HYDROCARBON ENTRAPMENTS AT BENI SUEF AREA EGYPT

A Thesis Submitted in partial Fulfillment of the requirements for the Degree of Ph.D. of Science in Geology.

By

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(M.Sc. In Geology)

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2011

Approval Sheet

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ABSTRACT

This study deals with evaluating the hydrocarbon-bearing reservoirs in the area occupied by Beni Suef concession and clarifying the entrapment style of the implied hydrocarbons. These have been carried out by interpreting the subsurface borehole data and delineating the different structural elements influencing the target reservoirs. The study also includes analysis and interpretation of the well log data of eight wells scattered in the study area as well as the interpretation of twelve seismic lines distributed throughout the area.

The subsurface geology of the study area was discussed, based on the study of the lithologic composite logs of eight wells. Depth contour maps , isopach maps and correlation diagram (fence diagram) of the following rock units : Khoman , Abu Roash A , B , C , D , E , F & G Members ,Upper & Lower Bahariya and Kharita Formations are constructed.It is concluded from the subsurface geology that, the structure of the area is represented mainly by an anticlinal feature.

The well logging analysis concerns with evaluating the hydrocarbon potentiality of the encountered reservoirs in the Cretaceous (Upper Bahariya and Lower Bahariya Formation). The petrophysical analyses of these reservoirs show that, the Upper Bahariya and Lower Bahariya Formation attains good oil - bearing anomalies in the northwestern part of the study area, as well as in some locations in the middle part. The average petrophysical characteristics of these two reservoirs are in the range of 12.7% and 12.32% for porosity, 11.4% and 10.74% for hydrocarbon saturation, and 22.68% and 21.85% for shale volume, respectively.

The seismic reflection data, on the other hand, are interpreted to figure out the prevailing subsurface structural elements in the study area. A comprehensive velocity analysis is performed using the seismic arrival times and the computed average and interval velocities. The interpreted seismic sections reveal the presence of a number of major dissecting normal faults cutting through the target reservoirs, giving rise to a number of step-like, horsts and grabens structural patterns. The entrapment style of the implied hydrocarbons is mainly controlled by the prevailing normal faults (structural element). The trap condition, in the study area, seems to be generated by the effect of extensional stresses.

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كلية العلوم
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مصائد التجمعات الهيدروكربونية فى منطقة بني سويف, مصر

رسالة مقدمة للحصول على درجة دكتوراه الفلسفة فى العلوم فى الجيولوجيا

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CHAPTER 1
INTRODUCTION

1.1 GENERALITIES

The Western Desert province covers an area of about 700000 square kilometers, so it comprises almost two-thirds of the whole Egypt area. The Western Desert extends about 1000 kilometers from the Mediterranean Sea in the north to the Sudanese border in the south, and about 600-800 kilometers from the Nile Valley in the east to the Libyan border in the west.

1.2 LOCATION OF THE STUDY AREA

East Beni Suef concession covers an area of about 27,000 square kilometers and lies between longitudes 30° 30´ and 32° 00´E and latitudes 27° 00´ and 29° 17´N (Fig.1).The Beni Suef oil field is located southeast of Wadi El Rayan Field, covering an area of 20 square kilometers and south of Qarun Concession block and due east of Beni Suef basin, between longitudes 30° 51´ and 30° 55´E and latitudes 29° 08´ and 29° 10´N.

Eight wells were selected to evaluate the subsurface geologic setting of the investigated area and its reservoir petrophysical characteristics and hydrocarbon potentialities. These wells are EBS 2X- 3X- 4X- 6X- 7X- 8X, Fayoum-1 and BRE 27-1 as shown in (Fig.2). In addition, eleven seismic lines are distributed throughout the study area (Fig.3), velocity records and vertical seismic profiles (VSP) are also analyzed and interpreted to throw some light on the prevailing subsurface structural elements influencing the study area.

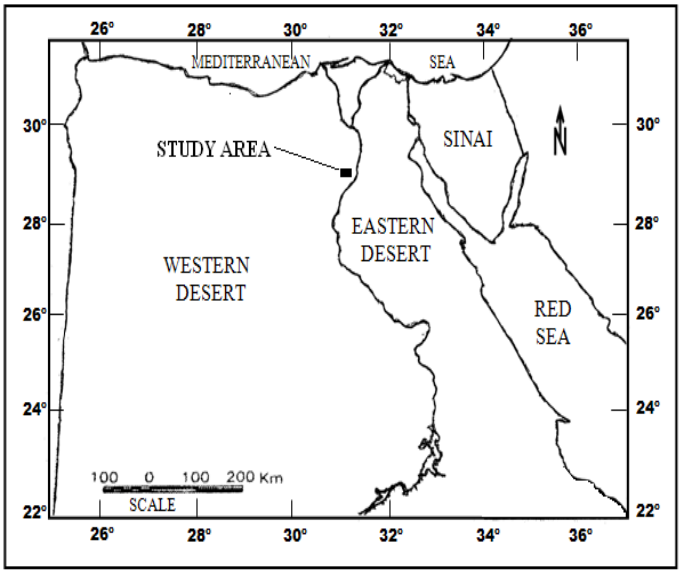

Fig. (1) Location map of the study area.

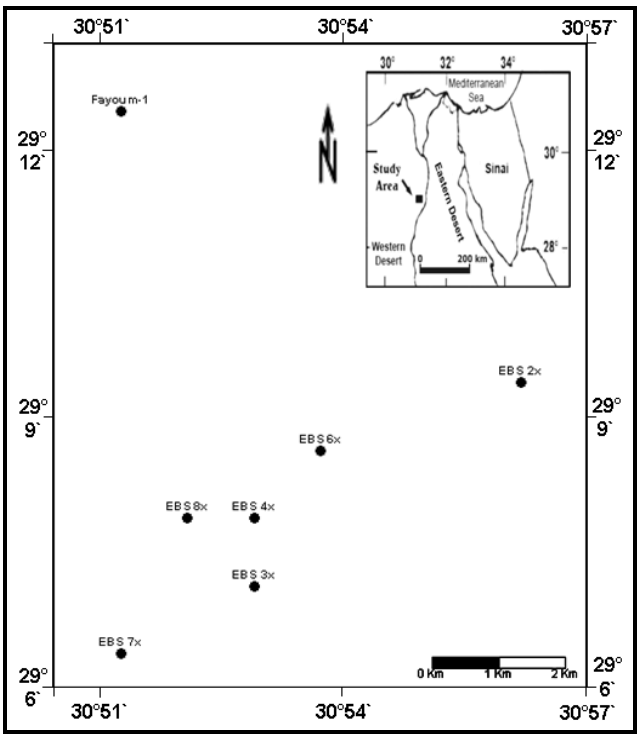

Fig. (2) Well location map of the study area.