

Hydrocarbon Prospectivity of Offshore El Salvador and Guatemala

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9.29.2020 - 10.1.2020 – AAPG Annual Convention and Exhibition 2020, Online/Virtual

Abstract

Gravity data indicates the Sandino basin of offshore Nicaragua extends into offshore of El Salvador and Guatemala. The basin is a forearc basin situated between an outer-arc high and the mainland. The regional geology of the San Joaquin basin of California, the Guerrero terrane of southern Mexico, the offshore Sandino basin of Nicaragua, and the basement Nicoya complex of Costa Rica were studied and projected into offshore El Salvador and Guatemala. The study indicates that the unexplored offshore basin in these two countries has substantial hydrocarbon prospectivity. Pacific Ocean currents drive coastal upwelling along continental margins. The organic matter found in the black shales of the San Joaquin Valley, California and in Central American countries is composed of marine plankton such as diatoms and radiolarians. When these floating organisms die, they sink and accumulate as organic-rich siliceous oozes on oxygen-deficient sea floors. Radiolarian cherts and mudstones are present in outcrop in Central America. On the Nicoya peninsula of Costa Rica, the black shales of the Cretaceous Loma Chumico Formation contain Types I and II kerogen with a total organic carbon content averaging 10%. These exposed Cretaceous source rocks probably extend to the northwest beneath the Sandino basin. The Guerrero terrane of southern Mexico was accreted to the North American block in Late Cretaceous. Gravity data indicates the terrane extends beneath the Tertiary basin offshore Guatemala and El Salvador. Cretaceous black shales and black limestones found in outcrop along the Pacific coast of Mexico may be potential source rocks where buried deeply offshore. Reservoir rocks offshore El Salvador and Guatemala are expected in the Upper Cretaceous, Eocene, Miocene, and Pliocene. In Honduras and El Salvador the Mesozoic section was uplifted and folded in Late

Cretaceous. This includes the sand-rich Jurassic Todos Santos formation which, when eroded could be a source of quartz sand for the Paleocene through Pliocene formations deposited offshore. Burial history modeling indicates petroleum generation from Cretaceous source rocks in the Sandino basin began in the Oligocene and continued to the present. Oil migration was primarily to the west, toward the outer high. Faults in the basin should allow vertical migration into Tertiary reservoirs.