PETROPHYSICAL STUDIES ON ABU ROASH FORMATION , ABU EL-GHARADIG FIELD, WESTERN DESERT, EGYPT

BY

Mahmoud El Saiyd
Abdallah M. E. Mahmoud Abdallah
(B. Sc. In Geology)

THESIS

Submitted In Partial Fulfilment Of
The Requirments For The Degree Of

MASTER OF SCIENCE
IN
GEOLOGY

Faculty Of Science
Ain Shams University -
1984

NOTE

The present thesis is submitted to Ain Shams University in partial fulfilment of the requirements for the Degree of Master of Science in Geology.

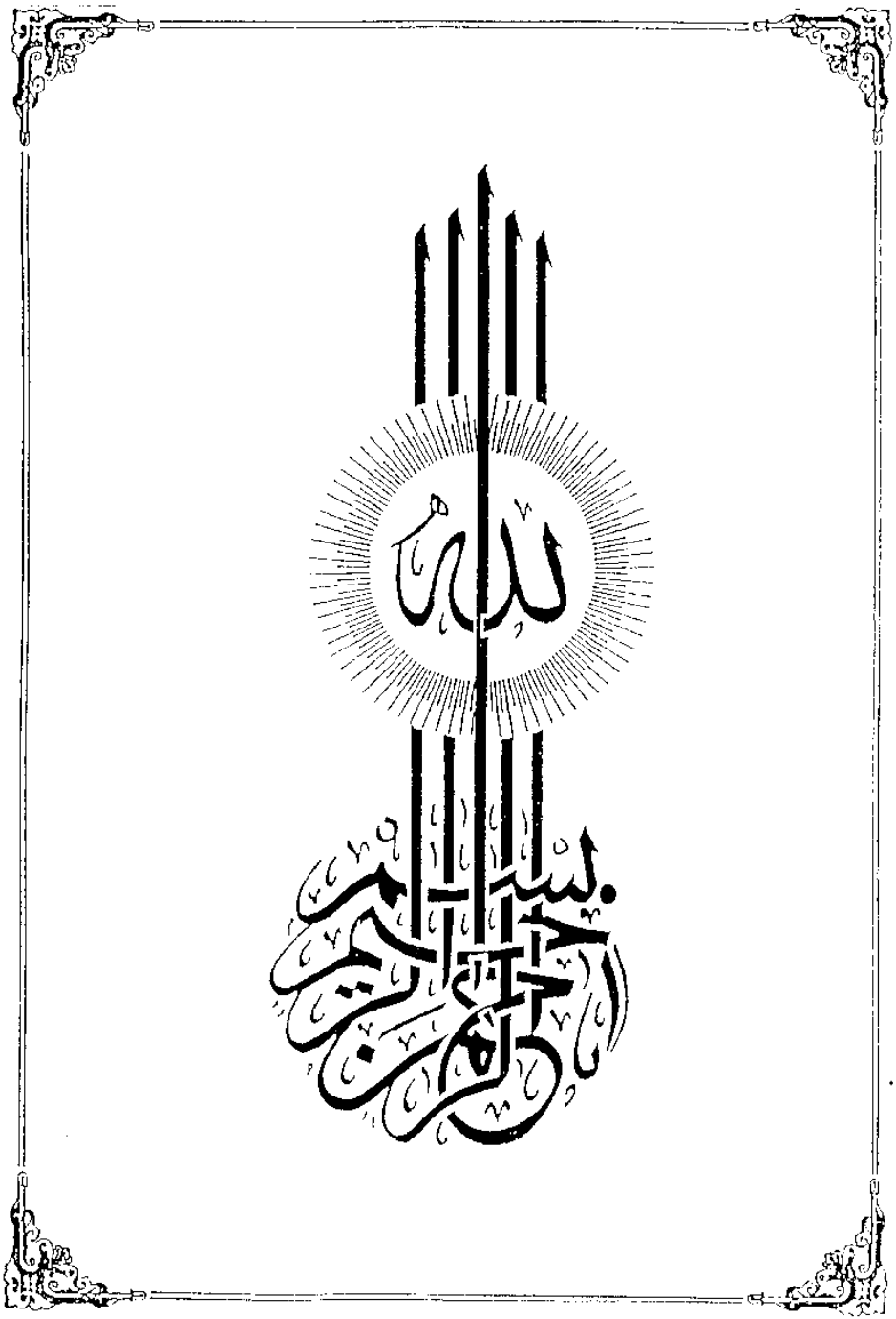
Besides the research work materialized in this thesis, the candidate has attended eight graduate courses for one year in the following topics :

Electric Methods
Geotectonics
Subsurface Geology
Structural Geology
Petrophysics
Sedimentation
Laboratory Techniques
Field Geology And Surveying

He has successfully passed the final examination in these courses.

In fulfilment of the language requirement of the degree, he also passed the final examination of a course in the English Language.

Prof.Dr. Mohamed Ezzeldin Hilmy
Head,Department of Geology



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LIST OF SYMBOLS

Symbol		Meaning
API	:	American Petroleum Institute)
BHC	:	Bottom Hole compensated (sonic).
BHT	:	Bottom Hole Temperature.
CL	:	Caliper Log.
dh	:	Hole diameter.
FD	:	Formation Depth.
FDC	:	Formation Density Compensated.
F-Log	:	Formation Resistivity Factor Log.
FT.	:	Formation Temperature.
G	:	Integrated Radial Geometrical Factor.
HDT	:	High Resolution Dipmeter Tool.
hmc	:	Mud Cake Thickness.
ILd	:	Induction Resistivity Log Deep.
ILm	:	Induction Resistivity Log Medium.
KB	:	Kelly Bushing.
LL8	:	Lalero Log Resistivity-8.
MLL	:	Micro Resistivity Latero Log
PL	:	Proximity Log.
PSP	:	Pseudo Spontancous Potential.
Rm	:	Mud REsistivity.
Rmc	:	Mud cake resistivity.
Rmf	:	Mud Filtrate Resistivity.
Rmfeq	:	Mud Filtrate Resitivity Equivalent.
Rs	:	Surrounding Zone Resistivity.
Rt	:	True Resistivity.
Rw	:	Water Resistivity
Rweq	:	Water Resistivity Equivalent.
SBR	:	Surrounding Bed Ratio.
Sh	:	Hydrocarbon saturation.
Shm	:	Movable Hydrocarbon saturation.
Shr	:	Residual Hydrocarbon saturation.
SNP	:	Side-wall Neutron Porosity.
SP	:	Spontaneous Potential.
SSP	:	Static Spontaneous potential.
ST	:	Surface Temperature.
Sw	:	Water saturation.
Sxo	:	Flushed Zone Saturation.
TD	:	Total Depth
Vsh	:	Volume of shale Percentage.
A 16"M	:	Short Normal Resistivity Log.
6FF40	:	Induction Resistivity Log Deep.
ρb	:	RHO-B(Bulk Density unit-gm./cc.)
ρf	:	Fluid Density.
ρma	:	Matrix Density.
Δt	:	Enterval Transit Time (μsec./ft.)
ϕ	:	Porosity
ϕT	:	Total Porosity.
ϕAV	:	Average Porosity.
GR	:	Gamma Ray Log.

"ACKNOWLEDGEMENT"

I am particularly intended to Prof. Dr. NASSER M. HASSAN, Professor of Geophysics, Department of Geology, Faculty of Science, Ain Shams University, for his supervision, stimulating guidance helpful suggestions and for critical reading of the manuscript.

Special gratitude is to all the staff members of the Geology Department, Ain Shams University Headed by Prof. Dr. MOHAMED E. HELMY for their continuous interest and encouragement.

Grateful appreciation is expressed to the GUPCO Oil Company for providing the needed data for this work.

I tend to God with Heart that full of thank.

ABSTRACT

This thesis is devoted to the study of the formation evaluation of the well logs and periphery of the subsurface geology of the main central part of the Abu Gharadig basin at the northern part of the Western Desert. The basic logging data comprises the records of the Spontaneous potential, resistivity, porosity tools, caliper, gamma ray and dipmeter in ten wells in the study area. The available subsurface data are added in the form of lithologic and stratigraphic information.

The first part of this work deals with the various interpretations of the available logs for the Abu Roash Formation. These include the corrections of the estimated values of the shale content, the different fluid resistivities, the rock resistivities, the average total porosities, the secondary porosity and the fluid saturations.

The second part is concerned with the outlining of the regional structural deformations in the study area.This is concluded through a construction of a set of variation thickness maps for the seven members of the Abu Roash Formation and their relations to the lithofacies and the probable depositional environmental of the encountered basinal areas,

compared with the rige-like areas. Conclusions agree with those deduced from the constructed structure contour maps for the top and bottom of the Abu Roash Formation depending on the estimated dipmeter data.

The third part discusses the horizontal variations of the different petrophysical properties for each member of the studied formation. This comprises shale content, porosity, water and movable hydrocarbon saturation maps. Litho-saturation cross plots were constructed, showing the petrophysical parameters of the analyzed zones within each of the studied ten wells.

Finally, the oil story is delineated, including various phases of oil synthesis as the testing of the stratigraphic sequence comprising the source, reservoir and cap rocks. The controlling transformation cycle involve the stages of hydrocarbon generation, migration and accumulation. The trapping style, also includes the various structural, stratigraphic and combined ones.

INTRODUCTION

INTRODUCTION

The increasing need for petroleum and the discovery of large amounts of hydrocarbons in the subsurface led to a continuous development in the techniques used for understanding the subsurface geology of the Earth's crust.

This work deals with the geophysical methods of studying rocks, based on the existence of some relationships between a certain physical property of the rock and it's different mineralogical, sedimentological, structural and fluid properties.

The direct examination and the application of various laboratory techniques on rock samples is considered the most appropriate method for studying the petrophysical properties. The collection of subsurface cores is an expensive process, taking into consideration, that only few horizons can be cored in a certain sequence. Most of the available subsurface rock samples are in the form of rock cuttings which cannot give reliable results specially those describing the storage capacity of a rock. This led to development of various logging techniques in order to measure the petrophysical and the petrographical parameters based on some physical properties of the drilled rock sequence. These well logging techniques provide various data