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Burgos Basin Play Analysis Reveals Frio-Vicksburg Exploration Focus Areas

Recently, Scotia and Pemex completed a detailed analysis of the Burgos basin's Frio-Vicksburg play to identify future exploration focus areas. The Frio-Vicksburg play is one of five Tertiary producing trends, which are, from the west to east, Paleocene-Eocene, Wilcox-Queen City, Jackson-Yegua, Frio-Vicksburg and Miocene. The Frio-Vicksburg and Wilcox-Queen City plays together produce 97% of the gas in the Burgos basin. The Frio-Vicksburg play alone has produced more than 4.1 tcf.

This study involved the regional mapping of major structural elements, definition of the Frio-Vicksburg stratigraphic framework, mapping of depositional systems, reservoir sands, well performance and show data, and integration and comparison with the Frio-Vicksburg in south Texas. Fifty-two subplays were identified within 13 stratigraphic units across the study area, which were recombined into six plays to aid in comparison with south Texas producing analogs. Plays were then ranked and stacked to identify future focus areas.

Three structural provinces are recognized across the study area. In the northwestern part of the Burgos basin, Vicksburg expansion dominates the first province, whereas in the second province, east of the Frio Francisco-Cano fault system, an expanded Frio section dominates. The third province is distinguished by a northeast- to southwest-trending normal fault system that extends across the entire southern half of the study area.

The top of the Frio formation is relatively unstructured in the

Burgos basin and displays a north-south structural grain and gentle east dip. Significantly more structural relief exists at the Lower Frio SB30 level, particularly east of the Francisco-Cano expansion fault. Sediments outcrop in the west and reach greater than 5,000 m in the east. Both the Frio and Vicksburg traps include high-side and low-side fault-dependent structures and combination structural-stratigraphic traps.

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Depositional systems mapping and play analysis

Depositional architecture mapping has identified major depositional systems that include

- Bedload and coastal streamplain systems
- Fluvial and wave-reworked delta systems
- Strandplain and barrier lagoon systems
- Inter-deltaic embayments
- Shelf and slope systems.

The most dominant subplays include those in the barrier-lagoon and wave-reworked delta systems, which together make up 24 of the 52 subplays. These cover 34% of the total area, yet contribute 74% of the Frio-Vicksburg production. The next largest contributors are

bedload-fluvial and fluvial-dominated deltas, which cover 19% of the total play area and have contributed 18% of the Frio-Vicksburg production. Both shelf and slope have been historically poor producers, while interdeltaic embayment subplays have no production to date.

Comparison with Texas analogs

South Texas is geologically and geographically contiguous with the Burgos basin and, because of its maturity of hydrocarbon exploration and development, offers a unique opportunity for >

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providing insight into the future potential of the Burgos basin. In the simplest comparison, significantly more wells have been drilled in Texas than in the Burgos basin, over 83,000 wells in Railroad District 4 (RRD4), some 28 times more than the 2,900 wells drilled in the Burgos basin. Similarly, there are currently 9,299 producing wells in RRD4, compared with 800 in the Burgos basin. To facilitate comparison between Texas and the Burgos basin, the Frio-Vicksburg trend was divided into six play regions based on tectonic and depositional systems and hydrocarbon trapping styles. Four of the Texas plays can be correlated with major producing regions in the Burgos basin. ■

Conclusions

There is considerable exploration potential and reserves growth opportunities from field rehabilitation in Mexico's Burgos basin. The greatest potential in Vicksburg reservoirs is interpreted to exist in the deeper stratigraphic units where extending the structural mapping along trend from current production may define additional anticlinal closures. Shallower Vicksburg and Frio units also have potential in untested fault blocks. In the

deep Frio unit, rollover anticlinal traps south of the Reynosa-McAllen fault zone and fault traps along other major growth faults are expected.

Biographical Sketch

MARK A. COCKER is senior vice president of geology for The Scotia Group, Inc., Houston, a full-service oil and gas advisory group, providing consulting services in exploration and development, reserves analysis, and property valuation. He has over 25 years' domestic and international experience in the industry, conducting geological studies from prospect to basin scale, and has been involved in studies in Mexico for the last four years. Mr. Cocker holds a BS Honors in geology from Aston University in Birmingham, England. He is a member of AAPG, SPE, SPWLA, and the Houston Geological Society.

