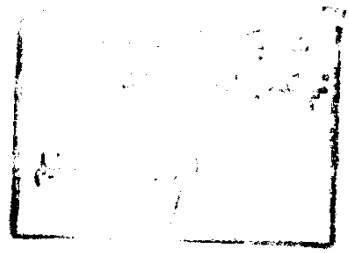
SEDIMENTOLOGICAL AND GEOPHYSICAL STUDIES OF HELIOPOLIS BASIN, CAIRO-ISMAILIYA DESERT ROAD, AND THEIR APPLICATIONS



A THESIS

presented in partial fulfilment for the requirements of the degree of

MASTER OF SCIENCE

in

GEOLOGY

By

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(B.Sc.Geology)

To

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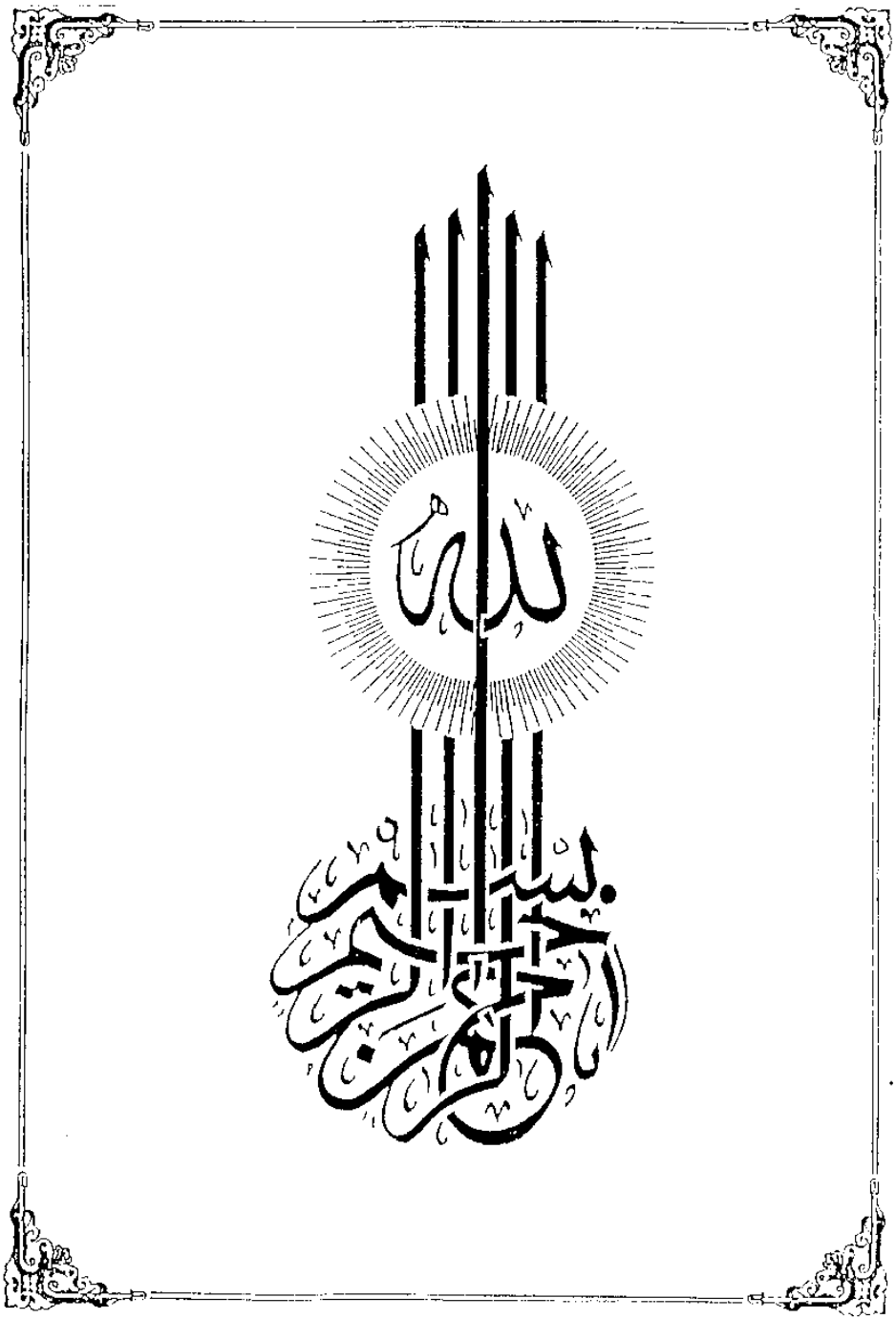

My thanks are also offered to all who have helped directly or indirectly during the progress of the present work and during its final compilation.

"NOTE"

The present thesis is submitted to the Faculty of Science, 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 ten post-graduate course for one year in the following topics:

1- Field Geology
2- Statistics
3- Electric Method
4- Potential Theory
5- Gravity
6- Magnetic
7- Sedimentary Basins
8- Basement Rocks
9- Structural Geology
10- Geotectonic

He has successfully passed the final examination in these courses. In fulfilment of the language requirement of the degree, he has also, passed the final examination of a course in the English Language.

Prof.Dr.W.Morcos

Head of Geology Department

ABSTRACT

The present work deals with the application of the sedimentological and geophysical studies on the area east of the Nile Delta (Heliopolis basin), Cairo-Ismailiya desert road. The area under investigation, extends from El Dibba ridge (South) to El Hamza ridge (North), and from the wadi El Gafra and wadi Moftah (East) to El Khanka and Gebel El Asfar area (West). The area occupies a portion of a semi-arid to arid belt and is characterized by mild climatic conditions, low topography and relief. Physiographically, it displays both local and semiregional landforms.

For the present work intense geologic field work and geologic maps of the area are used to make a compiled geological and geotopographic maps. Drilling samples, geophysical survey and water samples have been applied and interpreted.

The area is highly affected by faults, and a few folds. The main trends of these faults are NW-SE and NE-SW.

Samples from 4 drilled wells and 2 surface sections were collected and described. These samples were mechanically analyzed for correlation and construction of panel diagram. The size distribution are plotted on graphs and the size parameters are considered with respect to two main idea, in order to ensure better inferences and interpretations. Other patterns for environmental implication are considered.

Generally, the mean size values range from granules to medium sand-sizes and generally decrease westward. The standard deviation values range from moderately to poorly sorted.

Mineralogically, all samples were analyzed for the light and heavy minerals. From the analyses, the concentration of the stable minerals in the Miocene deposits indicates mineralogic maturity.

The vertical frequency distribution of minerals in the Miocene section shows percentage decrease upward reflecting the change of current velocity during sedimentation.

The geophysical data obtained from the Vertical Electrical Sounding (VESes) are interpreted to make geo-electric profiles. From the geo-electric profiles, three litho-resistivity zones were defined. These are: Litho-resistivity zone "A" (0.32-4.05m thick) with resistivity values (12-910 Ohm.m), litho-resistivity zone "B" (60-168m thick) with resistivity values (5.6-560 Ohm.m) and litho-resistivity zone "C", water-bearing formation with resistivity values (<5-32 Ohm.m).

Generally, the resistivity values decrease to the west of the area due to change in facies of the sedimentary deposits, and decrease from zone "B" to zone "C" due to the presence of water in zone "C".

From the hydrogeological and hydrochemical studies two main aquifers can be differentiated the area, the Pleistocene aquifer and Miocene aquifer.

The Pleistocene aquifer represents the main aquifer in the western part of the area. It is composed of graded sands and gravels with clay intercalations. The total salinity of the water ranges between 452 mg/l and 1856 mg/l . and the chemical water types are sodium-bicarbonate and sodium-chloride.

The Miocene aquifer represents the main aquifer in the eastern part of the area. It is composed of sand, gravels, limestone interbeds and clay intercalation with lateral and vertical facies changes. The total salinity of the water varies from 4014 mg/l to 7498 mg/l. The chemical water type is Sodium-Chloride.

The groundwater movement of the Miocene water aquifer is from SE to NW direction. The hydraulic gradient is gentle ranging between 1.02×10^{-3} and 1.6×10^{-3} .

The Pleistocene aquifer ground water can be used for irrigation. For domestic purposes, these waters range between the permissible and doubtful limits for human uses, while the ground water of Miocene aquifer is unsuitable for either irrigation under ordinary conditions or domestic uses.

T A B L E S O F C O N T E N T S

L I S T O F I L L U S T R A T I O N