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3D SEISMIC STUDY  
IN  
NORTHERN PERU

BY  
MARCELO SOLANO

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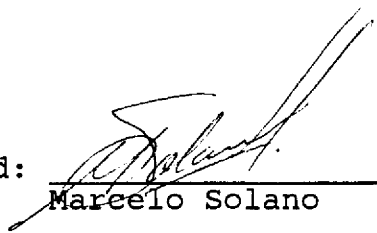
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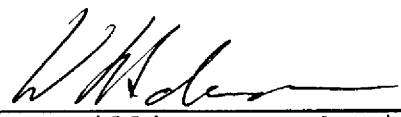
A thesis submitted to the faculty and the Board of Trustees of the Colorado School of Mines in partial fulfillment of the requirements for the degree of Master of Science in Geophysics.

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I. ABSTRACT

The Capahuari Sur field is located in the North-Central part of the "Maranon" sedimentary basin. This basin extends from Southern Colombia through Eastern Ecuador and Northern Peru. To date Occidental Exploration and Production Co. (OXY), has discovered seventeen oil fields in the vicinity of Capahuari Sur. Since 1971 these fields have produced more than 160 million barrels of oil, and approximately 80 % of the discovered reserves have been found in the Upper Cretaceous Vivian Formation. The Vivian Formation consists of fluviodeltaic sandstones with thicknesses varying from 40 to 200 feet (Del Solar, 1982).

The location of the discovery well, the "Capahuari Sur # 1", was given according to the mapping of conventional 2D seismic lines. The 3D seismic data were collected and originally processed from November 1976 through July 1977. Although there are 26 wells in the oil field (23 producing), further studies have been made to investigate the lateral extension of the oil field, and the spatial distribution of both the water saturation and porosity of the reservoir rock. The foregoing objectives were accomplished with the use of a recursive seismic inversion technique, flattened horizontal sections along the producing sand, and crossplot-

ting seismic and well log data.

In order for the seismic inversion process to provide reliable results, it was necessary to reprocess the data volume due to irrecoverable time variant scalars and time variant deconvolution applied during the original processing. In addition to the wavelet processing, another subject of major concern was the estimation of residual statics and an apparent structure in the northwestern end of the 3D Survey. The Generalized Reciprocal Method (GRM) for refraction interpretation was implemented to investigate the presence of near surface anomalies. Although the GRM does not support the presence of near surface anomalies, it was found that the northern structure was induced by the stacking velocity field.

The results obtained from the crossplotting of the seismic and well log data, consist of maps showing the porosity and water saturation distribution along the Vivian sand. Porosity values vary from 5 to 14 % , and water saturation has an average value of 7% in the hydrocarbon bearing zone.

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