Ground water in southwestern New Mexico

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GROUND WATER IN SOUTHWESTERN NEW MEXICO

by

Anonymous

Water, the most vital natural resource, is conspicuous by its apparent absence in the southwestern corner of New Mexico. But note the use of the word *"apparent";* although the annual average rainfall in the area is less than 10 inches, and no perennial stream can be seen on the Conference route, at no time will the Conferees be more than a few tens or hundreds of feet from water. Ground water, generally, is available everywhere in the area. Depths to water range from less than 5 feet at some points on valley floors to as much as 550 feet on the upper alluvial slopes that apron the mountain ranges. The depth to water in wells within the mountains commonly is less than 500 feet. However, the few wells that have been successfully developed in the more rugged parts of the mountains probably tap small bodies of perched water. The water table under the mountain ranges seems to stand at an altitude only slightly higher than under the adjacent valley floors.

Although one can say with reasonable assurance "drill deep enough and you'll get water" at most places in the region, the quantity that can be developed is quite another matter. Large quantities of water have been pumped from wells tapping the valley fill, or so-called "bolson deposits" in the San Simon, Animas, Playas, Lordsburg, and Mimbres (Deming) valleys. In each of these areas irrigation wells have been developed, some of which have yields up to 1,800 gpm (gallons per minute). City-supply and industrial wells in the vicinity of Silver City obtain yields of up to 500 gpm from parts of the Gila Conglomerate. On the other hand, wells that tap the crystalline intrusive and metamorphic rocks, the volcanic rocks, and the marine sedimentary rocks commonly yield less than 10 gpm; in some areas, particularly in the more rugged mountains, yields of 1 to 2 gpm are considered good. Each of the rock formations has its own lithologic characteristics, and these determine the ability of the formation to yield water to wells.

The lithologic characteristics of the rock formations in the region have been described in detail in the literature. The hydrologic characteristics of most of the formations or types of rocks to be seen in the area are summarized by Trauger and Doty (1965) in the Society's Sixteenth Guidebook. The occurrence of ground water in the principal valley areas has been described in detail in the various published reports of the New Mexico State Engineer cited in the list of selected references. A report on the ground-water resources of Grant County will soon be published by the New Mexico Bureau of Mines and Mineral Resources. In addition to the areal reports cited, the New Mexico State Engineer publishes annually a summary of water-level measurements made in observation wells located throughout the area, and maps that show changes in water levels in the heavily pumped areas.

The ground-water resources of the region are great, but they are not unlimited. Water levels are declining in all the areas of heavy pumping, and it is inevitable that sooner or later development will have to be abandoned or the extent of operations reduced. It also is probable that, although water levels are declining in the known aquifers, large supplies of ground water have yet to be discovered.

The great thicknesses of limestone rocks that undoubtedly underlie much of the bolson fill generally have been discounted as potential supplies of large quantities of water. Yet evidence exists that this belief may be erroneous. It is true that in the upland areas, the limestone rocks do not commonly yield large quantities of water. But at depth, the situation may be different where deep circulation of water may have developed solution permeability or where fracturing along zones of faulting may have increased storage and permeability. Records of deep wells at Apache Tejo, in Grant County, indicate that the original large yield of wells come from the limestones at depths of over 1,000 feet, and that subsequent caving greatly reduced the yields. It is reported that circulation was lost in the Montoya Limestone penetrated in an oil-test hole near Hachita. More recently, a water well drilled near the new town of Tyrone reportedly penetrated the lower Gila Conglomerate, entered limestone, and when test pumped yielded as much as 1,500 gpm. These instances suggest that when future demands for water warrant the extra cost, it may be worth while to explore the deep-lying limestone formations that underlie the bolsons and adjacent alluvial-fan slopes.

At the present time the quality of the ground water found in the region, in all the aquifers, and at all depths, is generally fair to excellent. The few reported instances of poor to impotable water are local, and are commonly associated with mineral deposits. No data are available concerning the quality of water that might be available in the deep-lying limestones, but, except for the probability that it would be very hard, there is no reason to expect it to be saline as is most water in the deep-lying formations in New Mexico east of the Rio Grande.

The generally good quality of most ground water in southwestern New Mexico may be attributed largely to two factors—a general absence of saline deposits, or saline-rich formations, and to an apparently freer circulation of water, both shallow and deep. Water moves through the formations underlying the San Simon, Animas, Playas, and Lordsburg valleys and probably discharges along the valley of the Gila River. Ground water in the drainage basin of the Mimbres River and in Hachita Valley follows a southerly course, moving toward points of discharge in the series of great playa lakes a few miles south of the United States-Mexican boundary.

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