AIN SHAMS UNIVERSITY
INSTITUTE OF ENVIRONMENTAL
STUDIES AND RESEARCH

STUDY OF GROUNDWATER RESOURCES IN THE NORTHERN PART OF SUEZ GULF.

BY

WAGIH MISTAR ANDRAWIS

B.SC. GEOLOGY,AIN SHAMS UNIVERSITY ١٩٨٠

A THESIS PRESENTED IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS

FOR

THE DEGREE OF M.SC.

IN

ENVIRONMENTAL SCIENCES
(Environmental Geophysics)

DEPARTMENT OF ENVIRONMENTAL BASIC SCIENCE
INSTITUTE OF ENVIRONMENTAL STUDIES AND RESEARCH
AIN SHAMS UNIVERSITY

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ABSTRACT

The study area lies west of suez gulf and is located between latitudes ٢٩°٤٠´ - ٢٩° ٥٠´ N and longitudes ٣٢°١٥´ - ٣٢°٢٥´ E .

The purpose of this study is mainly to define the subsurface stratigraphy and structural elements that control the occurrence of the groundwater and olso to detect the suitable sites for further wells.

The area is covered by Eocene, Miocene, and Pliocene deposits. The lithologic data deduced from two drilled wells are: Hagul Formation at top followed by Hommath Formation while the Observatory Formation lies at the base of the section.

Twenty four Vertical Electric Soundings (VES) using Sehlumberger configuration were measured. The quantitative interpretation of these VES stations reveals the occurrence of groundwater aquifer in the sandstone unit of hagul formation.

The thickness of the aquifer increases toward west direction .

The geaelectrie sections show three inferred faults and it is recommended to drill any new wells in the area west of the fault F٣.

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INTRODUCTION

The study area is situated on the northern part of Suez Gulf.It is located between latitudes ٢٩_ ٤٠' - ٢٩_ ٥٠' N and longitudes ٣٢_ ١٥' - ٣٢_ ٢٥' E.

The backbone for any development is fresh water supply.Consequently , this study deals with the hydrogeological interferences of the detailed geological and geophysical studies on the study area.

The geophysical data confirmed by drilled wells shed more light on the hydrogeological regime of the area under investigation,as the electric resistivity survey is uniquely suitable to groundwater exploration. The contrast in the electric resistivities on the subsurface layers enable delineation of the water table and the thickness of the aquifer due to the lower resistivities of water saturated layers relative to the dry enveloping layers.

In the present study, the electric resistivily survey is applied using the Vertical Electric Sounding (VES) technique using Schlumberger configuration where twenty four (VES) stations were measured in selected locations,the length of the current spreads AB starts with ٣ m and progressively increased up to a maximum AB ٣٠٠٠ m.

The Schlumberger vertical electric soundings are interpreted to determine the thickness and true resistivity values of the successive strata below the different stations. The interpretation technique is carried out manually using the two layer curves of Orellana and Mooney.The data obtained is analytically interpreted using computer program known as RESIXIP-١٩٩٣.

Within the study area, the true resistivities of the different formations are determined from the parametric VES measured beside a drilled well with known

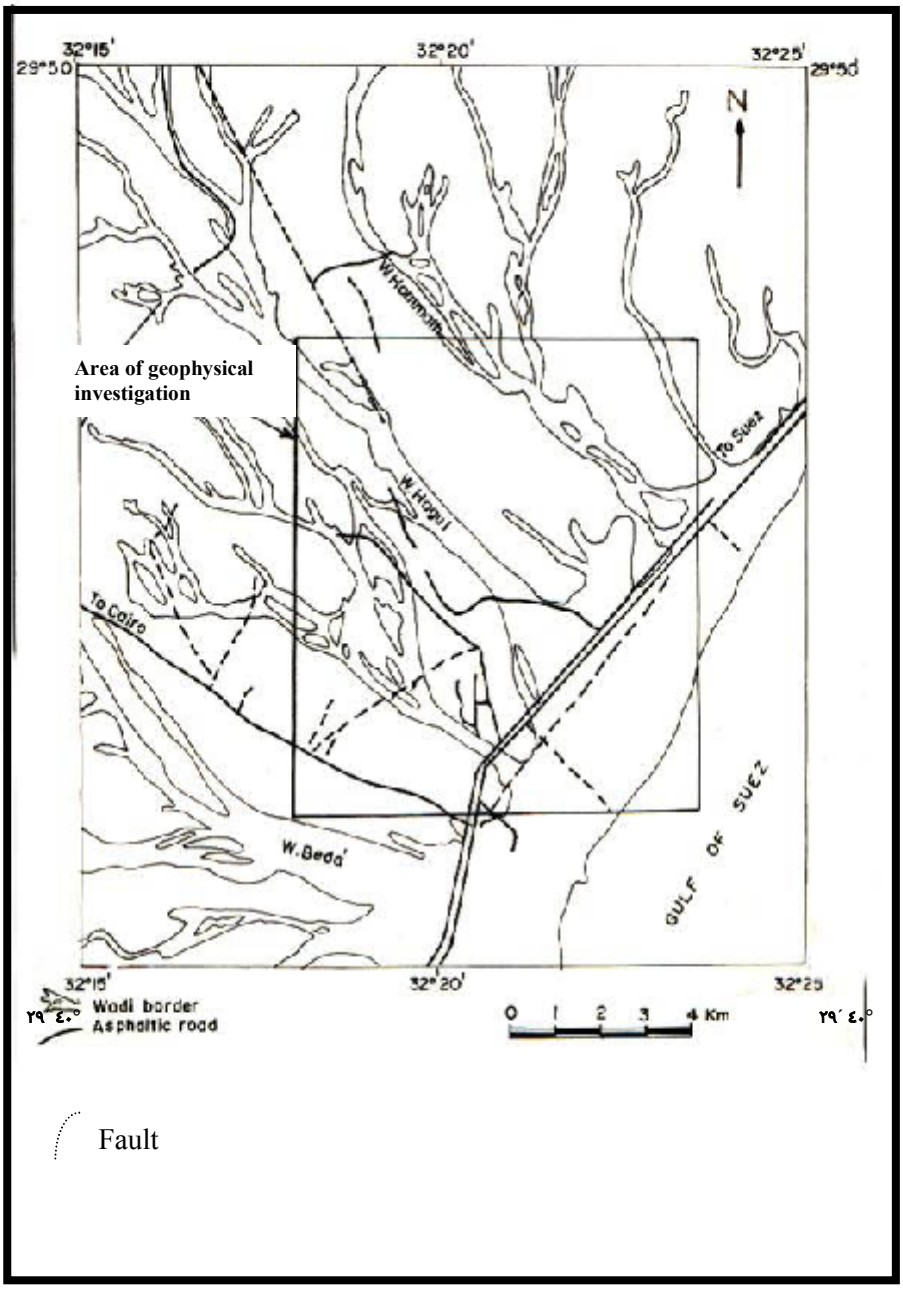

Fig.(1) : LOCATION MAP OF THE STUDY AREA.

geologic informations. This helped calibration of resistivities in the other (VES) stations.

The interpretation data of the (VES) measurements are used to construct eight geoelectric sections which inturn help in illustration the subsurface configuration of the different formations.

GEOLOGICAL SETTING

Chapter II
GEOLOGICAL SETTING

II-١.General view :

The study area lies on the west side of the Gulf of Suez (Fig.١) .The area is dissected by two main Wadies, Hommath and Wadi Hagal. .It lies north of northern Galala and south of Gabal Ataqa. The Eocene rocks exposed are difficult to correlate with the northern and southern facies. The facies of middle Eocene in the area are similar to Observatory Formation,overlies by Lower Miocene (Sadat Formation) and Middle Miocene (Hommath Formation).The Pliocene sediments represented by Hagul Fm,which the type locality section is found near the area in the upstream of Wadi Hagul .

The following is a regime notes for the two main wadies :

A) Wadi Hommath

This Wadi initiates west south Gabal Ataqa, It takes NW – SE direction . At first it passes through moderately elevation hills formed of coarse sand , marl and clay .Some important wadies drain at Wadi Hommath such as Wadi El Naka and Om Elda .The width of Wadi Hommath begin to increase and drain at the coastal valley in El Hafayer region.

B) Wadi Hagul

This wadi is considered as the biggest wadi of the area, it 's length is about ٤٠ Km .The wadi initiates from NW Gabal Ataqa. Chains of mountains boarder the wadi from the west direction such as Kohaylia and Om Zyta mountain .The Hagul direction goes down at SE direction passes through moderately to low elevation hills formed of marl ,clay and limestone. Wadi Hagul meets some wadies come from west direction as Wadi Abu Sely and Wadi Morak .Finally the wadi passes through

moderately elevation hills formed of marl, carbonate sand ,and coarse sand .The wadi approaches the coastal valley at odeep well.

II-٢ .Surface geology :

The study area is mainly covered by Eocene, Miocene and Pliocene deposits (Fig. ٢). The Eocene rocks are represented by Observatory Formation.The Miocene deposits are differentiated into two formations ; Sadat and Hommath. The Pliocene deposits occure in the middle part of the area .

The following paragraphs are short description of these formations .The **Eocene rocks** are the oldest deposits in the study area and represented by the Observatory Formation of Middle Eocene;this formation was described by Farag and Ismail ١٩٥٩ and may be correlated with the Suez Formation specially in the study area .The Observatory Formation consists of hard limestone crystalline in the base of the section with bands of Nummulic Gizehensis contain bands of massive chalky in parts .Overlying with about ١٥ meter of soft limestone, snow white color rich with fossils .

Specially the top layer carry large - sized Gisortia Sp.The upper part of this formation in the study area represented by ٨ meters of soft Oolitic chalky limestone, fine grained with Discocyclina of varians and Operculina Schwageri.

This formation outcrops only in the north east part of the area, north Wadi Ramia by a thickness of about ٤٥ meters .

The rocks of **Miocene age** occur in that district occupying the greater part of the low ground are not chiefly exposed on either sides of the main drainage lines of Hagual, El Bada .As well as along the feet of the main limestone ridges boardering these valleys. while mostly of marine origin , the upper part of succession consists of beds of fresh – water lacustrine character associated in parts with beds of estuarine origin.The marine beds are also divisible into lower part ,in which