshore)

BEE COUNTY

Virginia

Caesar Mosca Nomanna Orangedale(2) Ray-Wilcox San Domingo **Tulsita Wilcox** Strauch_Wilcox

BROOKS COUNTY

Ann Mag Boedecker Cage Ranch Encintas ERF Gyp Hill Gyp Hill West Loma Blanca Mariposa Mills Bennett Pita Tio Ayola Tres Encinos

CALHOUN COUNTY

Appling Coloma Creek, North Heyser Lavaca Bay Long Mott Magnolia Beach Mosquito Point Olivia Panther Reef Powderhorn Seadrift, N.W. Steamboat Pass Webb Point S.E. Zoller CAMERON COUNTY

Holly Beach Luttes San Martin (2) Three Islands, East Vista Del Mar COLORADO COUNTY E. Ramsey Graceland N. Fault Blk Graceland S. Fault Blk **DEWITT COUNTY** Anna Barre Cook Nordheim Smith Creek Warmsley Yorktown, South **DUVAL COUNTY** DCR-49 Four Seasons Good Friday Hagist Ranch Herbst Loma Novia Petrox Seven Sisters Seventy Six, South Starr Bright, West **GOLIAD COUNTY** Berclair North Blanconia Bombs Boyce Cabeza Creek, South Goliad West St Armo Terrell Point **HIDALGO COUNTY** Alamo/Donna Donna Edinburg, West Flores-Jeffress Foy Hidalgo LA Blanca McAllen& Pharr McAllen Ranch Mercedes Monte Christo North Penitas San Fordvce San Carlos San Salvador S. Santallana Sharv Tabasco Weslaco, North Weslaco South JACKSON COUNTY

Carancahua Creek Francitas Ganado & Ganado Deep LaWard, North Little Kentucky

lost now found
Maurbro
StewartSwan Lake
Swan Lake, East
Texana, North
West Ranch
JIM HOGG COUNTY
Chaparosa
Thompsonville,N.E.
JIM WELLS COUNTY
Freebom
Hoelsher
Palito Blanco
Wade City
KARNES COUNTY
Burnell
Coy City
Person
Runge
KENEDY COUNTY
Candelaria
Julian
Julian, North
Laguna Madre
Rita
Stillman
KLEBERG COUNTY
Alazan
Alazan, North
Big Caesar
Borregos
Chevron (offshore)
Laguna Larga
Seeligson
Sprint (offshore)
LA SALLE COUNTY
Pearsall
HAWKVILLE:EAGLEFORD
LAVACA COUNTY
Halletsville
Норе
Southwest Speaks
Southwest Speaks Deep
LIVE OAK COUNTY
Atkinson
Braslau
Chapa
Clayton
Dunn
Harris
Houdman
Kittie West-Salt Creek
Lucille
Sierra Vista
Tom Lyne

Brazil Devil's Waterhole Hostetter Hostetter, North NUECES COUNTY Agua Dulce (3) Arnold-David Arnold-David, North Baldwin Deep Calallen Chapman Ranch Corpus Christi, N.W. Corpus Christi West C.C. **Encinal Channel** Flour Bluff/Flour Bluff, East GOM St 9045(offshore) Indian Point Mustang Island Mustang Island, West Mustang Island St. 889S(offshore) Nueces Bay/Nueces Bay West Perro Rojo Pita Island Ramada Redfish Bay Riverside Riverside, South Saxet Shield Stedman Island Turkey Creek **REFUGIO COUNTY** Bonnieview/Packery Flats Greta La Rosa Lake Pasture Refugio, New Tom O'Connor SAN PATRICIO COUNTY Angelita East Commonwealth Encino Enos Cooper Geronimo Harvev Hiberia Hodges Mathis, East McCampbell Deep/Aransas Pass Midway

MATAGORDA COUNTY

MCMULLEN COUNTY

Collegeport

Arnold-Weldon

Odem

Plymouth Portilla (2) Taft Taft, East White Point, East STARR COUNTY El Tanque Garcia Hinde La Reforma, S.W. Lyda Ricaby Rincon Rincon North Ross San Roman Sun Yturria VICTORIA COUNTY Helen Gohike, S.W. Keeran, North Marcado Creek McFaddin Meyersville Placedo WEBB COUNTY Aquilares/Glen Martin **Big Cowboy** Bruni. S.E. Cabezon Carr Lobo Davis Hirsch Juanita Las Tiendas Nicholson O'Hem Olmitos Tom Walsh WHARTON COUNTY Black Owl WILLACY COUNTY Chile Vieja La Sal Vieja Paso Real Tenerias Willamar ZAPATA COUNTY Benavides Davis, South Jennings/Jennings, West Lopeno M&F Pok-A-Dot ZAVALA COUNTY

El Bano

Call Coastal Bend Geologica<u>l Library, Letty: 361-883-2736</u> I log – \$10 each, 5-10 logs \$9 each and 10 + logs \$8.00 each – plus postage

Midway, North

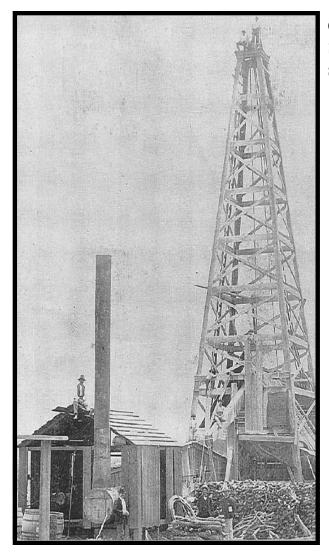
White Creek

White Creek, East

OIL MEN TALES FROM THE SOUTH TEXAS OIL PATCH DVD MEMBER PRICE \$25 NON-MEMBER \$30



To Order DVD Sebastian Wiedmann swiedmann.geo@gmail.com If mailed add \$5.00



Corpus Christi Geological Society Sebastian Wiedmann-swiedmann.geo@gmail.com

Order Form				
Mail order form for Wooden rigs-Iron Men. The price is \$75 per copy, if mailed \$80 per copy. Name				
Address				
City, State, Zip				
No. of books Amount enclosed				
Send to Corpus Christi Geological Society Book Orders 4425 Driftwood PL Corpus Christi, TX. 78411 Tax exempt# if applicable				

Wooden Rigs—Iron Men The Story of Oil & Gas in South Texas By Bill & Marjorie K. Walraven Published by the Corpus Christi Geological Society



Cogito Geologic Mark T. Ford, PhD Consulting Services "Solid hard rock solutions" Mineralogy, Igneous Petrology, Geochemistry, Field Geology Markfordgeo@gmail.com 541-908-4739	FOX ENVIRONMENTAL SERVICES, LLC Planning Permitting Real estate Marketing Maps LAURA M. FOX LAURA@FOXENVIRONMENTALSERVICES.COM P.O. BOX 745 ROCKPORT, TEXAS 78381 361.319.3119	MATTHEW FRANEY Consulting Geologist AAPG CPG #6342 Texas Licensed PG #1169 FRANEY OIL OPERATIONS, INC. 545 N. Upper Broadway, Suite 403 361-563-6327 Corpus Christi, TX 78401 mfraney57@att.net		
Enrique (Rick) Sarza Oprision Supervisor US Land Rick.Garza@GlobalGeophysical.com DIRECT +1 713-808-7428 works +1 713-808-7428 13927 South Gesamer Road Missouri City, Toxas 77489 USA www.GlobalGeophysical.com	Bisler Brothers Logging Co., Inc. P.O. BOX 485 106 E. MAIN RUNGE, TX 78151 Wes Gisler Bus. (830) 239-4651 Mobile (361) 676-1369	RAY GOVETT, Ph. D. CONSULTING GEOLOGIST 361-855-0134		
Robert Graham 361-774-3635 RGR ENERGY, LLC Oil & Gas Exploration and Development P. O. Box 1843, Corpus Christi, TX 78403 grexploration@gmail.com	HART EXPLORATION, LLC. RICK HART Geologist / Owner PO. Box 3576 Bandera, Texas 78003 Cell: 512-626-3053 Email: hartexploration@aol.com	EXPLORATION, LLC H. TONY HAUGLUM President 600 Leopard ST. SUTE 1704 PHONE 361.884.1811 CORPUS CHRISTI FAX 361.884.8071 Texas 78401 E-MAIL THAUGLUM@SWBELLNET		
p: (361) 884-8824 ext. 409 c: (361)215-4855 bhopkins@suemaur.com	James R. Jones Geologist 7434 Long S Drive Corpus Christi, TX 78414 361-779-0537 jrjones5426@aol.com	ECG Resources Sale 200 Sale 200 Carpus Christi, TX 71801-0008 Direct: (361) 844-1546 randy_lambert@eogresources.com		
FUNDER EXPLORATION, INC. WALTER S. LIGHT, JR. PRESIDENT PETROLEUM GEOLOGIST PO. BOX 541674 HOUSTON, TEXAS 77254-1674 US MOBILE: +713 823 8288 UK MOBILE: +713 823 8288 UK MOBILE: +44 (0)794 424 0106 EMAIL: wthunderx@aol.com	PATRICK J. McCULLOUGH [President] patrickm@emeraldbayexp.com 311 Saratoga Boulevard Corpus Christi, Texas 78417 361.852.6195 [o] 361.852.6676 [f] 361.876.7881 [c]	CURTIS R. MAYO GEOLOGICAL CONSULTANT Reserve Analysis Prospect Evaluation Expert Witness Prospect Generation Fredericksburg, Texas 78624 Office: 830.992.2938 Cell: 830.765.0628 E-Mail: cmayo@ctesc.net		
VALOR EXPLORATION, LLC Armando Medina Owner / Geologist 8610 N. New Braunfels #703 • San Antonio, TX 78217 (210) 538-2170 • amedina@valorexploration.com	J. Mark Miller President President Phone (361) 883-7700 Fax (361) 883-7700 mark@millersmithgas.com 545 N. Upper Broadway Suite 400 Corpus Christi, Texas 78476	Www.Iniks.com Www.Iniks.com P: +1 281 485 5557 D: +1 281 485 5557 D: +1 281 485 3101 C: +1 721 483 510 C: +1 721 483 515 Mark Mixon Account Manager MR Resources Inc. 6951 Hond Course Drive, Suite 300, Houston, TX 77072, USA		
YOUR CARD COULD BE HERE! \$30 FOR 10 ISSUES. PRICES PRO-RATED. EMAIL ROBBY AT ROBERT.STERETT@GMAIL.COM				

Dennis O. Moore O 432-685-8965 Sr. Account Manager M 432-215-1899 Log Ananlyst dennis.moore@bhge.com Permian Wireline Services 6 Desta Dr Suite 5300 Midland, TX 79705	Mailing Address 615 Loopard, Ste. 640 Corpus Christi, Texas 78401-0641 361.582.7888 phone 361.582.7889 fax 361.946.2581 mobile Contact Address 1701 Southwest Parkway, Ste. 109 College Station, Texas 77840 866.946.2581 phone 866.946.2581 phone 866.946.2581 fax pmueller@muelrexp.com www.muelrexp.com	Austin Office: 712 Windsong Trail West Lake Hills, Texas 78746
Patrick Nye President patrick@nyexp.us NEXPORT OF A Comparison of the production, LLC Seg N. Canacabus, Soine 1270 Prost Baak Plans Corpse (Christ, TX 7860) www.gyexp.us	BRIAN E. O'BRIEN BEO INVESTMENTS, LTD. 510 Bering Dr. Suite 600 Houston, Tx. 77057 E-mail: bobrien@saxetpetroleum.com	Ken Orlaska Account Manager 281-497-8440 Birset: 281-249-8641 Birset: 281-249-8641 Birset: 281-249-8640 Dirset: 281-249-8640 Birset: 28
Herradura Petroleum, Inc. JEFF OSBORN Gorpus Christi, Texas 78475 email-jeff@herradurapetroleum.com Cdll:Sd1-S37-2349	Richard M. Parker Consulting Geologist Adjunct Professor – Geosciences Texas A&M University - Kingsville Registered State of Texas Board of Professional Geoscientists License # 6056 12802 Max Rd. 713-724-4380 Cell 1 Brookside Village, Texas 77581 Email: <u>markstar@sbcglobal.net</u> 281-412-0745 Home Email: <u>markstar@sbcglobal.net</u> 281-412-0745 Home Email: <u>Richard.Parker@tamuk.edu</u> 361-593-4072 A&M	State State St
GEOPH-YSICAL SERVICES, INC. GEOPH-YSICAL SERVICES, INC. BRENT PROPST, P.G. Business Development Manager Cell: (832) 643-5158 • bprops@paragongeo.com Houston, Texas	Minerals Exploration and Mining Uranium In Situ Leach Richard M. Rathbun, Jr. Certified Professional Geologist 9544 / AIPO 921 Barracuda Pl. Corpus Christi, Texas 78411 (361) 903-\$207 rathbunassoc@msn.com	Wobile: 281-235-7507 President Mobile: 281-235-7507 POL Box 820253 Office: 713-621-7282 Houston, TX 77282-0233 barry@icarusog.com Deliveries 110 S. Dairy Ashford Rd, Ste. 202 Houston, TX 77077
Weatherford Wireline Services Weatherford Weatherford International Ltd. 401 E. Sonterra Blvd., Suite 1 San Ahronio, Texas 78258 US Guid Coast Wireline Sales *1.210.930.7588 Direct +1.210.930.7610 Fax +1.210.241.2463 Mobile sam.roach@weatherford.com www.weatherford.com	First Rock, Inc. RGR Production First Rock I, LLC Gregg Robertson 10 Buffalo St. Ste 402 Corpus Christi, TX 78401 361-884-0791 361-215-5559 - Cell 210-260-0300 - Cell 361-884-0863 - Fax firstrockinc@msn.com	Aivin Rowbatham Sales, Gulf of Mexico Main +1 713 789 7250 Direct +1 281 781 1065 Fax +1 713 789 7201 Mobile +1 832 372 2366 alvin.rowbatham@iongeo.com 2105 CityWest Blvd. Suite 900 Houston, TX 77042-2839 USA
Doug Sartoris Exploration Geologist / Managing Partner Suite 2570 South South Sortenine Blycd, Suite 2570 South Corpus Christi, TX 78401	Robert V. Schneider, D.Sc Geophysicist Quantitative Geophysical Interpretation Seismic Attributes AVO analysis, Modeling and Inversion Well-to-Seismic Tying Seismic Processing QC Multicolumnia Schneiderdsc@gmall.com Mobile: +1 713.447.2381	TOM SELMAN selmanlog.com Ofc. (432) 563-0084 (800) 578-1006 Cell (432) 288-2259 SECLADAR AND ASSOCIATES, LTD. GEOLOGICAL CONSULTING / SURFACE LOGGING SERVICES P.O. Box 61150 Midland, TX 79711 4833 Saratoga #624 Corpus Christi, TX 78413 P.O. Box 61150 Midland, TX 79711
\$30 FOR 10 ISSUES. P	YOUR CARD COULD BE HERE! RICES PRO-RATED. EMAIL ROBBY AT ROBERT.S	TERETT@GMAIL.COM

Joe H. Smith President Petcophysics, Inc. Velocity Surveys - Synthetics - Sonic Log Data RO. Box 863323 Plano, Texas 75086	Crossroads Exploration Gloria D. Sprague Geologist 388 CR 4012 Timpson, Texas 75975 Mobile: 936-488-9428 gsprague4532@att.net	DAHCO Exploration, LLC EROBBY STERETT Geologist Convus Grindest, Texas 78403 Dence: (361) 887-2981 Cell. (361) 739-5618 Email. Referent @Dunico.us		
Charles A. Sternbach, Ph.D President Star Creek Energy Company Oil and Gas Exploration 800 Wilcrest Drive, Suite 230 Houston, Texas 77042 office: 281 for 97.333 celi: 832.567.7333 celi: 832.567.7333 carbodude@gmail.com	THOMAS W. SWINBANK Gertified Petrollum geologist President Strike Oil & Minerals Corp. P.O. 80x 1338 Georgetown, Telas 78627 Cell 512-876-9585	Dennis A. Taylor President and Chief Geologist dennis@amshore.com President and Chief Geologist Dennis@a		
Environmental Exploration & Production JEANIE TIMMERMANN GEOSCIENTIST TX LICENSE #2289 7214 Everhart #9 (361) 991.7451 Corpus Christi, IX 78413 jtimmermann74@mon.com	Jim Travillo Consulting Petroleum Geoscientist Exploration - Development - Acquisitions - Divestitures 2006 Highlands Circle Oxford, MS 38655 Cell: 713.823.932 email: jatravill@aol.com	Austin Austin		
SEBASTIAN P. WIEDMANN GEOSCIENTIST WILSON PLAZA WEST 606 N. CARANCAHUA, SUITE 500 CORPUS CHRISTI, TEXAS 78401 MOBILE (361) 946-4430 Swiedmann.geo@gmail.com	Dave Willis Main +1 713 789 7250 Onshore Sales Direct +1 281 781 1035 Mobile +1 281 543 6189 Fax +1 713 789 7201 Jober +1 281 781 1035 Mobile +1 281 543 6189 Fax +1 713 789 7201 Jober +1 281 543 6189 Fax +1 713 789 7201 Jober +1 281 543 6189 Fax +1 713 789 7201 Jober +1 281 543 6189 Fax +1 713 789 7201 Jober +1 281 543 6189 Fax +1 713 789 7201 Jober +1 281 543 6189 Fax +1 713 789 7201 Jober +1 281 543 6189 Fax +1 713 789 7201 Jober +1 281 543 6189 Jober +1 281 543 6189 Fax +1713 789 7201 Jober +1 281 543 6189 Fax +1713 789 7201 Jober +1 281 543 6189 Fax +1713 789 7201 Jober +1 281 543 6189 Fax +1713 789 7201 Jober +1 281 543 6189 Fax +1713 789 7201 Jober +1 281 543 6189 Fax +1713 789 7201 Jober +1 281 543 6189 Fax +1713 789 7201 Jober +1 281 781 618 Fax +1713 789 7201 Jober +1 281 781 618 Fax +1713 789 7201 Jober +1 281 781 618 Fax +1713 789 7201 Jober +1 281 781 618 Fax +1713 789 7201 Jober +1 281 781 618 Fa	State State St		
YOUR CARD COULD BE HERE! \$30 FOR 10 ISSUES. PRICES PRO-RATED. EMAIL ROBBY AT ROBERT.STERETT@GMAIL.COM				



www.millenniumpetrocapital.com

SEEKING DEALS

 - 3-D Seismic Based Prospects in the Gulf Coast Region of Texas
- Conventional or Tight Oil Sands Only
- Leased or Unleased
- Operations Preferred





The Millennium family of companies are a privately held oil and natural gas exploration and production enterprise founded in 2006 and are headquartered in San Antonio, Texas.

Geographically focused, Millennium specializes in developing and producing reserves in the Gulf Coast regions of Texas. Our team aggressively pursues large working interest positions with operations in prospects with strong geological merit, well control and reliable seismic interpretations.

To present your prospect for consideration, please email a summary and/or any associated confidentiality documents to our exploration team:

geology@millenniumpetrocapital.com