Revitalization of the Mature Parrylands Field, 
Southern Basin, Trinidad

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Abstract:
The mature onshore Parrylands oil field is located South Trinidad, northeast of the Los Bajos Fault. The area covers 2,397.4 acres and has approximately 1,005 wells drilled since 1913. The Pliocene and Miocene aged Forest and Cruse Formations are the primary producing reservoirs in this field and has produced total cumulative reservoir fluids of 51,588,962 BO, 13,931,000 BW and 10,586,936 MSCF till June 2014. The Cruse reservoir sequence is represented by older turbidite deposits and submarine fan complexes to the younger wave-dominated deltaic and incised valley-fills. While the Forest reservoir is represented by barrier island complexes to fluvial and tidal deltaic deposits. The reservoir trap is an anticline with syn- and post depositional normal faulting that further disrupts reservoir continuity and traps hydrocarbons behind fault/dip structures. Oil production in this field is dominated by shallow wells that have been drilled to encounter the Forest and Cruse reservoirs leaving the deeper Lower Cruse turbidite deposits under-drilled or partially penetrated in some areas. Historically, no active infill drilling targeting the Lower Cruse horizons were carried out in the Parrylands field between 2006 to 2010. This was due to the fact that the highly produced shallow Cruse formation in certain fault blocks were considered depleted by conventional standards (volumetric calculations). Additionally, the deeper Lower Cruse turbidities were too much of a risk to pursure because of geological uncertainty and no available seismic data prior to 2010. Understanding the challenges faced in this mature acreage coupled with the need to increase oil production in a timely manner, an in-depth geological and reservoir study was carried out to highlight under-produced fault blocks and to select and drill wells with multiple targets.

A focused work plan was also implemented to drill wells with a greater number of semi-appraisal sections down to 4,500 feet to encounter new hydrocarbon discoveries in the deep Lower Cruse, coupled with prompt follow-ups and acquisition of bottom hole pressure data. Heavy oil opportunities were also highlighted in the shallow Cruse formations. Petrotrin drilled and completed a total of fourteen wells in several areas of the Parrylands field from October 2010 to July 2014 ranging from 12 to 32 Degree API. Parrylands primary production increased from 830 BOPD to a peak oil production of 1,418 BOPD during this active drilling period, with an average production of 1,000 BOPD. The infill drilling campaign has yielded a cumulative oil production of 280 MBO and desirable results with wells generally coming into production at 70-90% of the expected initial production. Two of the three Lower Cruse wells drilled in areas of limited well spacing and flagged as depleted blocks continue to exhibit flowing production possibly due to by-passed oil due to reservoir heterogeneity. Two wells penetrated and are currently on production from the deep Lower Cruse horizons. The challenge in drilling infill wells in the mature Parrylands field is not without its risks and require further in-depth technical studies and improved technologies in actively targeting follow-ups in the Basal Sands of the commercially viable Lower Cruse.