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Source Rocks, Reserves and Resources in the Neuquén Basin, Argentina: Mass-Balance Approach and Exploratory Potential

The back-arc Neuquén depocenter was implanted during the Jurassic-Cretaceous on the western convergent margin of the South America Plate. Behind an active magmatic building, several expansion-retraction events of sea realm were in tune with global eustatic oscillations. The resulting sedimentary column contains numerous cycles consisting of organic-rich shale units, clastic, carbonate and volcanic reservoirs, and a variety of efficient seal packages (evaporites and shales).

Basinwide source rocks are the Toarcian and Kimmeridgian marine shales. Thermal maturity increases westwards according to thickening of the sedimentary pile, where generation started in the Berriasian-Tithonian and Middle Albian, respectively. Timing of generation and migration explains the dominant presence of gas associated to the oldest unit, whereas most of the black oils correlate with the youngest interval. Comparatively lower hydrocarbon volumes were generated during the Tertiary along the western Cenozoic-uplifted thrust belt, from a Late Valanginian-Early Hauterivian marine-shale section. Minor amount of oil was sourced by a lacustrine interval accumulated in the Early Jurassic within deep half-grabens located in the eastern margin of the basin.

Eighty years of exploration and subsequent development effort has identified a EUR of 9.7 BBOE and yields a daily production of 760 MBO and 5 BCFG. Known plays bear around 1.9 BBO and 17.5 TCFG of proven and probable reserves.

Better understanding of petroleum systems and continuously improving technology allow the development of new play concepts with lower uncertainty level. The current analysis of the generation-accumulation efficiency leads to infer high potential for finding additional petroleum resources.