IJG> Vol.3 No.1, February 2012

OPEN ACCESS

Potentiality of Secondary Aquifers in Saudi Arabia: Evaluation of Groundwater Quality in Jubaila Limestone

PDF (Size:2099KB) PP. 71-80 DOI: 10.4236/ijg.2012.31009

Author(s)

Mohammed Tahir Hussein, Mazin. M. Al Yousif, Hussein S. Awad

ABSTRACT

Groundwater scarcity in arid regions may hinder development plans and cause many inconveniences for the population and authorities. Saudi Arabia has limited groundwater resources stored in the sedimentary sequence of the Arabian Shelf. Some of these resources were classified as major aquifers, secondary and minor aquifers, and some were considered as aquicludes. The Jubaila Limestone is one of the secondary aquifers of Saudi Arabia. The main purpose of this paper is to evaluate the groundwater resources of the Jubaila Limestone in Riyadh area, with emphasis on groundwater quality. Groundwater was found to occur in fractures and within solution openings of the Jubaila Limestone at depths which range between 19 and 210 m. The transmissivity value was 1.7×10^{-3} to 7.2×10^{-3} m^2/s; the storage coefficient was of 1.3×10^{-4}. The electrical conductivity for collected water samples ranged between 831 and 7670 µS/cm. The major ionic relationships were Na > Ca > Mg and SO_4Cl > HCO_3. The groundwater evolves from NaCl dominated at the southern end of the study area, into Ca, $MgSO_4$ water in the north. The main chemical process responsible of this variation was found to be dissolution of anhydrite and gypsum. The groundwater was not found suitable for drinking purposes but can be used by livestock and for some agricultural purposes.

KEYWORDS

Saudi Arabia; Riyadh; Jubaila Limestone; Groundwater Quality; Dissolution

Cite this paper

M. Hussein, M. Al Yousif and H. Awad, "Potentiality of Secondary Aquifers in Saudi Arabia: Evaluation of Groundwater Quality in Jubaila Limestone," *International Journal of Geosciences*, Vol. 3 No. 1, 2012, pp. 71-80. doi: 10.4236/ijg.2012.31009.

References

[1] R. Powers, L. Ramirez, C. Redmond and E. Elberg, "Geology of the Arabian Peninsula: Sedimentary Geology of Saudi Arabia," Geological Survey Professional Paper 540-D, United States Government Printing Office, Wash- ington DC, 1966.

[2] M. Al Husseini, "Update to Late Triassic-Jurassic stratigraphy of Saudi Arabia for the Middle East Geologic Time Scale," Geoarabia, Vol. 14, No. 2, 2009, pp. 145- 186.

[3] Water Atlas, "Water Atlas of Saudi Arabia," Ministry of Agriculture and Water, Saudi Arabia, 1984.

[4] A. M. Al Bassam, "Groundwater (in Arabic)," Al Humaidi Publishing House, Riyadh, 2001.

[5] D. L. Parkhurst and C. A. J. Appelo, "User's Guide to PHREEQC (Version 2)—A Computer Program for Speciation, Batch-Reaction, One-Dimensional Transport, and Inverse Geochemical Calculations," US Geological Survey Water-Resources Investigation Report, 1999, pp. 99- 4529.

[6] APH/AWWA/WPCF, "Standard Methods for the Examination of Water, Wastewater," American Public Health Association, Washington DC, 1989.

[7] M. I. Al Husseini and R. Mathews, "Arabian Orbital Stratigraphy: Period Second Order Sequence Boundaries," Geoarabia, Vol. 10, No. 2, 2005, pp. 165-184.

- Open Special Issues
- Published Special Issues
- Special Issues Guideline

IJG Subscription

Most popular papers in IJG

About IJG News

Frequently Asked Questions

Recommend to Peers

Recommend to Library

Contact Us

[8] M. I. Al Husseini and R. Mathews, "Stratigraphic Note: Orbital calibration of the Arabian Plate Second Order Sequence Stratigraphy," Geoarabi, Vol. 11, No. 3, 2006, pp. 161-170.

[9] G. W. Hughes, "Biofacies and Paleaoenvironments of the Jurassic Shaqra Group of Saudi Arabia," Volumina Jurassica, Vol. VI, 2009, pp. 33-44.

[10] Parsons Basil Consultant Agriculture and Water Resources, "The Great Nafud Sedimentary Basin," Final Report, Ministry of Agriculture and Water, Riyadh, 1969.

[11] Italconsult, "Water and Agriculture Development Studies for Area IV," Final Report, Ministry of Agriculture and Water, Riyadh, 1969.

[12] Groundwater Development Consultant (GDC), "Final Draft of Umm-Er-Radhuma Study," Unpublished Report, Ministry of Agriculture and Water, Riyadh, 1979.