Underground Water Problems in the Mesilla Valley

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Information regarding ground water in the Mesilla Valley is not too plentiful. Hence, in a discussion of this type, it is necessary to rely upon observation, experience in other ground water areas, as well as upon available data. Some conclusions that now appear to be valid may later be subject to modification. This paper, therefore, does not pretend to express a technical viewpoint based upon the analysis of adequate data.

Underground water problems in the Mesilla Valley revolve mainly around the questions of quantity and quality of ground water, as is the case in practically all other ground water areas. Insofar as we know, there is nothing particularly unusual about the ground water situation in this area.

Due to a severe reduction in surface water supplies available to lands in the Mesilla Valley during the past several years, it has been necessary to make extensive use of ground water in this area. Under normal surface water conditions, the average amount of water per acre required by crops approaches three and one half acre feet. Allotments of surface water have been as follows during the past three years:

1954	6 inches per acre
1955	5 inches per acre
1956	4.7 inches per acre

The difference between the normal requirement of around three and one half acre feet, and the actual delivery of surface water, has consisted of ground water.

There are approximately 850 irrigation wells in, and adjacent to, the Mesilla Valley, the vast majority of them being located on the valley floor. These wells vary in size and output, but most of them are capable of pumping at least three cubic feet per second. The wells represent an average investment of around $7000 each, or a total investment of nearly six million dollars. Operation costs are estimated to be about $10.00 per acre foot of water pumped when adequate allowances are made for depreciation, repairs, fuel and interest on investment.

Most irrigation wells in the Mesilla Valley are comparatively shallow. Maximum depth, at present, does not appear to exceed 250

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feet. Apparently the principal water strata now being tapped lie within 100 feet of the surface of the ground. During the early days of extensive well drilling in the Mesilla Valley, many wells were drilled to a depth of only 75 to 125 feet. So far, it has not been necessary to deepen existing wells to any considerable extent in an attempt to tap additional supplies of ground water.

The use of irrigation wells in the Mesilla Valley is presumably a temporary practice, designed solely to meet a serious situation caused by the shortage of surface water. It is assumed that, when surface water conditions improve, the use of irrigation wells will decline substantially, although some pumping will undoubtedly continue, particularly during the winter months. One factor favoring a reduction in pumping is its high cost in comparison with the cost of surface water. Another factor is the decline in the quality of ground water, particularly in some areas.

The Mesilla Valley is not located in a declared ground water district, hence the drilling of irrigation wells is not subject to control by the office of the State Engineer. This lack of control has not operated to the detriment of owners of water right land in the Mesilla Valley for the reason that there is comparatively little new land adjacent to the floor of the valley that is capable of being successfully cultivated. Also, due to the cost of drilling, equipping and operating irrigation wells, water users limit the number of wells, and the extent of their operation, to what is absolutely necessary to irrigate the acreage in cultivation.

Because of its extensive use in the Mesilla Valley, the questions of quantity and quality of ground water are of great importance. The quantity of ground water that underlies the Mesilla Valley has not been estimated. It is known, however, that the water tale extends outward underneath the adjoining mesas for varying distances. Depths to which recoverable ground water is available are not known with any degree of accuracy, but there are some indications that ground water strata may be found below present levels from which water is pumped. There appears to be some variation in occurrence of ground water beneath the valley floor, since occasional dry holes have been reported. There also appears to be considerable variation in materials encountered in drilling, as would be natural in a valley fill. Gravel and coarse sand strata containing recoverable ground water seem to alternate with layers of clay and other materials.

Prior to the extensive drilling of irrigation wells in the Mesilla Valley, the ground water table averaged about nine feet below the surface of the ground, based on Bureau of Reclamation test well data. It now averages about fourteen and one half feet below the surface of the ground, based on the same source of information. This indicates an average drop of approximately five and one half feet since the period

immediately prior to 1951 when extensive pumping in the Mesilla Valley began. This does not appear to be particularly bad in view of experience elsewhere. These figures are based upon readings taken from 39 Bureau of Reclamation test wells located in the Mesilla Valley. Because the wells are comparatively few in number, and are not evenly distributed throughout the valley the data should be taken as indicative of a general trend rather than an a precise measurement of ground water levels in the area. There is considerable variation in the extent to which the water table has dropped in various parts of the valley, the difference between minimum and maximum fluctuations being about thirteen feet.

It was estimated some years ago that, beneath each township in the Middle Rio Grande Valley, there were 500,000 acre feet of ground water within 100 feet of the surface. On this basis, there would be around a million and a half acre feet beneath the New Mexico portion of the Mesilla Valley minus withdrawals to date. However, this estimate does not include ground water beneath the adjoining mesas which, in time, would become at least partially available to the wells in the valley and the effect of recharge of ground water from various sources.

There has been considerable discussion from time to time regarding the origin and movement of ground water beneath the Mesilla Valley. It undoubtedly originates from several sources such as precipitation on the valley floor; surface, and below surface, inflow from the adjoining mesas; seepage from the river and from the irrigation distribution system; and from the application of water to valley lands. It is impossible to define with any degree of accuracy how much ground water originates from each source. Positive statements are occasionally made that ground water originates mainly from a single source, but accurate proof of such statements has not been forthcoming. It is known that, prior to the construction of the present irrigation distribution system in the Mesilla Valley, and the furnishing of water from storage, there were no extensive seepage problems in the area. However, soon after the distribution system was extended and irrigation with stored water became possible, the ground water table rose rapidly and it became necessary to construct an extensive system of open drains in the valley. This might be interpreted to mean that the extensive application of water to the land is an important source of recharge to the ground water table; or that seepage from an extensive distribution system is an important contributor. There is some evidence that impervious material has sealed off portions of the river bed from the water table, thereby decreasing seepage loss. At any rate, an extensive study would be required to estimate the contributions from the various sources of ground water underlying the Mesilla Valley and the accuracy of such an estimate would be subject to question.

As to the movement of ground water underneath the Mesilla Valley, there is evidence to indicate a flow from north to south following the gradient of the valley floor. It is known that there is an undergraduate barrier at the lower end of the Mesilla Valley in the vicinity of the cement plant. During times of normal water supply the extreme lower end of the Mesilla Valley, located mostly in Texas, is troubled with a high water table, which is not the case elsewhere, indicating that free flow of ground water from the valley may be obstructed. Drains in the lower portion of the Mesilla Valley have continued to flow slightly, whereas drains in the upper end have been completely dry for a considerable period of time. This situation may also be indicative of a north to south flow of ground water with an obstructed outflow at the lower end. Whether there is any substantial permanent loss of ground water through outflow at points along the edges of the valley has not been determined. There is at least one unconfirmed report of such a situation.

The quality of ground water beneath the Mesilla Valley is generally satisfactory for irrigation purposes. There is considerable variation in quality, however, from place to place. Very few wells in the Mesilla Valley have had to be abandoned because of poor quality water up to the present time, and a relatively small number of wells may be approaching this situation. There is a tendency for total salts, as well as harmful salts, in irrigation well water to increase as pumping continues. This appears to be a natural situation that has also occurred in other areas irrigated by pumping. There is no evidence, as yet, of an accumulation of harmful salts in the soil, caused by the application of pumped water, to an extent that would permanently injure the soil. Water users are aware, however, of the advisability of making full use of available surface water supplies as a means of counteracting a decline in the quality of water.

To summarize and to conclude, it might be said that pumping in the Mesilla Valley is considered to be a temporary measure made necessary by a severely diminished surface water supply. It has been the principal factor in maintaining farm production at a normal level during the past six years in the face of an adverse water situation. It has made possible the transfer of sufficient surface water to small tracts that do not have wells to make it possible to keep such tracts in production. The use of ground water has been economical and has been largely confined to valley lands. The quantity of ground water available has been adequate since 1951, when pumping first began on a large scale, and there is not indication, as yet, of approaching exhaustion of ground water. In general, the quality of the water has been satisfactory for irrigation purposes and there appears to be no immeditate danger of a serious character caused by a deterioration in the quality of ground water.