Westchase Hilton • 9999 Westheimer
Social Hour 5:30–6:30 p.m.
Dinner 6:30–7:30 p.m.

Cost: $30 Preregistered members; $35 non-members/walk-ups

To guarantee a seat, pre-register on the HGS website & pre-pay by credit card.
Pre-registration without payment will not be accepted.
Walk-ups may pay at the door if extra seats are available.

Alan R. Huffman
SIGMA³ Integrated
Reservoir Solutions Inc.

Geohazard Prediction in Deepwater Wells: When the Reservoir Becomes the Enemy

In recent years, drilling safety requirements have become more challenging as ultra-deep wells have demonstrated that basic undercompaction models are inadequate to predict pressures in high pressure-high temperature (HP-HT) environments. The requirements of these wells have forced pressure prediction to adapt to environments where diagenetic processes and hydrocarbon maturation are dominant (unloaded environments), and where chemical compaction takes over from undercompaction as the dominant factor in determining rock property changes (secondary compaction environments). Adding to the complexity of the pressure prediction process is the interplay between shales and reservoir rocks.

As pressures and temperatures increase, the window between the formation pore pressure and fracture pressure narrows. In HP-HT environments, the lateral extent, structural position, and architecture of the reservoirs become much more critical to the viability of a prospect. They also determine the range of safe depths where a specific reservoir can be penetrated without the risk of a pressure influx that could jeopardize the drilling operation. In this setting, geopressure prediction and reservoir pressure computation become essential components of the prospect risking exercise. While the explorationist desires large reservoir bodies in deep prospects to allow sufficient reserves to justify the high cost of an ultra-deep well, he must also recognize that large reservoir extents can threaten the viability of the prospect. To mitigate this risk, the exploration team must use all the available information to determine the extent of the reservoir, its structural position, and its interaction with faults and other potential flow conduits. This information can then be integrated with 3D shale pressure volumes to predict column heights for specific fluids and the reservoir pressures at any specific penetration point in the subsurface. The accurate prediction of the reservoir pressures at a specific penetration point can be the difference between an efficiently managed drilling operation and a potentially catastrophic pressure influx event. ■

Biographical Sketch

ALAN R. HUFFMAN is a recognized technical and business leader with over 25 years of experience in international exploration and production. He received his bachelor's degree in geology from Franklin & Marshall College in 1983 and his Ph.D. in geophysics from Texas A&M University in 1990. In 1986-87, he was privileged to perform the seismic hazard analysis for the successful proposal for the Superconducting Supercollider in Waxahachie, Texas. In 1989-1990, he served as Science Manager of DOSECC, the U.S. Continental Drilling Program.

As the Chief Technology Officer of SIGMA3 Integrated Reservoir Solutions LLC, Dr. Huffman manages the technical operations and technology development of the company. Prior to the merger with SIGMA3, Dr. Huffman served as the Chairman and CEO of FusionGeo Inc. where he was responsible for the strategic growth and expansion of the enterprise since 2003. He was the primary architect of Fusion's rapid growth from a small consulting practice to a global business enterprise with over 300 clients and offices in multiple countries. Dr. Huffman was also the Lyssa & Cyril Wagner Professor of Geology and Geophysics in the School of Geology and Geophysics at the University of Oklahoma in Norman, OK in 2003 and 2004.

From 1997-2002, Dr. Huffman was Manager of the Seismic Imaging Technology Center (SITC) with Conoco. In this role, he managed the geophysical technology division of Conoco, with responsibility for worldwide technology development and technical services. From 1990 to 1997 at the Exxon Corporation, he worked as a technology specialist on exploration and production projects in the United States, West Africa and the Far East, and was also actively involved in technology and software development.

Dr. Huffman is a recognized industry expert in the fields of geopressure prediction, shallow hazards prediction, direct detection of hydrocarbons, and exploration risking. He is active in industry and professional affairs, having chaired numerous technical conferences and having served on organizing committees for the Society of Exploration Geophysicists (SEG), the American Association of Drilling Engineers, the American Association of Petroleum Geologists (AAPG), and the Society of Petroleum Engineers. He was the recipient of the 2004 Robert H. Dott, Sr. Memorial Award from the AAPG for the publication of AAPG Memoir 76 and he also received the 2002 Best Paper Award from the SEG. He has published numerous papers in refereed journals, authored articles in international publications, and prepared 40 abstracts. He has nine U.S. patents in the field of geophysics.