GEOPHYSICAL STUDIES TO DELINEATE THE GEOLOGICAL AND HYDROGEOLOGICAL CONDITIONS IN THE AREA BETWEEN RAS ALAM EL RUM - RAS ABU LAHO - NORTH WESTERN COAST - EGYPT.

A Thesis
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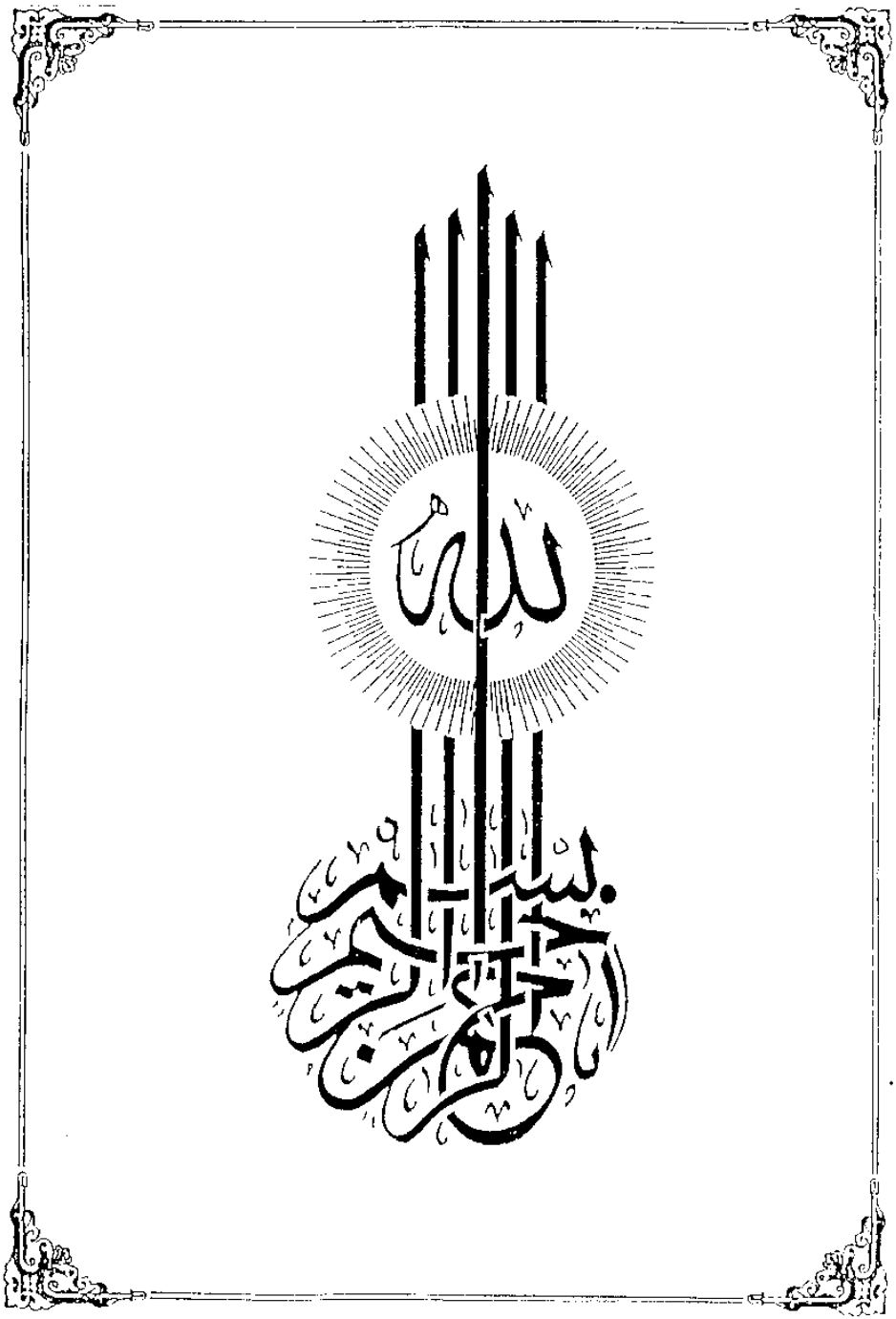
الله
بسم الله الرحمن الرحيم
ولله العزة ولرسوله وللمؤمنين ولكن المنافقين لا يعلمون



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ABSTRACT

This thesis represents an integrated study between geoelectrical, seismic, petrophysical and hydrogeological methods to delineate the geological and hydrogeological conditions in the area lying between Ras Alam El Rum and Ras Abu Laho in the northwestern coast of Egypt . The study area has the same geomorphological features along the Mediterranean Coast which are coastal plain, piedmont plain, table land and drainage basins .

The stratigraphic succession in the study area consists of Quaternary (Holocene and Pleistocene) and Tertiary (Pliocene and Middle Miocene) . Holocene is represented by dune sand accumulation, wadi fillings, limestone crust and loamy deposits . Pleistocene rocks are oolitic limestone, cardium limestone and pink limestone . Pliocene rocks are creamy limestone, oolitic limestone and loamy deposits . Middle Miocene Marmarica formation consists of four claystone beds alternating with three limestone beds (Pecten, Gastropodal and Polyzoan limestone) .

Structurally, Marmarica homocline is affected by monoclinal axis of NE-SW direction which protrude into the sea at Ras Alam El Rum, Ras Umm El Rakham and Ras Abu Laho . A gentle domal structure of E-W direction with low amplitude present at El Kharruba and El Raml which is related to bigger buried Pre-Tertiary structures .

Petrographical and petrophysical analysis were carried out to detect the water collecting potentialities . The insoluble residue analysis showed that

carbonate is the dominant component in all the analyzed rock samples . However, wadi fillings have higher sand ratio than the other rock samples . Oolitic limestone and pink limestone have the highest porosities as determined from bulk and grain densities, whereas the crystalline limestone and limestone crust attain the lowest porosity which was conformed by direct measuring of porosities on selected rock samples .

The total and effective porosities of unit D increase toward the central part of the area, between Wadi Magid and Wadi El Kharruba. An empirical equation relating the total porosity to the bulk density has been established for Marmarica limestone as a whole and for each of rock unit B and D . Permeability values indicate that the rock unit D is the most capable rock unit as an aquifer . The permeability distribution of rock unit D has its maximum reported values at Wadi Magid whereas its minimum reported values are at Wadi El Kharruba .

The electrical resistivity distribution of unit D at the three main directions of measurement revealed a zone of low resistivity in the central part of the area separating two higher resistivity zones toward the northwest and the southeast . Empirical equations were established relating the formation resistivity factor in the main three directions of measuring to the porosity for Marmarica formation and rock unit D. Another relation between the electrical resistivity index and the water saturation were established.

Effective directional porosity in the three directions of measurement increase toward the central part of the area and decrease in the southwestern and northeastern directions .