

Hydrogeologic Conceptual Model of the Coastal Aquifer of Yaqui Valley, Sonora, Mexico

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Abstract

This work integrates the use of hydraulic resources, hydrological and geologic information to elaborate a hydrological conceptual model of the Yaqui Valley aquifer, in northwest of Mexico. In the use of hydraulic resources, it is used 2,840 million m³/y on the average, of surface and ground waters, captured by the dams of the Yaqui river and for the pumping wells, this volume irrigates 233,000 hectares. The geologic development begins with the sedimentation of calcareous rocks that finishes at the end of the Permian, when the sea loses depth, a surface that is subject to erosion emerging.

The structural activity of ends of the Cretaceous and principles of the Tertiary affected to the mountains of the region, the emission of andesitic and rhyolitic lavas they probably rest on a basement Cretaceous. At the end of the Tertiary the erosion formed conglomerates and sandstone. In the quaternary one the erosion continued, forming bank deposits, alluvial fans and the recent fillers of the valley.

Regarding the hydrogeology, the aquifers of the valley are formed by the alluvial deposits generated by the river flows of the region, they are permeable and transmissible in almost the whole plain, mainly on the riverbanks of the rivers, these hydrodynamic properties decrease until reaching contact with the slope and waterproof terraces located to the north and east of the valley.

In the conceptual model we concludes that the alluvial materials deposited on the waterproof formations constitute the only aquifers of the region, the hydraulic recharge is for infiltrations from rivers, dams, irrigation channels system and from irrigated agricultural lands and of the rain fall. The hydraulic discharge happens vertically for the pumping of wells, horizontal groundwater flow toward the agricultural drainage channels system, low section of the rivers, besides the groundwater flow that discharges to the sea.