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GEOLOGICAL AND GEOPHYSICAL STUDIES IN RAS BUDRAN OIL FIELD, GULF OF SUEZ - EGYPT

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ABSTRACT

Ras Budran oil field is located at the northern part of the Gulf of Suez between latitudes 29° 00' and 28° 55' N and longitudes 33° 05' and 33° 10 'E, approximately 4 km west of Sinai coast of Gulf of Suez and 13 km northwest of Abu Rudeis. This work deals with understanding the nature of the geologic events and tectonic evolution of the study area and their effect on hydrocarbon exploration of the area through the studying of the different seismic velocities analysis, the seismic stratigraphy and seismic-facies analysis, and the subsurface structural setting of the study area.

The depth contour maps were constructed for the tops of different horizons including Zeit Formation, South Gharib Formation, Belayium Formation, Kareem Formation, Rudeis Formation, Nukhul Formation and Thebes Formation from the younger to the older, according to the normal depositional process. Moreover, Thickness (isocore) contour maps were constructed for the same horizons. Seismic velocity analysis was conducted depending on the available sonic and composite logs. Average velocity, interval velocity, reflection coefficient and velocity heterogeneity maps for several horizons of Ras Budran Area were drawn and analyzed.

A set of twenty six 3D seismic lines, and the available composite logs and sonic logs of seventeen wells located in the study area are used in this study to interpret the structural framework, sequence stratigraphy and depositional environment. The topographic changes and the various structural features affecting the tops of the studied horizons are mapped and interpreted through constructing six structural time and structural depth maps. Also, a number of interpreted 3-D

seismic sections were conducted to exhibit the different subsurface structures influencing the study area and to clarify the vertical entrapment styles of the possible reservoirs. The interpretation of different seismic sections shows that, the study area is dissected by a number of listric step-like faults. Rollover folds are located at the northeastern portions of the study area. The analysis of the constructed structure time and depth maps reveals that, a dominant graben block is found at the central part of the study area between the two groups of listric faults in the northeastern and southwestern directions. Seismic sequence identification and seismic facies analysis were carried out to detect the sequence stratigraphic boundaries and the different reflection configuration patterns of the group of reflectors within these sequences. Some interpreted seismic sections are tied with the composite lithologic logs of the wells to detect the exact sequence boundaries and the possible causes of seismic amplitude variations. The sequence stratigraphic analysis illustrates that, the Miocene succession is divided into two major sequences with two sequence boundaries.

CHAPTER 1
INTRODUCTION AND GEOLOGIC SETTING

1.1. Introduction

The Gulf of Suez covers an area of about 25000 sq km. It extends along the northwest trends from latitude 27° 30' N to 30° 00' N. Its width varies from 30 to slightly over 50 km in the central part. Both the eastern and western coastal belts exhibit a sedimentary sequence, also present offshore. Thus, originally the Gulf has been found wider than at present.

The Gulf of Suez and the Red Sea, together with the Gulf of Aqaba, are structurally genetically closely related. They form the northern branches of the great East African Rift system. The length of the Gulf of Suez from the southern tip of the Sinai Peninsula to Suez is about 350 km. The graben extends from Suez at north to the Mediterranean Sea. This extension is masked by the alluvial and deltaic deposits of the Nile, along which the Suez Canal was eventually built.

The Gulf of Suez is a rather shallow and narrow body of water, its average depth not exceeding 55m. Several islands, formed by emerging fault blocks, are present near the junction with the Red Sea. The gulf itself is bordered by a similarly structured coastal belt. The overall onshore and offshore parts proven oil potential amounts, to about 38,500 sq km (**Well Evaluation Conference, Schlumberger, Egypt, 1984**).

This chapter is devoted to review the general geology of the Gulf of Suez with special emphasis to the study area subsurface