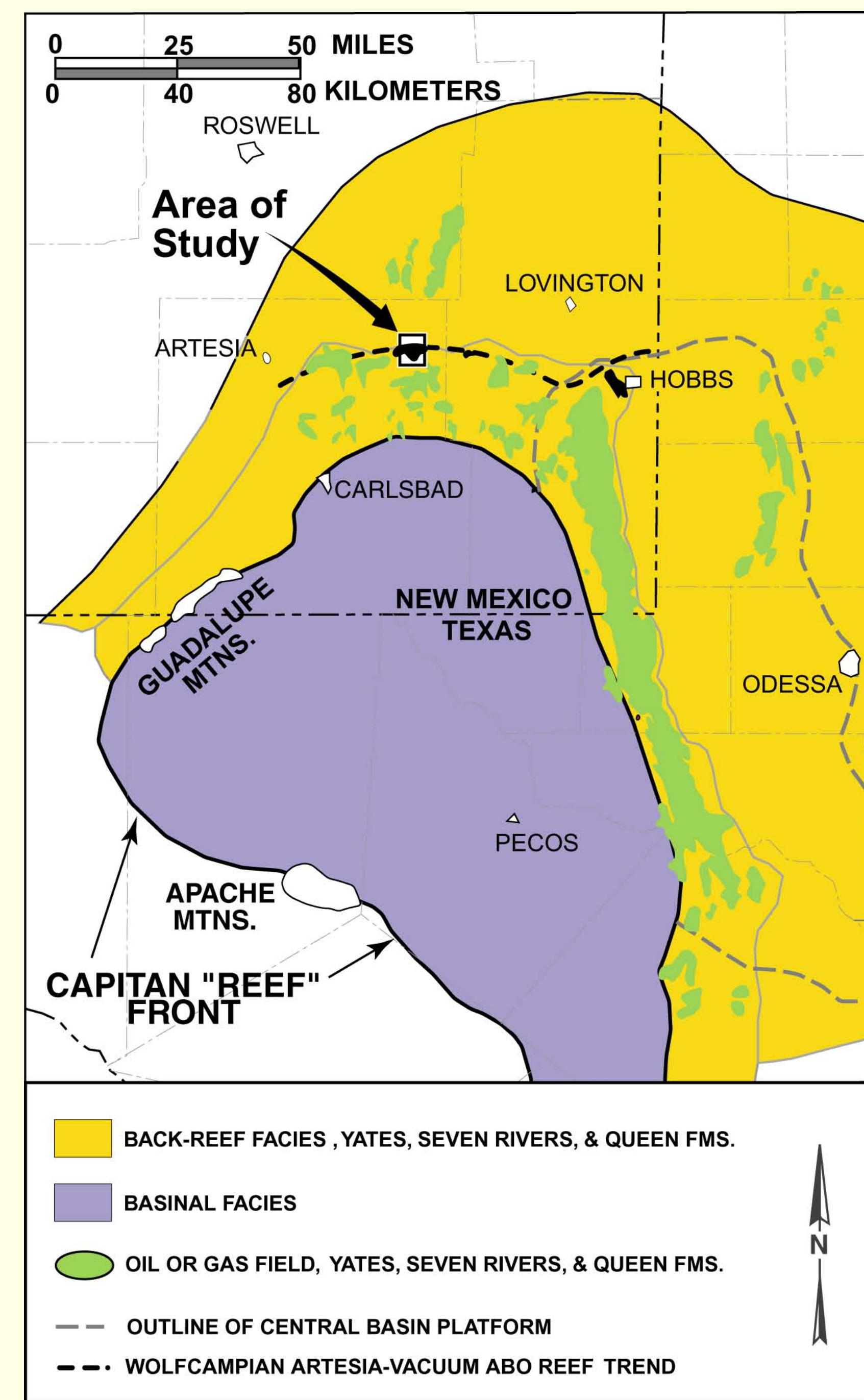


Interpretation of Depositional Environments of Upper Seven Rivers Formation from Core and Well Logs Grayburg Jackson Pool, Eddy County, New Mexico

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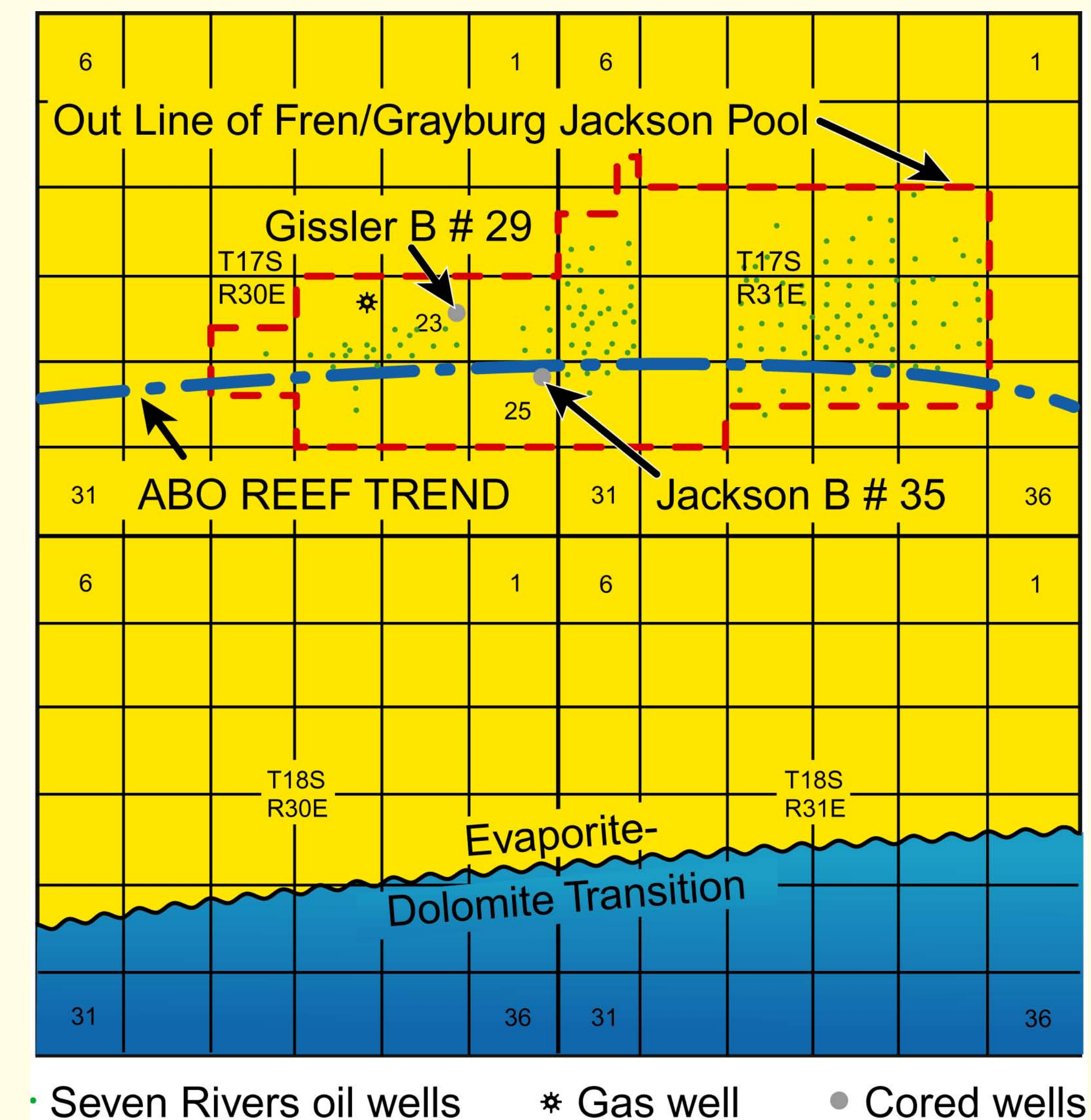
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Abstract: The Seven Rivers Formation is a potential oil and gas reservoir in many fields across the northern shelf of the Delaware Basin. The largest Seven Rivers reservoir, Grayburg Jackson Pool (formerly Fren Pool), has yielded more than 5.4 mmo and 1.6 bcf of associated gas. Grayburg Jackson and other fields that overlie the Artesia-Vacuum Abo reef trend mark the northernmost significant Seven Rivers production where porous dolomite stringers pinch out landward into bedded anhydrite. Two wells were cored and thin sectioned to study these thin (<4 feet) dolomite reservoir beds. The cores demonstrate that the upper Seven Rivers is comprised of massive to bedded nodular anhydrite (majority), non-reservoir, argillally laminated, fenestral, dolomitized boundstone/mudstone; and dolomitized grainstone/packstone reservoir rocks. Petrography reveals complete dolomitization of carbonate units, abundant anhydrite cements in the laminated facies, and excellent porosity preservation in the higher energy facies. These lithofacies represent depositional environments that range from supratial sabkha to intertidal mud flat and tidal channel. The grainstone/packstone facies are the primary contributors to production, having porosity ranging from 10 to 28.5% and permeabilities ranging from 0.1 to 35 md. Well log-derived pore volume mapping demonstrates that the higher energy facies are related to shore-perpendicular porosity zones, suggestive of tidal channels.

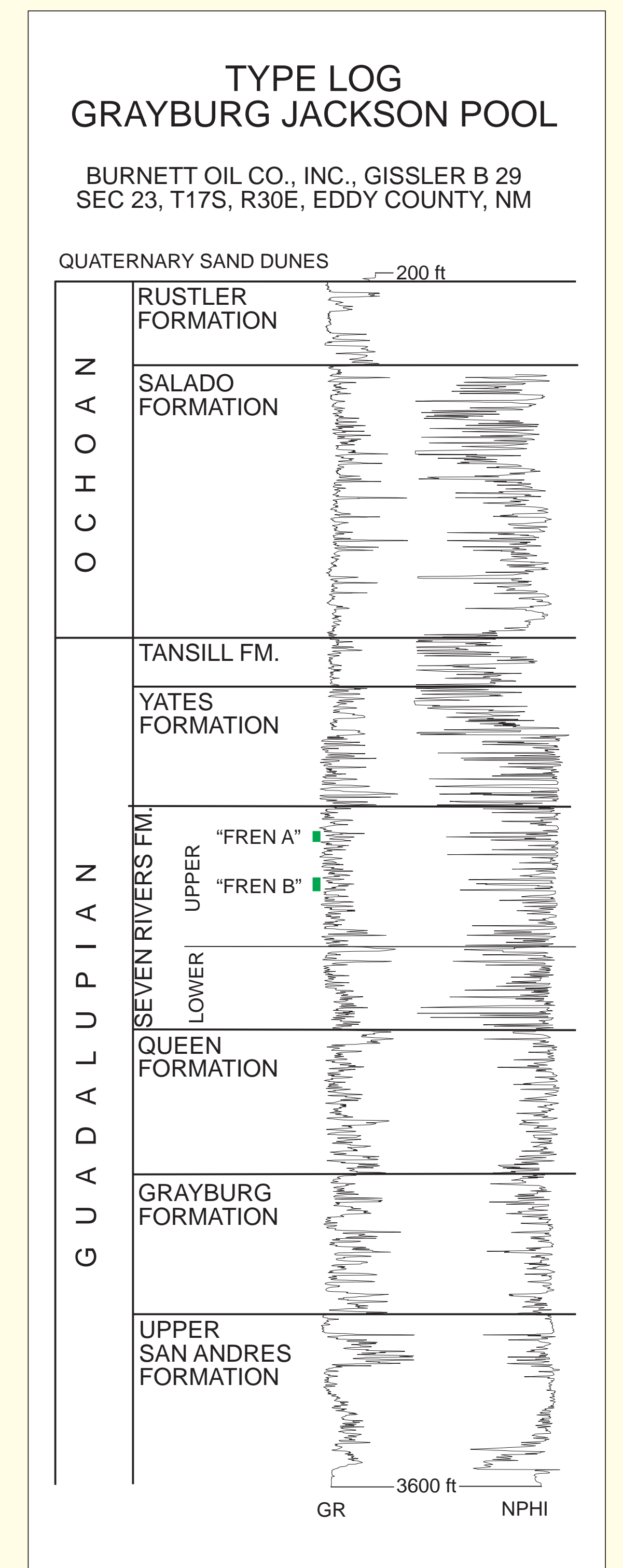


Map showing Upper Guadalupian (Queen-Seven Rivers-Yates) production and depositional facies of west Texas and southeastern New Mexico. Grayburg Jackson Pool (study area) is one of several similar fields overlying the crest of the Wolfcampian Artesia-Vacuum Abo reef trend (after Ward et al., 1986)

Geologic Framework



Map of Seven Rivers production in Grayburg Jackson Pool showing outline of abolished Fren Seven Rivers Pool (Seven Rivers oil and gas wells denoted) and two cored wells of interest. Also shown are the axis of Artesia-Vacuum Abo reef trend and the approximate location of the Seven Rivers evaporite-carbonate transition after Sheldon (1954).



Type log demonstrating lithostratigraphic nomenclature for Grayburg Jackson Pool. Informal Seven Rivers Formation reservoir zones "Fren A" and "Fren B" are noted. GR = gamma ray; NPHI = neutron porosity.