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Basin definition with gravity and resistivity (VES) in the central El Qaa Plain, Sinai, Egypt.

W. Sauck (1), A. Kehew (1), F. Soliman (2), L. Smart (1), M. Mesbah (3)

(1) Department of Geosciences, Western Michigan University, Michigan, USA, (2) Department of Geology, Suez Canal University, Ismailia, Egypt, (3) Faculty of Petroleum and Mining Engineering, Suez, Egypt (sauck@wmich.edu / Fax: 269-387-5513 / Phone: 269-387-4991)

The resort city of Sharm el Sheikh at the southern tip of the Sinai is limited in its growth by lack of fresh water. Presently the city is supplied via a small pipeline and tanker trucks from wells located 80-100 km northwest. These wells are in the central El Qaa coastal plain, NE of the town of El Tur. This coastal plain extends for more than 120 km parallel to the margin of the Gulf of Suez, and is underlain by a half-graben structure whose NE bounding fault is clearly visible on satellite photos. A matching, similar structure is visible on the west side of the Gulf of Suez. The problem is to determine why the SE half of this basin is not a productive aquifer.

The gravity method was first used, with about 100 stations observed in an approximately 20 x 25 km area near El Tur that included the southernmost wells and also the non-productive area further SE. The relative Bouguer Anomaly map clearly revealed that the assumption of a continuous graben between the mountain front and the shore of the Gulf of Suez was not correct. The deep Miocene to Recent graben or alluvial basin (negative gravity anomaly) is truncated at the latitude of El Tur, and the coastal plain further to the SE is apparently underlain by shallow bedrock. 2-D gravity modeling indicates low-density basin fill in the productive graben area to be at least 3 km thick, depending upon the density model chosen. This is similar to maximum depth estimates of 4 km made from an aeromagnetic survey interpreted by Meshref and El-Kattan in 1989. Estimates of alluvium thickness further to the SE in the shallow bedrock area are only in the range of 200-500 meters.

As some of the wadis draining the mountains of the south-central Sinai have large watersheds and carry appreciable runoff, the question arose as to where this water went

after infiltrating into the beds of the wadis as they crossed the alluvial plain in the region of shallow bedrock. A row of 12 Schlumberger Vertical Electrical Soundings was surveyed along the axis of Wadi Isla, from the mountain front, to about 10 km downstream. These confirmed earlier work by Shendi (1988) that indicated shallow bedrock in this area. We saw evidence for considerable buried topography, with interpreted alluvial thicknesses in the range of 100 to 250 meters. However, much more field work is required to map the alluvial thickness and possibly define some small, shallow sub-basins which may also serve as aquifers.

In any case, the thick aquifer of the central El Qaa plain is being depleted, with rapid historical drops in water table. Locating more ground water in this very arid region is only a short-term solution. Water conservation and desalinization will have to be considered for any long-term management plan for this area.