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The Geophysical Impact of Salt in the Enchilada Area, N.E. Garden Banks

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The Greater Enchilada-Salsa Area (ESA) is located in the Flex trend, offshore Louisiana (water depths 500 to 1,500 ft.), approximately 200 miles southwest of New Orleans. Primary recoverable reserves for the Enchilada project include volumes from a historic discovery at prospect Elmer and recent discoveries at Enchilada, Salsa, and Chimichanga. Subsurface interpretation of ESA involves a series of technical issues. Challenges associated with a strongly sloping water bottom and shallow, rapid lateral velocity changes can result in seismic positioning uncertainties deeper in the section. Additionally, the upper section is characterized by an abrupt transition into "strong overpressures" associated with a subregional layer of highly channelized, rotated blocks at depths of 5,000 to 8,000 ft.

The Aspen salt structurally dominates the Enchilada area. At its northern edge in the South Marsh Island area, it rises as a thick and massive salt dome to nearly the seafloor. Immediately to the south, the salt abruptly thins and collapses to form a deep evacuation, synclinal minibasin. It then rises again, to a depth of about 6,000 ft, forming an east-west triangular ridge on which the Elmer discovery is located. Along its southern limit, the salt expands as a tabular body of about 2,000-ft thickness at a depth of 9,000 ft. Both the Enchilada and Chimichanga discoveries in the upper Pliocene section are located adjacent to and/or under the Aspen salt. This stratigraphic interval is interpreted to be a near-slope channel-levee turbidite complex mappable in a north-south direction for over 10 miles. Its channelized nature dictates a requirement for accurate and detailed geophysical imaging to reduce uncertainty for both trap definition and early estimation of reservoir characteristics. The Aspen salt-top is reasonably well imaged, with numerous overhangs and a complex, topographically irregular surface, including mappable faulted offsets. Data immediately below the base of salt is degraded by complex ray paths, multiples, and converted-mode energy. Primary Enchilada and Chimichanga development will take place with wells penetrating the salt.

Technical challenges associated with imaging, well planning, and field development have been successfully tackled with prestack depth migration and detailed 3-D volume modeling. The generation of detailed, complex salt bodies for immersion in the sedimentary velocity field has allowed alternative salt models to be quickly tested and an improved 3-D depth image to be ultimately reached.

Biographical Sketch

Dr. Rocky Detomo, Jr., received his B.Sc. and M.Sc. degrees in physics from Ohio State University in 1973 and 1975, respectively. He then served as a research associate at the Ohio State University Van de Graaff Accelerator Laboratory, where he received his Ph.D. in experimental nuclear physics. In 1981, Rocky joined Shell Western E&P as a geophysicist, where he supervised land acquisition and seismic processing teams and interpreted data in Michigan, Arkansas, Colorado, Montana, Oklahoma, West Texas, Washington, and California. From 1987 to 1991, Rocky served as SWEPI's exploration computing coordinator, initially responsible for supercomputing deployment and then for personal workstation deployment in E&P. Since 1991, Rocky has been interpreting for the Shelf Division of SOI in the Gulf of Mexico, focusing on complex structural and technically challenging areas. He has been the geophysical interpreter for Enchilada since 1995. ■