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### **The Las Ventanas Fractured Reservoir Play: A La Paz Field Look-Alike in the Catatumbo Basin of Colombia**

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The Catatumbo Basin of Colombia (500 MMBOE cum.) is the southwestern updip portion of the prolific Maracaibo Basin of Venezuela (35 BBOE cum.). While Tertiary clastics make up the majority of production in both areas to date, Cretaceous low porosity fractured carbonate rocks from the Tibu Fm of the Uribante Group in the Catatumbo Basin have flowed hydrocarbons from the Tibu Field and from the Rio de Oro-14k well along the basin margin. The fractured reservoir characteristics and tectonic deformation of these carbonate rocks are very similar to those of the time equivalent La Luna Fm and underlying Cogollo carbonates of the Maracaibo Basin in the giant La Paz Field (830 MMBOE cum.) and the deep productive carbonate section of Blocks I and IX in central Lake Maracaibo. Also, production has been established regionally from similar carbonate rocks of equivalent age to the west at Emerald Mountain Field in the Magdalena Basin of Colombia. Similarities in reservoir and fracture characteristics have been established by production histories and by direct observation of approximately 9,000 ft of core from the La Paz Field, the Blocks I & IX of central Lake Maracaibo and from the Rio de Oro-14k well in the Las Ventanas area.

Multiple generations of tectonic fractures are observed in cores from all of these areas depicting fractures associated with regional stress patterns, normal faults, thrust faults, and strike-slip faults. Fractures and faults associated with local wrench faulting appear to be most important for significant production in this rock package. Wrench-related structures occur in abundance in the Catatumbo Basin along the western margin of the Basin. This tectonic basin margin is dominated by the large north trending Catatumbo Flexure. The flexure is dextral transpressional zone juxtaposing the Cretaceous and Tertiary sedimentary basin on the east with the basement cored Santander Massif uplift to the west. Numerous secondary faults and folds emanate from this right-lateral slip zone and extend eastward into the basin. These folds and faults develop both the fractures and closure needed for production. In addition, oil seeps along the flexure indicate that the ramp dip up to the west into the flexure is, and has been, an operative hydrocarbon migration pathway.

The poster presentation will highlight tectonic and fracture system similarities between the prospective Las Ventanas area and the historic productive areas of the Maracaibo Basin proper at the Cretaceous carbonate level.