



Geophysical and hydrogeological investigations of an area of Pesquería, Nuevo León, México

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Hydrogeological and geophysical investigations were carried out with the aim to obtain a model that can us explain the depth groundwater and the direction of groundwater flow. The area is located in the northeastern of México, in a region where the pluvial precipitation is erratic and concentrated. On the basis of the superficial geology we decide to carry out the six vertical electrical soundings with Schlumberger array with a maximum $AB/2 = 500$ meters, and three geoelectrical profiles with dipole-dipole array where $a=30$ meters and “ $n=5$ ”. Each of the geoelectrical profiles has a length of 510 meters. Measurements of the phreatic level of existing wells were also carried out. This helps us also to decide the location of the six vertical soundings and the three geoelectrical profiles. The area of investigation corresponds to the valley El Carmen - Salinas Victoria conformed by alluvial sediments of the Quaternary (in some cases by clays), by conglomerates of the Pliocene, and by sedimentary rocks of end of the Cretaceous (shales calcareous). The sediments of the Quaternary have an aquitard, conformed by sandy clays, and in some locations by fragments of limestones and shales. The thickness of these materials varies from 3 m in the center of the valley up to 30 m in the foothills of the existing mountains, and they are distributed widely in the valley, principally in the northeastern part of the area. These materials allow the vertical recharge of the flow of water into the confined aquifer, located under these materials. The confined aquifer is conformed by shales and shales with sand and calcareous materials. The groundwater in this aquifer flows through fractures. The results, of the distribution of the measurements of the electrical resistivity, show locations suitable for future work to explore for groundwater. The resistivity data were acquired with the instrument SuperSting R1/IP. The inversion of the data was carried out using the software EarthImager 1D and 2D. The interpretation of the obtained resistivity models was made with the aid of information of the geology of the area, and lithology of the materials of some existing wells. The information about the depth and direction of the flow of groundwater was also obtained from the hydrogeological and geophysical measurements.