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FACULTY OF SCIENCE
GEOPHYSICS DEPARTMENT**



**DEPTH IMAGING OF THE PRE-SALT SECTION
FOR IMPROVING THE HYDROCARBON
POTENTIAL OF AMAL FIELD,
SOUTH GULF OF SUEZ,
EGYPT**

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B. Sc.
A thesis
Submitted for Master Degree
In
Applied Geophysics
Geophysics Department
Faculty of science
Ain Shams University

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2010

NOTE

The present Thesis is submitted to the faculty of science, Ain Shams University in partial of fulfillment for the requirements of the master degree of science in Geophysics.

Beside the research work materialized in this thesis, the candidate has attended ten post-graduated courses for one year in the following topics:

- 1- Geophysical Field Measurements, Numerical Analysis and computer Programming.
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ACKNOWLEDGMENT

In the beginning it gives me pleasure to be working in **PICO PETROLEUM CO.**, Amal Field one of the fields owned by PICO so all possible data for the area was available for our study.

ALL OFFICIAL WAYS TO OBTAIN THE DATA WERE DONE, STARTING FROM THE APPROVAL OF **(PICO, AMAL) COMPANIES AND THE EGYPTIAN GENERAL PETROLEUM CORPORATION ACCEPTANCE.**

I would like to express my sincere thanks to **Prof. Dr. Mahdy A. M. Abdel Rahman, Professor of Geophysics** , Faculty of Science, Ain Shams University, for supervising providing me with the idea of pressure , supporting me with all research papers needed for this study, reading and reviewing the manuscripts,

I am deeply thanks **Dr. Abdel-Khalk El-werr, Ass. professor of Geophysics**, Geophysics Department, Faculty of Science, Ain Shams University, for supporting the stress work, formatting the figures, reviewing and reading the manuscripts.

As well as I would like to thank **(President of KUFPEC limited Egypt, Petroleum Company) Dr. of Geophysics Said Safaan,**

I am unaware of words meaningful enough to adequately express the deep sense of gratitude that I wish to convey to my family for their patience, fortitude and understanding. Their love and devotion kept me going and I am extremely grateful to them for their encouragement and support.

ABSTRACT

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Amal field located in southern part of the Gulf of Suez. This area contains all elements of entrapment (source rock, reservoir and cap rock) to be one the most prolific hydrocarbon generation zones especially in Kareem and Rudies Formations.

The main complain problem in Amal field is the salt cap covering the area and causing several problems due to masking the subsurface layers. Several modern techniques were used to solve and overcome these problems. Seismic imaging (PSDM) is the most powerful tool in delineating salt cover.

After solving this problem, Accurate maps for stratigraphic, structural and hydrocarbon potentialities of Amal oil field have been established honoring the seismic and well data. These accurate results have been used in building 3D static model which represents the most upgraded phase.

The present work considers the complete study on Amal field as well as using all available well data and seismic data, besides it utilized the advantage of software facilities of (G& G studies with integration of advanced software for 3D static model), and previous studies contribute to understand some points.

Charisma and Petrel software were adding a great support to achieve the target of study and minimize a lot of the previous problem, in addition to new modern technology for analysis of every piece of data has been applied to make use of the integration between the seismic data and well data.

The final results show excellent progress in the development plan of area from technical and economic points of view, also new wells were drilled and verified the result.

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CHAPTER 1

INTRODUCTION

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1.1 GENERAL

Seismic imaging involves transmitting sound or pressure waves at a site from ground surface downward into the subsurface, causing the impulses to reflect on interfaces between physical layers within the subsurface and ultimately return to ground surface. The arrival times and intensities of the reflections first are recorded by an array of geophones that are placed carefully across the area of interest, and then the recorded data are processed by computer programs that generate an enhanced seismic cube. This cube can be submitted to other processes to generate an enhanced subsurface image. Finally, a geophysicist interprets these images to construct a conceptual model of the subsurface, a modeling process which frequently draws on other data available for the site (e.g., knowledge of the regional and, borehole logs, etc.).

In the petroleum industry, three-dimensional (3-D) seismic imaging needs special preparation in (acquisition, processing and interpretation) phases to be a proven technology to explore and detect natural hydrocarbon reservoirs. It is also very useful in identifying geologic settings where petroleum may be present. Also, seismic imaging PSDM and attribute technology can be used to create a fully 3-D image that may depict subsurface features and conditions. Besides, other geophysical methods, no other widely available characterization technology or method can produce a 3-D image of this nature. For example, drilling and sampling or direct push methods only produce “point” data. Conceptual models built only on point data require interpolation between data points. Such interpolation may result in the omission of important site features that point data may fail to detect.