شبكة المعلومات الجامعية

بسم اللّه الرحمن الرحيم

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

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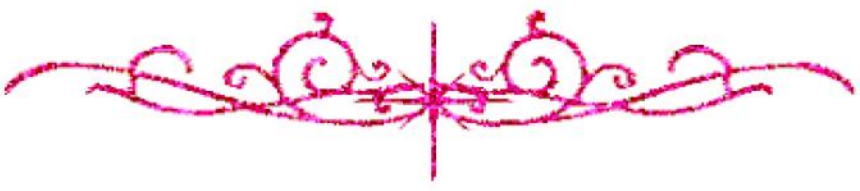

بالرسالة صفحات
لم ترد بالأصل

Ain Shams University
Faculty of Science
Geology Department

Characteristics of Fractured Carbonate Aquifers in Wadi El Tarfa Basin, East El Minia Governorate, Egypt

A THESIS

Submitted in Partial Fulfillment of the Requirements of M.Sc. Degree in Geology

By

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Mohamed Said Abu Setta

Abstract

Wadi El Tarfa is one of the most promising areas in the Eastern Desert for land reclamations due to the availability of the groundwater resources from Eocene aquifers which are characterized by high potentiality and good quality. It extends southeast Beni Mazar and east Matai cities at the eastern fringes of El Minia governorate, Egypt. It lies between latitudes 28˚25ʾN and 28˚37ʾN and longitudes 30˚50ʾE and 32˚22ʾE. It is characterized by its large surface area that reaches about 4939 km^2 which curved on the top of El Maaza limestone plateau and drains its surface water to the west direction toward the Nile River.

The present study is focused mainly on the characteristics of Eocene fractured carbonate aquifers at Wadi El Tarfa and determining the available water resources. It has been achieved through detailed studies of the geomorphological, the geological, the hydrogeological and the hydrogeochemical settings.

Geomorphologically, Wadi El Tarfa is subdivided into two main geomorphologic features; watershed areas and water collectors. The watershed areas include plateaus (El Maaza plateau and Southern Galala plateau) and the highly topographic features and mountains (Gebel El Ahmer, Gebel El Merier and Gebel Qurun Harhash). Water collectors contain (drainage network, morphotectonic depressions and flood plain). Wadi El Tarfa is subdivided into eight subbasins. It attains eighth order and its subbasins range from fifth order to seventh order. The evaluation of the flash flood hazard degrees of Wadi El Tarfa and its subbasins according to the morphometric ranking method reflected that subbasins (nos. 3 & 6), Wadi Abu Kibithat and Wadi Abu Sayyal are the most dangerous subbasins while Wadi Abu Thumaymat and

subbasins (nos. 1 & 4) are the lowest hazards that reflect the good opportunity of recharging the shallow aquifers.

Geologically, the stratigraphic succession of the exposed rock units at the study area ranges from Precambrian to Quaternary age. Especial attention is focused mainly on the rock units of the Middle Eocene age (Samalut and Maghagha Formations) which represent the water bearing formations at Wadi El Tarfa area. Four sections represent Middle Eocene rocks have been measured and described. Structurally, Wadi El Tarfa was affected by normal faults with NW – SE trend that originated after Eocene due to the tensile stress. Based on the field measurements, the geological map of Conoco (1987) and Landsat 8 images, the structural lineaments reveals two major trends NW – SE and NE – SW.

Hydrogeologically, two water bearing formations have been recognized at Wadi El Tarfa which represented by Maghagha and Samalut aquifers. The groundwater occurs under unconfined conditions. The groundwater of Maghagha aquifer is recorded at depth ranges from 38.95 m to 59.27 m and it is characterized by its good quality as the salinity ranges from 862.5 mg/l to 978.5 mg/l. The groundwater of Samalut aquifer is recorded at depth ranges from 10 m to 80 m and the salinity ranges from 227.5 mg/l to 2545.1 mg/l. The groundwater of Samalut flows from west and southwest to east and northeast directions away from the Nile direction which indicates that the Nile River is the main source of recharge. This aquifer is distinguished by its low to high potentiality as the transmissivity reaches 4125.60 m^2/day.

The stable isotope analysis of oxygen-18 and deuterium reveals that the sources of recharge of Samalut limestone aquifer are the Nile water before and after Aswan High Dam construction and the mixing between them as well as the paleowater source.

Abstract

Hydrogeochemically, the groundwater of the two aquifers are affected by evaporation, leaching and dissolution, ion exchange and rock water interactions processes. The majority of the groundwater samples are characterized by their good quality for human drinking, livestock and poultry and irrigation purposes.

For sustainable development of the water resources at Wadi El Tarfa basin, several recommendations have been suggested among them; mitigation and harvesting of flash floods through construction of artificial barriers, tunnels and dams. Criminalization of flood irrigation systems and using modern techniques for land irrigation to avoid salinization and deterioration of soil and aquifers. The geophysical exploration of Samalut limestone aquifer at the area east of Cairo – Assuit road is recommended.

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