Ground-Water Resources of the Ainsworth Unit Cherry and Brown Counties, Nebraska

By JAMES G. CRONIN *and* THOMAS G. NEWPORT

With a section on

CHEMICAL QUALITY OF GROUND WATER

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By James G. Cronin and Thomas G. Newport

ABSTRACT

The Ainsworth unit, so named by the U. S. Bureau of Reclamation, is in north-central Nebraska and is in the drainage basin of the Niobrara River. It is an area of about 1,000 square miles in the east-central part of Cherry County and northern part of Brown County. The east-west length of the area is about 60 miles and the width ranges from 9 to 21 miles. About 80 percent of the area consists of grass-covered sandhills; the remainder is the Ainsworth tableland, which is flat to gently rolling farmland between Plum and Long Pine Creeks in the eastern part of the area. The average annual precipitation is about 23 inches. Although most of the crops are raised by dry-farming methods, some farmland is irrigated with water pumped from wells. The U. S. Bureau of Reclamation has proposed to irrigate much of the Ainsworth tableland with surface water to be stored in a reservoir on the Snake River at the west border of the Ainsworth unit.

The rocks exposed in the Ainsworth unit range in age from Tertiary (Pliocene) to Quaternary (Recent). The Ogallala formation of Pliocene age is exposed along the lower part of the Snake River valley and underlies the entire Ainsworth unit. It is composed of silt, sand, and gravel, and contains layers of sandstone and conglomerate, much of which is crossbedded and cemented with lime; coarser sediments generally are more prominent in the lower part. Overlying the Ogallala formation are deposits of Pleistocene age consisting in part of layers of saturated sand and gravel which are the most important sources of ground water in the Ainsworth unit. Throughout most of the area the ground water is under water-table conditions, but locally it is confined by lenses of clay or silty clay. Some wells tap only the sand and gravel of Pleistocene age, some tap both the deposits of Pleistocene age and the underlying Ogallala formation, and some tap only the Ogallala formation; no wells are known to extend into rocks older than the Ogallala. Dune sand mantles the deposits of Pleistocene age in about 80 percent of the Ainsworth unit and a thin deposit of loess covers the surface elsewhere. Terrace deposits border the flood plain of the principal streams, and alluvium underlies the flood plain of most of the stream valleys in the area.

Precipitation and underflow from the southwest are the principal sources of the ground water in the Ainsworth unit. As most of the precipitation in the sandhills evaporates, is utilized by growing plants, or penetrates to the zone of saturation, the overland runoff from this part of the area is small. In the vicinity of Ainsworth a minor amount of recharge probably is derived from the return of irrigation water pumped from wells. Where the water table is near the surface in the valleys of the sandhills, ground water is discharged directly from the zone of saturation to the atmosphere by evapotranspiration; and, as the surface of the lakes in the sandhills area is an extension of the water table, evaporation from the lake surface also constitutes ground-water discharge. In addition,

ground water is discharged by the streams that are incised below the water table and by subsurface outflow. The yield of wells accounts for only a small part of the discharge of ground water from the area.

In the Ainsworth unit the water table slopes northeastward from the region of favorable recharge, the sandhills, toward the Niobrara River and its principal tributaries. The average gradient of the water table is about 10 feet per mile. In the sandhills the water table is at or near the surface in the valleys and as much as 100 feet, or a little more, beneath the higher sandhills. In the vicinity of Ainsworth the water level in wells ranges from less than 1 foot to about 40 feet below the land surface, but nearer the Niobrara River and close to its deeply entrenched tributaries the depth to the water table is as much as, or a little more than, 200 feet.

The coefficient of transmissibility of the ground-water reservoir in the vicinity of Ainsworth was determined by the pumping-test method to be about 47,500 gpd per foot at one site and about 77,000 gpd per foot at a second site. The coefficient of storage at the first test site was calculated to be 0.0006, which clearly indicates at least local artesian conditions, and at the second to be 0.008, which indicates a transition between artesian and water-table conditions. The amount of ground water flowing through a cross section of the aquifer along the 2,500-foot contour line on the water table between Sand Draw and Willow Creeks was computed to be about 7,000,000 gpd or 11,400,000 gpd, depending on which of the two coefficients of transmissibility was used in the computation.

All water for public supply and domestic use and much of the water for stock use is obtained from wells. Ainsworth and Wood Lake are the only towns in the area having public water systems; the other communities depend on privately owned wells. An estimated 2,000 acres of land in the vicinity of Ainsworth is irrigated with water from 33 wells, the yields of which range from 350 to 1,240 gpm. It is estimated that an average of not less than 8,000 acre-feet per year could be pumped safely from wells in the southwestern part of the Ainsworth tableland.

Water from wells and streams in the Ainsworth unit is, in general, low in dissolved solids but somewhat high in silica. It is of the calcium carbonate type and is suitable for domestic and irrigation uses. The water in the lakes varies in both dissolved mineral content and percentage composition as the result of concentration of the salt by evapotranspiration. A canal carrying Snake River water across the sandhills area in Cherry County would cause no water-quality problems as a result of mixing of Snake River water with any other water in the Ainsworth unit. However, if the canal is not lined and no provision made for drainage, canal leakage could raise the water table and thereby cause waterlogging and consequent salinization of the soil in some areas.

The logs of several test holes and wells in the area, water-level measurements, and records of all wells that were inventoried are included in this report.

INTRODUCTION

PURPOSE AND SCOPE OF THE INVESTIGATION

The principal objectives of the investigation on which this report is based were to determine the potential annual yield of ground water from the aquifer underlying the Ainsworth tableland, the quality of the ground water throughout the Ainsworth unit, and the effect of the proposed canal on the position of the water table and quality of the water in the sandhills part of the area.

According to proposed plans of the United States Bureau of Reclamation, a canal is to be constructed to convey water eastward from the proposed Merritt Reservoir on the Snake River, which borders the Ainsworth unit on the west, to irrigate 33,960 acres of the Ainsworth tableland north of U. S. Highway 20.

The investigation was one of several made by the United States Geological Survey as a part of the program of the Interior Department for the development and conservation of the natural resources of the Missouri River basin. (See fig. 1.)

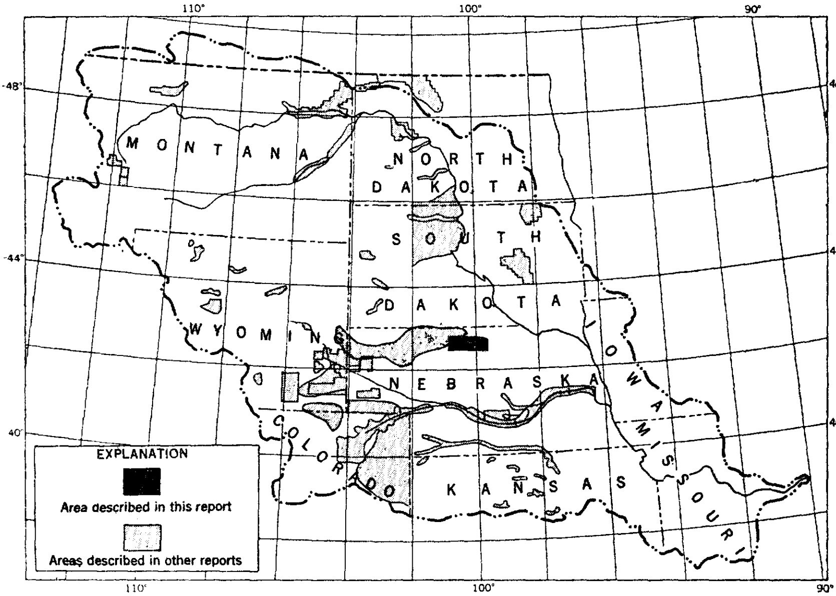

FIGURE 1.—Map showing areas in which ground-water studies have been made under the program for the development of the Missouri River basin.

PREVIOUS INVESTIGATIONS

Prior to this investigation, the geology and ground-water resources of the Ainsworth unit had not been studied in detail. Several earlier reports, however, describe the geologic and hydrologic features of larger areas that include all or part of the Ainsworth unit. Some of these earlier studies are referred to in this report and are listed in the bibliography.

A comprehensive study of the Pleistocene deposits of Nebraska was made by Lugn (1935) during the period 1929–33, before much subsurface information by test drilling was available. Condra and Reed (1936) prepared a report on water-bearing formations in Nebraska, and later a report (1943) in which they reviewed the age relations and lithologic character of all sedimentary formations in the State. In 1950 Condra, Reed, and Gordon described the Pleistocene deposits of Nebraska in considerable detail. Their report is based in large part on logs of test holes drilled by the Conservation and Survey Division of the University of Nebraska as a part of a study in cooperation with the U. S. Geological Survey.

PRESENT INVESTIGATION

The field work for this report was begun in September 1949 and continued through December 1952. Information about the construction and yield of wells, the depth to water, and use currently being made of ground water was obtained by interviewing well owners and by examining all the wells pumped for irrigation or public supply, some of the wells pumped for domestic purposes or the watering of stock, and a few unused wells.

Measurements of the water level in 264 wells were made periodically. Although a few privately owned wells were used for observation of water-level fluctuations, most of the wells used for this purpose were constructed in connection with the investigation. The wells were installed by various methods—jetting, driving, drilling, and boring.

In the jetting method, the open end of a length of ¾-inch pipe, connected by hose to a centrifugal pump that discharged water under pressure, was forced into the ground. The water discharged from the pipe carried the jetted material to the surface through the annular space around the outside of the pipe, and when the jetting pipe had penetrated to the desired depth it was retraced from the hole. Then a length of ¾-inch pipe attached to a commercial suction-type strainer was inserted in the hole. After the space around the pipe had been filled in, the completed well was pumped by use of a pitcher pump until clear water was discharged. About 20 of the jetted wells were cased with an open-end pipe and these wells were flushed by pouring clear water into them.

The driven wells were constructed by a combination of the boring and driving methods. First, a hole to the water table was excavated by use of a posthole auger; then a 1¼-inch pipe, attached to a screened well point 24 inches long, was placed in the hole and a sledge hammer was used to drive the well point several feet into the zone of saturation. These wells also were pumped until the water discharged was clear.

Test holes drilled by a hydraulic-rotary drilling machine were cased for use as observation wells by installing ¾-inch closed-end pipe that was slotted to admit ground water. The hole was cleared of mud, by forcing clear water into the pipe, and then backfilled with gravel.

The U. S. Bureau of Reclamation also installed some observation wells by boring to a depth of about 6 feet and installing downspout pipe having a diameter of 3 inches.

In order to correlate fluctuations of lake levels with fluctuations of the water level in nearby observation wells, staff gages were installed on three lakes and were read periodically.

The altitude of the water level in most of the wells was determined by instrumental leveling from benchmarks that had been established by the U. S. Geological Survey and other Federal agencies. A map (pl. 1) showing the configuration of the water table was prepared from these data.

The depth to water in about three-fourths of the Ainsworth unit is shown by areal patterns on this same map. The shape and extent of the areas of different depths to water were determined by superimposing the lines showing the contour of the water table on the topographic maps of the land surface and plotting the difference in the altitude of the two surfaces.

The subsurface geology of the eastern part of the area was determined by test drilling by the U. S. Bureau of Reclamation and the Conservation and Survey Division of the University of Nebraska. Eleven test holes were drilled to depths ranging from 250 to 690 feet. Geologic sections based on this test drilling are included in this report. The logs of six wells drilled by commercial drillers also are included.

The hydraulic properties of water-bearing materials in the vicinity of Ainsworth were determined by making two tests of the aquifer. The permeability and storage coefficients of the water-bearing materials were calculated from the data collected during the tests.

Chemical analyses were made of 84 samples of water collected from 19 wells and 16 lakes and streams in the Ainsworth unit. The analyses were made by the U. S. Geological Survey.

WELL-NUMBERING SYSTEM

Wells were assigned numbers in accordance with a system based on the U. S. Bureau of Land Management survey of the area (see fig. 2). The first numeral of a well number indicates the township, the second the range, and the third the section in which the well is located. The lowercased letters following the section number indicate the location of the well within the section. The first letter denotes the quarter section; the second denotes the quarter-quarter section, or 40-acre tract. The letters are assigned in a counterclockwise direction beginning in the northeast quarter of the section or quarter-quarter section. The numbers of two or more wells in a 40-acre tract are distinguished by consecutive numbers following the lowercased letters.

PERSONNEL AND ACKNOWLEDGMENTS

The investigation was under the general supervision of A. N. Sayre, chief of the Ground Water Branch of the U. S. Geological Survey, and of G. H. Taylor, regional engineer in charge of ground-water

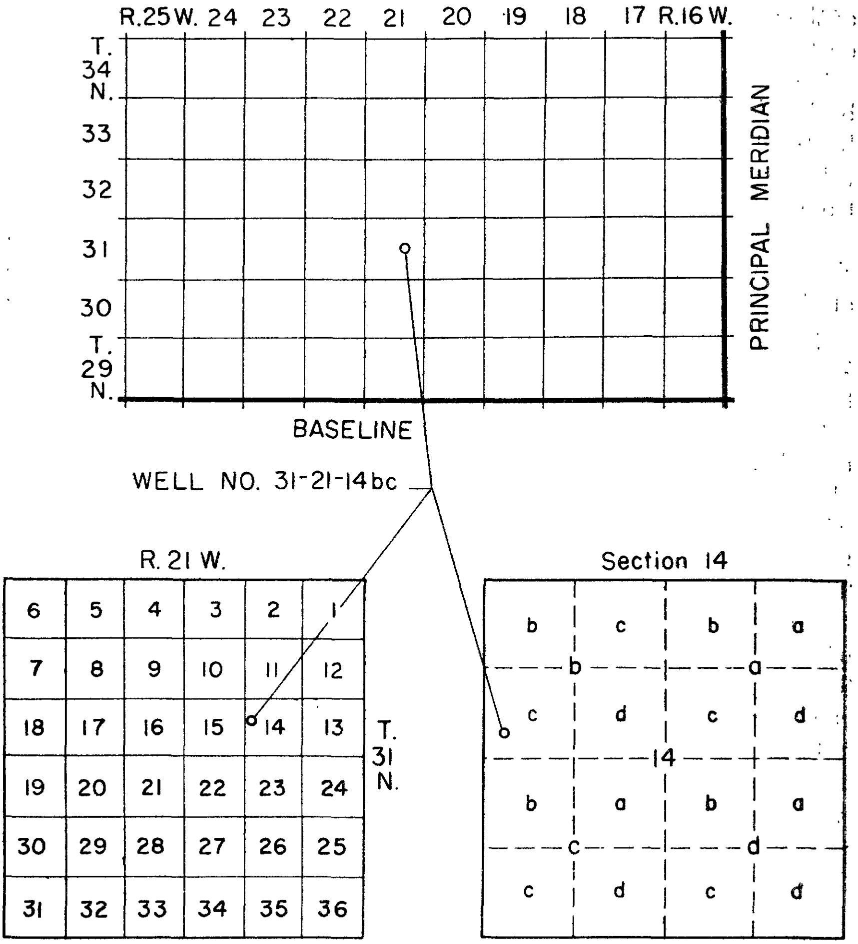

FIGURE 2.—Well-numbering system.

investigations in the Missouri River basin. H. A. Waite directly supervised the field work and the preparation of this report. H. S. Unger, R. S. Brown, and J. T. Forsythe installed about a hundred ¾-inch observation wells during August 1950. F. E. Busch, assisted by L. Reed and H. Pokorney, determined the altitude of 316 wells by instrumental leveling. D. A. Trumm assisted in the field studies from April 24 to October 20, 1950. H. A. Waite, C. F. Keech, A. I. Johnson, and R. T. Sniegocki helped make the pumping tests.

Studies of the chemical quality of the ground water were under the general direction of S. K. Love, chief of the Quality of Water Branch, and P. C. Benedict, regional engineer in charge of quality-of-water investigations in the Missouri River basin.

C. E. Burdick, area engineer, and other personnel of the Niobrara River area office of the U. S. Bureau of Reclamation at Ainsworth determined the altitude of 87 wells, helped install about 50 wells, made depth-to-water measurements, furnished information from test drilling at proposed dam sites, and aided in various other phases of the investigation. Personnel of the U. S. Fish and Wildlife Service at the Valentine National Wildlife Refuge provided storage space for materials and equipment and supplied information concerning the Valentine National Wildlife Refuge.

G. E. Condra, State geologist and director of the Conservation and Survey Division of the University of Nebraska, and E. C. Reed, associate State geologist, reviewed the manuscript and gave many helpful suggestions, especially relating to the geology of the area.

Local residents furnished information about their wells, permitted measurement of the depth to water, and allowed the construction of observation wells and the drilling of test holes on their land. Ranchers in the sandhills supplied much general information concerning that part of the area. M. F. Skinner, who is a field associate in the Frick Laboratory of the American Museum of Natural History and who owns land in the vicinity of Ainsworth, furnished considerable information on the geology of the area.

GEOGRAPHY

LOCATION AND EXTENT OF THE AREA

The Ainsworth unit is an area of about 1,000 square miles in the east-central part of Cherry County and the northern part of Brown County, in north-central Nebraska (see fig. 3). It is approximately 60 miles long and is about 21 miles wide in the western part, about 9 miles wide in the east-central part, and about 18 miles wide in the eastern part. It lies within Tps. 29–32 N. and Rs. 20–30 W., and the distance north to the Niobrara River ranges from less than 1 to about 18 miles.

The Valentine National Wildlife Refuge, an area of about 100 square miles, is in the southwestern part of the unit. (See pl. 1.)

TOPOGRAPHY AND DRAINAGE

The Ainsworth unit lies within the Great Plains physiographic province. It consists of two distinct parts—the sandhills area, which is the major part, and the Ainsworth tableland, which consists of flat to gently rolling farmland in the vicinity of Ainsworth, in the eastern part of the unit.

The sandhills area is a part of the large sandhills region of western Nebraska, which was described by Condra (1918) as follows:

> The surface of the sandhills country is comparatively rough. It is modified by many hills, basins, valleys, and lakes. The valleys are one-quarter to one

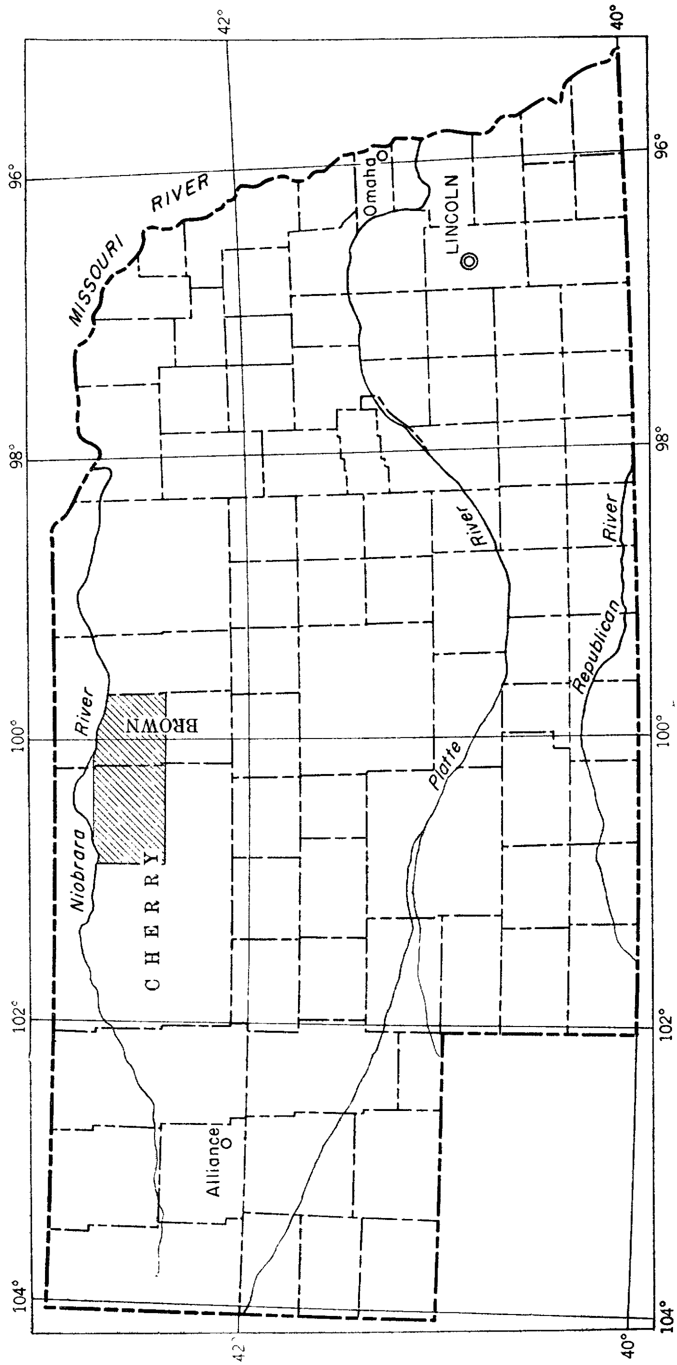

FIGURE 3.—Map of Nebraska showing area described by this report.

mile or more wide. Their courses are very irregular. In places, the grouping of the hills is such as to form ridges. Some hills are low and small; others rise 100 feet or more above the valleys. About two-thirds of the region is occupied by hills and one-third by basins, valleys, and lakes. Though there is an east-west grouping of hills, valleys, and lakes in much of the region, this pattern does not prevail. In places, the direction is northwest-southeast and in others southwest-northeast. In many parts of the region, there is no system in the arrangement of surface features.

The general trend of the sandhills in the Ainsworth unit is northwestward; this is especially true in the vicinity of the Valentine National Wildlife Refuge. In some places, however, the trend is westward or southwestward.

The Ainsworth tableland is a relatively uneroded remnant of an old constructional plain in north-central and northeastern Brown County. It is an area of about 230 square miles and is bordered on the northwest by Plum Creek, on the east by Long Pine Creek, on the north by the valley of the Niobrara River, and on the south by sandhills. The surface of the Ainsworth tableland is flat to gently rolling except where small hills of windblown sand have been formed and where tributaries to Long Pine and Plum Creeks have cut valleys.

The land surface in the report area is between 2,020 and 3,100 feet above sea level. The summits of the sandhills range in altitude from about 2,700 feet south of Ainsworth to about 3,100 feet in the southwestern part of the unit. The water surface of the lakes in and near the Valentine National Wildlife Refuge range from about 2,970 feet above sea level at Beaver Lake to about 2,864 feet at Little Alkali Lake. The altitude of Ainsworth is 2,523 feet; of Long Pine, 2,400 feet; of the town of Wood Lake, 2,690 feet; and of Johnstown, 2,590 feet. The altitude of the Niobrara River at Meadville, 18 miles north of Ainsworth, is 2,020 feet.

The Ainsworth unit lies within the Niobrara River basin and is drained by both overland runoff and subsurface outflow to the Niobrara River and its tributaries. The principal streams draining the unit are the Snake River and Gordon, Schlagel, Plum, Bone, and Long Pine Creeks. The flow of these streams is relatively constant because most of it represents discharge from the ground-water reservoir.

The Snake River rises in a small lake south of Gordon in Sheridan County and flows eastward to the western boundary of the unit near the site of the proposed Merritt Dam and reservoir; thence it flows almost due north, dropping about 18 feet over the Snake River Falls, and continues through a valley that is progressively deeper and more rugged toward the confluence of the Snake with the Niobrara River. The average discharge of the Snake River is about 234 cubic feet per second (cfs).

Gordon and Schlagel Creeks originate in lakes or wet meadows of the sandhills. In their upper reaches the streams are intermittent and flow in shallow channels. Where the streams approach their confluence with the Niobrara River, the valleys are deeper and the streamflow is greater and perennial.

Plum Creek rises in Red Deer Lake, flows through a wide, apparently mature valley to a point about 4 miles west of Johnstown, and thence northeastward through a deeply entrenched valley along the northwest side of the Ainsworth tableland to the Niobrara River. Long Pine Creek heads south of Ainsworth in the wet meadows bordering the northern flank of the sandhills. In its upper reach it flows in a small channel through a rather broad valley and in its lower reach through a steep-banked, deeply incised valley. Most of the runoff from the Ainsworth tableland is carried by Long Pine Creek, the lower reach of which is the eastern boundary of the Ainsworth tableland. Monthly discharge records for Plum and Long Pine Creeks are presented in the following table.

Monthly runoff, in acre-feet, of Plum Creek near Meadville, Nebr., and Long Pine Creek near Riverview, Nebr.

[From records of the U. S. Geological Survey]

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
Plum Creek												
1947–48	-------	-------	[1] 1,750	5,050	4,990	5,080	5,440	5,150	5,460	4,910	5,050	4,570
1948–49	4,990	4,750	4,830	4,660	4,920	7,810	9,790	6,370	8,690	4,810	4,830	4,600
1949–50	4,850	4,790	5,000	4,510	4,440	6,180	7,680	10,650	6,460	5,070	5,200	5,450
Long Pine Creek												
1947–48	-------	-------	-------	-------	-------	-------	[2] 4,650	6,330	6,270	6,190	5,710	5,240
1948–49	6,160	6,030	6,690	6,440	6,500	8,040	8,590	7,130	7,090	6,090	5,800	5,700
1949–50	6,690	5,980	6,360	6,430	6,570	9,170	6,810	7,570	6,970	6,490	8,010	7,720

[1] Dec. 21 to 31.
[2] Apr. 11 to 30.

Some of the lakes in and adjacent to the Valentine National Wildlife Refuge are connected by canals. Prior to its failure in 1953, a small dam diverted water from Gordon Creek to Hackberry Lake and to other lakes in the wildlife refuge in order to maintain lake levels high enough for fish and other animals. Dams have been constructed at the outlet of some lakes to raise lake levels.

CLIMATE

The following summary is based in large part on the U. S. Department of Agriculture Yearbook of Agriculture (1941, p. 967–978).

The climate of the Ainsworth unit is typical of the interior of a large continent in middle latitudes. It is characterized by rather light precipitation, low humidity, hot summers, severe winters, great variations in temperature and precipitation from year to year, and frequent changes in weather from day to day or week to week. Climatological data have been recorded continuously in the area since 1898.

The average annual temperature is about 49° F. The average temperature during the coldest month (January) is about 21° F, and the minimum recorded temperature is −33° F; the average temperature during the warmest month (July) is about 75° F, and the maximum recorded temperature is 112° F. The average growing season is about 148 days, and the length of the growing season has ranged from 83 to 196 days.

The average annual precipitation is about 23 inches. The maximum recorded annual precipitation was 45.48 inches (1915) and the minimum was 11.79 inches (1940). (See fig. 4.) Normally about 75 percent of the precipitation falls during the growing season. A large part of the summer rainfall results from thunderstorms; although torrential rains are rare, rain frequently falls heavily for a short period. During some growing seasons the storms are numerous and widespread, but in other growing seasons they are infrequent and scattered. In dry years, periods of 15 to 20 days without appreciable rain may occur during June, July, and August; under such conditions hot dry winds often cause serious and extensive damage to crops.

The total annual precipitation at Ainsworth was 36.93 inches in 1951; this was the second wettest year during the period of record.

The amount of evaporation, as recorded by the U. S. Weather Bureau at the Valentine National Wildlife Refuge during the growing seasons of 1949 through 1952, is shown in the following table.

Record of evaporation at Valentine National Wildlife Refuge

[From records of the U. S. Weather Bureau]

Year	Evaporation, in inches					
	May	June	July	Aug.	Sept.	Oct.
1949	7.19	7.62	10.63	9.49	8.14	6.16
1950	[1] 7.34	8.88	7.64	6.47	5.44	4.11
1951	[1] 6.10				[1] 4.90	[1] 4.12
1952	[1] 5.96	[1] 8.44	[1] 10.84	[1] 8.31	[1] 6.89	[1] 5.03

[1] Adjusted to full month.

The direction of the wind changes frequently at all seasons of the year, but the prevailing direction is from the northwest from about October to April, and from the south or southeast during the remainder of the year. Strong winds are common, but tornadoes are rare. The average wind velocity is about 10 miles per hour.

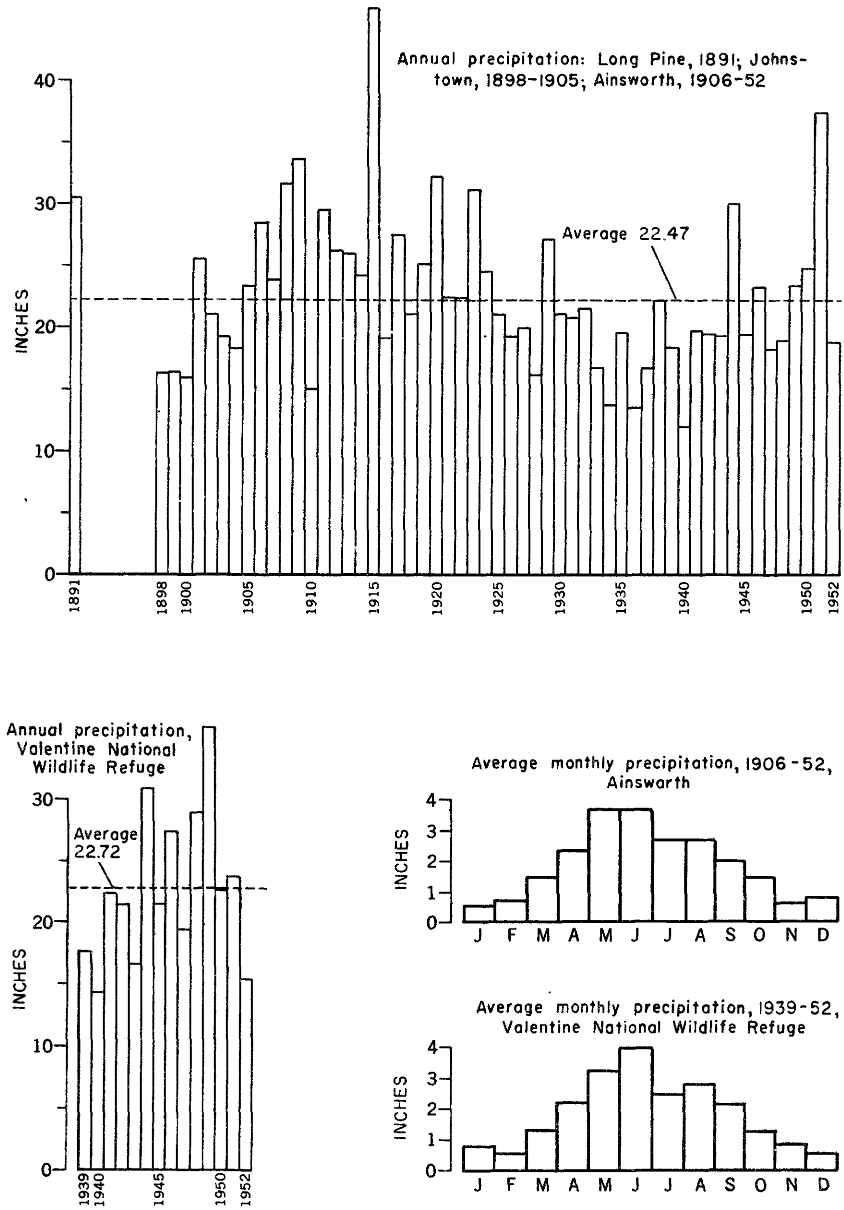

FIGURE 4.—Annual and average monthly precipitation in the Ainsworth unit.

CULTURE

Ainsworth, the county seat of Brown County, is the largest town in the report area. In 1950 the population of Ainsworth was 2,150; that of Johnstown, about 10 miles west of Ainsworth, 109; and that of Wood Lake in Cherry County, 21 miles west of Ainsworth, 238. The towns are situated along the Chicago & Northwestern Railway and U. S. Highway 20, which closely parallel each other. U. S. Highway 83 traverses the western part of the area in a north-south direction and passes through Valentine, which is a few miles north of the report area. State Highway 7 crosses the area in a north-south direction and passes through Ainsworth.

The Ainsworth tableland is the only part of the area where cultivated crops are grown. Generally, dry-farming methods are used, but in the vicinity of Ainsworth about 2,000 acres is irrigated with water from wells. According to the plans of the U. S. Bureau of Reclamation, it is proposed to irrigate 33,960 acres of presently non-irrigated land on the Ainsworth tableland north of U. S. Highway 20 with water diverted from the Snake River.

The sandhills area, where grass is the dominant vegetation, is utilized almost exclusively for the production of beef cattle. The grass provides good grazing, and wild hay is cut and stacked for winter feeding. Ample supplies of water for stock and domestic use are available from wells. The sandhills area is sparsely settled; some of the ranches are 10,000 acres in extent.

No large manufacturing plants are located in the area. Butter, ice cream, and livestock feeds are manufactured for local distribution.

Electric power is available in all the towns; wind-chargers and small home lighting plants are used on some farms and ranches to provide electric power. The KBR Electric Membership Association under agreement with the Rural Electrification Administration is constructing about 900 miles of electric power lines within and in the vicinity of the Ainsworth unit. These lines will supply electric power to many farms and ranches in Brown, Cherry, and adjoining counties.

SUMMARY OF STRATIGRAPHY

The rocks exposed in the Ainsworth unit range in age from Tertiary (Pliocene) to Quaternary (Recent). The oldest strata cropping out in the area are in the Ogallala formation, which is best exposed along the lower part of the Snake River valley where certain resistant strata in the formation form the "cap rock." The Ogallala formation is exposed also along the lower part of the Plum Creek valley and in the valley of the Niobrara River north of the Ainsworth unit. The Ogallala formation unconformably overlies the Brule (?) clay of Tertiary (Oligocene) age, and in most of the area it is overlain by deposits of sand and gravel of Pleistocene age. The Ainsworth tableland and is mantled by a thin deposit of loess ranging in age from Pleistocene to Recent. Dune sand of Pleistocene to Recent age covers about 80 percent of the Ainsworth unit and constitutes part of the main sandhills region of Nebraska. Narrow belts of alluvium have been deposited in the valleys of most of the principal streams, including the Snake River and Gordon, Schlagel, Plum, Bone, and Long Pine Creeks. Terrace deposits border the principal streams and lie 10 to 50 feet above them. The terrace deposits, alluvium, and soil are of Recent age.

The characteristics and ground-water supply of the geologic formations in the Ainsworth unit are described briefly in the following table and in more detail in the following section on geologic formations and their water-bearing properties.

GEOLOGIC FORMATIONS AND THEIR WATER-BEARING PROPERTIES

CRETACEOUS SYSTEM

UPPER CRETACEOUS SERIES

PIERRE SHALE

The Pierre shale is dark-brown to black fissile clayey shale containing concretions, some thin layers of limestone, moderately hard fine-grained sandstone, and bentonitic clay. Crystals of gypsum and pyrite are present in many of the layers. The Pierre shale dips gently to the west and increases in thickness in that direction. The upper part of the Pierre shale in this area was removed by erosion prior to the deposition of the overlying formations. The depth to the eroded surface of the Pierre shale is estimated to be at least 450 feet.

The U. S. Bureau of Reclamation reported that a test hole drilled in the northeast corner of sec. 26, T. 31 N., R. 31 W., to a depth of 783 feet did not reach the Pierre shale. The Pierre shale is relatively impermeable and is not a source of water supply within the area.

TERTIARY SYSTEM

OLIGOCENE SERIES

BRULE(?) CLAY

Overlying the Pierre shale is a light-colored massive, firmly to lightly cemented, very fine sandy silt that is calcareous in part and that contains varying amounts of clay, small amounts of volcanic ash, and thin well-cemented layers of very fine sand.

The term "Brule clay" has been previously applied to these beds and they are locally known as such. However, because this area is so far separated from known occurrences of the Brule clay and because no diagnostic fossils have been found, these beds cannot be definitely identified.

The U. S. Bureau of Reclamation reports that two separate zones of artesian water were penetrated in drilling a test hole at the proposed

Generalized section of the geologic formations in the Ainsworth unit

System	Series	Group	Formation	Thickness (feet)	Character	Water supply
Quaternary.	Pleistocene and Recent.		Alluvium and terrace deposits.	0–15	Very fine to medium-grained sand and some silt; underlies flood plains of principal stream valleys.	Relatively unimportant as a water-bearing formation in this area.
			Dune sand.	0–200	Windblown light-yellowish-brown very fine to fine sand; grass covered except where blowouts occur.	Yields large supplies to stock wells tapping adequate thickness of saturated sand.
	Pleistocene.		Peorian loess.	0–6	Light-buff silt containing some fine sand and some clay.	As the loess deposits are generally above the water table, they are important primarily as a transmitting agent of recharge to the zone of saturation.
			—Unconformity—			
			Grand Island formation.	0–100	Crossbedded sand and gravel derived mostly from granitic crystalline rocks.	Yields moderately large to large supplies of water to wells tapping an adequate thickness of saturated material.
			—Unconformity—			
			Fullerton formation.	0–25	Grayish-yellow clay and silt.	Not a source of water supply.
			Holdrege formation.	0–50	Sand and gravel containing principally reworked Tertiary material and some quartz and granitic crystalline material.	Yields large supplies of water.
			—Unconformity—			
Tertiary.	Pliocene.		Ogallala formation.	60–140	Buff to yellowish and light-gray to dark-gray fine to medium sand and silt containing volcanic ash; calcareous in places. Contains fossil seeds and zone containing fragments of vertebrate fossils. (This is the "Ash Hollow formation" as used by the Nebraska Geological Survey.)	Yields small to moderately large supplies of water to wells tapping an adequate thickness of saturated sand.
				0–44	Crossbedded gray fine to coarse sand containing greenish clay balls in some places. (This is the Burge sands member of the Valentine formation as used by the Nebraska Geological Survey.)	Not known to be a source of water supply.
					—Unconformity—	
				125–400	Light-gray to buff friable sand. In the western part of the area the basal member is sandstone completely cemented with silica. Vertebrate fossils are common in several localities. (This is the Valentine formation as used by the Nebraska Geological Survey.)	Yields small to moderately large supplies of water to wells tapping an adequate thickness of saturated sand.
			—Unconformity—			
	Oligocene.	White River.	Brule(?) clay.	0–350	Massive, compact, firmly to lightly cemented, pinkish clay and silt containing varying amounts of clay and small amounts of volcanic ash.	Not an important source of water supply. No wells are known to be drilled into the Brule(?) clay in this area.
			—Unconformity—			
Cretaceous.		Montana.	Pierre shale.	(?)	Brownish-gray to black clayey shale containing thin layers of limestone having cone-in-cone structure and, near the top of the formation, thin layers of sandstone. Gypsum and pyrite crystals occur in some localities.	Not a source of water supply. No wells in area are known to be drilled into the Pierre shale.

dam site on the Niobrara River near Sparks, Nebr., about 15 miles north of the report area. The upper zone, between 73 and 202 feet below the land surface, is believed to be within the Brule(?) clay; the lower, between 255 and 261 feet below the land surface, is believed to be at the base of the Brule(?) clay. Near the site of the test hole is an exposed section of the Brule(?) clay, the top of which is about 87 feet above the land surface at the test-hole site. Thus, the Brule(?) clay apparently is about 350 feet thick at this location.

The Brule(?) clay probably underlies the entire Ainsworth unit It is not exposed within the area, but it crops out north of the Ainsworth unit along the valley sides of the Niobrara River near the town of Valentine and eastward to about 5 to 10 miles below Meadville. It is not known whether the absence of these sediments east of Meadville is due to removal by erosion or to nondeposition.

Inasmuch as the Brule(?) clay is relatively impermeable, except where fractured, its upper surface is considered to be the lower limit of profitable drilling for water. No wells in the report area are known to derive water from the Brule(?) clay.

MIOCENE SERIES

Sediments of Miocene age are not known to be present beneath the report area. Subsequent to the field work for this report, however, the U. S. Bureau of Reclamation reported (written communication dated January 9, 1955) the existence of Miocene sediments, varying greatly in thickness within short distances, in local areas within the Niobrara River valley westward for about 50 miles from the vicinity of Valentine, Nebr. A 135-foot section of these beds, exposed at a dam site in sec. 6, T. 33 N., R. 34 W., southeast of Eli, Nebr., was assigned a Miocene age by M. F. Skinner, a field associate in the Frick Laboratory of the American Museum of Natural History, through examination of fossil vertebrates from these beds. It is possible that beds of the same age are present locally beneath the report area, but they have not been so identified.

PLIOCENE SERIES

OGALLALA FORMATION

The Ogallala formation is composed of beds of loose to poorly cemented silt, sand, and gravel, interspersed with layers of sandstone and conglomerate. Many of these beds are crossbedded and cemented by calcium carbonate, which imparts a white to light-gray color to some of the beds. Fine to coarse sand constitutes the principal material of the Ogallala formation; the coarser sediments are more generally characteristic of its lower part. Lenses or beds of sandy silt occur in all parts of the formation but are more numerous in the upper part. Gradations from one lithologic type to another occur both laterally and vertically within relatively short distances. (See pl. 2.)

Correlation of the subdivisions of the Ogallala formation became possible as the result of the work of Elias (1935) on fossil grass seeds in the Tertiary sedimentary rocks of the Great Plains. The following subdivisions of the Ogallala formation are based on their fossil seed content (Lugn, 1939):

Kimball formation: 25–50 feet thick; contains *Echinochloa*, *Panicum*, and *Biorbia* seeds, and algal limestone.

Sidney gravel: 15–50 feet thick; includes the upper part of the *Biorbia* seed zone.

Ash Hollow formation: 110–250 feet thick; includes main part of the *Biorbia* seed zone and several faunal horizons; *Krynitzkia* seed zone in lower part.

Valentine formation: 175–225 feet thick; contains *Stipidium* seeds.

Lugn found that *Krynitzkia coroniformes*, which is limited to the lower part of the Ash Hollow formation of Lugn (1938) and Engelman (1876) in the North Platte valley and to regions to the south, is present in the cap-rock zone above the channel deposits containing the Burge fauna of Stirton and McGrew (1935). These channel deposits were referred to by Johnson (1936) as the Burge sands member of the Valentine formation. Lugn found also that the beds above the cap-rock zone contain *Biorbia* seeds, which are characteristic of the Ash Hollow formation of Lugn (1938) and Engelman (1876) farther south. These correlations led Lugn to consider that the part of the Ogallala formation underlying the cap-rock zone in the Niobrara River valley region belongs to the Valentine formation of Johnson (1936) and that the cap rock, together with the strata lying above it, are correlated with the Ash Hollow formation of Lugn (1938) and Engelman (1876) to the south. Although the Ogallala formation in the valley of the Niobrara River differs lithologically from the lower part of the Ogallala formation in central and southern Nebraska, they probably were deposited contemporaneously.

Where exposed in the Ainsworth unit, the lower part of Lugn's Valentine formation is composed of loose to moderately compact, friable very fine to medium sand, some silt, and small amounts of clay. Locally, soft sandstone and discontinuous beds of quartzitic sandstone are present in this part of the Valentine formation of Lugn (1938) and Engelman (1876). The upper part is characterized by moderately compact greenish-buff argillaceous very fine to fine sand. In certain localities deposits of loose to poorly cemented, fine to coarse, crystalline sand occur as fill in channels cut in the upper part of Lugn's Valentine formation. These deposits, identified by the Nebraska Geological Survey as the Burge sands member of the

Valentine formation, have yielded vertebrate fossils that have been designated the Burge fauna by Stirton and McGrew (1935). The maximum observed thickness of the Burge sands member of the Valentine formation is approximately 44 feet.

Lugn's Ash Hollow formation consists, in general, of light-gray to light-tan interbedded layers and lenses of silt, sand, and marl. Several moderately hard to hard beds of sandstone occur within the unconsolidated sediments. The most prominent and perhaps the most resistant of the sandstones is the calcareous cap rock, which is the basal member of Lugn's Ash Hollow formation and which forms the resistant rim along the lower stretch of the Snake River and along the middle reach of the Niobrara River. The upper sandstone layers contain siliceous tubules and fragments of vertebrate fossils. *Biorbia* seeds have been found in a few places. A measured section of this part of the Ogallala formation is shown in figure 5.

Many wells in the western part of the area tap beds of coarse sand in the Ogallala formation. The yield of these wells generally is adequate for domestic and livestock use.

QUATERNARY SYSTEM

PLEISTOCENE SERIES

Deposits of Pleistocene age overlie the Ogallala formation throughout most of the report area. These deposits consist principally of stream-laid sand and gravel and windborne silt. The older deposits are restricted to channels eroded in the Ogallala formation, and the younger, deposited after the channels were filled, are sheetlike. Deposition during the Pleistocene was interrupted several times by periods of erosion during which widespread soils were developed and valleys were cut into the unconsolidated sediments.

HOLDREGE FORMATION

In the Ainsworth unit the Holdrege formation is the oldest deposit of Pleistocene age. It is restricted for the most part to valleys that were developed on the pre-Pleistocene surface, and it consists of sand and gravel derived principally from exposed sediments of Tertiary age. Lugn (1935) described the Holdrege sand and gravel as an inwash-outwash fluvioglacial deposit that was built up as an alluvial plain in Nebraskan time. Quartz and other metamorphic and granitic crystalline minerals constitute the bulk of the formation, and the thickness of the formation ranges from a featheredge to as much as 50 feet. Because no wells or test holes in the Ainsworth unit are known definitely to have been drilled into this formation, little is known about its distribution or water-yielding properties. It crops out in the valley walls in the northeastern part of the unit and

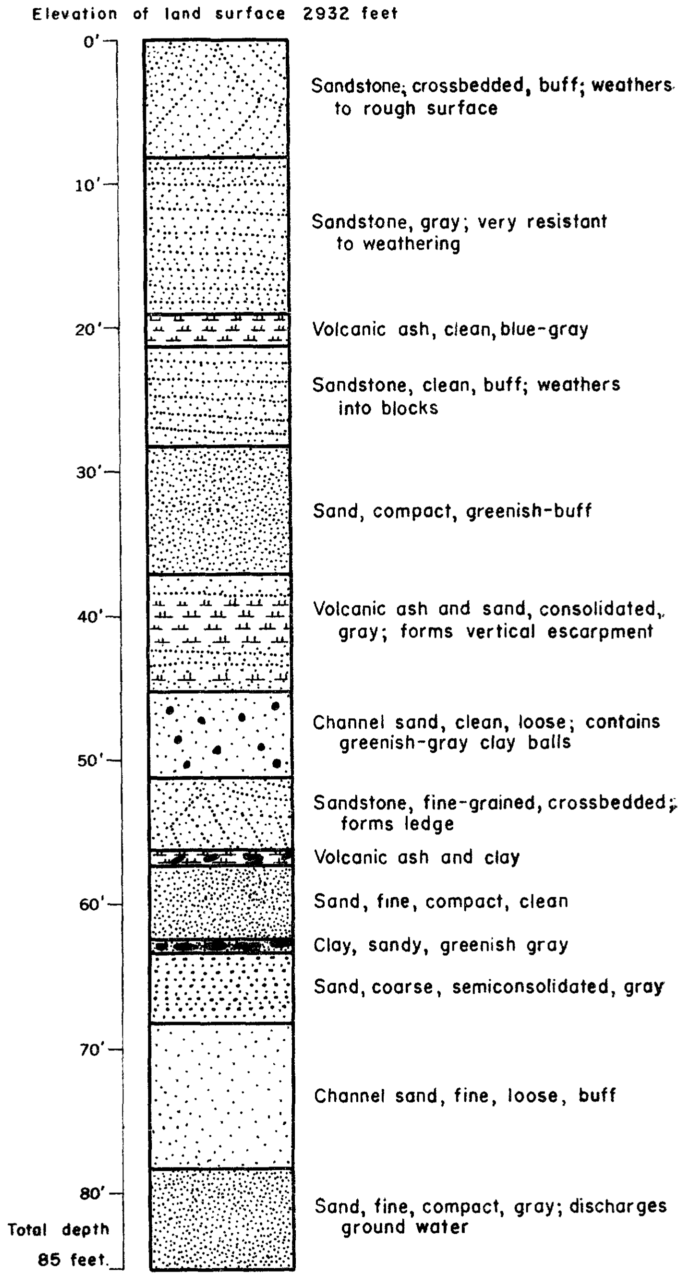

FIGURE 5.—Partial section of the Ogallala formation on the east side of the Snake River in the NW¼ sec. 29, T. 31 N., R. 30 W.

possibly is present only in that part of the area. Large supplies of water probably could be obtained from wells tapping the Holdrege formation where it is saturated.

FULLERTON FORMATION

The Fullerton formation is of fluvial-eolian origin and is composed of silt and calcareous clay which locally grade into fine sand. It ranges in thickness from a featheredge to about 25 feet. Where the Holdrege formation fills valleys that were developed on the Ogallala surface, the Fullerton formation overlies the Holdrege; elsewhere the Fullerton formation is in direct contact with the Ogallala. The Fullerton formation probably underlies most of the Ainsworth table but is exposed only in the valley sides of the streams that dissect it. The Fullerton is not known to extend beneath the sandhills part of the report area. It is well exposed in the valley sides of Long Pine Creek a few miles east of the eastern limit of the Ainsworth unit. Because it is composed principally of very fine grained material, the Fullerton is not a source of water supply.

GRAND ISLAND FORMATION

Overlying the Fullerton formation, and for the most part coextensive with it, is a sheetlike deposit of sand and gravel known as the Grand Island formation. Although in places the upper part contains relatively large amounts of fine sand that may be of eolian origin, the formation consists principally of sand and coarse gravel that is clearly of fluvial origin (Lugn, 1935). The general lithologic character of the Grand Island formation is shown by the columnar sections of two irrigation wells near Ainsworth (fig. 6). The Grand Island formation is exposed in several gravel pits and along principal stream valleys between Ainsworth and Wood Lake. It is well exposed along the valley of Plum Creek in the vicinity of Johnstown and is exposed also in highway and railroad cuts near the village of Long Pine. The thickness of the Grand Island formation ranges from a featheredge to 100 feet or more. Irrigation wells and many domestic and livestock wells in the vicinity of Ainsworth derive water from this formation; the yield of the wells ranges from a few gallons per minute to as much as 1,240 gpm.

PEORIAN LOESS

The loess mantle on the Ainsworth tableland probably was derived from dust that was blown from the sandhills region. Apparently the silt and clay, originally present in the parent materials from which the dune sand was derived, were separated from the sand during the continual shifting of the dunes. The loess, herein referred to as Peorian loess, generally is less than 6 feet thick, and in many places

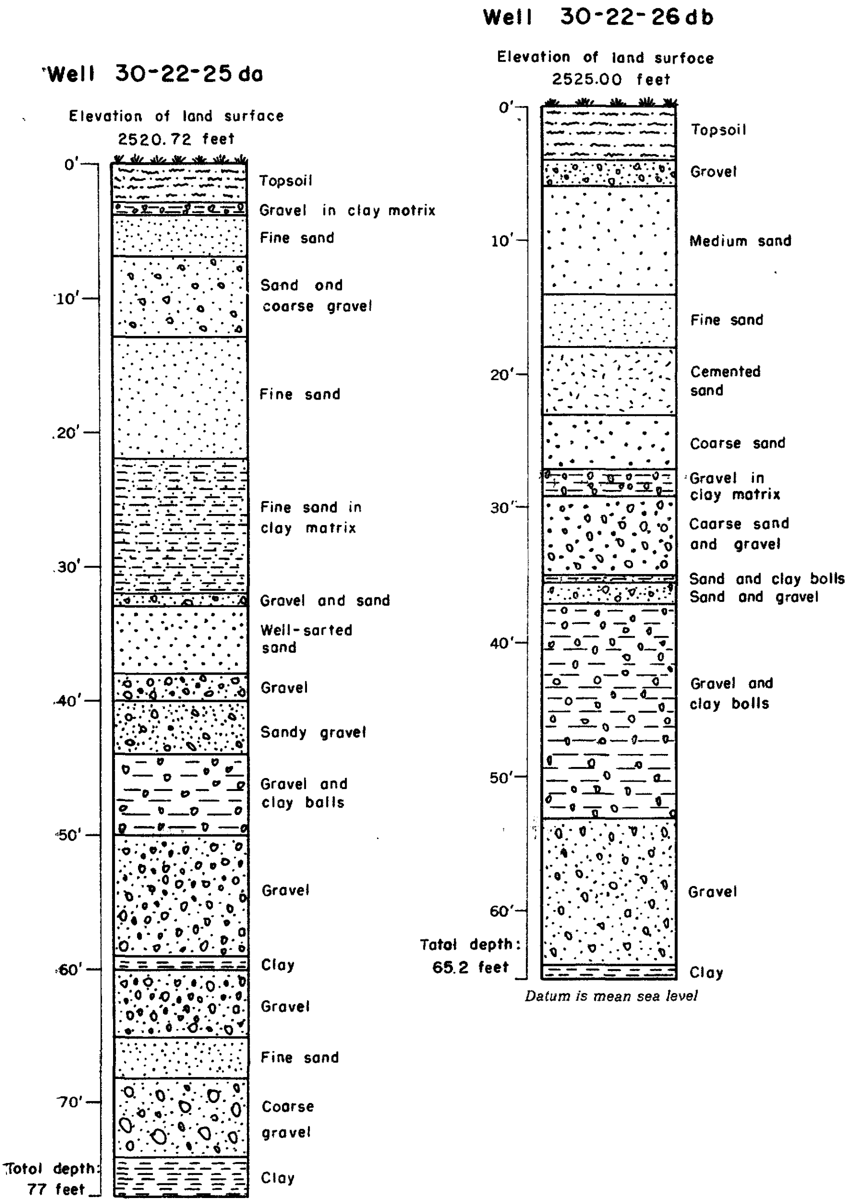

FIGURE 6.—Columnar sections of the Grand Island formation in two irrigation wells near Ainsworth.

is covered by windblown sand to a thickness of as much as 15 inches. As the loess is above the water table, it is not a source of ground water in this area, but it is important because it transmits recharge to the underlying ground-water reservoir.

PLEISTOCENE AND RECENT SERIES, UNDIFFERENTIATED

DUNE SAND

A large part of the Ainsworth unit is characterized by grass-covered sand dunes. These sandhills are as much as 100 feet high and the lower parts of many of the intervening valleys are occupied by lakes or marshes. Viewed from the air, the landscape in the sandhills region resembles a billowy sea.

Much of the dune sand is of Pleistocene age and was derived from the Ogallala and other formations of Tertiary age and from the sand and gravel deposits of earlier Pleistocene age. Sand dunes are now being formed in the area along the scarps of alluvial terraces, on sandy alluvial lands, and on sandy land not protected by vegetative cover. Some sorting of the sand grains has resulted from the selective action of the wind. In general, the sand on the tops of the hills is coarser textured and cleaner than that in the valleys; the sand in the valleys has been modified to some extent by admixture with organic material. Thin lenses of silt or clay are present in the sand in some places. Because the fine sand of the dunes rapidly absorbs precipitation and allows little or no runoff, the sandhills area is exceptionally favorable for the intake of recharge to the ground-water reservoir. The dune sand is unusually retentive of soil moisture and even light showers are markedly beneficial to the grass growing in the sandy soil.

Moderately large supplies of ground water for domestic and stock use can be obtained from wells that tap an adequate thickness of saturated sand in the sandhills areas.

STREAM TERRACE DEPOSITS AND ALLUVIUM

Only a small part of the Ainsworth unit is underlain by sediments deposited by the existing streams. Terrace deposits underlie narrow, discontinuous strips along lower Gordon, Schlagel, Plum, Bone, and Long Pine Creeks, and larger areas in the lower part of the Snake River valley. The terraces are 10 to 50 feet above the level of the stream and are well drained. The flood plains are about 2 to 8 feet above stream level and are underlain by Recent alluvium, which consists of silt and very fine to medium sand and ranges in thickness from a featheredge to about 15 feet. In most of the larger valleys, the alluvium is underlain by deposits of Pleistocene age. At the present time the streams are actively deepening the lower reaches of their valleys.

The water table is less than 8 feet below the flood plain in most places in the valleys and generally rises to or near the land surface during periods of heavy precipitation. No wells are known to derive water solely from the alluvium. Information on the occurrence of ground water in the terrace deposits was not obtained during this investigation.

HYDROLOGIC PROPERTIES OF THE WATER-BEARING MATERIALS OF PLEISTOCENE AGE

During the course of the present investigation, two aquifer tests were made in the vicinity of Ainsworth in order to determine the coefficients of transmissibility and storage of the water-bearing materials of Pleistocene age.

The first test was made on October 30, 1951, on well 30–22–25cb. (See fig. 7.) The well was 60 inches in diameter and 62.5 feet deep, and the thickness of the saturated aquifer was 41 feet. The well was pumped continuously for 7 hours at an average rate of 342 gpm. Four observation wells (nos. 1, 2, 3, and 4) were installed on a straight line at distances of 76.3, 159.5, 299.1, and 810.8 feet from the pumped well. During the period of pumping and for 20 hours and 11 minutes after pumping stopped, frequent measurements of the water level in these observation wells (table 1) were made with a steel tape and in the pumped well with an electrical water-level indicator.

The other test was made November 13, 1951, on well 30–22–26cc. (See fig. 8.) The well was 18 inches in diameter and 69 feet deep, and the thickness of the saturated aquifer was 53 feet. Three observation wells (nos. 1, 2, and 3) were installed at distances of 107.7, 297.7, and 597.4 feet from the pumped well on a line extending due east from the pumped well. Observation well 4 was 572.2 feet west of the pumped well and only a short distance east of Bone Creek. The test well was pumped continuously for 5 hours and 13 minutes at an average rate of 1,070 gpm. During the period of pumping and for 3 hours and 20 minutes after the pump stopped, measurements of the water level in the four observation wells (table 2) were made with a steel tape and in the pumped well with an electrical water-level indicator.

The Theis nonequilibrium formula was used in analyzing the data from the tests, and the results were checked by the gradient formula and by the Theis recovery formula (Wenzel and Fishel, 1942).

Because the observation wells at test site 30–22–25cb were installed by use of a cable-tool drilling rig, it was possible to make an exact log of the hole and thus to place the well screen in coarse-grained material. Consequently, the water level in the wells responded accurately to changes of water level in the aquifer during the test. The measurements for observation well 2 were chosen as best fitting the type curve.

Because the observation wells at test site 30–22–26cc were installed by the jetting method, it was not possible to determine the kind of material in which the well screens were placed. Apparently, only in

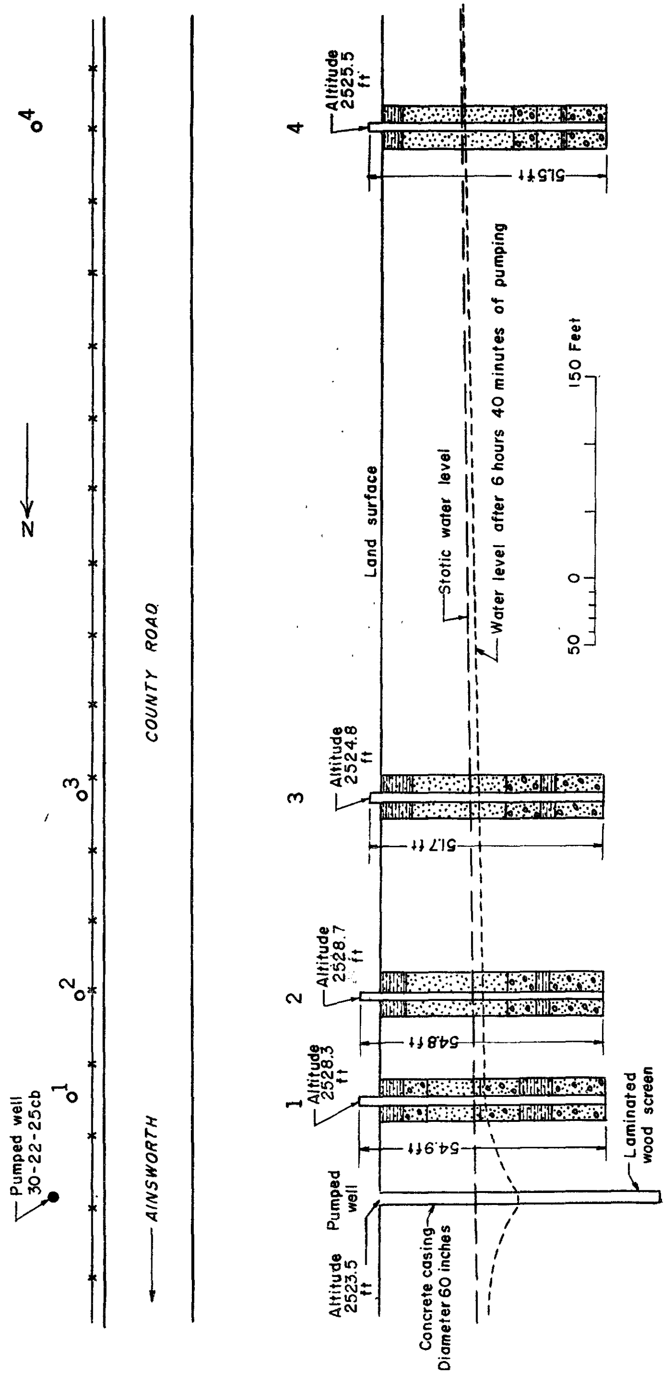

FIGURE 7.—Location of and cross section through wells used in pumping test on well 30-22-25cb.

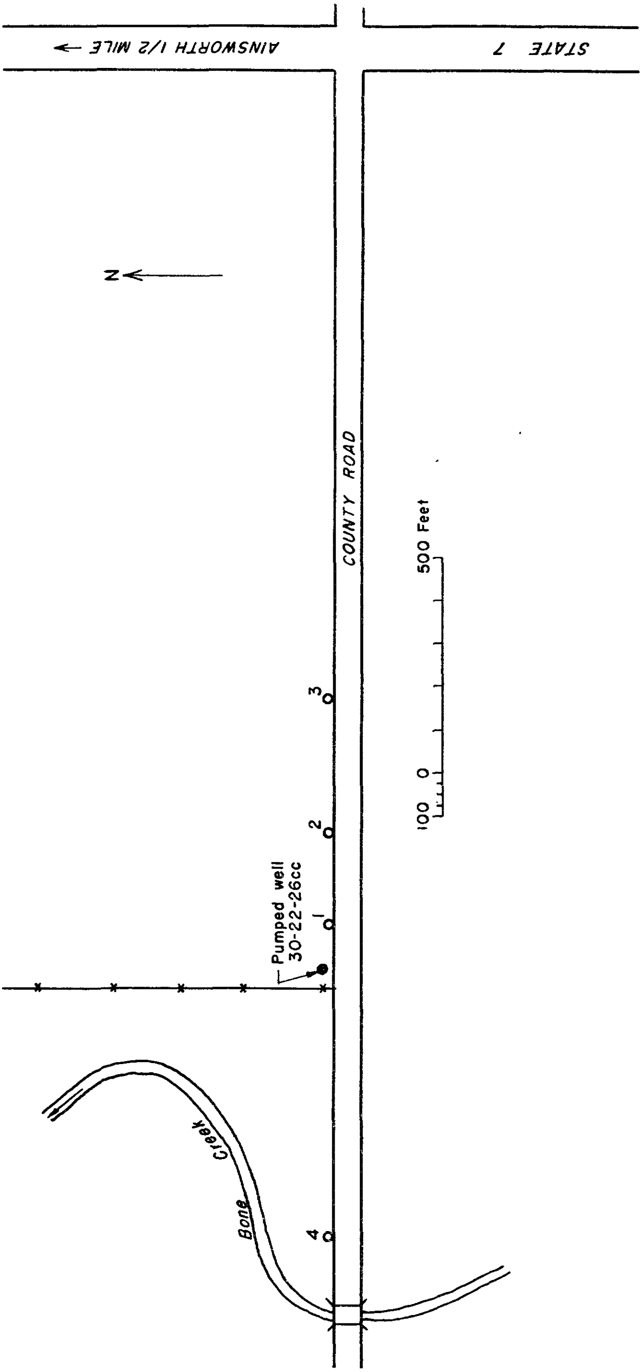

FIGURE 8.—Location of wells used in pumping test on well 30-22-26cc.

TABLE 1.—*Data for pumping test on well 30–22–25cb*

Time since pumping started (minutes)	Drawdown in observation wells (feet)				Time since pumping stopped (minutes)	Recovery in observation wells (feet)			
	1	2	3	4		1	2	3	4
0.25	0.10	0.02	0.05	0.00	0.25	0.17	0.03	0.05	0.01
0.50	.22	.08	.07	.00	0.50	.31	.11	.09	.04
0.75	.43	.14	.11	.00	0.75	.42	.19	.12	.05
1	.52	.22	.13	.01	1	.52	.27	.13	.06
1.5	.79	.39	.18	.02	1.5	.87	.56	.18	.07
2	1.01	.54	.27	.03	2	1.07	.60	.28	.07
2.5	1.18	.68	.33	.03	2.5	1.29	.72	.37	.08
3	1.35	.79	.35	.03	3	1.36	.87	.47	.09
4	1.63	.96	.42	.05	4	1.75	1.08	.59	.09
5	1.76	1.12	.59	.05	5	1.91	1.25	.79	.09
6	1.88	1.21	.67	.05	6	2.12	----	----	.10
7	----	1.30	.81	.07	7	2.22	1.48	.87	.11
8	2.06	1.35	.84	.07	8	2.31	1.56	.94	.12
9	2.08	1.40	.86	.08	9	2.38	1.61	.96	.14
10	2.20	1.47	.88	.09	10	2.44	1.66	1.03	.16
12	2.29	1.54	.92	.10	12	2.52	1.73	1.05	.18
14	2.41	1.61	.97	.12	14	2.57	1.78	1.13	.20
16	2.49	1.70	1.01	.14	16	2.61	1.81	1.15	.22
18	2.55	1.76	1.06	.16	18	2.64	1.84	1.17	.24
20	2.60	1.79	1.09	.18	20	2.66	1.86	1.19	.26
22	2.63	1.83	1.12	.20	22	2.68	1.87	1.20	.27
24	2.66	1.86	1.14	.20	24	2.70	1.88	1.21	.28
26	2.68	1.87	1.16	.20	26	2.71	1.90	1.23	.29
30	2.72	1.89	1.18	.28	30	2.73	1.92	1.25	.30
34	2.75	1.92	1.22	.34	34	2.75	1.95	1.28	.31
38	2.77	1.94	1.24	.35	38	2.77	1.96	1.30	.33
42	2.77	1.96	1.26	.35	42	2.78	1.97	1.31	.34
46	2.80	1.97	1.27	.33	46	2.79	1.98	1.33	.34
50	2.82	1.98	1.28	.33	50	2.80	1.99	1.34	.34
55	2.83	2.00	1.29	.34	55	2.81	2.00	1.35	.34
60	2.85	2.02	1.32	.33	60	2.81	2.01	1.36	.34
65	2.86	2.04	1.34	.33	65	2.82	2.02	1.37	.34
70	2.90	2.06	1.35	.38	70	2.83	2.03	1.38	.34
80	2.92	2.07	1.37	.40	80	2.85	2.04	1.39	.34
90	2.94	2.09	1.38	.43	90	2.86	2.05	1.40	.35
100	2.95	2.11	1.41	.43	100	2.87	2.06	1.41	.37
110	2.97	2.13	1.44	.43	110	2.87	2.06	1.42	.37
120	2.99	2.14	1.45	.43	120	2.88	2.06	1.42	.37
130	2.99	2.15	1.46	.43	130	2.89	2.07	1.43	.37
140	2.99	2.16	1.47	.43	140	2.89	2.08	1.44	.38
150	3.00	2.16	1.48	.43	150	2.90	2.09	1.45	.38
160	3.01	2.18	1.50	.43	160	2.90	2.09	1.46	.38
180	3.03	2.19	1.52	.43	180	2.90	2.09	1.46	.38
200	3.06	2.21	1.53	.43	200	2.90	2.11	1.46	.38
230	3.08	2.24	1.57	.45	1,202	----	----	----	.46
260	----	2.26	1.58	.50	1,206	----	----	1.61	----
290	3.13	2.28	1.59	.51	1,209	----	2.32	----	----
320	3.12	2.29	1.58	.51	1,211	3.08	----	----	----
360	3.12	2.29	1.62	.52	----	----	----	----	----
400	----	2.30	1.64	.52	----	----	----	----	----

observation well 1 was the screen placed in coarse-grained material, as it was the only well that gave reliable results. The water levels in the other three observation wells did not reflect quickly or accurately the changes in water level during the pumping period. Therefore, data obtained from these wells could not be used in the analysis of the test.

The data from observation well 2 at test site 30–22–25cb and from well 1 at test site 30–22–26cc were plotted (figs. 9 and 10) and then superimposed on the type curve (fig. 11) so that the plotted data coincided with the type curve. The coordinates of a match point, which is any point common to the drawdown curve and the type curve, were substituted in the Theis equation and the equation was solved

TABLE 2.—*Data for pumping test on well 30-22-26cc*

Time since pumping started (minutes)	Drawdown in observation wells (feet)				Time since pumping stopped (minutes)	Recovery in observation wells (feet)			
	1	2	3	4		1	2	3	4
0.25	0.00	0.00	0.00	0.00	0.25	0.00	0.01	0.00	0.00
0.50	.00	.00	.00	.00	0.50	.02	.02	.00	.01
0.75	.01	.01	.01	.02	0.75	.03	.03	.01	.02
1	.04	.01	.03	.03	1	.05	.03	.02	.03
1.5	.10	.02	.05	.08	1.5	.12	.04	.03	.04
2	.16	.04	.07	.08	2	.20	.05	.04	.05
2.5	.22	.06	.07	.08	2.5	.29	.07	.05	.06
3	.29	.08	.08	.09	3	.38	.10	.06	.07
4	.44	.12	.11	.11	4	.51	.14	.08	.08
5	.60	.16	.13	.15	5	.76	.17	.11	.10
6	.77	.20	.15	.20	6	.94	.20	.15	.14
7	.90	.24	.17	.22	7	1.11	.22	.17	.17
8	1.04	.26	.21	.26	8	1.27	.24	.19	.20
9	1.19	.27	.22	.30	9	1.42	.26	.20	.24
10	1.32	.29	.23	.31	10	1.53	.27	.21	.28
12	1.56	.32	.26	.34	12	1.81	.30	.23	.30
14	1.78	.34	.29	.36	14	2.01	.31	.24	.33
16	1.96	.36	.30	.39	16	2.19	.32	.25	.35
18	2.13	.39	.31	.42	18	2.30	.33	.27	.36
20	2.28	.40	.32	.43	20	2.43	.34	.28	.38
22	2.41	.41	.32	.44	22	2.57	.35	.28	.40
24	2.53	.42	.33	.45	24	2.68	.35	.29	.40
26	2.63	.43	.35	.47	26	2.76	.36	.29	.40
30	2.72	.45	.37	.48	30	2.91	.38	.29	.42
34	3.01	.46	.41	.51	34	3.02	.40	.29	.43
38	3.14	.47	.43	.52	38	3.09	.41	.29	.44
42	3.26	.48	.45	.53	42	3.16	.42	.30	.45
46	3.37	.49	.47	.54	46	3.23	.42	.31	.45
50	3.46	.51	.49	.54	50	3.30	.43	.32	.45
55	3.57	.53	.51	.54	55	3.36	.44	.33	.46
60	3.66	.54	.53	.54	60	3.42	.45	.33	.47
65	3.74	.55	.54	.54	65	3.47	.45	.34	.47
70	3.81	.57	.55	.55	70	3.50	.46	.34	.47
80	3.85	.58	.56	.56	80	3.58	.47	.34	.48
90	4.07	.60	.56	.58	90	3.65	.47	.35	.48
100	4.18	.62	.57	.59	100	3.73	.48	.35	.49
110	4.26	.64	.54	.60	110	3.79	.49	.35	.49
120	4.30	.66	.51	.61	120	3.83	.50	.36	.50
130	4.39	.67	.46	.62	130	3.87	.50	.36	.50
140	4.43	.68	.50	.62	140	3.91	.51	.36	.50
150	4.48	.69	.50	.63	150	3.97	.51	.36	.50
170	4.59	.72	.49	.63	160	3.99	.52	.36	.50
180	4.65	.73	.50	.65	180	4.05	.53	.37	.50
200	4.74	.75	.51	.66	200	4.09	.54	.37	.50
230	4.83	.78	.54	.67					
260	4.87	.87	.61	.68					
290	4.94	.88	.61	.72					
307	4.95		.54						

as shown in figures 9 and 10. The match-point coordinates that were selected and the corresponding values for the transmissibility and storage coefficients are shown in table 3.

The results of the test at site 30–22–25cb give a transmissibility of 47,500 gpd per foot and an average storage coefficient of 0.0006. The low storage coefficient indicates artesian conditions in the vicinity of the test well.

The results for observation well 1 at site 30–22–26cc give a transmissibility of 77,000 gpd per foot and a storage coefficient of 0.008 The coefficient of storage indicates a transition between artesian and water-table conditions.

The aquifer tapped by the pumped and observation wells may be, and probably is, underlain by other permeable strata that contributed

TABLE 3.—*Summary of pumping-test results*

Observation well No.	Distance from pumped well (feet)	Measuring point		Depth of well below measuring point (feet)	Distance from measuring point to top of screen (feet)	Altitude of water level before pumping test (feet)	Water-level drawdown at end of pumping period (feet)	Water-level recovery at end of test (feet)	Match-point coordinates				Coefficient of transmissibility (gpd/ft)	Storage coefficient
		Height above land surface (feet)	Altitude (feet)						s	r^2/t	u	$W(u)$		
Test well 30-22-25cb														
1	76.3	5.1	2,528.27	54.9	49.4	2,502.13	3.12	3.08	1.5	2.0×10^6	0.1	1.82	47,500	0.001
2	159.5	5.3	2,528.73	54.8	49.3	2,502.41	2.30	2.32	1.5	4.4×10^6	.1	1.82	47,500	.0006
3	299.1	1.1	2,524.8	51.7	46.2	2,502.86	1.64	1.61	1.5	8.0×10^6	.1	1.82	47,500	.0003
4	810.8	1.4	2,525.51	51.5	43.0	2,505.35	.52	.46						
Test well 30-22-26cc														
1	107.7	1.0	2,528.86	25.0	22.5	2,512.84	4.95	4.09	0.35	5.0×10^6	1.0	0.22	77,000	0.008
2	297.7	1.9	2,529.83	25.0	22.0	2,512.57	.88	.54						
3	597.4	1.0	2,528.43	27.8	25.3	2,512.22	.54	.37						
4	572.2	1.0	2,520.24	22.1	19.1	2,514.07	.73	.50						

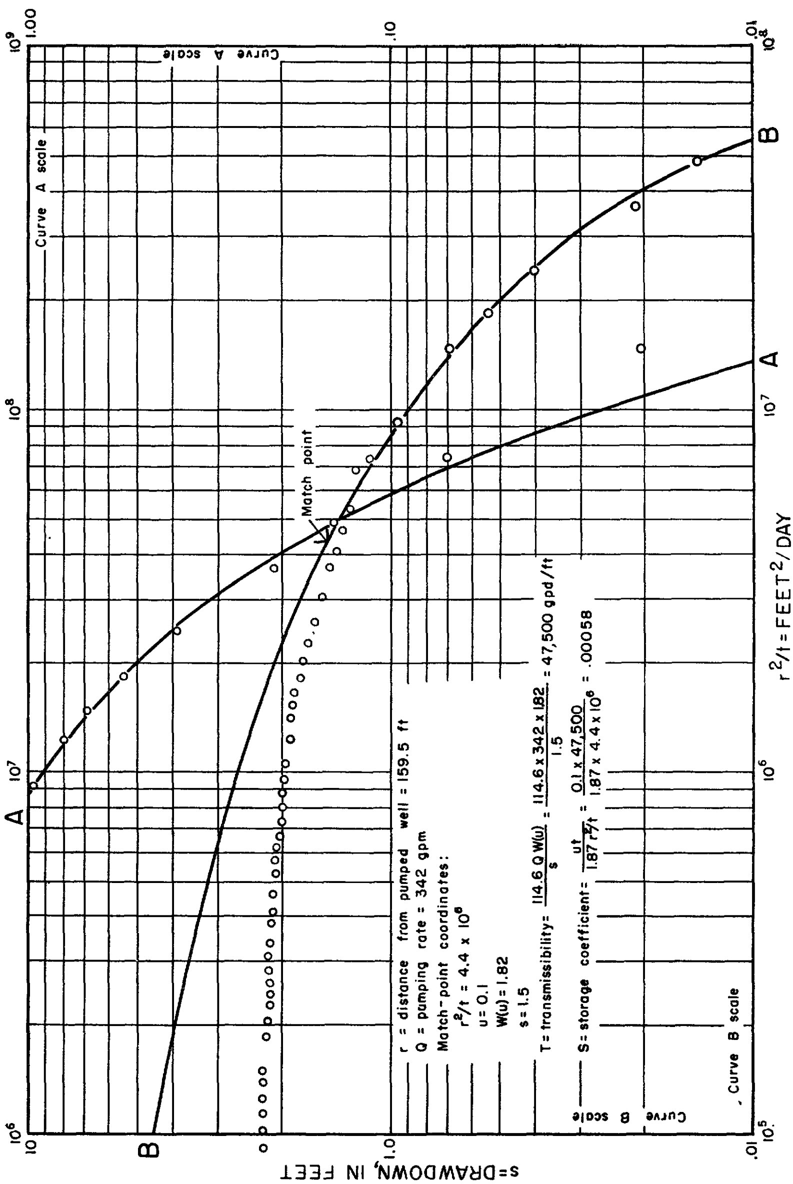

FIGURE 9. Logarithmic plot of drawdown of water level in observation well 2, 159.5 feet from pumped well 20-22-25cb.

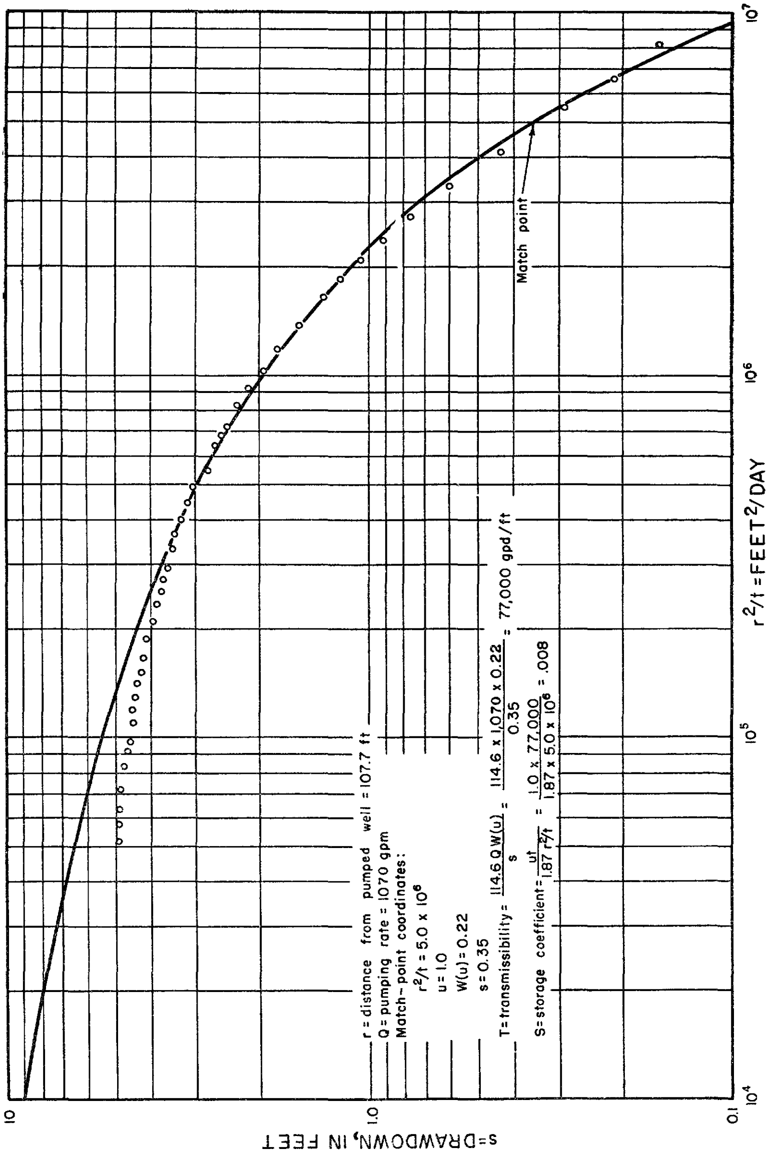

FIGURE 10.—Logarithmic plot of drawdown of water level in observation well 1, 107.7 feet from pumped well 30-22-26cc.

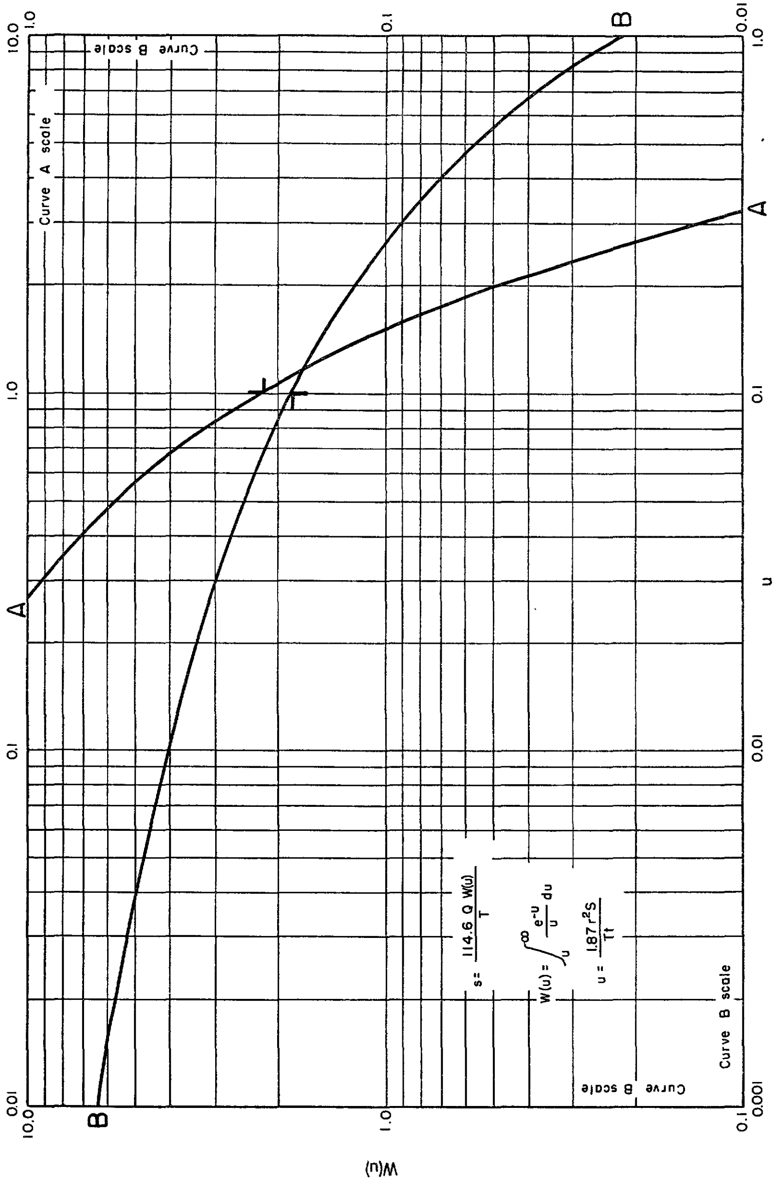

FIGURE 11.—Logarithmic graph of the well-function type curve.

water to the pumped wells. To the extent that this is true, the values for transmissibility, and the estimates of underflow given on page 32, may apply to the entire water-bearing section in the sediments of Pliocene and Pleistocene age. The uncertainty as to the thickness of the section contributing to the wells makes it impossible to compute accurately the permeability of the water-bearing materials from the results of the pumping tests, or to compute the velocity of ground-water flow.

GROUND WATER

The sand and gravel formations of Pleistocene age and the coarser textured parts of the underlying Ogallala formation are the only water-bearing materials in the Ainsworth unit that are known to be sufficiently permeable to yield water freely to wells. The Pleistocene deposits are the more important and are the source of water for most wells. Some wells tap water-bearing strata of both Pleistocene and Tertiary age; a few tap only the Ogallala formation. No wells in the Ainsworth unit are known to extend into rocks older than the Ogallala. Although locally the ground water is confined by lenses of clay or silty clay, the ground water for the most part is believed to be under water-table conditions.

CONFIGURATION OF THE WATER TABLE

The water table (upper surface of the zone of saturation) slopes northward, northeastward, and eastward from the southwest corner of the Ainsworth unit. Although generally smooth, the water table is characterized locally by low mounds that coincide with sandhills, by slight depressions that coincide with low places in the valleys of the sandhills region, and by troughs that coincide with the principal stream valleys. These irregularities of the water table are a reflection of local differences in the relative rates of ground-water recharge, discharge, and movement.

The configuration of the water table in the Ainsworth unit is shown on plate 1 by means of contour lines. As the altitude of the water table is the same for each point along a given contour line, the direction of maximum slope of the water table is at a right angle to the line. Ground water moves in the direction of the steepest water-table gradient. The steepness of the slope is indicated by the spacing of the contour lines—the slope is relatively gentle if they are far apart, and relatively steep if they are closely spaced. Uniform hydrologic conditions generally are reflected by a smoothly sloping water table, whereas differences in the recharge-discharge relation, in the permeability or thickness of the water-bearing material, or in the slope of the bedrock surface underlying the aquifer are reflected generally by irregularities in the slope of the water table.

The gradient of the water table in the sandhills part of the Ainsworth unit ranges from about 2 to 15 feet per mile, although locally (for example, 3 miles west of Johnstown) it is as much as 60 feet per mile. Profiles of the water table along the west and east boundaries of R. 28 W. are shown in figure 12. The water table slopes about

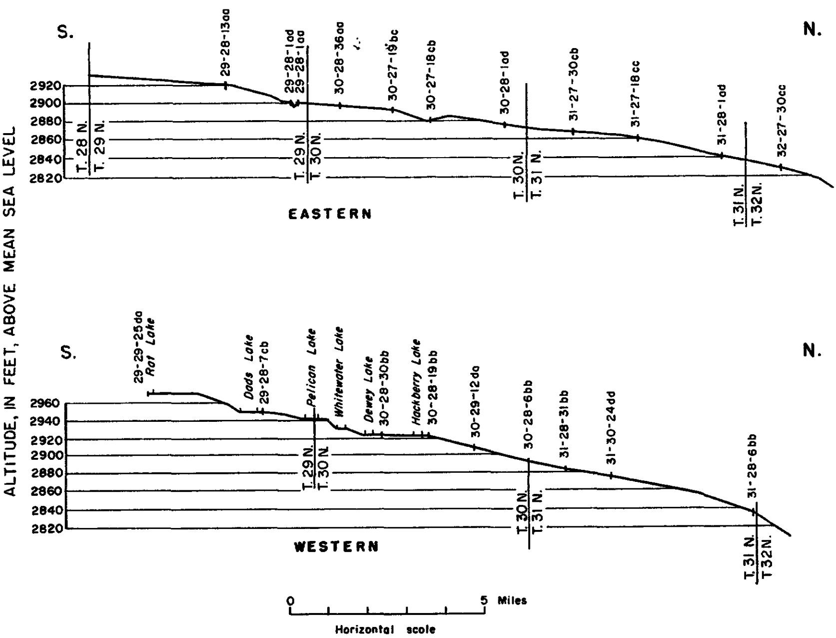

FIGURE 12.—Profiles of the water table along the western and eastern boundaries of R. 28 W.

15 feet per mile in the southwest-central part of the Ainsworth tableland but it is steeper near the bordering valleys, and it slopes rather steeply toward the Niobrara River and the deeply entrenched lower reaches of Plum and Bone Creeks in the northeastern half of the Ainsworth tableland. (See pl. 1.) In general, the water table has a more gentle slope where it is in deposits of Pleistocene age and a steeper slope where it is in the Ogallala formation.

MOVEMENT

Ground water moves into the Ainsworth unit by underflow from the southwest; within the Ainsworth unit its direction of movement is principally northeast toward the valley of the Niobrara River. Locally, however, where the water table intersects the land surface in valleys of the sandhills and where stream valleys are incised below the water table in the north and northeastern parts of the report area, the direction of movement is toward these nearer points of discharge.

The quantity of ground-water flow can be computed from values for transmissibility and hydraulic gradient. To estimate the amount of water that flows through the ground-water reservoir in the vicinity of Ainsworth, a cross section was selected along the 2,500-foot contour line on the water table. The length of this line between Sand Draw Creek, northwest of Ainsworth, to Willow Creek, southeast of Ainsworth, is about 39,000 feet. (See pl. 1.) The gradient of the water table where it crosses this contour line is about 0.38 percent, or 0.0038.

In Darcy's equation,

$$Q=PIA \qquad (1)$$

where

Q=gallons per day,
P=permeability, in gallons per day per square foot,
I=slope as a ratio, and
A=area of section in square feet,

let

$$A=mL \qquad (2)$$

where

m=thickness of the aquifer, in feet, and
L=Length of the section, in feet,

and let

$$P=\frac{T}{m} \qquad (3)$$

where

T=transmissibility, in gallons per day per foot.

Substituting (2) and (3) in (1),

$$Q=\frac{T}{m}\times I\times mL=TIL$$

If

T=47,500 gpd per ft (the value obtained at test site 30–22–25cb),

then

Q=47,500×0.0038×39,000
=7,040,000 gpd, 4,900 gpm, or 7,900 acre-feet per year

If the average transmissibility is 77,000 gpd per ft (the value obtained at site 30–22–26cc), then

Q=77,000×0.0038×39,000
=11,400,000 gpd, 7,900 gpm, or 12,800 acre-feet per year.

DEPTH TO WATER

The depth to water is dependent in large measure on the topography of the land surface. In the sandhills part of the report area the water table generally is shallow in the valleys, and the lakes that are present in many of the valleys are hydraulically continuous with the subsurface zone of saturation. Because the water table is a relatively smooth plane in the sandhills area, the depth to water beneath any hill is approximately equal to the height of that hill above the floor of the adjacent valleys. The water table is shallow (generally less than 10 feet) west and south of Ainsworth in a belt along the edge of the sandhills area, and in the vicinity of Ainsworth the water table is 20 to 40 feet below the land surface. North and east of Ainsworth, as far as the bluffs along the valley of the Niobrara River, the water table is progressively deeper because the streams have cut valleys that are deeply incised below the water table. The greatest depth to water recorded in the area was 212 feet in a well about a mile southeast of Plum Creek and about 4 miles south of the Niobrara River.

The depth to water in the western two-thirds of the Ainsworth unit is shown by patterns on plate 1. The boundaries of areas of different depth to water were delineated by superimposing topographic maps on a map showing the contour of the water table. As topographic maps have not been prepared for the eastern third of the area, the depth to water could not be shown accurately by areal patterns. Instead, the depth to water in each well is shown on plate 1 by a number near the symbol for that well.

RECHARGE

The principal sources of ground-water recharge are underflow and precipitation; a minor amount of recharge probably results from the return of part of the ground water applied for irrigation in the vicinity of Ainsworth. The amount of water moving into the area by underflow probably is relatively constant from year to year, whereas the amount of recharge from precipitation depends on the amount, distribution, and intensity of the precipitation, the amount of moisture in the soil when rain begins or snow melting starts, the temperature, the vegetative cover, and the permeability of the intake materials at the site of infiltration.

Movement of ground water into the Ainsworth unit by underflow is shown by the configuration of the water table (pl. 1). Ground water moves into the area from the west at the southwest corner of the area and from the southwest along the entire southern boundary of the area. Because the thickness of the water-bearing materials and the rate of ground-water movement along these boundaries are not known, it is not possible to calculate the amount of underflow into the Ainsworth unit. Even though no water infiltrated to the aquifer within the Ainsworth unit, the area still would be underlain by a thick sheet of transient ground water. However, the depth to water within the area would be greater than it is now, and only the amount of ground water moving in by underflow would be discharged from the area by evaporation, transpiration, springs, and streamflow.

Of the average annual precipitation of 23 inches, only a small fraction leaves the Ainsworth unit by direct overland runoff. This is particularly true of the sandhills part of the area, where the hillsides are relatively smooth and the flow of perennial surface streams is essentially constant, both indicating that most of the precipitation enters the ground. The amount of precipitation lost by evaporation or consumed by growing plants depends on the temperature at the time of rainfall and the stage of plant growth. A slow, steady rain when plant life is essentially dormant, the content of soil moisture high, and the ground not frozen results in far greater ground-water recharge than an equivalent amount of precipitation when growing plants are rapidly depleting the soil moisture or when the ground is frozen. Although conditions are favorable in the sandhills area for recharge from precipitation, in general they are favorable also in the Ainsworth tableland. The records of water-level fluctuations indicate that precipitation generally causes greater rises of the water table (and, hence, greater recharge) in areas of shallow ground water than in areas of deeper water table. Much of the recharge in areas of shallow ground water, however, is only temporarily added to the zone of saturation because it is evaporated or utilized by growing plants within a short time after it infiltrates to the aquifer. Although a lesser amount of precipitation infiltrates to the water table in areas where the water table is 10 feet or more below the land surface, it may be no less effective as recharge, because there is less chance of its loss from the zone of saturation by evapotranspiration.

The capacity of the soil to absorb water is an important factor in determining how much of the precipitation infiltrates to the zone of saturation. Tolstead (1942) discussed the absorption of water by soils in Cherry County as follows:

> Rain filters directly into dune sands with little or no surface runoff and reaches the water table except as removed by evaporation from the surface of the sand and by absorption and transpiration. The amount of rain that reaches the water table is therefore considerable, especially during years of heavy snow and early spring rain.

If conditions are favorable for infiltration, long periods of snow melt result in the addition of considerable water to the ground-water reservoir. Frozen ground or ice on the land surface, however, impedes the infiltration of water into the soil. When the water table is at the land surface, the ground-water reservoir is full and no further recharge can occur.

DISCHARGE

The ground water that enters the Ainsworth unit as subsurface inflow and the additional water that infiltrates to the zone of saturation either is discharged within the area or leaves as surface or subsurface outflow. In the sandhills part of the area and in the area of shallow ground water on the Ainsworth tableland, ground water is discharged largely by evaporation and transpiration. Where the water table is deeper, such as in the vicinity of Ainsworth and north and east of Ainsworth, ground water is discharged largely as streamflow or as springs along the valley sides. The ground water not discharged by these natural means or by wells leaves the area as underflow and is eventually discharged in the valley of the Niobrara River or in the valleys of tributaries.

The large losses of ground water that result from evapotranspiration in areas of shallow water table were discussed as follows by Tolstead (1942) in his report of a study of the vegetation in Cherry County.

> The water table in a wet meadow at Dewey Lake fell 1.61 feet from July 7 to August 20, 1937. It rose 0.83 feet as a result of rains in August and September, but again receded to former levels during late September, and did not return to the July level until October 22. Fig. 6 [Tolstead's report] indicates that the water table was about 2 feet below land surface on July 7, 1937. The water table fell 2.78 feet from June 30 to September 1, 1938. Greatest fluctuations occur in the tall-grass meadow. Daily fluctuations of the water table regularly occur during the growing season. Water table in a tall-grass meadow near Dewey Lake fluctuated 4.4 inches during a hot, windy day (July 7) in 1937 (fig. 7). Under moderate conditions, it fluctuated 2.3 inches on August 5, 1937, and 1.5 inches on August 12. Under conditions of high humidity, low wind, and moderate temperature on August 20, the water table fell only 0.3 inch. Fluctuations of the water table 8 feet beneath the surface of a dry meadow at Dewey Lake was 0.6 inch on August 12 and 20, 0.5 inch on September 10 and 0.2 inch on September 28. It was not determined whether the fluctuations were due to transpiration or were the results of variations in water levels in the wet meadow 100 yards distant. During very dry weather, the most rapid lowering of the water table occurred in the morning, gradually leveling off until 4:00 or 5:00 p. m. after which it began to rise. During the night, it attained approximately the same level as that of the preceding morning.

The surface of the lakes in the sandhills part of the area is an extension of the water table. The water table slopes toward the lakes; consequently, ground water is moving toward and is being discharged into them. In other words, the surface of the lake is the floor of a shallow depression in the water table. (See fig. 13.) Because the lake is hydraulically continous with the adjacent ground water, the surface of the lake fluctuates with water-level changes in the ground-water reservoir.

The relationship of the surface of Big Alkali, Little Alkali, and Ell Lakes to the water level in nearby wells is shown by the water-table profiles in figure 13 and by hydrographs in figures 14, 15, and 16. The altitudes of the lakes and the date the altitudes were determined are given in table 4.

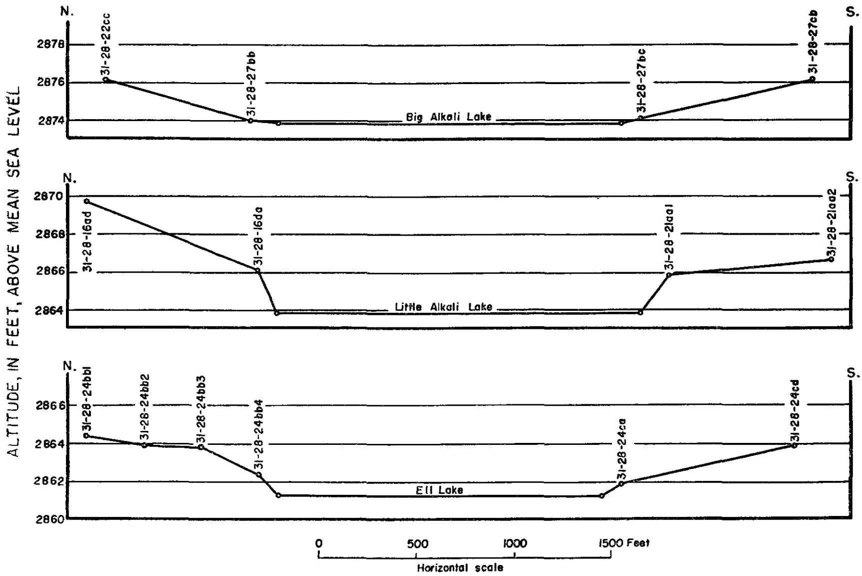

FIGURE 13.—Relation of the water surface of Big Alkali, Little Alkali, and Ell Lakes to the adjacent water table, as indicated by water levels in wells on July 10, 1950.

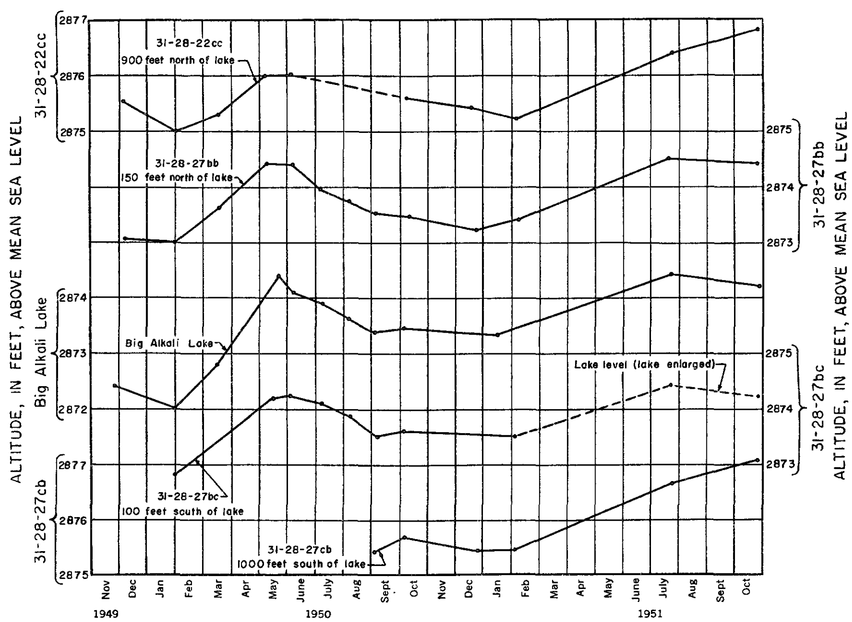

FIGURE 14.—Hydrographs of the water surface of Big Alkali Lake and the water levels in four nearby observation wells.

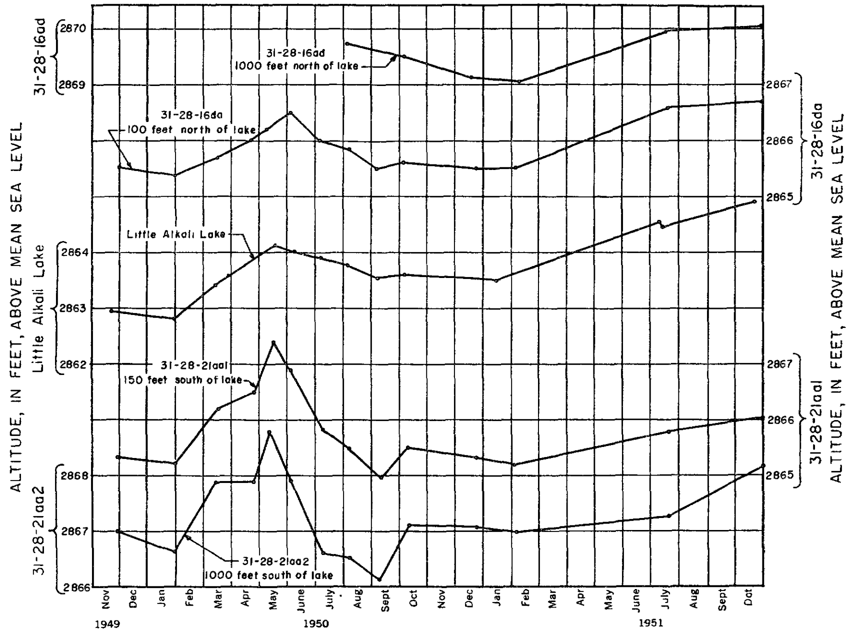

FIGURE 15.—Hydrographs of the water surface of Little Alkali Lake and the water levels in four nearby observation wells.

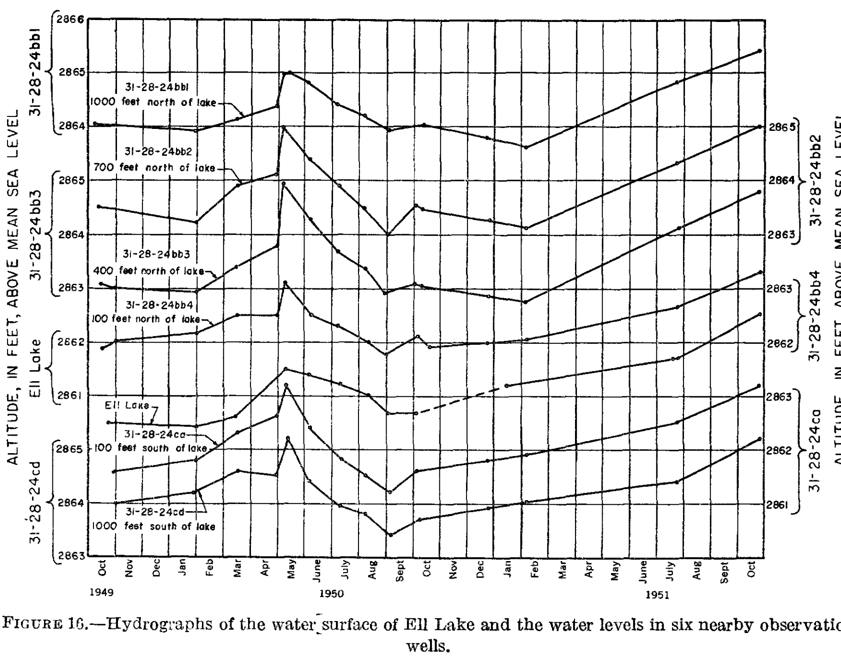

FIGURE 16.—Hydrographs of the water surface of Ell Lake and the water levels in six nearby observation wells.

An example of the close correlation of changes in the stage of lake level with changes in the stage of the water table near the lake is shown by the rise and fall of Little Alkali Lake and fluctuations of the water level in wells 31–28–21aa1 and 31–28–21aa2, which are 150 and 1,000 feet, respectively, south of it, and in wells 31–28–16da and 31–28–16ad, which are 100 and 1,000 feet, respectively, north of it. (See fig. 15.) From May 1950 to September 1950 the level of Little Alkali Lake declined, but not as much as the water level in the wells during the same period. Well 31–28–21aa1 is in an open field of grass where the soil is sandy, and well 31–28–21aa2 is at the edge of a meadow. As the depth to water in these wells ranges from about 1

TABLE 4.—*Altitude, in feet above sea level, of the water surface of nine lakes in the Valentine National Wildlife Refuge and vicinity*

Date	Big Alkali	Little Alkali	Ell	Trout	Willow	Dads	Watts	Pelican	Mule
Nov. 25, 1949	2,872.38	2,862.93	2,860.51						
Dec. 13, 1949				2,894.52					
Jan. 31, 1950	2,872.06	2,862.71	2,860.37						
Mar. 15, 1950			2,860.61	2,894.36					
Mar. 16, 1950	[1]2,872.74	[1]2,863.38							
Mar. 23, 1950				[1]2,895.12					
May 16, 1950	2,874.31	2,864.12	2,861.55	2,895.14					
June 5, 1950	2,874.10	2,864.07							
June 6, 1950			2,861.39						
June 9, 1950					[1]2,917.38	2,955.69	2,923.71	2,942.05	
July 10, 1950	2,873.85	2,863.84	2,861.20						
Aug. 7, 1950	2,873.63	2,863.74	2,861.01						
Sept. 6, 1950	2,873.41	2,863.50	2,860.72						
Oct. 11, 1950	2,873.41	2,863.54	2,860.80						
Dec. 27, 1950			[2]2,860.64						
Jan. 16, 1951	2,873.28	2,863.47	2,861.23						
Feb. 16, 1951									2,886.55
July 20, 1951	2,874.47	2,864.54	2,861.74						
July 26, 1951		2,864.46	2,861.76						
Oct. 23, 1951	2,874.13	2,864.91	2,862.50						

[1] Determined by U. S. Bureau of Reclamation.
[2] Staff gage may have been disturbed by ice action.

to 5 feet below the land surface, part of the decline probably is due to evapotranspiration. The decline of the water level in well 31–28–16da, which is at the base of a group of sandhills 100 feet north of Little Alkali Lake, was not as great as the decline in the wells south of the lake. The soil is sandy and the vegetation is sparse in the immediate vicinity of the well 31–28–16da, and the depth to water in the well is about 6 feet. Apparently less ground water was being discharged by evapotranspiration in the vicinity of this well than in the vicinity of the wells south of the lake during the same period, and, in addition, ground water must have percolated from under the sandhills to replace part of the water being discharged in the area of shallow water table between the sandhills and the lake. The lowering of the water table in the vicinity of the lake reduced the hydraulic gradient toward the lake.

During the period of this investigation many of the lakes in the Ainsworth unit increased in size, thus resulting in an increase in the area of water surface from which direct evaporation could take place. When observation well 31–28–27bc was installed in December 1949, it was 100 feet from the shoreline of Big Alkali Lake, but by July 1951 the lake had so enlarged that the well was surrounded by water. (See fig. 14.) Unlike the other lakes in the area, Big Alkali Lake began to decline in July 1951 despite the continued rise of the water level in wells 31–28–22cc and 31–28–27cb, which are 900 feet north and 1,000 feet south, respectively, from the shoreline of the lake. The lake reached its maximum level when the water had risen to a height at which drainage of the lake by Schlagel Creek began to occur; then because the evaporation rate from the surface of the lake apparently exceeded the recharge rate to the lake during July, the lake began to decline slightly even though water levels in the wells continued to rise. The water level in other lakes continued to rise during the same period because they have no surface outlet.

All the creeks that originate in the Ainsworth unit are effluent—that is, they receive and discharge ground water. Where stream valleys are incised deeply below the water table the streamflow is perennial but where the valleys are shallow the streams flow continuously only when the water table is at a high stage. The valley of Gordon Creek is incised below the water table downstream from a point about 2 miles southwest of Hudson Lake, and the valley of Plum Creek is incised from a point about 6 miles southwest of Johnstown. It is estimated that only about 15 percent of the total annual discharge of Plum Creek is overland runoff, the remainder being ground-water discharge.

Ground water is used throughout the area for domestic purposes and the watering of stock; it is used for irrigation in the vicinity of Ainsworth, and for public supply in Ainsworth and Wood Lake.

By 1950, 33 irrigation wells had been drilled in the area. Each well is equipped with either a deep-well turbine pump or a centrifugal pump operated by a stationary power unit, a farm tractor, or an electric motor. The depth ranges from 44 to 201 feet, and the diameter from 18 to 72 inches. (See p. 106 to 108.) Personnel of the U. S. Bureau of Reclamation measured the discharge rate of 20 of these wells and estimated it for 9. The measured rates ranged from 351 to 1,240 gpm and averaged 786 gpm. (See table 5.) The discharge rate of the other 4 wells is unknown. The specific capacity of 7 of the wells was determined by K. B. Schroeder, W. G. Eichberger, G. J. Whitsel, and L. E. Dickinson, of the U. S. Bureau of Reclamation, and was found to range from 35 to 62.5 gpm per foot of drawdown. (See table 6.)

TABLE 5.—*Discharge rate of irrigation wells and estimated pumpage for irrigation in 1950*

Well No.	Discharge rate (gallons per minute)	Estimated time pump operated (hours)	Amount pumped (acre-feet)	Estimated area irrigated (acres)
29-21-6cd	735	0	0	-----
30-21-12cb	[1] 300	0	0	-----
30-21-30ac	868	350	55.94	175
30-21-30bd	859	190	30.05	95
30-21-30cb	862	0	0	-----
30-21-31cc	[1] 750	90	12.43	17
30-21-31db	1,060	50	9.80	22
30-22-15cc	513	50	4.72	-----
30-22-16cd	542	0	0	-----
30-22-16dc1	461	40	3.40	-----
30-22-16dc2	718	40	5.29	-----
30-22-17cb	[1] 400	38	2.80	-----
30-22-22bc	587	120	12.97	38
30-22-23dc	351	5	.32	.5
30-22-23dd	[1] 500	50	4.60	15
30-22-24db	458	0	0	-----
30-22-25ad	[1] 1,050	130	25.13	68
30-22-25cb	1,080	20	3.99	-----
30-22-25da	[1] 1,000	20	3.68	-----
30-22-26cb	[1] 1,000	20	3.68	-----
30-22-26cc	1,070	0	0	-----
30-22-26db	1,050	20	3.87	-----
30-22-27dc1	860	48	7.60	-----
30-22-27dc2	971	0	0	-----
30-22-34ab	1,240	10	2.28	6
30-22-34bd	900	12	1.99	6
30-22-35bb	[1] 1,000	30	5.52	8.5
30-23-12cc	[1] 750	450	58.00	50
30-23-13bc	538	350	34.67	-----

[1] Estimated.

TABLE 6.—*Results of testing seven irrigation wells*

Well No.	Discharge (gallons per minute)	Total lift (feet)	Draw-down (feet)	Specific capacity (gallons per minute per foot of drawdown)	Date of test
30-21-31db	1,060	36.7	18.9	56	June 7, 1948
30-22-25cb	1,080	44	18.4	59	May 28, 1948
30-22-26db	1,050	44.4	18.7	56	Aug. 27, 1947
30-22-27dc1 [1]	860	37	21	41	Aug. 26, 1947
30-22-27dc2	971	44	24.1	40	Aug. 26, 1947
30-22-34ab	1,240	50	35.4	35	Aug. 25, 1947
30-22-34bd	900	36.8	14.4	62.5	Aug. 27, 1947

[1] 4 wells interconnected to a single pump; specific capacity computed as for a single well.

An inventory of pumpage for irrigation during 1950 indicates that only 293 acre-feet of water was pumped for that purpose. (See table 5.) This amount is about 75 percent less than that pumped in 1948, according to a similar inventory made by the U. S. Bureau of Reclamation for that year. The large difference in the amounts of pumpage presumably is related to the difference in the amount and distribution of precipitation during the growing season of the 2 years. As precipitation during the growing season of 1951 was more favorable for crop growth than it was in 1950, the amount of ground water pumped for irrigation in 1951 was even less than that in the previous year.

Ground water in sufficient quantity for domestic or stock use can be obtained almost everywhere in the area. Most of the wells in the sandhills part of the area are constructed by jetting or by driving a pipe equipped with a screen and well point. Most of those on the Ainsworth tableland are cased, drilled wells. Most of the existing wells yield only a few gallons per minute.

The municipal waterworks of Ainsworth reportedly started operations in 1892 at the southeast corner of the courthouse grounds. The water was obtained from a well of unknown depth, and a steam-driven pump raised the water to an elevated steel tower. About 1907 a 16-inch well (30–22–26ba1) was drilled 2 blocks west of the courthouse on the south side of U. S. Highway 20. The original well then was abandoned and the power plant was moved to the site of the new well. The water was pumped directly to the mains and the excess went to the water tower. A threshing-machine steam engine was used as an emergency source of power. In 1926 a new 100,000-gallon elevated steel storage tower was erected close to the well site. Sometime in the early thirties a second 16-inch well (30–22–26ba2) was drilled. One of the wells is sealed, and the water is siphoned into the other well about 10 feet away. An electrically powered turbine pump was installed during this same period. Late in 1940 a third 16-inch well (30–22–26ab) was drilled about a quarter of a mile east of the storage tank. This well is 72 feet deep and has the same type of pump and power as the second well. Gasoline motors are a standby source of power. The average daily consumption is about 125,000 gallons. The water is untreated and is of good quality. It is pumped direct to the mains and the excess goes to the storage tank. During the winter the wells are pumped successively, a week at a time.

The water supply for Wood Lake is obtained from two 24-inch wells (31–25–27bb1, 27bb2). Both wells have turbine pumps and are powered by electric motors. The date of drilling the first well is unknown, but the second well was drilled in 1949. The capacity of the pump in the first well is 150 gpm, and of that in the second well, 200 gpm. The wells are near the municipal power plant in the southern part of the town and the water is pumped to an elevated steel storage tank having a capacity of 40,000 gallons. The water is forced through the mains by gravity. The average daily consumption is about 38,000 gallons. The water is untreated.

FLUCTUATIONS OF THE WATER LEVEL IN WELLS

The position of the water table at any given time is the net effect of all prior recharge to and discharge from the aquifer. During any given period a rise of the water table indicates that recharge has has exceeded the discharge; a decline indicates the opposite to be

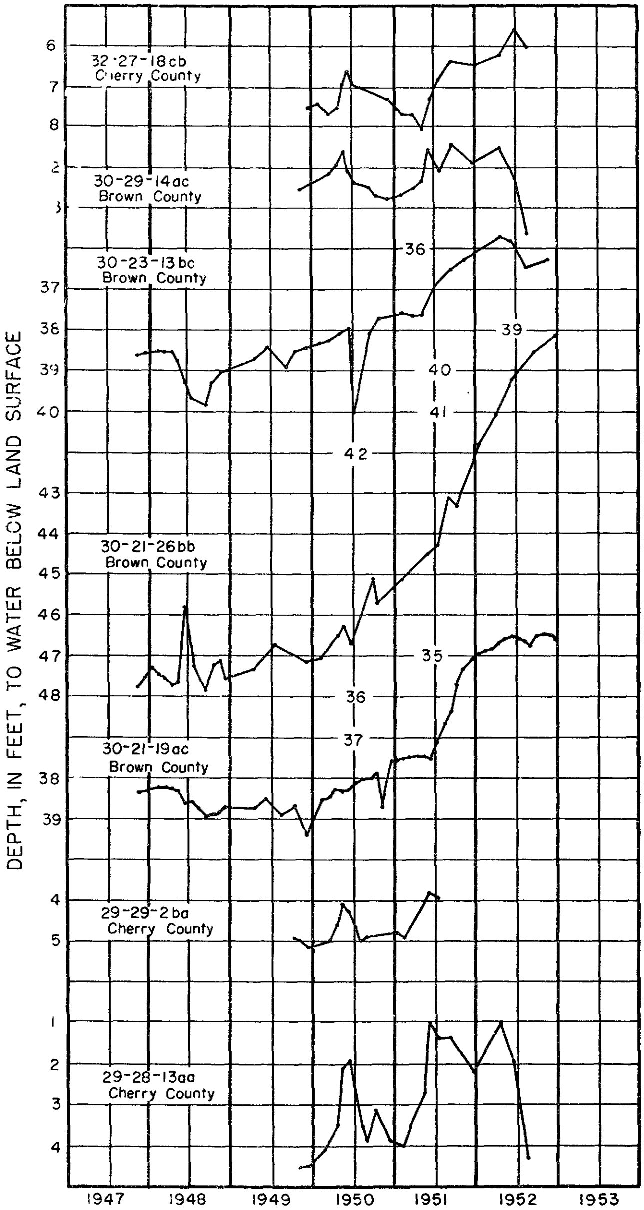

FIGURE 17.—Hydrographs of the water levels in selected observation wells.

true. Where the ground water is confined under artesian pressure, the fluctuations of the water level in a well depend in part on changes in the atmospheric pressure or other loading of the aquifer and hence are not necessarily an indication of the relation between recharge and discharge.

Measurements of the water levels in wells 30–22–26db, 30–22–27dc1, and 31–25–21bd have been made at intervals since 1937, 1934, and 1936, respectively. As part of the present investigation, water-level measurements have been made at intervals in 264 wells; during part of 1950 two wells near Ainsworth, 30–21–19cc and 30–22–19aa, were equipped with water-level recording gages. All water-level measurements known to have been made in the Ainsworth unit prior to the end of 1952 are given on pages 72 to 105. Water-level fluctuations in selected observation wells are shown in figure 17.

Available data indicate that the water table was at a relatively high stage during the period of this investigation. The net rise of the water level for the period of record was about 4.5 feet in well 30–22–26db and about 3.5 feet in wells 30–22–27dc1 and 31–25–21bd. (See fig. 18.)

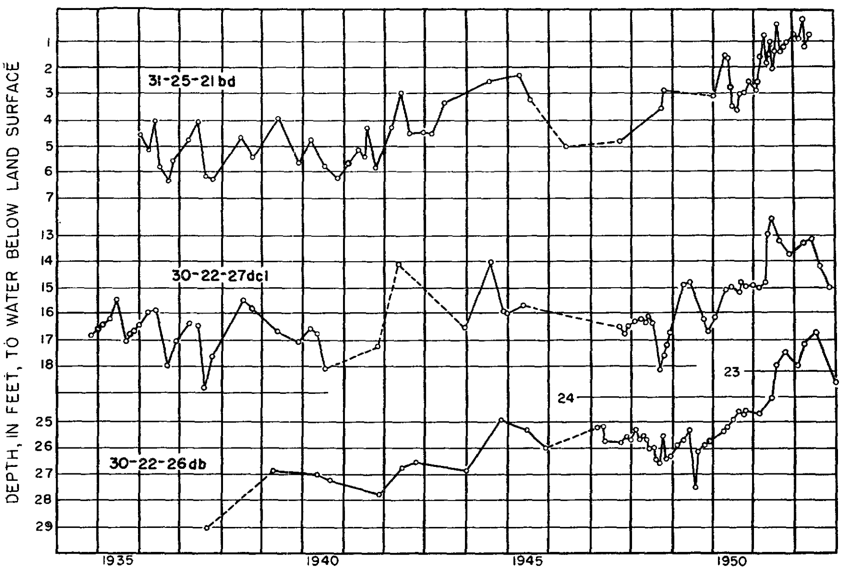

FIGURE 18.—Hydrographs of the water levels in wells 30–22–26db, 30–22–27dc1, and 31–25–21bd.

EFFECT OF PROPOSED IRRIGATION CANAL ON POSITION OF WATER TABLE ALONG CANAL ROUTE

The irrigation canal, as proposed by the U. S. Bureau of Reclamation, will be lined in sections where the water surface in the canal will be 4 feet or more above the present water table and will be unlined in sections where the water surface in the canal will be within 4 feet of the water table. In the unlined sections, canal water will leak out where and when the adjacent water table is lower than canal stage, and ground water will discharge into the canal where and when the adjacent water table is higher than canal stage. The distance from the canal at which changes in position of the water table will be detectable will be small, so long as the difference in height of the two water surfaces is less than 4 feet. However, leakage of canal water into underlying and adjacent permeable materials might eventually cause waterlogging of nearby land and consequent reduction of agricultural productivity.

When and where the water level in the canal is the same as the adjacent water table, no significant movement of water into or out of the canal will occur. Along some stretches ofi ts route, the canal could serve to stabilize the ground-water levels.

SUPPLEMENTAL USE OF GROUND WATER FOR IRRIGATION ON THE AINSWORTH TABLELAND

At the time the field work for this report was done there were 33 irrigation wells on the Ainsworth tableland, on land not included in the area to be served by the proposed canal. In 1950, 22 of these wells pumped a total of 96 million gallons, or 293 acre-feet, of water, and 7 of the wells were not pumped. No information is available on the pumping of the other 4 wells, but the pumpage probably was small because the precipitation for that year was above normal and was distributed advantageously during the growing season. Because 8,000 to 13,000 acre-feet (p. 34) of ground water—probably not less than 10,000—is estimated to move annually through the aquifers underlying the southern part of the Ainsworth tableland, it is assumed that not less than 8,000 acre-feet could be pumped each year. This amount would be adequate to irrigate all the irrigable land in this part of the Ainsworth tableland not proposed for irrigation from the canal.

South of U. S. Highway 20, irrigation wells need be only about 100 feet deep because the water-bearing Pleistocene deposits are moderately to highly permeable and the water table is shallow. However, in much of the area north of U. S. Highway 20 the Pleistocene deposits are above the water table and if irrigation wells are installed they must tap the water-bearing beds of the underlying Ogallala formation. Thus, the pumping of sufficient water for irrigation in the northern part of the Ainsworth tableland is economically far less feasible than in the southern part because the depth to water is greater and the water-bearing materials are less permeable.

CHEMICAL QUALITY OF THE WATER

By R. A. Krieger

ANALYTICAL RESULTS

The basic data for the study of the chemical quality of the water have been drawn from a broad survey of the entire Ainsworth unit, from an intensive study of ground-water and surface-water conditions and relations in the sandhills area south of Valentine, and from chemical analyses of surface water in the area. Because most of the streamflow is water that has been discharged from the ground-water reservoir, the chemical quality of the streams reflects the chemical quality of the ground water in the catchment area. The quantity and nature of mineral matter in water depend primarily on the type of rock and soil through which the water passes and on the length of contact time.

Chemical analyses of the ground- and surface-water samples collected in the Ainsworth unit are given in table 7, and the location of the sampling points is shown on figure 19. Concentration of solids may be expressed either in parts per million (ppm), as in table 7, or in equivalents per million (epm). The former shows weight per unit weight of the individual constituents whereas the latter shows the true chemical proportions of the constituents. For an example of the latter, 1 epm (20.04 ppm) of calcium is equivalent to 1 epm (61.02 ppm) of bicarbonate. The concentration of an ion in equivalents per million is calculated by dividing the parts per million by the combining weight of that ion or by multiplying the parts per million by the reciprocal of the combining weight. Some of the constituents and their corresponding reciprocals are listed below:

Cation (+)	Factor	Anion (−)	Factor
Calcium	0.0499002	Bicarbonate	0.0163886
Magnesium	.0822368	Carbonate	.0333278
Sodium	.0434839	Sulfate	.0208190
Potassium	.0255781	Chloride	.0282032
		Fluoride	.0526316
		Nitrate	.0161270

TABLE 7.—*Chemical analyses of ground and surface waters in the Ainsworth unit*

[Analytical results in parts per million except as indicated]

Location	Well depth (ft)	Instantaneous discharge (cfs)	Date of collection	Temperature (° F)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Residue on evaporation at 180° C	Dissolved solids: Sum	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Percent sodium	Specific conductance (micromhos at 25° C)	pH	Sodium-adsorption ratio
Snake River near Burge																									
At gage	-------	213	Aug. 1, 1947	----	82	0.05	22	6.3	11		95	6	12	1.9	0.3	0.0	0.00	190	------	81	0	22	185	8.5	0.5
Do	-------	258	Dec. 9, 1947	----	57	.02	24	----			96	0	18	.6	.3	.2	.00	168	------	----	----	----	170	7.4	----
Do	-------	278	June 20, 1948	----	56	.02	22	3.3	9.9		96	0	3.2	1.4	.3	6.5	.01	148	------	68	0	24	164	7.7	.5
Do	-------	213	July 14, 1948	----	61	.04	23	2.9	7.4		96	0	4.0	1.0	.3	.4	----	192	------	69	0	19	176	7.8	.4
Do	-------	208	Aug. 10, 1948	----	53	.02	23	3.0	8.4		96	0	5.6	1.7	.4	.0	.01	161	------	70	0	21	170	8.0	.4
Do	-------	360	Sept. 23, 1948	----	53	.03	20	2.9	9.8		84	0	10	2.0	.4	.0	.00	143	------	62	0	26	156	7.4	.5
Do	-------	355	Mar. 7, 1949	----	48	.10	24	3.6	11		96	0	14	2.0	.2	2.5	.06	162	------	75	0	24	183	7.3	.5
Do	-------	279	May 9, 1949	----	54	.02	22	3.3	14		102	0	12	1.0	.4	1.6	----	154	------	69	0	32	203	7.5	.8
Do	-------	253	June 15, 1949	----	57	.01	21	.3	18		100	0	8.0	.2	.3	1.3	----	166	------	54	0	47	184	7.5	1.3
Do	-------	227	July 14, 1949	----	55	.05	20	1.0	19		95	0	14	.2	.4	1.0	----	158	------	54	0	43	176	7.7	1.1
Do	-------	286	July 11, 1951	----	49	.02	22	2.4	8.7		92	0	6.0	.5	.3	1.2	.05	153	------	65	0	23	169	7.2	.5
Do	-------	247	Sept. 26, 1951	----	54	.02	21	3.5	10		97	0	7.0	.5	.4	.9	.03	166	------	67	0	25	172	7.9	.5
Do	-------	248	Feb. 23, 1952	----	45	.05	22	2.4	7.1		89	0	2.0	1.5	.3	3.4	----	140	------	65	0	19	173	7.8	.4
Do	-------	206	June 20, 1952	----	56	.10	23	3.3	7.1		100	0	2.0	.5	.3	1.0	.06	162	------	71	0	18	178	7.9	.4
Do	-------	217	Sept. 18, 1952	----	48	.04	22	3.2	10		98	0	7.0	.5	.3	1.1	.03	155	------	68	0	25	174	7.9	.5
Average	-------	-------	----------	----	55	----	22	3.0	10		[1] 95	----	8.3	1.0	.3	1.4	.03	161	------	68	----	25	176	----	.5
Gordon Creek																									
At diversion dam	---- --	------	Apr. 20, 1950	----	35	----	----	----	14	8.4	130	0	3.0	1.5	0.6	1.6	----	185	------	74	0	27	225	7.0	0.7
Gordon Creek near Simeon																									
At gage	-------	0.1	Dec. 24, 1947	----	50	0.08	25	3.0	15		117	0	7.4	1.0	0.5	0.6	0.00	156	------	75	0	30	205	7.6	0.7
Do	-------	.3	June 30, 1948	----	36	.00	36	4.5	23		165	0	18	2.6	.2	1.4	.11	214	------	108	0	32	263	7.3	1.0

Ground water of the sandhills, eastern Cherry County

29-28-1ad			Apr. 21, 1950	54	60				5.2	5.4	50	0	0.0	1.0	0.2	1.1		117		26	0	26	94.3	6.6	0.5
30-28-29ba	6.56		Apr. 18, 1950	48	20				3.7	2.2	20	0	2.0	2.0	.4	1.8		56		13	0	33	52.2	6.5	.4
30-29-14ac			Apr. 19, 1950	48	18				5.0	3.6	26	0	2.0	4.5	.6	.7		78		17	0	34	62.7	8.0	.5
30-29-14cd	33		Jan. 11, 1949	56	57	0.03	17	2.3	3.3	3.8	74	0	3.0	1.4	.4	.1	0.30	124		52	0	11	127	7.8	.2
30-29-25ca			Apr. 21, 1950	56	64				6.2	3.5	86	0	.0	3.0	.6	2.9		164		61	0	17	146	8.2	.3
31-25-27bb1	38		Oct. 18, 1950	54	49	.08	14	1.2	4.5	4.0	46	0	6.0	1.5	.1	9.1	.20	125		40	2	18	112	7.2	.3
31-28-23aa1	35-40		April 1950	53	61				12	15	109	0	18	20	.2	12		258		102	13	18	322	7.1	.5
31-28-23aa2	128		do	49	60				5.7	5.4	93	0	.0	1.0	.2	1.4		152		60	0	16	159	6.9	.3
31-28-23da2			do	53	57				4.8	4.2	54	0	.0	1.0	.2	1.4		120		31	0	22	102	6.6	.4
31-29-33dd	40		Oct. 9, 1952	55	63	.24	40	5.4	7.2	5.6	152	0	5.0	11	.1	.6	.02	226		122	0	11	269	7.9	.3
32-26-17aa	90-95		Jan. 11, 1950	54	58	.05	17	.8	5.9	4.9	73	0	4.0	1.1	.6	.2	.30	134		46	0	20	127	8.1	.4
32-26-28bb	68		Jan. 12, 1950	52	51	.44	20	2.3	6.3	4.3	90	0	2.0	1.1	.1	.2	.30	134		60	0	17	149	8.0	.4
32-26-29ac	129		Jan. 12, 1950	52	57	.03	11	.4	3.9	4.4	44	0	3.0	1.0	.1	3.3	.30	110		29	0	20	90.8	7.8	.3

Lakes in eastern Cherry County

Little Alkali Lake			Apr. 20 1950	43	64	0.05	5	1.1	560	624	1,410	385	135	3.0	6.0	2.6			2,480	17	0	60	3,600	9.4	59
Big Alkali Lake:																									
At northeast edge			do	44	40	.10	24	17	189	87	680	0	41	17	2.5	2.0		801		130	0	63	1,100	7.8	7.2
At east edge			do	44	39		24	10	175	85	644	0	33	15	2.5	1.1		758		102	0	64	1,040	8.0	7.6
Ell Lake			do	47	40	.10	18	13	267	189	914	33	41	34	3.0	1.8			1,090	99	0	63	1,610	8.5	12
Ballards Lake			Apr. 21, 1950	56	17	.15	45	40	220	172	1,050	0	25	29	3.0	2.1			1,070	277	0	49	1,600	7.9	5.8
Trout Lake			do		16				75	40	400	0	7.0	9.0	3.0	3.3		437		145	0	45	645	7.2	2.7
Hay Lake			Apr. 18, 1950	49	29				121	71	483	0	12	12	2.0	9.0		594		85	0	60	788	7.2	5.7
Red Deer Lake:																									
At spillway			Aug. 8, 1946		37	.02	63	27	62		460	0	3.3	8.0	1.4	10	0.00	526		268	0	34	728	7.3	1.6
About 1 ft west of concrete dam.			Apr. 18, 1950	49	34	.30	39	8.3	26	16	240	0	3.0	.5	1.0	1.1	.01	279		132	0	27	377	7.2	1.0
Watts Lake			Apr. 19, 1950	44	15				13	9.4	166	0	1.0	4.5	.7	1.3		181		106	0	19	264	7.3	.6
Hackberry Lake			Apr. 18, 1950	49	29				22	17	213	0	3.0	2.0	1.2	1.8	.01	257		116	0	26	351	7.4	.9
Canal between Hackberry and Dewey Lakes.			do	49	21				23	19	238	0	3.0	2.5	1.2	1.0		269		131	0	24	386	6.9	.9
Dewey Lake			do	49	23				20	17	215	0	5.0	2.0	1.2	1.7		254		124	0	23	346	7.2	.8
Dewey Lake spillway discharge.			do	52	15				22	20	223	0	6.0	1.0	1.2	1.0		265		122	0	25	352	7.3	.9
Willow Lake			do	49	22				84	73	465	0	16	11	3.0	1.5		556		146	0	43	743	7.4	3.0
Willow Lake near dam.			do	49	22				97	86	523	0	13	12	3.0	1.3		623		147	0	45	824	7.6	3.5
North Marsh Lake			Apr. 21, 1950	56	23				27	26	220	0	2.0	4.0	1.4	1.2		255		101	0	30	365	7.1	1.2
Whitewater Lake			do	50	63				49	41	281	0	6.0	6.5	2.0	10		393		101	0	41	496	6.8	2.1
Pelican Lake:																									
At northeast edge			Apr. 19, 1950	46	20				31	36	278	0	5.0	5.0	1.2	1.6		327		131	0	28	435	7.2	1.2
At southeast edge			do	46	25				33	38	292	0	1.0	5.5	1.2	1.4		338		132	0	29	469	7.3	1.3
West Twin Lake			Apr. 21, 1950	58	12				45	44	337	0	2.0	6.5	1.6	2.5		357		139	0	33	539	7.3	1.7
Dads Lake			Apr. 19, 1950	46	68	.12	15	3.9	130	95	491	0	10	23	2.0	1.8		681		54	0	62	796	7.3	7.7
Do			Apr. 20, 1950	46	66		12	5.6	126	99	460	0	26	22	3.0	1.3		655		53	0	60	803	7.0	7.5

[1] Includes carbonate as bicarbonate.

TABLE 7.—*Chemical analyses of ground and surface waters in the Ainsworth unit*—Continued

Location	Well depth (ft)	Instantaneous discharge (cfs)	Date of collection	Temperature (° F)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Residue on evaporation at 180° C	Dissolved solids: Sum	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Percent sodium	Specific conductance (micromhos at 25° C)	pH	Sodium-adsorption-ratio
Plum Creek near Meadville																									
At gage	----	85	Oct. 31, 1947	----	59	0.02	25	3.7	12		105	0	16	1.8	0.2	0.9	0.00	144	----	78	0	26	173	7.9	0.6
Do	----	124	June 25, 1948	----	57	.00	34	3.5	18		151	0	8.0	2.4	.4	1.1	.09	216	----	99	0	28	242	7.5	.8
Do	----	74	July 21, 1948	----	61	.00	25	2.0	12		108	0	4.0	2.4	.3	.4	.07	168	----	71	0	27	177	7.9	.6
Do	----	88	Aug. 16, 1948	----	----	.00	24	2.5	15		109	0	9.6	.6	.4	.8	.00	174	----	70	0	31	181	----	.8
Do	----	81	Oct. 4, 1948	----	59	.04	25	3.0	14		109	0	12	1.0	.3	1.2	.00	160	----	75	0	29	175	7.8	.7
Do	----	99	Mar. 13, 1949	----	51	.05	34	3.0	4.1		120	0	4.0	1.0	.3	1.8	.05	171	----	98	0	8	207	7.4	.2
Do	----	89	Apr. 29, 1949	----	53	.05	31	4.4	2.8		116	0	3.2	.8	.3	1.0	1.6	167	----	96	1	6	194	7.5	.1
Do	----	97	June 22, 1949	----	53	.02	29	4.7	14		138	0	6.4	.8	.5	1.8	----	188	----	92	0	26	231	7.2	.7
Do	----	85	Aug. 1, 1949	----	60	.05	26	2.1	10		109	0	3.4	.5	.4	1.6	----	169	----	74	0	23	178	8.0	.5
Do	----	74	Sept. 22, 1949	----	56	.04	27	2.3	6.9		108	0	1.0	.5	.3	1.3	----	162	----	77	0	16	185	8.1	.3
Average	----	----	----	----	57	----	28	3.1	11		117	----	6.8	1.2	0.3	1.2	0.05	172	----	83	0	23	194	----	0.5
Ground water of the Ainsworth tableland, Brown County																									
30-21-12cb	78	----	Sept. 29, 1952	53	47	0.10	22	3.2	7.8	6.4	82	6	4.0	2.5	0.2	7.6	0.04	150	----	68	0	18	185	8.7	0.4
30-21-26bb	65	----	Oct. 18, 1950	53	44	.06	13	1.3	6.6	6.5	56	0	3.0	2.5	.2	8.3	.10	120	----	38	0	24	119	7.3	.5
30-22-25 cb:																									
Pumped 30 min	----	----	Oct. 30, 1951	52	----	0.18	----	----	----	----	----	----	----	----	----	----	----	134	----	47	----	----	134	----	----
Pumped 5 hr	----	----	do	52	----	.02	----	----	----	----	----	----	----	----	----	----	----	110	----	39	----	----	104	----	----
Pumped 6 hr, 40 min.	----	----	do	52	47	.04	12	1.5	5.7	3.4	56	0	1.0	1.3	0.1	3.0	0.01	112	----	36	0	24	106	7.2	0.4
30-22-26ba2	----	----	Dec. 6, 1949	54	50	.03	19	3.0	7.5	5.7	90	0	4.0	3.3	.2	3.3	.30	156	----	60	0	20	180	8.2	.4
30-22-26cc:																									
Pumped 30 min	69.5	----	Nov. 13, 1951	51	----	.02	----	----	----	----	----	----	----	----	----	----	----	126	----	47	----	----	114	----	----
Pumped 2 hr, 10 min.	69.5	----	do	51	----	.03	----	----	----	----	----	----	----	----	----	----	----	126	----	45	----	----	114	----	----
Pumped 5 hr	69.5	----	do	51	50	.02	13	2.3	5.9	4.5	64	0	3.0	1.0	.2	1.9	.01	120	----	42	0	21	115	7.0	.4
30-23-18ac	58	----	Jan. 12, 1950	56	36	.04	14	1.9	5.2	2.3	34	0	7.0	4.0	.1	18	.30	118	----	53	15	20	125	7.7	.4

Long Pine Creek near Riverview

At gage	-------	99	June 29, 1948	----	57	0.03	22	2.0	8.0	92	0	1.6	1.2	0.2	1.4	0.06	146	------	63	0	22	152	7.9	0.4
Do	-------	100	July 21, 1948	----	57	.05	21	2.1	12	92	0	8.0	.8	.3	1.5	.02	146	------	61	0	30	151	8.0	.7
Do	-------	93	Sept. 1, 1948	----	----	.00	20	3.0	14	92	0	14	.0	.2	1.8	.00	152	------	62	0	32	158	7.3	.7
Do	-------	89	Sept. 17, 1948	----	58	.02	22	2.3	9.1	92	0	4.0	2.8	.3	.0	.00	147	------	64	0	24	156	8.1	.5
Do	-------	259	Apr. 6, 1949	----	27	.06	23	5.5	12	103	0	16	1.0	.5	2.0	.06	174	------	80	0	24	180	7.8	.6
Do	-------	112	May 3, 1949	----	54	.02	28	2.3	3.0	95	0	3.6	1.5	.2	2.3	-----	146	------	80	2	8	171	7.4	.1
Do	-------	138	May 25, 1949	----	48	.02	24	1.0	10	99	0	.4	.8	.6	2.7	-----	152	------	64	0	26	171	8.0	.6
Do	-------	228	June 12, 1949	----	28	.04	34	4.0	6.7	131	0	4.0	1.0	.2	3.0	-----	164	------	102	0	13	217	7.1	.3
Do	-------	98	July 25, 1949	----	58	.05	22	.5	11	92	0	1.4	1.5	.2	1.3	-----	143	------	57	0	29	161	7.3	.6
Do	-------	762	May 17, 1952	59	28	.13	32	3.4	16	146	0	6.0	1.0	.2	2.4	.31	196	------	94	0	27	242	7.5	.7
Average	-------	------	----------------	----	46	-----	25	2.6	9.9	103	----	5.9	1.2	0.3	1.8	0.08	157	------	73	0	23	176	----	0.5

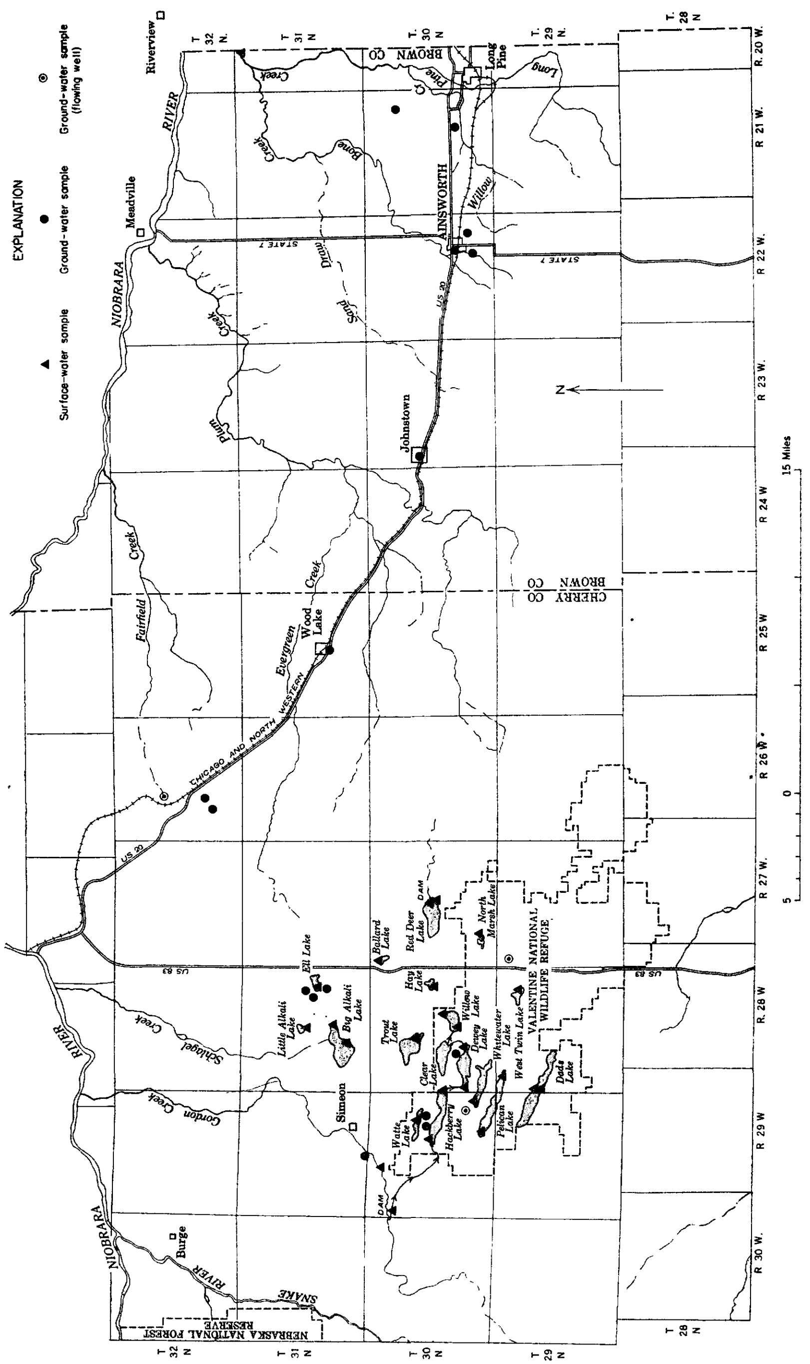

FIGURE 19.—Location of quality-of-water sampling points.

The data in table 7 are grouped according to source and area; as indicated below, each subdivision of the table supplies information on a part of the hydrologic picture in the report area.

1. Samples from the Snake River near Burge represent the water that will be diverted under the proposed development program.
2. Samples of water from Gordon Creek at diversion dam and near Simeon are representative of the ground water in the western part of the area to be traversed by the proposed canal.
3. Ground-water samples collected in the sandhills area in eastern Cherry County also are representative of the ground water in the area to be traversed by the proposed canal.
4. Samples were collected from the lakes in eastern Cherry County because these lakes have been suggested as constituting potential sources of pollution to irrigation water should the lake water be drained by the proposed canal.
5. Samples of water from Plum Creek near Meadville are representative of the ground water in the eastern part of the area to be traversed by the proposed canal and also the western part of the Ainsworth tableland.
6. Samples of ground water collected from wells in Brown County are representative of the water in the Pleistocene deposits in the southwestern part of the Ainsworth tableland.
7. Samples of water from Long Pine Creek near Riverview, which receives much of its drainage from the Ainsworth tableland, probably are representative of the ground water that may be used as a supplemental source of irrigation water.

SIGNIFICANCE OF THE IONS IN SOLUTION

An understanding of the significance of the mineral constituents and related physical measurements is essential for evaluating changes in water quality and suitability of water for irrigation and domestic purposes.

Certain chemical constituents of irrigation water supplement soil nutrients and are beneficial to plant growth, whereas others, in excessive quantities, may be detrimental to plant growth and soil structure. The most important factors that affect the quality of water for irrigation are the dissolved-solids content, the ratio of sodium to the other principal positively charged ions (calcium, magnesium, and potassium) and the bicarbonate and boron contents.

For the purpose of classifying irrigation water, the dissolved-solids content can be expressed in terms of specific conductance, which is a measure of the capacity of a solution to carry an electrical current and is, therefore, an index of the content of dissolved and ionized salts. The application of highly mineralized water may produce saline soils if drainage is not adequate. The U. S. Salinity Laboratory Staff (1954, p. 70) reports:

Nearly all irrigation waters that have been used successfully for a considerable time have conductivity values less than 2,250 micromhos/cm. Waters of higher conductivity are used occasionally, but crop production, except in unusual situations, has not been satisfactory.

Irrigation water having a high sodium ratio adversely affects the soil texture by the chemical process of ion exchange, by which sodium replaces calcium and magnesium in the soil complex. The sodium-bearing soil particles are readily dispersed and may cause the soil to become relatively impermeable to the infiltration of water, thereby ultimately accentuating drainage problems and bringing about saline soils and crop damage.

The relation of bicarbonate to calcium plus magnesium also affects the suitability of the water for irrigation. Eaton (1950) has shown that the sodium ratio increases if the salts in water are concentrated by evapotranspiration to the extent that sparingly soluble calcium carbonate and magnesium carbonate precipitate. The amount of carbonate plus bicarbonate in excess of calcium plus magnesium—expressed in equivalents per million—has been termed by Eaton the "residual sodium carbonate." The U. S. Salinity Laboratory Staff (1954, p. 81) concludes that waters containing more than 2.5 epm of "residual sodium carbonate" are not suitable for irrigation use; waters containing 1.25 to 2.5 are marginal, and those containing less than 1.25 are probably safe.

Boron is essential to the normal growth of all plants, but the quantity required is very small. Boron is very toxic to certain plant species; the concentration that will injure sensitive plants is often approximately that required for normal growth of very tolerant plants. Scotfield (1936) lists the following permissible limits for boron in irrigation water:

Classification of irrigation water on basis of boron content

Class	Boron (ppm)		
	Sensitive crops	Semitolerant crops	Tolerant crops
1	<0.33	<0.67	<1.00
2	0.33–0.67	0.67–1.33	1.00–2.00
3	.67–1.00	1.33–2.00	2.00–3.00
4	1.00–1.25	2.00–2.50	3.00–3.75
5	>1.25	>2.50	>3.75

The U. S. Public Health Service (1946) has established certain maximum concentration limitations for potable water to be used an interstate carriers. Although excess concentrations of other than toxic substances do not necessarily preclude the domestic use of a water, these limitations are valuable as generally accepted criteria for drinking water. The allowable limits are as follows:

Constituent	*Limiting concentration (ppm)*	*Constituent*	*Limiting concentration (ppm)*
Iron and manganese together	0.3	Fluoride	1.5
Magnesium	125	Sulfate	250
Chloride	250	Dissolved solids	[1] 500

[1] 1,000 ppm permitted if no other water is available.

High concentrations of iron and manganese are objectionable in water for domestic purposes because these metals stain fixtures, utensils, and fabrics. Calcium and magnesium are the principal constituents that make water hard. Hardness limits have not been specified, but if hardness exceeds about 200 ppm the water is considered to be very hard. Water containing large quantities of magnesium in conjunction with sulfate (epsom salts) has saline cathartic properties. Other salts of sulfate have similar physiological effects but in varying degree. Drinking water containing more than 250 ppm of chloride tastes salty to some users, and water containing more than 500 ppm tastes salty to most users.

High fluoride concentration in water may cause a dental defect known as mottled enamel if the water is used for drinking by children during calcification, or formation, of the teeth (Dean, 1936). However, the consumption of water that contains small quantities of fluoride during the same period has been shown (Dean, 1938) to assist in reducing the incidence of tooth decay (dental caries). A fluoride content of about 1.0 ppm is considered to be optimum. Nitrate in amounts greater than a few parts per million may indicate previous contamination of the water by sewage or other organic matter, as it represents the final stage of oxidation in the nitrogen cycle. According to Maxcy (1950), methemoglobinemia, one of the causes of infant cyanosis (blue baby), sometimes results from the drinking of water that has a high nitrate content, in excess of about 44 ppm.

EFFECT OF MODIFICATION OF THE NATURAL HYDROLOGIC REGIMEN ON WATER QUALITY

The Snake River is a typical effluent stream, receiving most of its flow from ground-water discharge. From June 1947 to September 1953 its flow at Burge ranged only from 100 to 566 cfs. Fifteen samples of water were collected and analyzed between August 1947 and September 1952. The residue on evaporation of these samples ranged only from 140 to 192 ppm. (See table 7.) Because of the relative constancy in both water discharge and dissolved-solids content, an average of the 15 analyses is probably representative of the water that would be diverted to the Ainsworth irrigation project. The water is dilute and of the calcium bicarbonate type. The silica content averages about 34 percent of the dissolved solids.

LOWERING OF THE WATER TABLE

The ground water sampled in Cherry County is similar in type and concentration to the water from the Snake River. The dissolved-solids content ranged from 56 to 258 ppm. There appears to be no correlation between the chemical quality of the water and the depth or location of wells, or the direction of water movement. The relative shallowness of the water table and the high percentage of recharge from precipitation would tend to accentuate the effect on water quality of local differences in lithologic character and recharge. Analytical results in table 7 are of samples collected during different seasons from 1949 to 1952. It is very probable that the mineral content of the water yielded by any one shallow well fluctuates appreciably. However, the analyses can be regarded as representative of the area to be traversed by the proposed canal.

Gordon Creek and Plum Creek, which drain excess ground water from most of the region west of the proposed irrigation project, are very similar in quality to the ground water sampled and only slightly more mineralized than the Snake River.

Lakes and marshes abound in eastern Cherry County. Analyses of water from 16 of these lakes also are shown in table 7. The dissolved-solids content of these samples ranged from 181 to 2,480 ppm, and the percent sodium ranged from 19 to 64. Because some of these waters are chemically undesirable for irrigation, an understanding of the relation of the lake salts in the lake waters to any proposed modification of the natural hydrologic regimen of the area is essential. Two questions are involved: First, What is the source of the salt? and second, If the lakes are drained, what will be the effect of the salt on the surrounding ground water and on the water in the irrigation canal?

Because the lakes are hydraulically continuous with the subsurface zone of saturation (p. 37), ground water flows into the lakes. As water is lost by evaporation, the dissolved salts remain and their concentration increases. During this process some of the least soluble salts may precipitate. In the report area the most highly mineralized lake waters have the highest percentages of soluble salts of sodium and potassium. This geochemical difference in quality is caused by the precipitation of sparingly soluble calcium and magnesium carbonate. Condra (1918) and Rainwater (*in* Bradley, 1956) report that a similar chemical progression from ground water of the dilute calcium bicarbonate type to lake water of the sodium potassium sulfate bicarbonate type occurs in the sandhills region west of the Ainsworth unit.

The effect of lake water moving into the surrounding ground-water reservoir as a result of a declining water table probably would be insignificant. Available data suggest that the process occurs at some places and times under the present natural environment, and the analyses of adjacent ground water show no deleterious effects. Probably these lakes are not in closed basins but constantly receive water, concentrate it, and discharge it to the aquifer or to natural surface drainageways. If the lakes were not discharging water, the concentration of minerals would be many times the amount present when sampled. The lakes are flooded valleys, and the mean depth of many of them is less than 10 to 15 feet. Thus the quantity of concentrated water to be disposed of is not large. Also, precipitation would be expected to dilute any highly concentrated water because the water moves only very slowly (probably only a few feet per day) through the aquifer.

Mixing of water from some of the more mineralized lakes with Snake River water would naturally increase the salt content of the transit irrigation water. An accurate appraisal of the effect of this mixing entails consideration of the volume of the lakes and the volume of diversion, in addition to the quality of the water at different times. However, regardless of these factors, any economically deleterious effect would probably be small because the Snake River is so dilute, the water from most of the lakes is suitable, even as it is, for irrigation of the well-drained soils that characterize the Ainsworth tableland, and the concentrated lake water would be dissipated in a short time.

In summation, it is improbable that inflow of either ground or surface water from eastern Cherry County would render Snake River water unsuitable for irrigation.

RAISING OF THE WATER TABLE

A water-losing canal would present another problem, even though the quality of the Snake River is similar to that of the ground water. Plate 1 shows that the water table is less than 10 feet below the land surface in much of the area to be traversed by the proposed canal and that marsh areas, which are susceptible to water-quality changes, are extensive. Where the water table rises to within a few feet of the land surface, ground water may move upward by capillarity into the root zone and to the soil surface. Under this condition ground water contributes to the salinization of the soil because the dissolved salts are concentrated by evapotranspiration. Where the concentration of salts is sufficiently extensive, the geochemical characteristics of the ground water may be altered as they are in the lakes. Raising of the water table by canal leakage would widen the area susceptible to water-quality changes. (See p. 45–46.)

SUITABILITY OF THE WATER FOR USE

IRRIGATION

Most of the interest in the use of ground water for irrigation in the report area is centered on the Ainsworth tableland. However, this discussion of water-quality criteria is applicable to both ground and surface water throughout the report area.

The quality of water underlying the Ainsworth tableland is indicated by analyses of water from six wells and from Plum and Long Pine Creeks. (See table 7.) All the sampled wells obtain water from sand and gravel of Pleistocene age. Although no water samples were collected from the Ogallala formation in the area, analyses of water collected from this aquifer in adjacent areas show that, in general, the water is similar in quality to that from the deposits of Pleistocene age. Deep wells in the Ogallala formation may yield water that is somewhat more mineralized but is still suitable for irrigation. The data in table 7 include analyses of samples collected at various times during two aquifer tests and show that the quality of the pumped water did not change appreciably during the tests.

The staff of the U. S. Salinity Laboratory (1954) has presented a diagrammatical method for classifying irrigation water on the basis of sodium hazard and salinity hazard. (See fig. 20 and interpretation below.) This diagram is empirical in that the designation of classes and the conditions for satisfactory water use are based on field and laboratory observations. Sodium-adsorption ratio (SAR) is the selected medium for expressing the percentage relation of sodium to other cations in solution.

$$SAR=\frac{Na}{\sqrt{\frac{Ca+Mg}{2}}}$$

Concentrations are in equivalents per million.

The interpretation of the diagram (fig. 20) for conductivity (salinity hazard) and sodium (sodium hazard) by the U. S. Salinity Laboratory Staff is as follows:

CONDUCTIVITY

Low-salinity water (C_1) can be used for irrigation with most crops on most soils with little likelihood that soil salinity will develop. Some leaching is required, but this occurs under normal irrigation practices except in soils of extremely low permeability.

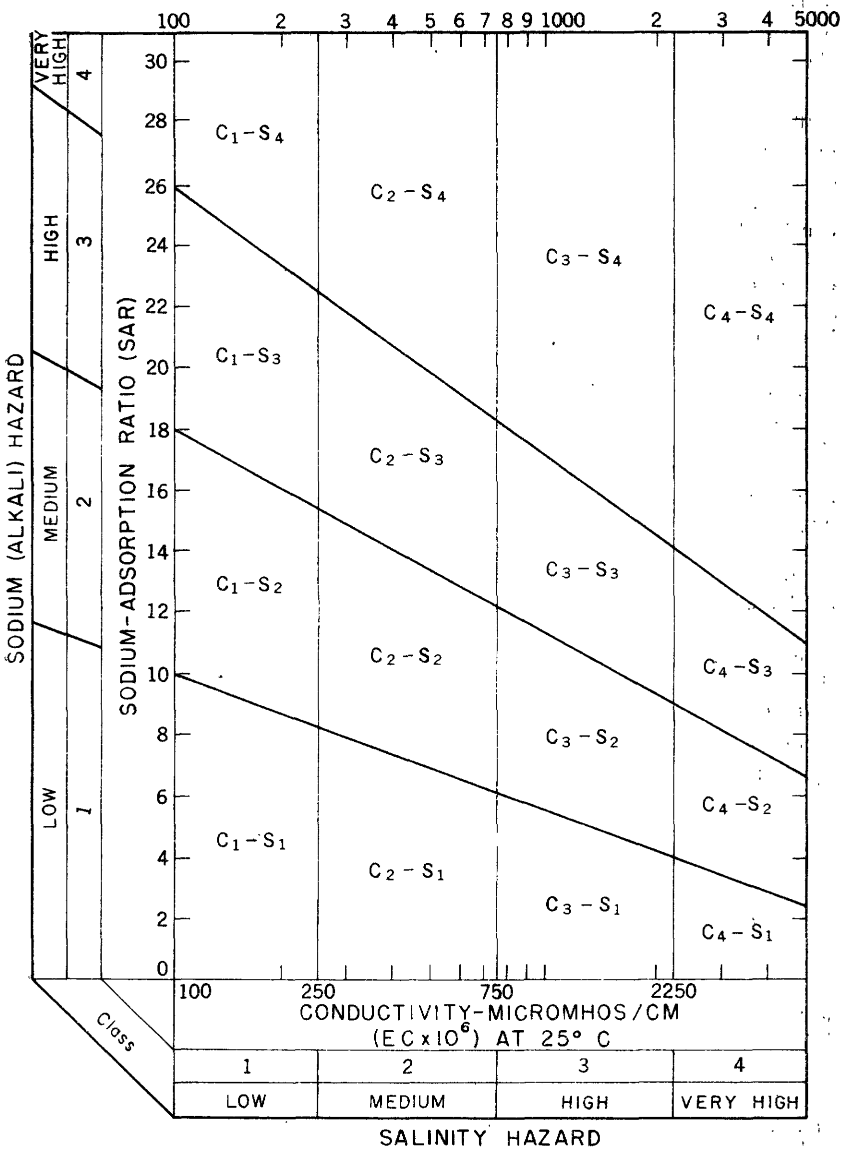

FIGURE 20.—Diagram for the classification of irrigation water (after U. S. Salinity Laboratory Staff).

Medium-salinity water (C_2) can be used if a moderate amount of leaching occurs. Plants with moderate salt tolerance can be grown in most cases without special practices for salinity control.

High-salinity water (C_3) cannot be used on soils with restricted drainage. Even with adequate drainage, special management for salinity control may be required and plants with good salt tolerance should be selected.

Very high salinity water (C_4) is not suitable for irrigation under ordinary conditions, but may be used occasionally under very special circumstances. The soils must be permeable, drainage must be adequate, irrigation water must be applied in excess to provide considerable leaching, and very salt-tolerant crops should be selected.

SODIUM

The classification of irrigation waters with respect to SAR is based primarily on the effect of exchangeable sodium on the physical condition of the soil. Sodium-sensitive plants may, however, suffer injury as a result of sodium accumulation in plant tissues when exchangeable sodium values are lower than those effective in causing deterioration of the physical condition of the soil.

Low-sodium water (S_1) can be used for irrigation on almost all soils with little danger of the development of harmful levels of exchangeable sodium. However, sodium-sensitive crops such as stone-fruit trees and avocados may accumulate injurious concentrations of sodium.

Medium-sodium water (S_2) will present an appreciable sodium hazard in fine-textured soils having high cation-exchange-capacity, especially under low-leaching conditions, unless gypsum is present in the soil. This water may be used on coarse-textured or organic soils with good permeability.

High-sodium water (S_3) may produce harmful levels of exchangeable sodium in most soils and will require special soil management—good drainage, high leaching, and organic matter additions. Gypsiferous soils may not develop harmful levels of exchangeable sodium from such waters. Chemical amendments may be required for replacement of exchangeable sodium, except that amendments may not be feasible with waters of very high salinity.

Very high sodium water (S_4) is generally unsatisfactory for irrigation purposes except at low and perhaps medium salinity, where the solution of calcium from the soil or use of gypsum or other amendments may make the use of these waters feasible.

The chemical characteristics that affect the suitability of the water for irrigation are shown in the following table. No harmful effects

Suitability of waters of the Ainsworth tableland for irrigation

Well or stream	Specific conductance (micromhos at 25° C)	Residual sodium carbonate (epm)	Percent sodium	Sodium-adsorption ratio	Classification	Boron (ppm)
30-21-12cb	185	0.18	18	0.4	C_1-S_1	0.04
30-21-26bb	119	.16	24	.5	C_1-S_1	.10
30-22-25cb	106	.20	24	.4	C_1-S_1	.01
30-22-26ba2	180	.21	20	.4	C_1-S_1	.30
30-22-26cc	115	.21	21	.4	C_1-S_1	.01
30-23-18ac	125	.00	20	.4	C_1-S_1	.30
Plum Creek near Meadville (average)	194	.27	23	.5	C_1-S_1	.05
Long Pine Creek near Riverview (average)	176	.23	23	.5	C_1-S_1	.08

from sodium, salinity, residual sodium carbonate, or boron could be attributed to the water quality. Other methods used for rating water for irrigation (Wilcox, 1948, and Thorne and Thorne, 1951) similarly show that the water is of good quality.

Because most of the soils of the Ainsworth tableland are permeable and well drained, salinization is not likely to result from the irrigation if the water table is low enough to permit flushing of the root zone. However, some unfavorable chemical-quality conditions may develop in the area south and west of Ainsworth, where the depth to water is now less than 10 feet, unless adequate drainage is provided. The Bureau of Reclamation plans to provide adequate drainage facilities if pumping of ground water does not prevent waterlogging in the areas where the canal will be unlined.

DOMESTIC PURPOSES

Chemical analyses in table 7 show that, without exception, the ground water of the Ainsworth unit is of good mineral quality for domestic use. The hardness is generally less than 50 ppm and no objectionable quantities of iron, magnesium, sulfate, fluoride, nitrate, or dissolved solids were found. The water-quality data in this report pertain only to the mineral character and do not include the bacteriological, or sanitary, condition of the water.

CONCLUSION

Underlying much of the Ainsworth unit is an aquifer capable of yielding large quantities of water to wells. The aquifer comprises unconsolidated sediments of Quaternary age and semiconsolidated to consolidated sediments of Tertiary (Pliocene) age and ranges in aggregate thickness from a few feet to as much as 500 feet and possibly more. Ground water moves into the area by underflow from the southwest, and while it is percolating through the aquifer in a generally northeast direction toward the Niobrara River it is augmented by infiltrating precipitation. In the valleys throughout much of the sandhills part of the area and in the extreme southwest part of the Ainsworth tableland, the top of the zone of saturation is less than 10 feet below the land surface; in the central part of the Ainsworth tableland, the depth to water ranges from 10 to 60 feet, and nearer the deeply incised valleys that border the Ainsworth tableland the depth to water ranges from 60 to a little more than 200 feet. The lakes occupying some of the valleys in the sandhills part of the area are hydraulically continuous with the adjacent and underlying ground-water body. Because the water table is within the reach of plant roots in a large part of the sandhills area, evaporation and transpiration account for much of the discharge of ground water. The other principal means of discharge are outflow into surface drainage courses and subsurface outflow into adjoining areas. At the present time only small amounts of ground water are withdrawn by wells, despite the capacity of the aquifer to yield large quantities.

If a canal is constructed across the sandhills part of the area to carry irrigation water from a reservoir on the Snake River to the

Ainsworth tableland, the interchange of water in unlined portions of the canal with ground water along the canal route will effect local changes in water level. Where the canal is lined, however, such changes will be minor.

The yield of wells in the southwestern half of the Ainsworth tableland is adequate for irrigation, and it is estimated that not less than 8,000 acre-feet per year could be pumped safely from wells there. In the northeastern half, where the water table is deeper and the aquifer is thinner and less permeable, irrigation wells would need to be much deeper, the lift of water would be much greater, and the yield per well probably would be less; thus the conditions in the northwestern half of the area are less favorable for irrigation with ground water.

Drainage of ground or surface waters from the sandhills area into a proposed canal carrying water from the Snake River will have little effect on the overall chemical quality of the canal water. However, recharge of the ground-water reservoir by canal leakage could cause some waterlogging followed by salinization of the soil where the dissolved salts are concentrated by evapotranspiration.

Because of its low mineralization, sodium-adsorption ratio, and boron content, the ground water of the Ainsworth tableland is of suitable quality for irrigation. The soils, in general, are well drained; salinization is not likely to occur, particularly where the depth to water is great enough that waterlogging is not a threat.

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RECORDS

LOGS OF TEST HOLES AND WELLS

The logs of 2 test holes and 9 wells, drilled in cooperation with the U. S. Bureau of Reclamation and the Conservation and Survey Division of the University of Nebraska, and the logs of 6 other wells, drilled by commercial drillers, are given in the following table.

Logs of test holes and wells

[Wells drilled by commercial drillers indicated by an asterisk (*)]

29-22-10ac *

	Thickness (feet)	Depth (feet)
Quaternary system:		
Soil	2	2
Pleistocene series, undifferentiated:		
Clay, green	12	14
Sand, fine	9	23
Clay	2	25
Sand and gravel	14	39
Quaternary system—Continued		
Pleistocene series, undifferentiated—Continued		
Clay	5	44
Sand and clay	13	57
Sand and gravel	51	108
Sandstone	7	115

29-22-14ab

	Thickness (feet)	Depth (feet)
Quaternary system:		
Soil, sandy	3	3
Pleistocene series, undifferentiated:		
Silt, sandy	1	4
Silt	1	5
Silt, sandy	12.5	17.5
Sand and gravel	19	36.5
Silt, sandy	2.5	39
Sand and gravel	2.8	41.8
Silt, sandy	3.2	45
Sand, silty	4.8	49.8
Sand and gravel	4.2	54
Silt	1	55
Sand and gravel	7	62
Silt, sandy	1.5	63.5
Sand, fine to coarse	16.5	80
Sand and gravel	35.2	115.2
Silt	11.8	127
Tertiary system:		
Pliocene series—Ogallala formation:		
Sandstone	13	140
Sand, fine, loose	35	175
Sand, silty	15	190
Sand, fine	15	205
Sand, silty	5	210
Silt, sandy	15	225
Sand, fine, greenish-gray	10	235
Sand, silty	5	240
Sand, medium	5	245
Sand, silty, slightly cemented	10	255
Sand, slightly cemented; contains many siliceous rootlets	45	300
Sand, silty	5	305
Tertiary system—Continued		
Pliocene series—Ogallala formation—Continued		
Sand, slightly cemented; contains fossil *Biorbia* seeds	15	320
Sand, silty, slightly cemented	10	330
Sand, very fine to coarse, loose	10	340
Sand, very fine to fine, cemented, calcareous	40	380
Sand, very fine to fine, loose	13	393
Silt, sandy, slightly cemented, greenish-gray	2	395
Sand, very fine to medium, silty, slightly cemented	13	408
Sand, fine to medium	4.8	412.8
Sand, silty, well cemented	.2	413
Sand, very fine to medium	47.7	460.7
Limestone, hard	.7	461.4
Sand, very fine to fine	16.6	478
Silt, sandy, cemented	2	480
Sand, very fine, cemented	15	495
Sand, very fine to fine, slightly cemented	20	515
Sand, fine	5	520
Sand, very fine, cemented	20	540
Sand, very fine, silty; contains some clay	20	560
Sand, very fine to fine, cemented	5	565
Clay, silty, greenish-gray, calcareous	22	587
Oligocene series—Brule(?) clay:		
Silt, flesh-colored, calcareous	13	600

29-22-22ad

	Thickness (feet)	Depth (feet)
Quaternary system:		
Soil, silty	2	2
Pleistocene series, undifferentiated:		
Sand, fine to coarse	13	15
Sand, very fine to medium	23.5	38.5
Sand, very fine to fine, silty	1.5	40
Sand, fine to coarse	8	48
Silt	.2	48.2
Sand, fine to coarse	11.8	60
Sand, very fine to medium, silty	5	65
Sand, fine to coarse	13	78
Sand and gravel	2	80
Sand, medium to coarse	5	85
Sand and gravel	37	122
Silt, sandy, light-brown	48	170
Tertiary system:		
Pliocene series—Ogallala formation:		
Sand, fine, cemented; contains siliceous rootlets	38	208
Sand, fine, very silty	2	210
Sand, fine, cemented, greenish-gray	50	260
Sand, fine, cemented, calcareous	5	265
Silt, sandy, cemented, calcareous	5	270
Sandstone, calcareous, light-gray	15	285
Limestone, sandy, moderately hard	10	295
Sand, fine, calcareous, cemented, greenish-gray	25	320

Logs of test holes and wells—Continued

29-22-22ad—Continued

	Thickness (feet)	Depth (feet)
Tertiary system—Continued		
Pliocene series—Ogallala formation—Continued		
Sand, very fine to fine, cemented, calcareous	15	335
Sand, very fine to fine, silty, cemented	15	350
Sand, very fine to fine, loose, calcareous	5	355
Sand, very fine to fine, cemented, calcareous	31	386
Tertiary system—Continued		
Pliocene series—Ogallala formation—Continued		
Silt	0.2	386.2
Sand, very fine to fine, cemented, calcareous	3.7	389.9
Silt and clay	.1	390
Sand, very fine to fine, cemented, calcareous	10	400
Silt, greenish-gray; contains some clay	10	410

30-21-3aa

	Thickness (feet)	Depth (feet)
Quaternary system:		
Soil	3.5	3.5
Pleistocene series, undifferentiated:		
Clay, sandy, black to tan	2.5	6
Sand, medium to coarse	2	8
Silt, light-tan	.2	8.2
Sand and silt	1.8	10
Sand and gravel	5	15
Silt	1	16
Sand, very fine to fine	14.5	30.5
Silt, sandy	8	38.5
Clay	1	39.5
Silt, brownish-gray	6.5	46
Silt, dark-brown (buried soil zone)	3	49
Silt, brownish-gray	3	52
Silt, sandy, pinkish-tan	15	67
Sand, silty; contains reworked materials of Ogallala formation	10.5	77.5
Silt, sandy, pinkish-tan	2.5	80
Tertiary system:		
Pliocene series—Ogallala formation:		
Sand, fine to medium, greenish-gray	14.8	94.8
Sand, silty; contains some clay	5.2	100
Sand, fine to medium, cemented	25	125
Tertiary system—Continued		
Pliocene series—Ogallala formation—Continued		
Sand, silty, greenish-gray, calcareous	29.8	154.8
Sand, very fine; contains some clay, greenish-gray	5.2	160
Sand and gravel	25	185
Sand, fine to medium, greenish-gray	95	280
Sand, very fine, brownish-buff	10	290
Sand, fine to medium, greenish-gray	15	305
Sand, very fine to fine, buff; contains a few lenses of silt	45	350
Sand, silty	5	355
Sand, very fine to fine, buff, cemented	17	372
Silt, buff-gray; contains some clay	6	378
Sand, silty, cemented	2.8	380.8
Sand, cemented; contains concretions	.7	381.5
Oligocene series — Brule(?) clay:		
Silt, compact, brownish, calcareous	18.5	400

30-21-20cc

	Thickness (feet)	Depth (feet)
Quaternary system:		
Soil	0.5	0.5
Pleistocene series, undifferentiated:		
Sand and gravel	1.5	2
Sand, very fine to medium	8	10
Sand, silty, buff-tan	5	15
Sand and gravel	53	68
Silt, sandy, compact	8.5	76.5
Tertiary system:		
Pliocene series—Ogallala formation:		
Sand, very fine to fine, cemented; contains siliceous rootlets	43.5	120
Sand, silty, compact	7.5	127.5
Sand, very fine to fine, cemented	.5	128
Sand, very fine, silty	6	134
Sand, very fine, cemented; contains siliceous rootlets	1	135
Sand, very fine, cemented	20	155
Sand, cemented; contains lenses of silt	13	168
Tertiary system—Continued		
Pliocene series—Ogallala formation—Continued		
Silt, sandy, light-gray	6	174
Sand, very fine to fine, lightly cemented; contains siliceous rootlets	41	215
Silt, compact, light buff-gray	5	220
Sand, very fine to fine, cemented, calcareous; contains lenses of silt	30	250
Sand, silty, cemented; contains siliceous rootlets	30	280
Sand, very fine to fine, slightly cemented	10	290
Sand, fine to coarse, cemented	7.5	297.5
Silt, sandy	1	298.5
Sand, very fine to medium, silty	31.5	330
Sand, fine; contains lenses of silt	30	360
Sand, lightly cemented; contains lenses of silt	80	440

Logs of test holes and wells—Continued

30-21-20cc—Continued

	Thickness (feet)	Depth (feet)
Tertiary system—Continued		
Pliocene series—Ogallala formation—Continued		
Sand, very fine to fine, brownish-buff	20	460
Sand interbedded with silt	7	467
Silt, sandy	3	470
Sand, very fine to fine, silty, cemented, calcareous	5	475
Sand, very fine to fine, silty, brownish-buff	35	510
Sand, very fine to fine; contains lenses of silt	20	530
Sand, very fine to fine, cemented, greenish-gray	5	535
Tertiary system—Continued		
Pliocene series—Ogallala formation—Continued		
Sand, fine to coarse; contains some silt	14	549
Sand, very fine, silty, calcareous	6	555
Sand, fine, silty; contains reworked Pierre shale	5	560
Cretaceous system:		
Upper Cretaceous series—Pierre shale:		
Shale, weathered, calcareous, rusty to slate gray	20	580

30-22-11bb

	Thickness (feet)	Depth (feet)
Quaternary system:		
Soil	3.5	3.5
Pleistocene series, undifferentiated:		
Silt	2.5	6
Sand and gravel	4	10
Sand, very fine to fine, silty	5	15
Sand, fine to coarse	2	17
Sand, very fine to fine, silty	3	20
Sand and gravel; contains lenses of silt	47.5	67.5
Sand, fine, silty, compact	2.5	70
Sand, very fine to coarse	7.5	77.5
Sand, very fine, silty	2.5	80
Silt, sandy, pinkish-tan	7.5	87.5
Sand, very fine to fine; contains lenses of silt	2.5	90
Sand, silty, gray	13.5	103.5
Silt, gray; contains some clay	1.5	105
Tertiary system:		
Pliocene series—Ogallala formation:		
Sand, fine to medium; contains lenses of silt	5	110
Sand, silty	5	115
Sand, silty, cemented; contains siliceous rootlets	44	159
Silt, sandy, light-buff, calcareous	6	165
Sand, very fine to fine; contains lenses of silt and siliceous rootlets	13	178
Silt, sandy, compact	2	180
Sand, very fine to fine, cemented, contains siliceous rootlets	20	200
Sand, very fine to fine, lightly cemented	15	215
Sand, fine to coarse, lightly cemented	15	230
Sand, fine, loose; contains some lenses of silt	15	245
Sand, very fine to fine, slightly cemented	25	270
Tertiary system—Continued		
Pliocene series—Ogallala formation—Continued		
Sand, very fine to medium, slightly cemented	35	305
Sand, fine to coarse	5	310
Sand, very fine to fine; contains lenses of silt	20	330
Sand, very fine to fine, cemented; contains some siliceous rootlets	20	350
Sand, fine to medium, cemented; contains siliceous rootlets	30	380
Sand, very fine to medium; contains lenses of silt	65	445
Sand, very fine to fine, cemented, calcareous; contains lenses of silt	70	515
Sand, very fine to fine, calcareous; contains lenses of silt	50.5	565.5
Limestone, sandy, hard	.2	565.7
Sand, very fine to fine, calcareous; contains lenses of silt	14.3	580
Sand, very fine to fine, silty	10	590
Sand, very fine to fine, very silty, calcareous	20	610
Silt, sandy	20	630
Silt, sandy, some clay, calcareous	15	645
Clay, silty, gray	15	660
Sand, silty, dark-tan	17	677
Sand and gravel; contains some reworked Pierre shale	1.5	678.5
Cretaceous system:		
Upper Cretaceous series—Pierre shale:		
Shale, limonite stain at top, dark-gray	11.5	690

Logs of test holes and wells—Continued

30-22-18db*

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Quaternary system:			Tertiary system—Continued		
Soil	3	3	Pliocene series—Ogallala formation—Continued		
Pleistocene series, undifferentiated:			Sandstone; contains some sandy clay	3	106
Sandy loam, black	1	4	Sandstone, fair	26	132
Clay, yellow; contains some snail shells	2	6	Clay, sandy, light-gray	6	138
Gravel, coarse	8	14	Sand, cemented, tight	4	142
Clay, sandy, and medium sand	1	15	Sandstone, very good[1]	4	146
Sand, fine to medium	11	26	Sandstone, fair	3	149
Sand, fine	16	42	Clay, sandy, light-colored	1	150
Sand, very fine	2	44	Sandstone, fair	1	151
Clay, sandy, light-green	1	45	Sandstone, good[1]	4.5	155.5
Sand, very fine; contains some clay	1	46	Sand, cemented, tight; contains some sandy clay	7.5	163
Sand, very fine	5	51	Sandstone, good	2	165
Sand, very fine; contains some clay	7	58	Clay, sandy	2	167
Gravel, medium	11	69	Sandstone; contains lenses of clay	7.5	174.5
Tertiary system:			Clay, sandy	1.5	176
Pliocene series—Ogallala formation:			Sandstone, fair	11	187
Sandstone, tight[1]	5	74	Clay, sandy, light-green	3	190
Sandstone, fair[1]	7	81	Sandstone, very good	3.5	193.5
Clay, sandy	2	83	Sandstone, fair	9.5	203
Sandstone, fair	13	96	Sandstone, fair	7	210
Sandstone; contains some loose sand	7	103	Limestone, sandy, good	3	213
			Sand, cemented, tight	8	221
			Limestone, very hard	2	223

[1] "Very good," "good," "fair," and "tight" are drillers' terms for permeability.

30-22-25da*

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Quaternary system:			Quaternary system—Continued		
Soil	2	2	Pleistocene series, undifferentiated—Continued		
Pleistocene series, undifferentiated:			Sand and gravel	1	33
Sand and gravel; contains some clay	1	3	Sand, well-sorted	5	38
Gravel and clay	1	4	Sand and gravel	27	65
Sand, fine, in clay matrix	3	7	Sand, fine, well-sorted	3	68
Sand and gravel	6	13	Gravel, coarse	6	74
Sand, very fine, clayey	19	32	Clay	3	77

30-22-26ba2*—City of Ainsworth municipal-supply well

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Quaternary system:			Quaternary system—Continued		
Soil	6	6	Pleistocene series, undifferentiated—Continued		
Pleistocene series, undifferentiated:			Gravel	10	47
Sand	5	11	Gravel, coarse	9	56
Clay	6	17	Gravel, medium	8	64
Clay, sandy	4	21	Clay; contains gravel	2	66
Sand, crossbedded	7	28	Tertiary system:		
Sand, coarse	3	31	Pliocene series—Ogallala formation:		
Clay	2	33	Sandstone	7	73
Sand	4	37			

30-22-26cc*

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Quaternary system:			Quaternary system—Continued		
Soil	5	5	Pleistocene series, undifferentiated—Continued		
Pleistocene series, undifferentiated:			Gravel, green and yellow	3	41
Sand, fine	22	27	Gravel, yellow	28	69
Clay, blue	5	32	Clay	.5	69.5
Sand and gravel	6	38			

Logs of test holes and wells—Continued

	Thickness (feet)	Depth (feet)
30-22-26db*		
Quaternary system:		
Soil	4	4
Pleistocene series, undifferentiated:		
Gravel	2	6
Sand	8	14
Sand, fine	4	18
Sand, cemented	5	23
Sand, coarse	4	27
Quaternary system—Continued		
Pleistocene series, undifferentiated—Continued		
Gravel and clay	2	29
Sand and gravel	8	37
Gravel and clay balls, green	16	53
Gravel	11	64
Clay	1	65
30-22-30dd		
Quaternary system:		
Soil	2	2
Pleistocene series, undifferentiated:		
Sand, very fine to fine	4.5	6.5
Sand, fine to coarse	3.5	10
Sand, medium to coarse	5	15
Sand and gravel	13	28
Silt	2	30
Sand, medium to coarse	15	45
Sand, fine to medium; contains lenses of silt	7.5	52.5
Sand, fine to medium; contains some gravel	15.3	67.8
Silt, sandy, greenish-gray	2.2	70
Sand, fine to coarse; contains some lenses of silt	7.5	77.5
Sand, fine to coarse	5.5	83
Sand, fine to coarse; contains some lenses of silt	4.5	87.5
Sand, fine to coarse; contains very little silt	7.5	95
Sand, fine to coarse	8	103
Silt, sandy, compact	6.5	109.5
Sand, fine to coarse	.5	110
Silt, sandy, compact, light-gray	1.5	111.5
Tertiary system:		
Pliocene series—Ogallala formation:		
Sand, fine to coarse, cemented; contains lenses of silt	8.5	120
Sandstone	5	125
Sand, fine to coarse; contains cemented silt	5	130
Sand, fine to coarse, silty, cemented	20	150
Sand, fine, cemented	7.5	157.5
Silt, compact, light-gray	7.5	165
Sand, very fine to fine, cemented; contains siliceous rootlets	66	231
Silt, sandy, compact, light greenish-buff	1	232
Sand, fine, slightly cemented; contains lenses of silt	13	245
Sand, very fine to fine, cemented; contains siliceous rootlets	15	260
Sand, very fine to fine, cemented; contains lenses of silt	8	268
Tertiary system—Continued		
Pliocene series—Ogallala formation—Continued		
Silt, compact, greenish-buff	2	270
Sand, very fine to fine, cemented; contains lenses of silt	8	278
Limestone, sandy, white, very hard	.5	278.5
Limestone, sandy, whitish-gray, moderately hard	11.5	290
Sand, very fine to fine, cemented, calcareous	10	300
Sand, fine, cemented, greenish-buff	10	310
Sand, fine, lightly cemented, calcareous	14.7	324.7
Limestone, sandy, white, hard	.3	325
Sand, fine, cemented, calcareous	10	335
Sand, silty	5	340
Sand, silty, cemented	15	355
Silt, sandy	10	365
Sand, fine to medium, silty, calcareous	15	380
Sand, very fine to fine	15	395
Sand, silty, cemented	5	400
Sand, very fine to fine, lightly cemented	20	420
Sand, silty, slightly calcareous	5	425
Silt, sandy, clayey, calcareous	5	430
Sand, very fine to fine, calcareous	5	435
Sand, very fine to fine, greenish-gray	20	455
Sand, silty, compact, gray-buff	5	460
Sand, very fine to fine	7.5	467.5
Silt, sandy	2.5	470
Sand, very fine to fine; contains lenses of silt	25	495
Sand, very fine to fine, calcareous	5	500
Oligocene series—Brule (?) clay:		
Silt, calcareous, pinkish-tan	20	520

Logs of test holes and wells—Continued

30-23-9dd

	Thickness (feet)	Depth (feet)
Quaternary system:		
Soil	5	5
Pleistocene series, undifferentiated:		
Clay, silty	3	8
Sand, silty, clayey	3.5	11.5
Sand, silty	1.5	13
Sand, fine to coarse	17	30
Sand and gravel	28.5	58.5
Silt, sandy, pinkish-brown	10	68.5
Sand, very fine, silty, light-gray	1.5	70
Tertiary system:		
Pliocene series—Ogallala formation:		
Sand, fine, cemented, greenish-gray	30	100
Sand, very fine to fine, cemented, calcareous; contains siliceous rootlets	45	145
Sand, very fine to fine, cemented; contains lenses of silt	18	163
Limestone, sandy, white	5	168
Sand, very fine to fine	22	190
Sand, cemented, calcareous; contains siliceous rootlets	15	205
Sand, very fine to fine, silty, calcareous	22.5	227.5
Limestone, hard, light-gray	.8	228.3
Tertiary system—Continued		
Pliocene series—Ogallala formation—Continued		
Sand, very fine to fine, silty	0.7	229
Silt, sandy, compact, greenish-buff	1	230
Sand, silty, cemented	10	240
Silt, sandy, greenish-buff	5	245
Sand, fine, silty, compact	10	255
Limestone, moderately hard	.2	255.2
Sand, very fine to fine, silty, calcareous	4.8	260
Sand, silty	5	265
Sand, silty, cemented	15	280
Sand, silty	35	315
Sand, fine to coarse; contains some green clay	15	330
Sand, silty, light-gray	16	346
Sand, very fine to fine; contains lenses of silt	24	370
Sand, fine, slightly cemented	10	380
Sand, very fine to fine	50	430
Sand, very fine to fine, cemented, silty, greenish-gray	10	440
Oligocene series—Brule(?) clay:		
Silt, sandy, dark-buff	5	445
Silt, compact, pinkish-buff	5	450

31-21-13aa

	Thickness (feet)	Depth (feet)
Quaternary system:		
Soil	4	4
Pleistocene series, undifferentiated:		
Sand, fine to coarse, silty	2	6
Sand, fine to medium	2.3	8.3
Silt, sandy	1.7	10
Sand, fine to medium	9.5	19.5
Sand and gravel	30.5	50
Sand, silty	5	55
Silt, sandy, compact, buff-gray	5	60
Sand, fine to coarse; contains some lenses of silt	10	70
Sand, fine to coarse, buff; contains some lenses of silt	3	73
Sand, silty, dark-brown	2.5	75.5
Tertiary system:		
Pliocene series—Ogallala formation:		
Sand, silty, gray	4.5	80
Sand, fine, buff-gray	10	90
Tertiary system—Continued		
Pliocene series—Ogallala formation—Continued		
Sand, very fine to fine, slightly cemented	5	95
Sand and gravel	10	105
Sand, fine to medium, slightly cemented, buff-gray	10	115
Sand, very fine to fine, cemented; contains lenses of silt	15	130
Sand, very fine to medium, cemented, calcareous; contains lenses of silt	65	195
Silt, sandy, cemented, calcareous, greenish-gray	35	230
Sand, fine, calcareous	5	235
Oligocene series—Brule(?) clay:		
Silt, calcareous, pinkish-tan	15	250

Logs of test holes and wells—Continued

31-21-19da

	Thickness (feet)	Depth (feet)
Quaternary system:		
Soil	3.5	3.5
Pleistocene series, undifferentiated:		
Sand, fine, silty, dark-brown	1.5	5
Silt, sandy, dark-brown	3	8
Sand and gravel	11.2	19.2
Silt, sandy, compact, buff	15.8	35
Sand, silty, fine to medium	5	40
Sand, fine to coarse, silty	15	55
Sand, very fine to medium; contains lenses of silt	7	62
Silt, compact, buff-gray	3	65
Sand, very fine to fine, compact; contains lenses of silt	15	80
Silt, compact, light buff-gray	4	84
Silt, compact, pinkish-gray	6	90
Tertiary system:		
Pliocene series—Ogallala formation:		
Sand, very fine to fine, slightly cemented, buff	11.5	101.5
Silt, sandy, compact, gray	8.5	110
Sand, very fine to fine, slightly cemented	15	125
Sand, very fine to fine, cemented, calcareous, whitish-gray	30	155
Silt, sandy, cemented, calcareous, whitish-gray	5	160
Sand, silty, cemented, calcareous, brownish-gray	5	165
Silt, sandy, calcareous, cemented, whitish-gray	5	170
Tertiary system—Continued		
Pliocene series—Ogallala formation—Continued		
Sand, fine to coarse, slightly calcareous, brownish-buff	14	184
Silt, greenish-buff	1	185
Sand, very fine to fine; contains lenses of silt	5	190
Silt, sandy, some clay, greenish-buff	1.5	191.5
Sand, very fine to fine, cemented; contains lenses of silt	83.5	275
Silt, compact, light-gray	3.5	278.5
Sand, very fine to fine	5.1	283.6
Silt, sandy, gray	1.4	285
Sand, very fine to fine; contains lenses of silt	15	300
Sand, silty	7.5	307.5
Sand, very fine to fine, cemented	2.5	310
Sand, silty	5	315
Sand, very fine to fine; contains lenses of silt	5	320
Sand, very fine to fine	20	340
Sand, very fine to fine, silty; contains cemented silt grains	12	352
Sand, silty, well cemented, calcareous	.5	352.5
Sand, very fine to fine, silty	2.5	355
Oligocene series—Brule (?) clay:		
Silt, sandy, cemented, weathered	17	372
Silt, sandy, pinkish-tan	38	410

31-22-11dd

	Thickness (feet)	Depth (feet)
Quaternary system:		
Soil	4	4
Pleistocene series, undifferentiated:		
Clay and silt	3.5	7.5
Sand and gravel	8.3	15.8
Silt and sand	2.2	18
Sand, coarse; contains lenses of silt and clay	1.5	19.5
Clay, yellow	.5	20
Silt and clay, light-gray	2	22
Clay, sandy, light-gray	3	25
Clay, sandy; contains lenses of silt	4.3	29.3
Clay, calcareous, light-gray	.7	30
Clay, brownish-gray	5	35
Clay, calcareous, light-gray	6.2	41.2
Clay, silty, calcareous	6.8	48
Clay, very compact	1.5	49.5
Clay, silty	4.5	54
Silt and clay, light-brown	3	57
Sand, very fine	3	60
Tertiary system:		
Pliocene series—Ogallala formation:		
Sand, very fine, calcareous, pinkish-tan	20	80
Sand, very fine to fine, silty, brownish-buff	2	82
Sand, medium, calcareous	3	85
Tertiary system—Continued		
Pliocene series—Ogallala formation—Continued		
Sand, very fine to coarse; contains some silt	15	100
Sand, very fine to medium, cemented	7	107
Sand, silty, greenish-buff	1.5	108.5
Sand, silty; contains some clay	1.5	110
Sand, medium, cemented, calcareous	5	115
Sand, fine to medium, silty, cemented	2.5	117.5
Silt, sandy, cemented, calcareous, light-gray	2.5	120
Sand, fine to medium, calcareous, cemented	5	125
Silt, sandy, calcareous, light-gray	5	130
Sand, silty, calcareous, cemented	8	138
Sand, very fine to fine, calcareous, cemented, light-gray	9	147
Sand, very fine to coarse, calcareous, brown	3	150
Sand, very fine to coarse, silty	15	165
Sand, very fine to coarse, cemented, brown	5	170
Sand and gravel	21	191

Logs of test holes and wells—Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
31-22-11dd—Continued					
Tertiary system—Continued			Tertiary system—Continued		
Pliocene series—Ogallala formation—Continued			Pliocene series—Ogallala formation—Continued		
Sand, very fine to fine, silty	9	200	Sand, very fine to fine; contains lenses of silt	10	275
Sand, very fine to coarse, compact	30	230	Sand, very fine to fine	5	280
Sand, very fine to medium; contains lenses of silt	10	240	Sand, very fine to medium, clean	5	285
			Sand, silty, fine	15	300
			Sand, fine to medium	20	320
Sand, very fine to medium, brownish-buff	25	265	Oligocene series—Brule (?) clay:		
			Silt, sandy, pinkish-tan	20	340

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
31-22-30bb					
Quaternary system:			Tertiary system—Continued		
Soil	1	1	Pliocene series—Ogallala formation—Continued		
Pleistocene series, undifferentiated:			Sand, very fine, silty, cemented, buff-gray	19	210
Sand, silty, dark-brown	1.5	2.5	Sand, very fine to fine; contains lenses of silt	15	225
Sand, silty, light-brown	2	4.5	Silt, sandy, very fine, light-gray	10	235
Sand, silty, dark-brown	.5	5	Sand, very fine to coarse, slightly cemented	30	265
Silt, sandy, dark-brown	4	9	Sand, very fine to medium; contains lenses of silt	5	270
Sand, silty, brownish-gray	.5	9.5	Sand, very fine to fine	25	295
Sand, fine to coarse; contains some gravel	44.5	54	Sand, very fine to fine, cemented; contains lenses of silt	25	320
Sand, fine; contains lenses of silt	3.5	57.5	Sand, very fine to fine	5	325
Sand and gravel	3.8	61.3	Sand, very fine to fine; contains lenses of silt	20	345
Silt, sandy; contains some clay, greenish-gray	13.7	75	Sand, silty	5	350
Sand, very fine to fine; contains lenses of silt	10	85	Sand, very fine to fine; contains lenses of silt	100	450
Silt, sandy, calcareous, light-gray	5	90	Sand, very fine to fine	20	470
Sand, very fine to fine, silty, calcareous	5	95	Silt, some clay, slightly calcareous	10	480
Sand and silt, calcareous, brownish-buff	5	100	Sand, very fine to fine, cemented, calcareous	5	485
Sand, very fine to fine, silty, calcareous	15	115	Sand, very fine to fine, brownish-buff	47	532
Silt, buff-gray; contains some clay	10	125	Sand, very fine, cemented; contains lenses of silt	45	577
Sand, very fine to fine, silty, brownish-gray	4	129	Sand, very fine to fine, silty, cemented	18	595
Silt, sandy, dark brownish-gray	1	130	Sand, fine to medium, brownish-buff	15	610
Tertiary system:			Silt, sandy, some clay, light-gray	15	625
Pliocene series—Ogallala formation:			Cretaceous system:		
Sand, very fine to fine; contains lenses of silt	15	145	Upper Cretaceous series—Pierre shale:		
Sand, fine to medium, cemented; contains siliceous rootlets	44	189	Shale, weathered, yellow	2	627
Sand, very fine to medium, silty	2	191	Shale, plastic, dark-gray	13	640

WATER-LEVEL MEASUREMENTS

The investigation on which this report is based included measurements of the depth to water in 260 observation wells. Two of the observation wells near Ainsworth were equipped with recording gages during part of 1950. Measurements of the depth to water below land surface in all observation wells are given in the following tables.

Measurements of the water level in wells, in feet below land surface

BROWN COUNTY

Date	Water level	Date	Water level	Date	Water level
29-21-5aa					
May 24, 1950	7.05	Oct. 9, 1950	6.53	Feb. 16, 1951	7.08
May 29, 1950	7.15	Oct. 31, 1950	6.84	Nov. 14, 1952	7.99
July 6, 1950	7.38				
29-21-6cd					
November 1944	[1] 5.00	Dec. 14, 1948	6.32	Sept. 8, 1950	3.26
Nov. 14, 1947	5.80	Apr. 20, 1949	2.19	Oct. 9, 1950	2.14
Dec. 16, 1947	5.55	June 6, 1949	2.74	Oct. 31, 1950	2.50
Jan. 13, 1948	5.57	July 27, 1949	4.42	Feb. 16, 1951	[2] 3.30
Feb. 17, 1948	5.57	Aug. 30, 1949	5.18	July 5, 1951	1.07
Mar. 16, 1948	5.62	Oct. 17, 1949	5.42	Oct. 5, 1951	1.34
Apr. 13, 1948	5.65	Dec. 6, 1949	5.62	Jan. 31, 1952	.89
May 13, 1948	5.35	Mar. 29, 1950	[2] 3.80	Apr. 4, 1952	.50
June 16, 1948	5.18	May 4, 1950	3.39	June 24, 1952	2.46
July 13, 1948	5.68	May 29, 1950	2.85	Sept. 23, 1952	3.75
Sept. 15, 1948	5.77	June 27, 1950	3.14	Nov. 14, 1952	5.03
Oct. 14, 1948	5.75	Aug. 8, 1950	3.95	Dec. 31, 1952	4.23
Nov. 15, 1948	6.13				
29-21-7ab					
Nov. 14, 1947	4.62	Mar. 16, 1948	5.54	July 13, 1948	[3] 5.65
Dec. 16, 1947	3.92	Apr. 13, 1948	5.44	Aug. 23, 1948	5.68
Jan. 13, 1948	3.96	May 13, 1948	5.36	Oct. 14, 1948	5.99
Feb. 17, 1948	5.56	June 16, 1948	5.36	Aug. 30, 1949	[3] 5.20
29-21-8dc					
May 24, 1950	[4] 2.70	Oct. 9, 1950	1.82	Jan. 31, 1952	0.38
May 29, 1950	2.76	Oct. 31, 1950	2.62	Nov. 14, 1952	3.36
July 6, 1950	3.77	Feb. 16, 1951	3.19		
29-21-17cc					
July 21, 1950	[4] 3.03	July 5, 1951	0.71	June 24, 1952	0.81
Oct. 9, 1950	1.80	Oct. 5, 1951	.23	Sept. 23, 1952	1.72
Oct. 31, 1950	2.25	Jan. 31, 1952	+.27	Nov. 14, 1952	1.21
Feb. 16, 1951	1.57	Apr. 4, 1952	+.56	Dec. 31, 1952	.57
29-22-2bb					
Sept. 19, 1950	[4] 2.65	Feb. 19, 1951	2.88	Jan. 17, 1952	0.58
Oct. 31, 1950	3.07	June 7, 1951	1.63	Nov. 14, 1952	4.11
29-22-4ab					
November 1944	[1] 0.90	Aug. 23, 1948	3.60	Mar. 29, 1950	0.82
Nov. 13, 1947	3.12	Sept. 15, 1948	3.95	May 17, 1950	.94
Dec. 16, 1947	2.48	Oct. 14, 1948	3.54	June 27, 1950	1.84
Jan. 13, 1948	2.47	Nov. 22, 1948	3.18	Sept. 11, 1950	1.99
Feb. 17, 1948	2.34	Dec. 15, 1948	2.09	Oct. 9, 1950	.89
Mar. 16, 1948	1.93	Apr. 20, 1949	.76	Nov. 1, 1950	1.81
Apr. 13, 1948	1.88	July 26, 1949	2.88	Feb. 19, 1951	.63
May 13, 1948	2.12	Aug. 30, 1949	3.35	June 7, 1951	+.17
June 16, 1948	2.70	Oct. 17, 1949	2.94		
July 13, 1948	3.17	Dec. 6, 1949	2.55		

See footnotes at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

BROWN COUNTY—continued

Date	Water level	Date	Water level	Date	Water level
29-22-5dd					
Dec. 16, 1947	5.58	Apr. 13, 1948	4.79	Oct. 14, 1948	6.64
Jan. 13, 1948	5.64	May 13, 1948	4.91	Apr. 20, 1949	5.45
Feb. 25, 1948	5.27	July 13, 1948	5.86	Aug. 8, 1950	3.68
Mar. 16, 1948	4.82	Aug. 23, 1948	6.03		
29-22-8dd					
July 21, 1950	[4] 2.37	Nov. 1, 1950	2.55	Nov. 14, 1952	2.98
Sept. 26, 1950	1.84	Feb. 19, 1951	[2] .40		
29-22-10ac					
Jan. 23, 1951	12.94	June 7, 1951	10.36	Nov. 14, 1952	12.87
Feb. 19, 1951	12.76				
29-22-15dc					
July 21, 1950	[4] 5.07	July 16, 1951	2.13	Sept. 23, 1952	5.89
Sept. 26, 1950	2.73	Oct. 5, 1951	2.78	Nov. 6, 1952	5.50
Oct. 31, 1950	4.49	Jan. 17, 1952	1.88	Nov. 14, 1952	5.41
Feb. 19, 1951	5.79	Apr. 4, 1952	1.89	Dec. 31, 1952	4.87
June 7, 1951	2.05	June 24, 1952	4.81		
29-22-28bc					
Sept. 19, 1950	[4] 10.27	Feb. 19, 1951	10.44	June 7, 1951	6.50
Oct. 31, 1950	9.14				
29-23-1bb					
May 29, 1950	2.69	Feb. 1, 1951	4.34	Nov. 14, 1952	6.13
July 6, 1950	4.00	Oct. 5, 1951	2.33	Dec. 31, 1952	5.66
Sept. 26, 1950	2.47	June 24, 1952	3.92		
Nov. 1, 1950	3.56	Sept. 23, 1952	5.26		
29-23-17aa					
June 20, 1950	[4] 7.50	Sept. 26, 1950	6.32	Feb. 1, 1951	6.86
July 6, 1950	7.70	Nov. 1, 1950	6.83		
29-23-29ad					
July 6, 1950	18.84	Nov. 1, 1950	18.27	Feb. 1, 1951	17.50
Sept. 26, 1950	17.46				
29-24-3db					
June 21, 1950	[4] 3.35	June 4, 1951	1.55	Apr. 4, 1952	1.15
July 6, 1950	4.90	July 18, 1951	1.85	June 24, 1952	2.83
Oct. 3, 1950	3.21	Oct. 8, 1951	1.47	Sept. 23, 1952	3.63
Dec. 8, 1950	3.67	Jan. 18, 1952	1.27	Dec. 31, 1952	2.85
Feb. 1, 1951	3.74				

See footnotes at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

BROWN COUNTY—continued

Date	Water level	Date	Water level	Date	Water level
29-24-4cc					
June 22, 1950	[4] 2.56	Dec. 8, 1950	2.84	Oct. 8, 1951	2.59
July 6, 1950	3.34	Feb. 1, 1951	2.64	Jan. 18, 1952	1.04
Oct. 3, 1950	2.23	June 4, 1951	1.37		
29-24-6dc					
June 22, 1950	[4] 3.06	Dec. 8, 1950	3.39	Apr. 4, 1952	1.18
July 5, 1950	3.47	Feb. 1, 1951	3.25	June 24, 1952	2.50
Aug. 3, 1950	4.18	June 4, 1951	1.62	Sept. 23, 1952	4.08
Sept. 5, 1950	3.66	Oct. 8, 1951	1.73	Dec. 31, 1952	2.78
Oct. 3, 1950	2.99	Jan. 18, 1952	1.03		
29-24-7ab					
Feb. 18, 1948	1.56	Aug. 24, 1948	1.65	Sept. 1, 1949	2.89
Mar. 23, 1948	1.40	Sept. 16, 1948	3.18	Sept. 27, 1949	2.75
Apr. 19, 1948	1.29	Oct. 15, 1948	2.66	Nov. 4, 1949	1.62
May 14, 1948	.95	Nov. 29, 1948	1.92	Jan. 13, 1950	1.33
June 17, 1948	1.44	Dec. 15, 1948	1.99	Aug. 3, 1950	.55
July 14, 1948	3.14	July 18, 1949	2.32		
29-24-15ba					
June 21, 1950	[4] 1.89	Oct. 3, 1950	1.64	Feb. 1, 1951	2.27
July 6, 1950	2.98	Dec. 8, 1950	3.06		
29-24-26bc					
June 22, 1950	[4] 4.79	Oct. 3, 1950	2.56	Feb. 1, 1951	4.98
July 6, 1950	5.34	Dec. 8, 1950	4.23		
30-21-15cd					
Nov. 15, 1947	75.25	Aug. 23, 1948	75.23	June 6, 1949	74.46
Dec. 16, 1947	75.02	Sept. 14, 1948	75.47	July 25, 1949	75.18
Jan. 13, 1948	75.02	Oct. 13, 1948	75.02	Oct. 17, 1949	74.40
Mar. 17, 1948	74.95	Nov. 15, 1948	74.39	Dec. 5, 1949	75.20
Apr. 13, 1948	75.08	Dec. 14, 1948	74.60	Nov. 14, 1952	68.60
May 12, 1948	75.36	Apr. 20, 1949	74.56		
30-21-18bc1					
Nov. 15, 1947	56.08	June 15, 1948	55.88	Dec. 14, 1948	56.00
Dec. 16, 1947	56.04	July 12, 1948	55.91	Apr. 20, 1949	55.97
Jan. 13, 1948	56.03	Aug. 23, 1948	56.00	June 6, 1949	55.91
Feb. 17, 1948	55.98	Sept. 14, 1948	55.96	July 25, 1949	55.93
Mar. 17, 1948	55.95	Oct. 13, 1948	55.98	Aug. 30, 1949	55.84
Apr. 13, 1948	55.94	Nov. 15, 1948	56.00	Feb. 7, 1950	55.70
May 12, 1948	55.88				
30-21-18bc2					
Feb. 7, 1950	55.53	Sept. 8, 1950	55.35	July 16, 1951	54.92
June 28, 1950	55.49	Feb. 16, 1951	55.17	Oct. 5, 1951	54.38
Aug. 9, 1950	54.64	June 7, 1951	55.51	Nov. 17, 1952	48.46

See footnotes at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

BROWN COUNTY—continued

30-21-19cc [5]

Date	Water level	Date	Water level	Date	Water level
Nov. 14, 1947	38.29	Jan. 15, 1951	37.59	Sept. 28, 1951	36.09
Feb. 25, 1948	[6] 38.22	Jan. 22, 1951	37.54	Oct. 2, 1951	35.98
Mar. 16, 1948	[6] 38.20	Jan. 29, 1951	37.54	Oct. 18, 1951	35.78
Apr. 13, 1948	[6] 38.25	Feb. 5, 1951	37.52	Oct. 19, 1951	35.73
May 12, 1948	[6] 38.29	Feb. 13, 1951	37.56	Oct. 24, 1951	35.64
June 16, 1948	[6] 38.60	Feb. 19, 1951	37.52	Oct. 31, 1951	35.58
July 13, 1948	[6] 38.60	Feb. 26, 1951	37.54	Nov. 19, 1951	35.36
Aug. 23, 1948	[6] 38.78	Mar. 5, 1951	37.48	Nov. 28, 1951	35.27
Sept. 15, 1948	[6] 38.97	Mar. 12, 1951	37.54	Dec. 28, 1951	35.06
Oct. 13, 1948	[6] 38.90	Mar. 19, 1951	37.52	Jan. 30, 1952	34.97
Nov. 15, 1948	[6] 38.84	Mar. 26, 1951	37.49	Feb. 28, 1952	34.87
Dec. 14, 1948	[6] 38.77	Mar. 31, 1951	37.49	Mar. 27, 1952	34.82
Apr. 20, 1949	[6] 38.76	Apr. 2, 1951	37.54	Apr. 23, 1952	34.75
June 6, 1949	[6] 38.57	Apr. 30, 1951	37.48	Apr. 28, 1952	34.69
Aug. 30, 1949	[6] 38.95	May 2, 1951	37.47	May 26, 1952	34.60
Oct. 17, 1949	[6] 38.70	May 29, 1951	37.53	June 30, 1952	34.55
Dec. 5, 1949	39.42	June 7, 1951	37.46	July 30, 1952	34.60
Feb. 7, 1950	38.56	June 11, 1951	37.49	Aug. 8, 1952	34.67
Mar. 28, 1950	38.41	June 18, 1951	37.48	Sept. 2, 1952	34.53
Nov. 13, 1950	37.78	June 30, 1951	37.39	Oct. 6, 1952	34.45
Nov. 30, 1950	37.68	July 5, 1951	37.37	Nov. 5, 1952	34.43
Dec. 25, 1950	37.59	July 31, 1951	37.12	Nov. 25, 1952	34.46
Dec. 26, 1950	37.62	Aug. 29, 1951	36.63	Dec. 1, 1952	34.47
Jan. 1, 1951	37.59	Sept. 11, 1951	36.37	Dec. 31, 1952	34.59
Jan. 8, 1951	37.56				

30-21-26bb

Date	Water level	Date	Water level	Date	Water level
Nov. 16, 1947	47.78	Nov. 15, 1948	47.15	Feb. 16, 1951	45.10
Dec. 16, 1947	47.57	Dec. 14, 1948	47.58	June 7, 1951	44.52
Jan. 13, 1948	47.27	Apr. 20, 1949	47.30	July 16, 1951	44.34
Feb. 17, 1948	47.43	July 25, 1949	46.69	Sept. 11, 1951	43.15
Mar. 17, 1948	47.54	Dec. 5, 1949	47.15	Oct. 5, 1951	43.30
Apr. 13, 1948	47.67	Feb. 7, 1950	47.05	Jan. 17, 1952	41.82
May 12, 1948	47.60	May 1, 1950	[7] 46.47	Apr. 1, 1952	41.15
June 15, 1948	45.80	May 29, 1950	[7] 46.33	June 24, 1952	40.20
Aug. 23, 1948	47.23	June 27, 1950	[7] 46.66	Sept. 23, 1952	39.58
Sept. 14, 1948	47.82	Oct. 9, 1950	[7] 45.08	Dec. 31, 1952	39.20
Oct. 13, 1948	47.22	Oct. 31, 1950	45.70		

30-21-30ac

Date	Water level	Date	Water level	Date	Water level
Nov. 15, 1941	[8] 39.90	Nov. 14, 1947	36.18	Oct. 9, 1950	35.56
May 30, 1942	[8] 30.50	May 4, 1950	36.29	Oct. 31, 1950	35.34
Dec. 28, 1943	[8] 38.60	May 29, 1950	36.20	Feb. 16, 1951	35.14
November 1944	[1] 36.47	June 27, 1950	36.08	June 7, 1951	35.10
Mar. 21, 1947	[8] 37.00	Sept. 8, 1950	36.40	Jan. 31, 1952	32.42

30-21-30bd

Date	Water level	Date	Water level	Date	Water level
May 10, 1947	[8] 37.50	Nov. 16, 1948	37.87	Oct. 9, 1950	36.53
Nov. 14, 1947	37.13	Dec. 14, 1948	37.81	Oct. 31, 1950	36.33
Dec. 15, 1947	37.09	Apr. 20, 1949	37.73	Feb. 16, 1951	36.03
Jan. 13, 1948	37.10	June 6, 1949	37.37	June 4, 1951	36.05
Feb. 17, 1948	37.04	Oct. 17, 1949	37.43	July 16, 1951	35.50
Mar. 16, 1948	37.15	Dec. 6, 1949	37.42	Sept. 11, 1951	33.49
Apr. 13, 1948	37.24	Mar. 29, 1950	37.39	Oct. 5, 1951	33.84
May 13, 1948	37.29	Apr. 24, 1950	37.22	Jan. 17, 1952	33.32
June 16, 1948	38.38	May 4, 1950	37.14	Apr. 1, 1952	33.46
July 13, 1948	38.39	May 29, 1950	37.12	June 24, 1952	33.10
Sept. 15, 1948	38.45	June 27, 1950	37.00	Sept. 23, 1952	32.94
Oct. 14, 1948	38.01	Sept. 8, 1950	37.26	Dec. 31, 1952	33.30

See footnotes at end of table.

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Measurements of the water level in wells, in feet below land surface—Continued

BROWN COUNTY—continued

Date	Water level	Date	Water level	Date	Water level
30-21-30cb					
November 1944	[1] 36.47	June 27, 1950	37.19	Feb. 16, 1951	35.96
Nov. 15, 1947	37.16	Aug. 8, 1950	36.83	June 7, 1951	35.90
May 4, 1950	38.54	Oct. 9, 1950	36.47	Sept. 11, 1951	33.78
May 29, 1950	37.01	Oct. 31, 1950	36.18	Jan. 31, 1952	33.10
30-21-31cc					
July 5, 1947	[8] 12.00	Nov. 14, 1947	12.28	May 4, 1950	10.28
30-22-6cc					
June 16, 1948	12.28	Aug. 23, 1948	12.00	Nov. 19, 1952	4.09
July 13, 1948	12.30				
30-22-10ad					
Jan. 28, 1948	45.13	Oct. 14, 1948	45.50	Feb. 8, 1950	44.60
Feb. 18, 1948	45.17	Nov. 22, 1948	45.52	May 18, 1950	44.25
Mar. 17, 1948	45.24	Dec. 15, 1948	45.52	June 28, 1950	44.33
Apr. 14, 1948	45.35	Apr. 20, 1949	45.15	Aug. 9, 1950	43.97
May 13, 1948	45.40	June 16, 1949	45.00	Nov. 1, 1950	43.47
June 16, 1948	45.26	July 26, 1949	44.87	July 16, 1951	42.60
July 13, 1948	45.21	Sept. 1, 1949	44.82	Oct. 5, 1951	41.44
Aug. 23, 1948	44.91	Oct. 17, 1949	44.67	Nov. 17, 1951	37.80
Sept. 15, 1948	44.90	Dec. 6, 1949	44.58	Nov. 14, 1952	37.80
30-22-14dc					
Nov. 15, 1941	[8] 17.00	May 31, 1950	16.19	Nov. 1, 1950	16.37
May 30, 1942	[8] 16.50	June 27, 1950	16.21	Feb. 16, 1951	16.24
May 18, 1950	16.15	Aug. 9, 1950	16.36	Nov. 14, 1952	15.43
30-22-15cc					
Nov. 14, 1947	42.18	Apr. 20, 1949	41.83	Feb. 16, 1951	40.60
Dec. 16, 1947	41.92	June 16, 1949	42.51	July 16, 1951	40.40
Jan. 13, 1948	41.84	Aug. 31, 1949	42.97	Sept. 11, 1951	39.93
Feb. 17, 1948	42.14	Dec. 6, 1949	41.80	Oct. 5, 1951	39.80
Mar. 17, 1948	41.54	Mar. 29, 1950	41.66	Jan. 17, 1952	39.17
Apr. 14, 1948	41.56	May 18, 1950	41.34	Apr. 4, 1952	38.70
Sept. 15, 1948	42.92	May 31, 1950	41.35	June 24, 1952	38.21
Oct. 14, 1948	42.36	June 27, 1950	41.26	Sept. 23, 1952	38.32
Nov. 22, 1948	42.27	Oct. 11, 1950	41.24	Nov. 17, 1952	37.94
Dec. 15, 1948	42.18	Nov. 1, 1950	41.09	Dec. 31, 1952	37.94
30-22-16cd					
Nov. 14, 1947	42.33	Aug. 8, 1950	42.88	July 16, 1951	41.52
May 18, 1950	42.98	Sept. 8, 1950	42.58	Oct. 5, 1951	40.60
May 31, 1950	42.83	Oct. 11, 1950	42.48	Nov. 17, 1952	38.84
June 27, 1950	42.69	Nov. 1, 1950	42.27		
30-22-16dc1					
Nov. 15, 1941	[8] 44.60	May 31, 1950	42.46	Feb. 16, 1951	41.63
May 30, 1942	[8] 45.00	June 27, 1950	42.24	Sept. 11, 1951	40.89
Nov. 14, 1947	43.18	Oct. 11, 1950	42.26	Jan. 17, 1952	39.89
May 18, 1950	42.41	Nov. 1, 1950	42.05	Nov. 17, 1952	38.82

See footnotes at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

BROWN COUNTY—continued

Date	Water level	Date	Water level	Date	Water level
30-22-16dc2					
Nov. 14, 1947	42.13	Oct. 11, 1950	41.33	Jan. 17, 1952	38.92
May 18, 1950	41.66	Nov. 1, 1950	41.16	Nov. 17, 1952	39.62
May 31, 1950	41.66	Feb. 16, 1951	40.79		
Aug. 8, 1950	42.73	Sept. 11, 1951	39.76		
30-22-17cb					
Nov. 20, 1944	[1] 46.85	Sept. 15, 1948	46.59	May 1, 1950	45.50
Nov. 14, 1947	45.12	Oct. 14, 1948	46.39	May 29, 1950	45.47
Dec. 16, 1947	46.05	Nov. 22, 1948	46.35	June 28, 1950	45.42
Jan. 13, 1948	46.00	Dec. 15, 1948	46.33	Aug. 9, 1950	45.49
Feb. 18, 1948	45.93	Apr. 20, 1949	46.40	Sept. 8, 1950	45.04
Mar. 17, 1948	45.94	June 16, 1949	46.16	Oct. 9, 1950	44.90
Apr. 14, 1948	45.97	Sept. 1, 1949	46.10	Nov. 1, 1950	44.74
May 13, 1948	45.98	Oct. 17, 1949	45.90	Feb. 16, 1951	44.30
June 16, 1948	46.24	Dec. 6, 1949	45.86	Nov. 17, 1952	40.56
July 13, 1948	46.13	Feb. 8, 1950	45.70		
Aug. 23, 1948	46.12	Mar. 29, 1950	45.69		
30-22-19aa [5]					
Nov. 16, 1947	38.20	Sept. 15, 1948	38.61	Feb. 8, 1950	37.82
Dec. 16, 1947	38.11	Oct. 14, 1948	38.68	Mar. 29, 1950	37.35
Jan. 13, 1948	38.09	Nov. 22, 1948	38.70	May 1, 1950	37.26
Feb. 18, 1948	38.08	Dec. 15, 1948	38.70	May 29, 1950	37.24
Mar. 17, 1948	38.12	Apr. 20, 1949	38.73	Aug. 14, 1950	36.96
Apr. 14, 1948	38.18	June 16, 1949	38.50	Feb. 16, 1951	35.07
May 13, 1948	38.22	July 26, 1949	38.41	Mar. 31, 1951	36.13
June 16, 1948	38.24	Sept. 1, 1949	38.27	May 2, 1951	36.17
July 13, 1948	38.32	Oct. 17, 1949	38.03		
Aug. 23, 1948	38.48	Dec. 6, 1949	37.88		
30-22-21ac					
Nov. 14, 1947	41.95	June 28, 1950	41.28	Feb. 16, 1951	40.50
May 18, 1950	41.40	Aug. 8, 1950	41.16	Nov. 17, 1952	37.49
May 31, 1950	41.38	Nov. 1, 1950	40.86		
30-22-22bc					
Nov. 15, 1941	[8] 43.20	Nov. 14, 1947	42.08	Oct. 11, 1950	41.20
May 30, 1942	[8] 43.10	May 18, 1950	41.38	Nov. 1, 1950	41.06
Nov. 20, 1944	[1] 41.70	May 31, 1950	41.38	Feb. 16, 1951	40.76
June 17, 1945	[8] 41.50	June 28, 1950	42.35	Sept. 11, 1951	39.90
Mar. 21, 1947	[8] 42.20	Sept. 8, 1950	41.36	Nov. 14, 1952	38.36
30-22-23dc					
Jan 29, 1948	36.97	Nov. 1, 1950	36.50	Apr. 4, 1952	35.02
May 17, 1950	36.38	Feb. 6, 1951	36.44	June 24, 1952	35.24
May 31, 1950	36.47	July 16, 1951	35.58	Sept. 23, 1952	35.79
June 27, 1950	36.54	Oct. 5, 1951	35.47	Nov. 14, 1952	35.68
Aug. 8, 1950	36.80	Jan. 17, 1952	35.40	Dec. 31, 1952	35.72
Sept. 11, 1950	36.72				

See footnotes at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

BROWN COUNTY—continued

Date	Water level	Date	Water level	Date	Water level
		30-22-24db			
Nov. 20, 1944	[1] 40.30	June 27, 1950	39.57	Feb. 16, 1951	39.04
Nov. 14, 1947	39.87	Aug. 8, 1950	39.51	June 7, 1951	38.97
May 17, 1950	39.63	Sept. 8, 1950	40.43	Sept. 11, 1951	38.14
May 31, 1950	39.53	Nov. 1, 1950	39.31	Nov. 14, 1952	36.28
		30-22-25ad			
Nov. 14, 1947	34.62	Oct. 31, 1950	33.71	Sept. 11, 1951	31.45
May 17, 1950	34.56	Feb. 16, 1951	33.46	Jan. 31, 1952	30.67
Sept. 8, 1950	34.09	June 7, 1951	33.47		
		30-22-25cb			
Apr. 23, 1939	[8] 25.80	Mar. 21, 1947	[8] 25.30	Oct. 31, 1950	24.27
May 19, 1940	[8] 27.20	Nov. 14, 1947	[8] 24.90	Feb. 19, 1951	24.33
Nov. 15, 1941	[8] 27.70	May 17, 1950	25.09	June 7, 1951	23.55
May 30, 1942	[8] 27.00	June 27, 1950	24.77	Sept. 11, 1951	21.50
Oct. 17, 1942	[8] 26.60	Aug. 8, 1950	24.82	Oct. 30, 1951	21.60
Dec. 28, 1943	[8] 26.90	Sept. 11, 1950	24.80	Jan. 17, 1952	21.92
Nov. 18, 1944	[9] 24.86	Oct. 9, 1950	24.37	Nov. 14, 1952	22.53
June 17, 1945	[8] 25.10				
		30-22-25da			
Jan. 23, 1951	34.36	June 7, 1951	33.83	Jan. 17, 1952	31.01
Feb. 16, 1951	34.31	Sept. 11, 1951	31.46	Nov. 14, 1952	31.35
		30-22-26cb			
Jan 23, 1951	20.13	Sept. 11, 1951	18.59	June 26, 1952	21.46
Feb. 19, 1951	20.10	Jan. 17, 1952	19.02	Nov. 14, 1952	20.06
June 4, 1951	18.91				
		30-22-26cc			
Nov. 28, 1950	[8] 16.94	Sept. 11, 1951	14.63	Jan. 17, 1952	15.24
Feb. 19, 1951	16.98	Nov. 13, 1951	15.22	Nov. 14, 1952	16.88
June 7, 1951	14.68				
		30-22-26db			
Mar. 30, 1937	[8] 27.00	Jan. 13, 1948	25.57	Dec. 6, 1949	25.69
Aug. 15, 1937	[8] 29.00	Feb. 17, 1948	25.23	May 17, 1950	25.17
Apr. 23, 1939	[8] 26.90	Mar. 16, 1948	25.55	June 27, 1950	24.90
May 19, 1940	[8] 27.00	Apr. 13, 1948	25.55	Aug. 8, 1950	24.66
Sept. 2, 1940	[8] 27.20	May 13, 1948	25.63	Sept. 11, 1950	24.53
Nov. 15, 1941	[8] 27.70	June 16, 1948	25.97	Oct. 9, 1950	24.66
May 30, 1942	[8] 26.70	July 13, 1948	25.96	Oct. 31, 1950	24.60
Oct. 17, 1942	[8] 26.50	Aug. 23, 1948	26.42	Feb. 19, 1951	24.64
Dec. 28, 1943	[8] 26.80	Sept. 15, 1948	26.54	June 7, 1951	24.07
Nov. 18, 1944	[1] 24.95	Oct. 14, 1954	25.49	July 16, 1951	22.84
June 17, 1945	[8] 25.20	Nov. 16, 1948	26.38	Sept. 11, 1951	22.35
Nov. 28, 1945	[8] 26.00	Dec. 15, 1948	26.27	Oct. 5, 1951	22.32
Mar. 21, 1947	[8] 25.20	Apr. 20, 1949	25.64	Jan. 17, 1952	22.95
Apr. 27, 1947	[8] 25.20	June 6, 1949	25.21	Apr. 4, 1952	22.08
May 10, 1947	[8] 25.70	July 26, 1949	[10] 27.50	Jine 24, 1952	21.66
Oct. 9, 1947	[8] 25.70	Aug. 30, 1949	26.08	Sept. 23, 1952	22.97
Nov. 13, 1947	25.50	Oct. 17, 1949	25.82	Dec. 31, 1952	23.51
Dec. 16, 1947	25.67				

See footnotes at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

BROWN COUNTY—continued

Date	Water level	Date	Water level	Date	Water level
		30-22-27dc1			
Nov. 8, 1934	16.82	Nov. 28, 1939	17.09	Oct. 14, 1948	17.62
Jan. 2, 1935	16.65	Mar. 29, 1940	16.64	Nov. 22, 1948	17.20
Feb. 23, 1935	16.45	May 19, 1940	[8] 17.30	Dec. 15, 1948	16.74
Apr. 17, 1935	16.17	July 19, 1940	18.15	Apr. 20, 1949	14.85
June 5, 1935	15.43	Nov. 15, 1941	[8] 17.80	June 15, 1949	14.84
July 13, 1935	[3] 35.60	May 30, 1942	[8] 14.70	Oct. 17, 1949	16.33
Sept. 13, 1935	17.08	Dec. 28, 1943	[8] 17.10	Dec. 6, 1949	16.72
Oct. 21, 1935	16.79	Aug. 1, 1944	14.02	May 31, 1950	15.08
Nov. 22, 1935	16.60	Nov. 17, 1944	15.98	June 27, 1950	15.08
Dec. 27, 1935	16.43	May 16, 1945	15.71	Sept. 11, 1950	15.34
Jan. 16, 1936	16.39	Aug. 1, 1945	15.85	Oct. 9, 1950	14.87
Mar. 25, 1936	15.95	Oct. 6, 1947	16.49	Oct. 31, 1950	14.97
May 31, 1936	15.89	Nov. 13, 1947	16.76	Feb. 19, 1951	15.05
Sept. 13, 1936	18.00	Dec. 16, 1947	16.58	Mar. 31, 1951	15.02
Nov. 19, 1936	17.11	Jan. 13, 1948	16.43	May 2, 1951	14.85
Mar. 31, 1937	16.43	Feb. 17, 1948	16.34	June 7, 1951	12.92
June 15, 1937	16.45	Mar. 16, 1948	16.27	July 5, 1951	12.40
Aug. 19, 1937	18.87	Apr. 13, 1948	16.20	Sept. 11, 1951	13.24
Oct. 13, 1937	17.70	May 13, 1948	16.32	Apr. 23, 1952	13.28
July 14, 1938	15.47	June 16, 1948	16.16	June 23, 1952	13.21
Oct. 21, 1938	15.80	July 13, 1948	16.33	Aug. 18, 1952	14.25
June 6, 1939	16.67	Sept. 15, 1948	18.15	Nov. 14, 1952	15.11
		30-22-27dc2			
Apr. 23, 1939	[8] 18.00	May 17, 1950	16.96	Oct. 9, 1950	17.09
Nov. 15, 1941	[8] 18.80	May 31, 1950	16.95	Oct. 31, 1950	17.23
May 30, 1942	[8] 16.80	June 27, 1950	17.07	Feb. 19, 1951	17.13
Dec. 28, 1943	[8] 18.10	Aug. 8, 1950	17.72	June 7, 1951	16.06
Mar. 21, 1947	[8] 17.20	Sept. 11, 1950	17.53	Nov. 14, 1952	17.58
Nov. 13, 1947	18.01				
		30-22-32bb			
May 29, 1950	1.47	Nov. 1, 1950	1.74	June 7, 1951	0.79
July 6, 1950	2.31	Feb. 1, 1951	1.71	Nov. 14, 1952	2.38
		30-22-34ab			
Apr. 23, 1939	[8] 14.20	Nov. 13, 1947	[8] 14.07	Oct. 9, 1950	12.29
May 19, 1940	[8] 14.30	May 17, 1950	12.19	Oct. 31, 1950	13.44
Nov. 15, 1941	[8] 15.20	May 31, 1950	12.14	Feb. 19, 1951	12.53
May 30, 1942	[8] 11.80	June 27, 1950	12.08	June 7, 1951	9.95
Nov. 18, 1944	[1] 13.24	Sept. 11, 1950	12.87	Sept. 11, 1951	10.52
Mar. 21, 1947	[8] 12.80				
		30-22-34bd			
May 30, 1942	[8] 19.70	May 17, 1950	19.95	Oct. 31, 1950	20.24
Oct. 17, 1942	[8] 21.90	May 31, 1950	19.90	Feb. 19, 1951	20.28
Nov. 21, 1944	[1] 21.07	June 27, 1950	19.91	June 7, 1951	17.67
June 17, 1945	[8] 21.60	Sept. 11, 1950	20.67	Nov. 14, 1952	20.95
Nov. 13, 1947	21.74	Oct. 9, 1950	20.03		
		30-22-35ba			
May 19, 1940	[8] 19.20	Nov. 18, 1944	[11] 17.85	May 29, 1950	17.48
Nov. 15, 1941	[8] 20.50	Nov. 13, 1947	19.72	June 27, 1950	17.13
May 30, 1942	[8] 18.50	May 4, 1950	17.89		
		30-22-35bb [12]			
May 19, 1940	[8] 1.90	Dec. 28, 1943	[8] 1.90	Nov. 13, 1947	1.14
Nov. 15, 1941	[8] 2.80	Nov. 18, 1944	[1] .30	Nov. 14, 1952	.45
May 30, 1942	[8] .20				

See footnotes at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

BROWN COUNTY—continued

Date	Water level	Date	Water level	Date	Water level
		30-23-1cc			
Nov. 16, 1947	63.40	June 16, 1948	63.28	June 16, 1949	63.27
Dec. 16, 1947	63.37	July 13, 1948	63.40	July 26, 1949	63.48
Jan. 13, 1948	63.39	Aug. 23, 1948	63.40	Sept. 1, 1949	63.30
Feb. 18, 1948	63.38	Sept. 15, 1948	63.39	Dec. 6, 1949	63.10
Mar. 17, 1948	63.40	Oct. 14, 1948	64.20	Feb. 8, 1950	63.05
Apr. 14, 1948	62.94	Nov. 22, 1948	63.35	Sept. 8, 1950	62.63
May 14, 1948	63.38	Dec. 15, 1948	63.48		
		30-23-12cc			
Nov. 15, 1941	[8] 47.80	Sept. 8, 1950	45.78	Feb. 16, 1951	45.22
Nov. 20, 1944	[11] 46.50	Oct. 11, 1950	45.63	Oct. 5, 1951	44.35
Nov. 14, 1947	46.38	Nov. 1, 1950	45.50	Nov. 14, 1952	43.15
June 28, 1950	45.70				
		30-23-13bc			
Nov. 15, 1941	[8] 41.00	Nov. 22, 1948	39.07	Sept. 8, 1950	38.14
Nov. 20, 1944	[11] 39.50	Dec. 15, 1948	39.05	Oct. 11, 1950	37.91
Nov. 14, 1947	38.62	Apr. 20, 1949	38.68	Nov. 1, 1950	37.72
Dec. 16, 1947	38.59	June 16, 1949	38.40	Feb. 16, 1951	37.59
Jan. 13, 1948	38.57	Sept. 1, 1949	38.94	Mar. 31, 1951	37.63
Feb. 18, 1948	38.48	Oct. 17, 1949	38.50	May 2, 1951	37.62
Mar. 17, 1948	38.55	Dec. 6, 1949	38.42	July 5, 1951	36.91
Apr. 14, 1948	38.57	Feb. 8, 1950	38.36	Sept. 11, 1951	36.48
May 13, 1948	38.67	Mar. 22, 1950	38.27	Nov. 19, 1951	36.26
June 16, 1948	39.32	May 1, 1950	38.14	Apr. 23, 1952	35.75
July 13, 1948	39.68	May 29, 1950	38.03	June 23, 1952	35.84
Sept. 15, 1948	39.85	June 28, 1950	37.96	Aug. 18, 1952	36.52
Oct. 14, 1948	39.28	Aug. 9, 1950	40.04	Nov. 14, 1952	36.29
		30-23-21aa			
Nov. 16, 1947	22.82	Dec. 15, 1948	23.72	May 1, 1950	22.38
Dec. 16, 1947	22.90	Apr. 20, 1949	23.20	May 29, 1950	21.66
Jan. 13, 1948	22.94	June 16, 1949	22.73	June 28, 1950	21.32
Feb. 18, 1948	22.97	July 26, 1949	22.59	Aug. 9, 1950	21.13
Mar. 17, 1948	23.06	Sept. 1, 1949	22.44	Sept. 8, 1950	20.94
Apr. 14, 1948	23.16	Dec. 6, 1949	22.48	Nov. 14, 1952	18.74
July 13, 1948	23.34				
		30-23-21bc			
June 20, 1950	[4] 2.45	May 2, 1951	1.99	Dec. 29, 1951	[3] 0.55
July 6, 1950	3.22	Juue 4, 1951	.81	Apr. 23, 1952	.29
Sept. 26, 1950	2.22	July 5, 1951	.81	June 23, 1952	.72
Nov. 1, 1950	2.75	Sept. 11, 1951	.34	Aug. 18, 1952	.94
Feb. 1, 1951	2.85	Nov. 19, 1951	.37	Nov. 14, 1952	1.52
Mar. 31, 1951	2.57				
		30-23-23ac			
Mar. 17, 1948	9.06	Feb. 8, 1950	8.84	June 28, 1950	6.78
Apr. 14, 1948	8.97	Mar. 22, 1950	8.33	Aug. 9, 1950	7.02
May 14, 1948	8.95	May 1, 1950	7.88	Sept. 8, 1950	6.33
July 14, 1948	8.83	May 29, 1950	7.21	Feb. 1, 1951	7.46
Oct. 17, 1949	8.42				
		30-23-26cc			
June 20, 1950	[4] 2.39	Sept. 26, 1950	2.30	Feb. 1, 1951	3.61
July 6, 1950	3.67	Nov. 1, 1950	3.29	Nov. 14, 1952	4.86

See footnotes at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

BROWN COUNTY—continued

Date	Water level	Date	Water level	Date	Water level
30-23-29db					
Jan. 29, 1948	8.72	June 16, 1948	8.96	Nov. 29, 1948	9.38
Feb. 18, 1948	8.78	July 14, 1948	9.09	Dec. 15, 1948	9.47
Mar. 23, 1948	8.84	Aug. 23, 1948	9.20	July 26, 1949	9.07
Apr. 14, 1948	8.84	Sept. 16, 1948	8.96	Oct. 7, 1949	8.35
May 14, 1948	8.64	Oct. 14, 1948	9.25	Dec. 6, 1949	9.18
30-23-33cc					
June 20, 1950	[4] 1.80	June 4, 1951	1.09	June 24, 1952	2.17
July 6, 1950	2.55	July 16, 1951	1.22	Sept. 23, 1952	4.92
Sept. 26, 1950	1.46	Oct. 5, 1951	1.23	Nov. 14, 1952	4.69
Nov. 1, 1950	1.97	Jan. 17, 1952	1.00	Dec. 31, 1952	4.09
Feb. 1, 1951	2.10	Apr. 7, 1952	1.12		
30-24-5da					
Aug. 16, 1950	[4] 10.44	Oct. 8, 1951	9.63	Nov. 18, 1952	9.69
Feb. 9, 1951	10.46	Dec. 29, 1951	9.49		
30-24-9bc					
Sept. 28, 1950	[4] 7.96	Feb. 2, 1951	9.74	Nov. 18, 1952	7.54
Nov. 2, 1950	8.16	Oct. 8, 1951	6.32		
30-24-14cb					
Feb. 9, 1951	13.77	July 20, 1951	13.06	Dec. 29, 1951	13.27
Mar. 31, 1951	13.67	Sept. 12, 1951	13.06	Jan. 28, 1952	13.42
May 2, 1951	13.39	Nov. 19, 1951	13.36	Apr. 23, 1952	12.87
June 12, 1951	12.65				
30-24-15aa					
Oct. 17, 1950	79.92	Oct. 8, 1951	79.49	Nov. 17, 1952	77.96
Feb. 9, 1951	79.89				
30-24-18cb					
Oct. 19, 1950	[4] 5.93	Feb. 2, 1951	6.06	Nov. 18, 1952	6.90
Nov. 2, 1950	6.12	Oct. 8, 1951	4.71		
30-24-20ac					
Sept. 27, 1950	[4] 5.87	Oct. 8, 1951	5.85	Sept. 23, 1952	5.98
Nov. 2, 1950	6.17	Apr. 7, 1952	4.57	Nov. 18, 1952	6.37
Feb. 2, 1951	5.94	June 24, 1952	6.05		
30-24-27cd					
June 21, 1950	[4] 2.39	Feb. 1, 1951	2.65	Jan. 18, 1952	2.10
July 6, 1950	2.82	June 4, 1951	1.32	Nov. 17, 1952	2.87
Oct. 3, 1950	2.38	Oct. 8, 1951	2.37		

See footnotes at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

BROWN COUNTY—continued

Date	Water level	Date	Water level	Date	Water level
30-24-31db					
Mar. 23, 1948	8.29	Apr. 21, 1949	8.15	Apr. 15, 1950	7.52
Apr. 19, 1948	8.30	June 16, 1949	7.48	June 1, 1950	6.97
May 14, 1948	8.26	July 18, 1949	7.75	July 5, 1950	6.80
June 17, 1948	8.70	Sept. 27, 1949	7.90	Sept. 5, 1950	6.74
Oct. 18, 1948	8.20	Nov. 4, 1949	7.87	Dec. 12, 1950	6.51
Nov. 29, 1948	8.22	Mar. 24, 1950	7.67		
30-24-32ad					
June 22, 1950	[4] 4.00	Feb. 1, 1951	4.88	Jan. 18, 1952	1.99
July 6, 1950	4.78	July 18, 1951	2.09	Nov. 17, 1952	4.24
Oct. 3, 1950	4.40	Oct. 8, 1951	2.16		
30-24-34cc					
June 21, 1950	[4] 2.71	Feb. 1, 1951	3.92	Jan. 18, 1952	2.38
July 6, 1950	3.67	June 4, 1951	1.42	Nov. 17, 1952	4.30
Oct. 3, 1950	2.02	Oct. 8, 1951	3.00		
31-22-23dd					
Nov. 15, 1947	41.95	Sept. 15, 1948	42.21	Mar. 28, 1950	41.82
Dec. 16, 1947	42.04	Oct. 14, 1948	42.95	May 1, 1950	41.33
Jan. 13, 1948	42.20	Nov. 22, 1948	42.90	May 29, 1950	41.20
Feb. 17, 1948	42.09	Dec. 15, 1948	42.37	June 27, 1950	41.24
Mar. 17, 1948	42.03	Apr. 20, 1949	42.02	Aug. 9, 1950	40.93
Apr. 14, 1948	42.30	June 16, 1949	42.29	Sept. 8, 1950	40.65
May 13, 1948	42.25	July 26, 1949	41.58	Nov. 1, 1950	40.54
June 16, 1948	42.25	Aug. 31, 1949	41.63	Feb. 16, 1951	40.27
July 13, 1948	42.30	Dec. 6, 1949	[10] 42.80	Jan. 31, 1952	38.03
Aug. 23, 1948	42.26	Feb. 7, 1950	42.49	Dec. 4, 1952	36.59

CHERRY COUNTY

Date	Water level	Date	Water level	Date	Water level
28-28-1cc					
Aug. 23, 1950	[4] 5.28	May 2, 1951	4.76	Dec. 29, 1951	3.19
Dec. 6, 1950	5.28	June 8, 1951	3.11	Apr. 23, 1952	2.05
Feb. 26, 1951	5.48	July 20, 1951	2.39	June 23, 1952	3.12
Mar. 31, 1951	5.39	Sept. 12, 1951	2.17	Aug. 18, 1952	4.72
29-25-1ac					
June 23, 1950	[4] 2.28	Sept. 5, 1950	3.72	Feb. 1, 1951	3.96
July 6, 1950	3.82	Dec. 8, 1950	3.29	Oct. 8, 1951	2.34
29-25-1db					
June 23, 1950	[4] 2.88	Dec. 8, 1950	3.52	Oct. 8, 1951	2.67
July 6, 1950	3.74	Feb. 1, 1951	3.29	Jan. 18, 1952	1.52
Sept. 5, 1950	3.16				
29-25-2aa					
July 18, 1950	3.45	Feb. 23, 1951	[2] 0.50	Jan. 18, 1952	0.61
Dec. 8, 1950	1.56	Oct. 8, 1951	.89		

See footnote at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

CHERRY COUNTY—continued

Date	Water level	Date	Water level	Date	Water level
		29-25-4ac			
June 26, 1950	[4] 2.92	Dec. 8, 1950	3.49	Oct. 8, 1951	2.28
July 5, 1950	2.99	Feb. 2, 1951	3.64	Jan. 18, 1952	.95
Oct. 3, 1950	2.64	June 4, 1951	1.17		
		29-25-9da			
July 19, 1950	[4] 4.70	Feb. 2, 1951	5.48	Oct. 8, 1951	3.60
Oct. 3, 1950	4.81	June 4, 1951	3.06	Jan. 18, 1952	3.62
Dec. 8, 1950	5.41	July 18, 1951	3.13		
		29-25-10aa			
July 19, 1950	[4] 2.08	Dec. 8, 1950	1.89	Oct. 8, 1951	0.92
Oct. 3, 1950	1.56	Feb. 23, 1951	[2] .90	Jan. 18, 1952	.79
		29-25-10cc			
Sept. 14, 1950	[4] 1.60	Feb. 2, 1951	1.17	Oct. 8, 1951	0.07
Dec. 8, 1950	1.19				
		29-25-13ba			
July 19, 1950	[4] 4.31	Dec. 8, 1950	4.20	Feb. 1, 1951	4.44
Oct. 3, 1950	3.28				
		29-25-15dd			
Sept. 14, 1950	[4] 4.35	Feb. 2, 1951	3.72	Oct. 8, 1951	2.38
Dec. 8, 1950	3.77				
		29-25-22cc			
Sept. 14, 1950	[4] 5.47	Dec. 8, 1950	5.27	Feb. 2, 1951	5.33
		29-26-1dd			
July 28, 1950	[4] 3.41	Feb. 2, 1951	3.62	Oct. 8, 1951	2.43
Nov. 3, 1950	3.38				
		29-26-4bd			
Apr. 19, 1948	0.02	Dec. 16, 1948	[2] +0.02	May 15, 1950	0.37
May 14, 1948	.00	July 18, 1949	2.46	June 1, 1950	.63
June 17, 1948	+.07	Sept. 27, 1949	1.80	July 5, 1950	.29
July 14, 1948	1.60	Nov. 4, 1949	.55	Sept. 5, 1950	1.28
Aug. 24, 1948	1.79	Feb. 9, 1950	[2] .00	Oct. 3, 1950	.09
Sept. 16, 1948	1.95	Mar. 24, 1950	[3] +.10	Nov. 3, 1950	.46
Oct. 15, 1948	.86	Apr. 14, 1950	[2] .20	Feb. 9, 1951	[2] .00
Nov. 29, 1948	.16				
		29-26-11dc			
Sept. 13, 1950	[4] 2.77	Feb. 2, 1951	2.54	Oct. 8, 1951	1.33
Nov. 3, 1950	2.48				

See footnotes at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

CHERRY COUNTY—continued

Date	Water level	Date	Water level	Date	Water level
		29-26-13bd			
Sept. 13, 1950	[4] 3.24	Feb. 2, 1951	2.79	Oct. 8, 1951	1.74
Nov. 13, 1950	2.82				
		29-26-23ca			
Sept. 13, 1950	[4] 6.10	Feb. 2, 1951	5.97	Oct. 8, 1951	4.52
Nov. 3, 1950	5.65				
		29-26-26cb			
Sept. 13, 1950	[4] 3.42	Feb. 2, 1951	3.09	Oct. 8, 1951	2.07
Nov. 3, 1950	2.87				
		29-27-11ad			
Feb. 19, 1948	3.77	July 14, 1948	4.61	Dec. 16, 1948	3.98
Mar. 23, 1948	3.40	Aug. 24, 1948	4.15	July 18, 1949	4.04
Apr. 19, 1948	3.42	Oct. 15, 1948	4.30	Sept. 27, 1949	[13] 4.52
May 14, 1948	3.40	Nov. 29, 1948	3.86	Nov. 4, 1949	[14] 3.21
June 17, 1948	4.42				
		29-27-16ab			
Aug. 22, 1950	[4] 4.18	Feb. 23, 1951	3.38	Oct. 10, 1951	2.85
		29-27-17da			
Aug. 22, 1950	[4] 3.40	Feb. 23, 1951	[2] 0.90	Oct. 10, 1951	1.56
		29-27-26ca			
Oct. 13, 1950	[4] 1.77	July 24, 1951	0.44	Oct. 10, 1951	0.56
Feb. 26, 1951	[4] 2.00				
		29-27-30cd			
Aug. 23, 1950	[4] 3.98	Feb. 26, 1951	3.94	Oct. 11, 1951	2.51
Jan. 10, 1951	4.04				
		29-27-31dd			
Aug. 23, 1950	[4] 5.09	Jan. 10, 1951	5.29	Feb. 26, 1951	5.32
		29-28-1aa			
Nov. 1, 1949	1.07	June 1, 1950	1.08	Dec. 6, 1950	[2] 0.50
Nov. 2, 1949	1.08	June 29, 1950	2.22	Feb. 5, 1951	[2] .20
Dec. 20, 1949	[2] .25	July 7, 1950	2.28	June 8, 1951	.59
Feb. 27, 1950	[2] .50	Aug. 4, 1950	2.00	Oct. 10, 1951	.69
Apr. 27, 1950	.64	Aug. 31, 1950	.69	Dec. 29, 1951	[2] .65
May 12, 1950	.41	Oct. 3, 1950	.48		

See footnotes at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

CHERRY COUNTY—continued

Date	Water level	Date	Water level	Date	Water level
29-28-5ac					
Nov. 1, 1949	3.25	June 2, 1950	1.59	Oct. 11, 1950	2.75
Nov. 2, 1949	3.28	July 10, 1950	2.57	Nov. 13, 1950	2.99
Dec. 6, 1949	3.43	Aug. 4, 1950	3.04	Feb. 20, 1951	3.09
Mar. 13, 1950	2.76	Sept. 1, 1950	3.08	Oct. 11, 1951	1.22
May 10, 1950	1.68				
29-28-6aa					
Nov. 1, 1949	5.04	June 2, 1950	2.35	Oct. 11, 1950	3.19
Nov. 2, 1949	5.14	July 10, 1950	3.02	Nov. 13, 1950	3.44
Dec. 6, 1949	5.25	Aug. 4, 1950	3.22	Feb. 20, 1951	3.45
Mar. 6, 1950	4.80	Sept. 12, 1950	3.42	Oct. 11, 1951	2.03
May 10, 1950	2.63				
29-28-7ba					
Nov. 1, 1949	4.22	May 11, 1950	2.89	Oct. 11, 1950	3.88
Nov. 2, 1949	4.37	June 6, 1950	3.49	Jan. 17, 1951	4.80
Dec. 20, 1949	4.03	July 7, 1950	4.19	Feb. 20, 1951	3.74
Mar. 13, 1950	3.43	Aug. 4, 1950	4.41	June 8, 1951	2.50
Apr. 19, 1950	3.30	Sept. 1, 1950	4.09		
29-28-7cb					
Nov. 1, 1949	3.15	June 6, 1950	1.50	Oct. 11, 1950	2.29
Nov. 2, 1949	3.24	July 7, 1950	2.41	Jan. 17, 1951	2.51
Mar. 13, 1950	2.59	Aug. 4, 1950	2.62	Feb. 20, 1951	2.56
Apr. 19, 1950	2.11	Sept. 1, 1950	2.75	June 8, 1951	.91
May 11, 1950	1.45				
29-28-8aa					
Nov. 1, 1949	4.65	June 6, 1950	3.13	Sept. 1, 1950	4.16
Nov. 2, 1949	4.67	July 7, 1950	4.18	Oct. 11, 1950	3.70
Mar. 13, 1950	3.41	Aug. 4, 1950	4.51	Feb. 20, 1951	3.60
29-28-12ad					
Nov. 1, 1949	2.97	June 1, 1950	1.86	Dec. 6, 1950	2.23
Nov. 2, 1949	2.99	June 29, 1950	3.02	Feb. 5, 1951	1.21
Dec. 20, 1949	2.29	Aug. 4, 1950	3.15	June 8, 1951	.57
Feb. 28, 1950	[2] 1.05	Aug. 31, 1950	2.70	Oct. 10, 1951	.96
Apr. 27, 1950	1.77	Oct. 3, 1950	.87	Dec. 29, 1951	.58
May 12, 1950	.93				
29-28-12bc					
Dec. 20, 1949	3.19	June 1, 1950	3.34	Oct. 3, 1950	3.14
Feb. 28, 1950	2.85	June 29, 1950	4.45	Feb. 23, 1951	2.85
Apr. 27, 1950	3.35	Aug. 4, 1950	4.38	Oct. 11, 1951	3.11
May 12, 1950	2.91	Aug. 31, 1950	3.78		
29-28-13aa					
Nov. 1, 1949	4.46	Aug. 4, 1950	3.48	June 8, 1951	0.94
Nov. 2, 1949	4.50	Aug. 31, 1950	3.82	July 20, 1951	1.38
Dec. 20, 1949	4.44	Oct. 3, 1950	3.11	Sept. 12, 1951	1.35
Feb. 28, 1950	4.12	Dec. 6, 1950	3.83	Dec. 29, 1951	2.20
Apr. 27, 1950	3.50	Feb. 5, 1951	3.99	Apr. 23, 1952	.97
May 12, 1950	2.11	Mar. 31, 1951	3.57	June 23, 1952	1.99
June 1, 1950	1.97	May 2, 1951	2.68	Aug. 18, 1952	4.33
June 29, 1950	2.78				

See footnotes at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

CHERRY COUNTY—continued

29-28-22bb

Date	Water level	Date	Water level	Date	Water level
Jan. 10, 1951	5.49	Feb. 12, 1951	5.51	Oct. 11, 1951	4.4[illegible]

29-28-22db

Date	Water level	Date	Water level	Date	Water level
Nov. 10, 1950	1.82	Feb. 12, 1951	1.19	Oct. 11, 1951	1.33

29-28-25ac

Date	Water level	Date	Water level	Date	Water level
Nov. 10, 1950	.62	Oct. 11, 1951	+0.04	Dec. 29, 1951	+0.30
Feb. 12, 1951	[2] 1.20				

29-28-25bb

Date	Water level	Date	Water level	Date	Water level
Nov. 10, 1950	3.72	Feb. 12, 1951	3.70	Oct. 11, 1951	1.05

29-28-32ab

Date	Water level	Date	Water level	Date	Water level
Nov. 10, 1950	4.81	Feb. 20, 1951	4.70	Oct. 11, 1951	2.89

29-29-2ba

Date	Water level	Date	Water level	Date	Water level
Oct. 8, 1949	4.90	May 11, 1950	4.04	Jan. 17, 1951	4.77
Nov. 1, 1949	4.93	June 6, 1950	4.23	Feb. 20, 1951	4.89
Dec. 20, 1949	5.10	July 7, 1950	4.62	June 8, 1951	3.79
Mar. 13, 1950	4.96	Aug. 4, 1950	4.97	July 23, 1951	3.91
Apr. 19, 1950	4.57	Sept. 1, 1950	4.89		

29-29-25da

Date	Water level	Date	Water level	Date	Water level
Nov. 10, 1950	11.30	July 24, 1951	10.79	Oct. 11, 1951	10.77
Feb. 20, 1951	11.14				

29-30-27dd

Date	Water level	Date	Water level	Date	Water level
Nov. 8, 1950	5.73	Feb. 8, 1951	6.22	Nov. 1, 1951	3.78

29-30-30dc

Date	Water level	Date	Water level	Date	Water level
Aug. 22, 1950	[4] 4.89	Nov. 9, 1950	6.39	Feb. 8, 1951	6.36

30-25-2cc

Date	Water level	Date	Water level	Date	Water level
Aug. 11, 1950	[4] 4.84	Feb. 2, 1951	4.36	Oct. 8, 1951	2.57
Nov. 2, 1950	4.37				

30-25-6cc

Date	Water level	Date	Water level	Date	Water level
July 24, 1950	[4] 3.06	Feb. 9, 1951	2.20	Jan. 18, 1952	0.81
Nov. 3, 1950	2.51				

See footnotes at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

CHERRY COUNTY—continued

Date	Water level	Date	Water level	Date	Water level
30-25-8ab					
July 20, 1950	[4]3.20	Feb. 2, 1951	3.19	Oct. 8, 1951	1.45
Oct. 3, 1950	1.82	June 4, 1951	1.49	Jan. 18, 1952	1.35
Nov. 3, 1950	2.56				
30-25-10bc					
Aug. 11, 1950	[4]3.04	Feb. 2, 1951	2.09	Oct. 8, 1951	0.80
Nov. 2, 1950	1.85				
30-25-10da					
July 31, 1950	[4]4.09	July 18, 1951	1.72	June 24, 1952	2.57
Nov. 2, 1950	3.14	Oct. 8, 1951	1.86	Sept. 24, 1952	4.80
Feb. 2, 1951	3.99	Apr. 4, 1952	1.86	Dec. 31, 1952	4.29
30-25-15da					
Aug. 11, 1950	[4]3.51	Oct. 8, 1951	1.77	Sept. 23, 1952	4.00
Nov. 2, 1950	2.34	Apr. 4, 1952	.87	Dec. 31, 1952	4.16
Feb. 2, 1951	2.94	June 24, 1952	2.39		
30-25-17ab					
July 17, 1950	[4]3.85	Oct. 8, 1951	2.56	June 24, 1952	3.41
Oct. 3, 1950	2.75	Jan. 18, 1952	2.09	Sept. 24, 1952	5.83
Nov. 3, 1950	3.56	Apr. 4, 1952	2.87	Dec. 31, 1952	5.84
Feb. 2, 1951	4.11				
30-25-17cc					
July 17, 1950	[4]6.84	Feb. 2, 1951	7.37	Oct. 8, 1951	6.18
Oct. 3, 1950	6.69	June 4, 1951	5.50	Jan. 18, 1952	6.20
Nov. 3, 1950	6.94				
30-25-22da					
Aug. 11, 1950	[4]3.52	Feb. 2, 1951	3.13	Oct. 8, 1951	2.14
Nov. 2, 1950	3.10				
30-25-29bb					
Mar. 23, 1948	2.04	Sept. 1, 1949	3.29	Oct. 3, 1950	0.41
Apr. 19, 1948	2.26	Sept. 27, 1949	3.52	Nov. 3, 1950	1.49
May 14, 1948	1.85	Nov. 4, 1949	2.52	Feb. 2, 1951	2.10
June 17, 1948	.79	Jan. 13, 1950	2.79	June 4, 1951	.41
July 14, 1948	3.17	Mar. 24, 1950	.72	July 18, 1951	.56
Aug. 24, 1948	2.69	Apr. 15, 1950	.01	Oct. 8, 1951	.55
Sept. 16, 1948	3.69	May 15, 1950	.36	Jan. 18, 1952	.08
Oct. 15, 1948	3.27	June 1, 1950	.99	Apr. 4, 1952	.51
Nov. 29, 1948	2.72	July 5, 1950	1.24	June 24, 1952	2.81
Dec. 15, 1948	3.00	Aug. 3, 1950	.41	Sept. 24, 1952	Dry
July 18, 1949	3.33	Sept. 5, 1950	2.48		
30-25-30dd					
July 28, 1950	[4]3.69	Feb. 2, 1951	3.84	Oct. 8, 1951	1.86
Nov. 3, 1950	3.46				

See footnotes at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

CHERRY COUNTY—continued

Date	Water level	Date	Water level	Date	Water level
		30-25-31cc			
July 28, 1950	[4] 4.30	Feb. 2, 1951	4.29	Oct. 8, 1951	2.18
Nov. 3, 1950	3.86				
		30-25-33cd			
Mar. 23, 1948	0.63	Dec. 15, 1948	3.01	July 5, 1950	2.18
Apr. 19, 1948	1.87	July 18, 1949	3.59	Aug. 3, 1950	3.29
May 14, 1948	1.34	Sept. 27, 1949	3.39	Sept. 5, 1950	2.81
June 17, 1948	2.48	Nov. 4, 1949	1.90	Oct. 3, 1950	.36
July 14, 1948	3.66	Jan. 13, 1950	2.10	Dec. 8, 1950	1.83
Aug. 24, 1948	3.51	Mar. 24, 1950	[2] .00	Feb. 2, 1951	.35
Sept. 14, 1948	4.30	Apr. 15, 1950	+.03	June 4, 1951	.27
Oct. 15, 1948	3.96	May 15, 1950	.23	Oct. 8, 1951	.62
Nov. 22, 1948	2.82	June 1, 1950	1.09	Jan. 18, 1952	.25
		30-25-34dd			
July 19, 1950	[4] 2.16	Feb. 20, 1951	1.95	Oct. 8, 1951	0.93
Oct. 3, 1950	1.54	July 18, 1951	1.17	Jan. 18, 1952	.45
Dec. 8, 1950	2.41				
		30-25-36cc			
Feb. 19, 1948	5.71	Apr. 19, 1948	5.94	Sept. 27, 1949	[10] 6.43
Mar. 23, 1948	5.57	Dec. 15, 1948	6.68		
		30-26-5cc			
Aug. 10, 1950	[4] 4.58	June 4, 1951	2.19	Apr. 7, 1952	1.69
Nov. 2, 1950	4.58	Oct. 10, 1951	2.59	June 27, 1952	2.49
Feb. 6, 1951	5.00	Feb. 1, 1952	2.67	Sept. 24, 1952	6.14
		30-26-7cc			
July 18, 1949	1.98	May 16, 1950	[15] +0.36	Oct. 3, 1950	2.10
Sept. 27, 1949	3.13	June 1, 1950	[15] +.16	Dec. 8, 1950	2.39
Nov. 3, 1949	2.30	July 7, 1950	.55	June 4, 1951	.13
Feb. 9, 1950	2.49	Aug. 3, 1950	2.03	Oct. 10, 1951	.49
Mar. 23, 1950	[2] 1.10	Sept. 5, 1950	2.74	Feb. 1, 1952	[15] +.05
Apr. 14, 1950	[2] .40				
		30-26-11ab			
July 20, 1950	[4] 3.85	July 24, 1951	2.60	Sept. 24, 1952	5.61
Nov. 3, 1950	4.10	Jan. 18, 1952	2.30	Dec. 31, 1952	4.95
Feb. 9, 1951	4.28	June 27, 1952	2.96		
		30-26-11cc			
July 23, 1950	[4] 8.76	Feb. 9, 1951	9.72	June 27, 1952	7.57
Oct. 3, 1950	9.53	Jan. 18, 1952	7.90	Sept. 24, 1952	10.71
Nov. 3, 1950	9.49	Apr. 7, 1952	5.92	Dec. 31, 1952	10.65
		30-26-12dc			
Aug. 16, 1950	[4] 4.76	Nov. 3, 1950	4.05	Feb. 9, 1951	4.04

See footnotes at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

CHERRY COUNTY—continued

Date	Water level	Date	Water level	Date	Water level
30-26-14cc					
July 26, 1950	[4] 3.25	Nov. 3, 1950	3.10	Jan. 18, 1952	1.49
Oct. 3, 1950	2.51	Feb. 9, 1951	[2] 3.20		
30-26-18aa					
Nov. 2, 1950	3.06	June 4, 1951	+0.43	Feb. 1, 1952	0.50
Feb. 6, 1951	3.04	Oct. 10, 1951	1.26		
30-26-18ab					
Aug. 31, 1950	[4] 4.85	Feb. 6, 1951	4.80	Oct. 10, 1951	2.91
Nov. 2, 1950	4.56	June 4, 1951	2.05	Feb. 1, 1952	2.80
Dec. 8, 1950	4.62	July 18, 1951	2.39		
30-26-20db					
Feb. 19, 1948	3.78	Dec. 16, 1948	3.91	Aug. 3, 1950	3.95
Mar. 24, 1948	2.78	July 18, 1949	3.95	Sept. 5, 1950	4.34
Apr. 19, 1948	3.15	Sept. 27, 1949	4.95	Oct. 3, 1950	3.53
May 14, 1948	3.12	Nov. 3, 1949	4.13	July 24, 1951	2.68
June 17, 1948	3.18	Feb. 9, 1950	3.93	Jan. 18, 1952	1.70
July 14, 1948	3.72	Mar. 24, 1950	2.20	Apr. 7, 1952	1.52
Aug. 24, 1948	3.59	Apr. 14, 1950	1.39	June 27, 1952	3.07
Sept. 16, 1948	4.22	May 15, 1950	2.09	Sept. 25, 1952	5.57
Oct. 15, 1948	4.43	June 1, 1950	2.68	Dec. 31, 1952	4.32
Nov. 29, 1948	3.96	July 5, 1950	3.25		
30-26-22dd					
July 26, 1950	[4] 3.37	Nov. 3, 1950	3.44	Jan. 18, 1952	1.87
Oct. 3, 1950	2.84	Feb. 9, 1951	3.66		
30-26-26bc					
Mar. 23, 1948	2.30	July 18, 1949	3.50	Sept. 5, 1950	Dry
Apr. 19, 1948	2.50	Sept. 27, 1949	Dry	Oct. 3, 1950	.99
May 14, 1948	2.16	Nov. 4, 1949	3.22	Nov. 3, 1950	2.27
June 17, 1948	1.98	Feb. 9, 1950	3.17	Feb. 9, 1951	1.99
July 14, 1948	3.34	Mar. 24, 1950	.65	July 24, 1951	1.36
Aug. 24, 1948	3.29	Apr. 24, 1950	[2] .40	Jan. 18, 1952	.89
Sept. 16, 1948	Dry	May 15, 1950	.14	Apr. 7, 1952	.39
Oct. 15, 1948	Dry	June 1, 1950	.73	June 27, 1952	2.12
Nov. 29, 1948	3.25	July 5, 1950	1.52	Sept. 24, 1952	Dry
Dec. 16, 1948	3.30	Aug. 3, 1950	2.98		
30-26-34ca					
July 26, 1950	[4] 7.21	Nov. 3, 1950	7.51	Feb. 9, 1951	7.73
Oct. 3, 1950	7.49				
30-27-1ca1					
Dec. 16, 1948	1.95	Mar. 23, 1950	[2] 1.43	July 5, 1950	0.79
July 18, 1949	2.49	Apr. 15, 1950	[15] +.31	Aug. 3, 1950	2.30
Sept. 27, 1949	2.67	May 15, 1950	(16)	Sept. 5, 1950	Dry
Nov. 3, 1949	1.48	June 7, 1950	(16)	Dec. 7, 1950	1.62

See footnotes at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

CHERRY COUNTY—continued

Date	Water level	Date	Water level	Date	Water level
		30-27-1ca2			
Aug. 30, 1950	[4] 4.39	July 20, 1951	2.67	June 26, 1952	2.54
Dec. 7, 1950	4.10	Oct. 9, 1951	2.85	Sept. 24, 1952	4.94
Feb. 6, 1951	4.16	Apr. 8, 1952	2.09		
		30-27-8cd			
Aug. 25, 1950	[4] 4.36	Dec. 8, 1950	4.39	Feb. 23, 1951	4.57
		30-27-10cb			
Aug. 25, 1950	[4] 2.67	Dec. 8, 1950	1.99	Feb. 23, 1951	[2] 1.70
		30-27-13dd			
Oct. 12, 1950	[4] 1.25	Dec. 8, 1950	1.04	Feb. 6, 1951	[2] 0.50
		30-27-14dd1			
Feb. 19, 1948	2.40	June 14, 1949	0.98	Aug. 3, 1950	2.72
Mar. 24, 1948	1.42	July 18, 1949	2.98	Sept. 5, 1950	Dry
Apr. 19, 1948	1.62	Sept. 27, 1949	Dry	Oct. 3, 1950	2.17
May 14, 1948	1.58	Nov. 3, 1949	2.55	Dec. 12, 1950	1.97
June 17, 1948	2.59	Feb. 9, 1950	1.59	June 4, 1951	.53
July 14, 1948	Dry	Mar. 23, 1950	[2] .98	July 20, 1951	1.70
Aug. 24, 1948	2.37	Apr. 14, 1950	.62	Oct. 10, 1951	1.55
Sept. 16, 1948	3.33	May 16, 1950	.80	Feb. 1, 1952	.29
Oct. 15, 1948	3.30	June 7, 1950	1.46	June 27, 1952	1.96
Nov. 29, 1948	2.83	July 7, 1950	2.39	Sept. 24, 1952	Dry
Dec. 16, 1948	2.67				
		30-27-14dd2			
Aug. 24, 1950	[4] 3.37	Oct. 3, 1950	2.16	Feb. 6, 1951	1.94
Sept. 5, 1950	3.38	Dec. 12, 1950	2.06		
		30-27-18cb			
Feb. 19, 1948	1.30	Dec. 17, 1948	3.25	June 1, 1950	Dry
Mar. 24, 1948	1.51	June 14, 1949	2.71	June 29, 1950	Dry
Apr. 19, 1948	2.18	July 18, 1949	2.40	Oct. 3, 1950	3.04
May 14, 1948	2.36	Sept. 27, 1949	Dry	Dec. 12, 1950	2.48
June 17, 1948	1.89	Nov. 2, 1949	3.15	Feb. 5, 1951	2.09
July 1948	Dry	Feb. 9, 1950	[2] 2.00	June 4, 1951	2.22
Aug. 23, 1948	3.13	Mar. 22, 1950	[2] 1.93	Oct. 10, 1951	2.63
Sept. 17, 1948	Dry	Apr. 14, 1950	[2] 3.10	Dec. 29, 1951	2.84
Oct. 15, 1948	Dry	May 16, 1950	2.70	Feb. 1, 1952	2.17
Nov. 29, 1948	3.10				
		30-27-19bc			
Oct. 3, 1950	2.20	Feb. 5, 1951	2.24	Oct. 10, 1951	1.99
Dec. 12, 1950	2.46	June 8, 1951	1.52	Dec. 29, 1951	1.79
		30-27-20ad			
Aug. 24, 1950	[4] 3.94	Feb. 6, 1951	3.28	Oct. 10, 1951	2.78
Oct. 3, 1950	3.09	June 4, 1951	1.43	Feb. 1, 1952	1.33
Dec. 12, 1950	3.21				

See footnotes at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

CHERRY COUNTY—continued

Date	Water level	Date	Water level	Date	Water level
		30-27-21ac			
Feb. 19, 1948	4.04	June 14, 1949	2.50	Aug. 24, 1950	5.15
Mar. 24, 1948	3.17	July 18, 1949	Dry	Sept. 5, 1950	4.75
Apr. 19, 1948	3.50	Sept. 27, 1949	Dry	Oct. 3, 1950	3.20
May 14, 1948	3.49	Nov. 2, 1949	4.40	Dec. 8, 1950	4.06
June 17, 1948	3.67	Feb. 9, 1950	3.43	Feb. 6, 1951	3.78
July 14, 1948	Dry	Mar. 23, 1950	2.39	June 4, 1951	2.45
Aug. 24, 1948	4.27	Apr. 14, 1950	2.07	July 20, 1951	3.65
Sept. 16, 1948	Dry	May 16, 1950	2.39	Oct. 10, 1951	3.57
Oct. 15, 1948	4.45	June 7, 1950	2.96	Feb. 1, 1952	2.33
Nov. 29, 1948	4.04	July 7, 1950	3.70	June 27, 1952	2.92
Dec. 16, 1948	4.13	Aug. 3, 1950	Dry	Sept. 24, 1952	5.65
		30-27-23cc			
Dec. 12, 1950	5.78	July 24, 1951	4.75	Oct. 10, 1951	5.04
Feb. 27, 1951	5.74				
		30-27-29cb			
Nov. 2, 1949	6.42	June 1, 1950	5.38	Oct. 3, 1950	5.27
Nov. 3, 1949	6.32	June 29, 1950	5.36	Dec. 7, 1950	5.76
Mar. 14, 1950	6.26	Aug. 4, 1950	5.85	Feb. 6, 1951	6.18
May 12, 1950	5.07	Aug. 31, 1950	5.74	Oct. 10, 1951	4.94
		30-27-32cd			
Nov. 1, 1949	4.99	June 1, 1950	4.47	Oct. 3, 1950	4.22
Nov. 2, 1949	5.03	June 29, 1950	4.76	Dec. 7, 1950	4.55
Feb. 27, 1950	4.05	Aug. 4, 1950	5.25	Feb. 12, 1951	4.11
May 12, 1950	3.84	Aug. 31, 1950	5.15	Oct. 10, 1951	4.09
		30-28-1ad			
Dec. 16, 1949	[4] 3.26	Oct. 3, 1950	3.74	July 20, 1951	3.16
Jan. 27, 1950	4.12	Dec. 11, 1950	4.12	Sept. 12, 1951	2.74
Mar. 15, 1950	3.60	Feb. 5, 1951	4.04	Dec. 29, 1951	3.02
Apr. 14, 1950	3.44	Mar. 31, 1951	4.01	Apr. 23, 1952	2.50
May 13, 1950	3.24	May 2, 1951	3.95	June 23, 1952	2.52
June 1, 1950	3.64	June 8, 1951	2.91	Aug. 18, 1952	3.65
June 29, 1950	3.62				
		30-28-2bd			
Dec. 11, 1950	4.70	Feb. 12, 1951	4.43	June 12, 1951	4.61
		30-28-3bb			
Dec. 11, 1950	3.31	Feb. 12, 1951	3.39	June 12, 1951	1.46
		30-28-3ca			
Feb. 19, 1948	1.54	Aug. 25, 1948	2.37	Sept. 27, 1949	2.82
Mar. 24, 1948	.94	Sept. 17, 1948	3.22	Nov. 2, 1949	1.98
Apr. 19, 1948	1.58	Oct. 18, 1948	3.18	Mar. 16, 1950	[2] 1.13
May 17, 1948	1.98	Nov. 29, 1948	3.19	Apr. 14, 1950	.89
June 18, 1948	1.78	Dec. 17, 1948	2.05	Dec. 11, 1950	1.66
July 16, 1948	2.49	July 26, 1949	3.25		

See footnotes at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

CHERRY COUNTY—continued

Date	Water level	Date	Water level	Date	Water level
		30-28-6bb			
Feb. 19, 1948	3.90	Dec. 17, 1948	3.48	May, 9, 1950	0.76
Mar. 24, 1948	3.24	June 14, 1949	1.17	June 2, 1950	1.12
Apr. 20, 1948	3.37	July 26, 1949	4.05	June 29, 1950	2.96
May 17, 1948	3.23	Sept. 28, 1949	4.38	Aug. 7, 1950	3.72
June 16, 1948	2.94	Nov. 3, 1949	3.45	Sept. 6, 1950	3.69
July 16, 1948	3.55	Nov. 4, 1949	3.50	Oct. 11, 1950	3.32
Aug. 24, 1948	4.04	Dec. 15, 1949	3.02	Feb. 5, 1951	2.94
Sept. 17, 1948	4.55	Mar. 16, 1950	1.40	Apr. 23, 1951	1.67
Oct. 18, 1948	3.09	Apr. 27, 1950	1.76	June 8, 1951	.45
Nov. 30, 1948	3.52				
		30-28-26ca			
Oct. 3, 1950	2.64	Dec. 12, 1950	3.18	Oct. 11, 1951	2.09
Dec. 7, 1950	3.14	Feb. 6, 1951	3.35		
		30-28-27ac			
Oct. 31, 1949	3.35	May 12, 1950	1.95	Oct. 3, 1950	2.44
Nov. 2, 1949	3.36	June 1, 1950	2.42	Dec. 7, 1950	2.72
Dec. 6, 1949	3.39	June 29, 1950	2.58	Dec. 12, 1950	2.60
Mar. 6, 1950	2.83	Aug. 4, 1950	3.09	Feb. 6, 1951	2.67
Apr. 18, 1950	2.46	Sept. 1, 1950	2.67	Oct. 11, 1951	1.48
		30-28-29ba			
Oct. 31, 1949	3.86	May 10, 1950	3.04	Sept. 12, 1950	3.98
Nov. 2, 1949	3.94	June 2, 1950	3.08	Oct. 11, 1950	3.72
Dec. 6, 1949	3.98	July 10, 1950	3.75	Feb. 6, 1951	4.02
Mar. 6, 1950	3.58	Aug. 7, 1950	4.03	Oct. 11, 1951	3.37
Apr. 18, 1950	3.56				
		30-28-30bb			
Oct. 31, 1949	1.44	June 2, 1950	0.49	Oct. 11, 1950	1.37
Nov. 11, 1949	1.50	July 10, 1950	1.39	Dec. 7, 1950	1.46
Dec. 6, 1949	1.56	Aug. 7, 1950	1.60	Feb. 6, 1951	1.63
Mar. 6, 1950	1.05	Sept. 12, 1950	1.57	Oct. 11, 1951	.95
May 10, 1950	.50				
		30-28-35ca			
Nov. 1, 1949	2.87	May 12, 1950	1.68	Sept. 1, 1950	2.78
Nov. 2, 1949	2.89	July 7, 1950	3.41	Oct. 11, 1950	2.75
Mar. 30, 1950	[2] 1.04	Aug. 4, 1950	3.43	Feb. 12, 1951	1.51
		30-28-36aa			
Nov. 2, 1949	3.60	Aug. 4, 1950	3.39	July 20, 1951	2.40
Nov. 3, 1949	3.56	Aug. 31, 1950	2.73	Sept. 12, 1951	1.98
Dec. 20, 1949	2.95	Oct. 3, 1950	2.28	Dec. 29, 1951	2.29
Feb. 28, 1950	2.18	Dec. 6, 1950	2.58	Apr. 23, 1952	1.61
Apr. 27, 1950	2.35	Feb. 5, 1951	2.25	June 23, 1952	2.57
May 12, 1950	2.03	Mar. 31, 1951	1.93	Aug. 18, 1952	4.35
June 1, 1950	2.45	May 2, 1951	2.13		
June 29, 1950	2.76	June 8, 1951	1.46		
		30-29-12da			
Dec. 27, 1950	0.45	June 8, 1951	+0.42	Dec. 29, 1951	+0.43
Feb. 5, 1951	[2] .40				

See footnotes at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

CHERRY COUNTY—continued

30-29-14ac

Date	Water level	Date	Water level	Date	Water level
Nov. 1, 1949	2.59	Sept. 12, 1950	2.53	July 19, 1951	2.05
Nov. 2, 1949	2.55	Oct. 11, 1950	2.68	Sept. 12, 1951	1.51
Mar. 14, 1950	2.19	Dec. 7, 1950	2.79	Dec. 29, 1951	1.89
Apr. 19, 1950	1.97	Feb. 5, 1951	2.73	Apr. 23, 1952	1.54
May 13, 1950	1.62	Mar. 31, 1951	2.50	June 23, 1952	2.25
June 6, 1950	2.08	May 2, 1951	2.38	Aug. 18, 1952	3.63
July 10, 1950	2.40	June 8, 1951	1.57		

30-29-22bb

Date	Water level	Date	Water level	Date	Water level
Oct. 27, 1949	2.88	Sept. 12, 1950	3.64	Sept. 12, 1951	1.40
Oct. 28, 1949	2.93	Oct. 11, 1950	3.24	Dec. 29, 1951	2.31
Mar. 13, 1950	2.12	Jan. 17, 1951	2.97	Apr. 23, 1952	1.15
May 10, 1950	.87	Mar. 31, 1951	2.58	June 23, 1952	2.68
June 2, 1950	1.63	May 2, 1951	2.39	Aug. 18, 1952	4.12
July 7, 1950	3.19	June 8, 1951	.89		
Aug. 4, 1950	3.54	July 23, 1951	2.93		

30-29-23aa

Date	Water level	Date	Water level	Date	Water level
Nov. 1, 1949	3.06	June 6, 1950	2.67	Dec. 7, 1950	3.40
Nov. 2, 1949	3.08	July 7, 1950	3.22	Feb. 5, 1951	3.47
Mar. 14, 1950	2.81	Sept. 12, 1950	3.61		
May 13, 1950	2.25	Oct. 11, 1950	3.25		

30-29-25bb

Date	Water level	Date	Water level	Date	Water level
Oct. 31, 1949	1.34	June 2, 1950	0.50	Dec. 7, 1950	1.12
Nov. 1, 1949	1.40	July 10, 1950	1.64	Feb. 6, 1951	[2] 1.00
Dec. 6, 1949	1.20	Aug. 7, 1950	1.66	Oct. 11, 1951	.99
Mar. 6, 1950	[2] 1.02	Sept. 12, 1950	1.23		
May 10, 1950	.45	Oct. 11, 1950	1.47		

30-29-26cb

Date	Water level	Date	Water level	Date	Water level
Oct. 31, 1949	3.15	June 2, 1950	2.22	Dec. 7, 1950	3.30
Nov. 2, 1949	3.20	July 10, 1950	3.17	Feb. 6, 1951	3.31
Dec. 20, 1949	3.17	Aug. 4, 1950	3.46	Oct. 11, 1951	2.94
Mar. 6, 1950	2.75	Sept. 12, 1950	3.07		
May 10, 1950	2.13	Oct. 11, 1950	3.24		

30-29-27bd

Date	Water level	Date	Water level	Date	Water level
Dec. 20, 1949	9.02	July 7, 1950	8.62	Nov. 13, 1950	8.76
Mar. 6, 1950	8.84	Aug. 4, 1950	8.76	Feb. 6, 1951	8.77
May 10, 1950	8.57	Sept. 12, 1950	8.79	Oct. 11, 1951	8.15
June 2, 1950	8.50	Oct. 11, 1950	8.67		

30-29-28db

Date	Water level	Date	Water level	Date	Water level
Nov. 10, 1950	Dry	Feb. 6, 1951	Dry	June 8, 1951	Dry

30-29-28dc

Date	Water level	Date	Water level	Date	Water level
Mar. 24, 1948	1.16	Aug. 25, 1948	2.76	June 14, 1949	0.67
Apr. 20, 1948	3.50	Sept. 17, 1948	3.45	July 26, 1949	1.62
May 17, 1948	2.97	Oct. 18, 1948	2.52	Nov. 2, 1949	.67
June 18, 1948	3.60	Nov. 30, 1948	3.15		
July 16, 1948	3.00	Dec. 17, 1948	3.21		

See footnotes at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

CHERRY COUNTY—continued

Date	Water level	Date	Water level	Date	Water level
		30-29-32da			
Mar. 24, 1948	3.60	Aug. 25, 1948	4.31	June 14, 1949	3.02
Apr. 20, 1948	3.10	Sept. 17, 1948	4.72	July 26, 1949	4.37
May 17, 1948	4.00	Oct. 18, 1948	4.42	Nov. 2, 1949	3.55
June 18, 1948	4.17	Nov. 30, 1948	4.09	Mar. 30, 1950	2.09
July 16, 1948	4.27	Dec. 17, 1948	3.98	June 6, 1950	2.94
		30-29-33ac			
Nov. 10, 1950	2.68	Feb. 20, 1951	2.46	June 8, 1951	0.59
		30-29-35ad			
Nov. 1, 1949	2.70	June 2, 1950	1.49	Nov. 13, 1950	2.47
Nov. 2, 1949	2.74	July 10, 1940	2.55	Feb. 6, 1951	2.25
Dec. 6, 1949	2.72	Aug. 4, 1950	2.71	June 8, 1951	1.20
Mar. 6, 1950	2.14	Sept. 12, 1950	2.62	Oct. 11, 1951	1.58
May 10, 1950	1.70	Oct. 11, 1950	2.42		
		30-29-35ba			
Nov. 1, 1949	9.38	June 2, 1950	8.94	Nov. 13, 1950	9.00
Nov. 2, 1949	9.40	July 10, 1950	9.07	Feb. 6, 1951	8.99
Dec. 20, 1949	9.33	Aug. 4, 1950	9.18	June 8, 1951	8.70
Mar. 6, 1950	9.15	Sept. 12, 1950	9.14	Oct. 11, 1951	8.84
May 10, 1950	8.84	Oct. 11, 1950	9.03		
		30-30-34cd			
Nov. 7, 1950	7.55	Feb. 8, 1951	7.90	Mar. 31, 1951	7.91
		31-25-19db			
July 27, 1950	[4] 3.90	Feb. 9, 1951	4.69	Oct. 10, 1951	1.42
Nov. 2, 1950	4.48	June 4, 1951	2.04	Feb. 1, 1952	1.94
		31-25-21bd			
Jan. 16, 1936	4.57	June 1, 1942	2.91	Feb. 16, 1951	2.95
Mar. 25, 1936	5.19	Aug. 23, 1942	4.55	Feb. 26, 1951	2.65
June 1, 1936	4.00	Aug. 24, 1942	4.83	Mar. 31, 1951	1.57
July 18, 1936	5.81	Mar. 11, 1943	4.52	Apr. 30, 1951	.78
Sept. 12, 1936	6.38	June 26, 1943	3.34	May 2, 1951	.77
Nov. 19, 1936	5.51	Aug. 1, 1944	2.58	May 29, 1951	1.89
Mar. 31, 1937	4.79	May 16, 1945	2.25	June 12, 1951	1.35
June 15, 1937	4.09	Aug. 2, 1945	3.24	June 29, 1951	.95
Aug. 9, 1937	6.20	Aug. 6, 1946	5.04	July 20, 1951	2.12
Oct. 13, 1937	6.25	Oct. 7, 1947	4.81	July 31, 1951	1.36
July 14, 1938	4.70	Oct. 18, 1948	3.57	Aug. 29, 1951	1.06
Oct. 22, 1938	5.45	Nov. 16, 1948	2.82	Sept. 12, 1951	.31
June 6, 1939	3.97	Feb. 9, 1950	3.06	Sept. 28, 1951	1.44
Nov. 28, 1939	5.63	Mar. 22, 1950	[2] 1.30	Oct. 31, 1951	1.25
Mar. 29, 1940	4.78	May 16, 1950	1.50	Nov. 30, 1951	1.02
July 19, 1940	5.95	May 26, 1950	1.59	Dec. 28, 1951	.61
Oct. 31, 1940	6.25	June 28, 1950	2.72	Jan. 30, 1952	.78
Mar. 15, 1941	5.51	July 31, 1950	3.54	Feb. 28, 1952	.84
June 1, 1941	5.17	Aug. 30, 1950	3.64	Mar. 27, 1952	.10
July 8, 1941	5.48	Sept. 28, 1950	3.05	Apr. 28, 1952	1.18
August 1941	4.33	Oct. 30, 1950	2.95	May 26, 1952	.74
Oct. 1, 1941	5.85	Nov. 30, 1950	2.69	June 30, 1952	2.87
Oct. 18, 1941	5.48	Dec. 26, 1950	2.53		
March 1942	4.35	Jan. 31, 1951	3.27		

See footnotes at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

CHERRY COUNTY—continued

Date	Water level	Date	Water level	Date	Water level
31-25-32cc					
July 24, 1950	[4] 4.24	Nov. 3, 1950	3.80	Jan. 18, 1952	2.29
Oct. 3, 1950	3.05	Feb. 23, 1951	4.16		
31-25-33dc					
July 20, 1950	[4] 3.79	Nov. 3, 1950	3.61	Jan. 18, 1952	1.25
Oct. 3, 1950	2.00	Feb. 2, 1951	4.69		
31-25-35da					
Aug. 17, 1950	[4] 11.43	Feb. 2, 1951	11.58	Oct. 8, 1951	9.45
Nov. 2, 1950	11.69				
31-26-25da					
July 27, 1950	[4] 4.90	Feb. 9, 1951	5.32	Oct. 10, 1951	3.66
Nov. 2, 1950	5.20	June 4, 1951	3.56	Apr. 7, 1952	2.56
31-26-32ca					
Aug. 10, 1950	[4] 4.40	June 18, 1951	2.72	June 27, 1952	2.69
Nov. 2, 1950	4.49	Oct. 10, 1951	3.07	Sept. 24, 1952	5.34
Feb. 9, 1951	4.72	Feb. 1, 1952	2.40		
June 4, 1951	2.81	Apr. 7, 1952	2.49		
31-26-33dd					
Aug. 10, 1950	[4] 4.80	June 4, 1951	2.25	Apr. 7, 1952	2.10
Nov. 2, 1950	4.83	Oct. 10, 1951	3.52	June 27, 1952	3.29
Feb. 9, 1951	4.67	Feb. 1, 1952	2.33	Sept. 24, 1952	5.81
31-26-34ad					
July 27, 1950	[4] 3.30	Feb. 9, 1951	4.39	Oct. 10, 1951	2.66
Nov. 2, 1950	4.58	June 4, 1951	2.32	Feb. 1, 1952	1.92
31-26-35ad					
July 27, 1950	[4] 5.60	June 4, 1951	3.19	June 27, 1952	4.54
Nov. 2, 1950	5.77	Oct. 10, 1951	4.44	Sept. 24, 1952	7.07
Feb. 9, 1951	5.38	Feb. 1, 1952	3.61		
31-27-2cd					
Aug. 29, 1950	[4] 4.02	Feb. 6, 1951	3.31	Oct. 9, 1951	2.75
Dec. 7, 1950	3.44				
31-27-3bc					
Aug. 29, 1950	[4] 4.17	Feb. 6, 1951	3.87	Oct. 9, 1951	3.15
Dec. 7, 1950	3.86				

See footnotes at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

CHERRY COUNTY—continued

Date	Water level	Date	Water level	Date	Water level
31-27-10cd					
Aug. 29, 1950	[4] 3.12	July 20, 1951	2.70	Apr. 8, 1952	1.19
Dec. 7, 1950	2.22	Oct. 9, 1951	1.64	June 26, 1952	1.52
Feb. 6, 1951	1.62	Feb. 1, 1952	.94	Sept. 24, 1952	4.07
31-27-15cb					
Aug. 28, 1950	[4] 5.75	Feb. 6, 1951	6.09	Feb. 1, 1952	3.65
Dec. 7, 1950	5.91	Oct. 9, 1951	4.04		
31-27-17ad					
Aug. 28, 1950	[4] 5.72	Oct. 9, 1951	4.31	June 26, 1952	3.95
Dec. 7, 1950	6.04	Feb. 1, 1952	4.31	Sept. 24, 1952	6.72
Feb. 6, 1951	6.15	Apr. 8, 1952	3.01		
31-27-18cc					
July 18, 1949	2.00	May 9, 1950	(16)	Feb. 5, 1951	1.79
Sept. 27, 1949	1.97	June 1, 1950	0.54	Apr. 23, 1951	[2] 1.30
Nov. 3, 1949	1.32	June 29, 1950	1.20	June 8, 1951	+.21
Jan. 23, 1950	1.47	Aug. 3, 1950	1.79	Oct. 9, 1951	.02
Mar. 16, 1950	[15] 1.30	Oct. 3, 1950	1.19	Dec. 29, 1951	.15
Apr. 15, 1950	.36	Dec. 7, 1950	1.79		
31-27-18db					
Aug. 28, 1950	[4] 3.63	Feb. 6, 1951	3.58	Feb. 1, 1952	1.57
Dec. 7, 1950	3.60	Oct. 9, 1951	2.64		
31-27-21db1					
Aug. 30, 1950	[4] 2.91	July 20, 1951	1.38	Apr. 8, 1952	0.24
Dec. 7, 1950	3.17	Oct. 9, 1951	.62	June 26, 1952	.60
Feb. 6, 1951	3.20	Feb. 1, 1952	.54	Sept. 24, 1952	4.22
31-27-21db2					
Dec. 16, 1948	1.63	Mar. 23, 1950	(16)	Aug. 3, 1950	1.64
July 18, 1949	1.50	Apr. 15, 1950	(16)	Sept. 5, 1950	1.90
Sept. 27, 1949	1.47	May 15, 1950	(16)	Dec. 7, 1950	1.21
Nov. 3, 1949	.18	June 7, 1950	(16)		
31-27-25cb					
Aug. 31, 1950	[4] 4.40	Oct. 9, 1951	3.16	Feb. 1, 1952	3.56
Feb. 6, 1951	5.12				
31-27-27cd					
Aug. 30, 1950	[4] 3.90	Feb. 6, 1951	3.83	Feb. 1, 1952	2.05
Dec. 7, 1950	3.73	Oct. 9, 1951	2.49		
31-27-29dd					
Dec. 7, 1950	5.33	Oct. 9, 1951	3.45	Feb. 1, 1952	3.43
Feb. 26, 1951	5.41				

See footnotes at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

CHERRY COUNTY—continued

Date	Water level	Date	Water level	Date	Water level
31-27-30cb					
Oct. 3, 1950	2.80	June 8, 1951	0.79	Dec. 29, 1951	0.65
Dec. 7, 1950	2.13	Oct. 9, 1951	.77	Feb. 1, 1952	.74
Feb. 5, 1951	2.18				
31-27-30da					
Dec. 7, 1950	5.35	July 20, 1951	1.97	Feb. 1, 1952	3.16
Feb. 26, 1951	4.90	Oct. 9, 1951	3.94		
31-27-35bd1					
Dec. 16, 1948	2.68	May 15, 1950	+0.01	Feb. 6, 1951	2.89
July 18, 1949	3.24	June 7, 1950	1.44	Oct. 9, 1951	1.33
Sept. 27, 1949	3.75	July 5, 1950	2.37	Feb. 1, 1952	+.12
Nov. 3, 1949	2.85	Aug. 3, 1950	3.23	Apr. 8, 1952	.03
Jan. 23, 1950	2.81	Sept. 5, 1950	3.40	June 26, 1952	1.69
Mar. 23, 1950	[3] .03	Dec. 7, 1950	2.75	Sept. 24, 1952	Dry
Apr. 15, 1950	+.27				
31-27-35bd2					
Dec. 7, 1950	3.31	July 20, 1951	2.02	Feb. 1, 1952	1.56
Feb. 6, 1951	3.37	Oct. 9, 1951	2.18		
31-28-1ad					
Dec. 16, 1949	[4] 2.88	June 29, 1950	2.15	July 19, 1951	1.44
Jan 27, 1950	3.23	Oct. 3, 1950	3.12	Sept. 12, 1951	.58
Mar. 15, 1950	2.08	Dec. 7, 1950	3.35	Dec. 29, 1951	1.34
Apr. 14, 1950	.72	Feb. 5, 1951	3.41	Jan. 14, 1952	.97
May 9, 1950	.42	Mar. 31, 1951	2.66	Apr. 23, 1952	.64
May 13, 1950	.79	May 2, 1951	2.02	June 23, 1952	1.47
June 1, 1950	1.13	June 8, 1951	.55	Aug. 18, 1952	3.42
31-28-2dc					
Dec. 14, 1950	5.22	Jan. 4, 1951	5.29	Feb. 27, 1951	5.61
31-28-6bb					
Dec. 15, 1950	9.09	July 19, 1951	8.75	June 26, 1952	6.37
Feb. 7, 1951	9.41	Nov. 1, 1951	8.68	Oct. 7, 1952	7.04
31-28-8db					
Feb. 20, 1948	3.46	Dec. 21, 1948	3.34	June 2, 1950	1.58
Mar. 24, 1948	2.59	July 26, 1949	3.85	June 29, 1950	2.96
Apr. 20, 1948	2.80	Sept. 28, 1949	3.79	Aug. 9, 1950	3.26
May 17, 1948	2.89	Nov. 3, 1949	3.19	Sept. 6, 1950	3.58
June 18, 1948	2.97	Dec. 15, 1949	3.01	Oct. 11, 1950	3.03
July 16, 1948	2.83	Feb. 1, 1950	3.14	Feb. 27, 1951	2.54
Aug. 25, 1948	3.41	Mar. 16, 1950	[3] .40	Apr. 23, 1951	1.57
Sept. 17, 1948	3.90	Apr. 27, 1950	2.11	June 26, 1952	2.18
Oct. 18, 1948	3.94	May 9, 1950	.88	Oct. 7, 1952	4.51
Nov. 30, 1948	3.40				
31-28-9aa					
Dec. 14, 1950	3.21	Feb. 27, 1951	3.71	Jan. 16, 1952	2.73

See footnotes at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

CHERRY COUNTY—continued

Date	Water level	Date	Water level	Date	Water level
31-28-9cc					
Dec. 14, 1950	3.11	Feb. 27, 1951	3.30	Jan. 16, 1952	3.02
31-28-15aa					
Dec. 14, 1950	6.02	Feb. 5, 1951	6.19	July 19, 1951	4.54
Dec. 27, 1950	6.04				
31-28-16ad					
Aug. 7, 1950	9.11	Dec. 27, 1950	9.69	Nov. 1, 1951	8.77
Sept. 6, 1950	9.28	Feb. 5, 1951	9.84	Jan. 14, 1952	9.09
Oct. 11, 1950	9.33	July 26, 1951	8.92		
31-28-16da					
Dec. 1, 1949	[4] 6.34	June 1, 1950	5.45	Dec. 27, 1950	6.62
Jan. 31, 1950	6.63	July 10, 1950	5.86	Feb. 5, 1951	6.64
Mar. 15, 1950	6.24	Aug. 7, 1950	6.08	July 26, 1951	5.30
Apr. 27, 1950	6.04	Sept. 6, 1950	6.49	Nov. 1, 1951	5.22
May 9, 1950	5.66	Oct. 11, 1950	6.28	Jan. 14, 1952	5.34
31-28-18bd					
Mar. 24, 1948	0.00	July 26, 1949	2.13	June 29, 1950	2.05
Apr. 20, 1948	.88	Sept. 28, 1949	1.41	Aug. 7, 1950	1.13
May 17, 1948	1.43	Nov. 3, 1949	.40	Sept. 6, 1950	1.69
June 18, 1948	1.31	Apr. 27, 1950	.00	Oct. 11, 1950	.81
July 16, 1948	1.84	May 9, 1950	.00	Dec. 15, 1950	.10
Dec. 21, 1948	1.02	June 2, 1950	.00	Apr. 23, 1951	.00
31-28-20ab					
Dec. 27, 1950	17.00	June 8, 1951	17.05	Dec. 29, 1951	16.41
Feb. 5, 1951	17.05				
31-28-21aa1					
Dec. 2, 1949	4.83	June 1, 1950	3.26	Dec. 27, 1950	4.70
Jan. 31, 1950	4.94	July 10, 1950	4.27	Feb. 5, 1951	4.82
Mar. 15, 1950	3.94	Aug. 7, 1950	4.61	July 26, 1951	3.26
Apr. 27, 1950	3.66	Sept. 6, 1950	5.17	Nov. 1, 1951	3.05
May 9, 1950	2.75	Oct. 11, 1950	4.50	Jan. 14, 1952	2.88
31-28-21aa2					
Dec. 2, 1949	[4] 2.84	June 1, 1950	1.98	Dec. 27, 1950	2.77
Jan. 31, 1950	3.16	July 10, 1950	3.27	Feb. 5, 1951	2.88
Mar. 15, 1950	1.94	Aug. 7, 1950	3.35	July 26, 1951	2.54
Apr. 27, 1950	1.94	Sept. 6, 1950	3.74	Nov. 1, 1951	1.53
May 9, 1950	1.02	Oct. 11, 1950	2.74	Jan. 14, 1952	1.15
31-28-22cc					
Dec. 2, 1949	[4] 8.47	June 6, 1950	8.14	Dec. 27, 1950	8.82
Jan. 31, 1950	9.21	Aug. 7, 1950	7.81	Feb. 5, 1951	8.95
Mar. 15, 1950	8.91	Sept. 6, 1950	8.58	July 26, 1951	7.75
May 16, 1950	8.10	Oct. 11, 1950	8.47	Oct. 23, 1951	7.32

See footnotes at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

CHERRY COUNTY—continued

Date	Water level	Date	Water level	Date	Water level
31-28-23da1					
Mar. 25, 1948	0.90	Aug. 25, 1948	2.35	June 14, 1949	0.76
Apr. 20, 1948	1.45	Sept. 17, 1948	2.49	July 26, 1949	1.87
May 17, 1948	1.69	Oct. 18, 1948	2.18	Sept. 28, 1949	1.80
June 18, 1948	1.39	Nov. 30, 1948	1.87	Nov. 3, 1949	1.41
July 16, 1948	1.67	Dec. 21, 1948	1.77		
31-28-24bb1					
Nov. 16, 1949	5.80	May 13, 1950	4.87	Dec. 27, 1950	6.12
Nov. 30, 1949	5.83	June 6, 1950	5.06	Feb. 5, 1951	6.22
Dec. 1, 1949	5.86	July 10, 1950	5.42	June 12, 1951	5.17
Jan. 30, 1950	6.03	Aug. 7, 1950	5.65	July 26, 1951	5.13
Mar. 15, 1950	5.70	Sept. 6, 1950	6.04	Oct. 23, 1951	4.55
Apr. 27, 1950	5.48	Oct. 11, 1950	5.84	Jan. 14, 1952	4.70
May 9, 1950	4.89				
31-28-24bb2					
Nov. 16, 1949	4.48	May 9, 1950	3.05	Oct. 11, 1950	4.53
Nov. 30, 1949	4.54	June 6, 1950	3.64	Dec. 27, 1950	4.74
Dec. 1, 1949	4.58	July 10, 1950	4.13	Feb. 5, 1951	4.87
Jan. 30, 1950	4.78	Aug. 7, 1950	4.44	July 26, 1951	3.72
Mar. 15, 1950	4.09	Sept. 6, 1950	4.92	Oct. 23, 1951	3.01
Apr. 27, 1950	3.92	Oct. 3, 1950	4.41	Jan. 14, 1952	3.06
31-28-24bb3					
Nov. 16, 1949	4.89	May 9, 1950	3.00	Oct. 11, 1950	4.85
Nov. 30, 1949	4.90	June 6, 1950	3.68	Dec. 27, 1950	5.11
Dec. 1, 1949	4.95	July 10, 1950	4.19	Feb. 5, 1951	5.18
Jan. 30, 1950	5.02	Aug. 7, 1950	4.60	July 26, 1951	3.83
Mar. 15, 1950	4.49	Sept. 6, 1950	5.09	Oct. 23, 1951	3.18
Apr. 27, 1950	4.13	Oct. 3, 1950	4.78	Jan. 14, 1952	3.25
31-28-24bb4					
Nov. 16, 1949	3.25	May 9, 1950	2.04	Oct. 11, 1950	3.22
Nov. 30, 1949	3.12	June 6, 1950	2.60	Dec. 27, 1950	3.19
Dec. 1, 1949	3.21	July 10, 1950	2.85	Feb. 5, 1951	3.11
Jan. 30, 1950	3.02	Aug. 7, 1950	3.16	July 26, 1951	2.53
Mar. 15, 1950	2.61	Sept. 6, 1950	3.44	Oct. 23, 1951	1.83
Apr. 27, 1950	2.67	Oct. 3, 1950	3.06	Jan. 14, 1952	1.37
31-28-24ca					
Nov. 30, 1949	5.28	June 6, 1950	4.45	Dec. 27, 1950	5.12
Dec. 1, 1949	5.31	July 10, 1950	5.10	Feb. 5, 1951	5.04
Jan. 30, 1950	5.08	Aug. 7, 1950	5.37	July 26, 1951	4.33
Mar. 15, 1950	4.52	Sept. 6, 1950	5.69	Oct. 23, 1951	3.63
Apr. 27, 1950	4.32	Oct. 11, 1950	5.29	Jan. 14, 1952	3.36
May 9, 1950	3.68				
31-28-24cd					
Nov. 30, 1949	3.37	June 6, 1950	2.93	Dec. 27, 1950	3.38
Dec. 1, 1949	3.40	July 10, 1950	3.46	Feb. 5, 1951	3.28
Jan. 30, 1950	3.12	Aug. 7, 1950	3.54	July 26, 1951	2.98
Mar. 15, 1950	2.68	Sept. 6, 1950	3.91	Oct. 23, 1951	2.15
Apr. 27, 1950	2.81	Oct. 11, 1950	3.55	Jan. 14, 1952	1.77
May 9, 1950	2.09				

See footnotes at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

CHERRY COUNTY—continued

Date	Water level	Date	Water level	Date	Water level
31-28-27bb					
Dec. 7, 1949	[4] 3.98	July 10, 1950	3.10	Dec. 27, 1950	3.81
Jan. 31, 1950	4.04	Aug. 7, 1950	3.33	Feb. 5, 1951	3.64
Mar. 15, 1950	3.50	Sept. 6, 1950	3.55	July 26, 1951	2.58
May 16, 1950	2.67	Oct. 11, 1950	3.58	Oct. 23, 1951	2.74
June 6, 1950	2.68				
31-28-27bc					
Jan. 31, 1950	[2] 1.56	July 10, 1950	0.18	Feb. 5, 1951	[2] 0.80
Mar. 15, 1950	[2] +.45	Aug. 7, 1950	.41	July 26, 1951	([16])
May 16, 1950	.07	Sept. 6, 1950	.80	Oct. 23, 1951	([16])
June 5, 1950	+.06	Oct. 11, 1950	.64		
31-28-27cb					
Sept. 6, 1950	4.54	Dec. 27, 1950	4.52	July 26, 1951	3.29
Oct. 11, 1950	4.29	Feb. 5, 1951	4.59	Oct. 23, 1951	2.93
31-28-31bb					
Dec. 27, 1950	1.86	June 8, 1951	+0.41	Apr. 23, 1952	+0.40
Feb. 5, 1951	2.02	July 19, 1951	+.11	June 23, 1952	.42
Mar. 31, 1951	[2] 1.70	Sept. 12, 1951	+.38	Aug. 18, 1952	2.96
May 2, 1951	1.24	Dec. 29, 1951	[2] +.21		
31-28-33cc					
Dec. 11, 1950	1.35	Feb. 12, 1951	1.22	June 12, 1951	+0.11
31-29-1cd					
Dec. 17, 1949	[4] 8.28	June 29, 1950	7.74	Feb. 7, 1951	9.05
Feb. 1, 1950	8.76	Aug. 3, 1950	8.22	July 19, 1951	7.07
Mar. 16, 1950	8.58	Aug. 7, 1950	8.32	Nov. 1, 1951	6.98
Apr. 27, 1950	8.10	Sept. 6, 1950	8.69	Apr. 8, 1952	7.16
May 9, 1950	7.62	Oct. 11, 1950	8.86	June 26, 1952	7.45
June 2, 1950	7.29	Dec. 16, 1950	8.96	Oct. 7, 1952	8.46
31-29-2ab					
Aug. 3, 1950	17.62	Nov. 1, 1951	18.33	June 26, 1952	15.77
Dec. 16, 1950	17.90	Apr. 8, 1952	17.44	Oct. 7, 1952	15.49
July 19, 1951	18.38				
31-29-10ca					
Dec. 21, 1948	1.62	June 2, 1950	([16])	Jan. 15, 1951	1.42
Sept. 28, 1949	3.04	June 29, 1950	2.03	Feb. 7, 1951	1.26
Nov. 3, 1949	2.05	Aug. 7, 1950	2.29	July 19, 1951	1.33
Dec. 15, 1949	1.74	Sept. 6, 1950	2.04	Nov. 1, 1951	1.27
Apr. 27, 1950	.74	Oct. 11, 1950	1.67		

See footnotes at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

CHERRY COUNTY—continued

31-29-13ab

Date	Water level	Date	Water level	Date	Water level
Dec. 21, 1948	4.33	Feb. 1, 1950	4.07	June 2, 1950	1.95
Sept. 28, 1949	4.18	Mar. 16, 1950	3.26	June 29, 1950	3.21
Nov. 3, 1949	3.53	Apr. 27, 1950	2.77	Aug. 7, 1950	3.61
Dec. 15, 1949	3.50	May 9, 1950	1.16		

31-29-21cc

Date	Water level	Date	Water level	Date	Water level
Feb. 19, 1948	3.07	Nov. 30, 1948	3.07	May 9, 1950	+0.10
Mar. 24, 1948	2.35	Dec. 21, 1948	2.51	June 6, 1950	2.59
Apr. 20, 1948	2.54	July 26, 1949	4.33	June 29, 1950	3.25
May 17, 1948	2.76	Sept. 28, 1949	3.96	Aug. 7, 1950	3.39
June 18, 1948	2.38	Nov. 3, 1949	3.13	Sept. 6, 1950	3.33
July 16, 1948	3.78	Dec. 15, 1949	2.74	Oct. 11, 1950	2.81
Aug. 25, 1948	3.68	Feb. 1, 1950	2.83	Jan 3, 1951	2.54
Sept. 17, 1948	4.30	Mar. 16, 1950	[2] .90	Feb. 7, 1951	2.55
Oct. 18, 1948	3.56	Apr. 27, 1950	1.74	June 12, 1951	.16

31-29-23bc

Date	Water level	Date	Water level	Date	Water level
Jan. 3, 1951	8.69	Feb. 7, 1951	8.55	June 12, 1951	7.63

31-29-24dd

Date	Water level	Date	Water level	Date	Water level
Mar. 16, 1950	[2] 0.10	June 29, 1950	2.54	Dec. 27, 1950	1.08
Apr. 27, 1950	1.12	Aug. 7, 1950	2.90	Feb. 5, 1951	[2] 1.00
May 9, 1950	.90	Sept. 6, 1950	2.19	June 8, 1951	.43
June 2, 1950	.74	Oct. 11, 1950	1.41	Dec. 29, 1951	.53

31-29-32bb

Date	Water level	Date	Water level	Date	Water level
Dec. 27, 1950	5.86	Feb. 8, 1951	6.18	June 12, 1951	3.18

31-29-33ad

Date	Water level	Date	Water level	Date	Water level
Feb. 19, 1948	2.07	June 14, 1949	0.70	Aug. 7, 1950	3.00
Mar. 24, 1948	1.08	July 26, 1949	2.44	Sept. 6, 1950	2.93
Apr. 20, 1948	1.80	Sept. 28, 1949	2.73	Oct. 11, 1950	2.45
May 17, 1948	1.93	Nov. 3, 1949	2.43	Dec. 27, 1950	1.69
June 18, 1948	2.16	Dec. 15, 1949	2.05	Feb. 7, 1951	1.53
July 16, 1948	2.01	Feb. 1, 1950	[2] 1.20	Apr. 23, 1951	[2] .70
Aug. 25, 1948	2.19	Mar. 16, 1950	[2] 1.14	June 12, 1951	.70
Sept. 17, 1948	2.24	Apr. 27, 1950	1.35	July 19, 1951	2.01
Oct. 18, 1948	2.35	May 9, 1950	.45	June 26, 1952	2.27
Nov. 30, 1948	2.40	June 6, 1950	2.38	Oct. 7, 1952	3.22
Dec. 17, 1948	2.44	June 29, 1950	2.86		

31-29-34ac

Date	Water level	Date	Water level	Date	Water level
May 17, 1948	Dry	Nov. 3, 1949	Dry	Aug. 7, 1950	Dry
July 16, 1948	Dry	Dec. 15, 1949	2.30	Sept. 6, 1950	Dry
Aug. 25, 1948	3.39	Feb. 1, 1950	3.20	Oct. 11, 1950	1.38
Oct. 18, 1948	3.46	Mar. 16, 1950	[2] .85	Dec. 27, 1950	1.04
Nov. 30, 1948	3.38	Apr. 27, 1950	1.63	Feb. 7, 1951	[2] 1.10
Dec. 17, 1948	3.38	May 9, 1950	1.03	Apr. 23, 1951	1.07
June 14, 1949	1.88	June 6, 1950	1.90	June 12, 1951	1.26
Sept. 28, 1949	Dry	June 29, 1950	Dry		

See footnotes at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

CHERRY COUNTY—continued

Date	Water level	Date	Water level	Date	Water level
		31-29-34dd			
Feb. 19, 1948	3.98	Dec. 17, 1948	3.43	June 29, 1950	1.04
Mar. 24, 1948	3.09	July 26, 1949	2.89	Aug. 7, 1950	2.13
Apr. 20, 1948	3.20	Sept. 28, 1949	3.51	Sept. 6, 1950	2.65
May 17, 1948	1.97	Nov. 3, 1949	3.50	Oct. 11, 1950	2.80
June 18, 1948	3.04	Dec. 15, 1949	3.40	Dec. 27, 1950	2.90
July 16, 1948	3.40	Feb. 1, 1950	3.30	Feb. 7, 1951	2.95
Aug. 25, 1948	3.10	Mar. 16, 1950	2.11	Apr. 23, 1951	2.81
Sept. 17, 1948	3.46	Apr. 27, 1950	1.25	June 12, 1951	1.51
Oct. 18, 1948	3.66	May 9, 1950	.87		
Nov. 30, 1948	3.50	June 6, 1950	.95		
		31-30-25dd			
Dec. 27, 1950	Dry	Feb. 8, 1951	Dry	June 12, 1951	Dry
		31-30-26ca			
Aug. 22, 1950	41.43	Feb. 8, 1951	41.52	June 12, 1951	41.30
Dec. 27, 1950	41.69				
		31-30-29ac			
Oct. 10, 1950	96.43	Feb. 8, 1951	95.24	May 7, 1952	94.94
Jan. 2, 1951	95.24				
		31-30-29da			
Jan. 2, 1951	61.09	Jan. 16, 1951	61.00	Feb. 8, 1951	61.05
		32-27-18cb			
Dec. 16, 1949	[4] 7.50	June 29, 1950	6.88	July 19, 1951	6.81
Jan. 27, 1950	7.47	Dec. 7, 1950	7.28	Sept. 12, 1951	6.40
Mar. 15, 1950	7.65	Feb. 6, 1951	7.72	Dec. 29, 1951	6.46
Apr. 14, 1950	7.53	Mar. 31, 1951	7.76	Apr. 23, 1951	6.21
May 13, 1950	6.98	May 2, 1951	8.04	June 23, 1951	5.61
June 1, 1950	6.64	June 8, 1951	7.34	Aug. 18, 1951	6.03
		32-27-30cc			
Oct. 3, 1950	3.08	May 2, 1951	3.29	Dec. 29, 1951	2.27
Dec. 7, 1950	3.84	June 8, 1951	1.86	Apr. 23, 1952	1.69
Feb. 5, 1951	3.85	July 19, 1951	2.76	June 23, 1952	2.03
Mar. 31, 1951	3.45	Sept. 12, 1951	1.68	Aug. 18, 1952	3.92

See footnotes at end of table.

Measurements of the water level in wells, in feet below land surface—Continued

CHERRY COUNTY—continued

Date	Water level	Date	Water level	Date	Water level
		32-28-16dd			
Dec. 15, 1950	3.39	July 19, 1951	3.24	Nov. 1, 1951	3.16
Feb. 27, 1951	3.26				
		32-28-26da			
Dec. 11, 1950	3.09	Feb. 27, 1951	2.60	Oct. 9, 1951	1.98
		32-28-29dd			
Dec. 15, 1950	3.69	Feb. 27, 1951	3.85	Nov. 1, 1951	3.48
		32-28-32dc			
Dec. 15, 1950	5.72	Nov. 1, 1951	3.42	July 22, 1952	4.53
Feb. 7, 1951	4.83	Jan. 16, 1952	4.01	Oct. 29, 1952	6.59
		32-28-33dd			
Dec. 15, 1950	3.40	Nov. 1, 1951	1.97	Oct. 7, 1952	4.00
Feb. 27, 1951	3.38	Jan. 16, 1952	2.47		
July 19, 1951	2.05	June 26, 1952	1.61		
		32-28-35cb			
Dec. 11, 1950	2.97	Feb. 27, 1951	3.36	Oct. 9, 1951	2.10
		32-28-36cb			
Dec. 11, 1950	3.90	Jan. 4, 1951	4.09	Feb. 27, 1951	3.89

[1] Measured by O. J. Scherer; measuring point not recorded.
[2] Ice surface in well.
[3] Well being pumped.
[4] Measurement made when well was constructed.
[5] See p. 104 for records of lowest daily water level.
[6] Measuring point not recorded.
[7] Windmill stopped 20 minutes prior to measurement of water level.
[8] Measurement by M. F. Skinner; measuring point was top of well curb.
[9] Measurement by O. J. Scherer; measuring point was top of well curb.
[10] Pumping stopped 10 minutes prior to measurement of water level.
[11] Measurement by O. J. Scherer; measuring point was land surface.
[12] Well was visited nine times during 1950 and 1951 and was submerged on each occasion; the water ranged from 0.2 foot (May 4, 1950) to 3.0 feet (June 7, 1951) above the measuring point of well.
[13] Pumping stopped 3 minutes prior to measurement of water level.
[14] Pumping stopped 30 minutes prior to measurement of water level.
[15] Well surrounded by water.
[16] Well submerged.

Measurements of lowest daily water level in wells, from recorder chart

30-21-19cc

Day	1950							
	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	----	38.34	38.26	38.27	38.11	----	37.98	37.85
2	----	38.38	38.28	38.23	38.11	----	37.99	37.86
3	----	38.36	38.27	38.20	38.12	----	37.98	37.85
4	----	38.34	38.25	38.24	38.14	----	37.96	37.81
5	----	38.36	38.23	38.20	----	38.04	37.96	37.84
6	38.36	38.38	38.23	38.20	----	38.03	37.99	37.83
7	38.41	38.39	38.25	38.18	----	38.03	37.97	----
8	38.40	38.36	38.27	38.21	38.22	38.03	37.97	----
9	38.36	38.34	38.25	38.18	38.19	38.03	37.97	----
10	38.36	38.34	38.25	38.18	38.10	38.03	----	----
11	38.36	38.32	38.23	38.18	38.13	38.03	37.94	----
12	38.36	38.33	38.23	38.22	38.10	38.03	37.94	----
13	38.36	38.31	38.25	38.18	38.11	38.03	37.94	----
14	38.34	38.30	38.28	38.28	38.11	38.02	37.94	----
15	38.34	38.33	38.32	38.18	38.06	38.02	37.92	----
16	38.34	----	38.24	38.20	38.11	38.02	37.96	----
17	38.34	38.33	38.27	38.17	38.09	38.03	----	----
18	38.34	38.33	38.32	38.17	38.09	38.02	37.88	----
19	----	38.33	38.23	38.15	38.08	38.01	37.88	----
20	----	----	38.23	38.15	38.06	38.04	37.86	----
21	----	----	38.23	38.14	38.05	38.03	37.87	----
22	----	----	38.24	38.14	38.04	38.00	37.86	----
23	----	38.30	38.27	38.14	38.04	38.00	37.86	----
24	38.36	38.30	38.23	38.16	38.07	38.03	37.87	----
25	38.34	38.30	38.26	38.13	38.09	37.99	37.85	----
26	38.37	38.28	38.24	38.13	38.04	37.97	----	----
27	38.36	38.26	38.22	38.12	38.03	38.00	----	----
28	38.36	38.26	38.22	38.12	38.03	37.98	----	----
29	38.34	38.26	38.20	38.16	38.03	38.01	----	----
30	38.34	38.26	38.26	38.12	38.02	38.04	37.83	----
31		38.27		38.14	38.02		37.85	

30-22-19aa

Day	1950				
	Aug.	Sept.	Oct.	Nov.	Dec.
1	----	36.53	36.45	36.33	36.22
2	----	36.52	36.50	36.34	36.23
3	----	36.51	36.50	36.34	36.23
4	----	36.51	36.49	36.33	36.24
5	----	36.52	36.45	36.30	36.27
6	----	36.52	36.44	36.32	36.27
7	----	36.52	36.46	----	36.22
8	----	36.52	36.46	----	36.21
9	----	36.52	36.45	----	36.23
10	----	36.52	36.43	----	36.23
11	----	36.52	36.43	----	36.20
12	----	36.50	36.43	----	36.20
13	----	36.50	36.42	36.28	36.19
14	----	36.50	36.41	36.27	36.19
15	----	36.49	36.41	36.30	36.20
16	----	36.50	36.41	36.30	36.20
17	----	36.50	36.39	36.28	36.20
18	----	36.48	36.39	36.25	36.20
19	----	36.48	36.40	36.27	----
20	----	36.48	36.40	36.29	----
21	36.80	36.50	36.38	36.28	----
22	36.77	36.50	36.38	36.27	----
23	36.71	36.48	36.38	36.29	----
24	36.66	36.48	36.35	36.29	----
25	36.64	36.48	36.35	36.26	----
26	36.61	36.48	36.33	36.25	----
27	36.57	36.48	36.33	36.24	----
28	36.56	36.48	36.32	36.25	----
29	36.56	36.47	36.32	36.25	----
30	36.54	36.45	36.32	36.23	----
31	36.53		36.32		----

Measurements of lowest daily water level in wells, from recorder chart—Continued

30-22-23dd. Depth to water on Nov. 14, 1947, 38.87 feet

Day	1947	1948								
	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	--------	38.69	38.67	38.62	38.61	38.69	38.94	38.93	39.18	39.30
2	--------	38.69	38.67	38.61	38.60	38.70	38.94	38.93	39.23	39.26
3	--------	38.74	38.64	38.63	38.60	38.70	38.93	38.91	39.17	39.25
4	--------	38.71	38.66	38.63	38.62	38.69	38.94	38.93	39.17	39.25
5	--------	38.73	38.66	38.59	38.60	38.71	38.98	38.95	39.16	39.30
6	--------	38.69	38.68	38.59	38.64	38.70	39.02	38.95	39.17	39.29
7	--------	38.68	38.66	38.61	38.64	38.68	39.03	39.00	39.19	39.31
8	--------	38.73	38.64	38.61	38.62	38.78	39.06	39.18	39.17	39.28
9	--------	38.70	38.65	38.62	38.57	38.72	39.13	39.12	39.21	39.29
10	38.75	38.67	38.67	38.61	38.61	38.71	39.14	39.12	39.26	39.28
11	38.77	38.69	38.67	38.58	38.60	38.70	39.23	39.17	39.25	39.28
12	38.77	38.73	38.63	38.60	38.62	38.70	39.17	39.20	39.27	39.31
13	38.75	38.70	38.66	38.59	38.60	38.68	39.18	39.16	39.16	39.30
14	38.78	38.68	38.67	38.58	38.58	38.73	39.13	39.15	39.17	39.29
15	38.76	38.75	38.63	38.62	38.62	38.70	39.11	39.13	39.15	39.30
16	38.76	38.68	38.66	38.61	38.62	38.71	39.09	39.15	39.13	39.30
17	38.75	38.65	38.64	38.60	38.57	38.71	39.12	39.15	39.15	39.32
18	38.76	38.70	38.62	38.58	38.64	38.74	39.07	39.18	39.16	39.32
19	38.77	38.66	38.72	38.60	38.67	38.75	39.06	39.14	39.14	39.35
20	38.75	38.66	38.66	38.68	38.66	38.76	39.02	39.15	39.18	39.35
21	38.72	38.66	38.63	38.60	38.65	38.77	39.01	39.20	39.17	39.38
22	38.75	38.71	38.61	38.58	38.62	38.83	39.02	39.17	39.19	39.46
23	38.74	38.66	38.69	38.59	38.70	38.81	39.00	39.16	39.19	39.47
24	38.75	38.68	38.65	38.57	38.69	38.81	38.98	39.22	39.20	39.44
25	--------	38.70	38.62	38.59	38.66	38.80	38.97	39.17	39.20	39.45
26	38.72	38.69	38.60	38.63	38.68	38.79	38.96	39.18	39.23	39.42
27	38.72	38.69	38.62	38.62	38.69	38.82	38.95	39.16	39.21	39.40
28	38.71	38.66	38.64	38.58	38.67	38.83	38.93	39.23	39.22	39.39
29	38.72	38.66	38.63	38.59	38.65	38.84	38.94	39.18	39.24	39.37
30	38.73	38.65		38.62	38.73	38.85	38.92	--------	39.22	--------
31	38.73	38.65		38.59		38.86		39.18	39.25	

Day	1948			1949						
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
1	39.33	39.18	39.13	38.97	38.96	38.91	38.75	38.59	38.65	38.56
2	39.32	39.16	39.10	39.01	38.93	38.90	38.74	38.58	38.60	38.60
3	39.30	39.14	39.09	39.01	38.93	38.90	38.74	38.59	38.61	38.57
4	39.29	39.16	39.13	--------	38.93	38.88	38.73	38.60	38.58	38.60
5	39.32	39.17	39.00	--------	38.98	38.89	38.71	38.62	38.57	38.63
6	39.30	--------	39.11	--------	38.93	38.90	38.73	38.61	38.59	38.63
7	39.32	--------	39.09	--------	38.95	38.89	38.74	--------	38.57	38.67
8	39.30	39.16	39.12	--------	--------	38.87	38.71	--------	38.58	38.66
9	39.29	39.16	39.11	--------	--------	38.87	38.70	--------	38.57	38.68
10	39.30	39.16	39.11	--------	--------	38.86	38.69	--------	38.57	38.68
11	39.27	39.17	39.11	--------	38.97	38.85	38.66	--------	38.56	38.66
12	39.27	39.16	39.09	38.96	38.97	38.85	38.65	--------	38.61	--------
13	39.26	39.17	39.10	39.00	38.94	38.85	38.70	--------	38.57	--------
14	39.25	39.15	39.04	38.98	38.92	38.86	38.66	--------	38.58	--------
15	39.31	39.16	39.05	39.04	38.97	38.81	38.64	--------	38.54	--------
16	39.27	39.15	39.07	39.05	38.96	--------	38.63	--------	38.56	--------
17	39.23	39.13	39.03	38.96	38.92	--------	38.62	--------	38.59	--------
18	39.22	39.16	39.03	39.00	38.99	38.82	38.60	--------	38.56	--------
19	39.21	39.11	39.03	38.98	38.95	38.85	38.58	--------	38.50	--------
20	39.22	39.12	39.04	38.96	38.94	38.83	38.57	38.66	38.54	--------
21	39.21	39.13	39.04	38.97	38.94	38.82	38.61	38.66	38.51	--------
22	39.23	39.10	39.02	38.97	38.93	38.81	38.58	38.68	38.49	--------
23	39.19	39.12	39.02	38.97	38.94	38.81	38.58	38.67	38.60	--------
24	39.19	39.10	39.03	38.98	38.96	38.83	38.61	38.64	38.50	--------
25	39.19	39.11	39.03	38.96	38.92	38.82	38.61	38.64	38.50	--------
26	39.18	39.11	38.99	38.96	38.94	38.78	38.59	38.65	38.58	--------
27	39.19	39.13	38.99	38.97	38.92	38.78	38.58	38.62	38.55	--------
28	39.17	39.11	39.03	38.97	38.91	38.78	38.57	38.61	38.54	--------
29	39.18	39.14	39.03	38.97		38.79	38.56	38.60	38.58	--------
30	39.19	39.13	39.03	38.93		38.78	38.58	38.62	38.56	--------
31	39.18		39.00	38.94		38.78		38.61		--------

RECORDS OF WELLS AND TEST HOLES

Records were obtained for 442 wells and test holes in the report area. The location of these wells is shown on plate 1. The available pertinent data for all wells that are shown on the map are given in the following table.

Record of wells

Type of well: B, bored; Dn, driven; Dr, drilled; Du, dug; J, jetted.
Depth of well: Reported depths are given in feet; measured depths are given in feet and tenths.
Type of casing: C, concrete; M, metal pipe (iron, galvanized iron, or steel).
Method of lift: C, cylinder; Cf, centrifugal; F, natural flow; N, none; T, turbine.
Type of power: E, electricity; G, gasoline; H, hand operated; N, none; W, wind.
Use of water: D, domestic; I, irrigation; N, none; O, observation of water levels; P, public supply; S, stock.

Description of measuring point: H, hole in casing; Hpb, hole at pump base; Tc, top of casing; Tcu, top of concrete curb; Tp, top of pipe; Tpl, Top of pump platform.
Altitude of measuring point: Altitudes preceded by an asterisk (*) were determined by U. S. Bureau of Reclamation; all others by U. S. Geological Survey.
Remarks: Ca, water sample collected for chemical analysis; D, discharge, in gallons per minute (M, measured; R, reported); L, log of well included in report; P pumping test to determine hydrologic properties of water-bearing material; T, temperature of water in degrees Fahrenheit.

Well No.	Owner or tenant	Year completed	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Method of lift	Type of power	Use of water	Measuring point			Depth to water below measuring point (feet)	Date of measurement	Remarks
										Description	Distance above (+) or below (−) land-surface (feet)	Height above mean sea level (feet)			
Brown County															
29-21-5aa	U. S. Geol. Survey	1950	J	14.0	¾	M	N	N	O	Tp	+4.4	2,492.67	12.39	11-14-52	
29-21-6cd	R. Anderson		Du,Dr	85	72	C,M	Cf	G	I,O	Tcu	.0	*2,521.25	5.03	11-14-52	D-735-M.
29-21-7ab	do		Dr		4	M	C	W	S,O	Hpb	+1.8	*2,524.74	7.00	8-30-49	
29-21-8dc	U. S. Geol. Survey	1950	J	14	¾	M	N	N	O	Tp	+1.6	2,519.49	4.96	11-14-52	
29-21-12aa	C. Pettiejohn		Dr	51	6	M	C	W	S	Tc			48.10	11-20-52	
29-21-14bd	R. Snover		Dr	25	6	M	C	W	S	Tc			15.80	11-20-52	
29-21-17cc	U. S. Geol. Survey	1950	J	16.8	¾	M	N	N	O	Tp	+4.0	2,541.95	5.21	11-14-52	
29-22-2bb	do	1950	J	10.7	¾	M	N	N	O	Tp	+3.0	2,540.37	7.11	11-14-52	
29-22-4ab			Dr	29	4½	M	N	N	O	Tc	+1.1	2,554.7	1.73	2-19-51	
29-22-5cc	J. Alberts	1940	Dr	70					N			2,571.7			
29-22-5dd	do		Dr	70			C	W	S, O	Tc	.0	*2,564.8	3.68	8-8-50	
29-22-8dd	U. S. Geol. Survey	1950	J	7.0	¾	M	N	N	O	Tp	+2.3	2,574.91	5.23	11-14-52	
29-22-10ac	R. Lucht	1949	Dr	115	18	C	T	G	I, O	Hpb	+.5	2,570.41	13.37	11-14-52	L.
29-22-14ab	U. S. Geol. Survey	1952	Dr	32	¾	M	N	N	N	Tp	+3.0	2,564.45	9.39	12-1-52	L.
29-22-15dc	do	1950	J	16.5	¾	M	N	N	O	Tp	+3.3	2,584.96	8.71	11-14-52	
29-22-28bc	do	1950	J	17.6	¾	M	N	N	O	Tp	+3.5	2,621.55	10.00	6-7-51	

29-23-1bb	do	1950	J	15.3	¾	M	N	N	O	Tp	+3.5	2,597.14	9.63	11-14-52	
29-23-17aa	do	1950	J	17.1	¾	M	N	N	O	Tp	+3.5	2,655.45	10.36	2-1-51	
29-23-29ad	do	1950	J	25.1	¾	M	N	N	O	Tp	+2.5	2,633.39	20.00	2-1-51	
29-24-3db	do	1950	J	14.1	¾	M	N	N	O	Tp	+3.7	2,656.0	6.55	12-31-52	
29-24-4cc	do	1950	J	10.6	¾	M	N	N	O	Tp	+2.0	2,664.31	4.59	10-8-51	
29-24-6dc	do	1950	J	17.5	¾	M	N	N	O	Tp	+3.5	2,701.19	6.28	12-31-51	
29-24-7ab	U. S. Bur. of Reclamation.	1948	B	5.1	3	M	N	N	O	Tc	+.5	*2,694.43	1.05	8-3-50	
29-24-15ba	U. S. Geol. Survey	1950	J	7.0	¾	M	N	N	O	Tp	+2.0	2,682.23	4.27	2-1-51	
29-24-16cb	do	1950	J	17.9	¾	M	N	N	N	Tp	+3.2	2,711.79	8.82	2-1-51	
29-24-26bc	do	1950	J	11.0	¾	M	N	N	O	Tp	+2.5	2,714.25	7.48	2-1-51	
29-24-30aa	do	1950	J	14.0	¾	M	N	N	N	Tp	+1.2	2,729.69	6.11	2-1-51	
30-20-7ab	Bejot		Dr	145	5	M	N	N	N	Tc	+.5		143.70	11-19-52	
30-21-1bc	J. A. Bejot			150	7	M	C	W	S	Tc	+1.5	2,407.22	141.69	11-19-52	
30-21-3aa	U. S. Geol. Survey	1952	Dr	190.5	¾	M	N	N	N	Tp	+2.01	2,376.18	90.30	12-1-52	L.
30-21-3bb	M. Sisson		Dr			M	C	H	D	Tc			10.20	11-19-52	
30-21-12cb	H. Johnson		Dr	78	18	M	T	G	I						Ca; D-300-R; T-53° F.
30-21-15cd	C. Bejot		Dr	76.5	6	M	N	N	D, O	Tcu	.0	*2,437.03	68.60	11-14-52	
30-21-17ba	J. Moody		Dr	41.0	6	M	C	W	S	Tc	+2.0	2,445.73	38.30	11-24-52	
30-21-18bc1			Dr	61.0	6	M	N	N	O	Tc	−3.0	*2,501.35	52.84	8-30-49	
30-21-18bc2		1949	Dr	61.0	4	M	C	W	S, O	Tc	+1.0	2,505.50	49.46	11-17-52	
30-21-19cc	Consumers Public Power District.		Dr	57.3	6	M	N	N	O	Tc	+.2	2,511.07	34.66	11-25-52	
30-21-20cc	U. S. Geol. Survey	1952	Dr	52.7	¾	M	N	N	N	Tp	+3.0	2,503.50	39.46	12-1-52	L.
30-21-26bb			Dr	65.0	5	M	C	W	S, O	Tc	+1.2	*2,424.98	40.72	11-14-52	Ca; T-53° F.
30-21-27cd	R. M. Langus	1948	J		1¼	M	C	H	D	Tp	+2.0	2,430.84	6.72	11-14-52	
30-21-30ac	J. Fling	1940	Dr	74	18	M	T	G	I, O	Hpb	+.2	*2,511.8	34.62	1-31-52	D-868-M.
30-21-30bd	do	1947	Dr		18	M	T	G	I, O	Hpb	−.2	*2,513.87	33.64	10-5-51	D-859-M.
30-21-30cb	C. D. Hall	1944	Dr	76	18	M	T	G	I, O	Hpb	+.2	*2,518.82	33.98	9-11-51	D-862-M.
30-21-31cc	do	1947	Dr		18	M	T	G	I, O	Hpb	+1.2	*2,522.59	11.48	5-4-50	D-750-R.
30-21-31db	G. Coad		Dr		18	M	T	G	I	Hpb	+.8	*2,513.67	16.86	11-14-47	D-1064-M.
30-21-34cd	Zwiebel		Dr		4½	M	C	W	S	Tc	+.5	2,490.44	40.54	11-14-52	
30-22-3cb						M	C	W	S	Tpl		2,539.49	69.35	11-19-52	
30-22-6cc			Dr		4	M	C	M	S, O	Tc	+2.0	*2,507.63	6.09	11-19-52	
30-22-9bc			Dr	70	6	M	C	W	S	Tcu		2,543.51	61.13	11-19-52	
30-22-10ad			Dr		6	M	C	W	S, O	Tc	+1.5	*2,507.10	39.30	11-14-52	
30-22-10cb			Dr		6	M	C	W	S	Tc	.5		53.02	1-28-48	
30-22-11bb	U. S. Geol. Survey		Dr	94	¾	M	N	N	N	Tp	+3.0	2,521.52	68.04	6-24-51	L.
													65.77	12-1-52	
30-22-14dc	Skillman		B	32	18	M	N	N	O	Tc	+.5	*2,490.20	15.93	11-14-52	
30-22-15cc	E. Kennedy		Dr	70	18	M	T	G	I, O	Hpb	+.5	*2,538.71	33.44	11-17-52	D-513-M.
30-22-16cd	do	1947	Dr	69.0	18	M	T	G	I, O	Hpb	.0	*2,547.28	38.84	11-17-52	D-542-M.
30-22-16dc1	do		Dr	70	18	M	T	G	I, O	Hpb	+.5	*2,542.55	39.32	11-17-52	D-461-M.
30-22-16dc2	do	1947	Dr	68.5	18	M	T	G	I, O	Hpb	+.3	*2,544.71	37.92	11-17-52	D-718-M.
30-22-17cb	Clausen		Dr		18	M	T	G	I, O	Hpb	+.3	*2,562.60	40.86	11-17-52	D-400-R.
30-22-18db	H. Jessen	1951	Dr	201	18	C	T	G	I	Tc	+.3		40.23	11-5-51	L.
30-22-19aa	R. Snyder		Dr	63	5	M	C	W	S, O	Tc	+.5	2,564.88	36.67	5-2-51	
30-22-21ac	H. Rowher	1944	Dr	66	18	M	T	G	I, O	Hpb	+.4	*2,548.93	37.89	11-17-52	
30-22-22bc	J. Bejot		Dr	142	18	M	T	G	I, O	Hpb	+.2	*2,540.73	38.56	11-14-52	D-587-M.
30-22-23dc	K. Hunt	1944	Dr		18	M	T	E	I, O	Tcu	+.5	*2,520.28	36.18	11-14-52	D-351-M.
30-22-23dd	B. Vonheeter	1934	Dr	68	24	M	T	G	I, O	Tc	+.5	*2,521.10	39.37	11-14-47	D-500-R.
30-22-24db	V. Denny	1942	Dr	71	24	M	T	G	I, O	Tc	+.3	*2,512.84	36.58	11-14-52	D-458-M.

Record of wells—Continued

Well No.	Owner or tenant	Year completed	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Method of lift	Type of power	Use of water	Measuring point: Description	Measuring point: Distance above (+) or below (−) land-surface (feet)	Measuring point: Height above mean sea level (feet)	Depth to water below measuring point (feet)	Date of measurement	Remarks
Brown County—Continued															
30-22-25ad	C. D. Hall	1946	Dr		18	M	T	G	I, O	Hpb	+1.2	*2, 519.10	32.65	9-11-51	D-1,050-R.
30-22-25cb	M. Skinner	1939	Du, Dr	625	60	C	Cf	G	I, O	Tcu	.0	*2, 523.50	22.53	11-14-52	P; Ca; D-1,084-M.
30-22-25da	do	1949	Dr	74	36	C	T	G	I, O	Tcu	.0	2, 520.72	31.35	11-14-52	L; D-1, 000-R.
30-22-26ab	City of Ainsworth	1940	Dr	72	16		T	E	P						
30-22-26bal	do	1907	Dr						P	Tc	−18.0	2, 500.9	9.0	11-15-41	
30-22-26ba2	do	193–	Dr	72	16		T	E	P	Tc	.0	2, 518.6	33.0	11-15-41	L; Ca
30-22-26cb	M. Skinner	1948	Dr		27	C	T	G	I, O	H	.0	2, 525.40	20.06	11-14-52	D-1,000-R.
30-22-26cc	O. H. McBride	1948	D	69	18	M	T	G	I, O	Hbp	+1.0	2, 528.94	17.88	11-14-52	L; D-1,069-M; P; Ca; T-51° F.
30-22-26db	M. Skinner	1937	Du, Dr	68	72	C	Cf	G	I, O	Tcu	.0	*2, 525.0	23.51	12-31-52	D-1,050-M; L.
30-22-27dcl	D. Bower	1931	Dr	64	(1)	M	Cf	G	I, O	Tpl	+.5	*2, 534.29	15.61	11-14-52	D-860-M.
30-22-27dc2	McCoid	1931	Du, Dr		72	C	Cf	G	I, O	Tcu	.0	*2, 530.70	17.58	11-14-52	D-971-M.
30-22-30dd	U. S. Geol. Survey	1952	Dr	30.5	¾	M	N	N	N	Tp	+3.0	2, 570.29	11.37	12- 1-52	L.
30-22-32bb	do	1950	J	13.3	¾	M	N	N	O	Tp	+3.0	2, 560.50	5.38	11-14-52	
30-22-34ab	W. R. Baker	1934	Du, Dr	68	72	C	T	G	I, O	Tcu	.0	2, 535.95	10.52	9-11-51	D-1, 239-M.
30-22-34bd	O. Feilmeier		Dr		18	M	T	G	I, O	Hpb	.0	*2, 545.90	17.67	6- 7-51	D-900-M.
30-22-35ba	L. Davidson		Dr	52			Cf	G	I, O	Tpl	−.2	*2, 527.80	16.93	6-27-50	
30-22-35bb	do			44	60	C	Cf	G	I, O	Tcu	.0	*2, 516.80	+.45	11-14-52	D-1,000-R.
30-23-1cc			Dr	71	8	M	C	N	O	Tc	−.3	*2, 568.80	62.33	9- 8-50	
30-23-5cd			Dr		5	M	C	W	S	Tc	+1.0		71.88	11-14-52	
30-23-6aa			Dr		4½	M	C	W	S	Tc			135.61	11-25-52	
30-23-11aa	School District		Dr	74	5	M	C	W	D	Tc	+1.0	2, 569.13	62.25	11-16-47	
													58.84	11-18-52	
30-23-12cc	Johnsou	1939	Dr	70	18	M	T	G	I, O	Hpb	−.3	*2, 572.21	42.85	11-14-52	D-750-R.
30-23-13bc	M. A. Miles		Dr	80	18	M	T	G	I, O	Tc	+1.5	*2, 574.20	37.79	11-14-52	D-538-M.
30-23-15bc	City of Ainsworth	1941	Dr	69	18	M	N	N	D	Tc	.0	2, 587.80	31.26	11-21-52	
30-23-16cb					5	M	C	W	S	Tc			23.72	11-14-52	
30-23-18ac	G. Mitchel	1939	B	58	6	M	C	E	D						Ca; T 56° F.
30-23-21aa			Dr		4	M	C	W	S, O	Tc	+1.3	*2, 587.80	20.04	11-14-52	
30-23-21bc	U. S. Geol. Survey	1950	J	12.8	¾	M	N	N	O	Tp	+3.0	2, 586.47	4.52	11-14-52	
30-23-23ac			Dr		6	M	C	W	S, O	Tc	+.6	2, 570.12	8.06	11-14-52	
30-23-26cc	U. S. Geol. Survey	1950	J	11.1	¾	M	N	N	O	Tp	+3.0	2, 591.74	7.86	11-14-52	

30-23-26db			Dr		4	M	C	W	S	Tc	+1.0	*2,584.0	7.98 8.05	1-29-48 2-18-48	
30-23-29db			Dn		2	M	N	N	O	Tp	.0	*2,619.66	9.18	12-6-49	
30-23-33cc	U. S. Geol. Survey	1950	J	14.1	¾	M	N	N	O	Tp	+3.5	2,624.15	8.19	11-14-52	
30-24-5da	do	1950	J	17.8	¾	M	N	N	O	Tp	+3.3	2,600.72	12.99	11-18-52	
30-24-9bc	do	1950	J	14.1	¾	M	N	N	O	Tp	+2.0	2,611.61	9.54	11-18-52	
30-24-14cb	do	1950	Dn	19.0	1¼	M	N	N	O	Tp	+3.0	2,528.7	15.87	4-23-52	
30-24-15aa			Dr	110.7	4	M	N	N	O	Tp	+1.0	2,604.10	78.96	11-17-52	
30-24-18cb	U. S. Geol. Survey	1950	J	14.1	¾	M	N	N	O	Tp	+4.0	2,665.61	10.90	11-18-52	
30-24-20ac	do	1950	J	14.2	¾	M	N	N	O	Tp	+2.5	2,646.62	8.87	11-18-52	
30-24-27cd	do	1950	J	14.0	¾	M	N	N	O	Tp	+3.5	2,601.32	6.37	11-17-52	
30-24-31db	C. C. Beal		Dr		5	M	C	W	S, O	Tc	+1.0	2,689.66	7.51	12-12-50	
30-24-32ad	U. S. Geol. Survey	1950	J	15.7	¾	M	N	N	O	Tp	+2.0	2,663.94	6.24	11-17-52	
30-24-34cc	do	1950	J	7.1	¾	M	N	N	O	Tp	+1.3	2,632.82	5.60	11-17-52	
31-20-6ac			Dr		4	M	C	W	S	Tc	+.5	2,279.5	94.64	12-4-52	
31-20-19bd	Arrowsmith		Dr		6	M	C	W	S	Tc		2,301.0	127.66	5-6-48	
31-21-4dd	J. H. Bolich		Dr		6	M	C	W	S	Tc	+2.0	2,324.06	140.40	11-18-52	
31-21-5aa	K. Kurzenburger		Dr		6	M	C	W	S	Tc		2,316.71	93.70	11-18-52	
31-21-5ca			Dr		6	M	C	W	S	Tc	.0	2,359	112.66	12-4-52	
31-21-7bb			Dr		6	M	C	W	D	Tc		2,405.20	125.29	11-18-52	
31-21-8dd			Dr		6	M	C	W	S	Tc		2,340.0	115.00	11-24-52	
31-21-13aa	U. S. Geol. Survey	1952	Dr	198.7	¾	M	N	N	N	Tp	+2.0	2,283.58	132.23	12-1-52	L.
31-21-14bc	E. Ulrich		Dr		5	M	C	W	S	Tc	+1.0		141.91	11-18-52	
31-21-14da	H. Bates		Dr		6	M	C	W	S	Tc		2,320	137.10	11-18-52	
31-21-19da	U. S. Geol. Survey	1952	Dr	193.6	¾	M	N	N	N	Tp	+4.0	2,444.28	144.40	12-1-52	L.
31-21-19dc			Dr		4	M	C	W	S	Tc	.0	2,346.0	24.75	12-2-52	
31-21-20bb	G. Bassett		Dr		6	M	C	W	S	Tc		2,436.02	141.30	11-19-52	
31-21-22dc			Dr	192	6	M	C	W	S	Tc			182.40	11-20-52	
31-21-26ad	Arrowsmith		Dr		5	M	C	W	S	Tc		2,321.1	91.39	12-4-52	
31-21-29bb	U. S. Geol. Survey	1952	Dr	53.7	¾	M	N	N	N	Tp	+2.2	2,324.42	10.23	12-1-52	
31-22-1ab	C. Bowen		Dr		5	M	C	H	N	Tc		2,382.62	101.59	11-18-52	
31-22-1dc			Dr		6	M	C	W	S	Tc	+.5	2,394.5	110.85	12-4-52	
31-22-3dd	R. Burke		Dr		5	M	C	W	S	Tc		2,462.88	163.94	12-5-52	
31-22-4aa			Dr		4	M	C	W	S	Tc	−4.5	2,465.08	207.19	12-5-52	
31-22-7aa	H. Williams		Dr		4	M	C	W	S	Tc	−5.0	2,512.09	34.91	11-20-52	
31-22-7dd	F. Keim		Dr	70	6	M	C	W	S	Tc	+2.0	2,529.68	60.98	11-20-52	
31-22-8bd	A. Biltoff		Dr		6	M	C	W	S	Tc	−5.0		4.59	11-20-52	
31-22-11dd	U. S. Geol. Survey	1952	Dr	164.6	¾	M	N	N	N	Tp	+2.5	2,454.10	109.03	12-1-52	L.
31-22-13dc	B. Clark		Dr		6	M	C	W	S	Tpl	+1.5		124.22	12-5-52	
31-22-14bc	D. Clark		Dr		6	M	C	W	S	Tpl		2,465.97	121.52	11-19-52	
31-22-15dc	M. Skinner		Dr		6	M	C	W	S	Tc	+1.0		136.26	11-19-52	
31-22-16dd	School Section		Dr		4	M	C	W	D	Tc	+.5		150.50	11-19-52	
31-22-17dc	C. L. Clark		Dr		8	M	C	W	D	Tc	+.3		159.26	11-19-52	
31-22-21cd	C. Shelm		Dr	135			C	W	S	Tcu	+1.0	2,528.67	128.16	11-19-52	
31-22-22cc			Dr		6	M	C	W	S	Tpl	+2.0	2,483.61	97.47	11-19-52	
31-22-23ad	U. S. Geol. Survey	1952	Dr	172.3	¾	M	N	N	N	Tp	+2.5	2,466.50	109.15	12-1-52	
31-22-23cb	W. Clark		Dr		6	M	C	W	S	Tcu		2,489.62	120.99	11-19-52	
31-22-23dd	R. M. Boggy		Dr	62	5	M	C	H	D, O	Tc	+1.2	*2,400.00	37.79	12-4-52	
31-22-24dc	J. Crane		Dr		6	M	C	W	S	Tc	+1.5	2,372.5	22.46	12-4-52	

[1] 4 wells 12 inches in diameter.

Record of wells—Continued

Well No.	Owner or tenant	Year completed	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Method of lift	Type of power	Use of water	Measuring point: Description	Measuring point: Distance above (+) or below (−) land-surface (feet)	Measuring point: Height above mean sea level (feet)	Depth to water below measuring point (feet)	Date of measurement	Remarks
Brown County—Continued															
31-22-25dc	A. Trumm		Dr	125	6	M	C	W	S	Tpl		2,459.37	97.00	11-19-52	
31-22-29db			Dr	100	6	M	C	W	S	Tc	+1.0	2,516.33	88.50	11-19-52	
31-22-30bb	U. S. Geol. Survey	1952	Dr	150.0	¾	M	N	N	N	Tp	+3.0	2,546.64	128.44	12- 1-52	L.
31-22-30da	O. Booth		Dr	127	6	M	C	W	S	Tc		2,537.48	110.75	11-19-52	
31-22-34aa	L. Schnabel		Dr	75	6	M	C	W	S	Tc		2,488.80	72.33	11-20-52	
31-23-2cc	C. Keim		Dr	155	6	M	N	N	N	Tc	+1.0	2,521.51	153.76	11-24-52	
31-23-13ad	D. Keim		Dr	147	6	M	C	W	S	Tc	+3.5	2,541.28	141.89	11-20-52	
31-23-21cd			Dr	140	8	M	C	W	S	Tc		2,526.65	126.78	11-25-52	
31-23-23aa			Dr	165	6	M	C	W	S	H	+2.0	2,539.18	152.10	11-24-52	
31-23-24cc			Dr	150	6	M	C	W	S	Tpl		2,543.87	135.28	11-24-52	
31-23-26dd	O. Jackman		Dr		6	M	C	W	D	Tc	−4.0	2,573.90	137.39	11-18-52	
31-23-29cc			Dr	175	6	M	N	N	N	Tc	+2.0	2,570.13	167.27	11-25-52	
31-23-32ad			Dr	135	6	M	C	W	D	Tc			119.12	11-25-52	
31-23-34cb			Dr				C	W	S	Tpl	.0	2,570.88	110.52	11-17-52	
32-20-31db			Dr		4	M	N	N	N	Tc	+1.5	2,217.5	96.29	12- 4-52	
32-20-32aa			Dr		4	M	C	W	S	Tc	+1.5	2,207.5	137.99	12- 4-52	
32-21-28cd			Dr		5	M	C	W	S	Tc		2,338.97	145.57	11-18-52	
32-21-30bb			Dr		6	M	N	N	N	Tcu		2,364.75	140.89	11-18-52	
32-21-34ba	K. Kurzenberger		Dr		5	M	C	W	S	Tpl	+5.0	2,318.46	114.46	11-18-52	
32-21-34cd	E. Lucht		Dr		5	M	C	W	S	Tc		2,327.77	120.09	11-18-52	
32-21-35dc			Dr	110	6	M	C	W	S	Tc	+2.5	2,292	93.13	12- 4-52	
32-21-36ab	B. Rudnick		Dr	77		M	C	W	S	Tc	+1.8	2,227.34	75.20	11-21-52	
32-22-36da			Dr	105	6	M	C	W	S	Tc	+.1	2,362.5	98.66	12- 4-52	
Cherry County															
28-28-1cc	U. S. Geol. Survey	1950	J	14.0	¾	M	N	N	O	Tp	+1.5	2,930.59	6.98	2-26-51	
29-25-1ac	do	1950	J	11.3	¾	M	N	N	O	Tp	+4.0	2,705.39	7.96	2- 1-51	
29-25-1db	do	1950	J	10.8	¾	M	N	N	O	Tp	+3.5	2,703.91	6.79	2- 1-51	
29-25-2aa	do	1950	J	14.2	¾	M	N	N	O	Tp	+4.0	2,709.00	4.89	10- 8-51	
29-25-4ac	do	1950	J	10.0	¾	M	N	N	O	Tp	+2.7	2,736.78	6.34	2- 2-51	
29-25-9da	do	1950	J	14.1	¾	M	N	N	O	Tp	+5.0	2,750.00	10.48	2- 2-51	

29-25-10aa	do	1950	J	14.2	¾	M	N	N	O	Tp	+3.5	2,733.45	4.42	10-8-51	
29-25-10cc	do	1950	J	17.0	¾	M	N	N	O	Tp	+3.3	2,746.29	4.47	2-2-51	
29-25-13ba	do	1950	J	13.4	¾	M	N	N	O	Tp	+3.5	2,731.50	7.94	2-1-51	
29-25-15dd	do	1950	J	14.0	¾	M	N	N	O	Tp	+3.0	2,749.79	6.72	2-2-51	
29-25-22cc	do	1950	J	14.1	¾	M	N	N	O	Tp	+3.3	2,772.54	8.63	2-2-51	
29-25-30db	do	1950	J	14.2	¾	M	N	N	N	Tp	+2.5	----	5.50	2-2-51	
29-25-36cb	do	1950	J	17.5	¾	M	N	N	N	Tp	+2.5	2,766.24	13.10	2-2-51	
29-26-1dd	do	1950	J	7.1	¾	M	N	N	O	Tp	+1.3	2,775.05	4.92	2-2-51	
29-26-4bd	U. S. Bur. Reclamation	1948	B	4.3	3	M	N	N	O	Tp	+1.0	2,811.97	1.46	11-3-50	
29-26-6cb	U. S. Geol. Survey	1950	J	14.0	¾	M	N	N	N	Tp	+2.0	2,855.97	6.14	10-12-50	
29-26-11dc	do	1950	J	14.1	¾	M	N	N	O	Tp	+3.2	2,803.71	5.74	2-2-51	
29-26-13bd	do	1950	J	14.1	¾	M	N	N	O	Tp	+3.0	2,799.34	5.79	2-2-51	
29-26-20db	do	1950	J	14.1	¾	M	N	N	N	Tp	+1.3	2,862.83	2.20	10-13-50	
29-26-23ca	do	1950	J	14.1	¾	M	N	N	O	Tp	+2.5	2,835.24	8.47	2-2-51	
29-26-26cb	do	1950	J	14.1	¾	M	N	N	O	Tp	+2.6	2,846.14	5.69	2-2-51	
29-26-31dd	do	1950	J	17.2	¾	M	N	N	N	Tp	+3.7	2,879.83	5.60	2-26-51	
29-26-33ab	do	1950	J	14.0	¾	M	N	N	N	Tp	+3.0	2,856.15	4.89	10-13-50	
29-27-11ad	Red Deer Ranch	----	Dr	67.0	----	----	----	----	S, O	Tc	+2.0	2,879.75	5.21	11-4-49	
29-27-16ab	U. S. Geol. Survey	1950	J	10.7	¾	M	N	N	O	Tp	+3.5	2,901.03	6.88	2-23-51	
29-27-17da	do	1950	J	10.0	¾	M	N	N	O	Tp	+3.0	2,904.17	4.56	10-10-51	
29-27-26ca	do	1950	J	14.1	¾	M	N	N	O	Tp	+2.0	2,904.45	2.44	7-24-51	
29-27-30cd	do	1950	J	14.0	¾	M	N	N	O	Tp	+3.5	2,932.27	7.44	2-26-51	
29-27-31dd	do	1950	J	14.2	¾	M	N	N	O	Tp	+3.0	2,927.39	8.32	2-26-51	
29-27-34bb	do	1950	J	14.1	¾	M	N	N	N	Tp	+3.0	2,914.97	6.02	2-26-51	
29-28-1aa	do	1949	Dn	8.9	1¼	M	N	N	O	Tp	+1.9	*2,900.31	2.49	6-8-51	
29-28-1ad		----	----	----	----	M	F	----	N	----	----	----	----	----	Ca.
29-28-5ac	U. S. Geol. Survey	1949	Dn	12.1	1¼	M	N	N	O	Tp	+3.5	2,947.02	6.59	2-20-51	
29-28-6aa	do	1949	Dn	14.2	1¼	M	N	N	O	Tp	+3.6	*2,948.41	7.05	2-20-51	
29-28-7ba	do	1949	J	22.6	1¼	M	N	N	O	Tp	+3.6	*2,960.13	7.34	2-20-51	
29-28-7cb	do	1949	Dn	17.3	1¼	M	N	N	O	Tp	+3.5	*2,962.09	6.06	2-20-51	
29-28-8aa	do	1949	Dn	11.8	1¼	M	N	N	O	Tp	+2.9	*2,948.59	6.50	2-20-51	
29-28-12ad	do	1949	Dn	11.3	1¼	M	N	N	O	Tp	+1.2	*2,914.90	2.41	2-5-51	
29-28-12bb	do	1950	J	10.5	¾	M	N	N	N	Tp	+2.0	2,924.28	4.36	2-23-51	
29-28-12bc	do	1949	J	14.4	1¼	M	N	N	O	Tp	+2.3	*2,926.24	5.15	2-23-51	
29-28-13aa	do	1949	Dn	14.1	1¼	M	N	N	O	Tp	+2.3	*2,928.61	6.29	2-5-51	
29-28-22bb	do	1950	J	10.0	¾	M	N	N	O	Tp	+1.5	2,955.65	7.01	2-12-51	
29-28-22db	do	1950	J	10.0	¾	M	N	N	O	Tp	+2.5	2,949.58	3.69	2-12-51	
29-28-25ac	do	1950	J	10.5	¾	M	N	N	O	Tp	+2.5	2,929.87	2.46	10-11-51	
29-28-25bb	do	1950	J	11.0	¾	M	N	N	O	Tp	+2.5	2,940.54	6.20	2-12-51	
29-28-30da	do	1950	J	15.5	¾	M	N	N	N	Tp	+3.0	2,978.91	9.91	1-19-51	
													9.99	2-20-51	
29-28-32ab	do	1950	J	16.0	¾	M	N	N	O	Tp	+3.0	2,968.58	7.70	2-20-51	
29-28-34bc	do	1950	J	10.0	¾	M	N	N	N	Tp	+2.0	2,948.05	5.54	1-19-51	
													5.38	2-20-51	
29-28-35dd	do	1950	J	10.0	¾	M	N	N	N	Tp	+2.0	2,946.00	7.15	1-19-51	
													7.19	2-20-51	
29-29-2ba	do	1949	J	20.7	1¼	M	N	N	O	Tp	+4.8	*2,973.48	9.69	2-20-51	
29-29-3cc	do	1950	J	10.5	¾	M	N	N	N	Tp	+2.0	2,992.24	6.57	11-9-50	
													5.88	2-20-51	
29-29-8ab	do	1950	J	21.0	¾	M	N	N	N	Tp	+3.5	3,023.96	15.39	1-11-51	
													15.39	2-20-51	
29-29-9dd	do	1950	J	24.5	¾	M	N	N	N	Tp	+2.5	3,011.43	8.13	11-10-50	
													8.06	2-20-51	

Record of wells—Continued

Well No.	Owner or tenant	Year completed	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Method of lift	Type of power	Use of water	Measuring point: Description	Measuring point: Distance above (+) or below (−) land-surface (feet)	Measuring point: Height above mean sea level (feet)	Depth to water below measuring point (feet)	Date of measurement	Remarks
Cherry County—Continued															
29-29-10db	U. S. Geol. Survey	1950	J	26.0	¾	M	N	N	N	Tp	+4.5	3,014.86	Dry	11- 9-50	
													Dry	2-20-51	
29-29-13cc	do	1950	J	17.5	¾	M	N	N	N	Tp	+4.5	2,977.73	8.89	1-12-51	
													8.64	2-20-51	
29-29-18db		1950	Dr		4	M	C	W	S	Tc	+1.0	3,048	18.37	2-28-51	
29-29-20ad	U. S. Geol. Survey	1950	J	21.0	¾	M	N	N	N	Tp	+1.5		Dry	11-10-50	
													Dry	2-20-51	
29-29-21aa	do	1950	J	24.5	¾	M	N	N	N	Tp	+1.5	3,019.09	14.63	11-10-50	
													14.65	2-20-51	
29-29-23cc	do	1950	B, J	21.0	¾	M	N	N	N	Tp	+2.0	3,006.44	16.10	1-12-51	
													16.09	2-20-51	
29-29-24ac	do	1950	J	10.5	¾	M	N	N	N	Tp	+2.5	2,980.00	5.54	1-12-51	
													5.43	2-20-51	
29-29-25da	do	1950	J	21.5	¾	M	N	N	O	Tp	+3.5	2,987.29	14.64	2-20-51	
29-29-30bb			Dr	42.5	3	M	N	N	N	Tc	+1.5	3,081.25	36.66	11- 8-50	
													36.33	2-27-51	
29-29-32ad	U. S. Geol. Survey	1950	J	16.0	¾	M	N	N	N	Tp	+4.5	3,049.70	Dry	11-10-50	
													Dry	2-20-51	
29-29-34cb	do	1950	J	21.0	¾	M	N	N	N	Tp	+4.0	3,040.55	Dry	11-10-50	
													Dry	2-20-51	
29-29-35ad	do	1950	J	22.0	¾	M	N	N	N	Tp	+4.5	3,003.86	18.71	2-20-51	
29-30-2ca	do	1950	J	21.0	¾	M	N	N	N	Tp	+2.0	3,045.40	3.20	2- 8-51	
29-30-5cd	do	1950	J	10.5	¾	M	N	N	N	Tp	+2.5	3,059.28	Dry	2- 8-51	
29-30-9dd	do	1950	J	10.0	¾	M	N	N	N	Tp	+2.5	3,049.85	7.09	11- 8-50	
													6.96	2- 8-51	
29-30-12aa			Dr	35	5	M	N	N	N	Tp	+2.5	3,047.57	17.46	8-16-50	
29-30-13bd	U. S. Geol. Survey	1950	J	10.0	¾	M	N	N	N	Tp	+3.5	3,048.52	Dry	2- 8-51	
29-30-15cd	do	1950	J	10.5	¾	M	N	N	N	Tp	+2.0	3,053.86	4.76	11- 8-50	
													5.10	2- 8-51	
29-30-17dc	do	1950	J	10.5	¾	M	N	N	N	Tp	+2.0	3,056.00	6.29	11- 9-50	
													6.36	2- 8-51	
29-30-18ca	do	1950	J	21.0	¾	M	N	N	N	Tp	+2.0	3,064.27	4.99	11- 9-50	
													4.93	2- 8-51	
29-30-21bb			Dr, J	21	4	M	C	W	S	Tc	+2.0	3,058.91	11.09	8-22-50	
29-30-25aa	do	1950	J	21.0	¾	M	N	N	N	Tp	+5.0	3,072.68	Dry	2-27-51	
29-30-27dd	do	1950	J	10.5	¾	M	N	N	O	Tp	+2.0	3,051.19	8.22	2- 8-51	

29-30-28cc	do	1950	J	10.5	¾	M	N	N	N	Tp	+2.5	3,053.19	6.73	11- 9-50
													6.22	2- 8-51
29-30-30dc	do	1950	J	10.5	¾	M	N	N	O	Tp	+1.5	3,069.32	7.86	2- 8-51
29-30-36bd	do	1950	J	31.5	¾	M	N	N	N	Tp	+5.0	----------	Dry	2-27-51
30-25-2cc	do	1950	J	14.5	¾	M	N	N	O	Tp	+3.0	2,686.20	7.36	2- 2-51
30-25-6cc	do	1950	J	14.5	¾	M	N	N	O	Tp	+3.6	2,734.42	5.80	2- 9-51
30-25-8ab	do	1950	J	14.2	¾	M	N	N	O	Tp	+3.5	2,719.90	6.69	2- 2-51
30-25-10bc	do	1950	J	18.1	¾	M	N	N	O	Tp	+4.0	2,702.38	6.09	2- 2-51
30-25-10da	do	1950	J	14.4	¾	M	N	N	O	Tp	+4.6	2,692.27	8.59	2- 2-51
30-25-15da	do	1950	J	14.0	¾	M	N	N	O	Tp	+4.5	2,697.60	7.44	2- 2-51
30-25-17ab	do	1950	J	14.1	¾	M	N	N	O	Tp	+4.0	2,724.75	8.11	2- 2-51
30-25-17cc	do	1950	J	14.1	¾	M	N	N	O	Tp	+3.5	2,734.72	10.87	2- 2-51
30-25-22da	do	1950	J	13.9	¾	M	N	N	O	Tp	+4.0	2,699.86	7.13	2- 2-51
30-25-29bb	U. S. Bur. Reclamation	1948	B	5.6	3	M	N	N	O	Tp	+1.0	2,731.39	3.10	2- 2-51
30-25-30dd	U. S. Geol. Survey	1950	J	10.5	¾	M	N	N	O	Tp	+3.0	2,744.72	6.84	2- 2-51
30-25-31cc	do	1950	J	14.4	¾	M	N	N	O	Tp	+4.9	2,761.39	9.19	2- 2-51
30-25-33cd	U. S. Bur. Reclamation	1948	B	5.7	3	M	N	N	O	Tp	+1.0	*2,728.34	2.83	12- 8-50
30-25-34dd	U. S. Geol. Survey	1950	J	14.2	¾	M	N	N	O	Tp	+4.5	2,722.59	6.45	2-20-51
30-25-36cc	Beal	-------	B	------	------	------	C	W	S, O	Tc	+1.0	*2,708.43	7.43	9-27-49
30-26- 5cc	U. S. Geol. Survey	1950	J	17.6	¾	M	N	N	O	Tp	+4.0	2,807.48	9.00	2- 6-51
30-26- 7cc	U. S. Bur. Reclamation	1948	B	7.1	3	M	N	N	O	Tp	+1.0	2,810.85	3.39	12- 8-51
30-26-11ab	U. S. Geol. Survey	1950	J	16.3	¾	M	N	N	O	Tp	+2.5	2,757.45	6.78	2- 9-51
30-26-11cc	do	1950	J	16.3	¾	M	N	N	O	Tp	+3.0	2,774.75	12.72	2- 9-51
30-26-12dc	do	1950	J	17.0	¾	M	N	N	O	Tp	+4.0	2,747.85	8.04	2- 9-51
30-26-14cc	do	1950	J	17.7	¾	M	N	N	O	Tp	+4.3	2,771.02	7.50	2- 9-51
30-26-18aa	do	1950	J	13.9	¾	M	N	N	O	Tp	+2.5	2,805.67	5.54	2- 6-51
30-26-18ab	do	1950	J	14.0	¾	M	N	N	O	Tp	+3.5	2,812.50	8.30	2- 6-51
30-26-20db	U. S. Bur. Reclamation	1948	B	7.3	3	M	N	N	O	Tp	+1.3	2,803.82	4.83	10- 3-50
30-26-22dd	U. S. Geol. Survey	1950	J	16.2	¾	M	N	N	O	Tp	+3.0	2,774.58	6.66	2- 9-51
30-26-26bc	U. S. Bur. Reclamation	1948	B	4.6	3	M	N	N	O	Tp	+ .7	2,772.46	2.69	2- 9-51
30-26-31aa	U. S. Geol. Survey	1950	J	14.5	¾	M	N	N	N	Tp	+3.0	2,836.57	6.06	10-12-50
30-26-34ca	do	1950	J	14.3	¾	M	N	N	O	Tp	+2.5	2,796.32	10.23	2- 9-51
30-27-1ca1	U. S. Bur. Reclamation	1948	B	4.7	3	M	N	N	O	Tp	+1.5	2,824.36	3.12	12- 7-50
30-27-1ca2	U. S. Geol. Survey	1950	J	13.7	¾	M	N	N	O	Tp	+1.5	2,828.69	5.66	2- 6-51
30-27-3db	do	1950	J	14.2	¾	M	N	N	N	Tp	+4.0	2,864.55	9.96	12- 8-50
30-27-8cd	do	1950	J	14.1	¾	M	N	N	O	Tp	+3.0	2,887.20	7.57	2-23-51
30-27-10cb	do	1950	J	14.2	¾	M	N	N	O	Tp	+3.0	2,861.64	4.70	2-23-51
30-27-13dd	do	1950	J	11.2	¾	M	N	N	O	Tp	+3.5	2,824.66	4.54	12- 8-50
30-27-14dd1	U. S. Bur. Reclamation	1948	B	4.5	3	M	N	N	O	Tp	+1.0	2,849.00	2.97	12-12-50
30-27-14dd2	U. S. Geol. Survey	1950	J	10.3	¾	M	N	N	O	Tp	+3.0	2,842.33	4.94	2- 6-51
30-27-18cb	do	1950	J	10.0	¾	M	N	N	O	Tp	+1.5	2,878.03	3.59	2- 5-51
30-27-19bc	do	1950	J	14.0	¾	M	N	N	O	Tp	+1.0	2,893.42	3.24	2- 5-51
30-27-20ad	do	1950	J	14.2	¾	M	N	N	O	Tp	+4.0	2,883.56	7.28	2- 6-51
30-27-21ac	do	1950	J	10.4	¾	M	N	N	O	Tp	+3.0	2,873.82	6.78	2- 6-51
30-27-23cc	do	1950	J	17.7	¾	M	N	N	O	Tp	+4.0	2,870.78	9.74	2-27-51
30-27-29cb	do	1949	Dn	11.8	1¼	M	N	N	O	Tp	+2.1	*2,898.54	8.28	2- 6-51
30-27-32cd	do	1949	Dn	11.9	1¼	M	N	N	O	Tp	+2.0	*2,899.00	6.11	2-12-51
30-27-35da	do	1950	J	14.1	¾	M	N	N	N	Tp	+2.0	2,858.71	2.95	2-27-51
30-28-1ad	do	1949	J	9.8	¾	M	N	N	O	Tp	+3.0	2,881.14	7.04	2- 5-51
30-28-2bd	do	1950	J	14.0	¾	M	N	N	O	Tp	+4.0	2,887.44	8.43	2-12-51
30-28-3bb	do	1950	J	14.0	¾	M	N	N	O	Tp	+2.0	2,880.29	5.39	2-12-51
30-28-3ca	U. S. Bur. Reclamation	1948	B	6.3	¾	M	N	N	O	Tp	+1.0	*2,880.54	2.66	12-11-50
30-28-6bb	Univ. of Nebraska	-------	--------	5.8	1	M	N	N	O	Tp	.0	*2,893.47	2.94	2- 5-51

Record of wells—Continued

Well No.	Owner or tenant	Year completed	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Method of lift	Type of power	Use of water	Measuring point: Description	Measuring point: Distance above (+) or below (−) land-surface (feet)	Measuring point: Height above mean sea level (feet)	Depth to water below measuring point (feet)	Date of measurement	Remarks
Cherry County—Continued															
30-28-6dd	U. S. Geol. Survey	1950	J	10.5	¾	M	N	N	N	Tp	+2.0	2,895.26	2.05	2- 5-51	
30-28-10cb	do	1950	J	14.0	¾	M	N	N	N	Tp	+3.0	2,897.10	4.98	2-12-51	
30-28-14aa	do	1950	J	14.0	¾	M	N	N	N	Tp	+1.0	2,890.02	2.13	12-12-50	
30-28-16da	do	1950	J	14.0	¾	M	N	N	N	Tp	+2.5	2,903.57	4.00	2-12-51	
30-28-17bb	do	1950	J	10.5	¾	M	N	N	N	Tp	+2.0	2,915.41	2.30	1- 3-51	
													4.40	2-12-51	
30-28-19bb	do	1950	J	13.5	¾	M	N	N	N	Tp	+4.0	2,932.63	10.57	1- 3-51	
													10.58	2-28-51	
30-28-23ab	do	1950	J	10.5	¾	M	N	N	N	Tp	+4.5	2,906.06	5.95	12-12-50	
													6.00	2-12-51	
30-28-26ca	do	1950	J	14.0	¾	M	N	N	O	Tp	+2.5	2,919.45	5.85	2- 6-51	
30-28-27ac	do	1949	Dn	11.0	1¼	M	N	N	O	Tp	+3.2	2,922.76	5.87	2- 6-51	
30-28-29ba	do	1949	Dn	12.3	1¼	M	N	N	O	Tp	+3.0	*2,930.89	7.02	2- 6-51	Ca.
30-28-30bb	do	1949	Dn	9.0	1¼	M	N	N	O	Tp	+3.2	*2,928.29	4.83	2- 6-51	
30-28-33cd	do	1950	J	14.0	¾	M	N	N	N	Tp	+1.0	2,937.37	4.79	12-12-50	
													4.90	2-12-51	
30-28-34ba	do	1950	J	10.5	¾	M	N	N	N	Tp	+2.0	2,925.17	5.30	12-12-50	
													5.30	2-12-51	
30-28-35ca	do	1949	Dn	8.6	1¼	M	N	N	O	Tp	+2.9	*2,920.13	4.41	2-12-51	
30-28-36aa	do	1949	Dn	12.0	1¼	M	N	N	O	Tp	+3.0	2,899.36	5.25	2- 5-51	
30-29-4dd	do	1950	J	17.0	¾	M	N	N	N	Tp	+2.0	2,934.50	5.49	12-29-50	
													5.63	2- 8-51	
30-29-8bc	do	1950	J	16.0	¾	M	N	N	N	Tp	+1.0	2,960.80	5.99	12-29-50	
													6.08	2- 8-51	
30-29-9cc	do	1950	J	13.5	¾	M	N	N	N	Tp	+1.5	2,958.66	7.39	12-29-50	
													7.42	2- 8-51	
30-29-12da	do	1950	J	10.5	¾	M	N	N	O	Tp	+2.5	2,910.05	2.95	12-27-50	
30-29-14ac	do	1949	Dn	14.3	1¼	M	N	N	O	Tp	+3.5	*2,930.56	6.23	2- 5-51	Ca.
30-29-14cd	U. S. Fish and Wildlife Service.	1936	Dr	33	3	M	C	E	D						Ca.
30-29-18db	U. S. Geol. Survey	1950	J	21.5	¾	M	N	N	N	Tp	+2.0	2,987.00	5.38	12-29-50	
													5.51	2- 8-51	
30-29-19ba			Dr	60	4	M	N	N	N	Tc	+2.0	2,994.70	5.64	12-29-50	
													5.95	2- 8-51	

30-29-22bb	U. S. Geol. Survey	1949	Dn	11.6	1¼	M	N	N	O	Tp	+3.0	*2,953.42	5.97	1-17-51	
30-29-23aa	do	1949	Dn	12.3	1¼	M	N	N	O	Tp	+3.2	*2,930.76	6.67	2-5-51	
30-29-25bb	do	1949	Dn, J	19.8	1¼	M	N	N	O	Tp	+2.1	*2,928.59	3.22	12-7-50	
30-29-25ca			Dr	100	2	M	F								Ca.
30-29-26cb	U. S. Geol. Survey	1949	J	16.5	1¼	M	N	N	O	Tp	+5.0	*2,948.04	8.31	2-6-51	
30-29-27bd	do	1949	J	30.6	¾	M	N	N	O	Tp	+4.9	*2,968.22	13.67	2-6-51	
30-29-28db	do	1950	J	10.5	¾	M	N	N	O	Tp	+1.5	2,974.85	Dry	2-6-51	
30-29-28dc	Univ. of Nebraska			6	1	M	N	N	O	Tp	+ .3	2,970.62	.97	11-2-49	
30-29-29bc	U. S. Geol. Survey	1950	J	10.5	¾	M	N	N	N	Tp	+2.5	2,996.02	8.10	1-12-51	
													8.02	2-20-51	
30-29-32bb	do	1950	J	10.5	¾	M	N	N	N	Tp	+1.5	3,008.10	4.47	1-12-51	
													4.79	2-20-51	
30-29-32da	Univ. of Nebraska		B	6	1	M	N	N	O	Tp	.0	2,980.24	2.94	6-6-50	
30-29-33ac	U. S. Geol. Survey	1950	J	10.5	¾	M	N	N	O	Tp	+1.5	2,983	3.96	2-20-51	
30-39-35ad	do	1949	Dn	11.7	1¼	M	N	N	O	Tp	+1.8	*2,946.15	4.05	2-6-51	
30-29-35ba	do	1949	J	24.2	1¼	M	N	N	O	Tp	+1.7	*2,957.19	10.69	2-6-51	
30-30-5ad				77.0	4	M	C	W	S	Tc	+1.5		21.92	8-22-50	
30-30-12da	U. S. Geol. Survey	1950	J	21.0	¾	M	N	N	N	Tp	+1.0	2,978.54	9.87	12-29-50	
													9.97	2-8-51	
30-30-16cd					4	M	C	W	S	Tc	+2.5	3,008.26	16.07	8-22-50	
													14.81	1-2-51	
30-30-21aa	U. S. Geol. Survey	1950	J	21.0	¾	M	N	N	N	Tp	+2.0	3,013.70	11.70	1-2-51	
													11.97	2-8-51	
30-30-23bd			Dr		4	M	C	W	S	Tc	+1.5		10.79	8-21-50	
30-30-25dd	U. S. Geol. Survey	1950	J	10.5	¾	M	N	N	N	Tp	+2.5	3,014.39	4.87	11-9-50	
30-30-26bd	do	1950	J	21.0	¾	M	N	N	N	Tp	+1.5	3,029.77	10.75	11-7-50	
													10.95	2-8-51	
30-30-27cc	do	1950	J	21.0	¾	M	N	N	N	Tp	+1.0	3,035.39	8.57	11-7-50	
													8.55	2-8-51	
30-30-32bc	do	1950	J	10.5	¾	M	N	N	N	Tp	+1.5	3,039.54	6.52	11-7-50	
													6.25	2-8-51	
30-30-32dd	do	1950	J	10.5	¾	M	N	N	N	Tp	+1.0	3,043.40	5.19	11-7-50	
													5.22	2-8-51	
30-30-34cd	do	1950	J	21.0	¾	M	N	N	O	Tp	+3.5	3,052.11	11.40	2-8-51	
31-25-19db	do	1950	J	14.0	¾	M	N	N	O	Tp	+1.6	2,710.58	6.29	2-9-51	
31-25-21bd	Univ. of Nebraska	1935	Dn	12.2	1	M	N	N	O	Tp	+2.0	*2,687.61	4.65	2-26-51	
31-25-27bb1	Town of Wood Lake		Dr	74	24		T	E	P						Ca.
31-25-27bb2	do	1949	Dr	60	24		T	E	P						
31-25-32cc	U. S. Geol. Survey	1950	J	14.3	¾	M	N	N	O	Tp	+4.0	2,723.32	8.16	2-23-51	
31-25-33dc	do	1950	J	14.3	¾	M	N	N	O	Tp	+3.0	2,698.20	7.69	2-2-51	
31-25-35da	do	1950	J	21.3	¾	M	N	N	O	Tp	+3.0	2,682.57	14.58	2-2-51	
31-26-25da	do	1950	J	14.2	¾	M	N	N	O	Tp	+3.0	2,728.31	8.32	2-9-51	
31-26-32ca	do	1950	J	14.0	¾	M	N	N	O	Tp	+4.0	2,804.66	8.72	2-9-51	
31-26-33dd	do	1950	J	14.2	¾	M	N	N	O	Tp	+4.0	2,778.44	8.67	2-9-51	
31-26-34ad	do	1950	J	14.2	¾	M	N	N	O	Tp	+4.0	2,758.05	8.39	2-9-51	
31-26-35ad	do	1950	J	14.1	¾	M	N	N	O	Tp	+2.4	2,741.05	7.78	2-9-51	
31-27-2cd	do	1950	J	14.0	¾	M	N	N	O	Tp	+2.5	2,799.70	5.81	2-6-51	
31-27-3bc	do	1950	J	13.6	¾	M	N	N	O	Tp	+2.5	2,814.5	6.37	2-6-51	
31-27-10cd	do	1950	J	13.9	¾	M	N	N	O	Tp	+3.5	2,817.77	5.12	2-6-51	
31-27-15cb	do	1950	J	13.8	¾	M	N	N	O	Tp	+2.3	2,830.68	8.39	2-6-51	
31-27-17ad	do	1950	J	14.6	¾	M	N	N	O	Tp	+3.0	2,834.40	9.15	2-6-51	
31-27-18cc	U. S. Bur. Reclamation	1948	Du	6.9	3	M	N	N	O	Tp	+1.2	2,859.17	2.99	2-5-51	

Record of wells—Continued

Well No.	Owner or tenant	Year completed	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Method of lift	Type of power	Use of water	Measuring point: Description	Measuring point: Distance above (+) or below (−) land-surface (feet)	Measuring point: Height above mean sea level (feet)	Depth to water below measuring point (feet)	Date of measurement	Remarks
Cherry County—Continued															
31-27-18db	U. S. Geol. Survey	1950	J	14.1	¾	M	N	N	O	Tp	+3.5	2,859.17	7.08	2- 6-51	
31-27-21db1	do	1950	J	10.5	¾	M	N	N	O	Tp	+3.0	2,847.96	0.20	2- 6-51	
31-27-21db2	U. S. Bur. Reclamation	1948	B	4.9	3	M	N	N	O	Tp	+.3		1.51	12- 7-50	
31-27-25cb	U. S. Geol. Survey	1950	J	14.4	¾	M	N	N	O	Tp	+2.5	2,818.55	7.62	2- 6-51	
31-27-27cd	do	1950	J	13.7	¾	M	N	N	O	Tp	+2.0	2,847.47	5.83	2- 6-51	
31-27-29dd	do	1950	J	10.0	¾	M	N	N	O	Tp	+1.0	2,862.77	6.41	2-26-51	
31-27-30cb	do	1950	J	10.0	¾	M	N	N	O	Tp	+2.5	2,871.45	4.68	2- 5-51	
31-27-30da	do	1950	J	10.0	¾	M	N	N	O	Tp	+1.0	2,863.68	5.90	2-26-51	
31-27-35db1	U. S. Bur. Reclamation	1948	Du	6.0	3	M	N	N	O	Tp	+1.5	2,831.38	4.39	2- 6-51	
31-27-35bd2	U. S. Geol. Survey	1950	J	10.7	¾	M	N	N	O	Tp	+2.0	2,834.10	5.37	2- 6-51	
31-28-1ad	do	1949	J	9.4	¾	M	N	N	O	Tp	+3.0	*2,846.90	6.41	2- 5-51	
31-28-2dc	do	1950	J	10.5	¾	M	N	N	O	Tp	+1.5	2,868.84	7.11	2-27-51	
31-28-6bb	do	1950	J	21.0	¾	M	N	N	O	Tp	+1.0	2,842.83	10.41	2- 7-51	
31-28-8db	Univ. of Nebraska		B	6	1	M	N	N	O	Tp	.0	2,852.66	2.54	2-27-51	
31-28-9aa	U. S. Geol. Survey	1950	J	10.5	¾	M	N	N	O	Tp	+2.0	2,865.05	5.71	2-27-51	
31-28-9cc	do	1950	J	10.5	¾	M	N	N	O	Tp	+1.5	2,861.59	4.30	2-27-51	
31-28-15aa	do	1950	J	10.5	¾	M	N	N	O	Tp	+1.0	2,875.08	7.19	2- 5-51	
31-28-16ad	do	1949	J	18.0	¾	M	N	N	O	Tp	+2.5	2,881.35	12.34	2- 5-51	
31-28-16da	do	1949	J	14.0	¾	M	N	N	O	Tp	+3.5	2,875.44	10.14	2- 5-51	
31-28-18bd	Univ. of Nebraska		B	6	1	M	N	N	O	Tp	.0	*2,858.82	.10	12-15-50	
31-28-20ab	U. S. Geol. Survey	1950	J	21.5	¾	M	N	N	O	Tp	+2.5	2,893.49	19.55	2- 5-51	
31-28-21aa1	do	1949	J	13.5	¾	M	N	N	O	Tp	+3.7	*2,873.78	8.52	2- 5-51	
31-28-21aa2	do	1949	J	13.5	¾	M	N	N	O	Tp	+4.0	*2,873.84	6.88	2- 5-51	
31-28-22cc	do	1949	J	16.5	¾	M	N	N	O	Tp	+4.5	*2,888.63	13.45	2- 5-51	
31-28-23aa1	S. McKelvie		Dr	128			C	W	S						Ca.
31-28-23aa2	do		Dr	40			C	W	S						Ca.
31-28-23da1	Univ. of Nebraska		B	6	1	M	N	N	O	Tp	+.3		1.71	11- 3-49	
31-28-23da2	S. McKelvie						F								Ca.
31-28-24bb1	U. S. Geol. Survey	1949	J	28.2	¾	M	N	N	O	Tp	+3.6	*2,873.45	9.82	2- 5-51	
31-28-24bb2	do	1949	J	28.0	¾	M	N	N	O	Tp	+3.6	*2,871.59	8.47	2- 5-51	
31-28-24bb3	do	1949	J	20.8	¾	M	N	N	O	Tp	+2.5	*2,870.44	7.68	2- 5-51	
31-28-24bb4	do	1949	J	13.1	¾	M	N	N	O	Tp	+2.5	*2,867.66	5.61	2- 5-51	
31-28-24ca	do	1949	J	14.0	¾	M	N	N	O	Tp	+1.5	*2,868.37	6.54	2- 5-51	
31-28-24cd	do	1949	J	21.0	¾	M	N	N	O	Tp	+2.5	*2,869.83	5.78	2- 5-51	
31-28-25ca	do	1950	J	10.0	¾	M	N	N	N	Tp	+1.0	2,876.19	5.02	12-11-50	
													3.80	10- 9-51	
31-28-27bb	do	1949	J	13.0	¾	M	N	N	O	Tp	+4.6	*2,881.65	8.24	2- 5-51	
31-28-27bc	do	1949	J	8.4	¾	M	N	N	O	Tp	+3.2	*2,877.50	4.00	2- 5-51	
31-28-27cb	do	1950	J	14.0	¾	M	N	N	O	Tp	+3.5	2,883.49	8.09	2- 5-51	

31-28-31bb	do	1950	J	10.5	¾	M	N	N	O	Tp	+2.5	2,889.36	4.52	2- 5-51	
31-28-33cc	do	1950	J	14.0	¾	M	N	N	O	Tp	+2.0	2,883.11	3.22	2-12-51	
31-29-1cd	do	1949	J	16.7	¾	M	N	N	O	Tp	+3.4	*2,853.01	12.45	2- 7-51	
31-29-2ab	do	1949	J	29.3	¾	M	N	N	O	Tp	+3.5	2,856.15	21.40	12-16-50	
31-29-5dd	do	1950	B, J	21.5	¾	M	N	N	N	Tp	+.2	2,885.67	19.09	1- 3-51	
													19.37	2- 7-51	
31-29-9aa	U. S. Bur. Reclamation	1948	B	5.0	3	M	N	N	N	Tp	+1.0	2,872.64	3.65	2- 7-51	
31-29-10ca	Univ. of Nebraska	-------	B	5.5	1	M	N	N	O	Tp	.0	----------	1.26	2- 7-51	
31-29-13ab	U. S. Bur. Reclamation	1948	Du, B	7.7	3	M	N	N	O	Tp	+.7	*2,863.08	3.91	6-29-50	
31-29-14cb	U. S. Geol. Survey	1950	J	10.7	¾	M	N	N	N	Tp	+3.5	2,884.42	5.75	1- 3-51	
													5.54	2- 7-51	
31-29-20bd	do	1950	J	21.0	¾	M	N	N	N	Tp	+3.5	2,917.99	Dry	1- 3-51	
													Dry	2- 7-51	
31-29-21cc	U. S. Bur. Reclamation	1948	B	6.7	3	M	N	N	O	Tp	+1.2	2,902.30	3.75	2- 7-51	
31-29-23bc	U. S. Geol. Survey	1950	J	18.0	¾	M	N	N	O	Tp	+2.0	2,897.70	10.55	2- 7-51	
31-29-24dd	do	1949	J	8.1	¾	M	N	N	O	Tp	+3.4	*2,876.59	4.48	12-27-50	
31-29-32bb	do	1950	J	17.0	¾	M	N	N	O	Tp	+3.5	2,933.54	9.68	2- 8-51	
31-29-32cc	do	1950	J	14.0	¾	M	N	N	N	Tp	+4.0	2,948.50	8.96	12-27-50	
													9.21	2- 8-51	
31-29-33ad	U. S. Bur. Reclamation	1948	B	6.4	3	M	N	N	O	Tp	+1.0	2,915.79	2.53	2- 7-51	
31-29-33dd	A. E. Daniels	-------	Dr	40	6	M	C	W	S	-------	----------	----------	----------	----------	Ca.
31-29-34ac	U. S. Bur. Reclamation	1948	B	4.1	3	M	N	N	O	Tp	+.7	2,911.77	1.74	12-27-50	
31-29-34dd	do	1948	B	8.4	3	M	N	N	O	Tp	+1.0	2,909.10	3.95	2- 7-51	
31-30-25dd	do	1950	J	21.0	¾	M	N	N	O	Tp	+1.0	*2,951.45	Dry	2- 8-51	
31-30-26ca		-------	Dr	55.0	2	M	N	N	O	Tp	+3.5	2,960.11	45.02	2- 8-51	
31-30-29ac	U. S. Geol. Survey	1950	Dr	105.0	¾	M	N	N	O	Tp	+1.7	2,954.60	96.94	2- 8-51	
31-30-29da	do	1950	Dr	70.5	¾	M	N	N	O	Tp	+3.2	2,946.40	64.25	2- 8-51	
32-26-17aa	J. Drayton	-------	Dr	95	-------	M	F	-------	S	-------	----------	----------	----------	----------	Ca.
32-26-28bb	do	-------	Dr	68	3½	M	C	W	S	-------	----------	----------	----------	----------	Ca.
32-26-29ac	do	1949	Dr	129	3½	M	C	W	S	-------	----------	----------	----------	----------	Ca.
32-27-18cb	U. S. Geol. Survey	1949	J	17.2	¾	M	N	N	O	Tp	+4.0	2,785.30	11.72	2- 6-51	
32-27-30cc	do	1950	J	13.0	¾	M	N	N	O	Tp	+2.5	*2,829.24	6.35	2- 5-51	
32-28-16dd	do	1950	J	10.0	¾	M	N	N	O	Tp	+2.5	2,756.45	5.76	2-27-51	
32-28-19ab	do	1950	J	18.5	¾	M	N	N	N	Tp	+2.5	----------	Dry	3-20-51	
32-28-26da	do	1950	J	10.5	¾	M	N	N	O	Tp	+4.0	2,830.86	4.60	2-27-51	
32-28-29dd	do	1950	J	10.5	¾	M	N	N	O	Tp	+2.0	2,823.69	5.85	2-27-51	
32-28-32cc	do	1950	J	14.0	¾	M	N	N	N	Tp	+1.5	2,848.20	8.65	2- 7-51	
32-28-32dc	do	1950	J	14.5	¾	M	N	N	O	Tp	+4.5	2,851.16	9.33	2- 7-51	
32-28-33dd	do	1950	J	10.5	¾	M	N	N	O	Tp	+2.0	2,855.61	5.38	2-27-51	
32-28-35cb	do	1950	J	17.5	¾	M	N	N	O	Tp	+1.5	2,853.29	4.86	2-27-51	
32-28-36cb	do	1950	J	10.5	¾	M	N	N	O	Tp	+1.5	2,845.55	5.39	2-27-51	
32-29-13cd	do	1950	J	14.0	¾	M	N	N	N	Tp	+2.5	----------	Dry	1-15-51	
32-29-21aa	do	1950	J	18.0	¾	M	N	N	N	Tp	+3.5	----------	17.00	1-15-51	
32-29-27bb	do	1950	J	17.5	¾	M	N	N	N	Tp	+3.5	----------	Dry	1-15-51	
32-29-28bc	do	1950	B, J	31.5	¾	M	N	N	N	Tp	+3.0	2,839.57	29.91	1-15-51	
32-29-34dc	do	1950	J	21.0	¾	M	N	N	N	Tp	+1.5	2,860.43	5.87	12-16-50	
													6.27	2- 7-51	
32-29-36ad	do	1950	J	21.5	¾	M	N	N	N	Tp	+3.0	----------	Dry	12-16-50	
32-29-36bb	do	1950	J	20.0	¾	M	N	N	N	Tp	+3.0	2,817.95	6.05	12-16-50	

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