Saline Ground Water in the Roswell Basin, Chaves and Eddy Counties New Mexico, 1958–59

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1539-M

Prepared in cooperation with the Pecos Valley Artesian Conservancy District and the New Mexico State Engineer

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By JAMES W. HOOD

CONTRIBUTIONS TO THE HYDROLOGY OF THE UNITED STATES

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CONTENTS

ILLUSTRATIONS

[Plates are in pocket]

TABLES

CONTRIBUTIONS TO THE HYDROLOGY OF THE UNITED STATES

SALINE GROUND WATER IN THE ROSWELL BASIN, CHAVES AND EDDY COUNTIES, NEW MEXICO, 1958-59

By James W. Hood

ABSTRACT

The results of analysis of water samples from wells and springs show that in the Roswell basin saline-water encroachment in the San Andres limestone, of Permian age, is a real or potential threat to ground-water supplies in four areas.

Owing to increased precipitation in 1957 and 1958, saline-water encroachment was halted temporarily in the original study area in 1958, but by March 1959, because of deficient precipitation and consequent heavy pumping of wells, encroachment had resumed.

The mineral content of water from artesian wells in the northern extension of the area is increasing slowly. Seasonal fluctuation of chloride content generally is on the order of 100 ppm.

An area of saline-water encroachment north and east of Dexter is continuous with the saline part of the original study area.

In a potential area of encroachment east and southeast of Artesia the San Andres limestone contains saline water at depth. Encroachment probably will occur as artesian pressures decline.

The Quaternary alluvium contains saline water in the bottom lands of the Pecos River and east of the Hagerman Canal. The mineral content of water in the alluvium is increasing where saline ground and canal waters are used for irrigation. Saline water in the alluvium may encroach into the fresh-water area west of Dexter and Hagerman, where a cone of depression in the water table causes a flow of ground water from the vicinity of the Hagerman Canal.

INTRODUCTION

PURPOSE AND SCOPE OF THE INVESTIGATION

The encroachment of saline water in the San Andres limestone, of Permian age, into areas irrigated with water from this formation in the Roswell basin, threatens a decline in productivity of irrigated lands. The principal area of saline water in this basin, Tps. 10 and 11 S., Rs. 24 and 25 E., has been described previously by Hood, Mower, and Grogin (1960). The purpose of this investigation is to provide a continuous record of the mineral content of water, especially the chloride content, in parts of the Roswell basin; to learn the changes in the amount of chloride in areas already affected by saline water; to learn the rate of saline-water encroachment if such is taking place, and to ascertain areas of potential encroachment. The term "saline water," as used in this report, is water containing 500 ppm (parts per million) or more of chloride. The dividing point between fresh and saline water, 500 ppm of chloride, was chosen arbitrarily because water containing that much chloride generally is within the range of slightly saline water as defined by Winslow and Kister (1956) on the basis of dissolved solids.

The present report gives the results of investigations by the U.S. Geological Survey in cooperation with the Pecos Valley Artesian Conservancy District and the New Mexico State Engineer from July 1958 through June 1959 (fig. 1). In addition, the study was expanded to include most of the basin from the southern part of T. 7 S., southward through T. 18 S., to obtain quality-of-water data for detecting other potential areas of saline-water encroachment.

Approximately 700 samples of water were obtained from 207 wells chosen for sampling three or four times a year. In addition, single samples were taken from 26 wells in areas where supplemental data were needed. The samples were tested for chloride content and specific conductance, as such data were adequate to indicate the salinity of the water.

Much of the investigation consisted of reviewing and analyzing well records to identify the water-bearing formations. The depth of the well at the time of sampling, the casing record, and the log of formations penetrated by the well were aids in identifying the formation from which a water sample was obtained.

Data gathered during the investigation are presented in tables and maps. Graphs showing data on chloride content of water from 30 representative wells are included, and graphs for most of the other sources sampled are on file at offices of the Geological Survey in Albuquerque, N. Mex., and Washington, D.C. Chemical analyses and well data compose the major part of the basic data (tables 1, 2). In the tables, data on the quality of water in observation wells in the original study area (Tps. 10 and 11 S.) are restricted to the analyses representing the highest and lowest chloride concentrations for the period of record at the individual well. All available chemical data are given for those wells added to the observation net in 1958. Data are presented for several other wells south of T. 12 S., which have been sampled one or more times since 1926. The latter group of analyses show the changes in quality of water during a long period of time.

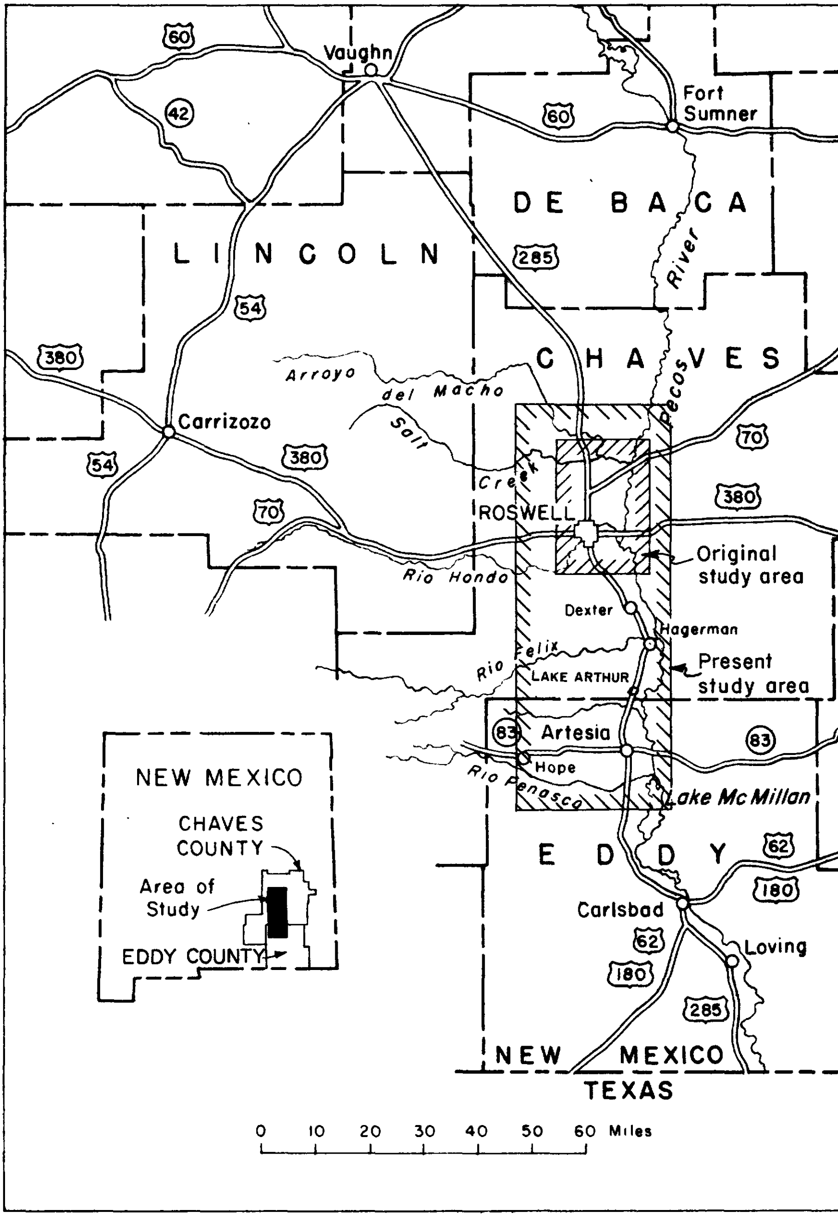

FIGURE 1.—Map showing location and extent of area of saline-water investigations in the Roswell basin, Chaves and Eddy Counties, N. Mex.

The locations of all wells and other water-sampling points given in tables 1 and 2 are shown on plate 1, which shows also the outcrops of geologic formations and the chloride content of water from the San Andres limestone in March 1959. Plates 2 and 3 were prepared from the data on which tables 1 and 2 are based and show the chloride content of water from the San Andres limestone in the original study area in the summer of 1958 and in January 1959. Plates 4 and 5 show the changes from September 1957 to September 1958 and from January 1958 to January 1959. It should be noted that the lines of chloride change shown on plates 4 and 5 are based on the control shown and on a comparison of isochlor maps for the months indicated.

The graphs in figures 3–8 supplement the data in tables 1 and 2 and show the chloride concentration in water from representative ground-water sources for which there is approximately 2 years of record, or more. Most of these, and additional graphs, are presented in a report by Hood, Mower, and Grogin (1960); data for the 1958–59 year have been added.

LOCATION-NUMBERING SYSTEM

The system used for numbering wells in New Mexico is based on the common system of subdivision of public lands into sections. By means of this system a number designates a given well or observation point, and locates its position to the nearest 10-acre tract in the land net.

A location number is divided by periods into four segments. The first segment denotes the township south of the New Mexico base line, and the second segment denotes the range east of the New Mexico principal meridian. The third segment denotes the number of the section within the township, and the fourth segment denotes the particular 10-acre tract of the section in which the well is located.

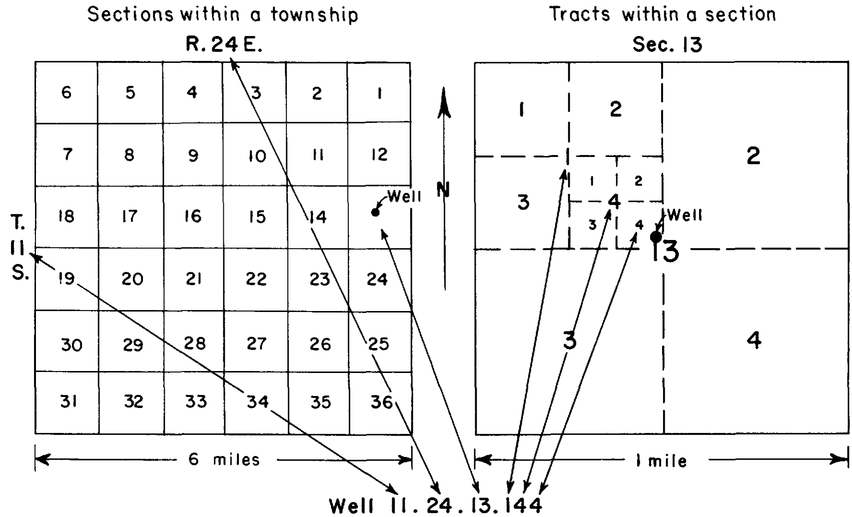

FIGURE 2.—System of numbering wells in New Mexico.

The section is divided into four quarters, numbered 1, 2, 3, and 4, for the northwest, northeast, southwest, and southeast quarters, respectively. The first digit of the fourth segment designates the quarter section, a tract of 160 acres. Similarly, the quarter section is divided into four 40-acre tracts, numbered in the same manner, and the second digit denotes the 40-acre tract. Finally, the 40-acre tract is divided into four 10-acre tracts. Thus, a location numbered 11.24.13.144 is in the SE¼SE¼NW¼ sec. 13, T. 11 S., R. 24 E. (fig. 2). If a well cannot be located accurately within a 10-acre tract, a zero is used as the third digit, and if it cannot be located accurately within a 40-acre tract, zeros are used for both the second and third digits. If it cannot be located more closely than the section, the fourth segment of the location number is eliminated. When it becomes possible to locate more accurately a sampling point in whose number zeros have been used, the proper digit or digits are substituted for the zeros. The letters a, b, c, are added to the last segment to designate the second, third, fourth, and succeeding wells listed in the same 10-acre tract. In this report the location numbers are used to designate not only the wells but also springs and surface-water sampling stations.

SALINITY OF GROUND WATER

ORIGINAL STUDY AREA

The chloride content of ground water in the basin is discussed by local areas because the quality of water is controlled by local conditions.

The original study area is one of the most heavily pumped areas in the basin. The wells are spaced closely, and most of them tap the same aquifer, the San Andres limestone.

The chloride content of water in the San Andres limestone in the original study area in the summer of 1958 and January 1959 is shown in plates 2 and 3. As defined by Hood, Mower, and Grogin (1960), the interface between saline and fresh water is indicated by the 500-ppm isochlor. Comparison of plates 2 and 3 with isochlor maps for comparable months in 1957 and 1958 indicates that the interface retreated eastward an average distance of about 0.07 mile from September 1957 to September 1958 and about 0.06 mile from January 1958 to January 1959 in the area between sec. 9, T. 10 S., R. 24 E., and sec. 9, T. 11 S., R. 25 E.

The retreat of the interface between the saline and fresh water is illustrated by both the chloride maps (pls. 4 and 5) and the graphs (figs. 3–8).

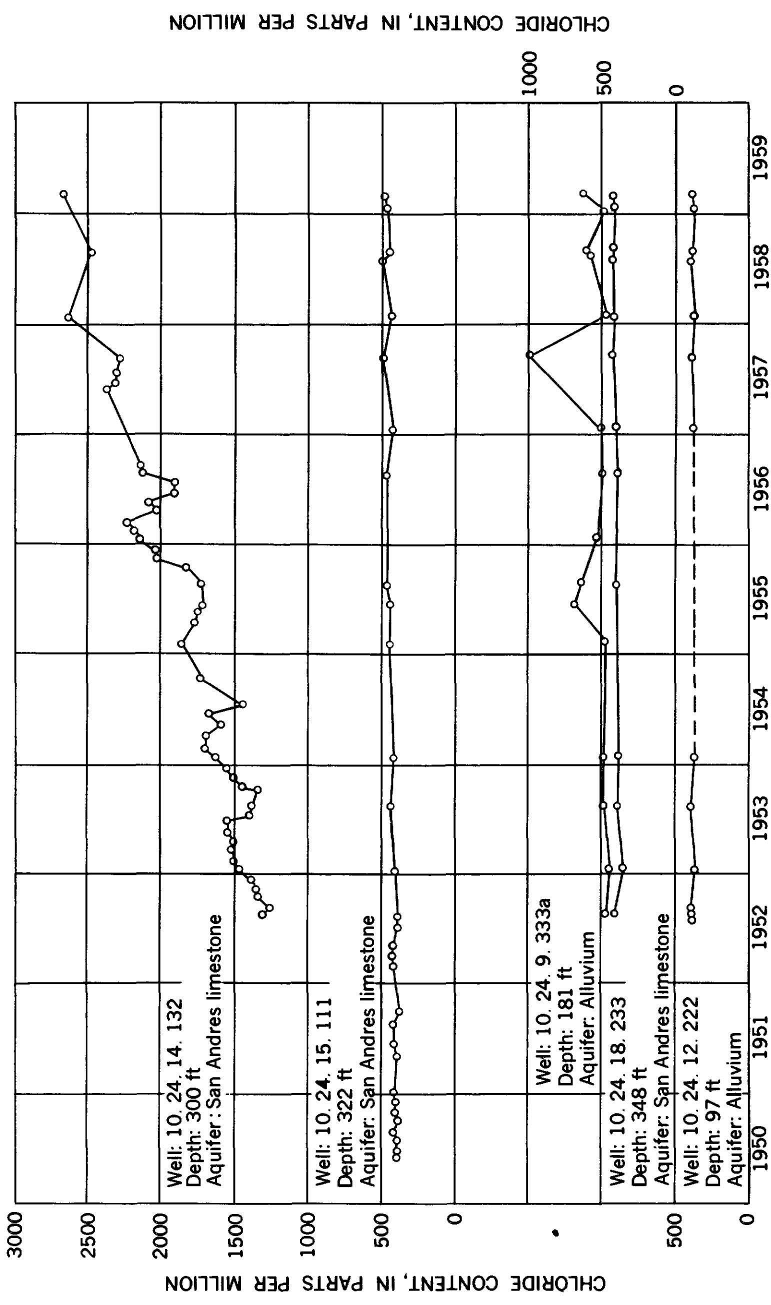

FIGURE 3.—Representative graph showing chloride content of water from wells 10.24.9.333a; 10.24.12.222; 10.24.14.132; 10.24.15.111; and 10.24.18.233, Roswell basin, New Mexico.

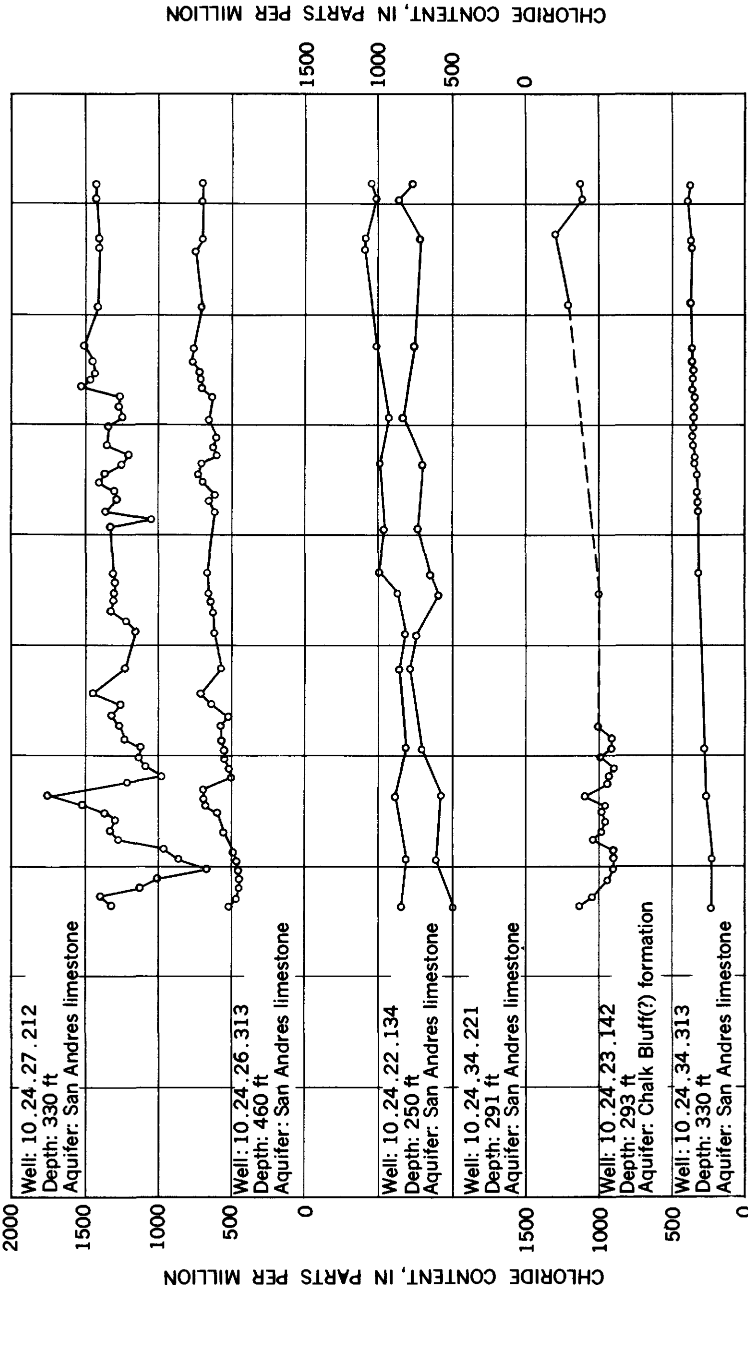

FIGURE 4.—Representative graph showing chloride content of water from wells 10.24.27.212; 10.24.26.313; 10.24.22.134; 10.24.34.221; 10.24.23.142; and 10.24.34.313, Roswell basin, New Mexico.

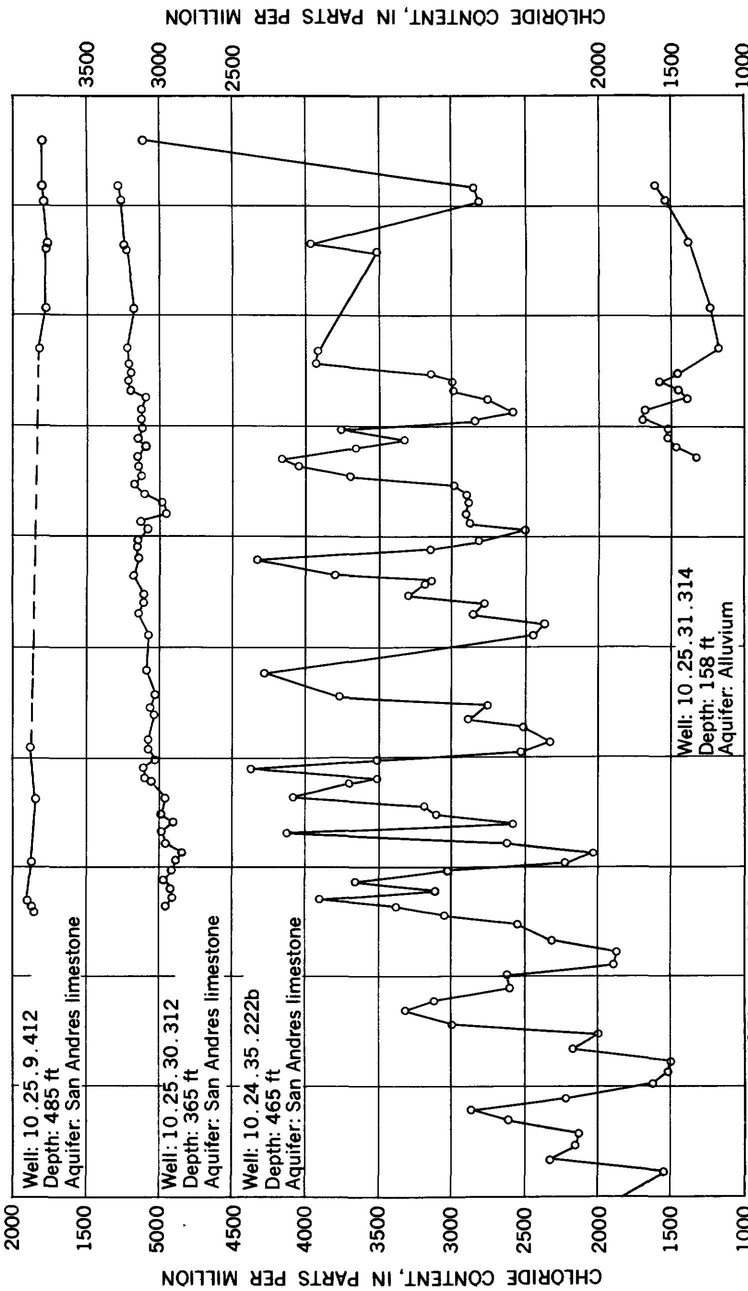

FIGURE 5.—Representative graph showing chloride content of water from wells 10.25.9.412; 10.25.30.312; 10.24.35.222b; and 10.25.31.314, Roswell basin, New Mexico.

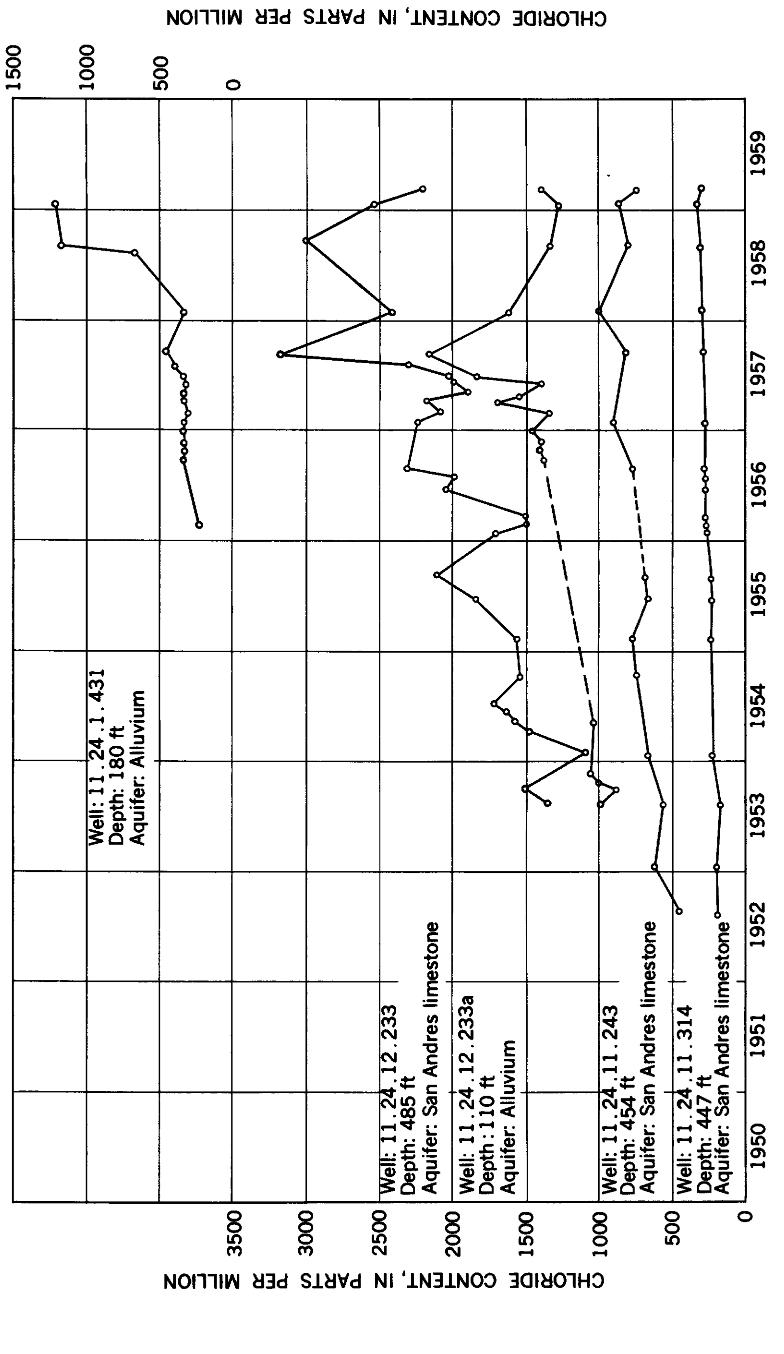

FIGURE 6.—Representative graph showing chloride content of water from wells 11.24.1.431; 11.24.12.233; 11.24.12.233a; 11.24.11.243; and 11.24.11.314, Roswell basin, New Mexico.

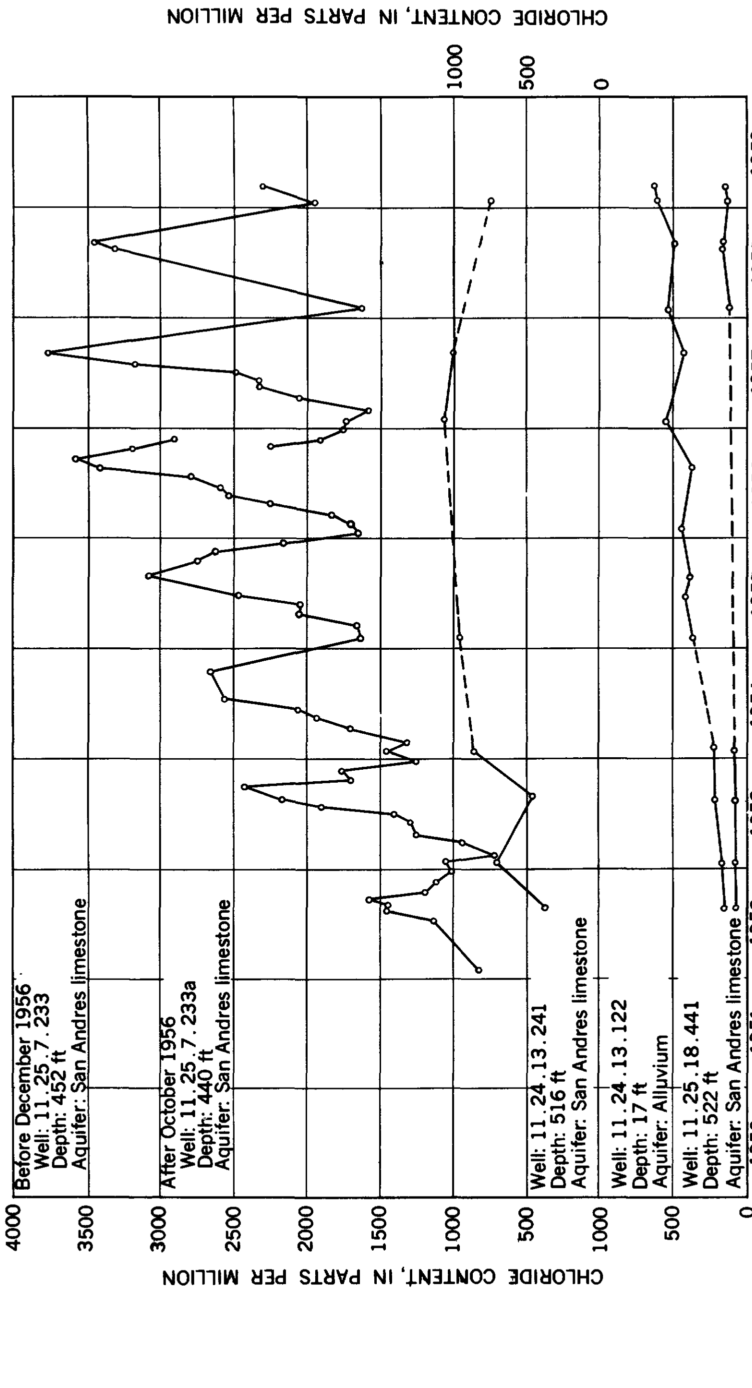

FIGURE 7.—Representative graph showing chloride content of water from wells 11.25.7.233; 11.25.7.233a; 11.24.13.241; 11.24.13.122; and 11.25.18.441, Roswell basin, New Mexico.

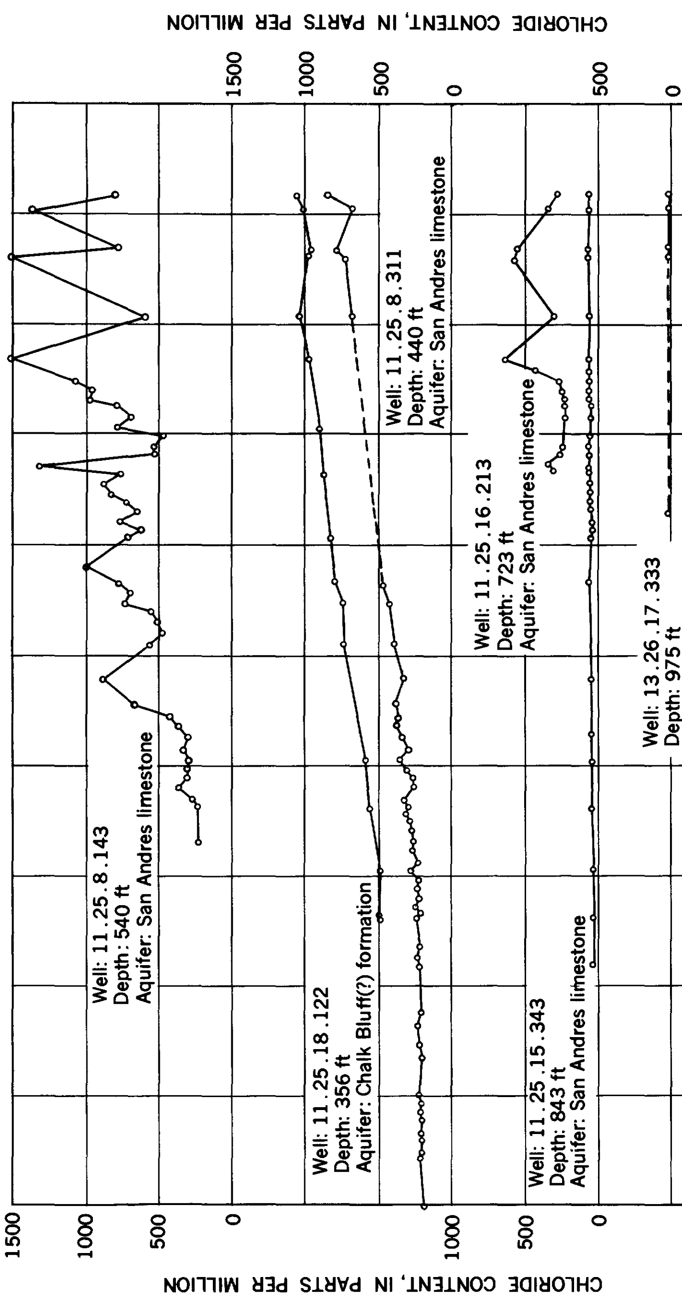

FIGURE 8.—Representative graph showing chloride content of water from wells 11.25.8.143; 11.25.18.122; 11.25.8.311; 11.25.16.213; 11.25.15.343; and 13.26.17.333, Roswell basin New Mexico.

The graphs indicate that the chloride content of water along the interface was lower in the summer of 1958 than in the comparable period of 1957. (See figs. 3–8.) A decrease in chloride content as shown on maps for September 1957 to September 1958 and January 1958 to January 1959 (pls. 4 and 5) indicates an area of saline-water retreat.

The slight retreat of the interface between the saline and fresh water in 1958 further confirms the conclusion by Hood, Mower, and Grogin (1960) that the encroachment of saline water is due to the decline of artesian pressure. An increase in artesian pressure generally is accompanied by a retreat of the interface; conversely, a decline in pressure is accompanied by an encroachment of the saline water. Artesian-pressure changes are related to precipitation, which regulates the rate of recharge to the San Andres limestone, and also affects the need for and the amount of water pumped from the formation.

For several years prior to the fall of 1957, precipitation was below normal. Inspection of climatic records (U.S. Weather Bureau, 1956–58) shows that the annual precipitation during 1956 at Roswell was 4.35 inches, 7.74 inches below normal. In 1957, however, the annual precipitation at Roswell was 9.32 inches, only 2.75 inches below normal, and in 1958, 13.06 inches, 0.99 inch above normal. Artesian-water levels in the Roswell area responded to increased precipitation. In the Berrendo and Berrendo-Smith recorder wells, the downward trend of mean monthly water levels halted during late 1957 and 1958. The mean monthly water levels in the Mountain View and Orchard Park recorder wells in late 1957 and 1958 were above comparable levels for the preceding year.

Precipitation during the first 5 months of 1959 generally was deficient, and the mean monthly water levels for January and February once again began to decline. The declines are reflected at many of the chloride-observation wells by increases in the chloride content of the artesian water.

The chloride content of water pumped from alluvium during 1958 and to February 1959 fluctuated in widely diverse ways. In some wells the decrease in chloride content, apparently is related to increased precipitation. Where saline water is applied to irrigated lands, however, there is a well-defined trend in the increase of chloride content of water in the alluvium. The graphs for wells 11.24.1.431 and 11.24.13.122 (figs. 6 and 7) show this trend.

NORTHERN EXTENSION

The part of the Roswell basin in Tps. 7–9 S., Rs. 23–25 E., is called the northern extension. Owing to hilly terrain, the amount of arable land and, therefore, the number of irrigation wells are smaller than in the rest of the basin. The Chalk Bluff formation (Permian) crops out at the surface or is covered by a veneer of Quaternary alluvium in much of this area. The alluvium is sufficiently thick only along the Pecos River and the larger tributaries to yield appreciable quantities of water to wells. Most large-capacity wells are finished in the San Andres limestone, but some may be partly or entirely finished in the Chalk Bluff formation. Owing to the lack of adequate records, data are meager concerning the aquifers that are penetrated by many of the wells.

Data in tables 1 and 2 show that during the irrigation season irrigation wells in the northern extension yield water that has a chloride content ranging from about 400 to more than 1,000 ppm. The seasonal fluctuation in chloride content of the water is about 100 ppm at most wells; however, water in wells 7.23.23.244 and 8.24.5.233 has a seasonal fluctuation of about 700 ppm. Well 8.24.5.233 probably taps both the Chalk Bluff formation and the San Andres limestone. The large fluctuations of chloride content in water from the well seem to be related to changes in the amount of low-chloride water obtained from the Chalk Bluff formation; the amount decreases with the length of time the well is pumped.

The chloride content of the water in the San Andres limestone increases to the east-northeast across the northern extension (pls. 2, 3). The 500-ppm isochlor trends northwestward and indicates that the area of saline water west of the Pecos River broadens to the north.

The chloride content of the water in the northern extension seems to be increasing, but at a slower and more uniform rate than in the area east of Roswell. The chloride content in water from well 8.24.18.144 increased about 200 ppm in 9 years; from well 9.23.36.133, about 200 ppm in 6 years; and from well 9.24.5.311, about 200 ppm in 8 years.

EAST GRAND PLAINS–RIO FELIX AREA

Saline water is encroaching into the area from East Grand Plains southward to the Rio Felix. This area comprises the extreme southern part of T. 11 S., R. 25 E., the eastern parts of Tps. 12 and 13 S., R. 25 E., and the part of Tps. 12 and 13 S., R. 26 E., west of the bluffs along the east side of the Pecos River.

The geologic conditions in the East Grand Plains–Rio Felix area are a southward extension of those in the original study area. However, the depth to the top of the San Andres limestone is greater in the East Grand Plains–Rio Felix area than in the original study area. The depth ranges from about 450 to about 800 feet below the land surface, owing to the east-southeastward dip of the beds. The Chalk

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Bluff formation also is thicker than it is to the north. Beneath the valley floor in part of T. 13 S., R. 26 E., the formation is nearly 800 feet thick. The Quaternary alluvium ranges in thickness from 0 to about 100 feet near the Pecos River; in places west of the river it is 300 feet thick.

Water from some artesian wells near the Pecos River contained several hundred parts per million of chloride in August and September 1958. Water from well 11.25.33.233 contained nearly 400 ppm of chloride; water from well 12.25.13.111 contained nearly 500 ppm; and water from well 13.26.3.114 contained an average of about 350 ppm. In January–March 1959, water samples were taken from 19 wells in addition to the wells sampled regularly to delineate the shape of the high-chloride area; the results of the analyses are given in plates 1 and 3 and tables 1 and 2. The saline-water body is continuous with the one east of Roswell. An analysis of water obtained by a drill-stem test in an oil-test well (12.26.26.240, table 2) indicates that the San Andres limestone east of the bluffs along the Pecos River contains brine, as it does east of the original study area. The interface between fresh and saline water is well defined at some places. The distribution of high-chloride water in the saline-water body is three dimensional as it is east of Roswell, and chloride concentrations generally increase eastward. The increase in chloride concentration is shown by the analyses of water from wells 13.26.8.223 and 13.26.4.212 (table 2). Well 13.26.8.223, which is 1,114 feet deep, yielded water containing 78 ppm of chloride in January 1959. Well 13.26.4.212, which is 1,130 feet deep, yielded water containing 1,040 ppm of chloride in March 1959. The chloride content of water yielded by wells that tap the San Andres limestone in the East Grand Plains–Rio Felix area also increases with depth of the well, but the relation between depth of well and chloride content of water yielded varies from one part of the area to another. The relation of chloride concentration to depth is shown by the analysis of water from well 13.26.4.212 (cited above) and that of well 13.26.14.211, which is 165 feet deeper. In March 1959 well 13.26.14.211 yielded water containing 1,680 ppm of chloride, or 640 ppm more than in the water from well 13.26.4.212. To the north, well 11.25.33.233, which is 780 feet deep, yielded water containing 515 ppm of chloride, and well 12.26.19.431, which is 1,014 feet deep, yielded water containing 536 ppm.

Saline water is encroaching in part of the area, but the rate has not been determined. The data in tables 1 and 2 show that the chloride content of water yielded by wells in the San Andres limestone fluctuates seasonally. The chloride content of water from well 11.25.33.233

fluctuates in a manner similar to that in most wells in the original study area; that is, it is higher during the pumping season than in the nonpumping season. It increased nearly 500 ppm from January to March 1959. Moreover, the chloride apparently has increased from year to year throughout the area, as indicated by analyses of water from well 12.26.31.133 (tables 1 and 2). In or near the interface between saline and fresh water, however, the water appears to be of poorest quality during the nonpumping season, as at wells 13.26.3.114 and 13.26.14.211. This fact suggests that fresh water can move to these wells more easily than the saline water and that the transmissibility of the San Andres limestone is therefore greatest in the direction of the fresh water. Other conditions may prove to be responsible for this type of fluctuation when a longer record is available.

Several irrigation wells that tap the Chalk Bluff formation in the East Grand Plains–Rio Felix area yield water at the rate of several hundred gallons per minute. Water from the wells that tap the Chalk Bluff formation characteristically has a low chloride content, generally less than 50 ppm, and a relatively high specific conductance, 2,500 to 3,000 micromhos. The relation of chloride content to specific conductance indicates a high sulfate content. Generally, the mineral content of water in the Chalk Bluff formation does not pose a threat to agriculture in the area, because crops can tolerate the high sulfate content.

The chloride content of water in the Quaternary alluvium generally is 200 ppm or less in most of the irrigated part of the East Grand Plains–Rio Felix area. The Hagerman Canal, however, which crosses the area from north to south, generally carries water having a chloride content in excess of 1,000 ppm. Leakage from the canal and infiltration of irrigation water in lands watered from the canal cause a deterioration in the quality of water in the alluvium between the canal and the river, from T. 12 S. southward beyond the Rio Felix. In areas where quality-of-water deterioration has been caused by canal leakage, the chloride content of water in the alluvium approaches that in the canal, as in wells 12.26.20.311 and 13.26.28.311 (table 2).

Saline water in the alluvium between the Hagerman Canal and the river could encroach into the fresh-water area in alluvium south and west of Dexter, where pumping of water from the alluvium has created a large cone of depression in the water table. As the cone of depression spreads, ground water of poor quality will move to it. The rate of encroachment will be much slower than in the San Andres limestone, however, owing to the lower coefficient of transmissibility of the alluvium.

RIO FELIX–ARTESIA AREA

The part of the Roswell basin in Tps. 14 to 18 S., Rs. 25 and 26 E., is called herein the Rio Felix–Artesia area. The area is described separately because of lithologic changes in the artesian aquifers.

Only one large-capacity artesian well is in use in T. 14 S.; all other irrigation and municipal ground-water supplies are obtained from the Quaternary alluvium. The northern half of T. 15 S. contains only a few large-capacity wells. The area from Lake Arthur, in the southern part of T. 15 S., southward beyond Artesia into T. 18 S. is irrigated from both artesian and shallow wells. Except for wells that irrigate lands in the Cottonwood Creek drainage area as far west as the middle of R. 23 E., most of the large-capacity wells in the Eddy County part of the basin are in R. 26 E.

The San Andres limestone dips southeastward in the Rio Felix–Artesia area, and the depth to the top of the formation increases southward. Along the Pecos River, the depth ranges from about 800 feet below the land surface near Dexter to about 1,100 feet south of Artesia, in T. 18 S. Near the river east of Artesia, the formation is about 1,000 feet deep, and westward it approaches the surface.

The Chalk Bluff formation in the northern part of the area is similar to that described in the vicinity of Roswell; however, in the latitude of Lake Arthur, beds of carbonate rocks, primarily dolomite, are intercalated with the red beds. These carbonate beds thicken southward, to the exclusion of the red-bed facies at the bottom of the formation, and become a recognizable unit called the Grayburg formation. The Grayburg and San Andres formations form the "limestone" or artesian aquifer from the town of Lake Arthur southward. Most artesian wells in Tps. 15 and 16 S. probably are finished partly in the Grayburg formation and partly in the San Andres limestone, but most artesian wells in Tps. 17 and 18 S., R. 26 E., that are less than 1,000 feet deep probably are finished solely in the Grayburg formation.

Quaternary alluvium lying on the Chalk Bluff formation generally is thinnest near the Pecos River and attains its maximum thickness of 200 to 350 feet 1 to 5 miles west of the river.

In general, water samples from wells finished in the artesian aquifer common to the Grayburg formation and the San Andres limestone were exceptionally low in chloride content. At 20 observation wells the chloride content was less than 50 ppm, and at 15 wells the specific conductance was less than 1,500 micromhos. (See table 1 for relation of specific conductance to dissolved solids in the samples for which the dissolved-solids content was determined.) Several observation wells yielded water low in chloride but had a relatively high specific conductance. For example, a water sample from well 15.25.35.111 contained 22 ppm of chloride but had a specific conductance of 2,900 micromhos. The high sulfate content, as indicated by the high specific conductance, indicates that the well obtains part of its water from the sulfate-rich Chalk Bluff formation.

Although high-chloride artesian water seems to be an exception in the Rio Felix–Artesia area, analyses of several water samples show that saline water is present in the Grayburg formation and San Andres limestone. Water from well 14.26.10.413, which is 1,236 feet deep, contained 172 ppm of chloride in 1939. Water from well 15.26.11.311, which is 1,187 feet deep, contained 664 ppm of chloride in August 1958. This well is on the west side of an area where generally it is difficult to construct a successful artesian irrigation well. Reportedly, the artesian aquifer has a low permeability in that area, and probably the poor quality of the water is related to the low permeability of and slow movement of water in the aquifer.

In the vicinity of Artesia, the San Andres limestone contains saline water below the zone in which most wells are finished. The saline water has entered some wells. The tables of analyses (tables 1 and 2) shows that in 1940 well 17.26.11.333, then 1,133 feet deep, and well 17.26.15.233, then 1,253 feet deep, both yielded water that contained more than 1,000 ppm of chloride. A sample taken in January 1959 from well 17.26.10.333, which is 1,150 feet deep, contained 350 ppm of chloride. The owner reports that water from this well was much saltier before it was plugged between 1,150 and 1,260 feet. All but two of the observation wells east and south of Artesia are less than 1,000 feet deep and all yield low-chloride water. Thus, it seems that in this area, in wells 1,000 feet or more deep, a difference of 100 to 200 feet in well depth can mean a difference of several hundred parts per million of chloride in the water. The quality of the artesian water also deteriorates eastward. In January 1959 water from well 17.26.8.413, which is 1,158 feet deep, contained 16 ppm of chloride, whereas water from well 17.26.10.333, which is about the same depth but 1½ miles to the east, contained 350 ppm of chloride. Because of the large declines of artesian pressure in the vicinity of Artesia, and the continued large withdrawals of artesian water, some saline-water encroachment is likely.

The quality of water in the alluvium in the vicinity of Hagerman is similar to that in the vicinity of Dexter—generally low in chloride west of the Hagerman Canal and higher in chloride east of the canal where lands are irrigated with canal water. The analyses of water from wells 14.26.3.433 and 14.26.18.113, and from wells 14.26.23.131

and 14.26.32.123, illustrate the difference in quality on the two sides of the canal. Saline water in the alluvium probably is encroaching slowly into the compound cone of depression in the water table caused by pumping west of Hagerman.

Southward, beyond the end of the Hagerman Canal, the quality of water in the alluvium generally deteriorates toward the Pecos River. East of Lake Arthur the alluvium is relatively thin, and water from shallow wells there generally is moderately to very saline. Southward, in Tps. 16–18 S., the quality of the shallow water is affected by the quality of the artesian water applied to irrigated lands. In most areas the shallow water contains less than 100 ppm of chloride, but near the river, as in well 18.26.14.443 (table 2), the chloride content is higher, and in the bottom lands along the banks of the river the water in the alluvium is moderately to very saline.

CONCLUSIONS

In four areas of the Roswell basin the encroachment of saline water in the San Andres limestone poses a real or potential threat to the productivity of irrigated lands of the basin. The principal area is the original study area in Tps. 10 and 11 S., Rs. 24 and 25 E. There, encroachment is well advanced. However, owing to increased precipitation in late 1957 and in 1958, the advance of saline artesian water into the irrigated areas was temporarily halted, but resumed in 1959 because of deficient precipitation and consequent large-scale pumping.

The quality of artesian water in the northern extension of the area is deteriorating slowly. It generally shows less seasonal fluctuation than in the original study area, but, as in the original area, quality decreases toward the river. A thorough discussion of quality of water in the northern extension cannot be made until the geology of the area is better known.

Saline water is encroaching between East Grand Plains and the Rio Felix. The encroachment is related to the large withdrawals of artesian water from wells in the vicinity of Dexter. In general, the quality of the water in a given zone deteriorates eastward, and at a given location salinity increases with depth. The chloride content of water pumped at and near the interface between saline and fresh water fluctuates seasonally.

In the vicinity of Artesia, where wells obtain water from both the Grayburg formation and San Andres limestone, the water is saline in the San Andres limestone. This saline water has encroached into wells in the eastern part of Tps. 17 and 18 S., R. 26 E., which are deeper than 1,000 feet. Continued large withdrawals of artesian water in the vicinity of Artesia may induce further encroachment.

The most obvious area of encroachment of saline water in the Quaternary alluvium is in the original study area, below lands irrigated with saline artesian water. South of the original study area, water in the alluvium between the Hagerman Canal and the Pecos River is saline, or nearly so, owing to canal leakage and irrigation of lands with saline canal water. Saline water moving in from the vicinity of the canal may be drawn westward into a large cone of depression in the water table that has developed west of Dexter and Hagerman.

Elsewhere, in parts of the basin where water samples were taken, water from wells finished in the alluvium had a low chloride content.

SELECTED REFERENCES

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TABLE 1.—*Comprehensive chemical analyses of ground and surface waters*

[Analyses by U.S. Geological Survey. Chemical constituents in parts per million. See "Remarks" for PS, public supply;

Location No.	Owner or name	Depth of well (feet)	Depth of casing (feet)	Principal water-bearing formation	Use of water	Date collected	Temperature (°F)	Calcium (Ca)	Magnesium (Mg)
8. 24. 18. 144	J. W. Corn	461		San Andres limestone and Chalk Bluff(?) formation.	Irr	3-19-50		398	125
9. 24. 5. 311	L. Shortridge	365		do	Dom. Irr.	5-17-50		512	86
10. 23. 34. 432	City of Roswell	568		San Andres limestone.	PS	5-11-51		168	41
						11-30-57	68	186	60
34. 432a	do	561		do	PS	11-30-57	68	183	53
10. 24. 8. 111	O. S. Stockton	368	61	San Andres limestone and alluvium.	Stock	5- 2-57	68		
10. 24. 28. 114	C. E. Kelly	80		Alluvium	Irr	8-20-52	65		
30. 444	City of Roswell	294	242	San Andres limestone.	PS	9-23-58	68	191	52
34. 221a	E. W. Lander	Spring		Alluvium	PS	7-23-52			
10. 25. 6. 142	W. M. Heinold	471		San Andres limestone.	Dom. Stock	7-24-40		170	53
30. 224	C. E. Blackwell	408	269	San Andres limestone and Chalk Bluff(?) formation.	Irr	7-21-52			
31. 132	Albert Shaw	70		Alluvium	Dom	10-27-54	60	304	90
32. 431	Henry Russell Estate.	103	103	do	Irr	7-24-52	66		
11. 24. 4. 124	City of Roswell	319	292	San Andres limestone.	PS	11-30-57		194	56
10. 143	E. M. Haley	168	79	Alluvium	Irr	8-15-52	64		
13. 122	Fred Payton	17		do	Dom	8-13-52	64		
11. 25. 7. 243	E. K. Patterson	500	419	San Andres limestone.	Irr	8-12-52			
9. 432	R. and C. Barbe	750±		do	Irr	2- 2-44		160	47
11. 25. 15. 343	W. T. Clardy	843	643	San Andres limestone.	Irr	5-10-28	68	133	41
36. 213b	Pecos Valley Artesian Conservancy District 2 (plastic).	30	30	Alluvium	Obs	9-12-57	67		

from part of the Roswell basin, Chaves and Eddy Counties, N. Mex.

chemical constituents for which columns are not provided. Use of water: Dom, domestic; Irr, irrigation; Obs, observation]

Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids: Parts per million	Dissolved solids: Tons per acre-foot	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Percent sodium	Sodium adsorption-ratio (SAR)	Specific conductance (micromhos at 25°C)	pH	Remarks
259		179	1,240	442	1.6	7.2	2,580	3.51	1,510	1,360	27	2.9	3,480	----	SiO_2, 21 ppm.
124		150	1,410	218	.6	2.6	2,440	3.32	1,630	1,510	14	1.3	2,950	----	SiO_2, 16 ppm.
54	3.4	237	421	58	.7	7.5	943	1.28	588	394	17	1.0	1,250	7.9	City well 10. Dissolved solids are residue on evaporation.
59		224	472	111	.6	5.9	1,070	1.46	710	527	15	1.0	1,460	7.7	SiO_2, 16 ppm. Dissolved solids are residue on evaporation.
62		228	461	96	.6	5.8	1,040	1.41	674	488	17	1.0	1,400	7.5	City well 11. SiO_2, 16 ppm. Dissolved solids are residue on evaporation.
---------		184	517	472	----	-----	------	-----	745	594	----	----	2,730	7.5	Pumping estimated at 8 gpm.
216		216	728	564	----	-----	------	-----	1,260	1,080	----	----	3,160	----	Pumped 5 min before sampling.
165		219	461	271	.5	7.0	1,270	1.73	690	511	34	2.7	1,940	7.3	City well 14. Test pumped for 18 hrs before sampling.
641		230	1,620	1,020	----	-----	------	-----	1,920	1,730	----	----	5,680	----	Flow estimated at 150 gpm.
222		191	499	318	----	1.0	1,360	1.85	642	486	43	3.8	2,140	----	
2,840		171	1,110	4,710	----	-----	------	-----	1,770	1,630	78	29	14,800	----	
333		226	748	626	.5	6.2	2,230	3.03	1,130	944	39	4.3	3,350	----	
434		215	774	895	----	-----	------	-----	1,300	1,120	----	----	4,180	----	Pumping estimated at 1,000 gpm.
202		211	499	322	.6	7.1	1,430	1.90	714	542	38	3.3	2,120	7.8	Well 9. SiO_2, 17 ppm. Dissolved solids are residue on evaporation.
222		226	1,760	415	----	-----	------	-----	2,120	1,940	----	----	3,890	----	
81		214	999	150	----	-----	------	-----	1,250	1,070	----	----	2,300	----	
144		229	404	244	----	-----	------	-----	638	450	----	----	1,790	----	
72		239	375	114	----	3.0	889	1.21	593	397	21	1.3	1,360	----	Flowed 3 min before sampling.
17	1.6	242	291	22	----	1.6	666	.91	501	302	7	.3	------	----	SiO_2, 16 ppm; Fe, 0.72 ppm. Dissolved solids are residue on evaporation. Flowing 5,500 gpm.
---------		220	2,840	1,040	----	-----	------	-----	3,020	2,840	----	----	6,830	7.2	Test hole. One of two casings in same drill hole. Casing gravel packed from 5 to 30 ft.

TABLE 1.—*Comprehensive chemical analyses of ground and surface waters*

Location No.	Owner or name	Depth of well (feet)	Depth of casing (feet)	Principal water-bearing formation	Use of water	Date collected	Temperature (°F)	Calcium (Ca)	Magnesium (Mg)
36.213c	Pecos Valley Artesian Conservancy District 2 (steel).	235	230–235	Alluvium(?)	Obs	9–13–57			
11.26.27.134	Mirror Lake			Chalk Bluff formation.	PS	2– 2–44		933	349
34.341	Lea Lake			do	PS	10–21–39		912	180
12.25.7.144	Elton Hamiel	145		Alluvium		5– 2–55	66		
22.231	O. L. Worley			do	Irr(?)	7–22–40		120	48
27.211	do			do	Irr	7– 8–55	65		
12.25.28.223	Chaves County Housing Corp.	152		Alluvium	PS	5– 7–42		130	40
28.224	do	150		do	PS	4–28–42		122	42
						4– 5–55	72		
						11–25–55		129	42
35.411	A. C. Stone	937		San Andres limestone.	Irr	9–13–56	67		
35.411a	do			Alluvium	Irr	4– 5–55	65		
36.211				do		7–23–40		186	58
12.26.7.421	Cecil Johnson			do		4–10–40	65	537	118
31.133	Carl Nicholas	1,201	856	San Andres limestone.	Dom Irr	9– 1–55	75		
31.133a	do			Alluvium	Irr	9– 1–55	65		
13.25.6.333	R. W. Lowe			do		2– 3–44		274	89
10.430		922		San Andres limestone.		5–10–28	71	358	91
						2– 9–39		561	141
13.113				Alluvium		2– 9–39		427	161
13.25.17.411	R. Thaman	148		do		6– 8–55	67		
27.211	Hal Bogle			do		2– 8–39		136	49
13.26.7.313		945		San Andres limestone.	Irr	5–10–28	74	158	51
						2– 9–39		174	59
8.330	G. M. Sterrett			Alluvium		6– 8–55	66	405	147
17.113	Town of Dexter	100		do	PS	4–25–41		389	123
17.333	do	975	940	San Andres limestone.	PS	4– 6–56		137	48
19.333	Hal Bogle			Alluvium		6– 8–54	64		
22.123	Wasson and Senter			do		7–14–54			
22.331	J. A. Wasson	226		do		4– 5–55	66		
28.111	George Cannady			do	Irr	7–14–54		691	195
28.114	Greenfield Community.	1,000	889	San Andres limestone.	PS	4– 4–56		142	50
28.121				Alluvium		2– 9–39		327	133
28.131	G. L. Grassie			do		1–31–44		373	137
31.113		1,025		San Andres limestone.		5–10–28	71	134	45

from part of the Roswell basin, Chaves and Eddy Counties, N. Mex.—Continued

Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids		Hardness as $CaCO_3$		Percent sodium	Sodium adsorption-ratio (SAR)	Specific conductance (micromhos at 25°C)	pH	Remarks
							Parts per million	Tons per acre-foot	Calcium, magnesium	Noncarbonate					
----------		40	1,770	33	----	-----	------	-----	1,770	1,740	----	----	2,680	7.4	Test hole. Second of two casings in same drill hole. Steel pipe perforated from 230 to 235 ft and gravel packed from 223 to 255 ft. Gravel pack sealed with five sacks of cement, and hole filled to 40 ft with mud.
2,990		131	3,840	4,370	----	-----	12,500	17.0	3,760	3,660	63	21	17,300	----	
1,300		142	2,590	2,160	----	-----	7,210	9.81	3,020	2,900	48	10	9,850	----	
----------		236	275	26	----	-----	------	-----	486	292	----	----	909	7.6	
12		188	323	22	----	2.0	664	.90	497	343	5	.2	921	----	Dissolved solids are residue on evaporation.
----------		203	849	152	----	-----	------	-----	1,160	994	----	----	2,050	8.3	Bicarbonate value includes equivalent of 2 ppm of carbonate (CO_3).
15	2.6	235	291	18	.6	2.8	690	.86	489	296	6	.3	907	----	Dissolved solids are residue on evaporation.
20		194	317	21	----	2.5	720	.84	477	318	8	.4	945	----	Do.
----------		239	384	20	----	-----	------	-----	615	419	----	----	1,070	7.2	
20		230	307	22	1.0	2.7	640	.90	494	306	9	.4	931	7.5	Do.
----------		226	385	22	----	-----	------	-----	620	435	----	----	1,070	7.4	
----------		284	502	35	----	-----	------	-----	785	552	----	----	1,320	7.3	
36		192	520	56	----	3.0	1,040	1.30	702	545	10	.6	1,310	----	Do.
72		187	1,680	56	----	1.0	2,560	3.75	1,830	1,670	8	.7	2,750	----	
131		232	623	246	----	.3	------	-----	900	710	24	1.9	2,090	7.0	
158		209	1,820	306	----	8.1	------	-----	2,160	1,990	14	1.5	3,690	----	
95		127	766	201	----	89	1,580	2.15	1,050	946	16	1.3	2,140	----	
27	1.1	224	1,040	37	----	.0	1,680	2.28	1,270	1,080	4	.3	------	----	
----------		----	1,630	50	----	-----	2,770	3.77	1,980	------	----	----	2,820	----	Do.
----------		----	1,420	320	----	-----	2,590	3.52	1,730	------	----	----	3,090	----	Do.
----------		235	407	22	----	-----	------	-----	555	362	----	----	1,130	7.2	
----------		----	369	33	----	-----	752	1.02	541	------	----	----	996	----	Do.
16	1.3	239	401	18	----	-----	836	1.14	604	408	5	.3	------	----	Do.
----------		----	483	21	----	-----	896	1.26	676	------	----	----	1,160	----	Do.
149		218	1,340	255	1.1	3.4	2,440	3.32	1,610	1,440	17	1.6	2,980	7.4	
98		212	1,190	200	----	-----	2,100	2.86	1,480	1,300	----	----	2,600	----	
6.4		236	322	16	1.0	.3	715	.90	540	346	3	.1	965	7.8	Do.
----------		211	869	99	----	-----	------	-----	1,140	967	----	----	1,930	7.9	
----------		227	------	31	----	-----	------	-----	------	------	----	----	1,110	----	
----------		190	1,130	485	----	-----	------	-----	1,810	1,650	----	----	3,280	7.1	
749		262	1,870	1,400	2.2	16	5,090	6.92	2,530	2,310	39	6.5	6,930	----	
6.0		234	343	15	.9	.6	754	.94	560	368	2	.1	997	7.15	Do.
----------		----	829	288	----	-----	1,730	2.35	1,360	------	----	----	2,300	----	Do.
69		165	919	368	----	13	1,970	2.68	1,490	1,340	9	.8	2,660	----	CO_3, 14 ppm.
12	1.3	241	303	12	----	1.8	690	.94	520	322	5	.2	------	----	Dissolved solids are residue on evaporation.

TABLE 1.—*Comprehensive chemical analyses of ground and surface waters*

Location No.	Owner or name	Depth of well (feet)	Depth of casing (feet)	Principal water-bearing formation	Use of water	Date collected	Temperature (°F)	Calcium (Ca)	Magnesium (Mg)
13.26 31.113		1,025		San Andres limestone.		2- 8-39		152	48
31.311	E. O. Moore	165		Alluvium	Irr	8-22-56	64		
14.25.1.121				do		5- 6-27		198	70
1.300	Herman Steffen	106		do		5-13-27	66	220	84
2.444	J. V. Thomas			do		1-25-44		288	97
8.333		200		do		7-23-40		126	48
14.131				do	Irr	9-15-55	66		
21.113				do		2- 8-39		98	41
24.133	E. O. Moore	150		do	Irr	9- 8-55	67		
25.331				do		7-22-40		158	51
14.26.5.111		180		do		7-23-40		255	107
5.112		96		do		7-23-40		421	168
8.433	Town of Hagerman.	280		do	PS	8-25-41	67	203	63
8.433a	do	164		do	PS	6-24-55	67	197	76
14.26.10.413	do	1,236		Sand Andres limestone.	PS	4-14-39		634	111
14.213	S. W. Mason			Alluvium	Irr	9- 7-55	63		
14.441				do		7-22-40		604	238
15.333	Dub Andrus			do	Irr	4- 5-55	65		
17.333				do		2- 8-39		170	59
						7-22-40		186	64
17.444	Pearson Bros	135		do		7-22-40		170	59
20.334	A. W. Langenegger.			do		1-25-44		225	78
22.213				do		2- 8-39		579	192
25.331	Jeffers and Johnson.	35	35	do	Obs	1-30-57			
26.423	do	47	47	do	Obs	1-29-57	67		
26.424	do	47	47	do	Obs	1-28-57	64	508	461
28.411				do	Irr	6-24-55	65		
28.423	L. T. Lewis			do		1-24-44		558	190
14.27.30	J. H. King	22		do		2-21-41		782	342
15.25.24.111				do		7-22-40		506	177
24.120	Hal Bogle			San Andres limestone and Grayburg formation.		1-19-44		603	120
15.25.28.331				Alluvium		7-23-40		305	90
35.213				San Andres limestone and Grayburg formation.	Irr	9- 5-55	73		
35.213a				Alluvium	Irr	9-15-55	68		
15.26.3.211				do	Irr	9- 8-55	67		
5.112				do		2- 8-39		240	76
7.111				do		7-23-40		284	102
22.343		27	27	do	Obs	1- 4-57		988	413
27.211		32	32	do	Obs	1- 5-57			
31.333				do	Irr	8-24-55	66		
32		1,000±		San Andres limestone and Grayburg formation.		5-30-40		197	69

from part of the Roswell basin, Chaves and Eddy Counties, N. Mex.—Continued

Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids: Parts per million	Dissolved solids: Tons per acre-foot	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Percent sodium	Sodium adsorption-ratio (SAR)	Specific conductance (micromhos at 25°C)	pH	Remarks
----	----	----	384	16	----	----	764	1.04	576	------	----	----	985	----	
----	----	248	801	63	----	----	----	----	1,080	877	----	----	1,810	7.2	
12	3.2	231	558	15	----	.1	1,040	1.41	782	592	4	.2	------	----	
55	4.8	195	617	126	----	29	1,300	1.77	894	734	12	.8	------	----	Dissolved solids are residue on evaporation.
60		177	770	160	----	48	1,530	2.08	1,120	934	10	.8	2,040	----	CO_3, 23 ppm.
36		178	383	28	----	6.2	804	1.09	512	366	13	.7	1,030	----	Dissolved solids are residue on evaporation.
----	----	215	349	17	----	----	----	----	540	364	----	----	971	7.6	
----	----	----	282	12	----	----	626	.85	413	------	----	----	832	----	Do.
3.9		212	330	23	----	11	----	----	550	376	2	.1	973	7.7	
23		187	454	18	----	3.5	922	1.25	604	450	8	.4	1,170	----	Do.
169		139	821	334	----	4.9	1,760	2.39	1,080	962	25	2.2	2,540	----	
257		153	1,380	516	----	8.3	2,830	3.85	1,740	1,620	24	2.7	3,810	----	
15		187	566	40	----	----	1.080	1.47	766	612	4	.2	1.300	----	Do.
19		177	585	62	.7	2.1	1,060	1.44	804	659	5	.3	1,400	7.1	SiO_2, 30 ppm. Well filled 280–164 ft.
75		126	1,780	172	----	----	2,860	3.86	2,040	1,940	7	.7	3,320	----	
972		235	2,430	1,890	----	3	----	----	3,300	3,110	39	7.4	8,710	7.8	
387		173	2.260	585	----	9.4	4,170	5.67	2,490	2,340	25	3.4	5,010	----	
----	----	238	1,900	1,370	----	----	----	----	2,880	2,680	----	----	6,730	7.2	
----	----	----	450	42	----	----	916	1.25	666	------	----	----	1,190	----	Dissolved solids are residue on evaporation.
31		184	519	71	----	5.4	1,150	1.56	728	576	9	.5	1,360	----	Do.
28		176	475	61	----	2.5	986	1.34	667	523	8	.5	1,260	----	Do.
55		146	682	90	----	30	1,240	1.69	882	741	12	.8	1,660	----	CO_3, 13 ppm.
----	----	----	1,400	860	----	----	3,540	4.81	2,230	------	----	----	4,700	----	Dissolved solids are residue on evaporation.
510		258	3,030	1,010	----	----	----	----	3,680	3,470	----	----	7,060	7.0	Test hole.
42		185	1,340	202	----	----	----	----	1,740	1,590	----	----	2,780	7.1	Do.
361		244	2,560	695	1.3	6.4	4,840	6.58	3,160	2,960	20	2.8	5,730	7.0	Do.
----	----	167	1,750	1,170	----	----	----	----	2,920	2,780	----	----	5,600	7.8	
193		150	1,370	715	----	15	3,130	4.26	2,170	2,030	16	1.8	4,210	----	CO_3, 14 ppm.
1,740		275	2,850	2,800	----	3.8	8.650	11.80	3,360	3,130	53	13	11,900	----	
137		162	1,900	128	----	2.5	2,930	3.98	1,990	1,860	13	1.3	3,230	----	
24		252	1,730	31	----	.1	2,630	3.58	2,000	1,790	3	.2	2,780	----	
5.1		191	958	55	----	12	1,570	2.12	1,130	974	9	.7	1,950	----	
28		182	1,460	29	----	.3	------	------	1,650	1,500	4	.3	2,430	7.9	
42		201	1,030	64	----	17	------	------	1,250	1,090	7	.5	2,080	7.0	
197		180	1,380	540	----	2.3	------	------	1,920	1,770	18	2	3,730	6.8	
----	----	----	748	75	----	----	1,390	1.89	912	------	----	----	1,700	----	
130		126	867	285	----	4.3	1,730	2.35	1,130	1,020	20	1.7	2,430	----	Dissolved solids are residue on evaporation.
6,190		188	3,550	9,770	1.7	----	21,000	28.6	4,160	4,010	76	42	29,400	6.9	Test hole.
8,340		199	3,880	13,300	----	----	------	------	4,820	4,660	79	52	38,000	6.9	Do.
143		121	1,970	244	----	9.5	------	------	2,190	2,090	12	1.3	3,600	7.5	
23		226	576	28	----	----	1,000	1.36	776	590	6	.4	1,350	----	

TABLE 1.—*Comprehensive chemical analyses of ground and surface waters*

Location No.	Owner or name	Depth of well (feet)	Depth of casing (feet)	Principal water-bearing formation	Use of water	Date collected	Temperature (°F)	Calcium (Ca)	Magnesium (Mg)
32.142	A. W. Langenegger.			Alluvium	Irr.	4-30-57	64		
16.25.3.114		841		San Andres limestone and Grayburg formation.		5-21-28	66	434	137
						2-8-39		418	75
16.25.6.400				Alluvium		2-8-39		288	136
8.111	Pearson Bros			do.	Irr.	4-30-57			
11.133	J. J. Terry			do.		2-8-39		417	138
11.133b	do.			do.		2-11-44		139	46
11.133d	do.	235		do.	Irr.	9-1-55	65		
15.333	Carl Manda	160		do.	Irr.	4-30-57	63		
34.233				do.	Irr.	6-24-55			
16.26.5.Lot 4				do.		2-9-40		280	61
7.131				do.		2-9-39		137	43
18.331				do.		7-23-40		206	79
19.211	H. V. Parker			do.	Irr.	7-7-55	66		
19.211a	do.			do.	Irr.	8-22-56	65		
28.333	Robert Horner			do.		2-11-44		195	65
28.431	do.			do.		2-9-39		369	172
		393	200(?)	do.	Irr.	7-7-55	68		
31.431	T. L. Sammons	231		do.	Irr.	4-30-57	65		
33.211	R. E. Coleman	1,168		San Andres limestone and Grayburg formation.	Irr.	6-7-57			
16.26.35.113a	J. T. Fulton	1,238(?)	1,012(?)	San Andres limestone and Grayburg formation.	Irr.	4-30-57	64		
17.25.12.120	J. W. Collins			Alluvium	Irr.	4-25-55	67		
14.141	Artesia Country Club.			do.	Irr.	7-23-40		130	44
22.220	N. T. Gissler			do.		5-29-49		107	38
24.344		121		do.		2-9-39		136	43
17.26.4.121		23		do.		7-22-40		311	148
7.131	J. W. Collins	150		do.	Irr.	4-30-57	64		
7.333				do.		2-9-39		180	160
8.442	City of Artesia			San Andres limestone and Grayburg formation.	PS.	5-10-51		162	43
						6-6-55	73	153	51
10.333a	A. B. and T. Harris.			Alluvium		7-22-40		356	188
10.433	D. D. Sullivan	1,007		San Andres limestone and Grayburg formation.	Irr.	5-21-28	73	162	67
17.26.10.433	D. D. Sullivan	1,007		San Andres limestone and Grayburg formation.	Irr.	3-14-40	73	187	67
						4-5-55	73		
10.433a	do.	210		Alluvium	Irr.	9-7-55	66		
11.333		1,133		San Andres limestone and Grayburg formation.		7-22-40	461	172	
13.310	E. P. Bach	100		Alluvium	Irr.	6-25-54			
14.133		961		San Andres limestone and Grayburg formation.		7-22-40		152	55

from part of the Roswell basin, Chaves and Eddy Counties, N. Mex.—Continued

Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids		Hardness as $CaCO_3$		Percent sodium	Sodium adsorption-ratio (SAR)	Specific conductance (micromhos at 25°C)	pH	Remarks
							Parts per million	Tons per acre-foot	Calcium, magnesium	Noncarbonate					
----	----	204	2,270	1,170	----	----	----	----	2,560	2,390	----	----	6,630	7.1	
17	1.9	230	1,420	20	----	.1	2,160	2.94	1,650	1,460	2	.2	----	----	
----	----	----	1,100	15	----	----	1,890	2.57	1,350	----	----	----	2,040	----	Dissolved solids are residue on evaporation.
----	----	----	965	139	----	----	1,900	2.58	1,280	----	----	----	2,310	----	Dissolved solids are residue on evaporation.
----	----	222	450	16	----	----	----	----	640	458	----	----	1,150	7.3	
----	----	----	1,370	62	----	----	2,330	3.17	1,610	----	----	----	2,540	----	Dissolved solids are residue on evaporation.
22		228	360	15	----	.2	694	.94	536	349	8	.4	979	----	
44		187	1,380	53	----	15	----	----	1,580	1,430	6	.5	2,440	8.2	
----	----	150	1,980	134	----	----	----	----	2,150	2,030	----	----	3,330	7.2	
60		225	286	127	----	167	----	----	665	480	12	1.0	1,440	7.8	
----	----	----	771	24	----	----	1,350	1.84	950	----	----	----	1,560	----	Dissolved solids are residue on evaporation.
----	----	----	346	15	----	----	694	.94	519	----	----	----	930	----	
28		117	675	66	----	10	1,120	1.52	839	743	7	.4	1,510	----	
3.7		189	567	72	----	14	----	----	850	695	1	.1	1,460	6.9	
----	----	180	615	79	----	----	----	----	870	722	----	----	1,540	7.3	
31		204	566	42	----	6.6	1,010	1.37	754	587	8	.5	1,360	----	
----	----	----	1,390	95	----	----	2,390	3.25	1,630	----	----	----	2,630	----	Dissolved solids are residue on evaporation.
29		159	1,740	49	----	2.3	----	----	1,950	1,820	3	.3	2,790	6.8	
----	----	206	478	52	----	----	----	----	695	526	----	----	1,290	7.3	
----	----	235	490	17	----	----	----	----	700	508	----	----	1,190	7.7	
----	----	182	1,140	48	----	----	----	----	1,320	1,170	----	----	2,130	7.2	
----	----	202	517	33	----	----	----	----	730	564	----	----	1,280	7.3	
20		197	342	18	----	6.7	704	.96	506	344	8	4	946	----	Dissolved solids are residue on evaporation.
15		227	187	32	----	37	528	.72	423	237	7	.3	869	----	
----	----	----	290	29	----	----	702	.95	516	----	----	----	972	----	Do.
115		133	1,280	133	----	4.1	2,060	2.80	1,380	1,280	15	1.3	2,540	----	
----	----	206	500	36	----	----	----	----	695	526	----	----	1,250	7.4	
----	----	----	472	53	----	----	954	1.30	696	----	----	----	1,220	----	Do.
16	3.2	240	400	8	1.1	2.0	842	1.04	581	384	6	.3	1,090	7.3	Do.
21		236	398	17	.9	2.2	930	1.06	591	398	7	.4	1,070	7.2	Do.
148		169	1,580	135	----	8.6	2,500	3.40	1,660	1,520	16	1.6	2,980	----	
15	2.1	156	531	17	----	1.1	965	1.31	680	552	5	.3	----	----	Do.
8.7		230	527	17	----	----	1,010	1.37	742	554	2	.1	1,250	----	Do.
----	----	228	545	24	----	----	----	----	770	583	----	----	1,290	7.6	
103		211	820	142	----	10	----	----	1,010	837	18	1.4	2,020	7.4	
635		200	1,520	1,060	----	.5	3,950	5.37	1,860	1,690	43	6.4	5,510	----	
26		215	404	17	----	----	----	----	564	388	----	----	1,070	----	
22		160	481	15	----	1.5	854	1.16	606	474	7	.4	1,120	----	Do.

TABLE 1.—*Comprehensive chemical analyses of ground and surface waters*

Location No.	Owner or name	Depth of well (feet)	Depth of casing (feet)	Principal water-bearing formation	Use of water	Date collected	Temperature (°F)	Calcium (Ca)	Magnesium (Mg)
14.210	E. P. Bach			Alluvium		7- -51		620	201
	G. E. Sharp	245		do		11- -54			
15.233		1,253		San Andres limestone and Grayburg formation.		7-22-40		608	225
15.313	G. E. Sharp			Alluvium		2- 6-39		140	47
15.411				do		7-22-40		303	101
21.311		821		San Andres limestone and Grayburg formation.		7-23-40		130	46
17.26.22.233				Alluvium		2- 6-39		304	99
22.240	H. L. Greer	103		do		11- -54			
23.130	G. Duncan	115		do		11- -54			
23.200	E. P. Bach			do	Irr	6-26-54			
29.113		145+		do		7-23-40		164	48
33.111	Adolph Zelery			San Andres limestone and Grayburg formation.		1-20-44		182	54
17.27.18.100		50		Alluvium		10-25-39		842	224

from part of the Roswell basin, Chaves and Eddy Counties, N. Mex.—Continued

Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids		Hardness as $CaCO_3$		Percent sodium	Sodium adsorption-ratio (SAR)	Specific conductance (micromhos at 25°C)	pH	Remarks
							Parts per million	Tons per acre-foot	Calcium, magnesium	Noncarbonate					
112		170	1,260	815	----	19	3,110	4.23	2,370	2,230	9	1.0	4,330	----	
----------		226	------	20	----	-----	------	-----	625	440	----	----	1,140	----	
1,090		194	1,950	1,860	----	1.0	5,830	7.93	2,440	2,280	49	9.6	8,200	----	
----------		----	359	13	----	-----	736	1.00	543	------	----	----	969	----	Do.
58		153	1,010	80	----	4.9	1,640	2.23	1,170	1,050	10	.8	2,040	----	
23		176	382	14	----	2.0	770	1.05	514	370	9	.4	981	----	Do.
----------		----	957	47	----	-----	1,680	2.28	1,170	------	----	----	1,940	----	Dissolved solids are residue on evaporation.
----------		230	------	70	----	-----	------	-----	1,540	1,350	----	----	2,510	----	
----------		254	------	84	----	-----	------	-----	1,700	1,490	----	----	2,820	----	
29		195	633	124	----	-----	------	-----	932	772	----	----	1,710	----	
27		200	436	30	----	6.9	920	1.25	606	442	9	.5	1,140	----	Dissolved solids are residue on evaporation.
	7.6	242	452	16	----	1.5	832	1.13	676	478	2	.1	1,150	----	
1,840		121	2,̇710	2,910	----	-----	8,590	11.70	3,020	2,920	57	15	12,000	----	Test hole.

TABLE 2.—*Temperature, chloride content, and specific conductance of ground and surface waters from part of the Roswell basin, Chaves and Eddy Counties, N. Mex.*

[Analyses by U.S. Geological Survey. Chemical constituents in parts per million. Water-bearing formation: Qa, Quaternary alluvium; Pcb, Chalk Bluff formation; Pgr, Grayburg formation, Psa, San Andres limestone]

Location No.	Water-bearing formation	Date collected	Temperature (°F)	Chloride (Cl)	Specific conductance (micromhos at 25°C)	Depth of well (feet)	Remarks
7.23.23.244	Psa and Pcb(?).	8-13-58	68	700	3,890	438	Pumping when collector arrived.
		9- 8-58	68	710	3,950		Do.
		1-12-59	66	320	2,550		Pumped 5 min before sampling.
7.24.19.143	Pcb(?)	1-12-59	66	700	4,650	345	Do.
7.25.32.434	Pcb(?)	8-13-58		1,020	6,550		
		9- 8-58	65	970	6,550		Pumped 3 min before sampling. Water charged with red sediment.
		1-12-59	64	980	6,440		Pumped 5 min before sampling.
		3- 4-59	67	970	6,490		Pumped 10 min before sampling.
8.24.5.233	Psa and Pcb(?).	8-13-58	68	1,040	5,730	446	Pumping when collector arrived.
		9- 8-58	65	345	3,820		Pumped 6 min before sampling. Water charged with red sediment.
		1-12-59	64	345	3,760		Pumped 7 min before sampling. Water charged with red sediment.
		3- 4-59		945	5,480		Pumping when collector arrived.
18.144	Psa and Pcb(?).	3-19-50		442	3,480	461	
		8-13-58	67	640	3,970		Pumping when collector arrived.
		9- 8-58	66	635	3,980		Do.
		1-12-59	66	620	3,930	461	Do.
		3- 4-59	68	610	3,930		Do.
27.433	Psa and Pcb(?).	8-13-58	67	698	3,830	490	Do.
		9- 8-58	66	610	3,570		Pumped 2 min before sampling.
		1-12-59	66	615	3,600		Pumped 5 min before sampling.
		3- 5-59	68	695	3,790		Pumped 3 min before sampling.
9.23.36.133	Psa	1-16-53	69	475	2,530	820	Pumping when collector arrived.
		8-13-58		598	3,030		
		9- 8-58	68	575	3,000		Pumping when collector arrived.
		1-12-59	66	580	3,190		Pumped 5 min before sampling.
		3- 5-59	68	695	3,510		Pumping when collector arrived.
9.24.5.311	Psa and Pcb (?).	5-17-50		218	2,950	365	Do.
		8-13-58	67	452	3,030		
		9- 8-58	64	370	3,490		Pumped 2 min before sampling.
9.142	Pcb(?)	1-12-59	66	415	3,100	190	Pumped 5 min before sampling.
19.332	Psa	1-12-59	67	505	3,190	550	Pumping when collector arrived.
22.434	Psa and Pcb (?).	8-13-58	66	605	3,800	480	Do.
		9- 8-58	67	510	3,030		Do.
		1-12-59	66	545	3,130		Pumped 3 min before sampling.
		3- 5-59	66	555	3,080		Pumped 6 min before sampling.

TABLE 2.—*Temperature, chloride content, and specific conductance of ground and surface waters from part of the Roswell basin, Chaves and Eddy Counties, N. Mex.*—Continued

Location No.	Water-bearing formation	Date collected	Temperature (°F)	Chloride (Cl)	Specific conductance (micromhos at 25°C)	Depth of well (feet)	Remarks
10.23.34.432	Psa	5-11-51		58	1,250	568	City well 10.
		11-30-57	68	111	1,460		
		8-11-58	69	86	1,360		Pumping when collector arrived.
		1-15-59		99	1,430		Pumped 1 min before sampling.
		3- 5-59	68	88	1,420		Pumped 2 min before sampling.
		9- 5-59		90	1,400	568	Pumping when collector arrived.
34.432a	Psa	11-30-57	68	96	1,400	561	City well 11.
		8-11-58	69	76	1,330		Pumping when collector arrived.
		9- 5-58		78	1,360		Do.
		1-15-59		83	1,380		Pumped 1 min before sampling.
		3- 5-59	68	80	1,360		Pumped 2 min before sampling.
10.24.2.344	Qa	1-25-54		495	2,710		Pumped 10 min before sampling.
		3- 2-59	63	620	3,800		Pumping when collector arrived.
4.323	Psa	1-12-59		445	2,740	320	Do.
10.24.8.111	Psa and Qa.	5- 2-57	68	472	2,730	368	Pumping estimated at 8 gpm.
		1-15-59	67	550	2,890		Pumping when collector arrived.
		3- 5-59	68	570	2,920		Do.
8.323	Qa	8-20-52		830	5,010	98	Pumped 5 min before sampling.
		1-16-53	66	415	2,420		Do.
	Qa and Psa(?).	9- 3-58	65	715	4,600	125	Deepened in 1955.
8.333a	Psa	1-22-57	67	430	2,460	202	Pumped 5 min before sampling.
		3- 2-59	68	500	2,670		Pumped 3 min before sampling.
8.433	Psa	1-16-53	67	365	2,160	213	Pumped 5 min before sampling.
		8-29-58	65	460	2,590		Pumping when collector arrived.
9.333a	Qa	1-16-53	66	450	2,650	181	Pumped 5 min before sampling.
		9-16-57	65	990	5,300		Pumping when collector arrived.
10.24.10.223	Qa and Pcb(?).	1-16-53	67	445	2,620	150	Do.
		8-10-53	66	1,110	5,230		Do.
12.222	Qa	1-14-53	63	365	2,510	97	Do.
		7-31-58		400	2,580		Do.
14.132	Psa	9-16-52		1,260	5,080	300	Pumped 5 min before sampling.
		3- 2-59		2,660	9,110		Pumped 3 min before sampling.
15.111	Psa	10- 1-51		375	2,280	322	Pumped 5 min before sampling.
		9-15-57	69	490	2,830		Pumping when collector arrived.
15.232	Psa	3- 6-59	69	790	3,630	330	Do.
15.342	Psa	7-24-48		690	3,410		
		6- 6-50		530	2,830	506	
15.431	Psa	9-13-57		1,410	5,590	366	
		1-28-58		520	2,870		
15.431a	Psa	5-31-57	70	556	3,110	341	Pumped 5 min before sampling.
		9-13-57		685	3,280	341	Pumped ½ min before sampling.
15.442	Psa	8-29-58	67	1,650	6,430	261	Pumped 1 min before sampling.
		3- 2-59	69	1,070	4,580		Pumped 3 min before sampling.

TABLE 2.—*Temperature, chloride content, and specific conductance of ground and surface waters from part of the Roswell basin, Chaves and Eddy Counties, N. Mex.*—Continued

Location No.	Water-bearing formation	Date collected	Temperature (°F)	Chloride (Cl)	Specific conductance (micromhos at 25°C)	Depth of well (feet)	Remarks
16.313	Psa	9-28-48		388	2,290	237	
		3- 5-59	68	600	3,150		Pumping when collector arrived.
17.143	Psa	6- 6-50		400	2,540	230	Pumped 10 min before sampling.
		8-20-52	66	580	3,390		Pumped 5 min before sampling.
17.234	Qa	7-26-51		435	2,700	84	
		3- 2-59		595	3,400		Pumped 5 min before sampling.
17.333	Psa	1-16-53	67	340	2,170	420	Pumping when collector arrived.
		3- 5-59	66	425	2,330		Do.
18.233	Psa	1-16-53	68	355	2,160	348	Pumped 5 min before sampling.
		9-15-57	68	432	2,490		Pumped ½ min before sampling.
18.334	Psa	1-16-53		335	2,140	160	Sampled from pressure system at residence.
		3- 5-59	66	465	2,450		Pumping when collector arrived.
19.233	Psa	8-20-52	69	328	2,170	180	Pumped 5 min before sampling.
		3- 2-59	69	465	2,610		Do.
20.221	Qa and Psa(?).	1-16-53		850	6,000	125	Sampled from pressure system.
		3- 2-59		1,300	7,510		Do.
20.433	Psa	1-23-56	69	355	2,430	183	Pumped 5 min before sampling.
		3- 2-59		476	2,500		Do.
21.133	Psa	1-19-53	69	440	2,800	379	Do.
		8-23-56	70	525	2,990		Pumping when collector arrived.
22.134	Psa	1-25-54		810	3,840	250	Pumped 5 min before sampling.
		9- 3-58	69	1,080	4,860	250	Pumped 2 min before sampling.
22.243	Psa	1-20-48		542	3,090	245	
		3- 2-59	69	635	3,110		Pumping when collector arrived.
[1] 22.441	Qa	1-19-53	64	1,270	6,670	Spring	
		3- 3-59	64	1,500	7,310		
23.124	Psa	7-21-54		1,420	5,710	360±	Pumped 5 min before sampling.
		1-13-59		940	4,280		Pressure system pumping when collector arrived.
23.142	Pcb(?)	11-20-53	68	900	4,040	293	Sampled from pressure system after 5-min flow from faucet.
		9-17-58	68	1,280	5,270		Pumping when collector arrived.
23.331	Psa	10-14-52		2,920	10,200	300	Density—1.001 g per ml. Pumped 5 min before sampling.
		3- 5-59		1,520	6,010		Pumped 1 min before sampling.
10.24.25.434	Qa	11-21-56	63	1,980	8,410	115	Pumped 5 min before sampling.
		9-16-58	62	2,080	8,840		Pumped 1 min before sampling.
26.143a	Psa	2- 8-55	69	1,030	4,530	328	Pumped 5 min before sampling.
		7-25-57	70	1,870	7,000		Pumping when collector arrived.
26.313	Psa	10-14-52	68	445	2,580	460	Pumped 5 min before sampling.
		7-31-57	70	775	3,660		Pumping when collector arrived.

See footnote at end of table.

TABLE 2.—*Temperature, chloride content, and specific conductance of ground and surface waters from part of the Roswell basin, Chaves and Eddy Counties, N. Mex.*—Continued

Location No.	Water-bearing formation	Date collected	Temperature (°F)	Chloride (Cl)	Specific conductance (micromhos at 25°C)	Depth of well (feet)	Remarks
26.344	Psa	9- 3-58	68	1,070	4,590	396	Pumped 3 min before sampling.
		1-13-59		635	3,250		Pumped 10 min through pressure system before sampling.
27.212	Psa	12-16-52	69	675	3,510	330	Pumped 5 min before sampling.
		8-13-53	66	1,770	6,990		Pumping when collector arrived.
10.24.27.331	Psa	8-20-52	68	355	2,310	317	Pumped 5 min before sampling.
		3- 9-59		520	3,170		Sampled from pressure system.
27.423	Qa	12-16-52		455	2,600	80±	Pumping when collector arrived.
		3- 3-59		695	3.260		Sampled from pressure system after 5-min flow from faucet.
28.114	Qa	8-20-52	65	564	3,160	80	Pumped 5 min before sampling.
		9-24-56	65	1,090	4,940		Do.
28.114a	Qa	8- 5-58		222	1.750	100	Sampled from pressure system.
		1-13-59		215	1,740		Pumped 1 min through pressure system before sampling.
28.232	Psa	1-20-53	68	496	2,530	312	Pumping when collector arrived.
		1-13-58		325	2,120		
29.423	Psa	1-19-53		296	2,050	340	Pumping when collector arrived.
		1-13-59	68	460	2,570		Pumped 2 min before sampling.
10.24.30.444		9-23-58	68	271	1,940	294	City well 14. Pumped for 18 hr before sample was taken.
		1-15-59	66	258	1,880		Pumped 4 min before sampling.
		3- 5-59		253	1,810		Pumped 2 min before sampling.
32.242	Psa	6- 9-55		93	1,390	251	City well 6. Pumped 3 min before sampling.
		1-15-59		284	1,980		Pumped 3 min before sampling.
32.314	Psa	5-11-51		107	1.590	264	City well 8.
		1-15-59	66	234	1,860		Pumped 1 min before sampling.
33.114	Psa	9- 5-58		320	2,070	295	Well 7. Pumping when collector arrived.
		1-15-59	66	330	2,100		Pumped 1 min before sampling.
10.24.33.211	Psa	8-20-52	69	325	2,070	284	Pumped 5 min before sampling.
		3- 5-59	66	432	2,380		Pumped 2 min before sampling.
34.221	Psa	8-18-52	68	490	2,740	291	Pumped 5 min before sampling.
		1-14-59		855	3,840		Pumping when collector arrived. Sampled through pressure system.
34.221a	Qa	7-23-52		1,020	5,680	Spring	Flow estimated at 150 gpm.
		1-14-59	63	1,250	5,410		
34.313	Psa	8-18-52	68	242	1,880	330	Pumping when collector arrived.
		3- 3-59	69	384	2,220		Pumped 3 min before sampling.
35.222a	Psa	9-30-46		1,160	4,660	452	
		10-10-55		3,940	13,400		
35.222b	Psa	3-21-51		1,500	5,850	465	
		11-18-53	69	4,370	14,200		Flowing when collector arrived.

TABLE 2.—*Temperature, chloride content, and specific conductance of ground and surface waters from part of the Roswell basin, Chaves and Eddy Counties, N. Mex.*—Continued

Location No.	Water-bearing formation	Date collected	Temperature (°F)	Chloride (Cl)	Specific conductance (micromhos at 25°C)	Depth of well (feet)	Remarks
10.24.35.341	Psa	8-18-52	68	390	2,360	300	Pumped 5 min before sampling.
		9- 3-58	64	990	5,090		Pumped 1 min before sampling.
35.421	Psa	2-17-53	69	860	3,890	433	Flowing when collector arrived.
		9- 2-58	68	1,420	5,650		Pumped 2 min before sampling.
36.333a	Psa	12- 4-50		895	3,990	600(?)	
		3- 3-59		1,560	5,890		Pumping when collector arrived.
10.25.6.142	Psa	7-24-40		318	2,140	471	
		1-13-59	64	400	2,400		Flowed 5 min before sampling.
9.412	Psa	9- 2-52		1,900	7,650		Flowing when collector arrived.
		1-29-58		1,770	7,360	485	
11.333	Qa and Pcb(?).	1- 4-57	67	1,730	7,840		Flowing when collector arrived.
		8-11-58		1,620	7,390	150	Drilled to 500 ft in Chalk Bluff formation. Reportedly obtains water only from alluvium. Pumped 1 min before sampling.
[1] 15.323	Qa	8-11-58		10,300	30,200	13	Test hole in saltcedar tract.
10.25.17.122	Psa	8-10-53		795	3,900		Flowed 5 min before sampling.
		1-29-58		745	3,580	505	
19.331	Qa	1-13-53	66	2,590	9,580	126	Pumped 10 min before sampling.
		8-27-58		2,170	7,530		Reported sanded up to 104 ft. Pumped 5 min before sampling.
19.413	Qa	1-21-57		1,380	5,780	100±	Sampled from pressure system.
		1-13-59		1,410	5,700		Do.
30.224	Psa and Pcb(?).	7-21-52		4,710	14,800	408	
	Pcb	1-21-57	67	2,150	7,840	370	Pumped 5 min before sampling.
		3- 6-59	67	2,630	8,790	370	Pumping when collector arrived.
30.312	Psa	4-20-56	68	2,470	10,500	365	
		3- 3-59	63	3,280	10,600		Pumped 5 min before sampling. Density—1.002 g per ml.
31.132	Qa	10-27-54	60	626	3,350	70	
		9-16-58		665	3,540		Pumped 1 min through pressure system before sampling.
31.314	Qa	1-27-57		1,690	7,540	158	Pumped 5 min before sampling.
		9-12-57		1,180	5,490		Pumped ½ min before sampling.
31.413	Qa	2-23-54	65	1,660	7,290	150	Pumped 5 min before sampling.
		7-19-56	65	1,290	6,440		Pumping when collector arrived.
32.431	Qa	7-24-52	66	895	4,180	103	Pumping estimated at 1,000 gpm.
		4-29-57	67	1,220	4,920		Pumped 5 min before sampling.
10.25.32.443	Qa	12-26-56	64	1,420	5,330	80	Pumped 5 min before sampling.
		3- 3-59	68	1,540	5,610		Pumped 7 min before sampling.
11.24.1.332	Psa	9-16-58	69	2,230	7,980	443	Pumping when collector arrived.
		3- 3-59		1,380	5,330		Do.

See footnote at end of table.

TABLE 2.—*Temperature, chloride content, and specific conductance of ground and surface waters from part of the Roswell basin, Chaves and Eddy Counties, N. Mex.*—Continued

Location No.	Water-bearing formation	Date collected	Temperature (°F)	Chloride (Cl)	Specific conductance (micromhos at 25°C)	Depth of well (feet)	Remarks
1.334	Psa	8-21-52	69	755	3,490	395	Pumped 5 min before sampling.
		1-16-59		1,400	5,390		Pumped 3 min before sampling.
1.431	Qa	2-23-56		235	1,670	180	
		9-3-58	64	1,160	5,280		Pumped 2 min before sampling.
(1)		1-15-59	63	1,210	5,960	289	Pumping when collector arrived. Deepened to 289 and backfilled to 144 ft with gravel.
2.111	Psa	8-21-52		278	1,960	396	Pumping when collector arrived.
		3-6-59		404	2,290	396	Pumping when collector arrived. Sampled through pressure system.
2.212	Psa	4-23-57	69	765	3,600	352	Pumped 6 hr before sampling.
		9-18-58	72	1,020	4,410		Pumped 3 min before sampling.
2.331	Psa	1-20-53	67	212	1,750	373	Pumped 5 min before sampling.
		2-1-58		560	4,380		
3.441	Psa	8-21-52	68	198	1,730	350	Pumped 5 min before sampling.
		2-1-58		555	4,530		
4.114	Psa	9-5-58		325	2,140	319	Well 1. Pumped 5 min before sampling.
		3-5-59		394	2,350		Pumped 1 min before sampling.
4.114a	Psa	8-11-58		225	1,800	309	Well 2. Pumping when collector arrived.
		3-5-59	68	362	2,240		Pumped 5 min before sampling.
11.24.4.114b	Psa	8-11-58	69	314	2,090	304	Well 3. Pumping when collector arrived.
		3-5-59		384	2,310		Pumped 3 min before sampling.
4.124	Psa	11-30-57		322	2,120	319	Well 9.
		3-5-59		360	2,180		Pumping when collector arrived.
8.124	Psa	8-23-56	69	96	1,420	368	Pumped 2 min before sampling.
		9-5-58		136	1,520		Pumping when collector arrived.
9.413	Psa	9-5-58	66	98	1,310	525	Do.
		1-16-59	66	98	1,250		Do.
		3-4-59	66	110	1,330		Pumped 3 min before sampling.
10.141	Pcb(?)	8-27-56	68	180	1,680	247	Pumping when collector arrived.
		3-4-59	63	710	4,800		Pumped 10 min before sampling.
10.143	Qa	8-15-52	64	415	3,890	168	
		2-1-58		705	4,760	168	
10.233	Psa	9-4-58	67	231	1,830	462	Pumping when collector arrived.
		3-6-59	66	270	2,000		Pumped 1 min before sampling.
11.243	Psa	8-21-52	69	445	2,560	454	Pumping when collector arrived.
		2-1-58		995	4,240		
11.314	Psa	8-11-53	68	170	1,790	447	Pumping when collector arrived.
		1-16-59	67	325	2,050		Pumped 1 min before sampling.

See footnote at end of table.

TABLE 2.—*Temperature, chloride content, and specific conductance of ground and surface waters from part of the Roswell basin, Chaves and Eddy Counties, N. Mex.*—Continued

Location No.	Water-bearing formation	Date collected	Temperature (°F)	Chloride (Cl)	Specific conductance (micromhos at 25°C)	Depth of well (feet)	Remarks
12.233	Psa	1-29-54	68	1,090	4,630	485	Pumped 5 min before sampling.
		9-11-57	----	3,170	10,300	----	
12.233a	Qa	9-30-53	64	870	4,690	110	Pumping when collector arrived.
		9-11-57	----	2,150	8,230	----	
12.233c	Qa	10-26-56	65	1,000	5,250	123	Pumped 5 min before sampling.
		2-28-57	65	700	3,900	----	
12.431	Psa	8-21-52	69	810	3,630	512	Pumped 5 min before sampling.
		7-30-57	----	1,880	6,790	512	
13.111	Psa	9- 4-58	68	875	3,880	490	Pumping when collector arrived.
		1-16-59	----	990	4,090	----	Sampled from pressure system.
		3- 6-59	67	760	3,460	----	Pumping when collector arrived.
13.122	Qa	8-13-52	64	150	2,300	17	
		3- 4-59	----	630	4,490	----	Pumped 5 min through pressure system before sampling.
13.144	Qa	4- 2-57	66	445	3,380	164	
		1-15-59	64	765	3,440	----	Pumped 1 min before sampling.
13.144a	Psa	2-28-57	----	410	2,390	551	
		1-15-59	66	880	3,770	----	Pumped 2 min before sampling.
13.223	Psa	9-17-58	64	690	4,040	516	Do.
		1-22-59	----	1,340	5,130	----	Do.
13.233a	Qa	3- 4-59	----	700	3,750	60	Sampled from bailer during drilling.
11-24-13-241	Psa	8-21-52	67	385	2,640	524	Pumped 5 min before sampling.
		1-31-57	68	1,060	4,430	----	Do.
14.321	Qa	12-27-56	66	290	2,910	192	
		8-27-58	----	82	1,250	----	Sampled from pressure system.
14.343	Psa	1-16-59	----	142	1,820	----	Do.
		3- 6-59	----	172	2,210	----	Do.
		9- 5-59	66	182	2,450	364	Pumping when collector arrived.
14-443	Qa	2-28-57	67	69	1,220	183	
		3- 4-59	----	425	2,500	----	Pumped 3 min before sampling.
15-244	Psa	8- 6-58	68	184	1,730	407	Pumping when collector arrived.
		8-27-58	67	180	1,680	----	Do.
		1-16-59	66	216	1,720	----	Do.
		3- 4-59	----	210	1,780	----	Do.
16-142	Psa	1-15-59	----	112	1,430	365	Pumped 5 min before sampling.
		3- 5-59	----	163	1,630	----	Pumping when collector arrived.
11.24.22.131	Psa	8-14-58	68	61	1,190	500	Pumping on arrival.
		9- 5-58	68	60	1,190	----	Do.
		1-22-59	----	58	1,130	----	Pumped 1 min before sampling.
		3- 6-59	68	57	1,110	----	Do.
22.333	Psa	8-14-58	67	65	1,240	465	Pumping when collector arrived.
		9- 5-58	66	63	1,200	----	Do.
		1-16-59	66	52	1,090	----	Pumped 3 min before sampling.
		3- 6-59	67	57	1,180	----	Pumping when collector arrived.
23.414	Psa	8-14-58	68	89	1,350	523	Do.
		9- 5-58	67	88	1,360	----	Do.
		3- 6-59	68	87	1,310	----	Do.

TABLE 2.—*Temperature, chloride content, and specific conductance of ground and surface waters from part of the Roswell basin, Chaves and Eddy Counties, N. Mex.*—Continued

Location No.	Water-bearing formation	Date collected	Temperature (°F)	Chloride (Cl)	Specific conductance (micromhos at 25°C)	Depth of well (feet)	Remarks
24.213	Psa	8-14-58	68	83	1,340	535	Pumping when collector arrived.
		9-17-58	67	94	1,380		Pumped 2 min before sampling.
		1-16-59	66	100	1,320		Pumped 1 min before sampling.
		3-6-59	66	88	1,250		Pumped 2 min before sampling.
11.24.25.341	Psa	8-14-58	69	34	907	678	Pumping when collector arrived.
		9-5-58	69	33	912		Do.
		1-16-59	68	35	843		Pumped 2 min before sampling.
		3-5-59	66	29	906		Do.
11.25.4.342	Qa	8-26-58		920	4,380	156	Pumping when collector arrived.
		1-14-59		304	1,880		Pumped 1 min before sampling.
5.333	Qa	11-21-56	61	620	2,990	115	Pumping when collector arrived.
		2-28-57	64	1,060	5,190		Pumped 1 min before sampling.
6.123a	Qa	1-26-53	64	845	4,550	163	Pumped 5 min before sampling.
		1-14-59	63	1,520	6,590		Pumping when collector arrived. New well drilled in March 1959.
7.233a	Psa	2-28-57	66	1,590	5,960	440	
		9-12-57	69	3,770	11,900		
11.25.7.243	Psa	8-12-52		244	1,790	500	
		8-6-58	68	1,540	5,690		Pumping when collector arrived.
7.412	Psa	2-18-53	69	415	2,380	450	Flowed 8 min before sampling.
		9-12-59		3,670	11,600		
8.133	Psa	10-26-56	67	615	2,980	533	Pumped 5 min before sampling.
		9-4-58		1,580	5,950		Pumping when collector arrived.
8.143	Psa	4-20-53	69	232	1,750	540	Flowing when collector arrived.
		9-12-57		1,510	5,630		Pumping when collector arrived.
8.311	Psa	2-16-48		174	1,570	440	
		3-5-59		850	3,750		Pumping when collector arrived.
8.331	Qa	7-30-57	64	545	3,430	132	Do.
		1-14-59	64	810	4,510		Pumped 1 min before sampling.
[1]11.25.8.422	Psa	12-12-53		7,330	23,300	595-796	"Third flow." Flowed 30 min before sampling.
		1-20-54		835	3,750	477-847	
		12-12-55		400	2,290		"Second flow." Flowing when collector arrived.
		12-27-56	65	452	2,060		
9.241	Qa	1-20-54	68	1,450	5,580	82	Pumping when collector arrived.
		10-26-56	68	465	2,560		Pumped 5 min before sampling.
9.432	Psa	2-2-44		114	1,360	750±	Flowed 3 min before sampling.
		3-4-59	68	2,820	9,860		Flowing when collector arrived.
14.332	Psa	1-15-53	69	97	1,180	845	Do.
		9-4-58	70	595	3,060		Do.
15.142	Qa	8-15-58	65	125	1,710	74	Pumping when collector arrived.
		1-14-59	66	54	1,270		Pumped 1 min before sampling.

See footnote at end of table.

TABLE 2.—*Temperature, chloride content, and specific conductance of ground and surface waters from part of the Roswell basin, Chaves and Eddy Counties, N. Mex.*—Continued

Location No	Water-bearing formation	Date collected	Temperature (°F)	Chloride (Cl)	Specific conductance (micromhos at 25°C)	Depth of well (feet)	Remarks
11.25.15.343	Psa	5-10-28	68	22		843	Flowing 5,500 gpm.
		9-4-58	68	71	1,210		Flowing when collector arrived.
16.133	Psa	1-15-53	63	70	1,220	591	Do.
		9-4-58	68	138	1,490		Pumping when collector arrived.
16.213	Psa	2-26-57	69	229	1,800	723	
		9-12-57		645	3,080		Pumping when collector arrived.
16.431	Psa	1-15-53	69	52	1,120	661	Flowed 5 min before sampling.
		3-4-59	68	79	1,250		Flowing when collector arrived.
17.123	Psa	1-15-53	68	145	1,500	479	Do.
		9-4-58	68	370	2,250		Pumping when collector arrived.
18.122	Pcb(?)	1-15-53	68	490	2,660	356	Flowed 5 min before sampling.
		3-6-59	65	1,060	4,280		Pumped 2 min before sampling.
18.133	Psa	9-4-58		630	3,300	593	Pumped 2 min through long hose before sampling.
		1-14-59	68	1,070	4,270	593	Pumped 2 min before sampling.
18.441	Psa	8-21-52	68	70	1,180	522	Pumped 5 min before sampling.
		8-15-58	67	157	1,640		Pumping when collector arrived.
19.423	Psa	8-14-58	69	32	914	700	Do.
		9-4-58	68	30	920		Do.
		1-15-59	68	31	906		Flowing when collector arrived.
		3-5-59		32	779		Pumping when collector arrived.
20.121	Psa	8-14-58		112	1,380	736	Do.
		9-4-58	69	110	1,400		Do.
		1-22-59		88	1,270		Flowing when collector arrived.
		3-5-59		91	1,300		Pumping when collector arrived.
22.331	Psa	8-14-58	72	52	1,200	896	Do.
		9-17-58	70	54	1,230		Flowed 3 min before sampling.
		1-15-59	70	51	1,190		Flowed 3 min before sampling.
		3-4-59	70	70	1,210		Pumping when collector arrived.
23.111a	Psa	9-11-57	69	290	2,000	847	Flowing when collector arrived.
		3-6-59	68	95	1,190		Do.
23.311	Psa	8-14-58	71	82	1,240	797	Do.
		9-16-58	70	74	1,240		Do.
		1-14-59	69	53	1,110		Do.
		3-4-59	68	55	1,120		Do.
23.312	Psa	9-11-57	70	116	1,370	908	Do.
		9-4-58		105	1,360		Flowing when collector arrived. Sampled from leaky valve.
		3-4-59		79	1,240		Sampled from leaky valve.
27.133	Qa	9-4-58	64	370	4,620	65	Pumping when collector arrived.
		3-4-59	62	370	4,490		Do.
27.133a	Psa	1-15-59		45	1,220	945	Flowing through small pipe when collector arrived.
		3-4-59		46	1,250	945	Sampled from domestic system at well.
28.111	Psa	1-15-59		46	1,050	755	Flowing through leak in pump when collector arrived.

TABLE 2.—*Temperature, chloride content, and specific conductance of ground and surface waters from part of the Roswell basin, Chaves and Eddy Counties, N. Mex.*—Continued

Location No.	Water-bearing formation	Date collected	Temperature (°F)	Chloride (Cl)	Specific conductance (micromhos at 25°C)	Depth of well (feet)	Remarks
29.433	Psa	1-19-59		48	995	791	Turbine pumping when collector arrived. Sampled from pressure system.
31.133	Psa	1-16-59		26	824	820	Sampled from pressure system.
33.233	Psa	9- 4-58	73	385	2,650		Pumping when collector arrived.
		1-15-59		32	1,100		Flowing when collector arrived.
		3- 4-59	73	515	3,150		Pumping when collector arrived.
		8-14-59	74	396	2,660	780	Do.
[1] 36.213b	Qa	9-12-57	67	1,040	6,830	30	Test hole. One of two casings in same drill hole. Casing gravel packed from 5 to 30 ft.
[1] 11.25.36.213c	Qa(?)	9-13-57		33	2,680	235	Test hole. Second of two casings in same drill hole. Steel pipe perforated from 230 to 235 ft and gravel packed from 223 to 255 ft. Gravel pack sealed with five sacks of cement, and hole filled to 40 feet with mud.
11.26.27.134	Pcb	2- 2-44		4,370	17,300		Mirror Lake.
		9- 9-57		8,200	26,500		Do.
34.341	Pcb	10-21-39		2,160	9,850		Lea Lake.
		9-12-57		3,410	13,200		Do.
12.25.3.421	Psa	1-19-59		28	920	799	Pressure system pumping when collector arrived.
7.144	Qa	5- 2-55	66	26	909	145	
12.25.9.243	Qa	3-15-54	66	26	983	110	
9.321	Psa	1-22-59		35	1,120	900	Pumped 1 min before sampling.
11.223	Psa	1-19-59	66	176	1,550	1,039	Flowing small quantity of water when collector arrived.
12.433	Psa	3- 4-59	72	320	2,280	883	Pumping when collector arrived. Plugged in May 1959.
13.111	Psa	8-14-58	74	488	2,870	896	Pumping when collector arrived.
		1-19-59	71	258	1,920		Flowing through small valve when collector arrived.
		3- 4-59	72	364	2,310		Pumping when collector arrived.
		9- 5-59	73	492	2,900		Do.
22.231	Qa	7-22-40		22	921		
27.211	Qa	7- 8-55	65	152	2,050		
28.223	Qa	5- 7-42		18	907	152	
28.224	Qa	4-28-42		21	945	150	
		2-15-43	62	21	905		
		4- 5-55	72	20	1,070		
		11-25-55		22	931		
35.411	Psa	9-13-56	67	22	1,070	937	
		8-13-58	72	25	1,050		Pumped 5 min before sampling.
		9- 5-58	72	22	1,050		Pumping when collector arrived.
		3- 4-59	71	21	1,040		Do.
35.411a	Qa	4- 5-55	65	35	1,320		
36.211	Qa	7-23-40		56	1,310		
12.26.7.421	Qa	4-10-40	65	56	2,750		
[1] 17.444	Qa	8-14-58		5,330	26,200	15	Density 1.022 g per ml. Test hole in saltcedar tract.
18.111	Qa	9-16-58	63	215	3,360	100	Pumped 3 min before sampling.
		1-19-59	62	235	3,330		Pumped 1 min before sampling.
		3- 4-59	62	248	3,400		Pumping when collector arrived.

See footnote at end of table.

TABLE 2.—*Temperature, chloride content, and specific conductance of ground and surface waters from part of the Roswell basin, Chaves and Eddy Counties, N. Mex.*—Continued

Location No.	Water-bearing formation	Date collected	Temperature (°F)	Chloride (Cl)	Specific conductance (micromhos at 25°C)	Depth of well (feet)	Remarks
12.26.19.431	Psa	2-20-59	73	536	3,540	1,014	Flowing when collector arrived.
[1] 20.212	Qa	8-14-58		995	6,650	13	Test hole in saltcedar tract.
[1] 20.222	Qa	8-14-58		1,340	7,230	17	Do.
20.311	Qa	1-19-59		1,340	5,900		
		3-4-59		1,210	5,740		
[1] 26.240	Psa	4-3-56		169,000		1,338–1,352	Oil test. Drill stem sample. Chloride determined in field.
28.121	Pcb	2-20-59	66+	35	2,600	502	Flowing when collector arrived.
28.212	Pcb	1-19-59	70	27	2,900	336	Do.
30.133	Qa	9-5-58	64	322	2,930	134	Pumping when collector arrived.
		1-19-59	64	340	2,860		Pumped 3 min before sampling.
		3-6-59	64	396	3,100		Pumping when collector arrived.
31.133	Psa	9-1-55	75	246	2,090	1,201	
		8-14-58	75	302	2,290		Pumping when collector arrived.
		9-5-58	75	308	2,350		Do.
		1-19-59	70	290	2,170		Flowing when collector arrived.
		3-6-59	70	333	2,430		Pumped 2 min before sampling.
31.133a	Qa	9-1-55	65	306	3,690		
32.133	Psa and Pcb(?).	1-19-59	77	260	2,410	1,100	Flowing when collector arrived.
33.232	Psa	2-20-59	70+	210	2,950	1,026	Do.
13.25.6.333	Qa	2-3-44		201	2,140		
10.430	Psa	5-10-28	71	37		922	
		2-9-39		50	2,820		
13.113	Qa	2-9-39		320	3,090		
14.231a	Qa	8-13-58	65	130	2,090	262	Pumping when collector arrived.
		9-5-58	66	128	2,110		Do.
		1-19-59	64	121	2,040		Pumped 3 min before sampling.
		3-4-59	64	131	2,150		Pumping when collector arrived.
17.411	Qa	6-8-55	67	22	1,130	148	
25.121	Psa	8-13-58	71	19	916	896	Pumping when collector arrived.
		9-17-58		19	947		Pumped 2 min through pressure system before sampling.
		1-20-59		14	1,010		Pressure system pumping when collector arrived.
		3-4-59		18	983		Do.
27.211	Qa	2-8-39		33	996		
28.421	Psa	8-13-58	71	16	926	823	Pumping when collector arrived.
		9-5-58	70	17	932		Do.
		1-20-59	68	13	919		Pumped 2 min before sampling.
28.421a	Psa	3-4-59	68	18	955	853	Do.
13.26.3.114	Psa	8-14-58	81	288	3,230	1,150	Pumping when collector arrived.
		9-5-58	76	375	3,560		Pumped 2 min before sampling.
		1-19-59	77	520	3,940		Flowing when collector arrived.
		3-4-59	76	516	4,030		Do.
3.211	Pcb	1-19-59	70	22	2,820	546	Flowed 4 min before sampling.
[1] 3.343	Qa	7-30-58	68	665	5,060	27	Test hole.
4.212	Psa	3-4-59	68+	1,040	5,440	1,130	Flowing when collector arrived.

See footnote at end of table.

TABLE 2.—*Temperature, chloride content, and specific conductance of ground and surface waters from part of the Roswell basin, Chaves and Eddy Counties, N. Mex.*—Continued

Location No.	Water-bearing formation	Date collected	Temperature (°F)	Chloride (Cl)	Specific conductance (micromhos at 25°C)	Depth of well (feet)	Remarks
5.111	Psa	8-14-58	--------	264	2,210	1,055	Pumping when collector arrived.
		9-5-58	77	261	2,230	--------	Do.
		1-19-59	75	310	2,320	--------	Flowed 5 min before sampling.
		3-4-59	74	308	2,370	--------	Flowing when collector arrived.
7.313	Psa	5-10-28	74	18	--------	945	
		2-9-39	--------	21	1,160	--------	
		1-19-59	70	25	1,290	--------	Flowing when collector arrived.
13.26.8.223	Psa	1-19-59	76	78	2,180	1,114	Do.
8.330	Qa	6-8-55	66	255	2,980	--------	
8.343	Psa and Pcb(?).	1-19-59	68	31	1,600	1,056	Flowing when collector arrived.
[1] 10.113	Qa	8-13-58	--------	750	6,940	44	Test hole.
[1] 10.123	Qa	7-30-58	68	675	5,080	20	Do.
11.244	Pcb	8-13-58	74	39	2,860	600	Pumping when collector arrived.
		9-5-58	74	34	2,850	--------	Do.
		1-19-59	74	28	2,840	--------	Flowing when collector arrived.
		3-4-59	73	30	2,860	--------	Do.
14.211	Psa	1-19-59	76	2,000	8,300	1,295	Do.
		3-4-59	78	1,680	7,460	--------	Do.
14.333	Qa and Pcb.	8-13-58	--------	308	3,290	287	Pumping when collector arrived.
		9-5-58	66	315	3,330	--------	Do.
		1-19-59	64	140	2,980	--------	Pumped 6 min before sampling.
		3-4-59	62	218	3,150	--------	Pumping when collector arrived.
17.113	Qa	4-25-41	--------	200	2,600	100	
17.333	Psa	4-6-56	--------	16	965	975	
		8-11-58	73	15	945	--------	Pumping when collector arrived.
		9-5-58	72	16	962	--------	Do.
		1-19-59	70	17	944	--------	Flowing when collector arrived.
		3-3-59	70	16	956	--------	Pumping when collector arrived.
19.333	Qa	6-8-54	64	99	1,930	--------	
22.123	Qa	7-14-54	--------	31	1,110	--------	
22.313	Qa	8-13-58	67	535	3,510	230	Pumping when collector arrived.
		9-5-58	67	525	3,480	--------	Do.
		1-19-59	66	630	3,740	--------	Pumped 5 min before sampling.
		3-4-59	64	630	3,880	--------	Pumped 3 min before sampling.
22.331	Qa	4-5-55	66	485	3,280	226	
28.111	Qa	7-14-54	--------	1,400	6,930	--------	
28.114	Psa	4-4-56	--------	15	997	1,000	
		8-11-58	--------	17	981	--------	Pressure system, pumping on arrival.
		9-5-58	--------	16	997	--------	Do.
		1-19-59	--------	15	981	--------	Do.
		3-4-59	--------	15	994	--------	Do.
28.121	Qa	2-9-39	--------	288	2,300	--------	
28.131	Qa	1-31-44	--------	368	2,660	--------	
28.233	Qa	7-15-54	--------	775	4,210	--------	
28.311	Qa	7-14-54	--------	1,290	6,140	198	
31.113	Psa	5-10-28	71	12	--------	1,025	
		2-8-39	--------	16	985	--------	
31.131	Psa	8-11-58	72	47	1,480	979	Pumping when collector arrived.
		9-5-58	72	42	1,450	--------	Do.
		1-20-59	71	48	1,520	--------	Flowing when collector arrived.
		3-6-59	72	59	1,610	--------	Pumping when collector arrived.

See footnote at end of table.

TABLE 2.—*Temperature, chloride content, and specific conductance of ground and surface waters from part of the Roswell basin, Chaves and Eddy Counties, N. Mex.*—Continued

Location No.	Water-bearing formation	Date collected	Temperature (°F)	Chloride (Cl)	Specific conductance (micromhos at 25°C)	Depth of well (feet)	Remarks
31.311	Qa	8-22-56	64	63	1,810	165	
		9-30-57	65	67	1,780		Pumping when collector arrived.
		8-13-58	65	67	1,760		Do.
		9- 5-58	65	64	1,770		Do.
		3- 6-59	64	51	1,420		Do.
32.322	Psa	8-11-58		15	933	1,075	Do.
		9- 5-58	72	16	949		Do.
		1-20-59	72	14	932		Flowing when collector arrived.
		3- 3-59	72	15	940		Do.
14.25.1.121	Qa	5- 6-27		15			
1.300	Qa	5-13-27	66	126		106	
2.444	Qa	1-25-44		160	2,040		
8.333	Qa	7-23-40		28	1,030	200	
14.131	Qa	9-15-55	66	17	971		
21.113	Qa	2- 8-39		12	832		
14.25.24.133	Qa	9- 8-55	67	23	973	150	
25.331	Qa	7-22-40		18	1,170		
14.26.3.433	Qa	8-13-58	64	1,520	7,160	95	Pumping when collector arrived.
		9- 5-58	64	1,710	7,560		Pumped 3 min before sampling.
		4-28-59		1,900	7,950		
5.111	Qa	7-23-40		334	2,540	180	
5.112	Qa	do		516	3,810	96	
8.433	Qa	8-25-41	67	40	1,300	280	
8.433a	Qa	6-24-55	67	62	1,400	164	Well filled 280–164 ft.
10.413	Psa	4-14-39		172	3,320	1,236	
14.213	Qa	9- 7-55	63	1,890	8,710		
14.441	Qa	7-22-40		585	5,010		
15.333	Qa	4- 5-55	65	1,370	6,730		
17.333	Qa	2- 8-39		42	1,190		
		7-22-40		71	1,360		
17.444	Qa	do		61	1,260	135	
18.113	Qa	9- 5-58	66	73	1,340	301(?)	Pumping when collector arrived.
		3- 6-59	66	85	1,310		Do.
14.26.20.334	Qa	1-25-44		90	1,660		
22.213	Qa	2- 8-39		860	4,700		
23.131	Qa	8-13-58	65	865	4,690		Pumping when collector arrived.
		9- 5-58	65	865	4,730		Do.
		1-20-59	62	1,380	6,530		Pumped 1 min before sampling.
		3- 3-59		1,310	6,330		Sampled from pressure system.
[1] 25.331	Qa	1-30-57		1,010	7,060	35	Test hole.
[1] 26.423	Qa	1-29-57	67	202	2,780	47	Do.
[1] 26.424	Qa	1-28-57	64	695	5,730	47	Do.
28.113	Psa	8-11-58	78	27	1,070	1,108	Pumping when collector arrived.
		9- 5-58	78	28	1,100		Do.
		3- 3-59	76	27	1,100		Do.
28.411	Qa	6-24-55	65	1,170	5,600		
28.423	Qa	1-24-44		715	4,210		
32.123	Qa	8-13-58	66	83	1,500	150	Pumping when collector arrived.
		9- 5-58	66	88	1,830		Pumped 2 min before sampling.
		1-20-59	66	78	1,480		Pumped 2 min before sampling.
		3- 3-59	64	134	2,120		Pumped 1 min before sampling.
14.27.30	Qa	2-21-41		2,800	11,900	22	
15.25.24.111	Qa	7-22-40		128	3,230		
24.120	Psa and Pgr.	1-19-44		31	2,780		
28.331	Qa	7-23-40		55	1,950		
35.111	Psa and Pgr.	8-11-58	75	22	2,900	1,101	Pumping when collector arrived.
35.213	Pgr	9- 5-55	73	29	2,430		
35.213a	Qa	9-15-55	68	64	2,080		

TABLE 2.—*Temperature, chloride content, and specific conductance of ground and surface waters from part of the Roswell basin, Chaves and Eddy Counties, N. Mex.*—Continued

Location No.	Water-bearing formation	Date collected	Temperature (°F)	Chloride (Cl)	Specific conductance (micromhos at 25°C)	Depth of well (feet)	Remarks
15.26.3.211	Qa	9-8-55	67	540	3,730		
5.112	Qa	2-8-39		75	1,700		
7.111	Qa	7-23-40		285	2,430		
8.221	Psa and Pgr.	1-20-59	74	50	2,120	1,195	Pumped 1 min before sampling.
10.112	Qa	8-12-58	66	1,180	5,780	300	Pumping when collector arrived.
		9-9-58	65	1,230	6,110		Pumped 3 min before sampling.
		1-20-59	65	980	5,210		Do.
		3-3-59	64	910	5,160		Do.
11.311	Psa and Pgr.	8-12-58	68	664	4,350	1,187	Pumping when collector arrived.
		9-9-58	68	650	4,580		Do.
13.121	Psa and Pgr.	8-12-58	80	19	1,160	1,381	Do.
		9-9-58	80	20	1,190		Do.
		1-20-59	74	18	1,070		Flowing when collector arrived.
		3-3-59	76	18	1,120		Do.
15.131	Psa and Pgr.	1-20-59	74	14	1,030		Originally an oil test drilled to 2,966 ft. Flowing when collector arrived.
18.112	Qa	8-13-58	65	414	3,860	130±	Pumping when collector arrived.
		9-17-58	67	410	3,790		Pumped 3 min before sampling.
		1-20-59	64	760	4,750		Pumped 5 min before sampling.
		3-3-59	65	350	3,670		Pumped 5 min before sampling.
[1] 22.343	Qa	1-4-57		9,770	29,400	27	Test hole.
[1] 27.211	Qa	1-5-57		13,300	38,000	32	Do.
29.111	Psa and Pgr.	8-12-58	73	40	2,460	1,060	Pumping when collector arrived.
		9-9-58	73	40	2,540		Do.
		1-20-59	72	72	2,770		Do.
31.333	Qa	8-24-55	66	244	3,600		
32	Psa and Pgr.	5-30-40		28	1,350	1,000±	
32.142	Qa	4-30-57	64	1,170	6,630		
[1] 15.27.6.121	Qa	8-14-58		13,700	36,700	17	Density=1.019 g per ml. Test hole.
[1] 6.141	Qa	8-14-58		6,570	22,600	18	Density=1.012 g per ml. Test hole.
[1] 6.233	Qa	8-14-58		14,700	39,200	12	Density=1.019 g per ml. Test hole.
16.25.3.114	Psa and Pgr.	5-21-28	66	20		841	
		2-8-39		15	2,040		
5.433	Pgr	8-11-58	71	17	1,780	1,156	Pumping when collector arrived.
		9-9-58	72	15	1,790		Do.
		3-3-59	70	15	1,770		Do.
6.400	Qa	2-8-39		139	2,310		
8.111	Qa	4-30-57		16	1,150		
11.133	Qa	2-8-39		62	2,540		
11.133b	Qa	2-11-44		15	979		
11.133d	Qa	9-1-55	65	53	2,440	235	
11.311	Qa	9-9-58	65	55	2,650	200±	Do.
		1-20-59	65	70	2,560		Pumped 1 min before sampling.
		3-3-59	66	54	2,370		Do.
15.333	Qa	4-30-57	63	134	3,330	160	
34.233	Qa	6-24-55		127	1,440		

See footnote at end of table.

TABLE 2.—*Temperature, chloride content, and specific conductance of ground and surface waters from part of the Roswell basin, Chaves and Eddy Counties, N. Mex.*—Continued

Location No.	Water-bearing formation	Date collected	Temperature (°F)	Chloride (Cl)	Specific conductance (micromhos at 25°C)	Depth of well (feet)	Remarks
16.26.5.Lot 4	Qa	2- 9-40		24	1,560		
7.131	Qa	2- 9-39		15	930		
8.223	Psa and Pgr.	8-12-58	73	22	1,700	965	Pumping when collector arrived.
		9- 9-58	73	18	1,650		Pumping when collector arrived.
		1-20-59	70	25	2,390		Pumped 2 min before sampling.
		3- 3-59	72	23	2,390		Pumping when collector arrived.
9.133	Qa	8-12-58	63	84	2,520	225	Do.
		9- 9-58	63	82	2,560		Do.
14.342	Psa and Pgr.	8-12-58	76	24	1,640	950	Do.
		9- 9-58	76	23	1,630		Do.
		1-20-59	72	23	1,570		Do.
		3- 3-59	72	25	1,480		Do.
18.331	Qa	7-23-40		66	1,510		
19.211	Qa	7- 7-55	66	72	1,460		
19.211a	Qa	8-22-56	65	79	1,540		
20.333	Psa and Pgr.	8-12-58	72	16	1,110	850	Do.
		9- 9-58	72	16	1,120		Do.
		1-20-59	70	17	1,160		Pumped 3 min before sampling.
16.26.28.331	Psa and Pgr.	9-17-58	72	13	1,180	1,320	Pumping when collector arrived.
		3- 3-59	71	16	1,140		Pumped 5 min before sampling.
28.333	Qa	2-11-44		42	1,360		
28.431	Qa	2- 9-39		95	2,630		
		7- 7-55	68	49	2,790	393	
		8-12-58	67	61	2,870		Pumping when collector arrived.
		9- 9-58	64	155	3,430		Pumped 3 min before sampling.
		1-20-59	66	95	3,110		Do.
		3- 3-59	66	68	2,960		Do.
31.431	Qa	4-30-57	65	52	1,290	231	
33.211	Psa and Pgr.	6- 7-57		17	1,190	1,168	
		8-12-58	75	16	1,200		Pumping when collector arrived.
35.113a	Psa and Pgr.	4-30-57	64	48	2,130	1,238(?)	
		8-12-58	66	45	2,120		Do.
		9- 9-58	66	42	2,160		Do.
		1-20-59	64	43	2,140		Pumped 2 min before sampling.
		3- 3-59	64	44	2,150		Pumping when collector arrived.
17.25.12.120	Qa	4-25-55	67	33	1,280		
14.141	Qa	7-23-40		18	946		
22.220	Qa	5-24-49		32	869		
24.344	Qa	2- 9-39		29	972	121	
17.26.4.121	Qa	7-22-40		133	2,540	23	
7.131	Qa	4-30-57	64	36	1,250	150	
		8-12-58	66	40	1,270		Do.
		3- 3-59	66	42	1,280		Do.
		9- 9-59	66	39	1,290		Do.
7.333	Qa	2- 9-39		53	1,220		
8.413	Psa and Pgr.	8-12-58		14	1,050	1,158	"5th Street well." Pumping when collector arrived.
		9-17-58		15	1,,050		Pumped 4 min before sampling.
		1-21-59		16	1,110		Pumped 2 min before sampling.
8.442	Psa and Pgr.	5-10-51		8	1,090		
		6- 6-55	73	17	1,070		

TABLE 2.—*Temperature, chloride content, and specific conductance of ground and surface waters from part of the Roswell basin, Chaves and Eddy Counties, N. Mex.*—Continued

Location No.	Water-bearing formation	Date collected	Temperature (°F)	Chloride (Cl)	Specific conductance (micromhos at 25°C)	Depth of well (feet)	Remarks
10.333	Psa and Pgr.	8-12-58	77	312	2,700	1,150	Drilled to 1,262 ft and plugged back. Pumping when collector arrived.
		9- 9-58	75	310	2,740	----------	Pumping when collector arrived.
		1-21-59	74	350	2,980	----------	Pumped 5 min before sampling.
		3- 3-59	75	325	2,790	----------	Pumping when collector arrived.
10.333a	Qa	7-22-40	--------	135	2,980	----------	
		8-12-58	67	52	1,620	278	Pumping when collector arrived.
		9- 9-58	66	52	1,640	----------	Do.
		1-21-59	64	61	1,770	----------	Pumped 3 min before sampling.
		3- 3-59	64	84	2,070	----------	Do.
10.433	Psa and Pgr.	5-21-28	73	17	--------	1,007	
		3-14-40	73	17	1,250	----------	
		4- 5-55	73	24	1,290	----------	
10.433a	Qa	9- 7-55	66	142	2,020	210	
11.333	Psa and Pgr.	7-22-40	--------	1,060	5,510	1,133	
11.433	Psa and Pgr.	8-12-58	74	43	1,310	1,040	Pumping when collector arrived.
		9- 9-58	71	43	1,130	----------	Pumped 3 min before sampling.
		1-21-59	68	80	1,420	----------	Flowing when collector arrived.
		3- 3-59	70	46	1,200	----------	Pumped 12 min before sampling.
13.310	Qa	6-25-54	--------	17	1,070	100	
14.133	Psa and Pgr.	7-22-40	--------	15	1,120	961	
		8-12-58	73	21	1,180	955	Pumping when collector arrived.
		9-16-58	72	38	1,270	----------	Pumped 2 min before sampling.
		1-21-59	70	19	1,150	----------	Flowing when collector arrived.
		3- 3-59	72	20	1,180	----------	Pumping when collector arrived.
14.210	Qa	7- -51	--------	815	4,330	----------	
		11- -54	--------	20	1,140	245	
15.233	Psa and Pgr.	7-22-40	--------	1,860	8,200	1,253	
15.313	Qa	2- 6-39	--------	13	969	----------	
15.411	Qa	7-22-40	--------	80	2,040	----------	
21.311	Psa and Pgr.	7-23-40	--------	14	981	821	
22.233	Qa	2- 6-39	--------	47	1,940	----------	
22.240	Qa	11- -54	--------	70	2,510	103	
23.130	Qa	11- -54	--------	84	2,820	115	
23.200	Qa	6-26-54	--------	124	1,710	----------	
17.26.23.311	Psa and Pgr.	8-12-58	72	18	1,120	893	Pumping when collector arrived.
		9- 9-58	71	20	1,140	----------	Do.
		1-21-59	70	18	1,110	----------	Flowing when collector arrived.
		3- 3-59	70	18	1,150	----------	Pumping when collector arrived.
26.331	Psa and Pgr.	9-16-58	72	19	1,300	958	Do.
		1-21-59	--------	19	1,270	----------	Pressure system pumping when collector arrived.
		3- 3-59	--------	19	1,290	----------	Do.
29.113	Qa	7-23-40	--------	30	1,140	145+	
32.131	Psa and Pgr.	8-12-58	70	17	1,080	861(?)	Pumping when collector arrived.
		9- 9-58	72	15	1,070	----------	Do.
		1-21-59	--------	15	1,050	----------	Pressure system pumping when collector arrived.

TABLE 2.—*Temperature, chloride content, and specific conductance of ground and surface waters from part of the Roswell basin, Chaves and Eddy Counties, N. Mex.*—Continued

Location No.	Water-bearing formation	Date collected	Temperature (°F)	Chloride (Cl)	Specific conductance (micromhos at 25°C)	Depth of well (feet)	Remarks
33.111	Psa and Pgr.	1-20-44	--------	16	1,150	----------	
33.343	Psa and Pgr.	8-11-58	61	18	1,130	766	Pumping when collector arrived.
		9- 9-58	72	18	1,150	----------	Pumping when collector arrived.
		3- 3-59	69	31	1,140	----------	Do.
17.27.7.230	Qa----------	11-[illegible]-54	--------	3,430	13,300	275	
18.100	Qa----------	10-25-39	--------	32,910	12,000	50	Test hole.
18.26.2.111	Psa and Pgr.	8- 2-58	73	20	1,330	955	Pumping when collector arrived.
		9- 9-58	72	18	1,370	----------	Do.
		1-21-59	72	17	1,310	----------	Flowing when collector arrived.
8.233	Psa and Pgr.	8-12-58	70	23	1,510	822	Pumping when collector arrived.
		9- 9-58	68	18	1,490	----------	Do.
		1-21-59	70	15	1,240	----------	Pumped 1 min before sampling.
		3- 3-59	70	18	1,330	----------	Pumping when collector arrived.
10.331	Psa and Pgr.	8-12-58	72	28	1,820	716	Do.
		9- 9-58	72	23	1,840	----------	Do.
14.443	Qa----------	8-12-58	65	466	4,180	170	Do.
		9- 9-58	64	620	4,660	----------	Pumped 2 min before sampling.
		3- 3-59	64	700	5,160	----------	Pumped 1 min before sampling.
15.421	Psa and Pgr.	9-16-58	72	53	1,740	760	Pumped 1 min before sampling. Odor of crude oil.
		1-21-59	70	24	1,590	----------	Do.
18.212	Qa----------	---do----	65	24	1,490	228	Pumped 1 min before sampling.
		3- 3-59	66	29	1,090	----------	Pumping when collector arrived.
34.313	Psa and Pgr.	8-12-58	73	16	1,380	871	Do.
		9- 9-58	71	14	1,390	----------	Pumped 4 min before sampling. Odor of crude oil.
		1-21-59	70	13	1,310	----------	Pumped 2 min before sampling. Odor of crude oil.
		3- 3-59	72	15	1,260	----------	Pumping when collector arrived. Odor of crude oil.

[1] Observation well.