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Past, Present, and Future Applications of 3-D Seismic in the Permian Basin

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Use of 3-D seismic in the Permian Basin has exploded since 1989 after early successes were publicized. Initially, the technology was applied in several selected plays; today, most, if not all, active trends/plays in the basin have been shot with one or more 3-D surveys. This talk will briefly review past, present, and future uses of 3-D seismic in the Permian Basin, as well as related practical and philosophical issues.

The Past

While 3-D seismic was shot in the Permian at least as early as 1973, the current boom can be attributed mainly to several exploration applications in the late 1980s and early 1990s: imaging reefal buildups in the Horseshoe Atoll area, and Wolfcamp debris flows in the Midland Basin. In addition, Unocal's success with 3-D in the Dollarhide Field confirmed the value of the technique for field development and extension.

The Present

Today, 3-D surveys have been shot in nearly every trend in the basin, for exploration and field extension/development applications. Producing field applications (e.g., locating infill wells, detailed interwell reservoir characterization, attempts to monitor secondary, etc.) and exploration applications (e.g., generating prospects, delineating previously defined leads, locating wells prior to drilling, and delineation after the exploratory test) will be discussed in detail. Other applications with tremendous promise, as well as issues that are contributing to 3-D failures, will also be presented.

The Future

Areas of improvement may include: (1) increased utilization of seismic attributes, along with techniques such as inversion; (2) improvements in our ability to image complex structures; and (3) ability to better account for surface and near surface complications.

Biographical Sketches

Jim Geitgey has eleven years of petroleum exploration experience and is currently a partner and petroleum geologist with Range Exploration, a prospect generating firm that specializes in 3-D projects. He received B.S. and M.S. degrees in geology from the Ohio State University, and is an AAPG Certified Petroleum Geologist. During a nine-year career with a major oil company, he gained experience in the Offshore Gulf of Mexico, Permian and Anadarko Basins. He has been involved in the initiation and interpretation of 3-D surveys since 1989, including involvement in approximately 200 square miles of 3-D in the Permian Basin.

Paul Barwis, currently a partner and petroleum geophysicist with Range Exploration, has seventeen years of professional experience and a B.S. in physics from Temple University. During a sixteen-year career with a major oil company, he worked the Onshore and Offshore Gulf of Mexico, and the Permian Basin. He has been heavily involved in the planning, acquisition, and interpretation of 3-D seismic throughout his career, including involvement in over 300 square miles of 3-D in the Permian Basin.

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