Geophysical Society of Houston

VOL. 33, NO. 3 NEWSLETTER NOVEMBER 1998

I N S I D E

December 10th at the Marriott Westside

SEG Distinguished Instructor Short Course

Course Presenter: Phil Schultz

"The Siesmic Velocity Model as an Interpretation Asset"

Notice to all GSH Members,

As was seen at the September Technical luncheon, it is most important that you make reservations by phone or e-mail for GSH events. At future events, walk-ins will be put on a waiting list and not admitted until after those with reservations. When reserving, please use your membership ID number. We have a lot of members with the same last name and even some with the same last and first names, only middle names different. It is impossible for the GSH office staff to know who each member is by name only and therefore the wrong ID number may be pulled up when making these reservations. Also, it's important that you use the correct meeting number when phoning in reservations, i.e. 6-0-1 GSH technical lunch. Following is the list of codes:

6-0-1	Luncheon Meeting - Technical
6-0-7	Technical Breakfast
6-0-2	Data Processing SIG Meeting
6-0-3	Interpretation Workstations SIG Meeting
6-0-4	Reservoir Geophysics SIG Meeting
6-0-5	Potential Fields SIG Meeting
6-0-6	Environmental Applications SIG Meeting

Numbers 601 and 607 are the most important ones. Thank you very much for your help.

GSH / HGS Joint Luncheon Meeting with Houston Association of Petroleum Landmen

"3-D Acquisition, Perils & Pitfalls"

by Patrick Buckley, Global Geophysical Experts, Inc.

NOTE CHANGE IN DATE AND VENUE

Date:	**Wednesday, November 18, 1998**
Place:	Hyatt Regency Downtown
Time:	Registration starts at 11:15, lunch is served at noon.
Reservations:	by Friday, November 13 to GSH or HGS
Cost:	$20 pre-registered, $25 walk-in

Patrick C. Buckley

ABSTRACT

Title:	3D Seismic Acquisition - Perils & Pitfalls
By:	Patrick C. Buckley

You are in the middle of your 3D and have more problems than you know what to do with! The

Technical Sessions continued on page 3

GEOPHYSICAL SOCIETY OF HOUSTON

Joan Henshaw, Office Manager • 7457 Harwin Drive, Suite 301 • Houston, Texas 77036 • Office Hours 8 a.m. - 5 p.m.
Phone: (713) 785-6403 • Fax: (713) 785-0553 • Event Reservations Number: (713) 917-0218
email: reservations@hougeo.org • website - http://www.seg.org/sections/gsh/gshhome.html

GSH Board of Directors = GSH Executive Committee + SEG Section Representatives

		PHONE	FAX	
PRESIDENT	Bob Tatham*	954-6027	954-6113	tatharh@texaco.com
Corp. Relations	Wulf Massell	713/650-3820	713/659-3735	wulf@epicgeo.com
Historian	Art Ross	423-5476	423-5202	Art.H.Ross@exxon.sprint.com
Honors & Awards	Wulf Massell	713/650-3820	713/659-3735	wulf@epicgeo.com
Museum	Tom Fulton	464-1300	464-1615	
Nominating	Bill Gafford	281/366-7873	281/366-7569	wtgafford@amoco.com
Tellers	Diana Shaw	713/963-2626	713-963-2030	diana.shaaw@waii.com
PRES.-ELECT	Pat Starich*	281/423-7234	281/423-7399	pjstarich@exxon.sprint.com
Academic Liaison	Hau-Wei Zhou	713/743-3424		
Advisory	Lee Lawyer	531-5347	531-5347	ujhr40a@prodigy.com
Employment Ref.	Sam LeRoy	556-9766	556-9778	earthview@aol.com
Finance	Joel Starr	781-4000	781-7858	joel@hstn.tensor.pgs.com
Office	David Forel	963-2493	963-2490	david.forel@waii.com
Volunteers	Open			
FIRST VP	Dan Ebrom	713/954-6252	713/954-6911	ebromda@texaco.com
Continuing Ed	H. Roice Nelson	713/974-6907	713-974-1496	roice@continuum-corp.com
Speakers	Dan Ebrom	713/954-6252	713-954-6911	ebromda@texaco.com
Tech Breakfasts	Scott Sechrist	281/856-8029	281-856-7445	acoustic@neosoft.com
Tech Luncheons	Shane Coperude	713/981-8181		shane@fairind.com
Tech Committee	Dave Agarwal	713/650-0325	713/650-3822	Dave0836@aol.com
Tech Transfer	David Forel	963-2493	963-2490	david.forel@waii.com
SIGS				
Data Processing	Karl Schleicher	713/782-1234		karl@geodev.com
Near Surf Geophysics	Tom Dobecki	281/679-5558		tdobecki@fugro.com
Interpretation	Randy Hoover	713/682-1039		
Potential Fields	Mike Kowalski	713/432-6828		kowalma@texaco.com
Res. Geophysics	Quincy Chen	713/689-5778	713-689-5757	Quincy.chen@waii.com
SEC. VP	Jock Drummond	281/873-3901	281/874-3470	jock_drummond@anadarko.com
Annual Meeting	Jim Moulden	281/293-5711		james.k.moulden@usa.conoco.com
Awards Banquet	Carmen Comis	713/393-4833	876-1359	ccomis@ParadigmGeo.com
Golf Tournament	George Lauhoff	281/879-2223	713/963-2030	george.lauhoff@waii.com
Bass Tounament	Greg Doll	713/658-8096	713/951-0343	gqdoll@msn.com
Shrimp Peel	Tim Hartnett	713/961-8346	713/960-8400	Hartnett.Tim.T.@bhp.com.au
Sporting Clays	Chris Tutt	713/689-2648	713/963-1928	chris.tutt@waii.com
Christmas Party	Lorinda Driskill	281/560-1104	281/560-1169	ldriskill@lgc.com
Tennis Tounament	Joe Jones	281/438-5626	281/682-6928	
SECRETARY	Ingrid Swendig	713/689-7865	713/689-7890	ingrid.swendig@waii.com
Directory	David Forel	963-2493	963-2490	david.forel@waii.com
GSH Membership	Steve Starr		498-7008	498-0913 sstarr9711@aol.com
Ladies Auxiliary	Roshan Agarwal	281/890-4024	713/650-3822	Dave0836@aol.com
OTC Rep	Alf Klaveness	713/468-5123	713/468-0900	
SEG Membership	Steve Starr	498-7008	498-0913	sstarr9711@aol.com
TREASURER	Stephen Johnson	281/366-3647	281/366-5856	sjohnson@amoco.com
Student Loans	Don Ashabranner	669-372	669-3725	deashab@ppco.com
EDITOR	Jess Kozman	713/623-2481	713/621-9432	jkozman@seismicexchange.com
Newsletter Staff	Elizabeth Fisher	281/597-1777	281/597-5377	eafisher@jasongeo.com
Company Contacts	Scott Sechrist	281/856-8029	281-856-7445	acoustic@neosoft.com
Electronic Pub.	Richard Verm	782-1234	782-1829	richard@goedev.com
Photography	John Freeland	281/423-7223	281/423-7801	
Publicity	Scott Sechrist	281/856-8029	281-856-7445	acoustic@neosoft.com
Company Store	Ingrid Swendig	713/689-7865	713/689-7890	ingrid.swendig@waii.com
Training Notices	Lloyd Weathers	775-2453	775-4123	Lloyd_r._weathers@ccmepus.mobil.com
PAST PRES.	Bill Gafford*	281/366-7873	fax 281/366-7569	wtgafford@amoco.com
PRIOR PAST PRES.	Wulf Massell*	713/650-3820	713/659-3735	wulf@epicgeo.com
SEG SECTION REPS*	Mike Schoenberger	713/966-6114		mike.schoenberger@exxon.sprint.com
	Art Ross	281/423-5476		art.h.ross@exxon.sprint.com
	Dave Agarwal	713/650-0325		
	Jim DiSiena	281/287-5757		disiena@swbell.net
	Joe Starr	281/443-8150		
	Claire Bresnahan	713/880-5910		
	John Sumner	713/431-6096		john.r.sumner@exxon.sprint.com
Alternate SEG Sec. Reps.	Hugh Hardy	713/729-9203 (home)		mghwh@aol.com
	Lee Lawyer	281/531-5347 (home)		ujhr40a@prodigy.com
	Phil Inderwiesen	713/954-6244		inderpl@texaco.com
	Jock Drummond	281/873-3901		jock_drummond@anadarko.com
	Alf Klaveness	713/468-5123		

The Geophysical Society of Houston Newsletter (ISSN 1082-0817) is published monthly except July and August by the Geophysical Society of Houston, 7457 Harwin, Suite 301, Houston, Texas 77036. Subscription to the Geophysical Society of Houston Newsletter is included in the membership dues ($20.00 annually). Periodicals Postage Paid in Houston, Texas.
POSTMASTER: Send address changes to Geophysical Society of Houston Newsletter, 7457 Harwin, Suite 301, Houston, TX 77036.

GSH Newsletter Due Dates

Issue ..... January 1999
Deadline ..... Nov. 19, 1998

Issue ..... February 1999
Deadline ..... Dec. 17, 1998

Issue ..... March 1999
Deadline .... January 21, 1999

Issue ..... April 1999
Deadine .... February 18, 1999

Issue ..... May 1999
Deadline ..... March 18, 1999

Issue ..... June 1999
Deadline ..... April 15, 1999

Technical Sessions continued from page 1

environmentalists are upset you are shooting the bird sanctuary, the prison warden whose grounds you are shooting over wants to go to a Saints game and the permit agent has an individual who claims you have damaged ten of his seven foot marijuana plants valued at $1000 each. The crew is standing by waiting on a permit that was overlooked and your injunction is going to take another eight days before you get a hearing. This was supposed to be a piece of cake! After all, everyone is shooting 3D. You never heard of these problems from anyone else! Is yours that unique or is just that no one is talking about THEIR problems and challenges? Now your partners are threatening to pull out if you cannot get this shot in the timeframe you indicated. Jeez, where is it all going to end! Oh, and by the way, you are over budget! The advent of 3D seismic has created additional opportunities within the realms of hydrocarbon exploration and production. While this new tool allows explorationists to delineate features which they otherwise would not have encountered, as with any new technique, there is a learning curve and mistakes are going to be made. Depending on the individuals and the company, these errors can occur in the office while designing the 3D or the field during the many stages of acquiring your data set. Though modeling and formulas are an integral aspect of the 3D acquisition planning, field knowledge and expertise provide the key elements between a successful and an unsuccessful 3D program. Especially when you meet Billy Bob Jim Jack who owns two sections right in the middle of your prospect and he "just don't really want none of them seismographic people runnin' around on my place!" And Rinky-Dink Oil Company wants some data for free for a mineral permit. So, while our design looked great in the office when you planned it and presented it to management, it has now taken on a whole new picture, and not necessarily one for the better. How do you overcome this challenge? While a poorly planned and executed 3D will result in dry holes, cost millions of dollars as well as one's job, a successfully planned and poorly executed 3D will have the same results. Incorrect control of such issues as mineral and surface permitting can cost in the hundreds of thousands of dollars and produce not only an unusable survey, it can also bankrupt an exploration company. With many of the new federal and state regulations facing the industry changing on a daily basis, companies must stay current on these least they find themselves in a predicament that will takes years of litigation to unravel. And let us not forget the timeframe necessary to execute each individual stage of the geophysical acquisition process. Oh, you mean the contractor didn't mention that the drills were on another job that has been getting rain for two weeks and can't get to yours for a couple of more weeks. Yes, they were promised, but hands are tied and there is nothing that can be done. Hmmm, imagine. Detailed coordination between all contractors, subcontractors and the company form the cornerstone of a successfully completed 3D. Wow, you finally have the field acquisition completed. What do you mean the processor is running behind and can't get to yours right now! They promised! Yes, but your 3D was not there at the promised time. Well, you ran into unexpected circumstances, surely they can understand that! Yes they do understand, but a HUGE international project came in which has a short fuse due to the timing of the bid round and your 3D will have to wait. Surely you, as a businessperson can understand that, right? Now your partners are really hot! Oh, by the way, you are getting calls from some of the landowners that are not happy about what you have done to their land and someone's "prize bull" broke his leg in one of your shot holes. And some of the permits were not paid, so you are also getting calls from other landowners. And you thought that just because the crew was out of the field, you were done with the acquisition of the 3D. Remember that Murphy's Law applies, probably more so to seismic acquisition than to almost any other component of the oil patch. No matter how detailed the planning appears in the 3D arena, a situation will in all probability occur which will affect the procedure utilized in acquiring the data, though not necessarily the data quality itself. Properly planned and properly executed 3Ds are every exploration manager's dreams, a geoscientist's reward and a company's road to building success.

Patrick Buckley began his geophysical career over 20 years ago as the youngest crew manager for Teledyne Exploration, supervising geophysical acquisition for Amoco Production Company. He assisted their research department in developing several new geophysical techniques, as well as acquiring their first onshore 3D data set. He joined Seismic Exchange, Inc. in 1983 where his responsibilities included data acquisition in the Mid-Continent and West Texas regions. During his tenure, these regions were responsible with the gathering of over 2500 miles of geophysical data. He became the manager of geophysical speculative programs with Richardson Seismic

Technical Sessions continued on page 4

SEG Distinguished Instructor Short Course

December 10, 1998 • Houston Marriott Westside

"The Seismic Velocity Model as an Interpretation Asset"

Presented by the
Society of Exploration Geophysicists Continuing Education Committee
and the Society of Exploration Geophysicists Foundation

Sponsored by the Geophysical Society of Houston

Course Description

A velocity model can have enduring and growing interpretive value, beyond its initial creation to optimize the seismic image. The 3D velocity model is often built carefully with a combination of geophysical and geological input, because of the accuracy demands placed on it by the requirements of depth imaging. As such, this model becomes an increasingly effective interpretive tool. This course addresses the ways in which the interpreter should participate in the development of the velocity model, and underscores its interpretive value with numerous case study examples.

After a brief introduction and preview of the day, the course begins with a comprehensive case study example. In this example, interpretive input was key to development of all phases of the refined velocity model for depth imaging and depth conversion, and the interpretation itself was refined in conjunction with the development of the velocity model. Following this showcase study, and to complete the morning session, the course embarks on a concise overview of the general model building methodology. The course will review the types of geological settings requiring varied approaches to velocity model building, and will highlight those model building aspects where interpretive input is normally essential.

In the afternoon, the course focuses on over a dozen case studies, supplied by major, independent, and national oil companies, where some interpretation or exploration problem was solved by attention to the velocity model. The studies follow the thought processes of the interpreter in his or her approach to the problem. The case studies run from the simple to the complex, cover soft rock and hard rock environments, and touch on imaging, depth conversion, fault location, well placement, lithology, anisotropy, and other velocity-related issues. All studies carry the common theme that the velocity model was a key element in the development of the geological interpretation. Moreover, the interpreter participated actively in the development of all the velocity models.

Who Should Attend?

- The interpreter excited by the prospect of participating actively in the velocity model building process.
- The interpreter who wishes to pursue aggressively the additional advantages offered by using the velocity model in interpretation.
- The manager and supervisor seeking familiarity with velocity-related tools for developing a geological model.

Course Presenter

Philip S. Schultz is a senior consulting geophysicist with Spirit Energy, a division of Unocal. He was most recently Vice President for Development at Advanced Data Solutions in Houston. He spent eleven years with Schlumberger, nine of which were overseas engineering management assignments in Tokyo, London, and finally Paris, where he headed the development of their Reservoir Modeling Workstation. Prior to Schlumberger, he was a research geophysicist with Digicon in Houston, where he was involved in the early development of depth migration technology, and was the project manager for the extension of the Disco processing system to 3D.

An early member of the Stanford Exploration Project (SEP), directed by Jon Claerbout, Dr. Schultz's thesis on the subject of "slant stacks" has the distinction of having the last single-digit SEP volume number. He is a recipient of the "Outstanding Presentation" award of the SEG, and has served as Associate Editor, Data Processing, for GEOPHYSICS.

He resides in Houston with his wife Sandy and their three children, and he enjoys a good game of tennis.

Registration form for DISC:

December 10, 1998
Houston Marriott Westside
NW Corner of Katy Freeway IH-10 and Eldridge Parkway
13210 Katy Freeway Houston, TX 77079 USA
Hotel Phone: 281-558-8338 Fax: 281-558-4028
Hotel Info. http://www.fairfieldinn.com/marriott/HOUWS/

Name: _____

Company Name: _____

Street Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____

Email: _____

Membership ID's: SEG: _____ GSH: _____
Cost: (Check ONE)

_____ I am a SEG and GSH member - Lunch cost only: $25.00

_____ I am not a member of SEG, I am a member of GSH - $70.00 will apply toward Associate Membership in the SEG and an application will be sent for Active Membership: $95.00

_____ I am not a member of GSH, I am a member of SEG - $20.00 will be applied toward membership, effective when your application is approved by the GSH Board: $45.00

_____ I am not a member of either the SEG or GSH: $115.00

TOTAL ENCLOSED: $_____

Make check payable to Geophysical Society of Houston
Send to: GSH, 7457 Harwin Drive, Suite 301, Houston, TX, 77036-2160

Payment by credit card:

CARD: _____ Mastercard _____ Visa _____ American Express

PRINTED NAME AS IT APPEARS ON CARD: _____

ACCOUNT NUMBER: _____

EXPIRATION DATE: _____ Signature: _____

DATE: _____ _____

BILLING ADDRESS: _____

If paying by credit card, you may fax to: 713-785-0553

Technical Breakfast

Wednesday, November 11
CGG

The Geophysical Society of Houston is proud to announce the November Technical Breakfast will be a case history of 3D exploration for deepwater turbidite sands. This month 's West Side meeting will be Wednesday, November 11 at CGG's new office location at Park Ten, west of I-10 and Highway Six in West Houston. Exit from Interstate 10 westbound at exit 750, (Park Ten), and turn right on Park Ten Boulevard, then left to 16430 Park Ten Place. CGG will be hosting a free continental breakfast for all attending.

Authors Karen Lanning, Consultant, Jim Hallin and Guillaume Cambois, CGG Houston present a "Case study of Elkhorn Slough Field: risk reduction using state-of-the-art 3D tools". The presentation abstract and speaker Karen Lanning's vitae follow.

Elkhorn Slough Field is located in Solano County, California on the eastern flank of the Sacramento Valley, approximately twenty-five miles southwest of the city of Sacramento, Ca. It is situated between the updip edge of the Upper Winters sand pinchout and the beginning of the Winters structural play. The Winters pinchout play is turbiditic in nature, sands being transported through channels incised into the shelf and deposited into deep-water fans, surrounded by shales. The sands have excellent porosities, from 18 to 25 percent and have thicknesses up to 95 gross feet. In the Elkhorn Slough area, the depth of these sands is approximately 8600 feet. These elements have made for an area conducive to AVO analysis.

In defining this play regionally, there are several key mapping tools that were used to identify these prospects: structural noses due to differential compaction around the sand bodies (which create structure where the sands exist), net sand isopachs to delineate the existence of reservoir, and seismic amplitudes to show potential gas accumulation. In the Elkhorn Slough area we began with 2D seismic and mapped the structures along with the regional sand maps to delineate the possible fan limits.

In 1992, Amerada Hess and Enron Oil and Gas began drilling wells within the fan. The initial well was the Enron No. 22-1 Nixon, which was a gas producer from 15 feet of the A sand and had 42 feet of wet B sand. The next well, the Enron No. 22-2 Nixon, was drilled downdip and found of 26 feet of net pay in the A sand (37 feet of gross sand with a water contact at the bottom). Having discovered our downdip limit in the A sand, we tried the other direction and drilled the Enron No. 23-1 Gladys, which had no A sand, but 6 feet of gas pay in the BC sand.

In 1995 CGG acquired a 52 square mile 3D survey over the area, which included the Elkhorn Slough Field. The data was excellent quality, despite the difficult nature of acquisition in the area. To extract a meaningful AVO attribute (the fluid factor), the data were processed in preserved amplitude and prestack time migrated. However, the close proximity of the sands and their thinning nature made seismic resolution of individual sand bodies extremely difficult. The use of neural network facies classification and a layer-based stratigraphic inversion gave a clearer picture of sand distribution.

From all these analyses, it appears quite clearly that the Nixon wells were not drilled at the right location, and that the Gladys well should not have been drilled at all. In 1997, the first well was drilled off of the 3D seismic. The Enron Gladys 23-2 found 70 feet of net pay in the A sand, 50 feet updip from the A sand in the Nixon 22-1 well. It is estimated that the field's reserves for the A sand is 14-18 BCF recoverable (which is about twice what was estimated before drilling this well).

The use of state-of-the-art 3D tools can dramatically increase the chances of drilling success. The keys to success for the Elkhorn Slough Field study were definition of a sound geological model, 3D seismic interpretation and visualization, AVO analysis and stratigraphic inversion. Three-D seismic is not a cure all: it will not find a prospect where there is none, nor is it worth the money spent if a sound geologic model is not in place. The use of state-of the-art 3D tools provides a wealth of information that must be adequately put together. Every piece of the jigsaw puzzle must fit, as the one weak link is usually the one that bites you. With the proper geologic model, good seismic data, (and a good land man), sometimes the cost of one or two dry holes can be saved, which pays for the 3D.

Biography of the author:

Karen Lanning was awarded a B.Sc. in Physics from the Steven F. Austin University (1979) and a MBA from Houston University (1986). She has worked with Texaco (1980-1983), Amerada Hess (1983-1987 and 1989-1998) and Arco (1987-1989). She is now an independent geophysical consultant specialized in interpretation, and uses a PC workstation with the SMT software. She can be contacted at P.O. Box 336, Round Top, TX 78954-0336, or by e-mail at klanning@cvtv.net.

Scott C. Sechrist
SIPES#2503
Geophysical Consultant
Message Phone: 281-856-8029
Fax: 281-856-7445
Email: acoustic@neosoft.com

Editor's Note: *The following is a letter of opinion and does not necessarily reflect the views of the GSH or its members. As a non-profit professional organization, the GSH does not advocate political views or support or endorse candidates. Equal opportunity will be gladly provided for opposing views.*

VOTE YOUR POCKETBOOK THIS FALL

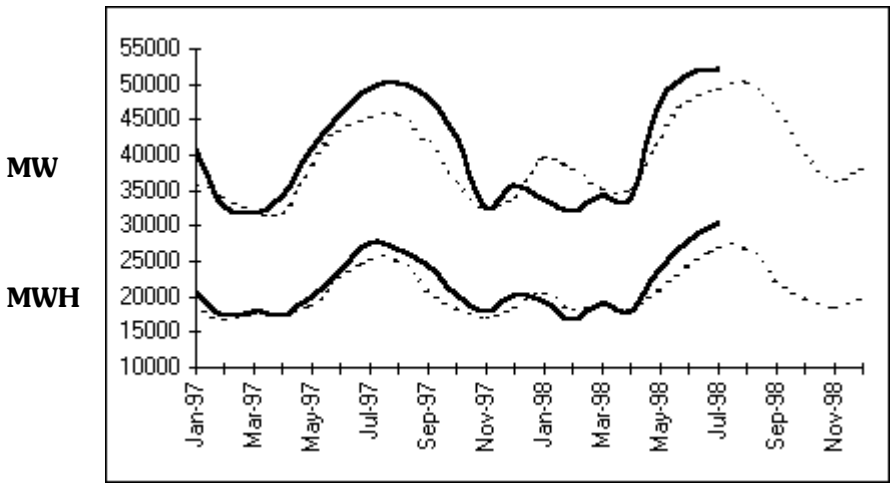
"Editorial" - Alan Foley

Real energy prices are at an all time low for this century and still Houston consumers pay some of the highest electricity prices ever. As we watched oil prices slide in late '97 and into '98 we had no idea that the summer of '98 was going to give us record-breaking heat for six weeks in a row.

Why in the gold mine of the energy business do the electricity vendors get the gold and we in the fuel-supply industry get the shaft? The reason is because electric utilities secure monopoly retail markets by buying political influence. We sit around and wonder how we can sell more gas to industry with minimal markup whilst they sell 3 cent power for 9 cents. As a group I believe we geophysicists and geologists are naive when it comes to politics. When the SEG was organizing to lobby against professional registration in Texas in 1994 one SEG member, who I've know for over twenty years, remarked on the expense of political help. He asked in amazement - "Do you realize how much those lobbyists make! I'm in the wrong business". At a time when geoscience consultants make $500 - $700 per day lobbyists and attorneys in Austin make $200 - $500 per hour!

The 1994 registration effort was being mounted in October for the January legislative session, but the politicians already have their votes counted and ignore everyone except existing donors after Thanksgiving. We were way too late then and the hour is late now in 1998. The only recourse we have at this point in the democratic process is to VOTE. So as the fall arrives and outdoor activities are cooler remind your friends, neighbors and colleagues how much their electricity bills ate into their budget this summer and explain why:

Electricity tariffs are constructed on a return on invested capital basis and have the fuel element as a no-profit pass through for the utility. This gives every incentive to build big, expensive plants, which use low-cost nuclear or coal fuel. HL&P is one of the few corporations downtown to own its office facilities - because it gets a 9.775% annual return on the money it bought it with. This at a time when 30 year government bonds, an instrument of similar duration and quality to HL&P debt, pay a 5.5% return. The Texas PUC under Pat Wood has granted HL&P and TU Electric unprecedented financial leeway this year. These monopolies are



Monthly Demand and Energy Report
Actual -vs- OE411 Forecast
(Solid Line is Actual, Dashed is Forecast, Top is MW, Bottom is MWH)
From: http://www.ercot.com/drp/dande/de9807r.htm

Editorial continued on page 8

Editorial continued from page 7

now allowed to retain revenue in excess of their "fair" return on capital to pay off early the over-priced plants they now operate. This "accelerated depreciation" amounted to $M67.5 in 2Q98 alone for HL&P. The PUC will give the utilities everything they ask for unless stopped by the politicians, since the PUC is an arm of the legislature.

Because of the way rates are structured in an average-weather summer the plants are funded adequately (this is a science at which electric companies excel). Thus in a hotter summer the more kwh used the greater the profit margin on those additional kwh. When you pay your electric bill at the house the electricity HL&P generates with natural gas - the fuel on the margin - at 2.5 cents per kwh costs you 9 cents. And kwh use is up as much as 40% in July and August. When the Electric Reliability Council of Texas, Inc. (ERCOT) system coincident peak demand is above 35GW most next dispatched plants are natural gas peaking plants. In electricity industry terms there were several successive daily peaks this summer of over 53 gigawatts in ERCOT (see graph on page 7). For us in the exploration industry the fact that the lowest ERCOT coincident peak demand never went below 35 GW for six weeks is more important. Thus the hot summer has kept natural gas prices above $2.00 per Mcf. for most of the summer. We like that, but lets get something which will allow long term investment by energy companies in exploration - retail access to electricity customers. Energy companies can then build "merchant plants" and sell directly to themselves or consumers. Only direct retail access will eliminate the rip-off currently underway. Get educated, know what's good for your pocketbook, get out the vote!

Alan Foley is a GSH member and consultant to energy and exploration contractors in Houston. He has represented Power Clearinghouse, a power marketer, at the Texas PUC.

HGS/GSH
Shrimp Peel October 9, 1998

SIG Announcements

GSH Reservoir Geophysics Seminar in November, 1998

Date: November 12, 1998,
Theme: Electromagnetic Imaging of reservoirs
Place: Western Geophysical Auditorium
10001 Richmond Ave.
Houston, TX 77042
Time: 4:30-6:30pm
Speaker one: Dr. Mike Wilt, EMI
Topic: Cross EM imaging in open and steel-cased wells

Abstract:

Crosshole and surface-to-borehole electromagnetic induction are natural extensions of the widely used induction logging technology. As opposed to the 1-D induction logs however, these techniques seek to determine the two and three dimensional electrical conductivity distribution between boreholes or the three dimensional conductivity near a single borehole. They are useful for stratigraphic correlation and structural mapping in oil fields and for tracking water and steam floods used in oil recovery. The EM data provide independent and highly complementary information to the widely used surface and borehole seismic methods.

In this presentation Dr. Michael Wilt will describe the crosshole induction tomography technique. He will briefly present the general theory and instrumentation and show a series of field examples of water and steam flood tracking in oil fields of California's San Joaquin Valley. Under development for almost 8 years in national labs and universities, the crosshole EM technique is presently poised for the first set of commercial surveys this year.

Biography:

Michael J. Wilt received his B.S. (1973) and M.S. (1975) in geophysics from the University of California, Riverside; he received his Ph.D. from U.C. Berkeley in 1991. Between 1977 and 1984, he was employed as a staff scientist at Lawrence Berkeley Laboratory working on topics employing electrical and electromagnetic methods for geothermal and petroleum exploration. From 1984 to 1989 he was enrolled in the Ph.D. program at the University of California, Berkeley where he did research in electromagnetic sounding, resistivity monitoring and the application of the self-potential method to engineering problems. He was employed at Lawrence Livermore National lab between 1989 and 1997 where he applied electrical and electromagnetic methods for oil and geothermal field characterization and steam flood monitoring. In 1997 he joined Electromagnetic Instruments Inc where he is vice president and director of the borehole geophysics division. At EMI he leads research and

development projects in crosshole EM and extended induction logging. His main research interests are electrical, electromagnetic and potential methods. He is a member of SEG and AGU and the Geothermal Resources Council.

Speaker two: Dr. Berthold Kriegshauser, Baker Atlas
Topic: Single hole and surface-to-borehole EM imaging

Abstract:

Single hole electrical and electromagnetic (EM) measurements have been used extensively and successfully in hydrocarbon exploration. However, current state-of-the-art wireline logging tools have only a limited radial depth of investigation. In order to improve the characterization and monitoring of hydrocarbon reservoirs, it is important to probe deeper into the formation. The objective of this research is to investigate the feasibility of electromagnetic (EM) borehole logging tools that could better resolve petrophysical formation parameters, which cannot be currently reached by conventional EM logging tools.

Modern single hole wireline logging tools comprise arrays of receiver sets to better estimate the radial resistivity distribution of the formation. The trend in the industry is to acquire data at multiple transmitter-receiver separations and in the case of induction tools, over a range of frequencies. Sophisticated processing and inversion techniques are then used to derive a 2-D resistivity distribution around the borehole from the data. However, the radial depth of investigation is limited to 2 to 3 meters, at best.

In this paper we discuss two novel techniques for better characterization and monitoring of hydrocarbon reservoirs further away from the borehole. We realistically evaluated two different techniques to probe deeper into the formation. In the first approach we examined the potential and difficulties associated with a deep reading single well EM system. The second technique discusses a surface-to-borehole method applicable to hydrocarbon exploration. This technique employs a large surface transmitter and records the EM fields in the borehole.

Successful application of a deep probing logging tool requires an extensive pre-survey design - the design of the field experiment and the tool design. In this feasibility study we used state-of-the-art 3-D forward modeling algorithms and powerful interpretation concepts to analyze different formation excitation modes and different transmitter-receiver configurations for a suite of synthetic earth models. We

Reservoir Geophysics continued on page 10

Reservoir Geophysics continued from page 9

developed a realistic noise model and qualitatively and quantitatively compared various tool and survey design options using resolution analysis techniques. Advances in software and hardware enable the use of sophisticated visualization techniques to gain more insight into the complex physical behavior of electromagnetic field propagation. Visualizing the electric fields and current densities as a function of time aids in explicating resolution analysis results and helps to broaden our understanding of electromagnetic field evolution.

We concluded that a deep probing electromagnetic logging tool is feasible without major hardware constraints. The resolution of the systems suggested is within 10% for formation parameters in the vicinity of 50 m around the borehole. This system can easily be incorporated into an integrated interpretation concept with other complimentary data, such as borehole reflection seismic and VSP data.

Biography:

Berthold Kriegshauser received his M.Sc. in geophysics from the University of Cologne, Germany, in 1992 and his Ph.D. in geophysics from the University of Utah in 1997. He joined Baker Atlas in 1994 as a research scientist. His main interests include interpretation, numerical modeling and inversion of electromagnetic fields.

Contact: For more information regarding this and other GSH Reservoir Geophysics seminars, please contact: Dr. Quincy Chen, Western Geophysical, GSH Reservoir Geophysics SIG Chairman, (713)689-5778; quincy.chen@waii.com

Data Processing SIG

SIG Chair - Karl Schleicher
713-782-1234
karl@geodev.com

NOVEMBER MEETING

Date:	Wednesday November 18, 1998
Time:	4:30pm - 6:30pm
Location:	BTC Lecture Hall Shell E&P Technology Company 3737 Bellaire Blvd
Directions:	3747 Bellaire Blvd, between Buffalo Speedway and Weslayan/Stella Link. Parking is available along buildings (from street address 3737 to 3747). Additional parking is also available at the church across the street. Enter the building through Gate-2.
Cost:	NO COST
Organizers:	Bee Bednar (Advanced Data Solutions) Chengbin Peng (Shell)

ABSTRACT

Inverse scattering series for attenuating free-surface and internal multiples

A.B.Weglein, ARCO and R.H.Stolt, Conoco

There has been a rejuvenation of interest in multiple attenuation methods due to the industry trend towards ever-more complex, costly and challenging exploration plays. For example, deep-water with a dipping ocean-bottom, or a subset or sub Basalt target, raise the technology bar, and can cause serious problems for the assumptions behind traditional multiple attenuation techniques.

The inverse scattering methods for attenuating free-surface and internal multiples are specifically designed to address these challenging circumstances. It is the only method to date, for attenuating all multiples, from a multi-dimensional earth, that requires absolutely no information about velocity or structure below the hydrophones, nor iteration nor interpretive intervention. The method doesn't depend on periodicity or move-out differences between primary and multiple. Furthermore, primaries are preserved at all offsets; and thus are suitable for subsequent structural and amplitude analysis.

These methods derive from the multiple prediction apparatus that resides within the only direct multi-dimensional inversion methodology: the inverse scattering series. The first talk (R.H.S.) will describe and illustrate the free-surface method; and the second talk (A.B.W.) will present and exemplify the internal multiple algorithm.

The key prerequisites of these inverse scattering techniques are a good estimate of the source signature and the near-source traces. Current methods for satisfying these requirements will be reviewed. Open issues and remaining challenges (e.g., improved methods to estimate the wavelet and near-traces, specific shallow water issues, and 3D application) will be briefly discussed.

Near Surface Geophysics SIG

The Near Surface SIG held a meeting at the Fugro Building on Wednesday, September 23. A total of eleven interested parties attended. The highlight of the evening was a presentation by Dr. Mustafa Saribudak of Environmental Geophysics (Houston). His presentation was a case history of a combination of magnetic, ground conductivity, and time-domain EM studies adjacent to a refinery in Central America. The purpose of the study was to map bedrock depths and fracture/fault patterns to assist in building a hydrologic model to explain

Near Surface continued on page 11

Near Surface continued from page 10

contamination occurrence in a pair of lakes on either side of the refinery. The project was a complex interpretation and sparked a lot of comment and discussion among the attendees. Our thanks to Mustafa.

The Near Surface SIG will be holding its next meeting on Wednesday, November 18th.

November Meeting - Near Surface SIG

Date:	Wednesday, November 18, 1998
Time:	5:30 PM
Location:	Fugro Building, Room 160, 6100 Hillcroft (corner Hillcroft and Gulfton, 1 block south of HWY 59)
Cost:	None
Speaker:	Steve H. Danbom, Conoco, Houston
Topic:	"Reviewing Three Recent Environmental Geophysics Projects"

A series of three recently completed environmental site investigations. The projects will include a wide variety of geophysical methods from ground conductivity to high resolution 3-D seismic

Reviewing Three Recent Environmental Geophysics Projects

Frequency-Domain EM and Magnetics Used to Study Pipeline Integrity

During March 1997, geophysical surveys were done to determine whether a pipeline had abandoned or decommissioned segments that may be indicative of possible repair splices with potentially associated hydrocarbon releases. Approximately 100 frequency-domain EM profiles and 50 magnetic-field profiles were recorded.

A field, convenient to the Conoco business complex having a similar pipeline traversing it was used to make a template for this study. Deploying the EM induction instrument with antennae perpendicular to the pipeline traverse caused a profile characterized by anomalously low measured conductivity centered on the pipeline symmetrically bordered by smaller anomalously high conductivity zones. As data are gathered for different traverses of the pipeline and contoured, the result is a contour map template that clearly shows the pipeline as a prominent linear feature.

This template was compared with site data similarly acquired and contoured. Two anomalous regions were subsequently exhumed to reveal that the pipeline was indeed anomalous for the two regions isolated by the geophysical data. One of these regions had metal debris such that EM-derived conductivity measurements were conjecturable. For this area, the magnetometer data were valuable as a second confirming opinion.

Groundwater Implications of a SWMU Located by EM and Radar

In June 1997, two geophysical techniques were used at a site distinguished only by a small pile of sand and gravel. This site's proximity to a contaminated water well warranted a subsurface investigation. A multi-frequency induction instrument measuring ground conductivity was initially used in the investigation. In addition to EM responses associated with known cultural features at the site, anomalously conductive regions were located both on and just slightly offset from the innocuous sand pile.

A second geophysical technique was used to gather additional evidence for buried conductive material - the focused EM technique known as ground penetrating radar. Radar cross sections corroborated basic implications of the conductivity data, that there are anomalously conductive subsurface features. Recognizing that radar signals travel at the speed of light normalized by the square root of the dielectric constant (DEC) of the earth material, but having no experimental DEC information, a radar-derived 7.2 nanosecond/ft slowness value predicted conductive objects about 2 feet below ground surface. Subsequent backhoe operations at the site found numerous metal features at this approximate depth indicating the presence of a SWMU with associated implications for the nearby well.

Reconnaissance Site Assessment using Surface and Borehole Seismic Methods

For an August, 1997, site assessment to increase understanding of near-surface geological conditions at a Midwest products terminal, seismic data were acquired from the surface and in 25 wells. Surface CDP seismic data had an objective of the first 1000 feet of the near surface to allow a continuous interpretation of structural and stratigraphic features between borehole geophysical well logs. Five 2-D lines totaling 4.3 miles of traverse and a 3-D survey for a small portion of the site were done. For the borehole program, the sonic-log was to calibrate the surface-seismic data for time-to-depth conversion and the gamma-ray log was to distinguish predominant limestone facies from shale.

Borehole sonic-log data revealed unexpectedly high velocities for shallow geological formations. Compressional-wave velocities as high as 20,000 feet/sec were encountered within 30 feet of the surface. This was the most problematic of several pitfalls that kept the surface data from significantly contributing near-surface information. However, there was sonic-log evidence for zones of increased porosity in carbonate formations with no indication of a lithology change from the gamma-ray log. These porosity changes are most likely secondary in nature, i.e., stemming from dissolution of rock material by infiltrating water. For those zones exhibiting over 30% increases in travel time occurring over tens of feet, this secondary porosity is most likely a void. Other conclusions about this site, including wide-scale fracturing of these well-indurated rocks are consistent with published discussions of local geology. However,

Near Surface continued on page 11

this is not considered problematic to current hydraulic containment measures used to keep a local groundwater contamination on site. Only if the pressure caused by the injection wells at the site were to fall below the aquifer's normal hydrostatic pressure due to confining conditions, could any local geology perturbations have an effect on containment measures.

Biography of Steve H. Danbom

Steve H. Danbom is a Senior Consultant in Conoco's Remediation Technology Division. Prior employment was with Sun Oil Company and The University of Oklahoma. His formal education is in Mathematics (B.S., Texas Tech, 1966) and Geophysics (M.S., Texas Tech, 1969; Ph.D., U. of Connecticut, 1975). As a 30-year member of the SEG, Dr. Danbom's involvement includes local section officer, technical program chairman (Midwest Convention), and co-editor of the SEG publication, SHEAR-WAVE EXPLORATION. He has been associated with two SEG Continuing-Education activities, the latest of which is the course, "Environmental Geophysics," which he developed and teaches. He is currently serving on a National Academy of Sciences committee entitled, "Committee for Non-Invasive Characterization of the Shallow Subsurface for Environmental and Engineering Applications." His scientific interests include solving near-surface environmental assessment problems using a variety of geophysical techniques and performing human-health risk assessments.

NOTE: The Near Surface SIG will strive to meet every other month for the coming year. All geoscientists are invited to our meetings and to make presentations or offer suggestions for meeting topics. Please contact the Near Surface SIG chair, Tom Dobecki, at 713-778-5505 (tdobecki@fugro.com).

Potential Fields SIG

Location: Hess Building, 5430 Westheimer, Houston
Date: November 19, 1998
Topic: Time-Lapse (4D) Gravity Gradiometry
Speaker: Dr. Manik Talwani, Rice University/ Houston Advanced Research Center
Authors: Manik Talwani, (Rice/ HARC), Melvin Schweitzer, Walter Feldman, Daniel DiFrancesco, William Konig, Jr. (Lockheed Martin Navigation and Gravity Systems)

Abstract:

The possible use of gravity gradiometry to monitor changes in effective density of rocks and thus track fluid movement in steam or gas flooded reservoirs is examined. Time-lapse (4D) gravity gradiometry will be responsive principally to changes in fluid state and distribution and hence will be a tool for dynamic reservoir characterization and monitoring. For this method to be successful it is essential that the change in gravity gradient be large compared to the sensitivity of the gradiometer. An actual gradiometer that has been tested and used for other purposes on land is described; its capabilities are discussed and the accuracy achieved in field measurements is presented. An enhancement to the gradiometer and its benefits are also described. Gravity gradients are modeled for density changes associated with reservoir simulation models for producing fields. As expected, the gradients are largest for shallow fields with large reservoirs of high porosity where a fluid (oil or water) is being replaced by a gas (steam or natural gas). Time-lapse gradiometry will be most suitable for such fields. A typical sequence of steps for a 4D survey in a producing field will consist of modeling based on reservoir simulations (or other estimates of density changes), estimates of number of measurements and time-lapse that will be required for effective monitoring of the measurements and their interpretation. Effectiveness of a time-lapse gradiometry is compared with time-lapse seismic and microgravity experiments.

Biographies:

Dr. Manik Talwani is Schlumberger Professor of Geophysics at Rice University and founding Director of the Geotechnology Research Institute at Houston Advanced Research Center. Previously he has served as the Director of Lamont Doherty Geological Observatory and Chief Scientist with Gulf Oil's Research and development Company. Dr. Talwani obtained a Ph.D. degree in Geophysics from Columbia University and an honorary Ph.D. degree from Oslo University in Norway. He has published extensively on instrumentation, acquisition and interpretation related to potential field data. Among his accomplishments are the development of forward modeling algorithms in gravity and magnetics, which are in wide use, and the development of the cross coupling computer first used with the Graf Askania sea gravimeter. He has served as Chief Scientist on more than twenty oceanographic expeditions and was Principal Investigator for the Apollo 17 Traverse Gravimeter experiment, which has made the first and only gravity measurements on the Moon.

Melvin Schweitzer is a Manager of the Advanced Development Department of Lockheed Martin Navigation and Gravity systems. He has managed the development of numerous undersea platforms and systems for the US and foreign military. These systems included navigation, gravity, and sonic subsystems. His present work emphasizes the commercial application extension of his prior military development. He received his BEE and MEE degrees in electrical engineering from the Polytechnic University of New York.

Potenial Fields continued on page 13

Potenial Fields continued from page 12

Dr. Walter Feldman is a Senior Research Section Head in the Advanced Development Department of Lockheed Martin Navigation and Gravity systems. He was the gravity analysis Section Head that developed the Gravity Sensors System for the Trident Fleet Ballistic Submarine Navigation, and was Chairman of the Gravity Analysis committee for the Navy's Navigation Branch. His present work emphasizes the commercial extension of his prior military efforts, i.e., the development of special techniques for reducing the errors inherent in land-based static gravity gradiometers. He received his Ph.D. in electrical engineering from the City University of New York in 1973.

Daniel DiFrancesco is an Engineering Section Head and Technical Director for the Lockheed Martin Federal Systems Navigation and Gravity Systems Unit. He has been responsible for the mechanical design and analysis of the gravity gradiometer instruments, as well as serving as the Program Manager and Technical Director for the Defense Special Weapons Agency Arms Control Verification Gravity Gradiometer (ACVGG). In this capacity, he directed the successful design, assembly, test and field trials of the ACVGG. He received a B.S. degree in Mechanical Engineering from LeTourneau University in Longview, Texas in 1982.

William Konig is a Senior Research Section Head in the Advanced Development Department of Lockheed Martin Navigation and Gravity Systems. During 14 years with the company he was involved with early warning, air traffic control and weather radar systems, acoustic communications, and gravity systems for terrain characterization. In the prior 23 years at Columbia University/ Riverside Research Institute his activities included military radar systems, optical processing, infrared systems and medical ultrasonic imaging. He holds an M.E.E. Degree and a Professional Degree from Columbia University.

Technical Sessions continued from page 3

Services/ Petroleum Information in the spring of 1991, where his responsibilities included the orientation and acquisition of geophysical projects. In 1993, he left to form Global Geophysical Experts, Inc., whose expertise consists of assisting companies in executing all aspects of geophysical data acquisition of both 2D and 3D seismic programs. Mr. Buckley has worked in both the domestic as well as the international arenas gathering high quality 2D and 3D seismic data. He is a member of SEG, OCGS, and DGGS and was the past chairman for the WTGS governmental affairs committee.

Upcoming Events:

December 1-2
IT in Oil and Gas E & P
Houston Plaza Hilton
See:
http://www.srinstitute.com

December 10
Distinguished Instructor Short Course

Spring 1999
SEG Distinguished Educator Rob Stewart - U of H

VOLUNTEERS

Any volunteers who would like to assist in conjunction with the HGS in planning and setting up a Spring Social Event, please contact Jock Drummond by phone at 281-873-3901 or by email at jock_drummond@anadarko.com.

1999 FUTURE SOCIAL EVENT

The Board of the Geophysical Society would like to announce a change to the GSH Social Calendar in 1999. In conjunction with the Houston Geological Society, the GSH has proposed to have a Spring Social Event. The theme for this event in 1999 will be a "Casino Night".

In this era of Geophysical and Geological integration, it is important to offer more opportunities for the members of the two professional organizations to meet and mingle on a social basis. With this in mind, the GSH and HGS propose to organize a Spring Social Event.

The 1999 Spring Social Event will replace the 1998 Annual Christmas Party. We realize that this will be a disappointment to many of our members who have regularly attended the Christmas Party and hope that they and many others will find the Spring Event to be an appropriate opportunity to socialize with, and get to know their peers.

Attendance at the Christmas Party has been dwindling for several years despite many valiant attempts to revitalize it. The Board, after consultation with past officers, felt that this time of year was extremely busy for all and that a social event for members and spouses would be better served in the Spring.

The GSH looks forward to your support of this event and would encourage you to monitor the monthly Newsletter for continuing development.

If you have any comments or recommendations, please forward them to Jock Drummond by email: jock_drummond@anadarko.com.

NEW SEG LOGO

The 1997 SEG Council approved the adoption of a new SEG logo. Following that action, a subcommittee was formed, under the direction of Wulf Massell, 1997-98 SEG First Vice-President. The Committee proposed two logo designs for consideration of the 1998 Council, at its September 13, 1998, meeting. The first design was an elongated variation of SEG's current logo, and the second was a more modern design using the letters SEG with longitudinal and latitudinal lines. Both designs presented a broader image of the world and reflected the internationalism of SEG. Council Members voted to adopt the first design.

NOTICE:

The SEG Foundation Trustee Associates will hold a luncheon at 11:30 am on November 17 in the Texas Room at the HESS Building. This meeting will be to inform attendees about the programs of the SEG Foundation and how they can participate in the Trustee Associates. The luncheon will be free for those making reservations. For more information, contact Gene Sparkman at ERCH , 281-363-7936 or sparkman@erch.org

For more information on the SEG Foundation, see the SEG website.

NOVEMBER 1998

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1	2	3	4	5	6	7
8	9 HGS Dinner Meeting	10	11 Technical Breakfast	12 Reservoir Geophysics Seminar	13	14
15	16 HGS International Dinner Meeting	17 SEG Foundation Lunch	18 Joint Technical Luncheon Data Processing SIG Near-Surface SIG	19 NEWSLETTER DEADLINE Potiential Fields SIG HGS Emerging Technology Dinner Meeting	20	21
22	23	24	25 Technical Breakfast Westside	26	27	28
29	30					

GEOPHYSICAL SOCIETY OF HOUSTON

7457 HARWIN DRIVE, SUITE 301
HOUSTON, TEXAS 77036
(713) 785-6403

ADDRESS SERVICE REQUESTED

DATED MATERIAL:
PLEASE DELIVER BY NOVEMBER 1

Periodicals
U.S. Postage
PAID
Houston, Texas