HYDROCARBON ENTRAPMENT AND RESERVOIR CHARACTERIZATION IN AMER FIELD –GULF OF SUEZ-EGYPT

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ABSTRACT

The Nullipore reservoir in the fields of Egypt's is a heavy oil reefal reservoir located in the Gulf of Suez area.
The Nullipore reservoir is characterized by a high degree of heterogeneity, which, in addition to the high oil viscosity, has made it difficult to locate and drain oil effectively. This was further complicated by the lack of accurate seismic and geological data.

Reservoir characterization study was made including in: Chapter (1) relation between the Nullipore reservoir rock and the major geology of the Gulf of Suez and local geology of Amer oil field, and illustrating its nature as reefal reservoir rock.

Well log analysis to available well logs, including study of lithology and clay mineral identification was done in Chapter (2) by using various computer programs. The calculated parameters were integrated with the results of the following chapters.

Fractures are one of the most common and important geological structures, for they have a significant effect on reservoir fluid flow. Despite their importance, detection and characterization of natural fractures remains a difficult problem for engineers, geologist and geophysicists.
The objective of chapter (3) was to illustrate a technique for the identification and characterization of naturally fractured reservoirs from well logs. Conventional well logs are the most readily available source of information; however they have not been used in a systematic manner for quantitative analysis of naturally fractured reservoirs. The use of non-conventional well logs is the best way to characterize the

fracture orientation, its effect on permeability of the reservoir and the type of the fracture it self.

Seismic properties are affected in complex ways by many factors, such as pressure, temperature, saturation, fluid type, porosity, pore type and many factors. These factors are often interrelated or coupled in a way that many also change when one factor changes. The effect of these changes on seismic data can be either additive or subtractive. Chapter (4) is an attempt to discuss some of the most important, yet practical, theories of the rock physics models and major factors that influence seismic properties of the Nullipore reservoir, and illustrating the various parameters of the reservoir rock related to its seismic properties.

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Chapter (I)
GEOLOGIC SETTING

1-1-1 Introduction

The Gulf of Suez

The Gulf of Suez basin is the most prolific and prospective oil province in Egypt, where the majority of operating oil companies is concentrated. Its history of production can be traced back to ancient times, where oil has been obtained from seepages at Gebel El Zeit and Gemsa by the Pharaohs. Since the end of the 19th Century when oil exploitation started in the Gulf of Suez area, numerous wells have been drilled and more than forty oil fields were discovered. To date, more than four billion barrels of recoverable oil have been discovered within the Gulf of Suez.

This province constitutes with the Sinai province a zone of subsidence in the earth's crust throughout the geological history.

The Gulf of Suez started as a big crack in the continental crust of Africa and Arabia (probably as early as the Early Cambrian if not during the Late Precambrian). The E-W tensional stress leading to the opening of the Gulf had their complementary N-S which resulted in an E-W basin orientation in Sinai.

Both the Suez rift and the Red Sea formed a continuous, northwest-southeast–oriented continental rift at the early stages of separation between the African and Arabian plates. Opening of the Suez rift started in the Oligocene (Robson, 1971), Oligocene–Miocene (Garfunkel and Bartov, 1977), or Early Miocene (Moustafa, 1993; Patton et al., 1994). Extension in the Suez rift was aborted in the Pliocene when the Dead Sea transform separated it from the Red Sea, which has continued opening since that time by sea-floor spreading (Cochran, 1983).

The Suez rift extends for about 300 km in a north-northwest direction toward Suez city. It is dominated by north-northwest–south-southeast oriented faults bounding tilted fault blocks.

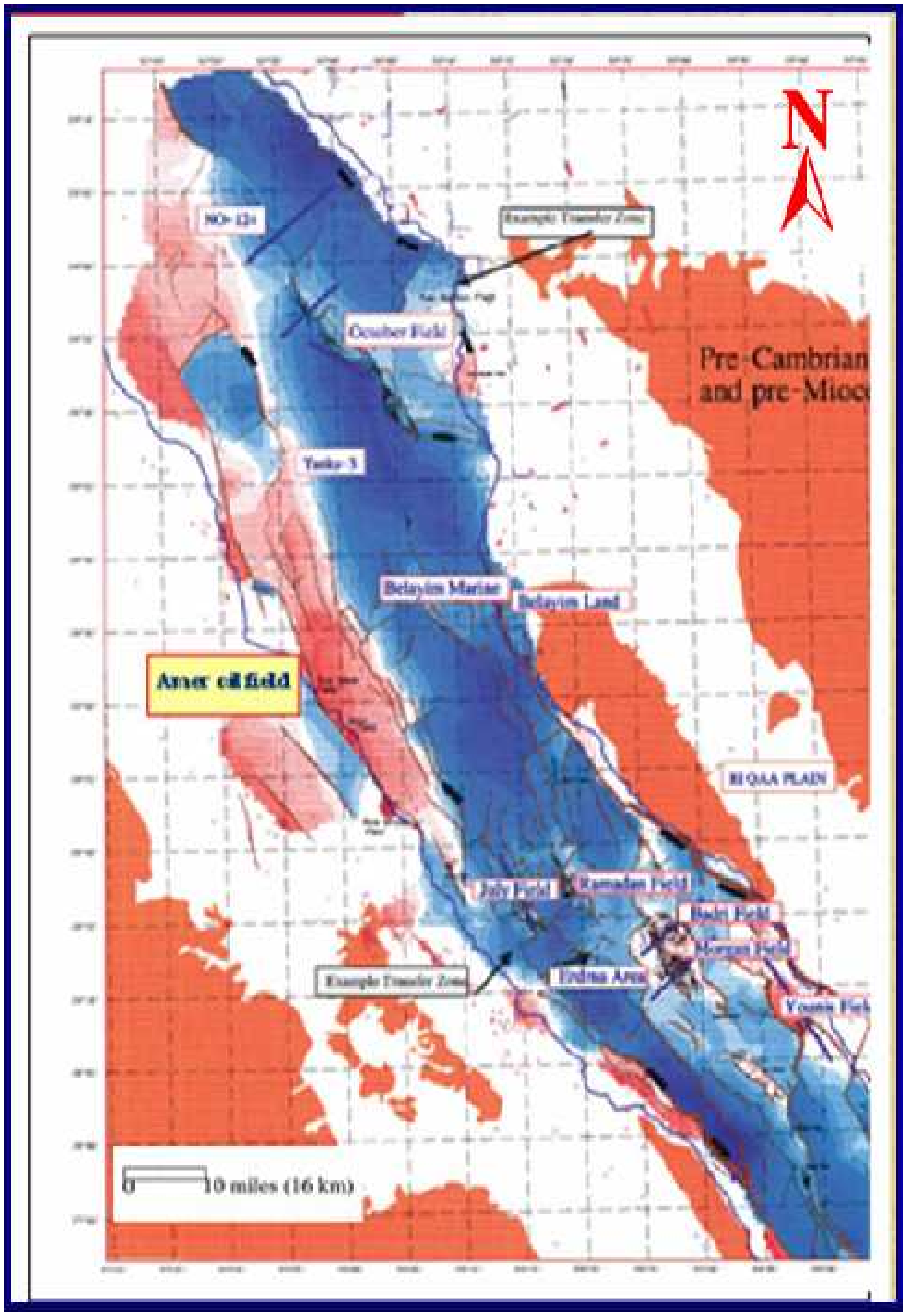

Figure (1-1) Gulf of Suez map with the Study area location. Also major faults are shown. (After Gupco 1997, edited)