Monday, January 14, 2002

Westchase Hilton • 9999 Westheimer
Social 5:30 p.m., Dinner 6:30 p.m.

Cost: $25 Preregistered members; $30 Nonmembers & Walk-ups

Make your reservations now by calling 713-463-8920 **(5-0-1)** or by e-mail to Joan@hgs.org (include your name, meeting you are attending, phone number, and membership ID#).

HGS General
Dinner Meeting

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New Resource from Old Fields:
Revitalizing Recovery in Shelf-bound Pliocene and Miocene-age Reservoirs, Gulf of Mexico

Gas resource ultimate recovery projections have varied greatly over the past 30 years. Recent estimates by the Gas Research Institute put recoverable domestic resources as high as 422 TCF, nearly 50% higher than estimates made by state and federal government organizations. High uncertainty in gas recoverable projections is in part due to the uncertainty of recovering resources in highly complex fluvial/deltaic/deep marine clastic reservoirs of the Gulf Coast. Heterogeneity exists on all levels. Varying complexity of depositional systems and varying drive mechanisms are the two primary factors that cause differences in the ultimate recovery from reservoirs.

The Secondary Gas Recovery (SGR) research program, carried out by the University of Texas at Austin, Bureau of Economic Geology and funded by the U.S. Department of Energy (DOE), was begun in 1988 in response to growing realization of the amount of gas resources being left unrecovered in U.S. reservoirs. It is the goal of this long-standing research initiative to seek to better resolve the stratigraphic and structural complexities and present methods to reduce uncertainty and improve gas production. The challenge is to identify a process design and enhanced technology for reducing uncertainty in between-well scale reservoir architecture characterization, to identify previously unrecognized stratigraphic and structural play types and to improve economic scenarios for field development. Outcomes must be user friendly, inexpensive to implement and non-manpower intensive. New play concepts must be of large enough scope to drive revitalization of existing fields. Prior to 1998, projects in SGR had been confined to onshore studies; however the most recent project marks the first in offshore federal waters.

Miocene strata account for approximately 40% of all hydrocarbons produced and 40% of all remaining proven reserves in the Gulf of Mexico. These units are mostly restricted to mature fields on the present continental shelf (< 200 m water depth). Two fields, Starfak and Tiger Shoal, located in the Central Planning Area of the northern Gulf of Mexico Shelf, Vermilion and South Marsh Island Blocks, are the current study area for the DOE Offshore SGR research initiative (Fig. 1). Integration of sequence stratigraphy, conventional interperative and attribute extraction geophysical methods, well-log analysis and seismic-to-petrophysics transform and three-dimensional reservoir flow simulation modeling have been used to identify bypassed resources and new nontraditional targets across the area. At certainty, estimates now suggest the possibility of at least 300 Bcf of additional resources available for exploitation within the study area.

Starfak and Tiger Shoal fields are located in offshore Louisiana immediately north of the Salt Deformation Province. Although the area's large-scale structural folds are a product of deep salt movement, geologic conditions here are structurally simple as compared with the complex diapiric deformation that occurs to the south. The fields are associated with several subregional normal faults and associated antithetic faults that are responsible for additional structural partitioning within these two large fields (Fig. 2, *pg. 17*). Depositional environments across the study area range from subaerial incised valleys to deltaic to deep marine basin floor fans (Fig. 3, *pg.17*). The section is progradational, punctuated by higher-frequency flooding and transgressive events. Sediments prograded from north-to-south.

HGS General Dinner *continued on page 15*

HGS General Dinner Meeting ——— continued from page 13

Several stratigraphic trap types, as well as secondary structural traps exist unexploited across the study area. Resources show systematic preferential distribution within seven play types. New seismic methods and attributes have been developed to improve seismic interpretation and inversion of data to petrophysical parameters for population of three-dimensional reservoir models. Seismic geomorphology and sedimentology provide a detailed look at the architecture of these complex reservoir/seal systems (Fig. 4, *pg. 19*). Several new targets have been tested by industry partners and proven successful. These results are being extrapolated into a more regional area utilizing previous play classification work by BEG and Mineral Management Survey researchers and will provide the roadmap by which resource growth and new opportunity can be exploited throughout the Gulf of Mexico. □

Figures 2–5 are on pages 17 and 19.

For digital abstracts and extended abstracts visit
http://www.beg.utexas.edu/resprog/sgr/index.htm.

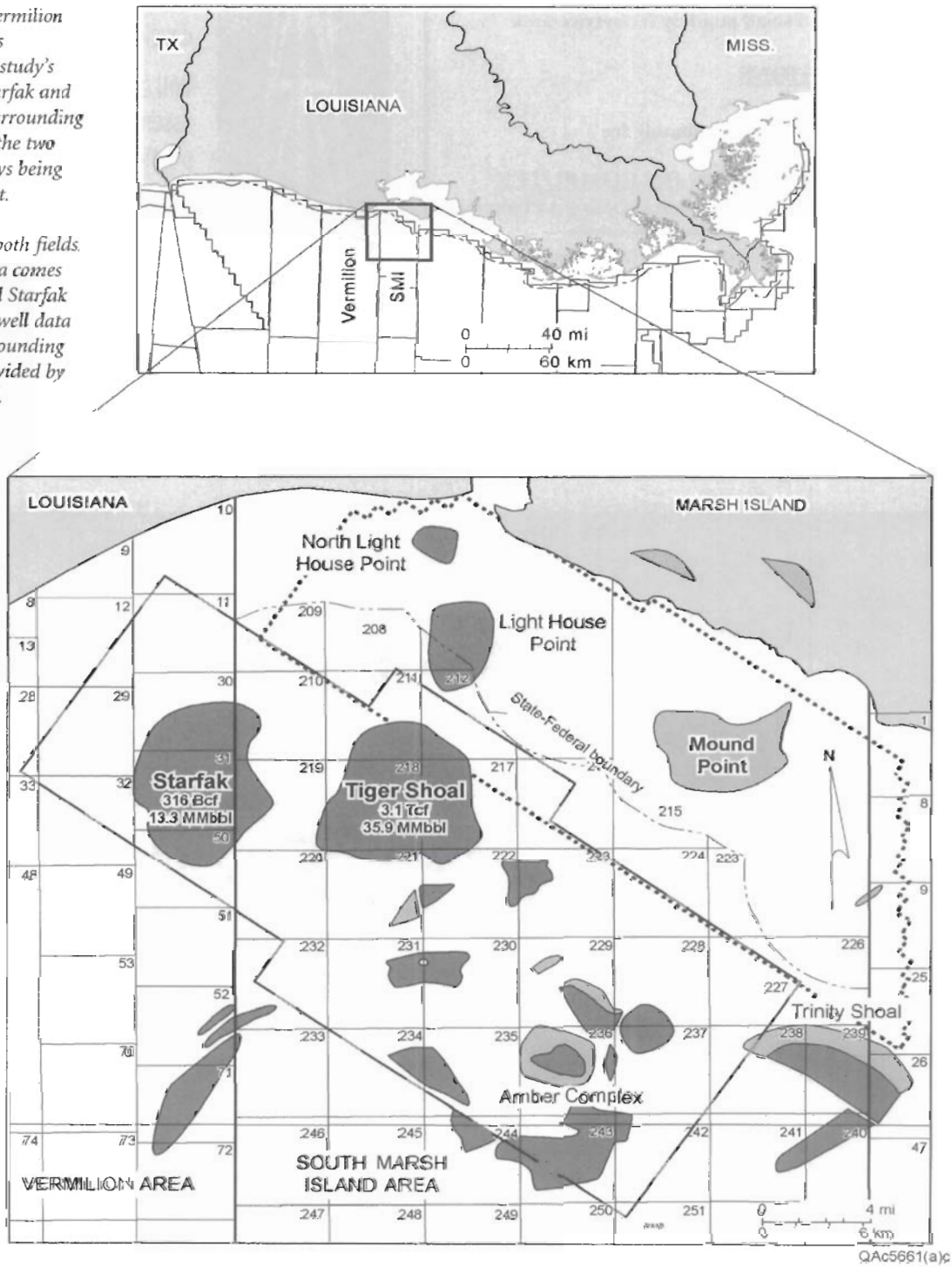

Figure 1. *Map of the Vermilion and South Marsh Islands (SMI)areas showing the study's primary target fields, Starfak and Tiger Shoal, as well as surrounding fields and the outline of the two major 3-D seismic surveys being used in the OSGR project. Pre-project resource estimates are shown for both fields. Well and production data comes from the Tiger Shoal and Starfak fields. Select additional well data were available from surrounding fields. All data were provided by industry partner, Texaco.*

HGS General Dinner *continued on page 17*

HGS General Dinner Meeting *continued from page 15*

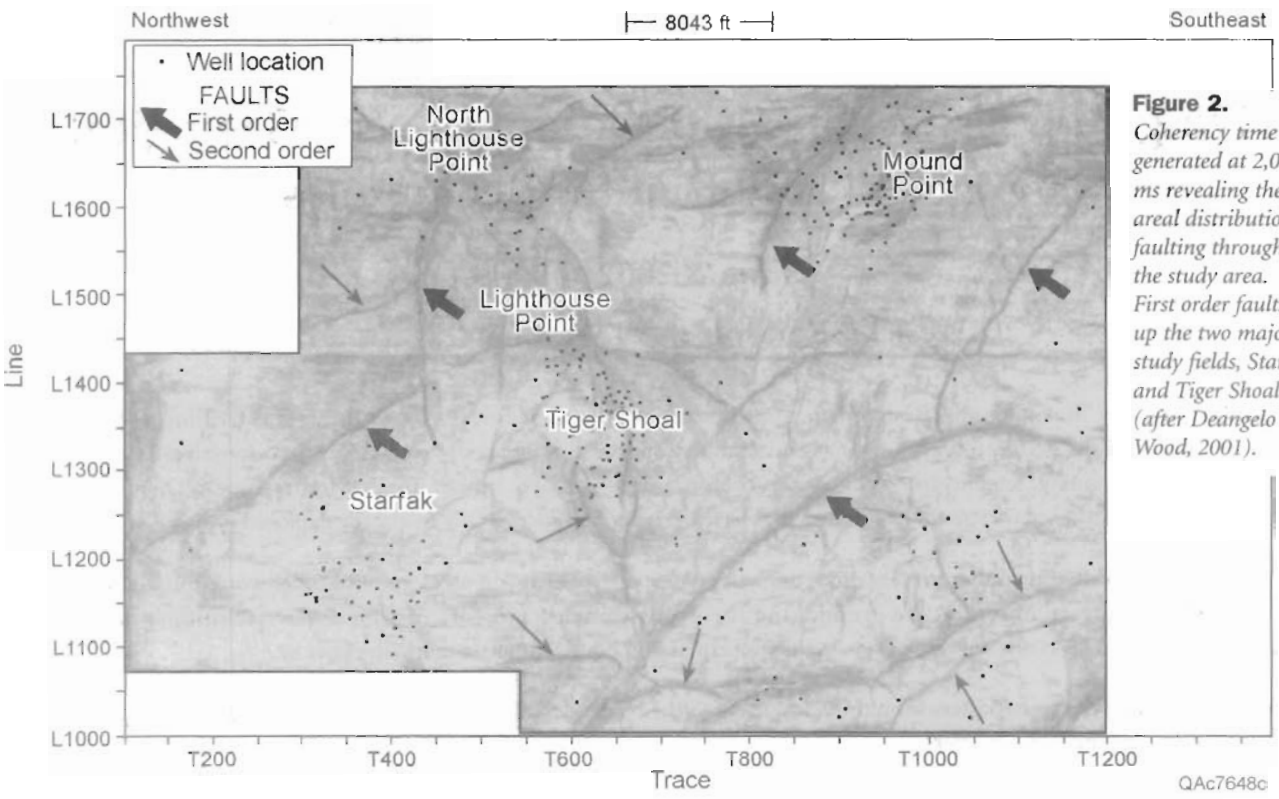

Figure 2. *Coherency time slice generated at 2,000 ms revealing the areal distribution of faulting throughout the study area. First order faults set up the two major study fields, Starfak and Tiger Shoal (after Deangelo and Wood, 2001).*

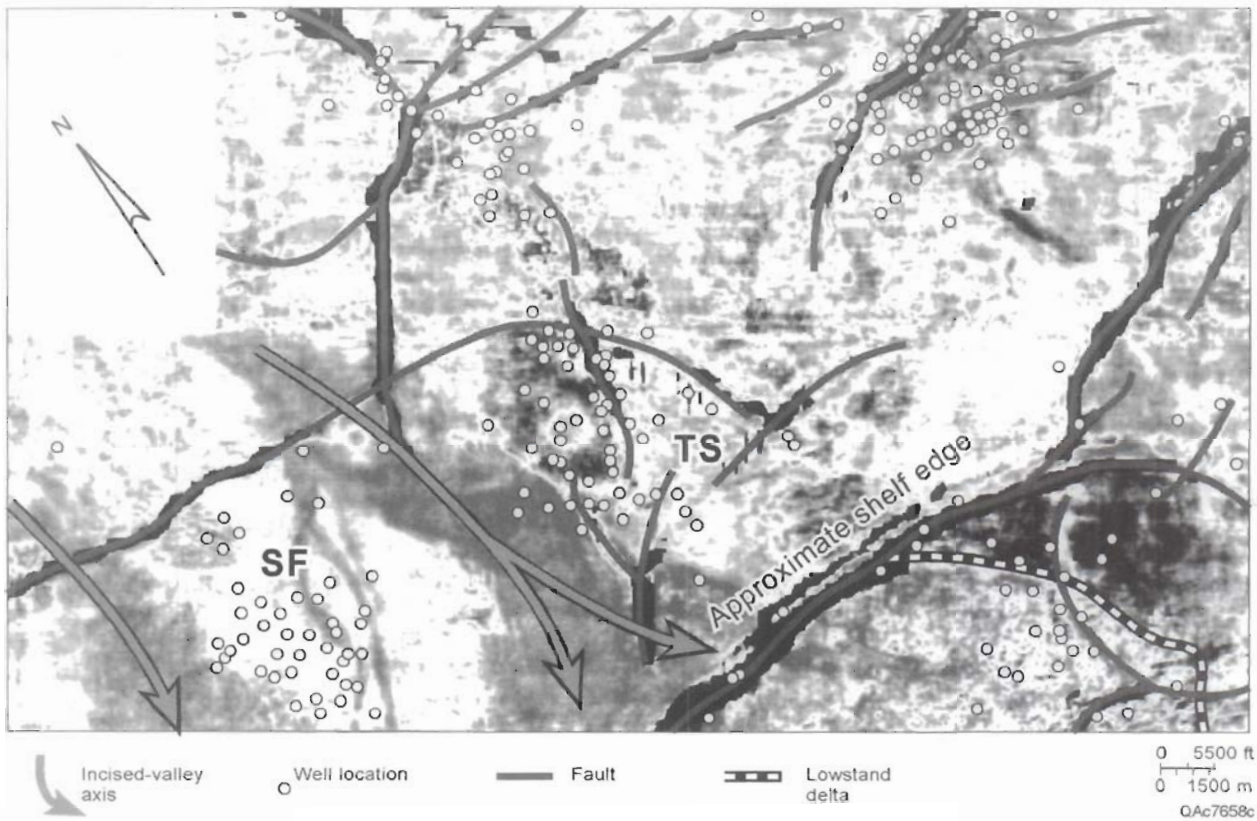

Figure 3. *Amplitude stratal slice just above sequence boundary 18 illustrating the lowstand deltaic wedge and incised-valley fill of third-order sequence seven within the general area of Starfak (SF) and Tiger Shoal (TS) fields. Valley systems fed a lowstand deltaic wedge approximately 3.5 miles southeast of the fields.*

HGS General Dinner *continued on page 19*

HGS General Dinner Meeting *continued from page 17*

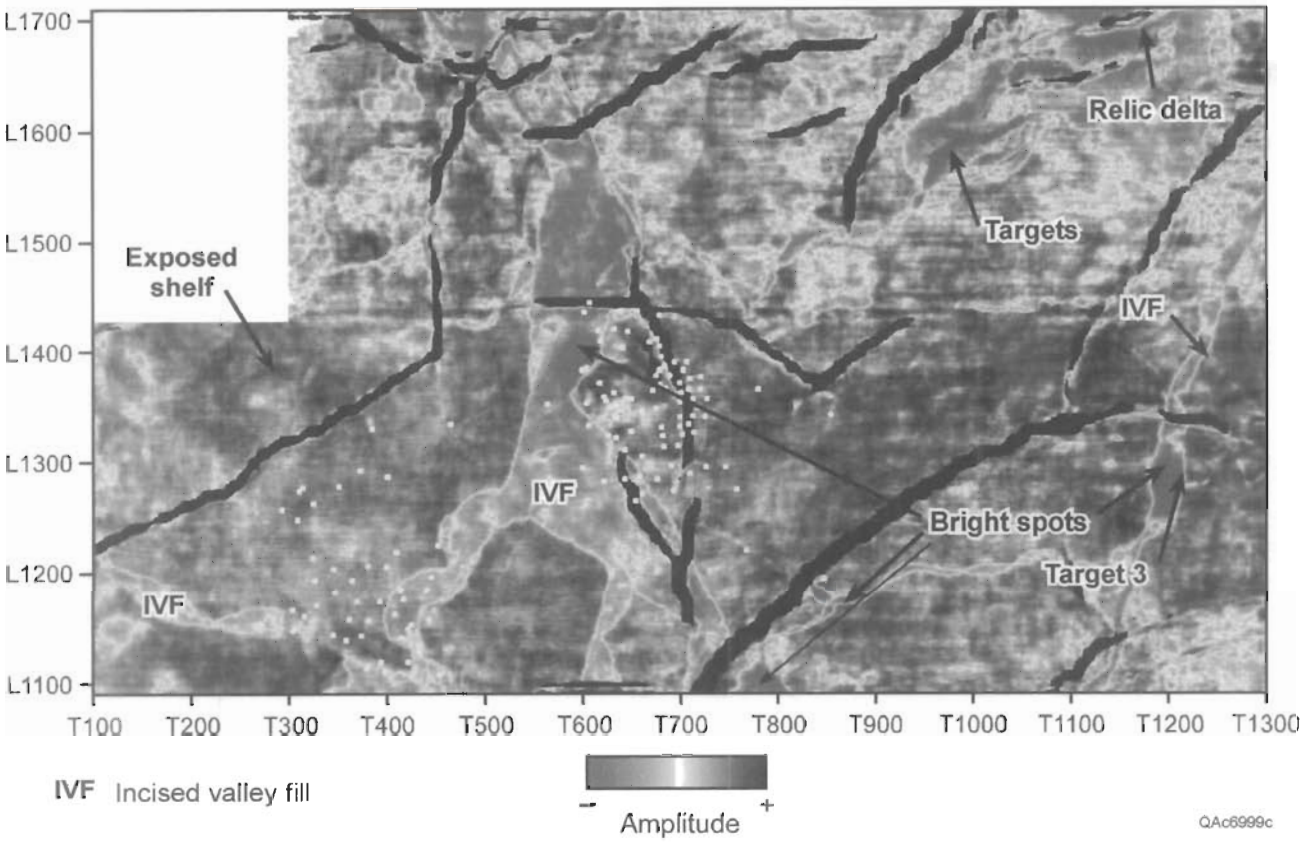

Figure 4. *Seismic sedimentology and geomorphology can add a great deal of understanding to the architecture and potential for stratigraphic traps within an area. Here stratal amplitude slices reveal an upper Miocene valley incising in and around the two study fields. Several incised distributary channels can also be seen. Texaco successfully tested the Target 3 resource-addition opportunity in 2000, and found BCF of gas.*

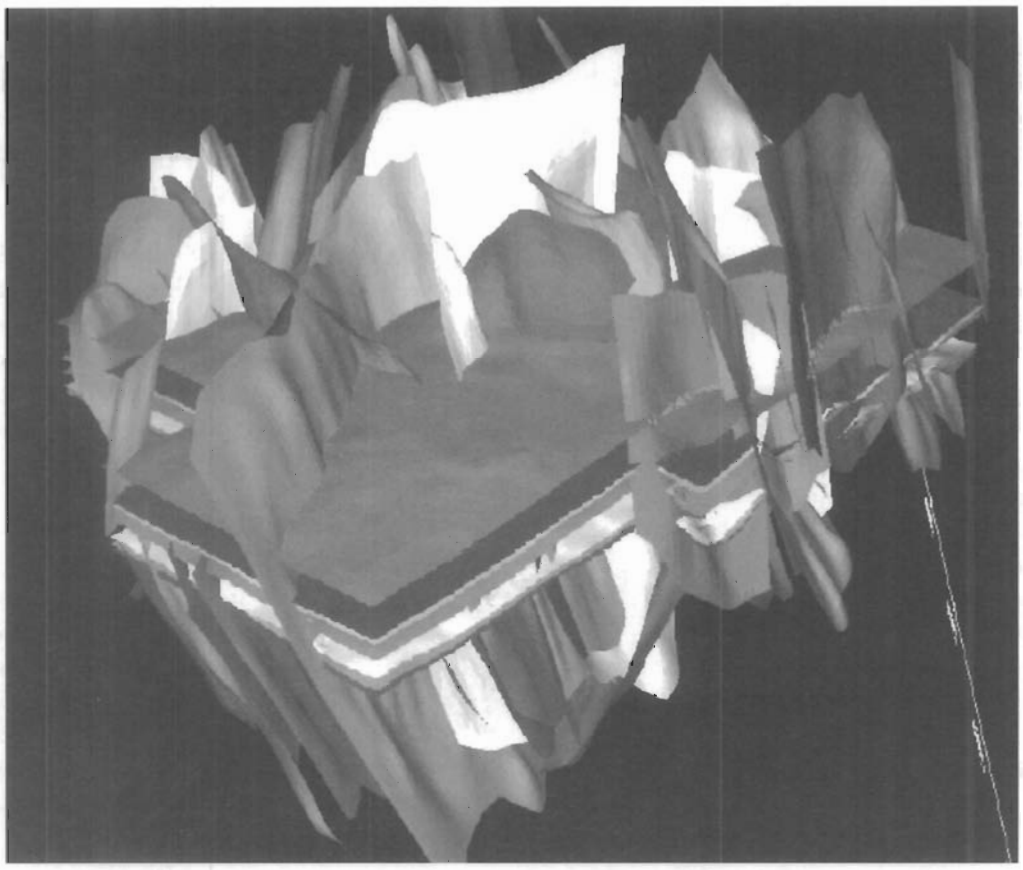

Figure 5. *Regional-scale 3D model generated using Roxar modeling software shows 7 maximum flooding surfaces (about horizontal) and 73 first- and second-order normal faults (high angle surfaces) that create a geologically complex fluid migration system typical in the fields of offshore Louisiana in the northern Gulf of Mexico.*