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The ground-water resources of the El Paso Texas area

By

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Conclusions and recommendations

The bolson deposits underlying the Mesa, north and northeast of El Paso, contain a large quantity of water in storage that can be recovered without excessive pumping lifts. Information concerning the thickness, permeability, porosity and specific yield of the water-bearing beds beneath the Mesa is too meager to permit definite conclusions regarding the total amount of water in storage. However, the water in storage is estimated to be sufficient to provide a satisfactory supply for the El Paso area for many years to come. There is also a large amount of annual recharge, or replenishment of this underground reservoir. Records of the fluctuations of the water level and of the rates of pumpage in this area are too short and inadequate to permit definite conclusions as to the amount of this recharge, but on the basis of present information, it appears to be doubtful whether the recharge is equal to the present rate of pumpage.

It is estimated that the pumpage for all purposes in the El Paso area has increased each year since 1906 at the average rate of about half a million gallons a day. It is not known, of course, whether the pumpage will continue to increase as it has in the past, but it is believed that, with allowance for a reasonable increase in pumpage, and with no allowance for recharge, the supply from the bolson deposits underlying the Mesa will be sufficient for a period of at least 20 years and probably considerably longer, provided the total pumpage in the Valley continues to be essentially the same as the present pumpage and provided wells are drilled at intervals as far as 10 miles north of the Mesa field. The recharge will serve to increase the period in which the Mesa may be relied on to yield a major part of the city's supply. At some future time, however, the city must doubtless seek an additional source of water.

The recharge to the water-bearing beds occurs chiefly along the east side of the Franklin and Organ Mountains. It is believed that the small dams which have recently been built in the canyons in the southern part of the Franklin Mountains will serve to increase the amount of recharge, and that additional dams in the canyons north of McKalligans Canyon would serve a similar purpose. The increase in recharge would, in itself, probably not warrant building additional dams, but if work relief projects are needed, such dams would serve a useful purpose in increasing recharge.

The La Mesa area west of the Franklin Mountains does not appear to be a promising source for large ground-water supplies. The water-bearing materials are, in general, rather fine, and pumping lifts would be much greater than on the Hueco Bolson.

It is recommended that large new developments of ground-water supplies be made by sinking wells, as required to supply to increasing demand for water, and that these wells be spaced at intervals of not less than one-half mile in a line extending directly north from the Mesa well field. These wells should be of artificial gravel-wall construction and should be drilled by men having a long record of successful construction of wells of this type. The new wells should, if possible, be developed to yield at least two million gallons a day, but should be pumped at not more than three-fourths of their developed capacity. Moderately successful wells could probably be obtained by drilling east of the Mesa well field, but the water-bearing material appears to be somewhat finer toward the east and it is believed that better wells will be obtained toward the north.

It is not advisable to extend the Montana field toward the east, partly because finer materials are found toward the east and partly because any extension of this field in that direction would necessitate drilling near the

Mesa rim in an area in which salt water exists and which is already over-pumped. In fact, the pumpage from the Montana field should be decreased, and plans should be made immediately that will permit the abandonment of the field, if this should become necessary.

In the El Paso Valley, beds yielding somewhat highly mineralized water overlie the beds that contain fresh water and to some extent occur within the zone in which most of the beds yield fresh water. This constitutes a source of possible contamination that must be carefully considered in making plans for pumpage of existing wells and in developing new wells. Most of the wells within the valley are drawing chiefly from fresh water-bearing beds, and also from one or more of the beds containing highly mineralized water, but there does not appear to be a general contamination of the fresh water beds. However, contamination may occur either by interchange of water through wells which have leaky casings opposite the highly mineralized beds, or it may occur by the breaking down of relatively thin impermeable beds as a result of large differences in head between the beds.

No heavy pumping of the upper, highly mineralized water is being done at the present time, but in order to keep the head of this water as low as possible, the construction of shallow wells for pumping this water for all purposes that do not require water of good quality should be encouraged. All abandoned wells should be effectively sealed from top to bottom. The program for rectifying the Rio Grande below El Paso has and will undoubtedly further lower the bed of the river at El Paso. This lowering will also lower the level of the shallow ground water.

The beds yielding highly mineralized water are at the same level as the beds yielding fresh water beneath the Mesa, and are presumably connected with them. It is likely that excessive lowering of the water level beneath

city wells, both new and old, should be equipped with a one-half inch pipe extending from the surface to a considerable distance below the pumping level so that water levels may be measured at any time with a steel tape. The records thus obtained should be carefully studied and a report should be prepared each year on the results of the studies, until a record of sufficient length for accurate determination of the amount of recharge is available. The compiling of these records would give advance warnings of conditions that would require the decrease in pumpage or abandonment of existing well fields, or the development of new fields, many years before the actual need for such changes arises.

the Mesa near the Mesa rim would cause the highly mineralized water to move under the Mesa. In fact, this appears to have occurred to some extent in the Southern Pacific Company wells at the edge of the Mesa.

In order to protect the interests of the ground-water users in the El Paso area and especially to protect the El Paso water supply, systematic records should be collected for several years that will aid in determining the rate of encroachment of salt water in and near the El Paso Valley, the amount of ground-water in storage and the amount of the recharge to the ground-water reservoir.

In studying the problem of salt water encroachment, each city well and each private well in the danger zone, that has been sampled for analysis during the investigation, should be sampled twice annually. To insure the value of these analyses for comparative purposes, the sample should be collected at comparable periods in the pumping season. Thus, one sample should be collected one or two hours after pumping starts at the beginning of the season, and one a few hours before pumping ceases at the end of the season. The analyses should be made by methods described by the United States Geological Survey, 1/ and should preferably all be made by the same analyst.

In order to determine more accurately the amount of ground-water, storage and recharge data on water-level fluctuations in all of the city wells and in all of the observation wells that have been measured during this investigation as well as data on pumpage from all wells of large yield in the area should be obtained at monthly intervals. All of the

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1/ Collins, W. D., Notes on practical water analysis: U. S. Geol. Survey Water-Supply Paper 596-h, pp. 235-266, 1937.