

GROUNDWATER EXPLORATION USING SEISMIC REFLECTION A CASE STUDY OF THE BASALTIC SEQUENCE SOUTH OF AL-MADINAH, SAUDI ARABIA

By

Nassir S. Al-Arifi^{1,2}, Abdulrhman G. Al-Anazi³, Abdulaziz M. Al-Bassam^{1,2}, and ¹Saad M. Al-Humidan^{1,2}

¹Department of Geology and Geophysics, College of Sciences King Saud University

²SGS Research chair, King Saud University, Saudi Arabia

³Institute of Oil and Gas, King Abdulaziz City for Science and Technology

E-mail: nalarifi@ksu.edu.sa

ABSTRACT

This study was carried out in Harat Rahat (south of Almadinah Almonwarah) using seismic reflection. The main objectives of this study are to determine the extent of basaltic layer and to define the subsurface faults and fractures that could affect and control the groundwater movement in the study area.

Seismic reflection method was used to build a geological model of the subsurface. In this respect five seismic lines were acquired which later processed and interpreted. Interpretation of the processed data was made with the help of additional available from well logging and lithological data. According to these results, the subsurface in the study area is classified into three seismic layers ranging in velocity from 500 m/s to 1100 m/s and the depths of water table vary between 125 to 150 m except the line(c) that shows a water level at a depth of 260 m. Relatively greater depth of water table under survey line (c) could be referred subsurface faulting.

It is important to note that the interpretation results obtained from seismic reflection survey are quite compatible with the available well logging and borehole lithologic data.

KEYWORDS: GROUNDWATER EXPLORATION, SAUDI ARABIA, SEISMIC REFLECTION, BASALTIC SEQUENCE